

ASME B31.8 INTERPRETATIONS VOLUME 16

Replies to Technical Inquiries March 2010 Through March 2012 Interpretations 16-1 Through 16-17

It has been agreed to publish interpretations issued by the B31 Committee concerning ASME B31.8 as part of the update service to the Code. The interpretations have been assigned numbers in chronological order. Each interpretation applies either to the latest Edition or Addenda at the time of issuance of the interpretation or the Edition or Addenda stated in the reply. Subsequent revisions to the Code may have superseded the reply.

These replies are taken verbatim from the original letters, except for a few typographical and editorial corrections made for improved clarity.

ASME procedures provide for reconsideration of these interpretations when or if additional information that the inquirer believes might affect the interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. As stated in the Statement of Policy in the Code documents, ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity.



B31.8

<u>Subject</u>	<u>Interpretation</u>	<u>File No.</u>
Appendix F	16-11	11-376
Para. 802.12(f), Injection and Production Flow Lines	16-13	07-1469, 07-1470
Para. 831.2.2, ASTM A307 Grade B Bolting for B16.5 Flanges in Classes 150 and 300 Service	16-4	10-718
Para 831.2.2, Follow-Up Inquiry on ASTM A307 Grade B Bolting for B16.5 Flanges in Classes 150 and 300 Service	16-10	11-371
Para. 831.4.1(c) and Appendix F	16-8	09-1699
Para. 841.31, General Provisions	16-3	07-1472
Para. 842.2, Design of Plastic Piping, General Provisions	16-9	10-1001
Para. 845.2.2, MAOP and Para. 845.4.1, Capacity of Pressure-Relieving and Pressure-Limiting Stations and Devices	16-14	10-1195
Para. 845.4.1, Transient Overpressure	16-16	11-1574
Para. 845.411, Hoop Stress Calculations	16-2	10-162
Para. A842.2.2, Design Against Yielding	16-12	11-377
Para. A842.2.2, Design Against Yielding and Para. A842.2.3, Alternate Design for Strain	16-15	11-1573
Paras. A842.2.2(a), A842.2.2(b), and A842.2.2(c)	16-1	10-23
Para. A842.2.2(a), Hoop Stress	16-6	10-1056
Para. A842.2.2(a), Hoop Stress and Para. A847.2, Test Pressure	16-5	10-1057
Para. A842.2.2(a), Hoop Stress and Para. A847.2, Test Pressure	16-7	10-1644
Para. A847.2, Test Pressure	16-17	12-121



Interpretation: 16-1

Subject: ASME B31.8-2007, Paras. A842.2.2(a), A842.2.2(b), and A842.2.2(c)

Date Issued: March 10, 2010

File: 10-23

Question (1): The equation for hoop stress in para. A842.2.2(a) has a temperature derating factor in the formula, whereas the equations for longitudinal stress and combined stress in paras. A842.2.2(b) and A842.2.2(c) do not use a temperature derating factor. Is this correct?

Reply (1): Yes.

Question (2): Does ASME B31.8 use temperature derated values of Specified Minimum Yield Strength?

Reply (2): No.

Interpretation: 16-2

Subject: ASME B31.8-2007, Para. 845.411, Hoop Stress Calculations

Date Issued: March 10, 2010

File: 10-162

Question (1): Is it allowed to use the Lamé formula to determine hoop stress when determining incidental pressure for an onshore pipeline in accordance with para. 845.411?

Reply (1): No.

Question (2): Is it required to multiply the hoop stress by the Location Class Basic Design Factor, F , for the capacity check per para. 845.411?

Reply (2): No.

Interpretation: 16-3

Subject: ASME B31.8-2003, Para. 841.31, General Provision

Date Issued: June 30, 2010

File: 07-1472

Question (1): With respect to para. 841.31, is a flange-end valve considered to be a nonwelded tie-in connection?

Reply (1): Yes, provided the valve serves as a tie-in point after construction and testing of the pipeline or piping.

Question (2): Is it mandatory for a pretested flange-end valve to be part of the piping system during hydrotesting?

Reply (2): No. Per para. 841.31, nonwelded tie-in connections not pressure tested after construction shall be leak tested.



Interpretation: 16-4

Subject: ASME B31.8-2010; Para. 831.2.2, ASTM A307 Grade B Bolting for B16.5 Flanges in Classes 150 and 300 Service

Date Issued: July 7, 2010

File: 10-718

Question: Does ASME B31.8 allow the use of ASTM A307 Grade A bolts in addition to Grade B bolts in para. 831.2.2(b)?

Reply: No.

Interpretation: 16-5

Subject: ASME B31.8-2010, Para. A842.2.2(a), Hoop Stress and Para. A847.2, Test Pressure

Date Issued: July 30, 2010

File: 10-1057

Question (1): In para. A842.2.2(a), eq. (2) is for thin-walled pipe, and eq. (3) is for thick-walled pipe. However, if we go by what is given in these two Code equations, the pipe thickness for thick-walled pipes will be less than the pipe thickness for thin-walled pipes. Therefore, is there a typographical or drafting error in eqs. (3) and (5) in this section?

Reply (1): The equations are all correct, but it is not clearly identified that eqs. (2) and (4) are for U.S. Customary Units and that eqs. (3) and (5) are for SI Units. Furthermore, there is a publishing error in the Note following these equations. The Note should read: "It is recommended that eq. (2) or (3) be used for D/t greater than or equal to 30 and that eq. (4) or (5) be used for D/t less than 30." Errata has been issued to correct these publishing errors.

Question (2): We have a pipeline where the corrosion allowance is 6 mm and 12.5% fabrication allowance. Is the hoop stress calculation under ASME B31.8, Chapter VIII (para. A842.2.2) to be based only on nominal wall thickness?

Reply (2): Yes.

Question (3): If no, then what are the maximum limits for corrosion and fabrication allowances beyond which we need to factor them while calculating the Hoop Stress?

Reply (3): The hoop stress calculations under ASME B31.8, Chapter VIII are to be based only on nominal wall thickness.

Question (4): When reading paras. A842.2.2(a) and A847.2, our interpretation for F_1 , hoop stress design factor for offshore pipelines, for a pressure test is that it should be equal to 1. Therefore, is it correct to take the F_1 design factor for offshore pipelines for a pressure test to be equal to 1?

Reply (4): No. As stated in Table A842.2.2-1, the hoop stress design factor, F_1 , for offshore pipelines shall be 0.72. There is no hoop stress design factor, F_1 , for pressure tests.

Question (5): If no, then what is the correct design factor for the above case?

Reply (5): See reply to Question (4).



Interpretation: 16-6

Subject: ASME B31.8-2010, Para. A842.2.2(a), Hoop Stress

Date Issued: October 20, 2010

File: 10-1056

Question: Can the hoop stress formula in para. A842.2.2(a), eq. (4), be revised as noted below? For an isotropic elastic pipe, this technical inquiry proposes the following formulation for hoop stress calculation.

$$S_h = (P_i - P_e)\zeta - P_i \quad (1)$$

where

$$\zeta = \left[2 \left[\left(\frac{t}{D} \right) - \left(\frac{t}{D} \right)^2 \right] \right]^{-1} = 2 \left(\frac{A_o}{A_s} \right) \quad (2)$$

A_o = external cross sectional area of pipe

A_s = pipe material cross sectional area (cross sectional area of pipe steel)

The proposed formulation, eq. (1), is based on Lamé's solution for hoop stress at the inside diameter of a cylinder subject to a differential pressure, i.e., internal and external pressure. Equation (1) predicts the hoop stress exactly when results are compared to finite element solution using eight-node solid continuum element.

The proposed formulation of eq. (1) is a replicate of the second equation of para. A842.2.2(a) but in a more concise and a practical format. The proposed hoop stress formulation of eq. (1) is in terms of A_o and A_s (i.e., pipe outer and material cross-sectional areas), which gives a direct implication of material usage in resisting the tensile hoop stress. The proposed hoop stress formulation is also shown in terms of wall thickness-to-diameter ratio (t/D), to assist designers in performing normalized parametric studies.

The proposed formulation of eq. (2) is more appropriate for deepwater application, where hydrostatic collapse pressure often results in pipe diameter-to-wall thickness ratios of less than 20, where the existing equation in ASME B31.8 may grossly overestimate the hoop stress.

Reply: Thank you for your considered discussion on the hoop stress equation formulation. However, use of the proposed Lamé equation to compute the hoop stress at the pipeline internal diameter for offshore pipelines does not have any significant advantage over the current equation, and is more difficult to use for development of pipeline wall thickness design. We do not agree with your assertion that the formula in para. A842.2.2(a), eq. (4) will grossly overestimate the hoop stress. We consider that the existing eq. (4) in para. A842.2.2(a) is appropriate for the D/t ranges covered in ASME B31.8.



Interpretation: 16-7

Subject: ASME B31.8-2010, Para. A842.2.2(a), Hoop Stress and Para. A847.2, Test Pressure

Date Issued: November 9, 2010

File: 10-1644

Question: Previously, I had sent an Inquiry to ASME asking if it was correct to take the F_1 design factor for offshore pipelines for a pressure test to be equal to 1 when considering the wording stated in paras. A842.2.2(a) and A847.2. The reply to this Inquiry (Interpretation 16-5, File 10-1057) stated that there is no hoop stress design factor, F_1 , for pressure tests. However, I have an additional question related to this response. Is the following the correct formula for computing the hoop stress for a pressure test?

$$S \leq ST$$

Reply: No. There is no maximum hoop stress limit identified in the Code for a hydrotest. The Cautionary Note in para. A847.2 was written to caution the Code user that conditions may exist that could yield the pipe.

Interpretation: 16-8

Subject: ASME B31.8-2010, Para. 831.4.1(c) and Appendix F

Date Issued: March 22, 2011

File: 09-1699

Question: In a fabricated branch connection, where the opening made in the header wall is smaller than the inside diameter of the branch pipe, may the full thickness of the header wall between the undersized branch hole and the inside of the branch pipe be considered to be reinforcement for purposes of area replacement calculation?

Reply: Yes.



Interpretation: 16-9

Subject: ASME B31.8-2010, Para. 842.2 Design of Plastic Piping, General Provisions

Date Issued: March 22, 2011

File: 10-1001

Question (1): Reinforced thermoplastic pipe (RTP) as described in, for example, ISO TS 18226, Plastics pipes and fittings — Reinforced thermoplastics pipe systems for the supply of gaseous fuels for pressures up to 4 MPa (40 bar), or API RP 15S, Qualification of Spoolable Reinforced Plastic Line Pipe, is not specifically identified as acceptable in para. 842.2. Is RTP allowed to be used for gas pipeline service?

Reply (1): No. However, certain products may be qualified for use by methods described in section 811.

Question (2): Is reinforced thermoplastic pipe (RTP) subject to the same pressure design limitations as thermoplastic pipe per para. 842.2.2?

Reply (2): No. See response to Question (1). The ASME B31.8 Code Committee is considering modifications to the current code specifically to include certain types of reinforced thermoplastic pipe that may be described in API RP 15S, ISO TS 18226, and other reinforced thermoplastic pipe standards.

Interpretation: 16-10

Subject: ASME B31.8-2010, Para 831.2.2, Follow-Up Inquiry on ASTM A307 Grade B Bolting for B16.5 Flanges in Classes 150 and 300 Service

Date Issued: March 22, 2011

File: 11-371

Question (1): Is there a conflict between ASME B31.8, para. 831.2.2 referencing ASME B16.5 and ASTM A307, Grade B bolting?

Reply (1): No. ASME B16.5 references ASTM A307 Grade B bolts in Table 1B under the category of Low Strength Bolting. In ASME B16.5, the Grade B bolts are limited to use with Classes 150 and 300 flanged joints, used with nonmetallic gasket materials at temperatures between -29°C to 200°C (-20°F to 400°F). These same conditions are required in ASME B31.8, para. 831.2.2. [The temperature range in the ASME B31.8-2010 actually reads -29°C to 232°C (-20°F to 450°F). There is an errata scheduled for publication to correct the high temperature discrepancy.] The ASTM A307 statement that the Grade B bolts are intended for use with cast iron flanges does not preclude their use in steel flanges under the conditions stated above.

Question (2): Since ASME B31.8 is referencing ASME B16.5, which is for steel flanges, shouldn't it also reference ASTM A307, Grade A bolts since these are used for general purpose (steel)?

Reply (2): No. ASTM A307, Grade A bolts are not referenced in ASME B16.5. The Grade A bolts allow sulfur levels up to 0.15% for ease of machining, and therefore may possess low fracture toughness properties unsuitable for natural gas service.



Interpretation: 16-11

Subject: ASME B31.8-2010, Appendix F

Date Issued: March 22, 2011

File: 11-376

Question (1): In the examples in Appendix F illustrating the application of the rules for reinforcement of welded branch connections for an onshore pipeline system, is the Design Factor, F , taken from Table 841.1.6-1?

Reply (1): No. A welded branch connection on an onshore pipeline system is a Fabricated Assembly, as defined in para. 841.1.9(a). Therefore, the Design Factor, F , is taken from Table 841.1.6-2.

Question (2): In the examples in Appendix F illustrating the application of the rules for reinforcement of welded branch connections, would the Design Factor, F , be taken from the Hoop Stress column in Table A842.2.2-1 for an offshore pipeline system?

Reply (2): Yes.

Interpretation: 16-12

Subject: ASME B31.8-2010, Para. A842.2.2, Design Against Yielding

Date Issued: March 22, 2011

File: 11-377

Question (1): My understanding of the test pressure criterion is the following:

$$S_h = (P_i - P_e) \frac{D}{2t} < SMYS$$

Is this correct?

Reply (1): No. The formula that you have noted is used to compute hoop stress. It is not a test pressure criterion. Furthermore, S_h as defined in eqs. (1) and (2) in para. A842.2.2 includes a Design Factor, F , and a Temperature Derating Factor, T .

Question (2): Since the nominal wall thickness is used in eq. (2) in para. A842.2.2 to compute hoop stress, does this mean that during a hydrotest, ASME B31.8 allows hoop stress to be 12.5% higher than SMYS when assuming a pipe manufacturing mill tolerance of -12.5% ?

Reply (2): No. When the Design Factor is included in the hoop stress formula, the hoop stress during a hydrotest will not be 12.5% higher than SMYS.



Interpretation: 16-13

Subject: ASME B31.8-2007, Para. 802.12(f), Injection and Production Flow Lines

Date Issued: March 23, 2011

File: 07-1469 and 07-1470

Question (1): In accordance with ASME B31.8-2007, does the Code exclude flow lines between gas injection wells and gas injection facilities?

Reply (1): Yes.

Question (2): In accordance with ASME B31.8-2007, does the Code exclude flow lines between gas production wells and gas separation facilities?

Reply (2): Yes.

Interpretation: 16-14

Subject: ASME B31.8-2007, Para. 845.2.2, MAOP and Para. 845.4.1, Capacity of Pressure-Relieving and Pressure-Limiting Stations and Devices

Date Issued: September 16, 2011

File: 10-1195

Question (1): Is the Maximum Allowable Working Pressure (MAWP) in para. 2.1 of ASME B16.5-2009 is the same as the Maximum Allowable Operating Pressure (MAOP) in para. 845.2.2 of ASME B31.8-2007?

Reply (1): No, they are not the same. The MAWP from ASME B16.5 should be used as one of the criteria in determining the MAOP of the pipeline system.

Question (2): Do the requirements for pressure-relieving and pressure-limiting stations and devices per para. 845.4.1(a)(2)(a) allow the pressure set point to be MAWP plus 10%?

Reply (2): No. Paragraph 845.4.1(a)(2)(a) requires that the relieving device prevent the pressure from exceeding the MAOP plus 10%. Note that para. 845.4.1(a)(2)(b) has an additional limitation on the device set point when 75% of SMYS is less than the hoop stress at 110% of the MAOP.



Interpretation: 16-15

Subject: ASME B31.8-2010, Para. A842.2.2, Design Against Yielding and Para. A842.2.3, Alternate Design for Strain

Date Issued: December 9, 2011

File: 11-1573

Question (1): Are the provisions on pipe longitudinal and combined stresses defined in para. A842.2.2 applicable to deepwater pipelines in service that are not pressurized temporarily? In particular, are these stress limits applicable to pipeline local buckling check per API RP-1111, para. 4.3.2.2, which allows pipe bending well into the plastic region for pipe with low diameter to wall thickness ratio? For the purpose of this question, it is assumed that this is an expected condition that occurs periodically during the intervals of pipeline system operating cycles, and all fatigue issues (including potential low cycle fatigue issues) have been checked.

Reply (1): If the pipeline design uses stress-based criteria, the Code requirements in para. A842.2.2 shall be met. If the pipeline design uses strain-based criteria, the Code requirements in para. A842.2.3 and A842.2.4 shall be met.

Question (2): Is para. A842.2.3 applicable to subsea pipelines that are not pressurized during an emergency, noncyclic event?

Reply (2): Yes.

Interpretation: 16-16

Subject: ASME B31.8-2010, Para. 845.4.1, Transient Overpressure

Date Issued: January 13, 2012

File: 11-1574

Question (1): ASME B31.8-2010, para. 845.4.1 explains that the pressure-relieving and pressure-limiting stations should be set to limit pressures from exceeding the lesser of MAOP + 10%, or hoop stress = 75% SMYS, for high-pressure distribution systems operating at hoop stress levels at or below 72% SMYS. Is "hoop stress = 75% SMYS" referring to hoop stress of any component of the pipeline system, or hoop stress of the pressure limiting device?

Reply (1): The requirements of para. 845.4.1(a)(2) are applicable to pipe or pipeline components.

Question (2): Can gas pipelines be designed to have transient overpressures up to 10% above MAOP, similar to ASME B31.4?

Reply (2): No.

Question (3): If gas pipelines are allowed transient overpressures up to 10% above MAOP, does the 0.72 hoop stress factor for operation conditions account for the possibility of 10% transient overpressure?

Reply (3): Since the Reply to Question (2) is "No," Question (3) is not applicable, because gas pipelines shall not be designed to have transient overpressures up to 10% above MAOP.

Question (4): Are gas pipelines allowed to operate at transient overpressures up to 10% above MAOP when MAOP is equal to the Design Pressure?

Reply (4): No.



Interpretation: 16-17

Subject: ASME B31.8-2010, Para. A847.2, Test Pressure

Date Issued: March 16, 2012

File: 12-121

Question: When the ASME B31.8 Code refers to Maximum Allowable Operating Pressure (MAOP) in para. A847.2, in order to set the hydrostatic test pressure for an offshore pipeline segment, is it referring to the MAOP at one set elevation at the highest point of the pipeline segment (e.g., at the compressor discharge)?

Reply: Yes.

