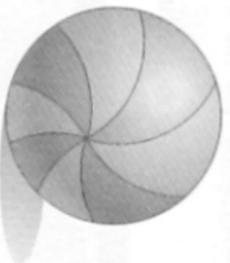


8.2-4 A rubber ball (see figure) is inflated to a pressure of 80 kPa. At that pressure the diameter of the ball is 208 mm and the wall thickness is 1.2 mm. The rubber has modulus of elasticity $E = 3.5$ MPa and Poisson's ratio $\nu = 0.45$.

Determine the maximum stress and strain in the ball.

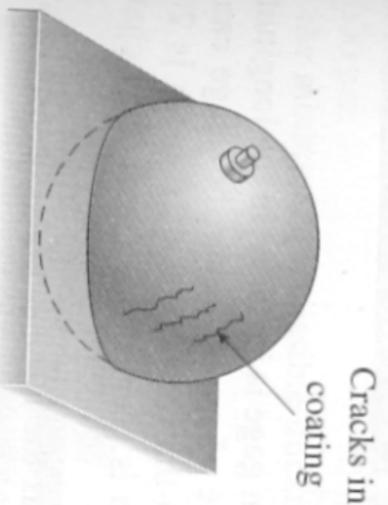


PROBS. 8.2-4 and 8.2-5

8.2-5 Solve the preceding problem if the pressure is 12 psi, the diameter is 8.20 in., the wall thickness is 0.048 in., the modulus of elasticity is 500 psi, and Poisson's ratio is 0.45.

8.2-6 A spherical steel pressure vessel (diameter 600 mm, thickness 10 mm) is coated with brittle lacquer that cracks when the strain exceeds 200×10^{-6} (see figure).

What internal pressure p will cause the lacquer to develop cracks? (Assume $E = 205$ GPa and $\nu = 0.30$.)



PROB. 8.2-6

8.2-7 A spherical tank of diameter 48 in. and wall thickness 2 in. contains compressed air at a pressure of 2500 psi. The tank is constructed of two hemispheres joined by a welded seam (see figure).

(a) What is the tensile load f (lb per in. of length of weld) carried by the weld? (b) What is the maximum shear stress τ_{\max} in the wall of the tank? (c) What is the maximum normal strain ϵ in the wall? (For steel, assume $E = 31 \times 10^6$ psi and $\nu = 0.29$.)

8.2-8 Solve the preceding problem for the following data: diameter 1200 mm, thickness 50 mm, pressure 20 MPa, modulus 210 GPa, and Poisson's ratio 0.29.