The anchor bolts are assumed to share the overturning load equally, and the bolt area required is given by:

$$A_b = \frac{1}{N_b f_b}\left[\frac{4M_s}{D_b} - W\right] \tag{13.92}$$

where A_b = area of one bolt at the root of the thread, mm^2,
N_b = number of bolts,
f_b = maximum allowable bolt stress, N/mm^2;
typical design value 125 N/mm^2 (18,000 psi),
M_s = bending (overturning) moment at the base, Nm,
W = weight of the vessel, N,
D_b = bolt circle diameter, m.

Scheiman gives the following guide rules which can be used for the selection of the anchor bolts:

1. Bolts smaller than 25 mm (1 in.) diameter should not be used.
2. Minimum number of bolts 8.
3. Use multiples of 4 bolts.
4. Bolt pitch should not be less than 600 mm (2 ft).

If the minimum bolt pitch cannot be accommodated with a cylindrical skirt, a conical skirt should be used.

The base ring must be sufficiently wide to distribute the load to the foundation. The total compressive load on the base ring is given by:

$$F_b = \left[\frac{4M_s}{\pi D_s^2} + \frac{W}{\pi D_s}\right] \tag{13.93}$$

where F_b = the compressive load on the base ring, Newtons per linear metre,
D_s = skirt diameter, m.

The minimum width of the base ring is given by:

$$L_b = \frac{F_b}{f_c} \times \frac{1}{10^3} \tag{13.94}$$

where L_b = base ring width, mm (Figure 13.29),
f_c = the maximum allowable bearing pressure on the concrete foundation pad, which will depend on the mix used, and will typically range from 3.5 to 7 N/mm^2 (500 to 1000 psi).

The required thickness for the base ring is found by treating the ring as a cantilever beam. The minimum thickness is given by:

$$t_b = L_r\sqrt{\frac{3f'_c}{f_r}} \tag{13.95}$$