Tables of cross-section values according to DIN 18 807 Hoesch Trapezoidal sheet

Info 4.3.5 GB

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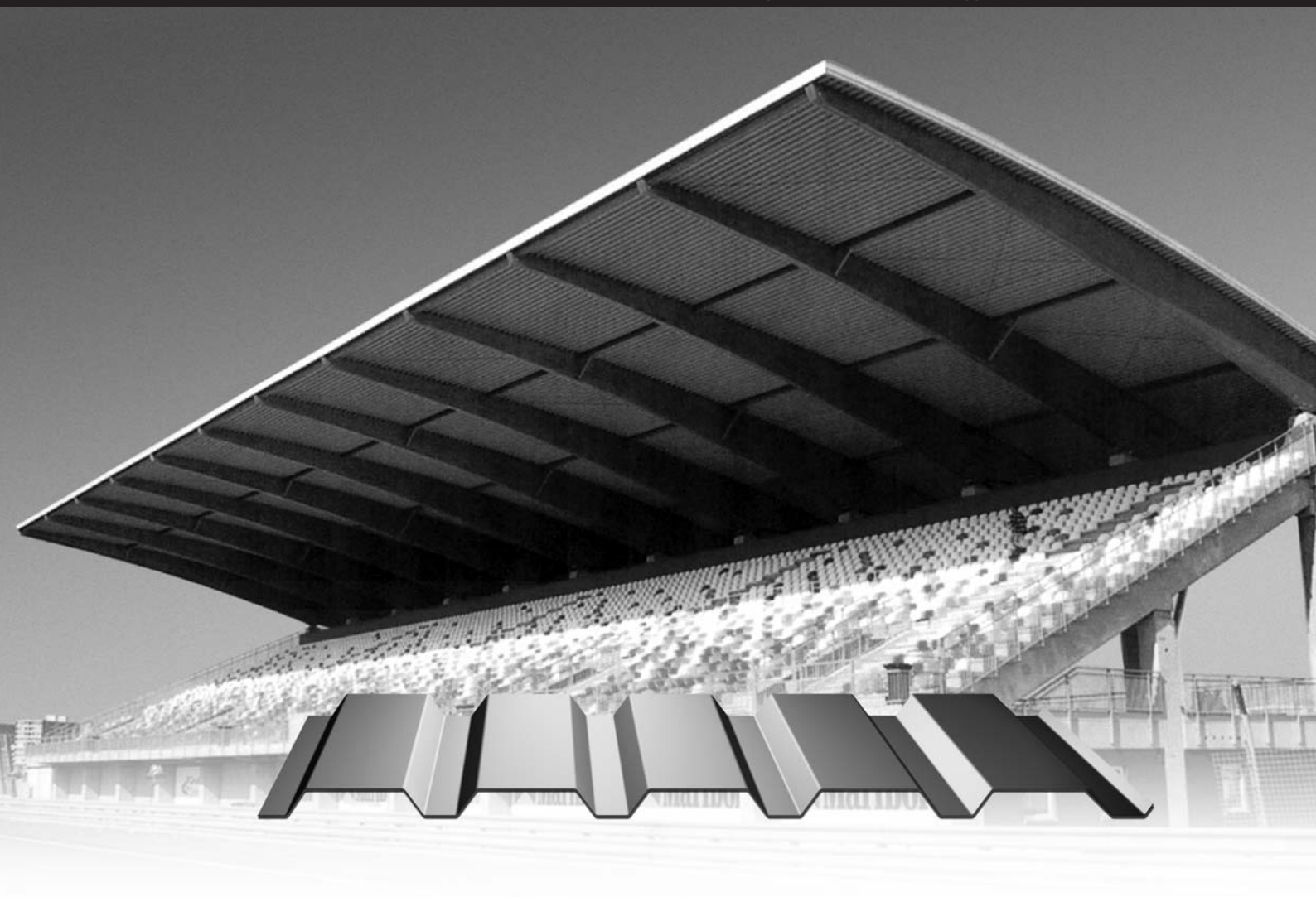

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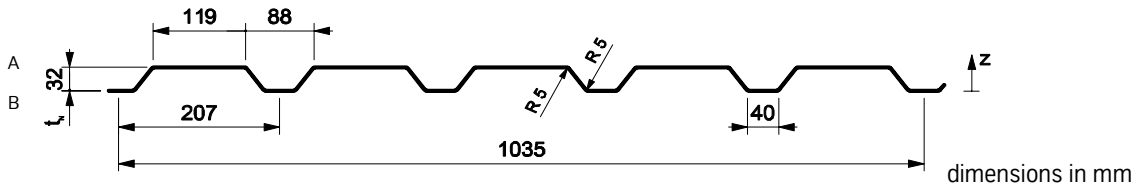
Hoesch Trapezoidal sheet T 35.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.63	0.0601	9.4	12.5	7.04	1.33	2.07	2.84	1.40	1.65	–	–
0.75	0.0716	13.3	14.6	8.47	1.33	2.07	3.99	1.38	1.66	0.90	1.13
0.88	0.084	16.7	17.6	10.0	1.33	2.07	5.39	1.36	1.67	1.40	1.75
1.00	0.0955	20.3	20.3	11.5	1.33	2.07	6.80	1.34	1.69	1.80	2.25
1.25	0.119	25.6	25.0	14.4	1.33	2.07	10.0	1.33	1.72	4.40	5.50
1.50	0.143	30.8	29.7	17.4	1.33	2.07	12.8	1.33	1.79	5.30	6.63

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.63	1.8	1.91	2.39	1.8	0.242	9.01	0.16	5.4	8.3
0.75	1.7	2.52	3.80	1.7	0.201	5.67	0.18	6.5	10.0
0.88	1.5	3.24	5.78	1.5	0.170	3.73	0.19	7.7	11.8
1.00	1.4	3.96	8.07	1.4	0.149	2.67	0.20	8.8	13.5
1.25	1.3	5.61	14.4	1.3	0.118	1.50	0.23	11.1	17.0
1.50	1.2	7.43	23.0	1.2	0.098	0.935	0.25	13.4	20.5
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.63	1.8	3.11	2.28	1.8	0.242	8.08	0.22	5.4	8.3
0.75	1.7	4.11	3.62	1.7	0.201	5.09	0.22	6.5	10.0
0.88	1.5	5.29	5.51	1.5	0.170	3.34	0.22	7.7	11.8
1.00	1.4	6.46	7.69	1.4	0.149	2.39	0.22	8.8	13.5
1.25	1.3	9.15	13.7	1.3	0.118	1.34	0.22	11.1	17.0
1.50	1.2	12.1	21.9	1.2	0.098	0.84	0.22	13.5	20.5

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 35.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 0 mm, ε = 1						
0.63	1.40	10.5	8.01	1.53	11.17	1.16	5.10			
0.75	1.87	13.2	10.1	2.42	12.34	1.65	6.74			
0.88	2.46	17.8	13.7	2.97	19.60	2.19	9.47			
1.00	3.00	22.1	16.9	3.50	26.95	2.69	12.0			
1.25	4.04	32.0	24.4	4.86	42.77	3.85	17.7			
1.50	5.09	41.6	31.9	6.23	61.68	5.03	23.6			
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 60 mm, ε =						
0.63	1.40	10.5	8.01			1.35	8.37			
0.75	1.87	13.2	10.1			1.83	11.3			
0.88	2.46	17.8	13.7			2.43	15.0			
1.00	3.00	22.1	16.9			3.02	18.5			
1.25	4.04	32.0	24.4			4.35	26.7			
1.50	5.09	41.6	31.9			5.66	34.8			

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.63	1.30	10.5			1.34	8.53	5.24			0.663	4.27
0.75	1.65	13.2			1.62	10.0	6.63			0.816	5.00
0.88	2.70	17.8			2.23	13.8	8.91			1.110	6.92
1.00	3.53	22.1			2.82	17.3	11.0			1.410	8.67
1.25	4.45	32.0			3.96	24.5	15.9			1.990	12.2
1.50	5.35	41.6			4.95	31.6	20.9			2.460	15.8

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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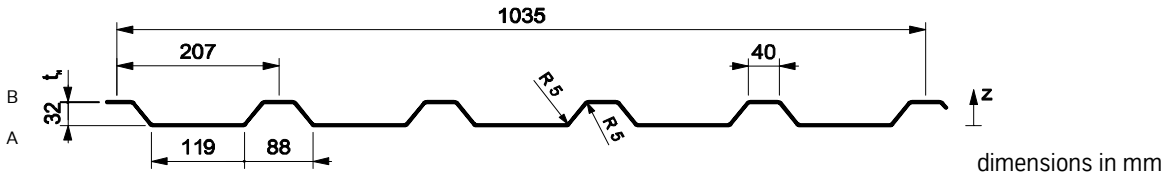
Hoesch Trapezoidal sheet T 35.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.63	0.0601	12.5	9.4	7.04	1.33	1.13	2.84	1.40	1.55	–	–
0.75	0.0716	14.6	13.3	8.47	1.33	1.13	3.99	1.38	1.54	1.10	1.38
0.88	0.084	17.6	16.7	10.0	1.33	1.13	5.39	1.36	1.53	2.10	2.63
1.00	0.0955	20.3	20.3	11.5	1.33	1.13	6.80	1.34	1.51	3.00	3.75
1.25	0.119	25.0	25.6	14.4	1.33	1.13	10.0	1.33	1.48	4.40	5.50
1.50	0.143	29.7	30.8	17.4	1.33	1.13	12.8	1.33	1.41	5.30	6.63

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.63	2.0	3.30	2.99	2.0	0.242	7.87	0.11	6.25	7.90
0.75	1.8	4.36	4.75	1.8	0.201	4.95	0.13	7.50	9.50
0.88	1.6	5.61	7.23	1.6	0.170	3.25	0.14	8.80	11.2
1.00	1.5	6.85	10.1	1.5	0.149	2.33	0.15	10.1	12.8
1.25	1.4	9.70	18.8	1.4	0.118	1.31	0.16	12.8	16.2
1.50	1.2	12.9	28.8	1.2	0.098	0.817	0.18	15.4	19.5
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.63	2.0	3.30	2.99	2.0	0.242	7.87	0.11	6.25	7.90
0.75	1.8	4.36	4.75	1.8	0.201	4.95	0.13	7.50	9.50
0.88	1.6	5.61	7.23	1.6	0.170	3.25	0.14	8.80	11.2
1.00	1.5	6.85	10.1	1.5	0.149	2.33	0.15	10.1	12.8
1.25	1.4	9.70	18.8	1.4	0.118	1.31	0.16	12.8	16.2
1.50	1.2	12.9	28.8	1.2	0.098	0.817	0.18	15.4	19.5

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 35.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 0 mm, ε = 1						
0.63	1.30	10.5	8.01	1.52	12.77	1.19	5.36			
0.75	1.82	13.2	10.1	1.80	27.54	1.56	7.92			
0.88	2.70	17.8	13.7	2.63	31.30	2.21	10.7			
1.00	3.53	22.1	16.9	3.39	36.61	2.79	13.3			
1.25	4.45	32.0	24.4	4.38	81.91	3.89	20.3			
1.50	5.35	41.6	31.9	5.36	161.3	4.96	27.3			
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 60 mm, ε =						
0.63	1.30	10,5	8,01			1,46	9,29			
0.75	1.82	13,2	10,1			1,77	10,9			
0.88	2.70	17,8	13,7			2,43	15,0			
1.00	3.53	22,1	16,9			3,06	18,9			
1.25	4.45	32,0	24,4			4,30	26,7			
1.50	5.35	41,6	31,9			5,37	34,5			

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.63	1.40	10.5			1.26	7.70	5.24			0.629	3.86
0.75	1.87	13.2			1.68	10.4	6.63			0.85	5.19
0.88	2.46	17.8			2.23	13.8	8.91			1.12	6.90
1.00	3.00	22.1			2.75	17.0	11.0			1.38	8.48
1.25	4.04	32.0			4.00	24.5	15.9			2.01	12.2
1.50	5.09	41.6			5.20	32.0	20.9			2.60	16.0

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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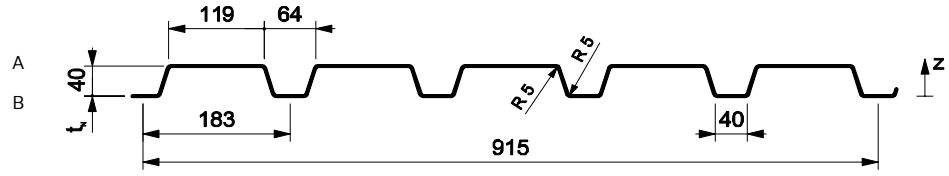
Hoesch Trapezoidal sheet T 40.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.082	21.6	21.6	9.41	1.63	2.69	4.53	1.73	2.08	1.20	1.50
0.88	0.0962	27.7	27.7	11.1	1.63	2.69	6.13	1.70	2.09	2.70	3.38
1.00	0.109	35.2	35.2	12.7	1.63	2.69	7.75	1.68	2.11	3.90	4.88
1.25	0.137	44.1	44.1	16.0	1.63	2.69	11.5	1.66	2.15	5.10	6.38
1.50	0.164	52.9	52.9	19.4	1.63	2.69	14.8	1.66	2.23	6.20	7.75

Shear plate input

				zulT_3 = G_s/750 [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	minL_s [4] [m]	zulT_1 [kN/m]	zulT_2 [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	1.9	2.04	2.86	1.9	0.234	10.2	0.17	6.5	10.0
0.88	1.7	2.62	4.35	1.7	0.198	6.71	0.18	7.7	11.8
1.00	1.6	3.21	6.07	1.6	0.173	4.80	0.19	8.8	13.5
1.25	1.5	4.54	10.8	1.5	0.137	2.69	0.22	11.1	17.0
1.50	1.3	6.01	17.3	1.3	0.114	1.69	0.24	13.4	20.6
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	1.9	2.86	2.71	2.1	0.234	9.71	0.23	6.5	10.0
0.88	1.7	3.68	4.13	1.9	0.198	6.38	0.23	7.7	11.8
1.00	1.6	4.50	5.77	1.6	0.173	4.57	0.23	8.8	13.5
1.25	1.5	6.36	10.3	1.5	0.137	2.56	0.23	11.1	17.0
1.50	1.3	8.43	16.5	1.3	0.114	1.60	0.23	13.4	20.6

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 40.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 1						
0.75	2.57	8.5	6.5	3.32	37.18	2.70	15.3			
0.88	3.31	16.0	12.2	4.32	53.57	3.63	26.5			
1.00	4.04	23.1	17.7	5.24	70.74	4.50	37.0			
1.25	5.51	37.7	28.9	7.16	113.8	6.12	58.8			
1.50	6.98	52.4	40.0	9.07	166.0	7.74	80.6			
		[2)] b_A+ov = mm		[4)] Width of the internal support $b_B \ge$ mm, ε =						
0.75										
0.88										
1.00										
1.25										
1.50										

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	2.48	8.5			3.06	14.0	4.25			1.53	6.99
0.88	3.35	15.5			3.69	15.5	7.73			1.85	7.73
1.00	4.14	17.2			4.59	17.2	8.57			2.30	8.57
1.25	5.62	20.2			6.38	20.2	10.1			3.20	10.1
1.50	7.11	23.0			8.25	23.0	11.5			4.13	11.5

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k} = 0$ for the ULS or use the elastic-elastic design method.

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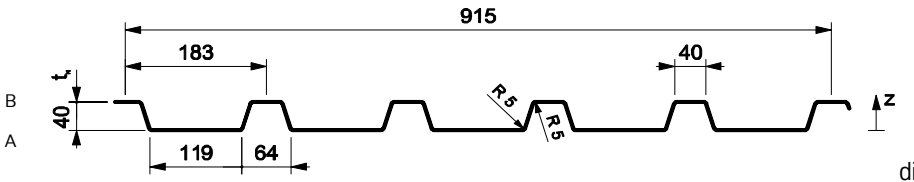
Hoesch Trapezoidal sheet T 40.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.082	21.6	21.6	9.41	1.63	1.38	4.53	1.73	1.92	1.20	1.50
0.88	0.0962	27.7	27.7	11.1	1.63	1.38	6.13	1.70	1.91	3.20	4.00
1.00	0.109	35.2	35.2	12.7	1.63	1.38	7.75	1.68	1.89	4.80	6.00
1.25	0.137	44.1	44.1	16.0	1.63	1.38	11.5	1.66	1.85	5.40	6.75
1.50	0.164	52.9	52.9	19.4	1.63	1.38	14.8	1.66	1.77	6.50	8.13

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	2.0	3.79	3.97	2.2	0.234	7.18	0.14	7.50	9.50
0.88	1.9	4.87	6.04	1.9	0.198	4.71	0.15	8.90	11.2
1.00	1.7	5.95	8.43	1.7	0.173	3.38	0.16	10.1	12.8
1.25	1.5	8.43	15.0	1.5	0.137	1.89	0.18	12.8	16.2
1.50	1.4	11.2	24.1	1.4	0.114	1.18	0.20	15.4	19.5
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	1.5	7.71	10.7	1.5	0.234	0.83	0.57	7.50	9.50
0.88	1.4	9.92	16.2	1.4	0.198	0.55	0.57	8.90	11.2
1.00	1.3	12.1	22.6	1.3	0.173	0.39	0.57	10.1	12.8
1.25	1.2	17.2	40.4	1.2	0.137	0.22	0.57	12.8	16.2
1.50	1.1	22.7	64.6	1.1	0.114	0.14	0.57	15.4	19.5

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 40.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 1						
0.75	2.48	8.5	6.5	3.26	72.37	2.92	12.3			
0.88	3.35	16.0	12.2	3.85	95.48	3.53	14.4			
1.00	4.14	23.1	17.7	4.41	183.0	4.20	37.0			
1.25	5.62	37.7	28.9	5.93	423.4	5.78	58.8			
1.50	7.11	52.4	40.0	–	–	7.28	80.6			
		[2)] b_A+ov = mm		[4)] Width of the internal support $b_B \ge$ mm, ε =						
0,75										
0,88										
1,00										
1,25										
1,50										

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	2.57	8.5			3.06	13.1	4.25			1.53	6.55
0.88	3.31	15.5			4.11	16.7	7.73			2.06	8.33
1.00	4.04	17.2			5.10	19.2	8.57			2.55	9.61
1.25	5.51	20.2			6.94	24.0	10.1			3.47	12.0
1.50	6.98	23.0			8.77	27.9	11.5			4.39	13.9

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k} = 0$ for the ULS or use the elastic-elastic design method.

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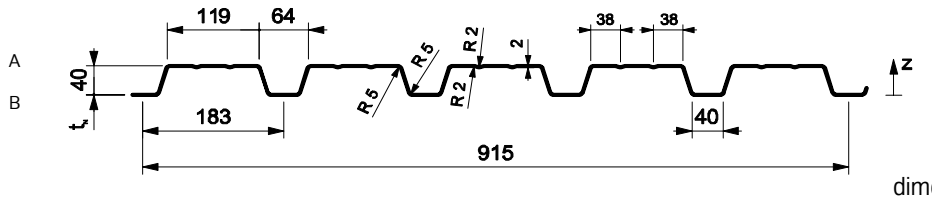
Hoesch Trapezoidal sheet T 40.1 S **positive position** (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section											
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0820	26.4	26.4	9.41	1.63	2.69	5.02	1.73	2.26	1.70	2.13
0.88	0.0962	31.2	31.2	11.1	1.63	2.69	6.71	1.71	2.25	2.80	3.50
1.00	0.109	35.2	35.2	12.7	1.63	2.69	8.39	1.69	2.25	3.90	4.88
1.25	0.137	44.1	44.1	16.0	1.63	2.69	11.8	1.66	2.20	5.00	6.25
1.50	0.164	52.9	52.9	19.4	1.63	2.69	14.7	1.65	2.22	6.00	7.50

Shear plate input									
				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	1.9	2.04	2.86	1.9	0.234	10.2	0.17	6.50	10.0
0.88	1.7	2.62	4.35	1.7	0.198	6.71	0.18	7.70	11.8
1.00	1.6	3.21	6.07	1.6	0.173	4.80	0.19	8.80	13.5
1.25	1.5	4.54	10.8	1.5	0.137	2.69	0.22	11.1	17.0
1.50	1.3	6.01	17.3	1.3	0.114	1.69	0.24	13.4	20.6
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	1.9	2.86	2.71	2.1	0.234	9.71	0.23	6.50	10.0
0.88	1.7	3.68	4.13	1.9	0.198	6.38	0.23	7.70	11.8
1.00	1.6	4.50	5.77	1.6	0.173	4.57	0.23	8.80	13.5
1.25	1.5	6.36	10.3	1.5	0.137	2.56	0.23	11.1	17.0
1.50	1.3	8.43	16.5	1.3	0.114	1.60	0.23	13.4	20.6

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 40.1 S positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 1						
0.75	2.57	8.50	6.50	3.32	37.18	2.70	15.3			
0.88	3.49	16.0	12.2	4.32	53.57	3.63	26.5			
1.00	4.41	23.1	17.7	5.24	70.74	4.50	37.0			
1.25	5.70	37.7	28.9	7.16	113.8	6.12	58.8			
1.50	6.98	52.4	40.0	9.07	166.0	7.74	80.6			
		[2)] b_A+ov = mm		[4)] Width of the internal support $b_B \ge$ mm, ε =						
0.75										
0.88										
1.00										
1.25										
1.50										

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	2.48	8.50			3.06	14.0	4.25			1.53	6.99
0.88	3.35	15.5			3.69	15.5	7.73			1.85	7.73
1.00	4.14	17.2			4.59	17.2	8.57			2.30	8.57
1.25	5.62	20.2			6.38	20.2	10.1			3.20	10.1
1.50	7.11	23.0			8.25	23.0	11.5			4.13	11.5

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k} = 0$ for the ULS or use the elastic-elastic design method.

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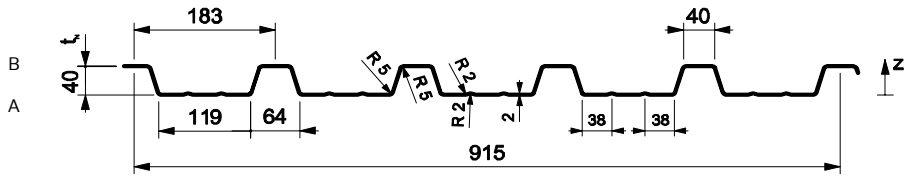
Hoesch Trapezoidal sheet T 40.1 S **negative position** (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section											
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			**L_{gr} [m]**	
t_N [mm]	**g** [kN/m²]	**I^+_{ef}** [cm⁴/m]	**I^-_{ef}** [cm⁴/m]	**A_g** [cm²/m]	**i_g** [cm]	**z_g** [cm]	**A_{ef}** [cm²/m]	**i_{ef}** [cm]	**z_{ef}** [cm]	Single-span beam	Multi-span beam
0.75	0.0820	26.4	26.4	9.41	1.63	1.38	5.02	1.73	1.74	1.60	2.00
0.88	0.0962	31.2	31.2	11.1	1.63	1.38	6.71	1.71	1.75	2.90	3.63
1.00	0.109	35.2	35.2	12.7	1.63	1.38	8.39	1.69	1.75	3.90	4.88
1.25	0.137	44.1	44.1	16.0	1.63	1.38	11.8	1.66	1.80	5.40	6.75
1.50	0.164	52.9	52.9	19.4	1.63	1.38	14.7	1.65	1.78	6.50	8.13

Shear plate input									
				$zulT_3 = G_s/750$ [kN/m]				**zul F_t [7]**	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	**$minL_s$** [4] [m]	**$zulT_1$** [kN/m]	**$zulT_2$** [kN/m]	**L_G** [5] [m]	**K_1** [m/kN]	**K_2** [m²/kN]	**K_3** [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	2.0	3.79	3.97	2.2	0.234	7.18	0.14	14.0	14.0
0.88	1.9	4.87	6.04	1.9	0.198	4.71	0.15	16.6	16.6
1.00	1.7	5.95	8.43	1.7	0.173	3.38	0.16	18.9	18.9
1.25	1.5	8.43	15.0	1.5	0.137	1.89	0.18	23.9	23.9
1.50	1.4	11.2	24.1	1.4	0.114	1.18	0.20	28.8	28.8
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	1.5	7.71	10.7	1.5	0.234	0.831	0.57	14.0	14.0
0.88	1.4	9.92	16.2	1.4	0.198	0.546	0.57	16.6	16.6
1.00	1.3	12.1	22.6	1.3	0.173	0.391	0.57	18.9	18.9
1.25	1.2	17.2	40.4	1.2	0.137	0.219	0.57	23.9	23.9
1.50	1.1	22.7	64.6	1.1	0.114	0.137	0.57	28.8	28.8

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 40.1 S negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 1						
0.75	2.48	8.50	6.50	3.26	72.37	2.92	12.3			
0.88	3.35	16.0	12.2	3.85	95.48	3.53	14.4			
1.00	4.14	23.1	17.7	4.41	183.0	4.20	37.0			
1.25	5.62	37.7	28.9	5.93	423.4	5.78	58.8			
1.50	7.11	52.4	40.0	–	–	7.28	80.6			
		[2)] b_A+ov = mm		[4)] Width of the internal support $b_B \ge$ mm, ε =						
0.75										
0.88										
1.00										
1.25										
1.50										

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	2.57	8.50			3.06	13.1	4.25			1.53	6.55
0.88	3.31	15.5			4.11	16.7	7.73			2.06	8.33
1.00	4.04	17.2			5.10	19.2	9.10			2.55	9.61
1.25	5.51	20.2			6.94	24.0	10.1			3.47	12.0
1.50	6.98	23.0			8.77	27.9	11.5			4.39	13.9

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k} = 0$ for the ULS or use the elastic-elastic design method.

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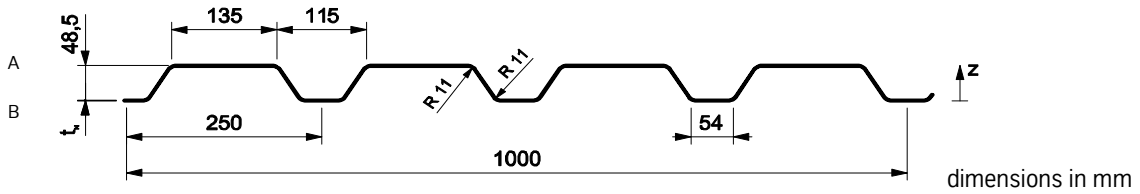
Hoesch Trapezoidal sheet T 50.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section										Maximum spans [3]	
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force							
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.63	0.0630	29.2	29.2	7.38	2.02	3.10	2.45	2.19	2.42	–	–
0.75	0.0750	35.1	35.1	8.88	2.02	3.10	3.47	2.15	2.43	1.77	2.21
0.88	0.0880	41.5	41.5	10.5	2.02	3.10	4.74	2.12	2.45	2.50	3.13
1.00	0.100	47.5	47.5	12.0	2.02	3.10	6.05	2.09	2.46	2.86	3.57
1.25	0.125	59.8	59.8	15.1	2.02	3.10	9.14	2.05	2.48	3.60	4.50
1.50	0.150	72.2	72.2	18.3	2.02	3.10	12.6	2.02	2.51	4.35	5.43

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.63	2.6	1.61	1.86	2.6	0.255	19.0	0.20	5.40	8.30
0.75	2.4	2.13	2.96	2.4	0.212	12.0	0.22	6.50	10.0
0.88	2.2	2.74	4.50	2.2	0.179	7.86	0.24	7.70	11.8
1.00	2.0	3.35	6.29	2.0	0.157	5.63	0.26	8.80	13.5
1.25	1.8	4.73	11.2	1.8	0.125	3.16	0.29	11.1	17.0
1.50	1.7	6.27	17.9	1.7	0.103	1.97	0.32	13.4	20.6
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.63	2.7	3.21	1.76	2.7	0.255	15.1	0.32	5.40	8.30
0.75	2.5	4.24	2.79	2.5	0.212	9.50	0.32	6.50	10.0
0.88	2.3	5.46	4.24	2.3	0.179	6.24	0.32	7.70	11.8
1.00	2.1	6.67	5.92	2.1	0.157	4.47	0.32	8.80	13.5
1.25	1.9	9.44	10.6	1.9	0.125	2.51	0.32	11.1	17.0
1.50	1.7	12.5	16.9	1.7	0.103	1.57	0.32	13.4	20.6

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 50.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	**min** ℓ [m]	**max** ℓ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 0 mm, ε = 1						
0.63	1.80	9.59	7.33	1.64	11.30	1.28	5.19			
0.75	2.30	13.8	10.5	2.39	12.60	1.81	7.02			
0.88	3.07	18.2	13.9	3.33	15.78	2.45	9.11			
1.00	3.77	22.4	17.2	4.21	18.73	3.03	11.0			
1.25	5.64	34.5	26.4	6.55	36.09	4.96	19.1			
1.50	7.52	46.6	35.6	8.89	53.34	6.90	27.0			
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 60 mm, ε = 1						
0.63	1.80	9.59	7.33	2.45	16.39	1.88	7.83			
0.75	2.30	13.8	10.5	3.24	20.64	2.42	9.96			
0.88	3.07	18.2	13.9	4.13	33.12	3.33	14.1			
1.00	3.77	22.4	17.2	4.94	44.51	4.19	18.0			
1.25	5.64	34.5	26.4	7.19	93.47	6.33	29.9			
1.50	7.52	46.6	35.6	9.42	142.2	8.46	41.7			

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =1				End support	[5)] Internal support, ε = 1			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.63	1.84	9.59	1.94	22.89	1.53	7.34	4.79	0.969	11.43	0.765	3.67
0.75	2.48	13.8	2.67	23.10	2.16	9.55	6.88	1.33	11.50	1.08	4.78
0.88	3.57	18.2	3.40	41.14	2.94	13.3	9.10	1.70	20.57	1.48	6.68
1.00	4.58	22.4	4.08	57.94	3.64	16.8	11.2	2.04	28.97	1.82	8.42
1.25	6.47	34.5	5.85	125.8	5.30	27.2	17.3	2.92	62.78	2.65	13.6
1.50	8.34	46.6	7.60	193.0	6.97	37.6	23.3	3.81	96.77	3.48	18.9

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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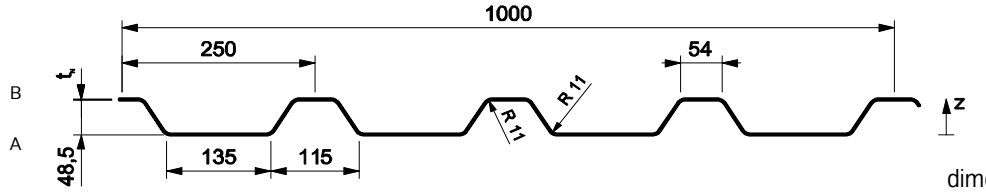
Hoesch Trapezoidal sheet T 50.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section											
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.63	0.0630	29.2	29.2	7.38	2.02	1.80	2.45	2.19	2.38	–	–
0.75	0.0750	35.1	35.1	8.88	2.02	1.80	3.47	2.15	2.37	2.20	2.75
0.88	0.0880	41.5	41.5	10.5	2.02	1.80	4.74	2.12	2.35	2.96	3.70
1.00	0.100	47.5	47.5	12.0	2.02	1.80	6.05	2.09	2.34	3.38	4.23
1.25	0.125	59.8	59.8	15.1	2.02	1.80	9.14	2.05	2.32	4.26	5.33
1.50	0.150	72.2	72.2	18.3	2.02	1.80	12.6	2.02	2.29	5.14	6.43

Shear plate input									
				$zulT_3 = G_s/750$ [kN/m]				$zul F_t$ [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.63	2.8	2.50	2.05	3.2	0.255	20.0	0.14	6.25	7.90
0.75	2.6	3.30	3.26	3.2	0.212	12.6	0.16	7.50	9.50
0.88	2.4	4.24	4.96	2.8	0.179	8.29	0.17	8.90	11.2
1.00	2.2	5.19	6.92	2.5	0.157	5.94	0.18	10.1	12.8
1.25	2.0	7.34	12.4	2.0	0.125	3.33	0.20	12.8	16.2
1.50	1.8	9.73	19.7	1.8	0.103	2.08	0.22	15.4	19.5
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.63	1.7	6.72	6.48	1.7	0.255	1.63	0.49	6.25	7.90
0.75	1.5	8.87	10.3	1.5	0.212	1.03	0.49	7.50	9.50
0.88	1.4	11.4	15.7	1.4	0.179	0.675	0.49	8.90	11.2
1.00	1.3	13.9	21.9	1.3	0.157	0.484	0.49	10.1	12.8
1.25	1.2	19.7	39.0	1.2	0.125	0.271	0.49	12.8	16.2
1.50	1.1	26.2	62.4	1.1	0.103	0.170	0.49	15.4	19.5

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 50.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	min ℓ [m]	max ℓ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 0 mm, ε = 1						
0.63	1.84	9.59	7.33	1.98	9.05	1.37	5.24			
0.75	2.48	13.8	10.5	2.33	16.64	1.78	7.62			
0.88	3.57	18.2	13.9	3.17	22.48	2.51	10.1			
1.00	4.58	22.4	17.2	3.93	27.82	3.17	12.4			
1.25	6.47	34.5	26.4	6.11	50.29	4.98	21.3			
1.50	8.34	46.6	35.6	8.28	72.70	6.79	30.2			
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 60 mm, ε = 1						
0.63	1.84	9.59	7.33	2.10	24.78	1.67	8.00			
0.75	2.48	13.8	10.5	2.91	25.17	2.36	10.4			
0.88	3.57	18.2	13.9	3.71	44.89	3.20	14.5			
1.00	4.58	22.4	17.2	4.44	63.05	3.96	18.3			
1.25	6.47	34.5	26.4	6.36	136.7	5.78	29.5			
1.50	8.34	46.6	35.6	8.27	210.1	7.59	40.8			

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =1				End support	[5)] Internal support, ε = 1			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.63	1.80	9.59	2.24	14.99	1.72	7.19	4.79	1.12	7.49	0.850	3.60
0.75	2.30	13.8	2.98	18.98	2.23	9.15	6.89	1.50	9.56	1.12	4.57
0.88	3.07	18.2	3.79	30.40	3.06	13.0	9.10	1.90	15.24	1.53	6.51
1.00	3.77	22.4	4.54	40.91	3.84	16.6	11.2	2.28	20.54	1.92	8.28
1.25	5.64	34.5	6.60	85.80	5.81	27.5	17.3	3.30	42.90	2.91	13.8
1.50	7.52	46.6	8.65	130.6	7.77	38.4	23.3	4.33	65.38	3.89	19.2

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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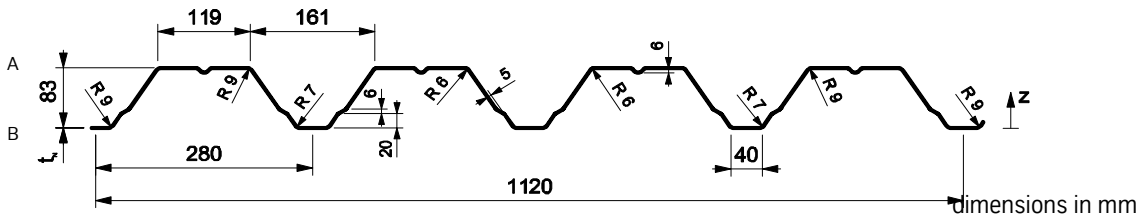
Hoesch Trapezoidal sheet T 85.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section										Maximum spans [3]	
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force							
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0803	91.0	91.0	9.3	3.12	5.03	4.38	3.56	4.53	3.50	4.38
0.88	0.0942	108	108	11.0	3.12	5.03	5.84	3.53	4.61	4.93	6.16
1.00	0.107	123	123	12.6	3.12	5.03	7.40	3.49	4.69	5.63	7.04
1.25	0.134	155	155	15.9	3.12	5.03	11.00	3.42	4.80	7.10	8.88
1.50	0.161	187	187	19.2	3.12	5.03	14.80	3.34	4.94	8.57	10.70

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	3.0	1.77	3.14	3.0	0.229	18.0	0.42	9.00	11.0
0.88	2.7	2.27	4.78	2.7	0.193	11.8	0.45	10.6	13.0
1.00	2.6	2.78	6.67	2.6	0.169	8.48	0.48	12.2	14.8
1.25	2.3	3.93	11.9	2.3	0.134	4.75	0.54	15.3	18.7
1.50	2.1	5.21	19.0	2.1	0.111	2.97	0.60	18.5	22.6
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	3.2	4.31	3.06	3.2	0.229	11.6	0.57	9.00	11.0
0.88	2.9	5.55	4.66	2.9	0.193	7.64	0.57	10.6	13.0
1.00	2.8	6.78	6.51	2.9	0.169	5.47	0.57	12.2	14.8
1.25	2.5	9.60	11.6	2.5	0.134	3.07	0.57	15.3	18.7
1.50	2.2	12.7	18.6	2.2	0.111	1.92	0.57	18.5	22.6

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 85.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	6.03	9.4	7.19	6.12	26.22	6.12	21.3	3.69	5.19	1.26
0.88	8.12	13.1	10.00	7.97	38.11	7.97	30.7	3.61	5.07	1.53
1.00	9.23	16.4	12.50	9.59	48.31	9.59	38.9	3.38	4.92	2.01
1.25	11.60	21.6	16.50	12.00	64.09	12.00	51.9	2.77	4.62	3.81
1.50	14.00	26.0	19.90	14.40	77.03	14.40	62.6	2.78	4.63	4.59
		[2) 4)] b_A+ov ≥ 90 mm		[4)] Width of the internal support $b_B \ge$ 120 mm, ε = 2						
0.75	6.03	12.2	9.35	6.45	34.79	6.45	28.2	3.81	5.72	1.36
0.88	8.12	17.1	13.00	8.28	50.36	8.28	41.0	3.48	5.72	2.14
1.00	9.23	21.3	16.30	9.98	64.76	9.98	52.2	2.99	5.18	2.85
1.25	11.60	28.1	21.50	13.10	84.69	13.10	68.7	2.10	3.84	4.32
1.50	14.00	33.8	25.90	15.80	102.2	15.80	82.8	2.09	3.84	5.23

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	6.27	9.4	7.21	33.30	7.21	27.0	4.69	3.60	16.62	3.60	13.4
0.88	8.36	13.1	9.06	47.56	9.06	38.6	6.56	4.54	23.86	4.54	19.4
1.00	9.78	16.4	10.80	61.13	10.80	49.6	8.19	5.41	30.70	5.41	24.8
1.25	12.30	21.6	14.30	80.55	14.30	65.1	10.80	7.16	40.14	7.16	32.6
1.50	14.90	26.0	17.30	96.91	17.30	78.5	13.00	8.64	48.21	8.64	39.3

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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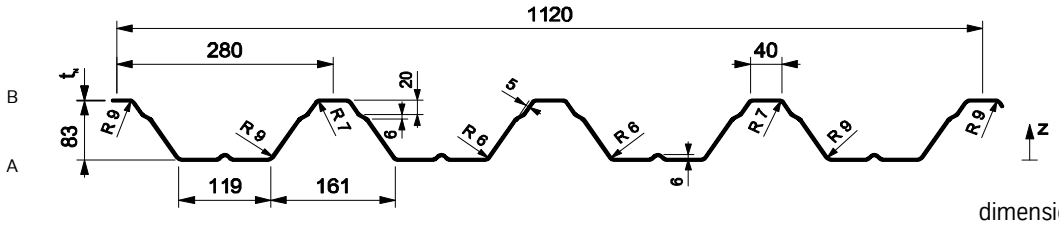
Hoesch Trapezoidal sheet T 85.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0803	91.0	91.0	9.3	3.12	3.27	4.38	3.56	3.77	3.38	4.22
0.88	0.0942	108	108	11.0	3.12	3.27	5.84	3.53	3.69	4.71	5.89
1.00	0.107	123	123	12.6	3.12	3.27	7.40	3.49	3.61	5.38	6.72
1.25	0.134	155	155	15.9	3.12	3.27	11.00	3.42	3.50	6.78	8.48
1.50	0.161	187	187	19.2	3.12	3.27	14.80	3.34	3.36	8.19	10.20

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	minL_s [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	3.2	2.40	2.66	5.3	0.229	28.0	0.23	14.0	14.0
0.88	2.9	3.09	4.05	4.5	0.193	18.4	0.26	16.6	16.6
1.00	2.8	3.78	5.65	3.9	0.169	13.2	0.27	18.9	18.9
1.25	2.5	5.35	10.1	3.1	0.134	7.39	0.31	23.9	23.9
1.50	2.2	7.09	16.1	2.6	0.111	4.62	0.34	28.8	28.8
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	1.3	11.3	18.9	1.3	0.229	0.64	0.69	14.0	14.0
0.88	1.2	14.5	28.7	1.2	0.193	0.42	0.69	16.6	16.6
1.00	1.1	17.7	40.1	1.1	0.169	0.30	0.69	18.9	18.9
1.25	1.0	25.1	71.6	1.0	0.134	0.17	0.69	23.9	23.9
1.50	0.9	33.3	114.0	0.9	0.111	0.11	0.69	28.8	28.8

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k.}$
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 85.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kNm/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	6.27	9.4	7.19	6.53	19.04	6.53	15.5	2.73	4.25	2.04
0.88	8.36	13.1	10.00	8.54	26.48	8.54	21.5	2.64	4.06	2.14
1.00	9.78	16.4	12.50	10.30	33.06	10.00	26.9	2.51	3.88	2.50
1.25	12.30	21.6	16.50	13.20	43.96	12.60	35.7	2.22	3.57	4.08
1.50	14.90	26.0	19.90	15.90	53.03	15.30	43.0	2.22	3.58	4.91
		[2)] b_A+ü ≥ 90 mm		[4)] Width of the internal support $b_B \ge 120$ mm, ε = 2						
0.75	6.27	12.2	9.35	6.36	29.25	6.36	23.9	1.98	3.73	2.21
0.88	8.36	17.1	13.00	8.00	41.86	8.00	34.0	1.98	3.55	2.93
1.00	9.78	21.3	16.30	9.54	54.05	9.54	43.8	1.87	3.25	3.51
1.25	12.30	28.1	21.50	12.60	70.99	12.60	57.5	1.60	2.60	4.50
1.50	14.90	33.8	25.90	15.30	85.66	15.30	69.3	1.60	2.55	5.15

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	6.03	9.4	7.31	39.47	7.31	32.0	4.69	3.65	19.68	3.65	16.0
0.88	8.12	13.1	9.38	56.97	9.38	46.4	6.56	4.69	28.59	4.69	23.1
1.00	9.23	16.4	11.30	73.28	11.30	59.2	8.19	5.64	36.57	5.64	29.6
1.25	11.60	21.6	14.80	95.79	14.80	77.9	10.80	7.43	47.97	7.43	38.9
1.50	14.00	26.0	17.80	115.6	17.80	93.8	13.00	8.96	57.77	8.96	46.9

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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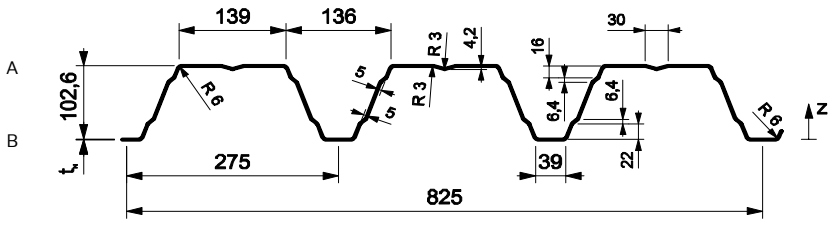
Hoesch Trapezoidal sheet T 100.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0909	167	167	10.76	3.94	6.22	4.13	4.45	5.65	5.08	6.35
0.88	0.107	198	198	12.73	3.94	6.22	5.39	4.43	5.70	7.70	9.63
1.00	0.121	226	226	14.55	3.94	6.22	6.65	4.41	5.75	10.12	12.65
1.25	0.152	285	257	18.33	3.94	6.22	9.51	4.37	5.85	12.39	15.49
1.50	0.182	344	310	22.12	3.94	6.22	12.48	4.30	6.01	14.99	18.74

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	4.0	1.77	1.86	5.0	0.257	36.099	0.42	9.00	12.0
0.88	3.7	2.28	2.83	4.2	0.217	23.711	0.46	10.6	14.2
1.00	3.5	2.79	3.95	3.7	0.190	16.981	0.49	12.2	16.2
1.25	3.1	3.94	7.04	3.1	0.151	9.521	0.55	15.3	20.5
1.50	2.8	5.23	11.25	2.8	0.125	5.953	0.61	18.5	24.7
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	4.2	3.62	1.77	4.2	0.257	29.296	0.63	9.00	12.0
0.88	3.8	4.65	2.70	4.1	0.217	19.242	0.63	10.6	14.2
1.00	3.6	5.68	3.76	4.1	0.190	13.781	0.63	12.2	16.2
1.25	3.2	8.04	6.71	4.2	0.151	7.727	0.63	15.3	20.5
1.50	2.9	10.66	10.74	4.3	0.125	4.831	0.63	18.5	24.7

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 100.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	6.53	9.46	9.46	6.96	24.38	6.96	21.8	2.51	3.14	2.51
0.88	8.63	13.16	13.16	8.63	33.78	8.63	30.22	2.47	3.10	3.39
1.00	10.6	17.04	17.04	10.15	43.65	10.15	39.03	2.43	3.06	4.20
1.25	15.7	19.49	19.49	13.36	49.64	13.36	44.41	2.41	3.05	6.26
1.50	18.9	27.49	27.49	16.12	69.70	16.12	62.35	2.40	3.04	7.55
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	6.53	9.46	9.46	6.96	35.51	6.96	31.77	2.14	2.97	3.47
0.88	8.63	13.16	13.16	8.63	48.88	8.63	43.71	2.13	2.96	4.62
1.00	10.6	17.04	17.04	10.15	62.73	10.15	56.10	2.11	2.95	5.69
1.25	15.7	19.49	19.49	13.36	70.54	13.36	63.12	2.09	2.92	8.53
1.50	18.9	27.49	27.49	16.12	98.13	16.12	87.79	2.07	2.90	10.30

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 1				End support	[5)] Internal support, ε = 1			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	8.02	39.67	9.23	103.1	7.10	79.34	19.83	4.61	51.49	3.55	39.67
0.88	10.5	62.98	11.73	163.8	9.02	125.95	31.49	5.86	81.81	4.51	62.98
1.00	12.8	87.09	14.23	228.0	10.87	174.17	43.54	7.11	113.9	5.43	87.09
1.25	17.0	134.91	19.40	350.8	14.92	269.83	67.45	9.70	175.4	7.46	134.91
1.50	20.5	192.81	24.84	501.3	19.11	385.62	96.40	12.42	250.6	9.55	192.81

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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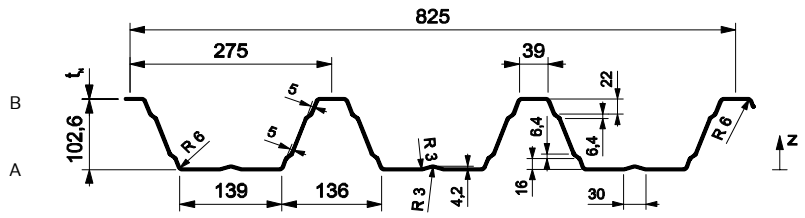
Hoesch Trapezoidal sheet T 100.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0909	167	167	10.76	3.94	4.04	4.13	4.45	4.61	4.42	5.53
0.88	0.107	198	198	12.73	3.94	4.04	5.39	4.43	4.56	7.12	8.90
1.00	0.121	226	226	14.55	3.94	4.04	6.65	4.41	4.51	9.61	12.01
1.25	0.152	257	285	18.33	3.94	4.04	9.51	4.37	4.41	12.39	15.49
1.50	0.182	310	344	22.12	3.94	4.04	12.48	4.30	4.25	14.99	18.74

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	4.3	2.60	1.87	6.2	0.257	43.045	0.22	14.0	14.0
0.88	3.9	3.34	2.84	6.3	0.217	28.273	0.24	16.6	16.6
1.00	3.7	4.08	3.97	6.4	0.190	20.249	0.26	18.9	18.9
1.25	3.3	5.78	7.07	5.3	0.151	11.353	0.29	23.9	23.9
1.50	3.0	7.66	11.31	4.4	0.125	7.099	0.32	28.8	28.8
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	1.5	10.69	13.37	1.5	0.257	1.091	0.89	14.0	14.0
0.88	1.4	13.76	20.26	1.4	0.217	0.717	0.89	16.6	16.6
1.00	1.3	16.81	28.43	1.3	0.190	0.513	0.89	18.9	18.9
1.25	1.2	23.79	50.70	1.2	0.151	0.288	0.89	23.9	23.9
1.50	1.1	31.53	81.08	1.1	0.125	0.125	0.89	28.8	28.8

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 100.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kNm/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	8.02	7.49	7.49	7.10	19.32	7.10	17.28			
0.88	10.5	10.56	10.56	9.02	27.12	9.02	24.25			
1.00	12.8	13.94	13.94	10.87	35.71	10.87	31.93			
1.25	17.0	23.00	23.00	14.92	58.60	14.92	52.39			
1.50	20.5	27.49	27.49	19.11	69.73	19.11	62.35			
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	8.02	7.49	7.49	7.10	28.16	7.10	25.18			
0.88	10.5	10.56	10.56	9.02	39.22	9.02	35.08			
1.00	12.8	13.94	13.94	10.87	51.33	10.87	45.90			
1.25	17.0	23.00	23.00	14.92	83.28	14.92	74.47			
1.50	20.5	27.49	27.49	19.11	98.18	19.11	87.79			

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 1				End support	[5)] Internal support, ε = 1			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	6.53	41.11	9.05	106.9	6.96	82.22	20.55	4.52	53.38	3.48	41.11
0.88	8.63	65.13	11.22	169.3	8.63	130.26	32.56	5.61	84.65	4.31	65.13
1.00	10.60	88.50	13.20	230.2	10.15	176.99	44.25	6.60	115.1	5.07	88.50
1.25	15.70	136.92	17.37	356.1	13.36	273.83	68.46	8.68	177.9	6.68	136.92
1.50	18.90	195.49	20.96	508.3	16.12	390.97	97.74	10.48	254.1	8.06	195.49

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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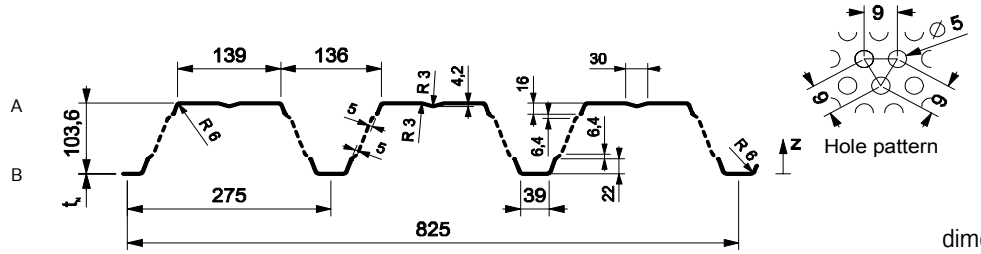
Hoesch Trapezoidal sheet T 100.1 A **positive position** (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0823	163	163	9.74	4.09	6.42				3.37	4.21
0.88	0.0966	193	193	11.53	4.09	6.42				5.68	7.10
1.00	0.110	216	220	13.17	4.09	6.42				7.81	9.76
1.25	0.137	278	278	16.60	4.09	6.42				13.74	17.18
1.50	0.165	335	335	20.03	4.09	6.42				16.58	20.73

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	4.2	1.38	1.34	5.1	0.257	49.498	0.51	9.0	12.0
0.88	3.8	1.78	2.05	4.5	0.217	32.511	0.55	10.6	14.2
1.00	3.6	2.17	2.86	3.9	0.190	23.284	0.59	12.2	16.2
1.25	3.2	3.07	5.09	3.2	0.151	13.055	0.66	15.3	20.5
1.50	2.9	4.07	8.15	2.9	0.125	8.163	0.73	18.5	24.7
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	4.3	2.49	1.29	4.3	0.257	40.239	0.63	9.0	12.0
0.88	3.9	3.21	1.96	4.0	0.217	26.430	0.63	10.6	14.2
1.00	3.7	3.92	2.74	4.0	0.190	18.928	0.63	12.2	16.2
1.25	3.3	5.55	4.89	4.1	0.151	10.613	0.63	15.3	20.5
1.50	3.0	7.36	7.81	3.9	0.125	6.636	0.63	18.5	24.7

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 100.1 A positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	5.80	8.13	6.37	5.85	19.54	5.08	16.1	3.09	3.69	1.82
0.88	7.95	12.0	9.74	7.61	28.41	6.75	22.8	3.12	3.72	2.47
1.00	9.94	15.6	12.9	9.23	36.15	8.29	28.9	3.15	3.75	3.06
1.25	14.2	26.3	20.5	13.0	54.80	11.8	43.0	3.14	3.74	4.38
1.50	17.1	31.7	24.7	15.7	66.17	14.3	51.9	3.14	3.74	5.29
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	5.80	8.13	6.37	6.54	26.85	5.76	20.0	2.78	3.56	2.42
0.88	7.95	12.0	9.74	8.70	36.87	7.74	27.8	2.86	3.64	3.21
1.00	9.94	15.6	12.9	10.7	48.41	9.56	35.0	2.94	3.71	3.94
1.25	14.2	26.3	20.5	14.9	80.68	13.7	55.0	2.54	3.34	6.45
1.50	17.1	31.7	24.7	17.9	96.46	16.5	66.4	2.54	3.20	7.78

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	6.47	13.3			6.13	20.0	6.63			3.07	9.99
0.88	8.46	18.6			8.56	26.2	9.30			4.28	13.1
1.00	10.3	23.6			10.8	32.0	11.8			5.40	16.0
1.25	14.3	35.8			14.6	48.0	17.9			7.29	24.0
1.50	17.3	43.2			17.6	57.9	21.6			8.79	28.9

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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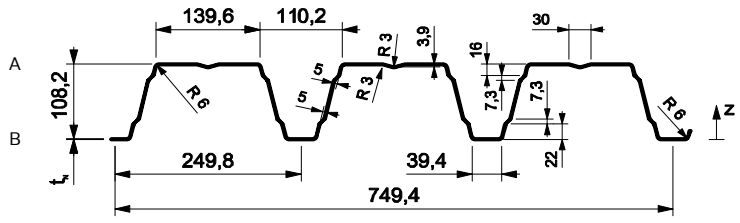
Hoesch Trapezoidal sheet T 106.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section											
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.100	206	206	11.84	4.17	6.56	4.43	4.72	5.94	5.83	7.29
0.88	0.117	243	243	14.01	4.17	6.56	5.78	4.70	6.00	8.54	10.68
1.00	0.133	278	278	16.01	4.17	6.56	7.14	4.68	6.05	11.04	13.80
1.25	0.167	330	350	20.18	4.17	6.56	10.24	4.64	6.15	13.57	16.96
1.50	0.200	398	423	24.35	4.17	6.56	13.43	4.56	6.33	16.37	20.46

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	4.3	1.77	1.33	4.9	0.284	47.440	0.41	9.00	12.0
0.88	3.9	2.28	2.03	4.9	0.240	31.160	0.45	10.6	14.2
1.00	3.7	2.79	2.83	4.9	0.210	22.316	0.48	12.2	16.2
1.25	3.3	3.95	5.06	3.9	0.167	12.512	0.54	15.3	20.5
1.50	3.0	5.23	8.09	3.2	0.138	7.824	0.59	18.5	24.7
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	4.3	3.32	1.47	4.7	0.284	41.246	0.64	9.00	12.0
0.88	3.9	4.27	2.23	4.7	0.240	27.091	0.64	10.6	14.2
1.00	3.7	5.22	3.12	4.8	0.210	19.402	0.64	12.2	16.2
1.25	3.3	7.38	5.56	4.9	0.167	10.878	0.64	15.3	20.5
1.50	3.0	9.79	8.89	5.0	0.138	6.802	0.64	18.5	24.7

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 106.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	7.31	10.79	10.79	8.04	27.82	8.04	24.88	2.32	2.99	3.17
0.88	9.96	15.03	15.03	10.07	38.59	10.07	34.52	2.34	3.01	4.27
1.00	12.4	19.48	19.48	11.84	49.86	11.84	44.61	2.35	3.02	5.29
1.25	16.3	22.35	22.35	15.63	56.93	15.63	50.92	1.55	2.31	10.10
1.50	19.7	31.52	31.52	18.86	79.95	18.86	71.50	1.55	2.31	12.20
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	7.31	10.79	10.79	8.04	40.52	8.04	36.26	2.15	3.03	4.00
0.88	9.96	15.03	15.03	10.07	55.82	10.07	49.93	2.05	2.94	5.74
1.00	12.4	19.48	19.48	11.84	71.67	11.84	64.12	1.96	2.85	7.35
1.25	16.3	22.35	22.35	15.63	80.93	15.63	72.37	1.42	2.40	12.50
1.50	19.7	31.52	31.52	18.86	112.6	18.86	100.66	1.42	2.40	15.10

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 1				End support	[5)] Internal support, ε = 1			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	8.95	45.03	10.66	117.0	8.20	90.06	22.51	5.33	58.52	4.20	45.03
0.88	12.1	71.51	13.55	186.0	10.42	143.02	35.75	6.77	93.00	5.21	71.51
1.00	15.0	99.38	16.33	258.5	12.56	198.76	49.69	8.16	129.2	6.28	99.38
1.25	20.7	153.99	22.41	400.2	17.24	307.98	76.99	11.20	200.0	8.93	153.99
1.50	25.0	220.10	28.76	572.3	22.12	440.21	110.05	14.38	286.2	11.06	220.10

1) At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.
2) b_A+ov = Width of end support including overhang of the sheet.
3) If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.
4) Interpolation of the characteristic capacity with reference to the support width is permissable.
5) For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.
6) L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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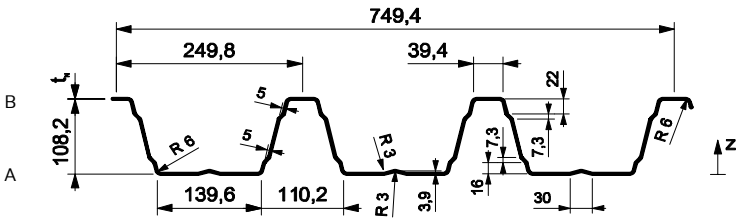
Hoesch Trapezoidal sheet T 106.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section											
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.100	206	206	11.84	4.17	4.26	4.43	4.72	4.88	4.74	5.93
0.88	0.117	243	243	14.01	4.17	4.26	5.78	4.70	4.82	8.02	10.03
1.00	0.133	278	278	16.01	4.17	4.26	7.14	4.68	4.77	11.04	13.80
1.25	0.167	350	330	20.18	4.17	4.26	10.24	4.64	4.67	13.57	16.96
1.50	0.200	423	398	24.35	4.17	4.26	13.43	4.56	4.49	16.37	20.46

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	4.5	2.76	1.74	6.4	0.284	46.904	0.22	14.0	14.0
0.88	4.1	3.56	2.65	6.4	0.240	30.808	0.23	16.6	16.6
1.00	3.9	4.35	3.70	6.5	0.210	22.064	0.25	18.9	18.9
1.25	3.5	6.15	6.60	6.2	0.167	12.371	0.28	23.9	23.9
1.50	3.1	8.15	10.56	5.2	0.138	7.735	0.31	28.8	28.8
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	1.9	9.50	9.66	1.9	0.284	1.768	1.06	14.0	14.0
0.88	1.7	12.23	14.71	1.7	0.240	1.161	1.06	16.6	16.6
1.00	1.6	14.94	20.54	1.6	0.210	0.832	1.06	18.9	18.9
1.25	1.5	21.14	36.63	1.5	0.167	0.466	1.06	23.9	23.9
1.50	1.3	28.03	58.57	1.3	0.138	0.292	1.06	28.8	28.8

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 106.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	min ℓ [m]	max ℓ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	8.95	8.59	8.59	8.20	22.14	8.20	19.80			
0.88	12.1	12.09	12.09	10.42	31.05	10.42	27.78			
1.00	15.0	15.97	15.97	12.56	40.90	12.56	36.57			
1.25	20.7	26.32	26.32	17.24	67.01	17.24	59.96			
1.50	25.0	31.52	31.52	22.12	79.95	22.12	71.50			
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	8.95	8.59	8.59	8.20	32.24	8.20	28.85			
0.88	12.1	12.09	12.09	10.42	44.93	10.42	40.18			
1.00	15.0	15.97	15.97	12.56	58.76	12.56	52.57			
1.25	20.7	26.32	26.32	17.24	95.29	17.24	85.23			
1.50	25.0	31.52	31.52	22.12	112.6	22.12	100.66			

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 1				End support	[5)] Internal support, ε = 1			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	7.31	46.65	10.45	121.2	8.04	93.29	23.32	5.22	60.55	4.02	46.65
0.88	9.96	73.92	13.09	192.2	10.07	147.83	36.86	6.54	96.01	5.03	73.92
1.00	12.4	100.96	15.39	262.4	11.84	201.92	50.48	7.69	131.1	5.92	100.96
1.25	16.3	156.23	20.32	406.2	15.63	312.47	78.11	10.16	203.1	7.81	156.23
1.50	19.7	223.10	24.52	580.1	18.86	446.20	111.55	12.26	290.1	9.43	223.10

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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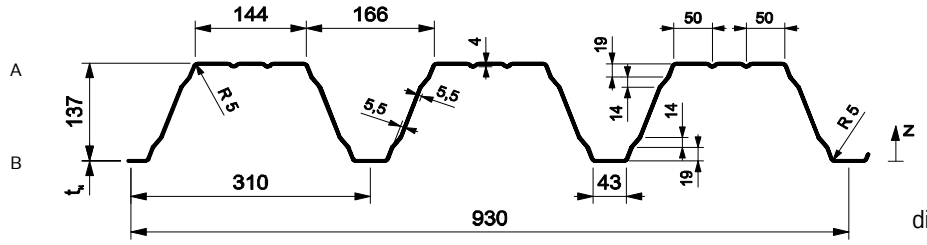
Hoesch Trapezoidal sheet T 135.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0974	297	297	11.5	5.14	8.07	4.01	5.96	7.86	5.18	6.48
0.88	0.114	344	344	13.6	5.14	8.07	5.22	5.94	7.90	10.0	12.5
1.00	0.130	387	387	15.6	5.14	8.07	6.42	5.91	7.92	11.4	14.3
1.25	0.162	491	491	19.7	5.14	8.07	9.20	5.85	7.94	14.4	18.0
1.50	0.195	594	594	23.7	5.14	8.07	12.0	5.76	7.93	17.4	21.7

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	5.1	1.53	1.66	6.7	0.275	56.0	0.51	9.00	12.0
0.88	4.7	1.97	2.52	5.6	0.232	36.8	0.55	10.6	14.2
1.00	4.4	2.41	3.52	4.9	0.203	26.3	0.59	12.2	16.2
1.25	3.9	3.41	6.28	3.9	0.161	14.8	0.66	15.3	20.5
1.50	3.6	4.52	10.0	3.6	0.134	9.24	0.73	18.5	24.7
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	5.3	3.44	1.58	5.3	0.275	40.5	0.79	9.00	12.0
0.88	4.9	4.43	2.41	5.0	0.232	26.6	0.79	10.6	14.2
1.00	4.6	5.41	3.37	5.1	0.203	19.0	0.79	12.2	16.2
1.25	4.1	7.66	6.00	5.2	0.161	10.7	0.79	15.3	20.5
1.50	3.7	10.2	9.60	5.3	0.134	6.60	0.79	18.5	24.7

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 135.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	10.2	7.16	5.47	9.44	20.40	7.86	16.6	6.62	7.46	2.24
0.88	12.6	10.4	7.92	12.3	29.07	10.5	24.3	5.08	5.95	3.59
1.00	14.8	13.3	10.2	14.9	36.98	12.9	31.2	4.43	5.33	4.82
1.25	20.6	24.6	18.9	21.3	66.00	19.2	50.7	4.00	4.92	7.42
1.50	26.5	36.2	27.7	27.8	94.91	25.4	70.1	3.82	4.75	10.0
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	10.2	7.16	5.47	10.8	29.18	9.56	22.8	8.02	8.83	1.84
0.88	12.6	10.4	7.92	14.3	39.33	12.7	30.2	6.00	6.85	3.04
1.00	14.8	13.3	10.2	17.4	47.97	15.6	37.0	5.18	6.05	4.14
1.25	20.6	24.6	18.9	24.0	82.79	21.9	60.2	4.14	5.05	7.16
1.50	26.5	36.2	27.7	30.6	117.3	28.4	83.1	3.75	4.68	10.2

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε = 1			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	9.83	7.16			10.1	29.1	3.57	12.4	30.38	8.77	16.0
0.88	12.8	10.4			12.5	36.4	5.17	18.0	36.90	11.8	21.4
1.00	15.5	13.3			14.8	43.2	6.65	23.3	43.10	14.7	26.3
1.25	21.3	24.6			23.1	72.3	12.4	69.9	36.35	21.6	31.1
1.50	27.2	36.2			28.1	87.2	18.0	84.3	43.84	26.0	37.6

1) At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.
2) b_A+ov = Width of end support including overhang of the sheet.
3) If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.
4) Interpolation of the characteristic capacity with reference to the support width is permissable.
5) For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.
6) L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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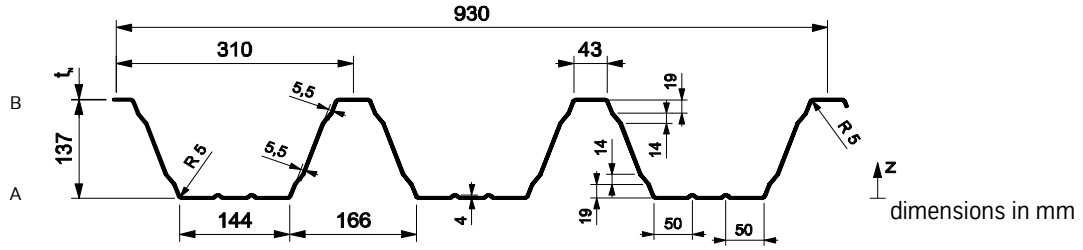
Hoesch Trapezoidal sheet T 135.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0974	297	297	11.5	5.14	5.63	4.01	5.96	5.84	6.00	7.50
0.88	0.114	344	344	13.6	5.14	5.63	5.22	5.94	5.80	8.57	10.7
1.00	0.130	387	387	15.6	5.14	5.63	6.42	5.91	5.78	9.79	12.2
1.25	0.162	491	491	19.7	5.14	5.63	9.20	5.85	5.76	12.3	15.4
1.50	0.195	594	594	23.7	5.14	5.63	12.0	5.76	5.77	14.9	18.6

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	5.5	2.22	1.48	9.0	0.275	78.4	0.25	14.0	14.0
0.88	5.0	2.85	2.25	9.1	0.232	51.5	0.28	16.6	16.6
1.00	4.7	3.49	3.15	9.1	0.203	36.9	0.30	18.9	18.9
1.25	4.2	4.93	5.61	8.1	0.161	20.7	0.33	23.9	23.9
1.50	3.8	6.54	8.97	6.8	0.134	12.9	0.36	28.8	28.8
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	2.1	10.2	10.9	2.1	0.275	1.79	1.04	14.0	14.0
0.88	2.0	13.1	16.6	2.0	0.232	1.17	1.04	16.6	16.6
1.00	1.8	16.0	23.1	1.8	0.203	0.840	1.04	18.9	18.9
1.25	1.6	22.6	41.2	1.6	0.161	0.471	1.04	23.9	23.9
1.50	1.5	29.9	65.9	1.5	0.134	0.295	1.04	28.8	28.8

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 135.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	9.83	7.16	5.47	10.6	20.77	8.69	17.9	7.67	8.48	1.86
0.88	12.8	10.4	7.92	13.4	29.10	11.2	24.0	6.72	7.55	2.75
1.00	15.5	13.3	10.2	16.1	36.91	13.6	29.9	6.30	7.14	3.57
1.25	21.3	24.6	18.9	23.7	57.93	20.6	46.5	5.01	5.89	6.15
1.50	27.2	36.2	27.7	31.5	79.14	27.5	63.2	4.52	5.43	8.71
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	9.83	7.16	5.47	12.0	23.35	9.71	21.3	6.84	7.67	2.08
0.88	12.8	10.4	7.92	14.3	34.15	12.1	27.9	6.24	7.08	2.96
1.00	15.5	13.3	10.2	16.5	44.28	14.4	34.2	5.95	6.80	3.77
1.25	21.3	24.6	18.9	24.5	75.24	21.9	56.4	4.16	5.07	7.39
1.50	27.2	36.2	27.7	32.4	105.9	29.5	78.6	3.54	4.49	11.0

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	10.2	7.16			11.6	26.9	3.57			11.7	27.2
0.88	12.6	10.4			13.4	37.2	5.17			12.8	34.9
1.00	14.8	13.3			15.0	46.6	6.65			13.8	42.2
1.25	20.6	24.6			20.6	80.6	12.4			19.6	67.3
1.50	26.5	36.2			24.8	97.2	18.0			23.5	81.3

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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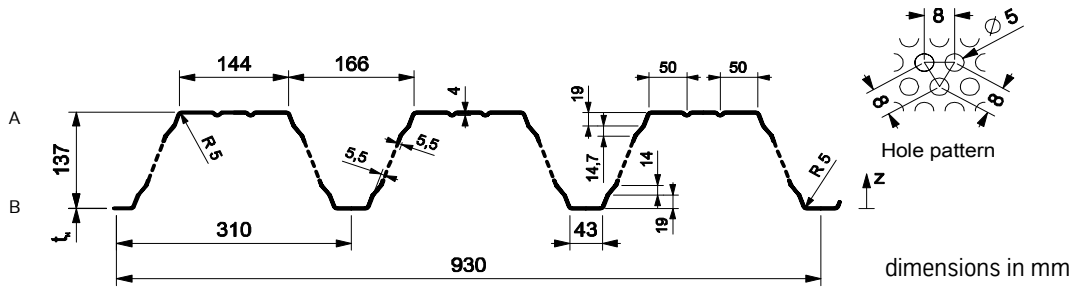
Hoesch Trapezoidal sheet T 135.1 A **positive position** (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.0863	268	262	10.1	5.30	8.49	3.64	5.83	7.72	4.17	5.21
0.88	0.101	327	325	11.9	5.30	8.49	4.71	5.80	7.75	7.82	9.80
1.00	0.115	377	380	13.6	5.30	8.49	5.80	5.80	7.77	10.60	13.30
1.25	0.144	468	483	17.2	5.30	8.49	8.39	5.83	7.82	14.60	18.30
1.50	0.173	542	570	20.8	5.30	8.49	11.00	5.82	7.86	16.20	20.20

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	5.10	1.53	1.66	6.66	0.311	56.00	0.51	6.32	8.38
0.88	4.70	1.97	2.52	5.66	0.262	36.80	0.55	7.48	9.91
1.00	4.40	2.41	3.52	4.96	0.229	26.30	0.59	8.54	11.30
1.25	3.90	3.41	6.28	3.97	0.182	14.80	0.66	10.80	14.30
1.50	3.60	4.52	10.00	3.30	0.151	9.24	0.73	13.00	17.20
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	5.30	3.44	1.58	4.33	0.311	40.50	0.51	6.32	8.38
0.88	4.90	4.43	2.41	5.05	0.262	26.60	0.55	7.48	9.91
1.00	4.60	5.41	3.37	5.10	0.229	19.00	0.59	8.54	11.30
1.25	4.10	7.66	6.00	5.24	0.182	10.70	0.66	10.80	14.30
1.50	3.70	10.20	9.60	5.33	0.151	6.60	0.73	13.00	17.20

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 135.1 A positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	min ℓ [m]	max ℓ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 50 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	7.85	5.81	4.36	8.73	15.66	5.07	13.1	7.67	8.62	1.75
0.88	10.50	7.85	5.89	11.00	21.99	7.27	17.8	7.88	8.90	2.44
1.00	13.00	10.40	7.80	13.10	29.03	9.36	22.7	8.04	9.12	3.12
1.25	18.70	17.80	13.30	17.30	47.42	13.90	34.2	8.27	9.43	4.68
1.50	25.00	28.00	21.00	21.40	71.24	18.80	47.6	8.34	9.55	6.43
		[2)] b_A+ov = 50 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	7.85	5.81	4.36	10.00	19.10	6.03	15.8	5.74	6.74	2.33
0.88	10.50	7.85	5.89	12.20	26.93	8.40	21.3	6.65	7.70	2.84
1.00	13.00	10.40	7.80	14.10	35.45	10.60	26.8	7.20	8.30	3.49
1.25	18.70	17.80	13.30	18.00	57.70	15.20	39.5	7.53	8.72	5.37
1.50	25.00	28.00	21.00	21.80	86.84	19.80	53.8	6.72	7.98	7.98

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε =				End support	[5)] Internal support, ε =			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	6.65	13.8			10.40	27.60	6.91			5.18	13.80
0.88	8.96	16.0			13.10	31.90	7.98			6.57	16.00
1.00	11.10	18.1			15.80	36.10	9.03			7.90	18.10
1.25	15.60	22.8			21.70	45.60	11.40			10.90	22.80
1.50	20.00	28.1			28.10	56.10	14.00			14.00	28.10

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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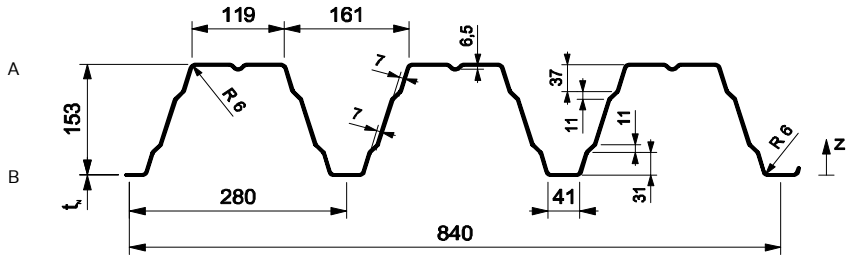
Hoesch Trapezoidal sheet T 150.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.107	377	377	12.5	5.49	8.91	5.26	6.29	8.46	7.75	9.69
0.88	0.126	446	446	14.8	5.49	8.91	7.13	6.24	8.48	10.0	12.5
1.00	0.143	510	510	16.9	5.49	8.91	9.04	6.21	8.51	11.4	14.3
1.25	0.179	642	642	21.3	5.49	8.91	13.6	6.08	8.68	14.4	18.0
1.50	0.215	775	775	25.7	5.49	8.91	18.4	5.96	8.82	17.4	21.7

Shear plate input

				zulT_3 = G_s/750 [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	minL_s [4] [m]	zulT_1 [kN/m]	zulT_2 [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	4.7	1.48	2.06	6.3	0.308	54.9	0.67	9.00	12.0
0.88	4.4	1.90	3.14	5.3	0.260	36.0	0.73	10.6	14.2
1.00	4.1	2.33	4.38	4.7	0.228	25.8	0.78	12.2	16.2
1.25	3.6	3.29	7.81	3.7	0.181	14.5	0.87	15.3	20.5
1.50	3.3	4.36	12.5	3.3	0.150	9.05	0.96	18.5	24.7
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	5.0	3.71	1.99	5.2	0.308	33.0	1.04	9.00	12.0
0.88	4.6	4.78	3.03	5.2	0.260	21.7	1.04	10.6	14.2
1.00	4.3	5.84	4.23	5.3	0.228	15.5	1.04	12.2	16.2
1.25	3.8	8.26	7.54	5.5	0.181	8.70	1.04	15.3	20.5
1.50	3.5	11.0	12.1	5.1	0.150	5.44	1.04	18.5	24.7

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 150.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	12.1	8.62	6.59	14.4	19.69	12.5	15.9	5.65	9.85	2.38
0.88	18.0	13.7	10.5	24.3	26.87	16.4	21.7	5.87	11.3	3.58
1.00	23.0	18.5	14.2	30.7	35.24	21.1	28.7	5.93	10.4	4.42
1.25	29.4	27.2	20.8	33.9	58.22	33.9	47.4	5.84	8.06	5.35
1.50	35.5	32.8	25.1	41.0	70.43	41.0	57.2	5.82	8.04	6.46
		[2) 4)] b_A+ov ≥ 90 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	12.1	11.2	8.57	14.1	36.65	12.5	29.7	3.67	9.55	3.81
0.88	18.0	17.8	13.6	20.1	54.25	16.4	44.1	4.03	10.7	4.67
1.00	23.0	24.1	18.4	25.4	71.57	21.1	57.9	4.24	9.94	5.51
1.25	29.4	35.4	27.0	33.5	105.3	33.5	85.7	4.30	7.60	7.36
1.50	35.5	42.7	32.6	40.4	127.8	40.4	103	4.27	7.56	8.88

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	11.5	8.62	18.2	33.49	14.9	18.4	4.30	9.10	16.71	7.45	9.18
0.88	15.0	13.7	24.0	52.91	22.3	26.2	6.85	12.0	26.57	11.1	13.1
1.00	19.5	18.5	29.1	71.75	28.4	34.5	9.23	14.6	35.76	14.2	17.2
1.25	33.5	27.2	36.7	104.2	36.2	53.4	13.6	18.4	52.33	18.2	26.7
1.50	40.3	32.8	44.4	125.9	43.9	64.4	16.4	22.1	63.00	21.9	32.1

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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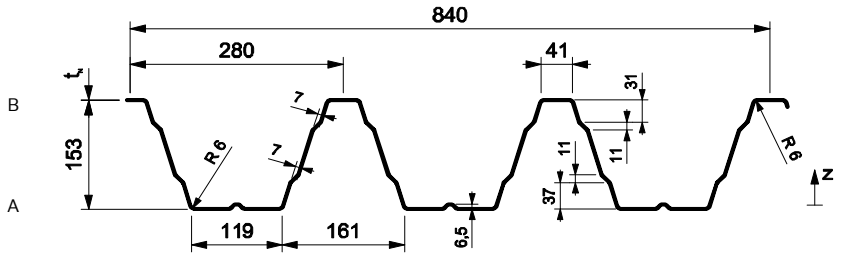
Hoesch Trapezoidal sheet T 150.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section										Maximum spans [3]	
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force							
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.107	377	377	12.5	5.49	6.39	5.26	6.29	6.84	6.25	7.81
0.88	0.126	446	446	14.8	5.49	6.39	7.13	6.24	6.82	9.05	11.3
1.00	0.143	510	510	16.9	5.49	6.39	9.04	6.21	6.79	10.3	12.9
1.25	0.179	642	642	21.3	5.49	6.39	13.6	6.08	6.62	13.0	16.3
1.50	0.215	775	775	25.7	5.49	6.39	18.4	5.96	6.48	15.7	19.7

Shear plate input

				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	5.1	1.97	1.64	11.3	0.308	88.1	0.35	14.0	14.0
0.88	4.7	2.54	2.50	11.4	0.260	57.9	0.38	16.6	16.6
1.00	4.4	3.10	3.49	10.2	0.288	41.4	0.41	18.9	18.9
1.25	3.9	4.39	6.22	8.1	0.181	23.2	0.46	23.9	23.9
1.50	3.6	5.82	9.95	6.8	0.150	14.5	0.50	28.8	28.8
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	2.1	9.94	11.3	2.1	0.308	2.00	1.26	14.0	14.0
0.88	2.0	12.8	17.2	2.0	0.260	1.32	1.26	16.6	16.6
1.00	1.8	15.6	24.0	1.8	0.228	0.942	1.26	18.9	18.9
1.25	1.6	22.1	42.9	1.6	0.181	0.528	1.26	23.9	23.9
1.50	1.5	29.3	68.6	1.5	0.150	0.330	1.26	28.8	28.8

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 150.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	11.5	8.62	6.59	12.9	20.01	12.9	16.2	5.12	8.52	2.94
0.88	15.0	13.7	10.5	19.6	28.42	19.6	23.1	4.61	7.26	3.90
1.00	19.5	18.5	14.2	24.7	37.42	24.7	30.5	4.73	7.19	4.67
1.25	33.5	27.2	20.8	30.5	57.99	30.5	47.1	5.68	8.17	5.93
1.50	40.3	32.8	25.1	36.7	70.27	36.7	56.9	5.65	8.14	7.17
		[2) 4)] b_A+ov ≥ 90 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	11.5	11.2	8.57	16.1	29.57	13.1	23.9	3.67	6.27	3.80
0.88	15.0	17.8	13.6	21.1	46.85	19.6	38.0	3.23	5.81	5.32
1.00	19.5	24.1	18.4	25.7	63.37	25.1	51.2	3.28	5.83	6.38
1.25	33.5	35.4	27.0	32.4	92.21	32.0	74.8	4.13	6.58	7.53
1.50	40.3	42.7	32.6	39.2	111.4	38.7	90.3	4.14	6.60	9.10

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	12.1	8.62	15.9	41.47	14.2	18.0	4.30	7.97	20.75	7.09	9.04
0.88	18.0	13.7	22.8	61.60	18.5	24.6	6.85	11.4	30.83	9.25	12.3
1.00	23.0	18.5	28.7	80.89	24.0	32.5	9.23	14.4	40.60	12.0	16.2
1.25	29.4	27.2	37.9	119.4	37.9	53.7	13.6	19.0	60.15	19.0	26.9
1.50	35.5	32.8	45.7	144.7	45.7	64.8	16.4	23.0	72.42	23.0	32.5

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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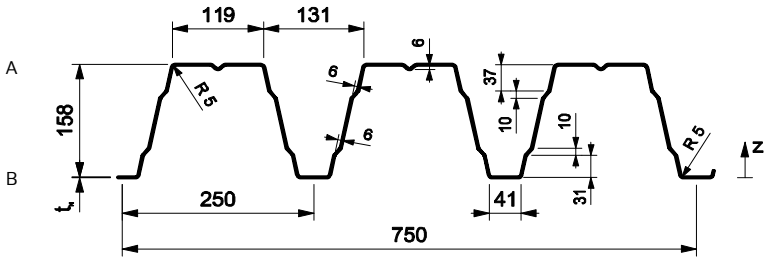
Hoesch Trapezoidal sheet T 160.1 positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section											
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.121	458	458	13.9	5.66	9.18	5.67	6.59	8.75	7.75	9.69
0.88	0.142	542	542	16.5	5.66	9.18	7.69	6.54	8.77	10.0	12.5
1.00	0.161	619	619	18.8	5.66	9.18	9.75	6.50	8.80	11.4	14.3
1.25	0.201	780	780	23.8	5.66	9.18	14.4	6.39	8.97	14.4	18.0
1.50	0.242	942	942	28.7	5.66	9.18	19.5	6.25	9.12	17.4	21.7

Shear plate input									
				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	5.0	1.60	1.73	8.6	0.343	68.3	0.69	9.00	12.0
0.88	4.6	2.06	2.64	7.3	0.290	44.9	0.76	10.6	14.2
1.00	4.3	2.51	3.69	6.4	0.254	32.1	0.81	12.2	16.2
1.25	3.8	3.56	6.57	5.1	0.201	18.0	0.91	15.3	20.5
1.50	3.5	4.72	10.5	4.3	0.167	11.3	1.00	18.5	24.7
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	5.2	3.62	1.64	5.9	0.343	46.4	1.13	9.00	12.0
0.88	4.8	4.66	2.49	6.0	0.290	30.4	1.13	10.6	14.2
1.00	4.5	5.70	3.48	6.1	0.254	21.8	1.13	12.2	16.2
1.25	4.0	8.06	6.21	6.3	0.201	12.2	1.13	15.3	20.5
1.50	3.6	10.7	9.93	6.5	0.167	7.64	1.13	18.5	24.7

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 160.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	13.2	11.4	8.71	13.6	26.66	9.92	25.5	3.65	9.15	3.29
0.88	17.5	17.0	13.0	17.0	37.11	13.2	36.5	3.48	8.41	3.95
1.00	22.1	22.3	17.0	20.9	49.37	18.0	46.2	3.38	7.91	5.34
1.25	27.8	28.1	21.4	26.3	62.05	22.8	58.2	3.66	8.14	6.62
1.50	33.6	33.8	25.9	31.7	74.88	27.3	70.2	3.73	8.21	8.00
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	13.2	11.4	8.71	15.6	38.83	13.1	32.9	4.63	7.96	3.83
0.88	17.5	17.0	13.0	19.5	57.85	17.6	48.6	4.28	7.27	5.01
1.00	22.1	22.3	17.0	22.6	77.96	21.1	63.5	4.13	7.19	6.95
1.25	27.8	28.1	21.4	28.5	98.76	27.2	80.0	4.06	6.97	8.65
1.50	33.6	33.8	25.9	34.5	119.2	33.0	96.3	4.05	6.97	10.5

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	14.2	11.4	14.2	36.66	11.4	27.7	5.70	7.11	18.34	5.70	13.8
0.88	17.8	17.0	18.7	45.41	15.7	37.6	8.53	9.38	22.76	7.84	18.7
1.00	21.5	22.3	24.8	58.27	18.4	48.4	11.2	12.4	29.19	9.16	24.3
1.25	27.0	28.1	31.3	73.85	23.1	60.5	14.0	15.7	36.85	11.5	30.6
1.50	32.5	33.8	37.9	89.27	27.9	73.6	16.9	18.9	44.34	13.9	36.9

1) At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

2) b_A+ov = Width of end support including overhang of the sheet.

3) If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

4) Interpolation of the characteristic capacity with reference to the support width is permissable.

5) For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks: $\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

6) L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

Hoesch Trapezoidal sheet T 160.1 positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 0 mm, ε = 2						
0.75	13.2	11.4	8.71	9.44	20.65	7.50	18.1	6.96	7.66	2.36
0.88	17.5	17.0	13.0	13.5	30.68	10.8	26.3	6.52	7.22	3.38
1.00	22.1	22.3	17.0	17.3	40.05	13.8	33.8	6.31	7.01	4.32
1.25	27.8	28.1	21.4	21.6	50.19	17.3	42.2	6.31	7.01	5.41
1.50	33.6	33.8	25.9	26.0	60.17	20.7	50.7	6.34	7.05	6.49
		[2)] b_A+ov = mm		[4)] Width of the internal support $b_B \ge$ mm, ε =						
0.75										
0.88										
1.00										
1.25										
1.50										

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	14.2	11.4	14.2	36.66	11.4	27.7	5.70	7.11	18.34	5.70	13.8
0.88	17.8	17.0	18.7	45.41	15.7	37.6	8.53	9.38	22.76	7.84	18.7
1.00	21.5	22.3	24.8	58.27	18.4	48.4	11.2	12.4	29.19	9.16	24.3
1.25	27.0	28.1	31.3	73.85	23.1	60.5	14.0	15.7	36.85	11.5	30.6
1.50	32.5	33.8	37.9	89.27	27.9	73.6	16.9	18.9	44.34	13.9	36.9

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k} = 0$ for the ULS or use the elastic-elastic design method.

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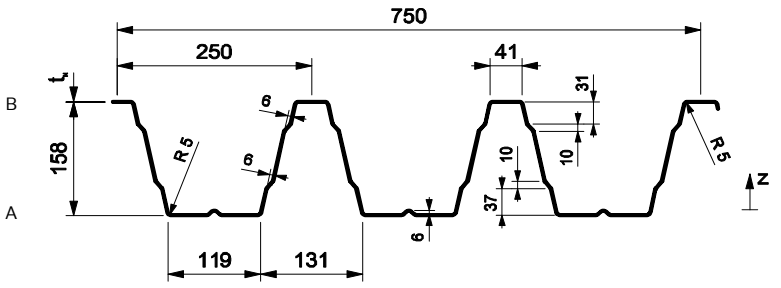
Hoesch Trapezoidal sheet T 160.1 negative position (narrow flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"



dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.121	458	458	13.9	5.66	6.62	5.67	6.59	7.05	7.75	9.69
0.88	0.142	542	542	16.5	5.66	6.62	7.69	6.54	7.03	10.0	12.5
1.00	0.161	619	619	18.8	5.66	6.62	9.75	6.50	7.00	11.4	14.3
1.25	0.201	780	780	23.8	5.66	6.62	14.4	6.39	6.83	14.4	18.0
1.50	0.242	942	942	28.7	5.66	6.62	19.5	6.25	6.68	17.4	21.7

Shear plate input

				zulT_3 = G_s/750 [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	minL_s [4] [m]	zulT_1 [kN/m]	zulT_2 [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	5.5	2.25	1.53	11.4	0.343	95.1	0.36	14.0	14.0
0.88	5.0	2.90	2.34	11.6	0.290	62.5	0.39	16.6	16.6
1.00	4.7	3.54	3.26	11.7	0.254	44.7	0.42	18.9	18.9
1.25	4.2	5.01	5.82	10.2	0.201	25.1	0.47	23.9	23.9
1.50	3.8	6.65	9.30	8.5	0.167	15.7	0.51	28.8	28.8
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	2.5	9.56	8.47	2.5	0.343	3.05	1.49	14.0	14.0
0.88	2.3	12.3	12.9	2.3	0.290	2.00	1.49	16.6	16.6
1.00	2.1	15.0	18.0	2.1	0.254	1.43	1.49	18.9	18.9
1.25	1.9	21.3	32.1	1.9	0.201	0.804	1.49	23.9	23.9
1.50	1.7	28.2	51.3	1.7	0.167	0.503	1.49	28.8	28.8

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 160.1 negative position (narrow flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 60 mm, ε = 2						
0.75	14.2	11.4	8.71	12.9	25.43	10.1	23.1	4.91	7.94	3.02
0.88	17.8	17.0	13.0	19.8	33.64	13.8	30.9	4.41	6.99	4.34
1.00	21.5	22.3	17.0	23.0	45.22	17.4	41.0	4.20	6.84	6.21
1.25	27.0	28.1	21.4	29.0	57.08	21.9	51.6	4.21	6.86	7.83
1.50	32.5	33.8	25.9	35.0	68.63	26.4	62.3	4.21	6.87	9.48
		[2)] b_A+ov = 40 mm		[4)] Width of the internal support $b_B \ge$ 160 mm, ε = 2						
0.75	14.2	11.4	8.71	13.4	36.24	11.3	31.5	4.74	8.43	4.11
0.88	17.8	17.0	13.0	20.1	52.01	17.4	42.9	4.88	8.50	5.70
1.00	21.5	22.3	17.0	23.4	71.11	20.1	56.7	4.25	7.34	7.22
1.25	27.0	28.1	21.4	29.4	89.47	25.4	71.4	4.28	7.37	9.10
1.50	32.5	33.8	25.9	35.5	107.8	30.6	86.3	4.27	7.36	10.9

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	13.2	11.4	14.5	28.44	10.6	27.2	5.70	7.68	15.08	5.63	14.4
0.88	17.5	17.0	17.8	39.07	14.0	38.4	8.50	9.61	21.02	7.51	20.7
1.00	22.1	22.3	20.4	48.33	17.7	44.9	11.1	11.8	28.00	10.2	26.2
1.25	27.8	28.1	25.7	60.83	22.3	57.0	14.0	14.9	35.28	12.8	33.0
1.50	33.6	33.8	31.1	74.17	26.9	68.9	16.9	18.0	42.85	15.5	39.8

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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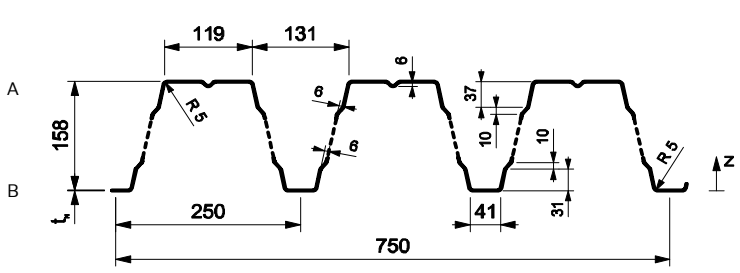
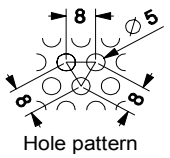
Hoesch Trapezoidal sheet T 160.1 A positive position (broad flange in compression)

Section properties of the trapezoidal sheet in compliance with German Standard "DIN 18807", "Anpassungsrichtlinie Stahlbau and "Mitteilungen Sonderheft 11/1"





dimensions in mm

Yield strength $f_{y,k}$ = 320 N/mm²

Effective properties of section											
Nominal thickness	Dead load	Properties of section for bending [1]		Properties of section for axial force						Maximum spans [3]	
				Full cross-sectional area			Effective cross-sectional area [2]			L_{gr} [m]	
t_N [mm]	g [kN/m²]	I^+_{ef} [cm⁴/m]	I^-_{ef} [cm⁴/m]	A_g [cm²/m]	i_g [cm]	z_g [cm]	A_{ef} [cm²/m]	i_{ef} [cm]	z_{ef} [cm]	Single-span beam	Multi-span beam
0.75	0.110	428	428	11.7	6.06	9.49	5.24	6.81	8.92	7.35	9.19
0.88	0.129	507	507	13.8	6.06	9.49	6.99	6.81	8.96	10.0	12.5
1.00	0.147	579	579	15.8	6.06	9.49	8.74	6.80	9.00	11.4	14.3
1.25	0.184	730	730	19.9	6.06	9.49	12.5	6.77	9.22	14.4	18.0
1.50	0.220	881	881	24.0	6.06	9.49	16.3	6.71	9.44	17.4	21.8

Shear plate input									
				$zulT_3 = G_s/750$ [kN/m]				zul F_t [7]	
					$G_s = 10^4/(K_1+K_2/L_s)$			Length of load introduction a	
t_N [mm]	$minL_s$ [4] [m]	$zulT_1$ [kN/m]	$zulT_2$ [kN/m]	L_G [5] [m]	K_1 [m/kN]	K_2 [m²/kN]	K_3 [6] [-]	≥ 130 mm [kN]	≥ 280 mm [kN]
Construction in compliance with German Standard DIN 18807-3 figure 6									
0.75	5.0	1.24	1.51	7.9	0.343	82.4	0.57	8.50	11.5
0.88	4.6	1.60	2.30	6.7	0.290	54.1	0.62	10.0	13.6
1.00	4.3	1.95	3.21	5.8	0.254	38.7	0.67	11.4	15.5
1.25	3.8	2.76	5.72	4.7	0.201	21.7	0.75	14.4	19.6
1.50	3.5	3.66	9.15	3.9	0.167	13.6	0.82	17.4	23.6
Construction in compliance with German Standard DIN 18807-3 figure 7									
0.75	5.2	2.83	1.42	6.1	0.343	55.9	0.94	8.50	11.5
0.88	4.8	3.64	2.17	6.2	0.290	36.7	0.94	10.0	13.6
1.00	4.5	4.45	3.03	6.3	0.254	26.3	0.94	11.4	15.5
1.25	4.0	6.29	5.40	6.4	0.201	14.7	0.94	14.4	19.6
1.50	3.6	8.34	8.63	6.4	0.167	9.21	0.94	17.4	23.6

[1] Effective second moment of area for downwards loads (+) and upwards loads (-).
[2] Effective section for a constant compression stress $\sigma = f_{y,k}$.
[3] Maximum span during construction for roof and slab construction without using loadspreading elements.
[4] If the shear plate length Ls<min Ls, reduce the permissable shear flow (T).
[5] If the shear plate length Ls>LG, "zul T3" is not significant.
[6] Reaction at support $R_s = K_3 \cdot \gamma \cdot T$; (T= applied shear flow in kN/m)
[7] Point load in compliance with "DIN 18807 Part 3 Section 3.6.1.5"

Hoesch Trapezoidal sheet T 160.1 A positive position (broad flange in compression)

Characteristic capacity of trapezoidal sheet
for UDL downwards[1)]

Nominal thickness	Sagging moment	Reaction at end support		Internal support: elastic - elastic				Internal support: plastic - plastic		
				Combined check for bending and shear [5)]				Resistance moments (residual moments) [6)]		
		Ultimate limit state ULS	Serviceability limit state SLS	$\frac{\gamma_F \cdot M_{B,S,k}}{M^0_{B,k}/\gamma_M} + \left(\frac{\gamma_F \cdot R_{B,S,k}}{R^0_{B,k}/\gamma_M}\right)^{\varepsilon} \le 1$			Reaction at internal support	$M_{R,k} = 0$ für $L \le \min \ell$ $M_{R,k} = \frac{L - \min \ell}{\max \ell - \min \ell} \cdot \max M_{R,k}$ $M_{R,k} = \max M_{R,k}$ für $L \ge \max \ell$		
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,T,k}$ [kN/m]	$R_{A,G,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$\min \ell$ [m]	$\max \ell$ [m]	$\max M_{R,k}$ [kNm/m]
		[2)] b_A+ov = 40 mm		[3)] Width of the internal support b_B = 160 mm, ε = 2						
0.75	12.8	6.29	4.81	16.8	25.66	13.4	22.6	5.31	9.79	3.51
0.88	17.7	8.99	6.88	20.6	38.26	16.6	31.2	6.62	10.9	4.15
1.00	22.2	11.5	8.80	24.0	49.97	19.6	39.2	7.48	11.7	4.74
1.25	27.9	14.5	11.1	30.2	62.65	24.7	49.3	7.48	11.7	5.97
1.50	33.8	17.5	13.4	36.5	75.52	29.9	59.6	7.49	11.7	7.20
		[2) 4)] b_A+ü ≥ 90 mm		[4)] Width of the internal support $b_B \ge$ mm, ε =						
0.75	12.8	6.92	5.29							
0.88	17.7	9.89	7.56							
1.00	22.2	12.7	9.68							
1.25	27.9	16.0	12.2							
1.50	33.8	19.3	14.7							

Characteristic capacity of trapezoidal sheet
for UDL upwards[1)]

Nominal thickness	Sagging moment	Connection to every flange					Connection to every second flange				
		End support	[5)] Internal support, ε = 2				End support	[5)] Internal support, ε = 2			
t_N [mm]	$M_{F,k}$ [kNm/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]	$R_{A,k}$ [kN/m]	$M^0_{B,k}$ [kNm/m]	$R^0_{B,k}$ [kN/m]	$\max M_{B,k}$ [kNm/m]	$\max R_{B,k}$ [kN/m]
0.75	12.3	11.9	15.2	102.1	15.2	47.6	5.95	7.63	51.10	7.58	23.8
0.88	15.4	16.3	20.4	146.8	19.9	65.1	8.14	10.2	73.14	9.96	32.5
1.00	18.3	20.4	25.0	187.0	24.3	81.3	10.1	12.5	93.69	12.2	40.6
1.25	23.2	25.7	31.6	236.7	30.8	102	12.8	15.8	118.1	15.3	51.2
1.50	27.9	30.9	38.1	285.2	37.1	124	15.4	19.0	142.5	18.5	61.7

[1)] At the location of line loads perpendicular to the span or point loads the trapezoidal sheet should be designed with the capacity of sagging moment (opposite load direction) and not with hogging moment capacity.

[2)] b_A+ov = Width of end support including overhang of the sheet.

[3)] If the width of the support is small, reduce the characteristic capacity of the section in linear ratio. If the support width is smaller than 10mm (i.e.CHS), use 10mm support width.

[4)] Interpolation of the characteristic capacity with reference to the support width is permissable.

[5)] For the combination of shear and bending use the formular above. If no values for $M^0_{B,k}$ or $R^0_{B,k}$ are given use the following checks:
$\gamma_F \cdot M_{B,S,k} \le \max M_{B,k} / \gamma_M$ and $\gamma_F \cdot R_{B,S,k} \le \max R_{B,k} / \gamma_M$.

[6)] L is the smallest span of the adjected bays. If no value for the residual moment is given, use $M_{R,k}$ = 0 for the ULS or use the elastic-elastic design method.

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