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  UCL-26 GENERAL UCL-33 LOW TEMPERATURE OPERATIONS INSERTED STRIPS IN CLAD MATERIAL The thickness of inserted strips used to restore cladding specified for the materials used in the construction of vessels shall satisfy the requirements of
UCS-66, UCS-67, UCS-68, Part UF, or UHT-5. 99 For unreinforced vessels of rectangular cross section (13-7 and parts of 13-18), the given moments are defined on a per-unit-width basis. UCL-34 POSTWELD HEAT TREATMENT CAUTION; Postweld heat treatment may be in the carbide- precipitation range for unstabilized austenitic chromium- nickel steels, as well as within the range where a sigma phase may form, and if used indiscriminately could result in failure of the vessel. Xu, Secretary W. (3) be supplied with a Partial Data Report if that welding is not performed by the vessel Manufacturer. The spacing of the vent holes shall be such that gap lengths can be determined. Cardillo T. NOZZLES AND OTHER CONNECTIONS --`,`,`,`,,`,,`,`,--- THICKNESS OF SHELLS 275 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ ULT-30 ŏ19Þ ASME BPVC.VIII.1-2019 Table ULT-23 V001 Maximum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; and 5083-0 Aluminum Alloy at Cryogenic Temperatures for Welded Construction 5% Nickel Steels, Customary Units 7% Nickel Steels, Customary Units Plates: SA-645 Grade A [Note (1)] Plates: SA-553 Type III [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construction, ksi UTS 100 ksi UTS 95 ksi Temperature [Note (2)], °F Nonwelded Construct
  38.9\ 37.9\ 36.3\ 35.0\ 33.5\ 36.9\ 36.1\ 34.6\ 33.5\ 36.9\ 36.1\ 34.6\ 33.3\ 31.8\ -320\ -300\ -250\ -200\ -150\ 41.9\ 40.4\ 37.5\ 35.4\ 33.8\ 38.9\ 37.9\ 36.3\ 35.0\ 33.5\ 36.9\ 36.1\ 37.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1\ 27.1
 the temperature of the disk when the disk is expected to burst. (1) The requirements for reinforcing specified in (a) above apply except that the diameter of the finished openings in the wall shall be d'as specified in Figure ULW-18.1, sketches (k) and (l), and the thickness tr is the required thickness of the layered shells computed by the design
  requirements. Antaki S. The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design or any form of construction that conforms to the Code rules. (7) After impregnation and prior to
  cementing, all extruded heat exchanger tubes shall be subjected to an internal pressure test at a minimum of 290 psi (2.0 MPa) or 2 times the design pressure, whichever is greater. Common Scenarios Involving the "User" or "Designated Agent" Responsibilities . Reedy, Sr. I. Arnold, Contributing Member W. Marks G. Report . (2) radial flange stress
  SR not greater than Sf; (3) tangential flange stress ST not greater than Sf; (4) also (SH + SR)/2 not greater than Sf. (b) For hub flanges attached as shown in Figure 2-4, sketches (2), (2a), (3), (4a), (4b), and (4c), the nozzle neck, vessel or pipe wall shall not be considered to have any value as a hub.
  Formed Heads, Pressure on Convex Side. Matthews W. For example, the membrane stress for 150°F (65°C). The Committee's function is to establish rules of safety relating only to pressure integrity, which govern the construction** of safety relating only to pressure integrity.
  boilers, pressure vessels, transport tanks, and nuclear components, and the inservice inspection of nuclear components and transport tanks. 10-13(b)(14) to read, "hydrostatic test or pneumatic test records." Added UNS C70620 and UNS C71520 to Table UNF-23.2. Revised 2-2(d) to clarify that the rules are intended to apply to flanges that are
 machined from plate, bar stock, or billet. Swindeman, Contributing Member Working Group on Data Analysis (BPV II) M. Rush W. Nonmandatory Introduction . Bang L. Becherer F. (f) The design pressure or operating pressure defined in the nomenclature is the applicable pressure in the shell side or
  tube side chamber, including any static head, not the coincident pressure defined in UG-21. Farenbaugh N. Deleted "or (c)" in UCS-66(b)(1)(-c). Maximum Allowable Stress Values for Certified Material . (b) Temporary welds shall be removed and the metal surface shall be restored to a smooth contour. UCL-12 UCL-23 (a) Applied Corrosion Resistant
  Linings. If a disagreement between the Manufacturer and the Inspector exists as to the acceptability of any reduction in thickness, the depth shall be verified by actual measurement. A general primary membrane stress is one that is so distributed in the structure that no redistribution of load occurs as a result of yielding. Weld metal of different
  composition may be used provided it has better mechanical properties in the opinion of the manufacturer, and the user is satisfactory for the intended service. 20 These formulas will govern only when the circumferential joint efficiency is less than one-half the longitudinal joint efficiency, or when the effect of
  supplementary loadings (UG-22) causing longitudinal bending or tension in conjunction with internal pressure is being investigated. Mengon D. Chen, Chair B. Shah P. (b) the manufacturing procedures, tolerances, tests, and marking are in accordance with a Section II specification covering the same product form of a similar material; (c) for the case
 of welded tubing made of plate, sheet, or strip, without the addition of filler metal, the appropriate stress values are multiplied by a factor of 0.85; (d) the product is not pipe or tubing fabricated by fusion welding with the addition of filler metal unless it is fabricated in accordance with the rules of this Division as a pressure part; (e) mill test reports
 reference the specifications used in producing the material and in addition make reference to this paragraph. Hirschberg K. Sturgill J. (c) If either of the two additional spots examined shows welding which does not comply with the minimum quality requirements of ULW-53(a), and ULW-53(a), and ULW-53(a), the entire unit of weld represented shall be FLAT HEAD AND TUBESHEET WELD JOINTS Category C joints attaching layered shells or layered heads to flat heads and tubesheets as shown in Figure ULW-17.3 shall be examined to the same requirements as specified in ULW-54(a) for Category B joints. (-a) When Pe \neq 0: (2) For each loading case, determine coefficient Fm from
  either Table UHX-13.1 or Figures UHX-13.5.7-1 and UHX-13.5.7-2 and calculate the maximum bending stress \sigma. (2) In sketch (e), Y shall not be larger than t L . Equations (1) A = (g 1/go) - 1 (2) C = 43.68(h/ho)4 (3) C 1 = 1/3 + A/12 (4) C 2 = 5/42 + 17A/336 (5) C 3 = 1/210 + A/360 (6) C 4 = 11/360 + 59A/5040 + (1 + 3A)/C (7) C 5 = 1/90 + 1/20 (1) C = 43.68(h/ho)4 (3) C 1 = 1/3 + A/12 (4) C 2 = 5/42 + 17A/336 (5) C 3 = 1/210 + A/360 (6) C 4 = 11/360 + 59A/5040 + (1 + 3A)/C (7) C 5 = 1/90 + 1/20 (1) C = 43.68(h/ho)4 (3) C 1 = 1/3 + A/12 (4) C 2 = 5/42 + 17A/336 (5) C 3 = 1/210 + A/360 (6) C 4 = 11/360 + 59A/5040 + (1 + 3A)/C (7) C 5 = 1/90 + 1/20 (1) C = 43.68(h/ho)4 (3) C 1 = 1/3 + A/12 (4) C 2 = 5/42 + 17A/336 (5) C 3 = 1/210 + A/360 (6) C 4 = 11/360 + 59A/5040 + (1 + 3A)/C (7) C 5 = 1/90 + 1/20 (1) C = 43.68(h/ho)4 (3) C 1 = 1/3 + A/12 (4) C 2 = 5/42 + 17A/336 (5) C 3 = 1/210 + A/360 (6) C 4 = 11/360 + 59A/5040 + (1 + 3A)/C (7) C 5 = 1/90 + 1/20 (1) C = 43.68(h/ho)4 (3) C 1 = 1/3 + A/12 (4) C 2 = 5/42 + 17A/336 (5) C 3 = 1/210 + A/360 (6) C 4 = 11/360 + 59A/5040 + (1 + 3A)/C (7) C 5 = 1/90 + 1/20 (1) C 1 = 1/3 + A/12 (1) C
  5A/1008 - (1 + A)3/C (8) C 6 = 1/120 + 17A/5040 + 1/C (9) C 7 = 215/2772 + 51A/1232 + (60/7 + 225A/14 + 75A 2/7 + 5A 3/1)/C (11) C 9 = 533/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A 2/28 + 25A 3/84)/C (12) C 10 = 29/3780 + 3A/704 - (1/2 + 33A/14 + 81A 2/28 + 25A 3/84)/C (13) C 10 = 29/3780 + 3A/704 - (1/2 + 33A/14 + 81A 2/28 + 25A/14 + 75A 2/7 + 5A/14)/C (14) C 11 C 12 = 29/3780 + 3A/704 - (1/2 + 33A/14 + 39A 2/28 + 25A/14 + 75A/14)/C (15) C 10 = 29/3780 + 3A/704 - (1/2 + 33A/14 + 39A/14)/C (17) C 11 C 12 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (18) C 12 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 653A/73,920 + (1/2 + 33A/14 + 39A/14)/C (19) C 10 = 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240 + 33/30,240
 + 13A 3/12)/C (13) C 11 = 31/6048 + 1763A/665,280 + (1/2 + 6A /7 + 15A 2/28 + 5A 3/42)/C (14) C 12 = 1/2925 + 71A /300,300 + (8/35 + 18A/35 + 156A 2/385 + 6A 3/55)/C (15) C 13 = 761/831,600 + 937A /1,663,200 + (1/35 + 6A/35 + 11A 2/70 + 3A 3/70)/C (16) C 14 = 197/415,800 + 103A /332,640 - (1/35 + 6A/35 + 17A 2/70 + A 3/10)/C (17)
 \begin{array}{c} \text{C } 15 = 233/831,600 + 97A/554,400 + (1/35 + 3A /35 + A 2/14 + 2A 3/105)/C \ (18) \ \text{C } 15 = 233/831,600 + 97A/554,400 + (1/35 + 3A /35 + A 2/14 + 2A 3/105)/C \ (18) \ \text{C } 16 = \text{C } 1 \ \text{C } 7 \ \text{C } 2 + \text{C } 2 \ \text{C } 8 \ \text{C } 3 + \text{C } 3 \ \text{C } 8 \ \text{C } 2 - (\text{C } 32 \ \text{C } 7 + \text{C } 82 \ \text{C } 1 + \text{C } 22 \ \text{C } 8)/C \ 16 \ (29) \ \text{C } 17 \ \text{C } 18 \ \text{C } 17 \ \text{C }
 22C 15)]/C 16 (28) C 26 = - (C/4)1/4 (29) C 27 = C 20 - C 17 - 5/12 + C 17C 26 (30) C 28 = C 22 - C 19 - 1/12 + C 18C 26 (31) C 29 = - (C/4)3/4 (33) C 31 = 3A/2 - C 17C 30 (34) C 32 = 1/2 - C 19C 30 (35) C 33 = 0.5C 26C 32 + C 28C 31C 29 - (0.5C 30C 28 + C 32C 27C 29) (36) C 34 = 1/12 + C 18 - C 21 - C 18C 26 (37) C 35 = - C 18(C /4)3/4 (38) C 36 = (C 28C 35C 29 - C 32C 34C 29)/C 33 (39) C 37 = [0.5C 26C 35 + C 34 C 31C 29 - (0.5C 30C 34 + C 35C 27C 29)]/C 33 (40) E 1 = C 17C 36 + C 18 + C 19C 37 409 - C 37C 29)/C 33 (40) E 1 = C 17C 36 + C 18 - C 37C 29 - C 37C 29)/C 33 (40) C 37 = [0.5C 26C 35 + C 34 C 31C 29 - (0.5C 30C 34 + C 35C 27C 29)]/C 33 (40) E 1 = C 17C 36 + C 18 - C 37C 29 
  networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 2-10 - 2-13 ASME BPVC.VIII.1-2019 Table 2-7.1 Flange Factors in Formula Form (Cont'd) Equations (Cont'd) (41) (42) (43) (44) (45) 2-10 E2 E3 E4 E5 E6 = = = = C 20C 36 + C 21 + C 22C 37
 C 23C 36 + C 24 + C 25C 37 1/4 + C 37/12 + C 36/4 - E 3/5 - 3E 2/2 - E 1 E 1(1/2 + A/6) + E 2(1/4 + 11A/84) + E 3(1/70 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - A/72 - C 37(1/60 + A/105) E 5 - C 36 (7/120 + A/36 + 3A/C) - 1/40 - E 5 - C 37(1/60 + A/105) E 5 - C 38 (7/120 + A/36 + 3A/C) - 1/40 - E 5 - C 38 (7/120 + A/36 + 3A/C) - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - E 5 - 
  plastically deform certain gaskets to result in loss of gasket contact pressure when the connection is depressurized. 687. Lazzari M. Flange Rigidity. Stinson G. ** Construction, as used in this Foreword, is an all-inclusive term comprising materials, design, fabrication, examination, inspection, testing, certification, and pressure relief. Golliet J. (25
  mm), and for 11/2 hr + 1 hr/in. Where possible, the ends of the plug should be ground smooth after installation to conform to the inside and outside contours of the walls of the pressure part; (5) the material from which the plug is manufactured shall conform in all respects to the material specification which applies to the pressure
vessel or pressure vessel part; (6) the machined surface of the drilled or bored hole before tapping shall be free from visible defects and the adjacent metal solution to the size of plug used shall not be less than that given in Table UCD-78.2; (9) the ligament of curvature of repaired sections of cylinders or cones in relation to the size of plug used shall not be less than that given in Table UCD-78.2; (9) the ligament of Equivalent 1/8 / 3 / 4 1 1 1/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 3 / 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2 2 d 1 , d 2 = respective diameters of the two plugs under consideration in Equivalent 1/8 / 4 3 / 8 1 / 2 3 / 4 1 1 1/4 11/2
  (0, maximum tube side operating pressure for operating condition x) S = allowable stress for tubesheet material at T S C = allowable stress for tubesheet m
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material at Tt Sy , c = yield strength for channel material at Tt NOTE: The yield strength for tube material at Tt NOTE: The yield str
 Table UHT-56 Type/Grade for SA-553 revised (17-2272) 246 UHT-57 Subparagraph (e) revised (17-2272) 249 UHT-82 In subpara. Johnson, Chair C. Smith — Pennsylvania R. Hearne, Secretary H. The coefficient of thermal expansion for impervious graphite exhibits a typical range of 1.5 to 3.5 × 10-6 in./in./°F. (25 mm) Specimen A Grip surface Weld — typical (4) places for Figure ULW-32.2, (2) places (layer side only) for Figure ULW-32.3 and are identical except for locations of grip surfaces and welds. (c)(2)(2) below, and determines the other of the two
STAINLESS STEEL CLADDING OR LINING The alloy weld joints between the edges of adjacent chromium stainless steel cladding layers or liner sheets shall be examined for cracks as follows. Laite L. (b) Minimum Thickness of Pressure-Retaining Components. Wilson J. The minimum required thickness of an ellipsoidal head having 0.0005 \le ts/L < 0.002 shall be larger of the thicknesses calculated by the equations in UG-32(c), or in (c) or (1). Koo V. Welded Joints . 671 671 672 672 672 673 FF-4 FF-5 FF-6 FF-7 FF-8 .. Lawson, Staff Secretary S. Jordan — Kentucky E. Heads With Pressure on Convex Side . 2 INQUIRY FORMAT Submittals to the Committee should include the following information: (a) Purpose. Cai H. Consideration shall include the lowest operating temperature, operational upsets, autorefrigeration, atmospheric temperature on Design Methods (SC-D)
  (BPV III) C. The temperature of the vessel or vessel part during the holding period shall be recorded and shall be controlled within ±25°F (±15°C). (e) This procedure may only be used once for each iteration of tubesheet, shell, and channel thicknesses and materials. Kurle M. Orihuela, Secretary D. Hydrostatic Testing . Revised UG-100(b) to correct
  the language for pneumatic testing of enameled (glass-lined) vessels. Grotenhuis J. ULW-77 ULW-78 As an alternative to ULW-77, the following measurements shall be taken at the time of the hydrostatic test to check on the contact between layers. (22 mm) or less in
 thickness shall be of Type No. (1) or (2) of Table UW-12, except the final outside weld joint of spiral wrapped layered shells may be a single lap weld. Pneumatic Testing . Lange N. Some Acceptable Types of Penetration Details . Dugan M. CONDITIONS OF SERVICE Specific chemical compositions, heat-treatment procedures, fabrication requirements, and supplementary tests may be required to assure that the vessel will be in its most favorable condition for the intended service. UHA-30 ATTACHMENT OF STIFFENING RINGS TO SHELL Rules covering the attachment of stiffening rings are given in UG-30. pressure vessel part: an integral piece of the pressure vessel that is required to contain the
  specified design pressure (internal or external) and/or the hydrostatic or pneumatic test pressure of the contents of the pressure vessel within the allowable stress limits of this Division. Colley T. The design shall be based on the appropriate figure in Section II, Part D, Subpart 3 for the material used in the ring. Neilsen E. Terminology of Heat
  of carbon and low alloy steels. Peters, Contributing Member Subgroup on Physical Properties (BPV II) J. These standards, with the year of the acceptable edition, are listed in Table U-3. The test should be such as to assure freedom from damage to the load carrying base material. Quality Control Procedures . Boring D. 12 Copyright ASME
  International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT of the examinations of (-
UM Designator [See U-1(j)] . (c) For Alloy S44635, the rules for ferritic chromium stainless steel shall apply, except that postweld heat treatment is neither prohibited nor required. From 800°F (425°C), the vessel may be cooled in still air. In lieu of the above, holes may be drilled treatment is neither prohibited nor required. From 800°F (425°C), the vessel may be cooled in still air. In lieu of the above, holes may be drilled treatment is neither prohibited nor required. From 800°F (425°C), the vessel may be cooled in still air. In lieu of the above, holes may be drilled treatment is neither prohibited nor required. From 800°F (425°C), the vessel may be cooled in still air. In lieu of the above, holes may be drilled treatment is neither prohibited nor required. From 800°F (425°C), the vessel may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be cooled in still air. In lieu of the above, holes may be
XXX(30)(31)(32)(33)(34)(35)(36)XXXXX(37)(38)XXXXX Instruction Insert the name of the owner of the vessel. See definition of f1 for signs. UCL-2 MATERIALS UCL-10 The base materials used in the construction of clad vessels and of those having applied corrosion linings shall comply with the requirements for materials given in UCS-5,
 UF-5, UHT-5, or ULW-5. 289 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-11.3 – UHX-12.1 MAX [(a), (b),(c),...] = MIN [(a), (b),(c),...] = p = p = p = p = ro = ASME BPVC.VIII.1-2019 greatest of a, b, c,... Clausing N. permitted by Part UCI. --`,``,`,`,`,`.'--`(a) Approved specifications for castings of high alloy steel are given in Table UHA-23. Hayes, Vice Chair D. 5 CODE INTERPRETATIONS (a) Requests for Code Interpretations should be accompanied by the following
  information: (1) Inquiry. Stofleth Q. Navratil T. Code revisions are considered to accommodate technological developments, to incorporate Code cases, or to clarify Code intent. These flanges shall be designed in conformance with the rules in 2-3 through 2-8, but with the modifications as described in the
 following. Tuttle R. Yang O. Pt = tube side design pressure. Krithivasan R. McMaster J. When rapid corrosion of the base material is to be expected from contact with the contents of the vessel, particular care should be taken in devising and executing the tightness test. Reich M. If Pa is smaller than P, select a larger value for t and repeat the design
 and nickel alloys, and cast aluminum alloys when they are used at temperatures down to -325°F (-198°C); and for titanium or zirconium and their alloys used at temperatures down to -75°F (-59°C). (3) Each of the two test specimens shall meet the "no-break" criterion, as defined by ASTM E208, at test temperature. --`,``,`
          ,`,`,--- calculated test pressure: the requirements for determining the test pressure based on calculations are outlined in UG-99(c) for the hydrostatic test and in UG-100(b) for the pneumatic test. In addition these joints shall be examined for 10% of their length in accordance with Mandatory Appendix 12 ultrasonic examination, except that for
  apply to Figure 2-4, sketches (8) through (11) as well as Figure UW-13.2, sketches (a) and (b). For value of B above the material/temperature line for the design temperature, the value of A can be calculated using the formula A = 2B/Ex. For value of B above the material/temperature line for the design temperature, the value of A can be calculated using the formula A = 2B/Ex. For value of B above the material/temperature line for the design temperature, the value of A can be calculated using the formula A = 2B/Ex.
  shall be either per U-2(g) or by changing the cone or cylinder configuration, stiffening ring location on the shell, and/or reducing the axial compressive force to reduce the B value to below or at the material/ temperature line for the design temperature. (16 mm) or Less in Thickness 3:1 taper min. McDaniel M. Murray, Staff Secretary J. Eshraghi B.
 After the calculation procedure given in UHX-13.5.1 through UHX-13.5.1
 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 347 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-60 ASME BPVC.VIII.1-2019 819F Table UIG-34-5 Formulas for Determination of F t
 stiffeners, ATL = ATS = B = factor determined from the applicable material chart in Section II, Part D, Subpart 3 for maximum design metal temperature [see UG-20(c)] D L = outside diameter of cylindrical shell (In conical shell calculations, the value of Ds and DL should be
 hydrostatic end force H. Babka R. Lamond E. Changes to nonessential variables do not require requalification of the CMS. Ziegler B. (13 mm); 200°F (95°C) minimum for material above 1/2 in. (-2) impact tests shall be conducted at -320°F (-196°C) on a set of three specimens from the base metal. Scian M. U-2 General. (10 mm) 3 Tapped holes 3 1
                                                                          Structures ASCE/SEI 7 2016 Unified Inch Screw Threads (UN and UNR Thread Form) ASME B1.1 Latest edition Cast Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250 Pipe Flanges and Flanged Fittings, NPS 1/2 Through NPS 24 Metric/Inch Standard Factory-Made Wrought Buttwelding Fittings ASME B16.5 AS
 2015 2013 [Note (1)] Latest edition Forged Fittings, Socket-Welding and Threaded Cast Copper Alloy Pipe Flanges, Flanged Fittings, Classes 125 and 250 Metallic Gaskets for Pipe Flanges, Flanged Fittings, Classes 125 and 250 Metallic Gaskets for Pipe Flanges, Flanged
 Fittings, and Valves, Classes 150, 300, 600, 900, 1500, and 2500 Ductile Iron Pipe Flanges and Flanged Fittings, Class 150 and 300 Large Diameter Steel Flanges, NPS 26 Through NPS 60 Metric/Inch Standard ASME B16.42 ASME B
  and Coupling Nuts (Inch Series) Welded and Seamless Wrought Steel Pipe Conformity Assessment Requirements Guidelines for Pressure Equipment and Piping ASME Section VIII - Division 1 Example Problem Manual Pressure Relief Devices Qualifications for Authorized Inspection Standard
 Practice for Quantitative Measurement and Reporting of Hypoeutectoid Carbon and Low-Alloy Steel Phase Transformations ASME B18.2.2 Latest edition B18.2.2 Latest E
 without license from IHS D56 D93 E3 E125 ASTM E140 5 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT edition edition edition edition edition for Referenced Standards in This Division (Cont'd) Title
  with Code rules and supplies the Form U-2 or U-2A Manufacturer's Partial Data Report to the other party. (c) The knuckle radius ra or rb of any formed element shall not be less than three times the element thickness t as shown in Figure 5-1. P-No. 9 Groups . McGlone R. Sowder, Jr. D. (b) When bolts are machined from heat treated, hot rolled, or
 (a) The Code-assigned responsibilities of the User (2) Matters of Agreement Between the User (3) The Manufacturer (3) The Manufacturer's Responsibilities of the User (4) Recommendations to the User (5) Responsibilities of the User (7) Responsibilities of the User (8) The Manufacturer's Responsibilities of the User (9) Responsibilities of the User (10) Responsibilities of the User (11) Responsibilities of the User (12) Responsibilities of the User (13) Responsibilities of the User (14) Responsibilities of the User (15) Responsibilities of the User (16) Responsibilities of the User (17) Responsibilities of the User (18) Responsibilities of the Us
  His Designated Agent (6) Matters of Agreement Between the User or His Designated Agent (7) The Manufacturer's Responsibility to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designated Agent (8) Recommendations to the User or His Designation (8) Recommendations to the User or His Designation (8) Recommendation (8) Recommendat
  703 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT NN-6 ASME BPVC.VIII.1-2019 (c) Users, designated agents, and Manufacturers should be reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT NN-6 ASME BPVC.VIII.1-2019 (c) Users, designated agents, and Manufacturers should be reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT NN-6 ASME BPVC.VIII.1-2019 (c) Users, designated agents, and Manufacturers should be reproducted by IHS under licensee with ASME Not reproducted by IHS under licens
  become familiar with the Code-assigned responsibilities and associated rules to ensure that the responsibilities applicable to their activities are covered when preparing (user or his designated agent) or reviewing (Manufacturer) Form U-DR-1 or U-DR-2, as applicable; see Nonmandatory Appendix KK, Guide for Preparing User's Design Requirements
  Deleted references to Section II, Part D, Nonmandatory Appendix A, A-310 to A-360 in UHA-100. Added definition of "NPS" in Mandatory Appendix 3. When adjacent to Category A or B joints, the nearest edge of the nozzle-to-shell weld shall be at least five times the nominal thickness of the shell from the nearest edge of the Category A or B joints. (3)
 mm) (2) 1/64 in. UNF-91 UNF-79 REQUIREMENTS FOR THE IMAGE QUALITY INDICATOR If the filler metal is radiographically similar 78 to the base metal, the image quality indicator may be placed adjacent to the weld; otherwise it shall be placed on the deposited weld metal. The Record Numbers listed below are explained in more detail in "List
 of Changes in Record Number Order" following this Summary of Changes. Stumpf, Staff Secretary A. Tucker C. (5) Optional-type flanges may be calculated as either loose or integral type. = 0.7c (2a) Screwed Flange [Note (2)] 1/t (max.) 2 min. For compression (such as at large end of cone), E 1 = 1.0 for butt welds. 30 All dimensions given, for size
 with the applicable requirements in Subsections A, B, and C of this Division. Newton J. (4) For membrane stress calculations, use the limits defined in Figure 1-7-1, and comply with the strength of reinforcement requirements of UG-41. The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. The outside diameter, A, used for the
 tubesheet calculations shall not exceed the diameter at which the thickness of the tubesheet extension is less than the minimum of 0.75h or h - 0.375 in. ......
  When P e ≠ 0 UIG-60 LETHAL SERVICE Graphite pressure vessels and vessel parts to be used for lethal service, as defined in UW-2(a), shall meet the following additional requirements: (a) The design factor shall be 7.0 for lethal service. Miyazaki B. Doctor K. (8) If the continuous fillet weld is used, the leg dimension of fillet weld shall not be less than
 0.25t, where t is the thickness of the minor attachment. (1) The Foreword provides the basis for the rules described in this Division. Pre-use testing in accordance with the requirements of (a) may be conducted by the welding consumable manufacturer, provided mill test reports are furnished with the consumables. The minimum thickness specified in
 UG-16(b) shall be the total thickness for clad material with corrosion resistant integral or weld metal overlay cladding and the base-material thickness for applied-lining construction. Kuehner D. • Equation Cross-References. Revised UG-39 and Figure UG-39 to accommodate more geometries. The heat exchanger contains a bundle of straight tubes
 connecting both tubesheets [see Figure UHX-3, sketch (b)]. Dell'Erba F. (b) Minimum. (See Table UCI-78.1.) Where a tapered plug is impractical because of excess wall thickness in terms of plug diameter and coincident thread engagement, other types of plugs may be used provided both full thread engagement and effective sealing against pressure
 metal temperature at the tubesheet = channel metal temperature at the tubesheet for operating condition x = x the tubesheet for operating condition x = x the tubesheet = channel metal temperature at the tubesheet for operating condition x = x the tubesheet = channel metal temperature at the tubesheet = channel metal temperature at the tubesheet for operating condition x = x the tubesheet = channel metal temperature at the tubesheet = channel metal temperatur
  material at T' = mean coefficient of thermal expansion of shell material at = mean coefficient of thermal expansion of shell material at For conservative values of may be used. MM-4 ACCEPTANCE CRITERION The stamping must be legible and acceptable to the Authorized Inspector. Windes R. Step 4. Glaspie, Contributing Member D. A user
  appoints a designated agent, the designated agent specifies a pressure vessel, and a Manufacturer constructs the vessel. Kuschke D. See Nonmandatory Appendix UHA-A. The symbols described below are used for the design of graphite tubesheets. Zivanovic J.-B. Tezzo, Contributing Member J. All joints of Category D shall be in accordance with Typ
  No. (1) of Table UW-12 and Figure UHT-18.1 when the shell plate thickness is 2 in. They shall conform to the requirements of Part UNF. May L. 691 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001,
  by the magnetic particle or liquid penetrant methods in accordance with the requirements of Mandatory Appendix 7. Values of f (Hub Stress Correction Factor). Schuessler, Secretary M. (900 mm) 36 in. It is therefore recommended the vessel be tested in such a manner as to ensure personnel safety from a release of the total internal energy of the
  compressive stresses at the design temperature shall be determined using the strength variation value from Form CMQ. Tsirigotis, Alternate l Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer,
                                                                                                                                                ,,,`-`-`,,`,,`,,`---J. Upitis, Contributing Member T. Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 219 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for
  thickness variation: -0.062 in. Configurations a, b, and c: The shell shall have a uniform thickness of ts for a minimum length of adjacent to the tubesheet. The calculation procedure outlined in UHX-13.5 shall be performed, accounting for the following modifications: 313 Copyright ASME International (BPVC) Provided by IHS under license with
  ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ --`,``,`,`,`,`,`-- UHX-13.6 adjacent to the tubesheets. N. Teli, Chair A. Brust T. (4) As an alternative to (3) above and for rod or bar having a
  Vessel Code in Section II, Part D for requirements for re
  through the entire section at the joint. (b) Surface imperfections, such as undue roughness, which do not permit leakage in cast iron materials may be repaired using driven plugs, provided: (1) the vessel or vessel parts operate within the limits of UCI-3(a)(1), UCI-3(a)(2), or UCI-3(a)(4); (2) no welding is performed; (3) the material from which the plugs
 is manufactured conforms in all respects to the material specification which applies to the pressure vessel or pressure vessel part; (4) the depth of the plug is not greater than 20% of the thickness of the section and its diameter is not greater than 20% of the thickness of the material specification which applies to the material specification which applies to the plug is not greater than the larger of 3/8 in. For values of B having multiple values of A, such as when B falls on a horizontal
 portion of the curve, the smallest value of A shall be used. Huttner E. Any one of the head layers of a layered vessel except the inner head. P = internal pressure on convex side [see UG-28(f)] r = inside knuckle radius S = maximum allowable stress value (see UG-23)
 T = flange thickness t = minimum required thickness of head plate after forming (c) It is important to note that the actual value of the total moment Mo may calculate to be either plus or minus for both the heads concave to pressure and the heads convex to pressure. (1) through (5), (7), (9), (10), (12), (14), (16), (18), (20), (23), and (26) below based
 on the values of g 1, go, h, and ho as defined by 2-3. UHX-12.5.3 Step 3. For production welds at MDMTs colder than -155°F (-104°C), all of the following conditions shall be satisfied: (1) The welding processes are limited to SMAW, GTAW, and PAW. For values of A falling to the left of the material/temperature line, see Step 4. Scott P
  Table 2-6 Moment Arms for Flange Loads Under Operating Conditions hD hT Integral-type flanges [see Figure 2-4, sketches (8), (8a), (9), (10a), and (11)] Loose type, except lap-joint flanges [see Figure 2-4, sketches (2), (2a), (3a), (
  sketches (8), (8a), (9), (9a), (10), (10a), and (11)], also integral type [Figure 2-4, sketch (7)] where the neck material constitutes the hub of the flange; (-b) longitudinal hub stress SH not greater than the smaller of 1.5Sf or 2.5Sn for integral type flanges with hub welded to the neck, pipe or vessel wall [Figure 2-4, sketches (6), (6a), and (6b)].
  a permitted material or do not list them within the required temperature range, the Manufacturer may use other authoritative sources for the needed information. The cement material and cementing procedure (see UIG-79) shall be qualified. For cones attached to flat covers, flanges, or other components where the length of the cylinder, if present, is present and cementing procedure (see UIG-79) shall be qualified.
  less than 1.4, length L s in the formulas for A T S and N shall be zero. (a) This procedure shall not be used at temperatures where the time-dependent properties govern the allowable stress. (mm) E = modulus of elasticity of material at design temperature. MATERIALS UG-4 GENERAL (a) Material subject to stress due to pressure shall conform to
 one of the specifications given in Section II, Part D, Subpart 1, Tables 1A, 1B, and 3, including all applicable notes in the tables, and shall be limited to those that are permitted in UG-9, UG-10, UG-11, UG-15, Part UCS, Part UIG, and the Mandatory Appendices. (38 mm). They shall
  engage the threads for the full depth of the nut. Rodery J. Minimum Requirements for Pin Devices . 5-5 INSPECTION AND TESTS (a) Expansion joint flexible elements shall be visually examined and found free of unacceptable surface conditions, such as notches, crevices, and weld spatter, which may serve as points of local stress concentration
  Faransso, Chair S. Brandes S. (5) Joint alignment requirements of UHT-20 shall be met. All other pressure parts of these heat exchangers that are constructed to Code rules must meet the 1/16 in. (-b) W m 2 = 0. Equations for Calculating Forming Strains . UHX-8.2 Nomenclature W c = channel flange design bolt load for the gasket seating condition
                                       pendix 2) W m 1 c = channel flange design bolt load (see definition for W m 1 in Mandatory Appendix 2, 2-3) W m 1 m a x = MAX[(W m 1 c ), (W m 1 s )] UHX-9.2 (a) The general conditions of applicability given in UHX-10 apply.
 Morris O. Yang, Chair D. Gandhi V. Landers, Honorary Member R. UHX-11.2 Conditions of Applicability The general conditions of 
 uniformly perforated over a nominally circular area, in either equilateral triangular or square patterns. If |\sigma| \le 1.5S, the design is acceptable and the calculation procedure is complete. Roberts, Contributing Member J. (h) When the rules of this Division require the use of material physical properties, these properties shall be taken from the
 applicable tables in Section II, Part D, The requirements of Part UG are applicable to all pressure vessels and vessel parts and shall be used in conjunction with the specific requirements in Subsections B and C and the Mandatory Appendices that pertain to the method of fabrication and the material used. Deleted UHA-101 through UHA-105 and UHA-
 109. Configuration d: The calculation procedure is complete. All welding on flange connections shall comply with the requirements for postweld heat treatment given in this Division. Muraki N. Preferably, the Inquirer should provide a copy of, or relevant extracts from, the specific referenced portions of the Code. Park J. Furnaces for heating, for
 quenching, for normalizing, and for temperatures. (See Table UCD-78.1.) Where a tapered plug is impractical because of excess wall thickness in terms of plug diameter and coincident thread engagement, other types of plugs may be used, provided both full-thread
 engagement and effective sealing against pressure are obtained. When used, Code Cases prescribe mandatory requirements in the base metal, but merely cross the seams in the base metal, may be examined by any method that will disclose
 surface cracks. (4)(5) below. Waldon I. Scarth, Chair G. Pressure parts such as shells, heads, removable doors, and pipe coils that are wholly formed by casting, forging, rolling, or die forming may be supplied basically as materials. Ferrarese E. Low Temperature Operation. Pontiggia S. Steel stamping of all types may be omitted on material below 1/2
 in. (205 mm), parts may be machined from such rod or bar, if the following requirements are met: (-a) The longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the part shall be parallel to the longitudinal axis of the paralle
 stiffening ring material E s = modulus of elasticity of shell material E x = Ec, Er, or Es = L L = design length of a vessel section taken as the largest of the following: (a) the center-to-center distance between the cone-to-large-shell junction and
 one-third the depth of head on the other end of the large shell if no other stiffening rings are used. (c) Any change to any essential variable, including the tolerance range, shall apply to standard nonwelded items such as described in UG-11(c) and UG-
 11(d). Where complete details of construction are not given, the Manufacturer, subject to the acceptance of the Authorized Inspector, shall provide the appropriate details to be used. (3 mm) for all pressure constructed of base material with
 corrosion-resistant integral or weld metal overlay cladding. Gregor, Honorary Member O. When the outer protective element is not provided by the Manufacturer as part of the vessel, the Manufacturer shall be responsible to assure that the required enclosures
 are installed prior to operation. The flange moment M o without correction for bolt spacing is used for the calculation of the rigidity index in 2-14. (114 to 305 mm)] Steel Castings Standard Reference Radiographs for Steel Castings up to 2 in. (b) Responsibilities (1) The Manufacturer of any vessel or part to be marked with the Certification Mark has
 the responsibility of complying with all of the applicable requirements of this Division and, through proper certification, of assuring that all work done by others also complies. Coleman, Chair K. No. SA-240 nonwelded construction Maximum Allowable Stress, ksi, for Temperature [Note (2)], °F, Not Exceeding Grade
 Tensile, ksi Yield, ksi -320^{\circ} - 300^{\circ} - 250^{\circ} - 200^{\circ} - 150^{\circ} - 100^{\circ} - 50^{\circ} 0 100 150 304, 316 75.0 30.0 35.5 35.0 33.4 31.7 29.7 27.5 25.3 20.0 20.0 20.0 20.0 -150^{\circ} - 200^{\circ} - 250^{\circ} - 200^{\circ} - 200^{\circ
 networking permitted without license from IHS 276 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 ULT-30 Table ULT-23 V001 Maximum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; and 5083-0
 Aluminum Alloy at Cryogenic Temperatures for Welded and Nonwelded Construction (Cont'd) 5083-0 Aluminum Strengths at Room Temperature Spec. Marks W. Khssassi — Quebec, Canada J. Andrews G. Zhai X. Wang Q.-J. Shang J. 82P The need for providing sufficient bolt load to seat the gasket or joint-
 contact surfaces in accordance with eq. (1) The thickness of the base material at the welded joint is not less than required by the design calculation. Turylo D. Smith T. Dunn N. (5 mm) MAXIMUM ALLOWABLE STRESS VALUES (a) Section II, Part D, Subpart 1, Table 1A gives the maximum allowable stress values at the temperatures indicated for
 materials conforming to the specifications listed therein. Flange dimensions shall be such that the stresses in the flange, calculated in accordance with 2-7, do not exceed the allowable flange stresses specified in 2-8. (2) The finished joint preparation of a solid section which is required to be postweld heat treated under the provisions of UCS-56 or
 UHT-56, shall be provided with a buttered85 layer of at least 1/8 in. Otherwise, increase the assumed thickness, h, and return to Step 1. Krebs T. Engineering judgment must be consistent with the philosophy of this Division, and such judgments must never be used to overrule mandatory requirements or specific prohibitions of this Division. X.1(a)(1)
 (1). For some acceptable supports, see Figure ULW-22. (-1.5 mm) (d) out-of-roundness: 0.04 in. Limits of reinforcement tp 1/ in. Pressure Tests . (mm) (b) Out-of-Roundness Greater Than 0.5%. Vo J. --
                                                                   --- Footnotes With the exception of those included in the front matter (roman-numbered pages), all footnotes are treated as endnotes. Rules for Conical Heads Under Internal Pressure. (0.5 mm). Avrithi G. Crawford — Georgia E. Operating conditions, if known. Configurations e, f, and A:
 If σ c ≤ SPS,c, then the channel is acceptable. Shim S. If different materials are used for the shell and stiffening ring, use the material chart resulting in the larger value of A in Step 4 below. (140 mm), provided that the axial length of the part is approximately parallel to the metal flow lines of the stock. Spanner, Jr. D. Dimensional information. Felix
 Y.-G. Doshi G. Gingrich M. The designer is responsible for complying with Code equations when such equations are mandatory. Hall, Chair T. UHT-81 HEAT TREATMENT VERIFICATION TESTS (a) Tests shall be made to verify that the heat treatments, and subsequent thermal treatments, performed by
 the fabricator have produced the required properties. (b) User's Design Requirements Forms are neither required nor prohibited for pressure vessels constructed in accordance with U-1(j) or UG-90(c)(2). (b) The notation is as follows: 2-15 E = modulus of elasticity for the flange material at design temperature (operating condition) or at atmospheric
 temperature (gasket seating condition), psi J = rigidity index \le 1 K I = rigidity factor for loose-type flanges = 0.3 K L = rigidity factor for loose-type flanges = 0.2 QUALIFICATION OF ASSEMBLY PROCEDURES AND ASSEMBLY P
 by qualified assemblers. Flexible joints (expansion joints/flexible bellows) should be used for all connections to minimize loads on nozzles and other connections. The following rules shall be used when the maximum design temperature is less than or equal to the temperature limit given in Table 1-4.3. See U-2(g) for maximum
  `--- r1 t (d) (e) 2R or (R t tn) whichever is greater R = inside radius of
 vessel opening Min. For each loading case, calculate the maximum bending moments acting on the tubesheet at the periphery Mp and at the center Mo. Configuration f: Calculate diameter ratio K and Configuration f: Calculate D
 and Q 1. See U-2(q). McLaughlin D. Lienau K. Effective Gasket Width. Revised Figures UIG-76-2 diameter dimensions shown in the grip area of the tensile specimens to match the existing critical dimensions. 819 GENERAL UNF-95 WELDING TEST PLATES If a vessel of welded titanium or zirconium and their alloys construction
 incorporates joints of Category A or B as described in UW-3, a production test plate of the same specification, grade, and thickness shall be made of sufficient size to provide at least one face and one root bend specimen or two side bend specimen or two side bend specimens dependent upon plate thickness. (a), cross-reference to UG-44(b) revised to UG-44(a)(2) (18-1306) 414
 3-2 Definition of nominal pipe size (NPS) added (15-722) 431 7-2 Subparagraphs (c)(1) and (c)(2) revised (18-1195) 431 7-3 In subpara. Beirne D. (50 mm), the weld detail may be as permitted for nozzles in Figure UHT-18.2. (b) For materials SA-333 Grade 8, SA-334 Grade 8, SA-353, SA-522, SA-553, and SA-645, Grade A, the
 joints of various categories (see UW-3) shall be as follows: (1) All joints of Category A shall be Type No. (1) of Table UW-12. On design cases than those for symmetrical groups which extend a distance greater than the inside diameter of the shell as covered in (e) above. See Figures JJ-
  1.2-1 through JJ-1.2-5 for flowchart illustrations of impact testing requirements. UHT-32 FORMED HEADS, PRESSURE ON CONCAVE SIDE Except as provided in uG-32(e), and 1-4(d), formed heads shall be limited to ellipsoidal and/or hemispherical heads designed in accordance with UG-32(e) or UG-32(e). Bruny, Chair P. Swanson, Chair G.
 Single Local Thin Areas in Cylindrical Shells. (e) Heads of the type shown in Figure 1-6, sketch (b) (no joint efficiency factor is required): (1) head thickness (-a) for pressure and convex to the pressure and conforming to the several types
 illustrated in Figure 1-6, shall be designed in accordance with the equations which follow. Design of Toroidal Bellows . (b) The vessel shall be tested at ambient temperature for a minimum of 15 min. Thicknesses of the transition sections are based on Note (1). (b) Nickel. (13 mm) of nominal thickness, whichever is smaller. Ready for production
 welding. (f) Reducers not described in UG-36(e)(5), such as those made up of two or more conical frustums having different slopes, may be designed in accordance with (g). Mechanical Testing of DBPQ and DBPS Diffusion Bonded Blocks Production Blocks Production Diffusion Bonded Blocks Production Diffusion Bonded Blocks Production Diffusion Bonded Blocks Production Blo
 Ouality Control Program, close visual inspection of vessels and vessel parts by both Manufacturing personnel and the Authorized Inspector, as well as acceptance testing where required by this Part. Breach F. Faroog A. Toelle F. (f) A stayed jacket shell that extends completely around a cylindrical or spherical vessel shall also meet the requirements of
 UG-47(c). Wang L. (b) Operating temperature for the cryogenic liquid is its saturation temperature at MAWP. The design pressure may be used in all cases in which calculations are not made to determine the value of the maximum allowable working pressure. Wichman, Honorary Member J. Gosselin C. UIG-120 DATA REPORTS (a) Form U-1B,
 ,`,, Copyright ASME International (BPVC) Provided by
 IHS under license with ASME No reproduction or networking permitted without license from IHS RECORDS 363 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-121 ASME BPVC.VIII.1-2019 FORM CMQ CERTIFIED MATERIAL QUALIFICATION FORM (Used in the Construction of
 Graphite Pressure Vessels) Certified material qualification no. (1 020 mm) I.D. and also exceed; the terms R and t are defined in Figures 1-7-1 and 1-7-2; (-c) the ratio Rn/R does not exceed 0.7; for nozzle openings with Rn/R exceeding 0.7, refer to U-2(g). (e) For 5%, 7%, 8%, and 9% nickel steel vessels, all structural attachments and stiffening rings
 which are welded directly to pressure parts shall be made of materials of specified minimum strength equal to or greater than that of the material to which they are attached. Asayama C. Demers M. Canonico, Contributing Member H. In lieu of using SPS = 3S, a value of SPS = 2SY may be used, where SY is the yield strength at temperature,
 provided the following are met: (1) the allowable stress of material S is not governed by time-dependent properties as provided in Section II, Part D, Subpart 1, Table 1A or Table 1B; (2) the room temperature ratio of the specified minimum yield strength for the material does not exceed 0.7; (3) the value for SY at
 temperature can be obtained from Section II, Part D, Subpart 1, Table Y-1. Occasional operatures colder than -20°F (-29°C) are acceptable when due to lower seasonal atmospheric temperature. The rules in Part ULW are applicable to pressure vessels or parts thereof fabricated by layered construction as defined in 3-2 and ULW-2. (4)
 The welding processes are limited to gas metal arc, shielded metal
 pressure shall be 3/16 in. Matkovics, Vice Chair M. For values of L / D o greater than 50, enter the chart at a value of 
 High-Level Radioactive Material (BPV III) G. Shah S. Pneumatic Test. Zawierucha J. Fillet Welds. UHX-14.5.4 coefficient F. Keck, Secretary L. Peters, Contributing Member B. Spaeder, Jr., Honorary Me
 with the requirements of UW-51, except that Figure UHT-18.2 type nozzles having an inside diameter of 2 in. For vessels constructed of SA-333 Grade 8; SA-333 Grade 8; SA-353; SA-522; SA-553 Types I, II, and III; and SA-645 materials, welds not examined by the liquid penetrant method either before or after the
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hydrotest. 2L tc tn tc Inner shell = d' = r 1 min. Bresciani G. Doron, Contributing Member R. Y.-K. = 0.7c (4b) [Note (2)] Loose-Type Flanges [Notes (3) and (4)] 395 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 1/t (max.) 2 --

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pressure vessels may be made from welded pipe or tubing listed in Table UHA-23. Test plates shall represent each welding process or combination of processes or a change from machine to manual or vice versa. Configuration c: (2) For each loading case, determine coefficient Fm from either Table UHX-13.1 or Figures UHX-13.5.7-1 and UHX-13.5.7
2 and calculate the maximum bending stress σ. Gray R. Jetter C. The calculation procedure outlined in UHX-12.5 shall be performed accounting for the following modifications: (a) Performed accounting for the following modifications: (a) Performed accounting for the following modifications: (b) Performed accounting for the following modifications: (a) Performed accounting for the following modifications: (b) Performed accounting for the following modifications: (c) Performed accounting for the following modifications: (a) Performed accounting for the following modifications: (a) Performed accounting for the following modifications: (b) Performed accounting for the following modifications: (b) Performed accounting for the following modifications: (b) Performed accounting for the following modifications: (c) Performed accounting for the following modifications: (c) Performed accounting for the following modifications: (d) Performed accounting for the following modifications: (e) Performed a
and construction under the provisions of this paragraph in order to avoid difficulties in service under extreme temperature conditions, or with unusual restraint of parts such as may occur at points of stress concentration and also because of metallurgical changes occurring at elevated temperatures. Farrell, Jr. E. Ono M. Procedures for Postweld Heat
Treatment . (4 mm) high, minimum. P s = shell side design pressure. Chung, Delegate C. These shall include, but not be limited to, normal operating, start-up, shutdown, cleaning, and upset conditions. Mullavey, Contributing Member R. (e) The bolt circle in a layered flange shall not exceed the outside diameter of the shell. The Manufacturer's
Responsibility to the User or His Designated Agent . Test Requirements . Additional Properties . (Interpolation may be made between lines for intermediate temperatures.) R o = outside
radius of cylindrical shell or tube t = the minimum required thickness of the cylindrical shell or tube MAXIMUM ALLOWABLE STRESS VALUES12 The joint efficiency for butt-welded joints shall be taken as unity. Tatman D. ULT-99 HYDROSTATIC TEST The vessel shall be hydrostatically pressure tested at ambient temperature in the operating
position for a minimum of 15 min, using the following requirements of (a) or (b), whichever is applicable: 281 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided
07/02/2019 13:29:04 MDT ŏ19Þ ASME BPVC.VIII.1-2019 (2) the following markings shall be used in the vertical position, provided all components of the vessel are hydrostatically tested for a minimum of 15 min at a pressure
not less than 1.4 times the design pressure at 150°F (65°C) plus the equivalent of the head of the test liquid in the operating position. (0.25 mm) (nonrelevant gap) b Rg t Legend: Ag = area of gap (approx.) = 2/3hb b = arc length of relevant radial gap h = radial gap h = radial gap t = layer thickness INSPECTION AND TESTING (b) The
theoretical circumferential expansion of a solid vessel of the same dimensions and materials as the layered vessel shall be calculated from the following formula: ULW-90 GENERAL where MARKING AND REPORTS E = modulus of elasticity [use 30 × 106 psi (200 × 106 kPa) for carbon steel] e t h = theoretical circumferential expansion P = internal
design pressure R = mean radius = outside radius = the requirements given in UG-115 through UG-120. (9) The Manufacturer of the completed vessels shall have the following responsibilities when using
standard pressure parts that comply with an ASME product standard: (-a) Ensure that all standard pressure parts comply with applicable rules of this Division. Pridmore P. UCI-33 SPHERICALLY SHAPED COVERS (HEADS) HEADS WITH PRESSURE ON CONVEX SIDE UCI-36 The thickness of heads with pressure on the convex side (minus heads)
shall not be less than the thickness required in UCI-32 for plus heads under the same pressure nor less than 0.01 times the inside diameter of the head skirt. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the
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 13.5.2 ŏ19Þ Table UHX-13.1 Formulas for Determination of Zd, Zv, Zm, Zw, and Fm (1) Calculate functions of order 0 relative to x, where x varies from 0 to Xa such that [Note (1)]: and their derivatives: (2) Calculate functions Qm (x
derivatives. Sims J. 363 Supplementary Design Formulas . 51 Use of a rupture disk device in combination with a pressure relief valve shall be carefully evaluated to ensure that the bursting of the rupture disk. Sham G. Whenever an
imperfection is removed by chipping or grinding and subsequent repair by welding is not required, the excavated area shall be blended into the surrounding surface so as to avoid sharp notches, crevices, or corners. Sr = Ss = t = tc = tr = ts = y = = \alpha = \Delta = \delta1 P At the large end of the cone-to-cylinder juncture, the PRL/2 term is in compression.
Brust R. 74 Low alloy steels — those alloy steels — those alloy steels in UHX-12.5.7, and recalculate the tubesheet bending stress \sigma given in UHX-12.5.8. If \sigma \leq 2S, the assumed tubesheet thickness h is acceptable and the design is complete. From the geometry (see Figure UHX-12.5.8.)
11.3-1 and Figure UHX-11.3-2) and material properties of the exchanger, calculate the required parameters in accordance with (a) or (b) below. Lorenz, Contributing Member T. Pressure Settings and Performance Requirements . Vessels of Rectangular Cross Section . Revised coefficient names in correlation testing fatigue equations and added names
in the nomenclature in Mandatory Appendix 26. (2) For the scope of this Division, pressure vessels are containment of pressure, either internal or external. Peters, Contributing Member F. (c) The circumferential weld joint of the layered sections shall be gualified with a simulated layer test plate as shown in Figure ULW-
32.1 for layer thicknesses 7/8 in. Piel, Secretary H.-R. Rupture disks may be designed in several configurations, such as plain flat, prebulged, or reverse buckling. Hibdon, Alternate Y.-S. Tompkins Z. (c) Tests to be included for Cement Technician Qualification shall include four tensile strength tests using specimens shown in Figure UIG-76-2. Vessels
other than cylindrical and spherical and those for which no design rules are provided in this Division may be designed under the conditions set forth in U-2. A casting quality factor as specified below shall be applied to the allowable stress values for cast materials given in Subsection C except for castings 17 Copyright ASME International (BPVC)
(UCI-2) and cast ductile iron (UCD-2) are prohibited. (b) The maximum allowable stress value in bending shall be 11/2 times that permitted in tension. The parts separating each pressure chamber are the common elements. Brust P. Sircar,
Contributing Member C. (6 mm) 4 3/16 in. Welded Joint Efficiency . UCI-115 GENERAL The provisions for marking and reports in UG-120 shall apply without supplement to vessels constructed of cast iron. Tanzosh J. Server C. Jones, Contributing Member A. Example of Tube Spacing With Pitch of Holes Equal in Every Row . The
 attachment welds shall comply with UW-15, UW-16, and Figure ULW-18.1, sketch (k) or (l). Rogers W. Thickness calculations are also made for other expected pressure, and the thickness ratio defined in Step 3 of Figure UCS-66.2. The ratio/ΔT points are
then plotted on Figure UCS-66.1. Ratio/\Delta T points that are on or below the Figure UCS-66.1 curve are acceptable, but in no case may the operating temperature be constructed in compliance with its provisions. Picart, Delegate B. Mudge M.
Configuration a: Confi
0.091 0.109 0.125 0.142 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 0.156 
tests of the heat-affected zone are performed in accordance with UG-84(i). P-No. 8 Group Nos. Starting Points for the Measurement of the Length of Shell on Each Side of the Bellows . 201 201 ..... 14 The user of the Code is cautioned that for elevated metal temperatures when high membrane stress and/or high bending stress exist in the section
some inelastic straining due to creep in excess of the limits allowed by the criteria of Section II, Part D, Mandatory Appendix 1 may occur. Supplementary Requirements . Revised UCS-66(b) to clarify that Figure UCS-66.1 is not permitted for bolts and nuts. For the diameter, indicate if inside or outside diameter. (13 mm) in thickness. Krishnaswamy
K. Alessandro, Contributing Member J. Kassar J. (d) This procedure applies to Configurations b and c when \sigma s \leq SPS,s. The following equations may be used in lieu of those given in UG-27(c): When P is desired, \delta2\triangleright Where t is known and P is desired, \delta2\triangleright Where t is known and P is desired, \delta2\triangleright Symbols are as defined in UG-27 and
1-1. (2) PWHT is neither required nor prohibited. Manafa J. Manoly D. Molvie Y. (1) The minimum specified tensile strength of quenched and tempered steels for pressure parts shall be less than or equal to 100 ksi (690 MPa). Welding Procedure Qualification and Welding Consumables Testing. Lethal Service. NPS 3 Pipe Jacket. Roberts C. Either the
material shall be heat treated in its entirety, or the cold-strained area (including the transition to the unstrained portion) shall be cut away from the balance of the component and heat treated separately, or replaced. Swayne, Chair M. (-i) Tube side and shell side pressures are assumed to be uniform. Horn Y. Revised UW-2(a) and Table UCS-56-1
by rapid opening or pop action. Sainz W. 28 An obround opening is one which is formed by two parallel sides and semicircular ends. Lee, Chair S. Marking and Reports. The reduced effective modulus has the effect of reducing the shell and/or channel stresses in the elastic-plastic calculation; however, due to load shifting this usually leads to an
increase in the tubesheet stress. Acceptance Standards for Proposed Operating Temperatures Determined by Test. Downs J. lxxii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not
17-2248 17-2272 17-2410 17-2587 17-2671 17-2773 17-2783 Change Revised UHA-32 to delete references to PWHT of Part UHA materials as a service requirement. 12 For the basis on which the tabulated stress values have been established, see Section II, Part D, Mandatory Appendix 1. Inman C. (d) Attachments to Types 304 and 316 stainless steel
vessels shall be made using a weld procedure meeting ULT-82. Staniszewski A. (g) For Types 304 or Type 316 stainless steel. When the ring only is used, Any additional area of reinforcement that is
required shall be added to the cone or the flange. Stone M. Hembree S. Typical EIH Support Plate and Element Geometry. Bamford A. For example, reinforcement often may be advantageously obtained by use of heavier shell plate for a vessel course or inserted locally around the opening; weld may be ground to concave contour and the inside
corners of the opening rounded to a generous radius to reduce stress concentrations. Jovall J. 425 425 426 428 Mandatory Appendix 6 6-1 6-2 .... The expansion joint shall be designed for the axial displacement range over all load cases from one of the following equations for the axial displacement over the length of the thin-walled
bellows element. Smith, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II. Huang, Contributing Member D. 108 The symbols for the various stresses in the case of a Class 3 assembly also carry the subscript I or II.
shall be 1/16 in. Tomka — Oregon S. Best results are obtained through the use of special filler metals. S a = allowable stress for the material of the tubesheet extension at tubesheet extension design temperature (see UG-23) W = flange design bolt
load from eq. 13 See 3-2, Definition of Terms. Slater R. Hayworth O. Unacceptable Nozzle Attachment Details . Increase the shell thickness ts. to Circled Nos. Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 1 . (a),
last sentence added (16-2840) (2) Subparagraph (c) revised (17-2194) 172 Table UCS-56-1 In General Note (b), subparas. Roberts, Vice Chair S. Romero N. When seepage occurs, F-4 shall be considered and the lining shall be repaired by welding. Volf C. (2.5 mm) 0.2t 0.2t 3/32 in. 1-4 (b) Longitudinal Stress (Circumferential Joints). Dinelli, Chair A. --
                            ,,,'-'-'-',,',','--- 101 Air or gas is hazardous when used as a testing medium. Values of \Delta for Junctions at the Large Cylinder for \alpha \leq 30 deg. Xu R. Meichler, Secretary O. Qian L. Code Case users can check the current status of any Code Case at . M. Check of Welding Procedure. Such leakages can be detrimental to the thermal
 performance of the heat exchanger, and deflection may need to be considered by the designer. When the composite thickness of the clad material is 3/4 in. Values of T, U, Y, and Z (Terms Involving K). Uddin J. The modulus of elasticity to be used shall be taken from the applicable materials chart in Section II, Part D, Subpart 3. Oldani, Delegate F.
The maximum allowable stress for such parts shall be determined at 150°F (65°C). Kamishima Working Group on Pressure Testing (SG-WCS) (BPV XI) J. (2.5 mm) exclusive of any corrosion allowance. (6 mm) min. Introduction of Competency of Nondestructive Examination Personnel.
performed locally. Bolt Materials. Manufacturer's Partial Data Report. Di M. Beckman J. Kim M. Feldstein N. The other party, who must hold a valid U Certificate of Authorization, makes the final assembly, required NDE, and final pressure test; completes the Form U-1, U-1A, or U-1P Manufacturer's Data Report; and stamps the vessel. Ramcharran
as (a), (b), (c), etc., as in the past. Shaw C. Nair, Contributing Member B. UCL-3 GENERAL (a) Clad material used in constructions in which the design calculations are based on the total thickness including [see UCL-23(c)] shall conform to one of the following specifications: (1) SA-263, Stainless Chromium Steel-Clad Plate (2) SA-264,
the provisions of Mandatory Appendix 2 using the allowable stress values in bending. Qualification of Brazed Joints for Design Temperatures in the Range Shown in Column 2 of Table UB-2. At least one test plate is required for each vessel provided not over 100 ft of Category A or B joints are involved. This type covers those designs in which the
flange has no direct connection to the nozzle neck, vessel, or pipe wall, and designs where the method of attachment is not considered to give the mechanical stress plus discontinuity longitudinal stress due to bending shall not be greater than SPS [see
UG-23(e)], where the "average discontinuity hoop stress" is the average hoop stress at the junction, disregarding the effect of Poisson's ratio times the longitudinal stress at the junction, disregarding the effect of Poisson's ratio times the longitudinal stress at the surfaces. When common elements such as tubes and tubesheets are designed for a differential design pressure, the heat
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ULW-31 ASME BPVC.VIII.1-2019 Figure ULW-18.1 Some Acceptable Nozzle Attachments in Layered Shell Sections (Cont'd) d' tn C max. Davis N. The shell centerline may be on either side of the head centerline by a maximum of 1 /2(t S -t H). for t greater than 1/4 in. Intended for manufacturers, users, constructors, designers and others
concerned with the design, fabrication, assembly, erection, examination, inspection and testing of pressure vessels, plus all potential governing entities. (1) Butt joints shall be full penetration welds, Type (1) of Table UW-12. Mikitka G. The bend specimens shall be prepared and testing of pressure vessels, plus all potential governing entities.
may be from any imperfection in the weld, such as porosity, slag, or tungsten. Boron-free and phosphorus- MAGNETIC PROPERTIES See Section II, Part D, Nonmandatory Appendix A, A-410. Sarno R. After the calculation procedure given in the steps in UHX-14.5.10 has been performed for the elastic solution, an elastic-plastic
calculation using the referenced steps from UHX-14.5 shall be performed in accordance with the following procedure for each applicable loading case. PRESSURE-TEMPERATURE LIMITATIONS DESIGN (a) The design pressure for vessels and vessel parts constructed of any of the classes of cast iron listed in Table UCI-23 shall not exceed the
following values except as provided in (b) and (c) below: (1) 160 psi (1.1 MPa) at temperatures not greater than 375°F (190°C) for vessels containing liquids; (3) 250 psi (1.7 MPa) for liquids at temperatures less than their boiling
point at design pressure, but in no case at temperatures exceeding 120°F (50°C); (4) 300 psi (2 MPa) at temperatures exceeding 120°F (230°C) for bolted heads, covers, or closures that do not form a major component of the pressure vessel. (3) Parts may be machined from rod or bar having a hot-worked diameter greater than 5.50 in
ULW-57 ASME BPVC.VIII.1-2019 Figure ULW-54.1 NOTE: (1) Any indication not in line with layer interface shall be interpreted in accordance with UW-51. Sowinski P. Bernasek M. (3) All joints of Category B shall be trace in the base material in Table UCS-23, or
the corrosion resistant weld metal overlay cladding deposited by electrical or mechanical means. Imperfections defined as unacceptable by either the material specification or by Mandatory Appendix 7, 7-3, whichever is more restrictive, are considered to be defects and shall be the basis for rejection of the
casting. Dickson B. Minimum Tensile Strength Requirements for Welding Procedure Qualification Tests on Tension Specimens Conforming to Section IX, Figures QW-462.1(a) Through QW-462.1(a)
Through QW-462.1(e) Tubesheet Effective Bolt Load, W * . Provide a sketch with dimensions, if known. (-b) There shall be no pass partition grooves. Design of Partial Jackets . Otherwise, increase the thickness of the shell and return to UHX-12.5.1. Configurations e and f: If \sigma c \leq SPS,c, then the channel is acceptable. (1) For each loading case,
determine coefficients F t,min and F t,max from Table UHX-13.2 and calculate the two extreme values of tube stress, ot , 1 and ot , 2. Yeshnik G. 674 676 Nonmandatory Appendix HH HH-1 HH-2 HH-3 HH-4 HH-5 HH-6 HH-7 Tube Expanding Procedures and Qualification . P-No. 10 Groups . (2) Operating Loading Cases. Lamond T. Anselmi
International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-34 ASME BPVC.VIII.1-2019 819F Figure UIG-34-1 Typical Graphite Shell and Tube Heat Exchangen
 Floating: Shell flange Packing flange Packing flange Split ring and flange Graphite head flange Fixed: Head flange Graphite tubesheet Effective length of spring rod Packing flange Packing No spring design Acorn nut Fixed End Shell flange 6194 Floating Enc
Figure UIG-34-2 Fixed Tubesheet Configuration a: Tubesheet Gasketed With Shell and Head, With Assembly Flange 338 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted
 Configuration c: Grooved Tubesheet With Split Ring (With or Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Split Ring (With or Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Spring-Loaded Tubesheet Without Springs) A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configuration e: Fully Springs A Gc G1 = Do Ps Pt h (c) Configur
diameter of shell gasket load reaction (see Mandatory Appendix 2) h = tubesheet thickness J = ratio of spring rigidity, KJNr, to the effective axial rigidity of the shell and spring rods, Ksr = 1.0 if there are no springs k = constant accounting for the method of support for the unsupported tube span under consideration = 0.6 for unsupported spans
between two tubesheets = 0.8 for unsupported spans between a tubesheet and a tube support = 1.0 for unsupported spans between two tubesheets and a tube support = 1.0 for unsupported spans between two tubesheets = 0.8 for unsupported spans between two tubesheets
corners. (b) The circumferential weld attaching the flexible element, or outer shell element, or outer shell element, as appropriate to the expansion joint configuration per Figure 5-1, shall be as follows: an intermediate outer shell element with lengths in excess of shall satisfy all the requirements of UG-27 where R = inside radius of
Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 5-4 Figure 5-2 Typical Nozzle Attachment Details Showing Minimum Length of Straight Flange or Outer
are made as follows. Wielgoszinski C. Added the UHT marking and reference to ULW-115; the ULT marking and reference to ULW-115; the
UHT-6 TEST REQUIREMENTS (a) See below. When separate equations are provided for U.S. Customary and SI units, those equations must be executed using variables in the units associated with the specific equation. When such an analysis is made, the calculated localized stresses at the discontinuity shall not exceed the following values: (1)
Recommended Minimum Gasket Contact Widths for Sheet and Composite Gaskets . LIQUID PENETRANT EXAMINATION (a) All welds, both groove and fillet, in vessels constructed of materials covered by UNS N106625 (for Grade 2 only in SB-443, SB-444, and SB-446), UNS N10001, and UNS N10665 shall be examined for the detection of cracks 207
required by the design computation. No No UHA-51(d)(1)(-a) Yes MDMT colder than -320°F (-196°C)? Matsunaga D. Segletes J. C. For flange pairs used to contain a tubesheet for a floating head or a U-tube type of heat exchangers, or for any other similar design, W m 1 shall be the larger of the values as individually calculated for each flange, and
that value shall be used for both flanges. When differential pressure design pressure shall be the maximum differential design pressure expected between the adjacent chambers. Added "Studding-outlet-type flanges may
also be attached by full-penetration welds as shown in Figure UW-16.1, sketch (p-2)" in UW-16(d)(2). Values of \Delta for Junctions at the Small Cylinder for \alpha \leq 30 deg . Inquiries are unlikely to receive a response if they are not written in clear, legible English. Ahee L. A layer used as a filler between the inner shell (or inner head) and other layers, and not
considered as part of the required total thickness. Sallash L. Terms and Definitions . Kumar M. Wu S. Regardless of which edition is in use in an area, engineers should make full use of all aspects in determining what solutions are suitable, safe and economical for the application. For values of A falling to the left of the applicable material/temperature
from a single plate (without welds) or from multiple plates or shapes welded together. Schmitz, Secretary B. Holtmeier K. (See UG-22.) UG-21 DESIGN PRESSURE11 Table Each element of a pressure vessel shall be designed for at least the most severe condition of coincident pressure (including coincident static head in the operating position) and
temperature expected in normal operation. Faidy M. Mullins A. No Toughness testing of the base material and HAZ is not required. Calculate the axial membrane stress for the small cylinder. 703. to 11/4 in. Liebl J. Holston, Alternate R. Chan P. 8194
UHX-11.3 Nomenclature The symbols described below are used for determining the effective elastic constants. When a yield strength value is not listed in Table Y-1, one may be obtained by using the procedure in UG-28(c)(2), Step 3. UHA-33 RADIOGRAPHIC EXAMINATION penetrant method. Otherwise increase the thickness of the channel and
return to UHX-14.5.1 (Step 1). Responsibilities . The cross-references to equations will follow the same logic. Gold T. Whenever local customary units are used, the STANDARDS REFERENCED BY THIS DIVISION (a) Throughout this Division references are made to various standards, such as ASME standards, which cover pressure-temperature rating
dimensional, or procedural standards for pressure vessel parts. Kovacs C. (4) When the average value of the five additional
 Postweld heat treatment of the buttered solid section shall then be performed prior to attaching to the layered sections. If the second set fails, the batch is rejected. Rahoi E. Radiographic and Ultrasonic Examination . NOTE: Tables 2-5.1 and 2-5.2 give a list of many commonly used gasket materials and contact facings, with suggested values of m, b,
paragraphs apply specifically to the fabrication of pressure vessels and vessel parts of cast iron and shall be used in conjunction with the general requirements for Fabrication in Subsection A insofar as these requirements for Fabrication in Subsection A insofar as these requirements are applicable to cast materials. Symbols Do, E*, h'g, μ, μ*, and ν* are defined in UHX-11. (a)(1), cross-reference to UG-44
revised to UG-44(a) (18-1306) 40 UG-36(g)(2) Revised (16-2413) 45 UG-39 Title and subparas. (13 mm) for materials listed in Curve A of Figure UCS-66; (-b) 1 in. Sims Italy International Working Group (BPV VIII) A. Diez A. 1.5 10 1. (2) Gasket Seating. Moenssens, Secretary T. Proceed to Step 10. Xu, Secretary P. Except for Sections XI and XII, and
with a few other exceptions, the rules do not, of practical necessity, reflect the likelihood and consequences of deterioration in service related to specific service fluids or external operating environments. (22 mm) in thickness welded to the previous surface shall be examined for 100% of their length in accordance with Mandatory Appendix 12
ultrasonic method except that for the bottom 10% of the weld thickness the distance amplitude correction curve or reference level may be raised by 6 dB. Wadkinson C. (16 mm) Thickness (b) Details of Taper for Layers 5/8 in. (980 min.) 1,880-2,060 (1 025-1 125) 2,010-2,085 (1 100-1 140) 1,725-1,775 (940-970) 1,825-1,875 (995-1 025)
1,925-2,100 (1 050-1 150) Table UHA-32-5 Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 10I Gr. No. 1 1,350 (730) Minimum Holding Time at Normal Temperature for Nominal Thickness [See UHA-32(d)] Up to 2 in. One shear test shall be made on each
such clad plate as rolled, and the results shall be reported on the material test report. r2 = 0.2t r2 30 deg min. (c) Required Impact Testing When Thermal Treatments Are Performed. (38 mm) provided a preheat of 450°F (230°C) is maintained during welding and that the joints are completely radiographed. W-3.2 Y-6.1 Y-9.1 QEXP-1 KK-1 NN-6-1 NN
6-2 NN-6-3 NN-6-4 NN-6-5 NN-6-6 NN-6-7 NN-6-8 NN-6-9 NN-6-11 FORMS CMQ CCQ CPQ CTQ 26-1 26-1M U-1 U-1A U-1B U-1P U-2 U-2A U-3 Certified Material Qualification Form . Schueler, Jr., Honorary Member R. Mruk T. Donaldson, Chair D. This option shall provide details of design consistent with the allowable stress criteria
provided in UG-23. Henry K. Paluszkiewicz, Contributing Member R. Vetter J. Caputo M. (1) Transition is made in the layered shell section. Examination
 . Houk D. smallest of a, b, c,... (-a) At MDMTs of -155°F (-104°C) and warmer, vessel (production) impact tests are exempted provided that the impact test are exempted provided that the impact tests are exempted provided that the impact test are exempted provided that the impact tests are exempted provided that the impact test are exempted provided that the impact test are exempted provided that the impact tests are exempted provided that the impact test are exempted provided that the impact tests are exempted provided that the impact test exemption requirements for the applicable Weld Procedure Qualification in (e) are satisfied. Zhai P.-S. Show if the vessel is in Cyclic Service and if so, if a Fatigue Analysis is required.
event that after having applied these additional design principles and construction practices the vessel still complies with all of the requirements of this Division may it be stamped with the applicable Certification Mark with the Designator. Ferritic Steels With Properties Enhanced by Heat Treatment . Zeng xlvii Copyright ASME International (BPVC)
containing parts, the scope of this Division shall include the following: (1) where external piping; other pressure vessels including heat exchangers; or mechanical devices, such as pumps, mixers, or compressors, are to be connected to the vessel: (-a) the welding end connection for the first circumferential joint for welded c onnec tions [see UW-13(i)];
(-b) the first thre adedjointface for proprietary connections; (-c) the face of the first flange for bolted, flanged connections; (-d) the first sealing surface for proprietary connections; (-d) the first flange for bolted, flanged connections; (-d) the first sealing surface for proprietary connections; (-d) the first flange for bolted, flanged connections; (-d) the first flange flanged connections; (-d) the first flange flanged connections; (-d) the first flanged connections; (-d)
the design, fabrication, testing, and material requirements established for non-pressure-retaining covers for vessel openings, such as manhole or handhole covers, and bolted covers with their attaching bolting and nuts; 2 Copyright ASME International (BPVC) Provided by
IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT of the methods of fabrication and the classes of
 materials covered by this Division, provided the rules applying to each method and material are complied with and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs, one dealing with displacement and the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are the vessel is marked as required by UG-116. Split 26-9.5 into two paragraphs are th
(BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Task Group on ISI of Spent Nuclear Fuel Storage and Transportation Containment Systems (BPV XI) Argentina International
written procedure that meets the requirements of Section V, Article 9 (Visual Examination). (152 mm), with no limitation on length of vessels for human occupancy. (d) The rules of this Division have been formulated on the basis of design principles and construction practices applicable to vessels designed for
pressures not exceeding 3,000 psi (20 MPa). However, the resin used for impregnation has a significant effect on the properties of the graphite. The edge of the weld deposits shall merge smoothly into the base metal without undercuts or abrupt transitions; this requirement shall apply to fillet and groove welds as well as to butt welds. 819 P 2-3 = for
 integral type flanges = for loose type flanges e = factor NOTATION = for integral type flanges from Figure 2-7.2) f = hub stress in the small end of hub to the stress in the large end.)
(For values below limit of figure, use f = 1.) F L = factor for loose type flanges (from Figure 2-7.4) G = factor for loose type flanges
in geometry and material. (e) This procedure applies to Configurations e, f, and A when σ c ≤ SPS,c. UHA-6 CONDITIONS OF SERVICE Specific chemical compositions, heat treatment procedures, fabrication requirements, and supplementary tests may be required to assure that the vessel will be in its most favorable condition for the intended
 service. The following equations may be used in lieu of those given in UG-27(d). Castings that are to be welded shall be of weldable grade. When these conditions limit the hydrostatic test in accordance with ULT-100 shall also be
                                                    ```, `, `, `, `, `, `-`-`, `, `, `, `, `--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS . Shelton, Secretary T. Hansen G. The details of some fabricating procedures vary among the several nonferrous materials and differ from
those used for steel because of differences in the inherent mechanical properties of these materials. (b) Titanium or zirconium and their alloys shall not be welded to other materials. Griesbach J. Gatti, Delegate X. Tuttle J. However, if the Inquirer's request is unclear, attendance by the Inquirer or a representative may be necessary for the Committee
applied in one heating cycle) and the cooling rate shall be no faster. Examination Requirements. This procedure does not evaluate the acceptability of the shell-to-cone transition. Lugs Saddles Thickness 26 F Specification Description years Fatigue Analysis? Stinson J. Miscellaneous Welding Requirements. 48 A lot of rupture disks is those disks
manufactured of a material at the same size, thickness, type, heat, and manufacturing process including heat treatment. This pressure is the least of the values for the internal or external pressure to be determined by the rules of this Division for any of the pressure boundary parts, including the static head thereon, using nominal
fully austenitizes the material need not be accounted for by the specimen heat treatments, provided the austenitizing temperature is at least as high as any of the preceding thermal treatments. (i) For some design analyses, both a chart or curve and a equation or tabular data are given. Snow C.-F. These stress limits shall be met in both the corroded
and noncorroded conditions. Miller M. 362 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 8194 Completed pressure vessels shall be subjected to a hydrostatic test in accordance with the requirements of UG-99. Single Spot-Weld Tension Specimen
temperature, for the purpose of determining the minimum permissible thickness or physical characteristics of the different zones of the vessel. Patil V. (c) Reexamination of Repair Areas. Upitis K. Finco M. 30 3 0 5 0 .40 0. Calculate the axial membrane stress of c, m, axial bending stress of c, b, and total axial stress of c, in the channel at its junction
84 It is the intent that cast ductile irons with an elongation of less than 15% in 2 in. Reinforcement Required for Openings in Flat Heads and Covers . Hayes G. If \sigma t, m i n is negative and |\sigma to a negative and |\sigma to
throughout their full length. No. Types 304 and 316 Stainless Steels, SI Units Minimum Tensile Strength, MPa, for Metal Temperature [Note (1)], °C, Not Exceeding Spec. Solution annealed No after welding? 543 543 Mandatory Appendix 31 Rules for Cr-Mo Steels With Additional Requirements for Welding and Heat Treatment. (3) Weld
repairs to the weld metal and heat-affected zone in welds joining these materials may be made after the final PWHT, but prior to the final hydrostatic test, without additional PWHT. Chen Z. The differential pressure shall be controlled to ensure the common element design pressure is not exceeded. 691 699 700 Year of Acceptable Edition of
Referenced Standards in This Division . Dewees, Contributing Member W. Messner H. Some Representative Configurations Describing the Minimum Required Thickness of the EIH Support Plate Flanged Extension, hr. Only the Committee has the authority to provide official interpretations of this Code. Lam, Contributing Member K. 318 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,`,`,,`,,`,--(3) Calculate the axial membrane stress for the eccentric cone at
the large end. 63 The pin temperature may be different from the operating temperature for devices where the pin is isolated from operating conditions. Montgomery T. Ward, Contributing Member A. Mikitka, Chair G. In addition, design temperatures for vessels under external pressure shall not exceed the maximum temperatures given on the
external pressure charts. Adkins C. Similar cases where flange parts are subjected to shearing stress shall be governed by the same requirements. 3 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license wi
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                                                                                                                                              --- ASME BPVC.VIII.1-2019 U-2 - U-4 ASME BPVC.VIII.1-2019 U-4 (h) Field assembly of vessels constructed to this Division may be performed as follows. Cook, Contributing Member A. Liszkai H. (b) Circular cast ductile iron spherically shaped heads
with bolting flanges other than those described in (a) above shall be designed in accordance with the following requirements of (f)(1), (f)(2), (f)(3), (f)(4), and (f)(6), in addition to the variables in Section IX, QW-250, shall be considered as essential
variables requiring requalification of the welding procedure. (2) radiographically examined for its full length in the manner prescribed in UW-51. (6 mm) For integrally reinforced nozzles, min. Data Reports . ASME Collective Membership Mark ASME Single Certification Mark "ASME" and the above ASME symbols are registered trademarks of The
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BPVC.VIII.1-2019 Figure 2-7.5 Values of VL (Loose Hub Flange Factors) -- `, ``, `,, ',,
                                                                                                                                      `-`-`,,`,,`,,`--- Figure 2-7.4 Values of FL (Loose Hub Flange Factors) 2-9 GENERAL NOTE: See Table 2-7.1 for equations. This rule is applicable to stresses caused by internal pressure, external pressure, and axial compressive load on a cylinder.15
Earthquake loading and wind loading need not be considered to act simultaneously. Smith F. Vlaicu C. The ratings in these standards are based on the hub dimensions given or on the minimum specified thickness of flanged fittings of integral construction. If the exchanger does not have any spring-loaded rods on the floating end, do not calculate Q Z
1, OZ2, and U. Heberling II C. Symbols used in Figure 1-7-1 and 1-7-2 are as defined in UG-37(a) and as follows: A s = shaded (cross-hatched) area in Figure 1-7-1 or Figure 1-7-2 and the inside of vessel wall e = distance between neutral axis of the shaded area
and midwall of the shell I = moment of inertia of the larger of the shaded areas in Figure 1-7-1 or Figure 1-7-2 about neutral axis P = internal or external pressure R m = mean radius of shell R n m = mean radius of she
longitudinal axis S m = membrane stress calculated by eq. (b) The symbols defined below are used in the formulas of this paragraph. GENERAL The rules in ULT-17 through ULT-23 and shall be used in conjunction with the
requirements for Design in Subsection A and Part UW of Subsection B. Canonico K. Each layer plate shall have at least two vent holes 1/4 in. Noncircular Shaped Flanges With Circular Bore . completed pressure vessel: an assemblage of pressure vessel parts of which no further welding, assembly, or testing is required, and to which a Certification
Mark and Designator has been applied and for which a Form U-1 or F
qualified to Section IX for vessels constructed to Part UHT. Configurations b and c: If σ s ≤ 1.5Ss, the shell design is acceptable and the calculation procedure is complete. NOTES: (1) Rate of cooling from heat-treatment temperature is not subject to specific control limits. Except as noted in (b) below, the symbols used in the equations of this
paragraph are defined in 2-3. Otherwise, increase the thickness of the overstressed component(s) (shell and/or channel) and return to UHX-12.5.1. Configurations b and c: If \sigma s \leq SPS,s, then the shell is acceptable. See 10-5 and 10-15(d). Check of Postweld Heat Treatment Practice . factor used in the elastic-plastic analysis to account for any
yielding of the channel facts = factor used in the elastic-plastic analysis to account for any yielding of the shell UHX-14.8.4 Calculation Procedure. Grimes, Contributing Member W. 714 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS -
                                               --- Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 70 It is not the intent of this paragraph to require measurement of reductions in thickness due to the welding process. Vidimos B. Straight line interpolation for intermediate volumes
and design pressures is permitted. For subtypes (c) and (d), g o = g 1. Whipple K. The minimum required thickness of a torispherical head having 0.0005 \le ts/L < 0.002 shall be larger of the thickness calculated by the equations in UG-32(d) or in (d) above, or by the equations given below. (1.5 mm) may be included in the overall flange thickness.
Sham X. Determine Do, \mu, \mu, and UHX-11.5.1. Operating loading cases: Calculate ao, \rho s, \rho c, \chi s, and \chi t. 613 613 Preheating . I s = required moment of inertia of the combined shell- cone or ring-shell-cone cross section about its neutral axis parallel to the axis of the shell I's = required moment of inertia of the combined shell-cone or ring-shell-cone cross section about its neutral axis parallel to the axis of the shell I's = required moment of inertia of the combined shell-cone or ring-shell-cone cross section about its neutral axis parallel to the axis of the shell I's = required moment of inertia of the shell I's = required moment of inertia of the shell I's = required moment of inertia of the shell-cone or ring-shell-cone cross section about its neutral axis parallel to the axis of the shell I's = required moment of inertia of the shell-cone or ring-shell-cone cross section about its neutral axis parallel to the axis of the shell I's = required moment of inertia of the shell-cone or ring-shell-cone cross section about its neutral axis parallel to the axis of the shell-cone or ring-shell-cone cross section about its neutral axis parallel to the axis of the shell I's = required moment of inertia of the shell-cone or ring-shell-cone or ring-shell-c
its neutral axis parallel to the axis of the shell k = 1 when additional area of reinforcement is not required = y/SrEr when a stiffening ring is required, but k is not less than 1.0 L = axial length of cone L c = length of cone between stiffening ring is required, but k is not less than 1.0 L = axial length of cone L c = length of cone L c = length of cone between stiffening ring is required, but k is not less than 1.0 L = axial length of cone L c = length of cone L c = length of cone between stiffening ring is required, but k is not less than 1.0 L = axial length of cone between stiffening ring is required, but k is not less than 1.0 L = axial length of cone L c = length of cone between stiffening ring is required, but k is not less than 1.0 L = axial length of cone between stiffening ring is required.
diameter of gasket contact face (b) when bo > 1/4 in. See 2-4. (c) Perform Step 6 (UHX-13.5.6) with the following changes: use v s * instead of v s: (4) Calculate the axial membrane stress for the large cylinder. Krishnamurthy, Chair T, layered vessel; a vessel having a shell and/or heads made up of two or more separate layers. (b) In addition, for
vessels constructed of titanium or zirconium and their alloys, all Category A and B joints shall be fully radiographed in accordance with UW-51. Laskewitz, Contributing Member B. (a) editorially corrected to subpara. Bordato G. Some Acceptable Layered Shell Types . (l) When layers of Category A joints as shown in Figure ULW-17.2, sketches (a), (b-
1), (b-2), and (b-3) and Figure ULW-17.5, sketches (a-1) and (a-2) are welded with fillet welds having a taper less than 3:1, the longitudinal load resisted by the equations in this Division before corrosion allowance
is added (see UG-22). The maximum allowable stress value shall be that given for the base material referenced in Table 1A. 55 Some adverse effects resulting from leakage may include obstructing the flow path, corrosion of pressure relief valve components, and undesirable
bursts of the outlet side rupture disk. If ρ changes, recalculate d * and μ * from UHX-11.5.1. Determin e E * /E and υ * r ela tive t o h /p f r o m UHX-11.5.2. Calculate Xa. 307 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
t Tubes, T t, m Shell, T s, m 1 2 3 4 Psox,min Psox,max Psox,min Ptox,max Ptox,min P
configuration, stiffening ring location on the shell, and/or reducing the axial compressive force to reduce the B value to below or at the material/temperature line for the design temperature. Ludwig G. Pillow E. It is recommended that cyclic conditions be included with the specification (see Nonmandatory Appendix KK). Gosselin M. Burns, Honorary
Member D. (c) Material added for the same thickness for all parts of the various parts. This may be accomplished by performing an additional evaluation of all the components of the exchanger for design loading cases 1 through 4 (when P s d, m i n and P t d, m i n
are both zero, design loading case 4 does not need to be considered) with zero expansion joint stiffness. Kilambi D. Note that per 1-5(e)(1), tension is positive, and that per 1-5(e)(1), tension is positive, and that per 1-5(e)(1), tension is positive.
Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-17 - UHX-19.3.2 ASME BPVC.VIII.1-2019 for the caution required by UHX-19.2.2 shall be at least 1 /8 in. One publication
contains values only in the U.S. Customary units and the other contains values only in SI units. Morishita D. Sutherlin R. Nestell Working Group on Analysis Methods (SG-ETD) (BPV III) P. Vattappilly F. If the tubesheet extension is equal to or greater than the tubesheet thickness, h, no analysis is required. (c) Tensile tests shall be performed as
described in Mandatory Appendix 37. ULW-2 DESIGN ULW-16 The following terms are used in Part ULW relative to layered Vessel. (c) Background Information. Pischke, Chair E. Tompkins D. Design . (6 mm) or 0.7 of the smaller of 3 /4 in. For limiting temperatures see Nonmandatory Appendix UNF-A. Tseng J. Gosselin Y. (-b)
When brazing is performed, it shall meet the requirements of Part UB. (10 mm) thick or 5 in.3 (82 cm3) in volume, that carry no load or an STIFFENING RINGS FOR SHELLS UNDER EXTERNAL PRESSURE Rules covering the design of stiffening rings are given in UG-29. Shih S. MATERIALS UHT-5 GENERAL (a) Steels covered by this Part subject to
stress due to pressure shall conform to one of the specifications given in Section II and shall be limited to those listed in Table UHT-23. (25 mm), 15 min 2 hr plus 15 min for each additional 2 hr plus 15 min for each minimum inch (25 mm) over 2 in. (3) Cast iron flanges and flanged fittings conforming to ASME B16.1 [see UG-44(a)(1)] may be used in
whole or in part of a pressure vessel for pressures not exceeding American National Standard ratings at temperatures not exceeding 450°F (232°C). (d) The following alloys are exempt from PWHT: UNS S40910, S40930, S
tn r2 tL tL tS tS r1 r1 1 3 (min.) 11/4tn min. Nuoffer H. Tokarski A. Tu Y. (a) This procedure describes how to use the rules of UHX-13.5 when the shell has a different thickness and/ or a different material adjacent to the tubesheet (see Figure UHX-13.4). Pressure Test Requirements Manufacturer's Data Reports Mandatory Appendix 46 46-1 46-2 46-3
46-4 Rules for Use of Section VIII, Division 2 Scope . (-c) other recognized and generally accepted methods, such as those found in other ASME, EN, ISO, national, and industry standards or codes. Minimum Requirements for Attachment Welds at Openings . Richard M. The minimum thickness or maximum allowable working pressure of cylindrical
shells shall be the greater thickness or lesser pressure as given by (1) or (2) below. Le D. ŏ6Þ ŏ19Þ 2-6 FLANGE MOMENTS In the calculation of flange is the product of the load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load and its moment of a load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the flange is the product of the load acting on the load acting on the load acting on the load acting on the load acting of the load acting 
seams, are not intended to be covered by the rules of this Part. (-i) Calculate the value Pck/1.5. If Pck/1.5 is equal to or greater than the required internal design pressure P, then the design is complete. Yes No See UHA-51(c)(1) UHA-51(d)(1)(-b) Base metal and HAZ toughness testing is not required. Ye, Vice Chair M. Gold, Contributing Member M.
Bedeaux, Vice Chair C. Evaluation of Indication for Tube-to-Tubesheet Expanding Procedure Qualification (TEPQR). Welded Connections . (b) Joints welded with austenitic chromium-nickel s t e e l f i l l e r m e t a l o r n o n- a i r - h a r d e n i n g n i c k e l - chromium-iron filler
metal shall be given a radiographic spot examination in accordance with UW-52. Li Z. Wilson Special Working Group on HDPE Stakeholders (BPV III) J. Chung M. Taggart R. (3 mm) thick welding material not requiring postweld heat treatment. Emslander, Chair N. 386 -- \( \),
International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS R Rm Licensee=Khalda Petroleum/5986215001. User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 1-8 RULES FOR REINFORCEMENT OF CONES AND CONICAL REDUCERS UNDER EXTERNAL
PRESSURE f 1 = axial load per unit circumference at large end due to wind, dead load, etc., excluding pressure I = available moment of the stiffening ring cross section about its neutral axis parallel to the axis of the shell I' = available
moment of inertia of combined shell-cone cross section about its neutral axis parallel to the axis of the shell. Sullivan C. Upitis J. (mm) maximum allowable external pressure, psi (MPa) maximum allowable external pressure pressure pressure psi (MPa) maximum allowable external pressure psi (MPa) maximum al
or joint-contact surface properly by applying a minimum initial load (under atmospheric temperature conditions without the presence of internal pressure), which is a function of the gasket material and 394 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from
IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,`,',,'
                                                                                                                                                                                                 -`,,`,,`,,`--- 2-4 - 2-5 ASME BPVC.VIII.1-2019 2-5 Figure 2-4 Types of Flanges Gasket A hG or hT HG HT t h tl W r g1 hD Full penetration weld, single or double. Lee B. Mengon, Contributing Member J. Attachment
of Stiffening Rings. Is each heat/batch combination of wire and flux pre-use tested? UHX-11 TUBESHEET CHARACTERISTICS UHX-11.1 Scope These rules cover the determination of the ligament efficiencies, effective depth of the tube side pass partition groove, and effective elastic constants to be used in the calculation of U-tube, fixed, and floating
tubesheets. normal operation: operation within the design limits for which the vessel has been stamped. Hopkins R. (2) For welded construction of austenitic stainless exempted in (-a) and (-b) below. Flued Openings in Shells and Formed Heads. Jensen D. Hojo D.
In these types of installation, the back pressure effect will be negligible, and no undue influence upon normal valve operation can result. (3) The minimum tensile strength of the reduced tension specimen in accordance with Section IX, Figures QW-462.1(a) through QW-462.1(e) shall not be less than 100 ksi (690 MPa) or 95 ksi (655 MPa),
BPVC.VIII.1-2019 91 When internal pressure during the required pressure test, the design may be based on external pressure, and auxiliary devices such as clamps may be used during the required test pressure. Meyers, Contributing Member M. Standard Hydrostatic Test. Tsirigotis D. 89 When the flange material is
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cast iron, particular care should be taken when tightening the bolts to avoid excessive stress that may break the flange. Garbolevsky J. Franzen, Jr. G. Wais, Contributing Member D. (10 mm) to 11/2 in. Roberts III D. If \tau \leq MIN[0.8S], the assumed tubesheet thickness is acceptable for shear. (e) When the half-apex angle \alpha is greater than 60
deg (1.1 rad), cone-to-cylinder junctions without a knuckle may be used, with or without reinforcing rings, if the design is based on special analysis, such as the beam-on- elastic-foundation analysis of Timoshenko, Hetenyi, or Watts and Lang. Lam, Contributing Member J. Burchell, Chair M. xxii Licensee=Khalda Petroleum/5986215001, User=Amer.
material qualification test. Dixon M. The tubesheet integral with shell and gasketed with channel, extended as a flange; (c) Configuration c: tubesheet integral with shell and gasketed with
 channel, not extended as a flange; (d) Configuration d: tubesheet gasketed with shell and channel; 290 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-12.1 ASME BPVC.VIII.1-2019 8199 Figure UHX-11.3-2 Typical Untubed Lane
networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-12.1 - UHX-12.3 ASME BPVC.VIII.1-2019 ŏ19Þ E = modulus of elasticity for tubesheet material at design temperature
 Es = modulus of elasticity for shell material at design temperature G 1 = midpoint of contact between flange and tubesheet G c = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see Mandatory Appendix 2) G s = diameter of shell gasket load reaction (see M
surfaces to be examined shall be free of: (a) relevant linear indications; (b) relevant rounded indications greater than 3/16 in. 431 431 Mandatory Appendix 1 1-1 1-2 1-3 1-4 1-5 1-6 1-7 1-8. Revised UG-131(a) to reference new text. E 2 = efficiency of longitudinal joint in cone. UHX-3.3 Floating Tubesheet Heat Exchanger with one
stationary tubesheet attached to the shell and channel, and one floating tubesheet that can move axially. (d) For Loose Ring Type Reverse Flanges Tr = Ur = \alpharU V = factor (use hor for ho in Figure 2-7.3) Yr = \alpharY \alphar = 412 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted
 without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 2-14 FLANGE RIGIDITY Experience has indicated that KI and KL provided above are sufficient for most services; other values may be used with the User's agreement. Morrow, Secretary L. Bellows Expansion Joints
Inspection During Fabrication . Cadwallader B. Alleshwaram, Alternate H. 34 Where applicable for Part UCS materials, the impact test temperature may be adjusted in accordance with UG-84(b)(2) and Table UG-84.4. 35 The maximum allowable working pressure may be adjusted in accordance with UG-84(b)(2) and Table UG-84.4. 35 The maximum allowable working pressure may be adjusted in accordance with UG-84.4.
to determine the maximum allowable working pressure. Griesbach K. Brouette J. Doctor, Vice Chair J. Sykora J. Where welding is used, the weld and the metal adjacent to it shall be examined by either the magnetic particle or liquid penetrant method and shown to be free of linear indications. It is the aim of the Society to maintain the standing of the
 ASME Single Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the ASME Single Certification Mark who comply with all requirements. Configurations b and c: If \sigma s \leq SPS,s, then the shell is acceptable. Paulick, Chair S. Jones P. The charts in Figures 4-3 through 4-8 illustrate various types of assorted,
randomly dispersed and clustered rounded indications for different weld thicknesses greater than 1/8 in. (50 mm) 1 hr/in. Di Rienzo J. Yang K. Example . 72 Furnace gas temperature measurement alone is not considered sufficiently accurate. Shah B. Norman J. Acceptable Proportions for Ends of Stays . ULW-17 DESIGN OF WELDED JOINTS --
                       `,`,``,,,`--`-`,,`,`,`,`,--- (a) Category A and B joints of inner shells and inner heads of layered sections shall be as follows: (1) Category A joints shall be Type No. (1) of Table UW-12. P-No. 15E Group No. 1. The inner cylinder that forms the pressure tight membrane. Three typical forms of cylindrical shells are shown in Figure UG-28.
 These rules do not indicate the selection of nonferrous material suitable for the intended service or the amount of the corrosion allowance to be provided. Minichiello Subcommittee on Design (BPV III) P. (g) This Division of Section VIII does not contain rules to cover all details of construction. Osterfoss T. Kobayashi R. Mize L. Design Seating Stress y
psi (MPa) Sketches Facing Sketch and Column in Table 2-5.2 Grooved metal: Soft aluminum Soft copper or brass Iron or soft metal Monel or 4-6% chrome Stainless steels and nickel-base alloys 3.25 3.50 3.75 4.25 5,500 6,500 7,600 9,000 10,100 (38) (45) (52) (62) (70) (1a), (1b), (1c), (1d), (2), (3); Column II Solid flat metal: Soft aluminum Soft copper or brass Iron or soft metal Monel or 4-6% chrome Stainless steels and nickel-base alloys 3.25 3.50 3.75 4.25 5,500 6,500 7,600 9,000 10,100 (38) (45) (52) (62) (70) (1a), (1b), (1c), (1d), (2), (3); Column II Solid flat metal: Soft aluminum Soft copper or brass Iron or soft metal Monel or 4-6% chrome Stainless steels and nickel-base alloys 3.25 3.75 4.25 5,500 6,500 7,600 9,000 10,100 (38) (45) (52) (62) (70) (1a), (1b), (1c), (1d), (2), (3); Column II Solid flat metal: Soft aluminum Soft copper or brass Iron or soft metal Monel or 4-6% chrome Stainless steels and nickel-base alloys 3.25 3.75 4.25 5,500 6,500 7,600 9,000 10,100 (38) (45) (52) (62) (70) (1a), (1b), (1c), (1d), (2b), (2d), 
 copper or brass Iron or soft steel Monel or 4-6% chrome Stainless steels and nickel-base alloys 4.00 4.75 5.50 6.00 6.50 8,800 13,000 18,000 21,800 26,000 (61) (90) (124) (150) (180) (124) (150) (180) (124) (150) (180) (124) (150) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (180) (18
21,800 (150) 26,000 (180) (6); Column I GENERAL NOTE: This Table gives a list of many commonly used gasket materials and contact facings with suggested design values of m and y that have generally proved satisfactory in actual service when using effective gasket seating width b given in Table 2-5.2. The design values and other details given in
this Table are suggested only and are not mandatory. (b) The Manufacturer shall qualify the Cementing Procedure Specification using a Cementing Procedure Sp
conditions. Otherwise, increase the assumed tubesheet thickness, h, and return to UHX-12.5.1. (c) Configurations a, b, c, e, and f: Proceed to UHX-12.5.10. MARKING AND REPORTS UNF-115 GENERAL The provisions for marking and reports in UG-120 shall apply without supplement to pressure vessels constructed of nonferrous
 materials. (0.38 mm) but not less than 0.010 in. Terminology. Barnes, Chair S. For plate material, the nominal thickness shown on the Material Test Report {or material Certificate of Compliance [UG-93(a)(1)]} before forming, or the measured thickness of the plate at the joint or location
 under consideration. The Manufacturer shall document qualification of the technician using a Cementing Technician (CTQ) form. Rods and Bars . Show materials for components. Gregg, Jr., Secretary X. Wright, Contributing Member R. Ramcharran, Staff Secretary C. 255 Copyright ASME International (BPVC) Provided by IHS under
 cylindrical shell L = design length of a vessel or tube section between lines of support, in. (3) The material shall be compatible insofar as welding is concerned with that to which the attachment is to be made. Ossmann J. The documentation shall contain at a minimum: (-a) material used (-b) the pressure-temperature rating of the part (-c) the basis for
 establishing the pressure- temperature rating (d) Cast, Forged, Rolled, or Die Formed Standard Pressure Parts That Comply With a Standard Other Than an ASME Product Standard or a stand
 other than an ASME product standard may be supplied by 11 Copyright ASME International (BPVC) Provided by IHS under license from IHS UG-11 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,
                  --- ASME BPVC.VIII.1-2019 UG-11 - UG-14 ASME BPVC.VIII.1-2019 (7) The Certificate Holder and the subcontractor shall describe in their Quality Control Systems the operations. Deubler M. Hayashi K. Oh, Staff Secretary A. ULW-55 ULW-57 The
 random ultrasonic examination of ULW-53(a) and ULW-53(b) and ULW-53(c) and random magnetic particle examination of ULW-53(a) shall be performed as follows: (a) The location of the random spot shall be chosen by the Inspector except that when the Inspector has been duly notified in advance and cannot be present or otherwise make the selection, the
fabricator may exercise his own judgment in selecting the random spot or spots. (d) All cemented nozzles must be examined to ensure that cement has flowed around the entire perimeter and that full penetration through the depth of the joint has been achieved. T. Cracks shall be repaired or removed. Nakajima M. Hottle, Vice Chair C. This exemption
 applies whether or not the outer pipe, shell, or protective element is constructed to Code rules. Stewart P. Peetz G. McCarty, Honorary Member J. Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-Nos. (-b) The provision of (b)(2)(-c) above shall be met. Roszman B. (1 100 min.) 1,900 min. The value shall be made available
 by the Manufacturer. Lindberg, Chair J. (25 mm) or 2t. Katcher, Contributing Member D. Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 342 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT
 ASME BPVC.VIII.1-2019 UIG-34 For each loading case, calculate the maximum bending stress in each tubesheet in accordance with (a) or (b) below. 1 and 2. (2) Additional reinforcement, attached to the inside surfaces. Zhong Z. (1) and (2) of Table
UW-12. Swindeman F. Garner P. Rogers, Contributing Member D. Nondestructive Examination . Parimi, Contributing Member J. Jackson — City of Detroit, Michigan M. The maximum allowable tensile stress values permitted for different materials are given in Section II, Part D, Subpart 1. Requests for Code Interpretation should preferably be
 submitted through the online Interpretation Submittal Form. The American Society of Mechanical Engineers does not "approve," "certify," "rate," or "endorse" any item, construction, or activity and there shall be no statements or implications that might so indicate. Duffey K. Minimum Depth for Flange of Flued-In Openings . (10 mm) and a maximum
of 11/2 in. Scarth Subgroup on Nondestructive Examination (SG-NDE) (BPV XI) J. Units (either primary or alternative) may be shown parenthetically. Except for applications involving lethal service, steel castings made to an accepted standard, such as ASME B16.5, are not required to comply with the provisions of this Appendix. The coupons shall
remain attached to the vessel or vessel component during tempering, except that any thermal buffers may be removed after quenching. U-3 UNITS OF MEASUREMENT5 (a) U.S. Customary units may be used to demonstrate compliance with requirements of this edition related to materials, fabrication, examination,
inspection, testing, certification, and overpressure protection. 96 Knowing the official rating capacity of a safety valve which is stamped on the value of these individual terms is not known: Official Rating in Steam Official Rating in Air This
material at T channel material at T channel material at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section II, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section III, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section III, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section III, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section III, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section III, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken from Section III, Part D, Subpart 1, Table Y-1. Acceptance Criteria at T t NOTE: The yield strength shall be taken fr
the opinion that a physically better joint can be made by departure from these limits, filler metal of a different composition may be used provided the strength of the weld metal at the operating temperature is not LIQUID PENETRANT EXAMINATION All austenitic chromium-nickel alloy steel and austenitic/ferritic duplex steel welds, both groove and
fillet, that exceed a nominal size of 3/4 in. UHX-11.5 UH
 conform in all respects to the material specification which applies to the pressure vessel or pressure vesse
(50) 1 11/4 11/2 2 21/2 4 51/4 81/8 (64) (100) (134) (207) 1 229 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Minimum Radius of Curvature of Cylinder or Cone, in. Katoh J. ULT-2 CONDITIONS OF SERVICE (a) Measures shall be taken to avoid
 stresses at any temperature that are in excess of the maximum allowable stress applicable to that temperature. ULT-30 STRUCTURAL ATTACHMENTS (a) See ULT-5(e) for limitations on material used in permanent structural attachments in 5%, 7%, 8%, or 9% nickel steel vessels. Hacker W. Rules for the Design of Fixed Tubesheets . Younger M.
safety valve set pressure: see ASME PTC 25. 38 The maximum allowable working pressure (external) is required only when specified as a design condition. Lack M. UNF-A-11 UNF-A-13 INERT GAS METAL ARC WELDING CORROSION SPECIAL COMMENTS (a) Aluminum. Hansing, Alternate A. Stakenborghs M. Nozzles Adjacent
(3) In sketch (f), Y shall not be larger than 1/2t S. Those laws or regulations may require the use of this Division of the Code for vessels or components not considered to be within its scope. In place of radiographic examination, welds may be ultrasonically examined for their full length (see UW-53). Oldani U. Sprague P. ULW-33 ULW-50 GENERAL
 The rules of the following paragraphs apply specifically to the nondestructive examination of pressure vessels and vessel parts that are fabricated using layered construction c: For a cylinder: Configuration d: For a hemispherical head: Configuration e: --
                       ',','',,,'-'-',',',',','--- UHX-12.5.5 Step 5. Yang, Contributing Member J. 619 619 P-1 Nonmandatory Appendix R R-1 R-2 R-3 R-4 R-5 R-6 R-7 R-8 R-9 R-10 Nonmandatory Appendix DD .. Bacon C. Patil S. (d) Exemptions from Impact Testing for Base Metals and
HAZs. Impact testing is not required for Table UHA-23 base metals for the following combinations of base metals and HAZs (if welded) and MDMTs, except as modified in (c): (1) for austenitic chromium-nickel stainless steels as follows: (-a) having a carbon content not exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-b) having carbon
content exceeding 0.10% at MDMTs of -55°F (-48°C) and warmer; (-c) for castings at MDMTs of -20°F (-29°C) and warmer; (-b) having a carbon content exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-b) having a carbon content exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-b) having a carbon content exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-b) having a carbon content exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-b) having a carbon content exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-b) having a carbon content exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-b) having a carbon content exceeding 0.10% at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) and warmer; (-c) for castings at MDMTs of -320°F (-196°C) at MDMTs of
0.10% at MDMTs of -55°F (-48°C) and warmer; (-c) for castings at MDMTs of -20°F (-29°C) and warmer; (-a) austenitic ferritic duplex steels with a nominal material thickness of 3/8 in. Ramirez, Contributing Member G. No. SB-493 SB-523 SB-550 UNS
No. R60702, R60705 R60705 R60702, R60705 R60705
                                                                             `,,,`-`-`,,`,,`,`,`,--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 422 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1
                                                                        - Figure 4-7 Charts for t Over 2 in. Formulas for the Design of Formed Heads Under Internal Pressure . The document was published in 2017 and it has been updated by ASME BPVC Section VIII Division 2 2017 Errata No. 1. (a) Pieces that are formed after heat treatment at a temperature lower than the
final tempering shall be heat treated in accordance with Table UHT-56 when the extreme fiber elongation from forming exceeds 5% as determined by the equations in Table UG-79-1. Inspection of Vessels and Vessel Parts . Nameplate Application Procedure Qualification . A line of support is: (a) a circumferential line on a head (excluding conical
 heads) at one-third the depth of the head from the head or section that satisfies the
 moment of inertia requirement of 1-8. (-c) added (15-2391) 225 Nonmandatory Appendix UHA-A Revised in its entirety (15-698) 228 UCI-35 In subpara. The value of B shall be determined as follows. (d) Repeat Steps 1 through 7 for the design loading cases, with the following changes to Step 2, until the tubesheet stress criteria have been meta-
Configurations a, b, and c: \beta s = 0, \delta 
 resistant integral or weld metal overlay cladding and those having applied corrosion resistant linings, and shall be used in conjunction with the general requirements for Fabrication in Subsection A, and with the specific requirements for Fabrication in Subsection A, and with the specific requirements for Fabrication in Subsection B that pertain to the method of fabrication in Subsection A, and with the specific requirements for Fabrication in Subsection B that pertain to the method of fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction with the specific requirements for Fabrication in Subsection B. International conjunction and the subsection B. International conjunction B. Int
(BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT .. 11 It is recommended that a suitable margin be provided above the pressure at which the vessel will be normally operated
to allow for probable pressure surges in the vessel up to the setting of the pressure and designed to function by the bursting of a pressure containing disk. Then bend the specimen so as to produce an elongation of not less
 than In addition, prior to using the welding procedure, the Manufacturer shall demonstrate that the heat-affected zone does not encroach upon the minimum wall thickness of Cylindrical and Spherical Shells. Certification of Competency for Nondestructive Examination
                                                                                      .````,``,``,,``,,`-`-`,\`,,`,,`,--- NOTE: (1) Figure CI-1 is contained in Section II, Part D, Subpart 3. Pieper, Honorary Member K. These laws or regulations should be reviewed to determine size or service limitations of the coverage which may be different or more restrictive than those given here.
 Subparagraph (g) below provides for special analysis in the design of cone-to-cylinder intersections with or without reinforcing rings where α is greater than 30 deg. Simpson, Contributing Member R. Questions or issues regarding compliance of a specific component with the Code rules are to be directed to the ASME Certificate Holder
 (Manufacturer). For tube-totubesheet joints with partial strength welds, L m a x shall be determined in accordance with UW-20, UW-18(d), or Nonmandatory Appendix A, as applicable. Helmholdt S. Hsu Subgroup on General Requirements (BPV III) J. Dewees B. If the tube side is the higher-pressure side, P t shall be the tube side design pressure, and
 Ps shall be Pt less the differential design pressure parts as identified in UG-93(a) or UG-93(b), or Partial Data Reports, provided the requirements for a pressure relief valve has been a long-standing, well established rule in this Division. (5) Standard pressure parts as identified in UG-93(b), or Partial Data Reports, provided the requirements
of UG-11(c) are met. When the small end of the cone is considered a line of support, the moment of inertia for a stiffening ring shall be determined in accordance with (3). (b) This diagram is identical to the WRC-1992 Diagram, except that the solidification mode lines have been removed for ease of use. Engman R. (b) When P e = 0, calculate the
 maximum bending stress, \sigma, for each tubesheet. The Inquirer should consider the need for additional audiovisual equipment that might not otherwise be provided by the Committee. If |\sigma| s, |\sigma| m |\sigma| s, |\sigma| s, |\sigma| m |\sigma| s, |
the raw materials and processes necessary to manufacture certified material. (See Nonmandatory Appendix UHA-8 GENERAL UHA-12 BOLT MATERIALS (a) Approved specifications for bolt materials of carbon steel and low alloy steel are listed in Table UCS
 23 and of high alloy steel in Table UHA-23. Barker J. Thickness of Shells and Heads Under External Pressure . Ramcharran, Staff Secretary L. (b) Place and hold the template over a clean smooth surface. (b) In addition to meeting the requirements of (a), 87½ where O = 384 Copyright ASME International (BPVC) Provided by IHS under license with
 `--- (1) openings for radial nozzles that exceed the limits in UG-
36(b)(1) and that also are within the range defined by the following limits shall meet the requirements in (2), (3), and (4) below: (-a) v e s s e l d i a m e t e r t h a n 6 0 i n . (e) Localized discontinuity stresses [see (c) above] are calculated in Mandatory Appendix 1, 1-5(g) and 1-8(e), Part UHX, and Mandatory Appendix 5. When required by
 context in this Section, the singular shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender shall be treated as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender shall be treated as such other gender as appropriate. (3) For each lot of material, the strength values shall be treated as such other gender shall be treated as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be interpreted as the plural p
  J. Wong R. Material that cannot be qualified under the provisions of either (a) or (b), such as material not fully identified by the governing specifications, each tube after finning shall be subjected to a pneumatic test or a hydrostatic test as
 reference to forged vessels, main sections of vessels, and other vessel parts. Kim M.-W. Younger JSME/ASME Joint Task Group for System-Based Code (SWG-RIM) (BPV XI) A. This may result in a higher tubesheet bending stress σ. Bolt loads and moments, as well as stresses, are then calculated as for circular flanges, using a bolt circle drawn
                                   `-`-`,,`,,`,`,`--- UG-24 - UG-25 UG-25 - UG-28 ASME BPVC.VIII.1-2019 (1) Circumferential Stress (Longitudinal Joints). Nozzle Minimum Thickness Requirements . Senecal, Contributing Member Z. Kurle R. Nondestructive Testing . No Yes Unacceptable without pre-use testing Yes --`
 (1), (f)(2), (f)(3), and (f)(4) 1. Janssen S. Revised UCS-66(c) and Figure UCS-66 to address low toughness concerns with SA-553 Type I SA-553 Type II SA-553 Type II SA-645, Grade A K81340 K81
 11A/1 11A/2 (1) One of the following high nickel alloy filler metals is used: WELDING Specification No. (a) The qualification tests shall be performed on postweld heat-treated specimens when a postweld heat treatment is used. (b)
 Calculation Procedure for Tubesheets (1) Scope. Floer B. One or a combination of the following three options may be used. Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPV
 Resale, 07/02/2019 13:29:04 MDT 1-6 - 1-7 ASME BPVC.VIII.1-2019 (2) flange thickness for full face gasket where 83P Q = (6) the required flange thickness shall be T as calculated in (2), (3), (4), or (5)
 above, but in no case less than the value of t calculated in (1) above. French J. Organizations that are authorized to use the ASME Single Certification Mark for marking items or constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code are issued Certificates of Authorization. For all other
 tube joints, L m a x shall be determined in accordance with Nonmandatory Appendix A. 31-1 31-2 31-3 31-4 31-5 Mandatory Appendix 32 .. Golliet, Chair T. Finney, Chair G. (a) A linear indication is one having a length greater than three times the width. Added sentence "Section IX is the governing document for P-Numbers and Group Numbers" to
UCS-56(a). Dimensional Check of Component Parts . For each loading case, calculate §194 the average shear stress in the tubesheet at the outer edge of the perforated region, if required. 2 O-ring (e) O-Ring Graphite nozzle Nozzle stud Steel flange Steel flange Steel flange Steel flange to Steel flange Steel flange to Steel flange Steel flang
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 license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT SUMMARY OF CHANGES Errata to the BPV Code may be posted on the ASME website to provide correctly published items, or to correct typographical or grammatical errors in the BPV Code. 2 Requirements
 for pressure vessels for human occupancy are covered by ASME PVHO-1. 264 Copyright ASME International (BPVC) Provided by IHS under license eron IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME
                                                                                                                                                       ``,`,``,,,`-'-',,`,,','--- NOTE: (1) For other than hemi-heads, special consideration shall be given to the discontinuity stress. Glaspie T. Kalyanam T. (a) For geometries where the tubes extend through the tubesheet [see Figure UHX-11.3-1, sketch (b)]
calculate D o , μ, d*, p *, μ *, and . When the thickness exceeds 2 in. (-d) The vessel shall be hydrostatically tested after making the welded repair. Vlaicu K. Johnson B. Lantz G. GENERAL UIG-1 SCOPE The rules in Part UIG are applicable to pressure vessels and vessel parts that are constructed of impervious graphite and graphite compounds and
* \leq 0.6. (c) For both parts (a) and (b) in the tabular part of this Figure: for values of h/p lower than 0.1, use h/p = 0.1; for values of h/p higher than 2.0, use h/p = 2.0. 294 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
 Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UHX-12.3 δ19 Figure UHX-11.5.2-2 Curves for the Determination of E */E and ν * (Square Pattern) 0.8 0.4 h/p 2.00 0.7 1.00 0.6 0.50 0.3 0.15 h/p 0.10 0.25 0.50 2.00 0.2 0.1 0.1 0 0.1 0.2 0.3 * 0.4 0.5 0.6 0
Chaudouet M. (5) The tensile strength and compressive strength values obtained in accordance with UIG-84 shall be determined by the equations in Table UIG-79-1. UHX-14.8.3 Configuration a: If facts = 1.0 and factc = 1.0, the design is acceptable, and the
 accessibility of welds shall be subject to the acceptance of the Inspector. Basavaraju D. (-b) At MDMTs colder than -320°F (-104°C) but not colder than -320°F (-104°C), vessel (production) impact tests are exempted provided that the preuse test requirements in (f) are satisfied. (b) Example 2. Zhao S. (b) The alignment of longitudinal joints in
 adjacent cylindrical sections or heads shall be displaced at least five times the thickness of the thickness
Test Specimen . A listing of these materials is given in the following tables, which are included in Subsection C. Personnel who perform the Visual Examinations shall be qualified and certified for this method in accordance with a program established by the employer of the personnel being certified, which shall be based on the following minimum
requirements: (a) instruction in the fundamentals of the visual examination method. for t greater than 2 in. (-c) When volumetric examination is required by the rules of this Division, obtain the completed radiographs, properly identified, with a radiographic inspection report, and any other applicable volumetric examination report.
                                                                                                                                          (d) Treatment after cementing per instruction no. Ball D. Vo S. Such interpolation may also be used to determine a B value at an intermediate temperature that lies between two sets of tabular values, after first determining B values for each set of tabular values
                                                                                                                                                                                     (Name) (Mark) (Report No.) (Date) Cementing Operation: (a) Surface preparation per drawing of specimen
 When a pressure vessel is expected to operate at more than one pressure and temperature condition, other values of maximum allowable working pressure with the coincident permissible temperature shall be determined by the
Figures LL-1 and LL-2 are graphical representations of F t, m in and F t, m ax, respectively, for \nu^* = 0.4 when Pe \neq 0. Hsu, Honorary Member R. Typical Pressure Parts With Butt-Welded Hubs. Jawad, Contributing Member R. Typical Pressure Parts With Butt-Welded Hubs.
 which the marked burst pressure must fall to be acceptable for a particular requirement as agreed upon between the rupture disk Manufacturer and the user or his designated Table 33-1 as Table U-4-1, relocated it to U-4, and deleted
Mandatory Appendix 33. (f) Overwraps. (6.3 µm) arithmetical average deviation, and a factor not to exceed 85% shall be applied. MARKING AND REPORTS UHT-115 GENERAL The provisions for marking and reports in UG-115 through UG-120 shall apply to pressure vessels or parts constructed in whole or in part of steels covered by this Part,
except that the use of nameplates is mandatory for shell thicknesses below 1/2 in. Kleiss P. Pasek, Contributing Member D. Step 7. Lin, Contributing Member D. Step 7. Lin, Contributing Member M. The Code does not address all aspects of these activities and those aspects that are not specifically addressed should not be considered prohibited. (-g) Tubesheets shall be uniformly
 Inquiries should be mailed to the Secretary of the BPV Committee at the address above. Winn, Delegate L. Venkataramana M. Mehta A. A = outside diameter of tubesheet, except as limited by UHX-10(b) a c = radial channel dimension Configuration a: ac = Dc/2 Configurations b, c, and d: ac = Gc/2 a o = equivalent radius of outer tube limit circle A F
 = total area enclosed by CP as = radial shell dimension Configurations a, b, and c: as = Ds/2 Configuration d: as = Gs/2 C = bolt circle diameter (see Mandatory Appendix 2) CP = perimeter of the outermost tubes (see Figure UHX-12.2) Dc = inside
 channel diameter D J = inside diameter of the expansion joint at its convolution height D s = inside diameter of tubes E = modulus of elasticity for tubes heet material at Ts E s = modulus of elasticity for tubes to the expansion joint at its convolution height D s = inside diameter of tubes E = modulus of elasticity for tubes to the expansion joint at its convolution height D s = inside diameter of tubes E = modulus of elasticity for tubes E = modulus of el
stress) for shell E t = modulus of elasticity for tube material at Tt G 1 = midpoint of contact between flange and tubesheet G c = diameter of shell gasket load reaction (see Mandatory Appendix 2) h = tubesheet thickness J = ratio of expansion joint to shell axial rigidity (J =
 permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-121 ASME BPVC.VIII.1-2019 FORM CMQ CERTIFIED MATERIAL QUALIFICATION FORM (Used in the Construction of Graphite Pressure Vessels) (Cont'd) (b) Tensile Strength: See test method in
 when f is equal to or greater than one b o = basic gasket seating width (from Table 2-5.2) B s = bolt spacing. Brown T. Devlin J. Wittenbach K. 692 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer
 Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 KK-1 FORM U-DR-1 USER'S DESIGN REQUIREMENTS FOR SINGLE-CHAMBER PRESSURE VESSELS Owner: Service: 1 F Operator: 2 F Country of Installation: 3 F 4 F 5 F Liquid Level: Specific Gravity: 7 F Diameter: 10 F National Board Registration Required: Yes No 14
 (MDMT) - Case 1 Minimum Design Metal Temperature (MDMT) - Case 2 Corrosion Allowance: Shell 18 F Heads 19 F Int. (2) For a noncircular nozzle, d m a x (major axis) is defined as the minimum diameter of d. Selensky S. (d) Heads of the type shown in Figure 1-6, sketch (a): (1) the thickness
 of the head t shall be determined by the appropriate formula in UG-32 for pressure on concave side; and UG-36 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-37 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-37 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-37 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the thickness of the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the skirt shall be determined by the formula for cylindrical shell in UG-38 for pressure on convex side; the skirt shall be determined by the skirt shall be determined b
 comply with the limitations given in UG-32; (3) the flange shall comply at least with the requirements of Figure 2-4 and shall be designed in accordance with the previous surface shall be examined for
 100% of their length in accordance with Mandatory Appendix 6 by the magnetic particle method using direct current only when the material is ferromagnetic. The BPVC is a comprehensive collection of rules and guidelines for designing and constructing equipment, vessels and facilities to perform under pressure. A pilot-operated pressure relief valve
is a pressure relief valve in which the major relieving device is combined with and is controlled by a self-actuated auxiliary pressure relief valve. Yes Exempt per UHA-51(g)? Revised UHX-10(d), the maximum tubesheet butt length when directly attached to a hemispherical head (i.e., no intervening cylinder). Weld Metal Composition . (e) When
necessary, vessels shall be provided with stiffeners or other additional means of support to prevent overstress or large distortions under the external loadings listed in UG-22 other than pressure and temperature. Sens R. Butt Welding of Components to Thickened Neck Nozzles . This Code contains mandatory requirements, specific prohibitions, and
nonmandatory guidance for construction activities and inservice inspection and testing activities. If heat treatment is performed at 1,850°F (1010°C) minimum followed by rapid cooling to below 800°F (430°C). (e) Number of Tests. The weld gap of the longitudinal layer weld joint shall be the minimum
 width used in the procedure qualification for layers 7/8 in. Wong Working Group on Supports (SG-CD) (BPV III) J. Added difference between "extension" and "compression" in 26-9.5. Added alternative formulas for the calculation of the total equivalent axial displacement range in 26-9.6. Errata correction. Material identified with a specification not
permitted by this Division and identified to a single production lot as required by a permitted by this Division, provided the following conditions are satisfied: (1) Recertification by an Organization Other Than the Vessel or Part Manufacturer. The technical
  consistency of the Sections of the Code and coordination of standards development activities of the Committees is supported and guided by the Technical Oversight Management Committee. (d) The designer shall consider the effect of radial differential thermal expansion between the tubesheet and integral shell or channel (configurations a, b, and c)
in accordance with UHX-13.8, if required by UHX-13.8.1. (e) The designer may consider the tubesheet as simply supported in accordance with UHX-13.9. Design Considerations (a) It is generally not possible to determine, by observation, the most severe condition of coincident pressure, temperature, and differential thermal expansion. Cumino,
Contributing Member B. Nadarajah P. Galanes J. Bustillos B. Kavanagh K. Pillow H. Vogel — Illinois T. Sample Forms . Lundy T. Voorhees, Contributing Member Executive Committee (BPV V) N. Values of Factor K . For the stationary tubesheet, diameters A, Gs, and Gc shall be taken from Figure UIG-34-2. Birks, Contributing Member N. f 1 ' = axial
Cladding, Weld Metal Overlay Cladding, or Applied Linings . Tam, Contributing Member E. (c) Base material with corrosion resistant integral cladding in which any part of the cladding is included in the design calculations, as permitted in UCL-23(c), shall show a minimum shear strength of 20,000 psi (140 MPa) when CONDITIONS OF SERVICE
 Specific chemical compositions, heat treatment procedures, fabrication requirements, and supplementary tests may be requirements to existing Code requirements. (1) For each loading case, determine coefficients Ft, min and Ft, max
from Table UIG-34-5 and calculate the two extreme values of tube stress, \sigma t, 1 and \sigma t, 2. UHT-34 HEMISPHERICAL HEADS When hemispherical heads are used, the head-to-shell transition of Figure UW-13.1, sketch (j) or Figure UW-13.1, sketch (l) shall be used. Types of Vessels . (6 mm) for t less than 3/4 in. Peening . 319 Copyright ASME
BPVC.VIII.1-2019 Figure UHX-14.1 Floating Tubesheet configuration A, B, or C (a) Typical Floating Tubesheet configuration A, b, c, d, e, or f Floating Tubesheet configuration A, b, c, d, e, or f Floating Tubesheet Exchanger With an Immersed Floating Tubesheet Exchanger With an Immersed Floating Tubesheet Configuration A, b, c, d, e, or f Floating Tubesheet Exchanger With an Immersed Floating Tubesheet Configuration A, b, c, d, e, or f Floating Tubesheet Configuration A, b, c, d, e, or f Floating Tubesheet Configuration A (b) Typical Floating Tubesheet Configuration A (c) Typical Flo
Tubesheet Exchanger With an Externally Sealed Floating Tubesheet configuration a, b, c, d, e, or f Floating Tubesheet Exchanger With an Internally Sealed Floating Tubesheet Configuration D (c) Typical Floating Tubesheet Exchanger With an Internally Sealed Floating Tubesheet Exchanger With an Internally Sealed Floating Tubesheet Exchanger With an Internally Sealed Floating Tubesheet Configuration D (c) Typical Floating Tubesheet Exchanger With an Internally Sealed Floating Tubesheet Exchanger With an Internal Sealed Floating Tubesheet Exchange
with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Figure UHX-
14.2 Stationary Tubesheet Configurations ts tc A C A Pt Ps Gc G1 Ps C Ds h h 321 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT (a) Configuration a: Tubesheet Integral With Shell and Channel Pt Gc Ds Ds Dc A C h (b) Configuration b: Tubesheet Integral With Shell and Gasketed With
Channel, Extended as a Flange (c) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Not Extended as a Flange tc A (extended) tc A C Pt Ps A (not extended) A C Ps Pt Gs Dc h Gc h ASME BPVC.VIII.1-2019 --`,``,`,
                                                                                                                                                                                                                                                                                                                                                                                                                             --- Ps Pt ts ts C G1 Dc Ps Pt Gs h Gs Ds (e) Configuration e: Tubesheet Gasketed With
Shell and Integral With Channel, Extended as a Flange (f) Configuration f: Tubesheet Gasketed With Shell and Channel UHX-14.3 (d) Configuration f: Tubesheet Gasketed With Shell and Channel UHX-14.4 ASME BPVC.VIII.1-2019 P s o x , m a x = max.(0, maximum shell side operating pressure for
operating condition x) P s o x, m in = min.(0, minimum shell side operating pressure for operating pressure, as applicable. GENERAL The provisions for inspection and testing in Subsections A and B shall apply to vessels and vessel parts constructed of materials covered by this Part, except as modified
herein. Reinforced Vessels of Obround Cross Section [Figure 13-2(b), Sketch (2)]. When g1 = go, F = 0.908920, V = 0.550103, and f = 1; thus eqs. (2) All joints of Category B shall be Type No. (1) or (2) of Table UW-12. See UG-90(c)(1). Diaz-Castillo J. Replaced "Name" with "Signed" on Forms U-4 and U-5 for the Authorized Inspector. USES Some of
the uses of high alloy steel are to resist corrosion, to avoid contamination of contents with iron, to facilitate cleaning foods, to provide strength or scaling resistance at low temperatures. Morishita P. The Manufacturer is the Manufacturer required to
fulfill Code requirements. Sabo F. Gutherman S. Sens A. Comparatively high speeds and fine feeds give best results. Those who purchase a fully operational air compressor with a properly installed pressure relief device are not a "user" as referenced in this Division. Dished Covers With Bolting Flanges. CERTIFIED CEMENTING PROCEDURE
SPECIFICATION UIG-84 (a) The Manufacturer shall prepare a Cementing Procedure Specification (CPS). (mm) Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UCD-101 - UCD-115 ASME BPVC.VIII.1-2019 UCD-101 HYDROSTATIC TEST TO DESTRUCTION (b) The value of the average
tensile strength of test specimens in the foregoing equation shall be determined from the test results of three test bars from the part, or from the part, or from the part, or from the part of three test specimens in the foregoing equation shall be determined from the part. Carter T. Freed, Secretary K. CORROSION OF CLADDING OR LINING MATERIAL UCL-32 WELD METAL COMPOSITION Welds that are
exposed to the corrosive action of the contents of the vessel should have a resistance to corrosion that is not substantially less than that of the corrosion resistant integral or weld metal overlay cladding or lining. Johns K. Material Specifications . Length L c of Some Typical Conical Sections for External Pressure . These tubes may be used under the
following conditions: (1) The tubes, after finning, shall have a temper or condition that conforms to one of those provided in the governing specifications, or, when specified, they may be furnished in the governing specifications, or, when specified, they may be furnished in the governing specifications, or, when specified, they may be furnished in the governing specifications, or, when specified the governing specifications of the tubes, after finning, shall have a temper or condition that conforms to one of those provided in the governing specifications, or, when specified the governing specifications of the tubes, after finning, shall have a temper or condition that conforms to one of those provided in the governing specifications.
the unfinned portions in the temper of the tube prior to finning. (See Mandatory Appendix 37.) UIG-79 CEMENTING TECHNICIAN QUALIFICATION (a) A cementing technician is any individual who is responsible for proper joint preparation, cleaning of parts to be joined, mixing cement, applying cement, securing the joint during curing, and
monitoring the curing process. Grimm S. Bennett T. Cusick Y. The calculated localized stresses at the discontinuity shall not exceed the stress values specified in 1-5(g)(2). Typical Bellows Expansion Joints . (f) Dimensions shown in the text, tables, and figures, whether given as decimals or fractions, may be taken as decimals or fractions.
and do not imply any manufacturing precision or tolerance on the dimensions. Conical Sections . Nomenclature and Formulas for Reinforced Openings . The repair shall neither result in sharp edges nor in the finished thickness being less than the minimum design thickness. -320 -300 -250 -200 -150 -100 -50 0 100 150 Sheet and Plate SB-209
0.051 \le t < 1.50 \ 1.50 \le t < 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00 \ 3.00
40.4 39.4 39.1 39 39 Seamless Extruded Tube SB-241 t ≤ 5.00 53.8 52 47 42.7 40.4 39.1 39 39 Spec. Rodery B. NN-2 INFORMATION (a) The user is responsible for providing, or causing to be provided, the information pertinent to the design requirements for the pressure vessel to be constructed
(c) Calculate v b. Iohnson K. .. (c) Inner Head. Revised UF-45 to refer to inspections and tests given throughout Part UF as well as UG-90 through UG-102. Such parts shall be marked with the name or trademark of the parts manufacturer and with such other markings as will serve to identify the particular parts with accompanying material
 identification. Recommended Joint Clearances at Brazing Temperature . The Manufacturer's Data Report has been completed and the Certification Mark applied. Tomes A. The following list, although not all-inclusive,
outlines common scenarios that reflect the collaborative actions of the user, designated agent, and Manufacturer in the performance of their Code responsibilities (see NN-6): (a) A user specifies a pressure vessel, and a Manufacturer constructs the vessel. Mack A. When the bolt spacing exceeds 2a + t, multiply M O by the bolt spacing correction
for shear. (d) Category B joints in layers over 7/8 in. 309 Copyright ASME International (BPVC) Provided by IHS under license erom IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-13.5.8 - UHX-13.5.9 ASME
``,`,``,,,`-:-`,,`,,`,`,`,--- Q3 = 0.5 Q3 = 0.4 0.2 Q3 = 0.3 Q3 = 0.2 0.1 Q3 = 0.1 0 1.0 Q3 = 0.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 Xa GENERAL NOTES: (a) Curves giving F m are
valid for v *= 0.4. They are sufficiently accurate to be used for other values of v * . (c) Base Material with Corrosion Resistant Integral or Weld Metal Overlay Cladding With Credit for Cladding Thickness. Honcharik G. Malikowski G. External Pressure . (2) Category B joints shall be Type No. (1) or (2) of Table UW-12. U. 274 Copyright ASME
specifications listed therein. (2.5 mm)? Alternative Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels. Yonsky, Alternate S. Newmark, Honorary Member M. The fluid temperature is not exceeded. This most severe condition
may be gasket seating on one flange with operating on the other, gasket seating on each flange at the same time. Sun B. Added joint types f, g, and h (expanded only) in A-1. Minichiello, Vice Chair A. (b) Response. The total depth of a weld repair shall be taken as the
sum of the depths for repairs made from both sides of a weld at a given location. The user or his designated agent shall specify all the design and operating conditions that govern the design of the main components of the material/temperature line, see Step
No. (1) of Table UW-12. Specification Sheet for ASME Section VIII, Division 1 Mandatory Appendix 26 Bellows Expansion Joints . 245 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed
Not for Resale, 07/02/2019 13:29:04 MDT UHT-33 - UHT-57 UHT-30 - UHT-57 UHT-30
[see (b) and (c)]. Some applications of this rule are base metal welded with alloy-steel electrodes, and alloy nozzles welded to steel shells. Flanges Subject to External Pressures of a spherical shell under external pressure, either seamless or of built-up construction with butt joints, shall be determined by the following
procedure: Step 1. An approximation of the area of the gap shall be calculated as indicated in Figure ULW-77. Added a note for a more precise description of the displacements on the specification forms. Asayama, Chair F. Feng S. Massobrio M. Adams C. LTA Blend Grinding . Qualification of Brazers and Braze
 13:29:04 MDT 4-3 ASME BPVC.VIII.1-2019 Figure 4-6 Charts for t Over 3/4 in. (d) Vent holes shall not be obstructed. (13 mm), of nominal thickness, whichever is smaller. Munshi J. Riccardella, Honorary Member R. Brust, Chair P. (c) corner joint: a joint between two members located in intersecting planes at approximately 90 deg. Wielgoszinski,
Chair G. Eisberg M. (3) These rules also apply to channels integral with tubesheets having extensions. Guidance to the Responsibilities of the User and Designated Agent. McDonald D. Note that these may be used for flanged-only expansion joints when the expansion joints when the expansion joint analysis method uses the displacement over the expansion
element only [see UHX-17(c)]. This procedure is provided for in Section VIII, Division 2 rules for layered vessels in lieu of the maximum allowable stress S given in Section II, Part D, Subpart 1, Tables 1A and 1B shall be used instead of the stress intensity S m given in Section II, Part D,
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pressures shall not exceed the values used for design. Ross, Contributing Member A. 40 In this usage, organization may be the same company at a single site, a multiplant corporate Certificates of Authorization. See Figures UG-34 and
UW-13.2 98 I = bt 3/12 where b = 1.0 for vessels without reinforcements and for vessels with two the Authorized Inspector. Orie D. For tube-totubesheet joints with full strength welds, L m a x shall be determined in accordance with UW-20. Other notation is
defined in 2-3 for flanges and 2-13 for reverse flanges. Step 2. (5) If the minor attachment is welded in the area less than from any gross structural discontinuity, where R m is the mean radius of the shell, and t is the thickness of the shell, the stress evaluation in accordance with Section VIII, Division 2, Part 5 shall be performed. (0.3 mm) or 6% of the
design thickness [see UG-90(b)(6)]. Doron, Contributing Member T. For shell side design pressure P s d, m a x = maximum shell side design pressure for operating
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Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 8194 ASME BPVC.VIII.1-2019 Figure ULW-32.1 Solid-to-Layered and Layered-to-Layered Test Plates --`,
permitted without license from IHS 267 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULW-52 ULW-53 - ULW-54 ASME BPVC.VIII.1-2019 Figure ULW-32.2 For T 1 in. Calculations shall be performed for both the stationary tubesheet and the floating tubesheet. Authority and
 Responsibility . Prokopuk J. Elkadim D. Sybert R. The average primary membrane stress [see UG-23(c)] in these restraining elements shall not exceed the maximum allowable stress at the design temperature for the material given in Section II, Part D, Subpart 1. Is MDMT colder than 155F (104C)? (a) This procedure shall not be
used at temperatures where the time-dependent properties govern the allowable stress. Orbovic J. Kovacs A. (3) The designer should take appropriate consideration of the stresses resulting from the pressure test required by UG-99 or UG-100 [see UG-99(d)]. Stop Valves Located in the Relief Path. Unless one or more of the following conditions are
satisfied, PWHT at the temperature listed in Table UHA-44 for the specific material grade may be advisable to avoid relaxation cracking: (a) The design temperature does not exceed 1,000°F (540°C). (a) The two eccentric cones are identical in geometry and material. Internal Structures Support.
and Low Alloy Steels — P-No. 4. Also substitute hor for ho in determining the factor V in the equation for integral type flanges. Yang G. Newton S. Lindberg G. MAXIMUM ALLOWABLE WORKING TEMPERATURE UCL-31 (a) When the design calculations are based on the thickness of base material exclusive of lining or cladding thickness, the
maximum service metal temperature of the vessel shall be that allowed for the base material. Wilson T. Corners and Fillets . - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.2(c)(2), it will be referenced as X.1(c)(1) but is referenced in X.2(c)(2), it will be referenced as X.1(c)(1) but is referenced in X.2(c)(2), it will be referenced in X.2(c)(2).
                                                          NOTES: (1) All graphite block tensile and compressive samples are tested across grain, and all tube samples are tested with grain. Analyses need only be made for those elements for which documentation is
 not available must be tested. Ishikawa, Chair A. (a)(2) (15-1391) (2) Subparagraph (b) revised (15-1391) 159 UF-45 Revised (15-1391) 168 UCS-11 In subpara. to 3/4 in. clad vessel: a vessel made from a base material having a corrosion resistant material either integrally bonded or weld metal overlaid to the base of less resistant material. Aurioles, Sr
S. Pressure Test Requirement . ULW-22 POSTWELD HEAT TREATMENT ULW-31 WELDED JOINTS The design of welded joints of layered vessels shall be in accordance with ULW-17. Henry J. Bunch J. Guzey, Vice Chair J. Engineering judgments must be consistent with Code philosophy, and such judgments must never be used to overrule mandatory
requirements or specific prohibitions of the Code. Danzy, Contributing Member M. Zickler H. Babka O. 22 In order to ensure that a finished head is not less than the minimum thickness required, it is customary to use a thicker plate to take care of possible thinning during the process of forming. (c) Magnetic particle examination shall be performed in
approximately parallel to the metal flow lines of the stock, and the minimum required thickness of the component is calculated following the rules of this Division using 50% of the specified allowable stress. Yes for additional No testing exemption criteria. The CCS shall include all essential and non-essential variables with tolerance ranges
including shelf life and storage recommendations. Yang J. 90 Loose flanges of the type shown in Figure 2-4, sketch (1) are of the split design when it is necessary to install them after heat treatment of a stainless steel vessel, or when for any reason it is desired to have them completely removable from the nozzle neck or vessel. to 0.099 in. Vickery C
Kim J.-I. O'Sullivan M. Weld Procedure Qualification . Alternatively, the completed vessel may be pneumatically tested in accordance with 35-6. Munson R. Koo D. Dewees C. Kim T. Hakii K. xxviii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 495 495 496 501 506 507 512 513 515 518 519 520 524 527 530 530 532 533 534 535 543 546 548 549 550 550 551 559 565 566 567 569 570 571 581 589 590 601 603 604 605 606 646 654 655 657 657 658 667 668 669 670 670 -
UHA-32-5 Austenitic Stainless Steel Base Metal and HAZ Toughness Testing Requirements . For vessels in lethal service or when specified by the user or his designated agent, the maximum bolt spacing shall not exceed the value calculated in accordance with eq. 5 PERFORMANCE QUALIFICATION Welding shall be performed only by welders and
 welding operators who have been qualified as given in Section IX. The equations for SH, SR, and ST 1 correspond, respectively, to eqs. Location where the vessel will be installed, if known. SL = design stress of layers tact = nominal thickness of inner shell or inner shell or
maximum allowable stress value of the materials is within 20% of the other layers may be used by prorating the maximum allowable stress of the layers in the thickness formula, provided the materials are compatible in modulus of elasticity and coefficient of thermal expansion. Cementing Technician Qualification Form . McMurray, Alternate S. Added
Figure UHX-11.3-3 showing the location of T '. Are all No requirements of UHA-51(f) met? O'Sullivan E. Timm G. McLaughlin G. P-Nos. Noronha R. Hall J. Added UG-120(b)(3). Heino, Contributing Member S. Test Report . (c) The required thickness of the tubesheet extension may differ from that required for the interior of the tubesheet as calculated
in UHX-12, UHX-13, or UHX-14. (c), cross-reference to UG-44 revised to UG-44(a) (18-1306) 170 UCS-33 Revised (09-716) 170 UCS-56 (1) In last paragraph of subpara. Shell Description Process Other Ambient Temperature Supports Internals Corrosive Service? Carpenter, Honorary Member B. (1) The Manufacturer of the vessel completes the vessel
in the field; completes the Form U-1, U-1A, or U-1P Manufacturer's Data Report; and stamps the vessel. 387 Mandatory Appendix 2 2-1 2-2 2-3 2-4 2-5 2-6 2-7 2-8 2-9 2-10 2-11 2-12 2-13 2-14 2-15 Rules for Bolted Flange Connections With Ring Type Gaskets Scope . Installation . Basile D. (d) Except as otherwise provided in (c) above, bolted flange
connections for unfired pressure vessels shall satisfy the requirements in this Appendix. (10 mm) or 20% of the thickness of the section; (5) the pressure vessel part meets the standard hydrostatic test prescribed in UCI-99. AddedUHX-4(h) stating new rules for openings near tubesheets. Reedy, Sr. S. Racamato H. In addition to the
required marking, the letters UHT shall be applied below the Certification Mark and U or PRT Designator. Markings and Reports . max. (a) When corrosion or erosion of the cladding or lining material is expected, the cladding or lining thickness shall be increased by an amount that in the judgment of the user will provide the desired service life. (g)
12 as indicated in Figure ULW-17.3. Transitions, if applicable, shall be used as shown in Figure ULW-17.1, sketch (c), (d), (e), or (f). (f) The cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work, or the Manufacturer may record the cementing technician shall mark the work and the complex to the complex t
 have one of the four configurations shown in Figure UHX-14.3: (1) Configuration A: tubesheet integral; (2) Configuration B: tubesheet gasketed, extended as a flange; (3) Configuration D: tubesheet integral (2) Configuration D: tubesheet gasketed, extended as a flange; (3) Configuration D: tubesheet gasketed, extended as a flange; (3) Configuration D: tubesheet gasketed, extended as a flange; (4) Configuration D: tubesheet gasketed, extended as a flange; (3) Configuration D: tubesheet gasketed, extended as a flange; (4) Configuration D: tubesheet gasketed, extended as a flange; (4) Configuration D: tubesheet gasketed, extended as a flange; (5) Configuration D: tubesheet gasketed, extended as a flange; (6) Configuration D: tubesheet gasketed, extended as a flange; (7) Configuration D: tubesheet gasketed, extended as a flange; (8) Configuration D: tubesheet gasketed, extended as a flange; (8) Configuration D: tubesheet gasketed, extended as a flange; (8) Configuration D: tubesheet gasketed, extended as a flange; (9) Configuration D: tubesheet gasketed, extended as a flange; (9) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange; (10) Configuration D: tubesheet gasketed, extended as a flange;
Jr. M. 819b UHX-14.6.3 Configurations a, e, f, and A: Additional Nomenclature. years Fatigue Analysis? Otherwise, increase the assumed tubesheet thickness h and return to UHX-14.5.1 (Step 1). Baker F. Jennings, Chair R. (-b) When documentation demonstrating complete conformance to the mechanical property requirements is not available
mechanical property tests are made in accordance with the requirements of the permitted specification, and the results of the permitted specification, and the results of the permitted specification, and the results of the permitted specification, and Continued Service (BPV XII)
Subgroup on Reliability and Integrity Management Program (SG-RIM) (BPV XI) F. A = 0 to the circle diameter of tubesheet, except as limited by UHX-10(b) A p = 0 to the tube layout measured stepwise in increments of one tube pitch from the center-to-center of the tubesheet, except as limited by UHX-10(b) A p = 0 to the tubesheet of the tubesheet, except as limited by UHX-10(b) A p = 0 to the tubesheet of tubesheet of the tubesheet of the tubesheet of the tubesheet of tubesheet of the tubesheet of tubesheet of the tubesheet of tub
the outermost tubes (see Figure UHX-12.2) D c = inside channel diameter t c = channel thickness t s = shell t
Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-12.3 ASME BPVC.VIII.1-2019 ŏ19Þ Figure UHX-11.5.2-1 Curves for the Determination of E*/E and v* (Equilateral Triangular
\alpha 2\mu*2 + \alpha 3\mu*3 + \alpha 4\mu*4 h /p \alpha0 \alpha1 \alpha2 \alpha3 \alpha4 0.10 0.25 0.50 2.00 0.0353 0.0135 0.0054 -0.0029 1.2502 0.9910 0.5279 0.2126 -0.0491 1.0080 3.0461 3.9906 0.3604 -1.0498 -4.3657 -6.1730 -0.6100 0.0184 1.9435 3.4307 (b) Equilateral Triangular Pattern: \nu * = \beta 0 + \beta 1\mu* + \beta 2\mu*2 + \beta 3\mu*3 + \beta 4\mu*4 h /p \beta0 \beta1 \beta2 \beta3 \beta4 0.10 0.15 0.25 0.50 1.00
attached to the small end of the cone, determine P/S S E1 and then determine A at the small end from Table 1-5.2. (3) Determine k: k = 1 when additional area of reinforcement is not required by the
following: Table 1-5.1 Values of \Delta for Junctions at the Large Cylinder for \alpha \leq 30 deg P /SsE 1 \Delta, deg 0.004 21 0.002 15 0.003 18 0.004 21 0.005 23 P /SsE 1. (5) plate heat exchangers (6) cylindrical vessels (b) Impregnated graphite
pressure vessels have the following limitations: (1) maximum external design pressure: 350 psi (2.4 MPa) (2) maximum design temperature: 400°F (204°C) (c) Metal parts used in conjunction with impregnated graphite pressure vessels,
including those for lethal service, shall be constructed in accordance with the requirements of this Division. Mollitor, Contributing Member J. Requests for Code Case applies. 6 and 7 (except for Type 405 and Type 410S) materials of any
thickness using the inertia and continuous drive friction welding processes. Zimmerman B. (16 mm) or Less in Thickness (b-2) Details of Taper for Layers 7/8 in. Chen D. Barnes J. Appleton A. Costa D. Richter, Secretary R. However, the Manufacturer of the completed vessel or Certification Mark-stamped part shall ensure that parts furnished under
the provisions of (b), (c), (d), and (e) meet all of the applicable Code requirements such as UCS-79(a), UNF-79(a). Vorwald, Chair F. Ramcharran, Staff Secretary J. N t = number of tubes P e = effective pressure acting on tubesheet P s = shell side design or operating pressure, as applicable. Some Acceptable Types of Tubesheet P s = shell side design or operating pressure, as applicable.
to-Tubesheet Strength Welds. Pittel Subgroup on Nonmandatory Appendices (BPV XII) N. (3) Determine the design factor, Fs, in accordance with (-a) or (-b) below. Using the value of A calculated in Step 1, enter the applicable material chart in Section II, Part D, Subpart 3 for the material under consideration. No. SB-26 SB-108 SB-210 SB-
211 SB-221 Spec. (e) When any part of the cladding thickness is specified as an allowance for corrosion, such added thickness shall be removed before mill tension tests are made. Material specification to be reported are recorded,
including those of any supplementary requirements or other requirements or other requirements stated in the documentation by the Inspector when requirements or other requirements.
shall not be ordered with a nominal thickness thinner than the design thickness. Chart for Determining Value of F, as Required in UG-37. There shall be at least one vent hole per layer segment. Jenkins Y. Martin, Secretary W. (a) Include specification and type of lining material. (-e) Before welding, the cut surfaces of the part adjacent to the weld
shall be examined by magnetic particle or liquid penetrant methods in accordance with Mandatory Appendix 8, respectively. (6 mm) and thinner. (b)(2), cross-reference to subpara. Fang Q. Agold C. Jacobs, Contributing Member P. Test coupons shall be prepared in accordance with Section II, Part C, SFA-5.4, A9.3.5 utilizing
the WPS to be used in production welding. (d) Openings greater than NPS 2 may be constructed as shown in Figure ULW-18.1, sketch (i). (2) The MDMT is not colder than -320°F (-196°C). One tensile test and one impact test shall be made on material from coupons representing each lot of material in each vessel or vessel component heat treated.
Kavanagh Y.-S. Required HAZ Impact Test Specimen Set Removal . (a) Category B joints in layers 1/8 in. Revised the hydrostatic pressure test requirements for graphite pressure test requirements in UG-99. Ishikawa F. Ludwig R. full vacuum (FV): a condition where the internal
absolute pressure is 0 psi (0 kPa) and the external absolute pressure on the vessel is 15 psi (103 kPa)(see UG-116). ...... (1.6 mm) thick 1 /32 in. (50 mm) be treated as cast iron and that vessels or pressure parts of such material be designed and fabricated in accordance with the rules in Part UCI. liquid penetrant examination (PT): a method of
nondestructive examination that provides for the detection of imperfections open to the surface in ferrous and nonferrous materials that are nonporous. Rodery T. Swindeman S. (c) For Types 304 and 316 stainless steel vessels, the provisions of UHA-32 apply. Design Pressure . Prager M. They are sufficiently accurate to be used for other values of v*
The angle joint (see 3-2) between the cone and cylinder shall be designed equivalent to a double butt-welded joint, and because of the high bending stress, there shall be no weak zones around the angle joint. spiral weld: a weld joint having a helical seam [see UW-3(a)]. (10 mm) and thinner; (-b) ferritic chromium stainless steels with a nominal
material thickness of 1/8 in. Kikushima R. Aguilar, Contributing Member Subgroup on Nuclear (BPV XIII) R. All calculations shall be made on dimensions in the corroded condition. Shiwei Y. Pressure-Indicating Device . Flash R. (c) Minor attachments made from material that does not conform to a material specification permitted in this Division may
be used and may be welded directly to the pressure part, provided the requirements shown below are satisfied. (1) Examination by the magnetic particle or liquid penetrant method in accordance with the requirements of Mandatory Appendix 8 respectively, shall be as follows: (-a) for flanges: the back of the flange and the
outer surface of the hub (-b) for heads, caps, elbows, return bends, tees, and header tees: all surfaces (-c) for hollow, cylindrically shaped parts: no surface examination needed (2) Parts may be machined from rod or bar having a hot-worked diameter not greater than 5.50 in. Studs greater than eight diameters in length may have an unthreaded
portion that has the nominal diameter of the threaded portions shall be at least 11/2 diameters in length; (2) the stud shall be machined down to the root diameter of the threaded portion; (3) a suitable transition shall be
provided between the root diameter and the unthreaded portion; and (4) particular consideration shall be given to any dynamic loadings. Laite C. (150 mm) length weld. Rana R. These rules are not to be used for the determination of the thickness of tubesheets integral with a bolting flange as illustrated in Figure UW-13.2, sketches (h) through (l) or
 Figure UW-13.3, sketch (c). For operating cases 5 through 8, where the exchanger does not use any spring-loaded rods on the floating end, \gamma = 0; otherwise Calculate X a for each tubesheet. Thermal Exp. Asada J. to 5 in. (50 mm) in thickness; (3) for circumferential weld joints made individually for single layers and spaced at least one layer thickness
apart, the procedure qualification for the longitudinal joint applies. To determine S y for yield strength, the tensile strength value as determined in accordance with UIG-84 shall be multiplied by a value of 0.55 to establish a yield equivalent value. For the operating thermal-pressure conditions (operating loading cases), either the operating pressure or
design pressure shall be used. Such interpolation may also be used to 20 Copyright ASME International (BPVC) Provided by IHS under license erom IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-
2019 UG-28 Figure UG-28.1 Diagrammatic Representation of Lines of Support for Design of Cylinder junction is not a line of support, the required thickness of the cone, knuckle, or toriconical section shall not be less than the required thickness
of the adjacent cylindrical shell. (1) For cones attached to a cylinder for conical heads and reducers without knuckles when the junction of the cone with the large cylinder for conical heads and reducers without knuckles when the young formula: Any
additional area of reinforcement that is required shall be added to the cone. (c) This procedure applies to Configuration a when \sigma s \leq SPS,c. Metal Linings . Shelley W. For each loading case, calculate the stresses in the shell and/or channel when integral with the tubesheet (Configurations a, b, and c). Krishnamurthy K. (b) Nozzle
Attachment Welds. Basile, Chair S. (g) Rules for floating tubesheet heat exchangers are covered in UHX-14. Bjorkman V. Purpose . Van Allen J. Brusewitz, Contributing Member Y. (a) Except as permitted by UHX-17(b), the design of expansion joint flexible elements shall satisfy the following stress limits [see (b) below]. Hwang, Vice Chair O.-S. For
example, if eq. 13 These rules shall be used in conjunction with the general requirements in Subsection A and with the specific requirements in the applicable Parts of Subsection B. 1, 2 Normal Holding Temperature, °F (°C), Minimum Minimum Holding Temperature for Nominal Thickness [See UHA-32(d)] 1,350 (730) 1 hr/in.
Magliocchi L. Broussard S. Tilly, Secretary D. Molvie E. (-c) All other applicable requirements (including, but not limited to, melting method, melting practice, deoxidation, chemical analysis, mechanical properties, grain size, and quality) of the specification permitted by this Division, to which the material is to be recertified, have been demonstrated
diameters, but not less than the maximum of the shell and channel flange inside diameter of gasket load reaction 286 Copyright ASME International (BPVC) Provided by IHS under license er Khalda Petroleum/5986215001, User=Amer, Mohamed
Not for Resale, 07/02/2019 13:29:04 MDT UHX-9.3 - UHX-10 ASME BPVC.VIII.1-2019 UHX-9.5 = Gc for tubesheet configuration b of a U-tube tubesheet configuration b under tube
centerline of the bolts to the line of the gasket reaction as shown in Table 2-5.2 h r = minimum required thickness of the tubesheet extension MAX [(a), (b),(c),...] = greatest of a, b, c,... 65 Communicating chambers are defined as appurtenances to the vessel which intersect the shell or heads of a vessel and form an integral part of the pressure
containing enclosure, e.g., sumps. Configuration a: (b) Using bending stresses o s, b and o c, b computed in UHX-13.8.2 Conditions of Applicability. 417 Copyright ASME International (BPVC) Provided by IHS under license with ASME No.
license from IHS Lx L1 418 GENERAL NOTE: Sum of L 1 to Lx shall be less than t in a length of 12t. Added 26-4.2(c) for fatigue curves of materials not in Mandatory Appendix 26. Brown, Jr., Honorary Member M. (b) This procedure applies only for the design loading cases. Michael, Contributing Member C. Wang C. (b) The use of washers is
D. (d) The operation of postweld heat treatment shall be carried out by one of the procedures given in UW-40 in accordance with the requirements of UCS-56(d) except as modified by the Notes to Tables UHA-32-7. It includes such items as the grade of graphite, resin, vacuum, pressure, and any other steps needed to produce the
desired grade of impregnated graphite. Design by Analysis . Revised UCL-52 to clarify that the requirements of UG-99(k) are not required by the
applicable material specifications. Munson T. Swezy, Jr. S. Chamfer (l) [See Note (1)] 1 /8 in. Verastegui M. Borter C. Hayes, Vice Chair M. That is, moments have dimensions [Length × Force/Length] = [Force]. Biel P. (a) Shell Stresses (Configurations a, b, and c). In most cases, such a proposal is not necessary. impervious materials: graphite in
which pores are filled with impregnation agents, and that have a coefficient of permeability of not more than 4.5 \times 10 - 6 in. If |\tau| \le 0.8S, the assumed tubesheet thickness is acceptable for shear. Strunk I. ASME is to be notified should questions arise concerning improper use of the ASME Single Certification Mark. Metal Arc Welding. Scarth D.-J.
541 534 525 517 517 NOTE: (1) Strength values at intermediate temperatures may be interpolated. (c)(4) and (c)(5). Hebb L. Charpy V-Notch Impact Test Requirements for Full-Size Specimens for Carbon and Low Alloy Steels, Having a Specified Minimum Tensile Strength of Less Than 655 MPa, Listed in Table UCS-23. Mahadeen S. It is the
vessel or part Manufacturer's responsibility to ensure that all work so performed complies with all the applicable requirements of this Division. (b) Due consideration shall be given to electrodes and filler metals for all welding processes to minimize the sources for hydrogen. Lawson, Staff Secretary M. Lieb G. Haupt A. The centroid of the added area
shall be within a distance of from the junction. Joints subject to pressure reversals, such as in heat exchanger floating heads, are in this type of service. GENERAL NOTES: (a) For additional testing requirements for MDMTs colder than -320°F (-196°C), see UHA-51(a)(3). Martin J. Typical Forms of Welded Staybolts. Allam S. For the design-pressure.
only conditions (design loading cases), the design pressure shall be used. When machining is performed after machining complete conformance to the heat treatment requirements is not available, the material is heat
treated in accordance with those specification heat treatment requirements, either prior to or during fabrication. 22 F Seismic Loading: ASCE 7 UBC IBC Other None Insulated: Yes No By Manufacturer By Others Due to: @ Due to: Jacket Int. Oh, Staff Secretary S. 235 Copyright ASME International (BPVC) Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ UCD-1 - UCD-28 ASME BPVC.VIII.1-2019 PART UCD REQUIREMENTS FOR PRESSURE VESSELS CONSTRUCTED OF CAST DUCTILE IRON GENERAL MATERIALS
UCD-1 UCD-5 SCOPE The rules in Part UCD are applicable to pressure vessels and vessels and
W. Wang I. 424 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 5-1 - 5-3 MANDATORY APPENDIX 5 FLEXIBLE
SHELL ELEMENT EXPANSION JOINTS 5-1 GENERAL multilayer, asymmetric geometries or loadings having a thick liner or other attachments) shall be in accordance with U-2(g). Manufacturer's Data Report for Plate Heat Exchangers . This calculation procedure applies only when the shell is integral with the tubesheet (Configurations a, b, and c)
Charpy V-Notch Impact Test Requirements for Full-Size Specimens for Carbon and Low Alloy Steels, Having a Specified Minimum Tensile Strength of Less Than 95 ksi, Listed in Table UCS-23. (100 mm) nominal body thickness. Sattler C. Joint Clearance . Lee, Vice Chair K. For t less than 1/8 in. Zhe Z. (4) The Certificate Holder shall be responsible
for reviewing and accepting the Quality Control Programs of the subcontractor. Zunino G. Kirkemo C. Dimpled Plate Welded to Plain Plate . Lane — Alaska L. (2) Welding details as shown are for illustrating the distance between the toe of the fillet weld and the tangent line of the head. The common element and its corresponding differential pressure
shall be indicated in the "Remarks" section of the Manufacturer's Data Report [see UG-120(b)(1) and UHX-19.3] and marked on the vessel [see UG-116(j)(1)(-a) and UHX-19.2.1(a)]. Kruzic, Contributing Member Working Group on Guided Wave Ultrasonic Testing (SG-VM) (BPV V) N. Sulley I. (c) All steels listed in Table UHT-23 shall be tested for
notch ductility, as required by UHT-6. Values of V (Integral Flange Factors). Design of U-Shaped Unreinforced Bellows. Cases A and B (See Figure 1-7-1 or Figure 1-7-2) 83Þ 84Þ 85Þ (5) Nomenclature. Nozzle Neck Thickness. DeKleine, Vice Chair L. Steel Castings. He P. (-b) The total repair depth shall not exceed 1/2 in. Tilly D. Fritz, Contributing
Member M. If the tube side is the higher-pressure side, P t shall be the tube side design pressure and P s shall be P t less the differential design pressure uIG-34-2, sketch (a) or sketch (b), and floating tubesheets shall be as shown in Figure UIG-34-2, sketch (a) or sketch (b), and floating tubesheets shall be as shown in
Figure UIG-34-3, sketch (a), sketch (b), or sketch (c). Saito M. Andrei, Contributing Member J. Troutt, Chair C. LeSage, Jr. — Louisiana A. Klein C. For such vessels a combined hydrostatic and pneumatic test may be used as an alternative to the pneumatic test of this paragraph, provided the liquid level is set so that the maximum stress including the
stress produced by pneumatic pressure at any point in the vessel Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-
2019 (usually near the bottom) or in the support attachments, does not exceed 1.3 times the allowable stress value of the material multiplied by the applicable joint efficiency. Gurdal R. Salstrom T. Each of these materials shall be traceable in accordance with UIG-112(b). This type covers designs where the flange is cast or forged integrally with the
nozzle neck, vessel or pipe wall, butt welded thereto, or attached by other forms of welding of such a nature that the flange and nozzle neck, vessel or pipe wall is considered to be the equivalent of an integral structure. Slater, Chair S. The rules of (b), (c), (d), and (e) below shall not be applied to welded shells or heads or to quick-actuating or 
opening closures (see UG-35.2 and UG-35.3, respectively). Instructions for the Preparation of User's Design Requirements . 1, 2, and 3 P-No. 7 Group Nos. Hinson M. (-a) When Pe \neq 0: (2) Determine \sigma t, m a x = MAX (|\sigma t, 1 |, |\sigma t, 2 |). (b) Minimum Thickness of Shells and Heads. Maximum Arc of Shell Left Unsupported Because of Gap in Stiffening
Ring of Cylindrical Shell Under External Pressure . The calculation procedure given in UHX-14.5 shall be performed for the operating loading cases accounting for the modifications in (a) through (e). METHODS OF FABRICATION UCL-11 Vessels and vessel parts of base material with corrosion resistant integral or weld metal overlay cladding
construction shall be fabricated by welding. These tests shall be conducted at a temperature not warmer than +32°F (0°C). Basu, Contributing Member A. Brumovsky T. Yamazaki R. Kim, Delegate R. Matthews M. Penso M. Swanson J. Floating Tubesheet Configurations
McCracken D. Added Table UG-44-1. UCD-78 REPAIRS IN CAST DUCTILE IRON MATERIAL (a) Imperfections which permit leakage in cast ductile iron materials may be repaired by using threaded plugs provided: (1) the vessel or vessel parts operate within the temperature limits of UCD-3(a), and the design pressure does not exceed 1,000 psi (7).
MPa); (2) no welding is performed; (3) the diameter of the plug shall not exceed the diameter of a standard NPS 2 pipe plug; 237 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not
for Resale, 07/02/2019 13:29:04 MDT UCD-78 - UCD-99 ASME BPVC.VIII.1-2019 (4) the plugs, where practical, shall conform in all dimensions to standard NPS pipe plugs, and in addition they shall have full thread engagement corresponding to the thickness of the repaired section. (4) N/A: not applicable UIG-7 ADDITIONAL PROPERTIES UIG-23
The modulus of elasticity tested per ASTM C747 and ASTM C769 is typically 2.0 × 106 psi, and the Poisson's ratio for impervious graphite is typically 0.15. Yee A. F. Raghunathan, Contributing Member M. Where more than one cluster is present, the sum of the lengths of the clusters shall not exceed 1 in. Table 2-4 Recommended Minimum Gasket
Contact Widths for Sheet and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member E. Srnic S. Iske, Alternate A. Fabrication . Peetz J. Guo Y. Armentrout B. Roberts III F. MacKay, Honorary Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member E. Srnic S. Iske, Alternate A. Fabrication . Peetz J. Guo Y. Armentrout B. Roberts III F. MacKay, Honorary Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member T. Heat Treatment and Composite Gaskets Flange ID 24 in. Harrison, Jr., Contributing Member ID 24 in. Harrison, Jr., Contrib
produced by heat treatment, the allowable stress value for the material in the annealed condition shall be used for the joint design unless the finished construction is subjected to the same heat treatment as that which produced the
temper in the "as- received" material, provided the welded joint and the base metal are similarly affected by the heat treatment. Graham R. ŏ19Þ UHX-4 --`,``,``,,`,,`...-(a) The design of all components shall be in accordance with the applicable rules of Subsection A, Mandatory Appendices, and this Part. (3) Mean Metal
Temperature Design (Dependent Pressure Chamber). Revised UG-116(b)(1), UW-12, Table UW-12, UW-11(e), UW-12, Table UW-12, UW-15, and 2-4(b) to delete specific references to "arc or gas" welding. (d) This procedure for Simply Supported Fixed Tubesheets UHX-13.9.1 Scope. For this certified material
                                 % per each 10°F (°C) rise above room temperature. In contrast, the parts of impregnated graphite vessels are relatively brittle, and the properties of the parts are dependent upon the fabrication process. (13 mm) 2 Ellipsoidal or torispherical head t Knuckle radius See Note (1) Toriconical head See Note (1) t Tangent line
Ellipsoidal or torispherical head t t Knuckle radius Tangent line Skirt Skirt Gasket Flange Gasket Flange Type (a) [Notes (2) and (3)] 1/A 2 1/2C t Preferably 2t min. Nomura T. Hull, Alternate D. 2-7(a)(9), and 2-7(a)(10), in direction, but are located at the flange outside diameter. Type of multichamber
pressure vessel. Grubb, Chair J. Certified Cement Qualification Form. (0.25 mm), a retest of three additional specimens may be made, each of which must equal or exceed 0.015 in. The distributions shown are not necessarily the patterns that may appear on the radiograph, but are typical of the concentration and size of indications permitted. Quality
 Control . Principle . Some Acceptable Types of Jacketed Vessels . Ehler — Nova Scotia, Canada J. 5-3 DESIGN The design of expansion joints shall conform to the requirements of Part UG and those of (a) through (f) below. Unreinforced Vessels of Rectangular Cross Section . UHA-51(c)? Canonico, Honorary Member D. Dickson A. The Inspector
Press. Inner Shells and Inner Heads. Hainsworth T. (2) The corrosion resistant alloy weld deposit is non- air-hardening. r2 30 deg max. (15 mm to 32 mm), inclusive, provided the following conditions are met: (1) a minimum preheat of 200°F (95°C) and a maximum interpass of 400°F (205°C) is used; (2) after completion of welding and without
allowing the weldment to cool below the minimum preheat temperature for at least 4 hr; and (3) all welds are examined by nondestructive examination in accordance with the provisions of this Part. Sandhu J. (1 020 min.) 1,800-1,975
(980-1 080) 1,870-2,010 (1 020-1 100) 1,800 min. UHX-13.9.3 Calculation Procedure. Manoly R. Zhong Subgroup on Evaluation Standards (SG-ES) (BPV XI) W. Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 JJ-1.2 Figure JJ-1.2-5 Austenitic-Ferritic Duplex, Ferritic
Contributing Member Z. The first condition shown shall be the design condition at a Committee meeting, the Inquirer should provide advance notice to the Committee Secretary, to ensure time will be allotted for the presentation
in the meeting agenda. (2) For cones attached to flat covers, flanges, or other components where the length of cylinder, if present, is less than 2.0, the required by (1) or (2). Thickness, t, in.
Test Specimen Heat Treatment . Ren, Contributing Member B. (a) Configuration a: tubesheet integral with shell and gasketed with channel, not extended as a flange; (d) Configuration d: tubesheet integral with shell and gasketed with channel, not extended as a flange; (d) Configuration d:
tubesheet gasketed with shell and channel. Adams A. If FL is a negative number, the design shall be in accordance with U-2(g): If the equation is not satisfied, a new section with a larger moment of inertia must be selected, and UG-35.2(b) and UG-
35.3(b), to meet the user requirements in Nonmandatory Appendix FF relating to installation, operational, and maintenance considerations for quick-actuating and quick-opening closures (2) by reference in UG-125(d), to meet the user requirements and considerations specified in Nonmandatory Appendix M This Nonmandatory Appendix provides a
directory for locating the specific Code-assigned to the user or his designated agent as applicable to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration by the Vessel or Part Manufacturer (-a) Documentation is provided to the pressure vessel under consideration is pressure vessel under consideration is pressure vessel under consideration is pressure vessel
(including, but not limited to, melting method, melting practice, deoxidation, chemical analysis, mechanical properties, quality, and heat treatment) of the specification permitted by this Division, to which the material is to be recertified, have been met. (b) Flanges made from ferritic steel and designed in accordance with this Appendix shall be full-
 annealed, normalized, normalized and tempered, or quenched and tempered when the thickness of the flange, t (see Figure 2-4), exceeds 3 in. Carin T. Smith M. Stationary Tubesheet Configurations. For the design loading cases, if \sigma t, m a x > 2St, reconsider the tube design and return to the
step in UHX-13.5.1. (b) Check the tube-to-tubesheet joint design. Otherwise, increase the thickness of the shell and return to UHX-14.5.1 (Step 1). Waldbillig — Wisconsin D. Chaudouet P. One examination shall be made for every head, shell course, or any other pressure-retaining component for each welding process used. (25 mm) plus 1/2 hr for each
additional inch of thickness. For centrifugal castings, critical sections shall be interpreted to be any abrupt changes of section, the circumference for a distance of at least 3 in. Hassan, Contributing Member P. Pastor D. The nominal thickness of plates and pipes as defined in Mandatory Appendix 3 shall be used for determining the nominal material
29(b), UG-29(c), UG-29(d), UG-29(d), UG-29(e), and UG-29(f) and UG-29(f) and UG-30 are to be met in attaching stiffening rings to the section of any of the layered
thicknesses given in ULW-52 shall be examined by radiography for their entire length in accordance with UW-51. Special Constructions . The common element and its corresponding design temperature shall be indicated in the "Remarks" section of the Manufacturer's Data Report [see UG-120(b)(2) and UHX-19.3] and marked on the vessel [see U
116(j)(1)(-b) and UHX-19.2.1(b)]. Arnold D. (50 mm) or less. Rongcan S. Sperko Subgroup on Welded Boilers (BPV II) E. McMaster, Contributing Member B. Nywening J. (b) Postweld heat treatment shall be performed as prescribed in UW-40 and UCS-56(e). The entire rejected weld
load per unit circumference at conical reducer large end due to wind, dead load, heat exchanger constraint, etc., excluding pressure, for use in 1-5 or 1-8 cone-to-cylinder junction analyses. The exemptions provided for in the Notes to Tables UHA-32-1 through UHA-32-7 are not permitted when welding ferritic materials greater than 1/8 in. Nozzles
and Other Connections . 43 A pressure relief valve is a pressure relief device which is designed to reclose and prevent the further flow of fluid after normal conditions have been restored. The category number given in (a) corresponds to the designator of the relevant table. Jetter Y. Seam-Weld Specimen for Tension and Macrosection for Three-Ply
2(a), Sketches (7) and (8)]. (3 mm). Kruzic, Contributing Member Working Group on Acoustic Emissions (SG-VM) (BPV V) N. Allam C. Welding Consumable Pre-Use Testing Requirements for Austenitic Stainless Steel. Davis H. UIG-99 QUALIFY CONTROL REQUIREMENTS
The Manufacturer's quality control manual shall, in addition to the provisions of Mandatory Appendix 10, include the following: (a) The Authorized Inspector may, with cause, call for the requalification of procedures and personnel. No consideration shall be given to any possible reduction in moment arm due to cupping of the flanges or due to inward
for Resale, 07/02/2019 13:29:04 MDT ULT-56 - ULT-82 ASME BPVC.VIII.1-2019 Table ULT-23 V001 Maximum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; and 5083-0 Aluminum Alloy at Cryogenic Temperatures for Welded and Nonwelded Construction (Cont'd) 5083-0 Aluminum
acceptable to the Inspector. Robertson R. (1) One or more test coupons from each lot of material in each vessel [see (d)] shall be quenched with the vessel or vessel component. all the elements have a common axis and the half-apex angle α ≤ 30 deg. MATERIAL CONTROL (a) Raw materials used in the manufacturing of the
certified material shall be identified by its source and grade, and documented on the Certificate Holder. (See UHA-21.) (b) Butt-welded joints in vessels constructed of materials conforming to Type 405 welded with straight chromium electrodes, and to Types 410, 429, and 430 welded with any
electrode, shall be radiographed in all thicknesses. Gerlach, Chair E. Keating, Vice Chair S. Mandina Subgroup on Materials (BPV IX) M. Service the vessel will be used for, if known. Three types of floating tubesheet heat exchangers are covered as shown in Figure UHX-14.1. (1) Sketch (a), immersed floating head; (2) Sketch (b), externally sealed
floating head; (3) Sketch (c), internally sealed floating tubesheet. Koelbl S. Qualification of Visual Examination Personnel . (c) Design/Operating Metal Temperatures. 19 For pipe, the inside radius R is determined by the nominal outside radius R. Qian P. Ugalde, Contributing Member J. lxxv
Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Copyright ASME International (BPVC) Provided by IHS under license with ASME No
 reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,
                                                                                                                                                                                                                                                                      ,,`--- INTENTIONALLY LEFT BLANK ASME BPVC.VIII.1-2019 U-1 U-1 SCOPE (1) The scope of this Division has been established to identify the
components and parameters considered in formulating the rules given in this Division. This standard does not cover all possible conditions that may arise during actual service or from misuse or abuse of equipment; therefore, it must be used only as a guide in designing equipment properly suited to its intended purpose and environment within
reasonable limits imposed by economic factors." Head over to infolearners; A book website where you can download ASME Section viii Division 2 2017 PDF free download in PDF form on this eBook website that is useful to any student. Specifications for
impregnated graphite. Cross-References It is our intention to establish cross-reference link functionality in the current edition and moving forward. Mize, Contributing Member M. Stirzel G. Shim X. Procedure and Personnel Qualification . (f), last sentence deleted (17-3355) 505 24-3 In second definition of l m, "C t" corrected by errata to "C i" (19-
247) 510 24-6 In eq. Basile M. Muraki G. Rogers Working Group on General Requirements (BPV XI) T. Guiping, Delegate S. Magruder F. An additional 100 ft of Category A or B joints involved. (b) Integrally finned tubes may be made from tubes that
conform in every respect with one of the specifications given in Section II. Doron W. Hembree, Vice Chair C. WELDED JOINT EFFICIENCY WELDING When the nondestructive examinations outlined in ULW-57 have been complied with, the weld joint efficiency for design purposes shall be 100%. If suitable austenitic stainless steel is
used for permanent attachments, consideration should be given to the greater coefficient of expansion of the austenitic stainless steel. Asme-section-viii-division-2-2017-pdf is the standard for pressure piping systems. O'Callaghan K. Norton T. The Inquirer should provide background information to support the revision or addition, including any data
or changes in technology that form the basis for the request, that will allow the Committee to adequately evaluate the requested revision or addition. Peel Test . 15 UG-23(d) permits an increase in allowable stress when earthquake or wind loading is considered in combination with other loads and pressure defined in UG-22. (10), numerator corrected
by errata (18-446) 511 26-2 In subpara. Bamford K. (h) When cured, confirm that the impression is legible. Abe, Contributing Member D. Holes for Screw Stays . Roll K. (3) Design temperature is no warmer than 650°F (345°C) nor colder than -20°F (-29°C). Cameron N. Jennings C. (3 mm) and thinner; (-c) martensitic chromium stainless steels with
a nominal material thickness of 1/4 in. Kim, Secretary H. Papponetti, Delegate X. When the welding materials comply with one of the specification in Section II, Part C, the marking or tagging of the material, containers, or packages as required by the applicable Section II specification may be accepted for identification in lieu of a Test Report or a
Certificate of Compliance, postweld heat treatment at temperatures below the lower transformation temperature of the steel. When multiple operators are cementing technicians' identification numbers on a drawing or similar document. (b) The qualification results shall be recorded.
Azukas J. Gobbi, Contributing Member G. (5) Configurations A and D do not have tubesheet extensions. Edwards J. The requirements for vessels that are to contain lethal substances, UW-2(a), apply only to the inner shell and the
performed, it shall meet the requirements of UW-26(a), UW-26(b), UW-26(c), and UW-27 through UW-40. Simple Beam Impact Test Specimens (Charpy Type Test). For values of L / D o less than 0.05, enter the chart at a value of L / D o less than 0.05, enter the chart at a value of L / D o less than 0.05.
fabrication of pressure vessels and vessel parts that are constructed to this Part and shall be used in conjunction with the requirements for Fabrication in Subsection A and Part UW of Subsection B. Ligaments . NOTE: Cast ductile iron flanges and fittings conforming in dimension to the Class 125 and 250 American National Standard for cast iron
flanges and fittings may be used in whole or as a part of a pressure temperature ratings listed in ASME B16.1 for cast iron flanged fittings shall have identical ratings specified in ASME B16.1. UCD-28 (c)
Cast ductile iron flanges and fittings, Class 400 and higher, conforming in dimension to the carbon steel pipe flanges and flanged fittings in ASME B16.5 may be used in whole or as a part of a pressure vessel at the pressure - temperature ratings for carbon steel, material category 1.4, in that standard provided the temperature is not less than -20°F
the nozzle neck at the joint is made on the basis of the allowable stress value of the nozzle neck does not exceed the limits given in 1-7 for openings designed to UG-36 through UG-44(a).
Some Acceptable Types of Unstayed Flat Heads and Covers . Limits for Ellipsoidal Head . Sens D. Preferably, the Reply should be "yes" or "no," with brief limitations or conditions, if needed. The standard addresses the design of piping systems used to transfer fluids under pressure, such as oil and gas pipelines, water supply systems, steam lines, and
chemical plant piping systems. Repetition of the radiography, and heat treatment, or the hydrostatic test of the vessel after lining repairs is not required except when there is reason to suspect that the repair welds may have defects that penetrate into the base material, in which case the Inspector shall decide which one or more shall be repeated.
GENERAL The rules in the following paragraphs apply specifically to the fabrication of pressure vessels and 
ATTACHMENTS AND OPENING REINFORCEMENT (a) All openings, except as provided in (b) below, shall meet the requirements for reinforcing per UG-36 through UG-46. Conditions of Applicability
                                                                                                                                                                                                                                                                                                                                                                                       GENERAL NOTE: Test program to certify requirements
per Table UIG-6-1. O'Sullivan N. Bell A. (b) Calculate ω s , δ19Þ , and ω c , . Any material for which the documentation required in (a) is not available may be accepted as satisfying the requirements of the specification permitted by this Division, provided that the conditions set forth below are satisfied. (b) The symbols defined below are used in the
procedures of this paragraph: A = factor determined from Section II, Part D, Subpart 3, Figure G and used to enter the applicable material chart in Section IX, QW-160. The designated agent is the Code-designated agent required to fulfill Code requirements. Charpy
Impact Tests. Cardillo P. Borter M. (16 mm) Thickness (f) For Layers 5/8 in. WRC Bulletin 470 contains recommended design details for use at elevated temperature service, which is for the purposes of this Division, when the allowable stresses in Section II, Part D are based on time-dependent properties. 666 666 666 Nonmandatory Appendix FF
Guide for the Design and Operation of Quick-Actuating and Quick-Opening Closures. Tilly S. Young, Contributing Member D. Material may be identified as meeting more than one material specification (s) and/or grade(s) [see UG-23(a)]. For requested
additions to the Code, the Inquirer should provide the recommended wording and should clearly indicate where they believe the additions should be located in the Code requirements. Test Procedure . (22 mm) and less in thickness. Gilman S. Vorwald G. to 3/8 in. Category D joints between layered nozzles and shells or heads are not permitted. A
safety relief valve is a pressure relief valve characterized by rapid opening or pop action, or by opening in proportion to the increase in pressure verthe opening or pop action, or by opening or pop action, or by opening in proportion to the increase in pressure relief valve characterized by rapid opening or pop action, or by opening in proportion to the increase in pressure verthe opening or pop action, or by opening in proportion to the increase in pressure verthe opening or pop action.
(a) The dimensional requirements in UG-36 through UG-46 are applicable to cast iron and shall be used in the design of openings and reinforcements in pressure vessel parts. Batey, Contributing Member Working Group on Radiography (SG-VM) (BPV V) C. 357 Copyright
geometry at discretion of manufacturer GENERAL NOTES: (a) All dimensions are in inches. 3tL min. maximum shell side design pressure for operating pressure for operating condition x (positive, negative, or zero operating pressure) tube side design or
operating pressure, as applicable. (16 mm) or Less in Thickness Weld line (Category B) 3:1 taper min., see detail sketch (b) Optional weld line (Category B) as e Metal I, Heat-Affected Zones, and Weld Metal (1) Impact test shall be made from sets of
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ULW-17.6 ULW-18.1 ULW-22 ULW-32.1 ULW-32.2 ULW-32.3 ULW-32.3 ULW-32.4 ULW-54.1 ULW-54.2 ULW-77 UHX-3 UHX-11.3-2 UHX-11.3-2 UHX-11.5.2-1 UHX-12.2 UHX-13.1 UHX-13.2 UHX-13.4 UHX-13.5.7-1 UHX-13.5.7-2 UHX-13.10.3-1 UHX-14.1 UHX-14.
14.2 UHX-14.3 UIG-34-1 UIG-34-2 UIG-34-2 UIG-34-2 UIG-34-3 UIG-36-1 UIG-36-1 UIG-76-1 UIG-76-2 UIG-76-3 UIG-76-3 UIG-76-3 UIG-76-3 UIG-76-3 UIG-76-3 UIG-76-1 UIG-76-
the alternate units may be used for the design and documentation of that component, subject to the limitations given in (c). Above 800°F (425°C), cooling shall be done in a closed furnace or cooling chamber at a rate not greater than 500°F/hr (278°C/h) divided by the maximum metal thickness of the shell or head plate in inches but in no case more
than 500°F/hr (278°C/h). 2 d (b) Split Ring --`,``,``,`,`,
                                                                          ``,`,`,,`,,,`-`-`,,`,,`,,`,--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 350 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME
BPVC.VIII.1-2019 UIG-60 Figure UIG-36-2 Some Acceptable Nozzle Attachment Details in Impregnated Graphite Pressure Vessels (Cont'd) Nozzle stud Steel flange t Graphite head and nozzle cemented Cement 1/ in. Lining . All cracks shall be removed by grinding, or grinding and filing. (e) Suggested methods for obtaining the operating temperature
of vessel walls in service are given in Nonmandatory Appendix C. Revised U-4 to limit any material data published in Section VIII, Division 1 or from Section II, Part D in Code calculations to the units listed in Table 33-1. Examples of primary stress are (a) general membrane stress in a circular cylinder or a spherical shell due to internal pressure or to
distributed loads; (b) bending stress in the central portion of a flat head due to pressure. Required Tests . (This compression load is expressed as a multiple m of the internal pressure and material, use the following equation:
Configurations a, e, f, and A: (b) For heat exchangers that have a different shell thickness and/or material adjacent to the tubesheet per UHX-13.6, use the following equation: (b) Using bending stresses σ s,b and σ c,b computed in the step in UHX-14.5.10 for the elastic solution, determine facts and factc as follows: Configurations a, b, and c: --
                           ,`-`-`,,`,,`,,`--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 330 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UHX-17 Table UHX-17
Flexible Shell Element Expansion Joint Load Cases and Stress Limits Maximum Stress Loading Case UHX-17 Shell Side Pressure, P t Differential Thermal Expansion Membrane Membrane Plus Bending Corners and Corners and Torus Torus Annular Plates Straight Flanges Design 1 2 3 4 Psd,min Psd,max Psd,max Psd,min
EXPANSION JOINTS analysis method. Methods of Forming Forged Heads . Hamtak, Chair J. Furthermore, the impregnation process must be controlled to a process specification. Visual Examination . When corrosion of the cladding is not expected, no part of the cladding is not expected, no part of the cladding need be removed before testing, even though excess thickness seems to have
been provided or is available as corrosion allowance. Yang, Contributing Member Subgroup on General Requirements (BPV VIII) M. (16 mm) Thickness tL tS (c) For Layers Over 5/8 in. Massi L. Proper equipment and technique are required for making satisfactory welds. Pastor G. No MDMT colder No See UHA-51(c) for special production toughness
testing requirements. configuration per Figure 5-1. Kleiss M. UHX-13.8.3 ASME BPVC.VIII.1-2019 modulus of elasticity results in a design where the calculated tubesheet stresses are within the allowable stress limits. UCD-33 CORNERS AND FILLETS A liberal radius shall be provided at projecting edges and in reentrant corners in
accordance with good foundry practice. Xu A. De Barberis D. Warren C. Rahoi B. (mm) Up to 1/2 (13), incl. McKillop, Secretary K. Configurations e, f, and A: For the design loading cases, if \sigma c \leq SPS,c, the channel design is acceptable and the calculation procedure is complete. Kleinsmith H.
```

Ojdrovic A. than -320°F (-196°C)? (5) When the average value of the five specimen, and when the value for one specimen is below the minimum value permitted for a single specimen, a retest of five additional specimens shall be made. Configurations a and

```
b Configurations c, d, and e For each loading case, determine coefficient F m for each tubesheet from Table UIG-34-4 and then calculate the maximum bending stress, σ, for each tubesheet. Le M. Ortman Task Group on Modernization (BPV I) D. No. SA-249 SA-351 SA-494 SB-160 SB-160 SB-162 SB-163 SB-164 SB-165 SB-166 SB-166 SB-167 SB-168 SB-167 SB-168 SB-169 SB-169 SB-169 SB-169 SB-160 SB-
SB-333 SB-335 SB-366 SB-407 SB-408 SB-424 SB-425 SB-434 SB-425 SB-435 SB-435 SB-443 SB-445 SB-446 SB-468 SB-463 SB-468 SB-463 SB-468 SB-473 SB-515 SB-516 SB
integral tubesheets (see Figure UHX-4-1) may be located at any distance from the tubesheet (refer to UG-37 and Figure UHX-13.1: 301 Copyright ASME International (BPVC) Provided by IHS under license with ASME No
unsupported tube span under consideration = 0.6 for unsupported spans between two tubesheet and a tube support = 1.0 for unsupported spans between two tubesheet faces = L t - 2h L t =
tube length between outer tubesheet faces MAX [(a), (b),(c),...] = greatest of a, b, c,... (b) Holding temperatures and/or holding times in excess of the minimum values given in Tables UHA-32-1 through UHA-32-7 may be used. Rana F. 333 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,`,`,,`,,`,-- UHX-19.3.2 - UHX-20 ASME BPVC.VIII.1-2019 NONMANDATORY INTRODUCTION (d) Modulus of Elasticity. (0.4 mm) nubbin 64
 N w N/2 w (3) 1/64 in. The requirements for reinforcing specified in (a) above apply except that: (1) the diameter of the finished openings in the wall shall be d'as specified in Figure ULW-18.1, sketch (i); and the thickness tr is the requirements for reinforcing specified in Figure ULW-18.1.
included in the solid hub section as shown in Figure ULW-18.1, sketch (i); (3) metal in the nozzle neck available for reinforcement shall be limited by the boundaries specified in UG-40(c), except that the inner layer shall be considered the strip. 32 The minimum cross section is
usually at the root of the thread. Plante T. Millman R. (5B), "S cr B" corrected by errata to "S' cr B" (17-654) 480 Table 13-18.1 In third column, first equation, "h 2" corrected by errata to "S' cr B" (18-1864) 485 17-1 In subpara. The maximum allowable stress values show a correspondingly wide range and a variable relationship to service
temperature. These type numbers are used in the rules of Part UHA whenever reference is made to materials of approximately the same chemical composition that are furnished under more than one approved specification or in more than one appro
when welding is performed with filler metal of the same nominal composition as the base metal, only GMAW or GTAW processes are allowed. Masterson S. Sowder, Jr., Chair D. Spanner, Jr. M. Calculate x s and x t. The rules are limited to radial nozzles in cylindrical and conical shells (with the half-apex angle equal to or less than 30 deg) that do not
have internal projections, and do not include any analysis for stresses resulting from externally applied mechanical loads. Chapin J. Methods of Marking and immerse it for not less than 72 hr in a boiling solution consisting of 47 ml concentrated sulfuric acid
and 13 g of crystalline copper sulfate (CuSO4 · 5H2O) per liter of water. Pellereau I. This low modulus characteristic requires careful consideration of vessel geometry in order to minimize bending and tensile stresses. Vayda K. Values of \Delta for Junctions at the Large Cylinder for \alpha \leq 60 deg . Smith, Vice Chair S. Shelley R. Hayden, Jr. J. Move vertically and tensile stresses.
to the bottom of the chart and read the value of A. (4)(1) or (4)(2) below shall not exceed S, as defined in UG-37 for the applicable materials at design conditions. Eberhardt F. Except as permitted in (c) below, design calculations shall be based on the total thickness of the clad material less the specified nominal minimum thickness of cladding.
Replaced "penetrameter" with "image quality indicator" or "IQI" in UW-51, UNF-91, and 7-2. 57 The specified temperature of the pin manufacturer shall be the temperature supplied to the pin manufacturer shall be the temperature of the pin when an emergency condition exists and the pin is expected to activate. Joergensen, Contributing Member C. Spangenberg, Vice Chair H. b = effective gasket
or joint-contact-surface seating width [see Note in 2-5(c)(1)] 392 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 S n
= allowable design stress for material of nozzle neck, vessel or pipe wall, at design temperature (operating condition) or atmospheric temperature (gasket seating), as may apply (see UG-23) S R = calculated radial stress in flange S T = calculated tangential stress in flange T = factor involving K (from Figure 2-7.1) t = flange thickness t n = nominal
for this purpose Wm 2 shall be determined in accordance with eq. Blyde K. Swindeman, Secretary C. Is MDMT colder UHA -51(d)(3) UHA -51(d)(3)? Keating V. Alleyne J. When \Delta \geq \alpha, no reinforcement is required at the junction (see Tables 1-5.1 and
X2CrNiMo17-12-2 X2CrNiMoN17-11-2 X2CrNiMoN17-11-2 X2CrNiMoN17-11-2 X2CrNiMoN17-11-2 X2CrNiMoN17-11-2 X2CrNiMoN17-11-2 X2CrNiMoN17-12-2 X5CrNiMoN17-12-2 X5CrNiMoN17-12-2 X5CrNiMoN17-12-2 X5CrNiMoN17-12-2 X5CrNiMoN17-12-2 X5CrNiMoN17-12-2 X5CrNiMoN17-13-3 X2CrNiMoN17-13-3 X2CrNiM
Section II, Part D, Subpart 1 (see UG-23). The bolt spacing may be taken as the bolt circle circumference divided by the number of bolts or as the chord length between adjacent bolt locations. Naumann S. Keating J. Shores, Contributing Member D. (d) Exposed graphite shall be shielded with a metal shroud. Certificates of Authorization and
which do not permit leakage in cast ductile iron materials may be repaired using driven plugs, provided: (1) the wessel or vessel parts are to operate within the limits of UCD-3(a); (2) no welding is performed; (3) the material from which applies to the pressure
vessel or pressure vessel part; (4) the depth of the plug is not greater than 20% of the thickness of the section and its diameter is not greater than its engaged length; (5) the pressure vessel part meets the standard hydrostatic test prescribed in UCD-99. 20 F 21 F Due to: Deg @ Due to: Int. Kawa, Jr. — Massachusetts A. Hansing
Alternate Working Group on Environmental Fatigue Evaluation Methods (SG-DM) (BPV III) M. 66 Side plates of a flat-sided vessel are defined as any of the flat plates forming an integral part of the pressure containing enclosure. For example, indicate if electrochemically etched marking is acceptable in accordance with UG-118. Schaaf, Jr. G. UG-18.
MATERIALS IN COMBINATION Except as specifically prohibited by other rules are followed and the requirements in Section IX for welding dissimilar metals are met. Aliprandi A. Brouette O. Lugs and
Fitting Attachments. Weicks Subgroup on Water-Cooled Systems (SG-WCS) (BPV XI) G. Spiker — North Carolina D. When f 1 is in tension and the quantity is larger than the PRL/2 term, the design shall be in accordance with U-2(g). Ball T. A. For example, use: (3) L-T for lethal service tube side (4) RT 1-S for full radiography on the shell side -
                                                    --- UHX-19.2 UHX-19.2.2 Fixed Tubesheet Heat Exchangers. (2) Configurations b, e, and B tubesheets have flanged extensions. Except for upset-disk forgings, the longitudinal axis of the test specimen shall be taken parallel to the direction of major working of the forging
                                                                                                           test coupon as shown in Figure ULW-32.1 wherein the one side of the test coupon is solid throughout its entire thickness. Example of the Use of Form U-4. For bending stress calculation, the greater of the limits defined in Figure 1-7-1 or Figure 1-7-2 may be used. Nestell R. (1.5 mm) minimum thickness requirements. (c) Do not perform UHX-14.5.11
in. Nonmandatory Appendix S provides discussion on Design Considerations for Bolted Flanged Connections. When the thickness of the cylindrical shell under internal design pressure exceeds one-half of the inside radius, or when P exceeds 1.25SE, the following equations shall apply: When P is known and t is desired, FORMULAS FOR THE DESIGN
OF FORMED HEADS UNDER INTERNAL PRESSURE (a) The equations of this paragraph provide for the design of formed heads of proportions other than those given in UG-32, in terms of inside and outside diameter. Nameplates are preferred on vessels constructed of steels covered by this Part in all thicknesses in preference to stamping. Repair
Requirements . Light P. A lot is defined as material from the same melt quenched simultaneously and whose thicknesses are within a shell course or spherical shell be in accordance with UW-9. Kostarev M. No. [Note (1)] SA-667 SA-278 S
20 25 30 35 50 (345) 55 (379) 60 (414) 80 (552) 16 (110) 20 (138) 24 (165) 28 (193) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (34.5) 5.5 (37.9) 6.0 (41.4) 8.0 (55.2) 1.6 (11.0) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (13.8) 2.4 (16.5) 2.8 (19.3) 5.0 (13.8) 2.4 (16.5) 2.8 (19.3) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 2.0 (13.8) 2.4 (16.5) 2.8 (19.3) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 (13.8) 2.0 
Requirements Repairs. (1) For cones attached to a cylinder having a minimum length of 2.0, reinforcement shall be provided at the junction of the cone with the large cylinder for conical heads and reducers without knuckles when the value of Δ obtained from Table 1-5.1, using the appropriate ratio P/SsE1, is less than α. Raynaud D. [See also
Galvanic Corrosion in Section II, Part D, Nonmandatory Appendix A, A-440(c).] UG-19 SPECIAL CONSTRUCTIONS (a) Combination Units. (Superseded by 17-1800.) Added an option to use design pressure in operating loading cases in UHX-10(f). Woodward G. (2) Differential Pressure Design (Dependent Pressure Chamber). (1) Test temperatures
                                                                                              --- 4 5 6 7 8 9 10 (03/09) 369 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT
UIG-121 ASME BPVC.VIII.1-2019 FORM CMQ CERTIFIED MATERIAL QUALIFICATION FORM (Used in the Construction of Graphite Pressure Vessels) (Cont'd) Record of Qualification Results CMS no. (4) attaching non-load-carrying studs not exceeding /2 in. (b) The tubesheet shall be of uniform thickness, except that the thickness of a tubesheet
extension as determined in UHX-9 may differ from the center thickness as determined in UHX-12, UHX-13, and UHX-14. Lugs for Platforms, Ladders, and Other Attachments to Vessel Walls . Over 1/2 to 15/16 (13 to 24), incl. (-d) The organization installs the pressure vessel, ensures the overpressure protection system is properly installed, and
provides the required documentation and approvals if overpressure by system design is used, and places the prescribed in Section IX. Briley
A. (f), cross-reference to 26-4.2.2 revised to 26-4.2.2 revised to 26-4.2.3 (17-178) 511 26-3 (1) Definitions of K 0, K 1, K 2, K 3; K ' 0, K ' 1, K ' 2, K 3; K ' 0, K ' 1, K ' 2, K ' 3; and S q added (06-261, 18-453) (2) Definition of S t revised (06-261, 18-
networking permitted without license from IHS lxviii Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Page Location Change (Record Number) 516 26-4.2 Revised in its entirety (06-261, 17-178) 522 26-6.6.3.1 (1) Subparagraph (a) revised (17-178) (2) Subparagraph (c) deleted (17-178) 522 26-6.6.3.1
26-6.6.3.2 (1) Subparagraph (a) revised (17-178) (2) Subparagraph (c) added (17-178) 525 26-7.6.3.2 (1) Subparagraph (a) revised (17-178) (2) Subparagraph (a) revised (17-178) 525 26-7.6.3.2 (1) Subparagraph (a) revised (17-178) 525 26-7.6.3.2 
(c) deleted (17-178) 528 26-8.6.3.2 (1) Subparagraph (a) revised (17-178) (2) Subparagraph (a) revised (18-1820) 529 26-9.5 Revised 
Figure 41-1-1 Former Figure 41-1-1 Former Figure 41-1.1-1 editorially redesignated as Figure 41-1-1 569 41-5 Definition of P revised (17-297) 578 44-6.1 Subparagraph (a) revised (17-297) 578 44-6.1 Subparagraph (g)(2) revised (18-2046) 571 41-7 Step 12 revised (17-2410) 577 Table 44-4-1 SA-240, Type 304LN added (09-1776) 577 44-5 Subparagraph (a) revised (17-297) 578 44-6.1 Subparagraph (g)(2) revised (18-2046) 577 44-5 Subparagraph (a) revised (17-297) 578 44-6.1 Subparagraph (a) revised (17-2987) 578 44-6.1 Subparagraph (g)(2) revised (18-2046) 577 44-5 Subparagraph (a) revised (17-2987) 578 44-6.1 Subparagraph (g)(2) revised (18-2046) 577 44-5 Subparagraph (g)(2) revised (g
887) 581 45-5 Subparagraph (b) revised (18-1094) 582 45-7 Revised (18-1308) 583 Mandatory Appendix 46 Added (12-307) 585 A-1 Subparagraphs (e)(3), (e)(3)(-b), and (f) revised (08-829, 14-2469) lxix Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without
                                                                                 --- Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Location Change (Record Number) 586 A-2 (1) Equations (2) and (3), second definitions of P o and P T revised (08-829, 17-1897) (2) Definitions of d i , E , E t , f r e , P
e, Ta, α, and α Tadded (08-829, 17-1897) 588 Table A-2 Note (10) added (08-829) 607 M-3 Cross-reference revised (16-1084) 640 Form U-5 Revised (16-1084) 641 Table W-3 Instruction for Reference Number (61) revised (17-231) 665 Nonmandatory Appendix DD Deleted (17-230)
674 GG-1 Revised (13-2204) 689 Figure JJ-1.2-3 Revised (18-1623) 706 Table NN-6-4 Code Reference for "Fabrication" revised (15-698) 708 Table NN-6-7 Code Reference for "Fabrication" revised (18-1623) 706 Table NN-6-8 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table NN-6-9 Code Reference for "Fabrication" revised (18-1623) 708 Table 
or vessel parts of the same material, design, and construction, whose maximum allowable working pressure is based on a test to destruction of a sample vessel in accordance with (a) above, shall be considered to have a design pressure equal to the maximum allowable working pressure thus determined, except as limited by the rules of UCI-3, and
shall be subjected to a hydrostatic test pressure in conformity with the rules of UCI-99. Johnson F. Tolerance for Formed Heads . A = outside diameter of tubesheet, except as limited by UHX-10(b) a c = radial channel dimension Configurations a, e, f, and A: ac = Dc/2 Configurations b, c, d, B, and C: ac = Gc/2 Configuration D: ac = A/2 a o =
equivalent radius of outer tube limit circle AP = total area enclosed by CP as = radial shell dimension Configurations A, B, C, and D: as = ac C = bolt circle diameter (see Mandatory Appendix 2) Cp = perimeter of the tube layout measured stepwise in increments of one tube
pitch from the center-to-center of the outermost tubes (see Figure UHX-12.2) D c = inside channel diameter D s = inside channel material at T E c = modulus of elasticity for tubes E = modulus of elasticity for 
 elasticity for tube material at T t G 1 = midpoint of contact between flange and tubesheet G c = diameter of channel gasket load reaction (see Mandatory Appendix 2) h = tubesheet thickness h = tubesheet thickness h = tubesheet for the method of support for the unsupported tube span
under consideration = 0.6 for unsupported spans between two tubesheet and a tube supported spans between two tubesheet and a tube supported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet and a tube support = 1.0 for unsupported spans between two tubesheet and a tube support = 1.0 for unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet and a tube support = 1.0 for unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = unsupported spans between two tubesheet faces = L t - 2h l = uns
faces MAX [(a), (b),(c),...] = greatest of a, b, c, ... Wright S. Referenced Documents . Raghunathan E. A special type of joint tensile specimen shall be made from the test coupon as shown in Figure ULW-32.3. (See also Figure ULW-32.4.) Face and root bend specimens shall be made of both the inner and outer weld to the thickness of the layer by
slicing the weld and solid portion to the layer thickness. (2.5 mm). Revised UCS-66(c). (d) Total Required and Actual Bolt Areas, Am and Ab. The total cross-sectional area of bolts Am required for both the operating conditions and gasket seating is the greater of the values for A m 1 = W m 1 /S b and A m 2 = W m 2/Sa. Am and Ab. The total cross-sectional area of bolts Am required for both the operating conditions and gasket seating is the greater of the values for A m 1 = W m 1 /S b and A m 2 = W m 2/Sa. Am and Ab. The total cross-sectional area of bolts Am required for both the operating conditions and gasket seating is the greater of the values for A m 1 = W m 1 /S b and A m 2 = W m 2/Sa. Am and Ab. The total cross-sectional area of bolts Am required for both the operating conditions and gasket seating is the greater of the values for A m 1 = W m 1 /S b and A m 2 = W m 2/Sa. Am and Ab. The total cross-sectional area of bolts Am required for both the operating conditions and gasket seating is the greater of the values for A m 1 = W m 1 /S b and A m 2 = W m 2/Sa. Am and Ab. The total cross-section area of bolts Am area of bolts Am and Ab. The total cross-section area of bolts Am area of bolts A
selection of bolts to be used shall be made such that the actual total cross-sectional area of bolts Ab will not be less than A m . McGill H. 2 (d) Shallow Counterbore 351 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,``,,`,,`,`, --`, Nozzle stud Steel flange ASME BPVC.VIII.1-2019 Figure UIG-36-2 Some Acceptable Nozzle Attachment Details in Impregnated Graphite Pressure Vessels (Cont'd) Nozzle stud Steel flange Retaining bolt Steel flange tn t
Graphite head and nozzle 1/ in. Whittle, Vice Chair T. Zeller F. Edwards, Alternate D. Xu N. Wu X. Nameplates . Swezy, Jr. R. (b) The structural details of supports shall be given special design consideration to minimize local stresses in attachment areas. These impact tests shall be conducted
at the lowest temperature at which pressure will be applied to the vessel or the minimum allowable temperature to be marked on the vessel, whichever is lower. In general, the tools should have more side and top rake than required for cutting steel and the edges should be keen and smooth. Cadell S.-H. Yin G. Limits for Torispherical Head. Kuntz M
N = Step 2. Thickness Above Which Full Radiographic Examination of Butt-Welded Joints Is Mandatory Tabular Values for Figure UCS-66 and Fi
Mullavey, Contributing Member S. When low-alloy steel electrodes and filler metals are used, the classification shall include an H4 supplemental diffusible hydrogen designator (4 ml of hydrogen max. Oldani, Delegate D. (1) One Charpy V-notch test (three specimens) shall be made from each plate as heat treated, and from each heat of bars, pipe
tube, rolled sections, forged parts, or castings included in any one heat treatment lot. Corrosion . Table 1-4.1 Values of Factor K D /2h K 3.0 1.83 2.9 1.73 2.8 1.64 2.7 1.55 2.6 1.46 2.5 1.37 2.4 1.29 2.3 1.21 2.2 1.14 2.1 1.07 2.0 1.00 D /2h K 1.9 0.93 1.8 0.87 1.7 0.81 1.6 0.76 1.5 0.71 1.4 0.66 1.3 0.61 1.2 0.57 1.1 0.53 1.0 0.50 ... ... GENERAL NOTE:
Values of Factor M. Peters M. Welded Test Plates. McCabe J. Nuoffer, Alternate B. Xu, Secretary R. (b) For filler metal pre-use testing requirements, see UHA-51(f) and Figure JJ-1.2-3. Table UCD-23 Maximum Allowable Stress Values in Tension for Cast Ductile Iron, ksi (MPa) Spec. Qualification of Brazing Procedure. Elevated Temperature. (1) The
 maximum allowable compressive stress value to be used in design shall be 80% of the determined value at the design temperature, divided by the design factor of 6.0 (7.0 for lethal service; see UIG-60). Bertolotti F. Reynolds, Jr., Honorary Member M. Postbrazing Operations. Jessee D. Mahadeen, Chair E. Prefabricated or Preformed Pressure Parts
Furnished Without a Certification Mark . (d)(3) below. (mm) REPAIRS IN CAST IRON MATERIALS (a) Imperfections that permit leakage in cast iron materials may be repaired by using threaded plugs provided: (1) the vessel or vessel parts are to operate within the limits of UCI-3(a) or UCI-3(b); (2) no welding is performed; (3) the diameter of the plug
shall not exceed the diameter of a standard NPS pipe plugs, and in addition they shall have full thread engagement corresponding to the thickness of the repaired section. Nestell S. Becht IV F. Calculate y. Welds of Socket Weld Flanges to Nozzle Necks
Ammerman G. Designs that differ from those covered in this Part shall be in accordance with U-2(g). (b) This procedure applies only for loading cases 1, 2, and 3. Configurations a, e, and f: \beta c = 0, \delta c = 0, \delta c = 0, \delta c = 0, \delta c = 0. Daume A. (25 mm) 1 in. Also, as an aid in understanding how these responsibilities and considerations are carried out, two
Contributing Member W. In UHX-12.5.4, replace E s with and recalculate ks and λ s. (See UIG-84.) 335 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
 13:29:04 MDT UIG-7 - UIG-27 ASME BPVC.VIII.1-2019 Table UIG-6-1 Properties of Certified Material Minimum tensile strength at room temperature 3,800 psi (26.2 MPa) 2,000 psi (13.8 MPa) 1,500 psi (10.3 MPa) 1,500 psi (10.3 MPa)
 opportunity to participate. Tubesheet Geometry. UHX-14.5.11.1 Option 1. Zhou, Secretary J. UCL-25 NOTE: Because of the different thermal coefficients of expansion of dissimilar metals, caution should be exercised in design and construction under the provisions of these paragraphs in order to avoid difficulties in service under extreme temperature
Division: (-a) vessels known as evaporators or heat exchangers; (-b) vessels in which steam is generated but not withdrawn for
external use. Kwon, Contributing Member B. Norman P. Zheng G. Mruk, Contributing Member R. Weicks A. (g) X5CrNiN19-9 shall be considered as Type 304N. The location of examinations shall be chosen by the Inspector except that, when the Inspector has been duly notified in advance and cannot be present or otherwise make the selection, the
2019 UNF-23 Table UNF-23.3 Nonferrous Metals — Nickel, Cobalt, and High Nickel Alloys Spec. 2-5(c)(1)(1) considering UHX-4(b) UHX-9.4 Calculation Procedure (a) For flanged extensions that have bolt loads applied to them [Configurations b, d (extended for bolting), e, and B], the procedure for calculating the minimum required thickness of them.
extension, hr, is as follows: (b) For unflanged Configurations c and f, the minimum required thickness of the extension, hr, shall be calculated in accordance with Mandatory Appendix 2, 2-8(c) for loose-type flanges with laps. Hub Moments . This calculation procedure applies only when the tubesheeet is integral with the shell or channel
reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 5-3 - 5-4 ASME BPVC.VIII.1-2019 Figure 5-1 Typical Flexible Shell Element Expansion Joints Butt joint (outer shell element permitted) Butt joint (outer shell element permitted)
Straight flange (typical) Outer torus (typical) Planet (typical) Planet (typical) Inner torus (typical) Radius (typical) Planet (typical) Inner torus (typical) Radius (typical) Planet (typical) Radius (typical) Planet (typical) Radius (typical) Planet (typical) Radius (typical) Radius (typical) Planet (typical) Radius (typical
,,`--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khald
                                                                                                                                                                                                                                                     --- Figure ULW-17.6 Some Acceptable Welded Joints of Layered-to-Layered and Layered-to-Solid Sections 261 Copyright ASME International (BPVC) Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULW-18 - ULW-31 ASME BPVC.VIII.1-2019 the thickness of the layer to which the attachment is welded shall be considered in calculating the stress near the attachment is welded.
except where provisions are made to transfer the load to other layers. Revised UHA-51(d)(3). Lange T. The maximum height of any gap shall not exceed 3/16 in. Halley K. (c) Material covered by specifications in Section II is not restricted as to the method of production unless so stated in the specification, and so long as the product complies with the
requirements of the specification. Layers added to the basic shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings, or making a transition to thicker sections of the layered vessel for reinforcing shell or head openings.
8 26-9 26-10 26-11 26-12 26-13 26-14 26-15 Bellows Expansion Joints. Michael F. UCD-23 MAXIMUM ALLOWABLE STRESS VALUES Table UCD-23 gives the maximum allowable stress values at the temperatures indicated for castings conforming to the Specification listed therein. Monte R. (50 mm) the maximum permissible size of an isolated
indication shall be increased to 3/8 in. H. Faidy B. 428 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,`
5-4 - 5-6 ASME BPVC.VIII.1-2019 6-1 - 6-5 MANDATORY APPENDIX 6 METHODS FOR MAGNETIC PARTICLE EXAMINATION (MT) 6-1 SCOPE An indication is the basis for acceptance evaluation. Hallman J. (16 mm) and over The requirements of
UW-35(a) and UW-51(b) shall be met except that for SA-517 material the maximum weld reinforcement shall not exceed 10% of the plate thickness or 1/8 in. (0.38 mm). Casse S. However, designers and engineers using computer programs for design or analysis are cautioned that they are responsible for all technical assumptions inherent in the
programs they use and the application of these programs to their design. Mokhtarian, Contributing Member Subgroup on Graphite Pressure Equipment (BPV VIII) A. The minimum metal temperature used in design shall be the lowest expected in service except when lower temperatures are permitted by the rules of this Division10 (see UG-116, UCS
66, and UCS-A-3). The provided thickness of the shells shall also meet the requirements of UG-16, except as permitted in Mandatory Appendix 32. Flow Capacity Curve for Rating Nozzle-Type Safety Valves on Saturated Water (Based on 10% Overpressure).
optional. Burgess J. (-c) The tubes shall not be considered in the calculation of the ligament efficiency. xvi Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
13:29:04 MDT .. (2) The maximum allowable compressive stress value to be used in design of graphite pressure vessel parts under the gasket of a flanged joint resulting from the design bolt load, W (see Mandatory Appendix 2), shall be limited to 60% of the determined compressive strength value at the design temperature. Hunt D. In addition, this
section provides guidance on the proper selection of materials for use in these applications and other related topics such as corrosion prevention, welding procedures for joining metal piping systems, and testing methods for determining metal piping systems.
in. 8194 UHA-34 FABRICATION UHA-40 GENERAL The rules in the following paragraphs apply specifically to the fabrication of pressure vessels and vessel parts that are constructed of high alloy steel and shall be used in conjunction with the general requirements for Fabrication in Subsection A, and with the specific requirements for Fabrication in
Subsection B that pertain to the method of fabrication used. (6) added (15-2814, 18-1563, 18-2228) 72 UG-84(h)(2)(-b) Revised (17-2773) 74 UG-91 (1) Subparagraph following subpara. Pischke M. Parts Forging . (b) on-the-job training to familiarize the personnel with the appearance and
license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT (c) Presentations. Ren R. Mandatory use of these rules is limited to K 

2. (b) The Manufacturer of certified material shall prepare a Certified Material Test Report (CMTR) that shall include the following, as a minimum (see
UIG-84) (1) Manufacturer's name (2) lot number (3) grade (4) lot specific room temperature compressive strength values (5) lot specific room temperature (c) The Manufacturer of certified material shall perform testing to meet the
sections17 without revealing any defects. (3) Materials for these parts shall be as permitted by this Division only. This document may be combined with a certificate of compliance as a single document. (c) Cast, Forged, Rolled, or Die Formed Standard Pressure Parts That Comply With an ASME Product Standard, Either Welded or Nonwelded (1)
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 7-1 - 7-3 ASME BPVC.VIII.1-2019 MANDATORY APPENDIX 7 EXAMINATION OF STEEL CASTINGS 7-1 SCOPE Castings up to 2 in. Rao M. Grimm, Secretary V. Table UNF-23.5 Nonferrous Metals — Zirconium Spec. Krishnamurthy,
Certification Mark for the scope of activity described in a Manufacturer's Certificate of Authorization. Swanson, Chair J. Miller B. When common elements such as tubes and tubesheets are designed for a differential pressure, or a mean metal temperature, or both, that is less severe than the design conditions for which its adjacent chambers are
stamped, the data for each common element that differs from the data for the corresponding chamber shall be indicated as required by UG-19(a) and UG-120(b) in the "Remarks" section of the Manufacturer's Data Report. (g) In UHX-13.5.7 (Step 7), recalculate Q 2, Q 3, and Fm as applicable, and the tubesheet bending stress of the Krueger, Vice Chair
D. Becker, Secretary D. Hu Q. Hiser J. It is recognized that layer wash87 or acceptable gaps (see ULW-77) may show as indications difficult to distinguish from slag on the radiographic film. Antoniou Y. Ortman, Vice Chair U. For vessels in lethal service or when specified by the user or his designated agent, the bolt spacing correction shall be applied
in calculating the flange stress in 2-7, 2-13(c), and 2-13(d). Yes UHA-51(f)(4)(-d) Pre-use testing is not required. Welding shall not be performed on steel that has a carbon content greater than 0.35%. Morelock, Alternate M. Any questions concerning the calculations raised by the Inspector must be resolved. UHX-12 RULES FOR THE DESIGN OF U-
TUBE TUBESHEETS UHX-12.1 Scope These rules cover the design of tubesheets for U-tube heat exchangers. Brown C. Chen H. Arnett R. (19 mm) or t n nominal thickness of nozzle wall thickness of nozzle
the nozzle neck O.D. for sketches (i), (j), (k), and (l). Beirne, Alternate M. Feldstein P. (b) Vessels and vessel parts constructed of stress relieved material conforming to Classes 40 through 60 of SA-278 may be used for design pressures up to 650°F (345°C), provided the distribution of metal in the pressure-
containing walls of the casting is shown to be approximately uniform. (e) Ferrous bolts, studs, and nuts may be used provided they are suitable for the application. Foulds J. Reedy, Sr. C. The value shall be determined by tests performed at the time of certified material qualification. Donavin R. Rogers S. 580 580 580 580 581 581 582 582 582 .
Guide for Preparing Manufacturer's Data Reports . (1). Freed K. (1.5 mm) or less, edge to edge. Mechanical loads include pressure and p
Section IX, and the applicable qualified welding procedure specification. Rowley, Alternate lix Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT
Working Group on MANDE (BPV XI) M. Lacroix Y. Wielgoszinski Subgroup on General Requirements and Piping (BPV I) C. See also U-2(a) and U-2(b). (f) Rounded Indication Charts. Tubesheet Extension . (A coded marking system with traceability of these data is acceptable.)
multiple pieces have been used, and shall then obliterate the Certification Mark with the U or PRT Designator from the nameplate. Hall B. When P s d, m i n and P t d, m i n are both zero, design loading case 4 does not need to be considered. (This test may be used in lieu of the room temperature lot test.) The cement manufacturing process shall be
certified. Findlan P. Byrum — Alabama S. (-a) Each heat and/or lot of welding consumables to be used in production welding with the SMAW and GMAW processes shall be pre-use tested by conducting impact tests in accordance with the requirements of (a). (f) Impact testing per UG-84 is not mandatory for pressure vessel materials that satisfy all of
the following: (1) The material shall be limited to P-No. 1, Gr. No. 1 or 2, and the thickness, as defined in UCS-66(a) [see also Note (1) in Figure UCS-66.2], shall not exceed that given in (-a) or (-b) below: (-a) 1/2 in. lined vessel: a vessel having a corrosion resistant lining attached intermittently to the vessel wall. Sheet and Plate SB-209 5083 SB-209 5083
and 316 Stainless Steels; and 5083-0 Aluminum Alloy at Cryogenic Temperatures for Welded Construction (Cont'd) 5% Nickel Steels, SI Units Plates: SA-553 Type III [Note (1)] Plates: SA-553 Typ
J. APPLICATION OF THE CERTIFICATION MARK (a) The graphite surface shall be clean and smooth. r2 t3 t r2 45 deg max. Reyes — California M. Kalnins, Contributing Member W. Wang Q. Udyawar, Secretary W. For each loading case, calculate the tubesheet bending stress σ. Coefficient Cd. (50 mm to 125 mm) Over 5 in. Qualification of
 Nondestructive Examination Personnel . (e) Reinforcement shall be provided at the small end of the cone when required by the following: (1) For cones attached to a cylinder having a minimum length of 1.4, reinforcement shall be provided at the junction of the conical shell of a reducer without a flare and the small cylinder when the value of \Delta
obtained from Table 1-5.2, using the appropriate ratio P/SsE1, is less than a. Laws or regulatory bodies having jurisdiction at the location of an installation establish the mandatory applicability of the Code rules, in whole or in part, within their jurisdiction. (22 mm)
 either membrane or bending stress. Donavin B. Shah V. (6) If postweld heat treatment is required by the rules of this Division, it may be performed either in the location of the parts manufacturer or in the location of the Manufacturer or the washing stress. Donavin B. Shah V. (6) If postweld heat treatment is required to actually perform the
installation of the overpressure protection system in accordance with UG-125(a) since the user may delegate this activity to his designated agent; however, the user retains the responsibility to ensure that it is done prior to initial operation. Quarry J. Kurle, Chair K. It is permitted for the corner weld to be full penetration through either element being
interpretations. Exempt per UHA-51(g)? (5 mm), and maximum thickness of the base metal at welds shall be 2 in. Wright A. Do K. 56 A pin device is a nonreclosing pressure and designed to function by the activation of a load bearing section of a pin that supports a pressure-containing
member. (5) If |\sigma t, m in | > S t b, reconsider the design and return to Step 1. Ramirez, Contributing Member K. (b) The longitudinal weld joint of the same P-Number material. (25 mm) in a 6 in. Kovacs B. to be machined
flush with base metal 5/ in. When a slip-on flange conforming to the standards listed in Table U-3 is used, design pressure-temperature is within the pressure-temperature as lip-on flange standard. Scope . Nogales P. Rahoi W. Renaud W. (350 mm) approx.
Deleted reference to austenitic steel in UF-5(c) as this paragraph is specific to SA-372. where NPS Plug or Equivalent Minimum Radius of Curvature of Cylinder or Cone, in. Flange Moments . Gobbi, Contributing Member A. Stevenson R. Gill S. (d) When the strength of any part cannot be computed with a satisfactory assurance of safety, the rules
provide procedures for establishing its maximum allowable working pressure. Knecht J. Careful application of this Section will help users to comply with applications within their jurisdictions, while achieving the operational, cost and safety benefits to be gained from the many industry best-practices detailed within these volumes. Inspection
and Testing. Additional References. Verderame A. Tolerance on Forged Heads. Colombo P. Macejko J. If a full penetration weld included in t. The liquid penetrant examination method, in accordance with Mandatory Appendix 8, shall be used. 59 Pressure relief device capacities
flow resistances are published in "Pressure Relief Device Certifications." This publication may be obtained from the National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229. (900 mm). Hongqi D. The neck of an opening in a head with an integrally flanged opening will thin out due to the fluing operation.
membrane stress: the component of normal stress that is uniformly distributed and equal to the average value of stress across the thickness of the section under consideration. Revised UG-116(j)]" and revised UG-116(j)]" and revised UG-119(a) by deleting "[See UG-116(j)]" and re
New York, NY 10016-5990 Copyright © 2019 by THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS All rights reserved --`,``,`,`,`,`,`-- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT TABLE OF CONTENTS --`,``,``,,`,,`
                                                                                                                                                                                                                                     --- List of Sections . Some device designs will burst at pressures much greater than their marked burst pressure when installed with the process pressure on the vent side of the device. Thickness of
  Shells and Tubes Under External Pressure . CAUTION: The properties of the base metal may be adversely affected by excessive local heat inputs. Procedure . McMurray, Alternate Working Group on HDPE Materials (SG-MFE) (BPV III) G. Mantovani M. Tokarski J. Keene M. For external pressure design in accordance with this Section, the modulus of
elasticity to be used shall be taken from the applicable materials chart in Section II, Part D, Subpart 3. Hunter, Secretary W. (4) For lethal service [UW-2(a)], see ULW-1 Scope. Echeverria E. Koyama D. (2) The completed vessel shall be hydrostatically tested per UG-99(b) or UG-99(c) or 27-4. Massobrio A. (2) In cases where the test coupon is not
attached to the part being treated, it shall be quenched from the same heat treatment charge and under the same condition, the following information shall be indicated on Form U-5 of the Manufacturer's Data Report Supplementary Sheet for Shelland-Tube Heat Exchangers. (16 mm)
5 /8 in. Like metallic materials, the impregnated graphite material, when stressed at sufficiently low levels, exhibits good fatigue life. (25 mm). Dinic J. (b) Integral Type Flanges. UHA-51(i)(1) Is PQR toughness Yes Yes (-196°C)? (-2) a water temperature of 210°F (99°C); (-3) a nominal water containing capacity of 120 gal (450 L); (-h) vessels not
exceeding the design pressure (see 3-2), at the top of the vessel, limitation on size [see UG-28(f), 9-1(c)]: (-1) vessels having an internal or external pressure in each chamber not exceeding 15 psi (100 kPa) and differential pressure
on the common elements not exceeding 15 psi (100 kPa) [see UG-19(a)]; (-i) vessels having an inside diameter, width, height, or cross section diagonal not exceeding 6 in. ULT-79 FORMING SHELL SECTIONS AND HEADS The requirements and limitations of UNF-77 apply for 5083 aluminum, and of UHT-79 for 5%, 7%, 8%, or 9% nickel steel. Henry
E. Configurations a, b, and c: UHX-13.8 Calculation Procedure for Effect of Radial Differential Thermal Expansion Adjacent to the Tubesheet UHX-13.8.1 Scope. (b) The symbols defined below are used in the equations of this paragraph (see Figure 1-4): 1-4 88 ŏ1Þ D = inside diameter of the head skirt; or inside length of the major axis of an ellipsoidal
head; or inside diameter of a cone head at the point under consideration measured perpendicular to the longitudinal axis D o = outside diameter of a cone head at the point under consideration measured perpendicular to the longitudinal axis D /2h = ratio
of the major to the minor axis of ellipsoidal heads, which equals the inside diameter of the skirt of the head divided by twice the inside heads this includes head-to-shell joint). Revised 26-4.2(b) to make required testing more clear.
Goodwin J. Reinforcement Required for Openings in Shells and Formed Heads. The result obtained from execution of these equations or any other units. Mulet M. Zhang Y. Angstadt S. Pellet I. (2) UHX-12.5.7 (Step 7): M = |Mo|. maximum allowable stress value:
the maximum unit stress permissible for any specified material that may be used in the design equations given in this Division (see UG-23). (c) Any change to any essential variable, including the tolerance range, shall require requalification of the CCS. Wu Y. (2) Code Cases. Aurioles, Sr. R. Dewees G. Roberts III M. (d) As the calculation procedure is
iterative, a value h shall be assumed for the tubesheet thickness to calculate and check that the maximum stresses in tubesheet, tubes, shell, and channel are within the maximum permissible stress limits and that the receiving jurisdiction should be
contacted to ensure the units are acceptable. (32 mm) 11/2 (38 mm) 398 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 2-5 Table 2-5.1 Gasket Materials and Contact Facings Gasket Factors m for Operating Conditions and Minimum Design Seating Stress y Gasket
Material Self-energizing types (O-rings, metallic, elastomer, other gasket types considered as self-sealing) Gasket Factor m Min. Coco R. (50 mm) P-No. 6 Gr. Nos. Burchell R. Tabular Values for Coefficients B 1, B 2, B 3. Zencker A. CONTACT BETWEEN LAYERS (a) Category A weld joints shall be ground to ensure contact between the weld area
and the succeeding layer, before application of the layer. (d) Technicians shall be requalified when they have not been actively engaged in production of graphite pressure vessels within 6 mo or when there is a reason to question their ability to complete a sound joint. 319 UNF-56 POSTWELD HEAT TREATMENT (a) Postweld heat treatment of
nonferrous materials is not normally necessary nor desirable. Hartless J. Nozzle Attachment Weld Loads and Weld Strength Paths to Be Considered. NDE methods and acceptance standards are given in Mandatory Appendix 7. number of tubes tube pitch [see Figure UIG-34-4, sketch (a)] effective pressure acting on tubesheet
shell side design or operating pressure, as applicable. Domage P. The final radiographs of all straight chromium ferritic welds including major repairs to these welds shall be made after postweld heat treatment has been performed. Cementing Technician Qualification. The requirements for the base metals, HAZs, and weld metal(s) of a weldment
`,`,``,,`-`-`,,`,`,`,`,`--- UHA-11 UHA-12 UHA-12 UHA-20 UHA-21 UHA-23 UHA-28 UHA-29 UHA-30 UHA-31 UHA-31 UHA-32 UHA-33 . (4) 1/16 in. (-c) After removal of the defect, the groove shall be examined. Indicate any other loadings per UG-22 for design consideration. Bower T. Stanko, Contributing Member B. The rounded indications
characterized as imperfections shall not exceed that shown in the charts. Nestell E. These rules cover the design of tubesheet (floating end) as shown in Figure UIG-34-1. Table UIG-34-1 provides the load combinations required to evaluate the heat
exchanger for each operating condition x. (3) Resin with graphite filler and catalyst. Impact testing of materials listed in Table UHA-23 is not required, except as modified by (c), for vessels when the coincident ratio of design stress 81 in tension to allowable tensile stress is less than 0.35. f 2 = axial load per unit circumference at conical reducer small
end due to wind, dead load, heat exchanger constraint, etc., excluding pressure, for use in 1-5 or 1-8 cone-to-cylinder junction analyses. (-h) Stationary and floating tubesheet thicknesses may be different, but each tubesheet shall be of uniform thicknesses, with the exception of gasket grooves and/or facing thicknesses. Wolf D. Kirk T. Anderson P.
Single-Spot-Weld Tension Specimen, Two-Ply Joint. For pressures above 3.000 psi (20 MPa), deviations from and additions to these rules usually are necessary to meet the requirements of design principles and construction practices for these higher pressures. Creep-Rupture Properties of Carbon Steels. UHA-51(e)(2)(-a) No No UHA -51(e)(1) No Yes
MDMT colder than -155°F (-104°C)? For welded vessels, use the efficiency specified in UW-12 E T = modulus of elasticity at maximum design temperature, psi. (3). Chen Y. These factors should be given attention in unusual designs or under conditions of cyclic loading. (b) Vessel use shall be restricted to fluids specifically considered for the design of
the vessel. The difference in measurements shall be averaged for each course in the vessel and the results recorded as average middle circumferential expansion em in inches (millimeters). Barborak S. Upitis R. Seipp D. Hall M. Yip, Contributing Member A. Weicks H. Sb shall be calculated by eq. Kimura T. No. SA-479 SA-564 SA-638 SA-666 SA-688
SA-705 SA-731 SA-747 SA-749 SA-749 SA-749 SA-790 S
S30453 S31600 S31603 S17400 S44626 S44627 J92180 S31260 S31500 S31803 S32003 S32101 S32202 S32205 S32304 S3250 S32750 S32750 S32750 S32760 S32906 S32900 S32906 S32900 S32906 S32900 S32906 S32900 S32
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Type/Grade ... 309S 309H 309Cb 310S 310H 310Cb 316 316L ... ... 321 ... 321H ... ... 347 348 ... 405 410 430 439 XM-27 ... ... 630 660 201-1, 201-2 XM-11 TPXM-29 TP304 TP304L TP304L TP304LN TP316 TP316L 630 TPXM-33
``,`,`',,,`-'-',,',,',',--- Spec. Grimm, Chair B. This exception shall not apply to specially designed cast or wrought fittings. If a proof test is performed, the rules of UCD-101 apply. Lower A. A slightly greater included angle in butt welds for adequate manipulation of the
electrode is required. Changes given below are identified on the pages by a margin note, (19), placed next to the affected area. It is recommended that users assure themselves by appropriate tests, or otherwise, that the high alloy steel selected and its heat treatment during fabrication will be suitable for the intended service both with respect to
corrosion resistance and to retention of satisfactory mechanical properties during the desired service life. 223 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS UHA-51 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale,
required if the Weld Procedure Qualification requires impact testing, unless otherwise exempted by the rules of this Division. Intended for manufacturers, users, constructors, designers and others concerned with the design, fabrication, assembly, erection, examination, inspection and testing of pressure vessels, plus all potential governing entities.
When components are manufactured at different local customary units are different local customary units are different than those used for the limitations given in (c). Gas Metal Arc-Spot-Weld Block for Macrosections and Strength Tests . Malikowski, Chair
W. Constant, C, for Gas or Vapor Related to Ratio of Specific Heats (k = cp/cv). Chapin, Contributing Member J. (6 mm to 10 mm), Inclusive. Welded Joint Category. Farrell H. (2) Reply. 713 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 52 Users are warned that a rupture disk will not burst at its design pressure if back pressure builds up in the rupture.
disk due to corrosion or other cause. Maximum Allowable Stress Values in Tension for Cast Iron. Cheetham, Contributing Member A. 238 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 21/2 (64) 4 (100) 51/4 (134) 81/8 (207) The rules in the
following paragraphs apply specifically to the inspection and testing of pressure vessels and vessels 
without a transition knuckle, use the following for design cases (pressure-only cases) in 1-8. Xu, Vice Chair N. Lorimor — South Dakota M. The value of S y shall be taken from Section II, Part D, Subpart 1, Table Y-1 t = minimum required thickness of head after forming t s = minimum specified thickness of head after forming, in. Rust E. (-c)
Combining more than one welding process or more than one heat, lot, and/or batch of welding material into a single test coupon is unacceptable. Graphite is naturally porous so it is impregnated with resin to make it impregnated with resin to make it impregnated with resin to make it impregnated or construction of pressure vessels and components.
MATERIALS UNF-5 NONFERROUS PLATE GENERAL (a) All nonferrous materials subject to stress due to pressure shall conform to one of the specifications given in Section II and shall be limited to those listed in Tables UNF-23.1 through UNF-23.5 except as otherwise provided in UG-10 and UG-11. Ranganath D. Ferlisi, Chair M. Jessee T.
Morishita, Contributing Member L. Definitions relating to specific applications, such as for layered vessels, may be found in related parts of this Division. Denis, Contributing Member M. (e) Conversion of units, using the precision specified above, shall be performed to assure that dimensional consistency is maintained. When K > 2, results become
increasingly conservative and U-2(g) may be used. 359 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,
Tube as supplied by manufacturer Acceptable fracture zone 1.406 2.000 reference .060 × 45 deg UIG-78 - UIG-84 UIG-78 - UIG-84 UIG-78 - UIG-84 UIG-78 - UIG-84 UIG-78 - UIG-80 (a) The Manufacturer shall prepare a Certified Cement Specification (CCS). Yin K. Roberts, Contributing Member M. Part UG General Requirements for All
Methods of Construction and All Materials . to 4 in. These stress values are to be multiplied by the casting quality factors of UG-24. Proper allowance shall be made if connections are subject to external loads other than external pressure. (h - 10 mm). (b) Except as noted, tolerance = ±0.010. Postweld Heat Treatment Requirements for Carbon and
Low Alloy Steels — P-No. 9A. Trieglaff, Vice Chair R. UCD-32 HEADS WITH PRESSURE ON CONCAVE SIDE UCD-37 Heads with pressure on the concave side (plus heads) shall be designed in accordance with the equations in UG-32. Where circumferential joints only are involved, the test plate need not be attached but shall be welded along with the
joint and each welder or welding operator shall deposit weld metal in the test plate at the location and proportional to that deposited in the production weld. The symbols and definitions in this paragraph pertain specifically to reverse flanges. 819 ULT-17 ULT-27 The minimum thickness of any vessel part shall be the greater of the following: (a) the
thickness based on the MAWP at the top of the wessel in its normal operating position plus any other loadings per UG-22, including the static head of the most dense cryogenic liquid to be contained. Abe J. Borter T. When B is less than 20g 1, it will be optional for the designer to substitute B 1 for B in the formula for longitudinal stress SH. Taylor T.
Wacker N. 106 A Nonmandatory Appendix Y flange bolted to a rigid foundation may be analyzed as a Class 1 assembly by substituting 2l for l in eq. (a) Check the axial tube stress. Ortolani W. UHX-12.5.11 Step 11. (51 mm). Imbro K. Except as required in UW-2(d)(3), the maximum temperature used in design shall be not less than the mean metal
temperature (through the thickness) expected under operating conditions for the part considered (see 3-2). Figure UHX-13.4 Different Shell Thicknesses and/or Material Adjacent to the Tubesheet ts,1 tc 308 Copyright ASME
International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Dc UHX-13.5.8 ASME BPVC.VIII.1-2019 UHX-13.5.7 Q 2. Emslander P. For the case of cylinders
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having Do/t values less than 10, see (c)(2). Minimum Thickness Requirements for Fittings . Revised ULW-52(a), ULW-52(b), and ULW-53(a) through ULW-53(a) through ULW-53(a) through ULW-53(a) through ULW-53(a) through ULW-53(a) through ULW-53(b), and ULW-53(a) through ULW-53(b), and ULW-53(a) through ULW-53(b), and ULW-53(b), and ULW-53(b), and ULW-53(b), and ULW-53(b), and ULW-53(c).

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Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHA-1 - UHA-13 ASME BPVC.VIII.1-2019 PART UHA REQUIREMENTS FOR PRESSURE VESSELS CONSTRUCTED OF HIGH ALLOY STEEL GENERAL UHA-1 (b) Cast high alloy steel flanges and fittings complying with ASME B16.5 shall be used within the
longitudinal butt joints, shall be determined by the following procedure: (1) Cylinders having Do /t values ≥ 10: Step 1. Postfabrication Strain Limits and Required Heat Treatment . Szarko P. Ganta T. Swezy, Jr. E. Morton T. Gersinska, Secretary H.-R. (50 mm), or of cast dual metal (see UCI-23 and UCI-29) except standard pressure parts covered by
obtained from Table 1-8.1 using the appropriate ratio P/SsE1 is less than α. UHA -51(h)(2)(-b) Yes 690 --`,``,``,`,`,`,`,`--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Production toughness testing is required. The sole stress at
the flange inside diameter is a tangential stress and is given by the formula for S T 2. Sowinski, Vice Chair M. (e) Certified by completing (a) through (d) above. UIG-76 UIG-77 CERTIFIED MATERIAL SPECIFICATION (a) The
Manufacturer shall prepare a Certified Material Specification (CMS) to ensure that the material meets the requirements of Table UIG-6-1. Saito D. Lewis J. For such services, the primary thickness calculations (shell and head) are normally made for the maximum design pressure coincident with the design temperature (MDMT). It shall not exceed the
maximum allowable working pressure, and it is usually kept at a suitable level below the setting of the pressurerelieving devices to prevent their frequent opening (see M-9). UG-17 METHODS OF FABRICATION IN COMBINATION A vessel may be designed and constructed by a combination of the methods of fabrication given in this Division, provided
the rules applying to the respective method of fabrication are followed and the vessel is limited to the service permitted by the method of fabrication having the most restrictive requirements (see UG-116). Schaaf, Jr. R. (11) User-Manufacturer Rules (b) See Tables NN-6-11 for the Code-assigned responsibilities and applicable
paragraphs for each of the categories listed in (a). (e), cross-reference to UG-44(a) (10) (18-1306) 54 UG-44 Revised in its entirety (18-2228) 70 UG-84(g) Subparagraph (2) revised and subpara. P-No. 1 Group Nos. This blog is about the ASME
Section VIII Division 2 2017 pdf free download. Marking on Materials . (2) For nonferrous and ductile cast iron materials, a factor not to exceed 90% shall be applied if in addition to the minimum requirements of (1): (-a) each casting is subjected to a thorough examination of all surfaces, particularly such as are exposed by machining or drilling,
without revealing any defects; (-b) at least three pilot castings16 representing the first lot of five castings made from a new or altered design are sectioned or radiographed at all critical sections 17 without revealing any defects; (-c) one additional casting taken at random from every subsequent lot of five is sectioned or radiographed at all critical sections 17 without revealing any defects; (-c) one additional casting taken at random from every subsequent lot of five is sectioned or radiographed at all critical sections 17 without revealing any defects; (-c) one additional casting taken at random from every subsequent lot of five is sectioned or radiographed at all critical sections 17 without revealing any defects; (-c) one additional casting taken at random from every subsequent lot of five is sectioned or radiographed at all critical sections 17 without revealing any defects; (-c) one additional casting taken at random from every subsequent lot of five is sectioned or radiographed at all critical sections 17 without revealing any defects; (-c) one additional casting taken at random from every subsequent lot of five is sectioned or radiographed at all critical sections 17 without revealing any defects; (-c) one additional casting taken at random from every subsequent lot of five is section at radiographed at all critical sections at radiographed at radiograph
sections without revealing any defects; and (-d) all castings other than those that have been radiographed are examined at all critical sections by the magnetic particle or liquid penetrant methods in accordance with the requirements of Mandatory Appendix 7. (3) Metal in the nozzle neck available for reinforcement shall be limited by the boundaries
BODY FLANGE REQUIREMENTS Description Type Facing/Surface Finish SKETCH 34 F Gasket Style Joint Assembly (See ASME PCC-1) 35 F GENERAL NOTES CERTIFICATION 36 F 37 F We certify that the statements made in this form are accurate and represent all details of design as per the user or his designated agent (see Nonmandatory
                                                          `,','',,,'-'-',,',','--'-',,',',','--- 38 F User: Signed: (Representative) Registration Identification: (Optional) Registration Seal (Optional) (07/15) 696 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
length, in. Hitchcock, Contributing Member G. Transitions shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (-c) Each rod or bar, before machining, shall be as shown in Figure ULW-17.2, sketch (c), (d-1), (d-2), (e), or (f). (d-2), (e), or 
vessels constructed of materials listed in Table UNF-23.3, with the exception of alloys 200 (UNS No. N02201), 400 (UNS No. N04401), and 600 (UNS No. N02201), 401 (UNS No. N04401), and 600 (UNS No. N02201), 401 (UNS No. N02201), 401 (UNS No. N04401), and 600 (UNS No. N04401), and 600 (UNS No. N02201), 401 (UNS No. N04401), and 600 (UNS No. N04401), and 60
the welded joint exceeds 3/8 in. (16 mm) through 7/8 in. (b) The manufacturer shall qualify the Certified Cement Specification (CCS) using a Certified Cement Specified Cement Specified Cement Specified
vessel, and the Authorized Inspector has signed the data report. Lugs Ext. K. Michael, Delegate D. UHX-14.5.11.2 Option 2. Wang Subgroup on Strength of Weldments (BPV II & BPV IX) G. (c) Filler metal containing more than 0.06% vanadium shall not be used for weldments subject to postweld heat treatment. When Pe ≠ 0, see Figures LL-1 and LL-
2 in Nonmandatory Appendix LL for a graphical representation of F t,min and F t,max. (d) For welded vessels in which the welds are not subject to quenching and tempering, the deposited weld metal and the heat-affected zone shall meet the impact test requirements of UG-84, except that the Charpy V-notch tests and requirements of UHT-6(a) shall
apply. UNF-14 RODS, BARS, AND SHAPES Rods, bars and shapes shall conform to one of the specifications in Tables UNF-23.1 through UNF-23.5. UNF-15 OTHER MATERIALS UNF-23.5. UNF-15 OTHER MATERIALS UNF-23.1 through UNF-23.1 through UNF-23.5.
purpose intended. In cases where the value at A falls to the right of the material/temperature line, assume an intersection with the horizontal projection of the upper end of the material/temperature line, assume an intersection with the horizontal projection of the upper end of the material/temperature line, assume an intersection with the horizontal projection of the upper end of the material/temperature line. The bolt loads used in the design of the flange shall be the values obtained from eqs. Ammerman, Chair G. Raynaud F. Mollitor J. Revised
UHA-44 and UNF-79 to reduce the minimum annealing time from 10 min to 20 min/in. (c) All pressure vessels or pressure vessels or pressure vessel parts of the same material, design, and construction, whose maximum allowable working pressure of not less than
twice the maximum allowable working pressure determined by the application of the rules in (a). The examination results show one or more indications accompanied by loss of back reflection larger than 60% of the reference back reflection. The specimen orientation for the
base metal and HAZ shall be T-L. SCOPE The rules in Part UCL are applicable to pressure vessels or vessel parts that are constructed of base material with corrosion resistant plate, sheet, or strip, attached
by welding to the base plates before or after forming or to the shell, heads, and other parts during or after assembly into the completed vessel. Gurdal C. McMurray, Alternate Special Working Group on Inelastic Analysis Methods (SG-ETD) (BPV III) M. Server D.-J. Specified For Metal Temp. Attachment of Threaded Nozzles to Integrally Forged Necks
and Thickened Heads on Vessels . 236 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UCD-32 - UCD-78 ASME BPVC.VIII.1-2019 NOTE: Cast ductile iron flanges conforming in dimension to the 125 lb and 250 lb American National Standard for cast iron flanges may be used for pressures
not exceeding 80% of the American National Standard pressure ratings for 150 lb and 300 lb carbon steel flanges, respectively, at their listed temperatures provided the temperature is not less than -20^{\circ}F (-29^{\circ}C) nor greater than 650°F (345^{\circ}C), except as in Note to UCD-3(b). Schupp M. Some Typical Expansion Bellows to Weld End Details . The
Inquirer should provide the information needed for the Committee's understanding of the Inquiry, being sure to include reference to the applicable Code Section, Division, Edition, Addenda (if applicable), paragraphs, figures, and tables. NOTES: (1) Normalization and tempering shall be performed in accordance with the requirements of the base
material specification and shall not be performed locally. Bruny, Contributing Member A. SCOPE The rules in Part UHT are applicable to pressure vessels and vessel parts that are constructed of ferritic steels suitable for welding, whose tensile properties have been enhanced by heat treatment, and shall be used in conjunction with the general
requirements in Subsection A, and with the specific requirements in Part UW of Subsection B. Otherwise, the design shall be reconsidered by using Option 1 or 2. 4, third sentence revised xli Personnel Updated 3 U-2 Subparagraph (g) revised (12-307) 5 Table U-3 References updated (14-598, 18-71, 18-1976) 4 U-4 (1) Revised in its entirety (13-2204)
(2) Table 33-1 redesignated as Table U-4-1 (13-2204) 10 UG-11 In subpara. Fifth-level breakdowns are now designated as (+a), (+c), etc. The heat exchanger contains a bundle of straight tubes connecting both tubesheets [see Figure UHX-3, sketch (c)].
(6 mm) 4 For bo 1/ in. (f) The scope of the Division includes requirements for overpressure protection in UG-125 through UG-140 and Mandatory Appendix 11. Hall S. McClanahan T. Wilkowski Working Group on Flaw Evaluation Reference Curves (BPV XI) G. Rossi, Staff Secretary G. Drawings, Design Calculations, and Specification Control
Ossmann W. Standard fittings (e.g., flanges, elbows, etc.) that have been certified to either U.S. Customary units or SI units may be used regardless of the units system used in design. C max. Catty V. Data Report Forms covering items not fully complying with ASME requirements should not refer to ASME or they should clearly identify all exceptions
to the ASME requirements. (c) A designated agent may be self-appointed as such by accepting certain responsibilities of a designated agent, as in the case of vessels designed, manufactured (built) for stock, and intended for operation in a specific application. Pontiggia C. (d) The essential variables to be included in the qualification of a CCS are as
follows: (1) Cement material (-a) filler material (-b) resin material (-c) accelerator material (-b) resin material (-c) accelerator material (-d) filler ma
Responsibilities of the User or His Designated Agent . (f) For materials SA-508 and SA-543, the following, in addition to the variables in Section IX, QW-250, shall be considered as essential variables requiring requalification of the welding procedure: (1) a change in filler metal SFA classification or to weld metal not covered by an SFA specification
Ray R. Xu F. Carbon content as used in (2) above is for weld metal produced with the addition of filler metal. (d) See Tables NN-6-5 through NN-6-8 and Table NN-6-10 for a full listing of paragraphs covering the responsibilities and collaborative and interactive provisions for user's designated agent(s). Types of Flanges. No. Alloy Sheet and Plate SB-
209 5083 SB-209 5083 Yield, MPa 1.30-38.10 38.13-76.20 76.23-127.00 Up through 127.00 Temper Thickness, mm 0 0 0 0 0 Rods, Bars, and Shapes SB-221 5083 0 Seamless Extruded Tube SB-241 5083 0 --`,`
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT. Yes MDMT colder than -20°F (-29°C)? Methods of Fabrication in Combination . Pei L. A magnetization method shall be used that will avoid arc strikes. Grubb D. Jang I. Classification Category Soil Profile Classification: 24 F Skirt @ Nozzles Int. Hembree, Chair
N. Rogers B. Maximum Allowable Working Pressure . Table U-4-1 Standard Units for Use in Equations Quantity Linear dimensions (e.g., length, height, thickness, radius, diameter) Area Volume Section modulus of elasticity Energy
(e.g., Charpy impact values) Temperature Absolute temperature Fracture toughness Angle Boiler capacity U.S. Customary Units inches (in.3) cubic inches (in.3) cubic inches (in.3) pounds mass (lbm) pounds force (lbf) inch-pounds (in.4) pounds mass (lbm) pounds force (lbf) inch-pounds (in.4) pounds mass (lbm) pounds force (lbf) inch-pounds (in.4) pounds force (lbf) inch-pounds (lbf) inch-poun
watts (W) 6 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT) ASME BPVC.VIII.1-2019 UG-1 - UG-4 SUBSECTION A GENERAL
REOUIREMENTS UG-1 SCOPE (d) Materials other than those allowed by the rules of this Division shall not be used. Jones D. Steel Forgings . 84 84 84 84 86 87 88 89 91 91 92 92 94 94 97 97 UW-30 UW-31 UW-32 UW-33 UW-34 UW-35 UW-36 UW-37 UW-38 UW-40 UW-41 UW-42 UW-46 UW-47 UW-48 UW-49 UW-50 UW-51 UW-51 UW-52 UW-52 UW-52 UW-53 UW-54 UW-54 UW-54 UW-54 UW-55 UW-56 
                                                                                                                                                                           --- UF-26 UF-27 UF-28 UF-29 UF-30 UF-31 UF-32 UF-37 UF-38 UF-43 UF-45 UF-46 UF-47 UF-52 UF-53 Tests of Welders and Welding Operators . Fletcher J. Hennessey D. King R. (f) In addition to inspecting the expansion joint for leaks and
structural integrity during the pressure test, expansion joints shall be inspected before, during, and after the pressure test for visible permanent distortion. Munshi, Chair J. (3) Nomenclature. The minimum load is a function of the design pressure, test for visible permanent distortion.
Installation and Operation . McCracken, Chair T. (1) The materials shall be limited to aluminum as follows: SB-247 Alloys 3003, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083, 5083
given in the tables referenced in UG-23. Ferlisi Task Group on Temper Bead Welding (BPV XI) S. Show the joint efficiency requirements for the material specification. Revised the second sentence in UG-84(g)(2) to clarify the intent of
the Code. Specific Code-Assigned Responsibilities. Negligible Corrosion Rate. Horowitz R. About the BPVC Since its first issuance in 1914, ASME's Boiler and Pressure Vessel Code (BPVC) has pioneered modern standards-development, maintaining a commitment to enhance public safety and technological advancement to meet the needs of a
changing world. More than 100,000 copies of the BPVC are in use in 100 countries around the world. Product Scope / Abstract This Division of Section VIII provides requirements applicable to the design, fabrication, inspection, testing, and certification of pressure vessels operating at either internal or external pressures exceeding 15 psig. Such
pressure vessels may be fired or unfired. Specific requirements apply to several classes of material used in pressure vessel construction, and also to fabrication methods such as welding, forging and brazing. It contains mandatory appendices detailing supplementary design criteria, nondestructive examination and inspection
acceptance standards. Anselmi B. (a) Tubesheet extensions, if present, may be extended as a flange (Inflanged) or not extended as a flange (unflanged). Gardiner, Chair J. W m 2 = minimum required bolt load for gasket seating [see 2-5(c)]. Selinger — Saskatchewan, Canada J. Bang B. Jackson M. It shall be so proportioned that test specimens may be
taken from the locations prescribed in (1) above. (-b) Each heat of filler metal and batch of flux combination to be used in production welding with the SAW process shall be pre-use tested by conducting impact tests in accordance with the requirements of (a). Martinez, Staff Secretary D. See W-2 and Table W-3 for the use of Form U-4 Manufacturer's
Data Report Supplementary Sheet. ts, 1 = shell thickness adjacent to tubesheets αs, m, 1 = mean coefficient of Plasticity at Tubesheet for Effect of Plasticity at Tubesheet Tubesheet of Plasticity at Tubesheet Tubesheet Tubesheet at Ts, m UHX-13.7.1 Scope. Impregnated graphite is made up of different of the sheet Tubesheet 
combinations of graphite grades and impregnated are combined in a specified process to make a unique composite material (both impregnated graphite are often referred to as grades). Charts for t Over 3/4 in. Records Retention . No. SA-268 UHA-32 ASME BPVC.VIII.1-2019 Table UHA-23 High Alloy Steel (Cont'd)
Spec. The longitudinal stress in the shell section with openings (for flow into the shell) shall be based on the applicable allowable stress criteria. Do R. Weritz R. Katcher, Contributing Member Subgroup on Ferrous Specifications (BPV II) A. Gandy J. Torance and the shell stress in the shell stress in the shell stress in the shell area less that removed by the openings (for flow into the shell area less that removed by the openings) and shall not exceed the applicable allowable stress criteria.
A. Vorwald N. (b) Design/Operating Pressure Ranges. Miyazaki R. (125 mm), and the outside diameter of such cylinders shall not exceed 36 in. Fisher R. (b) For 5083 aluminum, the provisions of UNF-56 apply. The scope of each Section has been established to identify the components and parameters considered by the Committee in formulating the
Code rules. Canonico J. 247 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-75 - UHT-81 ASME BPVC.VIII.1-2019 FABRICATION UHT-75 - UHT-81 ASME International (BPVC) Provided by IHS under licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-75 - UHT-81 ASME BPVC.VIII.1-2019 FABRICATION UHT-75 - UHT-81 ASME International (BPVC) Provided by IHS under licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-75 - UHT-81 ASME BPVC.VIII.1-2019 FABRICATION UHT-75 - UHT-81 ASME International (BPVC) Provided by IHS under licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-75 - UHT-81 ASME BPVC.VIII.1-2019 FABRICATION UHT-81 AS
75 The requirements of (c) and (d) below are to be taken as minimum steps toward these objectives. Otherwise, the unit geometry shall be reconsidered. Marks, Secretary E. Ball, Alternate T. (c) Category B joints of layered shell sections, or layered shell sections to solid shell sections, shall be of Type (1) or (2) of Table UW-12 and (d) below are to be taken as minimum steps toward these objectives.
Shores I. Vessels Operating at Temperatures Colder Than the MDMT Stamped on the Nameplate or the completed vessel in accordance with the rules of this Division. UIG-36 OPENINGS AND REINFORCEMENTS The rules for the
reinforcement of openings in graphite pressure vessels and vessel parts shall be used in conjunction with the general requirements of Openings and Reinforcements in Part UG of this Division insofar as they are applicable to graphite pressure vessels. Gold, Contributing Member B. of thickness for thicknesses in excess of 1 in. Postweld treatment
shall consist of annealing at 2,050°F (1 121°C) immediately followed by water quenching. (b) The type of construction shall be indicated directly below the Certification Mark and U or PRT Designator by applying the letter "G" [see UG-116(b)(1)]. R = radial distance from bolt circle to point of intersection of hub and back of flange. The maximum
temperature listed for any material is the temperature above which that material is not customarily used. For a butt weld joining two members having different thicknesses at the weld, t is the thinner of these two thicknesses at the weld, t is the thinner of these two thicknesses. NOTE: The term "applicable design calculations" means that all pressure-retaining components covered by the Certification
Mark stamping are supported by calculations and/or proof tests that comply with the requirements of this Division. (b) Statement of Need. Hassan, Contributing Member R. Patterson S. Complete Penetration Welding Per 17-1(c). Rod and bar may be used in pressure vessel construction for pressure parts such as flange rings [see 2-2(d)], stiffening
rings, frames for reinforced openings, stays and stay-bolts, and similar parts. Moment Factor, F M. Ellis S. Tsirigotis L. When the markings are grouped in one location in accordance with requirements of UG-116(a)(3) and UG-116(b)(1) and abbreviations for each chamber are used, they shall be as follows: (a) For markings in accordance with UG-116(a)(3) and UG-116(b)(1) and abbreviations for each chamber are used, they shall be as follows: (a) For markings in accordance with UG-116(a)(3) and UG-116(b)(1) and abbreviations for each chamber are used, they shall be as follows: (b) For markings in accordance with UG-116(a)(b) and UG-116(b)(b) and UG-
116(a)(4), the chambers shall be abbreviated as: (1) SHELL for shell side (2) TUBES for tube side This abbreviation shall precede the appropriate design data. 31 Dimensions referred to are nominal. Cipolla A. This type covers designs where the attachment of the flange to the nozzle neck, vessel, or pipe wall is such that the assembly is considered to
act as a unit, which shall be calculated as an integral flange, except that for simplicity the designer may calculate the construction as a loose type flange, provided none of the following values is exceeded: See Figure 2-4, sketches (8), (8a), (9), (10a), and (11) for typical optional type flanges. Values of yield strength are obtained from the
applicable external pressure chart as follows: (a) For a given temperature curve, determine the B value that corresponds to the right hand side termination point of the curve. Halley, Vice Chair D. GENERAL NOTE: See Table 2-7.1 for equations. Shah, Contributing Member K. Brazer and Brazing Operator. Cantrell — Nebraska, Chair J. Cullen,
Honorary Member W. Production Toughness Testing Requirements for Austenitic Stainless Steel. xxiv Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
                                                   ,,`--- 1 in. Contact Between Layers . A tabulation of allowable stress values at different temperatures (see UG-12) is given in Section II, Part D, Subpart 1, Table 3. Kovacs K. The length of time for such training shall be sufficient to ensure adequate assimilation of the knowledge required. Shelley, Vice Chair P. Alignment
Rules for Mass Production of Pressure Vessels . (4) and (5). Lee L. Cordes S. Raman, Contributing Member M. (c) The elastic moduli, yield strengths, and allowable stresses shall be taken at the operating metal temperature of the component under consideration for operating
 (b)(1)(-c), (c), and (i)(2) revised (16-450, 17-3135, 18-280, 18-2303) 182 Figure UCS-66 Notes (1), (2), and (4) revised (16-450, 18-888, 18-2303) 198 UCS-79(d) Revised (18-490) 199 Table UCS-79-1 Note (2) revised (14-598) 198 UCS-85 Subparagraph (d) revised (16-49)
(a)(1) revised (16-2090) lxv Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Page Location Change (Record Number) 209 Table UNF-79
Revised (15-2426) 208 UNF-91 Revised (18-1195) 213 UHA-23 In subpara. (3) When the MDMT is colder than -320°F (-196°C), production welding (SMAW), submerged arc welding (SAW), plasma arc welding (PAW), and gas tungsten arc welding (GTAW). Sham
construction that conforms to the Code requirements. Joint Efficiency Factors . The temperature that are to be used in the thickness calculations are to be taken from the tables at the temperature that is expected to be maintained in the metal
under the conditions of loading being considered. L s = design length of a vessel section taken as the largest of the following: (a) the center-to-center distance between the cone-to-small- shell junction and one-third the depth of head on the other
end of the small shell if no other stiffening rings are used. 376. Added the cautionary note in Tables UHA-32-7. Matkovics, Chair S. Yes Unacceptable for use with MDMTs colder than 155F (104C) No SMAW and GMAW UHA-51(f)(4)(-e) Is each heat/lot of filler metal pre-use tested? P. Mohr A. Song
M. Skip to Main Content Skip Nav Destination You do not currently have access to this chapter. (b), definition of C revised (13-1075) (2) In subpara. Freiler W. In using the equations in (1), the value of L is to be obtained from Table UG-37 and the value of r is to be obtained from Table 1-4.4. (-f) Calculate the value of internal pressure expected to
produce elastic buckling, Pe. Qualification of Brazed Joints for Design Temperatures Up to the Maximum Shown in Column 1 of Table UB-2. (3 mm) radial clearance between nozzle neck and vessel opening finished opening in the wall (refer to ULW-18 for maximum permissible diameter) 1 /4t n or 1/8 in. Lewis D. For the stationary end, diameters A
 C, Ds, Dc, Gs, Gc, G1, and thickness t c shall be taken from Figure UHX-14.2. For the floating end, diameters A, C, Dc, Gc, G1, and thickness tc shall be taken from Figure UHX-14.3, and the radial shell dimension as shall be taken from Figure UHX-14.3. For the floating end, diameters A, C, Dc, Gc, G1, and thickness tc shall be taken from Figure UHX-14.3.
but is referenced in X.1(e)(1), it will be referenced as (c)(1)(-a). (2) The applicable Welding Procedure Qualification Records (PQRs) with impact testing by other provisions of this Division. (d) The
essential variables to be included in the qualification of a CMS are as follows: (1) Carbon or graphite material: (-a) manufacturer (-b) type / resin system (-c) specific gravity range (-d) viscosity range at room temperature (-e) significant ingredients
with range (3) Impregnation or curing process (-a) process temperature (-c) process temperature (-c) process temperature (-a) at temperature ranges (-b) process temperature (-c) process temperature ranges (-d) vacuum ranges (-e) process temperature (-e) process temperature ranges (-f) under pressure (-g) at temperature ranges (-g) at temperature ranges (-g) at temperature ranges (-g) process temperature ranges (-g) at temp
material, but that do not affect the resulting properties of the material. UNF-28 UNF-30 UNF-30 UNF-30 UNF-56 UNF-57 UNF-58 UNF-58 UNF-57 UNF-58 UNF
IHS under license with ASME No reproduction or networking permitted without license from IHS ALTERNATIVE TO MEASURING CONTACT BETWEEN LAYERS DURING CONTACT 
Figure ULW-77 h 0.010 in. (-b) The elastic moduli, yield strengths, and allowable stresses shall be taken at the operating condition x. Joint Efficiency and Weld Joint Type — Heads . Halley R. 217 Copyright
 ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHA-32 ASME BPVC.VIII.1-2019 Table UHA-32-4 Postweld Heat Treatment Requirements for High
Alloy Steels — P-No. 10H Normal Holding Temperature for Nominal Thickness [See UHA-32(d)] Up to 2 in. Si, Contributing Member R. Sizing of Pressure
Relief Devices for Fire Conditions . UNF-3 UNF-6 Approved specifications for nonferrous plates are given in Tables UNF-23.5. A tabulation of allowable stress values at different temperatures is given in Section II, Part D, Subpart 1, Table 1B (see UG-5). Cardillo D. 545 545 545 545 547 ... (5) The minimum allowable temperature of the
 vessel shall be not less than -320°F (-195°C). V001 Maximum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; and 5083-0 Aluminum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; Types 304 and 316 Stainless Steels; and 5083-0 Aluminum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; and 5083-0 Aluminum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; Types 304
UBC Other No ASCE 7 IBC None Insulated: Yes No By Manufacturer By Others Component Ext. (25 mm) GENERAL NOTES: (a) Postweld heat treatment shall be a maximum of 100°F/hr (56°C/h) in the range above 1,200°F (650°C) after which the cooling rate shall
be rapid to prevent embrittlement. (6 mm) exclusive of any corrosion allowance; (4) the minimum thickness of shells and heads used in compressed air service, and water service, and wat
them (Configurations b, e, and B). Exceptions are: (1) the minimum thickness does not apply to heat exchangers nor to pipe and tubes that are enclosed and protected from mechanical damage by a shell, casing, or ducting
where such pipes 13 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19P
ASME BPVC.VIII.1-2019 (e) Corrosion Allowance in Design Formulas. UIG-27 THICKNESS OF CYLINDRICAL SHELLS MADE OF CERTIFIED MATERIALS UNDER INTERNAL PRESSURE The minimum thickness or the maximum allowable working pressure (MAWP) of cylindrical shells, made of certified materials and subject to internal pressure, shall
be calculated in accordance with the equations in UG-27 or Mandatory Appendix 1, as applicable, using a joint 336 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale,
07/02/2019 13:29:04 MDT UIG-27 - UIG-34 ASME BPVC.VIII.1-2019 (a) The minimum required thickness of a graphite flat head or cover held in place by a bolted steel backing plate causing an edge moment shall be calculated by the following formula [see Figure UG-34, sketch (j)]: efficiency of E = 1.0. As installed, the minimum tube wall thickness
shall be greater than or equal to the calculated minimum value. A rupture disk is the pressure-containing and pressure-sensitive activation component of a rupture disk device. Hirschberg M. May D. Angelini M. This option shall not be used at temperatures where the time-dependent properties govern the allowable stress. The removal of the
nameplate shall be noted in the "Remarks" section of the vessel Manufacturer's Data Report. Kassar R. Sandusky T. (-f) When the conformance of the material shall be marked as required by the permitted specification. Spherical Shells . Cullen G. Ward, Contributing Member J
Grimoldi G. Revised "hydrostatic" to "pressure" in 10-13(b)(14). Song X. (b) Notation HD HT = = = = = = = hD = = = hD = = = hD = = hD = = hD = = hD = = hor entropy for ho in Figure 2-7.6) total hydrostatic end force on attached component 0.785G 2P hydrostatic end force on area inside of flange 0.785B 2P
difference between hydrostatic end force on area inside of flange H - HD radial distance from the bolt circle to the circle on which HD acts (C + g 1 - 2g o - B) / 2 for integral type reverse flanges (C - B ) / 2 for integral type reverse flanges factor = B = inside diameter of shell B' = inside diameter 
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r = factor = (2) Stress at Inside Diameter B' M o = total moment acting on the flange, for the operating conditions or gasket seating as may apply = algebraic sum of MD, MT, and MG. Properties of Certified Material . (d) For the combination of earthquake loading, or wind loading with other loadings in UG-22, the wall thickness of a vessel computed
by these rules shall be determined such that the general primary membrane stress shall not exceed 1.2 times the maximum allowable stress permitted in (a), (b), or (c) above. McMurray, Alternate Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group on Elevated Temperature Construction (SG-ETD) (BPV III) Special Working Group (SG-ETD) (SG-ETD)
DM) (BPV III) G. Liu, Chair Y. Matkovics Germany International Working Group (BPV VIII) P. Austenitic-Ferritic Duplex, Ferritic Duplex, Ferrit
plate should be welded by the procedure used in the longitudinal joints of the vessel and should be heat treated using the same temperature of the shell and channel at their junction to the tubesheet as follows: Configurations a, b, and c: -
                                                     --- Table UHX-13.8.4-1 Operating Pressure Operating Loading Case Shell Side, P s Tube Side, P t Axial Mean Metal Temperature Tubes, T t, m Shell, T s, m 1 Psox,min Ptox,max Tt,mx Ts,mx 2 Psox,min Ptox,min Tt,mx Ts,mx 2 Psox,min Ptox,min Tt,mx Ts,mx 2 Psox,min Ptox,max Tt,mx Ts,mx 3 Psox,min Ptox,max Tt,mx Ts,mx 4 Psox,min Ptox,min Tt,mx Ts,mx 1 Psox,min Ptox,max Tt,mx Ts,mx 2 Psox,min Ptox,max Tt,mx Ts,mx 1 Psox,min Ptox,min Ptox,max Tt,mx Ts,mx 1 Psox,min Ptox,max Tt,mx Ts,mx 2 Psox,min Ptox,max Tt,mx Ts,mx 1 Psox,min Ptox,max Tt,mx Ts,mx 2 Psox,min Ptox,max Tt,mx Ts,mx 1 Psox,min Ptox,min Ptox,m
Tubesheet at the Rim, Channel at Tubesheet, 315 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Shell at Tubesheet, ASME BPVC.VIII.1
2019 UHX-13.10 (f) In UHX-13.5.7 (Step 7), replace the formula for Q 2 with: UHX-13.10.1 Scope. Configurations e and f: If \sigma c \leq 1.5Sc, the channel design is acceptable and the calculation procedure is complete. Strength of Brazed Joints . (50.8 to 114 mm)] Steel Castings ASTM E186 2015 Standard Test Method for Conducting Drop-Weight Test to
Determine Nil- Ductility Transition Temperature of Ferritic Steels Standard Reference Radiographs for Heavy-Walled [41/2 to 12 in. UCI-101 (a) The maximum allowable working pressure of identical cast iron vessels or vessel parts, based on testing one of them to destruction, limited to the service conditions specified in UCI-3 and in accordance with
UG-101(m) shall be where P B = destruction test pressure P R = maximum allowable working pressure at operating temperatures listed in Table UCI-23 The principle of UG-101(c) shall be followed. Lashley K. Hayes M. The design shall be reconsidered. Kang Y. Fourth-level breakdowns are now designated as (-1), (-2), (-3), etc. Scarth F. (b)
X2CrNiMo17-12-2 shall be considered as Type 316L. Thulien J. Iske J. Vollmer T. (mm) /8 /4 3 /8 1 /2 3 /4 (11 7 /32 /16 1 /2 21 3(21) (22) (24) (25) /16 7 /8 15 /16 1 GENERAL UCD-99 STANDARD HYDROSTATIC TEST (a) Cast ductile iron pressure vessels and pressure vessel parts shall be hydrostatically
shall not exceed 150°F (85°C). Reaction Forces and Externally Applied Loads . (b) Postweld heat treatment shall be a maximum of 100°F/hr (56°C/h) in the range above 1,200°F (650°C) after which the cooling rate shall be sufficiently rapid to prevent
embrittlement. The endnotes and preamble in this document (if any) are part of this American National Standard. For each loading case, calculate the average shear stress in the tubesheet at the outer edge of the perforated region, if required. Wang H. Newmark, Honorary Member S. (1) Calculate the largest tube-to-tubesheet joint load, Wt. (2)
Determine the maximum allowable load for the tube-to-tubesheet joint design, L m a x . Jones, Secretary M. Wang, Contributing Member M. A pin device body is the structure that encloses the pressure-containing members. graphite compound:
of 50% rendering it impervious to a permeation rate of not more than 4.5 × 10 - 6 in. Wu, Contributing Member D. In no case shall the 228 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer,
Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 819P UCI-36 - UCI-78 ASME BPVC.VIII.1-2019 thickness of the vessel wall, exceed twice the nominal thickness of the vessel wall, exceed twice the nominal thickness of the vessel wall.
 condition. DESIGN UCL-20 MAXIMUM ALLOWABLE STRESS VALUES Where S c is greater than S b, the multiplier S c/S b shall be taken equal to unity. Wadkinson M. T = tubesheet design condition x, as applicable [see UHX-14.4(c)] T a = ambient temperature,
70^{\circ}F (20^{\circ}C) T c = channel design temperature for the design condition or operating metal temperature for operating condition x, as applicable [see UHX-14.4(c)] t c = channel thickness T s = shell design temperature for operating condition x, as applicable [see UHX-14.4(c)] t s = shell
thickness T t = tube design temperature for the design condition or operating metal temperature for operating condition x, as applicable [see UHX-14.4(c)] t t = nominal tube wall thickness 322 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT A UHX-14.4-1 Design Pressure, P s Tube Side Design Pressure, P t 1 2 3 4 Psd,min Psd,max Psd,min Ptd,max Ptd,min Ptd,max Ptd,min Ioading Cases, the differential
UW-51. 7 The term "plate" for the purpose of this usage includes sheet and strip also. Bryan T. Pastor, Chair S. The operations on the test plate should be such as to duplicate as closely as possible the physical conditions of the material in the vessel itself. For example, when SA-516M Grade 485 is used in construction, the design values listed for its
equivalent, SA-516 Grade 70, in either the U.S. Customary or metric Section II, Part D (as appropriate) shall be used. 5. Hayes, Chair K. Shrivastava K. (16 mm) or Less in Thickness does not apply to the tubes in air cooled and cooling tower heat exchangers if
required to be postweld heat treated. Dyle E. Where longitudinal joints are involved, the test plate shall be attached to one end of the longitudinal joint and welded continuously with the joint. Marriott, Contributing Member W. but not less than 3/8 in. Pulgarin, Staff Secretary A. UHX-14.7.3 Calculation Procedure. Chung T. Mitchell, Secretary A.
 Sealey N. Deleted "(including bolts and nuts)" from UCS-66(b)(1)(-b) and UCS-66(i)(2). No. SA-213 SA-217 SA-240 UNS No. S31609 S31651 S31725 S32100 S20103 S20400 S20910 S24000 S30100 S30200 S30400 S30403 S30409 S30451 S30453 S30815
the annealed condition as permitted by the material specification are exempt from the requirements of (c) above when the heat treatment during fabrication is limited to 199 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
channel (configuration a) is not required to meet a minimum length requirement. Krueger C. = c max. (c) Calculate and . Otherwise, proceed to (c) below. (2) Recertification by the Vessel or Part Manufacturer (-a) When documentation demonstrating complete conformance to the chemical requirements is not available, chemical analyses are made on
different pieces from the lot to establish a mean analysis that is to be accepted as representative of the lot. Carter, Vice Chair J. 2 dtn (c) Deep Counterbore tn t Graphite head and nozzle cemented Cement d 1/ in. Values of Spherical Radius Factor K 1 . Xing F. It is recommended that bolts and study have a nominal diameter of not less than 1/2 in.
Rawls, Jr. R. Calculation Procedure . Third-level breakdowns are now designated as (-a), (-b), (-c), etc. To provide a uniform system of reference, these tables include a column of UNS (Unified Numbering System) numbers assigned to identify the various alloy compositions. The Inquirer should propose a condensed and precise Inquiry, omitting
superfluous background information and, when possible, composing the Inquiry in such a way that a "yes" or a "no" Reply, with brief limitations or conditions, if needed, can be provided by the Committee. Attachment of Stiffening Rings to Shells. Davies S. ASME Section viii Division 2 2017 PDF free download. Revised the external pressure
references to Section II, Part D, Subpart 3 in UCS-33, UNF-33, and UHA-31. Examples . Efficiencies fr . (1) Calculate the largest equivalent unsupported buckling length of support, k. Broom S. Swanson R. The rules of UHX-13.8 may be used only if the length
requirements of UHX-13.5.11(a) are met by the small shell cylinders. Galanes M. Bernasek R. Erickson C. tube pitch effective tube pitch radius to outermost tube hole center [see Figure UHX-11.3-1, sketch (a)] S = allowable stress for tubesheet material at tubesheet material at tubesheet design temperature (see UG-23) S t T = allowable stress for tube material at tubesheet material at tubesheet
 tubesheet design temperature (see UG-23) NOTE: For a welded tube or pipe, use the allowable stress for the equivalent seamless product. 1 through UHX-12.5.10 except as follows: (1) The shell (configurations a, b, and c) is not required to meet a minimum length requirement. Split Loose Flanges. Barnes,
Contributing Member R. (b) He/she is competent in the techniques of the magnetic particle examination method for which he/she is certified, including making the examination method consists of more than one operation, he/she may be certified as being qualified only for which he/she is competent in the techniques of the magnetic particle examination method for which he/she is certified, including making the examination method consists of more than one operation, he/she may be certified as being qualified only for which he/she is competent in the techniques of the magnetic particle examination method for which he/she is certified, including making the examination and interpreting and evaluating the results, except that where the examination method consists of more than one operation, he/she may be certified as being qualified only for which he/she is certified, including making the examination method consists of more than one operation, he/she may be certified as being qualified only for which he/she is certified.
Code requirements. Any indication which is believed to be nonrelevant shall be regarded as an imperfection unless it is shown by reexamination by the same method or by the use of other nondestructive methods and/or by surface conditioning that no unacceptable imperfection is present. Inspection of Materials . Pastor, Contributing Member India
International Working Group (BPV VIII) D. (a)(4)(-b), cross-reference to subpara. (e) Liquid Penetrant Method. Proposed revisions to the Committee are submitted to the American National Standards Institute (ANSI) and published at to invite comments from all interested persons. Information regarding Special Notices and
Errata is published by ASME at . Typical Sections of Special Seamless Vessels . (b) Cast ductile iron pressure vessel parts shall not be painted or otherwise coated either internally or externally prior to the hydrostatic pressure test. Copyright ASME International (BPVC) Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS GENERAL The rules in the following paragraphs apply specifically to the design of pressure vessels and vessels and vessels are vessels and vessels and vessels and vessels are vessels and vessels and vessels are vessels and vessels and vessels are vessels and vessels and vessels a
cast materials. Less than 1/8 1 /8 3 /16 1 /4 5 /16 3 /8 7 /16 1 /2 9 /16 5 /8 11 /16 3 /4 to 2, incl. Hansing, Alternate COMMITTEE ON HEATING BOILERS (BPV IV) J. Measurements shall be taken at zero pressure, and following application of hydrostatic test pressure, at the design pressure. Because any increase of tubesheet thickness may lead to
overstresses in the tubes, shell, channel, or tube-totubesheet joint, a final check shall be performed, using UHX-13.5 Calculation Procedure for the design of tubesheet heat exchanger is as follows. (c) Material on which welding is to be performed shall be proved of good weldable quality. Martinez, Staff Secretary
A. Glaspie J. Qashu S. Schildberg, Contributing Member J. [See NN-5(a).] (b) A user appoints a designated agent specifies a pressure vessel, and a Manufacturer constructs the vessel, and a Manufacturer constructs the vessel. Pillow D. Added formulas for interfacial pressures P o and P T to Nonmandatory Appendix A. Training. Yield strength and elongation are not a
requirement of this test. Nadarajah, Secretary D. The length of an acceptable cluster shall not exceed the lesser of 1 in. For the operating NOTE: For a welded tube or pipe, use the allowable stress for the equivalent seamless product. Tang Q. Some of these mixtures are brittle and may give rise to cracks during solidification or afterward. Revised
User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULW-54 - ULW-57 ASME BPVC.VIII.1-2019 Figure ULW-32.4 14 in. These holes shall be provided in the opposite surface to that where deterioration is expected. 341 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-34
ASME BPVC.VIII.1-2019 §19p Table UIG-34-1 Design Pressure, Ps Tube Side Design Pressure, Ps Tube Side Design Pressure, Pt 1 2 3 4 Psd,min Ptd,max Ptd,min Ptd,min Ptd,min Ptd,min Ptd,min Ptd,min Ptd,min Ptd,
are satisfied: (1) The material is solution annealed after welding. Repair of Weld Defects. If the Inquirer may propose such a revision for consideration by the Committee. Nutter, Chair T. 5A, 5B, and 5C. (a) The user or his designated agent (see
Nonmandatory Appendix NN) shall establish the design requirements for pressure vessels, taking into consideration factors associated with normal operation, such other conditions as startup and shutdown, and abnormal conditions which may become a governing design consideration (see UG-22). 67 One test specimen may represent a group of
forgings, provided they are of the same design, are from the same heat of material and are forged in the same manner. Kalahasthi S. Acceptance shall be based on reference to the weld geometry as shown in Figure ULW-54.1. As an alternative, an angle radiographic technique, as shown in Figure ULW-54.2, may be used to locate individual gaps in
order to determine the acceptability of the indication. Grohmann S. (-3) ASTM E1820 J I C tests shall be conducted on two sets of two specimens, one set from the HAZ, one set from the weld metal, at a test temperature no warmer than MDMT. (mm) Sc = allowable compressive stress (= 2.5 times the allowable tensile stress St), psi (MPa) u = UIG-29
100, % out-of-roundness EULER BUCKLING OF EXTRUDED GRAPHITE TUBES The requirements of UHX-14.5.9(b) shall apply. For flanges subject to external design pressure, see 2-11. Hunter E. Prescott, Alternate A. Large Openings in Cylindrical and Conical Shells . (b) The Manufacturer shall include sufficient provision for material control to
ensure that all material is traceable to the manufacturing lot number. Prahl J. nominal pipe size (NPS): nominal pipe size as used throughout this Division is defined as the pipe outside diameter for a given pipe size in accordance with ASME B36.10M. (d) Postweld Heat Treatment of UNS Nos. For carbon and low alloy steels, minimum thickness
exclusive of corrosion allowance shall be 0.125 in. (a) Nozzles shall not be located in Category A or B joints. Ammerman, Vice Chair V. EIH Support Plate Gasketed With Mating Flange. Gonczy M. Examination of Chromium Stainless Steel Cladding or Lining. The random spot examination shall be performed as specified in ULW-57. Reedy, Sr. G. Conti
P. Staniszewski K. This information now appears in all Boiler Code Sections (except for Code Sections (except for Code Sections (except for Code Sections), 90 0. GENERAL The rules in the following paragraphs apply specifically to the fabrication of pressure vessels and vessel parts that are constructed of heat-treated steels covered by this Part and shall be used in conjunction with the general
requirements for Fabrication in Subsection A, and, when applicable, with the specific requirements for Fabrication in Subsection B, Part UW. Freiler, Contributing Member G. Some Acceptable Nozzle Attachments in Layered Shell Sections . Calland, Chair C. DEFINITIONS OF TERMS Certification Mark: An ASME symbol identifying a product as
meeting Code Requirements. The reduced effective modulus has the effect of reducing the shell and/or channel stresses in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic plastic calculation; however, due to load shifting this usually leads to an increase in the elastic planting the elastic
pressure vessels and vessel parts that are constructed of nonferrous materials and shall be used in conjunction with the general requirements for Inspection A, and with the general requirements for Inspection A and with the general requirements for Inspection A. and with the ge
Calibration of Measurement and Test Equipment. (a) This procedures describes how to use the rules of UHX-14.5 when the effect of radial differential thermal expansion between the tubesheet and integral shell or channel is to be considered. Wiger K. Pizzichini J. (c) This procedure shall be used when specified by the user or his designated agent. W
m 1 s = shell flange design bolt load (see definition for W m 1 in Mandatory Appendix 2, 2-3) W m a x = MAX[(W c), (W s)] W s = shell flange design bolt load selected from Table UHX-8.1 for the respective Configuration and Loading Case UHX-9
TUBESHEET EXTENSION UHX-9.1 Scope NOTE: Tubesheet deflection, especially when the tubesheet or flat bolted cover may result in fluid leakage across a gasketed pass partition plate. Pastor S. 1-5 ASME BPVC.VIII.1-2019
Sr = allowable stress of reinforcing ring material at design temperature Sr = allowable stress of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone at cone-to-cylinder junction tr = minimum required thickness of cone-to-cylinder
nominal thickness of cylinder at cone-to-cylinder junction y = 1 and z = 1
Quality Control System . (a), cross-reference to 13-1 corrected by errata to 2-7 (17-2075, 17-3322) 403 2-9 Subparagraph (d) added (18-413) 410 2-11 In subpara. Example of Tube Spacing With Pitch of Holes Varying in Every Second and Third Row . Diaz N. (6 mm) /32 in. McRae, Contributing Member S. (f) In UHX-13.5.6 (Step 6), recalculate PW,
(Manufacturer and I.D. No.) UIG-121 ASME BPVC.VIII.1-2019 FORM CPQ CEMENTING PROCEDURE QUALIFICATION FORM (Cont'd) (Back) Tensile Strength, psi (MPa) Sample No. Block Joint Material Tube-to-Tubesheet Joint Tube-to-Tubesheet Joint Tube-to-Tubesheet Joint Tube-to-Tube
Joint 1 2 3 4 5 6 7 8 9 10 Average value Test deviation in % from average value ±20% ±20% UIG-6, minimum tensile strength of cemented joints 1,500 (10.3) 1,500 (10.3) 1,500 (10.3) -`,``,`,`,,`,
                                                                                                                                                                                                                                                                                                                                                              ,,`--- Permissible deviation, % (07/17) 374 Copyright ASME International (BPVC) Provided by IHS under license with ASME No
reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 FORM CTO CEMENTING TECHNICIAN OUALIFICATION FORM (Used in Cementing Parts of Graphite Pressure Vessels) Name of technician
                                                                                                                                                       Cementing procedure specification (CPS) no. xiv Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer,
Mohamed Not for Resale, 07/02/2019 13:29:04 MDT.. For the operating conditions, the total flange moment Mo is the sum of the three individual moments MD, MT, and MG, as defined in 2-3 and based on the flange design load of eq. Berger K. (b) Section V, Article 7 shall be applied for the detail requirements in methods and procedures, and the
additional requirements specified within this Appendix. Wang W. This Part is not intended to apply to those steels approved for use under the rules of accelerated cooling, including liquid quenching, is used to attain structures comparable to those attained
by normalizing thinner sections. If |\sigma| t,min |\leq| Stb, the tube design is acceptable. Bashir, Chair Y. B = factor determined from the applicable material chart or table in Section II, Part D, Subpart 3 for maximum design metal temperature [see UG-20(c)] D o = outside diameter of cylindrical shell course or tube (c) Cylindrical Shells. Joint Brazing
Procedure . Brahma M. Kulat, Vice Chair D. Chi A. Rules . Structural Attachments . 16 Pilot casting, usually one of the first from a new pattern, pouring, and melting) as the castings it is intended to represent. All such indications are not
necessarily imperfections, however, since excessive surface roughness, magnetic permeability variations (such as at the edge of heat-a ffected zones), etc., may produce similar indications. Odell R. To maintain a tight joint when the unit is repressurized, consideration should be given to gasket and facing details so that excessive deformation of the
gasket will not occur. Branch, Honorary Member G. (6 mm to 10 mm), Inclusive (a) Random Rounded Indications [See Note (1)] 1 in. 552 xix Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer,
Mohamed Not for Resale, 07/02/2019 13:29:04 MDT. Stayed Vessels of Obround Cross Section [Figure 13-2(b), Sketch (3)]. The designated agent also sizes the pressure relieving device, or specifies overpressure protection by system design at the instruction of the organization. Hansen M. (2) circumferential fillet welds with a throat thickness of 1/2
in. Borter, Contributing Member P. Allowable Design Stress for Clamp Connections. Gerlach D. O'Donnell, Sr., Contributing Member R. Janowiak K. (c) The pneumatic test shall be performed in accordance with UG-100, except that the ratio of stresses is not applied, and the test pressure shall be at least 1.2 times the internal pressure at 150°F.
(65°C). UG-90(c)(1)(-i) requirement for a visual inspection by the Inspector does not apply to either of these tests. Ladefian W. (13 mm) for nozzles of 3 in. Such consideration shall include but shall not be limited to the following: (1) the need for corrosion allowances; (2) the definition of lethal services.
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tube psi (MPa) Tensile strength, graphite compound psi (MPa) Compressive strength, graphite comp

(3) Decrease in tensile strength over temperature and the maximum material temperature and the maximum material temperature and the maximum material temperature. White, Alternate J. Clayton, Chair G. Ting Y. (f) The weldments of Types 304 and 316 stainless steels shall be Charpy impact tested as

(1) Physical properties at room temperature: Physical Properties Value --`,``,`,`,,`,,`,--- Flexural strength, tube psi (MPa) Flexural strength, graphite compound psi (MPa) Tensile strength, block psi (MPa) Tensile strength

CYLINDERS The minimum wall thickness of dual metal cylinders c on forming to SA-667 or SA-748 shall be 5 in. Butt Welding of Plates of Unequal Thickness of Cylindrical Shells Made of Certified Materials Under Internal Pressure. Wright M. Butler, Secretary A. Polynomial Coefficients yi for the

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exchanger shall be marked "Max Mean Metal Temp" in addition to meeting all the requirements of UG-19(a)(3) [see UG-116(j)]. lxxiii Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME Internati
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(a) Each Manufacturer shall be responsible for the quality of the materials, processes, and personnel used by their organization, and shall conduct tests of the processes to ensure that materials produced within a 3-mo period from a specific
grade of graphite and resin that meets established specifications for material properties. For each condition, the temperature at which the allowable stress was taken for the shell, channel, tube, and tubesheet shall be listed. (b) Tensile test specimens shall comply with Figure UIG-76-1, UIG-76-3, UIG-76-3, UIG-76-5. (a) When P e ≠ 0,
accordance with UW-51. Yes WPS Qualification with toughness testing is required. (1) It is important to note that a "user" as defined in this Division is an entity that defines the design conditions and parameters of the pressure vessel under consideration and communicates these conditions and parameters to the Manufacturer. UHA-28 THICKNESS
OF SHELLS UNDER EXTERNAL PRESSURE Cylindrical and spherical shells under external pressure shall be designed by the rules in UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-28, using the applicable figures in Section II, Part D, Subpart 3 and II, Part D, Subpart 3 and II, Part D, Subpart 3 and III, Part D, S
 Pumps (SG-CD) (BPV III) D. Detailed information regarding procedures best suited to the several metals may be obtained from the literature of the material producers, and from other reliable sources such as the latest editions of handbooks issued by the American Welding Society and the American Society for Metals. Patel M. (3.2 mm) thick 1 /16 in
Trant R. (150 mm) nominal pipe size may be constructed as shown in Figure ULW-18.1, sketches (k) and (l). Nondestructive Examination of Welds on Pneumatically Tested Vessels . Berger D. The user ensures that the required overpressure protection system is properly installed and places the vessel in service. See 2-11 for flanges with ring type
gaskets subject to external pressure, 2-12 for flanges with nut-stops, and 2-13 for reverse flanges. (6 mm to 50 mm), incl. Audrain, Alternate D. No. SA-351 SA-358 SA-376 SA-409 SA-453 SA-479 UNS No. J92901 J93000 J93254 J93400 J93254 J93400 J93254 S31266 S31725 S30400 S30409 S30409 S30451 S30453 S31600
 & B XM-19 XM-29 302 304 304L 304H 304LN Spec. Added ASCE/SEI 7-16. Chan S. WPS Qualification by toughness testing is not required. Uebel K. Garbolevsky R. Pitts Task Group on Buried Components Inspection and Testing (WG-PT) (BPV XI) D. Lowest Permissible Temperatures for Welding . (b) Inner Shell. Dinic, Alternate P. (i) The impression
UW-2(a). Hardy G. Outside layers are especially critical when support lugs, skirts, or jacket closures are welded to them. Vayda M. (19 mm to 50 mm), Inclusive and including thickness is the thickness selected to 1/8 in. (c) nominal thickness: except as defined in UW-40(f) and modified in UW-11(g), the nominal thickness is the thickness selected
this Part UHX-13 and UHX-14 supersede the requirements of UG-23. Geringer, Secretary I. 2-5(e)(5), which is opposed only by the gasket load, in which case NOTE: Where additional safety against abuse is desired, or where it is necessary that the flange be suitable to withstand the full available bolt load AbSa, the flange may be designed on the basis
of this latter quantity. The Committee also interprets these rules when questions arise regarding their intent. (f) addressing dimensions shown as decimals or fractions. Miller C. It is a primary bending stress because it is a measure of the stiffness required to maintain equilibrium at the longitudinal axis junction of the nozzle-shell intersection due to
the bending moment calculated by eq. Adams, Chair R. Donavin, Chair M. (3 mm to 6 mm), Inclusive (a) Random Rounded Indications [See Note (1)] 1 in. UCL-27 JOINTS IN INTEGRAL OR WELD METAL OVERLAY CLADDING AND APPLIED LININGS (a) The types of joints and welding procedure used shall be such as to minimize the formation of
brittle weld composition by the mixture of metals of corrosion resistant alloy and the base material. Values of Spherical Radius Factor K o for Ellipsoidal Head With Pressure on Convex Side . 329 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Shell at
Tubesheet, (2) The channel (configurations a, e, f, and A) is not required to meet a minimum length requirement. UHX-13.5, UHX-13.5, and UHX-14.5; configurations a, e, f, and A) is not required to meet a minimum length requirement. UHX-13.5, UHX-13.5, and UHX-14.5; configurations a, e, f, and A) is not required to meet a minimum length requirement. UHX-13.5.1 Step 1. Shijun Y. (d) The channel component integral with the tubesheet (UHX-13.5, UHX-13.5, and UHX-14.5; configurations a, e, f, and A) is not required to meet a minimum length requirement.
with one plate edge offset [Figure UW-13.1, sketch (i)] are prohibited anywhere in the vessel. Hopkins D. Notch toughness testing shall be performed as specified in (-a) or (-b) below, as appropriate. (e) Materials outside the limits of size and/or thickness given in the title or scope clause of the specifications given in Section II, and permitted by the
 10-16 10-17 Quality Control System . Hill III, Chair R. 1/ in. In Table U-3, updated year of acceptable edition for ASME B16.42, ASME B16.42, ASME B16.43, ASME B16.47, ASTM E4, and ASTM E691. Wright J. Matthews T. For each loading case, calculate For each loading case, calculate the maximum bending stress in the tubesheet in accordance with (a) or (b)
below. Stephens, Jr., Chair S. radius Grip length = 4 in. If \sigma s, m is positive, the shell design is acceptable and the calculation procedure for the design of a tubesheet for a U-tube heat exchanger is as follows: Step 1. Petrosky Subgroup on Volumetric Methods (BPV V) A. Information can be obtained from the
material producers and the Metals Handbook for conditions to give optimum results. Conditions of Applicability for EIH Support Plates . Bennett P. Yu G. These standards may 2-2 MATERIALS (a) Materials used in the construction of bolted flange connections shall comply with the requirements given in UG-4 through UG-14. Schriefer I. Yeshnik N
When f 2 is in tension and the quantity is larger than the PRs/2 term, the design shall be in accordance with U-2(g). Phillips, Contributing Member R. 81 Calculated stress from pressure and nonpressure loadings, including those listed in UG-22 which result in general primary membrane tensile stress. Any decrease in thickness (the maximum
modulus of elasticity results in a design where the calculated tubesheet stresses are within the allowable stress limits. (2) Post-forming heat treatments shall be performed at 1,350°F to 1,435°F (730°C to 780°C) for 1 hr/in. ŏ19Þ (2) Determine the maximum allowable load for the tube-to-tubesheet joint design, L m a x . MARKING AND REPORTS
UHA-60 GENERAL The provisions for marking and reports in UG-120 shall apply without supplement to vessels constructed of high alloy steels. Heberling II P. NOZZLES (a) All openings regardless of size shall meet the requirements for reinforcing, nozzle geometry, and nozzle attachments and shall conform to details shown in
 specifications for nonferrous castings are given in Tables UNF-23.1 through UNF-23.5. A tabulation of allowable stress values at different temperatures is given in UHX-13.5 shall be performed accounting for the following modifications, 431 431 432 433
Mandatory Appendix 8 8-1 8-2 434 434 8-3 8-4 8-5 Methods for Liquid Penetrant Examination (PT). Barnes W. 5 6 31 44 53 55 56 63 70 70 70 71 121 138 148 160 163 169 172 173 174 xxix --`
Requirements for High Alloy Steels — P-No. 10K. Barnes H.-W. Indicate if the Manufacture is required to calculate MAWP or use Design Temperature. Tang, Delegate W. tn tS = = = not less than 1/4 in. The CPS shall include all essential and non-essential variables with tolerance ranges. Wei S. (j) Pressure vessels exclusive of
those covered in (c), (g), (h), and (i) that are not provided with quick-actuating or quick-opening closures (see UG-35.2 and UG-35.3, respectively), and that do not exceed the following volume and pressure limits may be exempted from inspection by Inspectors, as defined in
UG-91, provided that they comply in all other respects with the requirements of this Division: (1) 5 ft3 (0.08 m3) in volume and 250 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (2.4 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 ft3 (0.08 m3) in volume and 350 psi (1.7 MPa) design pressure; or (2) 3 f
R60702, R60705 R60705, R60705 R60705, R60705 R60705, R60705 R60705, R60705 R60705, R60705 R60705, R607
inspection openings, etc., on which there are no external mechanical loadings, provided the following requirements are met. Uses . 64 By "lethal substances" are meant poisonous gases or liquids of such a nature that a very small amount of the gas or of the vapor of the liquid mixed or unmixed with air is dangerous to life when inhaled. (mm) Holding
Time Notes PWHT Temp., °F (°C) hr/in. Dechene M. (e) This procedure applies only when D e c c , L \leq 2.17D e c c , S . Swayne, Vice Chair K. of loadings listed in UG-22 that are likely to occur (see UG-98) at the designated coincident temperature [see UG-20(a)]. The CPQ shall include all essential variables and the actual test results. Jeong H. McRae
Contributing Member A. Chicoine D. (e) In the step in UHX-13.5.10, calculate o s, m, replacing ts with ts,1. (e) Any quantity to which units apply shall be entered on the User's Design Requirements Form with the chosen units. (-a) There shall be no untubed lanes. (-b) If existing Code text does not fully convey the meaning that was intended, or
conveys conflicting requirements, and revision of the requirements is required to support the Interpretation will be issued in parallel with a revision to the Code. (0.38 mm) for MDMTs of -320°F (-196°C) and warmer. It consists of Parts UCS, UNF, UHA, UCI, UCD, UHT, ULW, ULT, and Part UIG dealing with carbon
and low alloy steels, nonferrous metals, high alloy steels, cast iron, clad and lined material, cast ductile iron, ferritic steels with properties enhanced by heat treatment, layered construction, low temperature materials, and impregnated graphite, respectively. (22 mm) in thickness shall be examined for 100% of their length in accordance with
Mandatory Appendix 6 by the magnetic particle method using direct current only when the material is ferromagnetic. Bourguigne M. Configurations a, e, f, and A: A cylindrical channel shall have a uniform thickness of tc for a minimum length of adjacent to the tubesheet. Calculate diameter ratio K and coefficient F for each tubesheet. Material
for Data Reports as specified in UG-120. GENERAL The provisions for inspection and testing in Subsections A and B shall apply to vessels and vessel parts constructed of steels covered by this Part. See also informative and nonmandatory guidance regarding metallurgical phenomena in Section II, Part D, Nonmandatory Appendix A. (c) The wall
networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UHX-12.5.6 Step 6. Rice S. (b) Apply a thin to medium coating of cement onto a small section of the Code part. Gas Metal Arc-Spot-Weld Block
Curve in Thermal Expansion Test, \Delta L t = f(\theta). (g) Exemption From Impact Testing Because of Low Stress. (c) \rho may be either calculated or chosen as a considered a line of support, the moment of inertia for a stiffening ring shall be determined in accordance with (3). Garnett
R. At a welded joint in a casting, only the lesser of the casting quality factor or the weld joint efficiency specified in UW-12 applies, but not both. Tseng Working Group on Valves (SG-CD) (BPV III) P. (50 mm) or less shall be examined by a magnetic particle or liquid penetrant method. For the design of the flange, this load is modified per eq. 819.
UHA-23 MAXIMUM ALLOWABLE STRESS VALUES (a) Section II, Part D, Subpart 1, Table 3 for bolting and Table 1A for other materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures indicated for the materials give the maximum allowable stress values at the temperatures at the temperatures at the temperatures at the temperature at the temperat
indications larger than 40% of the reference back reflection when accompanied by a 40% loss of back reflection. The new text includes text from Code Case 2397 and editorial changes. Choi C. Supplementary Instructions for the Preparation of Manufacturer's or Assembler's Certificate of Conformance Forms UV-1 and UD-1. 1 in. General Conditions
of Applicability for Tubesheets Tubesheets Tubesheet Characteristics . Highlands E. The nameplate shall be destroyed. Revised UCS-56(c) and UHA-32(c) to address PWHT of welds between dissimilar metals. Chavdarov A. Tatar S. Baker W. Janowiak M. Osterfoss J. (5) The Certificate Holder shall ensure that the subcontractor uses written procedures and
welding operations that have been qualified as required by this Division. Internal Structures Support Guidelines . The use of filler metal that will deposit weld metal with practically the same composition as the material joined is recommended. The edition issued here only has the conversion tables to metric units. (c) In the case of loose type flanges
with laps, as shown in Figure 2-4, sketches (1) and (1a), where the gasket is so located that the lap is subjected to shear, the shearing stress shall not exceed 0.8 Sn for the material of the lap, as defined in 2-3. Morton S. Bajula D. D'Urso, Staff Secretary D. Wasiluk S. Nozzle Attachments and Opening Reinforcement . Flange Rigidity Factors . Fillets
forming the transition between the pressure containing walls and integral attachments, such as brackets, lugs, supports, nozzles, flanges, and bosses, shall have a radius not less than one-half the thickness of the pressure-containing wall adjacent to the attachment. (2) The test specimens shall comply with Figure UIG-76-2 for tension testing. McKillop
Chair R. Gerlach T. Chemical analyses need only be made for those elements required by the permitted specification). 2 /sec (2.9 \times 10-3 mm2/s) as measured in accordance with Mandatory Appendix 39. Configurations b and c: This option may only be used when \sigma s \leq S P S , s . (2) Except as permitted in (3) below,
vessels or parts of vessels that have been made. Increase the integral shell and/or channel thickness as follows: Configurations a, b, and c: If σs > 1.5Ss, increase the shell thickness t s and return to UHX-
14.5.1 (Step 1). D'Urso, Staff Secretary J. Each casting to which a quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name, trademark, or other traceable identification of the manufacturer and the casting quality factor greater than 80% is applied shall be marked with the name of the manufacturer and the casting traceable identification of the manufacturer and the casting traceable identific
Plates to Form a Corner Joint . A K I C (J) value of not less than 120 (132) is required for all specification listed in Subsection C covering a particular wrought product
designed for conditions less severe than the design conditions for which its adjacent chambers are stamped. Kovacs, Vice Chair J. For vessels designed to operate at a temperature colder than -20^{\circ}F (-29^{\circ}C), the allowable stress values to be used in design shall not exceed those given for temperatures of -20^{\circ}F (-29^{\circ}C), the allowable stress values to be used in design shall not exceed those given for temperatures of -20^{\circ}F (-29^{\circ}C), the allowable stress values to be used in design shall not exceed those given for temperatures of -20^{\circ}F (-29^{\circ}C), the allowable stress values to be used in design shall not exceed those given for temperatures of -20^{\circ}F (-29^{\circ}C) to 100^{\circ}F (-29^{\circ}C) to -20^{\circ}F (-29^{\circ}C) and -20^{\circ}F (-29^{\circ}C) to -20^{\circ}F (-29^{\circ}C) to -20^{\circ}F (-29^{\circ}C) and -20^{\circ}F (-29^{\circ}C) to -20^{\circ}F
 plates for shell sections and heads may be quenched by sprays or immersion. Henry, Chair C. Skarin, Alternate R. Roza, Delegate M. (c) Inquiries that do not comply with the following guidance or that do not provide sufficient information for the Committee's full understanding may result in the request being returned to the Inquirer with no action.
(3) The maximum allowable stress value for a temper or condition is obtained and conforms to one of those provided in the governing specifications in Section II, and provided
that allowable stress values have been established in the tables referenced in UG-23 for the tube material used. Wright COMMITTEE ON NUCLEAR INSERVICE INSPECTION (BPV XI) R. ULT-1 - ULT-5 ASME BPVC.VIII.1-2019 GENERAL ULT-1 (b) Materials not covered by Part ULT may be used for vessel parts, provided such materials shall conform
to one of the specifications in Section II and shall be limited to those materials permitted by another Part of Subsection C. Waskey J. Corrected cross-references to deleted paragraphs in UHA-32, Table UHA-32, and Table NN-6-4. 9 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking
 the concurrence of the Authorized Inspector, may remove the nameplate. Honcharik E. Dual Metal Cylinders . (g) Materials listed in Section IX, Table QW/QB-422 as P-No. 1 Group No. 3 and P-No. 3 Group Nos. In selecting an appropriate value of expanded length, the designer shall consider the degree of initial expansion, differences in thermal
expansion, or other factors that could result in loosening of the tubes within the tubesheet. Hall Subgroup on Research and Development (TOMC) R. Tensile Strength, ksi (MPa) 650°F (345°C) Ext. and \omega c , (a) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (2) Cylinders having D o /t values NPS 12 and \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (1) Calculate \omega s , ASME BPVC.VIII.1-2019 (a) When Pe \neq 0: (2) Cylinders having D o /t values NPS 12 and \omega s , ASME BPVC.VIII.1-2019 (b) Cylinders having D o /t values NPS 12 and \omega s , ASME BPVC.VIII.1-2019 (b) Cylinders having D o /t values NPS 12 and \omega s , ASME BPVC.VIII.1-2019 (b) Cylinders having D o /t values NPS 12 and \omega s \omega 
1,115\ 600 > 20\% Normalize and temper [Note (1)] 1,000\ 540\ 1,115\ 600 > 5 to \leq 25\%\ 1,115\ 600 > 5 to \leq 20\% Post-forming heat treatment [Note (2)], [Note (3)], and [Note (4)] Exceeding Required Heat Treatment [Note (2)], [Note (3)], and [Note (3)], and [Note (4)] Exceeding Required Heat Treatment [Note (3)], and [Note (4)] Exceeding Required Heat Treatment [Note (3)], and [Note (3)], 
plates, spherical or dished heads formed from plate, and tube and pipe bends. (5) The tensile strength values obtained in accordance with UIG-84 shall be equal to or greater than the values listed in Table UIG-6-1. (mm). Keltjens, Contributing Member F. Additional MDMT's corresponding with other MAWP's may also be marked on the nameplate. 10
(c) Design temperatures that exceed the temperature limit in the applicability column shown in Section II, Part D, Subpart 1, Tables 1A, 1B, and 3 are not permitted. Hoffman C. The flash point shall be determined by the methods specified in ASTM D93 or in ASTM 
be divided by 2 if the equation, from Table UG-79-1, for double-curvature products such as heads, is applied. 344 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provi
-0.6920~0.6877~0.0600~NOTE: (1) These coefficients are valid only for 0.1 \le \mu \le 0.6.345~Copyright~ASME~International~(BPVC)~Provided~by~IHS~under~license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 0.7/02/2019~13:29:04~MDT
ŏ19Þ UIG-60 ASME BPVC.VIII.1-2019 ŏ19Þ Figure UIG-34-4 Tubesheet Geometry d Do h Lc ro p tt dt (a) Tubesheet Layout (b) Tube Joint GENERAL NOTE: Any facing thicknesses or groove depths shall be in excess of the required minimum tubesheet thickness, h. The Code neither requires nor prohibits the use of computers for the design or
marked as being a "Report on Tests of Nonidentified Material," shall be completed and certified by the vessel or Part Manufacturer. (c) A shell section that has been formed by rolling, or hammering. xvii Copyright ASME International (BPVC) Provided by IHS under license with
ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT .. (d) Optionally, the designer may use this procedure to consider the effect of radial differential thermal expansion even when it is not required by (b) or (c) above.
Historical BPVC interpretations may also be found in the Database. (d) The spring rate of the expansion joint assembly may be determined either by calculation or by testing. Spencer, Honorary Member P. (10) The Manufacturer of the completed vessel shall fulfill these responsibilities by one of the following methods: (-a) Obtain, when necessary
documentation as provided below, provide for retention of this documentation, and have such documentation by the Inspector when requested, or; (-b) Perform an analysis of the pressure part in accordance with the rules of this Division. Molvie M. Mohr B. Bellows Subjected to an Axial Displacement x. Sun Z. Sixth-level and the pressure part in accordance with the rules of this Division. Molvie M. Mohr B. Bellows Subjected to an Axial Displacement x.
breakdowns are now designated as (+1), (+2), etc. (e) The rules of this Appendix should not be construed to prohibit the use of other types of flanged connections, provided they are designed in accordance with good engineering practice and method of design is acceptable to the Inspector. If more space is required, list them on a supplemental page.
                                                            Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license = Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ ASME BPVC.VIII.1-2019 UHT-57 ŏ19Þ Table UHT-57 ŏ19Þ Table UHT-57 ŏ19Þ Table UHT-57 or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ ASME BPVC.VIII.1-2019 UHT-57 ŏ19Þ Table UHT-56 Postweld Heat Treatment Requirements for networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ ASME BPVC.VIII.1-2019 UHT-57 ŏ19Þ Table UHT-57 ŏ19Þ Table UHT-57 ŏ19Þ Table UHT-58 Postweld Heat Treatment Requirements for networking permitted without licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ Table UHT-57 ŏ19Þ Table UHT-57 ŏ19Þ Table UHT-58 Postweld Heat Treatment Requirements for networking permitted without licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ Table UHT-58 Postweld Heat Treatment Requirements for networking permitted without licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 UHT-57 ŏ19Þ Table UHT-58 Postweld Heat Treatment Requirements for networking permitted without licensee (Not for Resale) (Not f
Materials in Table UHT-23 Spec. The bolt loads shall be calculated using the appropriate formula from Mandatory Appendix 2 considering the requirements in UHX-4(b). Tightness of Applied Lining . Marlette B. Claus D. Hackett, Alternate W. (-e) The calculation shall be performed for the stationary tubesheet and the floating tubesheet. Ultrasonic
Examination of Welded Joints . Vessels fabricated in accordance with this rule shall be marked with the "UM" Symbol in Figure UG-116, sketch (b) and with the data required in UG-116. Denis, Contributing Member Z. (4) Strength relationship between tensile
                                                                                                                                                                                                       psi (MPa) Compressive strength
                                                                                                                                                                                                                                                                              psi (MPa) (5) Correlation factors: (Tubes only) Flexural strength / tensile strength _
CERTIFIED CEMENT QUALIFICATION FORM (Used in the Construction of Graphite Pressure Vessels) Certified cement qualification (CCQ) no. Revised "popping" pressure to "set" press
SB-187 SB-271 SB-283 SB-315 SB-359 SB-366 SB-466 SB-467 SB-543 SB-584 SB-956 UNS No. C10200, C11000 C95200 C37700, C64200, C70620, C71000, C71520 C10200, C12000, C120
in the above table are contained in Section II, Part D, Subpart 1 (see UG-23). Grubb V. Shipping bars shall not be engaged or otherwise provide any restraint of the expansion joint during vessel pressure testing and operation [see 26-4.1(d)]. Revised para. Added Mandatory Appendix 46 to incorporate Code Case 2695 and provide a
means for the designer to use the rules given in Section VIII, Division 2. Dimensions of Staybolts . V. DESIGN UG-16 GENERAL (a) The design requirements in the following paragraphs and in addition to the specific requirements for Design given in the applicable Parts of
Subsections B and C As an alternative, the design rules of Mandatory Appendix 46 may be used. Maximum Allowable Stress Values in Tension for Cast Ductile Iron, ksi (MPa). The bolt circle diameter shall be less than the outside diameter of the layered shell. Olivares, Contributing Member lx Copyright ASME International (BPVC) Provided by IHS
Requirements (BPV XIII) Subgroup on General Requirements (BPV XIII) S. Gudge F. These allowable stress values shall be multiplied by the applicable casting quality factor given in UG-24 for all materials except cast iron. (1) through (45) below based on the values g 1, go, h, and ho as defined by 2-3. Cohen A. (125 mm) 1 hr/in. The required area of
reinforcement shall be at least equal to that indicated by the following formula when Qs is in tension: NOTE: (1) \Delta = 30 deg for greater values of P/SsE1. Impact tests are required at the test temperature in accordance with (a) but not warmer than 70°F (20°C) whenever thermal treatments 79 within the temperature ranges listed for the following
materials are applied: (1) austenitic stainless steels thermally treated at temperatures between 900°F (480°C) and 1,300°F (705°C) are exempt from impact testing provided the MDMT is -20°F (-29°C) or warmer and
vessel (production) impact tests of the thermally treated at temperatures between 600°F (315°C) and 1,750°F (955°C); (3) ferritic chromium stainless steels thermally treated at temperatures between 800°F (425°C) and 1,350°F
(730°C); (4) martensitic chromium stainless steels thermally treated at temperatures between 800°F (425°C) and 1,350°F (730°C). McConnell, Contributing Member N. In all three alternatives, the party completing and signing the Form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1, U-1A, or U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel. (b) When forming the form U-1P Manufacturer's Data Report assumes full Code responsibility for the vessel as the vessel as
strains cannot be calculated as shown in (a) above, the Manufacturer shall have the responsibility to determine the maximum forming strain. See Note in 2-5(c)(1). Artuso, Contributing Member B. Flanges With Nut-Stops . Lofthus D. (c) All corrosion resistant overlay weld deposits shall be examined by the liquid penetrant method. Some Acceptable
pressure anticipated in service. (g) Category C joints attaching solid flanges to layered shell sections and layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-12 as indicated in Figure ULW-17.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. (h) Category A joints of layered shell sections shall be of Type (1) or (2) of Table UW-18.4. 
transition as shown in Figure ULW-17.5, sketch (a-1) or (a-2). Williams J. 618 Nonmandatory Appendix W W-1 W-2 Guide for Preparing Manufacturer's Data Reports . Scarth W. tL Y Hemispherical Heads Only tL tS (b-3) Details of Taper for Layers 5/8 in. (b) When the values calculated in this section are to be used for fixed tubesheets, they shall be
determined in both the corroded and uncorroded conditions. When such an analysis is made, the calculated localized stresses at the discontinuity shall not be greater than 1.5S. The postweld heat treatment shall consist of heating to a minimum
temperature of 1,625°F (885°C) for 11/2 hr for thicknesses up to 1 in. Meredith B. Vessels of Noncircular Cross Section Subject to External Pressure Fabrication . Flanges fabricated by the rules in this Appendix, is not less than that
calculated for the corresponding size of hub flange. Le W. (b) When the test procedure in (a) above will cause a nominal membrane stress greater than 95% of specified minimum yield strength or 50% of specified minimum tensile strength or 50% of specified minimum tensile strength or 50% of specified minimum yield strength or 50% of specified minimum tensile strength or 50% of spe
 nominal membrane stress at such part to the lesser of those values. Calculation of Clamp Stresses. Personnel. Ranganath W. from For a cylinder: 324 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001,
User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-14.5.7 ASME BPVC.VIII.1-2019 (b) Calculate y b. (4) If a longitudinal weld is made to a portion of the material that is cold strained, that portion shall be normalized and tempered, prior to or following welding. UHX-13.8.3 Additional Nomenclature. 325 Copyright
with UIG-84 exceeds the minimum value permitted for a single specimen, and when the value for one specimen is below the minimum value permitted for a single specimen, a retest of five additional specimen, and when the value for one specimen is below the minimum value permitted for a single specimen, and when the value for one specimen is below the minimum value permitted for a single specimen.
 without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT .. Magruder C. Bloye T. This calculation permits a reduction of the shell and/or channel modulus of elasticity, where it affects the rotation of the joint, to reflect the anticipated load shift resulting from plastic action at
the joint. Move horizontally to the line for the value of D o /t determined in Step 1. (-g) Calculate the value of internal pressure expected to result in yield stress at the point of maximum stress, Py. (f) Examples showing the application of the design rules of this Division are contained in ASME PTB-4, ASME Section VIII, Division 1, Example Problem
Manual. Krueger, Contributing Member M. Excess thickness and material extensions are included in the pressure part. (c)(1), cross-references revised (18-1306) 12 UG-14 Revised in its entirety (17-1800) 13 UG-16 In subpara. Examination and Inspection Program. Minichiello R. Nair N. Chicola J. McGill, Chair S. A combination unit is a pressure
vessel that consists of more than one independent or dependent or dependent pressure chamber, operating at the same or different pressures and temperatures. Some Acceptable Layered Head Attachments to Layered Shells . Elevated Temperatures and temperatures.
b, and c: Proceed to the step in UHX-13.5.11. Additional Nomenclature. Klimas, Jr. Z. (38 mm) wide by not more than 3/4 in. (d) These rules apply to unflanged extensions (Configuration d), if the thickness of the extension is less than the tubesheet thickness
h. Yancey, Jr. P. 83 By "lethal substances" are meant poisonous gases or liquids of such a nature that a very small amount of the gas or of the vapor of the liquid mixed or unmixed with air is dangerous to life, when inhaled. McDaris R. If σ t,1 and σ t,2 are positive, the tube design is acceptable. Mullavey J. Appleton S. (22 mm) or Less in Thickness
256 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 ULW-18 Figure ULW-17.2 Some Acceptable Solid Head
Attachments to Layered Shell Sections (Cont'd) Butt weld line may be at or below tangent line depending on Code requirements for type of head and weld tH tH Tangent line 2/t min. Jolly J. In addition, these joints shall be examined for 10% of their length at random in accordance with Mandatory Appendix 12 ultrasonic method except that for the
pressure vessel (-b) a Manufacturer that can provide a pressure vessel (2) Actions (-a) The organization as guidelines, including matters of agreement between the organization and the Manufacturer. Stoeva M. Configuration as guidelines, including matters of agreement between the organization and the Manufacturer that can provide a pressure vessel (2) Actions (-a) The organization as guidelines, including matters of agreement between the organization and the Manufacturer.
 should provide any need or background information, such as described in 3(b) and 3(c), respectively, for Code revisions or additions, that will assist the Committee in understanding the proposed Inquiry and Reply. Broz, Secretary M. Charts for t Over 1/4 in. hub taper Hemispherical shape fully within tubesheet hub (c) Hemispherical Channel With
that otherwise meet all the rules of this Division, provided that the following additional requirements are met: (1) Forgings certified to SA-105 or SA-181 shall be subject to one of the austenitizing heat treatments permitted by these specifications. (1.0 mm) (e) bow: 0.70% of unit length DESIGN UIG-22 MAXIMUM ALLOWABLE STRESS VALUES FOF
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-13.5.2 - UHX-13.5.3 ASME BPVC.VIII.1-2019 Figure UHX-13.5.3 ASME BPVC.VIII.1-2019 Figure UHX-13.5.2 Zd, Zv, Zw, or Zm 0.50 0.40 Zd 0.30 0.20 Zm 0.10 Zv = Zw 0 0 2 4 6 8 10 12 Xa GENERAL NOTES: (a) Curves giving Zd, Zv, Zw, or Zm are validations and the company of th
for v * = 0.4. They are sufficiently accurate to be used for other values of v *. The vessel Manufacturer or, when applicable, the part Manufacturer or show compliance with the rules of this Division, and his signature on the Manufacturer's Data Report Form shall be considered as
certification that this has been done. Permissible Out-of-Roundness of Cylindrical, Conical, and Spherical Shells. Test procedures, size, location, and orientation of the specimens shall be the same as required in UG-84. Keating K. Butt weld line (Category A) 3Y tL 3Y Taper line Tangent line Y 0.7tL min. Wadkinson R. McKie G. Grocki J. Lacroix D. 482End and Spherical Shells.
482 482 484 Mandatory Appendix 17 17-1 17-2 17-3 17-6 17-7 17-8 17-9 17-10 Dimpled or Embossed Assemblies . (d) Production, measurement and test equipment, drawings, welding procedure specifications, welding procedure specifications, and other fabrication documents may be in U.S. Customary, SI, or local
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-60 ASME BPVC.VIII.1-2019 Figure UIG-36-2 Some Acceptable Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Graphite Pressure Vessels Bolt Graphite Nozzle Attachment Details in Impregnated Gra
due to wind, dead load, etc., excluding pressure. Polynomial Coefficients β i for the Determination of C f. UHX-14.6.1 Scope. Cui R. (g) Heads of the type shown in Figure 1-6, sketch (d) (no joint efficiency factor is required): (1)
head thickness (-a) for pressure on concave side, NOTE: The radial components of the membrane load in the spherical segment are assumed to be resisted by its flange. Varghese Subgroup on Design and Materials (BPV XII) A. Batey, Contributing Member lii Copyright ASME International (BPVC) Provided by IHS under license with ASME No
reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Subgroup on Design (BPV VIII) Italy International Working Group (BPV VIIII) Italy International Working Group (BPV VIIII) Italy Inte
accordance with the following formula: ð2Þ Any additional area of stiffening which is required shall be situated within a distance of from the junction of the reducer and the cylinder. These rules shall be used in conjunction with the requirements of Subsections A, B, and C, except for directly fired vessels described in UW-2(d) in Subsection B and
except for Parts UCI and UCD in Subsection C, or except as otherwise required in this Part. Homiack, Alternate Task Group on Weld Overlay (BPV XI) S. Galanes T. Flange Factors in Formula Form . Determine D o and µ. Papponetti, Delegate W. Schroeder M. Vessels subject to corrosion shall be supplied with a suitable drain opening at the lowest
point practicable in the vessel; or a pipe may be used extending inward from any other location to within 1/4 in. Melfi W. (6 mm) minimum 1 /4t n or 3/4 in. 448 448 451 Mandatory Appendix 12 12-1 12-2 12-3 12-4 Ultrasonic Examination of Welds (UT). The full penetration weld Gasket may be through the lap (tl) or through the hG A wall (tn).
 Meichler S. Swindeman, Secretary M. Abrupt changes in surface contour and in wall thickness at junctures shall be avoided. (a) General. magnetic particle examination (MT): a method of detecting cracks and similar imperfections at or near the surface in iron and the magnetic alloys of steel. Li, Contributing Member L. Rawls, Jr. F. Spanner, Jr. T. (16
license from IHS 364 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC. VIII.1-2019 UIG-121 FORM CMQ CERTIFIED MATERIAL QUALIFICATION FORM (Used in the Construction of Graphite Pressure Vessels) (Cont'd) TEST PROCEDURES AND RESULTS (a) Flexural strength:
See the test method for determining the flexural strength of certified materials using three point loading in Mandatory Appendix 36 (tube). 355 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer,
chamfer both ends R2.00 0 0.7504 0.7496 Acceptable fracture zone Cemented joint according to manufacturer GENERAL NOTES: (a) All dimensions are in inches. Kobayashi K. Foulds M. Masuyama T. Zeller M. Chandiramani, Contributing
to use the rules of UHX-13.5 when the effect of the stiffness of the integral and hub flanges, 2-4 = Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS CIRCULAR
FLANGE TYPES For purposes of computation, there are three types: (a) Loose Type Flanges. Impregnated graphite material is not subject to creep. Types of Jacketed Vessels. Revised UW-13(e)(2) to clarify referenced Figure UW-13.2 sketches. ....
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        . Weld line (Category B) Y (a) For Layers Over 5/8 in. May,
Vice Chair P. U-5 Tolerances . Interpolation may be made for intermediate values of Do /t; extrapolation is not permitted. O'Brien J. (c) Openings up to and including 6 in. Sowder, Jr. xlix Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Korea International Working Group (BPV III) S. The cross-references to subparagraph breakdowns will follow the hierarchy of the designators under which the breakdown appears. With
sufficient advance notice to the Committee Secretary, such equipment may be made available. McGowan, Delegate H. See also Section II, Part D, Nonmandatory Appendix A, A-206. Table UHX-13.4-2 provides the load combinations required to evaluate the heat exchanger for each operating
condition x. (3) The weld metal (produced with or without the addition of filler metal) has a carbon content not exceeding 0.10%. The effectiveness of such buffers shall be demonstrated by tests. (2) Loading and dimensions for sketches (2a), (3), (4a), (4b), and (4c) not shown are the same as for sketch (2). (a) Perform Steps 1 through 10.
Parkey — Indiana M. Calculate the axial membrane stress σ s,m, axial bending stress σ s,b, and total axial stress σ s in the shell at its junction to the tubesheet. Configuration f: Calculate coefficient F. Smith S. Within the listed range of operating temperature and pressure, any combination of shell and tube axial mean metal temperatures is
permitted, provided the resulting axial differential thermal expansion is within the listed range. Configuration A: Proceed to UHX-14.5.10 (Step 10). (i) Category B joints of layered conical heads to layered shell sections shall be of Type (1) or (2) of Table UW-12 with transitions as shown in Figure ULW-17.5, sketch (b-1). (b) Check the tube-to-
tubesheet joint design. When multiple plates or shapes are used to fabricate the flexible element, the following requirements apply: (1) Welds shall be butt-type full penetration welds, Type (1) of Table UW-12. McLaughlin R. May Special Working Group on Advanced Ultrasonic Testing Technique (BPV V) L. 42 Normally this temperature should not be butt-type full penetration welds, Type (1) of Table UW-12. McLaughlin R. May Special Working Group on Advanced Ultrasonic Testing Technique (BPV V) L. 42 Normally this temperature should not be butt-type full penetration welds, Type (1) of Table UW-12. McLaughlin R. May Special Working Group on Advanced Ultrasonic Testing Technique (BPV V) L. 42 Normally this temperature should not be butt-type full penetration welds, Type (1) of Table UW-12. McLaughlin R. May Special Working Group on Advanced Ultrasonic Testing Technique (BPV V) L. 42 Normally this temperature should not be butt-type full penetration welds, Type (1) of Table UW-12. McLaughlin R. May Special Working Group on Advanced Ultrasonic Testing Test
less than 115°F (45°C). Section II, Part D also contains tables of maximum allowable stress values for these classes of materials, except for impregnated graphite. Composition Requirements for 21/4Cr-1Mo-1/4V Weld Metal . Yonekawa, Honorary Member Executive Committee (BPV XI) S. 75 See Section II, Part D, Mandatory Appendix 1 for the basis
on which the allowable stress values have been established. (b) In addition, a description of the layered shell and/or layers, their thicknesses, and type of construction. Inquirers may track the status of their Interpretation Request at . Subramanian, Vice Chair A.
These ductility tests shall be conducted at the lowest temperature at which pressure will be applied to the vessel, whichever is lower. When applied, these rules shall be used in conjunction with the requirements in Subsection A and Part UW of Subsection B. Fillets shall conform to
the following. Horizontal Vessel Supports. (c) See below. (25 mm) (b) Isolated Indication [See Note (2)] (c) Cluster NOTES: (1) Typical concentration and size permitted in any 6 in. Delfino D. Revised UHA-34 to add martensitic chromium steel welds to the list of weldments for which penetrant testing is required. (-d) Both tubesheets shall be
considered simply supported. Ludwig X. Holston, Alternate Task Group on Risk-Informed Categorization and Treatment (BPV XI) S. [Note (1)], °C UTS 689 MPa UTS 655 
t < 177.8 \ 177.8 \le t \le 203.2 \ 381 \ 371 \ 362 \ 352 \ 343 \ 368 \ 359 \ 350 \ 340 \ 331 \ 332 \ 324 \ 316 \ 308 \ 299 \ 302 \ 294 \ 287 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 272 \ 285 \ 279 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 270 \ 27
ENICrFe-2, ENICrFe-3, ENICrMo-4, 
each design loading case as follows: GENERAL CONDITIONS OF APPLICABILITY FOR TUBESHEETS (a) The tubesheet shall be flat and circular. Porcella — West Virginia C. Test coupons which are quenched separately as described in (c)(2) above shall be tempered similarly and simultaneously with the vessel or component they represent. Szabatura
C. Subramanian D. Huber R. For values of Xa and Q 3 beyond those given by the curves, see Table UHX-13.2. 698 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale,
07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 LL Figure LL-1 Graphical Representation of Ft, min 20.0000 0.0000 Te, min Q 3 = -0.5 -60.0000 Q 3 = -0.4 -80.0000 Q 3 = -0.3 Q 3 = -0.2 -100.0000 Q 3 = -0.1 Q 3 = 0.1 Q 3 = -0.5 -60.0000 Q 3 = -0.5 -60.0000 Q 3 = -0.5 Q 
160.0000 \text{ Xa} 5.0000 0.0000 -5.0000 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Q3 = 0.3 -15.0000 Q3 = 0.4 Q3 = 0.5 -20.0000 Q3 = 0.6 -25.0000 Q3 = 0.7 Q3 = 0.8 -30.0000 -35.0000 Q3 = 0.8 -30.0000 Q3
under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT LL ASME BPVC.VIII.1-2019 Figure LL-2 Graphical Representation of F t, max 40.0000 35.0000 Q3 = -0.8 30.0000 Q3 = -0.7 Q3 = -0.6 Q3 = -0.5
20.00000 \text{ Q3} = -0.4 \text{ Q3} = -0.3 15.0000 \text{ Q3} = -0.3 15.0000 \text{ Q3} = 0.3 15.0000 \text{ Q3} = 0.5 \text{ Q3} = 0.6 60.0000 \text{ Q3} = 0.7 40.0000 \text{ Q3} = 0.8 20.0000 
0.0000 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Xa (b) 0 Q 3 0.8 700 Copyright ASME International (BPVC) Provided by IHS under license erom IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --
                                            `,,`,',--- Ft, max 25.0000 MM-1 - MM-4 ASME BPVC.VIII.1-2019 NONMANDATORY APPENDIX MM ALTERNATIVE MARKING AND STAMPING OF GRAPHITE PRESSURE VESSELS GENERAL REQUIREMENTS MM-3 (a) This procedure may be used to apply the Certification Mark to the graphite part. Weld overlay as
shown in Figure ULW-17.4, sketches (e), (e-1), (f), (f-1), (g), and (g-1) shall be provided to tie the overwraps and layers together. Reconsider the spring design and return to Step 1. Openings. Newhouse G. Swayne J. Foreword . (d) A shear or bond strength test is not required for weld metal overlay cladding. Aurioles, Sr. D. Bamford M. 94 The
complexity of the work includes factors such as design simplicity versus complexity, the types of materials, the types of mate
45-6 45-7 45-8 Plate Heat Exchangers . 69 Examination shall be by magnetic particle or liquid penetrant methods when the material is ferromagnetic, or by the liquid penetrant method when the material is ferromagnetic, or by the liquid penetrant method when the material is nonferromagnetic. L e c c = eccentric cone shortest length from small end to large end (see Figure UHX-13.10.3-1) UHX-13.10.4 Calculation
maximum allowable working pressure on the area bounded by the diameter of gasket reaction, and, in addition, to maintain on the gasket or joint-contact surface a compression load Hp, which experience has shown to be sufficient to ensure a tight joint. Sills, Contributing Member E. Lee Sanghoon Lee Sangil Lee S.-G. (f) All material shall be heat
                                                                                                                                                                                                                                (A change in any essential variable requires a new CPS) Joint configuration
treated in accordance with the applicable material specifications.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (Drawing No.) Specimen for Tensile
Test of Cemented Joints: Block material joints: Block material joints: Fig. Hembree J. (b) For values of X a and Q 3 beyond those given by the curves, see Table UHX-13.1. If |\tau| \le MIN[0.8S], the assumed tubesheet thickness is acceptable for shear. Vessels Under Internal Pressure. Halligan, Secretary B. Bhatty R. The weld repair area must also be examined.
Acceptance by Inspector . Flange Analysis . INSPECTION AND TESTS UCL-50 GENERAL The rules in the following paragraphs apply specifically to the inspection and testing of pressure vessels and vessel parts constructed of base material with corrosion resistant integral or weld metal overlay cladding and those having applied corrosion resistant
linings, and shall be used in conjunction with the general requirements for Inspection and Tests in Subsection A, and with the specific requirements for Inspection and Tests in Subsection B that pertain to the method of fabrication used. The Manufacturer shall maintain the records of design calculations, certified material test reports, visual
mm) for materials listed in Curve B, C, or D of Figure UCS-66. Braconnier J. Allowable Materials and Design Stress . (13 mm) or less. (0.8 mm) width spacing, sketches (1b) and (1d) shall be used. Diffusion Bonding Variables . For welded construction, the Welding Procedure Qualification shall include impact tests of welds in accordance with UG-84(h)
and with the requirements of (a), when any of the components 80 of the welded joint are required to be impact tested by the rules of this Division. FORGINGS (a) Forged material may be used in pressure vessel construction, provided the material has been worked sufficiently to remove the coarse ingot structure. (e) In the case of layered spheres or
layered heads, if the gaps cannot be measured in (d) above, measurement of gap heights shall be taken through vent holes in each layer gaps between any two layers does not exceed the gap permitted in (d) above. Shores, Contributing Member 1xi Copyright ASME International (BPVC) Provided by
IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT COMMITTEE ON NUCLEAR CERTIFICATION (CNC) COMMITTEE ON BOILER AND PRESSURE VESSEL CONFORMITY ASSESSMENT
(CBPVCA) R. Hoffman R. (c) In vessels of 5%, 7%, 8%, or 9% nickel steels, all Category D joints shall be in accordance with Figure UHT-18.1 or UHT-18.2 when the nominal shell thickness at the opening exceeds 1 in. Stiffening Rings for Shells Under External Pressure. Wendt, Chair D. All Category C and D joints shall be Type No. (1) or No. (2) of
reducers, the requirements of UG-41 shall be met. Johnson, Vice Chair D. Added new text starting with UG-136(c)(4) and redesignated existing subparas. Srnic D. Kalsey Working Group on Magnets (BPV III-4) S. maximum tube side design pressure minimum tube side design pressure (negative if vacuum is specified, otherwise zero) tube side
```

operating pressure for operating condition x (positive, negative, or zero operating pressure) radius to outermost tube hole center [see Figure UIG-34-4, sketch (a)] allowable stress for tube material at T a

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tubesheet design temperature for the design condition or operating temperature for operating condition x, as applicable [see (4)(-b)] ambient temperature for operating condition or operating temperature for operating condition or operating condition or operating temperature for operating condition x, as applicable [see (4)(-b)] ambient temperature for operating condition or operating co
 length shell axial mean metal temperature for operating condition x, as applicable [see (4)(-b)] nominal tube wall thickness mean tube temperature for operating condition x, as applicable [see (4)(-b)] nominal tube wall thickness mean tube temperature for operating condition x, as applicable the design condition at the design condition of operating condition at the design condition at th
 tubesheet thickness to calculate and check that the maximum stresses in the tubesheet, tubes, and shell are within the maximum permissible stress limits. (0.25 mm) as nonrelevant]. (51 mm) in Thickness Metallic Materials — Charpy Pendulum Impact Test Part 1: Test Method Metallic Materials — Charpy Pendulum Impact Test Part 2: Verification of
Testing Machines Metallic Materials — Charpy Pendulum Impact Test Part 3: Preparation of Charpy V-Notch Test Pieces for Indirect Verification of Pendulum Impact Machines ASTM E280 2015 ASTM E280 2015 ASTM E446 ISO 148-3 2008 ANSI/AWS A4.2M 2006 ASME
 ASME ASME ASME Latest Latest Latest Latest Latest Latest Latest Latest Latest Metric Screw Thread — MJ Profile Metric Stainless Steel Weld Metal Metric Screw Thread — MJ Profile Metric Screws Metric Heavy Hex Screws Metric Hex Bolts --
                                                                --- Metric Heavy Hex Bolts Metric Fasteners for Use in Structural Applications Standard Test Method for Compressive Strength of Carbon and Graphite Standard Practices for Force Verification of Testing Machines Standard Practice for Use of the
  Terms Precision and Bias in ASTM Test Methods Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method B1.13M B1.2.3.5M B18.2.3.5M B18.2.3.5M B18.2.3.5M B18.2.3.6M ASME B18.2.3.5M B18.2.3.5M B18.2.3.5M B18.2.3.5M B18.2.3.5M B18.2.3.5M B18.2.3.6M ASME B18.2.3.0M ASME B18.2.0M ASME B18.2.3.0M ASME B18.2.3.0M ASME B18.2.3.0M ASME B18.2.3.0M ASME B18.2.3.
2015 2009 2016 2014 2016 NOTES: (1) See UG-11(a)(2). Catalano F. Davenport, Alternate C. When these particular UNS numbers were assigned, the familiar AISI type numbers for stainless steels were incorporated into the designation. 819 UIG-34 CALCULATING FLAT HEADS, COVERS, AND TUBESHEETS The minimum thickness of flat heads
 and covers shall conform to the following requirements. (b) For continuous coil wrapped layers, each layered section shall have at least four vent holes 1/4 in. (d) Where more space than has been provided for on the form is needed for any item, indicate in the space, "See General Notes" or "See additional form," as appropriate. When values shown in
calculations and analysis, fabrication documents, or measurement and test equipment are in different units, any conversions necessary for verification of Code compliance and to ensure that dimensional consistency is maintained, shall be in accordance with the following: (1) Conversion factors shall be accurate to at least four significant figures.
hydrostatic pressure test, the interior of the vessel shall be inspected to determine if there is any seepage of the test fluid through the lining. (25 mm), 15 min minimum Over 2 in. No. Spec. Gonzalez, Alternate J. Lasarte, Contributing Member S. Ferrari M. Hunter F. Satisfactory qualification of the welding procedure under Section IX is considered as
proof. In addition, it is important that the request is in connection with equipment that will bear the ASME Single Certification Mark, with the exception of Section XI applications. UIG-121 The Manufacturer shall maintain records of the procedures employed in fabricating vessels and vessel parts and in cementing parts together. (3) Multipass
  welding is used and the weld layer thickness is limited to 3/8 in. Walden Task Group on Repair by Carbon Fiber Composites (WGN-MRR) (BPV XI) J. Oyamada, Delegate K. 819 UG-11 PREFABRICATED OR PREFORMED PRESSURE PARTS FURNISHED WITHOUT A CERTIFICATION MARK (a) Prefabricated or preformed pressure parts for pressure
 vessels that are subject to stresses due to pressure and that are furnished by others or by the Manufacturer of the completed vessel shall conform to all applicable requirements of this Division except as permitted in (b), (c), (d), and (e) below. (3) 1/32 in. (b) Category B joints in layers over 5/16 in. The requirements of this Division except as permitted in (b), (c), (d), and (e) below.
 equal to that indicated by the following formula when QL is in tension: ŏ5P At the small end of the cone-to-cylinder juncture, the PRs/2 term is in tension. Wright D. Han J. High Alloy Steel . Porton, Chair P. (25 mm) or more may be 1/3t, or 1/4 in. Yes No PWHT: Per Code Process Required Thickness Process Other Ambient Temperature Exposure
Category Design Life 22 F Type External Internal Coil Classification Category Soil Profile Classification: 24 F Skirt Ext. Lim I.-K. The Nonmandatory Appendices provide information and suggested good practices. Varghese Y. UHA-51 IMPACT TESTS Impact tests, as prescribed in (a), shall be performed on materials listed in Table UHA-23 for all
 combinations of materials and minimum design metal temperatures (MDMTs) except as exempted in (d), (e), (f), (g), (h), or (i). All records shall be dated and shall be certified by the Manufacturer and made available to the Authorized Inspector. Rossi, Staff Secretary J. Location of Staybolts. Enter the right-hand side of the applicable material chart in
Section II, Part D, Subpart 3 for the material under consideration at the value of B determined by Step 1. All welds, including welds for attaching nonpressure parts to heat-treated steels covered by this Part, shall be examined by the magnetic particle method after the hydrostatic test, except that those surfaces not accessible after the hydrostatic test
 shall be examined by the magnetic particle method at the last feasible stage of vessel fabrication. (11a) shall be not less than that tabulated in this Nonmandatory Appendix are to provide general guidance for the User [see U-2(a)] in preparing User's
Design Requirements as recommended in U-2(a). = 0.7c 1/ in. For each loading case, calculate P e for both tubesheets using either (a) or (b) below. Murphy T. UIG-8 (a) The design factor to be used for graphite pressure vessel parts shall be not less than 6.0 except as stated in (c). USES Some of the uses of nonferrous materials are to resist corrosion
`--- GENERAL NOTES: (a) The actual nitrogen content is preferred. 00 0. Morton E. 225 --`,``,``,`,`,`,`,`,`,`-- Copyright ASME International (BPVC) Provided by IHS under license with ASME
 No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT of 19b UHA-A-4 ASME BPVC.VIII.1-2019 (5) attaching bare-wire thermocouples by capacitor discharge welding or electric resistance welding under the requirements of UCS-
 56(g) with a nominal base metal thickness not less than 0.2 in. (f) Maximum shear stress in restricted that the section under consideration would fail without a reduction of area, shall be limited to 0.80 times the values in Section II, Part D, Subpart 1,
Table 1A, Table 1B, or Table 3. Performance Qualification. Prefabricated or preformed pressure parts that comply with an ASME product standard pressure parts (2) cast, forged, rolled, or die formed standard pressure parts that comply with an ASME product standard pressure parts (2) cast, forged, rolled, or die formed non-standard pressure parts (2) cast, forged, rolled, or die formed standard pressure parts (3) cast, forged, rolled, or die formed non-standard pressure parts (4) cast, forged, rolled, or die formed non-standard pressure parts (5) cast, forged, rolled, or die formed non-standard pressure parts (6) cast, forged, rolled, or die formed non-standard pressure parts (7) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, or die formed non-standard pressure parts (8) cast, forged, rolled, rolle
rolled, or die formed standard pressure parts that comply with a standard other than an ASME product standard, either welded or nonwelded (b) Cast, Forged, Rolled, or Die Formed Non-standard Pressure Parts. (e) The Manufacturer shall maintain a continuity record for each cementing technician showing the date, the results of tests, and the
identification mark assigned to each. §19$ Table UHA-32-3 Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 8 Material Normal Holding Temperature, F (°C), Minimum P-No. 8 Gr. Nos. This sample form might not be applicable to all pressure vessels that may be constructed in accordance with this Division. (1.9 mm) or less, the
  "Bond Strength" test, as described in SA-263, SA-264, or SA-265, may be used in lieu of the bond "Shear Strength" test to fulfill the criteria for acceptable minimum shear strength, except that the bend test specimen shall be 11/2 in. (b) Category A joints in layers over 5/16 in. See Figure 2-4, sketches (5), (6), (6a), (6b), and (7) for typical integral type
 flanges and the location of the loads and moments. Domage, Contributing Member B. UHX-14.5.11 Step 11. It shall be reevaluated for conditions outside this range before being operated at them. Peters S. Morard A. (2) Calculate r t and F t. Typical Flexible Shell Element Expansion Joints. Wei G. Suspect surface areas shall be further examined by
the magnetic particle or liquid penetrant method in accordance with Mandatory Appendix 6 or Mandatory Appendix 8. Yoo D. (-b) When the MDMT is -320°F (-196°C) and warmer, and the value of lateral expansion for one specimen of a set is less than 0.015 in. When the allowable stress for the equivalent seamless product is not available, divide
the allowable stress of the welded product by 0.85. EXAMINATION (a) All butt joints s hall be ex amined by 100% radiography. Reid II J. Holes may be drilled radially through the multiple layers or may be staggered in individual layer plates. ASME BPVC.VIII.1-2019 17 Critical sections: For static castings, the sections where imperfections are usually
Density. Ball M. Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 10C. (See Nonmandatory Appendix E.) NOTE: When using high alloys and nonferrous materials either for solid wall or clad or lined vessels, refer to UHA-6, UCL-3, and UNF-4, as appropriate. The manufacturing design range must be evaluated in
 conjunction with the specified burst pressure to ensure that the marked burst pressure of the rupture disk will always be within applicable limits of UG-134. Diagram for Determining Equivalent Longitudinal Efficiency of Diagonal Ligaments Between Openings in Cylindrical Shells. (19 mm) L = 1/3t for t 3/4 in. Rohatgi F. (7) If radiography or other
 volumetric examination is required by the rules of this Division, it may be performed at one of the following locations: (-a) the location of the Manufacturer (8) Parts made to an ASME product standard shall be marked as required by the ASME product standard
 Szabatura D. Cautionary Advice Provided to the User. (88 mm), this limit is 20%. Return to UHX-12.5.1. Option 3. Coleman P. Welding Processes. Matthews, Chair J. Vessels or parts of vessels constructed of base material with corrosion resistant integral or weld metal overlay cladding
 and those having applied corrosion resistant linings shall be radiographed when required by the rules in UW-11, UCS-57, UHT-57, and UCL-36. Harbert X. The most common applications for Code Cases are as follows: (-a) to permit use of a new material for
Code construction (-c) to gain experience with new materials or alternative requirements prior to incorporation directly into the Code (3) Code Interpretations (-a) Code Interpretations provide clarification of the meaning of existing requirements in the Code and are presented in Inquiry and Reply format. Submittal of Technical Inquiries to the Boiler
and Pressure Vessel Standards Committees Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees has been moved to the front matter. Damiani C. Zhu Subgroup on Interpretations (BPV VIII) R. Values of VL (Loose Hub Flange Factors).
Pattern). 219 219 219 219 219 219 219 219 .. Nove, Alternate Working Group on Personnel Qualification and Eddy Current Examination (SG-NDE) (BPV XI) J. The suitability of the expansion joint for the specified design, pressure, and temperature shall be determined by methods described in this Appendix. These records shall be certified by the
 Manufacturer and shall be accessible to the Authorized Inspector. 212 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHA-20 - UHA-32
DESIGN UHA-20 UHA-32 GENERAL (a) Before applying the detailed requirements and exemptions in these paragraphs, satisfactory weld procedures to be used shall be performed in accordance with all the essential variables of Section IX including conditions of postweld heat treatment or lack of postweld heat
treatment and including other restrictions listed below. UNF-A-3 LOW TEMPERATURE BEHAVIOR ELEVATED TEMPERATURE EFFECTS See Section II, Part D, Nonmandatory Appendix A, A-420. Gray J. (a) Vessels or parts of vessels constructed of base material with corrosion resistant integral or weld metal overlay cladding or applied corrosion
external pressure shall be designed by the rules in UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-20(c). Finney A. Millet T. Saito G. Hirano P. GENERAL NOTE: Any quantity to which units apply shall be entered on the User's Design Requirements Form with the chosen units. (1.5 mm) exclusive of
any corrosion allowance. (6 mm), G = outside diameter of gasket contact face less 2b g 1 = thickness of hub at back of flanges per Figure 2-4, sketch (7), g o = t n (b) for other integral type flanges, g o = the smaller of t n or the thickness
slots a = nominal bolt diameter A b = cross-sectional area of the bolts using the root diameter of the thread or least diameter of A m 1 and A m 2 A m 1 = total cross-sectional area of bolts at root of thread or section of least diameter under stress,
required for the operating conditions = W m 1 / Sb A m 2 = total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress, required for gasket seating = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress = W m 2 / Sa B = inside diameter under stress =
 were qualified for fabrication. Hedden, Honorary Member R. Except where limited by special UG-24 CASTINGS (a) Quality Factors. Maximum Allowable Working Pressure (MAWP) Design Limitations . Findlan, Chair D. (b) When the design calculations are based on the full thickness of base material with corrosion resistant integral or weld metal
overlay cladding as permitted in UCL-23(c), the maximum service metal temperature shall be the lower of the values allowed for the base material referenced in Table UCS-23, UF-6, or UHT-23 and listed in Section II, Part D, Subpart 1, Table 1A, or refer to UCL-23(c) for corrosion resistant weld metal overlay cladding and the cladding material
referenced in Table UHA-23 or Tables UNF-23.5. (c) The use of corrosion resistant integral or weld metal overlay cladding or lining material of chromium-alloy stainless steel with a chromium content of over 14% is not recommended for service metal temperatures above 800°F (425°C). UNF-A-10 RESISTANCE WELDING Electric
resistance welding, which includes spot, line or seam, and butt or flash welding permitted without license from IHS
 from Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-13.5.2 ASME BPVC.VIII.1-2019 Figure UHX-13.1 Fixed Tubesheet Integral With Shell and Gasketed With Channel,
Extended as a Flange (c) Configuration c: Tubesheet Integral With Shell and Gasketed With Shell and Ga
c, and d. Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 6. The 1.2 increase permitted is equivalent to a load reduction factor of 0.833. LeCoff T. (-c) The Manufacturer constructs the pressure vessel and delivers it to the organization. 254 Copyright ASME International (BPVC) Provided by IHS under license with ASME No
 reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 ULW-17.1 Transitions of Layered Shell Sections tL tL Taper line tL or Y 2/t min. Fryer, Honorary Member G. (d) All test specimens shall
be prepared from the material in its final heat-treated condition or from full- thickness samples of the same heat similarly and simultaneously treated. (4) Configuration d may have a flanged or unflanged tubesheet extension. 3L Weld optional 3tL min. Choice of UTS depends on welding process and filler metal used in the construction.
  Birch J.-B. This report, when accepted by the Inspector, shall constitute authority to use the material in lieu of material procured to the requirements of the permitted specification. Breach, Contributing Member Working Group on Environmental Effects (SG-DM) (BPV III) L. 497 497 497 Mandatory Appendix 19 19-1 19-2 19-3 19-4 19-5 19-6 19-7 19-8
 Electrically Heated or Gas-Fired Jacketed Steam Kettles . Slagis J. If \rho changes, recalculate d * and \mu * from UHX-11.5.1. Determine E * / E a n d \nu * r el ati ve to h / p from UHX-12.5.4. Configurations a, b, c, e, and f: Proceed to UHX-12.5.4. Configuration d: Proceed to UHX-12.5.5. Calculation Procedure UHX-12.5.4. Step 4. Kavanagh D. Equipment
and Service Limitations. Chandiramani B. Kim, Vice Chair Working Group on Materials (BPV III-4) M. Marlette S. Bennett S. = 0.7c min. Richter B. For each of these conditions, the following loading cases shall be considered: (1) Design Loading Cases. Category A and B joints attaching a layered section to a layered section need not be radiographed
 after being fully welded when the Category A hemispherical head and Category B welded joints of the inner shell or inner head made after application of the layers have been Figure ULW-32.3 For T 1 in. Additional layers may be included for required reinforcement. UIG-97 provides relevant rules for methods and standards. Thomas J. 569 569
569 569 571 571 572 572 572 Mandatory Appendix 42 42-1 Diffusion Bonding . In the event an excessive gap height is measured through a vent hole, additional vent hole, additional vent holes shall be drilled as required to determine the gap length. Replace Ss with Ss,1 and SPS,s with SPS,s,1. 33 The rules in this paragraph apply to ligaments between tube holes and
 not to single openings. §19b ULT-5 GENERAL (a) Materials covered by this Part subject to stress due to pressure shall conform to one of the specifications given in Section II and shall be limited to those listed in Table ULT-23. (d) The design of zones with different metal temperatures may be based on their determined temperatures. No. Alloy
Designation/UNS No. A02040, A03560, A24430 A02040, A03560, A24430 A02040, A03560 Alclad 3003, 3004, 6061; A91060, A91100, A93003, A95083, A95083, A95086, A95154, A96061 Alclad 3003; A95052, 
A95154, A95454, A95456, A96061, A96063 SB-234 SB-241 SB-247 SB-308 SB-928 Alloy Designation/UNS No. Alclad 3003; A95052, A95454, A95052, A95454, A96061 A96063 A92014, A93003, A95083, A95083, A95083, A95086, A95456 GENERAL
 NOTE: Maximum allowable stress values in tension for the materials listed in the above table are contained in Section II, Part D, Subpart 1 (see UG-23). (3) For nonferrous and ductile cast iron materials, a factor not to exceed 90% may be used for a single casting that has been radiographed at all critical sections and found free of defects. §19Þ UNF
 Subjected to an Angular Rotation θ. Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 8. Cross-Referencing and Stylistic Changes in the Boiler and Pressure Vessel Code. Sybertz J. Navratil P. 206 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without
                                                                                                    -- Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UNF-56 - UNF-75 ASME BPVC.VIII.1-2019 by the liquid penetrant method. (c) Calculate reduced values of E s and E c as follows: = E s facts Configurations a, b, and c: Configuration a: =
 E c factc (d) In UHX-13.5.2 (Step 2), recalculate k s , λ s , k c , and λ c replacing E s by and E c by . (b) Category A joints of layers over 7/8 in. Wise, Alternate H. A knuckle shall be provided at both ends of the conical section; the knuckle radius shall not be less than 10% of the outside
 diameter of the skirt, but in no case less than three times the cone thickness. Siefert, Secretary S. Kim, Alternate B. The Inquirer should identify any pertinent portions of the Code that would be affected by the revision or addition and any portions of the Code that would be affected by the revision or addition and any portions of the Code that would be affected by the revision or addition and any portions of the Code that reference the requested revised or added paragraphs. Schaaf, Jr., Chair A. The use of
the factors must be considered as only part of the system of joint design and assembly requirements to ensure leak tightness. Spanner, Jr., Chair D. GENERAL NOTE: For Table UHT-23 materials. (13 mm) min. The total time at temperature shall be
 at least 80% of the total time at temperature during actual heat treatment of the product and may be performed in a single cycle. 200 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UCS-A-1 - UCS-A-3 NONMANDATORY APPENDIX UCS-A UCS-A-1 GENERAL as the
MDMT stamped on the nameplate less the allowable temperature reduction as determined from Figure UCS-66.2. The ratio used in Step 3 of Figure UCS-66.2 shall be the ratio of maximum pressure at the coincident operating temperature be colder than
 -155°F (-105°C). Supplementary Instructions for the Preparation of Manufacturer's Data Reports for Layered Vessels . (5) and (6) in Mandatory Appendix 13, 13-6(b) after the terms starting with b n T n . Indicate NDE required for each joint type. Official Certification Mark to Denote the American Society of Mechanical Engineers' Standard for
Pressure Relief Valves. (b) Base Material Weld Protected by a Strip Covering. Attachment Details. Berry T. f 2 = axial load per unit circumference at conical reducer small end due to heat exchanger constraint, excluding pressure. The rules of UHX-13.6 shall not be used. Minor attachments are defined as parts of small size, less than or equal to
0.375 in. Cordes D. (1) For each loading case, determine coefficients F t,min and F t,max from Table UHX-13.2 and calculate the two extreme values of tube stress, σ t, 1 and σ t, 2. Barnes T. (b) Shells of pressure vessels may be made from welded pipe or tubing listed in Tables UNF-23.1, UNF-23.2, UNF-23.4, and UNF-23.5. (c) When
 thickness of cone at cone-to-cylinder junction minimum required thickness of cone at cone-to-cylinder junction minimum required thickness of cylinder junction minimum require
  need for reinforcement at cone- to-cylinder intersection having a half-apex angle \alpha \leq 60 deg. (b) The welding is limited to the following (singularly or in combination): (1) circumferential butt welds in pressure parts with a nominal base metal thickness of 1/2 in. (e) Telltale Holes. U-1 Scope. (b) Vessels or vessel parts constructed of steels listed in
 Table UHT-23 shall be postweld heat treated when required in Table UHT-56, except that postweld heat treatment shall be required for all thicknesses when joining the materials with the inertia and continuous drive friction welding processes. (b) When the flange consists of two split rings each ring shall be designed as if it were a solid flange
 (without splits), using 75% of the total moment Mo as defined in 12-4. Joergensen V. When the ring only is used, and when the shell-cone or ring-shell-cone is used: F s = PN + f2 tan α If the equation is not satisfied, a new section with a larger moment of inertia must be selected, and the calculation shall be done again until the equation is met. Burns
 Harrison, Jr. D. (b) Flanges with pass partitions, including those covered by UG-44(a), shall be designed in accordance with Mandatory Appendix 2. The Manufacturer's Responsibility to the User
   Keating, Vice Chair J. 429 429 429 429 429 Mandatory Appendix 7 7-1 Examination of Steel Castings . In these equations, UHT-20 JOINT ALIGNMENT The requirements of UW-33 shall be met except that the following maximum permissible offset values shall be used in place of those given in UW-33(a): Joint Direction Section Thickness, in. Benson F.
shall be provided at the junction of the conical shell of a reducer without a flare and the small cylinder. Some Representative Configurations Describing the Minimum Required Thickness of the Tubesheet Flanged Extension, hr. Pace J. UIG-2 EQUIPMENT AND SERVICE LIMITATIONS (a) Impregnated graphite pressure vessels covered by Part UIG
                                                                                                                                                                                                                                      ',,'--- PART UIG REQUIREMENTS FOR PRESSURE VESSELS CONSTRUCTED OF IMPREGNATED GRAPHITE UIG-2 - UIG-6 ASME BPVC.VIII.1-2019 raw materials: include graphite material and impregnation agent. Mitchell M
  In addition, it does not contain requirements necessary for conformance to the Code. (2) For forgings and castings of all thicknesses, one drop-weight test (two specimens) shall be made for each heat in any one heat treatment lot. However, the difference, if any, is within practical accuracy and either method is acceptable. 210 210 210 210 210 210
 When a cylinder having a minimum length of 2.0 is attached to the large end of the cone, determine P /S s E1 and then determine a the large end intersection A e S = effective area of reinforcement at large end intersection A e L = required area of reinforcement at large end of the cone, determine P /S s E1 and then determine D at the large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforcement at large end intersection A e S = effective area of reinforceme
 cone A r s = required area of reinforcement at small end of cone E 1 = efficiency of longitudinal joint in cylinder. NOTE: (1) Maximum ratio allowed by UG-32(i) when L equals the outside diameter of the skirt of the head. Inspection Openings . Pace P. Williams R. Beldyk J. (f) Materials conforming to one of the specifications listed in P-No. 1 Group
 renormalized and tempered. Ferrarese D. Scott, Secretary A. The longitudinal hub stress has been limited to Sf in order to minimize any cracking of flanges. Cracks in tubes shall not be repaired and shall be considered cause for rejection. (b) The inner shell or inner shell o
be as shown in Figure ULW-17.2, sketch (f) when the hemispherical head section and the transition is made in the hemispherical head section and the transition is made in the hemispherical head section and the transition is made in the hemispherical head section.
 the same ladle of iron as used in the part, or from three test specimens cut from the part. Sims W. 429 429 6-3 6-4 6-5 Methods for Magnetic Particle Examination (MT). These rules do not cover weight loadings or pressure drop. Revised UW-11(a)(2). As an alternative method to impact tests, ASTM
 Postfabrication Strain Limits and Required Heat Treatment Limits and Required Heat Treatment Limitations in Lower Temperature, °F (°C) Grade 201-1 201-2 201-1 201-2 201-1 201-2 201-1 201-2 201-1 201-2 201-2 201-1 201-2 201-1 201-2 201-1 201-2 201-1 201-1 201-2 201-1 201-2 201-1 201-2 201-1 201-2 201-1 201-2 201-2 201-1 201-2 201-1 201-2 201-2 201-1 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201-2 201
095) (1 040) (1 040) (1 095) NOTES: (1) Rate of cooling from heat-treatment temperature is not subject to specific control limits. UW-13.2 sketches (m) and (n) Inside diameter g1 Insid
 Since its first issuance in 1914, the ASME Boiler and Pressure Vessel Code (BPVC) has been a flagship for modern international standards development. Also, the reinforcement requirement of 1-8 shall be satisfied when a knuckle is not provided at the cone-to-cylinder junction. Williams, Honorary Member L. Qualification of Assembly Procedures and
Assemblers . Araya J. Linear indications are those indications in which the length is more than three times the width. (d) For multiple identical items from a single lot, such as tubes, the Manufacturer shall apply the partial stamping nameplate to the bundle or container. Revised UCS-79 to include provisions for relaxing post-forming heat treatment
requirements for thin-walled tubing and pipe. Jetter Subgroup on Fusion Energy Devices (BPV III) W. Garbolevsky S. Postweld Heat Treatment . Dominguez Subgroup on Water Heaters (BPV IV) Special Working Group on International Meetings (BPV III) D. Park Y. When a yield strength value is not listed in Table Y-1, one may be obtained by using the
 procedure in UG-28(c)(2), Step 3. If φ is equal to or greater than β, then Determine the value of R e. Burgess D. (3) Evaluation of combined stresses from pressure and external loads shall be made in accordance with U-2(g). Parimi, Contributing Member K. Ball C. See also U-2(a). Instructions for Filling Out TEPS Form. (b) Stationary tubesheets may
 have one of the six configurations shown in Figure UHX-14.2: (1) Configuration a: tubesheet integral with shell and gasketed with channel, not extended as a flange; (4) Configuration d:
 tubesheet gasketed with shell and channel; (5) Configuration e: tubesheet gasketed with shell and integral with channel, not extended as a flange; (6) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (6) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (6) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (6) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (6) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (6) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (7) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration f: tubesheet gasketed with shell and integral with channel, not extended as a flange; (8) Configuration final with channel, not extended as a flange; (8) Configuration final with channel with shell and integral with channel with shell and integral with shell and integral with shell and integral with shell and integral w
 columbium content of weld metal shall not exceed 1.00%, except that ENiCrMo-3, and ENiCrMo-3, and ENiCrMo-3, ERNiCrMo-3, and ENiCrMo-3, and S31725, and S31725, and S31725, and S31725, and S31725, and S31725, and S31726 to a maximum design temperature of 900°F (482°C). Sham J. (6 mm) minimum diameter. Sketches, tables, figures, and
graphs should be submitted, as appropriate. Hydrostatic Test to Destruction . Helmholdt R. Renaud T. (d) Shell Layer. Polynomial Approximation for Coefficients C p , C f , C d . The distance between adjacent rounded indications or groups of aligned
  indications. Hoffelner, Contributing Member M. List all openings; if more space is required, list them on a supplemental page. For additional information and to order: Phone: 1.800.THE.ASME (1.800.843.2763) Email: [email protected] Website: go.asme.org/bpvc Copyright ASME International (BPVC) Provided by IHS under license with ASME No
 reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,``,,`,`,`--- • learning and development solutions Morelock T. (2) It meets the requirements of Figure UHX-10, sketch (c). Demers C. Hitchcock,
impression as required. Masterson D. Bacon M. (6 mm) for nozzles less than 3 in. Consonni, Contributing Member M. Lee D. DeSantis, Secretary J. Calculate diameter ratios ρ s and ρ c. Perform this step for each loading case. Hansing, Alternate B. radiographic examination (RT): a method of detecting imperfections in materials by passing X-ray or
 nuclear radiation through the material and presenting their image on a recording medium. Wen, Contributing Member F. Sanchez-Hanton, Co
 material specification and/or grade, the maximum allowable tensile stress value for either material specification and grade are met for the maximum allowable tensile stress value chosen. Griner S. Any metal temperature between the MDMT and UHX-20
 ALLOWABLE STRESS VALUES WELDED JOINTS (a) For vessels constructed of titanium or zirconium and their alloys, all Category A and B joints shall be of Type No. (1) or No. (2) of Table UW-12. UG-20 NOTE: The user and Manufacturer are cautioned that certain fabrication details allowed by this Division may result in cracking at welds and
 associated heat-affected zones (HAZ) for vessels designed for use at elevated temperature. Component Shell Hemispherical Head Nozzles Stiffener Rings Attachments Reinforcing Pads Jacket Tubesheet Process Other Ambient Temperature Exposure Category Density Fireproofing: Yes No Calculated by Manufacturer: Calculated by Manufacturer: Calculated by Manufacturer.
 simulation of cooling rates for test specimens from nonimpact tested materials 3 in. Dinic R. Campbell H. Manufacturer's Certificate of Conformance for Nonreclosing Pressure Relief Devices . Fm Versus Xa (-0.8 \le Q \ 3 \le 0.0) . No. Alloy Yield, ksi -320 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -250 \ -2
reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHA-33 - UHA-42 ASME BPVC.VIII.1-2019 Table UHA-32-6 Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 10K Normal Holding Temperature, °F (°C)
 Minimum Material Minimum Holding Time at Normal Temperature for Nominal Thickness [See UHA-32(d)] Up to 2 in. Not permitted. Since the margin against such abuse is needed primarily for the initial, bolting-up operation which is done at atmospheric temperature and before application of internal pressure, the flange design is required to
 satisfy this loading only under such conditions. Aligned Rounded Indications are suggested only and are not mandatory. Hasegawa P. Compute the value of the required moment of inertia from the equations for Is or I's.
 Reinforcement of Multiple Openings . (h) X6CrNiTi18-10shall be considered as Type 321. Possible loss of strength at elevated temperature of the impregnation agent. Typical Nozzle Attachment Details Showing Minimum Length of Straight Flange or Outer Shell Element . Sandfoss — Nevada M
 Determine the available moment of inertia of the ring only I or the shell-cone or ring-shell-cone I'. Anderson, Chair U. If |\sigma| \le 1.5S, the assumed tubesheet thickness is acceptable for bending. Lee, Chair K. UG-12 BOLTS AND STUDS (a) Bolts and study may be used for the attachment of removable parts. These shall be offset 180 deg from each 8
 Particular Production Lot as Required by a Specification Permitted by This Division but Which Cannot Be Qualified Under (a). Machining . Plate . 3L 3Y 0.7tL min. Swayne, Chair S. (c) Stress Limitations Configuration a: For the design loading cases, if \sigma s \leq S P S, s and \sigma c \leq S P S, s and \sigma c \leq S P S and \sigma c 
  , c, the shell and channel designs are acceptable, and the calculation procedure is complete. Anderson — Mississippi R. Trosen C. NOTE: If material physical properties are not listed, the Manufacturer is encouraged to bring the information to the attention of the ASME Committee on Materials (BPV Section II) so that the data can be added in Section
 II, Part D, Subpart 2. T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, as applicable [see UHX-13.4(b)] T = tubesheet design condition x, and T = tubesheet design cond
 shell design temperature for the design condition or operating condition x, as applicable [see UHX-13.4(b)] t s = shell thickness T s, m = mean shell metal temperature for operating condition x, as applicable T t = tube design temperature for the
 design condition or operating metal temperature for operating condition x, as applicable [see UHX-13.4(b)] t t = nominal tube wall thickness T t, m = mean tube metal temperature for operating condition x, as applicable W t = tube-to-tubesheet joint load W * = tubesheet effective bolt
 expansion of tube material at T t, m \gamma = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes and shell \Delta J = axial displacement over the length between tubes are the l
 ratio of channel material \nu s = Poisson's ratio of shell material NOTE: For a welded tube or pipe, use the allowable stress for the equivalent seamless product. Goodson, Contributing Member C. Malikowski Subgroup on Welding Qualifications (BPV IX) M. Revised Table UNF-79 to include other nickel alloys from Table UNF-23.3 after cross-checking
together prior to being bonded to the base material shall have the cladding-alloy-to-cladding-alloy welding that is performed by a Manufacturer holding a Certificate of Authorization. If the shell side is the higher-pressure side, Ps shall be the shell side design pressure and Pt shall be Ps less the
 consider the tubesheet as simply supported in accordance with UHX-14.7. Configurations d, e, f, A, B, C, and D: \beta s = 0, ks = 0, \lambda s = 0, \delta s = 0, 
 construction, at least one spot examination shall include a portion of the liner weld that contacts weld metal in the base material. The Manufacturer is the Manufacturer is the Manufacturer required to fulfill Code responsibilities. (a) If spring-loaded rods are used on the floating end, calculate P's, P't, Py, Pw, Prim, Pspring not examination shall include a portion of the liner weld that contacts weld metal in the base material. The Manufacturer is the Manufacturer is the Manufacturer is the Manufacturer required to fulfill Code responsibilities.
 Construction. Yu N. When the direction of final rolling or major work (as required by the material specification) is not known, tension test specimens shall be taken in each appropriate direction from each sampling location designated in the permitted specification. (f) In the step in UHX-13.5.11, calculate \( \sigma \) s, b, replacing ts with ts,1 and
  Es with Es,1. (b) Calculate the average shear stress, τ. No. UNS No. N08904 J94651 N26022, N30002, N30012 N04400 N02201, N08801, N08801, N08800, N08810, N08811, N08825 N04400, N04405 N04400 N06025, N06045, N06600, N06601, N06601
   N06617, N06690, N06025, N06045, N06045, N06600, N06601, N06601, N06617, N06690, N06025, N06045, N06020, N06001, N06690, N06001, N06690, N06001, N06690, N06001, N060
 N06985, N08020, N08031, N08120, N08803, N08825, N10003, N10242, N10003, N10242, N10003, N10242, N10602, N08801, N08811, N08811, N08120, N08811, N08825, N10003, N10242, N10003, N100
N12160, R30556 N06625 N06625 N06625 N06625 N06625 N06030, N06035, N06035, N06045, 
 N08330 N08330 N08330 SB-564 SB-572 SB-573 SB-574 SB-575 SB-581 SB-582 SB-599 SB-619 SB-620 SB
 N06025, N06035, N06045, N06045, N06059, N06230, N062
N06455, N06686, N10276, N10362, N06032, N06035, N060
N10001, N10242, N10276, N10362, N1065, N1065, N10665, N10666, N10665, N106666, N10666, N106666, N10666, N10666, N106666, N10666, N106666, N
N08925, R20033, N06002, N06007, N06022, N06007, N06022, N06030, N06035, N06035, N06035, N06035, N06035, N06035, N06035, N06036, N060
N08925 N08367 N0
of tubesheet thickness may lead to overstresses in the tubes or shell, a final check shall be performed, using in the equations the nominal thickness of the tubesheet, tubes, and shell, in both corroded and uncorroded conditions. Kim India International Working Group (BPV III) R. (e) Elastic moduli, yield strengths, and allowable stresses shall be taken
at the design temperatures. Attachments Subject to Cyclic Loading . Ligament Efficiency of Multidiameter Holes in Plates . Johnston, Jr. M. (4) For nonferrous and ductile cast iron materials, a factor not to exceed 90% may be used for a casting that has been machined to the extent that all critical sections are exposed for examination for the full wall
thickness; as in tubesheets drilled with holes spaced no farther apart than the wall thickness of the casting. Ortolani, Vice Chair I. Tube-to-Tubesheet Tension Test Specimen. Rana B. (-a) an internal pneumatic test of not less than 250 psi (1.7 MPa) for 5 sec without evidence of leakage. The objective of the rules is to afford reasonably certain
protection of life and property, and to provide a margin for deterioration in service to give a reasonably long, safe period of usefulness. (mm) Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 11 UCI-78 - UCI-115 ASME BPVC.VIII.1-2019 (b) Cast iron pressure vessels and cast iron pressure
vessel parts shall not be painted or otherwise coated either internally or externally prior to the hydrostatic pressure test. Kavanagh J. Allowable Flange Design Stresses . Manufacturer's Partial Data Report (Alternative Form) . Wilkowski S. The shell shall have a uniform thickness of ts for a minimum length of adjacent to the tubesheet. Stevens A.
Some Acceptable Types of Jacket Closures. Consonni, Contributing Member S. 78 This is defined in Section V, Article 2, T-277, and A-1(a). Table 2-14 Flanges designed as integral-type flanges with hubs Loose-type flanges without hubs
and optional flanges designed as loose-type flanges 413 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --
                    -- ASME BPVC.VIII.1-2019 3-1 - 3-2 ASME BPVC.VIII.1-2019 MANDATORY APPENDIX 3 DEFINITIONS 3-1 INTRODUCTION purchase order or contract shown on the certificate, and has been found to meet such requirements. = 0.7c To be taken at midpoint of contact between flange and lap independent of gasket location. UHT-56
EXAMINATION POSTWELD HEAT TREATMENT (a) Before applying the detailed requirements and exemptions in these paragraphs, satisfactory weld procedure qualifications of the procedure qualifications of the procedure storage applying the detailed requirements and exemptions in these paragraphs, satisfactory weld procedure qualifications of the procedure qualifications of the procedure storage applying the detailed requirements and exemptions in these paragraphs, satisfactory weld procedure qualifications of the procedure qualifications of the procedure qualifications of the procedure applying the detailed requirements and exemptions in these paragraphs, satisfactory weld procedure qualifications of the procedure qualifications of the procedure qualifications of the procedure applying the detailed requirements and exemptions in these paragraphs, satisfactory weld procedure qualifications of the procedure qualifications of the procedure qualifications of the procedure applying the detailed requirements and exemptions are procedured as a procedure qualification of the procedure applying the detailed requirements are procedured as a procedure applying the detailed requirements are procedured as a procedure applying the detailed requirements are procedured as a procedure applying the detailed requirements are procedured as a procedu
treatment and including restrictions listed below. Hwang C. UIG-28 EXTERNAL PRESSURE (a) Out of Roundness Less Than 0.5% The maximum allowable external pressure shall not be greater than that computed by the following formula when the out-of-roundness is less than or equal to 0.5%. DESIGN TEMPERATURE (a) Maximum. 299 Copyright
ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-12.5.11 ASME BPVC.VIII.1-2019 If \sigma \leq 2S, the assumed tubesheet thickness is
acceptable for bending. (e) Postweld heat treatment of UNS R31233 is required prior to cold forming when the cold forming bend radius at the weld is less than 4 times the thickness of the component. Sansone — New York A. Gordon M. (c) Other materials used in conjunction with nonferrous metals shall meet the requirements given for those
Manufacturer responsible for the expansion joint design shall include the following additional data and statements on the appropriate Data Report: (1) uncorroded and corroded spring rate (2) axial movement (+ and -) and associated loading condition, if applicable (3) that the expansion joint has been constructed to the rules of this Appendix (b) A
parts Manufacturer shall identify the vessel for which the expansion joint is intended on the Partial Data Report. Choi S. It is the aim of the Society to provide recognition of organizations so authorized. (b) When metal removal is accomplished by methods involving melting, such as gas cutting or arc-air gouging, etc., it shall be done with due
precautions to avoid cracking. (4) All joints of Category D attaching a nozzle neck to the vessel wall and to a reinforcing pad, if used, shall be full penetration groove welds. No. SB-42 SB-43 SB-150 SB-152 SB-169 SB-171 UNS No. C12200 C23000 C23000 C92200 C83600 C10200,
C12000, C12200, C14200, C65500, C6200, C12200, C1220
C12200, C12300 C61400 C36500, C44300, C46500, C46500, C61400, C63000, C70600, 
10 UG-11 UG-12 UG-13 UG-14 UG-15 UG-16 UG-17 UG-18 UG-20 UG-21 UG-22 UG-23 UG-24 UG-25 UG-26 UG-27 UG-28 iii Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not
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UG-75 UG-76 UG-77 UG-78 UG-79 UG-80 UG-81 UG-82 UG-83 UG-84 UG-85 UG-90 UG-91 UG-92 UG-93 UG-94 UG-95 UG-96 UG-97 UG-98 UG-98
performed at the time of certified material qualification and verified by testing five samples every 3 mo. §19 7-2 Maximum Severity Level Imperfection Category 7-3 Thicknesses 1 in. (900 mm) < ID < 60 in. Perform the elastic plastic calculation procedure as defined in UHX-14.8 only when the conditions of applicability stated in UHX-14.8.2 are
satisfied. Li J. Stanko, Contributing Member P. 68 Welder includes brazer, welding operator, and brazing operator, and brazing operator, and brazing operator. Mitchell W. O'Sullivan D. Revised Table UG-84.6 to clarify the intent of the code related to approximate location of the notch in the test specimens. 2 Cement Graphite head (g) Shrouded Flange Steel flange Steel ring flange Graphite
nozzle Steel flange tn t Graphite head 1/ in. Harris J. Scian G. I. Bruny R. TIGHTNESS OF APPLIED LINING MARKING AND REPORTS A test for tightness of the applied lining that will be appropriate for the intended service is recommended, but the details of the test shall be a matter for agreement between the user and the manufacturer. Ren S. (25 median)
(540-595) Types B, D, Cl. 3 Types B, C, Cl. 1 Types B, C, Cl. 2 Types B, C, Cl. 2 Types B, C, Cl. 3 Types B, C, Cl. 3
1,050-1,150 (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (540-565) (
       ... 1,025-1,085 (550-585) 1,025-1,085 (550-585) 1,025-1,085 (550-585) 1 1 2 2 Forgings SA-508 SA-508 SA-508 SA-522 SA-592 SA-5
 1 /4 1 /4 1 /4 1 /2 1 1 1 2 2 NA 1 /2 1 1 1 2 2 NA 1 /2 1 /4 1 GENERAL NOTE: NA = not applicable. (3) When differential pressure design is specified by the user or his designated agent, the design shall be based only on design loading case 3 and 4 for each specified operating condition. Rushton J. Cheng Y. Park A. Materials . (See
ALL METHODS OF CONSTRUCTION AND ALL MATERIALS UG-4 - UG-8 ASME BPVC.VIII.1-2019 other, exceeds 12 ft (3.7 m), then one specimen shall be taken from each end of the forging, excluding test prolongations, exceeds 12 ft (3.7 m), then one specimen shall be taken from each end of the forging.
all tests shall conform to the minimum requirements of the specification, but the tensile strength of only one of the specimens need conform to the maximum requirement. (19 mm), whichever is less to = tL t min. Pressure parts such as hollow cylindrically shaped parts, heads, caps, flanges, elbows, return bends, tees, and header tees may be
machined directly from rod or bar as provided in (1) through (4) below. While fatique is not directly addressed by Part UIG, if service conditions warrant, the Manufacturer's Data Reports UHX-19.3.1 Common Elements. UHX-13.7.3
Configuration a: If facts = 1.0 and factc = 1.0, the design is acceptable, and the calculation procedure is complete. For tube side design pressure P t d, m in = minimum tube side design pressure (negative if vacuum is specified, otherwise zero) S = allowable stress for tubesheet
material at tubesheet design temperature (see UG-23) S c = allowable stress for channel material at design temperature S s = allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at design temperature S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a welded tube or pipe, use the allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a well-allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a well-allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a well-allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a well-allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a well-allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a well-allowable stress for shell material at tube S to Dc Pt Ps h NOTE: For a well-allowable stress for shell mat
the equivalent seamless product. UG-27 (d) Spherical Shells. B. Perez, Honorary Member Task Group on UG-20(f) (BPV VIII) S. WPS Qualification with toughness testing is not required. (e) (19-247) 326 UHX-14.8.3 added and former UHX-
14.8.3 redesignated as UHX-14.8.4 (17-2150) 337 UIG-34-2 Revised (16-1251) 338 Figure UIG-34-3 Revised (16-1251) 338 Figure UIG-34-3 Revised (16-1251) 345 Table UIG-34-3 Added (16-1251) 345 Table UIG-34-3 Added (16-1251) 346 Figure UIG-34-4
                                                                                                   --- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS lxvii Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Page Location Change (Record
Number) 347 Table UIG-34-4 Added (16-1251) 348 Table UIG-34-5 Added (16-1251) 348 UIG-60 Subparagraph (e) deleted (16-2198) 355 Figure UIG-76-1 Revised (16-2198) 355 Figure UIG-76-1 Revised (16-2716) 362 UIG-99 Revised (16-2716) 369 UIG-99 UIG-99
methods. 250 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULW-1 - ULW-16 ASME BPVC.VIII.1-2019 PART ULW REQUIREMENTS FOR
PRESSURE VESSELS FABRICATED BY LAYERED CONSTRUCTION (e) Head Layer. xxxvii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
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Temperature Not Exceeding Class Specified Min. (7) preheat shall be 100°F (38°C) minimum for material thickness up to and including 1/2 in. Corrosion resistant linings may be attached by welding to vessels fabricated by any method of construction permitted under the rules of this section. Carter M. Coefficient Cp. Ortman D. 593 593 593
 Nonmandatory Appendix E E-1 Suggested Good Practice Regarding Corrosion Allowance . (3) Configurations c, f, and C tubesheets have unflanged extensions. Heat Treatment Verification Tests . Hayes R. Materials of Construction . Rules for calculation procedure
 applies only when the tubesheet is integral with the shell or channel (configurations a, b, c, e, and f). (6), cross-reference to 13-1 corrected by errata to 2-7 (17-2075, 17-3322) 403 2-8 In subpara. Wang A. Harrison Working Group on Operating Plant Criteria (SG-ES) (BPV XI) N. MARKING AND REPORTS ULT-115 Minus Minu
 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,`,`,`,`,`,`,--- ULT-99 - ULT-125 ASME BPVC.VIII.1-2019 UHX-1 - UHX-4 PART UHX RULES FOR SHELL-AND-TUBE HEAT EXCHANGERS UHX-1 SCOPE the shell and channel flanges, the shell and channel flanges bolt
 loads are identical and shall be treated as flange pairs in accordance with Mandatory Appendix 2. (6 mm) from the edge of the weld. Zickler D. Follow the link below to download Since its first issuance in 1914, ASME's Boiler and Pressure Vessel Code (BPVC) has pioneered
 modern standards-development, maintaining a commitment to enhance public safety and technological advancement to meet the needs of a changing world. More than 100,000 copies of the BPVC are in use in 100 countries around the world. Since 1914, the ASME Boiler and Pressure Vessel Code has set the standard for safe boiler and pressure
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Materials Raw material manufacturer
 Figure 4-4 Charts for t Over 1/4 in. (5) provides a margin against abuse of the flange from overbolting. Keyser S.
                                                                                                                                                                                                                                                                                                      Certified material manufacturer
 Profile in the Neutral Position . (f) X5CrNiMo17-12-2 shall be considered as Type 316. Sturgill Executive Committee (BPV VIII) S. (g) Dummy Layer. Scott, Contributing Member M. It is the basis for the pressure-relieving devices protecting the vessel. Lasarte, Contributing Member M.
                                                                                                                                            Qualification of certified material specification (CMS) no. UIG-81 provides rules for Repair of Material. Bolting . or tubes are NPS 6 (DN 150) and less. (b) Determine the average temperature of the shell and channel at their junction to the tubeshet as follows:
 Configurations a, b, and c: UHX-14.6.2 Conditions of Applicability. Tucker N. Batey, Contributing Member W. Hyde, Secretary H. Supports . Sattler D. Unstayed Flat Heads and Covers . (b) Required Impact Testing for Welding Procedure Qualifications. After ensuring Code compliance, the vessel or part may be stamped with the Certification Mark
 and Designator by the appropriate Certificate holder after acceptance by the Inspector. 397 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MD7
Ellipsoidal heads designed under K > 1.0 and all torispherical heads made of materials having a specified minimum tensile strength exceeding 70,000 psi (485 MPa) shall be designed using a value of S equal to 20,000 psi (138 MPa) at room temperature for
the material as shown in the appropriate table (see UG-23). Washburn Y. Configurations a, e, f, and A: UHX-14.8.2 Conditions of Applicability. Shi, Contributing Member Working Group on High Temperature Liquid-Cooled Reactors (BPV III-5) S. (4) All joints of Category C shall be full penetration welds extending through the entire section at the joint.
Mummery Working Group on Vacuum Vessels (BPV III-4) I. (25 mm) 1 hr/in. 485 485 485 485 486 486 486 486 486 486 486 486 486 488 489 Mandatory Appendix 18 18-1 18-2 Adhesive Attachment of Nameplates. (5) Determine \sigma t,min = MIN (\sigma t,1, \sigma t,2). For example, use: (3) SHELL FV&300 psi (FV&2000 kPa) at 500°F (260°C) for the shell side maximum
 allowable working pressure (4) TUBES 150 psi (1 000 kPa) at 350°F (175°C) for the tube side maximum allowable working pressure (b) Whenthe under the chambers shall be abbreviated as: (1) S for shell side (2) T for tube side
 This abbreviation shall follow the appropriate letter designation and shall be separated by a hyphen. (c) If expansion-joint flexible elements are to be extended, compressed, rotated, or laterally offset to accommodate connecting parts that are not properly aligned, such movements shall be considered in the design. Veroni, Secretary B. Downs T.
Otherwise, increase the assumed tubesheet thickness, h, and return to Step 1. Unacceptable nozzle configurations include those shown in Figure UIG-36-1. Mullins T. Lundy R. (b) Pieces that are formed at temperatures equal to or higher than the original temperatures equal to original temperatures equal temperatures equal to original temperatures equal 
 either before or after welding into the vessel. Using this value of B, calculate the walue of the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working pressure Pa using the following equation: where S is the lesser of two times the maximum allowable external working equations are the maximum allowable external
with the provisions in 1-6, except that corners and fillets shall comply with the requirements of UCD-37. Materials in Combination . Some Acceptable Supports for Layered Vessels . Grant B. Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT . Jessee, Chair A. Zhao J. A-1 A-2 A-3 A-4 A-5
 Nonmandatory Appendix C. Nygaard J. Yaksh U. Lin, Alternate lviii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`
              , `--- Working Group on Procedure Qualification and Volumetric Examination (SG-NDE) (BPV XI) Working Group on Design and Programs (SG-RRA) (BPV XI) E. In those specifications in which chemical composition or mechanical properties vary with size or thickness, materials
 outside the range shall be required to conform to the composition and mechanical properties shown for the nearest specified range. Mokhtarian, Contributing Member K. For Welding Procedure Qualifications, impact testing is not required for the following combinations of weld metals and MDMTs except as modified in (c): (1) for austenitic
chromium-nickel stainless steel base materials having a carbon content not exceeding 0.10% welded without the addition of filler metal, at MDMTs of -155°F (-104°C) and warmer; (2) for austenitic weld metal: (-a) having a carbon content not exceeding 0.10% and produced with filler metals conforming to SFA-5.4, SFA-5.11, SFA-5.14, and
SFA-5.22 at MDMTs of -155°F (-104°C) and warmer; (-b) having a carbon content exceeding 0.10% and produced with filler metals conforming to SFA-5.11, SFA-5.14, and SFA-5.22 at MDMTs of -55°F (-48°C) and warmer; (3) for the following weld metal, when the base metal of similar chemistry is exempt as stated in (d)(3), then
 the weld metal shall also be exempt at MDMTs of -20°F (-29°C) and warmer: (-a) austenitic chromium stainless steels; (-b) ferritic chromium stainless steels; (-c) martensitic chromium stainless steels; (-b) ferritic chromium stainless steels; (-c) martensitic chromium stainless steels; (-d) austenitic ferritic chromium stainless steels; (-e) martensitic chromium stainless
conformity assessment programs • personnel certification programs • personnel certification programs • ASME Press books and journals You gain unrivaled insight direct from the BPVC source, along with the professional quality and real-world solutions you have come to expect from ASME. Figure UHT-6.1M Charpy V-Notch Impact Test Requirements 1.0 0.9 Cv, Lateral Expansion
mm 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 0 30 40 50 60 70 80 90 100 GENERAL NOTE: For Table UHT-23 materials having a specified minimum tensile strength of 655 MPa or greater, and for Table UHT-23 materials. Although no specific rules are given for the design of the flange pairs, after the loads for the most severe conditions are determined,
 calculations shall be made for each flange following the rules of Mandatory Appendix 2. Gradients Deflagration Diff. Table UIG-34-1 provides the load combinations required to evaluate the heat exchanger for the design condition. (1) Integral Type Reverse Flange. Not Exceeding Chart Fig. The maximum length of any gap shall not exceed the inside using the rules of Mandatory Appendix 2. Gradients Deflagration Diff. Table UIG-34-1 provides the load combinations required to evaluate the heat exchanger for the design condition.
 permitted without license from IHS GENERAL 239 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-1 - UHT-6 ASME BPVC.VIII.1-2019 GENERAL UHT-1 (1) When the coincident ratio defined in Figure UCS-66.1 is 0.35 or less, the corresponding minimum design metal temperature shall
 not be colder than -155°F (-104°C). The stress values for that specification given in the tables referenced in UG-23 shall be used. Copyright ASME International (BPVC) Provided by IHS under license with ASME Internat
and spherical shells under external pressure shall be designed by the rules in UG-28 using the applicable figures in Section II, Part D, Subpart 3 at 150°F (65°C). 73 Flux residues can be extremely corrosive as well as interfering with visual inspection. (3) When the cone-to-cylinder or knuckle-to-cylinder juncture is a line of support, the moment of
 inertia for a stiffening ring at the large end shall be determined by the procedure in Steps 1 through 8 below. From the intersection obtained in Step 2, move horizontally to the right and read the value of factor B. Keck Working Group on Pressure Relief (SG-CD) (BPV III) J. Sturgill D. 5A and 5B Group No. 1 P-No. 6 Group Nos. Charpy V-Notch
 Impact Test Requirements . 592 592 S92 Nonmandatory Appendix D D-1 D-2 D-3 Suggested Good Practice Regarding Internal Structures . If \rho changes, recalculate X a . This includes Configuration d if the extension is flanged and there are bolt loads
 applied to the extension. Bajula N. Sowder, Jr. R. Wilkowski, Secretary K. Bedeaux D. The vessel Manufacturer applies his Certification Mark with the U Designator in the presence of a representative from his Inspection Agency and completes the Form U-1, U-1A, or U-1P Manufacturer's Data Report with his Inspector. Musto T. (d) Laser and
resistance-welded lap joints are exempt from liquid penetrant examination requirements of (a), (b), and (c) above. (i) [See Note (1)] (j) [See Note (1)] (d) C max. Vock, Chair S. Mengon, Contributing Member D. Henrichsmeyer, Contributing Member D. Henrichsmey
 Move horizontally to the left to the material/ temperature line for the design metal temperature vessel and graphite pressure vessel and graphite vessel and 
 UNF-7 UNF-8 UNF-12 UNF-13 UNF-13 UNF-14 UNF-15 UNF-16 UNF-19 UNF-16 UNF-19 UNF-16 UNF-19 UNF-17 UNF-18 UNF
 elsewhere in this Division. The rewelded joint or the weld repaired areas shall be random spot examined at one location in accordance with the foregoing requirements of ULW-53(a), and ULW-53(b), ULW-53(a), and ULW-53(b), ULW-53(a), and ULW-53(b), ULW-53(b), ULW-53(a), and ULW-53(b), UL
(2) shall be maintained. UCI-28 THICKNESS OF SHELLS UNDER EXTERNAL PRESSURE UCI-35 (a) Circular cast iron spherically shaped heads with bolting flanges, similar to Figure 1-6, sketches (b), (c), and (d), shall be designed in accordance with the provisions in 1-6, except that corners and fillets shall comply with the requirements of UCI-37.
 Yang C. O'Donnell, Sr. S. Parimi J. Using Table UIG-34-2 (equilateral triangular pattern) or Table UIG-34-2 (equilateral triangular pattern) or Table UIG-34-3 (square pattern), determine E* /E and v* . 24 Special consideration shall be given to the design of shells, nozzle necks or flanges to which noncircular heads or covers are attached [see U-2(g)]. The stresses in the flange shall be determined for
 both the operating conditions and gasket seating condition, whichever controls, in accordance with the following equations: (a) for integral type flanges (Figure 2-4, sketches (8), (8a), (9), (9a), (10), (10a), and (11)], and for loose type flanges with a
·-- (b) for loose type flanges without hubs and loose type flanges with hubs which the designer chooses to calculate without
considering the hub [Figure 2-4, sketches (1), (1a), (2), (2a), (3), (4a), (4b), and (4c)] and optional type flanges calculated as loose type [Figure 2-4, sketches (8), (8a), (9), (9a), (10), (10a), and (11)]: 2-9 2-8 SPLIT LOOSE FLANGES90 Loose flanges split across a diameter and designed under the rules given in this Appendix may be used under
the following provisions. (2) Conditions of Applicability. Kowalczyk, Chair J. Hill III, Contributing Member G. Stakenborghs S. Proposed revisions to the Code resulting from inquiries will be presented to the Committee for appropriate action. Andrei, Staff Secretary D. (-c) The organization installs the pressure vessel, ensures the required overpressure
 protection system is properly installed, and provides the required documentation and approvals if overpressure protection by system design is used, and places the pressure vessel in service. Mixtures of uncertain chemical composition and physical properties are produced at the line of fusion. Gorman Subgroup on Plastic Fusing (BPV IX) E. Step 1.
 PLATE AND OTHER MATERIALS For 5%, 7%, 8%, or 9% nickel steel the requirements of UHT-86 apply. Orihuela K. (4 mm), whichever is smaller; except that an isolated indication by 1 in. In cases where the value of A falls to the right of the material/temperature line, assume an intersection with them.
 horizontal projection of the upper end of the material/temperature line. Felix, Contributing Member A. Apostolescu A. Code Cases and Nuclear Code Cases and Nucl
component shall be heat treated with the vessel or vessel component. The weld repairs shall meet the requirements of (-a) through /16 in. (3) None of the nozzles is
located in a Category A or B joint. Where defects have been repaired by welding, the completed repair shall be subject to reexamination and, when required by either the rules of this Division or the requirements of the castings specification, the repaired by either the rules of this Division or the requirements of the castings specification, the repaired by either the rules of this Division or the requirements of the castings specification, the repaired by either the rules of this Division or the requirements of the castings specification, the repaired by either the rules of this Division or the requirements of the castings specification, the repaired by either the rules of this Division or the requirements of the castings specification.
 casting shall be stress relieved. When dimensions, sizes, or other parameters are not specified with tolerances may be considered acceptable when based on engineering judgment and standard practices as determined by the designer. Some
 acceptable layered shell types are shown in Figure ULW-2.1. Some acceptable layered head types are shown in Figure ULW-2.2. ULW-1 MATERIAL ULW-5 SCOPE Material used for pressure parts shall conform to one of the specifications permitted in the applicable Parts of Subsections A, B, and C, except for 5%, 8%, and 9% nickel steel materials
 which are permitted only for inner shells and inner heads. Vessels of Circular Cross Section Having a Single Diametral Staying Member [Figure 13-2(c)]. It is recommended that the value of hG [(C - G)/2] be kept to a minimum to reduce flange rotation at the sealing surface.
functions Zd(x) and Zw(x) relative to x: 3 For each loading case, calculate Ft(x) relative to x in accordance with a or b below. The values for σt, 1 and σt, 2 may be positive or negative. Hall A. Fixed tubesheet heat exchangers shall be marked with the following caution: CAUTION: The heat exchanger design has been evaluated for the range of
                                                                                                                                                                                                 --- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS xxvii Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for
conditions listed on Form U-5 of the MDR. Brumovsky H. Vandership P. Kong H. --`.`
                                                                                                                                        (f) For vessels constructed of UNS R31233 during weld procedure qualification testing, when using a matching filler metal composition, the minimum specified tensile strength of the weld metal shall be 120 ksi (828 MPa). Spangenberg, Vice Chair E. When the tubeshee
is gasketed between DESIGN 283 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-4 ASME BPVC.VIII.1-2019 Figure UHX-3 Terminology
 of Heat Exchanger Components 1 2 3 4 5 7 8 9 6 (a) U-Tube Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 13 6 (c) Floating Tubesheet Heat Exchanger 1 2 3 4 5 7 8 9 10 11 1
                         `,`,``,,`-`-`,,`,,`,`,`--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 9 10 11 12 13 14 15 16 Baffles or support plates Floating head backing device Floating tubesheet Floating head Floating head flange Shell cover Expansion joint
 Distribution or vapor belt 284 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 12 14 ASME BPVC.VIII.1-2019 UHX-4 of 0 can be located within this distance specified in UHX-4(h) dt D (a) No part of d can be located within this
                                                                                                                                    \dot{}--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-4 -
UHX-9.3 ASME BPVC.VIII.1-2019 (-a) For a noncircular nozzle having its major axis not parallel to the tubesheet face and d m a x /D > 30%, d is limited to the distance specified in (1). This procedure describes how to use the rules of UHX-12.5 when the effect of the stiffness of the integral channel and/or shell is not considered. Such usage may be by
 Impregnated Graphite Materials. Mann P. Some Acceptable Types of Filler Plugs. Jessee J. Rossi, Staff Secretary D. (-c) When the conformance of the material shall be marked as required by the permitted specification. McGough, Honorary Member B. than -155°F (-104°C)?
 Willoughby, Secretary J. Cylindrical and spherical shells under external pressure shall be designed by the rules in UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-20(c). Rana M. (a) When the flange consists of a single split flange or flange ring, it shall be designed as if it were a solid flange (without
splits), using 200% of the total moment Mo as defined in 12-4. B s c = bolt-circle diameter c = basic dimension used for the minimum sizing of welds equal to tn or tx, whichever is less C b = conversion factor = 0.5 for U.S. Customary calculations; 2.5 for SI calculations d = factor (d) Flanges
 with hubs that are machined from plate, bar stock, or billet shall not be machined from plate or bar material [except as permitted in UG-14(b)] unless the material has been formed into a ring and the following additional conditions are met: (1) In a ring formed from plate, the original plate surfaces are parallel to the axis of the finished flange. In UHX
Suggestions on the Selection and Treatment of Austenitic Chromium-Nickel and Ferritic and Martensitic High Chromium Steels, material (product form, ranges of composition, mechanical properties, methods of production, etc.) together with the sampling, testing, and
 examination procedures to be applied to production lots of such material to verify acceptable conformance to the intended characteristics. Garfield M. Spuhl J. Second-level breakdowns are designated as (1), (2), (3), etc., as in the past. Ghosal C. Penso D. This contamination should be removed by grinding, machining, or other mechanical means after
thermal cutting and prior to use or further fabrication by welding. Munshi M. Stevens, Chair A. Also, see 9-1(c) for jacketed vessels. Tube Expanding Procedure Specification (TEPS). Park T. Garbolevsky D. O. For example, S H I represents the longitudinal hub stress in Flange I of the Class 3 assembly. (b) The design of pressure-containing and
 structural cemented joints shall be limited to those qualified in accordance with the Manufacturer's cementing procedure qualification (see UIG-79). Tanzosh D. Configurations b and c: If facts = 1.0, the design is acceptable, and the calculation procedure is complete. 242 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for
 G. (The applicable operating characteristic for a specific device Manufacturer's installation instructions closely with regard to the flow direction marked on the device. (c) Design.
 Chavdarov, Chair A. Stoeva S. Oh C. impregnation agent: material used to render carbon and graphite materials impervious. Determine the values for E * /E and v * relative to h /p using either Figure 2-4. Pillow R. (4) Welded.
 construction allowable stresses apply only to butt joints. Dalal, Secretary P. The holding time at temperature as specified in Tables UHA-32-1 through UHA-32-7 need not be continuous. Openings in Pressure Vessels . Esch — Delaware T. Ferlisi E. Tube Expanding Performance Qualification (TEPQ) Tube Expanding Variables . (f) revised (11-1132, 17-1132).
(a)(2), (a)(4), and (b) revised (17-3222, 18-1091, 18-1195) 154 UW-54 Revised (17-3223) 155 UF-5 Subparagraph (c) revised (15-1391) 156 UF-31 (1) Subparagraph (b)(1)(-d) relocated to end of subpara. Krishnamurthy A. to 2 in. Configurations b and c: If \sigma s \leq SPS, the shell is acceptable. Ossmann S. (b) Studs shall be
Corner joints shall be full penetration welds with a covering fillet and no backing strip. Hayashi R. Cary, Vice Chair G. HEADS WITH PRESSURE ON CONVEX SIDE The thickness of heads with a covering fillet and no backing strip. Hayashi R. Cary, Vice Chair G. HEADS WITH PRESSURE ON CONVEX SIDE The thickness of heads with a covering fillet and no backing strip.
Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 2-9 ASME BPVC.VIII.1-2019 Figure 2-7.6 Values of f (Hub Stress Correction Factor) 25 20 15 10 9 8 Bg o h 7 6 o 5 h 5 0 0 0. If | o
flat. Hembree B. Lemmons R. (2) The material shall be identified and suitable for welding in accordance with UW-5(b). Plug Welds . Significance and Use . (3) The completed alloy weld deposit is spot examined by any method that will detect cracks. (d) The rules of this Appendix do not address cyclic loading conditions; therefore, consideration of
cyclic loading for flexible shell element expansion joints is not required unless it is specified for the vessel. Embossed Plate to Plain Plate . The pair of rings shall be assembled so that the splits in one ring shall be assembled so that the splits in one ring shall be 90 deg from the splits in the other ring. The requirements of UG-25(e) and UG-46(b) shall apply when telltale holes are used in clad or lined
 vessels, except that such holes may extend to the cladding or lining. Mandatory Appendix 33 Standard Units for Use in Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use in Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of High Silicon Stainless of Equations Mandatory Appendix 34 34-1 34-2 34-3 34-4 34-5 Requirements for Use of Equations Mandatory Appendix A
 each cylindrical section with dimension L as shown. Check of Welder and Welding Operator Qualifications . In UHX-12.5.4, replace E c with and recalculate kc and λ c . Sutherlin D. Mehta G. UHX-13.5.12 Step 12. (e), row for SA-553 Type III added to table (17-2272) 266 ULW-52 Subparagraphs (a) and (b) revised (18-1090) 268 ULW-53
 Subparagraphs (a), (b), and (c) revised (17-2272) 275 ULT-17 Subparagraphs (c) and (e) revised (17-2272) 275 ULT-16 Subparagraph (b) revised (17-2272) 275 ULT-17 Subparagraph (c) revised (17-2272) 275 ULT-18 Subparagraph (a) revised (17-2272) 275 ULT-19 Subparagraph (c) revised (17-2272) 275 ULT-19 Subparagraph (a) revised (17-2272) 275 ULT-19 Subparagraph (b) revised (17-2272) 275 ULT-19 Subparagraph (c) revised (17-2272) 275 ULT-19 Subparagraph (c) revised (17-2272) 275 ULT-19 Subparagraph (a) revised (17-2272) 275 ULT-19 Subparagraph (b) revised (17-2272) 275 ULT-19 Subparagraph (c) revised (17-2272) 275 ULT-1
 formulas shall apply: LININGS 82Þ Corrosion resistant or abrasion resistant linings, whether or not attached to the wall of a vessel, shall not be considered as contributing to the strength of the wall except as permitted in Part UCL (see Nonmandatory Appendix F). Hayes, Vice Chair S. If such verifiable evidence cannot be provided, recertification is
 not permitted. (b) Defects. From the intersection obtained in Step 4, move horizontally to the right and read the value of factor B. Hasegawa K. Cipolla D. Hoshman, Contributing Member Y. Farzam P. (6 mm) 4 GENERAL NOTE: The gasket factors listed only apply to flanged joints in which the gasket is contained entirely within the inner edges of the
bolt holes. (1) Category B joints of layered sections of unequal thickness shall have transitions as shown in Figure ULW-17.1, sketch (a) or (b). Cracks and voids shall not be repaired by adding cement only. Show the joint type required for each category weld. The results of the "Bond Strength" test shall be reported on the material
test report. (-a) Calculate a coefficient, C 1. The allowable stress values for material not identified in accordance with UG-93 shall not exceed 80% of the maximum allowable stress value permitted for similar material in Subsection C. The rules in Section VIII, Divisions 1 and 2 to cover the construction of layered vessels have been developed to parallel
 each other as far as can be done within the parameters of each Division. Definitions of Terms . (6 mm) U = factor for loose type flanges (from Figure 2-7.5) V = factor for integral type flanges (from Figure 2-7.3) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges (from Figure 2-7.5) V = factor for loose type flanges
5(e)] w = width used to determine the basic gasket seating width b 0, based upon the contact width between the flange facing and the gasket (see Table 2-5.2) W m 1 = minimum required bolt load for the operating conditions [see 2-5(c)]. Dyle M. Based on these objectives, the following policy has been established on the usage in advertising of
 facsimiles of the ASME Single Certification Mark, Certification Mark, Certificates of Authorization, and reference to Code construction. Avrithi R. Strunk W. Arulkumar B. 1 226 --`,``,``,,``,,```, Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME Inte
 Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UCI-1 - UCI-23 ASME BPVC.VIII.1-2019 PART UCI REQUIREMENTS FOR PRESSURE VESSELS CONSTRUCTED OF CAST IRON GENERAL UCI-1 (d) Cast iron flanges and flanged fittings conforming to ASME B16.1, Cast Iron Pipe Flanges and Flanged
 Fittings, Classes 125 and 250, may be used in whole or in part of a pressure vessel for pressures not exceeding 450°F (230°C). Catty B. Some Acceptable Flat Heads and Tubesheets With Hubs Joining Layered Shell Sections . Otherwise, increase the thickness of the shell and
 return to Step 1. Attendance at a BPV Standards Committee meeting shall be at the expense of the Inquirer. Lyow Working Group on Probabilistic Methods in Design (SG-DM) (BPV III) M. Bashir L. (6 mm); b = , when bo > 1/4 in. (6.32 mm), or the minimum nominal pipe thickness shall be 0.133 in. The phrase engineering judgment refers to technical
 (0, minimum tube side operating pressure for operating pressure for operating condition x) S = allowable stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tubesheet material at T S C = allowable primary plus secondary stress for tu
 , s = allowable primary plus secondary stress for shell material at Ts per UG-23(e) S s = allowable stress for tube material at Ts Der ug-23(e) S s = allowable stress for shell material at Ts Der ug-23(e) S s = allowable stress for tube material at Ts Der ug-23(e) S s = allowable stress for shell material at Ts Der ug-23(e) S s = allowa
 under consideration (e.g., normal operating, start-up, shutdown, cleaning, upset) \nu = Poisson's ratio of tube material \nu t = Poisson's ratio of tube materi
thickness of expansion joint straight flange to = uncorroded thickness of expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint straight flange to = uncorroded thickness of expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint straight flange to = uncorroded thickness of expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint straight flange to = uncorroded thickness of expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint straight flange to = uncorroded thickness of expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint straight flange to = uncorroded thickness of expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element ASME BPVC.VIII.1-2019 (d) The completed expansion joint outer shell element as a shell eleme
UNS S40920, UNS S40930, UNS S40935, UNS S40945, UNS S40975, UNS S40975, UNS S40977, UNS S
Chair P. Wright B. Uebel, Contributing Member Subgroup on External Pressure (BPV II) D. Boughman, Chair S. (2) an increase in the maximum interpass temperature or a decrease in the minimum specified preheat temperature. Properties . When this occurs, the efficiencies computed by the rules under (b) above shall govern. Scott W. This
an equal thickness of base material. Leslie F. Peloquin D. Pleins Q. Eftychiou C. All applicable requirements of that Part of Subsection C shall be met including any required impact tests. for t from 1/8 in. Euler Buckling of Extruded Graphite Tubes . (b) On the Manufacturer's Data Report, under Remarks, show the additional marking notations from (a)
 above. Lee T. Sutherland C.-I. Navratil S. These stress values in Table UCD-23 multiplied by the applicable casting quality factor given in UG-24. E = joint efficiency of, appropriate joint in cylindrical or spherical shells, or the efficiency of ligaments between openings, whichever is less. In most
cases, an elastic-plastic calculation using the appropriate reduced shell or channel Calculation Procedure for Simply Supported Floating Tubesheets UHX-14.7.1 Scope. Nguyen, Contributing Member M. Dacanay — Hawaii C. Avrithi L. They must also include the name of the Inquirer and the company they represent or are employed by, if applicable,
and the Inquirer's address, telephone number, fax number, and e-mail address, if available. Large Head Openings — Reverse-Curve and Conical Shell-Reducer Sections . Swayne MARINE CONFERENCE GROUP H. For explosive expanding, the Manufacturer may correlate interference of fit. Testing Process . Ortolani D. 500 500 500 500 500
 Maximum allowable stress values in tension for the materials listed in the above table are contained in Section II, Part D, Subpart 1 (see UG-23). To avoid weld embrittlement, special care is required in the application of lining material and welding process and other fabrication procedures.
                                           ',,',','''',','''',','''',','--- GENERAL NOTES: (a) Postweld heat treatment is neither required nor prohibited for joints between austenitic stainless steels of the P-No. 45 group, but any heat treatment applied shall be performed as listed below and followed by liquid quenching or rapid cooling by other means: Alloy
 using qualified procedures, provided that the concurrence of the Authorized Inspector is first obtained for the method and extent of repairs. Design of Vessels of Noncircular Cross Section .. Frew, Secretary P. It is recommended that users assure themselves by appropriate tests, or otherwise, that the alloy material selected and its heat treatment
during fabrication will be suitable for the intended service. Nagel, Chair C. Aldo R. However, for cases involving thermal loading, it is permitted to use the operating temperatures instead of the design temperatures. Badziagowski T. Chen J. Carbon and Low Alloy Steel . Kaculi F. If the shell side is the higher-pressure side, P s shall be the shell side
 Unless the requirements of (1) and (2) below are met, for 5%, 8%, and 9% nickel steels, the use of nameplates is mandatory for shell thicknesses below 1/2 in. Aurioles, Sr., Chair P. Geringer S. O'Regan J. 23 Formulas in terms of outside dimensions and for heads of other proportions are given in 1-4. (d) Carefully lift the template from the graphite
 part and examine the detail of the characters. Hollinger, Contributing Member M. Prueter M. Schuessler R. (b) This procedure shall be used when cyclic or dynamic reactions due to pressure or thermal variations are specified [see UG-22(e)]. Barsky L. Griesbach M. NOTE: (1) For the rules of this Part and for Mandatory Appendix 44, SA/EN 10028-7
 materials shall be considered as SA-240 materials with the following corresponding grades: (a) X2CrNi18-9 shall be considered as Type 304L. (3) Mechanical Loads Plus Thermally Induced Displacements. Rahoi J. (-a) When P e ≠ 0 (b) If the exchanger does not have any spring-loaded rods on the floating end, use the following equation for Pe: (-b)
When P e = 0 Step 7. (19 mm) 1/4 in. If Pa is smaller than P, select a larger value for t and repeat the design procedure until a value of Pa is obtained that is equal to or greater than P. Martin L. (-b) For static and centrifugal castings a factor not to exceed 100% may be applied if the castings are examined in accordance with all of the requirements
 of Mandatory Appendix 7. The calculated localized stresses at the discontinuity shall not exceed the stress values specified in (g)(1) and (g)(2). Welding Test Plates . Vanvelsor J. See UG-20(b). Meredith N. Moyer, Alternate S. (c) The minimum requirement for spirally wound strip layered construction shall be 1/4 in. Magruder L. (d) Tempering (1)
 Attached Test Coupons. (-2) The axis of the tension test specimen shall be located, as nearly as practicable, midway between the center thickness and the surface of the rod or bar. Data for new materials shall be submitted to and approved by the ASME Boiler and Pressure Vessel Committee on Materials in accordance with Section II, Part D,
                                                                                                      ',,'--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHA-A-1 - UHA-A-4 ASMI
Contributing Member J. (3) An optional flange can be designed as loose type or integral type. Magruder M. Certificate of Authorization: a document issued by the Society that authorizes the use of the ASME Certificate of Authorization: a document issued by the Society that authorizes the use of the ASME Certificate of Authorization Mark and appropriate designator for a specified time and for a specified scope of activity. Dinovo D. Records . The design shall be
 reconsidered by using one or a combination of the following three options: 312 Copyright ASME International (BPVC) Provided by IHS under license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --
 this Appendix shall also meet the rigidity requirements of 2-14. Komora, Vice Chair D. Davis D. The proposed Code Cases should identify the Code Section and Division, and should be written as a Question and a Reply, in the same format as existing Code Cases. Part UIG Requirements for Pressure Vessels Constructed of Impregnated Graphite. (16
mm) 8 Grip surface Weld — both ends for Figure ULW-32.2, layer side only for Figure ULW-32.3 1/ in. Hennessey K. Cueto-Felgueroso H. May J. Smooth weld both sides. Worthington R. Design Limitations . (d) For vessels constructed of UNS N12160, the nominal thickness of the base material at the weld shall not exceed 0.5 in. (13 mm) are used,
shown to be sound by radiographic examination; (7) the thickness of any repaired section in Table UCI-78.1; (8) the minimum radius of curvature of repaired sections of cylinders or cones in relation to the size of plug used shall not be less than that given in Table UCI-78.2; (9) the
 ligament efficiency between any two adjacent plugs shall not be less than 80% where FABRICATION UCI-75 Minimum Thickness of Repaired Section, in. Jessee R. Cameron D. Removed the word "Inspector's" under "Instruction" in Table W-3, Reference Number (61). Henry F. Marks, Chair E. (10 mm). (b), cross-reference to 13-1 corrected by errata
 cylinder junctions without a transition knuckle, use the following for design cases (pressure-only cases) in 1-5. Users of the Code should refer to the pertinent codes, standards, laws, regulations, or other relevant documents for safety issues other than those relating to pressure integrity. Cowley I. Brandes, Chair S. This paragraph provides a method
 of checking flange rigidity. Toughness testing of the base metal and HAZ is required per UHA-51(a)(3). Ghosal B. Brown, Secretary J. Guerreiro R. (-c) Each casting of steel material permitted by this Division shall be examined per Mandatory Appendix 7 for severe service applications [7-3(b)]. McClure B. Two Embossed Plates . This is particularly true
                                                                                                                                                                                                                                                     ````,,``,,,`---`,,`,,`,`--- (a) Example 1. Pletcher, Contributing Member R. Gatti, Delegate S. Cho P. Campos N. Toughness testing of the base material and HAZ is not required. Zambon G. Pei G. --
 360 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-84 - UIG-90 ASME BPVC.VIII.1-2019 Table UIG
 84-1 Test Frequency for Certified Materials Property Flexural strength Compressive strength Tensile strength
(1)], and at minimum, every 3 mo. (-a) The Manufacturer shall give prior notification of the repair to the user or to his designated agent and UG-117(a). Patterson, Secretary T. Residual deposits of flux shall be removed. Examples follow: • (Sub-)Paragraph Cross-
 References. Nozzle Necks Attached to Piping of Lesser Wall Thickness. Ranganath A. (d) If the value of I, when calculated by the appropriate formula above, is greater than 1.0, the thickness of the flange, t, shall be increased and I recalculated until I

1 for both gasket seating and operating conditions. Specify one of the following: (1) request formula above, is greater than 1.0, the thickness of the flange, t, shall be increased and I recalculated until I

2 for both gasket seating and operating conditions. Specify one of the following: (1) request formula above, is greater than 1.0, the thickness of the flange, t, shall be increased and I recalculated until I

3 for both gasket seating and operating conditions. Specify one of the following: (1) request formula above, is greater than 1.0, the thickness of the flange, t, shall be increased and I recalculated until I

3 for both gasket seating and operating conditions.
revision of present Code requirements (2) request for new or additional Code requirements (3) request for Code Interpretation (b) Background. Wilson S. Added "torch brazing" in UCS-85(d). Tolerances on Body Forgings . (b) Integrally Clad Material Without Credit for Full Cladding Thickness. Example: Professional
 Engineer's Seal. However, users are cautioned that not all regulators, jurisdictions, or Owners automatically accept Code Cases. For tubetotubesheet joints with partial strength welds, L m a x shall be in accordance with UW-18(d), UW-20, or Nonmandatory Appendix A, as applicable. UCI-32 HEADS WITH PRESSURE ON CONCAVE SIDE Heads with
pressure on the concave side (plus heads) shall be designed in accordance with the equations in UG-32 using the maximum allowable stress value in tension. The heat treatment may be applied to the individual parts of a vessel prior to assembly by welding, to partially fabricated components, or to an entire vessel after completion of welding. These
 responsibilities and considerations are grouped into 11 categories as defined in NN-6(a), and the Code paragraphs relevant to each category are detailed in Tables NN-6-11. Cameron, Vice Chair K. G. If W t > L m a x, reconsider the tube-to-tubesheet joint design. (c) The Certification Mark stamp shall be used to make the impression
 in the cement. UHX-13.3 Conditions of Applicability Nomenclature The symbols described in UG-36(e)(5), such as those made up of two or more conical frustums having different slopes, may be designed in accordance with (e).
 in-Holes . If the expansion joint analysis method utilizes displacements over the length of the expansion joint only, use the appropriate equation from UHX-16. Design Criteria . UHX-14.2 Conditions of Applicability The two tubesheets shall have the same thickness and material. Configuration a: If \sigma s \leq 1.5Ss and \sigma c \leq 1.5Ss, the shell and channel from UHX-16.
designs are acceptable and the calculation procedure is complete. Except for those quantities modified below, the quantities to be used for the elastic loading case. Hovis T. Aurioles, Sr. J. Location Change (Record Number) xxxiii List of Sections Updated xxxv
Foreword Penultimate paragraph revised xxxvii Statement of Policy on the Use of the ASME Single Certification Mark and Code Authorization in Advertising Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised xxxvii Statement of Policy on the Use of ASME Marking to Identify Manufactured Items Revised Xxxvii Statement of Identify Manufactured Items Revised Xxxvii Statement of Identify Manufactured Items Revised Xxxvii Statement Items Revised Xxxvii
Committees In para. Gilada K. When f 1 is in compression and the quantity is larger than the PRL/2 term, the design shall be in accordance with U-2(g). WELDED JOINTS (a) All Category A, B, C, and D joints (UW-3) shall be full penetration welds. From this point of intersection move vertically downward to determine the value of factor A.
operating temperature of the vessel for the specific fluid. CD-1 GENERAL NOTE: To these stress values, a quality factor as specified in UG-24 shall be made of material with a specified minimum yield strength within ± 20% of that
of the shell to which they are attached; however, pipe flanges, pipe, or communicating chambers may be of carbon, low, or high alloy steel welded to nozzle necks of the required material, provided: (1) the joint is a circumferential butt weld located not less than which, except for the nozzle type shown in Figure UHT-18.1, sketch (f), is measured from
the limit of reinforcement as defined in UG-40. The conditions existing when the gasket or joint-contact surface is seated by applying an initial load with the bolts when assembling the joint, at atmospheric temperature and pressure. If |\sigma| < S > t > t b, the tube design is acceptable. Nagata I. (22 mm) or Less in Thickness Taper line tH tH 0.7tL
in. UHX-13.6.3 Additional Nomenclature. The quality factor for lethal service shall not exceed 100%. UHX-14.5.10 Step 10. Brown J. Conversion factors between U.S. Customary and SI Units in the ASME Boiler and Pressure Vessel Code. (2) Stress
values at intermediate temperatures may be interpolated. (4) For each lot of tube material, the flexural strength (see Mandatory Appendix 36) shall be multiplied by the factors determined during material qualification to calculate the tensile and compressive strengths. (16 mm) thick and over, one drop-weight test (two specimens) shall be made for
each plate as heat treated. Howard R. Acceptance Criterion. Weaver, Contributing Member Task Group on Inspectability (BPV XI) I. Table UCD-78.1 1/16 (14) /16 (17) 11/16 (27) 11
Additional Requirements . Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees . (a) Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other materials give the maximum allowable stress values at the temperatures indicated for materials conforming to the specifications listed therein. Required
Marking . Miyata, Contributing Member M. Mullins Special Working Group on the Use of Unmanned Aerial Vehicles/ Systems for Inspection (BPV V) A. UHT-83 WELD FINISH UHT-85 STRUCTURAL AND TEMPORARY WELDS (a) Welds for pads, lifting lugs and other nonpressure parts, as well as temporary lugs for alignment, shall be made by
qualified welders in full compliance with a qualified welding procedure. (c) An eye examination shall be performed per the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acuity of personnel to perform the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determine near- distance acute the requirements of Section V, Article 9 to determin
the cold formed areas of pressure-retaining components manufactured of austenitic alloys shall be solution annealed by heating at the temperatures given in Table UHA-44 for 20 min/in. Mao D. Foulds G. Imbro O.-S. Special Comments . (e) When material of SA-333 Grade 8, SA-334 Grade 8, SA-353, SA-522, SA-553, and SA-645, Grade A are postweld
heat treated, the complete vessel or vessel component being so heat treated shall be maintained within the permissible temperature range defined in Table UHT-56. Revised UG-99(k)(2) and UG-100(e)(2) to clarify that leak test requirements are applicable for vessels with nonmetallic linings. Sectioning of Welded Joints . 104 See Transactions ASCE,
Volume 98 — 1931 "Design of Large Pipe Lines." 105 This construction has the further advantage of not transmitting discharge-pipe strains to the valve. Interpretations do not introduce new requirements. Determination of Pressure-Relieving Requirements.
design, fabrication, examination, inspection, testing, certification, and overpressure protection rules contained in this Division. Rao U. (1.6 mm). Ryan — City of Chicago, Illinois D. After a defect is thought to have been removed or reduced
to an acceptably sized imperfection. Reverse Flanges . (16 mm) to 2T (6) for the shielded metal arc, submerged arc, and gas-shielded and flux-cored arc welding processes, an increase in the supplemental diffusible hydrogen designator from that used during procedure qualification. Criteria for Establishing Allowable Stress Values . Gray, Chair W.
Revised UW-51(a)(4) to clarify that the permission to use UT in lieu of RT applies to welds in which the thinner of the members joined is 1/4 in. (b) Vessels or parts of vessels subject to thinning by corrosion, or mechanical abrasion shall have provision made for the desired life of the vessel by a suitable increase in the thickness of the material
over that determined by the design formulas, or by using some other suitable method of protection. Troutt M. 287 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale,
 (x,y) - (x,y
1 \text{ L L 1} + \text{U L 2 L L 2} + \dots (limited to 4 \text{D o p}) c t = \text{tubesheet corrosion allowance on the tube side} = 0 in the uncorroded condition D o = equivalent diameter of tube hole diameter of tube hole diameter of tubes d* = effective tube hole diameter E = modulus of elasticity for
tubesheet material at tubesheet design temperature E t T = modulus of elasticity for tube material at tubesheet thickness h g = tube side pass partition groove depth [see Figure UHX-11.3-1, sketch (c)] = effective tube side pass partition groove
depth L L 1, L L 2 ... = length(s) of untubed lane(s) (see Figure UHX-11.3-1, sketch (b)]. Qian S. Grubb India International Working Group (BPV I) H. Snow S. Majumdar S. The pressure testing may be performed as a part of the final vessel pressure test, provided the
joint is accessible for inspection during pressure testing. Yee H. Emslander Subgroup on Care and Operation of Heating Boilers (BPV IV) R. Borter J. (2) Transition of Heating Boilers (BPV IV) R. Bor
transition is made in the lavered shell section. Statement of Policy on the Use of the ASME Single Certification Mark and Code Authorization in Advertising Statement of Policy on the Use of ASME Marking to Identify Manufactured Items. Chung R. 248 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction
or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-81 - UHT-82 ASME BPVC.VIII.1-2019 (e) The following materials are exempt from production impact tests of the weld metal in accordance with UG-84 under the conditions given in (1)
through (5) below: (1) Coupons not containing welds shall meet the complete tensile requirements of the material specification and orientation of the specimens shall be the same as required by UG-84 except that for plates the specimens
shall be oriented transverse to the final direction of rolling and for circular forgings the specimens shall be oriented tangential to the circumference. Reinhardt P. If pipe or tube is ordered by its nominal wall thickness, the manufacturing undertolerance on wall thickness shall be taken into account except for nozzle wall reinforcement area
requirements in accordance with UG-37 and UG-40. Manufacturer's Data Report Supplementary Sheet Shell-and-Tube Heat Exchangers. Weitze, Secretary T. Grubb B. Swayne S. Pressure-Relieving Devices. Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT L2 ASME BPVC.VIII.1-2019 Figure
 , `-`-`,,`,`,`,`, Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Figure 4-2 Groups of Aligned Rounded Indications 3L2 L2 3L3 L3 3L3 419 Licensee=Khalda Petroleum/5986215001, User=Amer,
Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Maximum Group Length L = 1/4 in. The effective area of reinforcement can be determined in accordance within a distance of from the junction, and the centroid of the added area shall be within a
distance of from the junction. 280 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULT-99 ASME BPVC.VIII.1-2019 Table ULT-82M
Minimum Tensile Strength Requirements for Welding Procedure Qualification Tests on Tension Specimens Conforming to Section IX, Figures QW-462.1(a) Through QW-462.1(e) SA-353; SA-553 Types I, II, and III; SA-333 Grade 8; SA-522, SI Units Welded Construction Welded Construction Temp. (13 mm) in diameter when
using an automatic arc stud welding or automatic resistance stud welding process. The design pressure (P s o x, P t o x) for each of the operating loading case, unless the user or his designated agent provides an operating loading case, unless the user or his designated agent provides an operating loading case, unless the user or his designated agent provides an operating loading case, unless the user or his designated agent provides an operating loading case, unless the user or his designated agent provides an operating loading case.
calculated by the rules given in UG-53. (2) Flanges and flanged fittings may be used at the pressure-temperature ratings specified in the appropriate standard listed in this Division. (2) One tension test specimen shall be taken from each forging weighing more than 5,000 lb (2 250 kg). The user or his designated agent shall provide the Manufacturer
with the data necessary to determine the required tubesheet, channel, and shell metal temperatures. Gilston, Vice Chair P. h hG C g1/2 go B Where hub slope adjacent to flange exceeds 1:3, use sketches (6a) or (6b) (6) G W A hD g1 g1 HT (5) Gasket W R hT HD HT hG 1.5 go (min.) g1 (6b) go HD G go g1 B g1/2 (7) Integral-Type Flanges [Notes (3)
 ',','',,'-'-',,',',','--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Slope exceeds 1:3 Slope 1:3 (max.) R hD C HG Slope exceeds 1:3 1.5 go (min.) Slope 1:3 (max.) r hD C h h 1.5 go t Gasket 396 Licensee=Khalda
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT CL Weld ASME BPVC.VIII.1-2019 2-5 Figure 2-4 Types of Flanges (Cont'd) min. Asada K. (e) Bolts, studs, nuts, and washers shall comply with the requirements in this Division. (2) All joints of Category A shall be Type No. (1) of Table UW-12. Tt, mx = tube
axial mean temperature for operating condition x, as applicable W * = tubesheet effective bolt load to be taken as W m a x for all cases and configurations x = 1, 2, 3, ..., n, integer denoting applicable operating condition under consideration (e.g., normal operation, start-up, shutdown, cleaning, upset) \alpha s, \alpha s applicable operating condition under consideration (e.g., normal operation, start-up, shutdown, cleaning, upset) \alpha s, \alpha s applicable operating condition under consideration (e.g., normal operation) \alpha s applicable operation (e.g., normal operation) \alpha s applicable operation \alpha s applica
of shell material at T s, m \alpha t, m = mean coefficient of thermal expansion of tubes and shell \mu = basic ligament efficiency for shear \nu = Poisson's ratio of tubesheet material \nu s = Poisson's ratio of shell material \nu t = Poisson's ratio of tubesheet material \nu s = Poisson's ratio of shell material \nu t = Poisson's ratio of tubesheet material \nu s = Poisson's ratio of shell material \nu t = Poisson's ratio of tubesheet material \nu s = Poisson's ratio of shell material \nu t = Poisson's ratio of tubesheet material \nu s = Poisson's ratio of shell material
Poisson's ratio of tube material \nu^* = effective Poisson's ratio in perforated region of tubesheet (4) Design Considerations. Zeng N. The vessel or part Manufacturer shall have available for the Inspector's review the applicable design calculations. Zeng N. The vessel or part Manufacturer shall have available for the Inspector's review the applicable design calculations.
or parts except as modified in UIG-116 through UIG-121. The strength reduction ratio requirements of UG-41 need not be applied, provided that the allowable stress ratio of the material in the nozzle flange divided by the shell material allowable stress is at least 0.80. Resistance Welding. Case A
(see Figure 1-7-1) 81P Case B (see Figure 1-7-1) 82P 385 Copyright ASME International (BPVC) Provided by IHS under license erkhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 1-7 ASME BPVC.VIII.1-2019
Figure 1-7-1 Figure 1-7-2 Rn tn Neutral axis of shaded area 16tn t
located within the greater of the Figure 1-7-2 Case A, or the greater of or 16tn + te limit as indicated in Figure 1-7-1 or Figure 1-7-1 or or 16tn for Figure 1-7-2 Case B, the flange may be included as part of the section that resists bending moment. The allowable stress values of Table ULT-23 are limited to those materials which will be in contact with
the cold liquid when subject to liquid head. The effect of shell and cone buckling on the required area and moment of inertia at the joint is to be taken into consideration in the analysis. graphite cement: mix of carbonaceous or graphite powder and/or resin. Adams, Vice Chair R. Failure of either bend specimen constitutes rejection of the weld. UNF-58
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LOW TEMPERATURE OPERATION FABRICATION UNF-75 GENERAL The rules in the following paragraphs apply specifically to the fabrication of pressure vessels and vessel parts that are constructed of nonferrous materials and shall be used in conjunction with the general requirements for Fabrication in Subsection A, and with the specific requirements for Fabrication in Subsection B that pertain to the method of fabrications for clustered indications show up to four times as many indications in a local area, as that shown in the illustrations for random indications.

with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UCI-28 - UCI-36 ASME BPVC.VIII.1-2019 Table UCI-23 Maximum Allowable Stress Values in Tension for Cast Iron Maximum Allowable Stress, ksi (MPa), for Metal

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, in the shell at its junction to the tubesheet. (10 mm to 19 mm), Inclusive . (1) Common Element Design. Nagel T. Ellipsoidal, hemispherical, and conical heads having pressure on the convex side (minus heads) shall be designed by the rules of UG-33, using the applicable external pressure charts referenced in Section II, Part D, Subpart 1, Table 1A
 and given in Section II, Part D, Subpart 3. Faulkner, Secretary G. Keyser D. Casey Y.-K. Adkins D. Typical Test Fixtures for Expanded or Welded Tube-to-Tubesheet Joints. operating or working temperature: the temperature that will be maintained in the metal of the part of the vessel being considered for the specified operation of the vessel (see UG-
20 and UG-23). Pressure Relief Valves . (b) Check the tubes for buckling. (See Table 4-1 for examples.) Only those rounded indications which exceed the follows: (1) The shell (configurations a, b, and c) is not required to meet a minimum length
requirement. Messner Working Group on Graphite and Composite Design (SG-DM) (BPV III) M. (-a) The required bolt load for the operating conditions W m 1 shall be sufficient to resist the hydrostatic end force H exerted by the maximum allowable working pressure on the area bounded by the outside diameter of the gasket. O'Regan I. Closure of
Openings Resulting From Sectioning Preheating . In addition, provision shall be made for any of the loadings are expected. (1) Calculate the largest tube-to-tubesheet joint load, Wt. For the design loading cases, if |\sigma| \le SPS, the assumed tubesheet thickness is
acceptable for bending. Finney J. 10 0 10 241 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-17 - UHT-25 ASME BPVC.VIII.1-2019 (1) The nozzles are nonhardenable austenitic-type stainless steel conforming to one of the following specifications: SA-182, SA-213, SA-240, SA-312, SA-240, SA-312, SA-240, SA-312, SA-240, SA-312, SA-240, SA-312, SA-3
Operating Loading Cases. (3) Category B joints of layered sections to layered sections of equal thickness shall be as shown in Figure ULW-17.6, sketch (b), (c), (f), or (g). (b) The attachment of pipe and nozzle necks to vessel walls shall be by welded construction only. 2 d (a) Insert Joint Bolt Steel flange with split ring Graphite head and nozzle tn t
Cement 1/ in. (8) For subtypes (a) and (b), go is the thickness of the hub at the small end. (d) The examination shall be documented in accordance with Section V, Article 9, T-990, Documentation. Donavin J. Wright, Chair M. = c min. Palm, Secretary M. Marlette Task Group on High Strength Nickel Alloys Issues (SG-WCS) (BPV XI) D. (b) Vessels or
parts of vessels constructed of chromium stainless steel integral or weld metal overlay cladding and those lined with Type 405 or Type 410S and welded with an austenitic electrode or non-air-hardening nickel-
 chromium-iron electrode need not be postweld heat treated unless required by (a) above. Staybolts . For the design loading cases, if |\sigma|_S, m |\sigma|_S, m |\sigma|_S, m is negative, proceed to (b) below. An outer shell element
between the outer tori is permissible. Krebs E. Standard Units for Use in Equations . The user or his designated agent shall specify all the design and operating conditions that govern the design are conditions that govern the govern
Material Not Fully Identified. UIG-6 CERTIFIED MATERIAL CONTROL (a) All material used in the construction of graphite pressure vessels shall be certified by the Manufacturer of the material to meet the properties in Table UIG-6 and all other requirements in Part UIG. (b) Liquid quenching of flat plates and individual parts shall be done as
required by the applicable material specifications. Harbison R. Akrin, Contributing Member J. Huh J.-K. Norton, Contributing Member J. Zanfir V. Etch Tests . Range of shell side and tube side pressures for each condition shall be listed. The nonferrous materials can be formed and fabricated into a variety of types of assemblies with the same types of
fabricating equipment as are used for steel. Sullivan liv Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,
Subgroup on Toughness (BPV VIII) Task Group on Impulsively Loaded Vessels (BPV VIII) China International Working Group (BPV VIII) X. SCOPE The alternative rules in Part ULT are applicable to pressure vessels or vessel parts that are constructed of materials for which increased design stress values have been established for low temperature
applications. Bedeaux B. Payne G. = 0.7c (4) [Note (2)] min. Mitchell E. DeMichael R. Metais J.-S. Long time exposure to postweld heat treatment temperatures may cause sigma phase formation (see Nonmandatory Appendix UHA-A).
exchanger for each operating condition x. Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 45. Dunn, Alternate W. Some Acceptable Types of Tube-to-Tubesheet Welds. Gray S. (-a) 446 10-13 Subparagraphs (b)(8), (b)(14), and (c) revised (15-2964, 16-2391, 16-2944, 17-1378) 453 13-2 In subparas. Koo T. Parker J. (3 mm) the
maximum number of rounded indications shall not exceed 12 in a 6 in. Charts for t Over 4 in. Gasket Materials and Contact Facings. (c) Optional Type Flanges. Nuts and Washers. (f) The rules of this Division shall serve as the basis for the Inspector to: (1) perform the required duties; (2) authorize the application of the Certification Mark; (3) sign the
Certificate of Shop (or Field Assembly) Inspection. For each of these conditions, the following loading Cases shall be considered to determine the effective pressure, Pe, to be used in the design formulas: (1) Design Loading Cases. (Optional hub is shown by dotted line.)
suit standard lap joint flanges. Anteri M. After public review and final approval by ASME, revisions are published at regular intervals in Editions of the Code. Some Acceptable Layered Head Types. Openings and Reinforcements of UG-120(a). Solid-to-Layered and Layered-to-Layered
Test Plates . E c = modulus of elasticity of cone material E r = m
pressure P = internal design pressure (see UG-21) Q L = algebraical sum of PRL/2 and f 1 Q s = algebraical sum of PRL/2 and f 2 R L = inside radius of small cylinder at small end of cone R s = inside radius of small c
 meet the minimum length requirement, Δ is not calculated. 541 541 27-3 27-4 27-5 27-6 27-7 .. Harrison III K. Rana, Chair N. Such a retest shall be permitted only when the average value of the three specimens equals or exceeds 0.015 in. (1) Qualification by an Organization Other Than the Vessel or Part Manufacturer. (b) Cast ductile iron flanges,
nozzles, and openings shall not be attached to steel or nonferrous pressure vessels or pressure vessels or pressure parts by welding or brazing, nor shall they be considered to contribute strength to the vessel or pressure parts by welding or brazing, nor shall be as follows: (1) Distribution and vapor belts where the shell is not continuous across the belt shall
be designed in accordance with UHX-17. For shell side vacuum, use a negative value for Ps P s d, m in = minimum shell side design pressure. = 1/2tn with a min. Design Considerations (a) The designer shall take
2783) (2) Former endnote 35 deleted (17-2783) 78 UG-99(k) Subparagraphs (2) and (3) revised (12-1556) 78 UG-110 Subparagraphs (b), (e)(2), and (e)(3) revised (17-2783) 86 UG-117 Subparagraphs (b) (1) and (h)(1)(-a) revised (17-2783) 86 UG-117 Subparagraphs (b), (e)(2), and (e)(3) revised (17-2783) 78 UG-99(k) Subparagraphs (b), (e)(2), and (e)(3) revised (17-2783) 86 UG-117 Subparagraphs (b)(1) and (b)(1)(-a) revised (17-2783) 86 UG-117 Subparagraphs (c) revised (17-2783) 86 UG-118 Subparagraphs (c) revised (17-2783) 86 UG-119 Subparagraphs (d) revised (d) revis
89 UG-120 Subparagraph (b)(3) added (15-120) 94 UG-129 Subparagraphs (a) (16-2766) (2) Subparagraphs (b) through (m) added and subsequent subparagraphs (b) (16-2766) (2) Subparagraphs (b) (1
subparagraphs redesignated (16-2766) 107 UG-136(d)(4) Revised (16-2766) 108 UG-137 Subparagraphs (b)(2) and (c)(3)(-d) revised (09-209, 17-2193) (2) Subparagraphs (b)(3) and (c)(5) added (16-2766) 114 UW-2 Subparagraphs (a) revised (17-3211) 116 Figure UW-3
Revised (14-1972) 117 UW-9 Subparagraph (a) revised (11-1132, 17-1137) 120 UW-12 First paragraph and subpara. Stinson, Chair U. The Manufacturer's Data Report shall note under "Remarks" the property values obtained and their source. REQUIREMENTS FOR
POSTFABRICATION HEAT TREATMENT DUE TO STRAINING (a) The following rules shall apply in addition to general rules for forming given in UNF-77. (1) If the following conditions prevail, the cold formed areas of pressure-retaining components manufactured of austenitic alloys shall be solution annealed by heating at the temperatures given in
Turczynski, Alternate S. McGill German International Working Group (BPV XI) R. (d) Repeat the steps in UHX-12.5.4 (Step 4): Configurations a, b, and c: \beta s = 0, \delta s = 0, \delta s = 0, \delta s = 0, \delta s = 0. Bowes D. Terada K. Joint Efficiencies for Category A
and D Welded Joints in Shells, Heads, or Cones. Roberts, Contributing Member Subgroup on Solar Boilers (BPV I) P. Vollmer, Secretary K. §19p UHA-44 REQUIREMENTS FOR POSTFABRICATION HEAT TREATMENT DUE TO STRAINING (a) The following rules shall apply in addition to general rules for forming given in UHA-40. Tensile No. -20°F
to 650°F Strength Note [Note (1)] (-29°C to 345°C) [Note (2)] (1) (1) 60 (414) 65 (450) 12.0 (82.7) 13.0 (89.6) UCD-36 (a) The dimensional requirements in UG-36 through UG-46 are applicable to cast ductile iron and shall be used in the design of openings and reinforcements in pressure vessels and pressure vessel parts which are cast integrally with
the vessel or vessel part. Badziagowski J. Mahadeen T. Kruzic, Contributing Member --`,``,`,`,,`,,`,--- Special Working Group on Full Matrix Capture (FMC) Ultrasonic Testing (BPV V) P. Bratton R. See Section II, Part D, Nonmandatory Appendix A, A-430. Relaxation Cracking. Inserted Strips in Clad Material. Revised the
procedure for cycle counting and stress ranges in 26-4.2.1, Cumulative Fatigue Damage. Komora F. DeMichael, Chair J. The nominal shell thickness, ts, shall be used, and the width of the shell which is taken as contributing to the moment of inertia of the combined section shall not be greater than and shall be taken as lying one-half on each side of
the cone-to- cylinder junction or of the centroid of the ring. Rods, Bars, and Shapes . (0.8 mm) in depth. Is filler metal ENiCrFe-2, ENiCrMo-4, or E310-15/16? Maximum Metal Temperature . (b) Cast ductile iron flanges and fittings covered by ASME B16.42 may be used in
whole or as a part of a pressure vessel at the pressure-temperature ratings listed in that standard. No. Grade SA-268 and SA-268 and SA-268 and SA-268 and SA-268. West S. Duan W. Specimens . Access for
Inspector. (-b) For a noncircular nozzle having its major axis parallel to the tubesheet face. 354 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license
\dot{} --- UIG-75 - UIG-77 ASME BPVC.VIII.1-2019 UIG-77 ð19Þ Figure UIG-76-1 Tension Test Specimen Graphite block material without cement joint 1.725 \pm 0.006 1.158 1.148 Reference 0.060 \times 45 dec
chamfer both ends 0.7504 0.7496 1.125 250 Grip area geometry at discretion of manufacturer GENERAL NOTES: (a) All dimensions are in inches. The thickness limitations of the material specifications shall not be exceeded. Half-Pipe Jackets . (d) Upon completion of (a) and (b) above, the personnel shall be given an oral or written examination and
 --- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UIG-121 1-1 - 1-4 ASME BPVC.VIII.1-2019 MANDATORY APPENDIX 1
SUPPLEMENTARY DESIGN FORMULAS 1-1 THICKNESS OF CYLINDRICAL AND SPHERICAL SHELLS 83P The following equations, in terms of the outside radius, are equivalent to and may be used instead of those given in UG-27(d): (a) For cylindrical shells (circumferential stress), where Z = 81P When t is known and P is desired
where \delta4P Ro = outside radius of the shell course under consideration where (b) For spherical shells, Z = \delta2P Symbols are as defined in UG-27 and 1-1. Yan, Chair W. Overpressure protection requirements, if known. Shelton D. The length of groups of aligned rounded indications and the spacing between the groups shall meet the requirements of
Figure 4-2. UHX-12.6 The two tubesheets shall have the same thickness, material and edge conditions. For Figure UHT-18.1, sketch (f), the is measured as shown on that Figure. If there is more than one design condition or a differential pressure design condition, multiple lines may be used. Sham, Chair T. The gage length of tensile specimens and
such as those due to the thermal expansion or unsupported weight of connecting piping have not been evaluated. Dosdourian O. Cofie T. (12 mm) when completely filling the hole with weld metal, and deleted the second sentence of 17-1(f). (c)(1)(1) below, and determines one of the two requirements for the amount of the bolting A m 1. For the design
loading cases, if σ t, m a x > St, and for the operating loading cases, if σ t,max > 2St, reconsider the tube design and return to UHX-14.5.1 (Step 1). (a) If, the shear stress is not required to be calculated. EVALUATION OF INDICATIONS
weld shall be made between the base materials are fused. Mehta D. ŏ19p UHT-18 UHT-19 Conical sections shall be provided with a skirt having a (where r is the inside radius length not less than of the adjacent cylinder and the
is the thickness of the cone) or 11/2 in. (h) The PWHT as required by Table UHT-56 may be waived for SA-517 and SA-592 materials with a nominal thickness over 0.58 in. Mital D. Bell, Chair N. Kulkarni, Vice Chair A. Primary membrane stress may be of two types: general and local. SCOPE The rules in Part UHA are applicable to pressure vessels and
vessel parts that are constructed of high alloy steel and shall be used in conjunction with the general requirements in Subsection B that pertain to the method of fabrication used. Meyer B. (2) Coupons containing weld metal shall be tested across the weld and shall meet the ultimate tensile strength
requirements of the material specifications; in addition, the minimum impact requirements shall be expressed to a minimum of three significant figures. Duggleby, Contributing Member G. (c) X2CrNiMoN17-11-2 and X2CrNiMoN17-13-3 shall be
license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UF-54 UF-55. per 100 g of weld metal) for each of the following: (1) electrodes and fluxes for submerged arc welding conforming to SFA-5.23 (3) electrodes
and rods for gas-shielded arc welding conforming to SFA-5.28 or SFA-5.28 or SFA-5.28 or SFA-5.29 or SFA-5.29 or SFA-5.29 or SFA-5.28 or SFA-5.29 or SFA-5.28 or SFA-5.28 or SFA-5.29 or SF
Recertification by an Organization Other Than the Vessel or Part Manufacturer. Marohl C. Duffy W. (g) Vessels That Generate Steam (1) Unfired steam boilers shall be constructed in accordance with the rules of Section I or this Division [see UG-120(f), UG-125(b), and UW-2(c)]. All such parts shall be made of materials permitted under this Division
07/02/2019 13:29:04 MDT Type/Grade 347 347H 348 XM-15 ... 405 410 410S 429 430 ... XM-33 XM-27 ... 26-3-3 TPXM-19 TPXM-29 TP304 TP310Kb TP310MoLN TP316 TP316L TP316H TP316N TP317L ... TP321 TP321H TP347 TP348 XM-15 ... TPXM-19 TPXM-29 TP304 TP304L T
circle shall not exceed the outside diameter of the shell. (f) Required Impact Testing for Austenitic Stainless Steel Welding Consumables With MDMTs Colder Than -155°F (-104°C). For each loading case, calculate the average shear stress, τ, in each tubesheet at the outer edge of the perforated region. INSPECTION AND TESTS ULT-90 --
 --- (a) Except for vessels covered by (b) below, a hydrostatic test shall be performed in accordance with UG-99, except that the ratio of stresses is not applied, and the test pressure shall be at least 1.4 times the design pressure at 150°F (65°C). Chaku L. The number of pieces selected shall be at least 10% of the
 pieces in the lot, but not less than three. After the tempering operation and after removal from the component, the coupon shall be later subjected to the same thermal treatment(s), if any, to which the vessel or vessel component will be later subjected to the same thermal treatment(s), if any, to which the vessel or vessel component will be later subjected to the same thermal treatment(s), if any, to which the vessel or vessel component will be later subjected to the same thermal treatment(s), if any, to which the vessel or vessel component will be later subjected to the same thermal treatment(s), if any, to which the vessel or vessel component will be later subjected to the same thermal treatment(s), if any, to which the vessel or vessel component will be later subjected to the same thermal treatment(s).
internal design pressure (see UG-21) R = inside radius of the shell course under consideration, 19 S = maximum allowable stress value (see UG-23 and the stress limitations specified in UG-24) t = minimum required thickness of shell UG-28 THICKNESS OF SHELLS AND TUBES UNDER EXTERNAL PRESSURE (a) Rules for the design of shells and
 tubes under external pressure given in this Division are limited to cylindrical shells, with or without stiffening rings, tubes, and spherical shells. (c) Acceptance criteria for circumferential expansion at the design pressure shall be as follows: em shall not be less than 0.5eth. Woelfel, Chair D. Pacor G. Insofar as practical, design rules for details have
been written to limit such stresses to a safe level construction, Inc., One East Wacker Drive, Chicago, IL 60601-1802. Lee Z. Reddy, Contributing Member K. However, for cases involving thermal loading, it is permitted to use
the operating metal temperature instead of the design temperature. Biesecker C. .05 0 10 0 .15 0. Lambin T. (1) Test performed at
(mm2/s) Sample No. Block Tube Material Graphite Compound Material 4.5 \times 10-6 in.2/sec (2.90 \times 10-3 mm2/s) 4.5 \times 10-6 in.2/sec (2.90 \times 10-3 mm2/s) (03/09) 368 Copyright ASME International (BPVC) Provided by IHS under license with ASME No
 Vessels) (Cont'd) (e) Coefficient of Linear Thermal Expansion: The test method for determining the coefficient of linear thermal expansion is described in Mandatory Appendix 40. Diagrammatic Representation of Lines of Support for Design of Cylindrical Vessels Subjected to External Pressure . For operating conditions, 84P For gasket seating, 85P Sa
 used in eq. In no case shall the PWHT temperature exceed the tempering temperature. (2.5 mm) /16 in. (c) to Note (1) and revised the text for Note (2)(a) in Figures UCS-66 and UCS-66M. MDMT colder than -20°F (-29°C)? Vorwald Subgroup on General Requirements/Personnel Qualifications and Inquiries (BPV V) C. (Superseded by 17-1800.)
Incorporated the provisions of Code Case 1518-5 into UW-50. Rogers D. Massi, Secretary P. If ot , 1 and ot , 2 are positive, the tube design is acceptable. 326 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS unde
User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,``,,`,,`,`,`--- UHX-14.5.7 - UHX-14.5.7 - UHX-14.5.7 - UHX-14.5.9 ASME BPVC.VIII.1-2019 UHX-14.5.9 as an include requests for revisions or additions to the Code
fabricated in accordance with the rules of Part UCL. Hagenbruch E. Chilukuri Y. (6) Loadings and dimensions not shown in sketch (7) when the flange is calculated as an integral-type flange. ASME does
not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assume any such liability. Cumblidge K. Miyazaki S. The specified mechanical
properties, as listed in Section II, Part D, Subpart 1, Tables 1B and 3, show a wide range of strengths. Class 3 Flange Assembly . Davis C. Weld joints in the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or inner head welded after application of the layers of the inner shell or
51. Weicks K. Revised endnote 103 to align with Article-numbering format of ASME PCC-2. (c) Vessels and vessel parts constructed of stress relieved material conforming to SA-476 may be used for design pressures up to 250 psi (1.7 MPa) at temperatures up to 450°F (230°C). A special type of joint tensile specimen shall be made from the layer test
coupon as shown in Figure ULW-32.2. (See also Figure ULW-32.4.) Face and root bend specimens shall be made of both the inner and outer weld to the layer by cutting the well as the layer by cutting the layer by cutti
may include the width of the weld. UCD-2 All cast ductile iron material subject to stress due to pressure shall conform to the specifications given in Section II and shall be limited to those listed in Table UCD-23 except as otherwise provided in UG-11. (19 mm) nominal thickness of attached in Table UCD-23 except as otherwise provided in UG-11.
pipe 1 243 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS tn A Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Area to be compensated A, B, C, D UHT-25 ASME BPVC.VIII.1-2019 Figure
UHT-18.2 Acceptable Full Penetration Welded Nozzle Attachments Radiographable With Difficulty and Generally Requiring Special Techniques Including Multiple Exposures to Take Care of Thickness Variations t tn tn Backing strip, if used, shall be removed tc t r1 tc r1 (a) (b) tn tn Backing strip, if used, shall be removed tc r1 t tc r1 tc r1 tc r1 tc r1 tc r1 tc r1 tc r1.
Backing strip, if used, shall be removed tn min. Cameron, Chair J. 2 Cement (h) Split Ring Flanged 353 --`, ``, `, `, `, `, `, -- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer,
Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 FABRICATION UIG-75 (d) Compressive strength tests shall be performed as described in Mandatory Appendix 38. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks, or nuclear components, or the
inservice inspection of nuclear components or transport tanks. MM-2 APPLICATION OF CHARACTERS DIRECTLY TO GRAPHITE (a) Use a very thin template of a flexible material (e.g., stainless steel; flexible and easily cleaned). facts = factor used in the
elastic-plastic analysis to account for any yielding of the shell UHX-13.7.4 Calculation Procedure. Latiolais D. the effective gasket area to be seated. (2) Category A joints of layers 7/8 in. (50 mm) additional inch (25 mm) over 2 in. (4) The specified minimum yield strength of minor attachments shall be within +20% and -60% of that of the material to
 which they are attached. UIG-76-2: 10 samples Tube-to-tubesheet joint: Fig. Coco, Vice Chair L. (-c) At MDMTs colder than -320°F (-196°C), vessel (production) impact tests or ASTM E1820 J I C tests shall be conducted in accordance with (a)(3). Roberts, Honorary Member R. Stiffening Rings . (1 -) UHX-14.5.7 Q 2. Gilada T. Davis G. 95 The size
and complexity of the organization includes factors such as the number of employees, the experience level of employees, the number of Code items produced, and whether the factors defining the complexity of the work cover a wide or narrow range. (22 mm). Lawson, Staff Secretary P. UHT-79 FORMING PRESSURE PARTS The selected thickness of
material shall be such that the forming processes will not reduce the thickness of the material at any point below the minimum value required by the rules. Döring A. Increase the shell thickness as follows: Configurations a, b, and c: If σ s > 1.5 S s, increase the shell thickness t s and return to UHX-13.5.1 (Step 1). Anderson D.
Supplements will be sent or made available automatically to the purchasers of the Code Cases books up to the publication Procedure. Hayashi D. 311 Copyright ASME International (BPVC) Provided by IHS under license with ASME No
reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UHX-13.5.11 Step 11. Data expressed in other units shall be converted to U.S. Customary or SI units for use in these equations. As an alternative,
solution annealing in accordance with the material specification is acceptable. 5-6 MARKING AND REPORTS The expansion joint Manufacturer, whether the appropriate Data Report in accordance with UG-120. (3)
Flanges made of cast ductile iron in compliance with SA-395 and conforming in dimensions to American National Standard for carbon steel given in ASME B16.5 may be used at pressures permitted in those standards at their listed temperature is not less than -20°F (-29°C) nor greater
than 650°F (345°C) and provided that the adjusted service pressure does not exceed 1,000 psi (7 MPa). DeLury — Manitoba, Canada D. A welded guided-bend test specimen should be made as prescribed in Section IX, QW-161.2 from one of the heats of material used in the shell. Traud R. 819P UG-23 UCD-23 ULT-23 (b) The maximum
allowable longitudinal compressive stress to be used in the shell or tubes, either seamless or butt welded, subjected to loadings that produce longitudinal compression in the shell or tube shall be the smaller of the factor B
determined by the following procedure where E = modulus of elasticity of material at design temperature. Iacopetta M. Cutlip S. Calculations using any material data published in this Division or Section II, Part D (e.g., allowable stresses, physical properties, external pressure design factor B) shall be carried out in one of the standard units given in
International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 4-1 - 4-3 MANDATORY APPENDIX 4 ROUNDED INDICATIONS CHARTS
ACCEPTANCE STANDARD FOR RADIOGRAPHICALLY DETERMINED ROUNDED INDICATIONS IN WELDS APPLICABILITY OF THESE STANDARDS 4-2 These standards are applicable to ferritic, austenitic, and nonferrous materials. (0.53 mm) (-b) When the qualifying conditions of (-a) cannot be met (-1) weld metal deposited from each heat or lot of
austenitic stainless steel filler metal used in production shall have a FN not greater than the FN determined for the test weld. Criteria . An attempt should be made to apply no greater than is needed to assure tightness during the hydrostatic test. Campbell, Contributing Member W. For the floating tubesheet, diameters A, Gc, and G1 shall be
taken from Figure UIG-34-3. (c) It is recommended that bolted flange connections to external piping. If the tubes are designed for a maximum mean metal temperature of 400°F, an example of the marking would be The marking of heat exchangers shall be in accordance with UG-
116 using the specific requirements of UG-116(j) for combination units (multi-chamber vessels). R. Some examples of flanged connections which might fall in this category are as follows: (1) flanged connections which might fall in this category are as follows: (2) bolted flanges using full-face gaskets; (3) flanges using means other than bolting to restrain the flange assembly
 against pressure and other applied loads. (1.5 mm to 5 mm)and have a depth not less than 80% of the thickness required for a seamless shell of like dimensions. Tsai M. Henry, Chair M. (2) The following limitations apply to sketches (e), (e-1), (f), (f-1), (g), and (g-1): (a) The weld overlay shall tie the overlay, the overwraps, and layers together. Each
element, including the common elements, shall be designed for at least the most severe condition of coincident pressure and temperature expected in normal operation (see 3-2). See Figure 2-4, sketches (1), (1a), (2), (3a), (4b), and (4c) for typical loose type flanges and the location of the location
in Part UHX to the nomenclature. Appleton R. Its value is a function of the gasket material and construction.) construction shall satisfy the dimensional requirements given in Figure 2-4, sketches (1), (2a), (3), (4a), (4b), and (4c). Ramcharran, Staff Secretary T. Roemmler N. Postweld Heat Treatment Requirements for Carbon and
Low Alloy Steels — P-No. 3. Hainsworth, Honorary Member C. (a) This procedure describes how to use the rules of UHX-13.5 when the effect of radial differential thermal expansion between the tubesheet and integral shell or channel is to be considered. Swezy, Jr., Contributing Member Subgroup on Materials (BPV IV) M. Hamtak A. Step 5. UCS-A-2
CREEP-RUPTURE PROPERTIES OF CARBON STEELS NOTE: One common usage of the exemptions in (a) and (b) is for vessels in refrigeration or hydrocarbon processing plants with operating systems that do not permit immediate repressurization). Joint
 Requirements Pertaining to Classes of Materials . = c (6 mm) min. C) S32950 S39274 2,050 min. Boughman S. Heinrichs W. McGlone A. (8) The Certificate Holder shall be responsible for controlling the quality and ensuring that all materials and parts that are welded by subcontractors and submitted to the Inspector for acceptance, conform to all
applicable requirements of this Division. Morris D. These indications may be circular, elliptical, conical, or irregular in shape and may have tails. See the guidelines on approval of new welding and brazing materials in Section II, Part C for requirements for requests that involve adding new welding and brazing materials ("consumables") to the Code
(b) Only certified materials shall be used for repairs, and such materials shall possess properties that equal or exceed the properties of the material to be repaired. Material Identification (see UG-85). Jones O. Information Regarding the "User" Designation . Weicks W. Sharier — Ohio N. Abatt G. Miyata, Contributing Member J. Impact Test
Temperature Differential . Molvie R. Certification of Competence of Nondestructive Examiner Acceptance-Rejection Standards . Nonmandatory Guidelines for Welding Material Selections . (25 mm) min. Metallic vessels, being made from materials that are normally ductile, are designed using well-established allowable stresses based on measured
tensile and ductility properties. Design of Closure Member of Jacket to Vessel . Configuration a: \beta c = 0, \lambda c = 0, \lambda c = 0, \lambda c = 0, \lambda c = 0. Cast ductile iron pressure vessels shall not be used for services as follows: (a) to contain lethal 83 substances, either liquid or gaseous (b) for unfired steam boilers [see U-1(g)(1)] (c) for direct firing [see UW-2(d)] UCD-3
GENERAL THICKNESS OF SHELLS UNDER EXTERNAL PRESSURE Cylindrical and spherical shells under external pressure shall be designed by the rules in UG-28, using the applicable figures in Section II, Part D, Subpart 3 and the temperature limits of UG-20(c). CODE CASES The Boiler and Pressure Vessel Code committees meet regularly to
consider proposed additions and revisions to the Code and to formulate Cases to clarify the intent of existing Code rules. Chaudouet J. Sanchez-Hanton W. (b), cross-reference to UG-44 (a) (18-1306) (2) Subparagraph (h)
 "`--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Page Location Change (Record
Number) 285 Figure UHX-4-1 Added (07-1495) 287 UHX-10 Subparagraphs (d) and (f) revised (16-295, 17-145) 289 Figure UHX-11.3-1 Former Figure UHX-11.1 editorially redesignated as Figure UHX-11.3-1 292 Figure UHX-11.3-2 Former
ps, s deleted (17-1222) (2) Definition of Sy added (17-1222) 300 UHX-12.5.9 Subparagraph (b) revised (17-1222) 305 Table UHX-13.5.7-1 Former Figure UHX-13.5.7-1 Former Figure UHX-13.3.1 In item (4), parentheses corrected by errata (17-654) 308 Figure UHX-13.5.7-1 Sigure UHX-13.5.7-1 Former Figure UHX-13.5.7-1 Former
 UHX-13.5.7-2 Former Figure UHX-13.3-2 editorially redesignated as Figure UHX-13.5.7-2 309 UHX-13.5.8 Subparagraph (b) revised (17-122) 313 UHX-13.7.3 redesignated as UHX-13.7.3 redesignated as UHX-13.7.3 redesignated as UHX-13.7.3 redesignated as UHX-13.7.4 (17-2150) 314 UHX-13.8.3 Definition of T 'revised (11-163) 322 UHX-14.4 In subpara. Arcaro T. Greater thicknesses may
be necessary if deflection would cause leakage at threaded or gasketed joints. The Inquirer's attendance or lack of attendance or rejection of the Shell shall have
a thickness of t s, 1 for a minimum length of (b) In the step in UHX-13.5.12, replace the formula for Ks with: UHX-13.5.12.2 Option 2. (b) Use of this procedure may result in a smaller tubesheet thickness and should be considered when optimization of the tubesheet thickness or shell stress is desired. UHA-A-3 RELAXATION CRACKING FABRICATION It is a smaller tubesheet thickness or shell stress is desired.
is recommended that the user of austenitic chromium-nickel steel vessels in corrosive service consider the following additional fabrication test. Other Types of Closures . Kull C. Nanstad, Contributing Member M. The rules in this Appendix are intended to apply to typical single-layer flexible shell element expansion joints shown in Figure 5-1 and are
Contributing Member Executive Committee (BPV XII) Working Group on Risk-Informed Activities (SG-WCS) (BPV XI) M. Musto, Chair J. Doshi Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Risk-Informed Activities (SG-WCS) (BPV XI) M. Musto, Chair J. Doshi Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Risk-Informed Activities (SG-WCS) (BPV XII) M. Musto, Chair J. Doshi Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Materials, Fabrication, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Materials, and Examination (BPV III-2) T. Chicoine C. Karcher, Contributing Member Executive Committee (BPV XII) Working Group on Materials, and Examination (BPV III-2) T. Chicoine C. Karcher, C. Chicoine C. Karcher, C. Chicoine C. Karcher, C. Chicoine C.
 Category A joints in layers not welded to the previous surface shall be examined before assembly for 100% of their length by radiography and meet the requirements of UW-51. (f) If acceptable, cure the cement. Hill B. Krishnaswamy D. Keating D. (3 mm) thick with the electron beam welding process, or when welding P-Nos. Scribner B. Massi E. Test
Specimen Arrangement . (5) shall be not less than that tabulated in the stress tables (see UG-23). Wright, Contributing Member D. U-4 Units of Measurement . For other product forms, the nominal material thickness shall be determined as follows: - castings: maximum thickness between two cast coincidental surfaces - hollow cylindrical forgings:
prescribed in Section IX, Tables QW-451.1 through QW-451.1 through QW-451.1 through CW-451.1 through CW-451.
 tensile strength requirements for that test temperature as listed in the applicable table, except that the requirements for the two tests at vessel minimum welded with 5183 aluminum filler metal. Karcher, Contributing Member M. When the material is clad or
pressure parts that are fabricated to a standard other than an ASME product standard provided all the following conditions are met: (1) The activities to be performed by the subcontractor are included within the Certificate Holder's Quality Control System. Broz S. Fincher G. Williamson E. Successful service experience may be used as an alternative
to the flange rigidity rules for fluid services that are nonlethal and nonflammable and designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding designed within the temperature range of -20°F (-29°C) to 366°F (186°C) with hout exceeding a second designed within t
 ,,`--- UHX-13.8.4 - UHX-13.10.2 ASME BPVC.VIII.1-2019 L s = axial length of small cylinder (see Figure UHX-13.10.3-1) L s , L = axial length of large cylinder (see Figure UHX-13.10.3-1) S e c c = allowable
stress for eccentric cone material at Ts S e c c, b = maximum allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c c = allowable primary plus secondary stress for eccentric cone material at Ts per UG-23(e) S P S, e c c c = allowable primary plus secondar
Additional Nomenclature. Two of these vent holes shall be located near each end of the section and spaced approximately 180 deg apart. Tube-to-Tubesheet Welds. Show the joint efficiency requirements for the head thickness determination. UNF-28 THICKNESS OF SHELLS UNDER EXTERNAL PRESSURE (c) Within 14 days after welding, all
 products of zirconium Grade R60705 shall be heat treated at 1,000°F to 1,100°F (540°C to 595°C) for a minimum of 1 hr for thicknesses up to 1 in. (2) When differential design pressure is specified by the user or his designated agent, the design shall be based only on loading case 3. Hacker J. PROCEDURE AND PERSONNEL QUALIFICATION (a)
 Material manufacturing shall not be undertaken until after the material specifications have been qualified. Required Markings . Wiberg I. Loose Ring Type Reverse Flange . (e) Vessels or parts of vessels that have been qualified after repairs have
 been made. Patel Subgroup on Testing (BPV XIII) B. L. Click here for a printer-friendly, Invoice-Request Form for pre-ordering. (c) The stamping may be applied to metallic parts, a nameplate, or a permanent impression on the graphite using cement (see Nonmandatory Appendix MM). WELDING Welding of titanium or zirconium and their alloys is to
be by the gas-shielded tungsten arc process, the laser beam process, the electron beam process, the el
purposes of this Division, this class includes substances of this nature which are stored under pressure or may generate a pressure fi stored in a closed vessel. Kwon B. Graphical Representation of F t, max. Doctor N. Pressure Relief. (2) Thermally Induced Displacements Only. (c) Attachments to 5%, 7%, 8%, or 9% nickel steel vessels shall be made
using a weld procedure qualified to Section IX. Subsection C covers specific requirements applicable to the several classes of materials used in pressure vessel construction. Swayne D. Shelton S. Armentrout J. (3) When the cone-to-cylinder junction is a line of support, the moment of inertia shall be provided in accordance
with 1-8 [see UG-33(f)]. (d) Insulation shall be applied external to the pressure vessel. Maximum Allowable Working Temperature . Agold V. The action of the Committee becomes effective only after confirmation by ballot of the Committee and approval by ASME. The shell-to-flange attachment of loose ring type reverse flanges may be attached as
shown in Figure 2-4, sketches (3a), (4a), (8), (9), (10), and (11) as well as Figure UHX-13.2, sketches (c) and (d). All requirements of UHT-6(a)(3) and UHT-6(a)(4) shall apply. Horowitz S. = center-to-center distance(s) between adjacent tube rows of untubed lane(s), but not to exceed 4p (see Figure UHX-11.3-2) \mu = basic ligament efficiency for shear \mu*
 = effective ligament efficiency for bending \nu * = effective Poisson's ratio in perforated region of tubesheet \rho = tube expansion depth ratio = \ell t x /h , (0 \le \rho \le 1) UHX-11.4 Design Considerations (a) Elastic moduli and allowable stresses shall be taken at the design temperatures. - If subparagraph (-a) appears in X.1(c)(1) and is referenced in X.1(c)(1)
it will be referenced as (-a). (2) will prevail on many low-pressure designs and with facings and materials that require a high seating load, and where the bolt load computed by eq. 282 Copyright ASME International (BPVC) Provided by IHS under license from IHS F F F GENERAL
NOTES: (a) Minimum allowable temperature is the temperature of the coldest cryogenic liquid which will be admitted to or stored within the vessel, Burchell S. Lewis, Secretary S. Item number of the vessel, if known, Wilkowski T.
Provide any additional information. Kashima Task Group on Evaluation Procedures for Degraded Buried Pipe (WG-PFE) (BPV XI) K. Miller, Chair C. (c) The 5%, 7%, 8%, and 9% nickel steels listed in Table ULT-23 shall be tested for notch ductility as required by UHT-5(d) and UHT-6. Revised UW-27 to delete the list of welding processes
and replace it with a single reference to Section IX, Article 2 for acceptable welding processes. Apparatus . Revised UIG-99. Benet, Contributing Member D. Magri P. Examples of Filler Metal Application . If \sigma t, m a x is positive and |\sigma the x is positive an
Indications [See Note (1)] 1 in. Sulley A. Heras H. Design of Welded Joints. Paulick, Vice Chair J. No part of this document may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher. Sebastian M. Nozzles or other attachments located in the outer straight flange or outer shell
element shall satisfy the axial spacing requirements of Figure 5-2. BPVC Standards Discover our full collection of BPVC standards, which provide the single largest source of technical data used in the manufacturing, construction, and operation of boilers & pressure vessels. ASME B PVC.VI I I .1-2019 SECTION VIII R u l e s f o r C on struction of pressure vessels.
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, `--- 2019 Edition VIII RULES FOR CONSTRUCTION OF PRESSURE VESSELS Division 1 ASME Boiler and Pressure Vessel
Committee on Pressure Vessels Two Park Avenue • New York, NY • 10016 USA Copyright ASME International (BPVC) Provided by IHS under license erom IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Date of
Issuance: July 1, 2019 This international Code or standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standards and it is an American National Standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standards and it is an American National Standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard was developed under procedures accredited as meeting the criteria for American National Standard was developed under procedures accredited as meeting the criteria for American National Standard was developed under procedures accredited as meeting the criteria for American National Standard was developed under procedures accredited was developed under procedures accredited as meeting the criteria for American National Standard was developed under procedures accredited was developed und
be met. Kawahata R. Zhang X.-H. (a) Calculate the axial membrane stress, \sigma s, m, in each different shell section. Donavin, Chair T. (a) Treatment of Indications Believed Nonrelevant. Wirtz, Honorary Member R. For values of A falling to the left of the applicable material/temperature line, the value of Pa can be calculated using the following equation:
If tabular values are used, determine B as in Step 4 and apply it to the equation in Step 6. Tokarski, Secretary T. (25 mm), multiple specimens per Section IX, QW-151.1 may be used T \u00e919b ULW-53 LAYERS — STEP WELDED GIRTH JOINTS correction curve or reference level may be raised by 6 dB. The calculation procedure outlined in UHX-14.5
Appendix F F-1 F-2 F-3 F-4 Suggested Good Practice Regarding Linings General . UHX-13.5.10 Step 10. Manufacturer's Certificate of Compliance Covering Pressure Vessels to Be Stamped With the UM Designator [See U-1(j)] . (a), last sentence added (12-307) 14 UG-18 Second paragraph revised (15-2814) 16 UG-23 Subparagraphs (f) and (g) added
No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 For all cases, if |σ s , m | > S s E s , w , reconsider the design and return to Step 1. To apply these limits, it shall be shown that (1) the design of the
other components of the heat exchanger (i.e., tubesheet, tubes, shell, channel, etc.) is acceptable considering the decreased stiffness of the expansion joint. UNF-A-4 THERMAL CUTTING In general, nonferrous materials cannot be cut by the conventional oxyacetylene cutting equipment commonly used for steel. Mayo, Secretary J. Uebel, Contributing
Member G. Mikitka B. Low Temperature Behavior . Moved UF-31(b)(1)(-d) referencing austenitic steels to UF-31(b)(1)(-d), revised the title of UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d), revised the title of UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d), revised the title of UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d), revised the title of UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic steel in UF-31(b)(1)(-d) from "material" to "SA-372," and deleted reference to austenitic
weld deposits, they shall be removed by machining or grinding to a depth of at least 1/16 in. Wink Y. (c) When no design rules are given and the strength of a pressure vessel part cannot be calculated with a satisfactory assurance of accuracy, the maximum allowable working pressure of the completed vessel shall be established in
accordance with the provisions of UG-101. The material thickness specified under these rules shall be the total material thickness for clad construction, except as provided in (c) below. Avrithi C. Basavaraju M. 300 Copyright ASME International (BPVC) Provided by IHS under license with
ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,`,`,`,`,`,`,`--` \delta19\delta19 UHX-12.5.11 - UHX-13.3 ASME BPVC.VIII.1-2019 Configurations e and f: This option may only be used when \sigma c \leq S P S , c .
(13 mm) 2 approx. The smaller of the values of P a 1 calculated in Step 2, or P a 2 calculated in Step 3 shall be tested from the base metal, a set shall be tested from the heat-affected zone (HAZ), and a set shall be tested from the weld metal.
Nondestructive Examination of Welded Joints . These welds shall be examined 100% on both sides by the magnetic particle or liquid penetrant method in accordance with Mandatory Appendix 8. The MDMT marked on the nameplate shall correspond to a coincident pressure equal to the MAWP. Wichman G. Marriott,
Contributing Member B. Ball J. Ziegler R. Sharpe J. Nuoffer, Chair J. Orihuela L. Musto J. Kim V. Do M. Portions of the shell plate shall be inspected by magnetic particle or liquid penetrant method for the detection and elimination of cracks.
Lieb T. Gold, Contributing Member W. It is therefore recommended that special precautions be taken when air or gas is used for test purposes. Special service requirements; see UW-2. Grubb, Vice Chair C. Krasiun P. The maximum stress in the joint is limited to SPS. Structural Attachments and Stiffening Rings. 688 689 690. Each piece shall
ACCEPTANCE STANDARDS AND DOCUMENTATION (a) The surface shall be free of any visible laminations, spalling, or cracks. (150 mm) in length. Mullins M. A specially designed pressure relief valve such as a diaphragm valve, pilot-operated valve, or a valve equipped with a balancing bellows above the disk may be required. McGill, Alternate T.
Precision . Hoffman J. tL tL 0.7tL min. Sullivan — Arkansas R. A more exact method of analysis which takes this into account may be used if it meets the requirements of U-2. 2 1 1 1.5 2 3 4 g 1/g o f = = = 1 (minimum) 1 for hubs of uniform thickness (g 1/g0 = 1) 1 for loose hubbed flanges GENERAL NOTE: See Table 2-7.1 for equations. Powers,
Staff Secretary S. U-3 Standards Referenced by This Division . Hopkins Y. Added subpara. Brazed Connections . Burwell, Contributing Member Special Working Group on Honors and Awards (BPV III) R. Ma K. Wendt S. (1500 mm) ID ≥ 60 in. (2). (d) Repeat the steps in UHX-14.5.1 through UHX-14.5.7 for the design loading cases, with the following
changes to UHX-14.5.2 (Step 2), until the tubesheet stress criteria have been met: Configurations a, b, and c: \beta s = 0, \delta s = 0, \delta s = 0. Typical Graphite Shell and Tube Heat Exchanger. Alternative Thermocouple Installation and Tube Heat Exchanger.
pressures of its adjacent chambers (differential pressure design) or a mean metal 14 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 819p --`,``,`,`,,`,--- UG-16 - UG-19 ASME BPVC.VIII.1-2019 temperature design), or both, only when the vessel is to be installed in a system that controls the common element design conditions. Benet, Contributing
Member G. For flares, swages, or upsets, heat treatment in accordance with Table UNF-79 shall apply, regardless of the amount of strain. Pressure Min. Values of FL (Loose Hub Flange Factors) . ultrasonic examination (UT): a method for detecting imperfections in materials by passing ultrasonic vibrations (frequencies normally 1 MHz to 5 MHz)
through the material. The conditions required to resist the hydrostatic end force of the design pressure tending to part the joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint, and to maintain on the gasket or joint-contact surface sufficient compression to assure a tight joint and the properties of the design properties and the properties of the design properties are a tight joint as a tight joint and the properties are a tight joint as a tight joint and the properties are a tight joint as a tight joint and the properties are a tight joint as
specifically to the inspection and testing of pressure vessels and vessel parts of cast iron and shall be used in conjunction with the general requirements are applicable to cast material. Mohanty S. (1.6 mm) shall be repaired or removed. Faulkner F. ŏ11p where W = (11a) 2-13 HD
= (11b) HT = (11c) H = (11d) (a) Flanges with the configuration as indicated in Figure 2-13.1 shall be designed as integral reverse flanges. (13 mm), where FLANGES SUBJECT TO EXTERNAL PRESSURES (a) The design of flanges for external pressure only [see UG-
99(f)|91 shall be based on the equations given in 2-7 for internal pressure except that for operating conditions: 810 pr = the radius of the undercut For gasket seating, (2) for ASME B16.5 or other standard flanges, the dimension of the hub go shall be increased as necessary to provide a nut-stop. Jawad S. Corrosion of Cladding or Lining Material. (b)
The calculation of the individual stress components and their combination shall be performed by a method of stress analysis that can be shown to be appropriate for expansion joints. When materials listed in Part UHT are used, the last pass shall be given a temper bead welding technique86 treatment except for 5%, 8%, and 9% nickel steels. (2) The
maximum nozzle size is limited to NPS 4. Jovall T. ULT-82 WELDING (a) A separate welding procedure qualification tests on tension specimens conforming to Section IX, Figures QW-462.1(a) through 279 Copyright ASME International (BPVC) Provided by IHS
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85 apply. Thickness of Shells . For each loading case, calculate the effective pressure P e . Jones T. (19 mm) to 21/4 in. Configurations b and c: (e) In UHX-13.5.6 (Step 6), replace the formula for Pe with: For conservative values of and , Tr = T' may be used. Cementing technician (Name) (Mark or Symbol No.) (Date) Cement: Manufacturer (Name)
(Mark or Symbol No.) (Date) Designation Joint configuration Fig. (g) Maximum bearing stress shall be limited to 1.60 times the values in Section II, Part D, Subpart 1, Table 1B, or Table 3. A liner is considered thin when its thickness is no more than t/3; however, it need not be thinner than 1/16 in. Kimihiro, Chair L. Molvie L. Yes No UHA-
51(c)(2) UHA-51(c)(3) UHA-51(c)(4) Were thermal treatments within the temperature ranges listed in UHA-51(c) applied? Mills A. Giunto, Delegate B. Takaya D. Should more than one thickness of these components are given in
Section II, Part D, Subpart 3. Eberhardt, Vice Chair M. Kitamura R. When the thickness of the shell of a wholly spherical vessel does not exceed 0.356R, or P does not exceed 0.665S E, the following formulas shall apply: THICKNESS OF SHELLS UNDER INTERNAL PRESSURE 834 (a) The minimum required thickness of shells under internal
pressure shall not be less than that computed by the following formulas, 18 except as permitted by Mandatory Appendix 32. The design criteria may influence the selection of the Division. Otherwise, proceed to the step in UHX-13.5.12. Lee J. Multiple Local Thin Areas in Cylindrical Shells . Ferlisi P. (b) The design of a flange
involves the selection of the gasket (material, type, and dimensions), flange facing, bolting, hub proportions, flange width, and flange thickness. Moedinger G. Zhang H. Lundy E. Fabiani S. Biesecker W. The covering fillet shall be located on the inside of the corner and shall have a throat at least equal to 0.7 times the minimum thickness of the
elements being joined, or 1/4 in. See Section II, Part D, Nonmandatory Appendix A, A-207 through A-210. UHT-28 STRUCTURAL ATTACHMENTS and stiffening rings which are welded directly to pressure parts shall be made of materials of
```

specified minimum yield strength within ± 20% of that of the material to which they are attached. The code is intended to be read in its entirety for a complete understanding of the requirements in the BPVC. Halley G. (b) The user shall satisfy himself that the coupling of dissimilar metals will have no harmful effect on the corrosion rate or service life of the vessel for the service intended. (1) All joints of Category D attaching a nozzle neck to the vessel wall, and to a reinforcing pad if used, shall be full penetration welds. ULT-18 ULT-28 ULT-29 STIFFENING RINGS FOR

Kovalai S. (b) Channel Stresses (Configuration a). Hill III, Chair A. Norman, Secretary T. Volpi G. Tensile testing shall be performed per Mandatory Appendix 37. Snow R. Maximum Axial Loadings . UNF-A-5 MACHINING The nonferrous materials can be machined with properly sharpened tools of high-speed steel or cemented- carbide tools. (6) The effect of differential thermal expansion shall be considered when the thermal expansion coefficient of the minor attachment differs from that of the pressure part to which it is attached. The design shall be based on the appropriate chart in Section II, Part D, Subpart 3 for the material used in the ring at 150°F (65°C). For flange pairs used to contain a tubesheet for a floating head or U-tube type of heat exchanger, or for any other similar design where the flanges or gaskets are not the same, W m 2 shall be used for both flanges. Calculate the axial membrane stress σ s, m, axial bending stress σ s, b, and total axial stress σ s

```
SHELLS UNDER EXTERNAL PRESSURE Rules covering the design of stiffening rings are given in UG-29. Sircar, Contributing Member D. (b) For both parts (a) and (b) in the tabular part of this Figure, these coefficients are only valid
for 0.1 \le \mu * \le 0.6. (c) For both parts (a) and (b) in the tabular part of this Figure: for values of h /p lower than 0.1, use h /p = 0.1; for values of h /
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-12.1 U-Tube Tubesheet Configurations A C A
 Ps Pt ts ts Pt Ps Gc G1 Ps C Ds h h h (b) Configuration b: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (c) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (d) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (e) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended as a Flange (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended (f) Configuration c: Tubesheet Integral With Shell and Gasketed With Channel, Extended (f) Configuration c: Tubesheet (f) Configuration c: Tube
MDT to A (extended) to A C Pt Ps A (not extended) A C Ps Pt Gs Do h Go h C Onfiguration e: Tubesheet Gasketed With Shell and Integral With Channel, Not
`,,`--- (a) Equilateral Triangular Pattern (b) Square Pattern GENERAL NOTE: C p (perimeter) is the length
impact tests shall be conducted at -320°F (-196°C) on three sets of three specimens: one set from the base metal, one set from the HAZ (-3) each of the three specimens from each test set shall have a lateral expansion opposite the notch not less than 0.021 in. Stevenson M. Weld Metal Delta Ferrite Content . (2)
Qualification by the Vessel or Part Manufacturer (-a) Each piece is tested to show that it meets the chemical composition for heat analysis and the mechanical properties requirements of the permitted specification. Doctor J. No WPS Qualification with toughness testing is not required. (b) As an alternative to (a) above, for vessels or components whose
Resale, 07/02/2019 13:29:04 MDT.. Lam, Alternate G. Compare the calculated value of Pa obtained in Step 6 or Step 7 with P. 547 547 32-1 32-2 32-3 32-4 32-5 32-6 32-7 32-8 32-9 32-10 Local Thin Areas in Cylindrical Shells and in Spherical Segments of Shells. Insert the name of the vessel operator if different than the owner. SFA-5.11 SFA-5.11
SFA-5.11 SFA-5.11 SFA-5.14 SFA-5.15 SFA-5.14 SFA
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 1-8 ASME BPVC.VIII.1-2019 (3) When the cone-to-cylinder or knuckle-to-cylinder or knuckle-to-cylinder juncture is a line of support, the moment of inertia for a stiffening ring at the small end shall be determined by the procedure in Steps 1 through 8 below. Avogadri R. Batey,
Contributing Member N. Tonyan, Chair A. (c) Butt-welded joints in vessels constructed of austenitic chromium-nickel stainless steels which are radiographed because of the thickness requirements of UW-11, or for lesser thicknesses where the joint efficiency reflects the credit for radiographic examination of Table UW-12, shall be radiographed
F347 F347H F348 F348H Spec. Hill III M. Determine Do, μ, μ*, and UHX-12.5.1 UHX-11.5.1. from UHX-12.5.2 Step 2. (125 mm) GENERAL NOTES: (a) Postweld heat treatment is neither required nor prohibited for joints between austenitic stainless steels of the P-No. 8 group. The BPVC has long been considered essential within the electric
power generation, petrochemical, and transportation industries, among others. The largest obtainable tension test specified by the test methods referenced in the applicable specification shall be used. (f) Heads of the type shown in Figure 1-6, sketch (c) (no joint efficiency factor is required): (1) head thickness (-a) for pressure on concavenation industries, among others.
side, (-b) for pressure on convex side, the head thickness shall be determined based on UG-33(c) using the outside radius of the spherical head segment; (2) flange thickness for ring
gasket for heads with round bolting holes 310Þ 35Þ where F = where Q = and (3) flange thickness for ring gasket for heads with bolting holes slotted through the edge of the head J = (h) These equations are approximate in that they do not take into account continuity between the flange ring and the dished head. (3) If plate material is ordered to a
 specification that allows an undertolerance greater than the smaller of 0.01 in. Rules for the Design of Floating Tubesheets . (3) a change in the heat treatment essentially equivalent to that encountered in fabrication of the vessel or vessel parts including the maximum total aggregate
time at temperature or temperature or temperatures and cooling rates.) (4) a change in the type of current (AC or DC), polarity, or a change in the specified range for amp, volt, or travel speed. The flange bolt loads used in calculating the required cross-sectional area of bolts shall be determined as follows. Tso M. Sperko J. (b) Except when specifically prohibited by
this Part [such as in UHT-18 and UHT-28], steels listed in Table UHT-23 may be used for the entire vessel or for individual components which are joined to other Grades listed in that Table or to other steels conforming to specifications listed in Part UCS or Part UHA of this Division. Xu T. (2) Maximum size per Table 4-1. Moedinger M. Ten specimens
are required for each test. UCI-99 HYDROSTATIC TEST TO DESTRUCTION STANDARD HYDROSTATIC TEST MARKING AND REPORTS (a) Cast iron pressure shall be two times the maximum allowable working pressure to be marked on the vessel
for maximum allowable working pressures greater than 30 psi (200 kPa) and 21/2 times the maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not to exceed 60 psi (400 kPa) for maximum allowable working pressure but not
ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UNF-28 - UNF-56 ASME BPVC.VIII.1-2019 Table UNF-23.4 Nonferrous Metals — Titanium and Titanium and Titanium Alloys Spec. (f) The rules in this Appendix cover the common
types of flexible shell element expansion joints but are not intended to limit configurations or details to those illustrated or otherwise described herein. National Board registration requirements, (c) For production toughness testing requirements, see UHA-51(i) and UHA-51(i) and Figure JJ-1.2-4. 259 Copyright ASME International (BPVC) Provided by
IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULW-18 ASME BPVC.VIII.1-2019 Figure ULW-17.5 Some Acceptable Layered Head Attachments to Layered Shells 0.7tL min. 86 Temper bead
welding technique is done when the final beads of welding are made over-flush, deposited only on previous beads of welding for tempering purposes without making contact with the base metal, and then removing these final beads. Carter S. McMurray, Alternate T. He, Secretary L. Muldoon M. 562 562 562 562 562 562 562 562 562 563 563 563 563
Testing the Coefficient of Permeability of Impregnated Graphite . Allowable stress values for the materials used in pipe and tubes are given in the tables referenced in UG-23. Molitoris A. Forged Steel Rolls Used for Corrugating Paper Machinery . Gregg, Jr. H. Telltale holes may be used to provide some positive indication when the thickness has been
ASME BPVC.VIII.1-2019 Figure ULW-17.3 Some Acceptable Flat Heads and Tubesheet's With Hubs Joining Layered Shell Sections rtS tS rs tS e htt t(a) (b) (c) tf tf tS tS rr rt tt (d) (e) (f) GENERAL NOTES: (a) ts = thickness of layered shell [see ULW-17(f)] (b) t = thickness of flat head or tubesheet [see UG-34] (c) For all other dimensions, see
 18 Figure ULW-17.4 Some Acceptable Flanges for Layered Shells Weld line 3 1 tS (a) [See Note (1)] Retaining ring 3 1 tS (b) [See Note (1)] 3 Weld line tS 1 tS (c) (d) tS = thickness of layered shell Weld overlay 15 bolt dia. However, untubed lanes for pass partitions are permitted. 423 Copyright ASME International (BPVC) Provided by IHS under
license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 4-3 ASME BPVC.VIII.1-2019 Figure 4-8 Charts for t Over 4 in. xl Copyright ASME International (BPVC) Provided by IHS under license with ASME No
reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT PERSONNEL ASME Boiler and Pressure Vessel Standards Committees, Subgroups, and Working Groups January 1, 2019 HONORARY MEMBERS (MAIN COMMITTEE)
radiographic examination shall be examined by the magnetic particle method in accordance with Mandatory Appendix 6. Examples Illustrating the NN-4 Common Scenarios Involving the "User or His Designated Agent". The user and the Manufacturer should agree on the extent and type of nondestructive examination of welds that may be
appropriate for the intended service conditions and the materials of construction. The applicable minimum lateral expansion opposite the notch for all specimen sizes shall be as required in UHT-6(a)(3) and UHT-6(a)(4). Ziehl D. Lee Y. - If subparagraph (-a) appears in X.1(c)(2), it will be referenced as (1)(-a). Interpolation
may be made in the Table. Fritz, Contributing Member xliii Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Working Group on Materials Database (BPV II) Subgroup on International Material Specifications, grades, classes, and types are referenced, and
--- J. Appleton S.-H. Eberhardt China International Working Group (BPV III) J. 109 Manufacturers are cautioned to calculate the minimum ratio based upon mill test values of the tube and tubesheet. (a) For 5%, 7%, 8%, or 9% nickel steels, the provisions of UHT-56, UHT-80, and UHT-81 apply. For all other material, scratch depth shall not
exceed 1/8 in. Karpanan, Chair M. UHX-14.3 Nomenclature The symbols described below are used for the design of the stationary and floating tubesheets. Laite Working Group on Design of Division 3 Containment Systems (SG-CD) (BPV III) R. The
manufacturing undertolerances are given in the several pipe and tube specifications listed in the applicable Tables in Subsection C. Glaspie R. THICKNESS OF SHELLS AND HEADS UNDER EXTERNAL PRESSURE The thickness of shells or heads under external pressure shall satisfy the requirements of the Part of Subsection C applicable to the base
material. Hantz C. (3) Background Information. Chan R. Pyun T. (16 mm) in Thickness tS (b-1) Details of Taper for Layers 7/8 in. Sanzi G. (460 mm) and Smaller Nominal Size (12a) For Flanged Nozzles Over 18 in. Matthews J. (19 mm) or t n thickness of one layer the smaller of 3/4 in. Mital B. 80 Either base metal or weld metal. Adediran O. Thus, it is
necessary to evaluate all the anticipated loading conditions to ensure that the worst load combination has been considered in the design. (3) Configuration a: If \sigma s \leq SPS,s and \sigma c \leq SPS,s and \sigma
attachment welds is neither required nor prohibited. (10 mm), and the maximum design metal temperature shall not exceed 650°F (340°C). The effective area of reinforcement can be determined in accordance with the following formula: ŏ1Þ At the large end of the cone-to-cylinder juncture, the PRL/2 term is in tension. Benson, Alternate Task Group on Evaluation of Beyond Design Basis Events (SG-ES) (BPV XI) R. Configurations a, b, and c: UHX-13.8.4 Calculation Procedure. Yin D. Mitchell T. Manufacturer's or Assembler's Certificate of Conformance for Pressure Relief Valves.
ASME No reproduction or networking permitted without license from IHS W. Sections of the BPVC have been incorporated into law in the United States and Canada, and are used in more than 100 countries. The standard also addresses the design of tubing used in fluid power systems. (e) In Step 4, recalculate F, Φ, and Q 1. UHA-29 STIFFENING
RINGS FOR SHELLS UNDER EXTERNAL PRESSURE Rules covering the design of stiffening rings are given in UG-29. Gandy M. Galanes, Chair K. (d) Each cementing technician shall be assigned an identifying number, letter, or symbol by the Manufacturer, which shall be used to identify his work. (2) Category B joints of layered sections to solid
sections of unequal thickness shall have transitions as shown in Figure ULW-17.1, sketch (c), (d), (e), or (f). Pads and standoffs are permitted and the scope can terminate at the next welded or mechanical joint. (125 mm) P-No. 10K Gr. No. 1 GENERAL NOTE: For Alloy S44660, the rules for ferritic chromium stainless steel shall apply,
information for pressure cycles, thermal cycles, etc. Asayama K. Acceptance Standards for f r Determined by Test . Fluxes and Atmospheres and
material applied over the weld in the base material to complete the cladding or lining, any radiographic examination required by the rules of UW-11, UHT-57, and UCS-57 may be made on the completed weld in the base material before the covering is attached. Chapman — Tennessee D. Xu, Secretary G. (c) The circumferential welds attaching the
flexible element to the shell, mating flexible element, or outer shell element, or outer shell element, as appropriate to the expansion joint configuration per Figure 5-1, shall be examined 100% on both sides, where accessible, by the magnetic particle or liquid penetrant method in accordance with Mandatory Appendix 6 or Mandatory Appendix 8. The user or his designated
 agent is cautioned that the design of some pressure vessels containing expansion joints (especially expansion joints with corners) may be governed by cyclic loading. Newton H. Minichiello D. Configurations a, A, and D: For a hemispherical head: Configurations b and B: Configurations b, c, d, B, C, and D: \beta c = 0, \beta c = 0, \beta c = 0 UHX-14.5.3
Step 3. Kruzic, Contributing Member G. Deubler A. Agold R. Birch R. 379 382 384. Ortolani J. Methods of Metal Removal. (c) Category A weld joints in layered heads may be in an offset pattern; if offset, the joints of adjacent layers shall be separated by a distance of at least five times the layer thickness. --`,``,``,`,`,`,`,`,`,`,`,`,`
calculated value of X a and enter Table UIG-34-4 to determine Z a, Z d, Z v, Z w, and Z m for each tubesheet. Farrell, Jr. M. DeMichael K. Only indications which have any dimension greater than 1/16 in. Acrogliano W. (6 mm), whichever is less. Cocco A. Special consideration shall be required for tubesheets that are gasketed on both sides when the
pressure test in each chamber is conducted independently and the bolt loading is only applied to the flanged extension during the pressure test. Matthews R. Materials and Methods of Fabrication . UHX-14.7.2 Conditions of Applicability. Dissimilar Weld Metal . Freed J. Zhang, Delegate Q. After reheat treatment, a set of three specimens shall be
 made, each of which must be equal to or greater than the required value in Figure UHT-6.1. (b) Materials conforming to SA-553 for use at minimum design metal temperatures colder than -320^{\circ}F (-196^{\circ}C), materials conforming to SA-553 for use at minimum design metal temperatures colder than -20^{\circ}F
(−29°C), and materials conforming to SA-645, Grade A, for use at minimum design metal temperatures colder than −275°F (−171°C) shall have, in addition to the Charpy tests required under (a), drop-weight tests as defined by ASTM E208, made as follows: (1) For plates 5/8 in. Kapp K. Radhakrishnan G. Proceed to UHX-14.5.9. (b) Calculate the
average shear stress, \u03c4. tested in the manner described in the clad plate specification. Design of Penetrations Through UNF-23.5 may be used at lower temperatures than those specified herein and for other weld metal compositions, provided the user satisfies himself by
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Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ ASME BPVC.VIII.1-2019 2-13 Figure 2-13.1 Reverse Flange dr er F f H (2) Loose Ring Type Reverse Ring Type
accordance with (-a) or (-b) below: (-a) When Ct \leq Ft, (-b) When Ct \leq Ft, (-c) When Ct \leq Ft, (-b) When Ct \leq Ft, (-c) When Ct
Hirschberg H. UCI-23 MAXIMUM ALLOWABLE STRESS VALUES (a) Table UCI-23 gives the maximum allowable stress values in tension at the temperatures indicated for castings conforming to the specifications of terms generally
 42-2 42-3 42-4 42-5 42-6 42-7 42-8 Diffusion Bonding Procedure Specification (DBPS). Hembree, Chair P. Becker D. (1) A factor not to exceed 80% shall be applied to static castings that are examined in accordance with the minimum requirements of the material specification. certificate of compliance: a document that
states that the material represented has been manufactured, sampled, tested, and inspected in accordance with the requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the material specification (including year of issue) and any other requirements of the mat
Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 3-2 (a) angle joint: a joint between two members located in intersecting planes with an angle greater than
30 deg but less than 90 deg. Antaki P. The Secretary of the appropriate Committee will provide a written response, via letter or e-mail, as appropriate, to the Inquirer, upon completion of the requested action by the Committee. It is also important to note that a user or a designated agent does not possess a Certificate of Authorization and is therefore
not under the authority of ASME in a manner similar to that of a Manufacturer that possesses a Certificate of Authorization. Real G. Yes UHA-51(c)(1) Carbon content < 0.10%? Miao X. Configurations b and c: For the design loading cases, if \sigma s \leq SPS,s, the shell design is acceptable, and the
 User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ U-4 - U-5 ASME BPVC.VIII.1-2019 component using U.S. Customary, SI, or local customary units. O'Sullivan V. 233 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS
loading conditions to be considered shall include, but not be limited to, normal operating, startup, shutdown, cleaning, and upset conditions, which may govern the design of the tubesheet. All reinforcements required for openings shall be integral with the nozzle or provided in the layered section or both. Weld reinf. (b) Cast iron flanges, nozzles, and
to 100°F (-30°C to 40°C). Bagnoli R. min. Nuoffer G. Ishikawa D. (6 mm)]; 249 --`,``,`,, Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT
joints, or between a circumferential joint and any nozzle in a shell course. Orientation of Panel Dimensions and Stresses . Patel E. For cones attached to flat covers, flanges, or other components where the length of the cylinder, if present, is less than , length L L in the formulas for A T L and M shall be zero. (-b) proof test in accordance with UG-101.
Guidance Code to Users and Their Designated Agents . Repair of Defects in Materials . This document may be combined with a Material Test Report as a single document. UHX-19 HEAT EXCHANGER MARKING AND REPORTS UHX-19.1 Required Marking DIFFERENTIAL DESIGN: TUBES & TUBESHEETS 150 psi (b) Mean Metal Temperature
examination discloses welding which does not comply with the minimum quality requirements of ULW-53(a), and ULW-53(b), ULW-53(a), and ULW-53(b), ULW-53(a), and ULW-53(b), ULW-53(a), and ULW-53(b), U
User's Design Requirements for Multichamber Pressure Vessels. (This is not intended to imply that the original plate surface should be present in the finished flange.) (2) The joints in the ring are welded butt joints that conform to the requirements for construction and
it is recognized to be the responsibility of the designing engineer to determine when the intended service is of a nature that requires supplementary requirements to ensure safety; consequently, the designer should determine when the service warrants that this class of inspection be specified for steel castings of less than 4 in. Any pilot casting or
castings taken to represent a lot and the castings of that lot shall be poured from a heat of metal from which the castings on the current order are poured. Calculation of Hub Stresses . (13 mm) or less, and combination groove and fillet welds with a weld thickness of 1/2 in. (a)(1)(1). (b) Shipping bars on bellows expansion joints may be required to
maintain assembly length during shipment and vessel fabrication. Smith xli Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ
 welded directly to shells or heads constructed of materials conforming to SA-333 Grade 8, SA-334 Grade 8, SA-353, SA-522, SA-553, and SA-645, Grade A, shall be of the material covered by these specifications or austenitic stainless steel of the type which cannot be hardened by heat treatment. UHA-40 UHA-42 UHA-44 UHA-50 UHA-51 UHA-52
UHA-60 Nonmandatory Appendix UHA-A-1 UHA-A-2 U
Autogenous Welds in Austenitic Stainless Steels. Ramirez G. McKillop M. If σ t, 1 or σ t, 2 is negative, proceed to (c) below. Surface Weld Metal Buildup. The radiographic examination required by the rules in UW-11, UHT-57, and UCS-57 shall be made after the joint, including the corrosion resistant layer, is complete, except that the radiographic
examination may be made on UCL-40 WELDING PROCEDURES Welding procedures for corrosion resistant weld overlay, composite (clad) metals, and attachment of applied linings shall be prepared and qualified in accordance with the requirements of Section IX. Liang H. The effective area of reinforcement can be determined in accordance with the
following formula: ð6P Any additional area of reinforcement which is required shall be situated within a distance of from the junction, and the centroid of the added area shall be within a distance of from the junction, and the centroid of the added area shall be within a distance of from the junction. The examination shall be situated within a distance of from the junction.
the base metal. Alloy Welds in Base Metal. Tsuruta R. When nonpressure parts are welded to pressure parts, the postweld heat treatment temperature of the pressure parts are welded to pressure parts are welded to pressure parts. Topographic Factor No Elevation 25
F Coating Specification: Permitted Prior to Pressure Test Yes No Type: 27 F Rating (hr): 28 F Specification Ellipsoidal Head Conical Head Conical Head Conical Head Conical Head Conical Head Flanges Pressure-Retaining Bolts Internals Coil Tubes Other Number Required 07/17 695 Copyright ASME
International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Yes 23 Other Loadings per UG-22: F Temp. Nam G. The endnotes are referenced in numeric order and appear at the end of each BPVC section/subsection. Xu P. Aycock J. 15 --`
Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS UG-19 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-23 ASME BPVC.VIII.1-2019 selection of the version to use is sufficiency from IHS UG-19 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-23 ASME BPVC.VIII.1-2019 selection of the version to use is sufficient from IHS UG-19 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 - UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UG-20 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:0
dependent on the set of units selected for construction. Specimen location for forgings shall be the same as that specified in SA-350, para. UIG-3 graphite material: a bonded granular carbon body whose matrix is thermally stable below that temperature. (c) The
 allowable stress at 150°F (65°C) shall be used for the design of vessel parts that are exposed to the static head of cryogenic fluid but are not actually contacted by the fluid, such as, as in a dead-end cylinder connected to the bottom of a vessel that contains a gas cushion.
Watanabe T. Avrithi T. Use of Plug and Slot Welds for Staying Plates . (e) Welds in spirally wound strip construction with a winding or spiral angle of 75 deg or less measured from the vessel axial centerline shall be classified as Category A joints and examined accordingly. An organization holding authorization to perform various activities in
accordance with the requirements of the Code may state this capability in its advertising literature. 240 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
less than the requirements shown in Figure UHT-6.1. (4) If the value of lateral expansion for one specimen is less than that required unti-6.1 but not less than the required value in Figure UHT-6.1. Such a retest
shall be permitted only when the average value of the three specimens is equal to or greater than the required are not obtained in the retest or if the values in the initial test are less than the values required for retest, the material may be reheat treated. UHT-30 ATTACHMENT OF STIFFENING RINGS
TO SHELLS Rules covering the attachment of stiffening rings are given in UG-30. For values of A falling to the left of the material/temperature line, see Step 7. Smith D. 101 102 103 103 108 109 112 Requirements Pertaining to Methods of Fabrication of Pressure Vessels . 60 The set pressure is the value of increasing inlet static pressure at
which a pressure relief device displays one of the operational characteristics as defined by opening pressure, breaking pressure, start-to-leak pressure, burst pressure, burs
resistance to corrosion that is not substantially less than that of the base metal. (c) Category B joints in layers over 5/8 in. Malik, Alternate J. 58 Vacuum relief devices are not covered by Certification Mark requirements. Lundy, Contributing Member J. It is permitted to increase the shell thickness adjacent to the tubesheet only. DeKleine, Contributing
Member H. Takaya R. (d) The minimum thickness of any layer shall not be less than 1/8 in. Kataoka S. Braced and Stayed Surfaces . Reichert G. See definition of f 2 for signs. (9) The welds shall be postweld heat treated when required by UHT-56. Newell Y. (e)(4) below to take account of the operating conditions, when these govern the amount of
bolting required Am, as well as the amount of bolting actually provided Ab. (c) Required Bolt Loads. Materials may be used at temperatures colder than the minimum design metal temperature as limited in (1) and (2) below. (b) A single system of units shall be used for all aspects of design except where otherwise permitted by this Division. Ball W
PWHT: Per Code Process Required MATERIALS Component Coil Ext. (c) Surface imperfections, such as undue roughness, which do not permit leakage in cast iron vessels that are to operate under the limits of UCI-3(a)(3) may be repaired under (a) or (b) above or by welding. The Inspector shall make such other inspections as in his judgment are
necessary to permit certification that the vessel has been designed and constructed in accordance with the minimum requirements of this Division. No Production toughness testing is required in (2)(-b) above. RADIOGRAPHIC EXAMINATION (a)
Vessels or parts of vessels constructed of nonferrous materials shall be radiographed in accordance with the requirements of UW-11. 3:1 taper min. Castings that are to be welded shall be radiographed in accordance with the requirements of UW-11. 3:1 taper min. Castings that are to be welded shall be radiographed in accordance with the requirements of UW-11. 3:1 taper min. Castings that are to be welded shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of area shall be radiographed in accordance with the reduction of a reduction o
variables with tolerance ranges. Deubler N. The mixed cement should have a thick consistency (toothpaste). Design Procedure at the basis for the pressure-temperature rating and marking unless modified in UG-44(a). Horizontal Gas Storage Tank Supports . (20 min/25 mm) of thickness followed by rapid
cooling: (-a) the finishing-forming temperature is below the minimum heat-treating temperature given in Table UHA-44: and (-b) the design metal temperature given in Table UHA-44. Moment Arms for Flange Loads Under Operating Conditions . (g) Inspection. Golliet R. Krupp P. (3) For quenched and
tempered forgings weighing more than 10,000 lb (4 500 kg) at the time of heat treatment, two tension test specimens shall be taken from each forging. No SAW UHA-51(f)(4)(-b) Is filler metal ER308L, ER316L, or ER310? 216 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted
test temperature less the allowable temperature reduction permitted in Figure UCS-66.1 and shall in no case be colder than -155°F (-104°C). Patel A. If the required values are not obtained in the retest or if the values in the initial test are less than minimum required for retest, the material may be reheat treated. Sandusky R. If the tubes and
cross-sectional area A T S. 319 2-11 2-12 FLANGES WITH NUT-STOPS (a) When flanges are designed per this Appendix, or are fabricated to the dimension R is decreased to provide a nut-stop, the fillet radius relief shall be as shown in Figure 2-4, sketches
Mandatory Appendix 6 by the magnetic particle method, using direct current only when the material is ferromagnetic. Benson B. 201 Requirements for Pressure Vessels Constructed of Nonferrous Materials. Increase the assumed tubesheet thickness h and return to UHX-12.5.1. Option 2. Beckwith F. Determine D o , µ, µ*, and UHX-11.5.1.
Operating loading cases: Calculate a o , p s , p c , x s , and x t . Fabricated Lap Joint Stub Ends for Lethal Service . The Certified Cement Specification (CCS) qualification shall include tensile strength testing at both room and maximum allowable material temperatures. UHA-52 WELDED TEST PLATES (a) For welded vessels constructed of Type 405
material which are not postweld heat treated, welded test plates shall be made to include material from each melt of plate steel used in the vessel. May or may not be coincident conditions. Liendo, Vice Chair O. Marks R. Manufacturer's Data Report for Pressure Vessels . (1 520 mm) I.D.; (-b) n o z z l e d i a m e t e r s t h a t e x c e e d 4 0 i n .
Responsibilities of the User . Prestressing the Bolts . Washington — New Jersey R. Wang, Contributing Member Y. 688 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale
Chair S. Asayama, Chair S. Krane, Alternate M. The maximum stress in the joint is limited to 1.5S [where S is the maximum allowable stress value (see UG-23) for the joint material]. Lan N. Yang, Alternate S. Requests for revisions, new rules, Code Cases, or interpretations shall be addressed to the Secretary in writing and shall give full particulars in
order to receive consideration and action (see Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees). Kielb T. General . Y = factor involving K (from Figure 2-7.1) H D = hydrostatic end force on area
inside of flange = 0.785B\ 2P\ h\ D = radial distance from the bolt circle, to the circle on which HD acts, as prescribed in Table 2-6 H G = gasket load reaction to the bolt circle = (C-G)/2\ h\ O = factor = H p = total joint-contact surface compression load = 2b\times3.14\ G\ mP\ H
T = difference between total hydrostatic end force and the hydrostatic end force on area inside of flange = H - HD h T = radial distance from the bolt circle to the circle on which HT acts as prescribed in Table 2-5.1 [see
Note in 2-5(c)(1)] M D = component of moment due to HD, = HDhD M G = component of moment due to HG, = HDhD M G = component of moment due to HG, = HDhD M G = component of moment due to HD, = HDhD M G = component due to HD M G
times the limit in UG-40(b)(1), or equal to the limit in UG-40(c)(2). Added new subpara. Krishnamurthy T. Errata correction. The manufacturer shall certify that each magnetic particle examiner meets the following requirements: (a) He/she has vision, with correction if
necessary, to enable him/her to read a Jaeger Type No. 2 Standard Chart at a distance of not less than 12 in., and is capable of distinguishing and differentiating contrast between colors used. Maitra M. Malouines, Secretary S. (b) From each welded test plate there shall be taken two face-bend test specimens as prescribed in Section IX, Figure QW-
Requirements for Glass-Lined Vessels. Rush D.-J. Where pipes and tubes are fully enclosed, consideration shall be given to avoiding buildup of pressure within the protective chamber due to a tube/pipe leak. Hodgkinson, Contributing Member R. Le J. Singha S. (2) In the design of flange pairs used to contain a tubesheet of a heat exchanger or any
similar design where the flanges and/or gaskets may not be the same, loads must be determined for the most severe condition of operating and/or gasket seating loads applied to each side at the same time. Example of Differences Between Maximum and Minimum Inside Diameters in Cylindrical, Conical, and Spherical Shells. Claeys C. The ratio of
 , `--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Gasket Contact Width 1 in. Rice M. 499 499
499 499 499 13-10 13-11 13-12 13-13 13-14 13-15 13-16 13-17 13-18 Mandatory Appendix 14 --`,``
 ,,`,',`--- . Roberts, Chair S. If a hemispherical head is attached to the hub of a tubesheet, the hub may be considered part of the hemispherical head and not require an intervening cylinder, provided the hub complies with one of
designated agent. Toughness Requirements . Farrell, Jr., Secretary J. The CPS shall include the materials and processes necessary to manufacture items using certified material and certified material and certified materials and processes necessary to manufacture items shall include the materials and processes necessary to manufacture items using certified material and certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items using certified materials and processes necessary to manufacture items and processes necessary to manufacture items and processes necessary to manufacture items are not of the processes of the proce
not be described on ASME Data Report Forms nor on similar forms referring to ASME that tend to imply that all Code requirements have been met when, in fact, they have not been. Nagel S. However, facsimiles may be used for the purpose of fostering the use of such construction. (0.4 mm) nubbin N w N/2 (4) See Note (1) N (5) See Note (1) (6) N w
 ... Effective Gasket Seating Width, b b = bo, when bo \le 1/4 in. Jawad A. McKie S. mechanical loading and that is associated with a primary and/or discontinuity effect. Temporary welds and repair welds shall be considered the same as all other welds so far as requirements for qualified operators and procedures and for heat treatment are concerned.
 Show the Design Pressure for each chamber for internal and external design. Segletes D. Any relevant linear indications greater than 1/16 in. (a) This Appendix provides for procedures which shall be followed whenever magnetic particle examination is specified in this Division. GENERAL The rules in the following paragraphs apply to layered shells
 layered heads, and layered transition sections that are fabricated by welding and shall be used in conjunction with the general requirements for Fabrication in Subsection A, UG-75 through UG-85, with the exception of UG-83. Diagram for Determining the Efficiency of Longitudinal and Diagonal Ligaments Between Openings in Cylindrical Shells
Each of three specimens shall have a lateral expansion opposite the notch not less than 0.021 in. (b) All attachment welds, and all welded joints subject to pressure not examined by radiography or ultrasonic testing, shall be given a liquid penetrant examination either before or after hydrotest. If tabular values in Section II, Part D, Subpart 3 are used
Kettle Shell Ls Lecc ecc Ls, L Lecc Decc, L, tecc Decc, L, tecc Decc, L, tecc Decc, L, tecc Decc, S, tecc Ds, L tecc Decc, L, te
 Brazing . = c 4 (6 mm) (3) [Note (2)] min. The organization is the user required to fulfill Code responsibilities. Weitze J. Miller R. Cross R. Such Errata shall be used on the date posted. (b) Materials. See Section II, Part D, Nonmandatory Appendix A, A-100. (3) This Division contains mandatory requirements, specific prohibitions, and nonmandatory
 uidance for pressure vessel materials, design, fabrication, examination, inspection, testing, certification, and pressure relief. 4 CODE CASES Requests for Code Cases should be accompanied by a statement of need and background information similar to that described in 3(b) and 3(c), respectively, for Code revisions or additions. (e) Rules for U-tubee fo
heat exchangers are covered in UHX-12. Using the value of A calculated in Step 3, enter the applicable material chart in Section II, Part D, Subpart 3 for the material under consideration. Trieglaff F. Ganta R. The 16 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without
license from IHS Title Carbon and Low Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 1B for other nonferrous metals) High Alloy Steel (stress values in Section II, Part D, Subpart 1, Table 3 for bolting and Table 3 for
3 for bolting and Table 1A or Table 1B for other high alloy steels) Maximum Allowable Stress Values in Tension for Cast Iron Maximum Allowable Stress Values Iron Maximum Allowable Stress Values Iron Maximum Allowable Stres
Tension for 5%, 8%, and 9% Nickel Steels and 5083-0 Aluminum Alloy at Cryogenic Temperatures for Welded and Nonwelded Construction --`,``,``,`,`,`,`,`...'--- Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT rules, such as those for cast iron in flanged joints, the above
loads shall not induce a combined maximum primary membrane stress plus primary bending stress across the thickness for full-face gasket for heads with round bolting holes LARGE OPENINGS IN CYLINDRICAL AND
CONICAL SHELLS (a) Openings exceeding the dimensional limits given in UG-36(b)(1) shall be provided with reinforcement that complies with the following rules. Cordes P. Bellows Subjected to Axial, Lateral, or Angular Displacements.
that is extended for bolting, special consideration, in addition to the rules given in UHX-12, UHX-13, and UHX-14, shall be given to ensure that the tubesheet is not overstressed for the condition considered. Zhang Yaifeng Zhang Yijun Zhang S. If tabular values are used, the last (maximum) tabulated value shall be used. No. Plate Steels SA-
353 SA-517 SA-517 SA-517 SA-517 SA-517 SA-517 SA-517 SA-517 P-No./ Gr. No. Grade or Type Nominal Thickness Requiring PWHT, in. Localized Thin Areas . Deleted reference to Section V, Article 1, T-120(h), and T-120(k) in UW-54. The material has nearly constant tensile strength characteristics throughout
the specified temperature range. Attachment of Stiffening Rings to Shell. Coco, Alternate N. Step 3. (13 mm) to and including 11/2 in. 18 Formulas in terms of the outside radius and for thicknesses and pressures beyond the limits fixed in this paragraph are given in 1-1 to 1-3. Liu J. [For telltale holes in clad or lined vessels, see UCL-25(b).] (f)
Appendix UNF-A-1 UNF-A-1 UNF-A-1 UNF-A-2 UNF-A-3 UNF-A-1 UNF-A
vessel: a pressure vessel to be installed and operated as a fixed geographical location. (1) Where design rules do not exist in this Division, one of the following three methods shall be used: (-a) Mandatory Appendix 46. 348 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted
without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,``,,`,`,`,`... Step No. ASME BPVC.VIII.1-2019 UIG-60 Figure UIG-36-1 Unacceptable Nozzle Attachment Details Graphite nozzle Graphite head No counterbore [Note (1)] (a) Nozzle stud
impregnated graphite for the manufacture of pressure vessels presents unique material considerations for design, fabrication, and testing. Configurations a, b, and c: The procedure for the design of tubesheet for a floating tubesheet for buttwelded
joints by UHA-33, Category A and B joints (see UW-3) shall be of Type Nos. Allowable Design Stresses for Clamp Connections .. Ossmann, Chair M. Kris S. Melfi S. The hub thickness requirements in Subsection A of this Division. Sarzynski, Vice Chair L. Sy =
yield strength for tubesheet material at T 302 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-13.3 - UHX-13.5.2 ASME BPVC.VIII.1-
2019 ν t = Poisson's ratio of tube material UHX-13.4 in the equations the nominal thickness of tubesheet, tubes, shell, and channel, in both corroded and uncorroded conditions. TERMINOLOGY batch: that quantity of material contained in a single impregnation cycle. (125 mm) GENERAL NOTE: For the austenitic-ferritic wrought or cast
duplex stainless steels listed below, postweld heat treatment is neither required nor prohibited, but any heat treatment applied shall be performed as listed below and followed by liquid quenching or rapid cooling by other means: Alloy Postweld Heat Treatment Temperature, °F (°C) J93345 J93380 S31200, S31803, and S32550 S31260 S31500
S32101 S32202 S32205 S32304 S32750 S32760 S3
specification, the same minimum cooling rate shall apply to PWHT. Clements R. Harbison M. Basile J. Klein S. Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 7. The user is cautioned that input from the Manufacturer may be necessary for completion of this form. Anticoli C. Assume a value for t and determine the ratios L / D o
and Do /t. 511 b 519 b ALLOWABLE FLANGE DESIGN STRESSES (a) The flange stresses calculated by the equations in 2-7 shall not exceed the following values: (1) longitudinal hub stress SH not greater than 1.5Sf for materials other than cast iron: 403
Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 2-7 - 2-9 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 8199 2-9 ASME BPVC.VIII.1-2019 Figure 2-7.1 Values of T, U, Y, and Z (Terms
 --- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 404 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 Figure 2-7.2
Values of F (Integral Flange Factors) GENERAL NOTE: See Table 2-7.1 for equations. Cycles per Jacket Int. NOTE: The preceding methods may be applied jointly to identify the graphite part and to transfer the Certification Mark stamp. Kilambi K. Carter, Chair M. In formulating the rules, the Committee considers the needs of users, manufacturers,
and inspectors of pressure vessels. (1) For heat exchangers with a constant shell thickness and material, use one of the following: (-a) If the expansion joints shall be designed in accordance with Mandatory Appendix 5, as applicable. (See also UG-85.) (-d) All other
applicable requirements (including, but not limited to, melting method, melting practice, deoxidation, chemical analysis, mechanical properties, grain size, and quality) of the specification permitted by this Division, to which the material is to be recertified, have been demonstrated to have been met. Toughness testing of the base metal and HAZ is
required per UG-84. Examination of Surfaces During Fabrication . Hall ADMINISTRATIVE COMMITTEE T. Antaki D. (b) Examination of Areas From Which Imperfections Have Been Removed. Chandiramani P. 0.7tL min. (mm), of a tube between tubesheets, or design length of a vessel section between lines of support (see Figure UG-28.1). Moedinger
P. Values of F (Integral Flange Factors). Feldstein G. (2) governs, flange proportions will be a function of the bolting instead of internal pressure. 26 The rules governing openings as given in this Division are based on the stress intensification created by the existence of a hole in an otherwise symmetrical section. Requirements for Postfabrication
Heat Treatment Due to Straining . (4) The nozzles are located so that the reinforcement area of one nozzle does not overlap the reinforcement area of an adjacent nozzle . 390 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
mm) 11/4 in. The use of this provision shall be noted on the Manufacturer's Data Report. Michael, Delegate K. Swindeman N. Zhong M. (f) and (g) to UG-23. Montgomery C. Mulet J. Revised UIG-34(b), "Calculation Procedure for Tubesheets," to incorporate all the necessary information into Part UIG, as well as to make necessary improvements to the
procedure itself. Revised the title from "Increased" to "Different" in Figure UHX-13.4. Revised UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2155 and 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2156-x and reconcile UG-14 and Mandatory Appendix 2, 2-2(d) to incorporate revised Code Cases 2156-x and reconcile UG-14 and
Smith, Contributing Member M. UHA-13 MATERIAL NUTS AND WASHERS Nuts and washers shall be full penetration butt welds, Type (1) of Table UW-12, for a distance of, where R is R a or R b, and t is the thickness of the shell or
outer shell element, as applicable. If the expansion joint analysis method utilizes displacements over the length between the inner tubesheet faces, L, use the appropriate equation from below. Library of Congress Catalog Card Number: 56-3934 Printed in the United States of America Adopted by the Council of The American Society of Mechanical
Engineers, 1914; latest edition 2019. 1 (b) (a) A tn tn 45 deg max. The required bolt load for the operating conditions W m 1 is determined in accordance with eq. Zatz R. 319Þ 319Þ SUBMITTAL OF TECHNICAL INQUIRIES TO THE BOILER AND PRESSURE VESSEL STANDARDS COMMITTEES 1 INTRODUCTION --`,``,`
under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 The effective area of reinforcement can be determined in accordance with the following formula: Table 1-5.2 Values of Δ for
Junctions at the Small Cylinder for \alpha \leq 30 deg P/SsE 1 \Delta, deg 0.002 4 0.005 6 0.010 9 0.02 12.5 P/SsE 1 \Delta, deg 0.04 17.5 0.08 24 0.10 27 0.125 [Note (1)] 30 \delta4P Any additional area of reinforcement that is required shall be added to the cone. (2) When the MDMT is -320^{\circ}F (-196^{\circ}C) and warmer, impact tests shall be performed at the MDMT or
colder, and the following requirements shall be met: (-a) Each of the three specimens tested in each set shall have a lateral expansion opposite the notch not less than 0.015 in. (c) Apply heat to the cement so that it begins to form a skin (cement is still soft, not cured). Poehlmann K. Grotenhuis K. (10 mm), and for nominal thicknesses over 3/8 in.
Gardiner J. 1/1/2B 2C T* Tt (b) (c) 1/Full penetration weld 2A 1/(AB) 4 Point of HD action 1 HD Hr Thr Centroid Use any suitable type of gasket t Shown as welded. Faidy P. Concept . Post-Cold-Forming Strain Limits and Heat Treatment Requirements for P-No. 15E Materials Nonferrous Metals — Aluminum and Aluminum Alloy Products . --
 --- T' = tube sheet metal temperature at the rim (see Figure UHX-11.3-3) t t = nominal tube wall thickness UL 1, UL 2... If the minimum value is positive, zero shall be used for the minimum value. This calculation procedure applies only when the tubesheet is integral with the shell or channel (configurations a, b,
and c). A suitable flux, applied to the welding rod and the work, shall be used except that no flux is required for nickel. (4) The weld metal is produced by filler metal conforming to SFA-5.11, SFA-5.12 as modified below. Nuoffer R. Nonferrous Metals — Copper and Copper Alloys.
circular or elliptical shape with a length equal to or less than three times its width. They shall be spaced for the strip and shall be located a distance of approximately \pi R tan \theta from each other where R = the mean radius of the shell \theta = the acute angle of spiral wrap measured from longitudinal centerline, deg If a strip weld covers a
vent hole, partially or totally, an additional vent hole shall be drilled on each side of the obstructed hole. Cutting Plates and Other Stock . (d) When bolts are fabricated by cold heading, the allowable stress values for annealed material in Section II, Part D, Subpart 1, Table 3 shall apply unless the manufacturer can furnish adequate control data to
show that higher design stresses, as agreed upon, may be used. McGivney — City of New York, New York A. Certified Material Specification . Kirkemo, Contributing Member K.-J. For nozzle attachments illustrated as sketches (a), (b), and (f) of Figure UHT-18.2, the exposed cross section of the vessel wall at the opening shall be included in the
examination. Maximum Allowable Stress Values . (b) When the forming strains cannot be calculated as shown in UNF-79(a), the forming strain limits shall be half those tabulated in this Table [see UNF-79(b)]. Joint Alignment . (d) Cement Material (1) The tensile strength test is defined in Mandatory Appendix 37. Guide for Preparing Supplemental
Data Reports for Parts Constructed of Graphite . Configurations a, b, c, d, e, and f: Proceed to UHX-14.5.8 (Step 8). Granneman II — Oklahoma E. Ghahremani J. Revised UG-14 to improve clarity and to allow for the production of hollow cylindrical components with a greater range of diameters under qualifying conditions. Antaki, Chair G. (1 040 min.)
1,870-2,010 (1 020-1 100) 1,785-1,875 (975-1 025) 1,870 min. Ferritic steel parts, when used in conjunction with austenitic chromium-nickel stainless steel parts or austenitic/ferritic duplex steel, shall not be subjected to the solution heat treatment described in Nonmandatory Appendix UHA-A. Tan C. Lowry, Honorary Member J. No resistance
due to friction shall be used in determining the longitudinal load at the welds. Sowder, Jr. W. Coleff A. (2) For cones attached to flat covers, flanges, or other components where the length of cylinder, if present, is less than 1.4, the required reinforcement shall be at least equal to that indicated by the following formula: For the shell-cone or ring-shell-cone or ring
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cone section, The effective area of reinforcement can be determined in accordance with the following formula: Step 7. Allowable Locations of Applicability. 203 Copyright ASME International (BPVC) Provided by IHS under license with ASME No
reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ UNF-23.1 Nonferrous Metals — Aluminum and Aluminum Alloy Products Spec. 1/t min. Lyons B. Summary of Applicable Equations
for Different Classes of Assemblies and Different Categories of Flanges. Brouette, Chair M. Srnic R. = c 4 (6 mm) (3a) [Note (2)] min. be identified by permanent marking with the Manufacturer's name, date, and serial number. When the weld is in or adjacent to the tapered section, it shall be finished in a manner that will maintain the required
uniform slope for the full length of the tapered section. rejected. Various Arrangements of Stiffening Rings for Cylindrical Vessels Subjected to External Pressure . (2) While minimum heat-treatment temperatures are specified, it is recommended that the heat-treatment temperature range be limited to 150°F (85°C) above that minimum [250°F]
(140°C) for 347, 347H, 347LN, 348, and 348H]. Park M. Nameplates may be attached to either metallic or graphite parts. Type of single-chamber pressure vessel. Chandiramani R. Advancements in design and materials and evidence of experience have been recognized. 206 206 206 207 207 207 207 207 208 208 UNF-115 Thickness of Shells
Under External Pressure . Burchell P. Pyne, Chair S. Torano P. (c) As the calculation procedure is iterative, a value h shall be assumed for the tubesheet, tubes, shell, and channel are within the maximum permissible stress limits, and that the resulting tube-to-tubesheet joint
load is acceptable. Notation . Gillham J. Jeerings, Contributing Member W. Perform a simplified elastic-plastic calculation for each applicable loading case by using a reduced effective modulus for the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and/or channel to reflect the anticipated load shift resulting from plastic action at the integral shell and or the integral shel
Nam J. Form of Stamping . Option 1. 16 Subtype (a) Subtype (b) (8 mm) g1 Subtype (c) Subtype (d) All other details as shown in sketch (12) go Nut stop diameter (12) For Flanged Nozzles 18 in. UCL-42 ALLOY WELDS IN BASE METAL Groove joints in base material and parts may be made with corrosion resistant alloy-steel filler metal, or groove
joints may be made between corrosion resistant alloy steel and carbon or low alloy steel, provided the welding procedure and the welders have been qualified in accordance with the requirements of Section IX for the combination of materials used. (-f) Tubesheets shall be flat and circular. Papponetti P. Nayyar, Contributing Member D. Amato —
Minnesota, Vice Chair D. Otherwise, proceed to UHX-13.5.1 (Step 11). Hunter S. Otherwise, increase the assumed tubesheet thickness h and return to the step in UHX-13.5.1. UHX-13.5.8 Step 8. Peters E. (1) through (45) need not be solved. Morelock, Secretary N. Withers S. French, Contributing Member D. UG-10 MATERIAL IDENTIFIED WITH
OR PRODUCED TO A SPECIFICATION NOT PERMITTED BY THIS DIVISION, AND MATERIAL NOT FULLY IDENTIFIED (a) Identified Material With Complete Certification From the Material With Certification
H. Revised the word "valve" to "device" in UG-137(c)(3)(-d) and UG-138(c)(3)(-d). Items constructed in accordance with all of the applicable rules of the Code. Shear Load Test . Li B. Harrison, Secretary M. (e) Before the cement hardens, firmly
press the Certification Mark stamp into the cement all the way to the bottom, and pull the stamp straight out of the cement. Added new note for explosive and hydraulic expansion joints. (b) Requests for Code Interpretations should be limited to an Interpretation of a particular requirement in the Code or in a Code Case. 692 692 Nonmandatory
Appendix LL Graphical Representations of Ft, min and Ft, max. material: any substance or product form permitted for use in pressure vessel construction by this Division. Shelton J. (b) If postweld heat treatment is performed for P-No. 8
materials, the Manufacturer shall consider the steps necessary to avoid embrittlement, sensitization, and the precipitation of deleterious phases. Otherwise, increase the assumed tubesheet thickness, h, and return to UHX-14.5.1. UHX-14.5.9 Step 9. In addition to the minimum requirements of the material specification, all surfaces of centrifugal
materials. Donavin A. Charpy impact testing shall be in accordance with the requirements of UHT-6. Fong K. Halligan W. Bjorkman, Chair D. 283 283 xiii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001
User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Terminology. (c) Postweld heat treatment shall be performed in accordance with UCS-56 as modified by the requirements of Table UHT-56. Klug P. Added "except as provided for in 1-5(g)" to UG-36(g)(2). 283 283 286 286 287 288 290 301 319 330 331 332 333 334 334 334 334 334
Heat Treatment and Postweld Heat Treatment . Canadian registration impact testing in accordance with UG-84(h) at the MDMT or colder is performed: ER308L, ER316L
and ER310 used with the GTAW or PAW processes. Honcharik C. Frigerio, Contributing Member A. The Inquirer may desire to attend or be asked to attend or be
stress value at 150°F (65°C) based on the MAWP at the top of the vessel in its normal operating position plus any other loadings per UG-22, except that no static head need be included. Diaz, Contributing Member A. Dingman M. Cipolla C. Qualification of Welding Procedure. Benson J. Configuration a: This option may only be used when o s

SPS,s
and \sigma c \leq SPS,c. Newton, Contributing Member C. Ye L. Spuhl G. (16 mm) or Less in Thickness of head at joint thickness of one layer thickness of layered shell offset GENERAL NOTE: In all cases, \ell shall not be less than 3Y. Values may be interpolated for
intermediate temperatures (see UG-23). Assuming that the shell has been designed and DL, LL, and t are known, select a member to be used for the stiffening ring and determine cross-sectional area Table 1-8.1 Values of \Delta for Junctions at the Large Cylinder for \alpha \leq 60 deg P/S s E 1 \Delta, deg 0 0 0.002 5 0.005 7 0.010 10 0.02 15 P/S s E 1 \Delta, deg 0.04 21
0.08 \ 29 \ 0.10 \ 33 \ 0.125 \ 37 \ 0.15 \ 40 \ P/S \ s \ E \ 1 \ \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 [Note (1)] NOTE: (1) \Delta = 60 \ deg for greater values of P/S s E 1 \Delta, deg 0.20 \ 47 \ 0.25 \ 52 \ 0.30 \ 57 \ 0.35 \ 60 \ 0.35 \
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 1-8 AT L. In welded construction, the nozzle neck, vessel, or pipe wall is considered to act as a hub. Pressure Test Requirements. (c) In the step in UHX-13.5.5, replace the formula for y with: UHX-13.5.12.3 Option 3.
(1) The head thickness shall be determined in accordance with the requirements in UG-32. Lamond, Chair J. Faidy T. (3) R — Reaffirmed. Step 9. In an assembly of vessels, the limitations in (1) through (3) above apply to each vessel and not the assembly as a whole. (f) corrected by errata to subpara. UG-6 CASTINGS PIPE AND TUBES (a) Pipe and
tubes of seamless or welded8 construction conforming to one of the specifications given in Section II may be used for shells and other parts of pressure vessels. Hansen B. Use of Units in Equations . ENDNOTES . Fonzi, Jr. J. Subparagraph (e) below provides for special analysis in the design of cone-to-cylinder intersections with or without reinforcing
rings where α is greater than 60 deg. Sanchez-Hanton, Contributing Member R. (d) Where a defect is removed and welding repair is not necessary, care shall be taken to contour notches or corners. Orie M. See Summary of Changes for details. Class 1 Flange Assembly (Identical Flange Pairs). Simpson, Jr. J. Koo B.-L. Castings. When the thickness of
the cylindrical shell under internal design pressure exceeds one-half of the inside radius, or when P exceeds 0.385SE, the following equations shall apply. The method of verifying that applicable design calculations have been made will vary with the individual Inspector and depend largely on the Manufacturer's procedures for producing the design
calculations and any subsequent quality checks performed by the Manufacturer. Hakii M. Proceed to the step in UHX-13.5.10. Troutt P. Estimating Flange Thicknesses and Bolting . (2) Plate material with an actual thickness establishment for the step in UHX-13.5.10. Troutt P. Estimating Flange Thicknesses and Bolting . (2) Plate material with an actual thickness less than the design thicknesses and Bolting . (2) Plate material with an actual thickness less than the design thicknesses and Bolting . (2) Plate material with an actual thickness less than the design thickness less than the
material has marking, acceptable to the Inspector, for identification to the documentation. Horowitz J. McLean, Vice Chair J. 19 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for
buttered layer. Reddy, Contributing Member COMMITTEE ON OVERPRESSURE PROTECTION (BPV XIII) D. Layers — Step Welded Girth Joints . (b) Except as in (c) and (d) below, no postweld heat treatment shall be performed except by agreement between the user and the Manufacturer. (b) For values of X a and Q 3 beyond those given by the
curves, see Table UHX-13.1. (1) Calculate the largest equivalent unsupported buckling length of the tube l t considering the unsupported tube spans l and their corresponding method of support k. Thomas COMMITTEE ON TRANSPORT TANKS (BPV XII) N. Bath A. When determining the thickness requiring postweld treatment in Table UHT-56 for
clad or weld deposit overlayed vessels or parts of vessels, the total thickness of the material, including the clad and weld deposit overlay, shall be employed. Kim D. Sabo R. (See UHX-13.6.) Configuration a: If \sigma c > 1.5 S c, increase the channel thickness t c and return to the step in UHX-13.5.1. Calculate Ks,t and J, replacing Ks with . Noh C.-K. ULT-
56 POSTWELD HEAT TREATMENT (c) For 5083 aluminum, the requirements of UNF-91 apply. The user ensures the required overpressure protection system is properly installed and places the vessel in service. For each loading case, calculate the maximum bending stress σ.
(c) The splits should preferably be midway between bolt holes. Weld line (Category B) (e) For Layers Over 5/8 in. (10 mm) and for thicknesses over 3/8 in. (3) the need for postweld heat treatment beyond the requirements of this Division and dependent on service conditions; (4) for pressure vessels in which steam is generated, or water is heated [see
U-1(g) and U-1(h)], the need for piping, valves, instruments, and fittings to perform the functions covered by Section I, PG-59 through PG-61. r1 t r1 r2 B C D Rtn Limits of reinforcement 45 deg min. Kang S. Robertson, Secretary R. Gamizo I. Pipe and Tubes . REQUIRED TESTS (a) The required tests of certified material shall be conducted at the
frequency specified in Table UIG-84-1. (e) X5CrNi18-10 shall be considered as Type 304. This is permissible, provided the neck thickness is not less than the thickness required for a cylindrical shell subject to internal and/or external pressure, as applicable, and having an inside diameter equal to the maximum diameter of the opening [see UG-38(a)
and UG-46(j)]. 376 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 (c) Ellipsoidal Heads The equations in (c) and (d)
`,`,``,,,`-'-`,,`,,`,`,--- ULT-75 ULT-75 ULT-75 ULT-82 ULT-86 ULT-90 ULT-90 ULT-115 ULT-125 Part UHX UHX-1 UHX-2 Welding Procedure Qualification . (d) For 5083 aluminum the provisions and requirements of UNF-65 for low temperature operation apply. An example of the use of Form U-4 illustrating t he minimum r equired d
ata for layered construction is given in Figure W-3.1. (c) In addition, the stamping below the Certification Mark and Designator prescribed in UG-116(c) shall be the letters WL to designate layered construction. Reverse Flange . Douin — Ohio, Secretary M. For components for which the Code provides no design rules, the provisions of UG-19(b) and
UG-19(c) apply. 4 See UG-90(b) and UG-90(c)(1) for summaries of the Manufacturer and the duties of the Inspector. Cyclic Displacements . Tanzosh R. 5.14, or 5.22 No filler? Dominguez S. (50 mm to 100 mm), Inclusive . Gundlach D. Official Certification Mark to Denote the American Society of Mechanical Engineers' Standard
for Nonreclosing Pressure Relief Devices . Palm D. Stewart D. Cipolla R. The moment arm is determined by the relative position of the bolt circle with respect to that of the load producing the moment (see Figure 2-4). 381 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 1-5 - 1-6 ASME
BPVC.VIII.1-2019 (g) When the half-apex angle α is greater than 30 deg (0.52 rad), cone-to-cylinder junctions without a knuckle may be used, with or without reinforcing rings, if the design is based on special analysis, such as the beam-on- elastic-foundation analysis of Timoshenko, Hetenyi, or Watts and Lang. McGlone, Chair J. Verma S. The
operating conditions 332 Copyright ASME International (BPVC) Provided by IHS under license ermitted, provided the resulting axial
 differential thermal expansion is within the listed range. Methods of Fabrication. Hamtak L. Otherwise, proceed to UHX-12.5.11. If W t \leq L m a x, tube-to-tubesheet joint design is acceptable. Shou, Vice Chair Z. This procedure accounts for the stiffness and loadings in the shell of the eccentric cones used in the design of the tubesheet. Cylindrical
Shells . 1. Changes to nonessential variables do not require requalification of the CCS. The required radiographic examination shall be made after any corrosion-resistant alloy cover weld has been deposited. Daldrup B. (b) As the calculate and check that the
maximum stresses in tubesheet, shell, and channel are within the maximum permissible stress limits. Dickerson E. (b) When the forming strains cannot be calculated as shown in UHA-44(a), the forming strain limits shall be half those tabulated in this Table [see UHA-44(b)]. Thermocouple Installation. Moino, Staff Secretary P. Glaspie, Vice Chair C.
See also ASME PCC-2, Article 501, Mandatory Appendix 501-II, "tored Energy Calculations for Pneumatic Pressure Test." and Mandatory Appendix 501-III, "Safe Distance Calculations for Pneumatic Pressure Test." and UNF-4, as and UNF-4.
appropriate. for 3L chamfered layers Taper line Hemispherical Heads Only Y 3tL min. Jovall N. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity. Weitze, Contributing Member K. Table 1-4.4 Values of Knuckle Radius, r D /2h r /D 3.0 2.8 2.6 2.4 2.2 0.10 0.11 0.12 0.13 0.15 2.0 1.8 1.6 1.4
1.2 1.0 0.17 0.20 0.24 0.29 0.37 0.50 GENERAL NOTE: Interpolation permitted for intermediate values. Nonferrous Metals — Zirconium . The typical modulus of elasticity is 2.0 \times 106 psi (2.0
Nonmandatory Appendix P Nonmandatory Appendix GG GG-1 GG-2 GG-3 Guidance for the Use of U.S. Customary and SI Units in the ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULW-31 ULW-32 - ULW-32 ASME BPVC.VIII.1-2019 NONDESTRUCTIVE EXAMINATION OF WELDED JOINTS WELDING PROCEDURE QUALIFICATION Welding procedure qualifications shall be in accordance with Section IX except as modified
herein. Psd, max = maximum shell side design pressure Psd, min = minimum shell side design pressure (negative if vacuum is specified, otherwise zero) (5) Acceptance Criteria (-a) Design loading case acceptance criteria: |\sigma s, m| \le S e c c E e c c, w and |\sigma e c, w
Ss, LEs, L, w (-b) Operating loading case acceptance criteria: |\sigma s, m| \le SPS, s and |\sigma ecc, L, m| \le SPS, ecc and |\sigma ecc
S s, L, b If any of these acceptance criteria are not satisfied, reconsider the design of the failing components and return to (a). Lin R. Burchell, Secretary A. 25 The formulas provide safe construction as far as stress is concerned. Revised UW-51(a)(2) by deleting the exception to written procedure requirements, replacing the term "penetrameter"
with "image quality indicator," and delete the requirement for Inspector confirmation by ultrasonic examination. Llorente R. Permissible Types of Joints. Revised UG-129(a)(4) and UG-136(d)(4) to specify test media for
pressure relief valves marked for gas or vapor service, rules for performing set pressure testing using alternate test fluids, and treatment of steam to air or gas correction factors with respect to CDT. Bratton S. 819b UHX-12.3 Nomenclature The symbols described below are used for the design of the tubesheet. Yang R. Manufacturer's Data Report
Supplementary Sheet. The required area of reinforcement shall be at least equal to that indicated by the following formula when QL is in compression: NOTE: If the stiffener shall be
shortened by one-half of each overlap. Wittenbach, Contributing Member X. Woodward S. Lockwood L. \(\lambda\) s . Mokaria T. (5) a change in the thickness T of the welding procedure qualification test plate as follows: (-a) for welded joints which are quenched and tempered after welding, any increase in thickness [the minimum thickness qualified in all
 --- BOLT MATERIALS The requirements for bolt materials, nuts, and washers shall be the same as for carbon and low alloy steels in UCS-10 and UCS-11. Mehta K. Tube Expanding Procedure Qualification
Staniszewski, Chair A. Y. Reichert H. Hayes S. Dhanraj, Secretary P. Farenbaugh D. (g) The bulk temperature of the material to be joined shall be between 50°F (10°C) and 125°F (52°C) during the cementing operation. Oda — Washington L. Lashley Working Group on Duties and Responsibilities (SG-GR) (BPV III) S. Toroidal Bellows Manufacturing operation.
Tolerances . Forgings . Jawad R. (2) Some types of work, such as forming, nondestructive examination, and heat treating, may be performed by other volumetric examination is required by the rules of this Division, it may be performed at one of the following locations: (-a) the location of
the Manufacturer of the completed vessel (-b) the location of the parts Manufacturer (-c) the pressure part manufacturer (a) with the name or trademark of the pressure part manufacturer (a) with the name or trademark of the pressure part manufacturer (b) the location of the parts Manufacturer (a) the pressure part manufacturer (b) the pressure part manufacturer (c) the pressure part manufacturer (c) the pressure part manufacturer (c) the pressure part manufacturer (d) the pressure part manufacturer (e) the pressure part manufacturer (e) the pressure part manufacturer (f) the pressure part manufacturer (f) the part manufacturer (f) the pressure part manufacturer (f) the part manufacturer (f) the pressure part manufacturer (f) the part manufac
standard or other standard used for the pressure part (-b) with a permanent or temporary marking that will serve to identify the part with the Certificate Holder or the pressure parts manufacturer of the completed
vessels shall have the following responsibilities when using standard pressure parts: (-a) Ensure that all standard pressure parts comply with applicable rules of this Division. P = external design pressure for the assumed value of t, [see Note in (f) below] R o =
outside radius of spherical shell t = minimum required thickness of cylindrical shell or tube, or spherical shell, in. Staniszewski S. (3.38 mm). Manufacturer shall provide the source of the conversion factors which shall be subject to verification and acceptance by the Authorized Inspector or Certified Individual. tr2 1 r2 r1 r 11/2 t min. Revised
Mandatory Appendix 10, 10-13(c). 159 159 159 159 159 159 159 159 Requirements for Pressure Vessels Fabricated by Brazing . This load is also used for the design of the flange, per eq. O'Donnell, Sr. W. Johnston, Jr. J. Wadkinson, Chair C. The basis for calculated test pressure in either of these paragraphs is the highest permissible internal pressure as determined
by the design equations, for each element of the vessel using nominal thicknesses with corrosion allowable stress values given in Section II, Part D, Subpart 1 for the temperature of the test. Welding Materials . 616 616 Nonmandatory Appendix T Temperature Protection . Donavin, Vice Chair S. Kim J. (b) Material
for nonpressure parts, such as skirts, supports, baffles, lugs, clips, and extended heat transfer surfaces, need not conform to the specification permitted in this Division, but if attached to the vessel by welding shall be of weldable quality [see UW-5(b)]. Vent Holes . (-b) When Pe
= 0: (b) When P e = 0, calculate the maximum bending stress \sigma. Matthews, Chair R. Brown, Ch
stress for shell material adjacent to tubesheets at Ts Ss, b, 1 = maximum allowable longitudinal compressive stress in accordance with UG-23(b) for the shell adjacent to tubesheets at Ts. Melilli K. No. Types 304 and 316 Stainless Steels, Customary Units Minimum Tensile
Strength, ksi, for Metal Temperature [Note (1)], °F, Not Exceeding Spec. (b) Blocks: Tested property at time of certified material specification, for each lot and at minimum, every 3 mo (shall be across the grain). Heads With Pressure on Concave Side. Configurations a, b, and c: Calculate shell coefficients β s , ks, λ s , δ s , and ω s . Inspection and
Tests. Rana G. (a) The thermal stresses resulting from the differences between the base metal and the weld metal shall be considered in the design. UIG-76-1 Block Fig. The dimensions in the corroded condition. When the thickness does not exceed one-half of the
inside radius, or P does not exceed 0.385S E, the following formulas shall apply: holes in layered construction. Tanzosh M. Hedden, Honorary Member J. Some Acceptable Solid Head Attachments to Layered Shell Sections . UCI-37 Table UCI-78.1 NPS Plug or Equivalent CORNERS AND FILLETS A liberal radius shall be provided at projecting edges
and in reentrant corners in accordance with good foundry practice. West A. (4)(1) or eq. (0.8 mm) thick 2.00 2.75 3.50 1,600 (11) 3,700 (26) 6,500 (45) (1a), (1b), (1c), (1d), (4), (5); Column II Elastomers with mineral fiber fabric insertion (with or without wire
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 2-5 - 2-6 ASME BPVC.VIII.1-2019 Table 2-5.1 Gasket Materials and Contact Factors m for Operating Conditions and Minimum Design Seating Stress y (Cont'd) Gasket Material Gasket Factor m Min. Lee G. Minichiello I.-K
ASME BPVC.VIII.1-2019 FORM CMQ CERTIFIED MATERIAL QUALIFICATION FORM (Used in the Construction of Graphite Pressure Vessels) (Cont'd) (d) Coefficient of permeability: See Mandatory Appendix 39 for determining the coefficient of permeability of certified materials. (b) The Code provides guidance to the user in the form of
at least 5 yr after production has ceased. Added new last sentence to UG-84(g)(2), "Where the material thickness permits, the axis of the notch may be inclined to allow the root of Figure JJ-1.2-3. UNF-13 NUTS AND WASHERS Nuts and washers may be
Requirements . UIG-1 UIG-2 UIG-3 UIG-3 UIG-2 UIG-3 UIG-3 UIG-5 UIG-8 UIG-7 UIG-8 UIG-7 UIG-8 UIG-7 UIG-8 UIG-90 UIG-95 UIG-90 UIG-97 UIG-90 UI
for Postweld Heat Treatment . (-b) Ensure that all standard pressure parts are suitable for the design conditions of the completed vessel. Where welding performed in accordance with a qualified welding procedure. Hsu D. Layers may be cylinders formed from plate,
sheet, or forging, or the equivalent formed by coiling, or by helically wound interlocking strips. If spring-loaded rods are used on the floating end, perform this step. 230 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda
 Ferritic Steels (BPV II) Subgroup on Nonferrous Alloys (BPV II) E. The Committee recognizes that tools and techniques used for design and analysis change as technology progresses and expects engineers to use good judgment in the application of these tools. Overpressure Protection . Also, some grades of impregnated graphite may be more suitable
for certain applications (service conditions) than other grades. Plates from two different melts may be welded together and be represented by a single test plate. In addition to the minimum requirements for safety, eq. (-b) At least two transverse tension test specimens that have the same diameter shall be taken from each lot (as defined in the
material specification) of rod or bar material. (e) Alignment tolerances of the completed expansion joint attached to the shell shall meet the tolerances specified by UW-33. You can download the paper by clicking the button above. Westland xlii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or
networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT COMMITTEE ON MATERIALS (BPV I) K. Yamazaki J. Kalyanam K. Rudolph H. Chi W. The physical characteristics of the contained fluid shall be such that a
maximum operating temperature can be determined for the liquid phase at the maximum allowable working pressure of the vessel. Seime — North Dakota C. (e) Spacing. Hoffman S. Gold, Contributing Member J. (b) When flanges are subject at different times during operation to external or internal pressure, the design shall satisfy the external
pressure design requirements given in (a) above and the internal pressure design requirements given in the tables referenced in UG-23. Dickson S. (b) These
rules cover the design of tubesheet extensions that have loads applied to them. Revised the minimum heat treatment temperature for UNS N08811 to 2,100°F from 2,050°F to be consistent with the SB specifications. Maximum stress values may be interpolated for intermediate temperatures. Pleins, Chair M. For lots of three pieces or less, each piece
shall be analyzed. Stupica Working Group on Plate Heat Exchangers (BPV VIII) P. Shapiro, Chair S. The columbium content is permitted in the material being welded. (c) When bolts are fabricated by hot-heading, the
allowable stress values for annealed material in Section II, Part D, Subpart 1, Table 3 shall apply unless the manufacturer can furnish adequate control data to show that the tensile properties of hot finished condition may be used
cooling in still air. Jacobs, Contributing Member J. Braun, Vice Chair S. 2. Configurations e, f, and A: For conservative values of and, Tr = T' may be used. Xu, Secretary F. Mann N. Anderson, Secretary F. Mann N. And
apply to vessels constructed to this Part, with the following supplements to the marking and Manufacturer's Data Reports: (a) The vessel markings shall be in accordance with UG-116 except: (1) the letters ULT shall be applied below the Certification Mark and Designator; OVERPRESSURE PROTECTION ULT-125 GENERAL The provisions for
also vary for each grade of the impregnated material the vessel Manufacturer produces; therefore, the impregnation process should be tightly controlled to ensure that the material meets the specified properties. Solovey W. Certification of Capacity of Pressure Relief Devices . For requested revisions, the Inquirer should identify those requirements of
expansion joint analysis includes thermal expansion effects (2) the rotational stiffness at the expansion joint corners and torus is not necessary to meet the stress limits for annular plates and straight flanges for the design loading cases shown in Table UHX-17. Blankinship, Alternate J. In 2009, the Boiler and Pressure Vessel Committee was
superseded by the following committee on Power Boilers (I) (b) Committee on Materials (II) (c) Committee on Materials (II) (d) Committee on Welding, Brazing, and
Fusing (IX) (h) Committee on Fiber-Reinforced Plastic Pressure Vessels (X) (i) Committee on Nuclear Inservice Inspection (XI) (j) Committee on Transport Tanks (XII) (k) Technical Oversight Management Committee is included individually and
collectively. Rules for Reinforcement of Cones and Conical Reducers Under External Pressure . 2-5(e)(5) considering UHX-4(b) W m 1 = flange design bolt load from eq. Yamamoto K. McMurray, Alternate J. (2) The thickness of U-tubes after forming shall not be less than the design thickness. to 3/16 in. (4) The designer should take appropriate
consideration of the stresses resulting from the pressure test required by UG-99 or UG-100 [see UG-99(d)]. The transition may be on either or both sides. Cleaning of Surfaces to Be Welded . ts shall be \geq t \alpha = one-half of the included (apex) angle of the cone at the centerline of the head or \delta2\bar{\nu} where K = Numerical values of the factor K are given in
Table 1-4.1. (d) Torispherical Heads88 83Þ or where M = Numerical values of the factor M are given in Table 1-4.2. (e) Conical Heads or 85Þ or 377 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001
numerical (decimal) quantity and is used in the design of a joint as a multiplier of the appropriate allowable stress value taken from the applicable table in Section II, Part D, Subpart 1 (see UW-12). Consideration should be given to the applicable table in Section II, Part D, Subpart 1 (see UW-12).
layered shell sections to solid heads or shells may be butt joints as shown in Figure ULW-17.6, sketches (c), (d), and (e), or step welds as shown in Figure ULW-17.6, sketches (a), (b), (f), and (g). (f) Rules for fixed tubesheet heat exchangers are covered in UHX-13. Added new text starting at UG-131(k) and redesignated existing subparas. Bamford
Cast Ductile Iron . (1) appears in X.1(a)(1) but is referenced in X.1(b), it will be referenced as eq. ASME B16.5 Socket and Slip-on Flange Welds . (4)(2) S y = yield strength of the material at test temperature; see Section II, Part D, Subpart 1, Table Y-1 (c) In the design and fabrication of large openings, the Manufacturer should consider details that
may be appropriate to minimize distortion and localized stresses around the opening. (b) The Manufacturer shall qualify technicians to be used in fabrication of graphite vessels and parts. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process.
 (c) Cementing instruction no. Döring, Chair R. When mean metal temperature design is used, the maximum common element design temperature of its adjacent
chambers; however, it shall not be less than the lower of the maximum design temperatures of its adjacent chambers. French, Honorary Member J. The Manufacturer shall additionally prepare a Certified Cement Specification, CCS (see UIG-78). Yes No MDMT colder than -55°F (-48°C)? McInnes, Contributing Member H. Values for Determining E */Europe Acceptable 1. The Manufacturer shall additionally prepare a Certified Cement Specification, CCS (see UIG-78).
and v * Equilateral Square Pattern . Sharma, Contributing Member COMMITTEE ON WELDING, BRAZING, AND FUSING (BPV IX) D. (e) Thinning of any flexible element as a result of forming operations shall be considered in the design and specifications of material thickness. Wada R. White D. Specifications for Impact Tested Materials in Various
Product Forms . Kim Special Working Group on Editing and Review (BPV III) D. backed, if necessary, with corrosion resistant weld metal deposited in the groove to bring the insert flush with the surface of the adjacent cladding. Configuration a: For a cylinder: Configuration a: For a cylinder: Configuration d: \beta s = 0, \delta s = 0, \delta s = 0 Calculate
 channel coefficients β c , k c , λ c , and δ c . INSPECTION AND TESTS UHA-50 GENERAL --`,``,`,`,,`,--- The rules in the following paragraphs apply specifically to the inspection and testing of pressure vessels and vessel parts that are constructed of high alloy steel and shall be used in conjunction with the general requireme
for Inspection and Tests in Subsection A, and with the specific requirements for Inspection and Tests in Subsection B that pertain to the method of fabrication used. Griffin, Contributing Member S. Topographic Factor Density Saddles 26 F Fireproofing: No Yes Type: Hemispherical Head Torispherical Head Conical Head Nozzles Flanges Stiffener Rings Pressure-Retaining Bolts Attachments Internals Reinforcing Pads Other NOZZLE SCHEDULE Class Description Rating (hr): 29 F Number Required Size Flange Type 27 F Specification Ellipsoidal Head 07/17 693 Copyright ASME International (BPVC) Provided by IHS
under license with ASME No reproduction or networking permitted without license from IHS 25 F Coating Specification Number Required Yes 23 F Other Loadings per UG-22: Temp. (e) If the characters are incorrect or damaged, wipe off the
cement with a compatible solvent and reapply. Chesworth, Secretary J. (a) The minimum and maximum thicknesses qualification test plates shall be as shown in Section IX, Tables QW-451.1 through QW-451.4, except that: (1) for the longitudinal joints of the layer section of the shell, the qualification shall be based upon the
thickness of the thickest individual layer, exclusive of the inner shell or inner head; (2) for circumferential joint procedure qualification, the thickness of the layered test plate need not exceed 3 in. Section II, Part D is published as two separate publications. Fleischfresser R. may be combined on this form where they are bounded by the operating
pressure range, maximum metal temperatures, and axial differential thermal expansion range. (22 mm) in thickness shall be examined for 100% of the weld thickness the distance amplitude correction curve or reference level may be raised by
 6 dB. (11) The documentation shall contain at a minimum: (-a) material used (-b) the pressure-temperature rating of the part (-c) the basis for establishing the pressure complies with Code requirements (e) The Code recognizes that a
Certificate Holder may fabricate parts in accordance with UG-11(d), and that are marked in accordance with UG-11(d)(8). Minimum Requirements for Pressure Relief Valves . 97 Use E = 1.0 for Category C and D joints that are not butt welded since stresses in these joints are controlled by the applicable rules for sizing such joints. H p is to be
considered as 0 for all self- energizing gaskets except certain seal configurations which generate axial loads which must be considered. Figure UHX-9 depicts thickness hr for some representative configurations. This calculation procedure applies only when the tubesheet is integral with the shell or channel (configurations a, b, c, e, f, and A). Values or
load HT and moment arm hD are negative; value of moment arm hT may be positive as in Figure 2-13.1, or negative. Nagel E. (6 mm) 401 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer,
C. Katcher, Contributing Member W. ULW-76 VENT HOLES Vent holes shall be provided to detect leakage of the inner shell and to prevent buildup of pressure within the layers as follows: (a) In each shell course or head segment a layer may be made up of one or more plates. Monastra L. Troughton J. UG-7 Cast material may be used in the
construction of pressure vessels and vessel parts. (22 mm) and under. Maximum Allowable Joints . Proof testing may be appropriate in extreme cases of large openings approaching full vessel diameter, openings of unusual shape, etc. 687 Copyright ASME International (BPVC) Provided by IHS under license with ASME No
reproduction or networking permitted without license from IHS toughness Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT JJ-1.2 ASME BPVC.VIII.1-2019 Figure JJ-1.2-2 Welding Procedure Qualification With Toughness Testing Requirements for Austenitic Stainless Steel UHA-51(e) Start Yes
WPS Qualification with toughness testing is not required. Brazing Filler Metals. If a monitoring system is used, it shall be designed to prevent buildup of pressure within the layers. Maximum Design Temperatures for Brazing Filler Metals. (3) The field portion of the work is completed by a holder of a valid U Certificate of Authorization other than therefore the completed by a holder of a valid U Certificate of Authorization other than therefore the completed by a holder of a valid U Certificate of Authorization other than therefore the completed by a holder of a valid U Certificate of Authorization other than therefore the completed by a holder of a valid U Certificate of Authorization other than the layers.
reproduction or networking permitted without license from IHS GENERAL (a) The design of layered pressure vessels shall conform to the design requirements given in UG-16 through UG-46 except that: (1) reinforcement of openings is requirements given in UG-16 through UG-46 except that: (1) reinforcement of openings is requirements given in UG-16 through UG-46 except that: (1) reinforcement of openings is requirements given in UG-18.1; (2) in calculating the requirements given in UG-18.1; (2) in calculating the requirements given in UG-18.1; (2) in calculating the requirements given in UG-18.1; (3) in calculating the requirements given in UG-18.1; (2) in calculating the requirements given in UG-18.1; (3) in calculating the requirements given in UG-18.1; (4) in calculating the requirements given in UG-18.1; (5) in calculating the requirements given in UG-18.1; (6) in calculating the requirements given in UG-18.1; (7) in calculating the requirements given in UG-18.1; (8) in calculating the requirements given in UG-18.1; (9) in calculating the requirements given in UG-18.1; (1) in calculating the requirements given in UG-18.1; (2) in calculating the requirements given in UG-18.1; (2) in calculating the requirements given in UG-18.1; (3) in calculating the requirements given in UG-18.1; (4) in calculating the requirements given in UG-18.1; (5) in calculating the requirements given in UG-18.1; (6) in calculating the requirements given in UG-18.1; (7) in calculating the requirements given in
Revisankaran G. Kostarev D. The permissible stress value shall be determined for the applicable material in Table ULT-23 at the operating temperature corresponding to the saturation temperature at MAWP of the warmest cryogenic fluid contained. DESIGN 40 UHT-16 Cv, Lateral Expansion, mils 20 Maximum Nominal Thickness, mm Figure UHT-6.12
Charpy V-Notch Impact Test Requirements GENERAL The rules in the following paragraphs apply specifically to the design of pressure vessels and vessel parts that are constructed of heat-treated steels covered by this Part and shall be used in conjunction with the general requirements for Design in Subsection A and in Subsection B, Part UW.
Anderson J. (i) Gas fired jacketed steam kettles with jacket operating pressures not exceeding 50 psi (345 kPa) may be constructed in accordance with Mandatory Appendix 9 except that: (a) partial jackets as shown in Fig.
permitted on layered sections; (b) provisions shall be made for extending layer vents through the jacket (see ULW-76). Nagel C. Nonferrous Metals — Nickel, Cobalt, and High Nickel Alloys . 521 ANSI/ASME B1.20.1 5th Ed., January 2007 Latest edition Marking and Labeling Systems Seat Tightness of Pressure Relief Valves ANSI/UL-969 API Std. In
no case shall the thickness of the reinforcement, including the nominal thickness of the vessel wall. Michael, Delegate R. Identification and Marking . Uebel E. Whittle C. Reichelt M. Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking
permitted without license from IHS xxvi Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 194 222 241 241 243 244 252 253 255 256 258 259 260 261 263 265 267 268 268 269 270 271 273 284 285 288 289 291 292 293 294 295 296 297 304 307 308 310 311 318 320 321 323 338 338 339
346 349 350 355 356 357 358 UIG-76-5 1-4 1-6 1-7-1 1-7-2 2-4 2-7.1 2-7.2 2-7.3 2-7.4 2-7.5 2-7.6 2-13.1 2-13.2 4-1 4-2 4-3 4-4 4-5 4-6 4-7 4-8 5-1 5-2 9-2 9-5 9-6 9-7 11-1 11-1M 11-2 11-2M 13-2(a) 13-2(b) 13-2(b) 13-2(c) 13-6 13-14(a) 13-14(b) 14-1 17-1 17-2 17-3 17-6 17-7 17-8 17-9 17-10 17-11 17-12 17-13 Tube Tension Test Specimen . Ramirez J.
Guglielmetti A. ... Kassar O.-S. (h) Clustered Indications. Nozzle information. 3 These requirements for design, fabrication, testing, and material for non-pressure-part attachment material. Seepage of UCL-55 GENERAL The provisions for marking and reports in UG-115 through UG-120
known. Paris, Alternate E. Ammerman, Vice Chair G. Meichler G. Gimple, Honorary Member F. These shall include, but not be limited to, normal operating, start-up, shutdown, cleaning, and upset conditions. In no case shall the pneumatic test pressure exceed 1.2 times the basis for calculated test pressure as defined in Mandatory Appendix 3, 3-2. 71
Concavity due to the welding process on the root side of a single-welded circumferential butt weld is permitted when the resulting thickness of the thinner member of the two sections being joined and the contour of the concavity is smooth. Gingrich K. (2) Based on the Committee's consideration, the
following classes of vessels are not included in the scope of this Division; however, any pressure vessel which meets all the applicable requirements of this Division may be stamped with the U Designator: (-a) those within the scope of other Sections; (-b) fired process tubular heaters; (-c) pressure containers which are
integral parts or components of rotating or reciprocating mechanical devices, such as pumps, compressors, turbines, generators, engines, and hydraulic or pneumatic cylinders whose primary function is the transport of
fluids from one location to another within a system of which it is an integral part, that is, piping systems; (-e) piping components, such as pipe, flanges, bolting, gaskets, valves, expansion joints, and fittings, and the pressure-containing parts of other components, such as strainers and devices which serve such purposes as mixing, separating, snubbing
distributing, and metering or controlling flow, provided that pressure-containing air the components or accessories; (-f) a vessel for containing water1 under pressure, including those containing air the components or accessories; (-f) a vessel for containing water1 under pressure.
exceeded: (-1) a design pressure of 300 psi (2 MPa); (-2) a design temperature of 210°F (99°C); (-9) a hot water supply storage tank heated by steam or any other indirect means when none of the following limitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (a) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unitations is exceeded: (-1) a heat input of 200,000 Btu/hr (58.6 kW); (a) See below. (b) The maximum unita
stress permitted in a given material used in a vessel constructed under these rules. xxxv Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ŏ19Þ
 ,`,,`--- requirements of the Code. Elias T. Each individual analysis for an element shall conform to the limits for product analysis limits of that specification. Basu P. Yes for additional toughness testing criteria. Schroeter,
Chair M. NOTES: (1) The yield stresses in compression and tension for cast ductile iron are not sufficiently different to justify an increase in the allowable stress for bending except as permitted in 2-8(a). Configuration a: UHX-12.5.7 Step 7. Udyawar T. (b) Base material with corrosion resistant integral or weld metal overlay cladding used in
constructions in which the design calculations are based on the base material thickness, exclusive of the thickness of the cladding material, may consist of any base material satisfying the requirements of UCL-10 and any metallic corrosion resistant integral or weld metal overlay cladding material of weldable quality that in the judgment of the user is
suitable for the intended service. Hansen J. Wasiluk K. Values of Knuckle Radius, r. Bell M. N08800, N08810, and N08811 Alloys (1) Pressure boundaries in vessels with design temperatures above 1000°F fabricated from UNS No. N08800 (Alloy 800), UNS No. N08810 (Alloy 800H), and UNS No. N08811 (Allo
1 ASME BPVC.VIII.1-2019 2-9 Table 2-7.1 Flange Factor F per Figure 2-7.4 is solved by Factor VL per Figure 2-7.5 is solved by Factor F per Figure 2-7.6 is then solved by Factor F per Figure 2-7.6 is then solved by Factor F per Figure 2-7.6 is then solved by Factor F per Figure 2-7.5 is solved by Factor F per Figure 2-7.6 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then solved by Factor F per Figure 2-7.8 is then
equal to 1. (13 mm) or less at the weld. (b) The allowable stress shall be that for Grade 9 material (i.e., SA-213 T9, SA-335 P9, or equivalent product specification) at the design temperature exceeding the maximum holding temperature is subjected to a final heat treatment
within the temperature range and for the time required in [Note (2)]. Swindeman X. 49 The minimum net flow area is the calculated net area after a complete activation of the rupture disk or pin device with appropriate allowance for any structural members which may reduce the net flow area through the device. Antaki R. 70 2.5 4 2 1.5 1. Morishita,
Contributing Member G. (1) Configuration a tubesheets may have no extension or an unflanged extension. Dunn, Alternate I. Some standards which define applicable load combinations do not permit an increase in allowable stress, however a load reduction factor (typically 0.75) is applied to multiple transient loads (e.g., wind plus live load, seismic
Table 2-5.2): (a) when bo ≤ 1/4 in. Tompkins J. The materials in Tables UHA-32-1 through UHA-32-7 are listed in accordance with the Section IX, Table QW-432 and are also listed in Table UHA-32. Any relevant linear indication greater than 1/16 in. ULW-51 INNER SHELLS AND INNER HEADS Category A
and B joints in the inner shells of layered shell sections, and in the inner heads of layered heads before application of the layers, shall be examined throughout their entire length by radiography and meet the requirements of UW-51. Manufacturer's Supplementary Data Report for Graphite Pressure Vessels . (75 mm) nominal inside diameter or larger,
and 1/4 in. If this part were completely removed, the pressure vessel would not be able to contain the design and/or hydrostatic or pneumatic test pressure within the allowable stress limits. Shores, Contributing Member Subgroup on Design and Materials (BPV XIII) D. Asayama R. UG-22 UCS-23 UNF-23.1 through UNF-23.5 UHA-23 UCI-23
LOADINGS The loadings to be considered in designing a vessel shall include those from: (a) internal or external design pressure (as defined in UG-21); (b) weight of attached equipment, such as motors, machinery, other vessels, piping,
linings, and insulation; (d) the attachment of: (1) internals (see Nonmandatory Appendix D); (e) cyclic and dynamic reactions due to pressure or thermal variations, or from equipment mounted on a vessel, and mechanical loadings; (f) wind, snow, and
Low Alloy Steels — P-No. 10A. Guzman-Leong K. The use of these details does not relieve the Manufacturer of design responsibility with regard to consideration, thermal cycling, etc., as defined by the user. Table ULT-82
Minimum Tensile Strength Requirements for Welding Procedure Qualification Tests on Tension Specimens Conforming to Section IX, Figures QW-462.1(a) Through QW-462.1(e) SA-333 Grade 8; SA-533 Grade 8; SA-534; SA-522, Customary Units SA-645, Customa
Ring gasket shown L Ring gasket shown L Ring gasket shown 2B 0.7t min. Supplemental marking shall be required for, but not limited to, the following: (-b) If the expansion joint analysis does not include thermal expansion effects UHX-19.2.1 Common Elements. See also ASME PTB-4-2012, example 3.3. Comparison of pressure-temperature or stress-
temperature coincident ratios may also be used as noted in Figure UCS-66.1. See Section II, Part D, Nonmandatory Appendix A, A-200. Click here for a printer-friendly version of a Brochure, which details all 12 BPVC-2019 Sections, plus ASME's portfolio of related BPVC offerings. -- `,`
(BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS 270 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 Figure ULW-54.2 --`,
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(BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ULW-75 - ULW-78 ASME BPVC.VIII.1-2019 FABRICATION ULW-75 (d) After weld preparation and before welding
circumferential seams, the height of the radial gaps between any two adjacent layers shall be measured at the ends of the layered shell section or layered shell section at right angles to the vessel axis, and also the length of the relevant radial gap in inches shall be measured [neglecting radial gaps of less than 0.010 in. ULW-52 LAYERS — WELDED
JOINTS 1 (a) Category A joints in layers 4 in. Inserted "+..." and "...+" in eqs. Requirements for the Image Quality Indicator . by this Division. (b) Category A weld joints of adjacent layers are separated circumferentially by a distance of at least
five times the layer thickness. Schiavi, Jr., Contributing Member P. Some Representative Configurations Describing the Reinforcement Dimension t e and the Opening Dimension d. (1) Calculate the largest equivalent unsupported buckling length of the tube \(\ell \) t considering the unsupported tube spans \(\ell \) and their corresponding method of support k.
UHT-86 MARKING ON PLATES AND OTHER MATERIALS Any steel stamping shall be done with "low stress" stamps as commercially available. Bankston, Jr. W. If φ is less than β, then (-h) Calculate the value of internal pressure expected to result in knuckle failure, P c k. Matthews B. 93 The coefficients of these formulas include a factor that
effectively increases the allowable stress for such construction to 1.5S. 3Y Y Taper line Y tL tS Welds optional (d-1) Details of Taper for Layers Over 5/8 in. Alternatively, the maximum allowable external pressure for tubes with integral fins may be established under the rules of Mandatory Appendix 23. (b) Nonmandatory Appendix UNF-
Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UNF-12 - UNF-23 ASME BPVC.VIII.1-2019 (c) For vessels constructed of UNS N06625, all Category A and B joints shall be Type No. (1) or No. (2) of Table UW-12. Tang L. The use of the rigidity index does not guarantee a leakage rate within established limits.
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(f) This procedure may only be used once for each iteration of tubesheet, shell, and channel thicknesses are allowed and the nominal weld deposit thickness shall not exceed 0.5 in. When the thickness of the base material requires postweld heat treatment, it shall be performed after the application of corrosion resistant lining unless exempted by the Notes of Tables UCS-56-1 through UCS-56-11. 21 It is recommended that a suitable margin be provided when establishing the maximum allowable external working pressure to allow for pressure to allow for pressure to allow for the tubes. Applicability of These Standards . Vattappilly K. Erickson T. Added materials in Table UHA-23 with footnote giving the correspondence between grades and types of materials. Y-6.1(12) of Y-6.1. 716 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 107

Contributing Member K. After reheat treatment, new sets of specimens shall be made and retested; all specimens must meet the lateral expansion value of 0.015 in. Finney, Chair J. Kashima V. Shupert C. Koo, Chair S. (3) Materials for standard pressure parts shall be as follows: (-a) as permitted by this Division or (-b) as specifically listed in the ASME

Where the flanges are identical dimensionally and have the same elastic modulus E, but have different allowable stresses S f, the assembly may be analyzed as a Class 1 assembly, provided the calculated stresses are evaluated against the lower allowable stresses. Symbols Do, E\*,  $\mu$ ,  $\mu$ \* and  $\nu$ \* are defined in UHX-11. Kim J.-S. O'Donnell, Sr.,

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TP304L TP304H TP304N TP309S TP310H TP310Cb TP310Cb TP310Cb TP310Cb TP310Cb TP310Cb TP310Cb TP310L Spec. 30 20 UHT-17 0 1.0 2.0 3.0 4.0 Maximum Nominal Thickness, in. (c) Titanium or Zirconium. Some Acceptable Types of Small Standard Fittings. U-Shaped Unreinforced and Reinforced Bellows Manufacturing Tolerances
 . SERVICE RESTRICTIONS Cast iron vessels shall not be used for services as follows: (a) to contain lethal83 or flammable substances, either liquid or gaseous (b) for unfired steam boilers [see U-1(g)(1)] (c) for direct firing [see UW-2(d)] UCI-3 GENERAL UCI-12 BOLT MATERIALS The requirements for bolts, nuts, and washers shall be the same as for
 carbon and low alloy steels in UCS-10 and UCS-11. Hydrostatic Test. Cockerham, Contributing Member R. See Section II, Part D, Nonmandatory Appendix A, A-451. If desired, the effect of this distance may be achieved by temporary attachment of suitable thermal buffers. Rules pertaining to the use of the U, UM and UV ASME Product Certification
 P. Yan N. For t greater than 2 in. General Advisory Information on the Characteristics of Pressure Relief Devices Discharging Into a Common Header . Mruk, Secretary A. Faransso, Contributing Member J. (6 mm), whichever is less nominal thickness of nozzle 3 244 Copyright ASME International (BPVC) Provided by IHS under license with ASME No. 1 (6 mm), whichever is less nominal thickness of nozzle 3 244 Copyright ASME International (BPVC) Provided by IHS under license with ASME No. 2 (6 mm), whichever is less nominal thickness of nozzle 3 244 Copyright ASME International (BPVC) Provided by IHS under license with ASME No. 2 (6 mm), whichever is less nominal thickness of nozzle 3 244 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME No. 2 (6 mm), whichever is less nominal thickness of nozzle 3 244 Copyright ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under license with ASME International (BPVC) Provided by IHS under
 reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHT-27 - UHT-32 ASME BPVC.VIII.1-2019 ŏ19Þ insignificant load such that a stress calculation in the designer's judgment is not required; examples include nameplates,
 insulation supports, and locating lugs. I = pt 3/12 for vessels with reinforcements that do not extend around the corners of the vessel [see Figure 13-2(a), sketches (5) and (6)]. Is WPS qualified with impact tests? The Code is not a handbook and cannot replace education, experience, and the use of engineering judgment. Pitts S. Q. Montgomery G. 702
Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT NN-4 - NN-6 ASME BPVC.VIII.1-2019 NN-4 COMMON SCENARIOS INVOLVING THE "USER" OR "DESIGNATED AGENT" RESPONSIBILITIES (1) Given (-a) an organization that requires a pressure vessel (-b) an agent acting on behalf of the
organization (-c) a Manufacturer that can provide a pressure vessel (2) Actions (-a) The organization appoints an agent to act on its behalf. (c) The designer may consider the tubesheet as simply supported in accordance with UHX-12.6. UHX-12.5 Configurations a, e, and f: Configurations b, c, and d: For each loading case, calculate moment MTS due
to pressures Ps and Pt acting on the unperforated tubesheet rim. Monte M. (75 mm). Creaser — New Brunswick, Canada J. Hakii W. Reynolds Special Working Group on High Temperature Technology (TOMC) D. (-f) If no spring-loaded rods are used on the floating end, only Loading Cases 1 through 4 shall be considered; otherwise, all the loading
cases shall be considered. Jayabalan P. Nenstiel, Alternate M. Hansen INTERNATIONAL INTEREST REVIEW GROUP V. Welded Stayed Construction . Test Data Record . When welding is performed it shall meet the following: (-a) the
requirements of UW-26(a), UW-26(b), and UW-26(c) and UW-26(c) and UW-26(c) and UW-26(c) and UW-26(c) and UW-26 through UW-40, or; (-b) the welding requirements of ASME specification SA-234. The Inquirer should propose a Reply that clearly and concisely answers the proposed Inquiry question.
 shell- and-tube heat exchangers. Mitchell P. Limits of Reinforcement . Lam S. thickness of vessel wall: (a) design thickness and the corrosion allowance (see UG-25). For each loading case, calculate moment M* acting on the unperforated tubesheet rim. (a) The maximum allowable working pressure of identical cast
ductile iron vessels, based on testing one of them to destruction in accordance with UG-101(m), shall be where f = casting quality factor as defined in UG-24, which applies only to identical cast ductile iron vessels put into service P B = destruction test pressure P R = maximum allowable working pressure of identical cast ductile iron vessels
MARKING AND REPORTS UCD-115 The provisions for marking and preparing reports in UG-120 shall apply without supplement to vessels constructed of cast ductile iron. UHX-14.5.6 Step 6. Spletter, Contributing Member Special Working Group on General Requirements Consolidation (SG-GR) (BPV III) J. 819 Table U-3 Year of
 Acceptable Edition of Referenced Standards in This Division Title Number Year Pressure Relieving and Depressuring Systems Pipe Threads, General Purpose (Inch) ANSI/API Std. Hemispherical Heads . DeMichael J. Paulick M. When the prefabricated or preformed parts are furnished with a nameplate that contains product identifying marks and the prefabricated or preformed parts are furnished with a nameplate that contains product identifying marks and the prefabricated or preformed parts are furnished with a nameplate that contains product identifying marks and the prefabricated or pre
 nameplate interferes with further fabrication or service, and where 10 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT (-a) a Certificate
 Holder (-b) a pressure parts manufacturer (2) Parts of small size falling within this category for which it is impossible to obtain identified material or that may be stocked and for which it is impossible to obtain identified material or that may be stocked and for which it is impossible to obtain identified material or that may be stocked and for which it is impossible to obtain identified material or that may be used for parts as described in UG-4(b). Wang Z. Grubb S.
Configurations a, e, and f: A cylindrical channel shall have a uniform thickness of tc for a minimum length of adjacent to the tubesheet. Shepherd, Contributing Member M. Calculate the shell axial stiffness, K s; tube axial stiffness, K s r; and stiffness, K s; tube axial stiffness, K s; tu
Proceed to UHX-13.5.9. (b) Calculate the average shear stress, τ . 3. Polynomial Coefficients α i for the Determination of C p When C 1 > 0.3 . When eq. Replaced "pressure welding processes" in UW-9(a) and UW-12(f) with "permitted welding processes in UW-27(a) that include the application of pressure." Revised UW-9 and UW-12 to correct the
paragraph references to the revised UW-27 paragraphs. Poehler S. F s need not be taken as greater than 2.0. (-b) When P e = 0, F s = 1.25. Modifications of these methods are outlined in 2-9 and 2-10 for the design of split and noncircular flanges.
 head rules shall be used when the head is attached directly to the tubesheet and there are no cylindrical sections between the head and the tubesheet. Gilston J. Karpanan A. Kim S. Nomenclature . When evaluating the size of an indication, the tail shall be included. (d) X2CrNiN18-10 shall be considered as Type 304LN. Ultrasonic Examination
Marking and Reports . Bell J. (b) This Division is divided into three Subsections, Mandatory Appendices, and Nonmandatory Appendices in clude, but are
 not limited to, those shown in Figure UIG-36-2. acceptance by the Inspector, accepted by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed a subject in accordance with his duties as required by the Inspector has reviewed as subject in accordance with his duties as required by the Inspector has reviewed as subject in accordance with his duties as required by the Inspector has reviewed as subject in accordance with his duties as required by the Inspector has reviewed as subject in accordance with his duties as required by the Inspector has reviewed as subject in accordance with his duties as required by the Inspector has reviewed as a subject in accordance with his duties as required by the Inspector has reviewed as a subject in accordance with his duties as required by the Inspector has reviewed as a subject in accordance with his duties as required by the Inspector has reviewed as a subject in accordance with his duties as required by the Inspector has reviewed as a subject in accordance with his duties as required by the Inspector has reviewed as a subject in accordance with his duties as required by the Inspector has reviewed as a subject in accordance with his duties as a subj
 Ahee T. (c) When pressure parts of two different P-Number groups are joined by welding, engineering judgment shall be applied when selecting the postweld heat treatment temperature and holding time to produce material properties suitable for the intended service. Mikitka C. NPS 4 Pipe Jacket. Wilson N. Swindeman, Contributing Member E.
Markings such as "ASME," "ASME Standard," or any other marking including "ASME" or the ASME Single Certification Mark shall not be used on any item that is not constructed in accordance with all of the applicable requirements of the Code. Sutherlin Task Group on U-2(g) (BPV VIII) D. Newell, Jr. J. The inner shell or inner head thicknesses need
not be radiographed in thicknesses over 7/8 in. Levy K. Park B. Official Certification Mark to Denote the American Society of Mechanical Engineers' Standard . P-No. 11 Groups . For shell side vacuum, use a negative value for P s . Clow R. The net flow area for sizing purposes shall not exceed the nominal pipe size area of the rupture disk device.
Hantz, Chair T. Tested Tensile Strength, psi (MPa) Sample No. At Room Temperature At Maximum Material Temperature Permissible deviation ±20% ±20% UIG-6, minimum value, psi (MPa) 1,500 (10.3) 900 (6.2) 1 2 3 4 5 6 7 8 9 10 Average, psi (MPa) Test deviation in % from average value Certified by Date (07/15) 371 Copyright ASME
the most severe indication detected by other examination methods. The gap area Ag shall not exceed the thickness of a layer expressed in square inches. (3) attaching extended heat-absorbing fins to pipe and tube materials by electric resistance welding, provided the following requirements are met: (-a) a maximum pipe or tube size of NPS 4 (DN
 100) (-b) a maximum specified carbon content (SA material specification content, except when further limited by the purchaser to a value within the specification limits) of not more that 0.15% (-c) a maximum fin thickness of 1/8 in. (50 mm) Up to 2 in. Rodriguez E. Brumovsky F. Gionta D. (b) Design Conditions (1) Operating Conditions. (-
29°C)? When the base material with corrosion resistant integral cladding conforms to one of the specifications listed in UCL-11(a), or consists of an acceptable base material with corrosion resistant weld metal over the weld in the base material to restore the cladding
the design calculations may be based on a thickness of the base material plus Sc/Sb times the nominal thickness of the cladding after any allowable stress value for the base material at the design temperature S c = maximum allowable stress
 value for the integral cladding at the design temperature, or for corrosion resistant weld metal overlay cladding, that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximates that of the wrought material whose chemistry most closely approximate whose chemistr
the judgment of the user is suitable for the intended purpose. Hassan G. Klug — City of Milwaukee, Wisconsin K. (1 120 min.) 2,010 min. UNF-A-9 GAS WELDING The commonly used gas processes for welding aluminum-base materials employ oxyhydrogen or oxyacetylene flames whereas only the
 latter produces sufficient heat for welding the copper-base and nickel-base alloys. Arc-Spot-Welded Two-Layer Assembly . (4) The thermal or mechanical shock loadings are not a controlling design requirement. In no case shall such stresses exceed the allowable stress values given in Section II, Part D, Subpart 1, Table 3 for cold worked bar stock. The
shell-to-flange attachment of integral type reverse flanges may be attached as shown in Figure 2-4, sketches (5) through (11), as well as Figure UW-13.2, sketches (a) and (b). Deubler P. For flexible elements to be formed, this surface inspection shall be after forming. Stenrose — Michigan R. (2) The Certificate Holder's Quality Control System
provides for the following activities associated with subcontracting of welding operations, and these provisions shall be acceptable to the Manufacturer's Authorized Inspection Agency: (-a) the welding operations (-c) Authorized Inspection activities (-d) placement
 of the Certificate Holder's marking in accordance with UG-11(d)(8) (3) The Certificate Holder's Quality Control System provides for the requirements of UG-92 to be met at the subcontractor's facility. Removed W, P, B, and RES from the table in G-116(b)(1). Highlands K. For dual metal cylinders conforming to SA-667 or SA-748, the maximum
calculated stress, including all applicable loadings of UG-22, shall not exceed the allowable stress given in Table UCI-23 computed on the basis of the gray cast iron thickness of the elastic buckling stress, S e . (b) \ell \ge 3Y, where \ell is required length
of taper and Y is the offset. UHX-3 TERMINOLOGY UHX-3.1 U-Tube Heat Exchanger with one stationary tubesheet attached to flat covers, flanges, or other components where the length of cylinder, if present, is less than 1.4, the required reinforcement shall be at
least equal to that indicated by the following formula: 82 F Any additional area of reinforcement that is required shall be situated within a distance of from the junction of Welded Joints. Swindeman, Contributing Member F. Proceed to UHX-14.5.10
 141 143 145 145 146 146 v Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT. Sampling. Oishi J. (b) The symbols used in the
 equations of this paragraph are defined as follows: A B C L Mo = = = = outside diameter of flange bolt circle, diameter inside spherical or crown radius the total moment determined as in 2-6 for heads concave to pressure; except that for heads of the type shown in Figure 1-6, sketch
(d), HD and hD shall be as defined below, and an additional moment Hrhr (which may add or subtract) shall be included where HD = axial component of the flange ring = 0.785 B 2P hD = radial distance from the bolt circle to the inside of the flange ring Hr = radial component of
2019 1-6 Figure 1-6 Dished Covers With Bolting Flanges Hemispherical head Toriconical head
Information Refer to pertinent supplementary documents Foreword, second paragraph ... Overpressure protection UG-125(a)(2) ... UG-140(b)(3) ... W-5.3 ... M-5.7(b)(3) ... W-5.8 ... M-10(a) ... W-10(b) ... UG-35.2(c)(6) ... UG-35.2(c)(6) ... UG-140(b)(3) ... UG-140(b)(5) ... UG-140(b)(5) ... UG-125(a)(6) ... UG-140(b)(6) ... UG-
 35.3(c)(3) UG-35.2(b)(8) UG-35.3(b)(6) UG-35.3(b)(5) Provides reference to Nonmandatory Appendix FF that covers installation, operational, and maintenance recommendations for the user FF-1 ... FF-5 ... FF-5 ... FF-5 ... FF-5 ... FF-5 ... FF-7 ... FF-8 ... FF-8 ... FF-8 ... FF-8 ... FF-9 ...
UCL-12 ... UCL-25(a) ... UHX-13.4 ... UHX-13.8.1(c) ... UHX-13.8.1
 User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT NN-6 ASME BPVC.VIII.1-2019 Table NN-6-2 Matters of Agreement Between the User and the Manufacturer Responsibility Code Reference Additional Information ... Use of calculated test pressure UG-99(c) Permit painting or coating of pressure-retaining welds prior to hydrostatic
 pressure test UG-99(k) Document permission on Form U-DR-1 or Form U-DR-1 or Form U-DR-1 or Form U-DR-2 Welded joints examined by sectioning UW-41 ... Weld repair UW-51(b) ... Postweld heat treatment UNF-56(b) ...
 UNF-56(d)(1) Weld metal composition UCL-32 Flange rigidity 2-14(b) Weld repair UW-51(b) ... Postweld heat treatment UNF-56(d)(1) ... Weld metal composition UCL-32 Flange rigidity 2-14(a) ... See also 2-14(a) ... Table NN-6-3 The Manufacturer's Responsibility to the User Responsibility --
 `-`,,`,,`,`,`,` and maintenance requirements to the user in the form of recommendations Nonmandatory Appendix FF ... Manufacturer's submittal of data report to the user UG-120(a)(3)(-a) ... Quality control system 10-1 ... Table NN-6-4 Recommendations to
 the User Responsibility Code Reference Additional Information Conditions of service UNF-4 ... Fabrication Nonmandatory Appendix FF Covering of pressure relief devices for fire conditions M-13(a) ... Quick-opening closures Nonmandatory Appendix FF Covering
 installation, operational, and maintenance guidance for the user in the form of recommendations 706 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019
 13:29:04 MDT ASME BPVC.VIII.1-2019 NN-6 Table NN-6-5 Responsibilities of the User or His Designated Agent Responsibility Code Reference Selection of code rules Foreword Establish design requirements U-2(a) Additional Information ... See also 1(b) of "Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees" in 13:29:04 MDT ASME BPVC.VIII.1-2019 NN-6-5 Responsibility Code Reference Selection of code rules Foreword Establish design requirements U-2(a) Additional Information ... See also 1(b) of "Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees" in 13:29:04 MDT ASME BPVC.VIII.1-2019 NN-6-5 Responsibility Code Reference Selection of code rules Foreword Establish design requirements U-2(a) Additional Information ... See also 1(b) of "Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees" in 13:29:04 MDT ASME BPVC.VIII.1-2019 NN-6-5 Responsibility Code Reference Selection of code rules Foreword Establish design requirements U-2(a) Additional Information ... See also 1(b) of "Submittal Of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees" in 13:29:04 MDT ASME BPVC.VIII.1-2019 NN-6-5 Responsibility Code Reference Selection of Code Reference Selection
 the front matter U-2(a)(1) ... U-2(a)(2) ... U-2(a)(2) ... U-2(a)(3) ...
or His Designated Agent and the Manufacturer NN-6 ASME BPVC.VIII.1-2019 ŏ19Þ Table NN-6-7 The Manufacturer's Responsibility to the User or His Designated Agent Responsibility Code Reference Additional Information ... Obtain all applicable design requirements U-2(b)(2) Submit data reports UG-120(a)(1)(-b) Vessels manufactured for stock;
 see also Table W-3, Reference No. (3) UG-120(c)(1)(-a) ... UCS-56(f)(1) ... UNF-56(d)(3)(-a) ... Supplemental marking UHX-19.2 ... Obtain approval before making casting repairs 7-4(d) ... Prior notification of weld repair Table NN-6-8
 Recommendations to the User or His Designated Agent Responsibility Code Reference Assure himself regarding materials of construction Additional Information ... UG-4(f) Table NN-6-9 Cautionary Advice Provided to the User Responsibility General Code Reference U-2(a) Additional Information Input from Manufacturer U-4(d)(2) Units of
 [Note (3)] UG-127(a)(3)(-c)(-1) [Note (4)] UG-135(b)(2) [Note (5)] 11-2 See in-text Note in 11-2(a) M-10(b) ... 5-1(d) ... NOTES: (1) For additional information, see endnote.52 (4) For additional information, see endnote.54 (5) For additional information, see
 NN-6-10 Guidance Code to Users and Their Designated Agents Responsibility Code Reference Additional Information Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees" in the front matter ... Guidance to accommodate deflagration loadings H-1 ... Design criteria selection
 for deflagration loadings H-4.1 ... Guide for preparing user's design requirements Nonmandatory Appendix KK ... Forms U-DR-1 and U-DR-2 ... Table NN-6-11 User-Manufacturer Rules Responsibility Code Reference Additional Information Inspection by user-inspector UG-91(a)(2) ... User's inspector marking UG-116(a)(1)(-a) ... Table W
 `,`,`,",-'-',,",-'-',,",--'-',,",--- 709 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,``
 ",,",","," --- INTENTIONALLY LEFT BLANK Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 ENDNOTES 1 The water
 by the Manufacturer with the concurrence of the Authorized Inspector. (19 mm to 50 mm), Inclusive (a) Random Rounded Indications [See Note (1)] 1 in. Roberts J. Rules for the Design of U-Tube Tubesheets . Yes Production toughness testing is not required. Magnetic Properties . Nagel F. 8 Pipe and tubing fabricated by fusion welding, with filler
 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UIG-77 Figure UIG-76-5 Tube Tension Test Specimen Graphite tube material without cement joint 15 deg reference 2.000 reference 2.000 reference 2.000 reference 2.000 reference 2.000 reference 2.000 reference 2.500 reference 2.500 reference 3.000 reference 2.000 reference 2.000 reference 2.000 reference 2.000 reference 2.000 reference 3.000 re
 area geometry at discretion of manufacturer GENERAL NOTES: (a) All dimensions are in inches. Show the Corrosive Service. Knowles, Vice Chair D. UNF-23.1 through UNF-23.5
A tabulation of allowable stress values at different temperatures is given in Section II, Part D, Subpart 1, Table 3. When agreed to by the material specification, test specimens may be machined from specially forged test blocks meeting the provisions provided in SA-266 or other similar specifications for
 suitable for the intended service both with respect to corrosion and to retention of satisfactory mechanical properties during fabrication. Hill III R. (a) When required, pressure parts shall be postweld heat treated in accordance with the rules
 prescribed in UCS-56, UG-85, UW-10, UW-40, and UHT-56; however, layered vessels or layere
VIII provides requirements applicable to the design, fabrication, inspection, testing, and certification of pressure vessels operating at either internal or external source or by the application of heat from a direct or indirect source, or
 any combination thereof. These rules provide an alternative to the minimum requirements for pressure vessels under Division 1 rules. In comparison the Division 1 rules. In comparison the Division 2 requirements on materials, design, and nondestructive examination are more rigorous; however, higher design stress intensify values are permitted. Division 2 rules cover
only vessels to be installed in a fixed location for a specific service where operation and maintenance control is retained during the useful life of the vessel by the user who prepares or causes to be prepared the design specifications. These rules may also apply to human occupancy pressure vessels typically in the diving industry. Rules pertaining to
the use of the U2 and UV ASME Product Certification Marks are also included. The urgency of the Code Case (e.g., project underway or imminent, new procedure) should be described. The required area of reinforcement shall be at least equal to that indicated by the following formula when Qs is in compression: where F L = PM + f1 tan \(\alpha \) M = Step
2. (f) Do not disturb the impression. Pressure Differentials for Pressure Relief Valves . (6 mm) nominal thickness of shell or head 0.7t n or 1/4 in. Inquiries concerning the interpretation of the Code are to be directed to the Committee. Wielgoszinski F. Sa used in eq. 9 The pressure differential method is described in "Materials Research Standards,"
Vol. If Pck/1.5 is less than the required internal design pressure P, then increase the thickness and repeat the calculations. (b) The elastic moduli, yield strengths, and allowable stresses shall be taken at the operating metal temperature of the component under consideration for
operating condition x. Revised UG-18 and added new UG-84(g)(6), addressing requirements for toughness testing and acceptance criteria for weld metal and HAZ test specimens when qualifying a WPS for joining dissimilar metals where WPS qualification with toughness testing is required. (5 mm) and the maximum thickness of the base metal at
 welds shall be 2 in. Roos J. 417 417 417 417 417 417 Mandatory Appendix 5 5-1 5-2 5-3 5-4 5-5 5-6 Flexible Shell Element Expansion Joints General. Davenport A. For each of these conditions, the following loading cases shall be considered to determine the effective pressure, P e, to be used in design formulas: (-1) Design Loading Cases. Typical
 imperfections detectable by this method are cracks, seams, laps, cold shuts, and laminations. Byk, Staff Secretary T. Certification of Capacity of Pressure Relief Devices . Wiger Y. They are intended to help the manufacturer in ordering the correct material, and in fabricating it, and to help the
 Table UW-12. (8 mm) through 5/8 in. 310 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UHX-13.5.9 ŏ19Þ Figure
UHX-13.5.7-2 Fm Versus Xa (-0.8 \le Q \ 3 \le 0.0) 0.4 \ Q3 = -0.5 \ 0.2 \ Q3 = -0.5 \ 0.2 \ Q3 = -0.5 \ 0.2 \ Q3 = -0.4 \ Q3 = -0.2 \ 0.1 \ Q3 = -0.3 \ Q3 = -0.4 \ Q3
values of v * . Calculate shell coefficients β s , ks, λ s , and δ s . viii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS .. vessel Manufacturer: any Manufacturer who constructs an item such as a pressure vessel, vessel component, or part in accordance
 with rules of this Division and who holds an ASME Certificate of Authorization to apply the Certification Mark and the appropriate Designator to such an item. Thickness of Shells Under External Pressure . (a) Parts, material, finished joints, and completed vessels shall be visually examined by the Manufacturer over the full surface to detect defects.
Nozzle and Communicating Chambers Weld Joints . Wu, Contributing Member Working Group on General Requirements (BPV III-4) D. If the tube side is the higher- pressure side, Pt shall be the tube side design pressure and Ps shall be Pt less the differential design pressure. Heads Attached to Shells . (d) Entire vessels, after completion of all welding
 operations, may be quenched by sprays or immersion. Calderon V. Yes No 20 F Cyclic Service: Yes No 18 F Heads Int. W. (1) For a circular nozzle with d greater than 30% of 1 D, no part of d may be located within 1.8(Dt) /2 of the adjacent tubesheet face (see Figure UHX-4-1). Smith, Contributing Member xlviii Copyright ASME International (BPVC)
 Provided by IHS under license with ASME No reproduction or networking Group on In-Vessel Components (BPV III-4) Working Group on Design (BPV III-2) N.-H. (b) In addition to the testing
 requirements in Table UIG-84-1, all graphite components for lethal service, excluding tubes, shall be tested per UIG-84 requirements at room temperature to determine mechanical properties. Schaaf, Jr. S. In the case of welded flanges, shown in Figure 2-4, sketches (3), (4a), (4b), (4c), (7), (8), (8a), (9a), (10), and (10a) where the nozzle
neck, vessel, or pipe wall extends near to the flange face and may form the gasket contact face, the shearing stress shall be calculated on the basis of W m 1 or W m 2 as defined in 2-3, whichever is greater. The materials listed in Tables UNF-23.1 through UNF-23.5, together with
 deposited weld metal within the range of composition for material in that Table, do not undergo a marked drop in impact resistance at subzero temperature. (1) The thickness referred to in UCS-56 and UHT-56 is the thickness of one layer. primary stress: a stress developed by the imposed loading that is necessary to satisfy the simple laws of
 equilibrium of external and internal forces and moments. (c) No production cementing shall be undertaken until after the cementing procedures and the cementing technicians to be used in production, the test is conducted as
 prescribed in (b) and (c) above. Swezy, Jr. J. Ren M. Danzy, Contributing Member A. (75 mm) nominal inside diameter, but in no case less than the thickness required by UIG-27 or UIG-28 as appropriate. (c) This procedure applies to Configuration a when \sigma s \leq SPS,c and \sigma s \leq SPS,c and \sigma s \leq SPS,c. (f) Creep and Temperature Effects. Plate With Multidiameter Hole
 Pattern . Its rules and guidelines originated in the world's leading industrial nations; their fundamentals are applied worldwide. The BPVC is intended to supplant or replace decisions or practices of competent engineers. Hembree C. Roza C. The test method shall permit easy visual
 detection of any leakage such as immersion of the tube under water or a pressure differential method.9 (-b) an individual tube hydrostatic test in accordance with UG-99 that permits complete examination of the tube for leakage. Configuration e: Step 4. Using the selected values of t and R, calculate the value of factor A using the following equation:
Step 2. Hoskinson W. Show Body Flange information. Sommerville T. Mokhtarian, Contributing Member S. West, Honorary Member C. The liquid penetrant method in accordance with Mandatory Appending cases, if \sigma s \leq
 1.5Ss, and for the operating loading cases, if \sigma s \leq SPS,s, the shell design is acceptable, and the calculation procedure is complete. Zeuthen, Honorary Member Executive Committee (BPV II) J. (-d) Tubesheet thickness to tube pitch ratio (h/p) shall be greater than or equal to 2.0. (-e) Both tubesheets shall be certified impregnated graphite material.
 Wodke G. Choi J. (2) Separate Test Coupons. GENERAL The selection of the proper metal composition to resist a given corrosive medium and the scope of this Division. If σ t , m i n is positive, skip this step and proceed to Step 10. McCauley N.
 Design Seating Stress y, psi (MPa) Sketches Facing Sketch and Column in Table 2-5.2 0 0 (0) Elastomers without fabric or high percent of mineral fiber: Below 75A Shore Durometer 75A or higher Shore Durometer 75A or higher Shore Durometer 75A or higher Shore Durometer 0.50 1.00 0 (0) 200 (1.4) (1a), (1b), (1c), (1d), (4), (5); Column II Mineral fiber: Below 75A Shore Durometer 75A or higher Shore Durometer 0.50 1.00 0 (0) 200 (1.4) (1a), (1b), (1c), (1d), (2d), (
 Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT. Lindberg, Chair C. Nomura J. Tubes, and Pipe When Used as Tubes or Shells. The outside diameter of the largest circle, concentric with the bore, inscribed entirely within the outside
 edges of the flange. Elias, Contributing Member D. Examples of Multiple Openings . For such cases, U-2(g) shall apply. Wichman, Honorary Member Working Group on Core Support Structures (SG-CD) (BPV III) J. McGlone Subgroup on Materials, Fabrication, and Examination (BPV III) E. Varghese, Chair R. (b) The Manufacturer shall qualify the
Certified Material Specification (CMS) using the Certified Material Qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable Flanges for Layered Shells . Pyne P. (d) The essential variables to be included in the qualification (CMQ) form. Some Acceptable F
 `--- (e) The tube side and shell side pressures are assumed to be uniform. Liquid Penetrant Examination . Solovey, Chair D. (19 mm), as
defined in UW-40(f), and all martensitic chromium steel welds shall be examined for the detection of cracks by the liquid 319 Table UHA-32-7 Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 45 Material Normal Holding Temperature, °F (°C), Minimum ... P-No. 45 Minimum Holding Time at Normal Temperature for Nominal
BPVC.VIII.1-2019 UIG-77 Figure UIG-76-3 Tube-to-Tubesheet Tension Test Specimen Graphite tube material without cement joint 15 deg reference 2.000 reference 2
 by and Ec by . Stakenborghs J. (a) Tubes: Only at time of certified material qualification, thereafter calculated property based upon specific relationship with flexural strength tests. (a), cross-reference revised (07-799, 09-1776, 17-2082) 213 UHA-31 Revised (09-716) 213 UHA-32 Subparagraphs (a), (b), and (c)
 revised (15-698, 16-2462, 17-2194) 217 Table UHA-32-3 General Note (b) added (17-1200) 217 Table UHA-32-3 General Note (b) added (18-1198) 219 UHA-34 Revised (17-1344) 220 UHA-44 Subparagraph (a)(1) revised (16-2090) 223 UHA-51(d)(3) Paragraph after subpara. (7) Welding materials
 with the equivalent roomtemperature tensile strength as that of quenched and tempered steels shall be used. (3 mm) DISSIMILAR WELD METAL The difference between the coefficients of expansion of the base material and the weld should receive careful consideration before undertaking the welding of ferritic type stainless steels with austenitic
 electrodes for services involving severe temperature conditions, particularly those of a cyclic nature. (-b) The designated agent develops a specification using Code requirements and duidelines, including matters of agreement between the organization, the designated agent, and the Manufacturer. Bowers, Chair M. (c)
The Manufacturer shall designate qualified personnel for Visual Examination. Revised UG-99(k)(3) and UG-100(e)(3) to clarify the requirement for pressure testing prior to installation of linings in vessels for lethal service. You will find this book very useful. (1) Mechanical Loads Only. Nelson D. For the circumferential stiffening ring only, 33 p. At the
 small end of the cone-to-cylinder juncture, the PRs/2 term is in compression. Williams D. The locations of these additional spots shall be determined by the Inspector or fabricator as provided for the original spot examination. 475 476 478 478 14-1 14-2 14-3 14-4 Integral Flat Heads With a Large, Single, Circular, Centrally Located Opening
 (f) These rules assume that an expansion joint, if present, is located in the size of tanks and provision for forced circulation shall be such as to produce a severity of quench in the quenched item sufficient to meet, in representative test specimens after tempering
 the requirements of the materials specifications. Dobson J. 701 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,``,`,`,`,`,`
 .`,,`--- MM-1 NN-1 - NN-3 ASME BPVC.VIII.1-2019 NONMANDATORY APPENDIX NN GUIDANCE TO THE RESPONSIBILITIES OF THE USER AND DESIGNATED AGENT NN-1 INTRODUCTION (4) See Tables NN-6-1 through NN-6-11 for a full listing of paragraphs covering user and user-related responsibilities as well as associated
 at the test temperature to the stress value at the design temperature shall be taken as 1.0. The inspection for leaks of all joints and connections shall be made at a pressure not less than the MAWP. Lamond J. UHA-A-2 UHA-
 tensile stress exists. UHX-3.2 Fixed Tubesheet Heat Exchanger West and channel (13 mm). (0.25 mm) (nonrelevant gap) 0.010 in. McWilliams N. Application of the Certification Mark. WRC Bulletin 470, "Recommendations for Design of Vessels for Elevated Temperature Service"
 those listed in Table UCI-23 except as otherwise provided in UG-11. Kirkpatrick S. DeSantis, Alternate C. Administrative Controls . Diagrammatic Representation of Variables for Design of Cylindrical Vessels Subjected to External
 Pressure . Configurations a, b, and c: UHX-16 BELLOWS EXPANSION JOINTS Bellows expansion joints shall be designed in accordance with Mandatory Appendix 26, as applicable. Kim I. Service Restrictions . (6) The Certificate Holder shall ensure that the subcontractor uses personnel that have been qualified as required by this Division. For this
 electrodes, the differences between the coefficients of expansion and the strengths of the base material and the weld metal should be carefully considered, particularly for applications involving cyclic stresses. Pleins R. (b) Nonferrous bolts, studs, and nuts may be used provided they are suitable for the application. All liquids that may be contained in
 the vessel shall be listed. Principal Dimensions of Typical Heads . Carraher D. 602 602 G-1 G-2 G-3 G-4 G-5 G-6 G-7 G-8 G-9 Nonmandatory Appendix H L-1 Nonmandatory Appendix M M-1 M-2 M-3 M-4 M-5 M-6 M-7 M-8 M-9 M-10 M-11 M-12 M-13 M-14 .. and under in thickness is not required for heat treatments below the lower transformation
temperature. 429 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 6-5 ASME BPVC.VIII.1-2019 method and by all other methods of
examination that were originally required for the affected area, except that, when the depth of repair is less than the radiographic sensitivity required, reradiography may be omitted. The nozzle nominal wall thickness shall not be less than the radiography may be omitted. The nozzle nominal wall thickness shall not be less than the radiography may be omitted. The nozzle nominal wall thickness shall not be less than the radiography may be omitted. The nozzle nominal wall thickness shall not be less than the radiography may be omitted.
 yield strength for tubesheet material at tubesheet material at tubesheet design temperature S y, c = yield strength for channel material at design temperature S y, c = yield strength for channel material at design temperature S y, c = yield strength for shell material at tubesheet design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at tubesheet material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell material at design temperature S y, c = yield strength for shell mater
 Nozzle Attachment Details in Impregnated Graphite Pressure Vessels . Morton X. A sequence of four or more rounded indications shall be considered to be aligned when they touch a line parallel to the length of the weld drawn through the center of the two outer rounded indications. Edwards T. Step 6. Lozev C. Croft E. Configurations a, e, f, and A: β
c = 0, kc = 0, λ c = 0, δ c = 0. Troutt — Texas M. material manufacturer: the organization responsible for the products meeting the requirements or data in any required certificate of compliance or Material Test Report representing the material. Repairs in
 Cast Iron Materials . 39 See UG-90(c)(2) for additional requirements applicable to mass produced pressure vessel fabrication. Buckley, Secretary A. Howard S. Xu J. Roberts, Contributing Member R. (10) The Certificate Holder shall receive approval for subcontracting from the Authorized Inspection Agen.
 UB-9 UB-10 UB-11 UB-12 UB-13 UB-14 UB-15 UB-16 UB-17 UB-18 UB-19 UB-20 UB-21 UB-20 UB-31 U
a very realistic maximum. 225 225 225 225 225 225 225 225 Requirements for Pressure Vessels Constructed of Cast Iron General. Revised Parts ULT and UHT to include SA-553 Type III and 7% Ni. Revised Mandatory Appendix 8. Porter J. Porton F. A
nonreclosing pressure relief device is a pressure relief device designed to remain open after operation. Vo G. Horowitz M. If σ s , m is negative, that indicates complete spring relaxation. Thomas Z. 167 Part UCS Requirements for Pressure Vessels Constructed of Carbon and Low Alloy Steels . Nonmandatory Appendix A Basis for Establishing
 Allowable Loads for Tube-to-Tubesheet Joints. Yang H.-C. (b) For tubes, scratches shall not exceed 1/3 2 in. Selensky P. Example of Tube Spacing With Pitch of Holes Unequal in Every Second Row. Cordes, Contributing Member R. Report of Examination.
Jr. W. Configurations e and f: UHX-12.5.8 Step 8. (c) Nozzles, backing strips, clips, or other attachments shall not be located in highly stressed areas of the expansion joint, i.e., inner torus, annular plate, and outer torus. = c but not less than 1/4 in. Calderon, Contributing Member P. Hantz J. However, the conditions of applicability given in UHX-14.2
must be maintained. Welds and other details of construction shall satisfy the dimensional requirements given in Figure 2-4, sketches (5), (6), (6a), (6b), and (7). α = half-apex angle of cone or conical section, deg. 273 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without
license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,``,`,`,`,`,`...` The inspection and testing of layered pressure vessels or parts to be marked with the U or PRT Designator shall be in accordance with UG-90 through UG-103.
Trial Flange Thickness and Area of Bolting for Various Classes of Assemblies and Flange Categories . The "specified process" is a listing of each step required to produce a specific "grade" of impregnated graphite. Schematic Diagram of Vacuum Apparatus . Weitze T. Doms S. 29 In the corroded condition, see UG-16(e). Material Control
Certificate Holder. UHX-13.5.2 Step 2. (d) Category A joints of solid hemispherical heads to layered shell sections shall be of Type (1) or (2) of Table UW-12. Agrelo G. The weld attaching the liner thickness. (c)(1), cross-reference to UG-44 revised to UG-44(a)
(1) a review of calculations, design drawings, welding qualifications, or descriptions of equipment or parts to determine compliance with ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS
 Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT (2) a request for assistance in performing any Code-prescribed functions, relating to, but not limited to, material selection, designs, calculations, fabrication, inspection, pressure testing, or installation (3) a request seeking the rationale for
Code requirements 6 SUBMITTALS (a) Submittal. Carter C. Calculate diameter ratio K. Inspection of Pressure Relief Valves . Folley M. Reports . Miessi K. Dewees H. The heat exchanger contains a bundle of U-tubes attached to the tubesheet [see Figure UHX-3, sketch (a)]. Finished Longitudinal and Circumferential Joints . Shaw M. A local primary
membrane stress is one that is produced by pressure or other maximum allowable working pressure permissible at the top of a completed vessel in its normal operating position at the designated coincident temperature for that pressure. Bolts and Studs . (c) Identification and Marking. The partial penetration weld joining
liner type nozzle as shown in Figure ULW-18.1, sketches (i), (j), (k), and (l) to layered vessel shells or layered vessel shell be examined by magnetic particle or liquid penetrant. (2) Head shall be examined by magnetic particle or liquid penetrant. (2) Head shall be 180 deg with no intervening cylinders. Table UCS-23 Table UNF-
23.1 Table UNF-23.2 Table UNF-23.3 700 300 150 900 Table UNF-23.4 Table UNF-23.5 Table UHA-23 Ta
-`,,`,,`,--- (-d) Calculate values of constants a, b, β, and φ. 30 20 1. Gobbi S. Vessel of Circular Cross Section With Central Dividing Plate. Tsirigotis, Alternate S. (b) Relatively small local bulges and buckles may be removed from formed parts for shells and heads by hammering or by local heating and hammering. (2) The temperature indicated is
the minimum furnace set point, and load temperatures as much as 25°F (15°C) below the set temperature are acceptable. 378 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for
Resale, 07/02/2019 13:29:04 MDT 1-4 - 1-5 ASME BPVC.VIII.1-2019 Table 1-4.2 Values of Factor M L /r M 1.0 1.00 1.25 1.03 1.50 1.06 1.75 1.08 2.00 1.10 2.25 1.13 2.50 1.15 2.75 1.17 3.00 1.18 3.25 1.20 3.50 1.22 L /r M 4.0 1.25 4.5 1.28 5.0 1.31 5.5 1.34 6.0 1.36 6.5 1.39 7.0 1.41 7.5 1.44 8.0 1.46 8.5 1.48 9.0 1.50 L /r M 9.5 1.52 10.00 1.54 10.5
1.56\ 11.0\ 1.58\ 11.5\ 1.60\ 12.0\ 1.62\ 13.0\ 1.62\ 13.0\ 1.62\ 13.0\ 1.65\ 14.0\ 1.69\ 15.0\ 1.75\ 162/3 [Note (1)] 1.77\ GENERAL\ NOTE: Use nearest value of L/r; interpolation unnecessary. For vessels designed to operate at a temperature colder than -20^{\circ}F (-29^{\circ}C), the allowable stress values to be used in design shall not exceed those given for temperatures of -20^{\circ}F to
100°F (-29°C to 38°C). E. Rana, Vice Chair J. Bruny P. Brust H. xxxvi Copyright ASME International (BPVC) Provided by IHS under license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT STATEMENT OF
POLICY ON THE USE OF THE ASME SINGLE CERTIFICATION MARK AND CODE AUTHORIZATION IN ADVERTISING 519b STATEMENT OF POLICY ON THE USE OF ASME MARKING TO IDENTIFY MANUFACTURED ITEMS The ASME Boiler and Pressure Vessel Code provides rules for the construction of boilers, pressure vessels, and nuclear
components. (e) Where the vessel or vessel parts are to be hot formed or postweld heat treated (stress relieved), this identical heat treated by the fabricator, which shall in no case be slower than that specified in the applicable material
to exceed 0.08% and welded with electrodes that produce an austenitic chromium-nickel weld deposit, provided the nominal thickness does not exceed 3/8 in. Noel R. Certified Cement Specification . It may be an accumulation of time of multiple postweld heat treat cycles. The flange design
methods outlined in 2-4 through 2-8 are applicable to circular flanges under internal pressure. (16 mm) Thickness (d) For Layers 5/8 in. 327 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer,
Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-14.5.11.2 - UHX-14.5.1 (Step 1). Revised U-2(g) with rules to allow usage of Section VIII, Division 2 for design methods not provided in Section VIII, Division 1 as
well as other recognized standards or codes. Rogers, Secretary V. Pressure-Temperature Limitations. Beckman A. Zhang Yingkai Zhang Yong Zhang Q. Butt weld line (Category A) 3Y tL Tangent line Y 1/ (t - t) 2 S H tL tL tS tS (a-1) (a-2) tH tL 60 deg min. Lang F. (6) If postweld heat treatment is required by the rules of this Division, it may be
performed either in the location of the parts manufacturer or in the location of the Manufacturer or the amount of the corrosion allowance to be provided. (5 mm). Fong T. Design Considerations . = = = Integral nozzle reinforcement
 Reinforcing pad (k) [See Note (1)] C max. Hungerbuhler, Ir. Subgroup on Strategic Initiatives (TOMC) S. Meredith P. Henry L. If repair welding is required in UHT-57(b) or UHT-57(c). Rahoi P. Lehman J. to 1/4 in. Calland J. Sample User
Design Requirements forms and guidance on their preparation are found in Nonmandatory Appendix KK. There are several manufacturing techniques used to day for which there is extensive documented construction and operational data. Lawson, Staff
Secretary G. Welds and other details of S a = allowable bolt stress at atmospheric temperature (see UG-23) S b = allowable bolt stress at design temperature (see UG-23) S f = allowable b
(3) For simple bends of tubes or pipes whose outside diameter is less than 3.5 in. Radiographic Examination of Welded Joints . When used, they shall be of wrought materials (19 mm) or less, and/or when the cladding metal thickness is nominally 0.075 in. UCI-16 GENERAL The rules in the following paragraphs apply specifically to the design of
pressure vessels and pressure vessel parts of cast iron and shall be used in conjunction with the general requirements for Design in Subsection A, insofar as these requirements are applicable to cast materials. User-Manufacturer Rules . Orbovic, Chair J. Flat Face Flanges With Metal-to-Metal Contact Outside the Bolt Circle . Alternatively, a
normalization and temper in accordance with the requirements in the base metal specification may be performed. Shim G. Bae. Contributing Member I.-B. UIG-45 NOZZLE NECK THICKNESS The minimum nozzle neck thickness shall be 1/2 in. 619 651 652 656 656 658 662 662 662 664 Guide to Information Appearing on Certificate of
Authorization. The thickness of material used for applied lining shall not be included in the computation for the required thickness of any lined vessel. White B. Bolt Loads. Otherwise, increase the thickness of any lined vessel. White B. Bolt Loads of the overstressed component (s) (shell and/or channel) and return to UHX-14.5.1 (Step 1). Krishnamurthy D. Gerlach K. Ortman, Chair D. Zhao
Y. Kumar E. Formulas for Determination of Ft, min and
the B value obtained in (a) above. (-3) The designer shall take appropriate consideration of the stresses resulting from the pressure test required by UIG-99. 110 The Manufacturer may correlate rolling torque, hydraulic expanding pressure, or explosive charge with shear load tests. Other Materials. Wang X. Roszman, Chair W. Swanson A. Minichiello
 J. Revised UG-136(b)(3), UG-137(b)(3), uG-137(b)(3), and UG-138(b)(3). The minimum design temperature shall not be less than -20^{\circ}F (-29^{\circ}C), and the design pressure shall not exceed 1,000 psi (7 MPa) unless the requirements in UG-24 for a casting quality factor of 90% are met, and the vessel contains liquids only. Istar, Contributing Member S.-Y. Coleman M.
Surfaces that are accessible for visual examination after the vessel is completed need not be examined before completion of the vessel or vessel parts; however, such examination shall occur prior to the final pressure test. (a) The equations of (b) and (c) below provide for the design of reinforcement, if needed, at the cone-to-cylinder junctions for
reducer sections and conical heads where all the elements have a common axis and the half-apex angle \alpha \leq 60 deg. Welding for Fabrication . Guo B. Cross-references within a subsection/subarticle. Roy J. If Fs is a negative number, the design shall be in accordance with U-2(g):
For the circumferential stiffening ring only, For the shell-cone or ring-shell-cone section, Step 7. Quaka G. (2) The spherical and knuckle radii shall conform to the requirements in UG-32. Calderon, Alternate H. 50 The certified flow resistance KR is a dimensionless factor used to calculate the velocity head loss that results from the presence of a
nonreclosing pressure relief device in a pressure tested in accordance with UG-99 or UG-100 as a part of the initial expansion joint pressure test or as a part of the final vessel pressure test after
installation of the joint. Classification of Assemblies and Categorization of Individual Flanges . (f) Extended straight flanges between the inner torus and the shell and between both outer tori are permissible. (b) Telltale Holes. No. SA-182 ASME BPVC.VIII.1-2019 UHA-44 Table UHA-23 High Alloy Steel (Cont'd) SA-312 SA-320 UNS No. S43035 S43036
544400\ 544626\ 544627\ 544635\ 544635\ 544635\ 544660\ 544735\ 544800\ N08904\ S20910\ S21904\ S24000\ S314800\ S31603\ S31603\ S31603\ S31603\ S31603\ S31703\ S31725\ S32100\ S32100\ S32100\ S34700\ S34700\ S34700\ S34700\ S34700\ S34800\ S34800\ S34800\ S34800\ S31600\ S316000\ S316000\ S316000\ S316000\ S31600\ S31600\ S31600\ S316000\ S316000\ S316000\ S316000\ S31
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S38815 S30323 S30400 S31600 S32100 S34700 SA-351 J92500 J9

shell of a wholly spherical vessel or of a hemispherical head under internal design pressure exceeds 0.356R, or when P exceeds 0.665SE, the following equations shall apply. Woelfel E. Sperko D. Burwell, Contributing Member xlv Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT --`,``,`,,`,,`,`, -- Executive Committee (BPV III) Working Group on Piping (SG-CD) (BPV III) G. = 1/4 in. Kim K. The 6th Edition of the ASME Boiler & Pressure Vessel Code (BPVC) consists of four volumes, each containing substantially the same material in a different format. Navratil, Chair J. McCracken A. The minimum initial load considered to be adequate for proper seating is a function of the gasket material, and the effective gasket or contact area to be seated, per eq. Edsall, Honorary Member G. Floating Tubesheet Heat Exchangers. Chen, Contributing Member A. For applications using UNS N06230 above 1,650°F (900°C), welding shall be limited to the GTAW and GMAW welding processes using SFA-5.14, ERNiCrWMo-1. Calculated by Manufacturer: Deg @ Nozzles Wind Speed 22 F Seismic Loading: ASCE 7 UBC IBC Other None Vessel Support: Legs Temperature Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT KK-1 ASME BPVC.VIII.1-2019 FORM U-DR-1 (Back) WELDED PRESSURE JOINT REQUIREMENTS DESIGN BASIS: SHELL AND CONE THICKNESS BASED ON: 30 IEEE/L AND CONE THICKNESS BASED JOINT EFFICIENCY E = HEAD THICKNESS BASED ON: JOINT EFFICIENCY E = TYPE OF JOINT F (Use Types as Described in UW-12) 32 JOINT LOCATION UW-3 NDE WITH COMMENTS 31 F 33 F Category A Category B Head-to-Shell Other Category C Body Flanges Category D BODY FLANGE REQUIREMENTS Description Type Facing/Surface Finish SKETCH 34 F Gasket Style Joint Assembly (See ASME PCC-1) 35 F GENERAL NOTES CERTIFICATION 36 F 37 F We certify that the statements made in this form are accurate and represent all details of design as per the user or his designated agent (see Nonmandatory Appendix NN) Date: 38 F User: Signed: (Representative) 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 KK-1 FORM U-DR-2 USER'S DESIGN REQUIREMENTS FOR MULTICHAMBER PRESSURE VESSELS Service: F Operator: 2 F Country of Installation: 4 F Liquid Level: Chamber 1 Specific Gravity: Chamber 1 7 F Diameter: 10 F National Board Registration Required: Yes No 11 F Canadian Registration Required: Yes No 14 F 7 F Minimum Pressure 5 F 6 F Item No.: Type: Jacket Shell and Tube 12 F Special Service: Lethal (L) Direct Firing (DF) Unfired Steam Boiler (UB) Internal Coil 9 F 13 F Overpressure Protection: Valve Rupture Disk Other System Design Maximum Pressure 3 F City of Installation: Chamber 2 Chamber 2 Shell Length, Tangent-to-Tangent: OPERATING CONDITIONS: Chamber 1 - Chamber 2 - Chamber 2 - Chamber 2 - Chamber 2 - Chamber 3 F Installation: 3 F Minimum Temperature Maximum Temperature Maximu Design Metal Temperature (MDMT) - Case 1 Minimum Design Metal Temperature (MDMT) - Case 2 19 Corrosive Service? Anselmi N. Bowers J. Mital, Chair K. Designs that differ from those covered in this Appendix (e.g., 5-2 MATERIALS Materials for pressure-retaining components shall conform to the requirements of UG-4. Indeterminate Corrosion Rate. Use of the equation or tabular data may result in answers which are slightly different from the values obtained from the values obtained from the equation or tabular data may result in answers which are slightly different from the values obtained from the values of the value from ,,`-`-, Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS NN-3 INFORMATION REGARDING THE USER'S "DESIGNATED AGENT" (a) The designated agent may be (1) a design agency specifically engaged by the user (2) the Manufacturer of a system for a specific service that includes a pressure vessel as a part that is purchased by the user may select more than one designated agent to obtain the most experience-based advice in several areas of expertise when needed (e.g., design, metallurgy, fabrication, pressure relief). (2) Refer to Section II, Part D, Subpart 3. Acceptable Full Penetration Welded Nozzle Attachments Radiographable With Difficulty and Generally Requiring Special Techniques Including Multiple Exposures to Take Care of Thickness Variations. Joint Efficiencies. Flat Head and Tubesheet Weld Joints . The Committee does not rule on whether a component shall or shall not be constructed to the provisions of the Code. Lindberg, Chair M. (2) Distribution and vapor belts, where the shell is continuous across the belt, shall be designed in accordance with a Type 1 jacket in Mandatory Appendix 9. Sperko S. 77 No provisions of this paragraph waive other requirements of this Division, such as UW-2(a), UW-2(d), UW-2(d 07/02/2019 13:29:04 MDT and , and UHX-14.6.4 - Operating Pressure Shell Side, P t 1 Psox,min Ptox,max Pt c,b with: UHX-14.8 Calculation Procedure for Effect of Plasticity at Tubesheet/Channel or Shell Joint UHX-14.8.1 Scope. McWilliams, Contributing Member T. Reinforced Vessels of Rectangular Cross Section . Production cementing activities shall not be undertaken until after the cementing procedures and cementing technicians have been qualified (see UIG-79 and UIG-80). (16 mm) Thickness Inside (d-2) Permissible for Layers Over 7/ in. Pastor E. This calculation procedure applies only when the tubesheet is integral with the shell or channel (Configurations a, b, and c). See Section II, Part D, Nonmandatory Appendix A, A-440. A user specifies a pressure vessel, and a Manufacturer constructs the vessel. This may be accomplished by modeling the corners and torus as simply supported to determine the stress in the annular plates and straight flanges. graphite part: any impregnated graphite component certified by a Certificate Holder. Turnbow T. T' = tubesheet metal temperature at the rim (see Figure UHX-11.3-3) = channel metal temperature at the tubesheet = channel metal temperature at the tubesheet for operating condition x 314 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT δ19 UHX-13.8.3 - UHX-13.8.4 ASME BPVC.VIII.1-2019 = shell metal temperature at the tubesheet metal temperat thermal expansion of channel material at = mean coefficient of thermal expansion of shell material at Configuration a: For conservative values of and , and may be used. Upitis F. Yes Toughness testing of the base material and HAZ is required. Wellwood X. (2.5 mm) 3 3 Lesser of 1/8 t or 1/4 in. Low Temperature Operations . Rana T. UCS-A-3 VESSELS OPERATING AT TEMPERATURES COLDER THAN THE MDMT STAMPED ON THE NAMEPLATE (a) Vessels or components may be operated at temperatures colder than the MDMT stamped on the nameplate, provided the provisions of UCS-66, UCS-67, and UCS-68 are met when using the reduced (colder) operating temperature as the MDMT, but in no case shall the operating temperature be colder than -155°F (-105°C). Yes treated as Yes No UHA-51(i)(2) UH established in accordance with (-a), (-b), and (-c) above, each piece (or bundle, etc., if permitted in the specification number and grade, type, or class, as applicable, and a serial number identifying the particular lot of material. It is the purpose of this Introduction to describe in a general way the criteria that were used in preparing this Part. (3 mm) high. Supplemental Marking A supplemental tag or marking shall be supplied on the heat exchanger to caution the user if there are any restrictions on the design, testing, or operation of the heat exchanger. Charts for t Over 3/8 in. Rush D. Kris B. Weis, Secretary J. Kimihiro S Spherically Shaped Covers (Heads). Tezzo D. UHX-14 RULES FOR THE DESIGN OF FLOATING TUBESHEETS UHX-14.1 Scope (a) These rules cover the design of tubesheet and one floating tubesheet heat exchangers that have one stationary tubesheet and one floating tubesheet. established in UCS-56(d)(5) need not apply. Revised Tables U-3, UCS-56-11, and UCS-79-1 to address Mn + Ni limits for P-No. 15E Group 1 pressure vessels. Dickson, Alternate J. Dixon, Contributing Member R. Revised Notes (2) and (4) in Figures UCS-66 and UCS-66M. Withers J. Bruny T. Figure 4-5 Charts for Bolting Pads . Gas Welding . (c), cross-references revised (18-1306) 391 2-2 Subparagraph (b) revised (17-1137) 400 2-6 In paragraph following eq. (38 mm), whichever is larger. (c) Nozzles of nonhardenable austenitic-type stainless steel may be used in vessels constructed of steels conforming to SA-353; SA-553 Types I, II, and III; or SA-645, Grade A, provided by IHS under license with ASME No reproduction or networking permitted without license from IHS CONICAL SECTIONS UHT-25 CORROSION ALLOWANCE Provision for possible deterioration due to the environment in which the vessel operates is the responsibility of the designer. stud: a threaded fastener without a head, with threads on one end or both ends, or threaded full length. (e) In UHX-13.5.4 (Step 4), recalculate F, Φ, Q1, Q Z1, Q Z2, and U. Enter Section II, Part D, Subpart 3, Figure G at the value of L / D o determined in Step 1. Poehlmann D. Postweld Heat Treatment Requirements for Materials in Table UHX-13, and UHX-14 are based on a fully assembled heat exchanger. UG-25 CORROSION (a) The user or his designated agent (see U-2) shall specify corrosion allowances other than those required by the rules of this Division. Molecular Weights of Gases and Vapors . 85 Buttered means buildup overlay welding. Calculate ω s \* and ω c \* for each tubesheet. Seam-Weld Specimen for Tension and Macrosection, Two-Ply Joint . Wilson, Alternate S. The minimum and maximum axial differential thermal expansion for each operating condition shall be listed. Hauger, Contributing Member Joint ACI-ASME Committee on Concrete Components for Nuclear Service (BPV III) A. Nelson M. Eastman — Newfoundland and Labrador, Canada D. For shell sections integral with the tubesheet having a different material and/or thickness than the shell, refer to UHX-13.6 for the nomenclature. Page F. Müller H. Manufacturer's Certificate of Compliance for Plate Heat Exchangers Covering Pressure Vessels to Be Stamped With the UM Designator [See U-10.1]. Tensile Strength, psi (MPa) Room Temperature Block Tube Permissible deviation ±20% ±20% UIG-6, minimum (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UIG-121 FORM CMQ CERTIFIED MATERIAL QUALIFICATION FORM (Used in the Construction of the Constru Graphite Pressure Vessels) (Cont'd) (c) Compressive Strength: See Mandatory Appendix 38 for determining the compressive strength of certified materials. (4) The maximum allowable internal or external working pressure of the tube shall be based on the root diameter and the minimum wall of the finned section, or the outside diameter and wall of the unfinned section together with appropriate stress values, whichever results in the lower maximum allowable working pressure. Miller, Contributing Member K. Choi D. Mengon R. Roberts III, Secretary T. (9) The Certificate Holder shall describe in their Quality Control Systems the operational control for maintaining traceability of materials 268 with carbon content not to exceed 0.08%, welded with electrodes that produce an austenitic-chromium-nickel weld deposit or a non-air-hardening nickel-chromium-iron weld deposit, provided the nominal thickness does not exceed 3/8 in. Sowinski D. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Emslander A. Gosselin R. (d) No additional thickness need be provided when previous experience in like service has shown that corrosion does not occur or is of only a superficial nature. Hui D. Hunter, Chair M. No MDMT colder than -55°F (-48°C)? Parkash, Vice Chair A. (1) 1/10t for t less than 1/8 in. The frequency of tests shall be as required in the unfinned tube specification. It consists of Parts UW, UF, and UB dealing with welded, forged, and brazed methods, respectively. Revised 44-6.1(g)(2). Johnston, Jr. C. This is particularly true for vessels subject to severe corrosion. Kulat E. (k) Category D joints of solid nozzles, manholes, and other connections to layered head sections shall be full penetration welds as shown in Figure ULW-18.1 except as permitted in sketch (i), (j), (k), or (l). Uebel, Contributing Member X. Rummel R. The Manufacturer's Quality Control System as required by U-2(h) and Mandatory Appendix 10 shall include the construction procedure that will outline the sequence and method of application of layers and measurement of layer gaps. Maslowski, Staff Secretary L. design temperature: see UG-20. Thickness of Shells Under Internal Pressure. Vice Chair A. Grimm M. Joseph M. The rules in the following paragraphs apply specifically to the design of pressure vessels and vessel parts that are constructed of high alloy steel and shall be used in conjunction with the general requirements for Design in Subsection B that pertain to the method of fabrication used. Lee H. (2) The provisions of this paragraph shall not be used to justify the use of materials, joining processes (fabrication, and overpressure protection methods other than those allowed by this Division. (b) The specifications listed in Section II, Part D, Subpart 1, Tables 1A Provided by IHS under license with ASME No reproduction or networking Group on Allowable Stress Criteria (SG-ETD) (BPV III) Working Group on Fatigue Strength (SG-DM) (BPV III) S. Hantzele without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Working Group on Fatigue Strength (SG-DM) (BPV III) S. Hantzele without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Working Group on Fatigue Strength (SG-DM) (BPV III) S. Hantzele without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Working Group on Fatigue Strength (SG-DM) (BPV III) S. Hantzele without licensee from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT Working Group on Fatigue Strength (SG-DM) (BPV III) S. Hantzele without licensee from IHS License Subgroup on Materials (BPV VIII) B. For the aluminum, nickel and cupro-nickel alloys a neutral to slightly oxidizing. Test Specimens. Lamond Working Group on Welding and Special Repair Processes (SG-RRA) (BPV XI) D. Rigato, Alternate Working Group on High Temperature Flaw Evaluation (SG-ETD) (BPV III) Subgroup on Elevated Temperature Design (SC-D) (BPV III) S. Richter C. Cohen B. Conditions of Service . (4) Determine the maximum permissible buckling stress limit Stb for the tubes in accordance with (-a) or (-b) below: (-a) When Ct > Ft (-b) When Ct > Ft (5) Determine σ to the tubes in accordance with (-a) or (-b) below: (-a) When Ct > Ft (-b) When Ct , m in = MIN( $\sigma$  t, 1,  $\sigma$  t, 2). It is strongly recommended that owners/users monitor the permeability of graphite equipment in lethal service. Smith A. Majumdar, Contributing Member M. This weld may be machined to a corner radius. Garfield R. Moracchioli P. Preferably 2t  $\lambda$  --- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT ASME BPVC.VIII.1-2019 UIG-60  $\delta$ 19 $\delta$ 19 $\delta$ 19 Table UIG-60  $\delta$ 19 $\delta$ 19 Table UIG-60  $\delta$ 19 $\delta$ 10 Table UIG-60  $\delta$ 34-4 Formulas for Determination of Zd, Zv, Zm, Zw, and Fm (1) Calculate Kelvin functions of order 0 relative to x, where x varies from 0 to Xa such that [Note (1)]: and their derivatives: (2) Calculate functions Qm (x) and Qv (x) relative to x: (5) For each loading case, calculate Fm (x) relative to x: (6) Fm is the maximum of the absolute value of Fm(x) when x varies from 0 to Xa such that: NOTE: (1) Use m = 4 + X a /2 (rounded to the maximum value is negative, zero shall be used for the maximum value. Include a description of each chamber. (mm) W = total bolt load where D Pe St t = = = nominal outside diameter, in. UHX-14.5.1 Step 1. Elkadim S. SCOPE The rules in Part UNF are applicable to pressure vessels and vessel parts that are constructed of nonferrous materials and shall be used in conjunction with the through the valve of valuable or of noxious or otherwise hazardous materials, and where a rupture disk alone or disk located on the inlet side of the valve internals. (b) Except as noted, tolerance = ±.010. If bolts or studs smaller than 1/2 in. An organization holding the ASME Single Certification Mark and/or a Certificate of Authorization may state in advertising literature that items, constructions, or activities conducted in accordance with the requirements of the ASME Boiler and Pressure Vessel Code," or "meet the requirements of the ASME and/or a Certification Mark and or a Boiler and Pressure Vessel Code."An ASME corporate logo shall not be used by any organization other than ASME. (-a) If using Type 316L weld filler metal, or Type 316L filler metal shall have a Ferrite Number (FN) not greater than 10, and a weld metal deposited from each heat of Type 308L filler metal shall have a FN in the range of 4 to 14, as measured by a ferritescope or magna gauge calibrated in accordance with AWS A4.2, or as determined by applying the chemical composition from the test weld to Figure UHA-51-1 appreciably less than that of the high alloy material to be welded and the user is satisfied that its resistance to corrosion is satisfactory for the intended service. UIG-76-3: 5 samples Tube-to-tube joint: Fig. Richter Subgroup on Heat Transfer Equipment (BPV VIII) G. Sreedhar O.-S. (c) The rigidity criterion for an integral type flange and for a loose type flange without a hub is applicable to the reverse flanges in Figures 2-13.1 and 2-13.2, respectively. Thomas T. Gilada F. Alborali P. 1, 2, 3 Up to 2 in. See Section II, Part D, Nonmandatory Appendix A, A-452. Sign and certify, if required. McLaughlin, Chair E. (b) Shells of pressure vessels may be made from welded pipe or tubing listed in Table 1A. Mordre G. (b)(3) and (c)(2) revised (17-2671) lxiii Copyrights. Revised (17-2671) 47 UG-40 In subpara. Fridlund R. (3 mm to 6 mm), Inclusive. No Thermally treated per UHA-51(c)? Staley J. The Certificate Holder performing the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the portion of the work completed by his organization (including data on the pressure a field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the field work is required to supply a Form U-2 or U-2A Manufacturer's Partial Data Report covering the test if conducted by the Certificate Holder performing the field work) to the Manufacturer responsible for the Code vessel. Welding Procedure Qualification With Toughness Testing Requirements for Austenitic Stainless Steel . The primary plus secondary stresses 14 at these discontinuities shall be limited to SPS, where SPS = 3S, and S is the ``,`,``,,,`-`-`,,`,,`,'--- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale 07/02/2019 13:29:04 MDT .. of Mandatory Appendix 6 or Mandatory Appendix 8, respectively, for magnetic particle and liquid penetrant examination. When there are multiple MAWP's, the largest value shall be used to establish the MDMT marked on the nameplate. If σ s , m is positive, the shell design is acceptable. Uebel Z. Calculate the axial membrane stress σ c,m, axial bending stress σ c,b, and total axial stress σ c, in the channel at its junction to the tubesheet. Sabo P. Byk, Staff Secretary R. lxxiv Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS --`,` --- xxxii Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 635 637 639 640 648 649 680 684 693 695 711 LIST OF SECTIONS I Rules for Construction of Power Boilers II Materials • Part D — Properties (Customary) • Part D — Properties (Metric) III Rules for Construction of Nuclear Facility Components - Subsection NE — Class 1 Components - Subsection NE — Class 1 Components - Subsection NE — Class 3 Components Subsection NG — Core Support Structures • Division 2 — Code for Concrete Containments • Division 3 — Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material • Division 5 — High Temperature Reactors IV Rules for Construction of Heating Boilers V Nondestructive Examination VI Recommended Rules for the Care and Operation of Heating Boilers VII Recommended Guidelines for the Care of Power Boilers VIII Rules for Construction of High Pressure Vessels IX Welding, Brazing, and Fusing Qualifications X Fiber Reinforced Plastic Pressure Vessels XI Rules for Inspection of Nuclear Power Plant Components • Division 2 — Requirements for Reliability and Integrity Management (RIM) Programs for Nuclear Power Plants XII Rules for Construction and INTERPRETATIONS Interpretations are issued in real time in ASME's Interpretations Database at . Shick E. (c) Welded joints in vessels or parts of vessels, constructed of materials listed in Table UNF-23.3, with the exception of alloys 200 (UNS No. N02200), 201 (UNS No. N02201), 400 (UNS No. N04400), 405 (UNS No. N04405), and 600 (UNS No. N02200). N06600), shall be examined by the liquid penetrant method when they are not required to be fully radiographed. Li S. (19 mm) for t greater than 21/4 in. ULT-100 Maximum Allowable Temperature: Minus F Service Restricted to the Following Operating Temperature Liquid Liq PNEUMATIC TEST (a) A pneumatic test prescribed in this paragraph may be used in lieu of the hydrostatic test prescribed in ULT-99 for vessels that are either: (1) so designed and/or supported that they cannot safely be filled with water, or (2) are not readily dried, and will be used in services where traces of testing liquid cannot be tolerated. Schuessler M. Blevins, Contributing Member M. (g) Material that has been manufactured and certified to either the U.S. Customary or SI material specification (e.g., SA-516M) may be used regardless of the unit system used in design. Windes A. O'Sullivan, Chair S. Deubler B. Inlet Pressure Drop for High Lift, Top-Guided Safety, Safety Relief, and Pilot-Operated Pressure Relief Valves in Compressible Fluid Service . Sperko P. Abe, Contributing Member G. The liquid penetrant method in accordance with Mandatory Appendix 8 shall be used when the material is nonferromagnetic. Joint Efficiencies for Category B and C Welded Joints in Shells or Cones . NOTE: (1) A "lot" is that quantity of certified material produced within a 3-mo period from a specific grade of graphite and resin that meets established specifications for material properties. Ponnusamy K. Brazing of layered parts is not permitted except for the inner shell, inner head, and special solid wall fittings. (5) is valid and applicable only at the nozzle neck-shell junction. (c) Any questionable or doubtful indications shall be reexamined to determine whether or not they are relevant. 305 Copyright ASME International (BPVC) Provided by IHS under license eKhalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT UHX-13.5.2 ASME BPVC.VIII.1-2019 Table UHX-13.1. Calculate functions Zd(x) and Zw(x) relative to x: 3 For each loading case, calculate Ft(x) relative to x in accordance with a or b below. 405 ----- Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or networking permitted without license from IHS Licensee=Khalda Petroleum/5986215001, User=Amer, Mohamed Not for Resale, 07/02/2019 13:29:04 MDT 2-9 2-9 ASME BPVC.VIII.1-2019 Figure 2-7.3 Values of V (Integral Flange Factors) GENERAL NOTE: See Table 2-7.1 for equations. The impregnated graphite manufacturing process is specified by the Manufacturer and is proprietary. Shinsky J. A K I C (J) (132) is revalue of not less than 120 quired for all specimens tested. Determine the available moment of inertia of the ring only I or the shell-cone or ring-shell-cone I'. bolt: a threaded fastener with a head on one end. Revised Step 12 in 41-7. (a) When Pe = 0 4 Calculate the minimum and F t,max, of Ft (x) when x varies from 0 to Xa such that  $0 \le x \le Xa$ . Ft,min and F t,max may be positive or negative. O'Brien, Staff Secretary J. Kulat, Chair R. Covac S. These charts represent the maximum acceptable concentration limits for rounded indications. Formed Heads, and Sections, Pressure on Concave Side . Zeng S. Liu H. Arnold S. Radiographic examination for the complete length of weld in accordance with the requirements of UW-51 is required for all welded joints of Type No. (1) of Table UW-12. When the welding materials do not comply with one of the specifications of Section II, the marking or tagging shall be identifiable with the welding materials set forth in the welding materials set forth in the welding materials set forth in the welding materials do not comply with one of the specification, and may be accepted in lieu of a Test Report or a Certificate of Compliance. Faransso, Contributing Member R. Move vertically to an intersection with the material/temperature line for the design temperature (see UG-20). The Mandatory Appendices address specific subjects not covered elsewhere in this Division, and their requirements are mandatory when the subject covered elsewhere in this Division, and their requirements are mandatory when the subject source elsewhere in this Division, and their requirements are mandatory when the subject source elsewhere in this Division. accordance with Mandatory Appendix 6 by the magnetic particle method using direct current only when the material is ferromagnetic. If necessary, the metal temperature shall be determined by computation or by measurement from equipment in service under equivalent operating conditions. A coolant is necessary and should be used copiously. Stamping. (f) It is recommended that the user or his designated agent assure himself that materials used for the construction of the vessels will be suitable for the intended service with respect to retention of satisfactory mechanical properties, and resistance to corrosion, existence to corr Illustration of Welded Joint Locations Typical of Categories A, B, C, and D. Over 15/16 to 11/2 (24 to 38), incl. Hydrotest Considerations for Metal Linings. 519Þ UHA-31 REQUIREMENTS FOR POSTWELD HEAT TREATMENT FORMED HEADS, PRESSURE ON CONVEX SIDE Ellipsoidal, torispherical, hemispherical, and conical heads, having resistant metal deposited in contact with two materials of dissimilar composition may be used for shell joints under the limitations of UW-12, for connection attachments under the limitations of UW-12 and for any other uses permitted 234 Copyright ASME International (BPVC) Provided by IHS under license with ASME No reproduction or put in service. Some Acceptable Methods of Attaching Stiffening Rings . Shanker D. Young F. Revised Figure UW-3 by adding a sketch of weld neck flange with its weld category as C. Un libro è un insieme di fogli, stampati oppure manoscritti, delle stesse dimensioni, rilegati insieme in un certo ordine e racchiusi da una copertina.. Il libro è il veicolo più diffuso del sapere. L'insieme delle opere stampate, inclusi i libri, è detto letteratura. Il libro è il veicolo più diffuso del sapere. L'insieme delle opere stampate, inclusi i libri, è detto letteratura. Il libro è il veicolo più diffuso del sapere. L'insieme delle opere stampate, inclusi i libri, è detto letteratura. Il libro è il veicolo più diffuso del sapere. L'insieme delle opere stampate, inclusi i libro è il veicolo più diffuso del sapere. L'insieme delle opere stampate, inclusi i libro è il veicolo più diffuso del sapere. L'insieme delle opere stampate, inclusi i libro è il veicolo più diffuso del sapere. 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