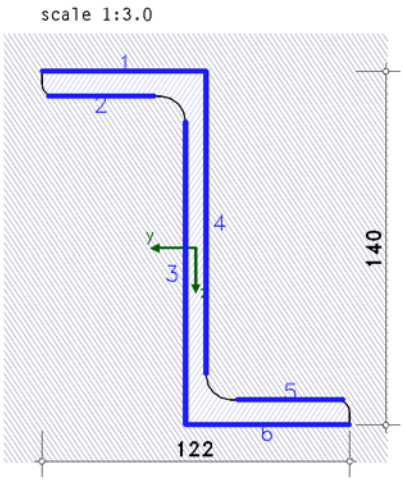
POS. 4: Z-SECTION, EC3, MINIMAL

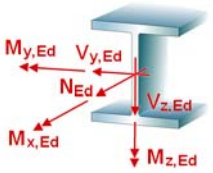
4H-EC3SA version: 10/2014-1m

Welded connection

EC 3-1-8 (12.10), NA: Deutschland



material
steel grade S 235
geometry
section Z140
plate: thickness t_p = 35.0 mm
welds as fillet weld:
a_{w1} = 8.0 mm, l_{w1} = 65.0 mm a_{w2} = 8.0 mm, l_{w2} = 42.0 mm a_{w3} = 8.0 mm, l_{w3} = 120.0 mm
a_{w4} = 8.0 mm, l_{w4} = 120.0 mm a_{w5} = 8.0 mm, l_{w5} = 42.0 mm a_{w6} = 8.0 mm, l_{w6} = 65.0 mm
design resistance
plastic cross-sectional check
weld verification with the directional method
resolution of shear force is made by the stiffness of the single weld.
internal forces and moments (sign definition of statics)
Lk 1: N_{Ed} = -19.39 kN $V_{z,Ed}$ = -18.62 kN $M_{z,Ed}$ = 2.65 kNm $V_{y,Ed}$ = 14.95 kN



Lk 1:

cross-sectional check
U_σ = 0.282 < 1 ok., $U_{c/t}$ = 0.235 < 1 ok.
verification of welds
weld 3: weld thickness a = 8.0 mm > $a_{max} = t_{min}$ = 5.7 mm !!
weld 4: weld thickness a = 8.0 mm > $a_{max} = t_{min}$ = 5.7 mm !!
weld 1: $\sigma_{w,x}$ = -221.03 N/mm² $\tau_{w,y}$ = 18.04 N/mm² $\tau_{w,z}$ = 0.07 N/mm²
$\sigma_{1,w,Ed}$ = 29.19 kN/cm² < $f_{1,w,Rd}$ = 36.00 kN/cm²,
$\sigma_{2,w,Ed}$ = 14.50 kN/cm² < $f_{2,w,Rd}$ = 25.92 kN/cm² ⇒ U_w = 0.872 < 1 ok.

Final result

maximum utilization: design resistance max U = 0.872 < 1 ok.
c/t-ratio max U = 0.235 < 1 ok.