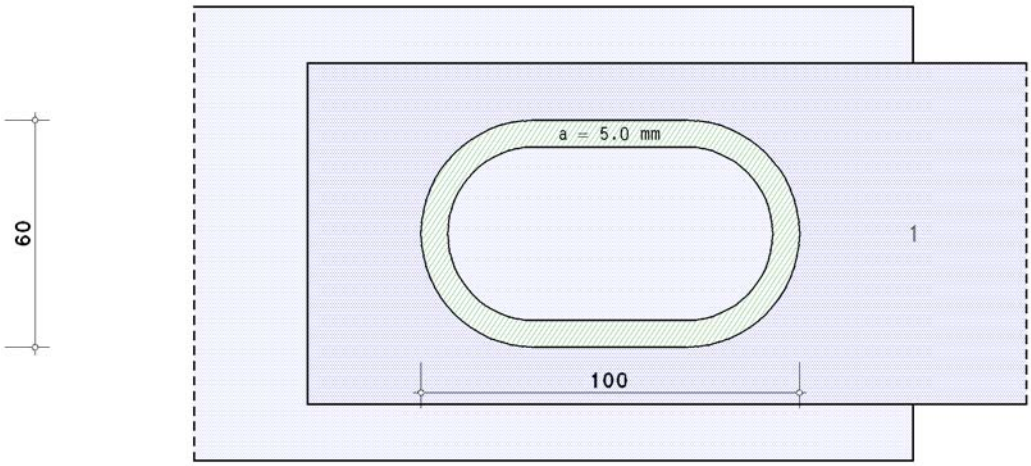
1. Welded Connection

EC 3-1-8 (04.25), NA: Deutschland

1.1. input report



connection device
fillet weld all arround, diameter of the slot d = 60.0 mm, slot length l = 100.0 mm, weld thickness a = 5.0 mm
connection plate
plate 1 with thickness t = 15.0 mm
steel grade S235
verifications
directional method
design member forces in the connection plate 1
shear force parallel zur weldalongachse $V_{p,Ed}$ = 55.00 kN
shear force perpendicular zur weldalongachse $V_{s,Ed}$ = 35.00 kN
partial safety factors for material
resistance of bolts, welds, plates in bearing γ_{M2} = 1.25

1.2. resistance

plate thickness t_1 = 15.0 mm > 3.0 mm ok
plate thickness t_2 = 10.0 mm > 3.0 mm ok
hole diameter d = 60.0 mm ≤ 4·t = 60.0 mm ok
effective weld length l_{eff} = 2·(l-d) = 80.0 mm
resistance of a fillet weld all arround
design values of maximum forces:
$F_{Vp,Ed} = V_{p,Ed} / l_{eff}$ = 687.50 kN/m
$F_{Vs,Ed} = V_{s,Ed} / l_{eff}$ = 437.50 kN/m
design values of loads, acting on the effective weld area:
$F_{Ed}(\tau_p) = F_{Vp,Ed}$ = 687.50 kN/m
$F_{Ed}(\tau_s) = F_{Vs,Ed}$ = 437.50 kN/m
design values of stress on the design area of the weld:
σ_s = 0, $\tau_s = F_{Ed}(\tau_s)/a$ = 87.50 N/mm², $\tau_p = F_{Ed}(\tau_p)/a$ = 137.50 N/mm²
requirement 1:
$\sigma_{1,w,Ed} = (\sigma_s^2 + 3\cdot(\tau_s^2 + \tau_p^2))^{1/2}$ = 282.29 N/mm²
resistance of a fillet weld (req.1): $f_{1w,d} = f_u / (\beta_w \cdot \gamma_{M2})$ = 360.00 N/mm², f_u = 360.0 N/mm², β_w = 0.80 (plate 1)
$\sigma_{1,w,Ed}$ = 282.29 N/mm² < $f_{1w,d}$ = 360.00 N/mm² ⇒ U = 0.784 < 1 ok

maximum utilization U_{max} = 0.784 < 1 ok

verification succeeded

2. Regulations

EN 1990, Eurocode 0: Grundlagen der Tragwerksplanung;
Deutsche Fassung EN 1990:2002 + A1:2005 + A1:2005/AC:2010, Ausgabe Dezember 2010
EN 1990/NA, Nationaler Anhang zur EN 1990, Ausgabe Dezember 2010

EN 1993-1-1, Eurocode 3: Bemessung und Konstruktion von Stahlbauten -
Teil 1-1: Allgemeine Bemessungsregeln und Regeln für den Hochbau;

Deutsche Fassung EN 1993-1-1:2022, Ausgabe April 2025
EN 1993-1-1/A1, Ergänzungen zur EN 1993-1-1, Ausgabe Juli 2014
EN 1993-1-1/NA, Nationaler Anhang zur EN 1993-1-1, Ausgabe Oktober 2022

EN 1993-1-8, Eurocode 3: Bemessung und Konstruktion von Stahlbauten -
Teil 1-8: Bemessung von Anschlüssen;
Deutsche Fassung EN 1993-1-8:2024, Ausgabe April 2025
EN 1993-1-8/NA, Nationaler Anhang zur EN 1993-1-8, Ausgabe November 2020