BEAMS WITHOUT LATERAL SUPPORT

The allowable compressive stress due to bending about the x-x axis for universal beams and columns, joists and channels is the lesser of the values of p_{bc} given in Tables 2 and 3 a, b or c (depending on the grade of steel) in BS 449. The values in Table 2 apply when the compression flange is so supported that lateral instability is obviated. When the compression flange is unsupported or insufficiently supported laterally, the appropriate Table 3 applies. The maximum effective length of compression flange which may be used without reduction of the allowable bending stresses in Table 2 is given as L_c with the safe load tables.

Example: Find the allowable stress, p_{bc}, and the safe uniformly distributed load, W, for a 533 = 210 UB 82 in grade 43 steel spanning 7m without lateral restraint and having the ends of the compression flange partially restrained.

Effective length = 0.85 x 700 = 595 cm (see BS 449, Clause 26)

l/r_y595/4.38 = 136; D/T = 40.

From BS 449, Table 3a, p_{bc} = 119N/mm2

The safe uniformly distributed load, W = 8fZ/L
= (8 x 119 x 1798 x 10^3/7000)N
= 245kN

Lateral instability is not a criterion for these sections when bent about the y-y axis and the allowable stresses in Table 2 apply.