**PG-55** SUPPORTS AND ATTACHMENT LUGS

**PG-55.1** Lugs or hangers when used to support a boiler of any type shall be properly fitted to the surfaces to which they are attached.

**PG-55.2** Lugs, hangers, or brackets may be attached by fusion welding provided the welding meets the requirements of Part PW, including stress relieving but omitting volumetric examination and provided they are attached by full penetration welds, combination groove and fillet welds, or by fillet welds along the entire periphery or contact edges. Some acceptable forms of welds for lugs, hangers, or brackets are shown in Figure PW-16.2. The materials for lugs, hangers, or brackets are not limited to those listed in Section II, Part D, Subpart 1, Tables 1A and 1B, but shall be of weldable quality. The allowable load on the fillet welds shall equal the product of the weld area based on minimum leg dimension, the allowable stress value in tension of the material being welded, and the factor 0.55. When using welded pipe, the stress values given in Section II, Part D, Subpart 1, Table 1A, may be increased to that of the basic material by eliminating the stated weld efficiencies.

**PG-56** LOADING ON STRUCTURAL ATTACHMENTS

**PG-56.1** Loads imposed on steel tube walls by welded or mechanical attachments, which produce bending stresses that are additive to bursting stresses, shall conform to PG-56.1.1 and PG-56.1.2. Alternatively, stresses at structural attachments may be evaluated using one of the following methods:

(a) Welding Research Council (WRC) Bulletin Number 537, Precision Equations and Enhanced Diagrams for Local Stresses in Spherical and Cylindrical Shells Due to Externally Applied Loads for Implementation of WRC Bulletin 107

(c) Stress Indices at Lug Supports on Piping Systems

(2) Stress Indices at Lug Supports on Straight Pipe, and

**PG-56.1.1** The following inequality:

\[ L \leq L_a \]

where

\[ L = \text{actual unit load calculated from PG-56.1.2, lb/in. (N/mm)} \]

\[ L_a = \text{maximum allowable unit load, lb/in. (N/mm) of attachment from PG-56.2} \]

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*Figure PG-52.5 Example of Tube Spacing With Tube Holes on Diagonal Lines*

- For a length less than or equal to the inside diameter of the drum for the position that gives the minimum efficiency, the average ligament efficiency shall be not less than that on which the maximum allowable working pressure is based. When the diameter of the drum exceeds 60 in. (1 500 mm), the length shall be taken as 60 in. (1 500 mm) in applying this rule.

- For a length less than or equal to the inside radius of the drum for the position that gives the minimum efficiency, the average ligament efficiency shall be not less than 80% of that on which the maximum allowable working pressure is based. When the radius of the drum exceeds 30 in. (750 mm), the length shall be taken as 30 in. (750 mm) in applying this rule.

*Example: A 54-in. I.D. drum is tube drilled with a longitudinal row of tubes with 2.457 in. diameter tube holes spaced at a regular spacing of 4.5 in. One tube hole is misdrilled at a lesser pitch of 4.0 in. as shown in Figure PG-53.2.2-1.

(a) Efficiency per PG-53.2.1

\[ \frac{p_1 - nd}{p_1} = \frac{53.5 - 12(2.547)}{53.5} = 0.429 \]

(b) Efficiency per PG-53.2.2

\[ \frac{p_1 - nd}{p_1} = \frac{26.5 - 6(2.547)}{26.5} = 0.423 \]

Efficiency to be used is 0.423.