Application of the ASME Code Rules

Consider a PWR pressure vessel that operates at 15 MPa and 320°C. The vessel is made of carbon steel, and has a diameter of 4.5 m and a thickness of 200 mm. If due to a seismic event the vessel is also subjected temporarily to an external compressive axial force $F_s$, as shown in Figure 1, what is the maximum allowable value of $F_s$, so that the ASME limit for the primary general membrane stresses is not violated? ($S_m = 180$ MPa for carbon steel at 320°C)

Assumptions
1) Use a thin-shell approach to calculate the principal stresses.
2) Neglect the external pressure.