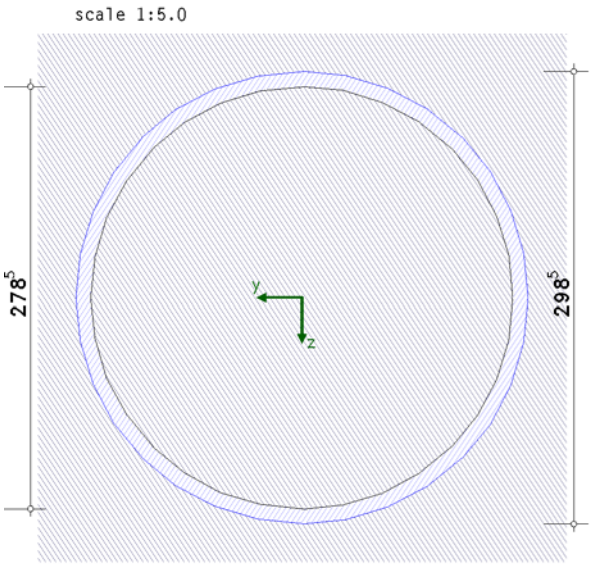
POS. 6: PIPE, DIN 18800, TABLE

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

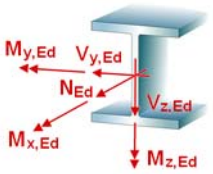
Welded connection

DIN 18800 (11.08)



material
steel grade S 235
material safety factor γ_M = 1.10
geometry
section R298.5X10.0
plate: thickness t_p = 35.0 mm
surrounding fillet weld: a_w = 5.0 mm, 75% decrease of the axial force by pressure contact
design resistance
elastic cross-sectional check

internal forces and moments and utilizations
N_{Ed},$V_{z,Ed}$,$M_{z,Ed}$,$V_{y,Ed}$,$M_{x,Ed}$: internal forces and moments by sign definition of statics
U_σ: stress utilization of cross section, U_w: stress utilization of welds



Lk	N_{Ed}	$V_{z,Ed}$	$M_{z,Ed}$	$V_{y,Ed}$	$M_{x,Ed}$	U_σ	U_w	
--	kN	kN	kNm	kN	kNm			
1	-82.12	-5.56	51.11	37.78	22.23	0.432	0.801*	Lf 1
2	-38.25	-0.08	36.27	-2.93	0.31	0.282	0.539	Lf 2
3	-65.61	-2.54	12.06	20.82	10.14	0.136	0.243	Lf 7

Final result

maximum utilization [Lk 1]: design resistance max U = 0.801 < 1 ok.

verification succeeded

Regulations

DIN 18800-1: Stahlbauten - Teil 1: Bemessung und Konstruktion, Ausgabe November 2008

Detailed edition

Lk 1: Lf 1

steel section

dimensions and cross-sectional properties (thick-walled)

d = 298.5 mm t = 10.0 mm
A = 90.6 cm^2 I_y = 9441.0 cm^4 I_z = 9441.0 cm^4 I_T = 18882.0 cm^4
W_y = 632.6 cm^3 W_z = 632.6 cm^3

stresses

σ_{max} = 71.7 N/mm^2 σ_{min} = -89.9 N/mm^2 τ_{max} = 8.3 N/mm^2 σ_v = 94.3 N/mm^2

utilization ($\sigma_{R,d}$ = 218.2 N/mm^2 $\tau_{R,d}$ = 126.0 N/mm^2)

$\sigma/\sigma_{R,d}$ = 0.41 < 1 $\tau/\tau_{R,d}$ = 0.07 < 1 $\sigma_v/\sigma_{R,d}$ = 0.43 < 1

welds

cross-sectional properties (not full-sized)

A_w = 46.9 cm^2 I_{yw} = 5222.3 cm^4 I_{zw} = 5222.3 cm^4 I_{Tw} = 10444.6 cm^4 W_{Tw} = 699.8 cm^3

weld-stresses

$\sigma_{w,max}$ = 128.69 N/mm^2 $\sigma_{w,min}$ = -163.45 N/mm^2 τ_w = 16.11 N/mm^2 τ_{Tw} = 31.77 N/mm^2
$\sigma_{w,v}$ = 166.07 N/mm^2

utilization (α_w = 0.95 $\sigma_{w,R,d}$ = 207.3 N/mm^2)

$\sigma_w/\sigma_{w,R,d}$ = 0.79 < 1 $\tau_w/\sigma_{w,R,d}$ = 0.08 < 1 $\sigma_{w,v}/\sigma_{w,R,d}$ = 0.80 < 1

all required verifications are verified!