Case N-405-1
Socket Welds
Section III, Division 1

Inquiry: May appurtenances that connect to nozzles of a Section III, Division 1, Class 1, vessel be designed and constructed employing joint designs in accordance with rules not currently covered in Section III?

Reply: It is the opinion of the Committee that all Section III, Division 1, Class 1, welded joints for construction of appurtenances, including internal piping, that form the barrier to the loss of fluid from the vessel and by which the appurtenances connect to nozzles of the vessel at or beyond the first circumferential weld joint in welded connections, the face of the first flange in bolted flange connections, or the first threaded joint in screwed connections shall be in accordance with all of the requirements for the component proper. However, the appurtenances with outside diameter equal to that of 2 in. standard pipesize and less may be constructed using weld joints in accordance with Figure 1, provided the following requirements are met.

(a) The design of the joint shall be such that stresses will not exceed the limits described in NB-3220 and tabulated in Tables 2A and 2B.
(b) A fatigue strength reduction factor of not less than 4 shall be used in fatigue analyses of the joints.
(c) The finished welds shall be examined by a magnetic particle or by a liquid penetrant method in accordance with Section V and the acceptance standards of NB-5000.
(d) End closure connections may be made with fillet welds or partial penetration welds provided the conditions stated above are met.
(e) This Case number shall be shown on the Data Report Form for the vessel.

The Committee's function is to establish rules of safety, relating only to pressure integrity, governing the construction of boilers, pressure vessels, transport tanks and nuclear components, and in-service inspection for pressure integrity of nuclear components and transport tanks, and to interpret these rules when questions arise regarding their intent. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks and nuclear components, and the in-service inspection of nuclear components and transport tanks. The user of the Code should refer to other pertinent codes, standards, laws, regulations or other relevant documents.
CASE (continued)
N-405-1

CASES OF ASME BOILER AND PRESSURE VESSEL CODE

Figure 1
Weld Connections for Appurtenances 2 in. Pipe Size and Smaller That are Attached to Nozzles

Legend:

- \( c_{\text{max}} \) = diametral clearance between connecting parts
- \( d = 0.045 \) in.
- \( d_b = \) outside diameter of Part B and shall be 2 in. max. pipe size
- \( d_a = \) inside diameter of counterbore of Part A and shall be \( 2\frac{1}{8} \) in. max.
- \( t = \) thickness of part penetrated
- \( t_{c \text{ min}} = 0.7t_a \)
- \( t_n = \) nominal thickness of connecting part
- \( t_p = \) thickness of Part B
- \( t_{p \text{ min}} = 2 \times \) required calculated thickness of Part B
- \( t_r = \) depth of counterbore \( \geq t_p \)
- \( t_w = \) weld thickness and shall be \( \geq t_p \)
- \( y_{\text{min}} = \frac{1}{2}t_a \)
- \( z = \) depth of engagement and shall be \( \frac{1}{6} \) in. min. for pipe sizes
- \( \frac{1}{2} \) in. to 2 in. and shall be \( \frac{1}{6} \) in. min. for pipe sizes under \( \frac{1}{2} \) in.

NOTES:

(1) Either weld preparation is acceptable
(2) Part A shall be attached to a nozzle of the vessel in accordance with the requirements for the vessel proper. Part B shall be attached either to Part A or to another Part B by the joints shown above or in accordance with the requirements of the vessel proper.

Copyright © 2013 by the American Society of Mechanical Engineers.
No reproduction may be made of this material without written consent of ASME.
Case N-405-1  
Socket Welds  
Section III, Division 1

Inquiry: May appurtenances that connect to nozzles of a Section III, Division 1, Class 1, vessel be designed and constructed employing joint designs in accordance with rules not currently covered in Section III?

Reply: It is the opinion of the Committee that all Section III, Division 1, Class 1, welded joints for construction of appurtenances, including internal piping, that form the barrier to the loss of fluid from the vessel and by which the appurtenances connect to nozzles of the vessel at or beyond the first circumferential weld joint in welded connections, the face of the first flange in bolted flange connections, or the first threaded joint in screwed connections shall be in accordance with all of the requirements for the component proper. However, the appurtenances with outside diameter equal to that of 2 in. standard pipe size and less may be constructed using weld joints in accordance with Fig. 1, provided the following requirements are met.

(a) The design of the joint shall be such that stresses will not exceed the limits described in NB-3220 and tabulated in Tables 2A and 2B.

(b) A fatigue strength reduction factor of not less than 4 shall be used in fatigue analyses of the joints.

(c) The finished welds shall be examined by a magnetic particle or by a liquid penetrant method in accordance with Section V and the acceptance standards of NB-5000.

(d) End closure connections may be made with fillet welds or partial penetration welds provided the conditions stated above are met.

(e) This Case number shall be shown on the Data Report Form for the vessel.
CASES OF ASME BOILER AND PRESSURE VESSEL CODE

\[ c_{\text{max}} = \text{diametral clearance between connecting parts} = 0.045 \text{ in.} \]
\[ d = \text{outside diameter of Part B and shall be 2 in. max. pipe size} \]
\[ d_i = \text{diameter of the hole and shall be } 2\frac{3}{8} \text{ in. max.} \]
\[ d_o = \text{inside diameter of counterbore of Part A and shall be } 2\frac{3}{8} \text{ in. max.} \]
\[ d_o - d_i = 0.050 \text{ in. min.} \]
\[ d_{\text{max}} = 1 \text{ in. or } dB \text{ whichever is less} \]
\[ r_{\text{max}} = \frac{1}{4} t_o \text{ or } \frac{3}{4} \text{ in.} \text{ whichever is less} \]
\[ t = \text{thickness of part penetrated} \]
\[ t_{\text{min}} = \text{nominal thickness of connecting part} \]

\[ t_p = \text{thickness of Part B} \]
\[ t_{p_{\text{min}}} = 2 \times \text{required calculated thickness of Part B} \]
\[ t_e = \text{depth of counterbore} \geq t_p \]
\[ t_w = \text{weld thickness and shall be } \geq t_p \]
\[ y_{\text{max}} = \frac{1}{32} \text{ in.} \]
\[ z = \text{depth of engagement and shall be } \frac{3}{8} \text{ in. min. for pipe sizes } \frac{3}{8} \text{ in. to 2 in. and shall be } \frac{1}{4} \text{ in. min. for pipe sizes under } \frac{3}{8} \text{ in.} \]

Part A shall be attached to a nozzle of the vessel in accordance with the requirements for the vessel proper. Part B shall be attached either to Part A or to another Part B by the joints shown above or in accordance with the requirements of the vessel proper.

NOTE:
(1) Either weld preparation is acceptable.

FIG. 1 WELD CONNECTIONS FOR APPURTENANCES 2 IN. PIPE SIZE AND SMALLER THAT ARE ATTACHED TO NOZZLES