Errata

6 − / + Q

$$C_v = 4.454 \quad \text{for} \quad M_x \leq 1.5 \tag{4.4.62}$$

$$C_v = \left(\frac{9.64}{M_x^2}\right)\left(1 + 0.0239 M_x^3\right)^{0.5} \quad \text{for} \quad 1.5 < M_x < 26 \tag{4.4.63}$$

$$C_v = \frac{1.492}{M_x^{0.5}} \quad \text{for} \quad 26 \leq M_x < 4.347\left(\frac{D_o}{t}\right) \tag{4.4.64}$$

$$C_v = 0.716\left(\frac{t}{D_o}\right)^{0.5} \quad \text{for} \quad M_x \geq 4.347\left(\frac{D_o}{t}\right) \tag{4.4.65}$$

$$\alpha_v = 0.8 \quad \text{for} \quad \frac{D_o}{t} \leq 500 \tag{4.4.66}$$

$$\alpha_v = 1.389 - 0.218\log_{10}\left(\frac{D_o}{t}\right) \quad \text{for} \quad \frac{D_o}{t} > 500 \tag{4.4.67}$$

Step 2. Calculate the predicted inelastic buckling stress, F_{ic}, per 4.4.3.

Step 3. Calculate the factor of safety, FS, per 4.4.2.

Step 4. Calculate the allowable axial compressive stress, F_{va}, as follows:

$$F_{va} = F_{ic}/FS \tag{4.4.68}$$

(e) Axial Compressive Stress and Hoop Compression. The allowable compressive stress for the combination of uniform axial compression and hoop compression, F_{xha}, is computed using the following equations:

(1) For $\lambda_c \leq 0.15$, F_{xha} is computed using the following equation with F_{ha} and F_{xa} evaluated using the equations in (a) and (b)(1), respectively.

$$F_{xha} = \left[\left(\frac{1}{F_{xa}^2}\right) - \left(\frac{C_1}{C_2 F_{xa} F_{ha}}\right) + \left(\frac{1}{C_2^2 F_{ha}^2}\right)\right]^{-0.5} \tag{4.4.69}$$

$$C_1 = \frac{F_{xa} \cdot FS + F_{ha} \cdot FS}{S_y} - 1.0 \tag{4.4.70}$$

$$C_2 = \frac{f_x}{f_h} \tag{4.4.71}$$

$$f_x = f_a + f_q \quad \text{for} \quad f_x \leq F_{xha} \tag{4.4.72}$$

The parameters f_a and f_q are defined in (k).

The values of FS are given in 4.4.2. The values of FS are to be determined independently for axial and hoop directions.

(2) For $0.15 < \lambda_c < 1.2$, F_{xha} is computed from the following equation with $F_{ah1} = F_{xha}$ evaluated using the equations in (1) and F_{ah2} using the following procedure. The value of F_{ca} used in the calculation of F_{ah2} is evaluated using the equations in (b)(2) with $F_{xa} = F_{xha}$ as determined in (1). As noted, the load on the end of a cylinder due to external pressure does not contribute to column buckling and therefore F_{ah1} is compared with f_a rather than f_x. The stress due to the pressure load does, however, lower the effective yield stress and the quantity in $(1 - f_q/S_y)$ accounts for this reduction.

$$F_{xha} = \min\left[F_{ah1}, F_{ah2}\right] \tag{4.4.73}$$

(c) Compressive Bending Stress. The allowable axial compressive membrane stress of a cylindrical shell subject to a bending moment acting across the full circular cross section F_{ba}, shall be determined using the procedure in (b).

(d) Shear Stress. The allowable shear stress of a cylindrical shell, F_{va}, is computed using the following equations.

Step 1. Calculate the predicted elastic buckling stress, F_{ve}.

$$F_{ve} = \alpha_v C_v E_y \left(\frac{t}{D_o}\right) \tag{4.4.61}$$

$$C_v = 4.454 \quad \text{for } M_x \le 1.5 \tag{4.4.62}$$

$$C_v = \left(\frac{9.64}{M_x^2}\right)\left(1 + 0.0239 M_x^3\right)^{0.5} \quad \text{for } 1.5 < M_x < 26 \tag{4.4.63}$$

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$$C_1 = \frac{F_{xa} \cdot FS + F_{ha} \cdot FS}{S_y} - 1.0 \tag{4.4.70}$$

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