

# Steel Bolted Connection (EC3)

Sample document with complete example values. It shows the report the purchased export produces for YOUR input - it is not itself a report for any part.

Project: Sample project

Part/Position: no real part

Prepared by: Sample, not released

Overall assessment: OK - all checks (shear, bearing, tension and interaction) are satisfied.

## Bolt and connection

|                                     |                                       |
|-------------------------------------|---------------------------------------|
| Property class                      | 8.8 ( $f_{ub} = 800 \text{ N/mm}^2$ ) |
| Nominal diameter d                  | 16 mm                                 |
| Tensile stress area $A_s$           | 157 mm <sup>2</sup>                   |
| Shear planes per bolt               | 1                                     |
| Shear plane location                | in the thread ( $A = A_s$ )           |
| Plate thickness t                   | 10 mm                                 |
| Component $f_u$                     | 360 N/mm <sup>2</sup>                 |
| Hole diameter $d_0$                 | 18 mm                                 |
| Bolt position                       | Edge bolt ( $e_1, e_2$ governing)     |
| Edge distance $e_1$                 | 60 mm                                 |
| Edge distance $e_2$                 | 30 mm                                 |
| Partial safety factor $\gamma_{M2}$ | 1.25                                  |

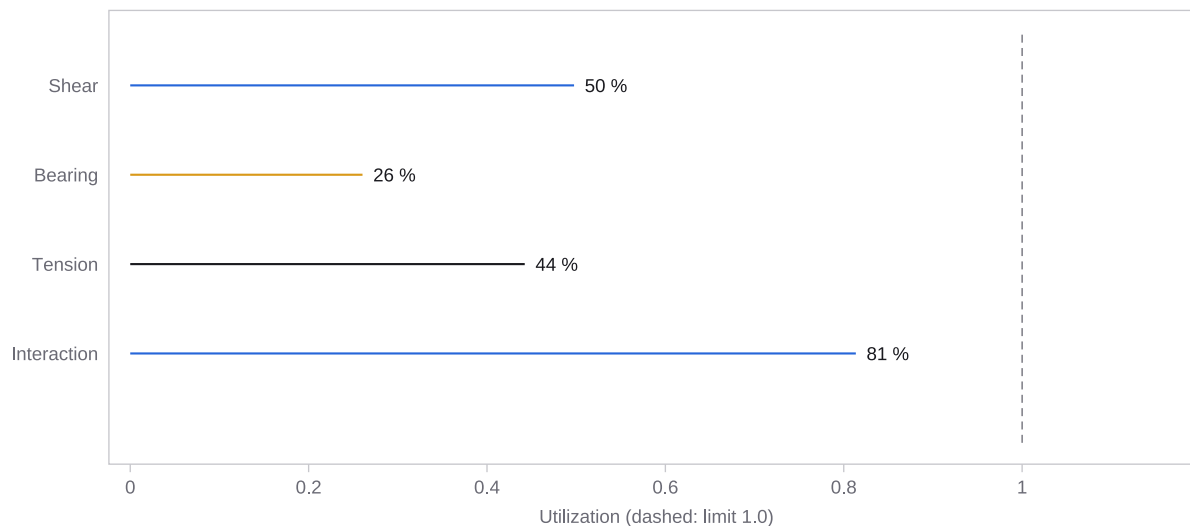
## Coefficients and resistances

|                                               |          |
|-----------------------------------------------|----------|
| Shear coefficient $\alpha_v$                  | 0.6      |
| Bearing coefficient $\alpha_b$                | 1        |
| Bearing coefficient $k_1$                     | 2.5      |
| Shear resistance $F_{v,Rd}$ (per shear plane) | 60.29 kN |
| Total shear resistance (1 shear planes)       | 60.29 kN |
| Bearing resistance $F_{b,Rd}$                 | 115.2 kN |
| Tension resistance $F_{t,Rd}$                 | 90.43 kN |
| Applied shear force $F_{v,Ed}$                | 30 kN    |
| Applied tension force $F_{t,Ed}$              | 40 kN    |

## Checks

| Criterion                                                           | Value | Limit | Status |
|---------------------------------------------------------------------|-------|-------|--------|
| Shear $F_{v,Ed} / (n \cdot F_{v,Rd})$                               | 0.5   | 1     | ● OK   |
| Bearing $F_{v,Ed} / F_{b,Rd}$                                       | 0.26  | 1     | ● OK   |
| Tension $F_{t,Ed} / F_{t,Rd}$                                       | 0.44  | 1     | ● OK   |
| Interaction $F_{v,Ed} / F_{v,Rd} + F_{t,Ed} / (1.4 \cdot F_{t,Rd})$ | 0.81  | 1     | ● OK   |

## Utilization per failure mode



## Calculation basis

Bolted connection in steel structures per DIN EN 1993-1-8, Tab. 3.4. The shear resistance per shear plane is  $F_{v,Rd} = \alpha_v \cdot f_{ub} \cdot A / \gamma_{M2}$  with  $\alpha_v = 0.6$  (classes 4.6/5.6/8.8) or 0.5 (10.9) and  $A = A_s$  when the shear plane is in the thread, otherwise the shank cross-section. The bearing resistance is  $F_{b,Rd} = k_1 \cdot \alpha_b \cdot f_u \cdot d \cdot t / \gamma_{M2}$ , where  $\alpha_b = \min(\alpha_d; f_{ub}/f_u; 1.0)$  and  $k_1$  follows from the edge and hole spacings ( $k_1 \leq 2.5$ ). The tension resistance is  $F_{t,Rd} = k_2 \cdot f_{ub} \cdot A_s / \gamma_{M2}$  with  $k_2 = 0.9$ . The partial safety factor is  $\gamma_{M2} = 1.25$ . Where shear and tension act together, the interaction  $F_{v,Ed}/F_{v,Rd} + F_{t,Ed}/(1.4 \cdot F_{t,Rd}) \leq 1.0$  is additionally checked. Block and component checks (block tearing, net cross-section) are not included.

## About this sample

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