TUBESHEET ANALYSIS - A PROPOSED ASME DESIGN PROCEDURE

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,	ABSTRACT A simplified design procedure is presented to de-	a fully integral or one-side integral construction, neglects the effect of radial differential thermal expansion, and currently does not include the effect of variations in the ligament efficiency in the perforated
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•	and Fixed Tu <u>besheet shell and tube exchangers.</u> The pro-	region stress field. Therefore, questionable results

$$\theta(a) = \theta(x_a) = \phi_R$$

(12)

$$I_S b = aV_a + p_T \frac{b^2}{2} + \Delta p(b^2 - a^2)/2; \Delta p = p_S - p_T$$
 (8)

The net moment M_R , acting on the ring at radius R* in the direction of the ring rotation φ_R , is now constructed. For example, for two-side integral construction, the net moment has the form: (see Fig. 2a)

which yields the result

$$M_a = aV_a Q_1 + Q_2 \tag{13}$$

where

$$K-1 - \Phi Z_V(x_a)$$
 $l=v^2$

- b (M_S - h Q_S)

For any class of construction, the relation between the ring moment \mathbf{M}_R and the ring rotation $\boldsymbol{\varphi}_R$ is

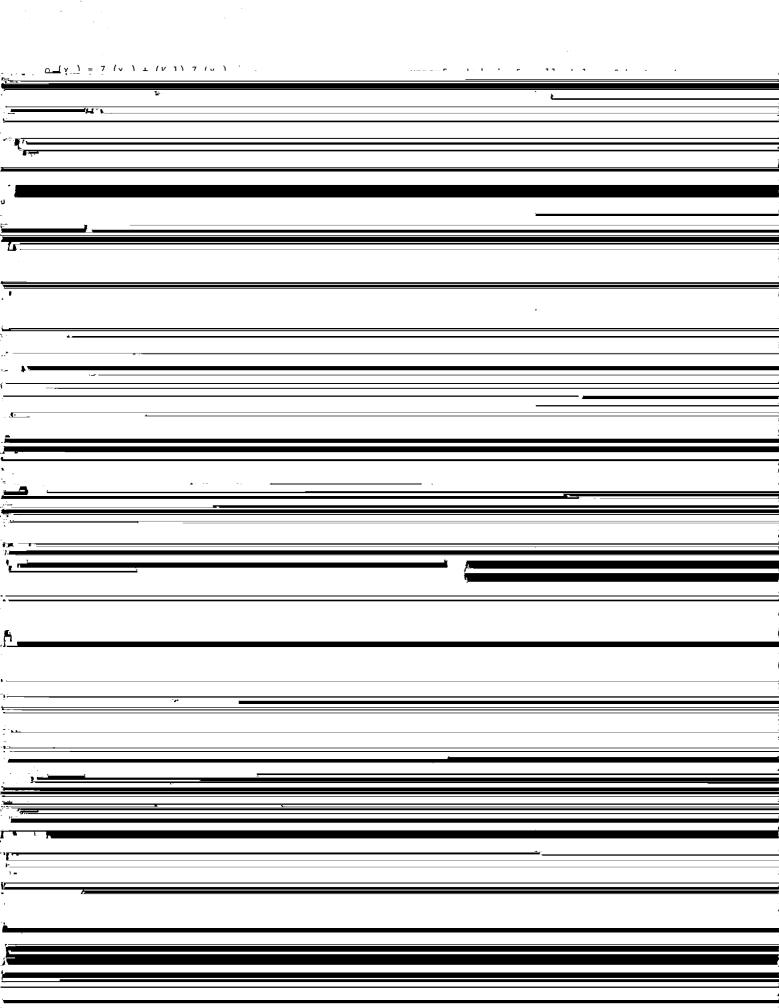
$$\phi_{R} = 12 \text{ R* } M_{R}/\text{Eh}^{3} \text{ ln } (a_{1}/a)$$
 (9b)

Cylindrical shell theory is used to describe the edge displacement and rotation of the shell and head in terms of shell and head edge moments and shears, local

and

$$Q_{2} = \frac{a^{2}(p_{T} \gamma_{T}^{**} + p_{T}^{TH} \gamma_{T}^{*} + p_{S}^{TH} \gamma_{S}^{*} - p_{S}^{TH} \gamma_{S}^{*}) + Bd_{b}\gamma_{B}}{1 + \Phi Z_{M}(x_{a})}$$
(15)

For a fixed tubesheet exchanger or for the stationary tubesheet of a floating head exchanger, Z_V and Z_M are complex expressions involving Ber and Bei Bessel functions evaluated at x . Figures 3a,3b illustrate these functions for $\nu^\star=0.4$. For a U-tube exchanger an appropriate limiting process for $x_a \rightarrow 0$ yields the analy-



REMARKS	15. Stoomwezen (Dutch Pressure Vessel Code): "Rules for Pressure Vessels", 1973.
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