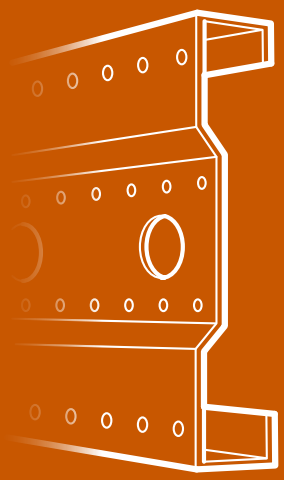


# SIGMA BEAMS

WEILAND
LAGERSYSTEM AB

# SIGMA BEAMS

Sigma beams from Weland Lagersystem AB are manufactured in 3 different standard heights and each height is available in 5 different material thicknesses. The design of the beams means 2 beams can be simply screwed together to form a single profile. This makes it possible to optimise the Sigma beams, both with regards to loading and the requirements placed on the beam's height by the available space. Weland Sigma beams are extremely suitable for the construction of mezzanine floors.

**Made in Sweden**

We manufacture the Sigma beams at our factory in Gislaved. This means we have full control over the entire production chain, from the purchasing of the raw material to the final product. For this reason, we can guarantee high quality for all of our deliveries.

The Sigma beams are hot dip galvanised as standard and can be used in most environments without any further treatment. The standard material grade has a yield strength of 250 N/mm$^2$. We can also provide Sigma beams in a material with a yield strength of 350 N/mm$^2$ in a hot dip galvanised version.

We supply Sigma beams in lengths from 300 mm to 12,000 mm, in intervals of 50 mm. In order to optimise transport, the beams are pre-packed in packs 800 mm wide.

# WHY YOU SHOULD CHOOSE WELAND SIGMA BEAMS

**Easy assembly without welding**

The beams are joined together by screw joints, which entails several advantages. The work is easy and fitters with welding qualifications are not required. Moreover, assembly can be carried out in sensitive environments where welding is not permitted. The corrosion protection also remains intact throughout the entire construction when welded joints are not used.

**Prompt delivery direct from our warehouse**

We stock Sigma beams with dimensions 300/2.5, in material with yield strength 250 N/mm$^2$ in 4.6 m, 5.2 m, 6.0 m and 7.2 m lengths for immediate delivery. We can also cut Sigma beams according to the customer's specific wishes.

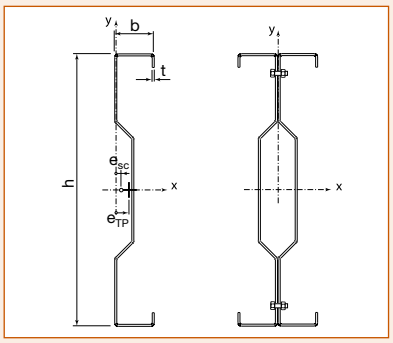
**Accessories**

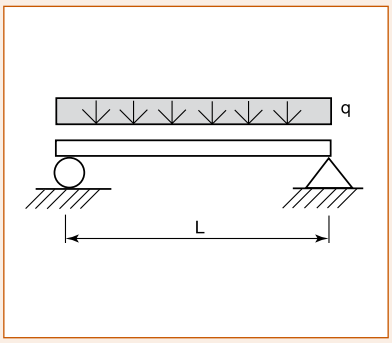
Beam joints (length 500 mm) and corner fittings are stocked for all Sigma beam heights. Steel railings, which are assembled without any welding, are also available as accessories.

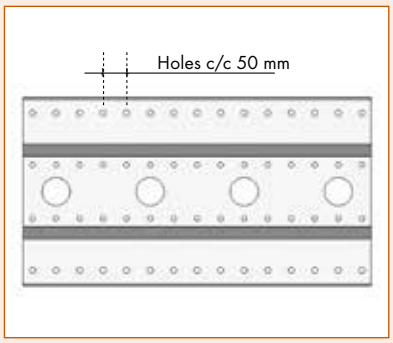
## **Technical Data** Single Beam (Material Grade S250)

| Profile | Cross-section (external dimsions) | | | | | TP | SC | Gross cross-section, x axis | | | | | Hole | Gross cross-section, y axis | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | H | W | T | $R_1$ | $R_2$ | $e_{TP}$ | $e_{SC}$ | A | $I_x$ | $W_x$ | $Z_x$ | $r_x$ | $A_{net}$ | $I_y$ | $W_y$ | $Z_y$ | $r_y$ |
| Σ200/2 | 200 | 58 | 2.0 | 2.0 | 4.0 | 20.0 | -3.1 | 685 | 3.83 | 3.83 | 4.63 | 74.8 | 568 | 0.244 | 0.66 | 1.08 | 18.9 |
| Σ200/2.5 | 200 | 58 | 2.5 | 2.0 | 4.5 | 19.8 | -2.7 | 864 | 4.79 | 4.79 | 5.81 | 74.5 | 715 | 0.301 | 0.82 | 1.34 | 18.7 |
| Σ200/3 | 200 | 58 | 3.0 | 2.0 | 5.0 | 19.6 | -2.3 | 1040 | 5.73 | 5.73 | 6.98 | 74.2 | 861 | 0.355 | 0.96 | 1.60 | 18.5 |
| Σ200/4 | 200 | 58 | 4.0 | 2.0 | 6.0 | 19.3 | -1.5 | 1388 | 7.52 | 7.52 | 9.22 | 73.6 | 1144 | 0.451 | 1.23 | 2.09 | 18.0 |
| Σ200/5 | 200 | 58 | 5.0 | 2.0 | 7.0 | 18.9 | -0.8 | 1724 | 9.19 | 9.19 | 11.1 | 73.0 | 1417 | 0.534 | 1.46 | 2.54 | 17.6 |
| Σ300/2 | 300 | 58 | 2.0 | 2.0 | 4.0 | 21.1 | 10.9 | 874 | 10.3 | 6.89 | 8.53 | 109 | 670 | 0.248 | 0.69 | 1.12 | 16.8 |
| Σ300/2.5 | 300 | 58 | 2.5 | 2.0 | 4.5 | 20.9 | 11.2 | 1102 | 12.9 | 8.63 | 10.7 | 108 | 844 | 0.305 | 0.85 | 1.40 | 16.6 |
| Σ300/3 | 300 | 58 | 3.0 | 2.0 | 5.0 | 20.8 | 11.6 | 1327 | 15.5 | 10.3 | 12.9 | 108 | 1015 | 0.360 | 1.01 | 1.67 | 16.5 |
| Σ300/4 | 300 | 58 | 4.0 | 2.0 | 6.0 | 20.5 | 12.2 | 1780 | 20.5 | 13.7 | 17.1 | 107 | 1356 | 0.461 | 1.30 | 2.22 | 16.1 |
| Σ300/5 | 300 | 58 | 5.0 | 2.0 | 7.0 | 20.3 | 12.9 | 2219 | 25.3 | 16.8 | 21.2 | 107 | 1684 | 0.550 | 1.56 | 2.69 | 15.7 |
| Σ400/2 | 400 | 58 | 2.0 | 2.0 | 4.0 | 17.3 | 7.1 | 1059 | 20.6 | 10.3 | 13.1 | 139 | 855 | 0.313 | 0.79 | 1.54 | 17.2 |
| Σ400/2.5 | 400 | 58 | 2.5 | 2.0 | 4.5 | 17.2 | 7.4 | 1341 | 26.0 | 13.0 | 16.6 | 139 | 1083 | 0.391 | 0.99 | 1.94 | 17.1 |
| Σ400/3 | 400 | 58 | 3.0 | 2.0 | 5.0 | 17.1 | 7.8 | 1617 | 31.3 | 15.6 | 19.9 | 139 | 1304 | 0.462 | 1.17 | 2.32 | 16.9 |
| Σ400/4 | 400 | 58 | 4.0 | 2.0 | 6.0 | 16.8 | 8.4 | 2173 | 41.6 | 20.8 | 26.6 | 138 | 1750 | 0.597 | 1.53 | 3.07 | 16.6 |
| Σ400/5 | 400 | 58 | 5.0 | 2.0 | 7.0 | 16.6 | 9.0 | 2714 | 51.3 | 25.7 | 33.0 | 137 | 2180 | 0.717 | 1.84 | 3.78 | 16.3 |
| Multiple | | | | | | | | | $10^6$ | $10^4$ | $10^4$ | | | $10^6$ | $10^4$ | $10^4$ | |
| Unit | mm | mm | mm | mm | mm | mm | mm | $mm^2$ | $mm^4$ | $mm^3$ | $mm^3$ | mm | $mm^2$ | $mm^4$ | $mm^3$ | $mm^3$ | mm |

| Profile | Effective cross-section and char. bearing capacity | | | | | | Torsion | | | Lateral buckling | | | Lateral-torsional buckling | | | Area and mass | | Lateraltorsional buckling | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | $A_{eff}$ | $\eta_x W_x$ | $\eta_y W_y$ | $N_k$ | $M_{xk}$ | $M_{yk}$ | $K_v$ | $W_v$ | C | $K_w$ | $W_w$ | $C_w$ | k | $i_p$ | $t_x$ | F | g | $I_o$ | $\omega_o$ |
| Σ200/2 | 610 | 4.63 | 0.82 | 152 | 11.6 | 2.06 | 0.85 | 453 | 69 | 2.74 | 0.61 | 0.58 | 3.46 | 80.5 | -114 | 0.722 | 5.55 | 860 | 0.288 |
| Σ200/2.5 | 768 | 5.81 | 1.02 | 192 | 14.5 | 2.55 | 1.73 | 723 | 140 | 3.37 | 0.76 | 0.71 | 4.44 | 80.1 | -112 | 0.718 | 6.91 | 855 | 0.286 |
| Σ200/3 | 924 | 6.89 | 1.21 | 231 | 17.2 | 3.01 | 3.06 | 1056 | 247 | 3.95 | 0.91 | 0.83 | 5.46 | 79.6 | -110 | 0.714 | 8.24 | 852 | 0.283 |
| Σ200/4 | 1230 | 9.22 | 1.54 | 308 | 23.1 | 3.84 | 7.50 | 1909 | 606 | 4.97 | 1.17 | 1.04 | 7.62 | 78.6 | -106 | 0.704 | 10.8 | 830 | 0.275 |
| Σ200/5 | 1526 | 11.4 | 1.83 | 381 | 28.5 | 4.56 | 14.8 | 2990 | 1195 | 5.83 | 1.41 | 1.22 | 9.88 | 77.7 | -101 | 0.695 | 13.3 | 815 | 0.267 |
| Σ300/2 | 692 | 8.53 | 0.69 | 173 | 21.3 | 1.73 | 1.09 | 578 | 88 | 6.52 | 1.01 | 1.37 | 2.54 | 111 | -73.5 | 0.914 | 6.99 | 790 | 0.290 |
| Σ300/2.5 | 899 | 10.7 | 0.85 | 225 | 26.8 | 2.13 | 2.21 | 924 | 179 | 8.00 | 1.26 | 1.68 | 3.26 | 110 | -68.3 | 0.909 | 8.69 | 780 | 0.287 |
| Σ300/3 | 1109 | 12.9 | 1.01 | 277 | 32.3 | 2.53 | 3.90 | 1346 | 315 | 9.38 | 1.49 | 1.97 | 4.00 | 110 | -63.0 | 0.904 | 10.4 | 773 | 0.288 |
| Σ300/4 | 1544 | 17.1 | 1.30 | 386 | 42.8 | 3.25 | 9.62 | 2448 | 777 | 11.9 | 1.93 | 2.50 | 5.58 | 109 | -51.8 | 0.896 | 13.7 | 760 | 0.285 |
| Σ300/5 | 1922 | 21.0 | 1.95 | 480 | 52.5 | 4.88 | 19.0 | 3838 | 1535 | 14.0 | 2.32 | 2.94 | 7.22 | 108 | -39.8 | 0.887 | 16.9 | 745 | 0.278 |
| Σ400/2 | 705 | 10.2 | 0.77 | 176 | 25.5 | 1.92 | 1.32 | 700 | 107 | 13.5 | 1.49 | 2.84 | 1.94 | 141 | -135 | 1.110 | 8.51 | 920 | 0.291 |
| Σ400/2.5 | 997 | 13.0 | 0.99 | 249 | 32.5 | 2.48 | 2.69 | 1125 | 217 | 17.0 | 1.88 | 3.57 | 2.47 | 141 | -130 | 1.109 | 10.6 | 910 | 0.289 |
| Σ400/3 | 1280 | 17.9 | 1.17 | 320 | 44.8 | 2.93 | 4.75 | 1639 | 384 | 19.9 | 2.23 | 4.18 | 3.03 | 140 | -122 | 1.104 | 12.7 | 840 | 0.287 |
| Σ400/4 | 1858 | 26.0 | 1.53 | 465 | 65.0 | 3.83 | 11.7 | 2978 | 945 | 25.4 | 2.90 | 5.33 | 4.21 | 140 | -106 | 1.096 | 16.8 | 780 | 0.278 |
| Σ400/5 | 2415 | 32.1 | 2.30 | 604 | 80.3 | 5.75 | 23.3 | 4707 | 1882 | 30.1 | 3.49 | 6.32 | 5.46 | 139 | -87.6 | 1.087 | 20.8 | 770 | 0.277 |
| Multiple | | $10^4$ | $10^4$ | | | | $10^3$ | | $10^6$ | $10^9$ | $10^6$ | $10^{15}$ | $10^{-4}$ | | | | | | |
| Unit | $mm^2$ | $mm^3$ | $mm^3$ | kN | kNm | kNm | $mm^4$ | $mm^3$ | $Nmm^2$ | $mm^6$ | $mm^4$ | $Nmm^4$ | $mm^{-1}$ | mm | mm | $m^2/m$ | kg/m | mm | |



## **Quick Guide** Single beam

| Span L (m) | | 1.2 | 1.5 | 1.8 | 2.1 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 4.8 | 6.0 | 7.2 | 8.4 | 9.6 | 10.8 | 12.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Profile** | | | | | | | | | | | | | | | | | |
| Σ200/2 | q | 53.6 | 34.3 | 23.9 | 17.5 | 13.4 | 10.6 | 8.6 | 7.1 | 6.0 | 3.3 | | | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.5 | 7.2 | 9.1 | 11.0 | 13.6 | 16.3 | 28.4 | | | | | | |
| Σ200/2.5 | q | 67.3 | 43.0 | 29.9 | 22.0 | 16.8 | 13.3 | 10.8 | 8.9 | 7.5 | 4.2 | 2.7 | | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.5 | 7.2 | 9.2 | 11.0 | 13.6 | 16.3 | 28.9 | 45.0 | | | | | |
| Σ200/3 | q | 80.0 | 51.9 | 35.9 | 26.4 | 20.2 | 15.9 | 12.9 | 10.6 | 8.9 | 5.0 | 3.2 | | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.5 | 7.2 | 9.2 | 11.4 | 13.6 | 16.2 | 28.8 | 45.0 | | | | | |
| Σ200/4 | q | 107.0 | 68.3 | 47.6 | 35.0 | 26.8 | 21.1 | 17.1 | 14.1 | 11.9 | 6.7 | 4.3 | | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.6 | 7.3 | 9.2 | 11.4 | 13.8 | 16.5 | 29.3 | 46.0 | | | | | |
| Σ200/5 | q | 132.0 | 84.5 | 58.5 | 43.1 | 33.0 | 26.0 | 21.1 | 17.4 | 14.6 | 8.2 | 5.2 | | | | | |
| Sag | f | 1.8 | 2.9 | 4.1 | 5.6 | 7.4 | 9.3 | 11.5 | 13.9 | 16.6 | 29.4 | 45.5 | | | | | |
| Σ300/2 | q | 98.8 | 63.4 | 44.0 | 32.3 | 24.7 | 19.5 | 15.8 | 13.1 | 11.0 | 6.1 | 3.9 | | | | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 4.9 | 6.2 | 7.7 | 9.3 | 11.1 | 19.4 | 30.4 | | | | | |
| Σ300/2.5 | q | 124.6 | 79.7 | 55.3 | 40.6 | 31.1 | 24.6 | 19.9 | 16.4 | 13.8 | 7.7 | 4.9 | | | | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 4.9 | 6.3 | 7.7 | 9.3 | 11.1 | 19.6 | 30.4 | | | | | |
| Σ300/3 | q | 149.5 | 95.7 | 66.4 | 48.8 | 37.4 | 29.5 | 23.9 | 19.7 | 16.6 | 9.3 | 5.9 | 4.1 | | | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 4.9 | 6.3 | 7.7 | 9.3 | 11.1 | 19.8 | 30.6 | 44.1 | | | | |
| Σ300/4 | q | 199.0 | 127.4 | 88.4 | 64.9 | 49.6 | 39.3 | 31.8 | 26.3 | 22.1 | 12.4 | 7.9 | 5.5 | 4.0 | | | |
| Sag | f | 1.3 | 1.9 | 2.8 | 3.8 | 4.9 | 6.3 | 7.7 | 9.4 | 11.2 | 19.9 | 30.9 | 44.6 | 60.1 | | | |
| Σ300/5 | q | 244.3 | 156.7 | 108.7 | 79.8 | 61.2 | 48.3 | 39.1 | 32.3 | 27.2 | 15.3 | 9.7 | 6.8 | 4.9 | | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 5.0 | 6.3 | 7.8 | 9.4 | 11.2 | 20.0 | 30.9 | 44.9 | 59.9 | | | |
| Σ400/2 | q | 119.2 | 76.3 | 53.0 | 39.0 | 29.8 | 23.6 | 19.1 | 15.7 | 13.2 | 7.4 | 4.7 | 3.3 | 2.4 | | | |
| Sag | f | 0.7 | 1.2 | 1.7 | 2.3 | 3.0 | 3.7 | 4.6 | 5.6 | 6.6 | 11.7 | 18.2 | 26.5 | 35.7 | | | |
| Σ400/2.5 | q | 151.3 | 97.0 | 67.4 | 49.5 | 37.9 | 29.9 | 24.2 | 20.0 | 16.8 | 9.4 | 6.0 | 4.2 | 3.0 | | | |
| Sag | f | 0.7 | 1.2 | 1.7 | 2.3 | 3.0 | 3.8 | 4.7 | 5.6 | 6.7 | 11.9 | 18.5 | 26.9 | 35.5 | | | |
| Σ400/3 | q | 207.7 | 132.9 | 92.3 | 67.7 | 51.9 | 41.0 | 33.2 | 27.4 | 23.0 | 12.9 | 8.3 | 5.7 | 4.2 | 3.2 | | |
| Sag | f | 0.9 | 1.3 | 1.9 | 2.6 | 3.4 | 4.3 | 5.3 | 6.5 | 7.7 | 13.6 | 21.3 | 30.4 | 41.5 | 53.9 | | |
| Σ400/4 | q | 302.2 | 193.4 | 134.3 | 98.6 | 75.4 | 59.6 | 48.3 | 39.9 | 33.5 | 18.8 | 12.0 | 8.3 | 6.1 | 4.7 | 3.7 | |
| Sag | f | 0.9 | 1.5 | 2.1 | 2.9 | 3.7 | 4.7 | 5.8 | 7.1 | 8.4 | 14.9 | 23.2 | 33.3 | 45.3 | 59.6 | 75.1 | |
| Σ400/5 | q | 372.5 | 238.6 | 165.6 | 121.8 | 93.2 | 73.7 | 59.7 | 49.3 | 41.4 | 23.3 | 14.9 | 10.3 | 7.6 | 5.8 | 4.6 | 3.7 |
| Sag | f | 0.9 | 1.5 | 2.1 | 2.9 | 3.7 | 4.7 | 5.8 | 7.1 | 8.4 | 14.9 | 23.3 | 33.4 | 45.7 | 59.5 | 75.6 | 92.7 |

**Terms:**

$A_{net}$ = average area through hole.
$A_{eff}$ = effective area with regard to buckling.
$N_k$, $M_{xk}$, $M_{yk}$ = characteristic bearing capacity for normal force and moment.
$K_v$ = the torsional stiffness' cross-sectional factor, for double beams the values apply with a distance between screws of < = 200 mm.

**Distance between screws for double beams**

- 1000 mm if the beams are braced on the sides.
- 500 mm on the side under pressure if the beams can buckle out to the side, 1000 mm on the side under tension.
- 500 mm on both sides if the beams are under pressure or if it is not certain how the beams will be turned.

**Reduction factor for lateral-torsional buckling:**

$\omega_b = 1.0$ if $l < = l_o$
$\omega_b = 1.0 - \omega_o(l/l_o - 1)$ if $l > = l_o$

where l is the distance between bracing points and $l_o$ and $\omega_o$ are as given in the table. The formula is on the safe side for long lengths ($l > 2l_o$). This is valid for cases with constant moment between side braces and is on the safe side for most other cases.

**The table gives the values:**

q KN/m
f mm
q: Gives the beam's bearing capacity (loading capacity) including the beam's own weight. The value is valid for safety class 3 (n=1.2). For other safety classes, the bearing capacity is found by multiplying the table value by:
1.20 in safety class 1
1.09 in safety class 2
f: Gives the associated sag at the beam's middle for the respective q value.
*No consideration is given to lateral-torsional buckling ($\omega_b = 1$).*

**References:**

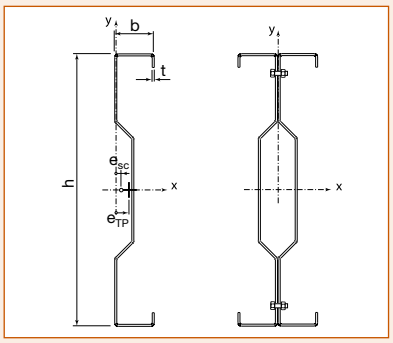
- StBK-N5, Code for Thin Gauge Steel Structures 79. Statens Stålbyggnadskommitté (National Swedish committee on regulations for steel) Stockholm 1980
- BSK 99, The Swedish National Board of Housing, Building and Planning's handbook on steel constructions, December 2001

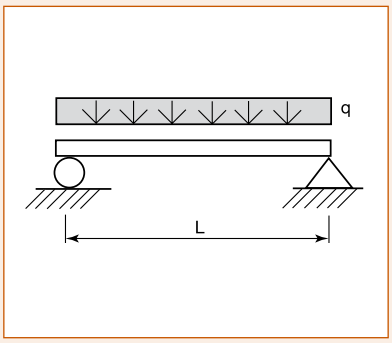
*If values according to Eurocode 3 are needed, please contact Weland Lagersystem AB.*

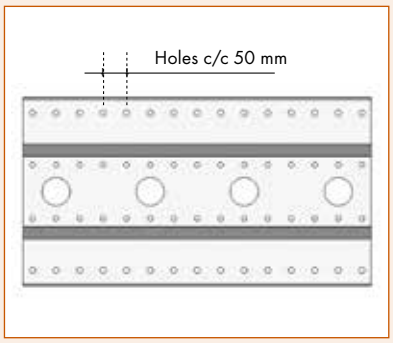
# **Technical Data** Double Beam (Material Grade S250)

| Profile | Cross-section (external dimensions) | | | | | TP | SC | Gross cross-section, x axis | | | | | Hole | Gross cross-section, y axis | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | H | W | T | $R_1$ | $R_2$ | $e_{TP}$ | $e_{SC}$ | A | $I_x$ | $W_x$ | $Z_x$ | $r_x$ | $A_{net}$ | $I_y$ | $W_y$ | $Z_y$ | $r_y$ |
| Σ200/2 | 200 | 58 | 2.0 | 2.0 | 4.0 | 0 | 0 | 1370 | 7.66 | 7.66 | 9.26 | 74.8 | 1136 | 1.09 | 1.88 | 2.87 | 28.2 |
| Σ200/2.5 | 200 | 58 | 2.5 | 2.0 | 4.5 | 0 | 0 | 1727 | 9.58 | 9.58 | 11.6 | 74.5 | 1430 | 1.37 | 2.36 | 3.63 | 28.2 |
| Σ200/3 | 200 | 58 | 3.0 | 2.0 | 5.0 | 0 | 0 | 2080 | 11.5 | 11.5 | 14.0 | 74.2 | 1722 | 1.64 | 2.83 | 4.39 | 28.1 |
| Σ200/4 | 200 | 58 | 4.0 | 2.0 | 6.0 | 0 | 0 | 2775 | 15.0 | 15.0 | 18.4 | 73.6 | 2288 | 2.15 | 3.72 | 5.90 | 27.8 |
| Σ200/5 | 200 | 58 | 5.0 | 2.0 | 7.0 | 0 | 0 | 3447 | 18.4 | 18.4 | 22.3 | 73.0 | 2834 | 2.65 | 4.57 | 7.38 | 27.7 |
| Σ300/2 | 300 | 58 | 2.0 | 2.0 | 4.0 | 0 | 0 | 1748 | 20.6 | 13.8 | 17.1 | 109 | 1340 | 1.34 | 2.32 | 3.85 | 27.7 |
| Σ300/2.5 | 300 | 58 | 2.5 | 2.0 | 4.5 | 0 | 0 | 2203 | 25.8 | 17.3 | 21.4 | 108 | 1688 | 1.69 | 2.92 | 4.88 | 27.7 |
| Σ300/3 | 300 | 58 | 3.0 | 2.0 | 5.0 | 0 | 0 | 2654 | 31.0 | 20.6 | 25.8 | 108 | 2030 | 2.04 | 3.51 | 5.91 | 27.7 |
| Σ300/4 | 300 | 58 | 4.0 | 2.0 | 6.0 | 0 | 0 | 3561 | 41.0 | 27.4 | 34.2 | 107 | 2712 | 2.73 | 4.71 | 8.02 | 27.7 |
| Σ300/5 | 300 | 58 | 5.0 | 2.0 | 7.0 | 0 | 0 | 4437 | 50.6 | 33.6 | 42.4 | 107 | 3368 | 3.40 | 5.86 | 10.1 | 27.7 |
| Σ400/2 | 400 | 58 | 2.0 | 2.0 | 4.0 | 0 | 0 | 2117 | 41.2 | 20.6 | 26.2 | 139 | 1710 | 1.33 | 2.30 | 3.87 | 25.1 |
| Σ400/2.5 | 400 | 58 | 2.5 | 2.0 | 4.5 | 0 | 0 | 2682 | 52.1 | 26.0 | 33.2 | 139 | 2166 | 1.69 | 2.92 | 4.94 | 25.1 |
| Σ400/3 | 400 | 58 | 3.0 | 2.0 | 5.0 | 0 | 0 | 3234 | 62.6 | 31.2 | 39.8 | 139 | 2608 | 2.04 | 3.52 | 6.00 | 25.1 |
| Σ400/4 | 400 | 58 | 4.0 | 2.0 | 6.0 | 0 | 0 | 4347 | 83.2 | 41.6 | 53.2 | 138 | 3500 | 2.73 | 4.71 | 8.18 | 25.1 |
| Σ400/5 | 400 | 58 | 5.0 | 2.0 | 7.0 | 0 | 0 | 5427 | 103 | 51.4 | 66.0 | 137 | 4360 | 3.41 | 5.88 | 10.3 | 25.1 |
| Multiple | | | | | | | | | $10^6$ | $10^4$ | $10^4$ | | | $10^6$ | $10^4$ | $10^4$ | |
| Unit | mm | mm | mm | mm | mm | mm | mm | $mm^2$ | $mm^4$ | $mm^3$ | $mm^3$ | mm | $mm^2$ | $mm^4$ | $mm^3$ | $mm^3$ | mm |

| Profile | Effective cross-section and char. bearing capacity | | | | | | Torsion | | | Lateral buckling | | | Lateral-torsional buckling | | | Area and mass | | Lateraltorsional buckling | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | $A_{eff}$ | $\eta_x W_x$ | $\eta_y W_y$ | $N_k$ | $M_{xk}$ | $M_{yk}$ | $K_v$ | $W_v$ | C | $K_w$ | $W_w$ | $C_w$ | k | $i_p$ | $t_x$ | F | g | $I_o$ | $\omega_o$ |
| Σ200/2 | 1219 | 9.26 | 2.35 | 305 | 23.2 | 5.88 | 0.38 | 1.52 | 30.7 | 5.52 | 1.19 | 1.16 | 51 | 79.9 | 0 | 1.443 | 11.1 | 1910 | 0.129 |
| Σ200/2.5 | 1536 | 11.6 | 2.95 | 384 | 29.1 | 7.38 | 0.50 | 1.96 | 40.5 | 6.76 | 1.49 | 1.42 | 53 | 79.7 | 0 | 1.436 | 13.8 | 1950 | 0.128 |
| Σ200/3 | 1849 | 13.8 | 3.54 | 462 | 34.5 | 8.8 | 0.63 | 2.42 | 50.9 | 7.92 | 1.79 | 1.66 | 55 | 79.4 | 0 | 1.429 | 16.5 | 2000 | 0.127 |
| Σ200/4 | 2461 | 18.4 | 4.65 | 615 | 46.1 | 11.6 | 0.91 | 3.39 | 73.8 | 9.94 | 2.36 | 2.09 | 59 | 78.7 | 0 | 1.408 | 21.6 | 2050 | 0.126 |
| Σ200/5 | 3051 | 22.8 | 5.71 | 763 | 57.0 | 14.3 | 1.22 | 4.41 | 98.5 | 11.7 | 2.93 | 2.46 | 63 | 78.1 | 0 | 1.390 | 26.6 | 2120 | 0.125 |
| Σ300/2 | 1384 | 17.1 | 2.28 | 346 | 42.7 | 5.70 | 1.23 | 3.48 | 99.3 | 16.0 | 3.25 | 3.36 | 54 | 112 | 0 | 1.827 | 14.0 | 2040 | 0.127 |
| Σ300/2.5 | 1799 | 21.4 | 2.92 | 450 | 53.5 | 7.30 | 1.60 | 4.48 | 129 | 20.0 | 4.22 | 4.20 | 55 | 112 | 0 | 1.818 | 17.4 | 2080 | 0.126 |
| Σ300/3 | 2218 | 25.8 | 3.51 | 555 | 64.5 | 8.78 | 1.98 | 5.49 | 160 | 24.0 | 5.22 | 5.04 | 56 | 112 | 0 | 1.809 | 20.7 | 2100 | 0.126 |
| Σ300/4 | 3087 | 34.2 | 4.71 | 772 | 85.5 | 11.8 | 2.84 | 7.64 | 229 | 32.1 | 6.89 | 6.74 | 58 | 111 | 0 | 1.791 | 27.3 | 2190 | 0.125 |
| Σ300/5 | 3843 | 42.0 | 7.33 | 961 | 105 | 18.3 | 3.76 | 9.86 | 304 | 40.0 | 8.45 | 8.40 | 60 | 110 | 0 | 1.774 | 33.8 | 2260 | 0.123 |
| Σ400/2 | 1409 | 20.4 | 2.26 | 352 | 51.0 | 5.65 | 0.94 | 3.56 | 76.0 | 29.9 | 3.93 | 6.28 | 35 | 142 | 0 | 2.219 | 17.0 | 1630 | 0.141 |
| Σ400/2.5 | 1994 | 26.0 | 2.92 | 499 | 65.0 | 7.30 | 1.24 | 4.59 | 100 | 37.8 | 5.07 | 7.94 | 36 | 142 | 0 | 2.218 | 21.3 | 1650 | 0.141 |
| Σ400/3 | 2560 | 35.8 | 3.52 | 640 | 89.5 | 8.80 | 1.55 | 5.65 | 125 | 45.2 | 6.21 | 9.49 | 36 | 141 | 0 | 2.209 | 25.4 | 1500 | 0.144 |
| Σ400/4 | 3717 | 52.0 | 4.71 | 929 | 130 | 11.8 | 2.26 | 7.93 | 183 | 59.9 | 8.66 | 12.6 | 38 | 141 | 0 | 2.191 | 33.6 | 1410 | 0.138 |
| Σ400/5 | 4830 | 64.3 | 7.35 | 1207 | 161 | 18.4 | 3.05 | 10.3 | 246 | 74.0 | 11.3 | 15.5 | 40 | 140 | 0 | 2.174 | 41.6 | 1450 | 0.135 |
| Multiple | | $10^4$ | $10^4$ | | | | $10^3$ | | $10^6$ | $10^9$ | $10^6$ | $10^{15}$ | $10^{-4}$ | | | | | | |
| Unit | $mm^2$ | $mm^3$ | $mm^3$ | kN | kNm | kNm | $mm^4$ | $mm^3$ | $Nmm^2$ | $mm^6$ | $mm^4$ | $Nmm^4$ | $mm^{-1}$ | mm | mm | $m^2/m$ | kg/m | mm | |



## **Quick Guide** Double Beam

| Span L (m) | | 1.2 | 1.5 | 1.8 | 2.1 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 4.8 | 6.0 | 7.2 | 8.4 | 9.6 | 10.8 | 12.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Profile** | | | | | | | | | | | | | | | | | |
| Σ200/2 | q | 107.2 | 68.6 | 47.8 | 35.0 | 26.8 | 21.2 | 17.2 | 14.2 | 12.0 | 6.6 | 4.3 | | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.5 | 7.2 | 9.1 | 11.0 | 13.6 | 16.3 | 28.4 | 45.1 | | | | | |
| Σ200/2.5 | q | 134.6 | 86.0 | 59.8 | 44.0 | 33.6 | 26.6 | 21.6 | 17.8 | 15.0 | 8.4 | 5.4 | 3.7 | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.5 | 7.2 | 9.2 | 11.0 | 13.6 | 16.3 | 28.9 | 45.0 | 64.5 | | | | |
| Σ200/3 | q | 160.0 | 103.8 | 71.8 | 52.8 | 40.4 | 31.8 | 25.8 | 21.2 | 17.8 | 10.0 | 6.4 | 4.4 | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.5 | 7.2 | 9.2 | 11.4 | 13.6 | 16.2 | 28.8 | 45.0 | 64.2 | | | | |
| Σ200/4 | q | 214.0 | 136.6 | 95.2 | 70.0 | 53.6 | 42.2 | 34.2 | 28.2 | 23.8 | 13.4 | 8.6 | 5.9 | | | | |
| Sag | f | 1.8 | 2.8 | 4.1 | 5.6 | 7.3 | 9.2 | 11.4 | 13.8 | 16.5 | 29.3 | 46.0 | 65.4 | | | | |
| Σ200/5 | q | 264.0 | 169.0 | 117.0 | 86.2 | 66.0 | 52.0 | 42.2 | 34.8 | 29.2 | 16.4 | 10.4 | 7.3 | | | | |
| Sag | f | 1.8 | 2.9 | 4.1 | 5.6 | 7.4 | 9.3 | 11.5 | 13.9 | 16.6 | 29.4 | 45.5 | 66.2 | | | | |
| Σ300/2 | q | 197.6 | 126.8 | 88.0 | 64.6 | 49.4 | 39.0 | 31.6 | 26.2 | 22.0 | 12.2 | 7.8 | 5.5 | | | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 4.9 | 6.2 | 7.7 | 9.3 | 11.1 | 19.4 | 30.4 | 44.4 | | | | |
| Σ300/2.5 | q | 249.2 | 159.4 | 110.6 | 81.2 | 62.2 | 49.2 | 39.8 | 32.8 | 27.6 | 15.4 | 9.8 | 6.9 | | | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 4.9 | 6.3 | 7.7 | 9.3 | 11.1 | 19.6 | 30.4 | 44.4 | | | | |
| Σ300/3 | q | 299.0 | 191.4 | 132.8 | 97.6 | 74.8 | 59.0 | 47.8 | 39.4 | 33.2 | 18.6 | 11.8 | 8.2 | 6.1 | | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 4.9 | 6.3 | 7.7 | 9.3 | 11.1 | 19.8 | 30.6 | 44.1 | 60.8 | | | |
| Σ300/4 | q | 398.0 | 254.8 | 176.8 | 129.8 | 99.2 | 78.6 | 63.6 | 52.6 | 44.2 | 24.8 | 15.8 | 11.0 | 8.0 | 6.2 | | |
| Sag | f | 1.3 | 1.9 | 2.8 | 3.8 | 4.9 | 6.3 | 7.7 | 9.4 | 11.2 | 19.9 | 30.9 | 44.6 | 60.1 | 79.5 | | |
| Σ300/5 | q | 488.6 | 313.4 | 217.4 | 159.6 | 122.4 | 96.6 | 78.2 | 64.6 | 54.4 | 30.6 | 19.4 | 13.6 | 9.8 | 7.6 | | |
| Sag | f | 1.2 | 1.9 | 2.8 | 3.8 | 5.0 | 6.3 | 7.8 | 9.4 | 11.2 | 20.0 | 30.9 | 44.9 | 59.9 | 79.2 | | |
| Σ400/2 | q | 238.4 | 152.6 | 106.0 | 78.0 | 59.6 | 47.2 | 38.2 | 31.4 | 26.4 | 14.8 | 9.4 | 6.6 | 4.8 | 4.9 | | |
| Sag | f | 0.7 | 1.2 | 1.7 | 2.3 | 3.0 | 3.7 | 4.6 | 5.6 | 6.6 | 11.7 | 18.2 | 26.5 | 35.7 | 36.4 | | |
| Σ400/2.5 | q | 302.6 | 194.0 | 134.8 | 99.0 | 75.8 | 59.8 | 48.4 | 40.0 | 33.6 | 18.8 | 12.0 | 8.4 | 6.0 | 4.7 | | |
| Sag | f | 0.7 | 1.2 | 1.7 | 2.3 | 3.0 | 3.8 | 4.7 | 5.6 | 6.7 | 11.9 | 18.5 | 26.9 | 35.5 | 47.5 | | |
| Σ400/3 | q | 415.4 | 265.8 | 184.6 | 135.4 | 103.8 | 82.0 | 66.4 | 54.8 | 46.0 | 25.8 | 16.6 | 11.4 | 8.4 | 6.4 | 5.1 | |
| Sag | f | 0.9 | 1.3 | 1.9 | 2.6 | 3.4 | 4.3 | 5.3 | 6.5 | 7.7 | 13.6 | 21.3 | 30.4 | 41.5 | 53.9 | 68.8 | |
| Σ400/4 | q | 604.4 | 386.8 | 268.6 | 197.2 | 150.8 | 119.2 | 96.6 | 79.8 | 67.0 | 37.6 | 24.0 | 16.6 | 12.2 | 9.4 | 7.4 | 6.0 |
| Sag | f | 0.9 | 1.5 | 2.1 | 2.9 | 3.7 | 4.7 | 5.8 | 7.1 | 8.4 | 14.9 | 23.2 | 33.3 | 45.3 | 59.6 | 75.1 | 92.8 |
| Σ400/5 | q | 745.0 | 477.2 | 331.2 | 243.6 | 186.4 | 147.2 | 119.4 | 98.6 | 82.8 | 46.6 | 29.8 | 20.6 | 15.2 | 11.6 | 9.2 | 7.4 |
| Sag | f | 0.9 | 1.5 | 2.1 | 2.9 | 3.7 | 4.7 | 5.8 | 7.1 | 8.4 | 14.9 | 23.3 | 33.4 | 45.7 | 59.5 | 75.6 | 92.7 |

**Terms:**

$A_{net}$ = average area through hole.
$A_{eff}$ = effective area with regard to buckling.
$N_k$, $M_{xk}$, $M_{yk}$ = characteristic bearing capacity for normal force and moment.
$K_v$ = the torsional stiffness' cross-sectional factor, for double beams the values apply with a distance between screws of < = 200 mm.

**Distance between screws for double beams**

- 1000 mm if the beams are braced on the sides.
- 500 mm on the side under pressure if the beams can buckle out to the side, 1000 mm on the side under tension.
- 500 mm on both sides if the beams are under pressure or if it is not certain how the beams will be turned.

**Reduction factor for lateral-torsional buckling:**

$\omega_b = 1.0$ if $l < = l_o$
$\omega_b = 1.0 - \omega_o(l/l_o - 1)$ if $l > = l_o$
where l is the distance between bracing points and $l_o$ and $\omega_o$ are as given in the table. The formula is on the safe side for long lengths ($l > 2l_o$). This is valid for cases with constant moment between side braces and is on the safe side for most other cases.

**The table gives the values:**

q KN/m
f mm
q: Gives the beam's bearing capacity (loading capacity) including the beam's own weight. The value is valid for safety class 3 (n=1.2).
For other safety classes, the bearing capacity is found by multiplying the table value by:
1.20 in safety class 1
1.09 in safety class 2
f: Gives the associated sag at the beam's middle for the respective q value.
*No consideration is given to lateral-torsional buckling ($\omega_b = 1$).*

**References:**


- StBK-N5, Code for Thin Gauge Steel Structures 79. Statens Stål-byggnadskommitté (National Swedish committee on regulations for steel) Stockholm 1980
- BSK 99, The Swedish National Board of Housing, Building and Planning's handbook on steel constructions, December 2001


*If values according to Eurocode 3 are needed, please contact Weland Lagersystem AB.*

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