Agenda Item 650-663

Title: Clarify Spacing of 3-Plate Laps

Date: Oct 31, 2008

Revision: 1

Handled By: Ron Spork

Purpose: Clarify spacing of 3-way laps on butt weld annular plates.

Source: Doug Miller 7/16/08 email

Impact: Clearer standard with less chance that poor construction details are used in practice.

Discussion:
The wording regarding 3-plate laps has been unchanged in API 650 since 1995 when the sentence "lapping of two bottom plates onto the butt-welded annular plates does not constitute a three-plate lap weld." was added in agenda item 650-361. From discussion with Earl Crochet who handled 650-361, I know that the intent of the 650-361 item was to make it clear that the spacing between "non breakdown" and "breakdown" lap joints in the attached sketch does NOT need to be controlled and does not need to be at least 12". I agree with that intent because I agree that only the joints that involve a "breakdown" need to be so separated.

The Figure 5-3D illustrates the various joints in question.

I think the wording from 650-361 was not really correct and can serve to justify poor construction details. The sentence added in 650-361 describes junctions that are" breakdown" lap joints. But these joints actually do involve "breakdowns" because in both, three plates lap on one another. The unintended result of our existing wording is that the "breakdown" joints may be very close to one another since both are said to "not constitute three-plate laps". I don't think we want that. The junction that truly doesn't need spacing is the junction between the "non breakdown" joint and the "breakdown" joint. The proposed words properly describe the "non breakdown" joint as not constituting a three-plate lap. The proposed revised wording permits the "non breakdown" joint junction to "breakdown" joint spacing to be close but ensures that the "breakdown" joint to "breakdown" joint spacing is at least 12".
5.1.5.4 Lap-Welded Bottom Joints

Lap-welded bottom plates shall be reasonably rectangular. Additionally, plate may be either square cut or may have mill edges. Mill edges to be welded shall be relatively smooth and uniform, free of deleterious deposits, and have a shape such that a full fillet weld can be achieved. Unless otherwise specified by the Purchaser, lap welded plates on sloped bottoms shall be overlapped in a manner to reduce the tendency for liquid to puddle during draw-down.

Three-plate laps in tank bottoms shall be at least 300 mm (12 in.) from each other, from the tank shell, from butt welded annular plate joints, and from joints between annular plates and the bottom. A three-plate lap is created where three plates come together and all plates are joined to one another by lap welds. Note that a location where a pair of bottom plates are lap welded to each other and are lapped onto an annular plate constitutes a three-plate lap but lapping a single of two bottom plates onto a the butt-welded annular plates splice does not constitute a three-plate lap weld since the two annular plates are not joined together by a lap weld. These lap joint connections to the butt-welded annular plate are illustrated in Figure 5-3D.

When annular plates are used or are required by 5.5.1, they shall be butt-welded and shall have a radial width that provides at least 600 mm (24 in.) between the inside of the shell and any lap-welded joint in the remainder of the bottom. Bottom plates need to be welded on the top side only, with a continuous full-fillet weld on all seams. Unless annular bottom plates are used, the bottom plates under the bottom shell ring shall have the outer ends of the joints fitted and lap-welded to form a smooth bearing surface for the shell plates, as shown in Figure 5-3B. Lap-welded bottom plates shall be seal-welded to each other on the exposed outer periphery of their lapped edges.