

5.3.1 Connection to RHS column design example

The following example demonstrates all the typical limit states that need to be checked for a simple I-section beam shear plate connection to a RHS column, along with the unique criterion given by equation 5.2. To do this, it is necessary to conform to a particular limit states structural steel specification and the Canadian standard CAN/CSA-S16.1-94 (CSA 1994) is used in this instance.

Connect a W410 x 39 Grade 350W beam via a single shear plate to a HSS 203 x 203 x 8.0 Grade 350W Class C column, to develop the capacity of the beam in shear. (An I-section beam approximately 410 mm deep and weighing 39 kg/metre, with a yield stress of 350 N/mm², is to be joined to a cold-formed square RHS measuring 203 mm x 203 mm x 8 mm, also with a yield stress $f_{c,y} = 350$ N/mm² and minimum ultimate stress $f_{c,u} = 450$ N/mm².)

Shear capacity of beam:

$$V^* = 484 \text{ kN} = \text{required shear capacity of connection} \quad \text{CSA Specification}$$

Shear plate thickness:

$$\begin{aligned} \text{Slenderness of the flat RHS face} &= (b_c - 4t_c)/t_c \\ &= (203 - 4(7.95))/7.95 \\ &= 21.5 < 1.4 \sqrt{E/f_{c,y}} = 33.5 \end{aligned}$$