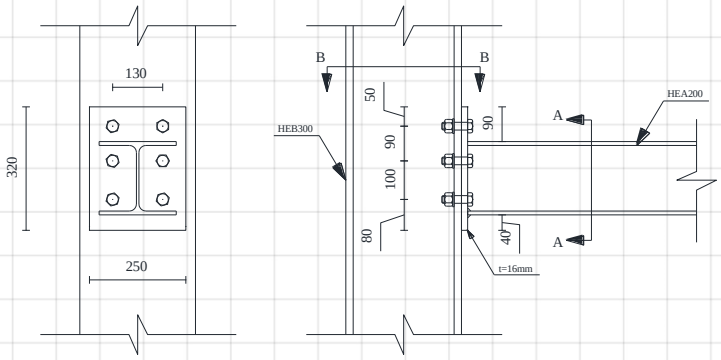
This playlist series focuses on the rigid connection calculation according to EN 1993-1-8. A comparison is made with Ansys at the end of the series after hand calculation. Finally, tips for applying the semi-rigid connection to RFEM are presented.

An Endplate welded to a beam, HEA200, is bolted to a HEB300 column with 6M20 class 8.8, as shown in the figures below. Steel material is S355 for all parties.

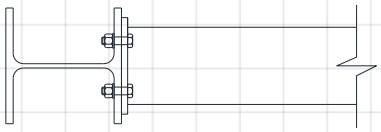
This video shows the resistance calculation of the Beam web in tension according to EN 1993-1-8. The contents are as follows:

a) Table 6.1 Item 8 explanation.
b) Beam web in tension according to 6.2.6.8.
c) Effective width of the beam web in tension.

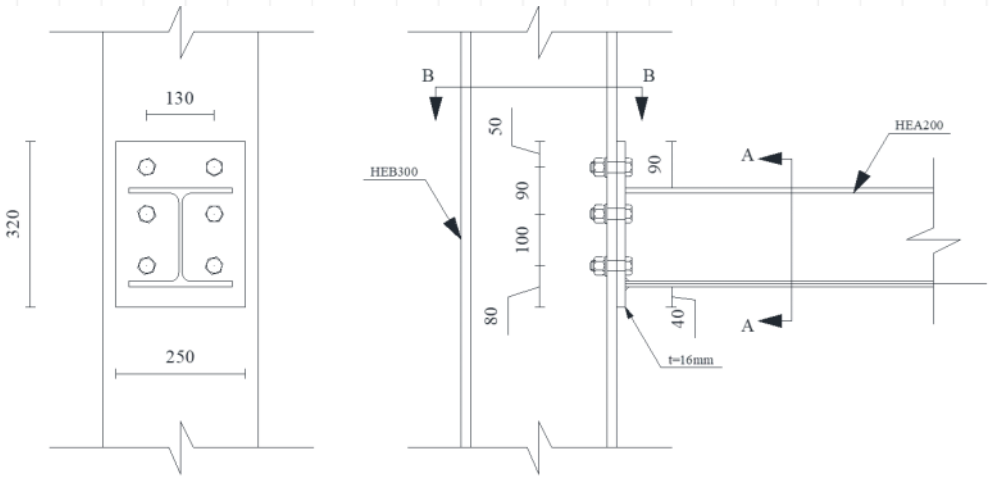
All dimensions are in mm unless otherwise specified.



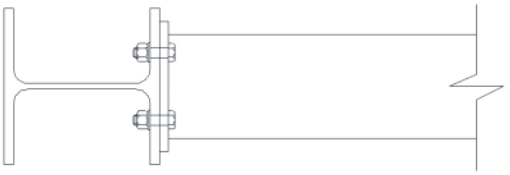
Sec A-A



Sec B-B

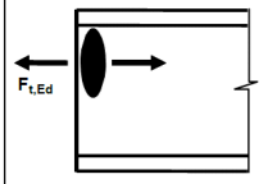


Sec A-A



Sec B-B

Table 6.1: Basic joint components

Component			Reference to application rules		
			Design Resistance	Stiffness coefficient	Rotation capacity
8	Beam web in tension		6.2.6.8	6.3.2	*)

6.2.6.8 Beam web in tension

(1) In a bolted end-plate connection, the design tension resistance of the beam web should be obtained from:

$$F_{t,wb,Rd} = b_{eff,t,wb}\, t_{wb}\, f_{y,wb} / \gamma_{M0} \quad \text{... (6.22)}$$

(2) The effective width $b_{eff,t,wb}$ of the beam web in tension should be taken as equal to the effective length of the equivalent T-stub representing the end-plate in bending, obtained from 6.2.6.5 for an individual bolt-row or a bolt-group.

$l_{eff,cp} = 2\pi m = 368\,mm$

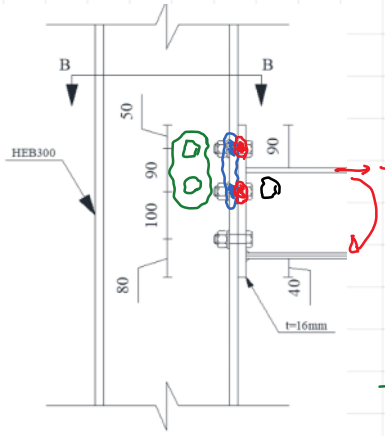
$l_{eff,nc} = 2\pi^{(+)} m = 368\,mm$

$\begin{cases} l_{eff,1} = 368\,mm \\ l_{eff,2} = 368\,mm \end{cases}$

$l_{eff(min)} = 368\,mm \rightarrow$

$$F_{t,wb,Rd} = b_{eff,t,wb}\, t_{wb}\, f_{y,wb} / \gamma_{M0} \rightarrow F_{t,wb,Rd} = 850\,kN$$

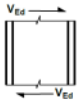
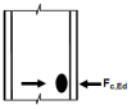
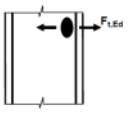
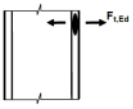
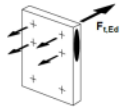
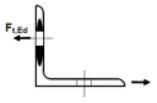
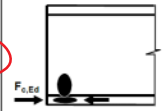
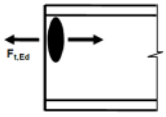
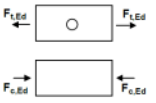
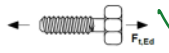
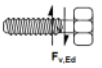
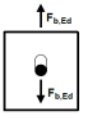
368 mm; t_{wb}: 6 5 mm, HEA 200; $f_{y,wb}$: 355 MPa; γ_{M0}: 1



(kN)	Col. web T. tension	Col. flange T bending	End plate bending	beam web tension	Min
r1	790	282	232	—	232
r2	790	282	282	850	282
r1, r2	1006	564	—	—	564

232 kN + 282 kN ≤ 564 kN (OK)

Table 6.1: Basic joint components

	Component		Reference to application rules		
			Design Resistance	Stiffness coefficient	Rotation capacity
1	Column web panel in shear		6.2.6.1	6.3.2	6.4.2 and 6.4.3
2	Column web In transverse compression		6.2.6.2	6.3.2	6.4.2 and 6.4.3
3	Column web in transverse tension		6.2.6.3	6.3.2	6.4.2 and 6.4.3
4	Column flange in bending		6.2.6.4	6.3.2	6.4.2 and 6.4.3
5	End-plate in bending		6.2.6.5	6.3.2	6.4.2
6	Flange cleat in bending		6.2.6.6	6.3.2	6.4.2
7	Beam or column flange and web in compression		6.2.6.7	6.3.2	*)
8	Beam web in tension		6.2.6.8	6.3.2	*)
9	Plate in tension or compression		in tension: - EN 1993-1-1 in compression: - EN 1993-1-1	6.3.2	*)
10	Bolts in tension		With column flange: 6.2.6.4 with end-plate: 6.2.6.5 with flange cleat: - 6.2.6.6	6.3.2	6.4.7
11	Bolts in shear		3.6	6.3.2	6.4.2
12	Bolts in bearing (on beam flange, column flange, end-plate or cleat)		3.6	6.3.2	*)

*) No information available in this part.