Miscellaneous REPORT, Miscellaneous Data Items

In SI units:

CAESAR II MISC. NOZZLE REPORT

API-650 NOZZLE NODE = 10

INPUT PARAMETERS:

Tank Diameter	(mm.)=	80000.000
Nozzle Height above bottom plate	(mm.)=	630.000
Nozzle Outer Diameter	(mm.)=	610.000
Shell Course Thickness	(mm.)=	34.000
Max Fluid Height above bottom plate	(mm.)=	19200.000
delta Temperature	(C)=	70.000
Modulus of Elasticity	(N./sq.mm.)=	0.199000E+06
Expansion Coefficient	(mm./mm./deg)=	0.840000E-03
Fluid Specific Gravity	=	1.000
Reinforcement on (S)hell or (N)ozzle	=	S

COMPUTED VALUES:

AXIAL TRANSLATIONAL STIFFNESS	(N./mm.)=	32997.
LONGITUDINAL BENDING STIFFNESS	(N.m./deg)=	271078.
CIRCUMFERENTIAL BENDING STIFFNESS	(N.m./deg)=	422135.
RADIAL DEFLECTION DUE TO FLUID & TEMP	(mm.)=	2377.88
LONGITUDINAL ROTATION DUE TO FLUID & TEMP	(deg)=	-1.84
Radial Force AXIS Limit	(N.)=	285207.
Longitudinal Moment AXIS Limit	(N.m.)=	179335.
Circumferential Moment Axis Limit	(N.m.)=	589851.

$$\frac{X_A}{(Rt)^{0.5}} = \frac{935}{[(40{,}000)(34)]^{0.5}} = 0.80$$

$$\frac{X_B}{(Rt)^{0.5}} = \frac{325}{[(40{,}000)(34)]^{0.5}} = 0.28$$

$$\frac{X_C}{(Rt)^{0.5}} = \frac{630}{[(40{,}000)(34)]^{0.5}} = 0.54$$

$$\lambda = \frac{a}{(Rt)^{0.5}} = \frac{305}{[(40{,}000)(34)]^{0.5}} = 0.26$$

$$K_R = (3.1 \times 10^{-4})(199{,}000\ \text{N/mm}^2)(610\ \text{mm})$$
$$= 3.76 \times 10^4\ \text{N/mm}$$

$$K_L = (4.4 \times 10^{-4})(199{,}000\ \text{N/mm}^2)(610\ \text{mm})^3$$
$$= 2.0 \times 10^{10}\ \text{N-mm/rad}$$

$$K_C = (9.4 \times 10^{-4})(199{,}000\ \text{N/mm}^2)(610\ \text{mm})^3$$
$$= 4.2 \times 10^{10}\ \text{N-mm/rad}$$

Discrepancy of Stiffness values and Allowables between Caesar II and Appendix P Sample ?

$$F_{R\max} = \frac{0.4}{1.29 \times 10^{-6}} = 310{,}000\ \text{N (tension at A controls)}$$

From Figure P.4a and Figure P.4b,

Y_F = 1.9/N (1.9/lbf)

Y_L = 7.8/N-mm (7.8/in.-lbf)

Y_C = 17.3/N-mm (17.3/in.-lbf)

$$M_{C\max} = \frac{0.59}{9.26 \times 10^{-10}} = 6.37 \times 10^8\ \text{N-mm (tension at C′ controls)}$$

$$M_{L\max} = \frac{0.4}{2.29 \times 10^{-7}} = 1.75 \times 10^6\ \text{in.-lbf (tension at A controls)}$$