Worked examples for seminars

134STS3 - Steel Structures 3

Name : . . . . . .

A B
C D (mark one of two letters)
a = b = c =

Recommended units: N, mm, MPa=N/mm^2

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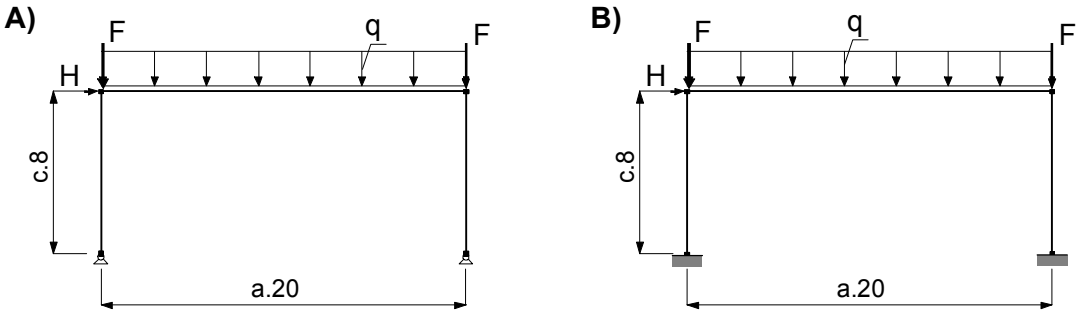
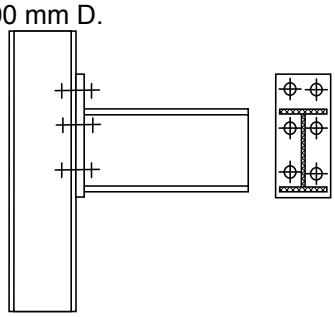
1) Design the members of the frame
Consider out-of plane restraint at the corner and at the eighths of the rafter span. The design shall cover the global sway imperfections and lateral-torsional buckling. Design also the rafter–column bolted joint with end plate.
Steel: C … S355 D … S235
Loading:

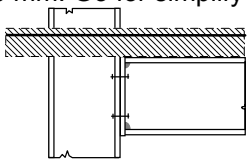
- Dead q_k = b.1,5 kN/m F_k = a.20 kN γ_G = 1,35
- Variable q_k = b.6 kN/m F_k = a.80 kN H_k = c.20 kN γ_Q = 1,50



2) Calculate a resistance and stiffness of joint, see Figure. Steel S 235. Bolts 5.6 A, 6.8 B, 8.8 C, 10.9 D. Three bolt rows. Beam IPE 140 A, 160 B, 180 C, 200 D. Braced frame AC, Unbraced frame BD. Classify the joint for beam span 4 200 A, 4 600 B, 5 600 C, 6 000 mm D.



3) Design a joint as composite; derive the structural rules, resistance, and stiffness of joint of worked example 1). Use reinforcement 6 x ϕ16, 8 x ϕ16, 10 x ϕ16 A, 6 x ϕ20 B, 8 x ϕ20 C, 10 x ϕ20 D. The reinforcement change based on ductility rules. Composite slab thickness 100 mm. Go for simplify and full component model.



4) Design the built-up battened column.
Use 2 hot-rolled I or U profiles. Design the welded battens, too. Applied load F_{Ed} = a.1000 kN
Buckling lengths: $L_{cr,y}$ = b.10 m, $L_{cr,z}$ = $L_{cr,y}$ /3
Steel: A … S275, B … S355

Literature:
Sokol: Steel Structures 1. Tables, CTU in Prague, 2008
http://people.fsv.cvut.cz/~wald/STS3-steel.htm