

SINBEAM

(CORRUGATED WEB BEAM)



TECHNICAL DOCUMENTATION

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A. GENERAL SECTION

1. General description and application

Corrugated web beams are built-up girders with a thin-walled, corrugated web and flat steel flanges (Fig 1).

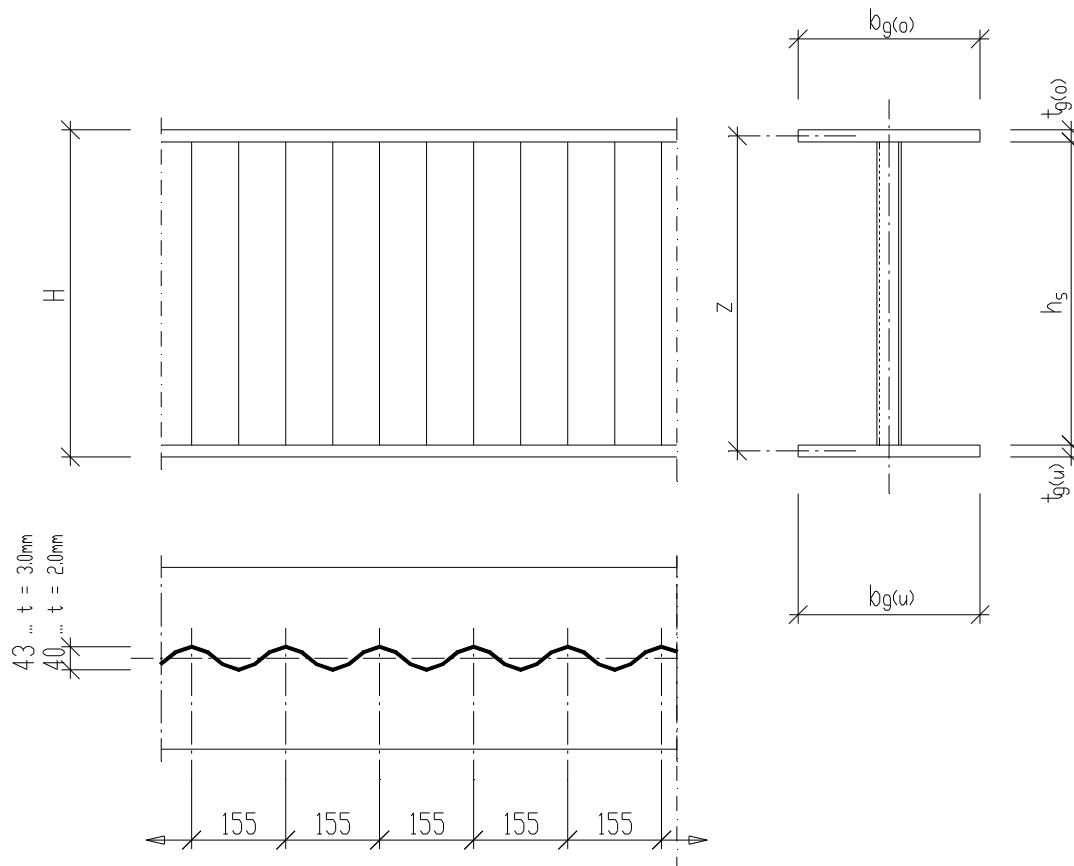


Fig. 1 Corrugated web beam - dimensions, designations

Profiling of the web generally avoids failure of the beam through loss of stability, even before the plastic limit loading for the web is reached. In addition to benefits in production methods, the almost sinusoidal profiling has the advantage over trapezoidal profiling of preventing local buckling of flat plate sections; local buckling is largely eliminated.

Corrugated web beams may be used as beams (roof or slab beams, frame transoms) or as components subjected to axial forces (columns or frame stanchions) virtually without limitations in terms of construction. The optimal area of application is in steel structural engineering wherever rolled profiles with greater than 300 mm structural height or low lattice girders of structural height below approx. 1 800 mm were formerly used.

Practical examples – see Section 19

2. Basis for calculation

As a result of the profiling, the web largely does not participate in the transfer of axial normal bending stresses. This means that,

in static terms, the corrugated web beam corresponds to a lattice girder

in which the bending moments and normal forces are transferred via the flanges only, whilst the transverse forces are transferred only through the diagonals and verticals of the lattice girder - in this case the corrugated web.

Dimensioning and verification is based on this static model and carried out in accordance with EN 1993-1-1 and EN 1993-1-5 Annex D, according to the E-P (E-E) method. Accordingly, verification of the load bearing capacity is best performed based on internal forces and the cross section resistances of the individual components of the cross section - flange and web.

Alternatively, calculations may of course also be based on any national regulatory standards for lattice girders or open web columns and for transverse buckling of orthotropic plates.

The determination of the resistance values for the corrugated web beam is described in detail in Section 8, based essentially on the verification formats in EN 1993-1-5 Annex and dealing specifically with corrugated web beams. The procedure is furthermore backed up by a number of experimental results ([8]...[10]) and expert opinions [6] and [7]^{*)}.

^{*)} Since these expert opinions were written before the publication of EN 1993-1-1 (5), the formulae for bearing loads of the flanges (Section 4) referred to therein do not agree exactly with those of the aforementioned standards. However, comparative calculations have shown that the results in the relevant areas of dimensioning and application are in good agreement.

3. Product range and designation

Standard girders comprise the selected webs and flat steel flanges, usually with identically dimensioned upper and lower flanges.

Web dimensions:

The standard coil widths are 1 000 mm / 1 250 mm / 1 500 mm. Splitting the standard coil widths produces the following standard web heights:

Web heights: 333, 500, 625, 750, 1 000, 1 250, 1 500 mm

Web thickness: 1.50; 2.00; 2.50; 3.00; 4.00; 5.00; 6.00 mm

With material quality S235 and S355.

0 ... 1.5mm / A ... 2.0mm / B ... 2.5mm / C ... 3.0mm / D ... 4.0mm / E ... 5.0mm / F ... 6.0mm

Flanges:

min. w = 120 mm max. w = 450 mm

min. t = 6 mm max. t = 30 mm

With material quality S235 and S355.

Parallel flange corrugated web beam

Lengths supplied:

These depend on the available machines, which varies from one supplier to the next.

min. 4 000 mm

max. 20 000 mm

Maximum dimensions for construction elements:

see Construction details, Sheets 1.3 and 1.4 (Appendix C).

Designations:

WT [web] [height] / [width] x [thickness]

Example: WT A 1000 / 300x15

Different upper flanges (UF) and lower flanges (LF) are possible. For manufacturing reasons, the flange widths should be the same.

$$\mathbf{w_{UP} = w_{LF} ; t_{UF} \neq t_{LF}}$$

By exception, however, $w_{UF} = w_{LF} \pm 50$ mm is possible, with the same flange thickness.

Example: WT B 1 250 / 300x15 / 300x12

Conical corrugated web beam

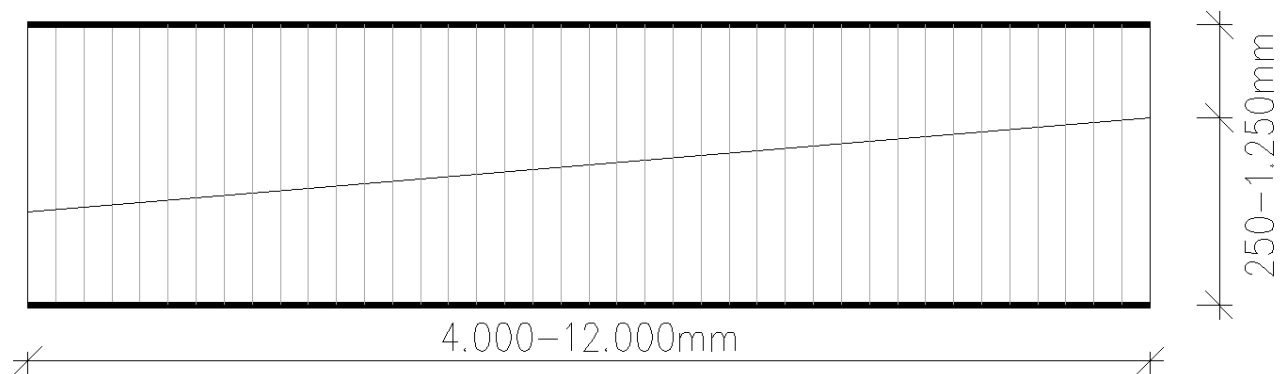
Manufacture

Two conical beams can be manufactured from one standard height beam. Using a cutting torch, the web is cut at an angle to the flanges, such that the heights are the same on both sides.

Lengths supplied + dimension:

min. 4 000 mm

max. 12 000 mm



For reasons of manageability, the following standard combinations are defined:

Based on the 1 500 mm original beam, the combinations are:

1 250+250 / 1 200+300 / 1 150+350 / 1 100+400 / 1 050+450 / 1 000+500

Based on the 1 250 mm original beam, the combinations are:

1 000+250 / 950+300 / 900+350 / 850+400 / 800+450

Based on the 1 000 mm original beam, the combinations are:

750+250 / 700+300 / 650+350 /

Any other combinations can in principle be produced, provided they meet the limiting conditions.

Designations:

SIN [web] [height,max – height,min] / [width,UF] x [thickness,UF] / [width,LF] x [thickness,LF]

Where UF designates the flange which is orthogonal to the web.

Example: SINA 1 000 – 500 / 300x15 / 320x12

Different upper (UF) and lower flanges (LF) are possible. For manufacturing reasons, the flange widths should be the same.

$$w_{UF} = w_{LF} ; t_{UF} \neq t_{LF}$$

4. Material

Standard product range:

Flange:	wide flat steel or steel lamellas S235J0 or JR in accordance with EN 10 025-2 S355J2 in accordance with EN 10 025-2
Web:	cold- or hot-rolled sheet in accordance with EN 10 025-2

Special qualities:

For the purposes of material procurement, all other qualities of steel are deemed special qualities.

Sheet material with higher yield strengths up to 320 N/mm² (StE 320) can also be utilized for the web. Longer delivery times due to material procurement time and minimum order quantities would apply, however.

5. Tolerances

For the completed construction: EN 1090-2

6. Corrosion protection

Corrosion protection through coatings:

The finished beam is factory coated approximately 40 µm thick. Any other or additional primers or top coatings which may be required must be separately agreed to in the order. Standard colors are indicated in the price list as amended.

In the standard design, the web plate is welded to the flanges using a continuous fillet weld on one side. An additional zinc primer coating is applied on the non-welded side of the web, in the throat region.

Corrosion protection by hot galvanizing:

The corrugated web beam is easy to hot-galvanize.

7. Quality monitoring

The manufacture is subject to constant and documented internal monitoring.

The quality of the original material is verified through factory certificates pursuant to EN 10 204 Clause 2.2. Any additional factory certificates must be agreed on at the time the material is reserved.

The factory is EN 3834 certified and has the “Großer Eignungsnachweis” [*Certificate for Manufacturer Qualification for Welding Steel Structures*] pursuant to DIN 18 800, Part 7, Section 6.2, DIN 4132 and DIN 8563 Part 10 (issued by SLV, Berlin) for welding techniques (E) and (MAG). Procedural tests are furthermore available for welding of the flanges using the MAG protective gas welding method and for stud welding.

All the tests are in respect of basic materials of quality classes S235 and S355.

The current certificates can be presented on request.

B. TECHNICAL SECTION

8. Load bearing capacity of webs and flanges

Transverse force load bearing capacity of the webs (EN 1993-1-5 Annex D)

The shear load bearing capacity V_{Rd} is defined as follows acc. to EN 1993-1-5:

$$V_{Rd} = \chi_c \frac{f_{yw}}{\gamma_{M1} \sqrt{3}} h_w f_w$$

$\chi_c \dots$ is the smaller of the reduction factor for local buckling of plates $\chi_{c,l}$ and for buckling $\chi_{c,g}$.

The reduction factor for **local buckling of plates** $\chi_{c,g}$ is determined as follows:

$$\chi_{c,l} = \frac{1,15}{0,9 + \bar{\lambda}_{c,l}} \leq 1,0$$

with

$$\bar{\lambda}_{c,l} = \sqrt{\frac{f_y}{\tau_{cr,l} \sqrt{3}}}$$

$\tau_{cr,l}$ is for sinusoidal webs

$$\tau_{cr,l} = \left(5,34 + \frac{a_3 s}{h_w t_w} \right) \frac{\pi^2 E}{12(1-\nu^2)} \left(\frac{t_w}{s} \right)^2$$

Tests have shown that local buckling is not significant.

- s half the developed length of the length of the corrugation wave
 w half the projected length of a corrugation wavelength $w = 155\text{ mm}$
 a_3 the height of the projected amplitude

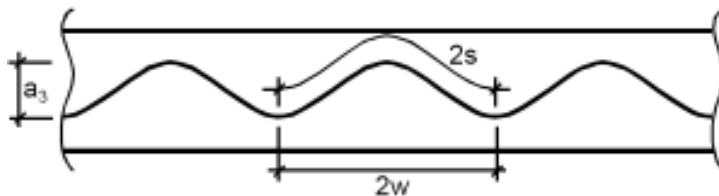


Fig. 2 Significant web dimensions

s is determined by numerical integration over the actual profiling form

$$s = \int_0^w \left(\sqrt{1 + \left[\frac{a_3 \pi}{w} \sin\left(\frac{2\pi x}{w}\right) \right]^2} \right) dx$$

for $t_w = 1.5 - 2.5\text{ mm}$ \Rightarrow $a_3 = 40\text{ mm}$

for $t_w = 3\text{ mm}$ \Rightarrow $a_3 = 43\text{ mm}$

The reduction factor for **buckling of the web** is calculated as follows:

The corrugated web is considered an orthotropic plate with rigidities D_x and D_z . The following therefore applies to the corrugated web:

$$\mathbf{D}_x = \frac{E \cdot t^3}{12(1-\nu^2)} \cdot \frac{w}{s} \quad ; \quad \mathbf{D}_z = \frac{E \cdot I_z}{w} \quad \text{for } \mathbf{D}_x \ll \mathbf{D}_y$$

with the second moment of inertia of a profiled section of length w

$$I_z = \int_0^w \left(\frac{1}{12} t_w^3 + t_w \left[\frac{a_3}{2} \sin\left(\frac{2\pi x}{w}\right) \right]^2 \right) dx$$

and the transverse buckling stress

$$\tau_{cr,g} = \frac{32,4}{t_w h_w^2} \sqrt[4]{\mathbf{D}_x \cdot \mathbf{D}_z^3}$$

we find the relative slenderness ratio

$$\lambda_{c,g} = \sqrt{\frac{f_{yk}}{\sqrt{3} \cdot \tau_{cr,g}}}$$

and the reduction factor for buckling of the web

$$\chi_{c,g} = \frac{1,5}{0,5 + \lambda_{c,g}^2} \leq 1,0$$

Normal force load bearing capacity of flanges

In determining the normal load bearing capacity of the flanges, the tensile and compressive stresses are considered separately.

In the case of **tensile stress**, the load bearing capacity of the flange is derived as follows:

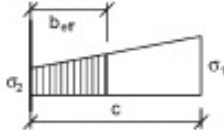
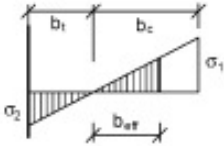
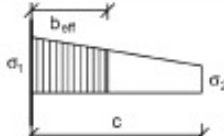
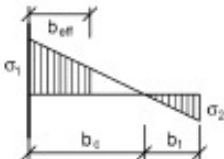
$$N_{g,Rk} = f_{yk} \cdot b_g \cdot t_g \quad ; \quad N_{g,Rd} = N_{g,Rk} / \gamma_M$$

The stability of the flange must be considered under **compressive stress**. A distinction must be made here between local buckling of the flanges and the overall stability (buckling transverse to the axis of the beam = torsional-flexural buckling).

For *local buckling*, the actually effective area of the flange under compressive stress is determined (EN 1993-1-5 Clause 4.4).

$$A_{c,eff} = \rho \cdot A_c$$

The following table gives the effective areas for cantilevered cross-sectional parts:

Stress distribution (pressure – positive)		Effective width b_{eff}			
		$1 > \psi \geq 0$: $b_{eff} = \rho c$			
		$\psi < 0$: $b_{eff} = \rho b_c = \rho c / (1 - \psi)$			
$\psi = \sigma_2 / \sigma_1$	1	0	-1	$1 \geq \psi \geq -3$	
Buckling value k_{σ}	0,43	0,57	0,85	$0,57 - 0,21 \psi + 0,07 \psi^2$	
		$1 > \psi \geq 0$: $b_{eff} = \rho c$			
		$\psi < 0$: $b_{eff} = \rho b_c = \rho c / (1 - \psi)$			
$\psi = \sigma_2 / \sigma_1$	1	$1 > \psi > 0$	0	$0 > \psi > -1$	-1
Buckling value k_{σ}	0,43	$0,578 / (\psi + 0,34)$	1,70	$1,7 - 5 \psi + 17,1 \psi^2$	
				23,8	

Tab. 1. Cantilevered cross-sectional parts under compressive stress (EC 1993-1-5 Table 4.2)

The reduction factor ρ is determined as follows:

$$\rho = 1 \quad \text{for} \quad \bar{\lambda}_p \leq 0,748$$

$$\rho = \frac{\bar{\lambda}_p - 0,188}{\bar{\lambda}_p^2} \leq 1,0 \quad \text{for} \quad \bar{\lambda}_p > 0,748$$

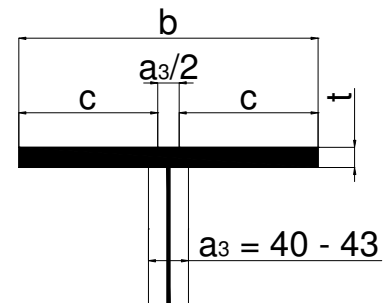
whereby

$$\bar{\lambda}_p = \sqrt{\frac{f_y}{\sigma_{cr}}} = \frac{\bar{b}/t}{28,4\varepsilon\sqrt{k_\sigma}}$$

k_σ buckling coeff. as a function of the stress ratio ψ

\bar{b} the relevant width

$$\bar{b} = c = \frac{b - 0,5a_3}{2}; \quad \varepsilon = \sqrt{\frac{23,5}{f_y k}}$$



the effective width of the compressed flange is thus

$$b_{DG,eff} = \rho \cdot 2 \cdot c + \frac{a_3}{2} \quad \text{or} \quad A_{c,eff} = \left(\rho \cdot 2 \cdot c + \frac{a_3}{2} \right) \cdot t$$

and

$$N_{g,Rd,1} = A_{c,eff} \cdot \frac{f_{yk}}{\lambda_M}$$

To prevent local buckling and utilize the full width of the flange ($\rho=1$), the following limit must therefore be observed for \bar{b} :

$$\bar{\lambda}_p = \frac{\bar{b}/t}{28,4\varepsilon\sqrt{k_\sigma}} \leq 0,748$$

$$\bar{b} = t \cdot 28,4 \cdot \varepsilon \sqrt{k_\sigma} \bar{\lambda}_p \quad \bar{b} = t \cdot \varepsilon \cdot 13,9$$

$$\bar{b} = c = \frac{b - 0,5a_3}{2} = t \cdot \varepsilon \cdot 13,9$$

$$b_{\text{lim}} = 2 \cdot t \cdot \varepsilon \cdot 13,9 + 0,5a_3$$

Regarding the *global stability* of the flanges, the simplified design method for beams with torsional-flexural buckling restraint is used for buildings (EN 1993-1-1 Clause 6.3.2.4).

Building elements with compression flanges laterally supported at individual points may be deemed not at risk of torsional-flexural buckling if the length L_c between these supporting points, or the resulting slenderness ratio $\bar{\lambda}_f$ of the flange under compressive stress, meets the following requirements:

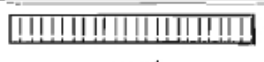
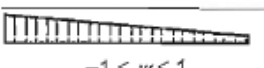




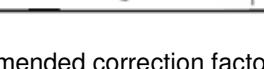

$$\bar{\lambda}_f = \frac{k_c \cdot L_c}{i_{f,z} \cdot \lambda_1} \leq \bar{\lambda}_{c0} \cdot \frac{M_{c,Rd}}{M_{y,Ed}}$$

$M_{y,Ed}$ the largest impacting design moment between the support points;

$$M_{c,Rd} = W_{y,eff} \frac{f_y}{\gamma_{M1}}$$

W_y the applicable section modulus of the cross-section for the compressive fiber;

k_c the correction factor to the slenderness ratio dependent on the distribution of moment between the laterally supported points

Distribution of moment	k_c
 $\psi = 1$	1,0
 $-1 \leq \psi \leq 1$	$\frac{1}{1,33 - 0,33\psi}$
	0,94
	0,90
	0,91
	0,86
	0,77
	0,82

Tab. 2 Recommended correction factors k_c (EC1993-1-1 Table 6.6)

$i_{f,z}$ the radius of gyration of the flange under compressive stress around the weak cross-sectional axis.

$\bar{\lambda}_{c0}$ the limiting slenderness ratio for the above element under compressive stress;

$$\lambda_1 = \pi \sqrt{\frac{E}{f_y}} = 93,9\varepsilon \quad \varepsilon = \sqrt{\frac{235}{f_y}} \quad (f_y \text{ in N/mm}^2)$$

$$\bar{\lambda}_{c0} = \bar{\lambda}_{LT,0} + 0,1 \quad \bar{\lambda}_{LT,0} = 0,4 \quad (\text{max. value acc. to EN1993-1-1 6.3.2.3})$$

For Class 4 cross sections, $i_{f,z}$ may be calculated as follows:

$$i_{f,z} = \sqrt{\frac{I_{eff,f}}{A_{eff,f}}}$$

whereby

$I_{eff,f}$ the effective second moment of inertia of the flange under compressive stress around the weak cross-sectional axis;

$A_{eff,f}$ the effective area of the flange under compressive stress

The contribution of a third of the web plate section under compressive stress ($+\frac{1}{3}A_{eff,w,c}$) is ignored in the case of the corrugated web beam.

Using the formula for the slenderness ratio of the flange, a $L_{c,lim}$ value can be determined above which a global stability problem may occur.

$$\bar{\lambda}_f = \frac{k_c \cdot L_c}{i_{f,z} \cdot \lambda_1} \leq \bar{\lambda}_{c0} \cdot \frac{M_{c,Rd}}{M_{y,Ed}} \quad M_{c,Rd} = M_{y,Ed}$$

$$L_{c,lim} = \frac{\bar{\lambda}_{c0} \cdot i_{f,z} \cdot \lambda_1}{k_c}$$

Global stability becomes important when $L_c > L_{c,lim}$

$$N_{c,Rd} = \frac{M_{c,Rd}}{h}; N_{y,Ed} = \frac{M_{y,Ed}}{h}$$

$$\bar{\lambda}_f = \frac{k_c \cdot L_c}{i_{f,z} \cdot \lambda_1} \leq \bar{\lambda}_{c0} \cdot \frac{N_{c,Rd}}{N_{y,Ed}}$$

$$N_{g,Rd,g} = \frac{\bar{\lambda}_{c0} \cdot N_{c,Rd} \cdot i_{f,z} \cdot \lambda_1}{k_c \cdot L_c}$$

The load bearing capacity of the flange under compressive stress is therefore

$$N_{g,rd} = \min(N_{g,Rd}; N_{g,Rd,l}; N_{g,Rd,g})$$

Table 2 lists the load bearing capacities of the flanges for steel quality S235, as a function of the spacing of the lateral supports for a constant normal force ($k_c = 1$).

The local buckling limits applicable to the shown flange cross-sections are shown in Table 13. Other application limits are:

- C_{lim} the spacing between lateral supports up to which the compressed flange can be designed for the full elastic limiting load N_{gRk} , without reduction, and
- C_{max} maximum spacing between lateral supports as given by a maximum slenderness (transverse to the beam axis) ratio of 250.

9. Dimensioning of beams

A simplified calculation model is assumed, with normal forces and bending moments absorbed only by the flanges (whereby the bending rigidity of the flanges is ignored) and where transverse forces are absorbed by the web alone. This corresponds to the procedure applied when calculating parallel flange lattice girders. The design and verification for corrugated web beams is performed analogously.

- Selecting the **structural height** via the slenderness of the beam

$$h_s = L_{St}/15 \text{ to } L_{St}/25 \quad (\text{single-span girders continuous girders or frame transoms})$$

- Selecting the **web thickness**, or verification of the web via the transverse force load bearing capacity V_{Rd} .

$$V_d = \gamma_F V < V_{Rd} = \frac{V_{g,Rk}}{\gamma_M} \quad V_{Rk} \text{ in accordance with Section 8 or Table 1}$$

- Selection or verification of the **flange** via the normal force loading capacity N_{Rd} .

$$N_{gd} = \gamma_F N \cdot \frac{A_g}{A} \pm \frac{\gamma_F M}{z} \leq N_{g,Rd} = \frac{N_{g,Rk}}{\gamma_M}$$

A	cross-sectional area of the two flanges
Z	spacing of the centers of gravity of the flanges
N_{Rk}	in accordance with Section 8 or Table 2 for tensile and compressive stresses, taking into account lateral stability (tilting)

As an alternative to verification of the flange, it is possible to verify the bearing moment $M_{Rd} = M_{Rk} / \gamma_M$ of the total cross section directly, using the cross sectional tables in Section 12. This presupposes, however, that the stability of the compressed flange is guaranteed by constructional measures (e.g. directly laid trapezoidal sheeting or purlins spaced $e < c_{lim}$).

- **Verification of serviceability**

This must be provided by verification of deflections. Shear deformation must be taken into account in this respect. The cross sectional tables in Section 12 give details of the “transverse force area” A_Q , and/or the ratio A/A_Q , as required by many computation programs, to allow the shear flexibility to be included when determining deformations and cross sectional forces.

- **Verification of the load introduction points**

See Section 11

10. Dimensioning of columns

When dimensioning columns, the static model of a multi-part compression member of the lattice or frame-stanchion type is assumed. As with bending girders, the normal force is distributed only to the flanges and the corrugated web serves to transfer only shear forces between flanges. Allowance must therefore be made for the shear flexibility of the web when verifying buckling in the direction of the “strong” axis (equivalent to the non-material axis in the case of multi-part compression members), e.g. by introducing ideal slenderness.

$$\lambda_{id} = \sqrt{\lambda_y^2 + \lambda_1^2} \quad \text{with} \quad \lambda_y = \frac{s_{ky}}{i_y} \quad \text{and}$$

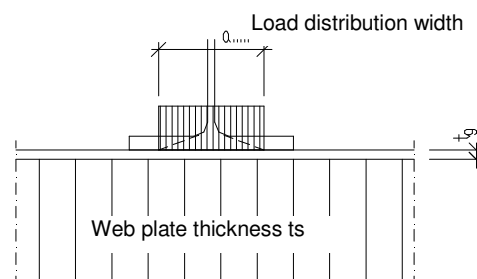
$$\lambda_1^2 = \frac{\pi^2 \cdot E \cdot A}{G_s \cdot t_s \cdot h_s} = \frac{\pi^2 \cdot E \cdot A}{G_s \cdot A_Q} = 25,9 \cdot \frac{A}{A_Q}$$

The buckling verification around the “weak” axis, or the torsional-flexural buckling verification may be carried out, to be on the safe side, on the “isolated” flange by referring to Table 2.

11. Verification of local load introduction

Tests have shown that the assumption of

$$P_{Rk} = t_s (a + 5 \cdot t_g) \cdot f_{yk}$$



is the safe side.

Fig. 2: Load introduction into the corrugated web without stiffener

12. Section properties for corrugated web beams

Designations and remarks:

$b_g \times t_g$	flange dimensions
H	overall height of the beam
U	coating surface per running meter
$2A_g$	sectional area (of both flanges)
	$A_{go} = b_{go} \cdot t_{go} ; \quad A_{gu} = b_{gu} \cdot t_{gu} ; \quad 2A_g = A_{go} + A_{gu}$
A_Q	transverse force area for consideration of shear distortion
	$G^* = G \cdot \frac{w}{s} = 80\,000 \cdot \frac{155}{178} \approx 69\,700 \text{ N/mm}^2$
	$A_Q = h_s \cdot t_s \cdot \frac{G^*}{G} = h_s \cdot t_s \cdot \frac{w}{s}$
I_y, I_z	moment of inertia
	$I_y = \frac{A_{go} \cdot A_{gu}}{A_{go} + A_{gu}} \cdot z^2 ; \quad I_z = \frac{1}{12} \cdot (t_{go} \cdot b_{go}^3 + t_{gu} \cdot b_{gu}^3)$
i_y, i_z	gyration radius
I_t	St. Venant torsional constant (for beams with equal upper and lower flanges)
	$I_d = \frac{2}{3} \cdot b_g \cdot t_g^3 + \frac{1}{3} \cdot h_s \cdot t_s^3$
I_w	warping constant (for beams with equal upper and lower flanges)
	$I_w = \frac{A_g}{24} \cdot b_g^2 \cdot z^2 \quad \dots \quad (A_g = b_g \cdot t_g \quad \dots \quad \text{area of a flange})$
C_{lim}	maximum spacing of lateral supports to avoid lateral buckling (tilting) of the compressed flange, acc. to DIN 18 800 Part 2, EI(310).

13. Standards and Expert Opinions:

- [1] EN 1993 -1 -1
- [2] EN 1993 -1- 5
- [3] EN 1993 -1 – 5, Annex D
- [4] O.Univ. Prof. D.I. Dr. Günter Ramberger, Gutachten über die Berechnung von geschweißten I-Trägern mit Stegen aus gewellten Blechen, Wien 20.12.1989.
[Expert Opinion on the calculation of welded I-beams with corrugated webs, Vienna 12.20.1989]
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C. TABLES

14. Section properties

WT 333

Dimensions			Cross Section Values											S235				S355																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
b _g x t _g mm	H mm	U m ² /m	weight / m											2 A _g cm ²	I _y cm ⁴	I _x cm ⁴	I _z cm ⁴	I _t cm ⁴	I _w cm ⁴	c _{lim} cm	N _{Rk} kN	M _{Rk} kNm	c _{lim} cm	N _{Rk} kN	M _{Rk} kNm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
			W _{T0} kg/m	W _{T1} kg/m	W _{TB} kg/m	W _{TC} kg/m	W _{TD} kg/m	W _{TE} kg/m	W _{TF} kg/m	W _{TG} kg/m	W _{TH} kg/m	W _{TI} kg/m	W _{TJ} kg/m													W _{TK} kg/m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
160 x 6	345	146	19,8	21,3	22,9	24,5	27,6	30,8	33,9	35,6	37,7	39,2	40,8	42,4	44,0	45,5	47,1	48,7	50,2	51,8	53,4	54,9	56,5	58,1	59,7	61,2	62,8	64,4	65,9	67,5	69,0	70,6	72,2	73,7	75,3	76,9	78,4	80,0	81,6	83,1	84,7	86,3	87,9	89,4	91,0	92,6	94,1	95,7	97,3	98,8	100,4	102,0	103,5	105,1	106,7	108,2	109,8	111,4	112,9	114,5	116,0	117,6	119,2	120,7	122,3	123,8	125,4	126,9	128,5	130,0	131,6	133,2	134,7	136,3	137,8	139,4	140,9	142,5	144,0	145,6	147,2	148,7	150,3	151,8	153,4	154,9	156,5	158,0	159,6	161,2	162,7	164,3	165,8	167,4	168,9	170,5	172,0	173,6	175,2	176,7	178,3	179,8	181,4	182,9	184,5	186,0	187,6	189,2	190,7	192,3	193,8	195,4	196,9	198,5	200,0	201,6	203,1	204,7	206,2	207,8	209,3	210,9	212,4	214,0	215,5	217,1	218,6	220,2	221,7	223,3	224,8	226,4	227,9	229,5	231,0	232,6	234,1	235,7	237,2	238,8	240,3	241,9	243,4	245,0	246,5	248,1	249,6	251,2	252,7	254,3	255,8	257,4	258,9	260,5	262,0	263,6	265,1	266,7	268,2	269,8	271,3	272,9	274,4	276,0	277,5	279,1	280,6	282,2	283,7	285,3	286,8	288,4	289,9	291,5	293,0	294,6	296,1	297,7	299,2	300,8	302,3	303,9	305,4	307,0	308,5	310,1	311,6	313,2	314,7	316,3	317,8	319,4	320,9	322,5	324,0	325,6	327,1	328,7	330,2	331,8	333,3	334,9	336,4	338,0	339,5	341,1	342,6	344,2	345,7	347,3	348,8	350,4	351,9	353,5	355,0	356,6	358,1	359,7	361,2	362,8	364,3	365,9	367,4	369,0	370,5	372,1	373,6	375,2	376,7	378,3	379,8	381,4	382,9	384,5	386,0	387,6	389,1	390,7	392,2	393,8	395,3	396,9	398,4	400,0	401,5	403,1	404,6	406,2	407,7	409,3	410,8	412,4	413,9	415,5	417,0	418,6	420,1	421,7	423,2	424,8	426,3	427,9	429,4	431,0	432,5	434,1	435,6	437,2	438,7	440,3	441,8	443,4	444,9	446,5	448,0	449,6	451,1	452,7	454,2	455,8	457,3	458,9	460,4	462,0	463,5	465,1	466,6	468,2	469,7	471,3	472,8	474,4	475,9	477,5	479,0	480,6	482,1	483,7	485,2	486,8	488,3	489,9	491,4	493,0	494,5	496,1	497,6	499,2	500,7	502,3	503,8	505,4	506,9	508,5	510,0	511,6	513,1	514,7	516,2	517,8	519,3	520,9	522,4	524,0	525,5	527,1	528,6	530,2	531,7	533,3	534,8	536,4	537,9	539,5	541,0	542,6	544,1	545,7	547,2	548,8	550,3	551,9	553,4	555,0	556,5	558,1	559,6	561,2	562,7	564,3	565,8	567,4	568,9	570,5	572,0	573,6	575,1	576,7	578,2	579,8	581,3	582,9	584,4	586,0	587,5	589,1	590,6	592,2	593,7	595,2	596,8	598,3	599,9	601,4	603,0	604,5	606,1	607,6	609,2	610,7	612,3	613,8	615,4	616,9	618,5	619,9	621,5	623,0	624,6	626,1	627,7	629,2	630,8	632,3	633,9	635,4	637,0	638,5	640,1	641,6	643,2	644,7	646,3	647,8	649,4	650,9	652,5	654,0	655,6	657,1	658,7	660,2	661,8	663,3	664,9	666,4	668,0	669,5	671,1	672,6	674,2	675,7	677,3	678,8	680,4	681,9	683,5	685,0	686,6	688,1	689,7	691,2	692,8	694,3	695,9	697,4	699,0	700,5	702,1	703,6	705,2	706,7	708,3	709,8	711,4	712,9	714,5	716,0	717,6	719,1	720,7	722,2	723,8	725,3	726,9	728,4	730,0	731,5	733,1	734,6	736,2	737,7	739,3	740,8	742,4	743,9	745,5	747,0	748,6	750,1	751,7	753,2	754,8	756,3	757,9	759,4	761,0	762,5	764,1	765,6	767,2	768,7	770,3	771,8	773,4	774,9	776,5	778,0	779,6	781,1	782,7	784,2	785,8	787,3	788,9	790,4	792,0	793,5	795,1	796,6	798,2	799,7	801,3	802,8	804,4	805,9	807,5	809,0	810,6	812,1	813,7	815,2	816,8	818,3	819,9	821,4	823,0	824,5	826,1	827,6	829,2	830,7	832,3	833,8	835,4	836,9	838,5	839,9	841,5	843,0	844,6	846,1	847,7	849,2	850,8	852,3	853,9	855,4	857,0	858,5	860,1	861,6	863,2	864,7	866,3	867,8	869,4	870,9	872,5	874,0	875,6	877,1	878,7	880,2	881,8	883,3	884,9	886,4	888,0	889,5	891,1	892,6	894,2	895,7	897,3	898,8	900,4	901,9	903,5	905,0	906,6	908,1	909,7	911,2	912,8	914,3	915,9	917,4	919,0	920,5	922,1	923,6	925,2	926,7	928,3	929,8	931,4	932,9	934,5	936,0	937,6	939,1	940,7	942,2	943,8	945,3	946,9	948,4	950,0	951,5	953,1	954,6	956,2	957,7	959,3	960,8	962,4	963,9	965,5	967,0	968,6	970,1	971,7	973,2	974,8	976,3	977,9	979,4	981,0	982,5	984,1	985,6	987,2	988,7	990,3	991,8	993,4	994,9	996,5	998,0	999,6	1001,1	1002,7	1004,2	1005,8	1007,3	1008,9	1010,4	1012,0	1013,5	1015,1	1016,6	1018,2	1019,7	1021,3	1022,8	1024,4	1025,9	1027,5	1029,0	1030,6	1032,1	1033,7	1035,2	1036,8	1038,3	1039,9	1041,4	1043,0	1044,5	1046,1	1047,6	1049,2	1050,7	1052,3	1053,8	1055,4	1056,9	1058,5	1060,0	1061,6	1063,1	1064,7	1066,2	1067,8	1069,3	1070,9	1072,4	1074,0	1075,5	1077,1	1078,6	1080,2	1081,7	1083,3	1084,8	1086,4	1087,9	1089,5	1091,0	1092,6	1094,1	1095,7	1097,2	1098,8	1100,3	1101,9	1103,4	1105,0	1106,5	1108,1	1109,6	1111,2	1112,7	1114,3	1115,8	1117,4	1118,9	1120,5	1122,0	1123,6	1125,1	1126,7	1128,2	1129,8	1131,3	1132,9	1134,4	1136,0	1137,5	1139,1	1140,6	1142,2	1143,7	1145,3	1146,8	1148,4	1149,9	1151,5	1153,0	1154,6	1156,1	1157,7	1159,2	1160,8	1162,3	1163,9	1165,4	1167,0	1168,5	1170,1	1171,6	1173,2	1174,7	1176,3	1177,8	1179,4	1180,9	1182,5	1184,0	1185,6	1187,1	1188,7	1190,2	1191,8	1193,3	1194,9	1196,4	1198,0	1199,5	1201,1	1202,6	1204,2	1205,7	1207,3	1208,8	1210,4	1211,9	1213,5	1215,0	1216,6	1218,1	1219,7	1221,2	1222,8	1224,3	1225,9	1227,4	1229,0	1230,5	1232,1	1233,6	1235,2	1236,7	1238,3	1239,8	1241,4	1242,9	1244,5	1246,0	1247,6	1249,1	1250,7	1252,2	1253,8	1255,3	1256,9	1258,4	1260,0	1261,5	1263,1	1264,6	1266,2	1267,7	1269,3	1270,8	1272,4	1273,9	1275,5	1277,0	1278,6	1280,1	1281,7	1283,2	1284,8	1286,3	1287,9	1289,4	1291,0	1292,5	1294,1	1295,6	1297,2	1298,7	1300,3	1301,8	1303,4	1304,9	1306,5	1308,0	1309,6	1311,1	1312,7	1314,2	1315,8	1317,3	1318,9	1320,4	1322,0	1323,5	1325,1	1326,6	1328,2	1329,7	1331,3	1332,8	1334,4	1335,9	1337,5	1339,0	1340,6	1342,1	1343,7	1345,2	1346,8	1348,3	1350,0	1351,5	1353,1	1354,6	1356,2	1357,8	1359,3	1360,9	1362,4	1364,0	1365,5	1367,1	1368,6	1370,2	1371,7	1373,3	1374,8	1376,4	1377,9	1379,5	1381,0	1382,6	1384,1	1385,7	1387,2	1388,8	1390,3	1391,9	1393,4	1395,0	1396,5	1398,1	1399,6	1401,2	1402,7	1404,3	1405,8	1407,4	1408,9	1410,5	1412,0	1413,6	1415,1	1416,7	1418,2	1419,8	1421,3	1422,9	1424,4	1426,0	1427,5	1429,1	1430,6	1432,2	1433,7	1435,3	1436,8	1438,4	1439,9	1441,5	1443,0	1444,6	1446,2	1447,7	1449,3	1450,8	1452,4	1453,9	1455,5	1457,0	1458,6	1460,1	1461,7	1463,2	1464,8	1466,3	1467,9	1469,4	1471,0	1472,5	1474,1	1475,6	1477,2	1478,7	1480,3	1481,8	1483,4	1484,9	1486,5	1488,0	1489,6	1491,1	1492,7	1494,2	1495,8	1497,3	1498,9	1500,4	1502,0	1503,5	1505,1	1506,6	1508,2	1509,7	1511,3	1512,8	1514,4	1515,9	1517,5	1519,0	1520,6	1522,1	1523,7	1525,2	1526,8	1528,3	1529,9	1531,4	1533,0	1534,5	1536,1	1537,6	1539,2	1540,7	1542,3	1543,8	1545,4	1546,9	1548,5	1550,0	1551,6	1553,1	1554,7	1556,2	1557,8	1559,3	1560,9	1562,4	1564,0	1565,5	1567,1	1568,6	1570,2	1571,7	1573,3	1574,8	1576,4	1577,9	1579,5	1581,0	1582,6	1584,1	1585,7	1587,2	1588,8	1590,3	1591,9	1593,4	1595,0	1596,5	1598,1	1599,6	1601,2	1602,7	1604,3	1605,8	1607,4	1608,9	1610,5	1612,0	1613,6	1615,1	1616,7	1618,2	1619,8	1621,3	1622,9	1624,4	1626,0	1627,5	1629,1	1630,6	1632,2	1633,7	1635,3	1636,8	1638,4	1639,9	1641,5	1643,0	1644,6	1646,2	1647,7	1649,3	1650,8	1652,4	1653,9	1655,5	1657,0	1658,6	1660,1	1661,7	1663,2	1664,8	1666,3	1667,9	1669,4	1671,0	1672,5	1674,1	1675,6	1677,2	1678,7	1680,3	1681,8	1683,4	1684,9	1686,5	1688,0	1689,6	1691,1	1692,7	1694,2	1695,8	1697,3	1698,9	1700,4	1702,0	1703,5	1705,1	1706,6	1708,2	1709,7	1711,3	1712,8	1714,4	1715,9	1717,5	1719,0	1720,6	1722,1	1723,7	1725,2	1726,8	1728,3	1729,9	1731,4	1733,0	1734,5	1736,1	1737,6	1739,2	1740,7	1742,3	1743,8	1745,4	1746,9	1748,5	1750,0	1751,6	1753

WT 500

Dimensions			Cross Section Values											S235				S355								
$b_g \times t_g$ mm	H mm	U m ² /m	2 Ag cm ²	I _y cm ⁴	I _y cm	I _z cm ⁴	I _z cm	I _t cm ⁴	I _t cm	I _w cm ⁴	C _{lim} cm	NRk kN	MRk kNm	C _{lim} cm	NRk kN	MRk kNm										
160 x 6	512	186	22.1	24.5	26.8	29.2	33.9	38.6	43.3	38.6	43.3	19.2	12.300	25.31	410	4.62	2.6	262.000	277	114	451	128	172	682	194	216
180 x 6	512	194	24.0	26.4	28.7	31.1	35.8	40.5	45.2	40.5	45.2	21.60	13.800	25.28	580	5.18	2.9	372.000	277	114	451	128	172	682	194	216
200 x 6	512	2.02	25.9	28.3	30.6	33.0	37.7	42.4	47.1	42.4	47.1	24.00	15.400	25.33	800	5.77	3.1	512.000	277	114	451	128	172	682	194	216
160 x 8	516	187	27.2	29.5	31.9	34.2	38.9	43.6	48.4	43.6	48.4	25.6	16.500	25.39	560	4.64	5.7	362.000	277	114	451	128	172	682	194	216
180 x 8	516	195	29.7	32.0	34.4	36.7	41.4	46.2	50.9	46.2	50.9	28.80	18.600	25.41	780	5.20	6.4	502.000	277	114	451	128	172	682	194	216
200 x 8	516	2.03	32.2	34.5	36.9	39.3	44.0	48.7	53.4	48.7	53.4	32.00	20.600	25.37	1070	5.78	7.1	688.000	277	114	451	128	172	682	194	216
220 x 8	516	2.11	34.7	37.1	39.4	41.8	46.5	51.2	55.9	51.2	55.9	35.20	22.700	25.39	1420	6.35	7.8	916.000	277	114	451	128	172	682	194	216
200 x 10	520	2.04	36.5	40.8	43.2	45.5	50.2	55.0	59.7	55.0	59.7	40.0	25.000	25.50	1330	5.77	13.6	867.000	277	114	451	128	172	682	194	216
220 x 10	520	2.12	41.6	44.0	46.3	48.7	53.4	58.1	62.8	58.1	62.8	44.00	28.600	25.50	1770	6.34	14.9	1154.000	277	114	451	128	172	682	194	216
250 x 10	520	2.24	46.3	48.7	51.0	53.4	58.1	62.8	67.5	62.8	67.5	50.00	32.500	25.50	2.600	7.21	16.9	1593.000	277	114	451	128	172	682	194	216
200 x 12	524	2.05	44.7	47.1	49.5	51.8	56.5	61.2	65.9	61.2	65.9	48.0	31.500	25.62	1600	5.77	23.3	1045.000	277	114	451	128	172	682	194	216
220 x 12	524	2.13	48.5	50.9	53.2	55.6	60.3	65.0	69.7	65.0	69.7	52.80	34.600	25.60	2.130	6.35	25.6	1396.000	277	114	451	128	172	682	194	216
250 x 12	524	2.25	54.2	56.5	58.9	61.2	65.9	70.7	75.4	70.7	75.4	60.00	39.300	25.59	3.100	7.22	25.1	2.048.000	277	114	451	128	172	682	194	216
300 x 12	524	2.45	63.6	65.9	68.3	70.7	75.4	80.1	84.8	80.1	84.8	72.00	47.200	25.60	5.400	8.66	34.8	3.539.000	277	114	451	128	172	682	194	216
220 x 15	530	2.14	58.9	61.2	63.6	65.9	70.7	75.4	80.1	75.4	80.1	66.0	43.800	25.76	2.660	6.35	49.8	1.765.000	277	114	451	128	172	682	194	216
250 x 15	530	2.26	65.9	68.3	70.7	73.0	77.7	82.4	87.1	82.4	87.1	75.0	49.700	25.74	3.910	7.22	56.5	2.590.000	277	114	451	128	172	682	194	216
300 x 15	530	2.46	77.7	80.1	82.4	84.8	89.5	94.2	98.9	94.2	98.9	90.0	59.700	25.76	6.750	8.66	67.8	4.476.000	277	114	451	128	172	682	194	216
350 x 15	530	2.66	89.5	91.8	94.2	96.6	101.3	106.0	110.7	106.0	110.7	105.0	69.600	25.75	10.720	10.10	79.0	7.107.000	277	114	451	128	172	682	194	216
250 x 20	540	2.28	85.6	87.9	90.3	92.6	97.3	102.1	106.8	102.1	106.8	100.0	67.600	26.00	5.210	7.22	133.6	3.521.000	277	114	451	128	172	682	194	216
300 x 20	540	2.48	101.3	103.6	106.0	108.3	113.0	117.8	122.5	117.8	122.5	120.0	81.100	26.00	9.000	8.66	160.3	6.084.000	277	114	451	128	172	682	194	216
350 x 20	540	2.68	117.0	119.3	121.7	124.0	128.7	133.5	138.2	133.5	138.2	140.0	94.600	25.99	14.290	10.10	186.9	9.661.000	277	114	451	128	172	682	194	216
400 x 20	540	2.88	132.7	135.0	137.4	139.7	144.4	149.2	153.9	149.2	153.9	160.0	108.200	26.00	21.330	11.55	219.6	14.421.000	277	114	451	128	172	682	194	216
300 x 25	550	2.50	124.8	127.2	129.5	131.9	136.6	141.3	146.0	141.3	146.0	150.0	103.400	26.25	11.250	8.66	312.8	7.752.000	277	114	451	128	172	682	194	216
350 x 25	550	2.70	144.4	146.8	149.2	151.5	156.2	160.9	165.6	160.9	165.6	175.0	120.600	26.25	17.860	10.10	364.8	12.310.000	277	114	451	128	172	682	194	216
400 x 25	550	2.90	164.1	166.4	168.8	171.1	175.8	180.6	185.3	180.6	185.3	200.0	137.800	26.25	26.670	11.55	416.9	18.375.000	277	114	451	128	172	682	194	216
430 x 25	550	3.02	175.8	178.2	180.6	182.9	187.6	192.3	197.0	192.3	197.0	215.0	148.100	26.25	33.100	12.41	448.2	22.827.000	277	114	451	128	172	682	194	216
450 x 25	550	3.10	183.7	186.0	188.4	190.8	195.5	200.2	204.9	200.2	204.9	225.0	155.000	26.25	37.970	12.99	469.0	26.163.000	277	114	451	128	172	682	194	216
350 x 30	560	2.72	171.9	174.3	176.6	179.0	183.7	188.4	193.1	188.4	193.1	210.0	147.500	26.50	21.440	10.10	630.3	15.054.000	277	114	451	128	172	682	194	216
400 x 30	560	2.92	195.5	197.8	200.2	202.5	207.2	212.0	216.7	212.0	216.7	240.0	169.500	26.50	32.000	11.55	720.3	22.472.000	277	114	451	128	172	682	194	216
430 x 30	560	3.04	209.6	212.0	214.3	216.7	221.4	226.1	230.8	226.1	230.8	258.0	181.200	26.50	39.750	12.41	774.3	27.917.000	277	114	451	128	172	682	194	216
450 x 30	560	3.12	219.0	221.4	223.7	226.1	230.8	235.5	240.2	235.5	240.2	270.0	189.600	26.50	45.560	12.99	810.3	31.995.000	277	114	451	128	172	682	194	216

*N_{Ed} and M_{Ed} when fully stabilized by lateral supports
Other flange dimensions are available*

WT 625

Dimensions			Cross Section Values											S235				S355			
b _g × t _g mm	H mm	U m ² /m	weight / m											c _{lim} cm	NRk kN	MRk kNm	c _{lim} cm	NRk kN	MRk kNm		
			WT0 kg/m	WTA kg/m	WTB kg/m	WTC kg/m	WTD kg/m	WTE kg/m	WTF kg/m	I _y cm ⁴	I _y cm	I _z cm ⁴	I _z cm							I _t cm ⁴	I _w cm ⁴
160 x 6	637	2,16	23,9	26,8	29,8	32,7	36,6	44,5	50,4	19,10	31,54	410	4,62	2,6	408,000	451	142	277	682	215	
180 x 6	637	2,24	25,8	29,7	31,7	34,6	40,5	46,4	52,3	21,500	31,55	580	5,18	2,9	581,000	508	160	289	767	242	
200 x 6	637	2,32	27,7	30,6	33,6	36,5	42,4	48,3	54,2	23,900	31,56	800	5,77	3,2	796,000	564	178	297	852	289	
160 x 8	641	2,17	28,9	31,9	34,8	37,8	43,6	49,5	55,4	25,6	31,62	550	4,64	5,8	547,000	602	190	277	909	288	
180 x 8	641	2,25	31,4	34,4	37,3	40,3	46,2	52,0	57,9	28,800	31,62	780	5,20	6,5	779,000	677	214	289	1.022	324	
200 x 8	641	2,33	34,0	36,9	39,8	42,8	48,7	54,6	60,4	32,000	31,67	1070	5,78	7,2	1.069,000	752	238	297	1.136	360	
220 x 8	641	2,41	36,5	39,4	42,4	45,3	51,2	57,1	63,0	35,200	31,67	1420	6,35	7,8	1.422,000	827	262	289	1.250	395	
200 x 10	645	2,34	40,2	43,2	46,1	49,1	55,0	60,8	66,7	40,300	31,74	1330	5,77	13,7	1.344,000	940	298	297	1.420	451	
220 x 10	645	2,42	43,4	46,3	49,3	52,2	58,1	64,0	69,9	44,400	31,77	1770	6,34	15,0	1.789,000	1.034	328	289	1.562	496	
250 x 10	645	2,54	48,1	51,0	54,0	56,9	62,8	68,7	74,6	50,400	31,75	2.600	7,21	17,0	2.625,000	1.175	373	297	1.775	543	
200 x 12	649	2,35	46,5	49,5	52,4	55,3	61,2	67,1	73,0	48,000	31,85	1.600	5,77	23,4	1.623,000	1.128	359	297	1.704	543	
220 x 12	649	2,43	50,3	53,2	56,2	59,1	65,0	70,9	76,8	52,800	31,86	2.190	6,35	25,7	2.160,000	1.241	395	289	1.874	597	
250 x 12	649	2,55	55,9	58,9	61,8	64,8	70,7	76,5	82,4	60,000	31,86	3.190	7,22	29,1	3.170,000	1.410	449	297	2.130	678	
300 x 12	649	2,75	65,4	68,3	71,2	74,2	80,1	86,0	91,8	72,000	31,84	5.400	8,66	34,9	5.478,000	1.692	539	289	2.556	814	
220 x 15	655	2,44	60,6	63,6	66,5	69,5	75,4	81,2	87,1	66,000	32,00	2.660	6,35	49,8	2.726,000	1.551	496	289	2.343	750	
250 x 15	655	2,56	67,7	70,7	73,6	76,5	82,4	88,3	94,2	75,000	32,00	3.910	7,22	56,6	4.000,000	1.763	564	289	2.663	852	
300 x 15	655	2,76	79,5	82,4	85,4	88,3	94,2	100,1	106,0	90,000	32,01	6.750	8,66	67,8	6.912,000	2.115	677	289	3.195	1.022	
350 x 15	655	2,96	91,3	94,2	97,1	100,1	106,0	111,9	117,8	105,000	32,00	10.720	10,10	79,1	10.976,000	2.468	790	289	3.728	1.193	
250 x 20	665	2,58	87,3	90,3	93,2	96,2	102,1	107,9	113,8	100,000	32,25	5.270	7,22	133,7	5.417,000	2.350	758	289	3.550	1.145	
300 x 20	665	2,78	103,0	106,0	108,9	111,9	117,8	123,6	129,5	120,000	32,25	9.000	8,66	160,3	9.361,000	2.820	909	289	4.260	1.374	
350 x 20	665	2,98	118,7	121,7	124,6	127,6	133,5	139,3	145,2	140,000	32,25	14.290	10,10	187,0	14.864,000	3.290	1.061	289	4.970	1.603	
400 x 20	665	3,18	134,4	137,4	140,3	143,3	149,2	155,0	160,9	160,000	32,25	21.330	11,55	213,7	22.888,000	3.760	1.213	289	5.680	1.832	
300 x 25	675	2,80	126,6	129,5	132,5	135,4	141,3	147,2	153,1	150,000	32,50	11.250	8,66	312,8	11.893,000	3.525	1.146	289	5.325	1.731	
350 x 25	675	3,00	146,2	149,2	152,1	155,0	160,9	166,8	172,7	175,000	32,50	17.860	10,10	364,9	18.869,000	4.113	1.337	289	6.213	2.019	
400 x 25	675	3,20	165,8	168,8	171,7	174,7	180,6	186,4	192,3	200,000	32,50	26.670	11,55	417,0	28.167,000	4.700	1.528	289	7.100	2.308	
430 x 25	675	3,32	177,6	180,6	183,5	186,4	192,3	198,2	204,1	215,000	32,50	33.190	12,41	448,2	34.991,000	5.053	1.642	289	7.633	2.481	
450 x 25	675	3,40	185,5	188,4	191,3	194,3	200,2	206,1	212,0	225,000	32,50	37.970	12,99	469,1	40.104,000	5.288	1.718	289	7.988	2.596	
350 x 30	685	3,02	173,7	176,6	179,6	182,5	188,4	194,3	200,2	210,000	32,75	21.440	10,10	630,3	22.993,000	4.935	1.616	289	7.455	2.442	
400 x 30	685	3,22	197,2	200,2	203,1	206,1	212,0	217,8	223,7	240,000	32,75	32.000	11,55	720,3	34.322,000	5.640	1.847	289	8.520	2.790	
430 x 30	685	3,34	211,4	214,3	217,2	220,2	226,1	232,0	237,9	258,000	32,75	39.750	12,41	774,3	42.638,000	6.063	1.986	289	9.159	3.000	
450 x 30	685	3,42	220,8	223,7	226,7	229,6	235,5	241,4	247,3	270,000	32,75	45.560	12,99	810,3	48.669,000	6.345	2.078	289	9.585	3.139	

N_{ex} and M_{ex} when fully stabilized by lateral supports
Other range dimensions are available

WT 1000

Dimensions		weight / m										Cross Section Values								S235				S355																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
b _g x t _g mm	H mm	U m ² /m	WT0 kg/m	WTA kg/m	WTB kg/m	WTC kg/m	WTD kg/m	WTE kg/m	WTF kg/m	WTG kg/m	WTI kg/m	WTJ kg/m	WTK kg/m	WTL kg/m	WTM kg/m	WTN kg/m	WT0 kg/m	WT1 kg/m	WT2 kg/m	WT3 kg/m	WT4 kg/m	WT5 kg/m	WT6 kg/m	WT7 kg/m	WT8 kg/m	WT9 kg/m	WT10 kg/m	WT11 kg/m	WT12 kg/m	WT13 kg/m	WT14 kg/m	WT15 kg/m	WT16 kg/m	WT17 kg/m	WT18 kg/m	WT19 kg/m	WT20 kg/m	WT21 kg/m	WT22 kg/m	WT23 kg/m	WT24 kg/m	WT25 kg/m	WT26 kg/m	WT27 kg/m	WT28 kg/m	WT29 kg/m	WT30 kg/m	WT31 kg/m	WT32 kg/m	WT33 kg/m	WT34 kg/m	WT35 kg/m	WT36 kg/m	WT37 kg/m	WT38 kg/m	WT39 kg/m	WT40 kg/m	WT41 kg/m	WT42 kg/m	WT43 kg/m	WT44 kg/m	WT45 kg/m	WT46 kg/m	WT47 kg/m	WT48 kg/m	WT49 kg/m	WT50 kg/m	WT51 kg/m	WT52 kg/m	WT53 kg/m	WT54 kg/m	WT55 kg/m	WT56 kg/m	WT57 kg/m	WT58 kg/m	WT59 kg/m	WT60 kg/m	WT61 kg/m	WT62 kg/m	WT63 kg/m	WT64 kg/m	WT65 kg/m	WT66 kg/m	WT67 kg/m	WT68 kg/m	WT69 kg/m	WT70 kg/m	WT71 kg/m	WT72 kg/m	WT73 kg/m	WT74 kg/m	WT75 kg/m	WT76 kg/m	WT77 kg/m	WT78 kg/m	WT79 kg/m	WT80 kg/m	WT81 kg/m	WT82 kg/m	WT83 kg/m	WT84 kg/m	WT85 kg/m	WT86 kg/m	WT87 kg/m	WT88 kg/m	WT89 kg/m	WT90 kg/m	WT91 kg/m	WT92 kg/m	WT93 kg/m	WT94 kg/m	WT95 kg/m	WT96 kg/m	WT97 kg/m	WT98 kg/m	WT99 kg/m	WT100 kg/m																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
160 x 6	102	3.06	29.2	33.9	38.6	43.3	52.8	62.2	71.6	81.1	90.6	100.1	109.6	119.1	128.6	138.1	147.6	157.1	166.6	176.1	185.6	195.1	204.6	214.1	223.6	233.1	242.6	252.1	261.6	271.1	280.6	290.1	299.6	309.1	318.6	328.1	337.6	347.1	356.6	366.1	375.6	385.1	394.6	404.1	413.6	423.1	432.6	442.1	451.6	461.1	470.6	480.1	489.6	499.1	508.6	518.1	527.6	537.1	546.6	556.1	565.6	575.1	584.6	594.1	603.6	613.1	622.6	632.1	641.6	651.1	660.6	670.1	679.6	689.1	698.6	708.1	717.6	727.1	736.6	746.1	755.6	765.1	774.6	784.1	793.6	803.1	812.6	822.1	831.6	841.1	850.6	860.1	869.6	879.1	888.6	898.1	907.6	917.1	926.6	936.1	945.6	955.1	964.6	974.1	983.6	993.1	1002.6	1012.1	1021.6	1031.1	1040.6	1050.1	1059.6	1069.1	1078.6	1088.1	1097.6	1107.1	1116.6	1126.1	1135.6	1145.1	1154.6	1164.1	1173.6	1183.1	1192.6	1202.1	1211.6	1221.1	1230.6	1240.1	1249.6	1259.1	1268.6	1278.1	1287.6	1297.1	1306.6	1316.1	1325.6	1335.1	1344.6	1354.1	1363.6	1373.1	1382.6	1392.1	1401.6	1411.1	1420.6	1430.1	1439.6	1449.1	1458.6	1468.1	1477.6	1487.1	1496.6	1506.1	1515.6	1525.1	1534.6	1544.1	1553.6	1563.1	1572.6	1582.1	1591.6	1601.1	1610.6	1620.1	1629.6	1639.1	1648.6	1658.1	1667.6	1677.1	1686.6	1696.1	1705.6	1715.1	1724.6	1734.1	1743.6	1753.1	1762.6	1772.1	1781.6	1791.1	1800.6	1810.1	1819.6	1829.1	1838.6	1848.1	1857.6	1867.1	1876.6	1886.1	1895.6	1905.1	1914.6	1924.1	1933.6	1943.1	1952.6	1962.1	1971.6	1981.1	1990.6	2000.1	2009.6	2019.1	2028.6	2038.1	2047.6	2057.1	2066.6	2076.1	2085.6	2095.1	2104.6	2114.1	2123.6	2133.1	2142.6	2152.1	2161.6	2171.1	2180.6	2190.1	2200.6	2209.6	2219.1	2228.6	2238.1	2247.6	2257.1	2266.6	2276.1	2285.6	2295.1	2304.6	2314.1	2323.6	2333.1	2342.6	2352.1	2361.6	2371.1	2380.6	2390.1	2400.6	2409.6	2419.1	2428.6	2438.1	2447.6	2457.1	2466.6	2476.1	2485.6	2495.1	2504.6	2514.1	2523.6	2533.1	2542.6	2552.1	2561.6	2571.1	2580.6	2590.1	2600.6	2609.6	2619.1	2628.6	2638.1	2647.6	2657.1	2666.6	2676.1	2685.6	2695.1	2704.6	2714.1	2723.6	2733.1	2742.6	2752.1	2761.6	2771.1	2780.6	2790.1	2800.6	2809.6	2819.1	2828.6	2838.1	2847.6	2857.1	2866.6	2876.1	2885.6	2895.1	2904.6	2914.1	2923.6	2933.1	2942.6	2952.1	2961.6	2971.1	2980.6	2990.1	3000.6	3009.6	3019.1	3028.6	3038.1	3047.6	3057.1	3066.6	3076.1	3085.6	3095.1	3104.6	3114.1	3123.6	3133.1	3142.6	3152.1	3161.6	3171.1	3180.6	3190.1	3200.6	3209.6	3219.1	3228.6	3238.1	3247.6	3257.1	3266.6	3276.1	3285.6	3295.1	3304.6	3314.1	3323.6	3333.1	3342.6	3352.1	3361.6	3371.1	3380.6	3390.1	3400.6	3409.6	3419.1	3428.6	3438.1	3447.6	3457.1	3466.6	3476.1	3485.6	3495.1	3504.6	3514.1	3523.6	3533.1	3542.6	3552.1	3561.6	3571.1	3580.6	3590.1	3600.6	3609.6	3619.1	3628.6	3638.1	3647.6	3657.1	3666.6	3676.1	3685.6	3695.1	3704.6	3714.1	3723.6	3733.1	3742.6	3752.1	3761.6	3771.1	3780.6	3790.1	3800.6	3809.6	3819.1	3828.6	3838.1	3847.6	3857.1	3866.6	3876.1	3885.6	3895.1	3904.6	3914.1	3923.6	3933.1	3942.6	3952.1	3961.6	3971.1	3980.6	3990.1	4000.6	4009.6	4019.1	4028.6	4038.1	4047.6	4057.1	4066.6	4076.1	4085.6	4095.1	4104.6	4114.1	4123.6	4133.1	4142.6	4152.1	4161.6	4171.1	4180.6	4190.1	4200.6	4209.6	4219.1	4228.6	4238.1	4247.6	4257.1	4266.6	4276.1	4285.6	4295.1	4304.6	4314.1	4323.6	4333.1	4342.6	4352.1	4361.6	4371.1	4380.6	4390.1	4400.6	4409.6	4419.1	4428.6	4438.1	4447.6	4457.1	4466.6	4476.1	4485.6	4495.1	4504.6	4514.1	4523.6	4533.1	4542.6	4552.1	4561.6	4571.1	4580.6	4590.1	4600.6	4609.6	4619.1	4628.6	4638.1	4647.6	4657.1	4666.6	4676.1	4685.6	4695.1	4704.6	4714.1	4723.6	4733.1	4742.6	4752.1	4761.6	4771.1	4780.6	4790.1	4800.6	4809.6	4819.1	4828.6	4838.1	4847.6	4857.1	4866.6	4876.1	4885.6	4895.1	4904.6	4914.1	4923.6	4933.1	4942.6	4952.1	4961.6	4971.1	4980.6	4990.1	5000.6	5009.6	5019.1	5028.6	5038.1	5047.6	5057.1	5066.6	5076.1	5085.6	5095.1	5104.6	5114.1	5123.6	5133.1	5142.6	5152.1	5161.6	5171.1	5180.6	5190.1	5200.6	5209.6	5219.1	5228.6	5238.1	5247.6	5257.1	5266.6	5276.1	5285.6	5295.1	5304.6	5314.1	5323.6	5333.1	5342.6	5352.1	5361.6	5371.1	5380.6	5390.1	5400.6	5409.6	5419.1	5428.6	5438.1	5447.6	5457.1	5466.6	5476.1	5485.6	5495.1	5504.6	5514.1	5523.6	5533.1	5542.6	5552.1	5561.6	5571.1	5580.6	5590.1	5600.6	5609.6	5619.1	5628.6	5638.1	5647.6	5657.1	5666.6	5676.1	5685.6	5695.1	5704.6	5714.1	5723.6	5733.1	5742.6	5752.1	5761.6	5771.1	5780.6	5790.1	5800.6	5809.6	5819.1	5828.6	5838.1	5847.6	5857.1	5866.6	5876.1	5885.6	5895.1	5904.6	5914.1	5923.6	5933.1	5942.6	5952.1	5961.6	5971.1	5980.6	5990.1	6000.6	6009.6	6019.1	6028.6	6038.1	6047.6	6057.1	6066.6	6076.1	6085.6	6095.1	6104.6	6114.1	6123.6	6133.1	6142.6	6152.1	6161.6	6171.1	6180.6	6190.1	6200.6	6209.6	6219.1	6228.6	6238.1	6247.6	6257.1	6266.6	6276.1	6285.6	6295.1	6304.6	6314.1	6323.6	6333.1	6342.6	6352.1	6361.6	6371.1	6380.6	6390.1	6400.6	6409.6	6419.1	6428.6	6438.1	6447.6	6457.1	6466.6	6476.1	6485.6	6495.1	6504.6	6514.1	6523.6	6533.1	6542.6	6552.1	6561.6	6571.1	6580.6	6590.1	6600.6	6609.6	6619.1	6628.6	6638.1	6647.6	6657.1	6666.6	6676.1	6685.6	6695.1	6704.6	6714.1	6723.6	6733.1	6742.6	6752.1	6761.6	6771.1	6780.6	6790.1	6800.6	6809.6	6819.1	6828.6	6838.1	6847.6	6857.1	6866.6	6876.1	6885.6	6895.1	6904.6	6914.1	6923.6	6933.1	6942.6	6952.1	6961.6	6971.1	6980.6	6990.1	7000.6	7009.6	7019.1	7028.6	7038.1	7047.6	7057.1	7066.6	7076.1	7085.6	7095.1	7104.6	7114.1	7123.6	7133.1	7142.6	7152.1	7161.6	7171.1	7180.6	7190.1	7200.6	7209.6	7219.1	7228.6	7238.1	7247.6	7257.1	7266.6	7276.1	7285.6	7295.1	7304.6	7314.1	7323.6	7333.1	7342.6	7352.1	7361.6	7371.1	7380.6	7390.1	7400.6	7409.6	7419.1	7428.6	7438.1	7447.6	7457.1	7466.6	7476.1	7485.6	7495.1	7504.6	7514.1	7523.6	7533.1	7542.6	7552.1	7561.6	7571.1	7580.6	7590.1	7600.6	7609.6	7619.1	7628.6	7638.1	7647.6	7657.1	7666.6	7676.1	7685.6	7695.1	7704.6	7714.1	7723.6	7733.1	7742.6	7752.1	7761.6	7771.1	7780.6	7790.1	7800.6	7809.6	7819.1	7828.6	7838.1	7847.6	7857.1	7866.6	7876.1	7885.6	7895.1	7904.6	7914.1	7923.6	7933.1	7942.6	7952.1	7961.6	7971.1	7980.6	7990.1	8000.6	8009.6	8019.1	8028.6	8038.1	8047.6	8057.1	8066.6	8076.1	8085.6	8095.1	8104.6	8114.1	8123.6	8133.1	8142.6	8152.1	8161.6	8171.1	8180.6	8190.1	8200.6	8209.6	8219.1	8228.6	8238.1	8247.6	8257.1	8266.6	8276.1	8285.6	8295.1	8304.6	8314.1	8323.6	8333.1	8342.6	8352.1	8361.6	8371.1	8380.6	8390.1	8400.6	8409.6	8419.1	8428.6	8438.1	8447.6	8457.1	8466.6	8476.1	8485.6	8495.1	8504.6	8514.1	8

WT 1250

Dimensions			Cross Section Values											S235				S355					
b _g x t _g mm	H mm	U m ² /m	weight / m											c _{limp} cm	NRk kN	MRk kNm	c _{limp} cm	NRk kN	MRk kNm				
			Wt0 kg/m	WtA kg/m	WtB kg/m	WtC kg/m	WtD kg/m	WtE kg/m	WtF kg/m	2 Ag cm ²	I _y cm ⁴	I _y cm	I _z cm ⁴							I _z cm	I _t cm ⁴	I _w cm ⁴	
160 x 6	1262	3,66	38,6	44,5	50,4	56,2	62,2	68,2	73,9	79,7	85,7	19,2	75.700	62,79	410	4,62	3,0	1.615.000	283	451	283	682	428
180 x 6	1262	3,74	40,5	46,4	52,3	58,2	64,1	70,0	75,8	81,6	87,6	21,60	86.200	62,80	580	5,18	3,2	2.300.000	243	508	243	767	482
200 x 6	1262	3,82	42,4	48,3	54,2	60,1	66,0	71,9	77,7	83,6	89,5	24,00	94.700	62,82	800	5,77	3,5	3.155.000	227	564	227	852	535
160 x 8	1266	3,67	43,6	49,5	55,4	61,3	67,2	73,1	79,0	84,9	90,8	25,6	101.300	62,90	550	4,64	6,1	2.161.000	278	602	278	909	572
180 x 8	1266	3,75	46,2	52,0	57,9	63,7	69,6	75,5	81,4	87,3	93,2	28,80	113.900	62,89	780	5,20	6,8	3.077.000	244	677	244	1.022	643
200 x 8	1266	3,83	48,7	54,6	60,4	66,3	72,2	78,1	84,0	89,9	95,8	32,00	126.600	62,90	1.070	5,78	7,5	4.220.000	227	752	227	1.136	715
220 x 8	1266	3,91	51,2	57,1	63,0	68,9	74,7	80,6	86,5	92,4	98,3	35,20	139.300	62,91	1.420	6,35	8,2	5.677.000	208	827	208	1.250	786
200 x 10	1270	3,84	55,0	60,8	66,7	72,5	78,4	84,2	90,1	95,9	101,8	40,0	158.800	63,01	1.330	5,77	14,0	5.292.000	277	940	277	1.420	895
220 x 10	1270	3,92	58,1	64,0	69,9	75,8	81,6	87,5	93,4	99,3	105,2	44,00	174.600	62,99	1.770	6,34	15,3	7.044.000	268	1.034	268	1.562	984
250 x 10	1270	4,04	62,8	68,7	74,6	80,5	86,4	92,3	98,2	104,1	110,0	50,00	198.500	63,01	2.600	7,21	17,3	10.336.000	237	1.175	237	1.775	1.118
200 x 12	1274	3,85	61,2	67,1	73,0	78,9	84,8	90,7	96,6	102,5	108,4	48,0	191.100	63,10	1.600	5,77	23,7	6.371.000	277	1.128	277	1.704	1.075
220 x 12	1274	3,93	65,0	70,9	76,8	82,7	88,6	94,5	100,4	106,3	112,2	52,80	210.200	63,10	2.130	6,35	26,0	8.479.000	268	1.241	268	1.874	1.183
250 x 12	1274	4,05	70,7	76,5	82,4	88,2	94,1	100,0	105,9	111,8	117,7	60,00	238.900	63,10	3.130	7,22	29,5	12.443.000	237	1.410	237	2.130	1.344
300 x 12	1274	4,25	80,1	86,0	91,9	97,8	103,7	109,6	115,5	121,4	127,3	72,00	286.700	63,10	5.400	8,66	35,2	21.501.000	207	1.692	207	2.556	1.613
220 x 15	1280	3,94	75,4	81,2	87,1	92,9	98,8	104,7	110,6	116,5	122,4	66,0	264.000	63,25	2.660	6,35	50,2	10.649.000	268	1.551	268	2.343	1.482
250 x 15	1280	4,06	82,4	88,3	94,2	100,1	106,0	111,9	117,8	123,7	129,6	75,0	300.000	63,25	3.910	7,22	56,9	15.627.000	268	1.763	268	2.663	1.684
300 x 15	1280	4,26	94,2	100,1	106,0	111,9	117,8	123,7	129,6	135,5	141,4	90,0	360.100	63,25	6.750	8,66	68,2	27.004.000	207	2.115	207	3.195	2.021
350 x 15	1280	4,46	106,0	111,9	117,8	123,7	129,6	135,5	141,4	147,3	153,2	105,0	420.100	63,25	10.720	10,10	79,4	42.881.000	174	2.468	174	3.728	2.358
250 x 20	1290	4,08	102,1	107,9	113,8	119,7	125,6	131,5	137,4	143,3	149,2	100,0	403.200	63,50	5.210	7,22	134,0	21.001.000	339	2.350	339	3.550	2.254
300 x 20	1290	4,28	117,8	123,6	129,5	135,4	141,3	147,2	153,1	159,0	164,9	120,0	483.900	63,50	9.000	8,66	160,7	36.290.000	307	2.820	307	4.260	2.705
350 x 20	1290	4,48	133,5	139,3	145,2	151,1	157,0	162,9	168,8	174,7	180,6	140,0	564.500	63,50	14.290	10,10	187,3	57.628.000	174	3.290	174	4.970	3.156
400 x 20	1290	4,68	149,2	155,0	160,9	166,8	172,7	178,6	184,5	190,4	196,3	160,0	645.200	63,50	21.330	11,55	214,0	86.021.000	141	3.760	141	5.680	3.607
300 x 25	1300	4,30	141,3	147,2	153,1	159,0	164,9	170,8	176,7	182,6	188,5	150,0	609.600	63,75	11.250	8,66	313,2	45.721.000	407	3.525	407	5.325	3.395
350 x 25	1300	4,50	160,9	166,8	172,7	178,6	184,5	190,4	196,3	202,2	208,1	175,0	711.200	63,75	17.860	10,10	365,2	72.603.000	174	4.113	174	6.213	3.960
400 x 25	1300	4,70	180,6	186,5	192,4	198,3	204,2	210,1	216,0	221,9	227,8	200,0	812.800	63,75	26.670	11,55	417,3	108.275.000	141	4.700	141	7.100	4.526
430 x 25	1300	4,82	192,3	198,2	204,1	210,0	215,9	221,8	227,7	233,6	239,5	215,0	873.800	63,75	33.130	12,41	448,6	134.634.000	107	5.053	107	7.633	4.866
450 x 25	1300	4,90	200,2	206,1	212,0	217,9	223,8	229,7	235,6	241,5	247,4	225,0	914.400	63,75	37.970	12,99	469,4	154.307.000	107	5.288	107	7.988	5.092
350 x 30	1310	4,52	188,4	194,3	200,2	206,1	212,0	217,9	223,8	229,7	235,6	210,0	860.200	64,00	21.440	10,10	630,7	87.808.000	174	4.935	174	7.455	4.771
400 x 30	1310	4,72	212,0	217,9	223,8	229,7	235,6	241,5	247,4	253,3	259,2	240,0	983.000	64,00	32.000	11,55	720,7	131.072.000	141	5.640	141	8.520	5.453
430 x 30	1310	4,84	226,1	232,0	237,9	243,8	249,7	255,6	261,5	267,4	273,3	258,0	1.056.800	64,00	39.750	12,41	774,7	162.830.000	107	6.063	107	9.159	5.862
450 x 30	1310	4,92	235,5	241,4	247,3	253,2	259,1	265,0	270,9	276,8	282,7	270,0	1.105.900	64,00	45.560	12,99	810,7	186.624.000	107	6.345	107	9.585	6.134

N_{rs} and M_{rs} when fully stabilized by lateral supports
 Other flange dimensions are available

WT 1500

Dimensions			Cross Section Values											S235				S355				
b _g x t _g mm	H mm	U m ² /m	weight / m											c _{lim} cm	NRk kN	MRk kNm	c _{lim} cm	NRk kN	MRk kNm			
			WT0 kg/m	WTA kg/m	WTB kg/m	WTC kg/m	WTD kg/m	WTE kg/m	WTF kg/m	2 Ag cm ²	I _y cm ⁴	I _y cm	I _z cm ⁴							I _z cm	I _t cm ⁴	I _w cm ⁴
160 x 6	1512	4,26	433	50,4	57,5	71,6	85,7	99,9										277	451	340	682	513
180 x 6	1512	4,34	452	52,3	59,3	73,5	87,6	101,7										243	508	382	767	577
200 x 6	1512	4,42	471	54,2	61,2	75,4	89,5	103,6										237	564	425	852	642
160 x 8	1516	4,27	484	55,4	62,5	76,6	90,7	104,9										278	602	454	909	685
180 x 8	1516	4,35	503	57,9	65,0	79,1	93,3	107,4										244	677	510	1.022	771
200 x 8	1516	4,43	534	60,4	67,5	81,6	95,8	109,9										277	752	567	1.136	857
220 x 8	1516	4,51	559	63,0	70,0	84,2	98,3	112,4										288	827	624	1.250	942
200 x 10	1520	4,44	597	66,7	73,8	87,9	102,1	116,2										277	940	710	1.420	1.072
220 x 10	1520	4,52	628	69,9	76,9	91,1	105,2	119,3										288	1.034	781	1.562	1.179
250 x 10	1520	4,64	675	74,6	81,6	95,8	109,9	124,0										338	1.175	887	1.775	1.340
200 x 12	1524	4,45	659	73,0	80,1	94,2	108,3	122,5										277	1.128	853	1.704	1.288
220 x 12	1524	4,53	697	76,8	83,8	98,0	112,1	126,2										288	1.241	938	1.874	1.417
250 x 12	1524	4,65	754	82,4	89,5	103,6	117,8	131,9										339	1.410	1.066	2.130	1.610
300 x 12	1524	4,85	848	91,8	98,9	113,0	127,2	141,3										407	1.692	1.279	2.556	1.932
220 x 15	1530	4,54	801	87,1	94,2	108,3	122,5	136,6										288	1.551	1.175	2.343	1.775
250 x 15	1530	4,66	871	94,2	101,3	115,4	129,5	143,7										339	1.763	1.335	2.663	2.017
300 x 15	1530	4,86	969	106,0	113,0	127,2	141,3	155,4										407	2.115	1.602	3.195	2.420
350 x 15	1530	5,06	1.077	117,8	124,8	138,9	153,1	167,2										474	2.468	1.869	3.728	2.824
250 x 20	1540	4,68	1.068	113,8	120,9	135,0	149,2	163,3										339	2.350	1.786	3.550	2.698
300 x 20	1540	4,88	1.225	129,5	136,6	150,7	164,9	179,0										407	2.820	2.143	4.260	3.238
350 x 20	1540	5,08	1.382	145,2	152,3	166,4	180,6	194,7										474	3.290	2.500	4.970	3.777
400 x 20	1540	5,28	1.639	160,9	168,0	182,1	196,3	210,4										542	3.760	2.858	5.680	4.317
300 x 25	1550	4,90	1.146	123,1	130,2	144,3	158,4	172,5										407	3.525	2.688	5.325	4.060
350 x 25	1550	5,10	1.256	134,2	141,3	155,4	169,5	183,6										474	4.113	3.136	6.213	4.737
400 x 25	1550	5,30	1.366	145,3	152,4	166,5	180,6	194,7										542	4.700	3.584	7.100	5.414
430 x 25	1550	5,42	1.476	156,4	163,5	177,6	191,7	205,8										583	5.053	3.853	7.633	5.820
450 x 25	1550	5,50	1.527	161,5	168,6	182,7	196,8	210,9										607	5.288	4.032	7.988	6.090
350 x 30	1560	5,12	1.256	134,2	141,3	155,4	169,5	183,6										474	4.935	3.775	7.455	5.703
400 x 30	1560	5,32	1.366	145,3	152,4	166,5	180,6	194,7										542	5.640	4.315	8.520	6.518
430 x 30	1560	5,44	1.476	156,4	163,5	177,6	191,7	205,8										583	6.063	4.638	9.159	7.007
450 x 30	1560	5,52	1.527	161,5	168,6	182,7	196,8	210,9										607	6.345	4.854	9.585	7.333

*N_{ss} and M_{ss} when fully stabilized by lateral supports
Other range dimensions are available*

f_y/k 35,5 kN/cm²
Steelgrade S355

	WTO				WTA				WTB				WTC				
	t =	2W =	2s =	2ly =	t =	2W =	2s =	2ly =	t =	2W =	2s =	2ly =	t =	2W =	2s =	2ly =	
h_y web [mm]	155	178	4,65	5,65	155	178	6,21	13,4	155	178	7,77	26,2	155	178	10,8	45,2	14.605
τ_{cr} [kN/cm ²]	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5
$\lambda_{y,quer}$	0,31	0,47	0,58	0,70	0,29	0,43	0,54	0,65	0,27	0,41	0,51	0,62	0,25	0,37	0,46	0,56	0,74
$\chi_{r,c}$	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
V_{rd} [kN]	102	154	192	231	137	205	256	307	171	256	320	384	171	256	320	384	512
τ_{cr} [kN/cm ²]	245,5	108,9	69,7	48,4	245,5	108,9	69,7	48,4	274,7	121,9	78,0	54,2	335,5	148,8	95,2	66,1	37,2
$\lambda_{y,quer}$	0,29	0,43	0,54	0,65	0,29	0,43	0,54	0,65	0,27	0,41	0,51	0,62	0,25	0,37	0,46	0,56	0,74
$\chi_{r,c}$	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
V_{rd} [kN]	310	410	512	615	310	410	512	615	310	410	512	615	310	410	512	615	769
τ_{cr} [kN/cm ²]	17,4	12,1	8,1	5,8	17,4	12,1	8,1	5,8	19,5	13,5	9,5	6,9	23,8	16,5	11,1	8,6	5,2
$\lambda_{y,quer}$	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,30	1,03	1,23	0,74	0,74	20,5	20,5	20,5	20,5	20,5
$\chi_{r,c}$	0,68	0,68	0,68	0,68	0,68	0,68	0,68	0,68	0,97	0,97	0,97	0,97	0,93	0,93	0,93	0,93	0,86
V_{rd} [kN]	420	572	716	845	420	572	716	845	420	572	716	845	420	572	716	845	1025

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	WTD				WTE				WTF			
	t =	2W =	2s =	2ly =	t =	2W =	2s =	2ly =	t =	2W =	2s =	2ly =
h_y web [mm]	155	178	14,41	107	155	178	18,02	209	155	178	21,77	362
τ_{cr} [kN/cm ²]	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5	20,5
$\lambda_{y,quer}$	0,23	0,35	0,43	0,52	0,22	0,33	0,41	0,49	0,21	0,27	0,33	0,40
$\chi_{r,c}$	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
V_{rd} [kN]	273	410	512	615	341	512	640	769	341	512	640	769
τ_{cr} [kN/cm ²]	434,1	192,6	123,2	85,6	434,1	192,6	123,2	85,6	478,0	286,5	183,4	127,3
$\lambda_{y,quer}$	0,22	0,33	0,41	0,49	0,22	0,33	0,41	0,49	0,25	0,35	0,43	0,53
$\chi_{r,c}$	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
V_{rd} [kN]	820	1025	1281	1537	820	1025	1281	1537	820	1025	1281	1537
τ_{cr} [kN/cm ²]	21,4	14,4	10,2	7,1	21,4	14,4	10,2	7,1	23,9	16,5	11,1	8,6
$\lambda_{y,quer}$	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,77	0,77	0,77	0,77
$\chi_{r,c}$	0,95	0,95	0,95	0,95	0,95	0,95	0,95	0,95	0,77	0,77	0,77	0,77
V_{rd} [kN]	1174	1537	1925	2310	1174	1537	1925	2310	1174	1537	1925	2310

Special Web on request

Special Web on request

Pale beams are normally discarded, since their web does not have the plastic load bearing capacity.

16. Concentrated load introduction

Steelgrade: S235

$g_M =$ 1,0	WTO						WTA						WTB						WTC					
	$t_s = 1,5 \text{ mm}$						$t_s = 2,0 \text{ mm}$						$t_s = 2,5 \text{ mm}$						$t_s = 3 \text{ mm}$					
	Lenght mit a in [mm]																							
$t_{flansch}$	0	50	100	150	200		0	50	100	150	200		0	50	100	150	200		0	50	100	150	200	
6	10,6	28,2	45,8	63,5	81,1	14,1	37,6	61,1	84,6	108,1	131,6	17,6	47,0	70,5	94,0	117,5	141,0	155,1	21,2	56,4	91,7	126,9	162,2	197,4
8	14,1	31,7	49,4	67,0	84,6	18,8	42,3	65,8	89,3	112,8	136,3	23,5	52,9	76,4	99,9	123,4	146,9	170,4	28,2	63,5	98,7	134,0	169,2	204,5
10	17,6	35,3	52,9	70,5	88,1	23,5	47,0	70,5	94,0	117,5	141,0	29,4	58,8	82,3	105,8	129,3	152,8	176,3	35,3	70,5	105,8	141,0	176,3	211,5
12	21,2	38,8	56,4	74,0	91,7	28,2	51,7	75,2	98,7	122,2	145,7	35,3	64,6	88,1	111,6	135,1	158,6	182,1	42,3	77,6	112,8	148,1	183,3	218,5
15	26,4	44,1	61,7	79,3	96,9	35,3	58,8	82,3	105,8	129,3	152,8	44,1	73,4	96,9	120,4	143,9	167,4	190,9	52,9	88,1	123,4	158,6	193,9	229,1
20	35,3	52,9	70,5	88,1	105,8	47,0	70,5	94,0	117,5	141,0	164,5	58,8	88,1	111,6	135,1	158,6	182,1	205,6	70,5	105,8	141,0	176,3	211,5	246,8
25	44,1	61,7	79,3	96,9	114,6	58,8	82,3	105,8	129,3	152,8	176,3	73,4	102,8	126,3	149,8	173,3	196,8	220,3	88,1	123,4	158,6	193,9	229,1	264,3
30	52,9	70,5	88,1	105,8	123,4	70,5	94,0	117,5	141,0	164,5	188,0	88,1	117,5	141,0	164,5	188,0	211,5	235,0	105,8	141,0	176,3	211,5	246,8	282,0

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$g_M =$ 1,0	WTD						WTE						WTF											
	$t_s = 4,0 \text{ mm}$						$t_s = 5,0 \text{ mm}$						$t_s = 6,0 \text{ mm}$											
	Lastenleitungsbreite am Flansch mit a in [mm]																							
$t_{flansch}$	0	50	100	150	200		0	50	100	150	200		0	50	100	150	200		0	50	100	150	200	
6	28,2	75,2	122,2	169,2	216,2	35,3	94,0	152,8	211,5	270,3	329,1	42,3	112,8	171,6	230,4	289,2	348,0	352,5	42,3	112,8	183,3	253,8	324,3	394,8
8	37,6	84,6	131,6	178,6	225,6	47,0	105,8	164,5	223,3	282,0	340,8	56,4	126,9	185,7	244,5	303,3	362,1	366,6	56,4	126,9	197,4	267,9	338,4	408,9
10	47,0	94,0	141,0	188,0	235,0	58,8	117,5	176,3	235,0	293,8	352,6	65,3	141,0	200,8	259,6	318,4	377,2	381,7	65,3	141,0	211,5	282,0	352,5	423,0
12	56,4	103,4	150,4	197,4	244,4	70,5	129,3	188,0	246,8	305,5	364,3	73,4	155,1	214,9	273,7	332,5	391,3	395,8	73,4	155,1	225,6	296,1	366,6	437,1
15	70,5	117,5	164,5	211,5	258,5	88,1	146,9	205,6	264,4	323,1	381,9	88,1	176,3	235,0	293,8	352,6	411,4	415,9	88,1	176,3	246,8	317,3	387,8	458,3
20	94,0	141,0	188,0	235,0	282,0	117,5	176,3	235,0	293,8	352,5	411,3	117,5	211,5	270,3	329,1	387,9	446,7	451,2	117,5	211,5	282,0	352,5	423,0	493,5
25	117,5	164,5	211,5	258,5	305,5	146,9	205,6	264,4	323,1	381,9	440,7	146,9	246,8	305,5	364,3	423,1	481,9	486,4	146,9	246,8	317,3	387,8	458,3	529,1
30	141,0	188,0	235,0	282,0	329,0	176,3	235,0	293,8	352,5	411,3	470,1	176,3	282,0	340,8	399,6	458,4	517,2	521,7	176,3	282,0	352,5	423,0	493,5	564,0

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Steelgrade S355

$g_M =$	WTO						WTA						WTB						WTC											
	$t_s = 1,5 \text{ mm}$						$t_s = 2,0 \text{ mm}$						$t_s = 2,5 \text{ mm}$						$t_s = 3,0 \text{ mm}$											
	Lastenleitungsbreite am Flansch mit a in [mm]																													
t_{flansch}	0	50	100	150	200	200	0	50	100	150	200	200	0	50	100	150	200	200	0	50	100	150	200	200	0	50	100	150	200	200
6	16,0	42,6	69,2	95,9	122,5	122,5	21,3	56,8	92,3	127,8	163,3	163,3	26,6	71,0	115,4	159,8	204,1	204,1	32,0	85,2	138,5	191,7	245,0	245,0	32,0	85,2	138,5	191,7	245,0	245,0
8	21,3	47,9	74,6	101,2	127,8	127,8	28,4	63,9	99,4	134,9	170,4	170,4	35,5	79,9	124,3	168,6	213,0	213,0	42,6	95,9	149,1	202,4	255,6	255,6	42,6	95,9	149,1	202,4	255,6	255,6
10	26,6	53,3	79,9	106,5	133,1	133,1	35,5	71,0	106,5	142,0	177,5	177,5	44,4	88,8	133,1	177,5	221,9	221,9	53,3	106,5	159,8	213,0	266,3	266,3	53,3	106,5	159,8	213,0	266,3	266,3
12	32,0	58,6	85,2	111,8	138,5	138,5	42,6	78,1	113,6	149,1	184,6	184,6	53,3	97,6	142,0	186,4	230,8	230,8	63,9	117,2	170,4	223,7	276,9	276,9	63,9	117,2	170,4	223,7	276,9	276,9
15	39,9	66,6	93,2	119,8	146,4	146,4	53,3	88,8	124,3	159,8	195,3	195,3	66,6	110,9	155,3	199,7	244,1	244,1	79,9	133,1	186,4	239,6	292,9	292,9	79,9	133,1	186,4	239,6	292,9	292,9
20	53,3	79,9	106,5	133,1	159,8	159,8	71,0	106,5	142,0	177,5	213,0	213,0	88,8	133,1	177,5	221,9	266,3	266,3	106,5	159,8	213,0	266,3	319,5	319,5	106,5	159,8	213,0	266,3	319,5	319,5
25	66,6	93,2	119,8	146,4	173,1	173,1	88,8	124,3	159,8	195,3	230,8	230,8	110,9	155,3	199,7	244,1	288,4	288,4	133,1	186,4	239,6	292,9	346,1	346,1	133,1	186,4	239,6	292,9	346,1	346,1
30	79,9	106,5	133,1	159,8	186,4	186,4	106,5	142,0	177,5	213,0	248,5	248,5	133,1	177,5	221,9	266,3	310,6	310,6	159,8	213,0	266,3	319,5	372,8	372,8	159,8	213,0	266,3	319,5	372,8	372,8

Special Web on request

$g_M =$	WTD						WTE						WTF											
	$t_s = 4,0 \text{ mm}$						$t_s = 5,0 \text{ mm}$						$t_s = 6,0 \text{ mm}$											
	Lastenleitungsbreite am Flansch mit a in [mm]																							
t_{flansch}	0	50	100	150	200	200	0	50	100	150	200	200	0	50	100	150	200	200	0	50	100	150	200	200
6	42,6	113,6	184,6	255,6	326,6	326,6	53,3	142,0	230,8	319,5	408,3	408,3	63,9	170,4	276,9	383,4	489,9	489,9	63,9	170,4	276,9	383,4	489,9	489,9
8	56,8	127,8	198,8	269,8	340,8	340,8	71,0	159,8	248,5	337,3	426,0	426,0	85,2	191,7	298,2	404,7	511,2	511,2	85,2	191,7	298,2	404,7	511,2	511,2
10	71,0	142,0	213,0	284,0	355,0	355,0	88,8	177,5	266,3	355,0	443,8	443,8	106,5	213,0	319,5	426,0	532,5	532,5	106,5	213,0	319,5	426,0	532,5	532,5
12	85,2	156,2	227,2	298,2	369,2	369,2	106,5	195,3	284,0	372,8	461,5	461,5	127,8	234,3	340,8	447,3	553,8	553,8	127,8	234,3	340,8	447,3	553,8	553,8
15	106,5	177,5	248,5	319,5	390,5	390,5	133,1	221,9	310,6	399,4	488,1	488,1	159,8	266,3	372,8	479,3	585,8	585,8	159,8	266,3	372,8	479,3	585,8	585,8
20	142,0	213,0	284,0	355,0	426,0	426,0	177,5	266,3	355,0	443,8	532,5	532,5	213,0	319,5	426,0	532,5	639,0	639,0	213,0	319,5	426,0	532,5	639,0	639,0
25	177,5	248,5	319,5	390,5	461,5	461,5	221,9	310,6	399,4	488,1	576,9	576,9	266,3	372,8	479,3	585,8	692,3	692,3	266,3	372,8	479,3	585,8	692,3	692,3
30	213,0	284,0	355,0	426,0	497,0	497,0	266,3	355,0	443,8	532,5	621,3	621,3	319,5	426,0	532,5	639,0	745,5	745,5	319,5	426,0	532,5	639,0	745,5	745,5

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17. Flange load bearing capacity

Steel quality: S235

$f_{yk} = 235$ N/mm ²		Considering Distribution of Normalforces $k_c = 1,00$ (EN1993-1-1, Tabelle 6.6)											$\gamma_M = 1,00$	
Dimensions of Flange $b \times t$ [mm]		TENSION		PRESSURE										
		N_{Rd} [kN]	c_{lim} [m]	N_{Rd} [kN]										
		Distance of Lateral Support [m]												
			3,00	4,00	5,00	6,00	8,00	10,00	12,00	15,00	18,00	21,00	24,00	
160 x 6	9,60	226	2,17	163	122	98	82	61	49					11,55
180 x 6	10,80	254	2,44	206	155	124	103	77	62	52				12,99
200 x 6	12,00	282	2,71	255	191	153	127	96	76	64				14,43
160 x 8	12,80	301	2,17	217	163	130	109	82	65					11,55
180 x 8	14,40	338	2,44	275	206	165	138	103	83	69				12,99
200 x 8	16,00	376	2,71	340	255	204	170	127	102	85				14,43
220 x 8	17,60	414	2,98	411	308	247	206	154	123	103	82			15,88
200 x 10	20,00	470	2,71	425	319	255	212	159	127	106				14,43
220 x 10	22,00	517	2,98	514	385	308	257	193	154	128	103			15,88
250 x 10	25,00	588	3,39	588	498	398	332	249	199	166	133	111		18,04
200 x 12	24,00	564	2,71	510	382	306	255	191	153	127				14,43
220 x 12	26,40	620	2,98	617	463	370	308	231	185	154	123			15,88
250 x 12	30,00	705	3,39	705	597	478	398	299	239	199	159	133		18,04
300 x 12	36,00	846	4,07	846	846	688	573	430	344	287	229	191	164	21,65
220 x 15	33,00	776	2,98	771	578	463	385	289	231	193	154			15,88
250 x 15	37,50	881	3,39	881	747	597	498	373	299	249	199	166		18,04
300 x 15	45,00	1058	4,07	1058	1058	860	717	538	430	358	287	239	205	21,65
350 x 15	52,50	1234	4,74	1234	1234	1171	976	732	585	488	390	325	279	25,26
250 x 20	50,00	1175	3,39	1175	995	796	664	498	398	332	265	221		18,04
300 x 20	60,00	1410	4,07	1410	1410	1147	956	717	573	478	382	319	273	21,65
350 x 20	70,00	1645	4,74	1645	1645	1561	1301	976	780	650	520	434	372	25,26
400 x 20	80,00	1880	5,42	1880	1880	1880	1699	1274	1019	849	680	566	485	28,87
450 x 20	90,00	2115	6,10	2115	2115	2115	2115	1613	1290	1075	860	717	614	32,48
300 x 25	75,00	1763	4,07	1763	1763	1433	1195	896	717	597	478	398	341	21,65
350 x 25	87,50	2056	4,74	2056	2056	1951	1626	1219	976	813	650	542	465	25,26
400 x 25	100,00	2350	5,42	2350	2350	2350	2124	1593	1274	1062	849	708	607	28,87
430 x 25	107,50	2526	5,83	2526	2526	2526	2454	1841	1472	1227	982	818	701	31,03
450 x 25	112,50	2644	6,10	2644	2644	2644	2644	2016	1613	1344	1075	896	768	32,48
350 x 30	105,00	2468	4,74	2468	2468	2341	1951	1463	1171	976	780	650	557	25,26
400 x 30	120,00	2820	5,42	2820	2820	2820	2548	1911	1529	1274	1019	849	728	28,87
430 x 30	129,00	3032	5,83	3032	3032	3032	2945	2209	1767	1472	1178	982	841	31,03
450 x 30	135,00	3173	6,10	3173	3173	3173	3173	2418	1935	1613	1290	1075	922	32,48

Steel quality: S355

$f_{yk} = 355$		Considering Distribution of Normalforces $k_c = 1,00$ (EN1993-1-1, Table6.6)											$\gamma_M = 1,00$			
Dimensions of Flange		PRESSURE											c_{max}			
$b \times t$ [mm]	A [cm ²]	Distance of Lateral Support [m]											[m]			
		N _{Rd} [kN]														
TENSION		N _{Rd} [kN]											c _{lim}			
N _{Rd} [kN]		N _{Rd} [kN]											[m]			
160 x 6	9,60	341	200	150	120	100	75	60	100	120	150	180	210	240	11,55	11,55
180 x 6	10,80	383	254	190	152	127	95	76	127	152	189	227	265	303	12,99	12,99
200 x 6	12,00	426	313	235	188	157	117	94	157	188	226	264	302	341	14,43	14,43
160 x 8	12,80	454	267	200	160	134	100	80	134	160	196	233	270	307	11,55	11,55
180 x 8	14,40	511	338	254	203	169	127	101	169	203	237	271	305	339	12,99	12,99
200 x 8	16,00	568	418	313	251	209	157	125	209	251	284	317	350	383	14,43	14,43
220 x 8	17,60	625	505	379	303	253	189	152	253	303	336	369	402	435	15,88	15,88
200 x 10	20,00	710	522	392	313	261	196	157	261	313	346	379	412	445	14,43	14,43
220 x 10	22,00	781	632	474	379	316	237	189	316	379	412	445	478	511	15,88	15,88
250 x 10	25,00	888	816	612	489	408	306	245	408	489	570	651	732	813	18,04	18,04
200 x 12	24,00	852	626	470	376	313	235	188	313	376	419	462	505	548	14,43	14,43
220 x 12	26,40	937	758	568	455	379	284	227	379	455	500	545	590	635	15,88	15,88
250 x 12	30,00	1065	979	734	587	489	367	294	489	587	651	715	779	843	18,04	18,04
300 x 12	36,00	1278	1278	1057	846	705	529	423	705	846	951	1056	1161	1266	21,65	21,65
220 x 15	33,00	1172	947	711	568	474	355	284	474	568	613	658	703	748	15,88	15,88
250 x 15	37,50	1331	1223	918	734	612	459	367	612	734	816	898	980	1062	18,04	18,04
300 x 15	45,00	1698	1598	1321	1057	881	661	529	881	1057	1233	1409	1585	1761	21,65	21,65
350 x 15	52,50	1864	1864	1739	1439	1199	899	719	1199	1439	1683	1927	2171	2415	25,26	25,26
250 x 20	50,00	1775	1631	1223	979	816	612	489	816	979	1084	1189	1294	1399	18,04	18,04
300 x 20	60,00	2130	2130	1762	1409	1175	881	705	1175	1409	1653	1897	2141	2385	21,65	21,65
350 x 20	70,00	2485	2485	2398	1918	1599	1199	959	1599	1918	2237	2556	2875	3194	25,26	25,26
400 x 20	80,00	2840	2840	2840	2506	2088	1566	1253	2088	2506	2925	3344	3763	4182	28,87	28,87
450 x 20	90,00	3195	3195	3195	3171	2643	1982	1586	2643	3171	3590	4009	4428	4847	31,03	31,03
300 x 25	75,00	2663	2663	2202	1762	1468	1101	881	1468	1762	2056	2350	2644	2938	32,48	32,48
350 x 25	87,50	3106	3106	2998	2398	1998	1499	1199	1998	2398	2797	3196	3595	3994	21,65	21,65
400 x 25	100,00	3550	3550	3550	3182	2610	1958	1566	3182	3550	3949	4348	4747	5146	25,26	25,26
430 x 25	107,50	3816	3816	3816	3620	3016	2262	1810	3620	3994	4388	4782	5176	5570	28,87	28,87
450 x 25	112,50	3994	3994	3994	3964	3303	2478	1982	3964	3964	4358	4752	5146	5540	31,03	31,03
350 x 30	105,00	3728	3728	3597	2878	2398	1799	1439	2878	3597	4016	4435	4854	5273	32,48	32,48
400 x 30	120,00	4260	4260	4260	3799	3132	2349	1879	3799	4260	4680	5100	5520	5940	25,26	25,26
430 x 30	129,00	4580	4580	4580	4344	3620	2715	2172	4344	4580	4999	5418	5837	6256	28,87	28,87
450 x 30	135,00	4793	4793	4793	4757	3964	2973	2378	4757	4757	5176	5595	6014	6433	31,03	31,03

18. Practical examples



Messe- und Veranstaltungshallen *Exhibition- and event halls*



Roof structure VIC-M:

Period of performance: 11 2006

– 08 2007 Location: Bruno Kreisky Platz 1, A-1220 Wien

Client: Internationales Amtssitz- und Konferenzzentrum Wien AG, Bruno Kreisky Platz 1, A-1220 Wien

Planner: Albert Wimmer ZT GmbH, Statics: Werner Consult ZT GmbH

Executed work: Spherical curved roof: Three-dimensional latticed framework

including sin-profiles (corrugated web beams), roofed with trapezoidal panels. Composite ceiling above the building core.

Railing, maintenance floor with cable securing system.

Technical specification: Weight of the structural steelwork: 900t, thereof sin-profiles: 150t. Area of composite ceiling: 2800m², area of trapezoidal panel roof: 6400m², roof overhang: Up to 24m.

Order value: EUR 2.640.000,- excl. VAT

Order value: EUR 2.640.000,- excl. VAT

Dachtragwerk Gebäude M – Vienna Internat. Center:

Zeit der Leistungserbringung: 11 2006 – 08 2007

Standort: Bruno Kreisky Platz 1, A-1220 Wien

Auftraggeber: Internationales Amtssitz- und Konferenzzentrum Wien AG, Bruno Kreisky Platz 1, A-1220 Wien

Planer: Albert Wimmer ZT GmbH, Statik: Werner Consult ZT GmbH

Ausgeführte Arbeiten: Sphärisch gekrümmtes Dach:

Dreidimensionale Fachwerkstruktur u.a. mit sin-Profilen

(Wellstegträgern), gedeckt mit Trapezblech für ein Gleitbügeldach.

Verbunddecke über dem Gebäudekernbereich mit Fertigteilen und

Aufbeton. Geländer, Wartungsebene mit Seilsicherungssystem.

Technische Daten: Gewicht der Stahlkonstruktion: 900t, davon sin-

Profile: 150t. Fläche der Verbunddecke: 2.800m², Fläche der der

sphärischen Dachform folgenden Trapezblechdecke: 6.400m²,

Dachauskragung: Bis 24m.

Auftragssumme: EUR 2.640.000,- excl. USt

Produktions- und Lagerhallen Production- and storage hangars



Produktionshalle:

Zeit der Leistungserbringung: 07 2006 – 04 2007
Standort: Leobersdorfer Straße 26, A-2560 Berndorf
Auftraggeber: Berndorf AG, Leobersdorfer Straße 26, A-2560 Berndorf
Planer: Dipl.- Ing. Anton P. Reithofer, Ziviltechniker für Hochbau
Ausgeführte Arbeiten: Statische Berechnung, Detailplanung, Lieferung und Montage der Halle u. a. mit sin-Profilen (Wellstegträgern), inklusive Verbindungsgang und Flugdach.
Technische Daten: Länge: 150m, Breite: 26m, Höhe: 16m.
Auftragssumme: EUR 2.350.000,- excl. USt

Production hangar:

Period of performance: 07 2006 – 04 2007
Location: Leobersdorfer Straße 26, A-2560 Berndorf
Client: Berndorf AG, Leobersdorfer Straße 26, A-2560 Berndorf
Planner: Dipl.- Ing. Anton P. Reithofer, Ziviltechniker für Hochbau
Executed work: Statical calculation, detailed planning, delivery and assembly of the hangar including sin-profiles (corrugated web beams), including connecting passage and flying roof.
Technical Specification: Length: 150m, width: 26m, height: 16m.
Order value: EUR 2.350.000,- excl. VAT



Extension of Tivoli Stadium for EM 2008:

Period of performance: 04 2006 – 10 2006

Location: Montessoristraße, A-6020 Innsbruck

Client: Arge Euro 2008 Porr-Alpine, Scherenbrandnerhofstraße 5, A-5021 Salzburg

Planner: A. Wimmer ZT-GmbH

Executed work: Static calculation, detailed planning, delivery and assembly of structural steelwork including sin-profiles (corrugated web beams) and complete roofing.

Deconstruction to the original building state after the games.

Technical Specification:

Spectator seats: Extension from 15.200 to 30.300, weight of the structural steelwork: 3500t, covered area: 16.000m², roof cantilever: 45m, roof height: 42m. Order value: EUR 9.050.000,- excl. VAT

Ausbau des Tivoli-Stadions für die Fußball-Europameisterschaft 2008:

Zeit der Leistungserbringung: 04 2006 – 10 2006

Standort: Montessoristraße, A-6020 Innsbruck

Auftraggeber: Arge Euro 2008 Porr-Alpine, Scherenbrandnerhofstraße 5, A-5021 Salzburg

Planer: Albert Wimmer ZT-GmbH

Ausgeführte Arbeiten: Statische Berechnung, Detailplanung, Lieferung und Montage der Stahltragkonstruktion u.a. mit sin-Profilen (Wellstegträgern) und der kompletten Überdachung. Rückbau auf den ursprünglichen Zustand nach der EM.

Technische Daten: Sitzplätze: Ausbau von 15.200 auf 30.300, Gewicht der Stahlkonstruktion: 3500t, Überdachte Fläche: 16.000m², Dachauskragung: 45m, Dachhöhe: 42m.

Auftragssumme: EUR 9.050.000,- excl. USt

SG2.6012 / Zeman & Co GmbH, Schönbrunner Straße 213-215, A-1120 Wien, www.zeman-stahl.com

Parkhäuser Parking facilities



Multi-story car park for AVL List GmbH:

*Period of performance: 12 2005
– 04 2006*

*Location: Wiener Straße 15, A-
8010 Graz*

*Client: Steiner-Bau GmbH,
Industriestraße 2, A-9470 St. Paul
/ Lavanttal (AVL List GmbH)*

Planner: DI Strohecker ZT GmbH

*Executed work: Structural
steelwork including sin-profiles
(corrugated web beams),
aluminium facade: Static
calculation, detailed planning,
production, delivery and
assembly.*

Technical Specification:

*Useable area: 13.000m², storeys:
6, car ports: 476.*

*Order value: EUR 1.207.000
excl. VAT*

Parkhaus für AVL List GmbH:

Zeit der Leistungserbringung: 12 2005 – 04 2006

Standort: Wiener Straße 15, A-8010 Graz

Auftraggeber: Steiner-Bau GmbH, Industriestraße 2, A-9470 St. Paul /
Lavanttal (AVL List GmbH)

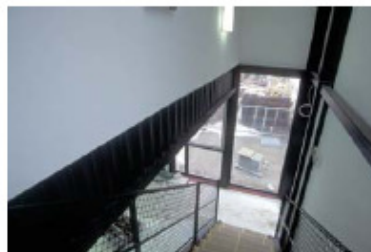
Planer: DI Strohecker ZT GmbH

Ausgeführte Arbeiten: Stahlkonstruktion, u.a. mit sin-Profilen
(Wellstegträgern), Aluminiumfassade: Statische Berechnung,
Detailplanung, Produktion, Lieferung und Montage.

Technische Daten: Nutzfläche: 13.000m², Geschoße: 6, Stellplätze:
476.

Auftragssumme: EUR 1.207.000,- excl. USt

Stahlgebäude Steel buildings



Bürogebäude Eisen Wolf:

Zeit der Leistungserbringung: 11 2005 - 02 2006
Standort: Michael Hainisch Straße 53, A-2493 Lichtenwörth
Auftraggeber: Andreas Wolf GmbH & Co KG, Michael Hainisch Straße 53, A-2493 Lichtenwörth
Planer: Arch. Rolf Seifert, Generalplaner Wendl ZT GmbH
Ausgeführte Arbeiten: Komplettes Bürogebäude in Stahlbauweise über dem Bach mit einer Tragkonstruktion aus sin-Profilen (Wellstegträgern). Durchführung als Generalunternehmer.
Technische Daten: Grundfläche 18m x 11m
Auftragssumme: EUR 465.000,- excl. USt

Office building Eisen Wolf:

Period of performance: 11 2005 – 02 2006

Location: Michael Hainisch Straße 53, A-2493 Lichtenwörth

Client: Andreas Wolf GmbH & Co KG, Michael Hainisch Straße 53, A-2493 Lichtenwörth

Planner: Arch. Rolf Seifert, Generalplaner Wendl ZT GmbH

Executed work: Complete office building located above the creek with a bearing construction of sin-profiles (corrugated web beams).

Project execution as main-contractor

Technical Specification: Ground area: 18m x 11m.

Order value: EUR 465.000,- excl. VAT

Parkdecks Parking facilities



Parkhaus Flughafen Wien:

Zeit der Leistungserbringung: 02 2005 – 05 2005
Standort: Parkhaus 3, A-1300 Wien Flughafen
Auftraggeber: Strabag AG, Donau-City-Straße 9, A-1220 Wien
Planer: Achammer-Trithart & Partner ZT GmbH
Ausgeführte Arbeiten: Überdachung des Parkhauses mit einer sin-Profil-Konstruktion (Wellstegträgerkonstruktion).
Technische Daten: Überdachte Fläche: 7000m²
Auftragssumme: EUR 506.000,- excl. USt

Multi-story car park airport Vienna:

Period of performance: 02 2005 – 05 2005

Location: Parkhaus 3, A-1300 Wien Flughafen

Client: Strabag AG, Donau-City-Straße 9, A-1220 Wien

Planner: Achammer-Trithart & Partner ZT GmbH

Executed work: Roofing of the multi story car park with a sin-profile-construction (corrugated web beam construction).

Technical Specification: Roofed area: 7000m²

Order value: EUR 506.000,- excl. VAT

Produktions- und Lagerhallen *Production- and storage hangars*



Theaterkulissenlager:

Zeit der Leistungserbringung: 03 2004 – 07 2004
Standort: A-2286 Haringsee
Auftraggeber: Granit Bau GmbH, Frauentalerstraße 81, A-8530 Deutschlandsberg (Art for Art Theater Service GmbH)
Planer: Zeman & Co GmbH + Nova Planungsgruppe OEG
Ausgeführte Arbeiten: 2 Lagerhallen mit sin-Profilen (Wellstegträgern). Gesamtbauzeit: 4 Monate.
Technische Daten: Länge x Breite: 256m x 60m und 199m x 60m, Fläche der Hallen: 15.000m² und 12.000m², freie Spannweite: 30m.
Auftragssumme: EUR 1.243.000,- excl. USt

Warehouses for theatre sceneries:

Period of performance: 03 2004 – 07 2004

Location: A-2286 Haringsee
Client: Granit Bau GmbH, Frauentalerstraße 81, A-8530 Deutschlandsberg (Art for Art Theater Service GmbH)

Planner: Zeman & Co GmbH + Nova Planungsgruppe OEG

Executed work: 2 warehouses with sin-profiles (corrugated web beams). Total construction time: 4 months.

Technical Specification: Length x width 256m x 60m and 199m x 60m, Ground area: 15.000m² and 12.000m², free span: 30m.

Order value: EUR 1.243.000 excl. VAT

Vordächer und Flugdächer *Canopys and flying roofs*



Hofüberdachung:

Jahr der Errichtung: 2003
Standort: Leopoldauerstraße 173-181, A-1210 Wien
Auftraggeber: Printkom GmbH
Planer: Ing. Rameder
Ausgeführte Arbeiten: Überdachung eines Teiles des Hofes mit einer sin-Profil-Konstruktion (Wellstegträgerkonstruktion): Stahlkonstruktion, Dacheindeckung und Wandverkleidung.
Technische Daten: Überdachte Fläche: 400m².

Court's roof:

Year of execution: 2003
Location: Leopoldauerstraße 173-181, A-1210 Wien
Client: Printkom GmbH
Planner: Ing. Rameder
Executed work: Roof above a part of the company court with a sin-beam-construction (corrugated web beams): Structural steelwork, roof and cladding.
Technical Specification: Roofed area: 400m².



Lagerhalle Baumarkt Obi:

Jahr der Errichtung: 2002

Standort: Hackingerstraße 12, A-1140 Wien

Auftraggeber: Sochor & Co GmbH, Brucknerstrasse 8, A-1040 Wien

Brucknerstraße 8, A-1040 Wien

Planer: Arch. Marschalek

Ausgeführte Arbeiten: Planung, statische Berechnung, Lieferung und Montage der zweischiffigen Lagerhalle mit Vordach: Stahlkonstruktion mit sin-Träger (Wellstegträger), Legato-Bogendach mit integrierten Lichtbändern, Wandverkleidung.

Technische Daten: Freie Spannweite: 33m x 28m, Dachfläche: 1070m², Fassadenfläche: 970m².

Warengar for Obi D-I-Y store:

Year of execution: 2002

Location: Hackingerstraße 12, A-1140 Wien

Client: Sochor & Co GmbH, Brucknerstraße 8, A-1040 Wien

Planner: Arch. Marschalek

Executed work: Design, static calculation, supply and assembly of the warengar: Steel construction including sin-profile (corrugated web beam), Legato-arched roof with integrated skylight strips, wall cladding.

Technical Specification:

Free span length: 33m x 28m, covered area: 1070m², cladded area: 970m².



Verkaufs- und Ausstellungshallen *Sales-and exhibition hangars*



Supermarkt Tesco:

Jahr der Errichtung: 2001
Standort: Bydgoszcz, Polen
Auftraggeber: Exbud Skanska
Planer: Exbud / Zeman HDF
Ausgeführte Arbeiten: Stahlkonstruktion, u.a. mit sin-Profilen (Wellstegträgern).

Supermarket Tesco:

Year of execution: 2001
Location: Bydgoszcz, Poland
Client: Exbud Skanska
Planner: Exbud / Zeman HDF
Executed work: Structural steelwork, including sin-profiles (corrugated web beams).

Zeman HDF Spółka z o.o., ul. Katowicka 24, PL-41-600 Swietochlowice, www.hdf.pl
Ein Unternehmen der Firmengruppe Zeman, www.zeman-stahl.com

Brückenkonstruktionen *Bridge constructions*



Fußgängersteg über die Westbahnstrecke:

Jahr der Errichtung: 2000

Standort: Hadikgasse, A-1140 Wien

Auftraggeber: Arge LT 22

Planer: Arge LT 22

Ausgeführte Arbeiten: Detailplanung, Lieferung und Montage des Fußgängersteges mit Zugang und Stiegenturm. Der Fußgängersteg ist mit sin-Profilen (Wellstegträgern) ausgeführt, welche gleichzeitig als Tragwerk und Geländer dienen.

Technische Daten: Freie Spannweite: 33m + 19m.

*Pedestrian overpass over
„Westbahn rail corridor“:*

Year of execution: 2003

Location: Hadikgasse, A-1140 Wien

Client: Arge LT 22

Planner: Arge LT 22

Executed work: Detailed planning, supply and assembly of the pedestrian overpass with entry and staircase.

Executed with corrugated web beams that simultaneously serve as frame and railing.

Technical Specification: The unsupported spans are 33m + 19 m.

Verkaufs- und Ausstellungshallen Sales-and exhibition hangars



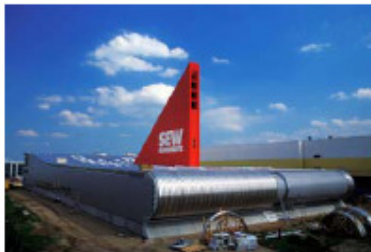
Supermarkt Szalony Max:

Jahr der Errichtung: 2000
Standort: Gniezno, Polen
Auftraggeber: Ahold Real Estate Polska
Planer: Ahold Real Estate / Zeman HDF
Ausgeführte Arbeiten: Stahlkonstruktion, u.a. mit sin-Profilen (Wellstegträgern), Dachkonstruktion, Wand und Fassade

Supermarket Szalony Max:

Year of execution: 2000
Location: Gniezno, Poland
Client: Ahold Real Estate Polska
Planner: Ahold Real Estate / Zeman HDF
Executed work: Structural steelwork, including sin-profiles (corrugated web beams), roof construction, wall and cladding.

Produktions- und Lagerhallen *Production- and sales hangars*



Montagewerk SEW Eurodrive:

Jahr der Errichtung: 1999
Standort: Richard-Strauss-Straße, A-1230 Wien
Auftraggeber: SEW Eurodrive GmbH
Planer: Arch. M. Kohlbauer
Ausgeführte Arbeiten: Stahlkonstruktion der Halle, u.a. mit sin-Profilen (Wellstegträger), Stahlkonstruktion der architektonischen Besonderheiten, Innenwandkassetten, Trapezprofildachtragschale.
Technische Daten: Spannweite der sin-Querträger: 20m.

Assembling hangar SEW Eurodrive

Year of execution: 1999
Location: Richard-Strauss-Straße, 1230 Wien
Client: SEW Eurodrive GmbH
Planner: Arch. M. Kohlbauer
Executed work: Hangar steel construction including sin-profiles (corrugated web beams), steel construction of the architectural features, interior wall cassettes, trapezoidal panel roof bearing structure.
Technical Specification: Span length of the sin-cross-girders: 20m.

Produktions- und Lagerhallen *Production- and storage hangars*



Refrigerated warehouse Stefanitsch:

Year of execution: 1995

Location: A-5400 Hallein

*Client: Stefanitsch,
Hausgemeinschaft Teichweg
4, A-5400 Hallein*

*Planner: Arch. Dipl.-Ing
Wolfgang Huber*

*Executed work: Planning and
static calculation; steel
supporting structure with sin-
profiles (corrugated web
beams); roofing; external
cladding and cladding of the
office section; ladders and
stairs.*

Technical specification:

Refrigerated warehouse:

*Length: 48m, width: 23,8m,
height: 15,5m. Lateral office*

*annex: Length: 48m, width:
23,8m, height: 15,5m. Weight*

of the structural steelwork: 97t

Tiefkühlhaus Stefanitsch:

Jahr der Errichtung: 1995

Standort: A-5400 Hallein

Auftraggeber: Stefanitsch, Hausgemeinschaft Teichweg 4, A-5400 Hallein

Planer: Arch. Dipl.-Ing. Wolfgang Huber

Ausgeführte Arbeiten: Planung und statische Berechnung; Stahltragkonstruktion mit sin-Profilen (Wellstegträgern); Dacheindeckung, äußere Wandverkleidung und Verkleidung des Bürotraktes; Leitern und Treppen.

Technische Daten: Kühlhalle: Länge 48m, Breite 23,8m, Höhe: 15,5m. Seitlicher Anbau: Länge 48m, Breite: 9,5m, Höhe: 6,5m. Gewicht der Stahlkonstruktion: 97t



Produktions- und Lagerhallen *Production- and storage hangars*



Lagerhalle Schartner:

Jahr der Errichtung: 1995
Standort: Gewerbegebiet Pfongau 145, A-5020 Neumarkt / Wallersee
Auftraggeber: Georg Schartner GmbH
Planer: Christian Wetzmaier
Ausgeführte Arbeiten: Gesamte Ausführung inklusive statischer Berechnung und Planung: Stahlkonstruktion mit sin-Profilen (Wellstegträgern), Kassettenwände, Dach mit Paneelen.

Warehouse Schartner:

Year of execution: 1995
Location: Gewerbegebiet Pfongau 145, A-5020 Neumarkt / Wallersee
Client: Georg Schartner GmbH
Planner: Christian Wetzmaier
Executed work: Complete construction including planning and static calculation: Steel construction with sin-profiles (corrugated web beams), cassette walls, panel-roof.