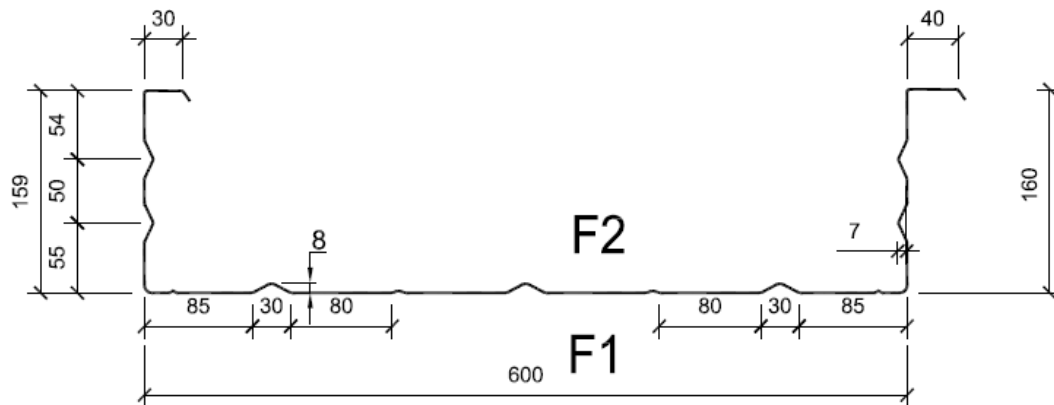


**TECHNICAL DATA SHEET  
OF CASSETTE PROFILE  
Hacierba<sup>®</sup> 160/600**

## Hacierba® 160/600



### Technical parameters:

Coil width:	1000 mm
Cassette width:	600 mm
Steel grade:	S320GD, S350GD according to EN 10346
Thickness:	0.75; 0.88; 1.00; 1.25 mm according to EN 10143
Durability/Coating quality:	ZM 60, ZM80, ZM100, ZM120, ZM175, ZM275 and Z100, 140, 200, 225, 275, 350 according to EN 10346
Organic coating:	Interieur (DU912, DU901), Hairplus, Hairultra, Hairflon, Keyron, Hairexcel, Sinea, (or acc. to Material guide), according to EN 10169
Max. length:	12 m
Min. length:	2 m

## Liner tray design tables

The design tables for ArcelorMittal Construction liner tray profiles C130, C150 and C160 were based on tests carried out at the Technical University of Košice (2/2014). The authors of the tables are given below. Both the test and the tables were made according to the Eurocode 3, Part 1.3.

The tables may be used in any country where the Eurocodes were accepted with the recommended values of the partial safety factors for resistance.

Prague, 24.3.2014



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## Design principles for the ArcelorMittal Construction liner tray profiles

This short description gives the information for the use of design tables for ArcelorMittal Construction liner trays, estimated according to the Eurocode EN 1993-1-3.

The design tables give the maximum loads for the particular liner tray profile and span. The profile is considered as simply supported member uniformly loaded in the direction normal to the wall surface.

The presentation of the design table is as shown below:

Thickness	Limit states	Span (m) - Support width : 80mm / 80mm									
		5,00	5,25	5,50	5,75	6,00	6,25	6,50	6,75	7,00	
0,75	ULS	1,60	1,52	1,45	1,39	1,33	1,28	1,23	1,16	1,08	
	SLS_PD	1,20	1,14	1,09	1,04	1,00	0,96	0,91	0,84	0,78	
	200	1,59	1,37	1,20	1,05	0,92	0,81	0,72	0,65	0,58	
	150	2,12	1,83	1,59	1,40	1,23	1,09	0,97	0,86	0,77	

Thickness: Nominal thickness of the steel profiles.

ULS Resistance of the profile (in kN/m<sup>2</sup>) in the Ultimate limit state.

SLS\_PD Elastic behavior limit (in kN/m<sup>2</sup>) in the Serviceability limit state (SLS).

200 Load (in kN/m<sup>2</sup>) corresponding to deflection  $L/200$  in the Serviceability limit state, where  $L$  is the span.

150 Load (in kN/m<sup>2</sup>) corresponding to deflection  $L/150$  in the Serviceability limit state.

The design tables are based on the liner tray tests. Considering the test conditions, the followings additional restrictions must be satisfied in the structural design and for the application.

### Restrictions and additional conditions for the liner tray design tables:

- Minimal bearing length at the support is 80 mm.
- The adjoining liner trays are connected by mechanical fasteners JT2 3H 5,5x25 V16 through their webs. The spacing between the fasteners is 400 mm along the length of the profile and at 20 mm distance from the wide flange.
- The narrow flange is connected to the outer trapezoidal sheeting by mechanical fasteners JT2 6H 5,5x25 V16 of spacing not exceeding 414 mm.
  - If bigger spacing is allowed, the bending capacity reduction  $\beta_b$  (according to the Eurocode EN 1993-1-3 section 10.2.2.2 (1)) must be used for the case of positive external pressure (narrow flanges in compression).
- The connection of the liner tray profile to the profile supporting structure must be designed and verified as well.

**Example project data:**

- Liner tray Hacierba 150/600
- Steel S320GD
- Span  $L = 6$  m
- End support bearing length:  $b_{End} = 80$  mm
- Deflection limit:  $L/200$
- Spacing between the fasteners connection the outer trapezoidal sheeting to the narrow flange  $s_2=350$  mm

Two load cases of the wind pressure are used in the example. The nominal value of the positive external pressure is  $w_k = 0,5$  kN/m<sup>2</sup> resp.  $0,6$  kN/m<sup>2</sup> for the case of negative external pressure. The partial safety factor for the load is  $\gamma_Q = 1,5$ .

a) Positive external wind pressure (narrow flanges in compression)

The table of the profile Hacierba 150, positive pressure, steel grade S320GD is given below:

Thickness	Limit states	Span	Ultimate limit state verification: $q_{Ed} = w_k \cdot \gamma_Q = 0,5 \cdot 1,5 = 0,75$ kN/m <sup>2</sup> $q_{Rd(ULS)} = 1,33$ kN/m <sup>2</sup> $\geq$ $q_{Ed} = 0,75$ kN/m <sup>2</sup> Satisfied
		6,00	
<b>0,75</b>	ULS	1,33	Serviceability limit state verification (criteria of both elastic behavior and deflection limit must be always checked): $q_{Rk(SLS\_PD)} = 1,00$ kN/m <sup>2</sup> $\geq$ $q_{Ek} = 0,50$ kN/m <sup>2</sup> Satisfied $q_{Rk(200)} = 0,92$ kN/m <sup>2</sup> $\geq$ $q_{Ek} = 0,50$ kN/m <sup>2</sup> Satisfied
	SLS_PD	1,00	
	200	0,92	
	150	1,23	

b) Negative external wind pressure (wide flange in compression)

The table of the profile Hacierba 150, negative pressure, steel grade S320GD is given below:

Thickness	Limit states	Span	Ultimate limit state verification: $q_{Ed} = w_k \cdot \gamma_Q = 0,6 \cdot 1,5 = 0,9$ kN/m <sup>2</sup> $q_{Rd(ULS)} = 1,07$ kN/m <sup>2</sup> $\geq$ $q_{Ed} = 0,90$ kN/m <sup>2</sup> Satisfied
		6,00	
<b>0,75</b>	ULS	1,07	Serviceability limit state verification (criteria of both elastic behavior and deflection limit must be always checked): $q_{Rk(SLS\_PD)} = 0,77$ kN/m <sup>2</sup> $\geq$ $q_{Ek} = 0,6$ kN/m <sup>2</sup> Satisfied $q_{Rk(200)} = 0,61$ kN/m <sup>2</sup> $\geq$ $q_{Ek} = 0,6$ kN/m <sup>2</sup> Satisfied
	SLS_PD	0,77	
	200	0,61	
	150	0,82	

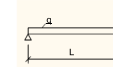
The verification of the profile Hacierba 150/600,  $t=0,75$  mm is satisfied. The connection of the liner tray profile to the primary structure must be designed as well.

**Design tables of cassette Hacierba 160/600**

Steel grade : **S320GD**

**Pressure**

Single span



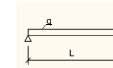
Thickness	Limit state	Span (m) - Support width : 80mm / 80mm																								
		3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.75	9.00
0.75	MSU	2.70	2.49	2.32	2.16	2.03	1.91	1.80	1.71	1.62	1.54	1.47	1.41	1.35	1.30	1.24	1.15	1.07	0.99	0.93	0.87	0.82	0.77	0.72	0.68	0.64
	MSP_PD	2.03	1.87	1.74	1.62	1.52	1.43	1.35	1.28	1.22	1.16	1.10	1.06	1.01	0.97	0.90	0.83	0.77	0.72	0.67	0.63	0.59	0.56	0.53	0.50	0.47
	200	9.40	7.39	5.92	4.81	3.96	3.30	2.78	2.37	2.03	1.75	1.52	1.33	1.17	1.04	0.92	0.82	0.74	0.67	0.60	0.54	0.50	0.45	0.41	0.38	0.35
0.88	MSU	4.15	3.83	3.56	3.32	3.11	2.93	2.77	2.62	2.49	2.37	2.26	2.15	1.97	1.82	1.68	1.56	1.45	1.35	1.26	1.18	1.11	1.04	0.98	0.93	0.88
	MSP_PD	3.11	2.87	2.67	2.49	2.34	2.20	2.08	1.97	1.87	1.78	1.70	1.57	1.44	1.33	1.23	1.14	1.06	0.99	0.92	0.87	0.81	0.76	0.72	0.68	0.64
	200	10.64	8.37	6.70	5.45	4.49	3.74	3.15	2.68	2.30	1.99	1.73	1.51	1.33	1.18	1.05	0.93	0.84	0.75	0.68	0.62	0.56	0.51	0.47	0.43	0.39
1.00	MSU	5.49	5.07	4.71	4.39	4.12	3.88	3.66	3.47	3.30	3.14	2.93	2.68	2.46	2.27	2.09	1.94	1.81	1.68	1.57	1.47	1.38	1.30	1.22	1.16	1.09
	MSP_PD	4.12	3.80	3.53	3.30	3.09	2.91	2.75	2.60	2.47	2.35	2.15	1.96	1.80	1.66	1.54	1.42	1.32	1.24	1.15	1.08	1.01	0.95	0.90	0.85	0.80
	200	12.41	9.76	7.82	6.36	5.24	4.37	3.68	3.13	2.68	2.32	2.01	1.76	1.55	1.37	1.22	1.09	0.98	0.88	0.79	0.72	0.65	0.60	0.55	0.50	0.46
1.25	MSU	8.28	7.65	7.10	6.63	6.21	5.85	5.52	5.23	4.97	4.53	4.12	3.77	3.47	3.19	2.95	2.74	2.55	2.37	2.22	2.08	1.95	1.83	1.73	1.63	1.54
	MSP_PD	6.21	5.73	5.32	4.97	4.66	4.39	4.14	3.92	3.68	3.33	3.04	2.78	2.55	2.35	2.18	2.02	1.88	1.75	1.63	1.53	1.44	1.35	1.27	1.20	1.13
	200	17.09	13.44	10.76	8.75	7.21	6.01	5.06	4.31	3.69	3.19	2.77	2.43	2.14	1.89	1.68	1.50	1.35	1.21	1.09	0.99	0.90	0.82	0.75	0.69	0.63
150	22.79	17.92	14.35	11.67	9.61	8.01	6.75	5.74	4.92	4.25	3.70	3.24	2.85	2.52	2.24	2.00	1.79	1.61	1.46	1.32	1.20	1.10	1.00	0.92	0.84	

**Design tables of cassette Hacierba 160/600**

Steel grade : **S320GD**

**Suction**

Single span



Thickness	Limit state	Span (m) - Support width : 80mm / 80mm																								
		3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.75	9.00
0.75	MSU	4.45	3.79	3.27	2.85	2.50	2.22	1.98	1.78	1.60	1.45	1.32	1.21	1.11	1.03	0.95	0.88	0.82	0.76	0.71	0.67	0.63	0.59	0.55	0.52	0.49
	MSP_PD	3.21	2.73	2.36	2.05	1.80	1.60	1.42	1.28	1.15	1.05	0.95	0.87	0.80	0.74	0.68	0.63	0.59	0.55	0.51	0.48	0.45	0.42	0.40	0.38	0.36
	200	5.65	4.45	3.56	2.90	2.39	1.99	1.68	1.42	1.22	1.06	0.92	0.80	0.71	0.63	0.56	0.50	0.45	0.40	0.36	0.33	0.30	0.27	0.25	0.23	0.21
0.88	MSU	6.29	5.36	4.62	4.03	3.54	3.14	2.80	2.51	2.27	2.05	1.87	1.71	1.57	1.45	1.34	1.24	1.16	1.08	1.01	0.94	0.89	0.83	0.78	0.74	0.70
	MSP_PD	4.57	3.90	3.36	2.93	2.57	2.28	2.03	1.82	1.65	1.49	1.36	1.24	1.14	1.05	0.97	0.90	0.84	0.78	0.73	0.69	0.64	0.60	0.57	0.54	0.51
	200	6.39	5.02	4.02	3.27	2.69	2.25	1.89	1.61	1.38	1.19	1.04	0.91	0.80	0.71	0.63	0.56	0.50	0.45	0.41	0.37	0.34	0.31	0.28	0.26	0.24
1.00	MSU	7.99	6.81	5.87	5.12	4.50	3.98	3.55	3.19	2.88	2.61	2.38	2.18	2.00	1.84	1.70	1.58	1.47	1.37	1.28	1.20	1.12	1.06	1.00	0.94	0.89
	MSP_PD	5.83	4.97	4.29	3.73	3.28	2.91	2.59	2.33	2.10	1.91	1.74	1.59	1.46	1.34	1.24	1.15	1.07	1.00	0.93	0.87	0.82	0.77	0.73	0.69	0.65
	200	7.42	5.84	4.68	3.80	3.13	2.61	2.20	1.87	1.60	1.39	1.20	1.05	0.93	0.82	0.73	0.65	0.58	0.53	0.48	0.43	0.39	0.36	0.33	0.30	0.27
1.25	MSU	11.53	9.83	8.47	7.38	6.49	5.75	5.13	4.60	4.15	3.77	3.43	3.14	2.88	2.66	2.46	2.28	2.12	1.97	1.85	1.73	1.62	1.53	1.44	1.36	1.28
	MSP_PD	8.46	7.21	6.22	5.42	4.76	4.22	3.76	3.38	3.05	2.76	2.52	2.30	2.12	1.95	1.80	1.67	1.55	1.45	1.35	1.27	1.19	1.12	1.05	0.99	0.94
	200	10.17	8.00	6.40	5.21	4.29	3.58	3.01	2.56	2.20	1.90	1.65	1.44	1.27	1.12	1.00	0.89	0.80	0.72	0.65	0.59	0.54	0.49	0.45	0.41	0.38
150	13.56	10.66	8.54	6.94	5.72	4.77	4.02	3.42	2.93	2.53	2.20	1.93	1.69	1.50	1.33	1.19	1.07	0.96	0.87	0.79	0.71	0.65	0.60	0.55	0.50	