Project : BRU2484

Subject : INFR180842 Stalen klem constructie

Members subjected to axial compression

NEN-EN 1993-1-1+C2 (nl)

Partial safety factors: γ_{M0} = 1,00 -

γ_{M1} = 1,00 -

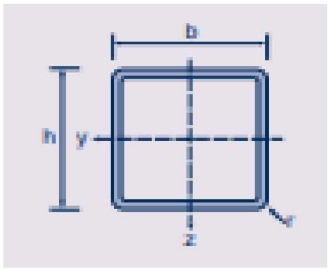
N_{Ed} = 1725 kN

MATERIAL PROPERTIES

Grade: S355

fy =	355	N/mm²
fyd =	355	N/mm²
E =	210000	N/mm²

CROSS-SECTIONAL PROPERTIES



A =	8704	mm²
h =	200	mm
b =	200	mm
t_w =	12,5	mm
t_f =	12,5	mm
I_y =	4,96E+07	mm^4
I_z =	1,67E+07	mm^4

Cross-section is not class 4 --> Use this sheet to continue with calculation

BUCKLING LENGTHS

L =	2200	mm
$L_{cr;y}$ =	1540	mm
$L_{cr;z}$ =	1540	mm

SLENDERNESS COEFFICIENTS

NEN-EN 1993-1-1+C2, art. 6.3.1.3

i_y =	$\sqrt{(I_y/A)}$ =	$\sqrt{(49.593.099/8.704)}$ =	75,5	mm
i_z =	$\sqrt{(I_z/A)}$ =	$\sqrt{(16.695.150/8.704)}$ =	43,8	mm
λ_1 =	$\pi*\sqrt{(E/f_y)}$ =	$\pi*\sqrt{(210.000/355)}$ =	76,4	-
$\overline{\lambda_y}$ =	$(L_{cr;y}/i_y)*(1/\lambda_1)$ =	(1.540/75,5)*(1/76,4) =	0,267	-
$\overline{\lambda_z}$ =	$(L_{cr;z}/i_z)*(1/\lambda_1)$ =	(1.540/43,8)*(1/76,4) =	0,460	-

REDUCTION FACTOR χmin

NEN-EN 1993-1-1+C2, art. 6.3.1.2

h/b = (200/200) = 1

t_f = 13

Buckling about y-axis: **curve** c

Buckling about z-axis: **curve** c

α_y =	0,49			
α_z =	0,49			
Φ =	$0,5*[1+\alpha*(\lambda-0,2)+\lambda^2]$ =	0,5*[1+0,490*(0,460-0,2)+0,212] =	0,67	-
χ_{min} =	$1/(\Phi+\sqrt{(\Phi^2-\lambda^2)})$ =	1/(0,670+(0,670^2-0,460^2)) ="	0,865	-

λz>λy AND αz>αy --> χmin=χz

DESIGN REQUIREMENT

NEN-EN 1993-1-1+C2, art. 6.3.1.1

$N_{Ed}/N_{b;Rd} \leq 1.0$

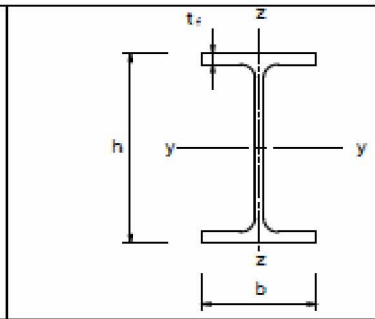
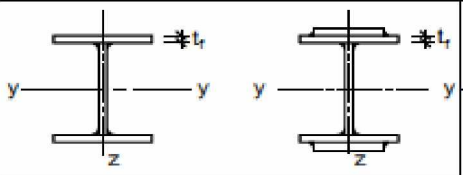
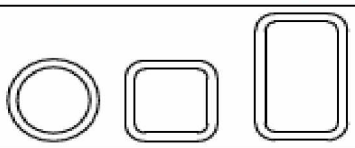
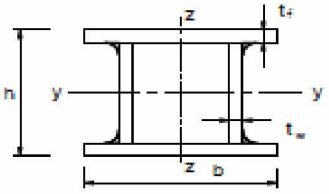
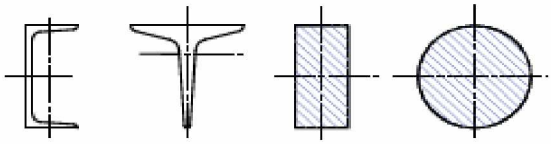
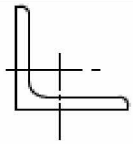
$N_{b;Rd}$ = $\chi_{min}*A*f_y/\gamma_{M1}$ = 2673 kN

UC = 1.725/2.673 = 0,645 OK

Tabel 6.1 — Imperfectiefactoren voor de knikkrommen

Knikkromme	a_0	a	b	c	d
Imperfectiefactor α	0,13	0,21	0,34	0,49	0,76

Tabel 6.2 — Keuzetabel voor de knikkrommen voor een doorsnede

Doorsnede		Begrenzingen		Knik om de as	Knikkromme S 235 S 275 S 355 S 420	Knikkromme S 460
Gewalste profielen		$h/b > 1,2$	$t_f \leq 40$ mm	y – y z – z	a b	a_0 a_0
			40 mm $< t_f \leq$ 100 mm	y – y z – z	b c	a a
		$h/b \leq 1,2$	$t_f \leq$ 100 mm	y – y z – z	b c	a a
			$t_f >$ 100 mm	y – y z – z	d d	c c
Gelaste profielen		$t_f \leq 40$ mm		y – y z – z	b c	b c
		$t_f >$ 40 mm		y – y z – z	c d	c d
Buisprofielen		Warmvervaardigd		Elke as	a	a_0
		Koudgevormd en gelast		Elke as	c	c
Gelaste kokerprofielen		Algemeen (behalve in het hieronder gegeven geval)		Elke as	b	b
		Dikke lassen: $a > 0,5t_f$ $b/t_f < 30$ $h/t_w < 30$		Elke as	c	c
U-, T- en massieve profielen				Elke as	c	c
L-profielen				Elke as	b	b