Materials and Conditions

- Bellows material: SA-240 304ss
- Eb, bellows modulus of elasticity: 27,557,164
- Sab, allowed stress, bellows: 20,000
- Cm, material factor: 3.00
- P, operating pressure, psi: 300.0

Dimensions

- Convolution Pitch (q): 3.000
- Bellows thickness (t): 0.250
- Inside diameter of bellows (Db): 24.000
- Convolution height (w): 4.000

Motion

- Axial compression: 0.000
- Axial extension: 0.000

Constants (per EJMA A-2)

- Dm = Db + w + t = 24.000 + 4.000 + 0.250 = 28.250
- Kr = \(\frac{2(q + xe)}{2q}\) = \(\frac{2(3.00 + 0)}{2 \times 3}\) = 1.000
- fv = \(\frac{q}{2.2 \sqrt{Dm \times t}}\) = \(\frac{3}{2.2 \sqrt{28.25 \times 0.25}}\) = 0.513
- fh = \(\frac{q}{2 \times w}\) = \(\frac{3}{2 \times 4}\) = 0.375
- Cp = 0.721
- Cf = 1.509
- Cd = 1.566

Pressure and Deflection Stresses (per EJMA)

- Circ stress from pressure: S2 = 5,235
- Meridional membrane from pressure: S3 = 2,400
- Meridional bending from pressure: S4 = 27,668
- Meridional membrane from deflection: S5 = 0
- Meridional bending from deflection: S6 = 0
- Combined total stress: St = 21,047
- EJMA Predicted Cycle Life: Nc = 100,000,000
- Bellows axial spring rate: Fi = 214,069

Stress Evaluation (per EJMA)

- S2 <= Sab
- S3 + S4 <= Cm*Sab

Stress Evaluation (per ASME Appendix 5)

- S2 <= 1.5*Sab
- S3 <= 1.5*Sab
- S4 <= 1.5*Sab
- S4 + S5 <= 3*Sab
- Nc >= 100

Stress Evaluation (per EJMA) Material not in creep range

Nc >= 100

No Straight Flange