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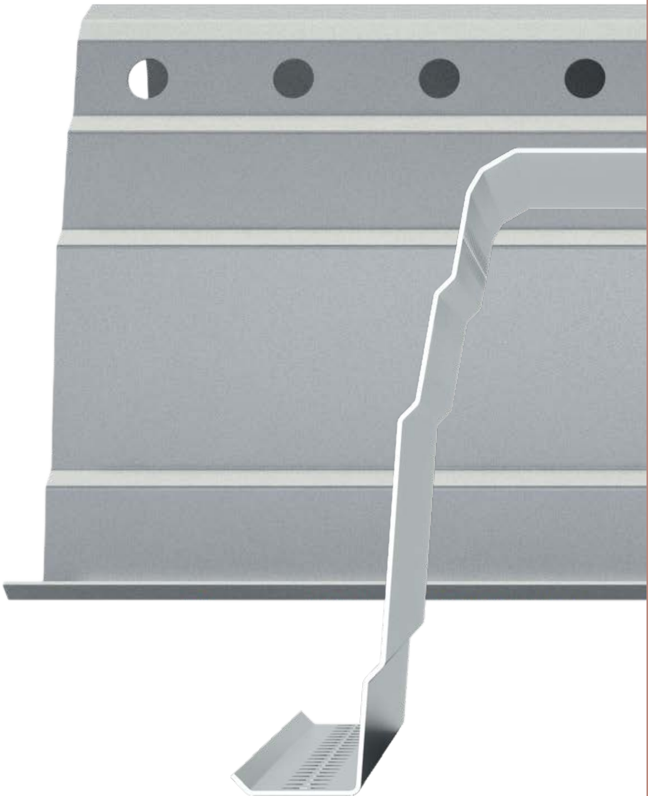


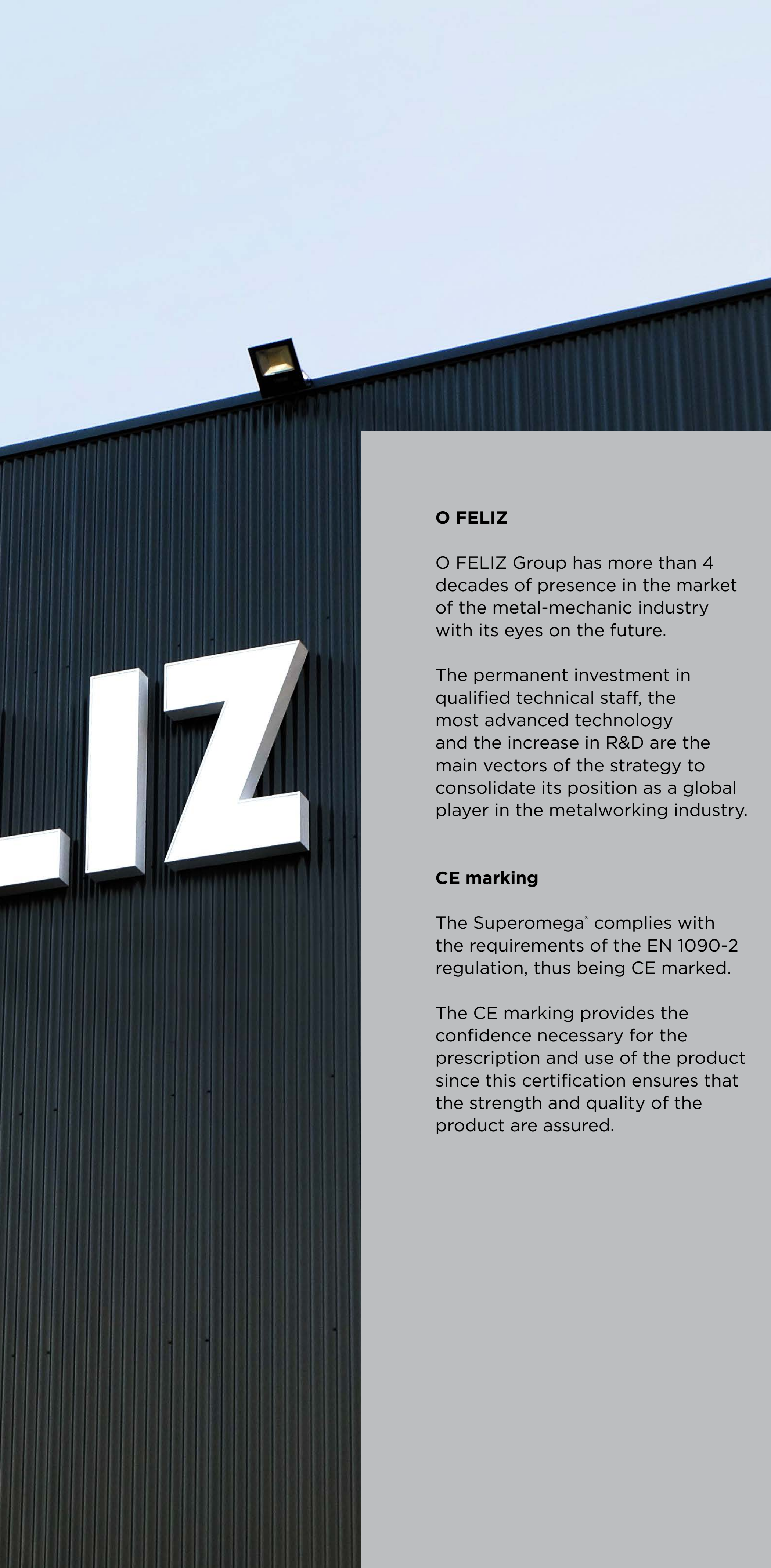
SUPERΩMEGA®

COLD-FORMED LIGHT STEEL SECTIONS

O FELIZ
METALOMECÂNICA

I N D E X

O FELIZ GROUP



O FELIZ

O FELIZ Group has more than 4 decades of presence in the market of the metal-mechanic industry with its eyes on the future.

The permanent investment in qualified technical staff, the most advanced technology and the increase in R&D are the main vectors of the strategy to consolidate its position as a global player in the metalworking industry.

CE marking

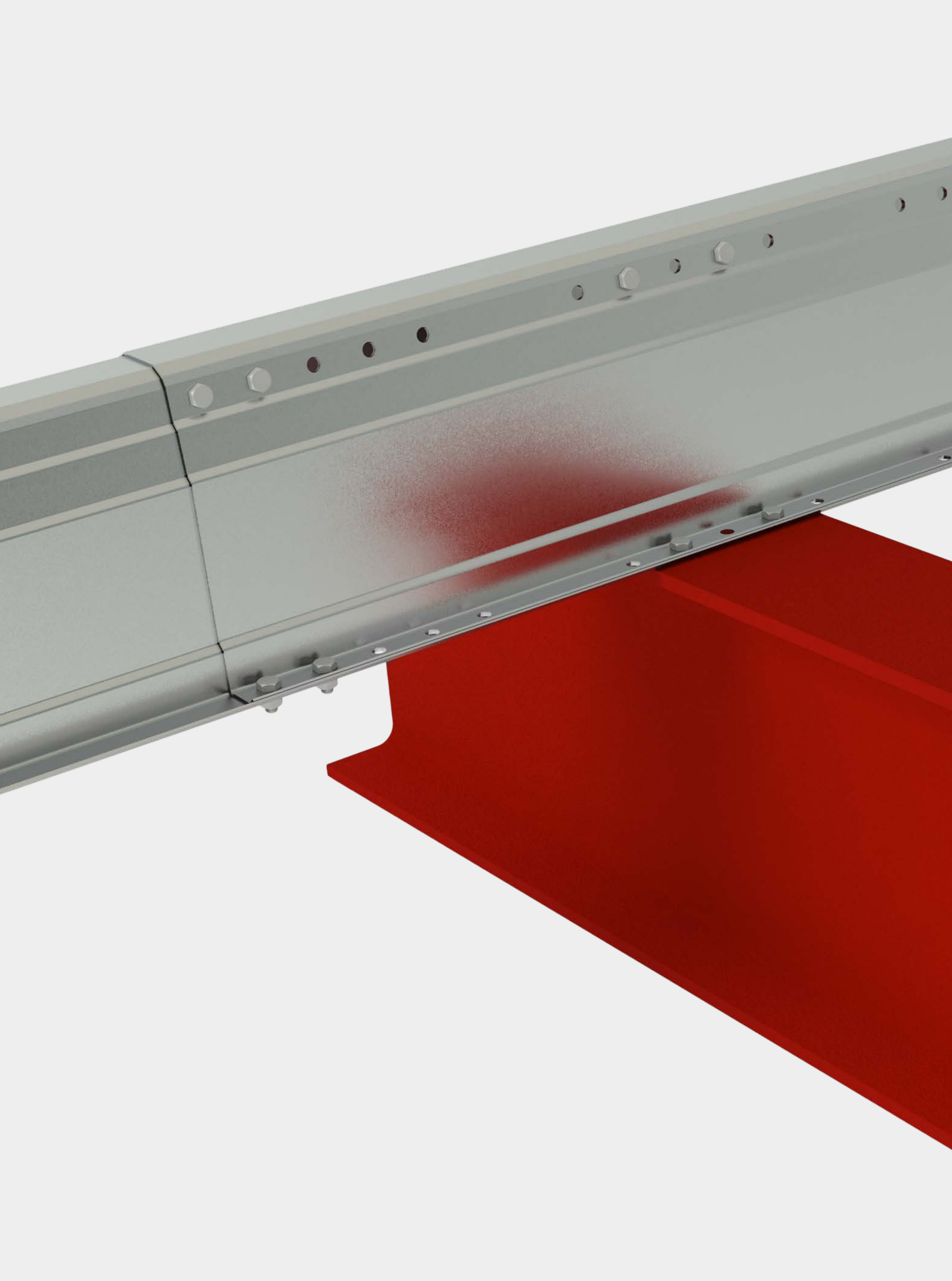
The Superomega® complies with the requirements of the EN 1090-2 regulation, thus being CE marked.

The CE marking provides the confidence necessary for the prescription and use of the product since this certification ensures that the strength and quality of the product are assured.

Reuse and Recycling

Since the cold-formed light steel sections do not lose their rigidity over time, these sections are suitable for re-use when removed from the original structure.

In addition, steel is now a material with recycling rates close to 100%, contributing unequivocally to the sustainability of the construction market.



The Superomega®

This product is the culmination of 2 years of research and development in the search for an innovative solution of cold-formed light steel sections.

The result is the most economical and rugged section amongst the light steel sections available on the market.

Developed in a partnership between O FELIZ and the University of Coimbra, this innovative section of the Omegas family allows significant weight reductions when compared to the most advanced solutions on the market for the same level of structural performance.

Main differences compared to other market solutions:

- Greater material savings *versus* structural performance;
- Optimized profile for transport in containers;
- Possibility of defining a continuity connection in the support zone or outside the support;
- Drilling adapted to the application;
- Possibility of continuous drilling;
- Futuristic and attractive aesthetic geometry.

The sections are obtained by cold profiling which allows a high production cadence as well as a high dimensional rigor.

Produced in a continuous profiling line, the sections are custom made and with different drilling patterns that facilitate the assembly process through the possibility of creating bolted connections.

“We believe we have created a revolutionary product.”

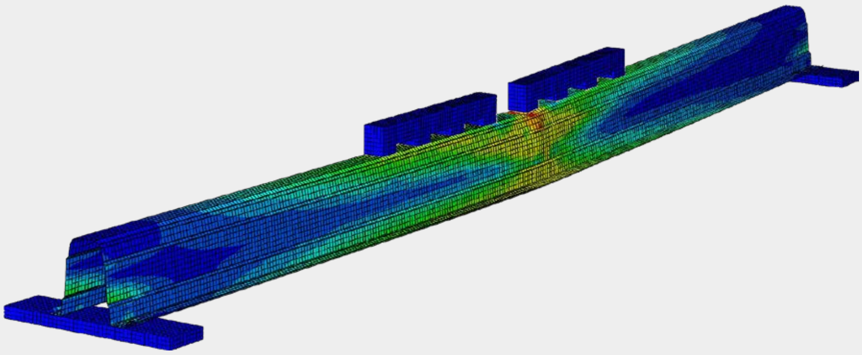
Finite Element Numerical Validation

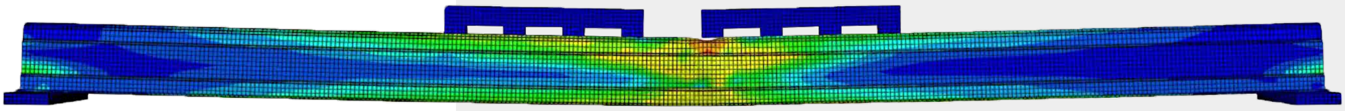
In order to validate the experimental results obtained and reach other results associated to the behaviour of the Superomega® sections, a numerical study was developed in ABAQUS software, defined by three stages:

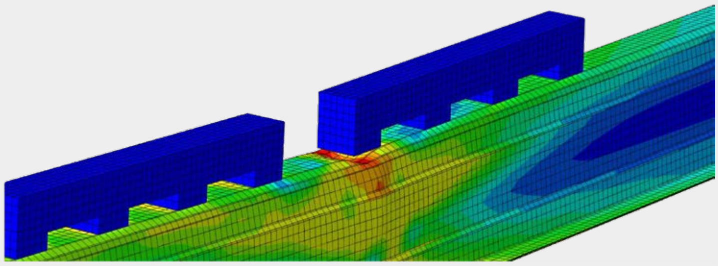
1. Calibration of the numerical models, according to the experimental results obtained in the flexural tests of the 160×1,5 Superomega® and 80×1,0 Superomega® sections, simulating the loading system applied in the tests;

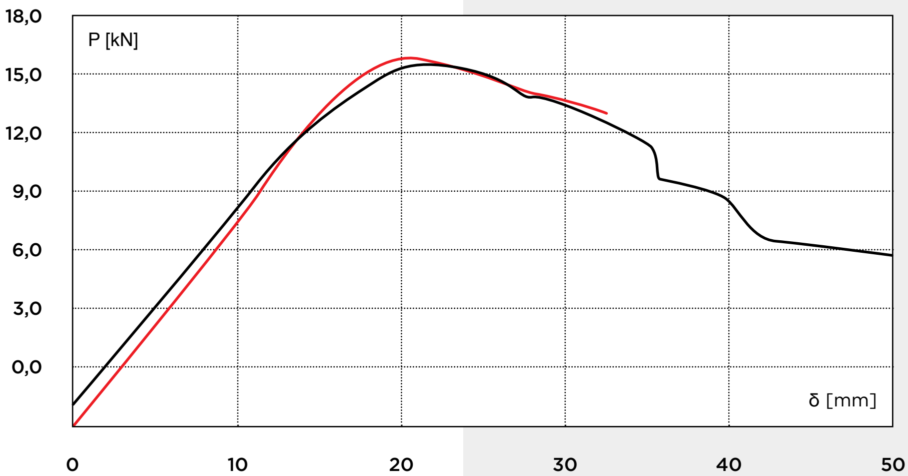
2. Simulation of the behaviour of sections with 80, 120, 160, 200 and 250 mm heights and with 1,50 mm of thickness, simply supported and subjected to evenly distributed loading;

3. Calibration and simulation of the connections' behaviour.









Experimental results

Numerical results

Calibration model: Superomega® 160×1,5

Experimental Program

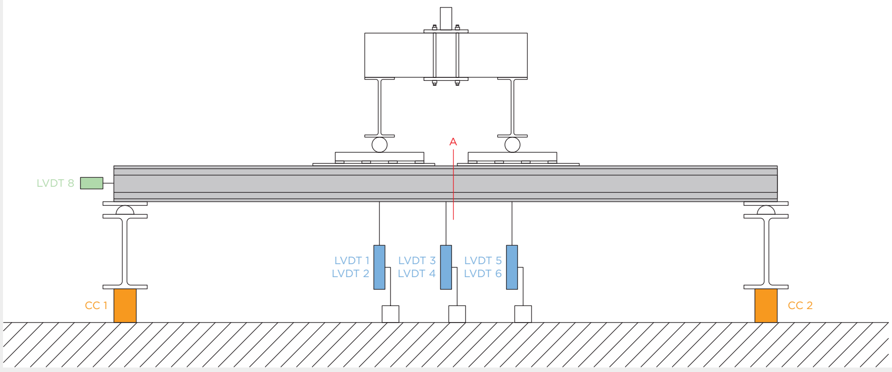
In order to validate the geometric parameters obtained as well as to verify the structural performance of the Superomega®, an experimental program of flexural tests of a representative set of 3 sections was carried out:

- Superomega® 80×1,0
- Superomega® 160×1,5
- Superomega® 250×2,0

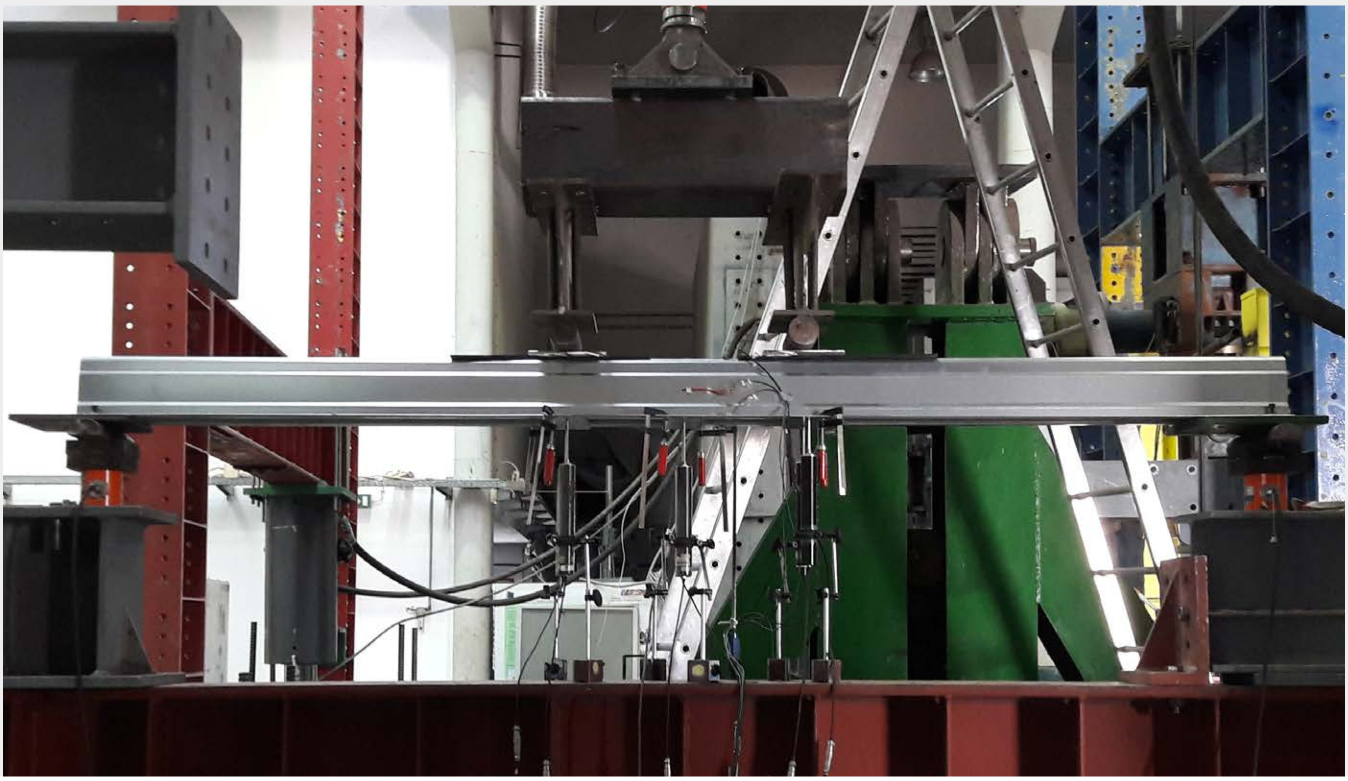
The experimental tests were carried out according to Annex A.3 of the EN 1993-1-3 regulation, which regulates the flexural test of cold-formed elements. In bending tests (Clause A.3.4), the regulation requires that: the specimen shall not be less than 15 times the largest cross-sectional dimension; the spacing of any bracing elements shall not be less than that in service; a pair of actions should be applied simulating an intermediate constant momentum with a dimension between 20 and 33% of the total span of the specimen.

Each specimen tested had a length $L + L_0$, of 3000 mm, and the free span between supports, L, of 2900 mm.

The test specimens were tested as simply supported by the application of two symmetrically loads placed at 300 mm from the mid-span in order to obtain a central constant moment span of 600 mm (corresponding to 21% of the total span between supports). The tests were carried out by deformation control at a speed of 0.02 mm/s.

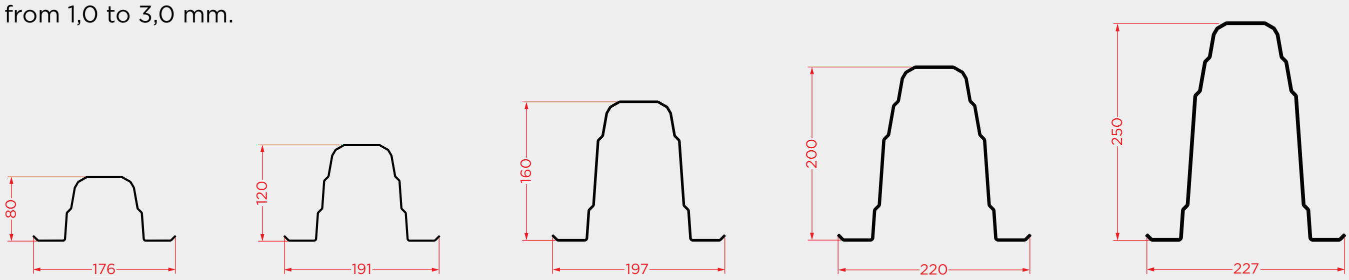


Test layout



Section Range

The range is composed of 5 sections with Ω type cross-section, with heights ranging from 80 to 250 mm and thicknesses ranging from 1,0 to 3,0 mm.



The geometric properties mentioned in this document were determined analytically for each type of section, considering the height, thickness and grade of steel as defined in Eurocode 3.

The section was developed with the purpose of maximizing the effective areas of the class 4 sections that, as the designers know, in the light of Eurocode 3 can be quite penalizing. Even in the slimmer sections it is possible to obtain section utilization rates above 95% due to the influence of longitudinal reinforcements on the slender parts of the section.

The result, in practice, is the reduction of the amount of steel needed for the same structural performance.

Section	Weight	Height h	Width b	Painting Area
	kg/m	mm	mm	m^2/m
Superomega® 80×1,0	2,39			
Superomega® 80×1,2	2,86	80	176	0,608
Superomega® 80×1,5	3,58			
Superomega® 120×1,0	3,05			
Superomega® 120×1,2	3,66	120	191	0,778
Superomega® 120×1,5	4,58			
Superomega® 120×2,0	6,11			
Superomega® 160×1,5	5,52			
Superomega® 160×2,0	7,36	160	197	0,938
Superomega® 160×2,5	9,20			
Superomega® 200×1,5	6,54			
Superomega® 200×2,0	8,71	200	220	1,110
Superomega® 200×2,5	10,89			
Superomega® 250×2,0	10,27			
Superomega® 250×2,5	12,83	250	227	1,308
Superomega® 250×3,0	15,40			

Quality of Materials

The Superomega® is produced in 2 classes of pre-galvanized structural steel: S280GD and S350GD in pre-galvanized sheet metal or Magnelis® according to the EN 10346 regulation.
Optionally, this product can be supplied with another type of surface finish, namely with lacquer in RAL to be defined.
Conditions of supply on request.

Steel Class	Yield Stress	Tensile Strength
	MPa	MPa
S280GD	280	360
S350GD	350	420

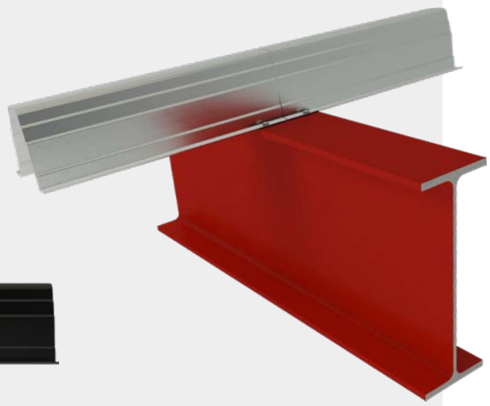
Pre-Galvanized	Surface Coating Mass	Surface Coating Thickness
	g/m²	µm/face
Z200	200	14
Z275	275	20

Magnelis®	Surface Coating Mass	Surface Coating Thickness
	g/m²	µm/face
ZM175	175	14
ZM250	250	20
ZM310	310	25

Applications

The versatility of the Superomega® allows a wide applicability to diverse types of structures as well as the adaptation to almost all types of materials.

This profile can be applied in:
- Secondary structure to support coatings and facade coverings;
- Interior partitions;
- Structures for mezzanines and intermediate floors;
- Light coverage in LSF;
- Supports for photovoltaic panel systems.



Geometric Properties

The geometric properties of the sections that make up the range were determined in accordance with the Structural Eurocodes in the various parts, namely: EN 1993-1-1, EN 1993-1-3 and EN 1993-1-5.

For the determination of the geometric properties, it was considered the reduction of the nominal thickness of the steel core, corresponding to the thickness of the galvanization, as suggested in clause 3.2.4 of the EN 1993-1-3 regulation, for a Z275 zinc coating (20 µm/surface).

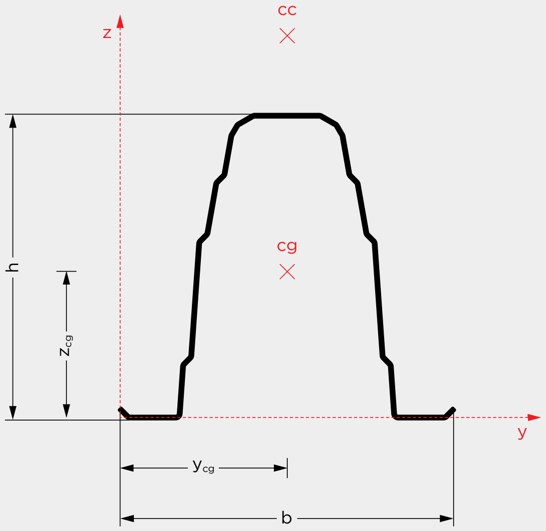
In the section analysis, the influence of the rounded corners was considered, as well as the possibility of their representation in straight sections for the purpose of evaluating the geometric properties, as foreseen in clause 5.1 of the EN 1993-1-3 regulation.

The geometric proportions of the various sections that allow the application of the simplified methods provided for in the abovementioned regulation have been verified.

The local instability phenomena of the section were incorporated into the analysis by determining the effective properties of the section under compression, flexion along the axis of greatest inertia (positive and negative) and flexion along the axis of least inertia.

The system of axes adopted for the location of cg and cc is shown in the image below.

Reference axis system



Subtitle

cg	Gravity centre
cc	Cutting Center
h	Section height
b	Width of section
$y_{cg}=y_{cc}$	Y-position of the centre of gravity and cutting centre
z_{cg}	Z-position of the centre of gravity
z_{cc}	Z-position of the cut centre

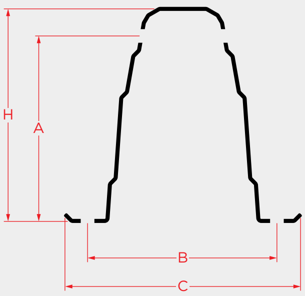
Drilling Patterns

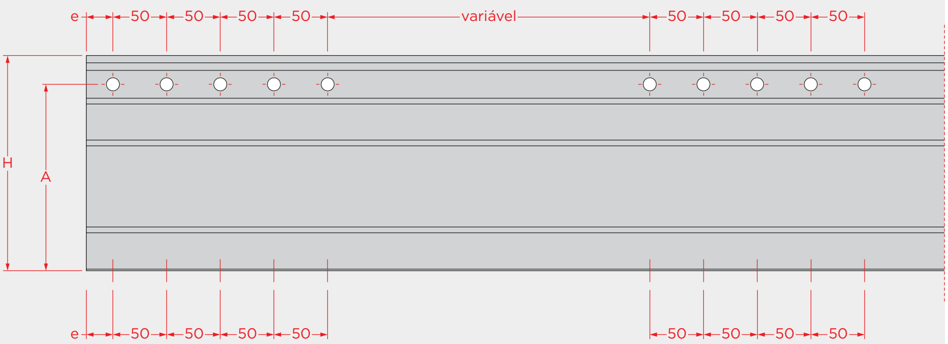
The Superomega® can be supplied without drilling or with 2 different drilling patterns, according to the project requirements and as explained below.

Standard A — Custom Drilling

Drill Ø14 or M10-class 8.8 screw on the lower section and top flaps of the webs, defined based on project requirements. Usually, this drilling will be defined on the supports and in the overlap zones to guarantee the transmission of the continuity efforts. The drilling is performed in blocks of 5 holes spaced 50 mm apart.
The distance between the profile end and the axis of the first column of holes can be set between 25-30-35-40-45-50 mm.

Section	H	A	B	C	e	Drill
	mm	mm	mm	mm	mm	
Superomega® 80	80	54	132	176	25 30 35 40 45 50	Ø14
Superomega® 120	120	93	147	191		
Superomega® 160	160	134	153	197		
Superomega® 200	200	174	175	220		
Superomega® 250	250	224	182	227		

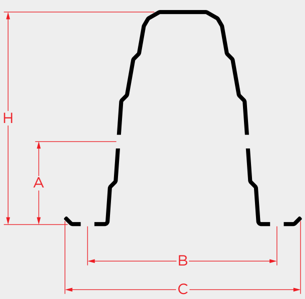


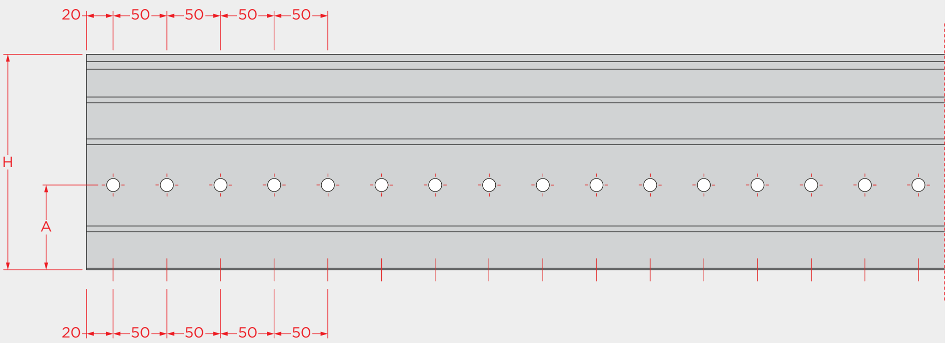


Standard B — Continuous Drilling

Drill Ø14 for M10-class 8.8 screw with a spacing of 50/50 mm between axes of holes arranged in the lower section flaps and section cores at height A (see table below).
The distance between the section end and the axis of the first column of holes is fixed: 20 mm.
At both ends of the beam, so that the distance is 20 mm from the center of the first hole, it is necessary that the length of the piece ends at 40 or 90 mm.

Section	H	A	B	C	Drill
	mm	mm	mm	mm	
Superomega® 80	80	54	132	176	Ø14
Superomega® 120	120	58	147	191	
Superomega® 160	160	78	153	197	
Superomega® 200	200	78	175	220	
Superomega® 250	250	104	182	227	





Continuity and Reinforcement Connections

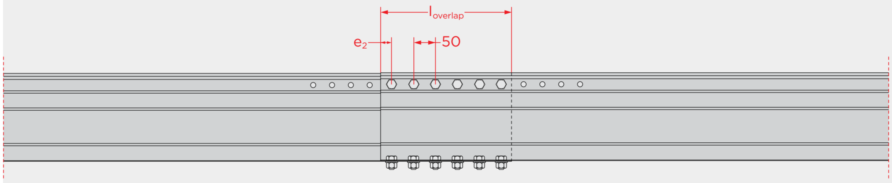
In order to allow the transmission of continuity efforts in amendment situations, standard connections were defined for each of the situations depending on the type of section and the possible need for reinforcement in the amendment zone.

The defined connections are valid for the S280GD and S350GD steel grades.

4 types of joints and reinforcements were considered in detail for the 4 configurations:

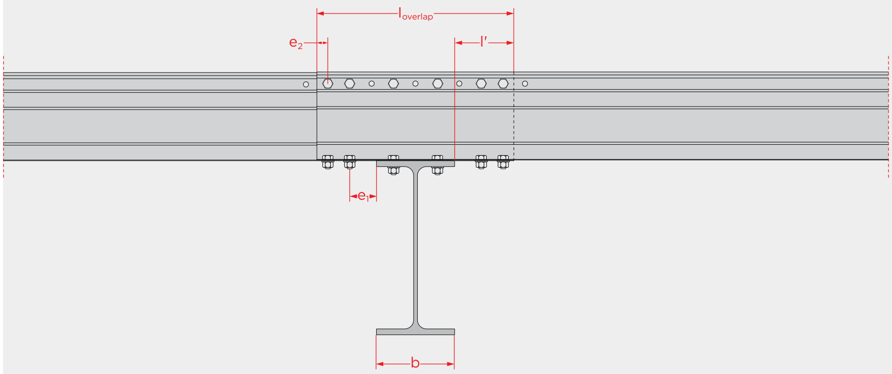
1. Simple amendment between supports

- The connection allows the amendment of elements by overlapping in any position in the free span of the beam and ensures the transmission of the continuity efforts.



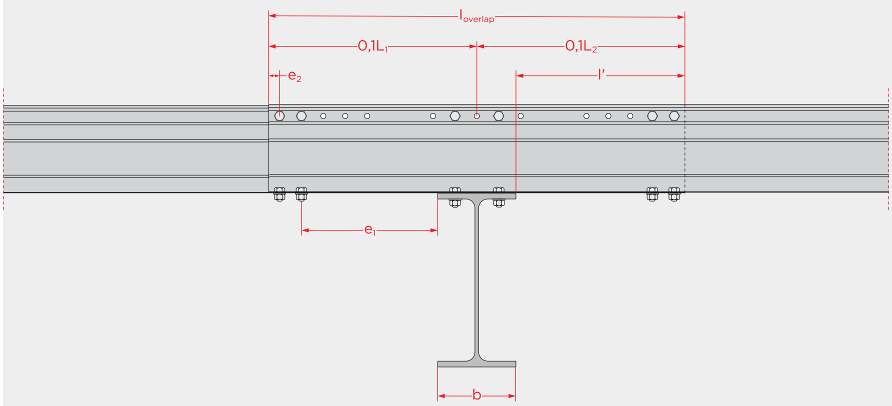
2. Simple amendment on the support

- The connection ensures the transmission of the continuity efforts of the zone elements on the support.



3. Strengthening support

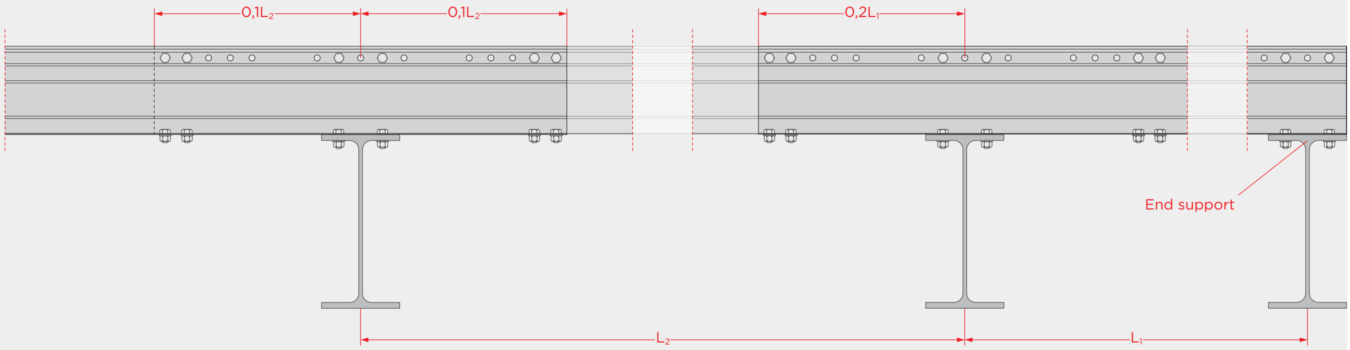
- The connection allows to reinforce the element in the area of the supports by being subjected to bending efforts and to higher concentrated forces in this region, avoiding the oversizing of the beam in the zone at half-span;
- It is recommended the relative overlap length to be between 10 and 20% of the length of the adjacent span.



Continuity and Reinforcement Connections

4. End span reinforcement

- In continuous beam solutions with 4 or more spans, the end spans can be reinforced by overlapping 2 beams with the same section along the entire span, in order to withstand the highest stresses to which this section is subject ;
- The overlap of the end span should extend to 10 or 20% of the length of the adjacent interior span;
- The use of this reinforcement is optional for beams with 4 or 5 spans, but mandatory for beams with 6 or more spans.



Subtitle

$l_{overlap}$ Length of overlap.

l' Distance between the end of the support beam flange and the end of the beam.

e_1 Distance between the end of the flange and the centre of the first hole capable of taking the bolt out of the support beam flange.

e_2 Distance between the end hole shaft and the beam end.

b Width of upper support beam flange.

Support to the Structural Project

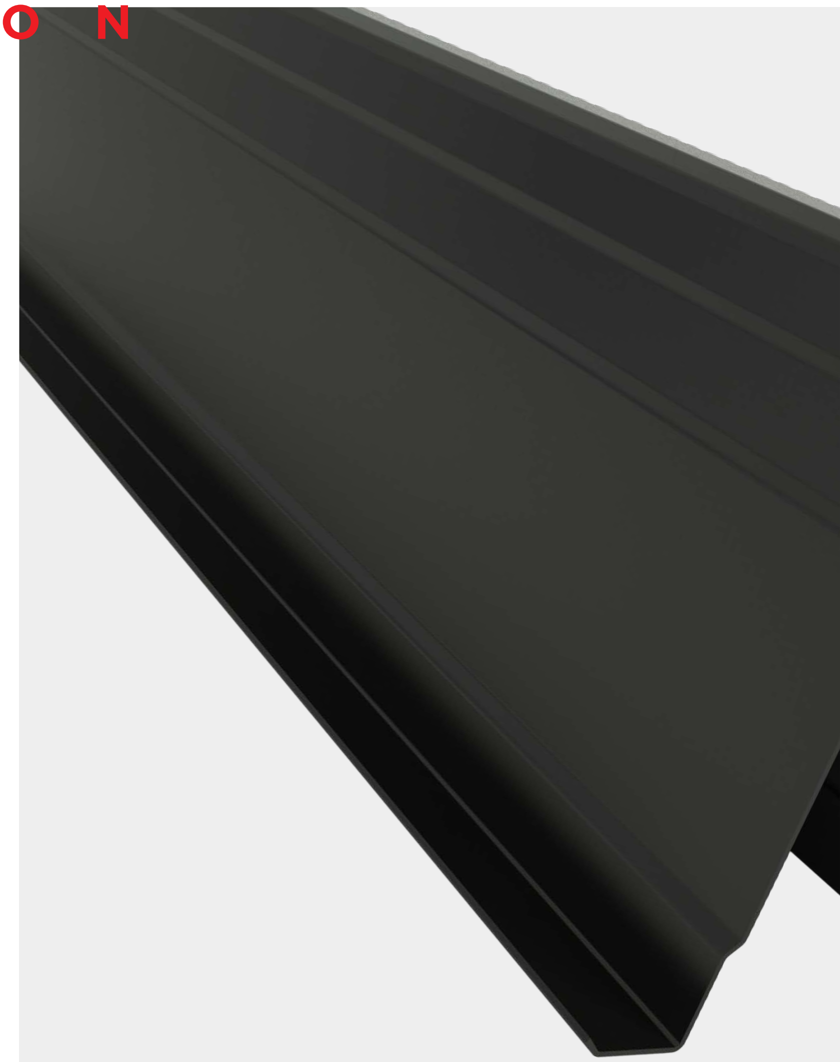
To facilitate the work of structural engineers, O FELIZ provides a computer tool for the dimensioning of secondary framework with the Superomega® sections according to the Structural Eurocodes.

This application allows, in a simple and intuitive way, to carry out the security checks in Latest Limit States and Service Limit States for design conditions easily parameterizable by the designer.

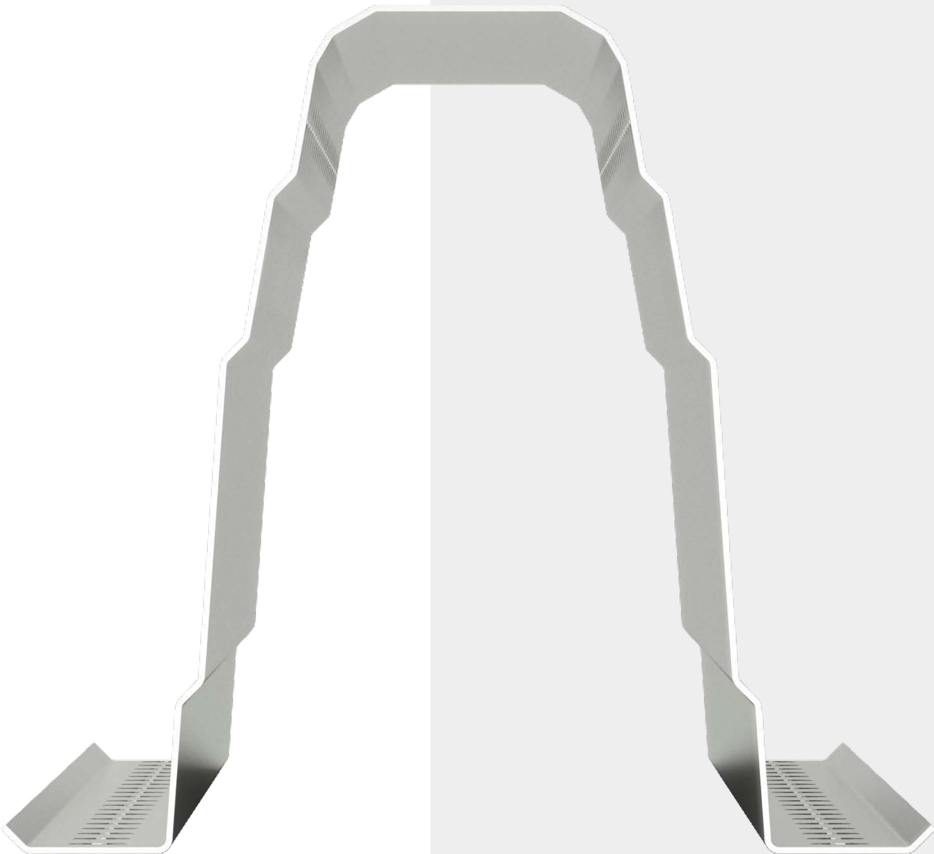
If you have any questions, please contact our Technical Department:

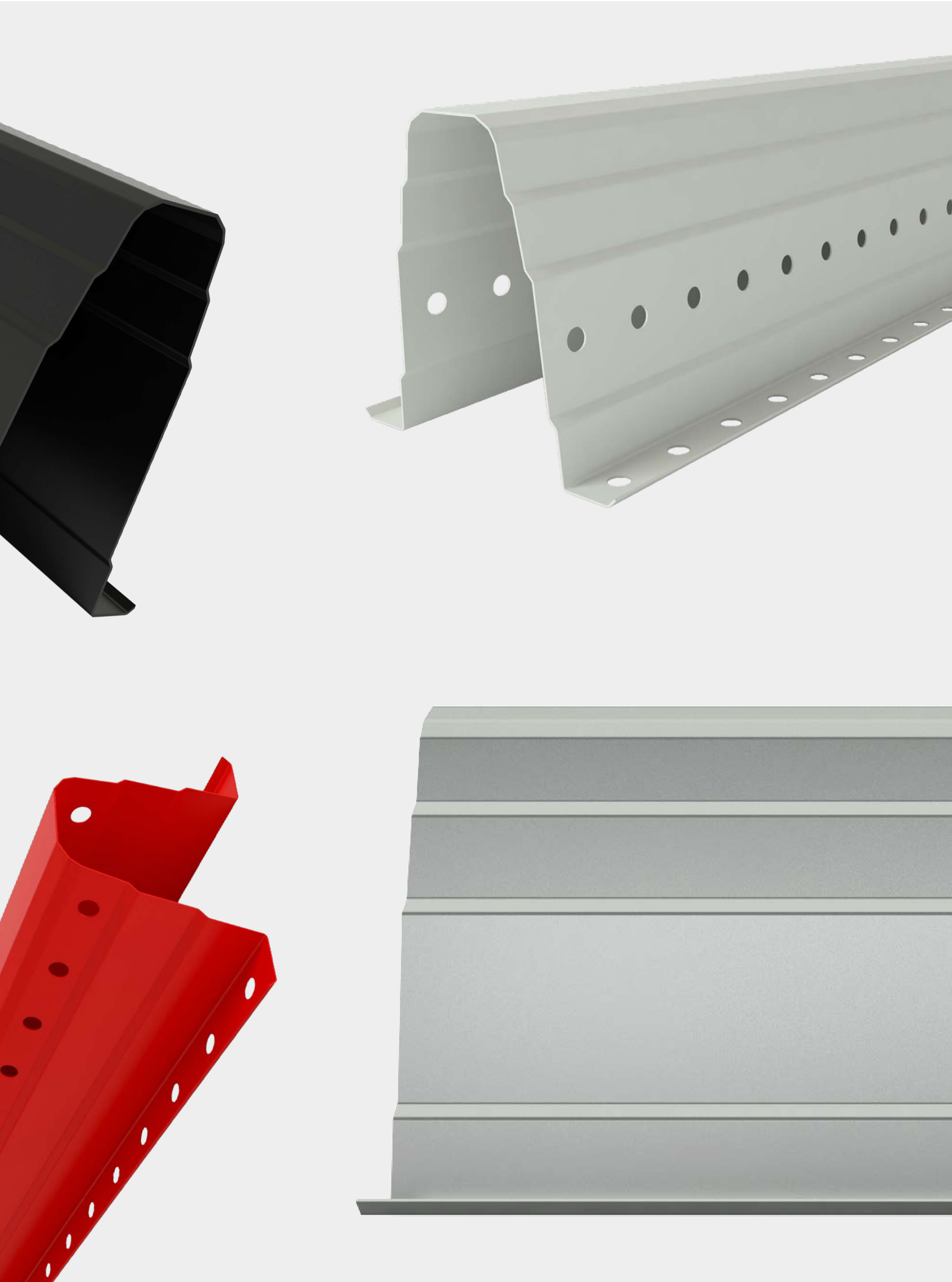
dt@ofeliz.com

SECTION RANGE

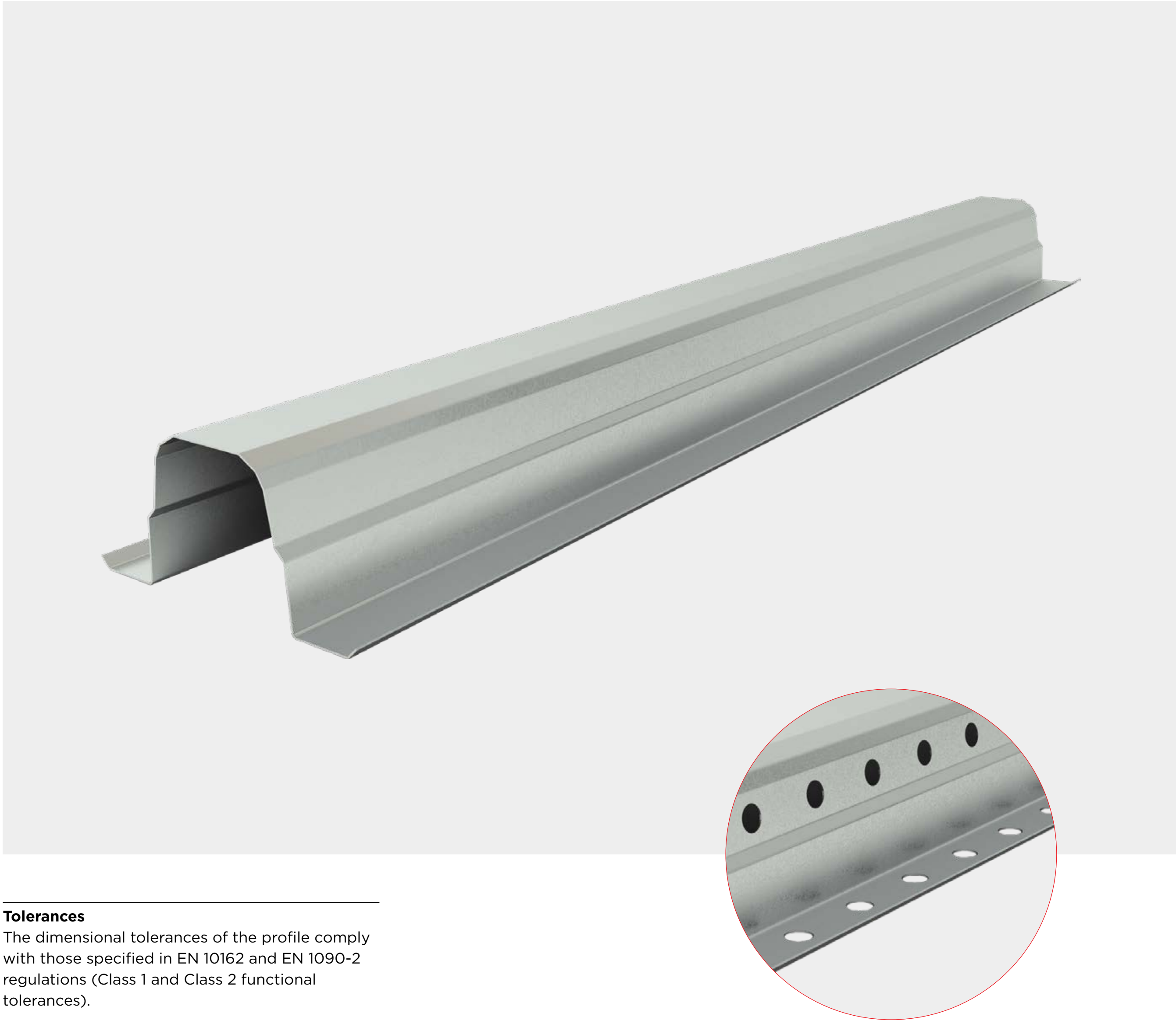


Superomega® 80
Superomega® 120
Superomega® 160
Superomega® 200
Superomega® 250

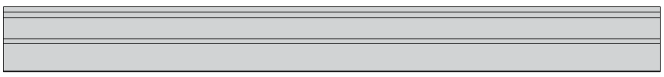


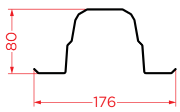


Superomega® 80

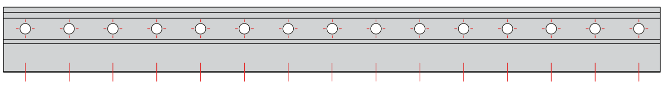


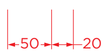
Tolerances
The dimensional tolerances of the profile comply with those specified in EN 10162 and EN 1090-2 regulations (Class 1 and Class 2 functional tolerances).

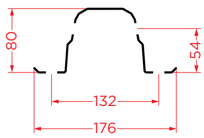




Superomega® 80







Superomega® 80 with continuous drilling

Geometric Properties

Gross Section Properties

Section	Weight	Height h	Width b	Painting Area	Thickness		Gross Section							
					t_{nom}	t_{eff}	A_{gross}	$I_{y,gross}$	$I_{z,gross}$	I_w	I_t	$Y_{cg}=Y_{cc}$	Z_{cg}	Z_{cc}
	kg/m	mm	mm	m²/m	mm	mm	cm²	cm⁴	cm⁴	cm⁶	x10⁻⁴ cm⁴	mm	mm	mm
Superomega® 80×1,0	2,39				1,0	0,96	2,92	28,02	69,24	223,09	89,76			
Superomega® 80×1,2	2,86	80	176	0,608	1,2	1,16	3,53	33,86	83,67	269,57	158,35	88,0	36,3	99,2
Superomega® 80×1,5	3,58				1,5	1,46	4,44	42,62	105,31	339,29	315,73			

S280GD

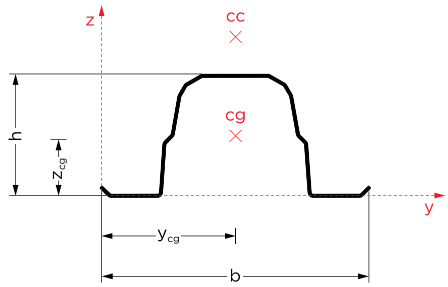
Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 80×1,0	2,79	88,0	36,2	2,86	26,86	6,16	88,0	35,4	2,86	27,20	6,49	88,0	37,1	2,90	68,72	7,78	88,3	36,4
Superomega® 80×1,2	3,48	88,0	36,8	3,53	33,86	7,93	88,0	36,3	3,48	33,28	7,88	88,0	36,8	3,51	83,02	9,40	88,3	36,4
Superomega® 80×1,5	4,43	88,0	36,4	4,44	42,62	9,98	88,0	36,3	4,43	42,44	9,97	88,0	36,4	4,41	104,44	11,82	88,4	36,4

S350GD

Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 80×1,0	2,73	88,0	36,2	2,83	26,35	5,98	88,0	35,0	2,82	26,75	6,45	88,0	37,5	2,88	68,31	7,71	88,6	36,5
Superomega® 80×1,2	3,39	88,0	36,5	3,48	32,88	7,59	88,0	35,7	3,45	32,80	7,84	88,0	37,2	3,51	83,02	9,40	88,3	36,4
Superomega® 80×1,5	4,39	88,0	36,8	4,44	42,62	9,98	88,0	36,3	4,39	41,91	9,92	88,0	36,8	4,41	104,44	11,82	88,4	36,4



Subtitle

- A_{gross} Gross cross-sectional area.
- $I_{y,gross}$ Inertia of the gross section yy-axis.
- $I_{z,gross}$ Inertia of the gross section zz-axis.
- I_w Constant warping.
- I_t Constant torsional.
- cg Gravity centre.
- cc Cutting centre.
- A_{eff} Effective section area.
- $I_{y,eff}$ Inertia of the effective section yy-axis.
- $W_{y,eff}$ Elastic module of the effective section yy-axis.
- $I_{z,eff}$ Inertia of the effective section zz-axis.
- $W_{z,eff}$ Elastic module of the effective section zz-axis.
- cg,eff Centre of gravity of the effective section.

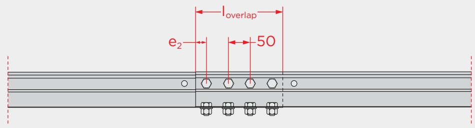
Note

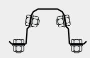
The weights indicated are theoretical weights calculated from the nominal section dimensions and are susceptible to variations within the steel tolerances provided for in EN 10051 regulation.

Continuity and Reinforcement Connections

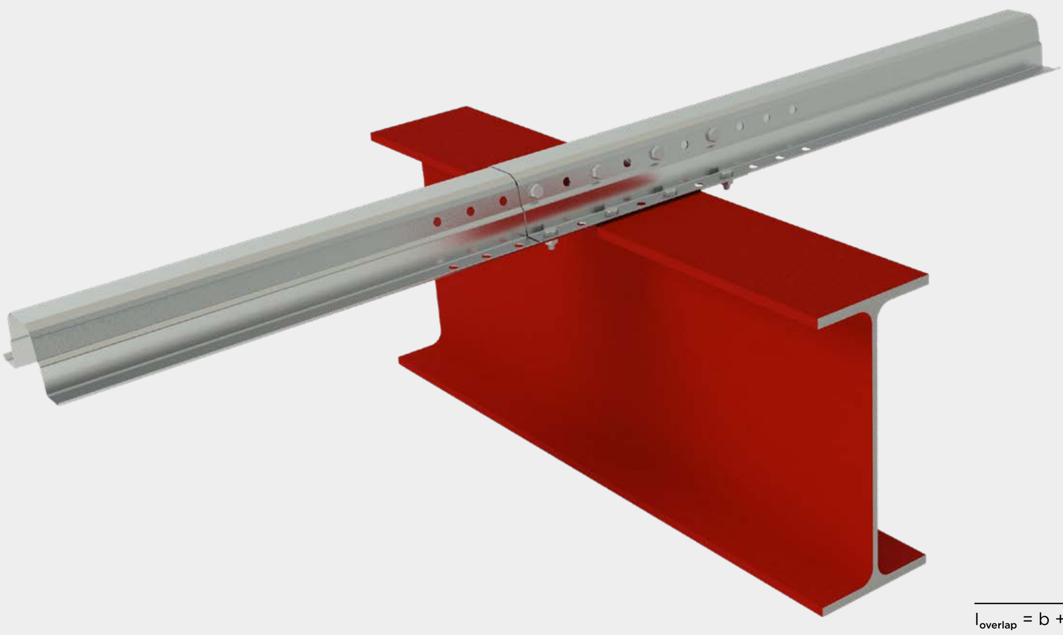
1.
Simple amendment between supports

$l_{overlap}$ = 200 mm
e_2 = 25 mm

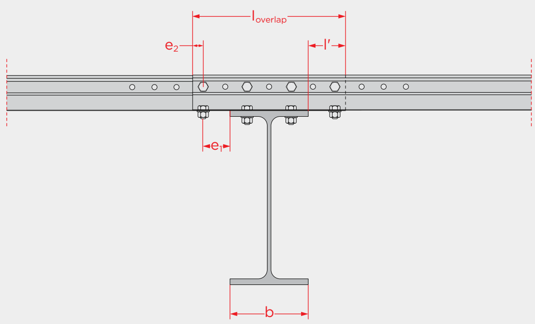


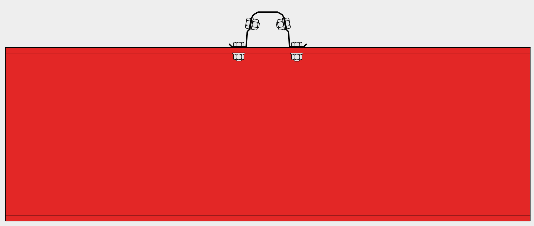


2.
Simple amendment on the support

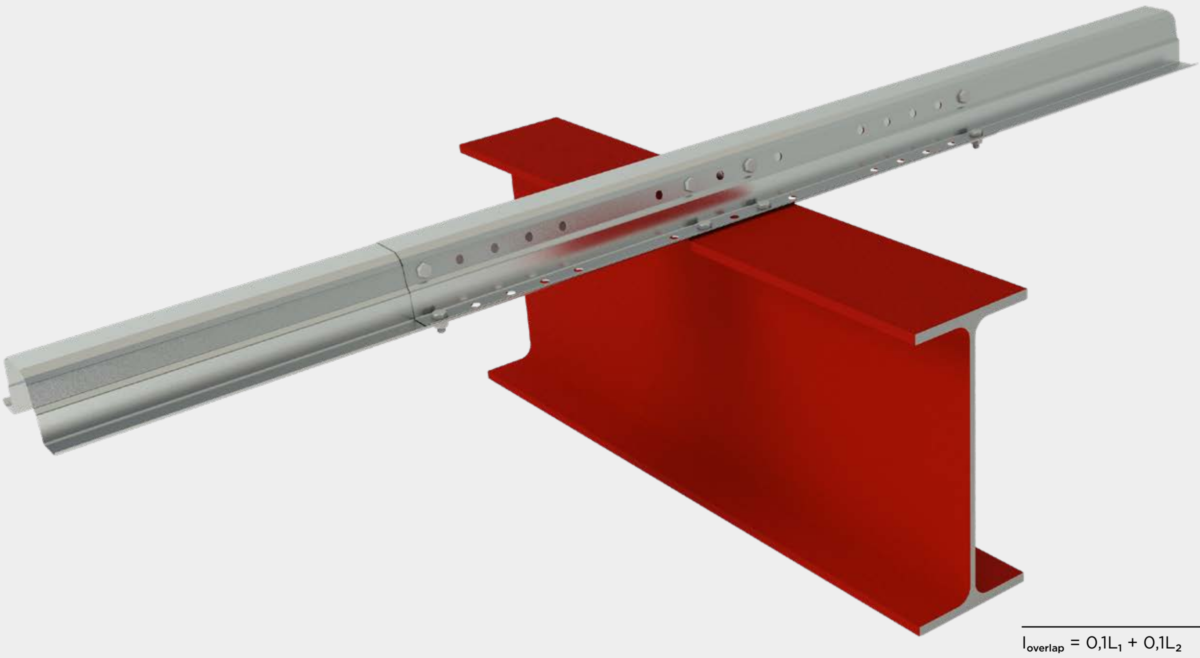


$l_{overlap}$ = b + 2l′
l′ = e_1 + 25 mm (80-120-160)
l′ = e_1 + 75 mm (200-250)
20 ≤ e_1 ≤ 70
e_2 = 25 mm
b ≥ 130 mm

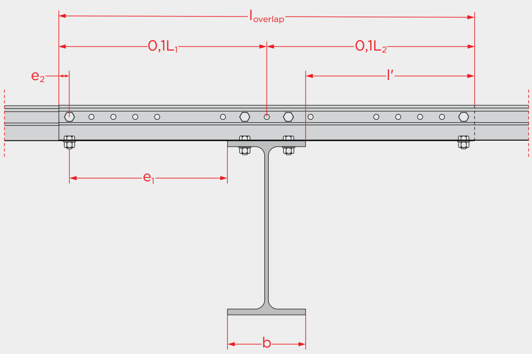


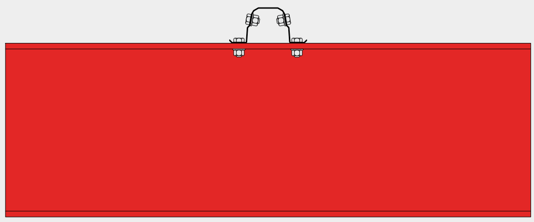


3.
Strengthening support



$l_{overlap} = 0{,}1L_1 + 0{,}1L_2$
$l' = 0{,}1L_1(\text{ou } L_2) - b/2$
$e_1 = l' - 25$
$e_2 = 25$ mm
$b \geq 130$ mm



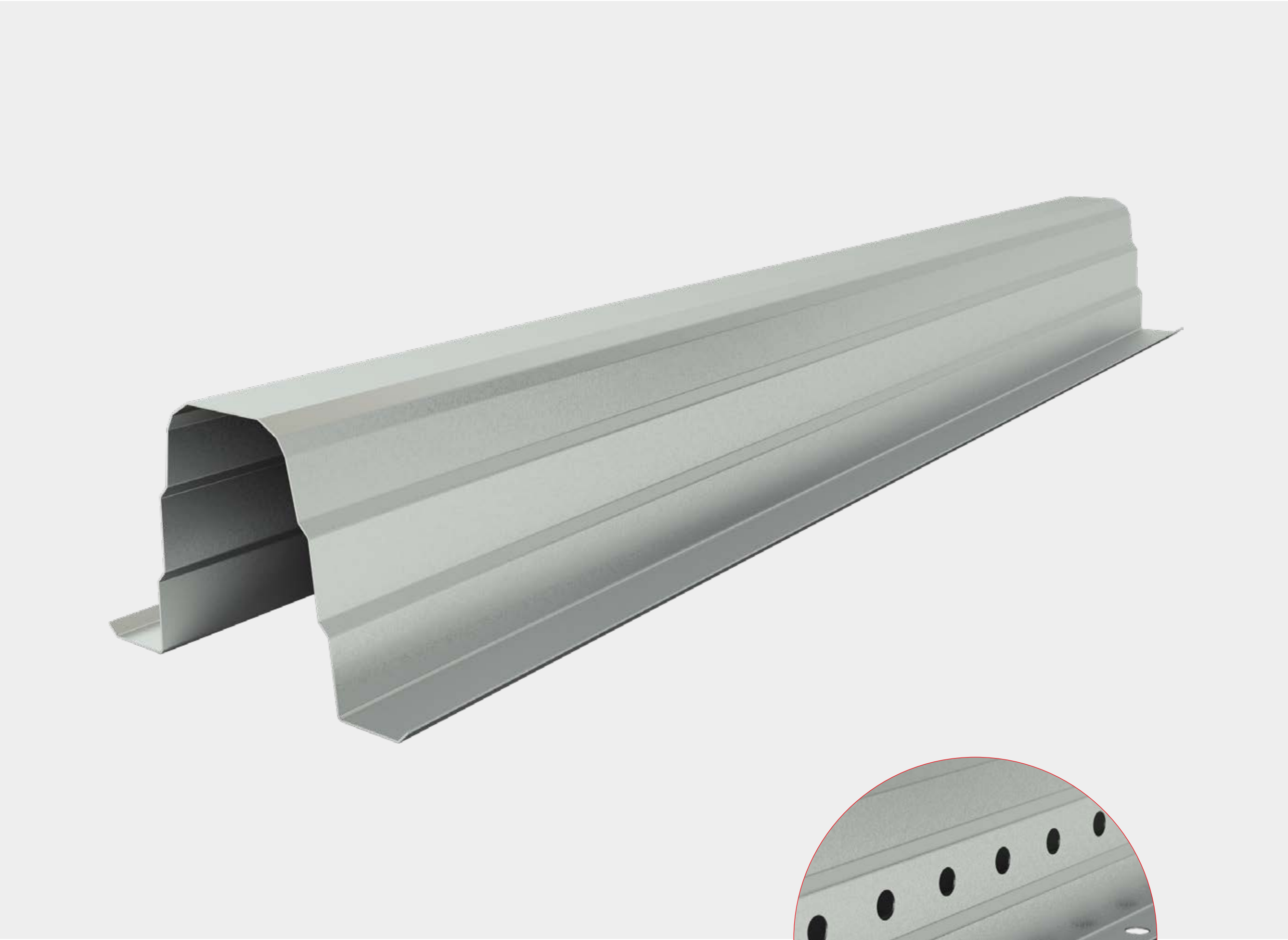


Subtitle

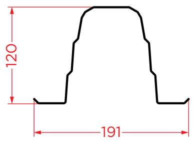
$l_{overlap}$	Length of overlap.
l'	Distance between the end of the support flange and the end of the beam.
e_1	Distance between the end of the flange and the centre of the end screw.
e_2	Distance between the centre of the end screw and the end of the beam.
L_1 e L_2	Lengths of spans adjacent to support.
b	Width of upper support of the support beam.

Notas
M10 screws class 8.8.
The rings for the screws in the top flange must have an external radius ≤ 12 mm.

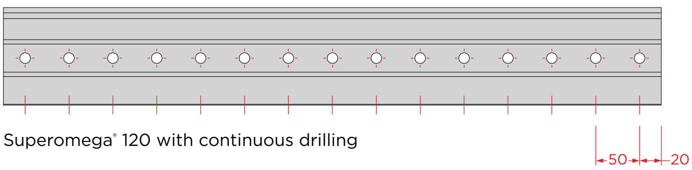
Superomega® 120

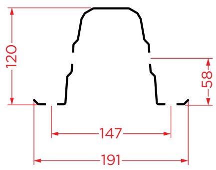


Tolerances
The dimensional tolerances of the profile comply with those specified in EN 10162 and EN 1090-2 regulations (Class 1 and Class 2 functional tolerances).



Superomega® 120





Superomega® 120 with continuous drilling

Geometric Properties

Gross Section Properties

Section	Weight	Height h	Width b	Painting Area	Thickness		Gross Section							
					t_{nom}	t_{eff}	A_{gross}	$I_{y,gross}$	$I_{z,gross}$	I_w	I_t	$Y_{cg}=Y_{cc}$	Z_{cg}	Z_{cc}
	kg/m	mm	mm	m²/m	mm	mm	cm²	cm⁴	cm⁴	cm⁶	x10⁻⁴ cm⁴	mm	mm	mm
Superomega® 120×1,0	3,05	120	192	0,778	1,0	0,96	3,73	73,73	102,70	583,53	114,70	95,7	55,8	151,3
Superomega® 120×1,2	3,66				1,2	1,16	4,51	89,09	124,10	705,10	202,35			
Superomega® 120×1,5	4,58				1,5	1,46	5,68	112,12	156,18	887,36	403,45			
Superomega® 120×2,0	6,11				2,0	1,96	7,62	150,52	209,68	1191,37	976,12			

S280GD

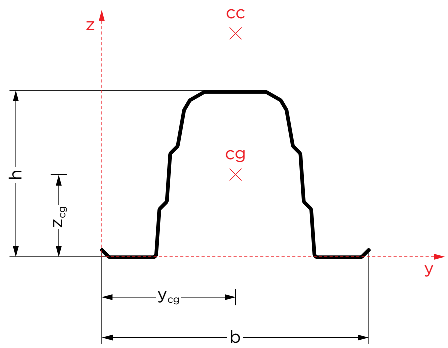
Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 120×1,0	3,52	95,7	56,7	3,67	71,17	11,07	95,7	54,7	3,62	70,31	11,42	95,7	57,4	3,68	98,62	10,17	97,0	56,6
Superomega® 120×1,2	4,36	95,7	57,0	4,51	89,06	14,08	95,7	55,8	4,42	86,11	13,88	95,7	57,0	4,47	120,55	12,47	96,6	56,4
Superomega® 120×1,5	5,56	95,7	56,8	5,68	112,09	17,73	95,7	55,8	5,61	109,96	17,58	95,7	56,5	5,65	153,61	15,96	96,3	56,1
Superomega® 120×2,0	7,54	95,7	56,3	7,62	150,48	23,80	95,7	55,8	7,60	149,98	23,77	95,7	55,9	7,60	208,38	21,71	96,0	55,9

S350GD

Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 120×1,0	3,38	95,7	57,3	3,64	70,06	10,81	95,7	54,2	3,58	69,05	11,33	95,7	58,0	3,66	97,15	9,97	97,5	56,9
Superomega® 120×1,2	4,28	95,7	57,1	4,46	86,92	13,58	95,7	55,0	4,37	84,76	13,79	95,7	57,5	4,44	118,95	12,26	97,1	56,6
Superomega® 120×1,5	5,51	95,7	57,3	5,68	112,09	17,73	95,7	55,8	5,56	108,48	17,48	95,7	56,9	5,62	151,83	15,71	96,6	56,4
Superomega® 120×2,0	7,48	95,7	56,7	7,62	150,48	23,80	95,7	55,8	7,55	148,31	23,65	95,7	56,3	7,57	206,36	21,44	96,3	56,1



Subtitle

A_{gross} Gross cross-sectional area.
$I_{y,gross}$ Inertia of the gross section yy-axis.
$I_{z,gross}$ Inertia of the gross section zz-axis.
I_w Constant warping.
I_t Constant torsional.
cg Gravity centre.
cc Cutting centre.
A_{eff} Effective section area.
$I_{y,eff}$ Inertia of the effective section yy-axis.
$W_{y,eff}$ Elastic module of the effective section yy-axis.
$I_{z,eff}$ Inertia of the effective section zz-axis.
$W_{z,eff}$ Elastic module of the effective section zz-axis.
cg,eff Centre of gravity of the effective section.

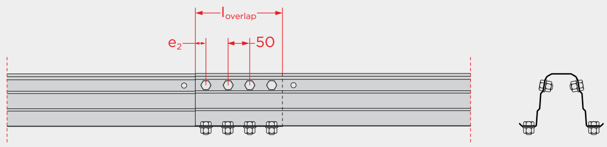
Note

The weights indicated are theoretical weights calculated from the nominal section dimensions and are susceptible to variations within the steel tolerances provided for in EN 10051 regulation.

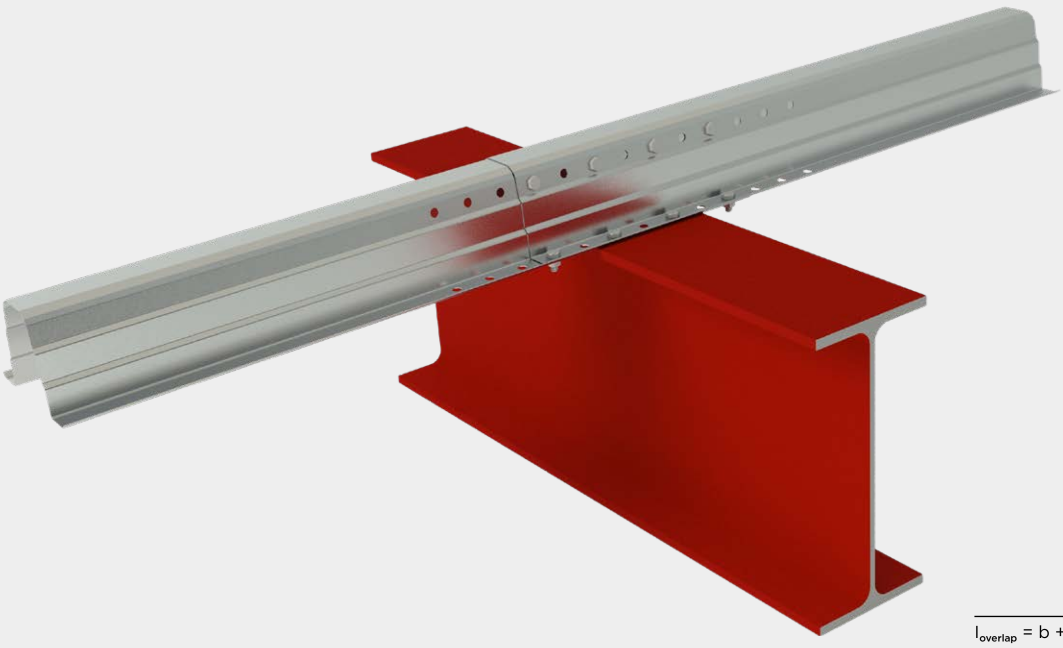
Continuity and Reinforcement Connections

1.
Simple amendment between supports

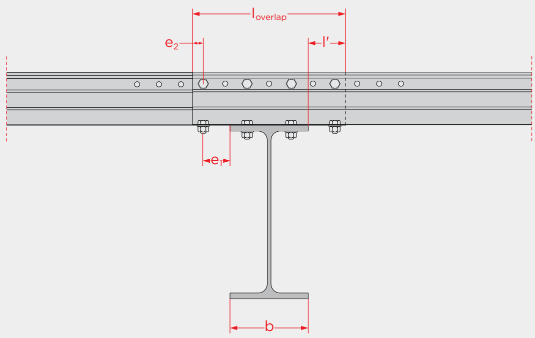
$l_{overlap}$ = 200 mm
e_2 = 25 mm

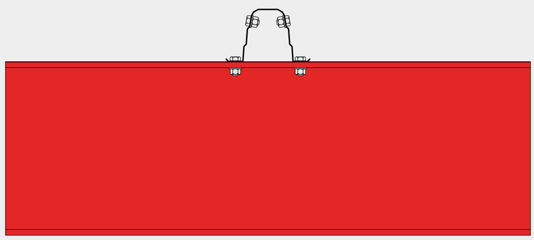


2.
Simple amendment on the support

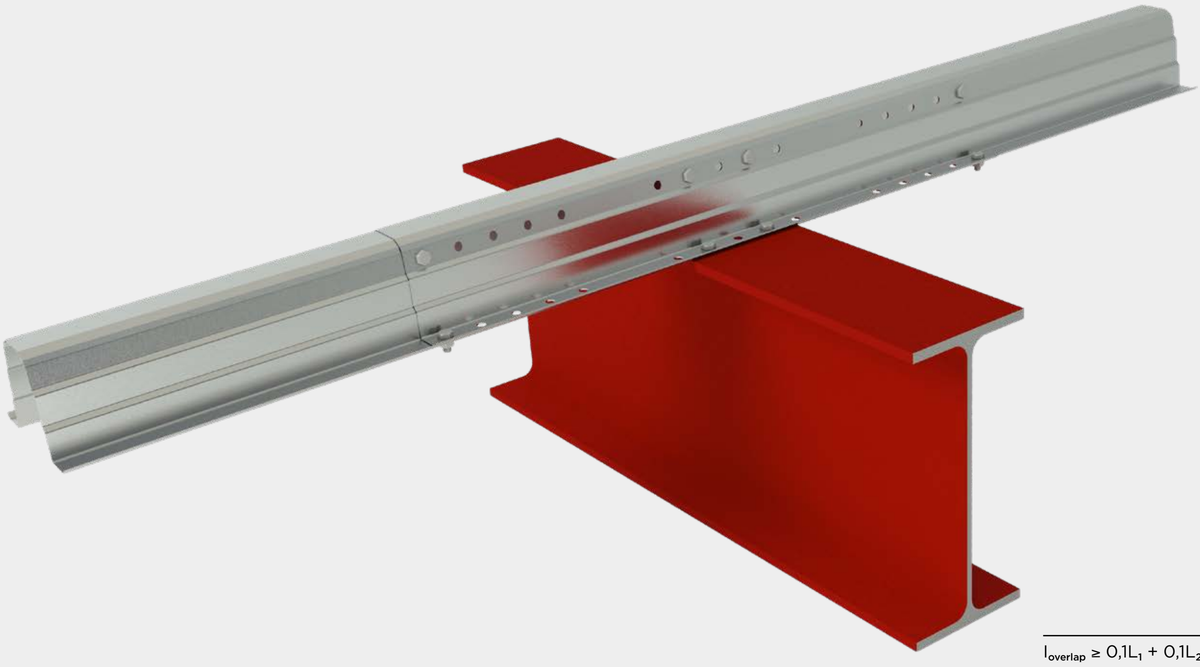


$l_{overlap}$ = b + 2l′
l′ = e_1 + 25 mm (80–120–160)
l′ = e_1 + 75 mm (200–250)
20 ≤ e_1 ≤ 70
e_2 = 25 mm
b ≥ 130 mm

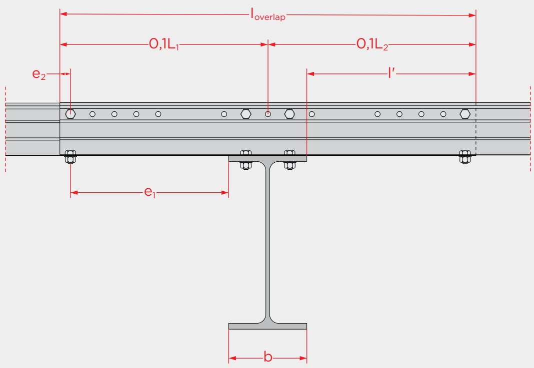


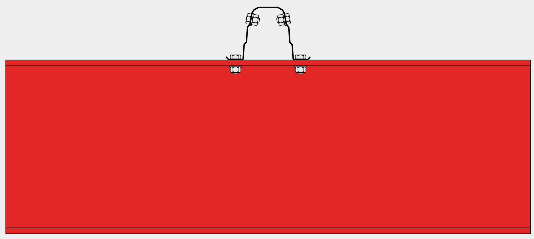


3.
Strengthening support



$l_{overlap} \geq 0{,}1L_1 + 0{,}1L_2$
$l' \geq 0{,}1L_1(\text{ou } L_2) - b/2$
$e_1 = l' - 25$
$e_2 = 25$ mm
$b \geq 130$ mm





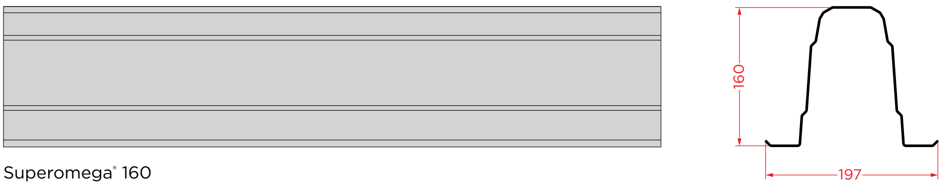
Subtitle

$l_{overlap}$	Length of overlap.
l'	Distance between the end of the support flange and the end of the beam.
e_1	Distance between the end of the flange and the centre of the end screw.
e_2	Distance between the centre of the end screw and the end of the beam.
L_1 e L_2	Lengths of spans adjacent to support.
b	Width of upper support of the support beam.

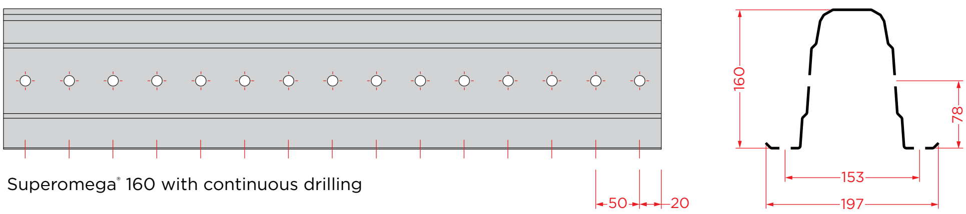
Notas
M10 screws class 8.8.
The rings for the screws in the top flange must have an external radius ≤ 12 mm.

Superomega® 160

Tolerances
The dimensional tolerances of the profile comply with those specified in EN 10162 and EN 1090-2 regulations (Class 1 and Class 2 functional tolerances).



Superomega® 160



Superomega® 160 with continuous drilling

Geometric Properties

Gross Section Properties

Section	Weight	Height h	Width b	Painting Area	Thickness		Gross Section							
					t_{nom}	t_{eff}	A_{gross}	$I_{y,gross}$	$I_{z,gross}$	I_w	I_t	$Y_{cg}=Y_{cc}$	Z_{cg}	Z_{cc}
	kg/m	mm	mm	m²/m	mm	mm	cm²	cm⁴	cm⁴	cm⁶	x10⁻⁴ cm⁴	mm	mm	mm
Superomega® 160×1,5	5,52				1,50	1,46	6,85	227,02	195,10	1961,97	486,64			
Superomega® 160×2,0	7,36	160	197	0,938	2,00	1,96	9,19	304,77	261,91	2633,87	1177,39	98,5	75,4	205,6
Superomega® 160×2,5	9,20				2,50	2,46	11,54	382,52	328,73	3305,78	2327,87			

S280GD

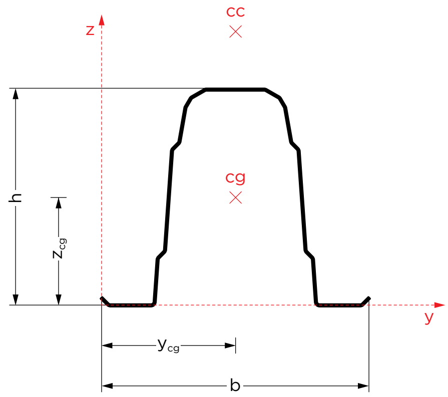
Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 160×1,5	6,30	98,5	76,2	6,85	227,00	27,15	98,5	75,4	6,78	223,05	26,93	98,5	76,2	6,56	183,07	18,08	101,2	76,3
Superomega® 160×2,0	9,14	98,5	75,8	9,19	304,73	36,45	98,5	75,4	9,18	303,76	36,40	98,5	75,6	9,13	256,97	25,92	99,2	75,9
Superomega® 160×2,5	11,48	98,5	75,7	11,54	382,47	45,75	98,5	75,4	11,54	382,52	45,76	98,5	75,4	11,50	325,73	32,95	98,8	75,6

S350GD

Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 160×1,5	6,12	98,5	76,8	6,85	227,00	27,15	98,5	75,4	6,73	220,33	26,78	98,5	76,7	6,49	181,19	17,80	101,8	76,3
Superomega® 160×2,0	8,77	98,5	76,2	9,19	304,73	36,45	98,5	75,4	9,12	300,70	36,23	98,5	76,0	9,01	253,89	25,43	99,8	75,9
Superomega® 160×2,5	11,46	98,5	75,8	11,54	382,47	45,75	98,5	75,4	11,52	381,56	45,70	98,5	75,5	11,50	325,73	32,95	98,8	75,6



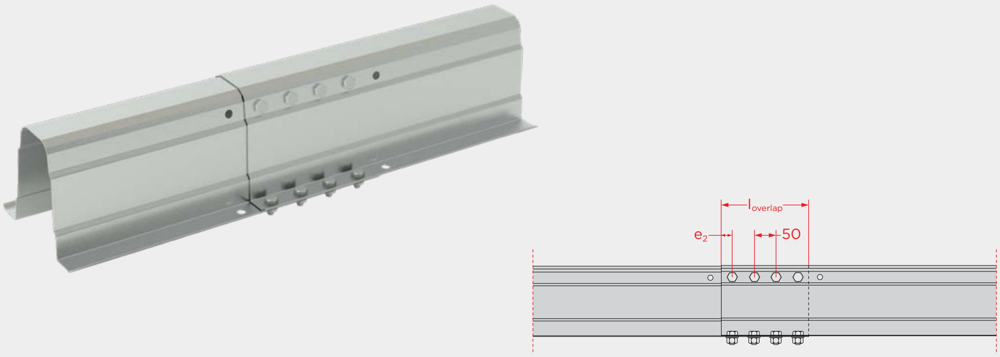
Subtitle

- A_{gross} Gross cross-sectional area.
- $I_{y,gross}$ Inertia of the gross section yy-axis.
- $I_{z,gross}$ Inertia of the gross section zz-axis.
- I_w Constant warping.
- I_t Constant torsional.
- cg Gravity centre.
- cc Cutting centre.
- A_{eff} Effective section area.
- $I_{y,eff}$ Inertia of the effective section yy-axis.
- $W_{y,eff}$ Elastic module of the effective section yy-axis.
- $I_{z,eff}$ Inertia of the effective section zz-axis.
- $W_{z,eff}$ Elastic module of the effective section zz-axis.
- cg,eff Centre of gravity of the effective section.

Note

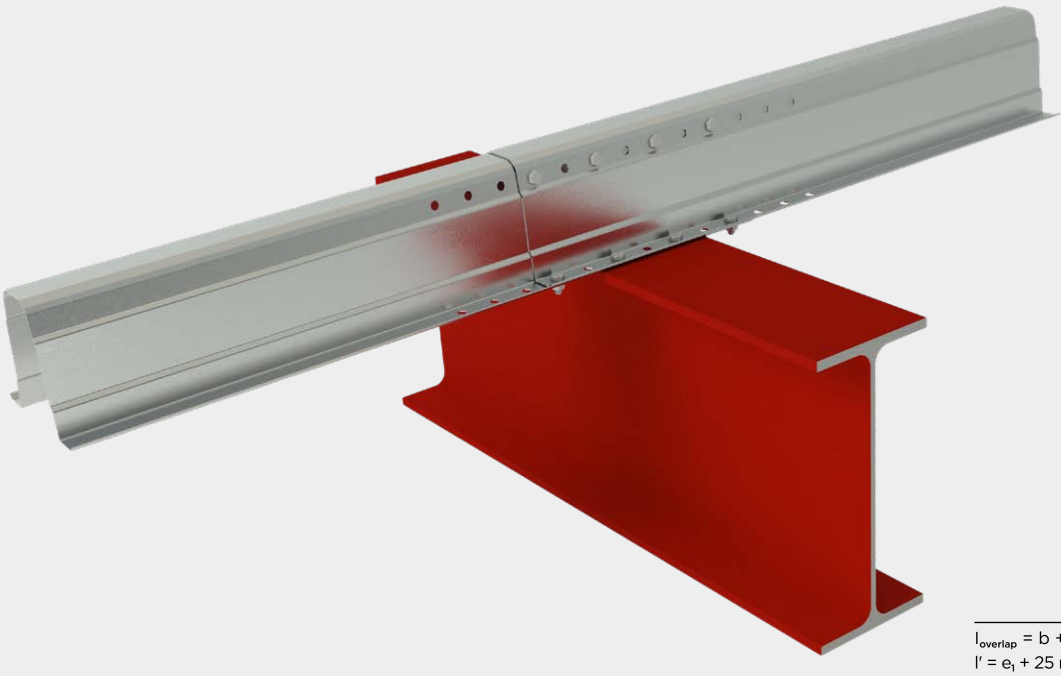
The weights indicated are theoretical weights calculated from the nominal section dimensions and are susceptible to variations within the steel tolerances provided for in EN 10051 regulation.

1.
Simple amendment between supports

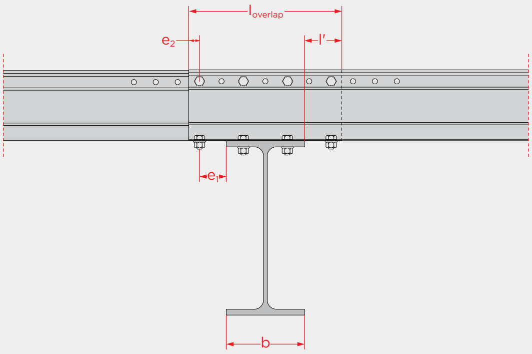


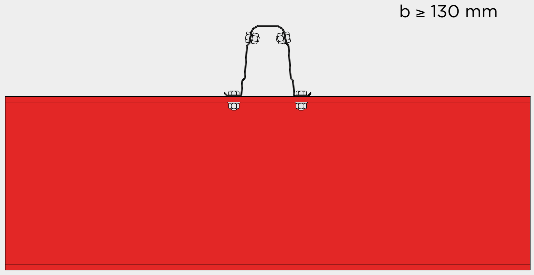
$l_{overlap}$ = 200 mm
e_2 = 25 mm

2.
Simple amendment on the support

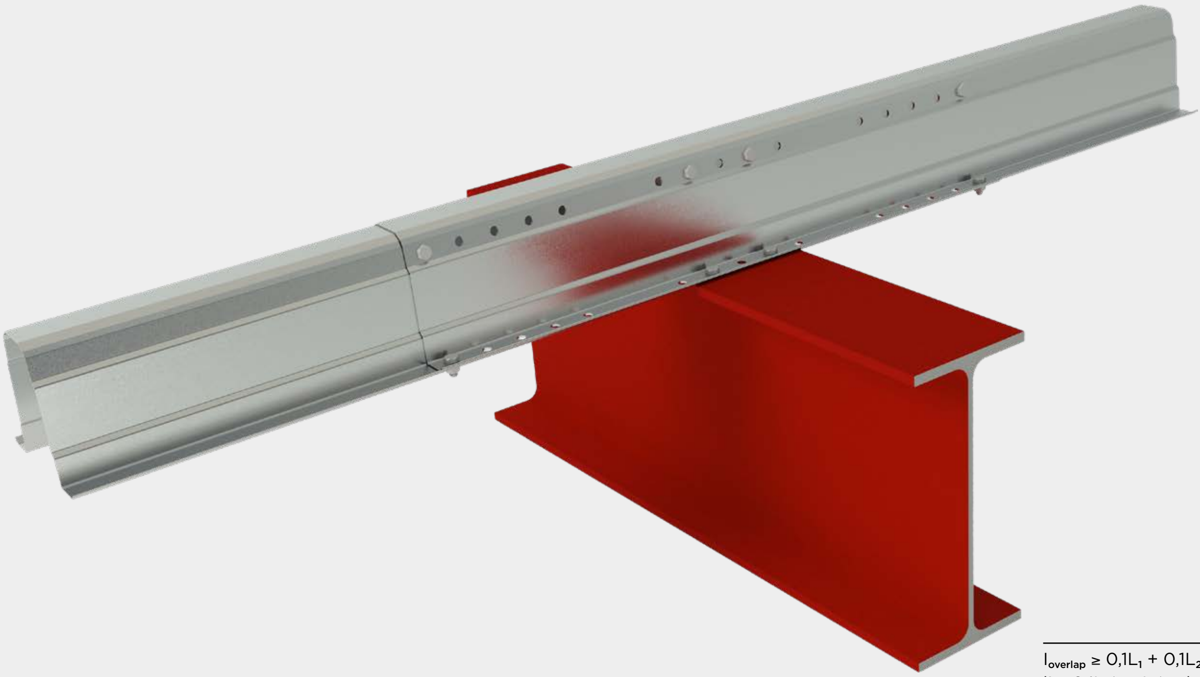


$l_{overlap}$ = b + 2l′
l′ = e_1 + 25 mm (80-120-160)
l′ = e_1 + 75 mm (200-250)
20 ≤ e_1 ≤ 70
e_2 = 25 mm
b ≥ 130 mm

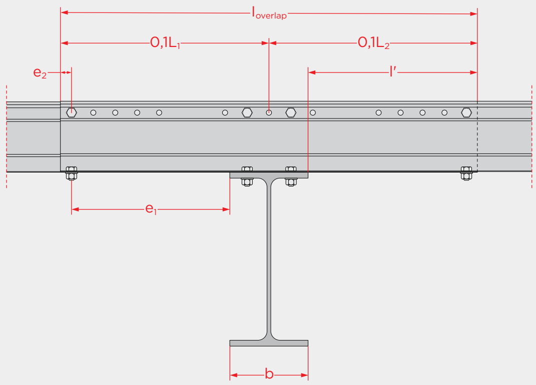


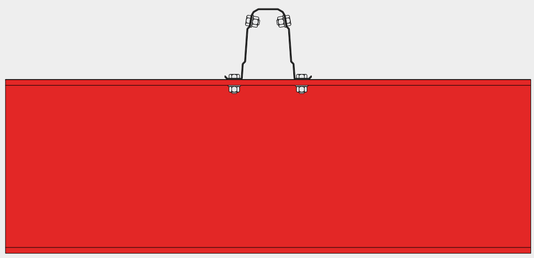


3.
Strengthening support



$l_{overlap} \geq 0{,}1L_1 + 0{,}1L_2$
$l' \geq 0{,}1L_1(\text{ou } L_2) - b/2$
$e_1 = l' - 25$
$e_2 = 25$ mm
$b \geq 130$ mm





Subtitle

$l_{overlap}$ Length of overlap.
l' Distance between the end of the support flange and the end of the beam.
e_1 Distance between the end of the flange and the centre of the end screw.
e_2 Distance between the centre of the end screw and the end of the beam.
L_1 e L_2 Lengths of spans adjacent to support.
b Width of upper support of the support beam.

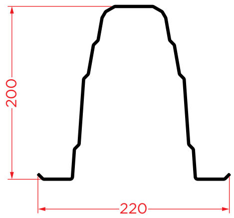
Notas

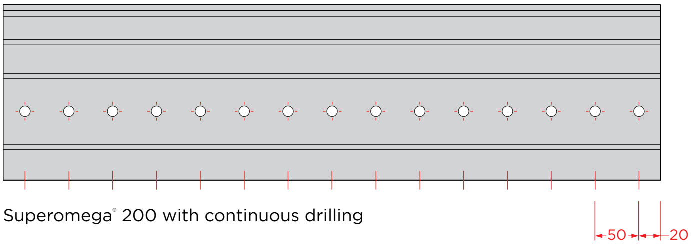
M10 screws class 8.8.
The rings for the screws in the top flange must have an external radius ≤ 12 mm.

Superomega® 200

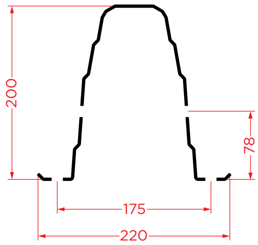
Tolerances
The dimensional tolerances of the profile comply with those specified in EN 10162 and EN 1090-2 regulations (Class 1 and Class 2 functional tolerances).

Superomega® 200





Superomega® 200 with continuous drilling



Geometric Properties

Gross Section Properties

Section	Weight	Height h	Width b	Painting Area	Thickness		Gross Section							
					t_{nom}	t_{eff}	A_{gross}	$I_{y,gross}$	$I_{z,gross}$	I_w	I_t	$Y_{cg}=Y_{cc}$	Z_{cg}	Z_{cc}
	kg/m	mm	mm	m²/m	mm	mm	cm²	cm⁴	cm⁴	cm⁶	x10⁻⁴ cm⁴	mm	mm	mm
Superomega® 200×1,5	6,54	200	220	1,110	1,50	1,46	8,10	397,27	295,57	3289,08	575,27	109,9	95,4	256,3
Superomega® 200×2,0	8,71				2,00	1,96	10,87	533,33	396,79	4415,48	1391,81			
Superomega® 200×2,5	10,89				2,50	2,46	13,64	669,38	498,02	5541,88	2751,80			

S280GD

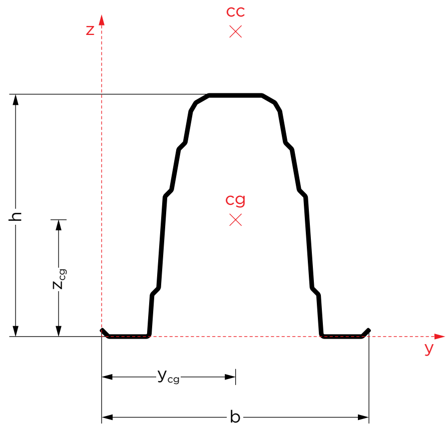
Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 200×1,5	7,61	109,9	96,5	7,89	392,51	37,43	109,9	94,1	8,02	390,11	38,00	109,9	96,3	7,86	285,45	26,85	111,8	96,1
Superomega® 200×2,0	10,86	109,9	95,4	10,87	533,33	51,48	109,9	95,4	10,84	530,84	51,36	109,9	95,6	10,81	394,26	37,65	110,2	95,5
Superomega® 200×2,5	13,63	109,9	95,4	13,64	669,38	64,61	109,9	95,4	13,64	669,38	64,61	109,9	95,4	13,64	497,88	47,69	109,9	95,4

S350GD

Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 200×1,5	7,41	109,9	97,7	7,89	392,51	37,43	109,9	94,1	7,97	385,61	37,77	109,9	96,9	7,78	281,76	26,34	112,5	96,3
Superomega® 200×2,0	10,53	109,9	96,0	10,87	533,33	51,48	109,9	95,4	10,78	525,73	51,11	109,9	96,1	10,71	389,65	36,99	110,8	95,8
Superomega® 200×2,5	13,63	109,9	95,4	13,64	669,38	64,61	109,9	95,4	13,61	666,70	64,48	109,9	95,6	13,63	497,08	47,59	110,0	95,4



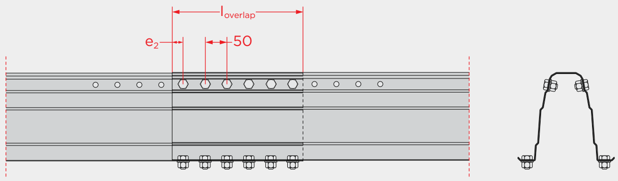
Subtitle

A_{gross} Gross cross-sectional area.
$I_{y,gross}$ Inertia of the gross section yy-axis.
$I_{z,gross}$ Inertia of the gross section zz-axis.
I_w Constant warping.
I_t Constant torsional.
cg Gravity centre.
cc Cutting centre.
A_{eff} Effective section area.
$I_{y,eff}$ Inertia of the effective section yy-axis.
$W_{y,eff}$ Elastic module of the effective section yy-axis.
$I_{z,eff}$ Inertia of the effective section zz-axis.
$W_{z,eff}$ Elastic module of the effective section zz-axis.
cg,eff Centre of gravity of the effective section.

Note

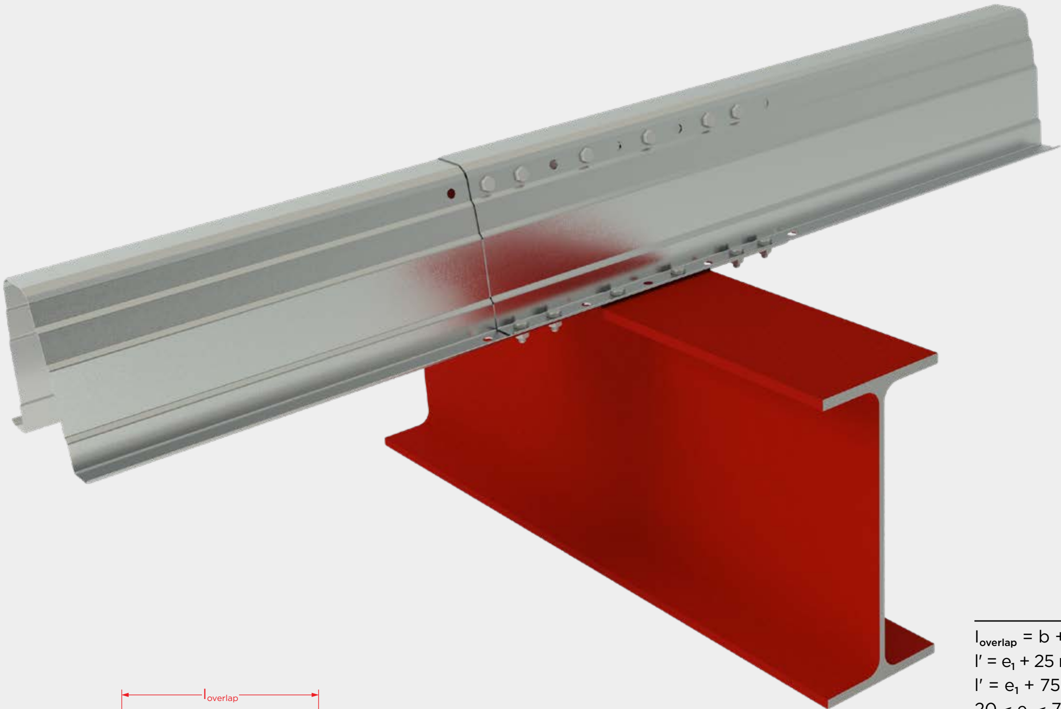
The weights indicated are theoretical weights calculated from the nominal section dimensions and are susceptible to variations within the steel tolerances provided for in EN 10051 regulation.

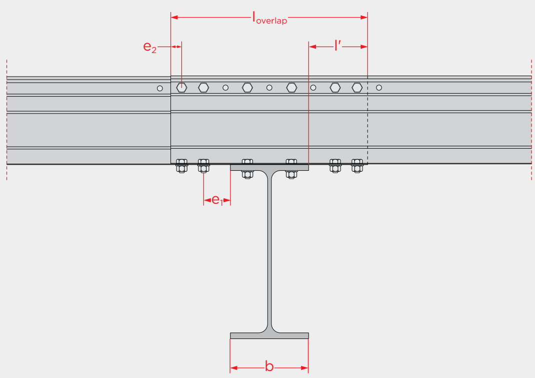
1.
Simple amendment between supports



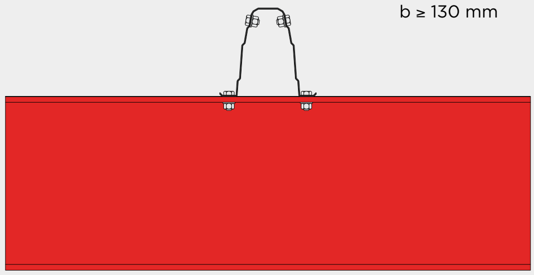
$l_{overlap}$ = 300 mm
e_2 = 25 mm

2.
Simple amendment on the support

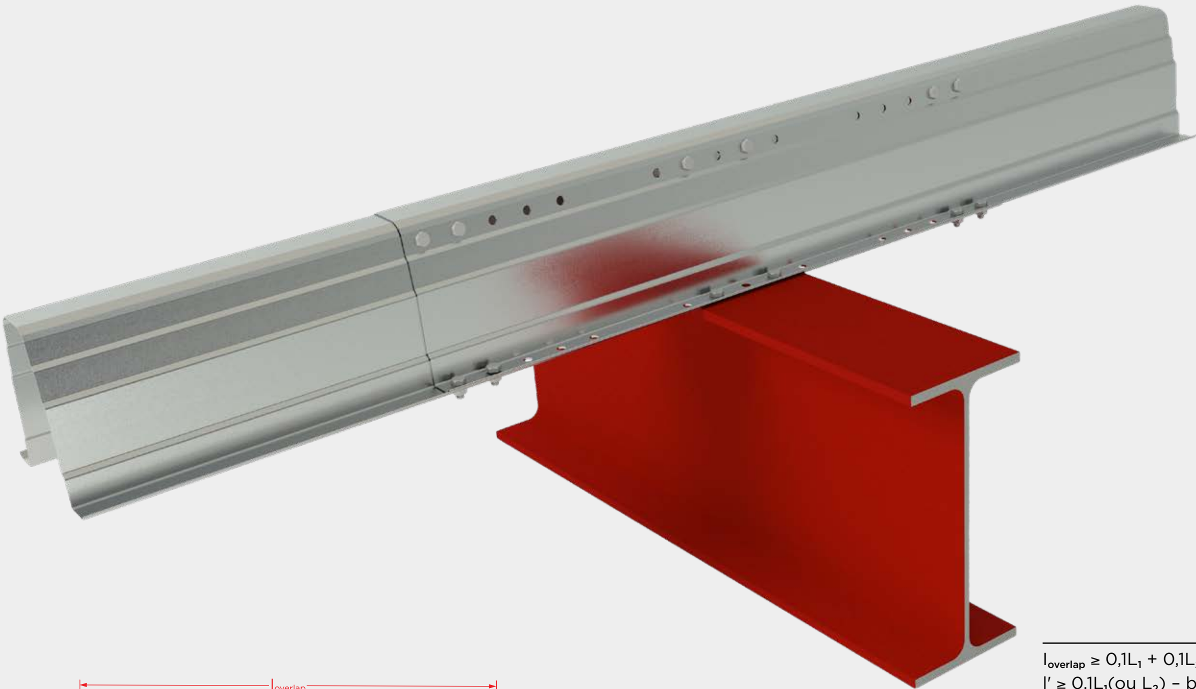


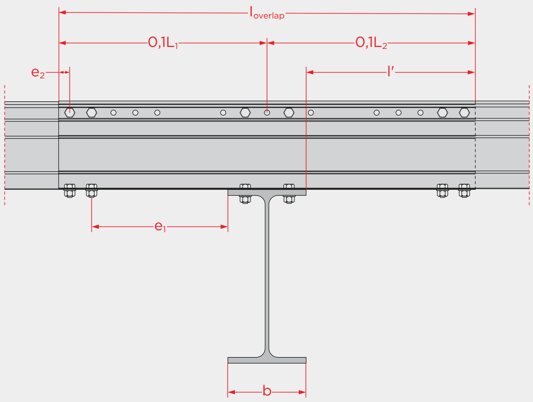


$l_{overlap}$ = b + 2l'
l' = e_1 + 25 mm (80-120-160)
l' = e_1 + 75 mm (200-250)
20 ≤ e_1 ≤ 70
e_2 = 25 mm
b ≥ 130 mm

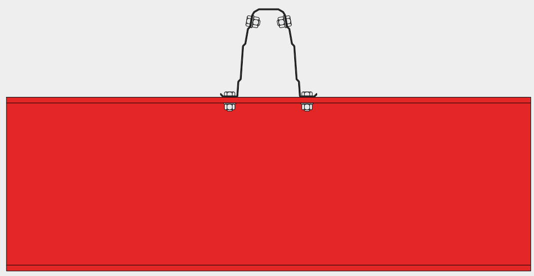


3.
Strengthening support





$l_{overlap} \geq 0{,}1L_1 + 0{,}1L_2$
$l' \geq 0{,}1L_1(\text{ou } L_2) - b/2$
$e_1 = l' - 75$
$e_2 = 25$ mm
$b \geq 130$ mm

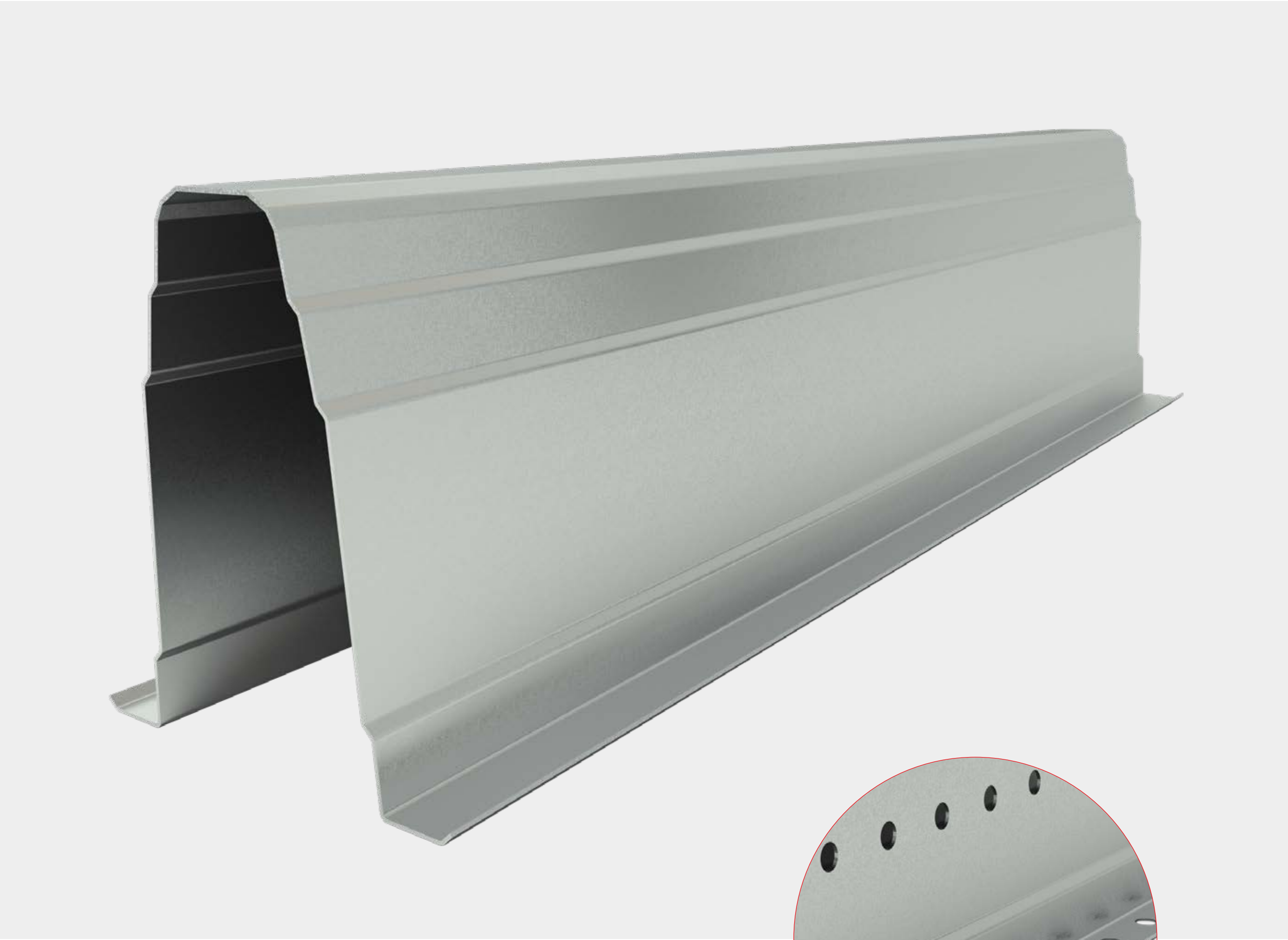


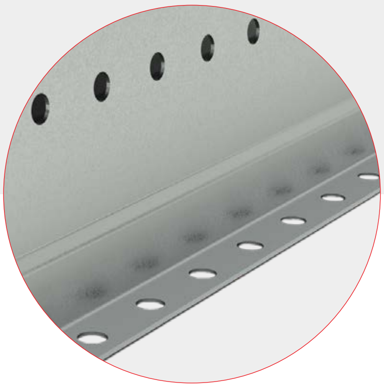
Subtitle

$l_{overlap}$	Length of overlap.
l'	Distance between the end of the support flange and the end of the beam.
e_1	Distance between the end of the flange and the centre of the end screw.
e_2	Distance between the centre of the end screw and the end of the beam.
L_1 e L_2	Lengths of spans adjacent to support.
b	Width of upper support of the support beam.

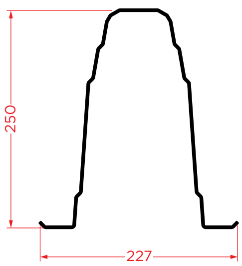
Notas
M10 screws class 8.8.
The rings for the screws in the top flange must have an external radius ≤ 12 mm.

Superomega® 250

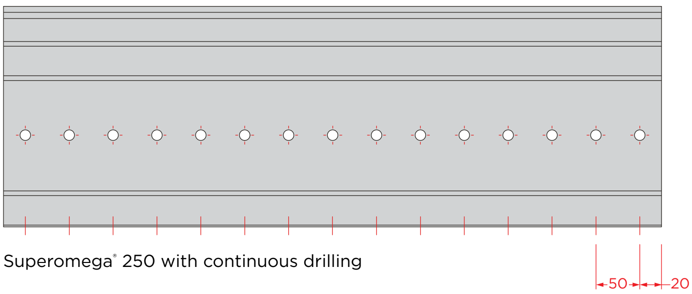


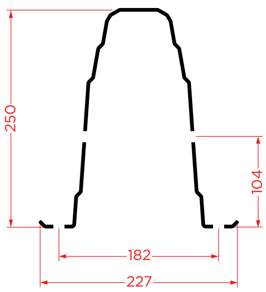


Tolerances
The dimensional tolerances of the profile comply with those specified in EN 10162 and EN 1090-2 regulations (Class 1 and Class 2 functional tolerances).



Superomega® 250





Superomega® 250 with continuous drilling

Geometric Properties

Gross Section Properties

Section	Weight	Height h	Width b	Painting Area	Thickness		Gross Section							
					t_{nom}	t_{eff}	A_{gross}	$I_{y,gross}$	$I_{z,gross}$	I_w	I_t	$Y_{cg}=Y_{cc}$	Z_{cg}	Z_{cc}
	kg/m	mm	mm	m²/m	mm	mm	cm²	cm⁴	cm⁴	cm⁶	x10⁻⁴ cm⁴	mm	mm	mm
Superomega® 250×2,0	10,27				2,00	1,96	12,83	942,64	498,18	8811,02	1643,39			
Superomega® 250×2,5	12,83	250	227	1,308	2,50	2,46	16,11	1183,11	625,26	11058,72	3249,21	113,4	120,3	325,0
Superomega® 250×3,0	15,40				3,00	2,96	19,38	1423,58	752,35	13306,43	5660,41			

S280GD

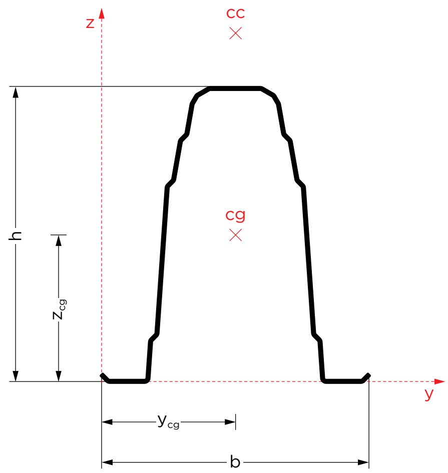
Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 250×2,0	11,18	113,4	122,9	12,83	942,64	73,26	113,4	120,3	12,82	940,28	73,16	113,4	120,5	12,03	461,18	41,10	117,7	122,0
Superomega® 250×2,5	14,80	113,4	121,9	16,11	1183,11	91,95	113,4	120,3	16,11	1183,11	91,95	113,4	120,3	15,54	600,23	54,45	115,7	121,2
Superomega® 250×3,0	18,59	113,4	121,1	19,38	1423,58	110,63	113,4	120,3	19,38	1423,58	110,63	113,4	120,3	19,13	742,42	65,96	114,2	120,6

S350GD

Effective Section Properties

Section	Compression			Y-Axis Positive Flexion					Y-Axis Negative Flexion					Z-Axis Flexion				
	A_{eff}	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{y,eff}$	$W_{y,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$	A_{eff}	$I_{z,eff}$	$W_{z,eff}$	$Y_{cg,eff}$	$Z_{cg,eff}$
	cm²	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm	cm²	cm⁴	cm³	mm	mm
Superomega® 250×2,0	10,90	113,4	123,4	12,83	942,64	73,26	113,4	120,3	12,76	932,45	72,84	113,4	121,0	11,86	450,97	39,80	118,8	122,6
Superomega® 250×2,5	14,42	113,4	122,4	16,11	1183,11	91,95	113,4	120,3	16,09	1180,95	91,86	113,4	120,4	15,30	587,85	52,81	116,8	121,8
Superomega® 250×3,0	18,12	113,4	121,5	19,38	1423,58	110,63	113,4	120,3	19,38	1423,58	110,63	113,4	120,3	18,85	728,44	65,31	115,2	121,1



Subtitle

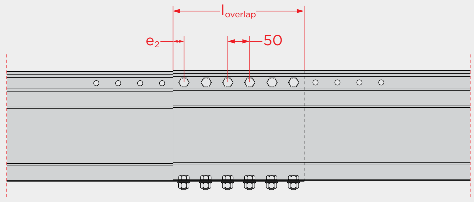
- A_{gross} Gross cross-sectional area.
- $I_{y,gross}$ Inertia of the gross section yy-axis.
- $I_{z,gross}$ Inertia of the gross section zz-axis.
- I_w Constant warping.
- I_t Constant torsional.
- cg Gravity centre.
- cc Cutting centre.
- A_{eff} Effective section area.
- $I_{y,eff}$ Inertia of the effective section yy-axis.
- $W_{y,eff}$ Elastic module of the effective section yy-axis.
- $I_{z,eff}$ Inertia of the effective section zz-axis.
- $W_{z,eff}$ Elastic module of the effective section zz-axis.
- cg,eff Centre of gravity of the effective section.

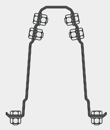
Note

The weights indicated are theoretical weights calculated from the nominal section dimensions and are susceptible to variations within the steel tolerances provided for in EN 10051 regulation.

Continuity and Reinforcement Connections

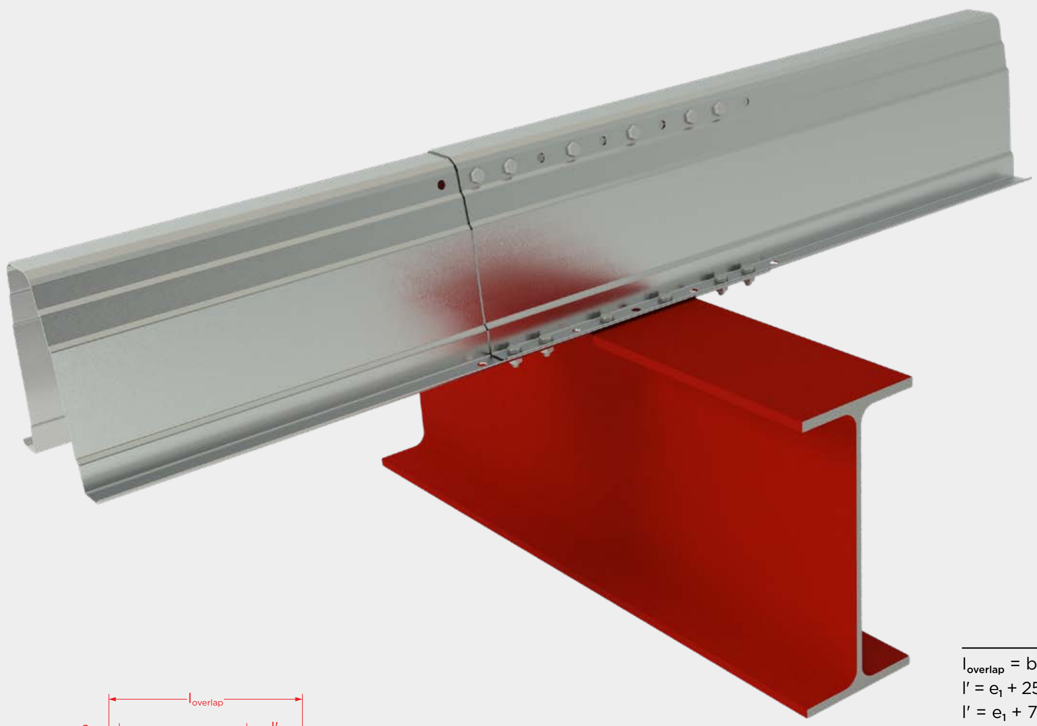
1.
Simple amendment between supports

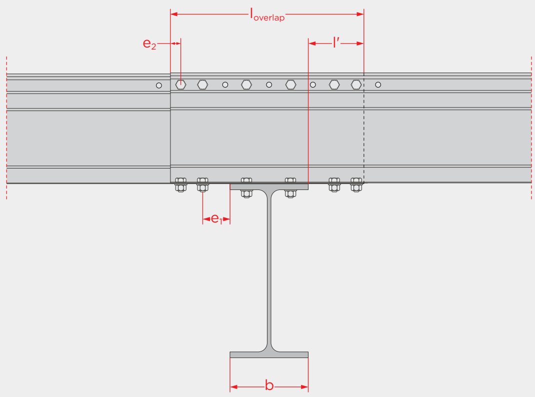


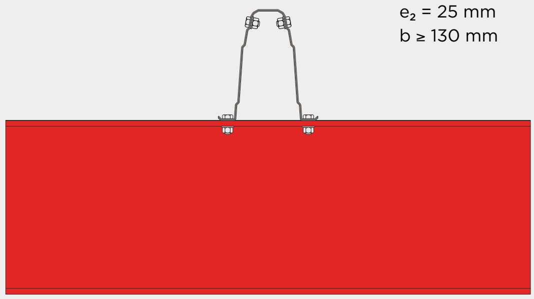


$l_{overlap}$ = 300 mm
e_2 = 25 mm

2.
Simple amendment on the support

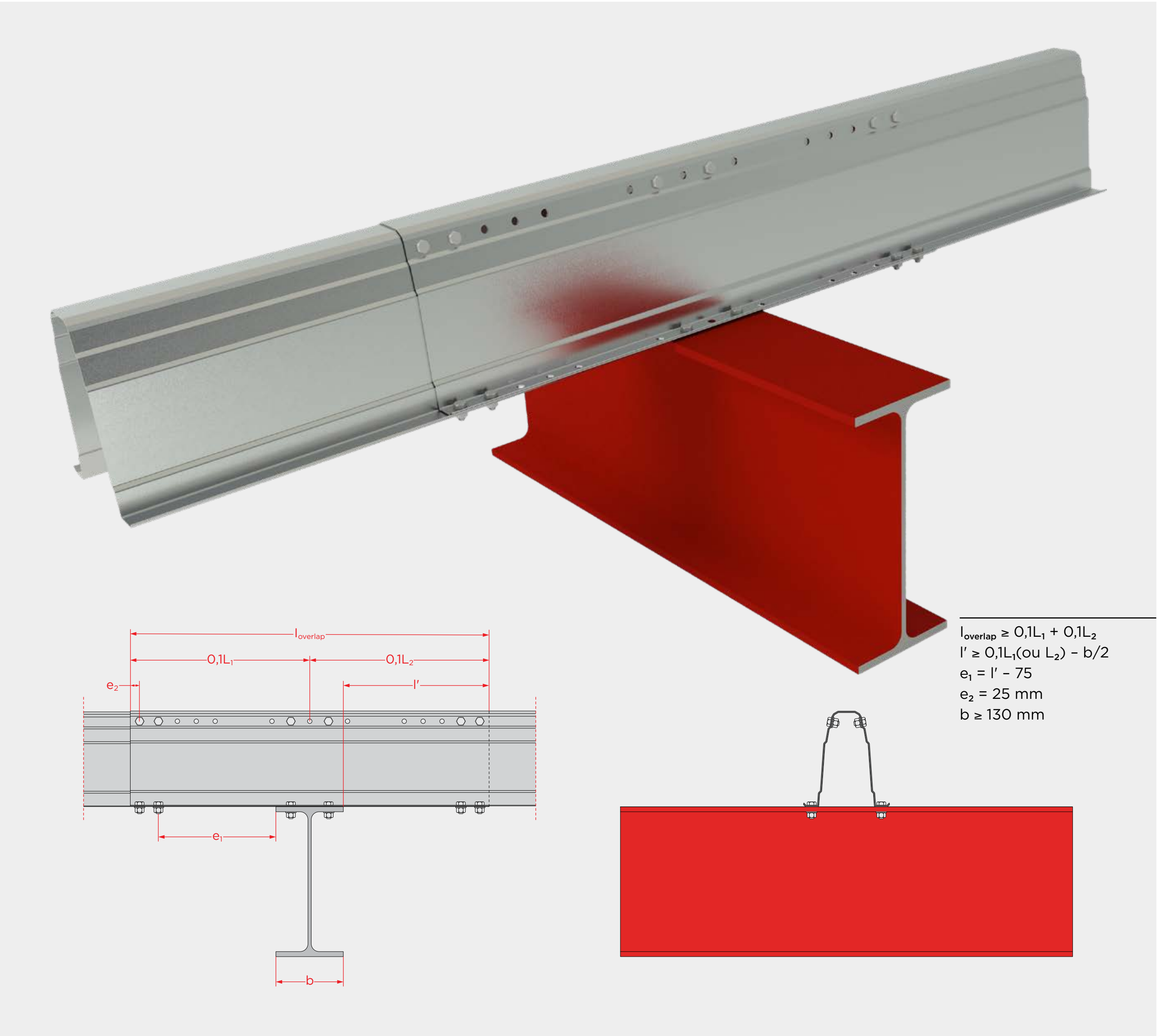






$l_{overlap}$ = b + 2l'
l' = e_1 + 25 mm (80–120–160)
l' = e_1 + 75 mm (200–250)
20 ≤ e_1 ≤ 70
e_2 = 25 mm
b ≥ 130 mm

3.
Strengthening support

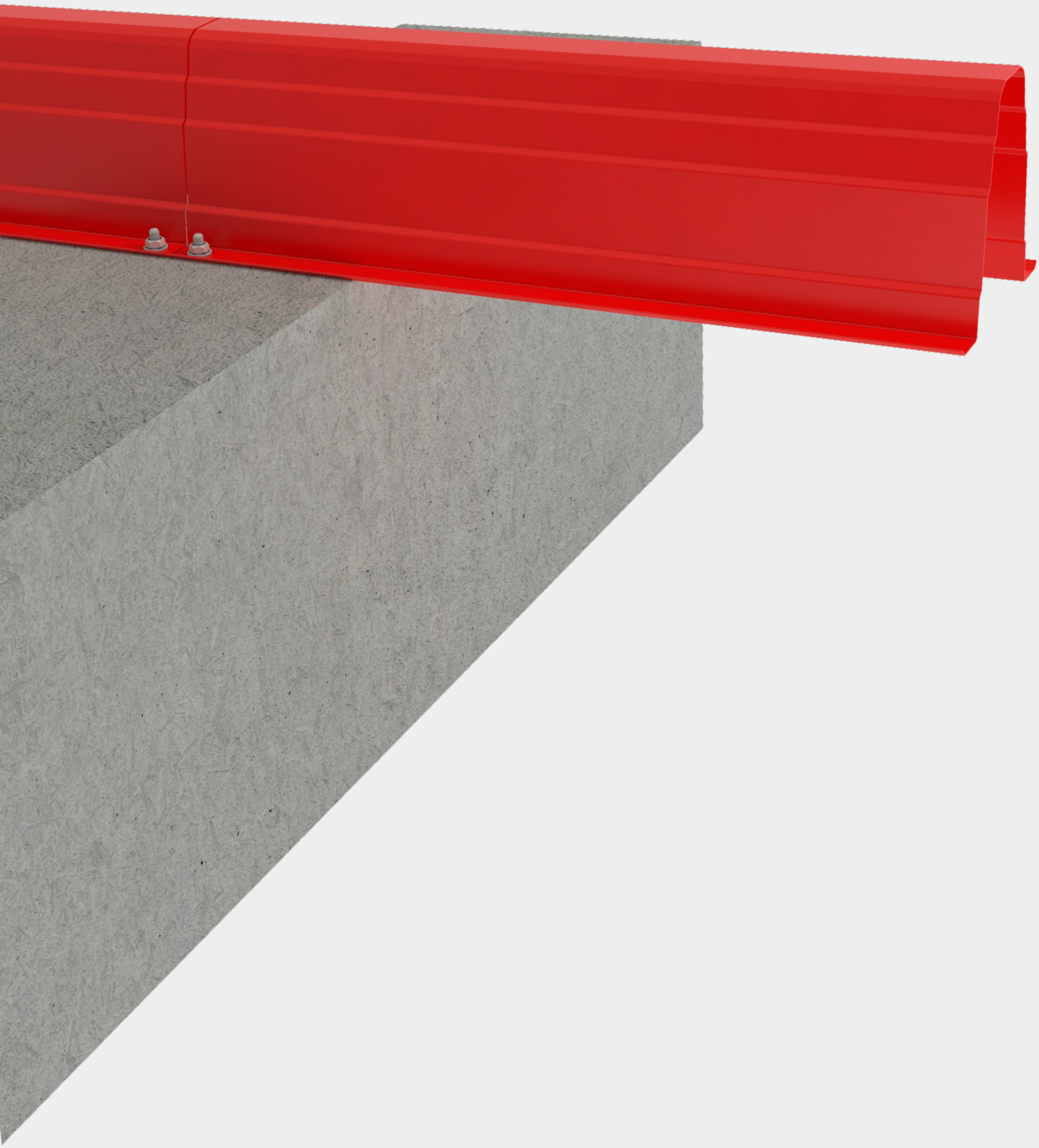


$l_{overlap} \geq 0{,}1L_1 + 0{,}1L_2$
$l' \geq 0{,}1L_1(\text{ou } L_2) - b/2$
$e_1 = l' - 75$
$e_2 = 25$ mm
$b \geq 130$ mm

Subtitle

$l_{overlap}$	Length of overlap.
l'	Distance between the end of the support flange and the end of the beam.
e_1	Distance between the end of the flange and the centre of the end screw.
e_2	Distance between the centre of the end screw and the end of the beam.
L_1 e L_2	Lengths of spans adjacent to support.
b	Width of upper support of the support beam.

Notas
M10 screws class 8.8.
The rings for the screws in the top flange must have an external radius ≤ 12 mm.



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