Agenda Item: 650-1097

Title: API-620 Outlet Allowance

Date: November 12, 2021

Contact: Jimmy Dale Schroeder
Innovative Tank Solutions, LLC
218-543-4287 jschroeder@innovativetanksolution.com

Purpose: To allow the use of studded outlets as shown in API-620 figure.

Source: Jimmy Schroeder

Revision: 5

Impact: None

Rationale: Studded outlets are allowed in API-620. Currently they are not allowed in API-650. There are certain applications in which is desirable to have a studded outlet to limit the distance from the outside of the shell to the face of the flange.

Proposal: Current wording in API 650 13th Edition:

4.6.1.1 Forged slip on, ring-type, welding neck, long welding neck, and lap joint flanges shall conform to the material requirements of ASME B.16.5..

Proposed wording:

4.6.1.1 Forged slip on, ring-type, welding neck, long welding neck, studding outlets, and lap joint flanges shall conform to the material requirements of ASME B.16.5.

Add sketches to appropriate figures.

Revision 2 proposed changes: (changes shown in blue)

Revision 3 proposed changes. (changes shown in green)

Revision 4 proposed changes. (changes shown in red) - remove inserted outlet

Revision 5 proposed changes (changes in yellow)

5.7.2.1 Openings in tank shells larger than required to accommodate a NPS 2 flanged or threaded nozzle shall be reinforced. All studding outlets ~~inserted into the shell or studding outlets placed on the outside of the shell and are~~ larger than NPS 2 shall be reinforced and their required area of reinforcing, available area of reinforcing, and weld strengths shall be calculated in accordance with 5.7.2.3 thru 5.7.2.8. The minimum cross-sectional area of the required reinforcement shall not be less than the product of the vertical diameter of the hole cut in the shell and the nominal plate thickness, but when calculations are made for the maximum required thickness considering all design and hydrostatic test load conditions, the required thickness may be used in lieu of the nominal plat thickness. For studding outlets, the area of the ~~bolts~~ bolt holes within the limits of reinforcement shall be added to the minimum cross-sectional ~~are of the~~ area required ~~reinforcement~~. The cross-sectional area of the reinforcement shall be measured vertically, coincident with the diameter of the opening.

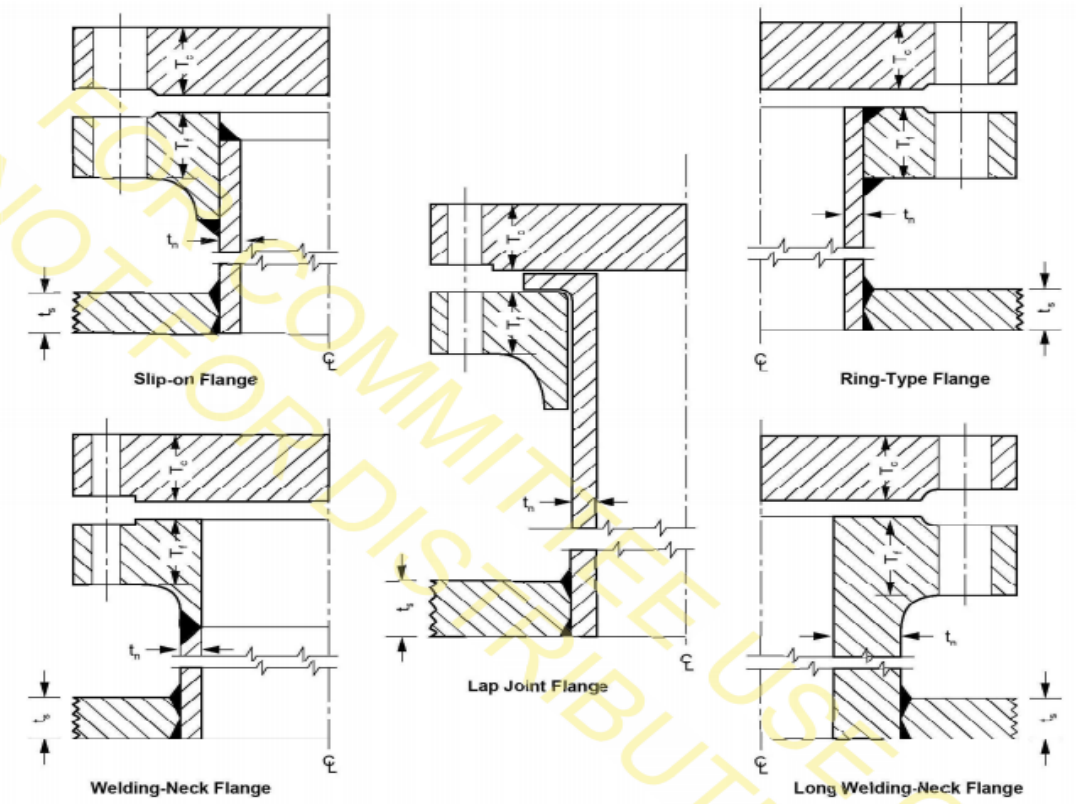
5.7.2.2 The only shell openings that may utilize welds having less than full penetration

through the shell are those that do not require reinforcement, studding outlets of any size placed on the outside of the shell, and those that utilize a thickened insert plate as shown in Figure 5.7b and Figure 5.8. However, any openings listed in Table 3 of the Data Sheet that are marked “yes” under “Full Penetration on Openings” shall utilize welds that fully penetrate the shell and the reinforcement, if used.

Add to definition of RTR in Figure 5.6:

RTR = Regular-Type Reinforced Opening (nozzle or manhole) with diamond or circular shape reinforcing plate, or studding outlet, or insert plate, or thickened insert plate, that does not extend to the bottom (see Figure 5.7A and Figure 5.8).

Notes: -



NOTE 1 Shell reinforcing plate is not included in these illustrations.
NOTE 2 t_s = shell thickness; t_n = nozzle neck thickness; T_f = flange thickness; T_c = bolted cover thickness.
NOTE 3 The governing thickness for each component shall be as follows:

Components	Governing Thickness (thinner of)
Nozzle neck at shell	t_n or t_s
Slip-on flange and nozzle neck	t_n or T_f
Ring-type flange and nozzle neck	t_n or T_f
Welding-neck flange and nozzle neck	t_n
Long welding-neck flange	t_n or t_s
Nonwelded bolted cover	$^1/_4$ T_c
Lap-type joint flange	t_n or T_f

Figure 4.3—Governing Thickness for Impact Test Determination of Shell Nozzle and Manhole Materials (see 4.5.4.3)

Add to Figure 4.3 under Components Governing Thickness

Studding Outlet t_s or T_f

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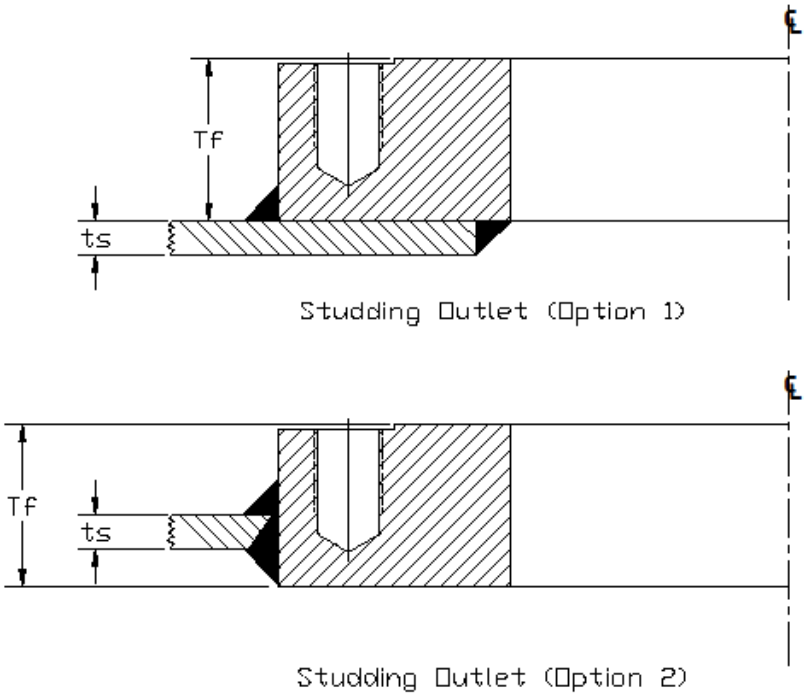
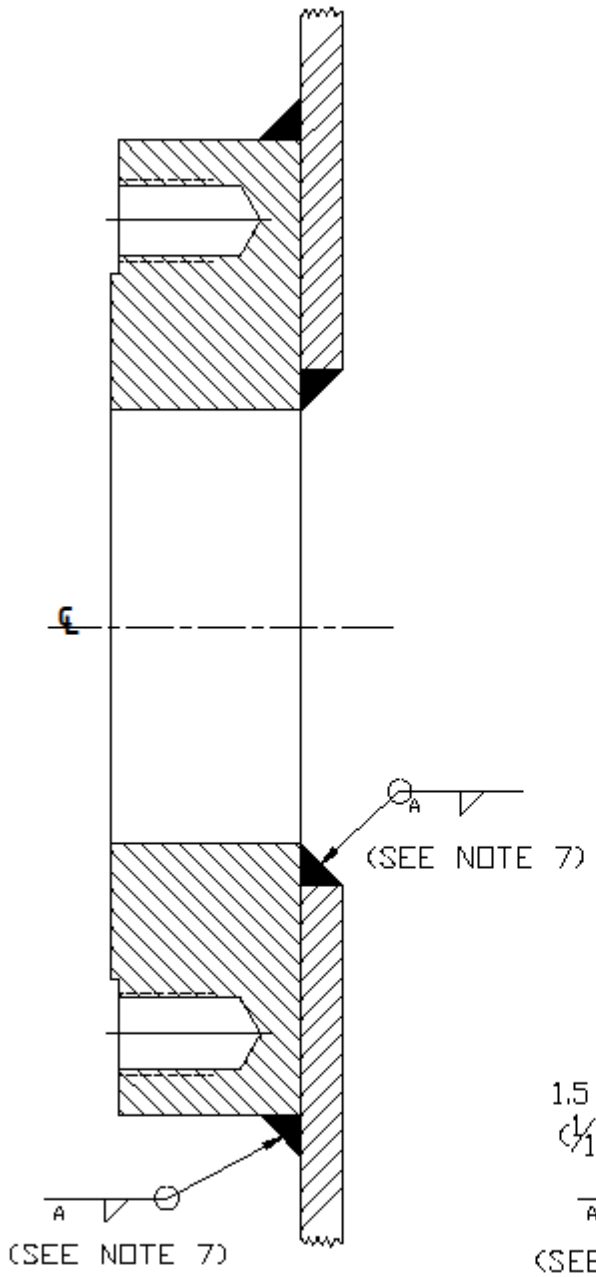
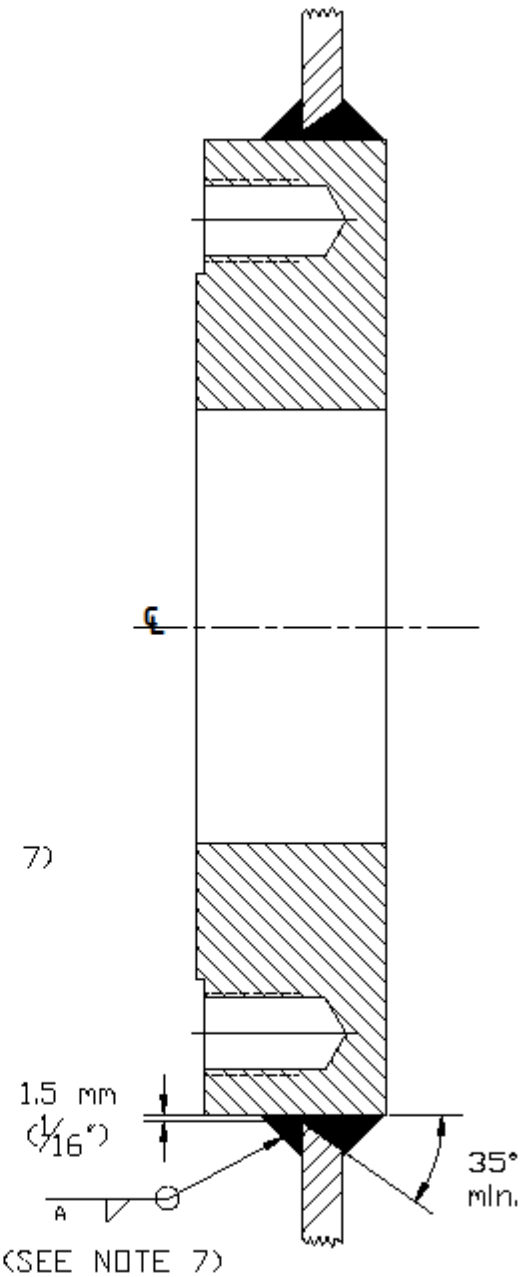
Add sketch to Figure 4.3



Add sketch to Figure 5.8



Studding Outlet (Option 1)



Studding Outlet (Option 2)