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ERRATA 2

Page ix, **Contents**, *listing for Figure 4.2*, delete:

$$[^{\circ}\text{C} = (^{\circ}\text{F} - 32)]$$

Page 1-4, **1.1.28**, *revise to read:*

Annex V provides additional requirements for tanks that are designed for external pressure (vacuum) loading greater than 0.25 kPa (1 in. water).

Page 4-10, **Figure 4.2**, *at the end of the title*, delete:

$$[^{\circ}\text{C} = (^{\circ}\text{F} - 32)]$$

Page 5-9, **5.2.1 b)** *revise to read:*

- b) **Design External Pressure (P_e):** Shall not be less than 0.25 kPa (1 in. of water) except that the Design External Pressure (P_e) shall be considered as 0 kPa (0 in. of water) for tanks with circulation vents meeting Annex H requirements. Refer to Annex V for design external pressure greater than 0.25 kPa (1 in. of water). Requirements for design external pressure exceeding this value and design requirements to resist flotation and external fluid pressure shall be a matter of agreement between the Purchaser and the Manufacturer (see Annex V). Tanks that meet the requirements of this standard may be subjected to a partial vacuum of 0.25 kPa (1 in. of water), without the need to provide any additional supporting calculations.

Page 5-12, **5.2.5.3**, *second sentence*, *revise the reference to:*

(see 5.2.5.2)

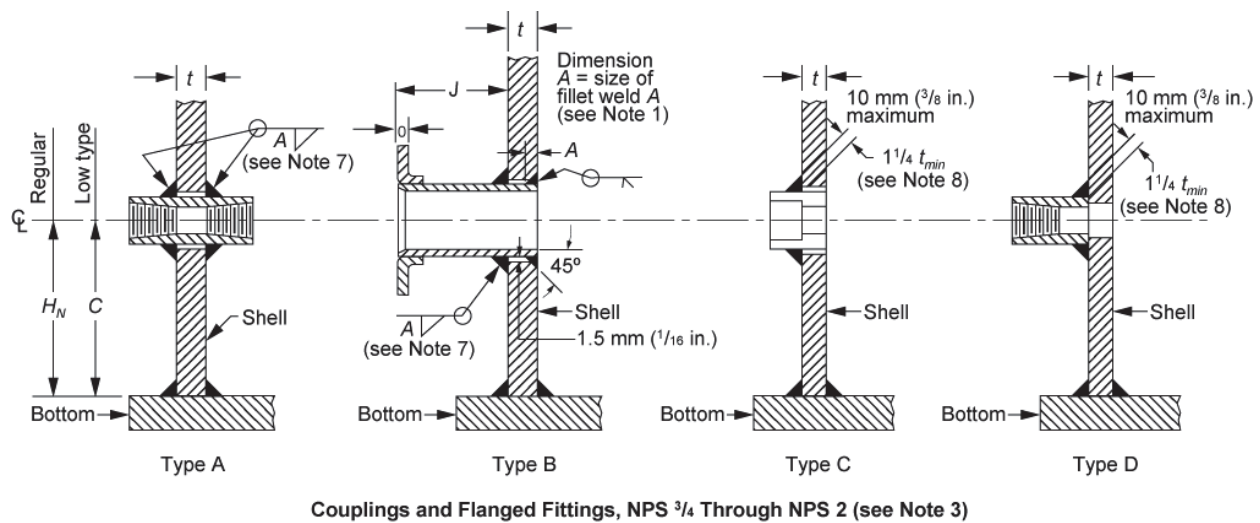
Page 5-19, **Table 5.2a, EN Specifications**, row 1, **Nominal Plate Thickness** column, *revise:*

$$16 < t \leq 1\frac{1}{2}$$

to

$$16 < t \leq 40$$

Page 5-37, **Figure 5.8 (continued)**, replace for updated note references:



Page 5-64, **5.8.1.2 b)**, revise the paragraph to read:

- b) The welding and inspection of permanent attachments to these shell courses shall conform to 7.2.3.7 and 7.2.3.8.

Page 5-96, **5.12.2**, equation "where" for "N", should read:

- N is the number of equally spaced anchors. If not equally spaced, then t_b shall be increased to account for unequal spacing (a minimum of 4 anchors are required).

Page 5-99, **5.12.14.1**, insert the following after the first sentence:

The ability of the detail selected to yield the anchor strap prior to over-stressing the shell shall be demonstrated.

Page E-25, **E.7.1**, the section title should read:

E.7.1 Shell Support

Page E-28, **E.7.4**, revise the first part of the sentence to read:

Connections and attachments for other lateral force...

Page G-6, **G.4.2.3.1**, revise the end of the first sentence to read:

...(except for skylights as allowed by G.8.3)

Page G-8, **G.8.3.1**, revise the end of the first sentence to read:

...the live and wind loads specified in G.4.2.1.

Page L-4, 4th bullet item, revise to read:

- Design External Pressure: See 5.2.1 b).

Page L-20, **Data Sheet** Page 1 of 8, item 7., line 2 *revise*:

External Pressure

to

Design External Pressure

Page M-3, **M.3.8**, second line, *revise*:

...the joint efficiency (F_y) shall be multiplied...

to

...the joint efficiency, F_y , shall be multiplied...

Page T-2, *insert new row before Tracer Gas row*:

RT	100% of the butt-weld around the periphery of an insert plate that extends less than the adjacent shell course height and that contains shell openings and their reinforcing elements.	8.1.2.2d
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Page V-1, **V.1** and **V.2**, *revise to read*:

V.1 Scope

This Annex provides minimum requirements that may be specified by the Purchaser for tanks that are designed for external pressure (vacuum) loading. This Annex applies to tanks for which the design external pressure exceeds 0.25 kPa (1 in. of water) but does not exceed 6.9 kPa (1.0 lbf/in.²). This Annex applies to tanks subject to uniform external pressure. The requirements in this Annex represent accepted practice for application to flat-bottom tanks. However, the Purchaser may specify other procedures or additional requirements. Any deviation from the requirements of this Annex must be by agreement between the Purchaser and the Manufacturer.

V.2 General

The design procedures presented in this Annex are intended to allow the user to evaluate the design of the bottom, shell and fixed roof of tanks for a specified design external pressure. See 5.2.2 for requirements for combining external pressure loads with other design loads. The requirements of this Annex are not intended to supersede the requirements of other Annexes of this standard that may be specified. For Annex M, S, SC and X tanks, the variables in the equations prescribed in this Annex shall be modified in accordance with the requirements of Annex M, Annex S, Annex SC, and Annex X, respectively.

Page V-2, **V.3.1**, *nomenclature for P_e , revise to read*:

P_e is the specified design external pressure, in kPa (lb/ft²);

Page V-4, **V.3.2**, revise definitions **V.3.2.1**, **V.3.2.2**, and **V.3.2.3** to read:

V.3.2.1

• **specified design external pressure (P_e)**

Design external pressure specified on the tank data sheet (see Annex L) by the Purchaser. This specified value excludes any external pressure due to wind.

V.3.2.2

total design external pressure for the roof (P_r)

Sum of the specified design external pressure and the roof live load or snow load and the dead load as provided in V.7.1.

V.3.2.3

total design external pressure for the shell (P_s)

Sum of the specified design external pressure and the external pressure due to wind as combined in V.8.1.2.

Page V-8, **V.8.1**, revise to read:

The procedure utilizes the nominal thickness of thinnest shell course and the transformed shell method to establish intermediate stiffener number and locations. The equations in V.8.1.2 and V.8.1.3 contain variables for a stability factor, ψ , that is dependent upon the magnitude of the design external pressure. The equations also include a 0.8 “knockdown” factor for imperfections in the cylindrical shell geometry. Shells shall be checked for two conditions: 1) the combined wind plus design external pressure, and 2) for design external pressure alone. Each condition shall be checked using the appropriate stability factor, ψ , as follows.

Page V-10, revise the “In SI Units:” and “In USC Units:” sections to read:

In SI Units:

Condition 1—Wind plus specified design external pressure

$\psi = 1.0$ for wind plus design external pressure [when design external pressure (P_e) is less than or equal to 0.25 kPa]. For this case, Annex V is not mandatory.

$\psi = [P_e + 0.70]/0.95$ for wind plus design external pressure [when design external pressure (P_e) is greater than 0.25 kPa, but less than or equal to 0.70 kPa].

$\psi = [P_e/0.48]$ for wind plus design external pressure [when design external pressure (P_e) is greater than 0.70 kPa; however, ψ need not exceed 2.5.]

Condition 2—Specified design external pressure only

$\psi = 3.0$

In USC Units:

Condition 1—Wind plus specified design external pressure

$\psi = 1.0$ for wind plus design external pressure [when design external pressure (P_e) is less than or equal to 5.2 psf]. For this case, Annex V is not mandatory.

$\psi = [P_e + 15]/20$ for wind plus design external pressure [when design external pressure (P_e) is greater than 5.2 psf, but less than or equal to 15 psf].

$\psi = [P_e/10]$ for wind plus design external pressure [when design external pressure (P_e) is greater than 15 psf; however, ψ need not exceed 2.5.]

Condition 2—Specified design external pressure only

$\psi = 3.0$

Page V-11, **V.8.1.2**, *revise to read:*

The total design external pressure for the shell (P_s , using the appropriate ψ from V.8.1) and the specified design external pressure (P_e , using $\psi = 3.0$) shall not exceed for an unstiffened tank: