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).

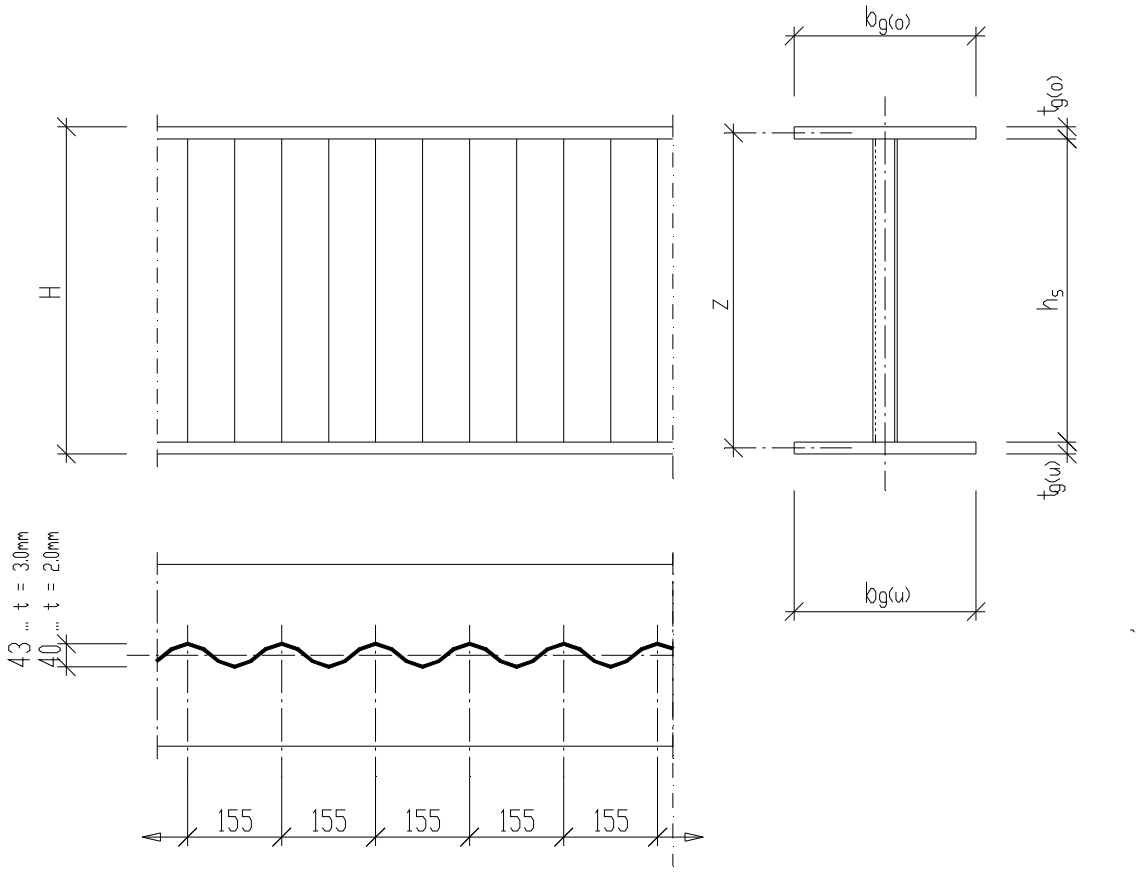


Fig. 1 Corrugated web beam - dimensions, designations

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.

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

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

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

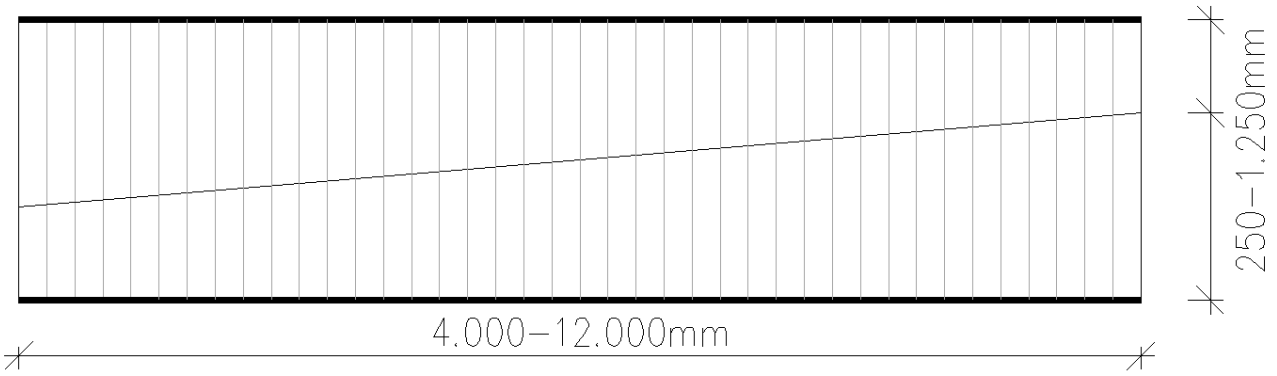
Conical corrugated web beam

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:

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

χ_c ... 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:

$$\chi_{c,l} = \frac{1{,}15}{0{,}9 + \overline{\lambda_{c,l}}} \leq 1{,}0$$

with

$$\overline{\lambda_{c,l}} = \sqrt{\frac{f_y}{\tau_{cr,l}\sqrt{3}}}$$

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

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

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 $w = 155\,mm$

a_3 the height of the projected amplitude

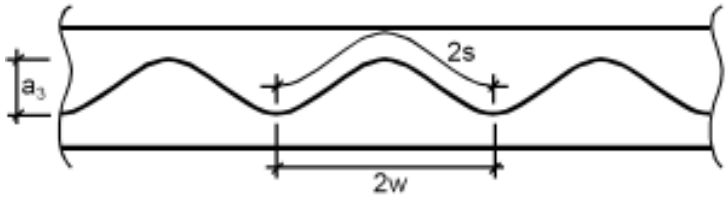


Fig. 2 Significant web dimensions

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 $t_w = 1.5 - 2.5mm \quad \Rightarrow \quad a_3 = 40mm$

for $t_w = 3mm \quad \Rightarrow \quad a_3 = 43mm$

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

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

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

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

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

we find the relative slenderness ratio

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

and the reduction factor for buckling of the web

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

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:

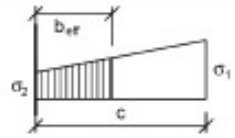
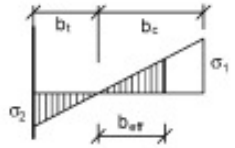
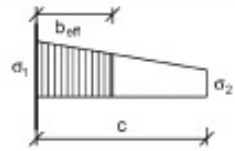
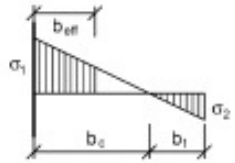
$$\mathbf{N}_{g,Rk} = f_{yk}.b_g.t_g \quad ; \quad \mathbf{N}_{g,Rd} = \mathbf{N}_{g,Rk} / \gamma_M$$

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:

$$\rho = 1 \qquad \text{for} \qquad \overline{\lambda_p} \le 0{,}748$$

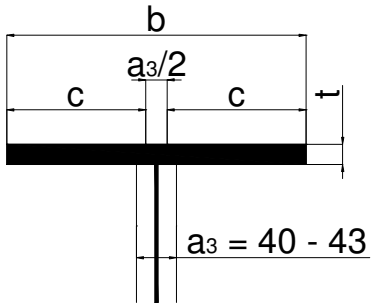
$$\rho = \frac{\overline{\lambda_p} - 0{,}188}{\overline{\lambda_p}^2} \le 1{,}0 \qquad \text{for} \qquad \overline{\lambda_p} > 0{,}748$$

whereby

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

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

$\bar{b}$ the relevant width



$$\bar{b} = c = \frac{b - 0{,}5a_3}{2}; \qquad \varepsilon = \sqrt{\frac{23{,}5}{fyk}}$$

the effective width of the compressed flange is thus

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

and

$$\mathbf{N}_{g,Rd,l} = A_{c,eff} \cdot \frac{f_{yk}}{\lambda_M}$$

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

$$\overline{\lambda_p} = \frac{\bar{b}/t}{28{,}4\varepsilon\sqrt{k_\sigma}} \le 0{,}748$$

$$\bar{b} = t \cdot 28{,}4 \cdot \varepsilon\sqrt{k_\sigma}\,\overline{\lambda_p} \qquad \bar{b} = t \cdot \varepsilon \cdot 13{,}9$$

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

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

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 $\overline{\lambda_F}$ of the flange under compressive stress, meets the following requirements:

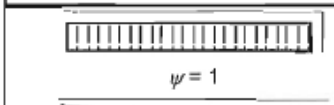
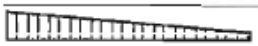
$$\overline{\lambda}_f = \frac{k_c \cdot L_c}{i_{f,z} \cdot \lambda_1} \le \overline{\lambda}_{c0} \cdot \frac{M_{c,Rd}}{M_{y,Ed}}$$

$M_{y,Ed}$ 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
 $-1 \le \psi \le 1$	$\frac{1}{1{,}33 - 0{,}33\psi}$
	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.

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

$$\lambda_1 = \pi\sqrt{\frac{E}{f_y}} = 93{,}9\varepsilon \qquad \varepsilon = \sqrt{\frac{235}{f_y}} \qquad (f_y \text{ in N/mm²})$$

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

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.

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

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

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

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

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

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

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

$$\mathbf{N}_{g,rd} = \min\left(N_{g,Rd}; N_{g,Rd,l}; N_{g,Rd,g}\right)$$

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 (kc = 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

  $h_s = L_{St}/15$ to $L_{St}/25$ (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} .

$$V_d = \gamma_F V < V_{Rd} = \frac{V_{g,Rk}}{\gamma_M}$$

V_{Rk} 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.

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

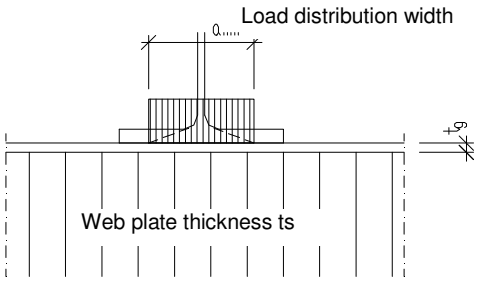
$$\lambda_1^2 = \frac{\pi^2 .E.A}{G_s .t_s .h_s} = \frac{\pi^2 .E.A}{G_s .A_Q} = 25{,}9.\frac{A}{A_Q}$$

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

$$\mathbf{P}_{Rk} = t_s \left(a + 5.t_g\right).f_{yk}$$



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 x t_g .... flange dimensions

H .... overall height of the beam

U .... coating surface per running meter

$2A_g$ .... sectional area (of both flanges)

$$A_{go} = b_{go}.t_{go} \quad ; \quad A_{gu} = b_{gu}.t_{gu} \quad ; \quad 2A_g = A_{go} + A_{gu}$$

A_Q .... transverse force area for consideration of shear distortion

$$G^* = G.\frac{w}{s} = 80\,000.\frac{155}{178} \approx 69\,700\,\text{N/mm}^2$$

$$A_Q = h_s.t_s.\frac{G^*}{G} = h_s.t_s.\frac{w}{s}$$

I_y, I_z .... moment of inertia

$$\mathbf{I}_y = \frac{A_{go}.A_{gu}}{A_{go} + A_{gu}}.z^2 \quad ; \quad \mathbf{I}_z = \frac{1}{12}.\left(t_{go}.b_{go}^3 + t_{gu}.b_{gu}^3\right)$$

i_y, i_z .... gyration radius

I_t .... St. Venant torsional constant (for beams with equal upper and lower flanges)

$$\mathbf{I_d} = \frac{2}{3}.b_g.t_g^3 + \frac{1}{3}.h_s t_s^3$$

I_w .... warping constant (for beams with equal upper and lower flanges)

$$\mathbf{I}_\omega = \frac{A_G}{24}.b_g{}^2.z^2 \quad \text{....} \quad (\mathbf{A_g} = b_g \cdot t_g \quad \text{....} \text{ area of a flange})$$

C_{lim} .... maximum spacing of lateral supports to avoid lateral buckling (tilting) of the compressed flange, acc. to DIN 18 800 Part 2, El(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]

[5] O.Univ. Prof. D.I. Dr. Günter Ramberger, 2. Gutachten über die Berechnung von geschweißten I-Trägern mit Stegen aus gewellten Blechen, Wien 16.11.1990.

[2nd Expert Opinion on the calculation of welded I-beams with corrugated webs, Vienna 11.16.1990]

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[7] Report no. 943040: Untersuchung zur Einleitung dynamischer Lasten in Wellstegträger WTB 750 - 300x12, Versuchsanstalt für Stahl, Holz und Steine (Amtl. Materialprüfanstalt) Universität Karlsruhe, 1995.

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[9] Final report on the bearing performance of corrugated web beams; Brandenburg University of Technology, Chair of Steel Construction, Cottbus 1996. *[in German]*

[10] Gutachterliche Stellungnahme zur Querkrafttragfähigkeit von Wellstegträgern; Univ. Prof. Dr.-Ing. habil. Hartmut Pasternak, Braunschweig/Cottbus 1996.

[Expert statement on the transverse force load bearing capacity of corrugated web beams]

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[13] Easley: Buckling Formulas for Corrugated Metal Shear Diaphragms. Journal of the Structural Division, ASCE, No. ST 7, July 1975, pp. 1403-1417.

[14] Commentary to EN 1993-1-5

[15] Stahlbaukalender 2004 „Träger mit profilierten Stegen“

C. TABLES

14. Section properties

WT 333

Dimensions			weight / m							Cross Section Values							S235			S355		
$b_g \times t_g$	H	U	WT0	WTA	WTB	WTC	WTD	WTE	WTF	$2\,A_g$	I_y	i_y	I_z	i_z	I_t	I_w	c_{lim}	N_{Rk}	M_{Rk}	c_{lim}	N_{Rk}	M_{Rk}
mm	mm	m^2/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	cm^2	cm^4	cm	cm^4	cm	cm^4	cm^6	cm	kN	kNm	cm	kN	kNm
160 x 6	345	1,46	19,8	21,3	22,9	24,5	27,6	30,8	33,9	19,2	5.500	16,93	410	4,62	2,5	118.000	*217*	**451**	**076**	*177*	**682**	**116**
180 x 6	345	1,54	21,7	23,2	24,8	26,4	29,5	32,6	35,8	21,60	6.200	16,94	580	5,18	2,8	168.000	*243*	**508**	**086**	*198*	**767**	**130**
200 x 6	345	1,62	23,5	25,1	26,7	28,3	31,4	34,5	37,7	24,00	6.900	16,96	800	5,77	3,1	230.000	*271*	**564**	**096**	*221*	**852**	**144**
160 x 8	349	1,47	24,8	26,4	27,9	29,5	32,6	35,8	38,9	25,6	7.400	17,00	550	4,64	5,6	159.000	*218*	**602**	**103**	*177*	**909**	**155**
180 x 8	349	1,55	27,3	28,9	30,5	32,0	35,2	38,3	41,4	28,80	8.400	17,08	780	5,20	6,3	226.000	*244*	**677**	**115**	*199*	**1.022**	**174**
200 x 8	349	1,63	29,8	31,4	33,0	34,5	37,7	40,8	43,9	32,00	9.300	17,05	1.070	5,78	7,0	310.000	*271*	**752**	**128**	*221*	**1.136**	**194**
220 x 8	349	1,71	32,3	33,9	35,5	37,0	40,2	43,3	46,5	35,20	10.200	17,02	1.420	6,35	7,7	413.000	*298*	**827**	**141**	*243*	**1.250**	**213**
200 x 10	353	1,64	36,1	37,7	39,2	40,8	43,9	47,1	50,2	40,0	11.800	17,18	1.330	5,77	13,5	392.000	*271*	**940**	**161**	*220*	**1.420**	**244**
220 x 10	353	1,72	39,2	40,8	42,4	44,0	47,1	50,2	53,4	44,00	12.900	17,12	1.770	6,34	14,8	522.000	*298*	**1.034**	**177**	*242*	**1.562**	**268**
250 x 10	353	1,84	44,0	45,5	47,1	48,7	51,8	54,9	58,1	50,00	14.700	17,15	2.600	7,21	16,8	766.000	*339*	**1.175**	**202**	*275*	**1.775**	**304**
200 x 12	357	1,65	42,4	44,0	45,5	47,1	50,2	53,4	56,5	48,0	14.300	17,26	1.600	5,77	23,2	476.000	*271*	**1.128**	**195**	*221*	**1.704**	**294**
220 x 12	357	1,73	46,2	47,7	49,3	50,9	54,0	57,1	60,3	52,80	15.700	17,24	2.130	6,35	25,5	634.000	*298*	**1.241**	**214**	*243*	**1.874**	**323**
250 x 12	357	1,85	51,8	53,4	54,9	56,5	59,6	62,8	65,9	60,00	17.900	17,27	3.130	7,22	29,0	930.000	*339*	**1.410**	**243**	*276*	**2.130**	**367**
300 x 12	357	2,05	61,2	62,8	64,4	65,9	69,1	72,2	75,3	72,00	21.400	17,24	5.400	8,66	34,7	1.607.000	*407*	**1.692**	**292**	*331*	**2.556**	**441**
220 x 15	363	1,74	56,5	58,1	59,7	61,2	64,4	67,5	70,6	66,0	20.000	17,41	2.660	6,35	49,7	806.000	*298*	**1.551**	**270**	*242*	**2.343**	**408**
250 x 15	363	1,86	63,6	65,1	66,7	68,3	71,4	74,6	77,7	75,0	22.700	17,40	3.910	7,22	56,4	1.183.000	*339*	**1.763**	**307**	*276*	**2.663**	**463**
300 x 15	363	2,06	75,4	76,9	78,5	80,1	83,2	86,3	89,5	90,0	27.200	17,38	6.750	8,66	67,7	2.044.000	*407*	**2.115**	**368**	*331*	**3.195**	**556**
350 x 15	363	2,26	87,1	88,7	90,3	91,8	95,0	98,1	101,2	105,0	31.800	17,40	10.720	10,10	78,9	3.245.000	*474*	**2.468**	**429**	*386*	**3.728**	**649**
250 x 20	373	1,88	83,2	84,8	86,3	87,9	91,0	94,2	97,3	100,0	31.200	17,66	5.210	7,22	133,5	1.623.000	*339*	**2.350**	**415**	*276*	**3.550**	**627**
300 x 20	373	2,08	98,9	100,5	102,0	103,6	106,7	109,9	113,0	120,0	37.400	17,65	9.000	8,66	160,2	2.804.000	*407*	**2.820**	**498**	*331*	**4.260**	**752**
350 x 20	373	2,28	114,6	116,2	117,7	119,3	122,4	125,6	128,7	140,0	43.600	17,65	14.290	10,10	186,8	4.452.000	*474*	**3.290**	**581**	*386*	**4.970**	**877**
400 x 20	373	2,48	130,3	131,9	133,4	135,0	138,1	141,3	144,4	160,0	49.800	17,64	21.330	11,55	213,5	6.646.000	*542*	**3.760**	**664**	*441*	**5.680**	**1.003**
300 x 25	383	2,10	122,5	124,0	125,6	127,2	130,3	133,4	136,6	150,0	48.100	17,91	11.250	8,66	312,7	3.605.000	*407*	**3.525**	**631**	*331*	**5.325**	**953**
350 x 25	383	2,30	142,1	143,6	145,2	146,8	149,9	153,1	156,2	175,0	56.100	17,90	17.860	10,10	364,8	5.724.000	*474*	**4.113**	**736**	*386*	**6.213**	**1.112**
400 x 25	383	2,50	161,7	163,3	164,8	166,4	169,5	172,7	175,8	200,0	64.100	17,90	26.670	11,55	416,8	8.544.000	*542*	**4.700**	**841**	*441*	**7.100**	**1.271**
430 x 25	383	2,62	173,5	175,0	176,6	178,2	181,3	184,5	187,6	215,0	68.900	17,90	33.130	12,41	448,1	10.615.000	*583*	**5.053**	**904**	*474*	**7.633**	**1.366**
450 x 25	383	2,70	181,3	182,9	184,5	186,0	189,2	192,3	195,4	225,0	72.100	17,90	37.970	12,99	468,9	12.166.000	*610*	**5.288**	**946**	*496*	**7.988**	**1.430**
350 x 30	393	2,32	169,6	171,1	172,7	174,3	177,4	180,5	183,7	210,0	69.200	18,15	21.440	10,10	630,2	7.062.000	*474*	**4.935**	**896**	*386*	**7.455**	**1.353**
400 x 30	393	2,52	193,1	194,7	196,2	197,8	200,9	204,1	207,2	240,0	79.100	18,15	32.000	11,55	720,2	10.542.000	*542*	**5.640**	**1.024**	*441*	**8.520**	**1.546**
430 x 30	393	2,64	207,2	208,8	210,4	211,9	215,1	218,2	221,4	258,0	85.000	18,15	39.750	12,41	774,2	13.096.000	*583*	**6.063**	**1.100**	*474*	**9.159**	**1.662**
450 x 30	393	2,72	216,7	218,2	219,8	221,4	224,5	227,6	230,8	270,0	88.900	18,15	45.560	12,99	810,2	15.009.000	*610*	**6.345**	**1.152**	*496*	**9.585**	**1.740**

N_{Rk} and M_{Rk} when fully stabilizied by lateral supports
Other flange dimensions are available

WT 500

Dimensions			weight / m							Cross Section Values							S235			S355		
$b_g \times t_g$	H	U	WT0	WTA	WTB	WTC	WTD	WTE	WTF	$2\,A_g$	I_y	i_y	I_z	i_z	I_t	I_w	c_{lim}	N_{Rk}	M_{Rk}	c_{lim}	N_{Rk}	M_{Rk}
mm	mm	m^2/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	cm^2	cm^4	cm	cm^4	cm	cm^4	cm^6	cm	kN	kNm	cm	kN	kNm
160 x 6	512	1,86	22,1	24,5	26,8	29,2	33,9	38,6	43,3	19,2	12.300	25,31	410	4,62	2,6	262.000	*217*	**451**	**114**	*177*	**682**	**172**
180 x 6	512	1,94	24,0	26,4	28,7	31,1	35,8	40,5	45,2	21,60	13.800	25,28	580	5,18	2,9	373.000	*243*	**508**	**128**	*198*	**767**	**194**
200 x 6	512	2,02	25,9	28,3	30,6	33,0	37,7	42,4	47,1	24,00	15.400	25,33	800	5,77	3,1	512.000	*271*	**564**	**143**	*221*	**852**	**216**
160 x 8	516	1,87	27,2	29,5	31,9	34,2	38,9	43,6	48,4	25,6	16.500	25,39	550	4,64	5,7	352.000	*218*	**602**	**153**	*177*	**909**	**231**
180 x 8	516	1,95	29,7	32,0	34,4	36,7	41,4	46,2	50,9	28,80	18.600	25,41	780	5,20	6,4	502.000	*244*	**677**	**172**	*198*	**1.022**	**260**
200 x 8	516	2,03	32,2	34,5	36,9	39,3	44,0	48,7	53,4	32,00	20.600	25,37	1.070	5,78	7,1	688.000	*271*	**752**	**191**	*221*	**1.136**	**289**
220 x 8	516	2,11	34,7	37,1	39,4	41,8	46,5	51,2	55,9	35,20	22.700	25,39	1.420	6,35	7,8	916.000	*298*	**827**	**210**	*243*	**1.250**	**317**
200 x 10	520	2,04	38,5	40,8	43,2	45,5	50,2	55,0	59,7	40,0	26.000	25,50	1.330	5,77	13,6	867.000	*271*	**940**	**240**	*220*	**1.420**	**362**
220 x 10	520	2,12	41,6	44,0	46,3	48,7	53,4	58,1	62,8	44,00	28.600	25,50	1.770	6,34	14,9	1.154.000	*298*	**1.034**	**264**	*242*	**1.562**	**398**
250 x 10	520	2,24	46,3	48,7	51,0	53,4	58,1	62,8	67,5	50,00	32.500	25,50	2.600	7,21	16,9	1.693.000	*339*	**1.175**	**300**	*275*	**1.775**	**453**
200 x 12	524	2,05	44,7	47,1	49,5	51,8	56,5	61,2	65,9	48,0	31.500	25,62	1.600	5,77	23,3	1.049.000	*271*	**1.128**	**289**	*221*	**1.704**	**436**
220 x 12	524	2,13	48,5	50,9	53,2	55,6	60,3	65,0	69,7	52,80	34.600	25,60	2.130	6,35	25,6	1.396.000	*298*	**1.241**	**318**	*243*	**1.874**	**480**
250 x 12	524	2,25	54,2	56,5	58,9	61,2	65,9	70,7	75,4	60,00	39.300	25,59	3.130	7,22	29,1	2.048.000	*339*	**1.410**	**361**	*276*	**2.130**	**545**
300 x 12	524	2,45	63,6	65,9	68,3	70,7	75,4	80,1	84,8	72,00	47.200	25,60	5.400	8,66	34,8	3.539.000	*407*	**1.692**	**433**	*331*	**2.556**	**654**
220 x 15	530	2,14	58,9	61,2	63,6	65,9	70,7	75,4	80,1	66,0	43.800	25,76	2.660	6,35	49,8	1.765.000	*298*	**1.551**	**399**	*242*	**2.343**	**603**
250 x 15	530	2,26	65,9	68,3	70,7	73,0	77,7	82,4	87,1	75,0	49.700	25,74	3.910	7,22	56,5	2.590.000	*339*	**1.763**	**454**	*276*	**2.663**	**686**
300 x 15	530	2,46	77,7	80,1	82,4	84,8	89,5	94,2	98,9	90,0	59.700	25,76	6.750	8,66	67,8	4.476.000	*407*	**2.115**	**545**	*331*	**3.195**	**823**
350 x 15	530	2,66	89,5	91,8	94,2	96,6	101,3	106,0	110,7	105,0	69.600	25,75	10.720	10,10	79,0	7.107.000	*474*	**2.468**	**635**	*386*	**3.728**	**960**
250 x 20	540	2,28	85,6	87,9	90,3	92,6	97,3	102,1	106,8	100,0	67.600	26,00	5.210	7,22	133,6	3.521.000	*339*	**2.350**	**611**	*276*	**3.550**	**923**
300 x 20	540	2,48	101,3	103,6	106,0	108,3	113,0	117,8	122,5	120,0	81.100	26,00	9.000	8,66	160,3	6.084.000	*407*	**2.820**	**733**	*331*	**4.260**	**1.108**
350 x 20	540	2,68	117,0	119,3	121,7	124,0	128,7	133,5	138,2	140,0	94.600	25,99	14.290	10,10	186,9	9.661.000	*474*	**3.290**	**855**	*386*	**4.970**	**1.292**
400 x 20	540	2,88	132,7	135,0	137,4	139,7	144,4	149,2	153,9	160,0	108.200	26,00	21.330	11,55	213,6	14.421.000	*542*	**3.760**	**978**	*441*	**5.680**	**1.477**
300 x 25	550	2,50	124,8	127,2	129,5	131,9	136,6	141,3	146,0	150,0	103.400	26,26	11.250	8,66	312,8	7.752.000	*407*	**3.525**	**925**	*331*	**5.325**	**1.398**
350 x 25	550	2,70	144,4	146,8	149,2	151,5	156,2	160,9	165,6	175,0	120.600	26,25	17.860	10,10	364,8	12.310.000	*474*	**4.113**	**1.080**	*386*	**6.213**	**1.631**
400 x 25	550	2,90	164,1	166,4	168,8	171,1	175,8	180,6	185,3	200,0	137.800	26,25	26.670	11,55	416,9	18.375.000	*542*	**4.700**	**1.234**	*441*	**7.100**	**1.864**
430 x 25	550	3,02	175,8	178,2	180,6	182,9	187,6	192,3	197,0	215,0	148.100	26,25	33.130	12,41	448,2	22.827.000	*583*	**5.053**	**1.326**	*474*	**7.633**	**2.004**
450 x 25	550	3,10	183,7	186,0	188,4	190,8	195,5	200,2	204,9	225,0	155.000	26,25	37.970	12,99	469,0	26.163.000	*610*	**5.288**	**1.388**	*496*	**7.988**	**2.097**
350 x 30	560	2,72	171,9	174,3	176,6	179,0	183,7	188,4	193,1	210,0	147.500	26,50	21.440	10,10	630,3	15.054.000	*474*	**4.935**	**1.308**	*386*	**7.455**	**1.976**
400 x 30	560	2,92	195,5	197,8	200,2	202,5	207,2	212,0	216,7	240,0	168.500	26,50	32.000	11,55	720,3	22.472.000	*542*	**5.640**	**1.495**	*441*	**8.520**	**2.258**
430 x 30	560	3,04	209,6	212,0	214,3	216,7	221,4	226,1	230,8	258,0	181.200	26,50	39.750	12,41	774,3	27.917.000	*583*	**6.063**	**1.607**	*474*	**9.159**	**2.427**
450 x 30	560	3,12	219,0	221,4	223,7	226,1	230,8	235,5	240,2	270,0	189.600	26,50	45.560	12,99	810,3	31.996.000	*610*	**6.345**	**1.681**	*496*	**9.585**	**2.540**

N_{Rk} and M_{Rk} when fully stabilizied by lateral supports

Other flange dimensions are available

WT 625

Dimensions			weight / m							Cross Section Values							S235			S355		
$b_g \times t_g$	H	U	WT0	WTA	WTB	WTC	WTD	WTE	WTF	2 Ag	I_y	i_y	I_z	i_z	I_t	I_w	c lim	N_{Rk}	M_{Rk}	c lim	N_{Rk}	M_{Rk}
mm	mm	m^2/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	cm^2	cm^4	cm	cm^4	cm	cm^4	cm^6	cm	kN	kNm	cm	kN	kNm
160 x 6	637	2,16	23,9	26,8	29,8	32,7	38,6	44,5	50,4	19,2	19.100	31,54	410	4,62	2,6	408.000	*217*	**451**	**142**	*177*	**682**	**215**
180 x 6	637	2,24	25,8	28,7	31,7	34,6	40,5	46,4	52,3	21,60	21.500	31,55	580	5,18	2,9	581.000	*243*	**508**	**160**	*198*	**767**	**242**
200 x 6	637	2,32	27,7	30,6	33,6	36,5	42,4	48,3	54,2	24,00	23.900	31,56	800	5,77	3,2	796.000	*271*	**564**	**178**	*221*	**852**	**269**
160 x 8	641	2,17	28,9	31,9	34,8	37,8	43,6	49,5	55,4	25,6	25.600	31,62	550	4,64	5,8	547.000	*218*	**602**	**190**	*177*	**909**	**288**
180 x 8	641	2,25	31,4	34,4	37,3	40,3	46,2	52,0	57,9	28,80	28.800	31,62	780	5,20	6,5	779.000	*244*	**677**	**214**	*199*	**1.022**	**324**
200 x 8	641	2,33	34,0	36,9	39,8	42,8	48,7	54,6	60,4	32,00	32.100	31,67	1.070	5,78	7,2	1.069.000	*271*	**752**	**238**	*221*	**1.136**	**360**
220 x 8	641	2,41	36,5	39,4	42,4	45,3	51,2	57,1	63,0	35,20	35.300	31,67	1.420	6,35	7,8	1.422.000	*298*	**827**	**262**	*243*	**1.250**	**395**
200 x 10	645	2,34	40,2	43,2	46,1	49,1	55,0	60,8	66,7	40,0	40.300	31,74	1.330	5,77	13,7	1.344.000	*271*	**940**	**298**	*220*	**1.420**	**451**
220 x 10	645	2,42	43,4	46,3	49,3	52,2	58,1	64,0	69,9	44,00	44.400	31,77	1.770	6,34	15,0	1.789.000	*298*	**1.034**	**328**	*242*	**1.562**	**496**
250 x 10	645	2,54	48,1	51,0	54,0	56,9	62,8	68,7	74,6	50,00	50.400	31,75	2.600	7,21	17,0	2.625.000	*339*	**1.175**	**373**	*275*	**1.775**	**564**
200 x 12	649	2,35	46,5	49,5	52,4	55,3	61,2	67,1	73,0	48,0	48.700	31,85	1.600	5,77	23,4	1.623.000	*271*	**1.128**	**359**	*221*	**1.704**	**543**
220 x 12	649	2,43	50,3	53,2	56,2	59,1	65,0	70,9	76,8	52,80	53.600	31,86	2.130	6,35	25,7	2.160.000	*298*	**1.241**	**395**	*243*	**1.874**	**597**
250 x 12	649	2,55	55,9	58,9	61,8	64,8	70,7	76,5	82,4	60,00	60.900	31,86	3.130	7,22	29,1	3.170.000	*339*	**1.410**	**449**	*276*	**2.130**	**678**
300 x 12	649	2,75	65,4	68,3	71,2	74,2	80,1	86,0	91,8	72,00	73.000	31,84	5.400	8,66	34,9	5.478.000	*407*	**1.692**	**539**	*331*	**2.556**	**814**
220 x 15	655	2,44	60,6	63,6	66,5	69,5	75,4	81,2	87,1	66,0	67.600	32,00	2.660	6,35	49,8	2.726.000	*298*	**1.551**	**496**	*242*	**2.343**	**750**
250 x 15	655	2,56	67,7	70,7	73,6	76,5	82,4	88,3	94,2	75,0	76.800	32,00	3.910	7,22	56,6	4.000.000	*339*	**1.763**	**564**	*276*	**2.663**	**852**
300 x 15	655	2,76	79,5	82,4	85,4	88,3	94,2	100,1	106,0	90,0	92.200	32,01	6.750	8,66	67,8	6.912.000	*407*	**2.115**	**677**	*331*	**3.195**	**1.022**
350 x 15	655	2,96	91,3	94,2	97,1	100,1	106,0	111,9	117,8	105,0	107.500	32,00	10.720	10,10	79,1	10.976.000	*474*	**2.468**	**790**	*386*	**3.728**	**1.193**
250 x 20	665	2,58	87,3	90,3	93,2	96,2	102,1	107,9	113,8	100,0	104.000	32,25	5.210	7,22	133,7	5.417.000	*339*	**2.350**	**758**	*276*	**3.550**	**1.145**
300 x 20	665	2,78	103,0	106,0	108,9	111,9	117,8	123,6	129,5	120,0	124.800	32,25	9.000	8,66	160,3	9.361.000	*407*	**2.820**	**909**	*331*	**4.260**	**1.374**
350 x 20	665	2,98	118,7	121,7	124,6	127,6	133,5	139,3	145,2	140,0	145.600	32,25	14.290	10,10	187,0	14.864.000	*474*	**3.290**	**1.061**	*386*	**4.970**	**1.603**
400 x 20	665	3,18	134,4	137,4	140,3	143,3	149,2	155,0	160,9	160,0	166.400	32,25	21.330	11,55	213,7	22.188.000	*542*	**3.760**	**1.213**	*441*	**5.680**	**1.832**
300 x 25	675	2,80	126,6	129,5	132,5	135,4	141,3	147,2	153,1	150,0	158.400	32,50	11.250	8,66	312,8	11.883.000	*407*	**3.525**	**1.146**	*331*	**5.325**	**1.731**
350 x 25	675	3,00	146,2	149,2	152,1	155,0	160,9	166,8	172,7	175,0	184.800	32,50	17.860	10,10	364,9	18.869.000	*474*	**4.113**	**1.337**	*386*	**6.213**	**2.019**
400 x 25	675	3,20	165,8	168,8	171,7	174,7	180,6	186,4	192,3	200,0	211.300	32,50	26.670	11,55	417,0	28.167.000	*542*	**4.700**	**1.528**	*441*	**7.100**	**2.308**
430 x 25	675	3,32	177,6	180,6	183,5	186,4	192,3	198,2	204,1	215,0	227.100	32,50	33.130	12,41	448,2	34.991.000	*583*	**5.053**	**1.642**	*474*	**7.633**	**2.481**
450 x 25	675	3,40	185,5	188,4	191,3	194,3	200,2	206,1	212,0	225,0	237.700	32,50	37.970	12,99	469,1	40.104.000	*610*	**5.288**	**1.718**	*496*	**7.988**	**2.596**
350 x 30	685	3,02	173,7	176,6	179,6	182,5	188,4	194,3	200,2	210,0	225.200	32,75	21.440	10,10	630,3	22.993.000	*474*	**4.935**	**1.616**	*386*	**7.455**	**2.442**
400 x 30	685	3,22	197,2	200,2	203,1	206,1	212,0	217,8	223,7	240,0	257.400	32,75	32.000	11,55	720,3	34.322.000	*542*	**5.640**	**1.847**	*441*	**8.520**	**2.790**
430 x 30	685	3,34	211,4	214,3	217,2	220,2	226,1	232,0	237,9	258,0	276.700	32,75	39.750	12,41	774,3	42.638.000	*583*	**6.063**	**1.986**	*474*	**9.159**	**3.000**
450 x 30	685	3,42	220,8	223,7	226,7	229,6	235,5	241,4	247,3	270,0	289.600	32,75	45.560	12,99	810,3	48.869.000	*610*	**6.345**	**2.078**	*496*	**9.585**	**3.139**

N_{Rk} and M_{Rk} when fully stabilizied by lateral supports
Other flange dimensions are available

WT 750

Dimensions			weight / m							Cross Section Values							S235			S355		
$b_g \times t_g$	H	U	WT0	WTA	WTB	WTC	WTD	WTE	WTF	$2\,A_g$	I_y	i_y	I_z	i_z	I_t	I_w	c_{lim}	N_{Rk}	M_{Rk}	c_{lim}	N_{Rk}	M_{Rk}
mm	mm	m²/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	cm²	cm⁴	cm	cm⁴	cm	cm⁴	cm⁶	cm	kN	kNm	cm	kN	kNm
160 x 6	762	2,46	25,7	29,2	32,7	36,3	43,3	50,4	57,5	19,2	27.400	37,78	410	4,62	2,7	585.000	217	451	171	177	682	258
180 x 6	762	2,54	27,6	31,1	34,6	38,2	45,2	52,3	59,3	21,60	30.900	37,82	580	5,18	3,0	833.000	243	508	192	198	767	290
200 x 6	762	2,62	29,4	33,0	36,5	40,0	47,1	54,2	61,2	24,00	34.300	37,80	800	5,77	3,3	1.143.000	271	564	213	221	852	322
160 x 8	766	2,47	30,7	34,2	37,8	41,3	48,4	55,4	62,5	25,6	36.800	37,91	550	4,64	5,9	784.000	218	602	228	177	909	344
180 x 8	766	2,55	33,2	36,7	40,3	43,8	50,9	57,9	65,0	28,80	41.400	37,91	780	5,20	6,5	1.117.000	244	677	257	199	1.022	387
200 x 8	766	2,63	35,7	39,3	42,8	46,3	53,4	60,4	67,5	32,00	46.000	37,91	1.070	5,78	7,2	1.532.000	271	752	285	221	1.136	431
220 x 8	766	2,71	38,2	41,8	45,3	48,8	55,9	63,0	70,0	35,20	50.600	37,91	1.420	6,35	7,9	2.039.000	298	827	314	243	1.250	474
200 x 10	770	2,64	42,0	45,5	49,1	52,6	59,7	66,7	73,8	40,0	57.800	38,01	1.330	5,77	13,7	1.925.000	271	940	357	220	1.420	540
220 x 10	770	2,72	45,1	48,7	52,2	55,7	62,8	69,9	76,9	44,00	63.500	37,99	1.770	6,34	15,1	2.563.000	298	1.034	393	242	1.562	594
250 x 10	770	2,84	49,8	53,4	56,9	60,4	67,5	74,6	81,6	50,00	72.200	38,00	2.600	7,21	17,1	3.760.000	339	1.175	447	275	1.775	675
200 x 12	774	2,65	48,3	51,8	55,3	58,9	65,9	73,0	80,1	48,0	69.700	38,11	1.600	5,77	23,4	2.323.000	271	1.128	430	221	1.704	649
220 x 12	774	2,73	52,0	55,6	59,1	62,6	69,7	76,8	83,8	52,80	76.600	38,09	2.130	6,35	25,7	3.091.000	298	1.241	473	243	1.874	714
250 x 12	774	2,85	57,7	61,2	64,8	68,3	75,4	82,4	89,5	60,00	87.100	38,10	3.130	7,22	29,2	4.536.000	339	1.410	537	276	2.130	812
300 x 12	774	3,05	67,1	70,7	74,2	77,7	84,8	91,8	98,9	72,00	104.500	38,10	5.400	8,66	35,0	7.839.000	407	1.692	645	331	2.556	974
220 x 15	780	2,74	62,4	65,9	69,5	73,0	80,1	87,1	94,2	66,0	96.600	38,26	2.660	6,35	49,9	3.895.000	298	1.551	593	242	2.343	896
250 x 15	780	2,86	69,5	73,0	76,5	80,1	87,1	94,2	101,3	75,0	109.700	38,24	3.910	7,22	56,6	5.715.000	339	1.763	674	276	2.663	1.018
300 x 15	780	3,06	81,2	84,8	88,3	91,8	98,9	106,0	113,0	90,0	131.700	38,25	6.750	8,66	67,9	9.876.000	407	2.115	809	331	3.195	1.222
350 x 15	780	3,26	93,0	96,6	100,1	103,6	110,7	117,8	124,8	105,0	153.600	38,25	10.720	10,10	79,1	15.682.000	474	2.468	944	386	3.728	1.426
250 x 20	790	2,88	89,1	92,6	96,2	99,7	106,8	113,8	120,9	100,0	148.200	38,50	5.210	7,22	133,7	7.720.000	339	2.350	905	276	3.550	1.367
300 x 20	790	3,08	104,8	108,3	111,9	115,4	122,5	129,5	136,6	120,0	177.900	38,50	9.000	8,66	160,4	13.340.000	407	2.820	1.086	331	4.260	1.640
350 x 20	790	3,28	120,5	124,0	127,6	131,1	138,2	145,2	152,3	140,0	207.500	38,50	14.290	10,10	187,1	21.184.000	474	3.290	1.267	386	4.970	1.913
400 x 20	790	3,48	136,2	139,7	143,3	146,8	153,9	160,9	168,0	160,0	237.200	38,50	21.330	11,55	213,7	31.621.000	542	3.760	1.448	441	5.680	2.187
300 x 25	800	3,10	128,3	131,9	135,4	138,9	146,0	153,1	160,1	150,0	225.200	38,75	11.250	8,66	312,9	16.893.000	407	3.525	1.366	331	5.325	2.063
350 x 25	800	3,30	148,0	151,5	155,0	158,6	165,6	172,7	179,8	175,0	262.800	38,75	17.860	10,10	365,0	26.825.000	474	4.113	1.594	386	6.213	2.407
400 x 25	800	3,50	167,6	171,1	174,7	178,2	185,3	192,3	199,4	200,0	300.300	38,75	26.670	11,55	417,1	40.042.000	542	4.700	1.821	441	7.100	2.751
430 x 25	800	3,62	179,4	182,9	186,4	190,0	197,0	204,1	211,2	215,0	322.800	38,75	33.130	12,41	448,3	49.744.000	583	5.053	1.958	474	7.633	2.958
450 x 25	800	3,70	187,2	190,8	194,3	197,8	204,9	212,0	219,0	225,0	337.900	38,75	37.970	12,99	469,1	57.012.000	610	5.288	2.049	496	7.988	3.095
350 x 30	810	3,32	175,4	179,0	182,5	186,0	193,1	200,2	207,2	210,0	319.400	39,00	21.440	10,10	630,4	32.606.000	474	4.935	1.925	386	7.455	2.907
400 x 30	810	3,52	199,0	202,5	206,1	209,6	216,7	223,7	230,8	240,0	365.000	39,00	32.000	11,55	720,4	48.672.000	542	5.640	2.200	441	8.520	3.323
430 x 30	810	3,64	213,1	216,7	220,2	223,7	230,8	237,9	244,9	258,0	392.400	39,00	39.750	12,41	774,4	60.465.000	583	6.063	2.365	474	9.159	3.572
450 x 30	810	3,72	222,5	226,1	229,6	233,1	240,2	247,3	254,3	270,0	410.700	39,00	45.560	12,99	810,4	69.301.000	610	6.345	2.475	496	9.585	3.738

N_{Rk} and M_{Rk} when fully stabilizied by lateral supports

Other flange dimensions are available

WT 1000

Dimensions			weight / m							Cross Section Values							S235			S355		
$b_g \times t_g$	H	U	WT0	WTA	WTB	WTC	WTD	WTE	WTF	$2\,A_g$	I_y	i_y	I_z	i_z	I_t	I_w	c_{lim}	N_{Rk}	M_{Rk}	c_{lim}	N_{Rk}	M_{Rk}
mm	mm	m^2/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	cm^2	cm^4	cm	cm^4	cm	cm^4	cm^6	cm	kN	kNm	cm	kN	kNm
160 x 6	1012	3,06	29,2	33,9	38,6	43,3	52,8	62,2	71,6	19,2	48.600	50,31	410	4,62	2,8	1.036.000	*217*	451	227	*177*	682	343
180 x 6	1012	3,14	31,1	35,8	40,5	45,2	54,6	64,1	73,5	21,60	54.600	50,28	580	5,18	3,1	1.476.000	*243*	508	255	*198*	767	386
200 x 6	1012	3,22	33,0	37,7	42,4	47,1	56,5	65,9	75,4	24,00	60.700	50,29	800	5,77	3,4	2.024.000	*271*	564	284	*221*	852	429
160 x 8	1016	3,07	34,2	38,9	43,6	48,4	57,8	67,2	76,6	25,6	65.000	50,39	550	4,64	6,0	1.387.000	*218*	602	303	*177*	909	458
180 x 8	1016	3,15	36,7	41,4	46,2	50,9	60,3	69,7	79,1	28,80	73.200	50,41	780	5,20	6,7	1.975.000	*244*	677	341	*198*	1.022	515
200 x 8	1016	3,23	39,3	44,0	48,7	53,4	62,8	72,2	81,6	32,00	81.300	50,40	1.070	5,78	7,3	2.710.000	*271*	752	379	*221*	1.136	573
220 x 8	1016	3,31	41,8	46,5	51,2	55,9	65,3	74,7	84,2	35,20	89.400	50,40	1.420	6,35	8,0	3.606.000	*298*	827	417	*243*	1.250	630
200 x 10	1020	3,24	45,5	50,2	55,0	59,7	69,1	78,5	87,9	40,0	102.000	50,50	1.330	5,77	13,9	3.400.000	*271*	940	475	*220*	1.420	717
220 x 10	1020	3,32	48,7	53,4	58,1	62,8	72,2	81,6	91,1	44,00	112.200	50,50	1.770	6,34	15,2	4.526.000	*298*	1.034	522	*242*	1.562	789
250 x 10	1020	3,44	53,4	58,1	62,8	67,5	76,9	86,4	95,8	50,00	127.500	50,50	2.600	7,21	17,2	6.641.000	*339*	1.175	593	*275*	1.775	896
200 x 12	1024	3,25	51,8	56,5	61,2	65,9	75,4	84,8	94,2	48,0	122.900	50,60	1.600	5,77	23,6	4.097.000	*271*	1.128	571	*221*	1.704	862
220 x 12	1024	3,33	55,6	60,3	65,0	69,7	79,1	88,5	98,0	52,80	135.200	50,60	2.130	6,35	25,9	5.453.000	*298*	1.241	628	*243*	1.874	948
250 x 12	1024	3,45	61,2	65,9	70,7	75,4	84,8	94,2	103,6	60,00	153.600	50,60	3.130	7,22	29,3	8.001.000	*339*	1.410	713	*276*	2.130	1.078
300 x 12	1024	3,65	70,7	75,4	80,1	84,8	94,2	103,6	113,0	72,00	184.300	50,59	5.400	8,66	35,1	13.826.000	*407*	1.692	856	*331*	2.556	1.293
220 x 15	1030	3,34	65,9	70,7	75,4	80,1	89,5	98,9	108,3	66,0	170.000	50,75	2.660	6,35	50,0	6.856.000	*298*	1.551	787	*242*	2.343	1.189
250 x 15	1030	3,46	73,0	77,7	82,4	87,1	96,6	106,0	115,4	75,0	193.200	50,75	3.910	7,22	56,8	10.061.000	*339*	1.763	894	*276*	2.663	1.351
300 x 15	1030	3,66	84,8	89,5	94,2	98,9	108,3	117,8	127,2	90,0	231.800	50,75	6.750	8,66	68,0	17.385.000	*407*	2.115	1.073	*331*	3.195	1.621
350 x 15	1030	3,86	96,6	101,3	106,0	110,7	120,1	129,5	138,9	105,0	270.400	50,75	10.720	10,10	79,3	27.607.000	*474*	2.468	1.252	*386*	3.728	1.892
250 x 20	1040	3,48	92,6	97,3	102,1	106,8	116,2	125,6	135,0	100,0	260.100	51,00	5.210	7,22	133,9	13.547.000	*339*	2.350	1.199	*276*	3.550	1.811
300 x 20	1040	3,68	108,3	113,0	117,8	122,5	131,9	141,3	150,7	120,0	312.100	51,00	9.000	8,66	160,5	23.409.000	*407*	2.820	1.438	*331*	4.260	2.173
350 x 20	1040	3,88	124,0	128,7	133,5	138,2	147,6	157,0	166,4	140,0	364.100	51,00	14.290	10,10	187,2	37.173.000	*474*	3.290	1.678	*386*	4.970	2.535
400 x 20	1040	4,08	139,7	144,4	149,2	153,9	163,3	172,7	182,1	160,0	416.200	51,00	21.330	11,55	213,9	55.488.000	*542*	3.760	1.918	*441*	5.680	2.897
300 x 25	1050	3,70	131,9	136,6	141,3	146,0	155,4	164,9	174,3	150,0	394.000	51,25	11.250	8,66	313,0	29.549.000	*407*	3.525	1.807	*331*	5.325	2.729
350 x 25	1050	3,90	151,5	156,2	160,9	165,6	175,1	184,5	193,9	175,0	459.600	51,25	17.860	10,10	365,1	46.922.000	*474*	4.113	2.108	*386*	6.213	3.184
400 x 25	1050	4,10	171,1	175,8	180,6	185,3	194,7	204,1	213,5	200,0	525.300	51,25	26.670	11,55	417,2	70.042.000	*542*	4.700	2.409	*441*	7.100	3.639
430 x 25	1050	4,22	182,9	187,6	192,3	197,0	206,5	215,9	225,3	215,0	564.700	51,25	33.130	12,41	448,4	87.013.000	*583*	5.053	2.589	*474*	7.633	3.912
450 x 25	1050	4,30	190,8	195,5	200,2	204,9	214,3	223,7	233,1	225,0	591.000	51,25	37.970	12,99	469,3	99.727.000	*610*	5.288	2.710	*496*	7.988	4.094
350 x 30	1060	3,92	179,0	183,7	188,4	193,1	202,5	212,0	221,4	210,0	557.000	51,50	21.440	10,10	630,5	56.858.000	*474*	4.935	2.542	*386*	7.455	3.839
400 x 30	1060	4,12	202,5	207,2	212,0	216,7	226,1	235,5	244,9	240,0	636.500	51,50	32.000	11,55	720,5	84.872.000	*542*	5.640	2.905	*441*	8.520	4.388
430 x 30	1060	4,24	216,7	221,4	226,1	230,8	240,2	249,6	259,1	258,0	684.300	51,50	39.750	12,41	774,5	105.436.000	*583*	6.063	3.122	*474*	9.159	4.717
450 x 30	1060	4,32	226,1	230,8	235,5	240,2	249,6	259,1	268,5	270,0	716.100	51,50	45.560	12,99	810,5	120.843.000	*610*	6.345	3.268	*496*	9.585	4.936

WT 1250

Dimensions			weight / m							Cross Section Values							S235			S355		
$b_g \times t_g$	H	U	WT0	WTA	WTB	WTC	WTD	WTE	WTF	$2\,A_g$	I_y	i_y	I_z	i_z	I_t	I_w	c_{lim}	N_{Rk}	M_{Rk}	c_{lim}	N_{Rk}	M_{Rk}
mm	mm	m^2/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	cm^2	cm^4	cm	cm^4	cm	cm^4	cm^6	cm	kN	kNm	cm	kN	kNm
160 x 6	1262	3,66		38,6	44,5	50,4	62,2	73,9	85,7	19,2	75.700	62,79	410	4,62	3,0	1.615.000	*217*	**451**	**283**	*177*	**682**	**428**
180 x 6	1262	3,74		40,5	46,4	52,3	64,1	75,8	87,6	21,60	85.200	62,80	580	5,18	3,2	2.300.000	*243*	**508**	**319**	*198*	**767**	**482**
200 x 6	1262	3,82		42,4	48,3	54,2	65,9	77,7	89,5	24,00	94.700	62,82	800	5,77	3,5	3.155.000	*271*	**564**	**354**	*221*	**852**	**535**
160 x 8	1266	3,67		43,6	49,5	55,4	67,2	79,0	90,7	25,6	101.300	62,90	550	4,64	6,1	2.161.000	*218*	**602**	**378**	*177*	**909**	**572**
180 x 8	1266	3,75		46,2	52,0	57,9	69,7	81,5	93,3	28,80	113.900	62,89	780	5,20	6,8	3.077.000	*244*	**677**	**426**	*199*	**1.022**	**643**
200 x 8	1266	3,83		48,7	54,6	60,4	72,2	84,0	95,8	32,00	126.600	62,90	1.070	5,78	7,5	4.220.000	*271*	**752**	**473**	*221*	**1.136**	**715**
220 x 8	1266	3,91		51,2	57,1	63,0	74,7	86,5	98,3	35,20	139.300	62,91	1.420	6,35	8,2	5.617.000	*298*	**827**	**520**	*243*	**1.250**	**786**
200 x 10	1270	3,84		55,0	60,8	66,7	78,5	90,3	102,1	40,0	158.800	63,01	1.330	5,77	14,0	5.292.000	*271*	**940**	**592**	*220*	**1.420**	**895**
220 x 10	1270	3,92		58,1	64,0	69,9	81,6	93,4	105,2	44,00	174.600	62,99	1.770	6,34	15,3	7.044.000	*298*	**1.034**	**651**	*243*	**1.562**	**984**
250 x 10	1270	4,04		62,8	68,7	74,6	86,4	98,1	109,9	50,00	198.500	63,01	2.600	7,21	17,3	10.336.000	*339*	**1.175**	**740**	*275*	**1.775**	**1.118**
200 x 12	1274	3,85		61,2	67,1	73,0	84,8	96,6	108,3	48,0	191.100	63,10	1.600	5,77	23,7	6.371.000	*271*	**1.128**	**712**	*221*	**1.704**	**1.075**
220 x 12	1274	3,93		65,0	70,9	76,8	88,5	100,3	112,1	52,80	210.200	63,10	2.130	6,35	26,0	8.479.000	*298*	**1.241**	**783**	*243*	**1.874**	**1.183**
250 x 12	1274	4,05		70,7	76,5	82,4	94,2	106,0	117,8	60,00	238.900	63,10	3.130	7,22	29,5	12.443.000	*339*	**1.410**	**890**	*276*	**2.130**	**1.344**
300 x 12	1274	4,25		80,1	86,0	91,8	103,6	115,4	127,2	72,00	286.700	63,10	5.400	8,66	35,2	21.501.000	*407*	**1.692**	**1.068**	*331*	**2.556**	**1.613**
220 x 15	1280	3,94		75,4	81,2	87,1	98,9	110,7	122,5	66,0	264.000	63,25	2.660	6,35	50,2	10.649.000	*298*	**1.551**	**981**	*243*	**2.343**	**1.482**
250 x 15	1280	4,06		82,4	88,3	94,2	106,0	117,8	129,5	75,0	300.000	63,25	3.910	7,22	56,9	15.627.000	*339*	**1.763**	**1.115**	*276*	**2.663**	**1.684**
300 x 15	1280	4,26		94,2	100,1	106,0	117,8	129,5	141,3	90,0	360.100	63,25	6.750	8,66	68,2	27.004.000	*407*	**2.115**	**1.338**	*331*	**3.195**	**2.021**
350 x 15	1280	4,46		106,0	111,9	117,8	129,5	141,3	153,1	105,0	420.100	63,25	10.720	10,10	79,4	42.881.000	*474*	**2.468**	**1.561**	*386*	**3.728**	**2.358**
250 x 20	1290	4,08		102,1	107,9	113,8	125,6	137,4	149,2	100,0	403.200	63,50	5.210	7,22	134,0	21.001.000	*339*	**2.350**	**1.492**	*276*	**3.550**	**2.254**
300 x 20	1290	4,28		117,8	123,6	129,5	141,3	153,1	164,9	120,0	483.900	63,50	9.000	8,66	160,7	36.290.000	*407*	**2.820**	**1.791**	*331*	**4.260**	**2.705**
350 x 20	1290	4,48		133,5	139,3	145,2	157,0	168,8	180,6	140,0	564.500	63,50	14.290	10,10	187,3	57.628.000	*474*	**3.290**	**2.089**	*386*	**4.970**	**3.156**
400 x 20	1290	4,68		149,2	155,0	160,9	172,7	184,5	196,3	160,0	645.200	63,50	21.330	11,55	214,0	86.021.000	*542*	**3.760**	**2.388**	*441*	**5.680**	**3.607**
300 x 25	1300	4,30		141,3	147,2	153,1	164,9	176,6	188,4	150,0	609.600	63,75	11.250	8,66	313,2	45.721.000	*407*	**3.525**	**2.247**	*331*	**5.325**	**3.395**
350 x 25	1300	4,50		160,9	166,8	172,7	184,5	196,3	208,0	175,0	711.200	63,75	17.860	10,10	365,2	72.603.000	*474*	**4.113**	**2.622**	*386*	**6.213**	**3.960**
400 x 25	1300	4,70		180,6	186,4	192,3	204,1	215,9	227,7	200,0	812.800	63,75	26.670	11,55	417,3	108.375.000	*542*	**4.700**	**2.996**	*441*	**7.100**	**4.526**
430 x 25	1300	4,82		192,3	198,2	204,1	215,9	227,7	239,4	215,0	873.800	63,75	33.130	12,41	448,6	134.634.000	*583*	**5.053**	**3.221**	*474*	**7.633**	**4.866**
450 x 25	1300	4,90		200,2	206,1	212,0	223,7	235,5	247,3	225,0	914.400	63,75	37.970	12,99	469,4	154.307.000	*610*	**5.288**	**3.371**	*496*	**7.988**	**5.092**
350 x 30	1310	4,52		188,4	194,3	200,2	212,0	223,7	235,5	210,0	860.200	64,00	21.440	10,10	630,7	87.808.000	*474*	**4.935**	**3.158**	*386*	**7.455**	**4.771**
400 x 30	1310	4,72		212,0	217,8	223,7	235,5	247,3	259,1	240,0	983.000	64,00	32.000	11,55	720,7	131.072.000	*542*	**5.640**	**3.610**	*441*	**8.520**	**5.453**
430 x 30	1310	4,84		226,1	232,0	237,9	249,6	261,4	273,2	258,0	1.056.800	64,00	39.750	12,41	774,7	162.830.000	*583*	**6.063**	**3.880**	*474*	**9.159**	**5.862**
450 x 30	1310	4,92		235,5	241,4	247,3	259,1	270,8	282,6	270,0	1.105.900	64,00	45.560	12,99	810,7	186.624.000	*610*	**6.345**	**4.061**	*496*	**9.585**	**6.134**

N_{Rk} and M_{Rk} when fully stabilizied by lateral supports
Other flange dimensions are available

WT 1500

Dimensions			weight / m							Cross Section Values							S235			S355		
$b_g \times t_g$	H	U	WT0	WTA	WTB	WTC	WTD	WTE	WTF	$2\,A_g$	I_y	i_y	I_z	i_z	I_t	I_w	c_{lim}	N_{Rk}	M_{Rk}	c_{lim}	N_{Rk}	M_{Rk}
mm	mm	m²/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	cm²	cm⁴	cm	cm⁴	cm	cm⁴	cm⁶	cm	kN	kNm	cm	kN	kNm
160 x 6	1512	4,26		43,3	50,4	57,5	71,6	85,7	99,9	19,2	108.900	75,31	410	4,62	3,1	2.322.000	217	451	340	177	682	513
180 x 6	1512	4,34		45,2	52,3	59,3	73,5	87,6	101,7	21,60	122.500	75,31	580	5,18	3,4	3.307.000	243	508	382	198	767	577
200 x 6	1512	4,42		47,1	54,2	61,2	75,4	89,5	103,6	24,00	136.100	75,30	800	5,77	3,7	4.536.000	271	564	425	221	852	642
160 x 8	1516	4,27		48,4	55,4	62,5	76,6	90,7	104,9	25,6	145.500	75,39	550	4,64	6,2	3.105.000	218	602	454	177	909	685
180 x 8	1516	4,35		50,9	57,9	65,0	79,1	93,3	107,4	28,80	163.700	75,39	780	5,20	6,9	4.421.000	244	677	510	199	1.022	771
200 x 8	1516	4,43		53,4	60,4	67,5	81,6	95,8	109,9	32,00	181.900	75,39	1.070	5,78	7,6	6.064.000	271	752	567	221	1.136	857
220 x 8	1516	4,51		55,9	63,0	70,0	84,2	98,3	112,4	35,20	200.100	75,40	1.420	6,35	8,3	8.071.000	298	827	624	243	1.250	942
200 x 10	1520	4,44		59,7	66,7	73,8	87,9	102,1	116,2	40,0	228.000	75,50	1.330	5,77	14,1	7.600.000	271	940	710	220	1.420	1.072
220 x 10	1520	4,52		62,8	69,9	76,9	91,1	105,2	119,3	44,00	250.800	75,50	1.770	6,34	15,4	10.116.000	298	1.034	781	243	1.562	1.179
250 x 10	1520	4,64		67,5	74,6	81,6	95,8	109,9	124,0	50,00	285.000	75,50	2.600	7,21	17,4	14.844.000	339	1.175	887	275	1.775	1.340
200 x 12	1524	4,45		65,9	73,0	80,1	94,2	108,3	122,5	48,0	274.300	75,59	1.600	5,77	23,8	9.145.000	271	1.128	853	221	1.704	1.288
220 x 12	1524	4,53		69,7	76,8	83,8	98,0	112,1	126,2	52,80	301.800	75,60	2.130	6,35	26,1	12.171.000	298	1.241	938	243	1.874	1.417
250 x 12	1524	4,65		75,4	82,4	89,5	103,6	117,8	131,9	60,00	342.900	75,60	3.130	7,22	29,6	17.861.000	339	1.410	1.066	276	2.130	1.610
300 x 12	1524	4,85		84,8	91,8	98,9	113,0	127,2	141,3	72,00	411.500	75,60	5.400	8,66	35,3	30.863.000	407	1.692	1.279	331	2.556	1.932
220 x 15	1530	4,54		80,1	87,1	94,2	108,3	122,5	136,6	66,0	378.700	75,75	2.660	6,35	50,3	15.275.000	298	1.551	1.175	243	2.343	1.775
250 x 15	1530	4,66		87,1	94,2	101,3	115,4	129,5	143,7	75,0	430.400	75,75	3.910	7,22	57,0	22.414.000	339	1.763	1.335	276	2.663	2.017
300 x 15	1530	4,86		98,9	106,0	113,0	127,2	141,3	155,4	90,0	516.400	75,75	6.750	8,66	68,3	38.732.000	407	2.115	1.602	331	3.195	2.420
350 x 15	1530	5,06		110,7	117,8	124,8	138,9	153,1	167,2	105,0	602.500	75,75	10.720	10,10	79,5	61.505.000	474	2.468	1.869	386	3.728	2.824
250 x 20	1540	4,68		106,8	113,8	120,9	135,0	149,2	163,3	100,0	577.600	76,00	5.210	7,22	134,1	30.083.000	339	2.350	1.786	276	3.550	2.698
300 x 20	1540	4,88		122,5	129,5	136,6	150,7	164,9	179,0	120,0	693.100	76,00	9.000	8,66	160,8	51.984.000	407	2.820	2.143	331	4.260	3.238
350 x 20	1540	5,08		138,2	145,2	152,3	166,4	180,6	194,7	140,0	808.600	76,00	14.290	10,10	187,4	82.549.000	474	3.290	2.500	386	4.970	3.777
400 x 20	1540	5,28		153,9	160,9	168,0	182,1	196,3	210,4	160,0	924.200	76,00	21.330	11,55	214,1	123.221.000	542	3.760	2.858	441	5.680	4.317
300 x 25	1550	4,90		146,0	153,1	160,1	174,3	188,4	202,5	150,0	872.100	76,25	11.250	8,66	313,3	65.408.000	407	3.525	2.688	331	5.325	4.060
350 x 25	1550	5,10		165,6	172,7	179,8	193,9	208,0	222,2	175,0	1.017.500	76,25	17.860	10,10	365,4	103.866.000	474	4.113	3.136	386	6.213	4.737
400 x 25	1550	5,30		185,3	192,3	199,4	213,5	227,7	241,8	200,0	1.162.800	76,25	26.670	11,55	417,4	155.042.000	542	4.700	3.584	441	7.100	5.414
430 x 25	1550	5,42		197,0	204,1	211,2	225,3	239,4	253,6	215,0	1.250.000	76,25	33.130	12,41	448,7	192.608.000	583	5.053	3.853	474	7.633	5.820
450 x 25	1550	5,50		204,9	212,0	219,0	233,1	247,3	261,4	225,0	1.308.200	76,25	37.970	12,99	469,5	220.753.000	610	5.288	4.032	496	7.988	6.090
350 x 30	1560	5,12		193,1	200,2	207,2	221,4	235,5	249,6	210,0	1.229.000	76,50	21.440	10,10	630,8	125.458.000	474	4.935	3.775	386	7.455	5.703
400 x 30	1560	5,32		216,7	223,7	230,8	244,9	259,1	273,2	240,0	1.404.500	76,50	32.000	11,55	720,8	187.272.000	542	5.640	4.315	441	8.520	6.518
430 x 30	1560	5,44		230,8	237,9	244,9	259,1	273,2	287,3	258,0	1.509.900	76,50	39.750	12,41	774,8	232.647.000	583	6.063	4.638	474	9.159	7.007
450 x 30	1560	5,52		240,2	247,3	254,3	268,5	282,6	296,7	270,0	1.580.100	76,50	45.560	12,99	810,8	266.643.000	610	6.345	4.854	496	9.585	7.333

N_{Rk} and M_{Rk} when fully stabilizied by lateral supports

Other flange dimensions are available

fy,k 23,5 kN/cm²
Steelgrade S235

	WT0					WTA					WTB					WTC				
	t =	1,5			mm	t =	2			mm	t =	2,5			mm	t =	3			mm
	2w =	155			mm	2w =	155			mm	2w =	155			mm	2w =	155			mm
	2s =	178			mm	2s =	178			mm	2s =	178			mm	2s =	178			mm
	2Iy =	4,65			cm⁴	2Iy =	6,21			cm⁴	2Iy =	7,77			cm⁴	2Iy =	10,8			cm⁴
	Dx =	5,65			kNcm²	Dx =	13,4			kNcm²	Dx =	26,2			kNcm²	Dx =	45,2			kNcm²
	Dz =	6.300			kNcm²	Dy =	8.414			kNcm²	Dy =	10.527			kNcm²	Dy =	14.605			kNcm²
h,steg	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd
[mm]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]
333	212,4	13,6	0,25	1,00	**68**	245,5	13,6	0,24	1,00	**90**	274,7	13,6	0,22	1,00	**113**	335,5	13,6	0,20	1,00	**136**
500	94,2	13,6	0,38	1,00	**102**	108,9	13,6	0,35	1,00	**136**	121,9	13,6	0,33	1,00	**170**	148,8	13,6	0,30	1,00	**204**
625	60,3	13,6	0,47	1,00	**127**	69,7	13,6	0,44	1,00	**170**	78,0	13,6	0,42	1,00	**212**	95,2	13,6	0,38	1,00	**254**
750	41,9	13,6	0,57	1,00	**153**	48,4	13,6	0,53	1,00	**204**	54,2	13,6	0,50	1,00	**254**	66,1	13,6	0,45	1,00	**305**
1000	23,6	13,6	0,76	1,00	**204**	27,2	13,6	0,71	1,00	**271**	30,5	13,6	0,67	1,00	**339**	37,2	13,6	0,60	1,00	**407**
1250	15,1	13,6	0,95	1,00	**254**	17,4	13,6	0,88	1,00	339	19,5	13,6	0,83	1,00	**424**	23,8	13,6	0,75	1,00	**509**
1500	10,5	13,6	1,14	0,84	**255**	12,1	13,6	1,06	0,93	377	13,5	13,6	1,00	1,00	**508**	16,5	13,6	0,91	1,00	**611**

Special Web on request

	WTD					WTE					WTF				
	t =	4			mm	t =	5			mm	t =	6			mm
	2w =	155			mm	2w =	155			mm	2w =	155			mm
	2s =	178			mm	2s =	178			mm	2s =	178			mm
	2Iy =	14,41			cm⁴	2Iy =	18,02			cm⁴	2Iy =	21,77			cm⁴
	Dx =	107			kNcm²	Dx =	209			kNcm²	Dx =	362			kNcm²
	Dy =	19.523			kNcm²	Dy =	24.414			kNcm²	Dy =	29.495			kNcm²
h,steg	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd
[mm]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]
333	388,2	13,6	0,19	1,00	**181**	434,1	13,6	0,18	1,00	**226**	478,0	13,6	0,17	1,00	**271**
500	172,2	13,6	0,28	1,00	**271**	192,6	13,6	0,27	1,00	**339**	653,8	13,6	0,14	1,00	**407**
625	110,2	13,6	0,35	1,00	**339**	123,2	13,6	0,33	1,00	**424**	418,4	13,6	0,18	1,00	**509**
750	76,5	13,6	0,42	1,00	**407**	85,6	13,6	0,40	1,00	**509**	290,6	13,6	0,22	1,00	**611**
1000	43,0	13,6	0,56	1,00	**543**	48,1	13,6	0,53	1,00	**678**	163,4	13,6	0,29	1,00	**814**
1250	27,5	13,6	0,70	1,00	**678**	30,8	13,6	0,66	1,00	**848**	104,6	13,6	0,36	1,00	**1018**
1500	19,1	13,6	0,84	1,00	**814**	21,4	13,6	0,80	1,00	**1018**	72,6	13,6	0,43	1,00	**1221**

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fy,k 35,5 kN/cm²
Steelgrade S355

WT0			WTA			WTB			WTC		
t =	1,5	mm	t =	2	mm	t =	2,5	mm	t =	3	mm
2w =	155	mm	2w =	155	mm	2w =	155	mm	2w =	155	mm
2s =	178	mm	2s =	178	mm	2s =	178	mm	2s =	178	mm
2Iy =	4,65	cm⁴	2Iy =	6,21	cm⁴	2Iy =	7,77	cm⁴	2Iy =	10,8	cm⁴
Dx =	5,65	kNcm²	Dx =	13,4	kNcm²	Dx =	26,2	kNcm²	Dx =	45,2	kNcm²
Dz =	6.300	kNcm²	Dy =	8.414	kNcm²	Dy =	10.527	kNcm²	Dy =	14.605	kNcm²

h,web	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd
[mm]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]
333	212,4	20,5	0,31	1,00	**102**	245,5	20,5	0,29	1,00	**137**	274,7	20,5	0,27	1,00	**171**	335,5	20,5	0,25	1,00	**205**
500	94,2	20,5	0,47	1,00	**154**	108,9	20,5	0,43	1,00	**205**	121,9	20,5	0,41	1,00	**256**	148,8	20,5	0,37	1,00	**307**
625	60,3	20,5	0,58	1,00	**192**	69,7	20,5	0,54	1,00	**256**	78,0	20,5	0,51	1,00	**320**	95,2	20,5	0,46	1,00	**384**
750	41,9	20,5	0,70	1,00	**231**	48,4	20,5	0,65	1,00	**307**	54,2	20,5	0,62	1,00	**384**	66,1	20,5	0,56	1,00	**461**
1000	23,6	20,5	0,93	1,00	**307**	27,2	20,5	0,87	1,00	**410**	30,5	20,5	0,82	1,00	**512**	37,2	20,5	0,74	1,00	**615**
1250	15,1	20,5	1,17	0,81	**310**	17,4	20,5	1,08	0,89	**459**	19,5	20,5	1,03	0,97	**619**	23,8	20,5	0,93	1,00	**769**
1500	10,5	20,5	1,40	0,61	**281**	12,1	20,5	1,30	0,68	**420**	13,5	20,5	1,23	0,74	**572**	16,5	20,5	1,11	0,86	**795**

Special Web on request

WTD			WTE			WTF		
t =	4	mm	t =	5	mm	t =	6	mm
2w =	155	mm	2w =	155	mm	2w =	155	mm
2s =	178	mm	2s =	178	mm	2s =	178	mm
2Iy =	14,41	cm⁴	2Iy =	18,02	cm⁴	2Iy =	21,77	cm⁴
Dx =	107	kNcm²	Dx =	209	kNcm²	Dx =	362	kNcm²
Dy =	19.523	kNcm²	Dy =	24.414	kNcm²	Dy =	29.495	kNcm²

h,steg	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd	τ,cr.	τ,pl.	λ,quer	χ,c	V,rd
[mm]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]	[kN/cm²]	[kN/cm²]			[kN]
333	388,2	20,5	0,23	1,00	**273**	434,1	20,5	0,22	1,00	**341**	478,0	20,5	0,21	1,00	**410**
500	172,2	20,5	0,35	1,00	**410**	192,6	20,5	0,33	1,00	**512**	286,5	20,5	0,27	1,00	**615**
625	110,2	20,5	0,43	1,00	**512**	123,2	20,5	0,41	1,00	**640**	183,4	20,5	0,33	1,00	**769**
750	76,5	20,5	0,52	1,00	**615**	85,6	20,5	0,49	1,00	**769**	127,3	20,5	0,40	1,00	**922**
1000	43,0	20,5	0,69	1,00	**820**	48,1	20,5	0,65	1,00	**1025**	71,6	20,5	0,53	1,00	**1230**
1250	27,5	20,5	0,86	1,00	**1025**	30,8	20,5	0,82	1,00	**1281**	45,8	20,5	0,67	1,00	**1.537**
1500	19,1	20,5	1,04	0,95	**1174**	21,4	20,5	0,98	1,00	**1.537**	34,9	20,5	0,77	1,00	**1.845**

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

Steelgrade: S235

g_M =	WT0					WTA					WTB					WTC				
		t_s = 1,5 mm					t_s = 2,0 mm					t_s = 2,5 mm					t_s = 3 mm			
1,0	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	17,6	47,0	76,4	105,8	135,1	21,2	56,4	91,7	126,9	162,2
8	14,1	31,7	49,4	67,0	84,6	18,8	42,3	65,8	89,3	112,8	23,5	52,9	82,3	111,6	141,0	28,2	63,5	98,7	134,0	169,2
10	17,6	35,3	52,9	70,5	88,1	23,5	47,0	70,5	94,0	117,5	29,4	58,8	88,1	117,5	146,9	35,3	70,5	105,8	141,0	176,3
12	21,2	38,8	56,4	74,0	91,7	28,2	51,7	75,2	98,7	122,2	35,3	64,6	94,0	123,4	152,8	42,3	77,6	112,8	148,1	183,3
15	26,4	44,1	61,7	79,3	96,9	35,3	58,8	82,3	105,8	129,3	44,1	73,4	102,8	132,2	161,6	52,9	88,1	123,4	158,6	193,9
20	35,3	52,9	70,5	88,1	105,8	47,0	70,5	94,0	117,5	141,0	58,8	88,1	117,5	146,9	176,3	70,5	105,8	141,0	176,3	211,5
25	44,1	61,7	79,3	96,9	114,6	58,8	82,3	105,8	129,3	152,8	73,4	102,8	132,2	161,6	190,9	88,1	123,4	158,6	193,9	229,1
30	52,9	70,5	88,1	105,8	123,4	70,5	94,0	117,5	141,0	164,5	88,1	117,5	146,9	176,3	205,6	105,8	141,0	176,3	211,5	246,8

Special Web on request

g_M =	WTD					WTE					WTF				
		t_s = 4,0 mm					t_s = 5,0 mm					t_s = 6,0 mm			
1,0	Lasteinleitungsbreite am Flansch mit a in [mm]														
$t_{flansch}$	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	42,3	112,8	183,3	253,8	324,3
8	37,6	84,6	131,6	178,6	225,6	47,0	105,8	164,5	223,3	282,0	56,4	126,9	197,4	267,9	338,4
10	47,0	94,0	141,0	188,0	235,0	58,8	117,5	176,3	235,0	293,8	70,5	141,0	211,5	282,0	352,5
12	56,4	103,4	150,4	197,4	244,4	70,5	129,3	188,0	246,8	305,5	84,6	155,1	225,6	296,1	366,6
15	70,5	117,5	164,5	211,5	258,5	88,1	146,9	205,6	264,4	323,1	105,8	176,3	246,8	317,3	387,8
20	94,0	141,0	188,0	235,0	282,0	117,5	176,3	235,0	293,8	352,5	141,0	211,5	282,0	352,5	423,0
25	117,5	164,5	211,5	258,5	305,5	146,9	205,6	264,4	323,1	381,9	176,3	246,8	317,3	387,8	458,3
30	141,0	188,0	235,0	282,0	329,0	176,3	235,0	293,8	352,5	411,3	211,5	282,0	352,5	423,0	493,5

Special Web on request Special Web on request Special Web on request

Steelgrade S355

g_M =	WT0					WTA					WTB					WTC				
		t_s = 1,5 mm					t_s = 2,0 mm					t_s = 2,5 mm					t_s = 3,0 mm			
1,0	Lasteinleitungsbreite 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	16,0	42,6	69,2	95,9	122,5	21,3	56,8	92,3	127,8	163,3	26,6	71,0	115,4	159,8	204,1	32,0	85,2	138,5	191,7	245,0
8	21,3	47,9	74,6	101,2	127,8	28,4	63,9	99,4	134,9	170,4	35,5	79,9	124,3	168,6	213,0	42,6	95,9	149,1	202,4	255,6
10	26,6	53,3	79,9	106,5	133,1	35,5	71,0	106,5	142,0	177,5	44,4	88,8	133,1	177,5	221,9	53,3	106,5	159,8	213,0	266,3
12	32,0	58,6	85,2	111,8	138,5	42,6	78,1	113,6	149,1	184,6	53,3	97,6	142,0	186,4	230,8	63,9	117,2	170,4	223,7	276,9
15	39,9	66,6	93,2	119,8	146,4	53,3	88,8	124,3	159,8	195,3	66,6	110,9	155,3	199,7	244,1	79,9	133,1	186,4	239,6	292,9
20	53,3	79,9	106,5	133,1	159,8	71,0	106,5	142,0	177,5	213,0	88,8	133,1	177,5	221,9	266,3	106,5	159,8	213,0	266,3	319,5
25	66,6	93,2	119,8	146,4	173,1	88,8	124,3	159,8	195,3	230,8	110,9	155,3	199,7	244,1	288,4	133,1	186,4	239,6	292,9	346,1
30	79,9	106,5	133,1	159,8	186,4	106,5	142,0	177,5	213,0	248,5	133,1	177,5	221,9	266,3	310,6	159,8	213,0	266,3	319,5	372,8

Special Web on request

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

Special Web on request Special Web on request Special Web on request

17. Flange load bearing capacity

Steel quality: S235

f_{yk} = 235 N/mm²	Considering Distribution of Normalforces kc = 1,00 (EN1993-1-1, Tabelle 6.6)	γ_M = 1,00

Dimensons of Flange		TENSION	PRESSURE											
b x t	A	N_{Rd}	c_{lim}	N_{Rd} [kN] Distance of Lateral Support [m]										c_{max}
[mm]	[cm²]	[kN]	[m]	3,00	4,00	5,00	6,00	8,00	10,00	12,00	15,00	18,00	21,00	24,00	[m]
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	244	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	325	25,26
400 x 20	80,00	1880	5,42	1880	1880	1880	1699	1274	1019	849	680	566	485	425	28,87
450 x 20	90,00	2115	6,10	2115	2115	2115	2115	1613	1290	1075	860	717	614	538	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	406	25,26
400 x 25	100,00	2350	5,42	2350	2350	2350	2124	1593	1274	1062	849	708	607	531	28,87
430 x 25	107,50	2526	5,83	2526	2526	2526	2454	1841	1472	1227	982	818	701	614	31,03
450 x 25	112,50	2644	6,10	2644	2644	2644	2644	2016	1613	1344	1075	896	768	672	32,48
350 x 30	105,00	2468	4,74	2468	2468	2341	1951	1463	1171	976	780	650	557	488	25,26
400 x 30	120,00	2820	5,42	2820	2820	2820	2548	1911	1529	1274	1019	849	728	637	28,87
430 x 30	129,00	3032	5,83	3032	3032	3032	2945	2209	1767	1472	1178	982	841	736	31,03
450 x 30	135,00	3173	6,10	3173	3173	3173	3173	2419	1935	1613	1290	1075	922	806	32,48

Steel quality: S355

f_{yk} = 355 N/mm²	Considering Distribution of Normalforces kc = 1,00 (EN1993-1-1, Table6.6)													γ_M = 1,00
Dimensons of Flange		TENSION	PRESSURE											
b x t	A	N_{Rd}	c_{lim}	N_{Rd} [kN] Distance of Lateral Support [m]										c_{max}
[mm]	[cm²]	[kN]	[m]	3,00	4,00	5,00	6,00	8,00	10,00	12,00	15,00	18,00	21,00	24,00	[m]
160 x 6	9,60	341	1,76	200	150	120	100	75	60						11,55
180 x 6	10,80	383	1,99	254	190	152	127	95	76	63					12,99
200 x 6	12,00	426	2,21	313	235	188	157	117	94	78					14,43
160 x 8	12,80	454	1,76	267	200	160	134	100	80						11,55
180 x 8	14,40	511	1,99	338	254	203	169	127	101	85					12,99
200 x 8	16,00	568	2,21	418	313	251	209	157	125	104					14,43
220 x 8	17,60	625	2,43	505	379	303	253	189	152	126	101				15,88
200 x 10	20,00	710	2,21	522	392	313	261	196	157	131					14,43
220 x 10	22,00	781	2,43	632	474	379	316	237	189	158	126				15,88
250 x 10	25,00	888	2,76	816	612	489	408	306	245	204	163	136			18,04
200 x 12	24,00	852	2,21	626	470	376	313	235	188	157					14,43
220 x 12	26,40	937	2,43	758	568	455	379	284	227	189	152				15,88
250 x 12	30,00	1065	2,76	979	734	587	489	367	294	245	196	163			18,04
300 x 12	36,00	1278	3,31	1278	1057	846	705	529	423	352	282	235	201		21,65
220 x 15	33,00	1172	2,43	947	711	568	474	355	284	237	189				15,88
250 x 15	37,50	1331	2,76	1223	918	734	612	459	367	306	245	204			18,04
300 x 15	45,00	1598	3,31	1598	1321	1057	881	661	529	440	352	294	252		21,65
350 x 15	52,50	1864	3,86	1864	1799	1439	1199	899	719	600	480	400	343	300	25,26
250 x 20	50,00	1775	2,76	1631	1223	979	816	612	489	408	326	272			18,04
300 x 20	60,00	2130	3,31	2130	1762	1409	1175	881	705	587	470	392	336		21,65
350 x 20	70,00	2485	3,86	2485	2398	1918	1599	1199	959	799	639	533	457	400	25,26
400 x 20	80,00	2840	4,41	2840	2840	2506	2088	1566	1253	1044	835	696	597	522	28,87
450 x 20	90,00	3195	4,96	3195	3195	3171	2643	1982	1586	1321	1057	881	755	661	32,48
300 x 25	75,00	2663	3,31	2663	2202	1762	1468	1101	881	734	587	489	419		21,65
350 x 25	87,50	3106	3,86	3106	2998	2398	1998	1499	1199	999	799	666	571	500	25,26
400 x 25	100,00	3550	4,41	3550	3550	3132	2610	1958	1566	1305	1044	870	746	653	28,87
430 x 25	107,50	3816	4,74	3816	3816	3620	3016	2262	1810	1508	1207	1005	862	754	31,03
450 x 25	112,50	3994	4,96	3994	3994	3964	3303	2478	1982	1652	1321	1101	944	826	32,48
350 x 30	105,00	3728	3,86	3728	3597	2878	2398	1799	1439	1199	959	799	685	600	25,26
400 x 30	120,00	4260	4,41	4260	4260	3759	3132	2349	1879	1566	1253	1044	895	783	28,87
430 x 30	129,00	4580	4,74	4580	4580	4344	3620	2715	2172	1810	1448	1207	1034	905	31,03
450 x 30	135,00	4793	4,96	4793	4793	4757	3964	2973	2378	1982	1586	1321	1133	991	32,48