AGENDA ITEM: 650-538    Date: July 30, 2006
TITLE: Flush Type Clean out reinforcing.
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SOURCE: E-mail, Mar.26, 2001 from B. Mistry
PURPOSE: Clarify Flush Type Clean Out Reinforcing, revise 3.7.7.4, 3.7.7.5 and 3.7.8.4
IMPACT: None
TECHNICAL BASIS: To make Reinforcing Area calculations technically more correct.
JUSTIFICATION: Same as Technical basis

PROPOSED CHANGES: (as shown bold and underlined)
3.7.7.4 The required cross-sectional area of the reinforcement over the top of the opening shall be calculated for Design Condition as well as Hydrostatic Test condition as follows:

where

Acs= required cross-sectional area of the reinforcement over the top of the opening, in mm2 (in.2),
K1=area coefficient from Figure 3-8,
h=vertical height of clear opening, in mm (in.),
t=calculated thickness of the lowest shell course, in mm (in.), required by the formulas of 3.6.3, 3.6.4, or A.4.1(with joint efficiency E=1.0), including corrosion allowance, where applicable, but exclusive of any corrosion allowance.

3.7.7.5
The thickness of the shell plate in the cleanout-opening assembly shall be at least as thick as the adjacent shell plate in the lowest shell course. The thickness of the shell reinforcing plate and the neck plate shall be the same as the thickness of the shell plate in the clean-out-opening assembly.

The reinforcement in the plane of the shell shall be provided within a height L above the bottom of the opening. L shall not exceed 1.5h except that, in the case of small openings, L – h shall not be less than 150 mm (6 in.). Where this exception results in an L that is greater than 1.5h, only the portion of the reinforcement that is within the height of 1.5h shall be considered effective. The reinforcement required may be provided by any one or any combination of the following:

a. The shell reinforcing plate.
b. Any thickness of the shell plate in the cleanout-door assembly that is greater than the required thickness of lowest shell course, as determined by 3.6.3, 3.6.4 or A.4.1(with joint efficiency E=1.0) including corrosion allowance where applicable, thickness of the adjacent plates in the lowest shell course.
c. The portion of the neck plate having a length equal to the thickness of the reinforcing plate.

Reinforcing area provided shall be adequate for Design Conditions as well as Hydrostatic test Conditions.

3.7.8.4
d. The reinforcement in the plane of the shell shall be provided within a height L above the bottom of the opening. L shall not exceed 1.5h except that, in the case of small openings, L – h shall not be less than 150 mm (6 in.). Where this exception results in an L that is greater than 1.5h, only the portion of the reinforcement that is within the height of 1.5h shall be considered effective.
e. The required reinforcement may be provided by any one or any combination of the following: (1) the shell reinforcing plate, (2) any thickness of the shell plate in the flush-type shell connection assembly that is greater than the required thickness of lowest shell course, as determined by 3.6.3, 3.6.4 or A.4.1(with joint efficiency
E=1.0) including corrosion allowance where applicable, thickness of the adjacent plates in the lowest shell course and (3) the portion of the neck plate having a length equal to the thickness of the reinforcing plate.

Reinforcing area provided shall be adequate for Design Conditions as well as Hydrostatic test Conditions.