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Subject: Seal Welds on Conflat Flanges	Effective Date 12/1/2008	Initiated Fabrication, Operations & Maintenance Division
	Supersedes 7/26/95	Engineering & Technology Development Department Head

Applicability: This Engineering Standard provides the criteria for seal welds which are deposited between a Conflat vacuum flange and a pipe or tube, typically at the ID interface, to provide a leak-tight barrier. Although this weld is designed primarily for sealing purposes, it has some degree of limited mechanical strength when subject to static loading conditions.

Introduction: Partial penetration square-groove seal welds are specified for use on connections between Conflat flanges and piping and tubing in vacuum service, where a maximum degree of leak-tightness is required by design. There is no minimum effective throat specified for these autogenous welds, as distortion of the machined flange surfaces must be avoided, and they are not designed for structural loading.

Reference Documents:

1. PPPL Procedure ENG-037 General Welding and Brazing Requirements
2. ASME B31.3 Chemical Plant & Petroleum Refinery Piping

Standards:

A typical Conflat flange to piping seal weld joint is shown in Figure 1. This seal weld specified as a partial penetration square-groove joint, to be deposited using the manual gas-Tungsten Arc (GTAW) process without filler metal addition.

Examination requirements for these welds is to be perform visual examination in accordance with the acceptance criteria of ASME B31.3 Category D, and helium leak testing to specified acceptance standards.

Welding shall be performed in accordance with Procedure ENG-037, using qualified procedures and welders. Prior to assembly, the joint area shall be thoroughly cleaned to assure adequate penetration and fusion.

In cases where Conflat flange connections are subject to considerable stress or vibration during installation or service, as determined by the Cognizant Individual, either of the following measures may be applied for added reliability:

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1. Add a flexible section to the piping to permit some misalignment and /or external stress, without overloading the seal welded connection.
2. On non-rotatable flanges, add at least one small equally spaced fillet welds to the outside size for the applicable design stress (See Figure 2)
3. On rotatable flanges with pipe diameters of 1 1/2" and greater prepare the ID joint surface for a 1/32-1/16" depth bevel groove, based upon applicable design stresses, and weld with filler metal addition (See Figure 3).

Attachments:

Figure 1 – Typical Conflat Flange Seal Weld Detail

Figure 2 – Seal Weld with External Reinforcing Fillet Welds (Non-Rotatable Flange)

Figure 3 – Bevel Groove Seal Weld (1 1/2" & greater diameter rotatable flanges)

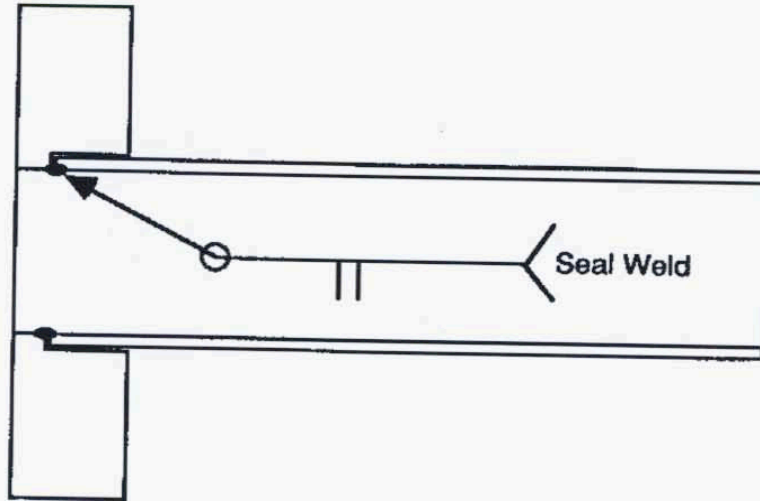


Figure 1: Typical Conflat Flange Seal Weld

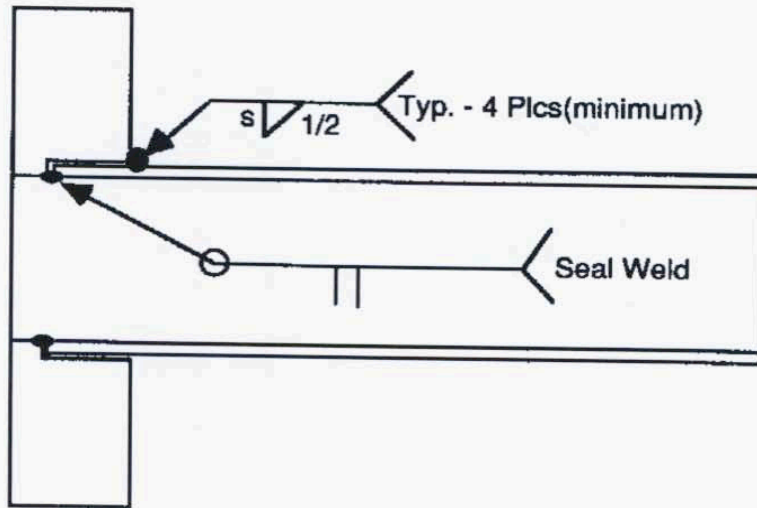


Figure 2: Seal Weld with Reinforcing Fillet Welds (Non-rotatable Flange)

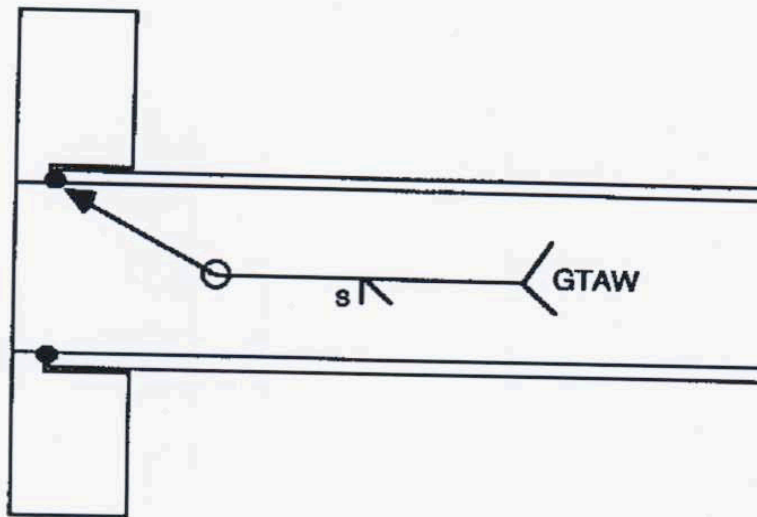


Figure 3: Bevel Groove Seal Weld