Bearing Plates

To resist a beam reaction, the minimum bearing length N in the direction of the beam span for a bearing plate is deter- mined by equations for prevention of local web yielding and web crippling. A larger N is generally desirable but is limited by the available wall thickness.

When the plate covers the full area of a concrete support, the area, in ^{2} (mm ^{2}), required by the bearing plate is

$A_1 = R/0.35f'_c$

Where

R=beam reaction, kip (kN),

f'_c= specified compressive strength of the concrete, ksi (MPa).

When the plate covers less than the full area of the concrete support, then, as determined by following table

Allowable Bearing Stress, F_p, on Concrete and Masonry

Full area of concrete support	$0.35f'_c$
Less than full area of concrete support	$0.35f'_c \sqrt{\frac{A_1}{A_2}} \leq 0.70f'_c$
Sandstone and limestone	0.40
Brick in cement mortar	0.25

† Units in MPa = 6.895 × ksi.

$$A_1 = \left(\frac{R}{0.35\, f'_c \ \sqrt{A_2}} \right)^2$$

where A_2= full cross-sectional area of concrete support, in^2(mm^2).

With N established, usually rounded to full inches (millimeters), the minimum width of plate B, in (mm), may be calculated by dividing A_1 by N and then rounded off to full inches (millimeters), so that BN >=A_1. Actual bearing pressure f_p, ksi (MPa), under the plate then is

f_p=R/BN

The plate thickness usually is determined with the assumption of cantilever bending of the plate:

$$t = \left(\frac{1}{2}B - k\right)\sqrt{\frac{3f_p}{F_b}}$$

where

t=minimum plate thickness, in (mm)

k=distance, in (mm), from beam bottom to top of web fillet

F_b= allowable bending stress of plate, ksi (MPa)

Source: http://www.engineeringcivil.com/bearing-plates.html