meTecno

UNI EN ISO 9001
IGQ 9640

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CERTIFICATES AND APPROVALS

Metecno has certified its products with the most prestigious European Laboratories officially authorised to issue test certifications, and has sought approval for the use of its products in various European countries with the relevant regulating bodies.
Metecno therefore offers designers and customers the advantage of working in compliance with the general European regulations on buildings and with the regulations applicable to each country.
Below is the list of the test certificates of products for each country and the relevant certifying bodies. Our customers are invited to contact us for more specific information.

CERTIFICATES

Country	Product	Test type	Certifying bodies
ITALY	GLAMET	Sound insulation Reaction to fire	CSI LAPI/IST. GIORDANO
	CUTEC	Reaction to fire	IST. GIORDANO
	HIPERTEC ROOF	Sound insulation Sound insulation Reaction to fire Resistance to fire	ICITE IST. GIORDANO IST. GIORDANO IST. GIORDANO
	HIPERTEC ROOF SOUND	Sound absorption Sound insulation Resistance to fire	IST. GIORDANO IST. GIORDANO IST. GIORDANO
	ROCKSTEEL ROOF	Reaction to fire	IST. GIORDANO
	MONOWALL	Sound insulation Reaction to fire	CSI LAPI/IST. GIORDANO
	HIPERTEC WALL	Sound insulation Reaction to fire Resistance to fire	IST. GIORDANO IST. GIORDANO IST. GIORDANO
	HIPERTEC WALL SOUND	Sound absorption Sound insulation Resistance to fire	IST. GIORDANO IST. GIORDANO IST. GIORDANO
	ROCKSTEEL WALL	Reaction to fire	IST. GIORDANO
	ALUROCK WALL SOUND	Sound absorption	IST. GIORDANO
	ALUROCK WALL	Reaction to fire	IST. GIORDANO
	ALUROCK ROOF	Reaction to fire	IST. GIORDANO
FRANCE	GLAMET	Reaction to fire	CSTB
	CUTEC	Reaction to fire	CSTB
	MEGATEC	Reaction to fire	CSTB
	MONOROOF	Reaction to fire	CSTB
	HIPERTEC ROOF	Reaction to fire	CSTB
	MONOWALL	Reaction to fire	CSTB
	HIPERTEC WALL	Reaction to fire Resistance to fire	CSTB CSTB

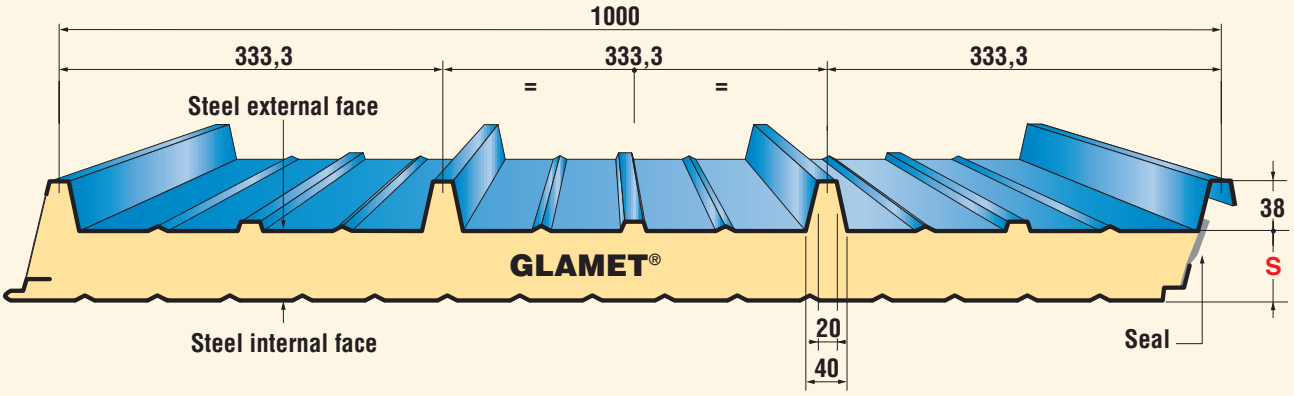
CERTIFICATES AND APPROVALS

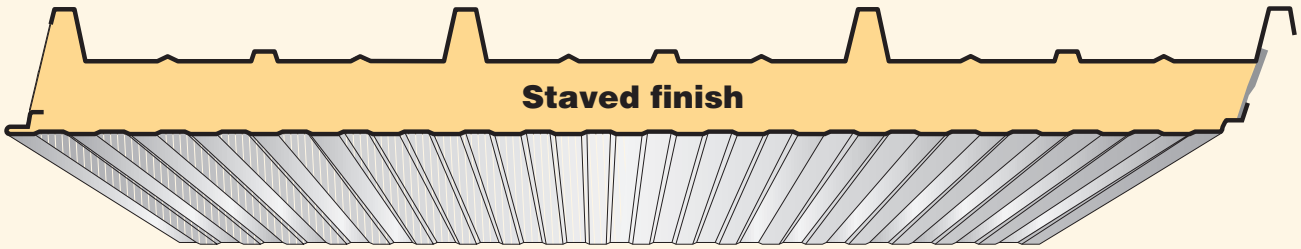
Country	Product	Test type	Certifying bodies
GERMANY	HIPERTEC ROOF	Reaction to fire Thermal insulation Sound insulation	MFPA FIW IST. FRAUNHOFER
	HIPERTEC WALL	Reaction to fire Thermal insulation Sound insulation Resistance to fire	MFPA FIW IST. FRAUNHOFER MPA
	HIPERTEC ROOF SOUND	Durability	FIW
HOLLAND	HIPERTEC WALL	Resistance to fire	TNO
AUSTRIA	HIPERTEC ROOF	Resistance to fire	IBS
	HIPERTEC WALL	Resistance to fire	IBS
HUNGARY	HIPERTEC ROOF	Resistance to fire	EMI
CROATIA	GLAMET	Reaction to fire Resistance to fire	IGH IGH
SLOVAKIA	HIPERTEC ROOF	Resistance to fire	FIRES

APPROVED PRODUCTS IN VARIOUS COUNTRIES

GLAMET	FRANCE • GERMANY • CZECH REPUBLIC • RUMANIA • SLOVAKIA • SLOVENIA • HUNGARY
CUTEC	SLOVENIA • HUNGARY
MONOROOF	HUNGARY
HIPERTEC ROOF	GERMANY • CZECH REPUBLIC • RUMANIA • HUNGARY • ITALY • FRANCE • SLOVAKIA • RUSSIA
MONOWALL	FRANCE • GERMANY • CZECH REPUBLIC • RUMANIA • SLOVAKIA • SLOVENIA • HUNGARY
HIPERTEC WALL	GERMANY • CZECH REPUBLIC • RUMANIA • HUNGARY • ITALY • FRANCE • SLOVAKIA • RUSSIA

Self-supporting metal panel, insulated with polyurethane, for pitched roofs with a minimum slope of 7%.





Self-supporting metal panel, insulated with polyurethane, for pitched roofs with a minimum slope of 7%.

TABLE OF SAFE SPANS

Minimum values with external face in steel, 0.5 mm thick, and internal face in steel, 0.4 mm thick or with external face in aluminium, 0.6 mm thick, and internal face in steel, 0.5 mm thick.
The spans *l* (m) as a function of a uniformly distributed overload p (daN/m²), have been obtained from load tests carried out in Metecno laboratories, and provide a deflection f ≤ *l*/200 with a safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations. With external and/or internal steel thicknesses inferior to the above mentioned ones, the guarantee on the admissible loads for the spans indicated in the table is maintained, while it is not maintained on the deflection limit and the safety coefficient.

steel - steel

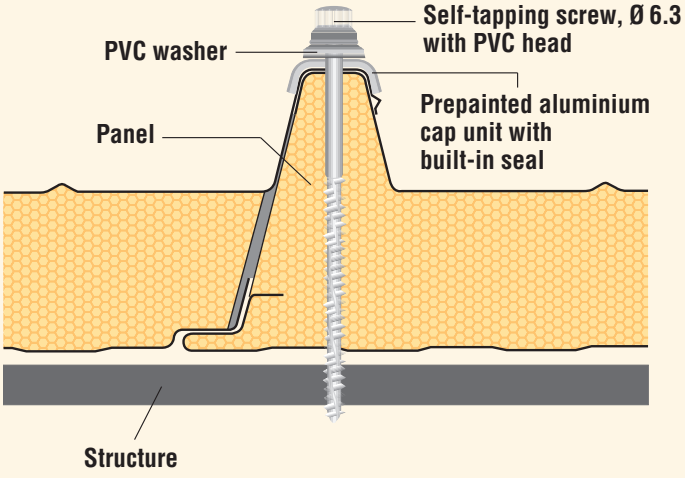
S mm	K Kcal m² h °C	K Watt m² °C	Panel weight kg/m² 0,5 + 0,4	p = daN/m²	60	80	100	120	150	200	250	60	80	100	120	150	200	250
					p p p							p						
					△ l △ l △ l △							△ l △						
30	0,51	0,59	9,42	*l* =	4,70	4,10	3,65	3,30	2,90	2,50	2,25	4,20	3,65	3,20	2,90	2,60	2,25	2,00
40	0,40	0,46	9,80	*l* =	5,00	4,40	3,90	3,55	3,20	2,75	2,45	4,50	3,90	3,50	3,20	2,85	2,45	2,20
50	0,33	0,38	10,18	*l* =	5,30	4,60	4,10	3,75	3,35	2,90	2,60	4,75	4,10	3,65	3,35	3,00	2,60	2,30
60	0,28	0,33	10,56	*l* =	5,60	4,85	4,35	3,95	3,55	3,05	2,75	5,00	4,30	3,90	3,55	3,15	2,75	2,45
80	0,22	0,25	11,32	*l* =	6,20	5,30	4,80	4,35	3,95	3,35	3,05	5,50	4,70	4,40	3,95	3,45	3,05	2,75

aluminium - steel

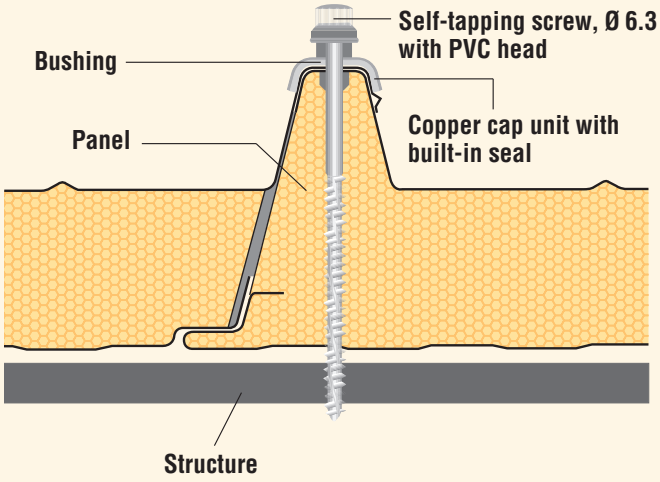
S mm	K Kcal m² h °C	K Watt m² °C	Panel weight kg/m² 0,6 + 0,5	p = daN/m²	60	80	100	120	150	200	250	60	80	100	120	150	200	250
					p p p							p						
					△ l △ l △ l △							△ l △						
30	0,51	0,59	7,45	*l* =	3,25	2,80	2,50	2,30	2,00	1,80	1,60	2,90	2,50	2,25	2,05	1,85	1,60	1,40
40	0,40	0,46	7,83	*l* =	3,60	3,10	2,80	2,55	2,30	2,00	1,75	3,20	2,80	2,50	2,30	2,05	1,80	1,60
50	0,33	0,38	8,21	*l* =	4,00	3,50	3,15	2,85	2,55	2,25	2,00	3,60	3,10	2,80	2,55	2,30	2,00	1,75
60	0,28	0,33	8,59	*l* =	4,40	3,90	3,45	3,15	2,80	2,50	2,20	4,00	3,45	3,10	2,80	2,50	2,20	1,90
80	0,22	0,25	9,35	*l* =	5,20	4,60	4,10	3,75	3,30	2,95	2,60	4,80	4,10	3,70	3,30	2,95	2,60	2,20

FASTENING SYSTEMS

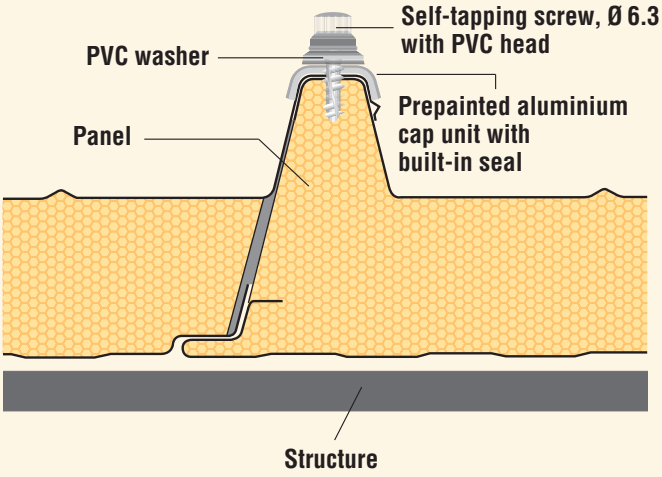
GLAMET fastening



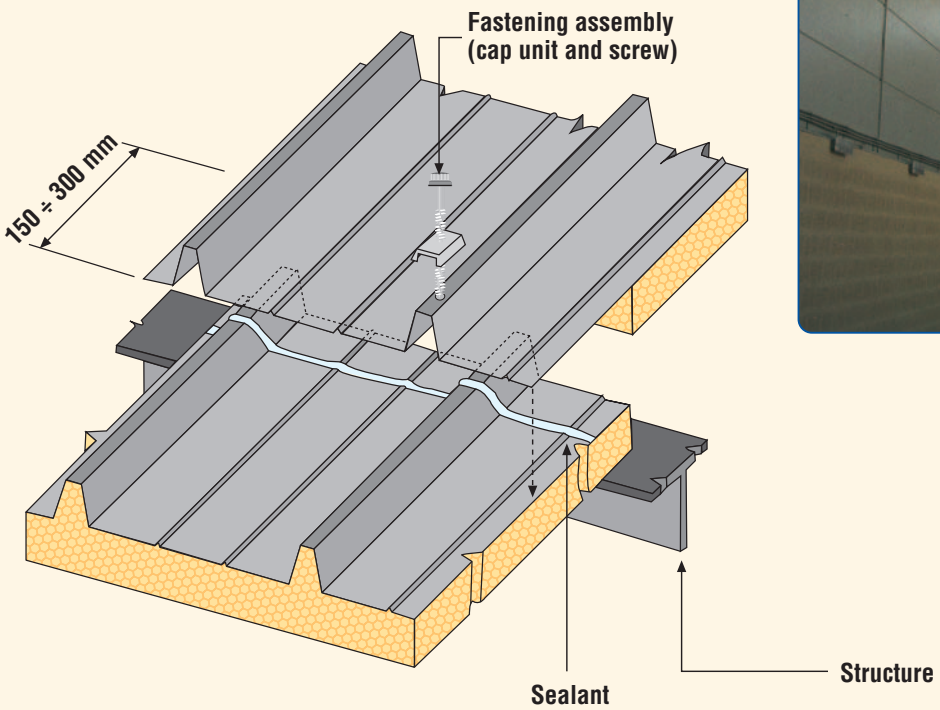
CUTEC fastening



GLAMET panel seam fastening



Pitch overlapping



CUTEC®

Profiled polyurethane-insulated roof system, slope p ≥ 7%

Self-supporting metal panel, insulated with polyurethane, with external side in copper for sloping roofs with a minimum slope of 7%. The copper external face gives the panel a more refined look and makes it particularly suitable for residential buildings or prestigious projects.

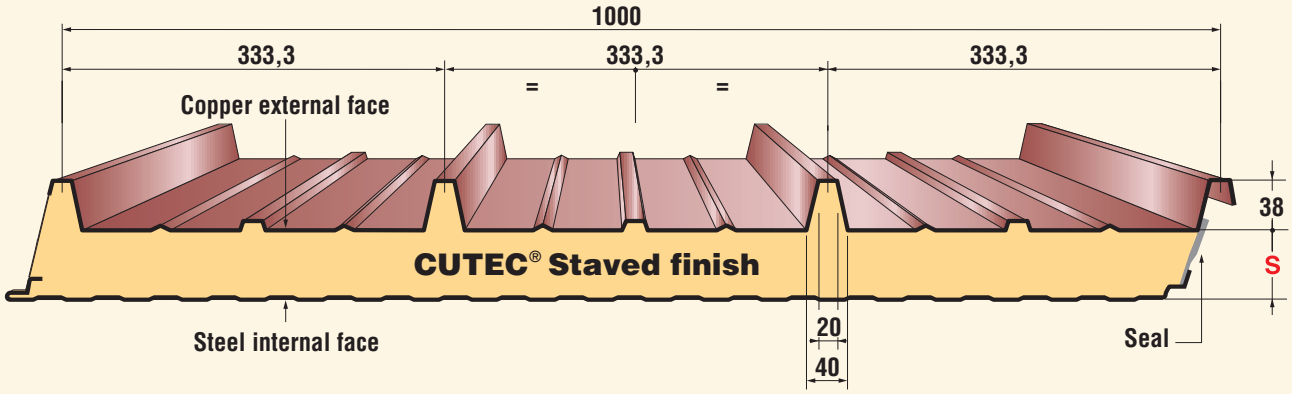


TABLE OF SAFE SPANS

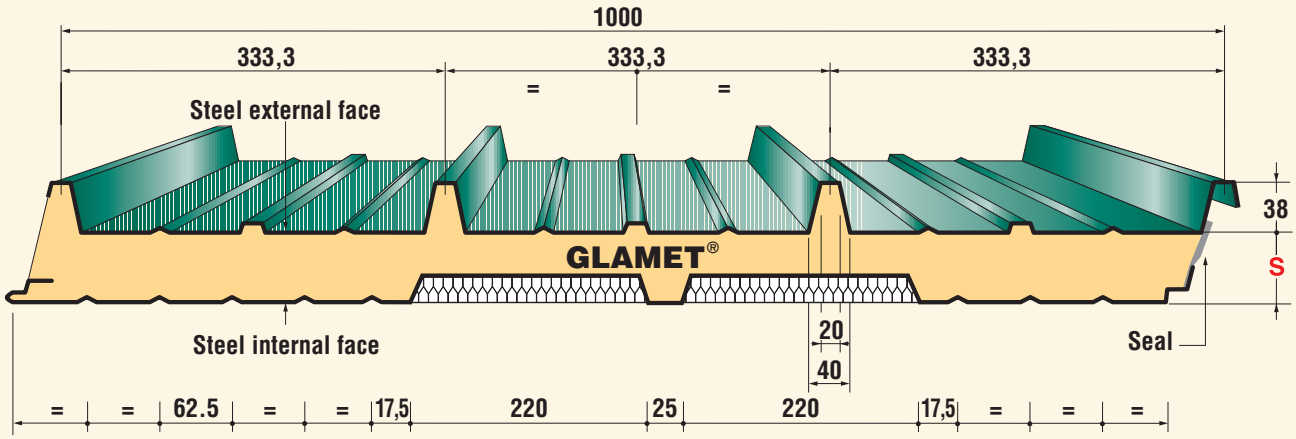
Minimum values with external face in copper 0.5 mm thick, and internal face in steel 0.4 mm thick.
The spans *l* (m) as a function of a uniformly distributed overload **p** (daN/m²), have been obtained from load tests carried out in Metecno laboratories, and provide a deflection f ≤ *l*/200 with a safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

S mm	K Kcal/m² h °C	K Watt/m² °C	Panel weight kg/m² 0,5 + 0,4	p = daN/m²	60	80	100	120	150	200	250	60	80	100	120	150	200	250
					p	p	p					p						
					△ *l* △ *l* △ *l* △							△ *l* △						
30	0,51	0,59	10,08	*l* =	3,80	3,30	3,10	2,95	2,75	2,45	2,25	3,40	2,70	2,30	2,10	1,90	1,70	1,55
40	0,40	0,46	10,46	*l* =	4,10	3,60	3,45	3,30	3,05	2,60	2,35	3,70	3,10	2,70	2,50	2,40	2,00	1,80
50	0,33	0,38	10,84	*l* =	4,50	3,90	3,70	3,50	3,15	2,75	2,45	4,00	3,50	3,15	2,90	2,70	2,30	2,05
60	0,28	0,33	11,22	*l* =	4,80	4,25	3,95	3,70	3,25	2,90	2,60	4,30	3,90	3,65	3,30	2,95	2,60	2,30
80	0,22	0,25	11,98	*l* =	5,40	4,80	4,30	3,90	3,40	3,00	2,70	4,80	4,30	4,00	3,70	3,20	2,80	2,50

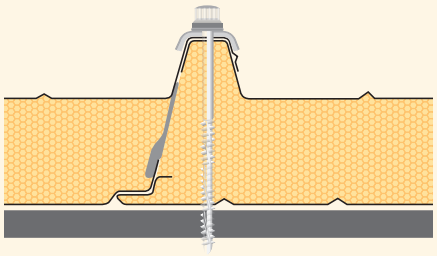
GLAMET® SOUND

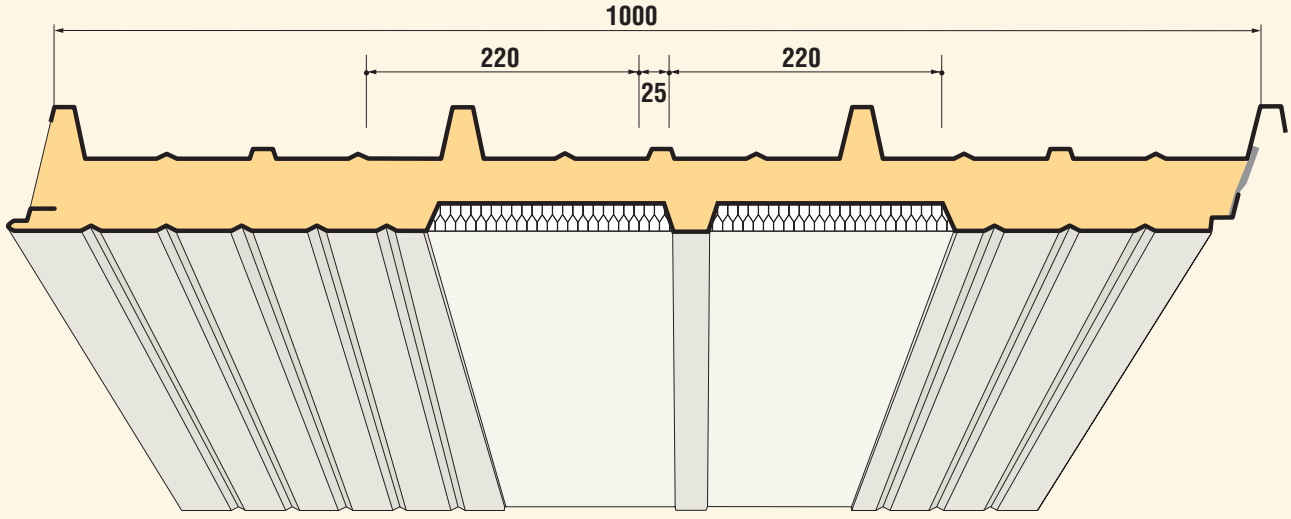
Profiled polyurethane-insulated roof system, slope p ≥ 7%

Self supporting metal panel, insulated with polyurethane, for roofs and walls for sound absorption with enhanced reverberation control. The GLAMET SOUND panel, manufactured on a Metecno production system, is formed by an external corrugated steel sheet and an internal sheet with two built-in panels in sound-absorbing white (RAL 9002) foam.
The open-cell reduces noise transmission and gives the panel good sound absorption characteristics. According to measures complying with DIN EN 20354 standards, which have been carried out by the Fraunhof Institute of Physics in Stuttgart, the noise absorption values as indicated in the tables below have been obtained. A polythene film protecting the sound absorbing material must be taken away before the panels are installed.
The GLAMET SOUND panel is listed in the DIN 4102-B1 category of building materials.

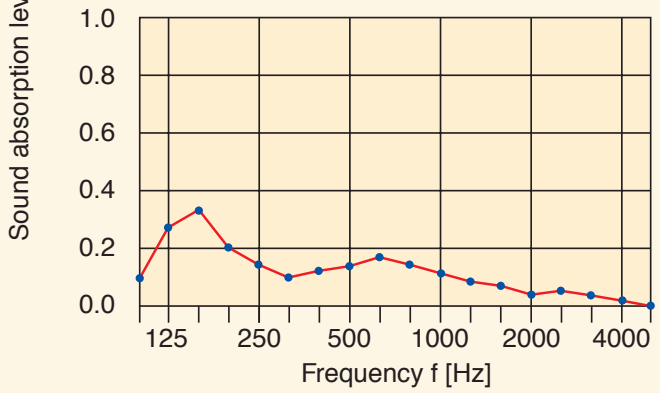


Joint detail



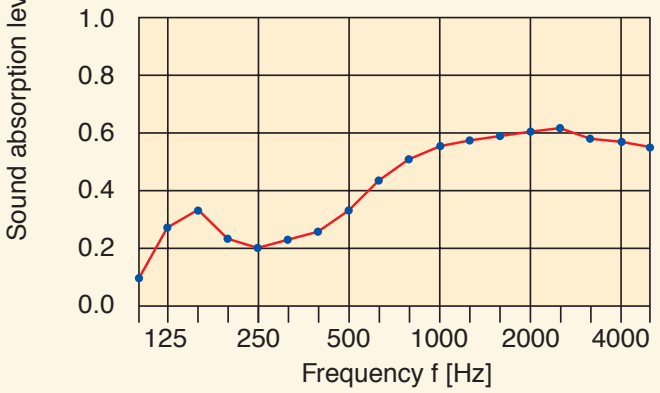


f [Hz]	125	250	500	1000	2000	4000
α_s	0.24	0.14	0.13	0.12	0.04	0.02



Sound absorption values without sound absorbing system

f [Hz]	125	250	500	1000	2000	4000
α_s	0.27	0.20	0.31	0.56	0.60	0.57



Sound absorption values with sound absorbing system

TABLE OF SAFE SPANS

Minimum values with external face in steel 0.6mm thick, and internal face in steel 0.5mm thick.
The spans *l* (m) as a function of a uniformly distributed overload p (daN/m²), have been obtained from load tests carried out in Metecno laboratories, and provide a deflection f ≤ *l*/200 with a safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

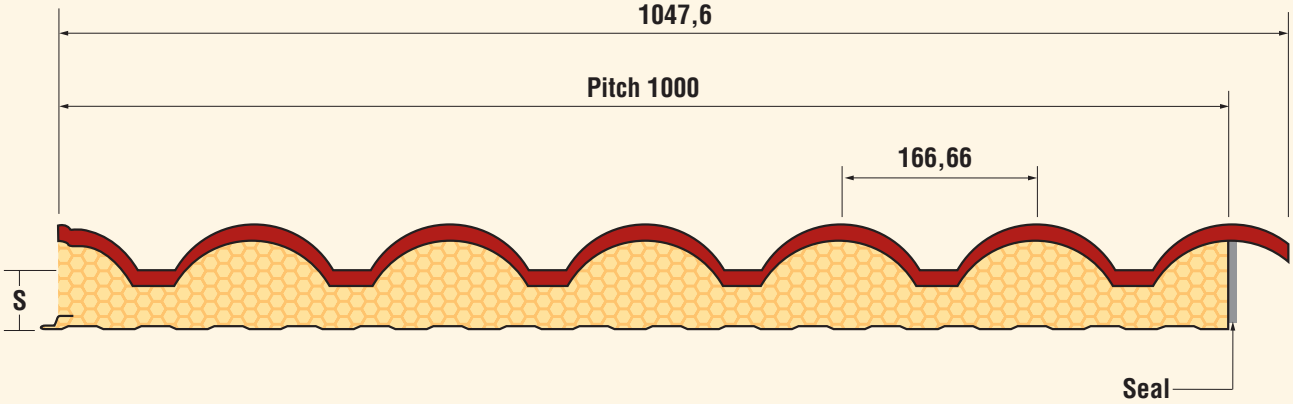
steel - steel

S mm	K(A38) Kcal/m² h °C	K(A38) Watt/m² °C	Panel weight kg/m²															
				p	p	p					p							
				△	*l*	△	*l*	△	*l*	△	△	*l*	△					
			0,6 + 0,5	p = daN/m²	60	80	100	120	150	200	250	300	60	80	100	120	150	200	250	300
60	0,33	0,39	12,30	*l* =	5,95	5,15	4,60	4,20	3,75	3,25	2,90	2,70	5,30	4,55	4,15	3,75	3,35	2,90	2,60	2,35
80	0,25	0,29	13,10	*l* =	6,55	5,60	5,10	4,60	4,20	3,55	3,25	2,95	5,85	5,00	4,65	4,20	3,65	3,25	2,90	2,60
100	0,20	0,23	13,90	*l* =	7,45	6,40	5,80	5,25	4,70	4,05	3,65	3,40	6,55	5,70	5,20	4,70	4,20	3,65	3,25	2,90

meTCOPPO®

Profiled polyurethane insulated tile roofing system, p ≥ 15% for residential construction.

Self-supporting polyurethane insulated metal panel tile, designed for roofs of residential or commercial properties, to a minimum slope of 15°. The external facing of the panel is profiled to simulate a tile profile and can be finished in **pre-painted galvanised steel**, **aluminium** or **copper**.
Steel and aluminum can be pre-painted in brick red color to match with traditional roofing tiles. The internal side of the panel is in pre-painted galvanized steel. The continuous thickness of the polyurethane insulator is a very effective barrier to the winter heat dispersion and the summer insulation.



Continuous ridge to eaves panels are preferable for the following characteristics:

- Environmental integration and traditional appearance.
- Perfectly usable and dustproof garret
- Long term performance integrity
- Ease and speed of installation
- No maintenance

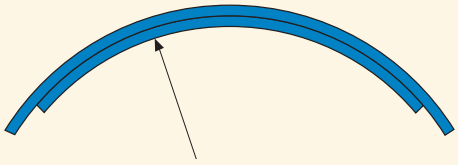
Thicknesses = 40 mm

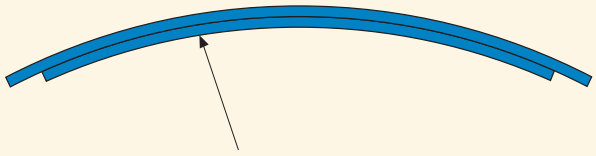
TABLE OF SAFE SPANS

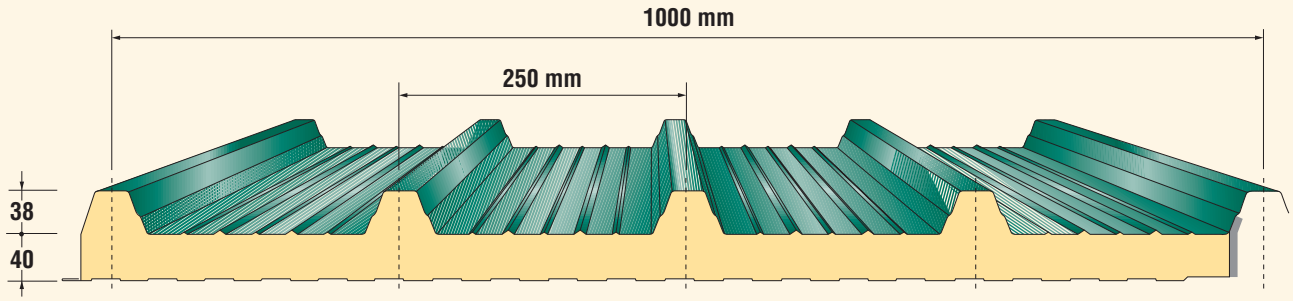
Minimum guaranteed values with steel sides as thick as indicated. The capacity loads p (daN/m²) relevant to spans *l* have been obtained from laboratory tests.

Span (mm)	S mm	K Kcal m² h °C	K Watt m² °C	Panel weight kg/m²	p / *l* = mm	1050	1400	1750	2100	2450	2800	3150	3500
External pre-painted steel sheet, 6/10 mm Internal pre-painted steel sheet, 4/10 mm	40	0,30	0,35	11,22	p =	559	360	261	200	158	128	106	88
External pre-painted aluminum sheet, 6/10 mm Internal pre-painted aluminum sheet, 4/10 mm				7,45	p =	398	270	196	149	116	92	74	61
External copper sheet, 5/10 mm Internal copper sheet, 4/10 mm				10,90	p =	574	386	283	217	170	136	112	100

Polyurethane insulated monolithic metal panel with curved longitudinal axis designed as a roofing system for residential and industrial buildings. The bending radius varies from 3500 mm to 20000 mm.







Maximum length of the external sheet: 6 m.
Variable bending radius: 3.5 to 20 m.
Useful width: 1000 m.

External metal surfaces
- Pre-painted galvanized steel, 6/10 mm
- Natural or pre-painted aluminum, 7/10 mm
- Copper, 5/10 mm

Internal metal surfaces
- Pre-painted galvanized steel, 4/10 mm
- Natural or pre-painted aluminum, 7/10 mm

Polyurethane insulation thickness (excluding the corrugation): 40 mm
Average density of the polyurethane foam: 40 Kg/m^3
Thermal insulation coefficient: **K** = 0.37 Kcal/m^2 h °C = 0.43 W/m^2 °C

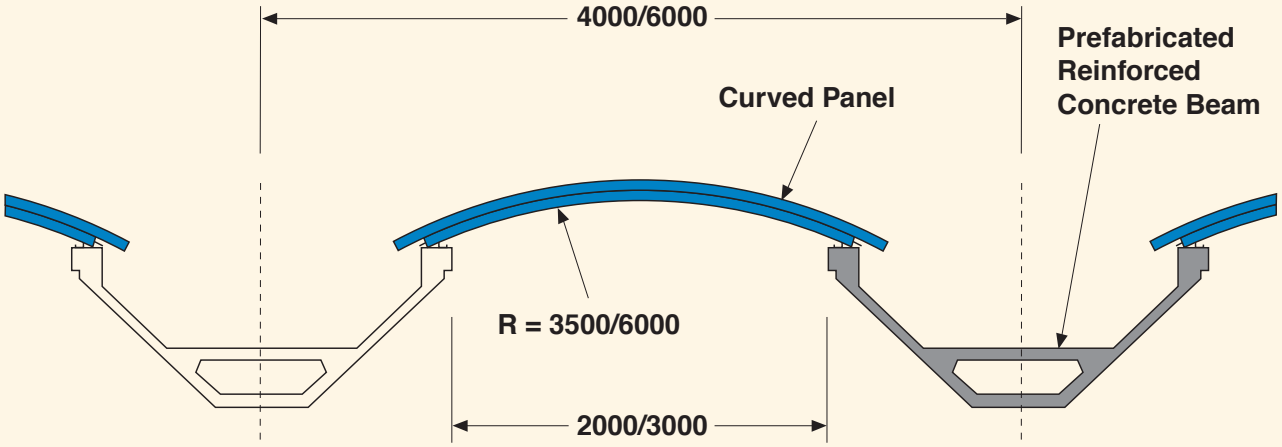
TABLE OF SAFE SPANS (in daN/m^2)

Metal roofing considered for the table here below: external steel 6/10 and internal steel 4/10. For other types of roofing, ask for technical data.

R	p l = span in mm.					p p p l = span in mm.		
mm	1000	2000	3000	4000	5000	1000	2000	3000
3000	1150	837	593	424	292	1453	1057	749
6000	679	480	312	222	161	858	606	394
9000	590	385	216	149	107	745	486	273
12000	558	356	170	112	80	705	450	215
16000	540	304	139	85	58	682	384	176
20000	532	257	124	70	46	672	325	157

INDUSTRIAL BUILDINGS WITH VAULTED ROOFING

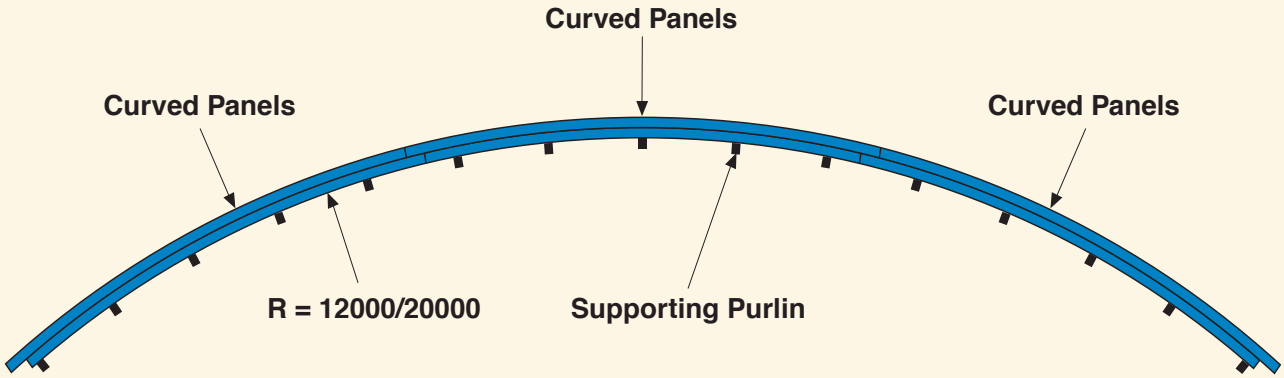
In these buildings, the roofing is formed by prefabricated self-supporting reinforced concrete or pre-compressed reinforced concrete beams, which are normally placed at a distance between centers of 5/6 m. The roofing elements are mounted perpendicularly to the supporting beams. The free span between the supporting beams is usually 2/3 m. The panel ends are usually fixed to the structures with specific steel brackets.



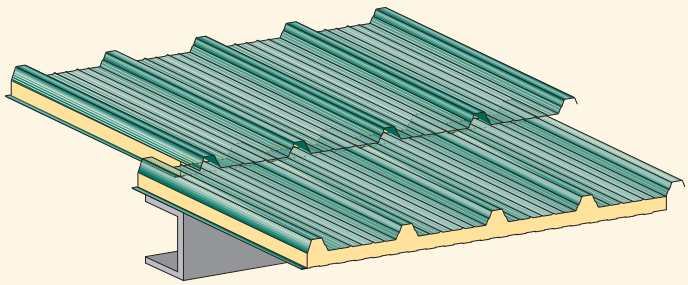
These types of roofing are usually formed by curved corrugated sheets or asbestos lumbers.
Our curved panels are an alternative solution, featuring strongly desirable decorative and structural characteristics and, above all, a considerable thermal insulation.

INDUSTRIAL BUILDINGS WITH CURVED ROOFING

The roofing elements of these buildings are usually formed by asbestos lumbers of variable lengths (1.22 to 2.44) and bending radiuses (6 to 15 m). Our solution featuring the monolithic panel eliminates all ecological problems, works on the same bending radius - suitably increased - as the trusses, distributes the load on several spans, and provides an excellent thermal insulation. The panel is fixed to the purlin by means of the standard assembly set including screws and suitable cap nuts.



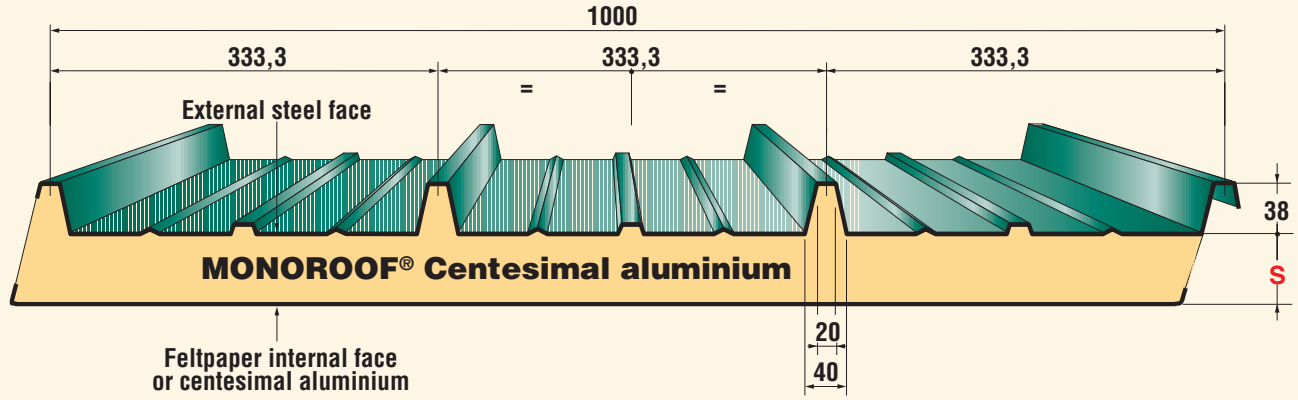
It is important to point out that, in this type of roofing, panels should be joined in the center of the supporting purlin, as indicated in the illustration to the right.

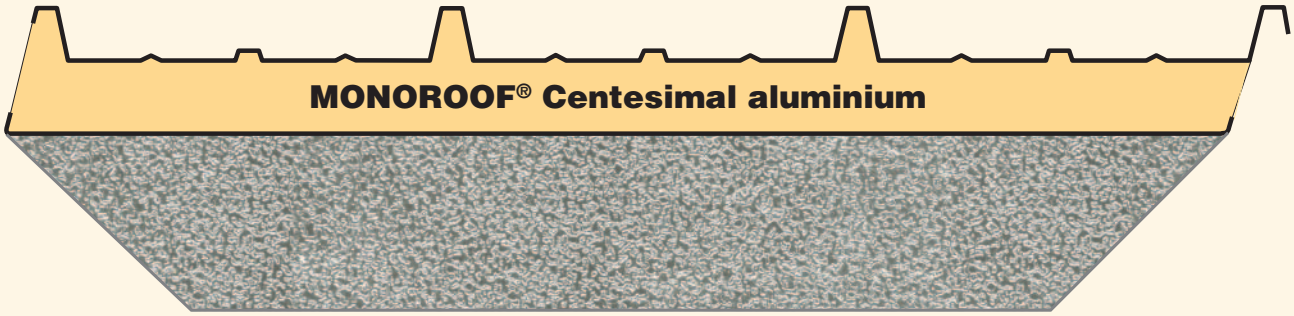


MONOROOF®

Profiled polyurethane-insulated roof system, slope p ≥ 7%

Self-supporting metal panel, insulated with polyurethane, for pitched roofs with a minimum slope of 7%. The internal side of the panel can have a surface finish made from **centesimal aluminium** or **bitumenised feltpaper**. Suitable precautions must be taken to protect the internal surface finish if the panel is exposed to external conditions.





Joint detail

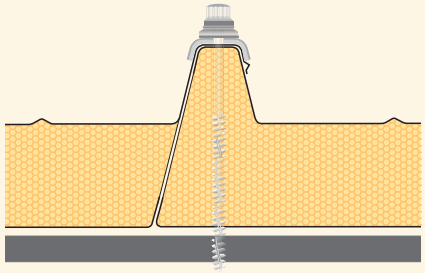


TABLE OF SAFE SPANS

The spans *l* in metres, as a function of a uniformly distributed overload p (daN/m²), have been calculated to provide a deflection f ≤ *l*/200 considering only the sheet as the resisting cross-section (the contribution of the polyurethane has not been taken into account) in accordance with standard UNI CNR - 10022/84 and the AIPPEG design guidelines. Data for the 0.5mm thickness sheet has been obtained from laboratory tests.

MONOROOF® A 38

S mm	K Kcal/m² h °C	K Watt/m² °C	Panel weight kg/m² 0,5	Panel weight kg/m² 1,0
15*	0,84	0,97	5,47	10,24
30	0,51	0,59	6,04	10,81
40	0,40	0,46	6,42	11,19
50	0,33	0,38	6,80	11,57
60	0,28	0,33	7,18	11,95
80	0,22	0,25	7,94	12,71

Sheet thickness mm.	p = daN/m²	80	100	120	150	200	250	300
0,45	*l* =	2,07	1,85	1,69	1,50	1,31	1,18	1,08
0,5	*l* =	2,07	1,85	1,69	1,50	1,31	1,18	1,08
0,6	*l* =	2,40	2,16	1,96	1,75	1,52	1,37	1,24
0,8	*l* =	3,00	2,69	2,45	2,20	1,90	1,70	1,55
1,0	*l* =	3,31 3,42	3,04 3,05	2,79	2,49	2,17	1,94	1,76

p = daN/m²	80	100	120	150	200	250	300
l =	2,01 2,16	1,88 1,94	1,76	1,59	1,38	1,23	1,13
l =	2,01 2,16	1,88 1,94	1,76	1,59	1,38	1,23	1,13
l =	2,18 2,41	2,01 2,16	1,91 1,97	1,76	1,52	1,38	1,24
l =	2,47 2,93	2,30 2,63	2,17 2,4	2,00 2,15	1,83 1,87	1,67	1,52
l =	2,68 3,30	2,48 2,96	2,34 2,70	2,18 2,42	1,97 2,09	1,84 1,88	1,71

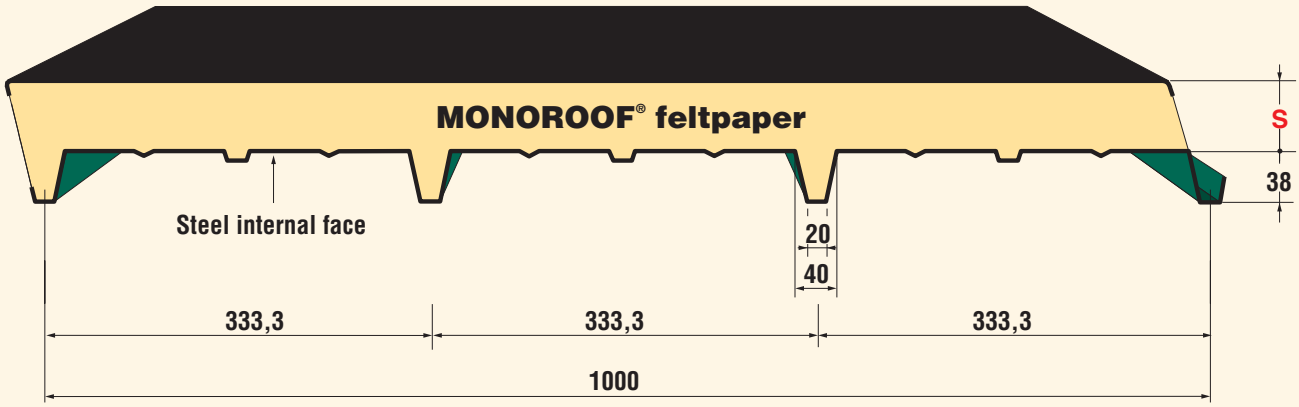
*Monoroof L

Values in red have no deflection limits.

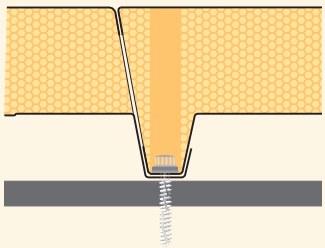
MONOROOF®

flat insulated roof system, slope ≥ 1%
to be waterproofed on site

Self-supporting metal panel, insulated with polyurethane, for flat roofs, to be weather-proofed on site.
The external side of the panel has a base covering in bitumenised feltpaper for the application of waterproofing linings.



Joint detail



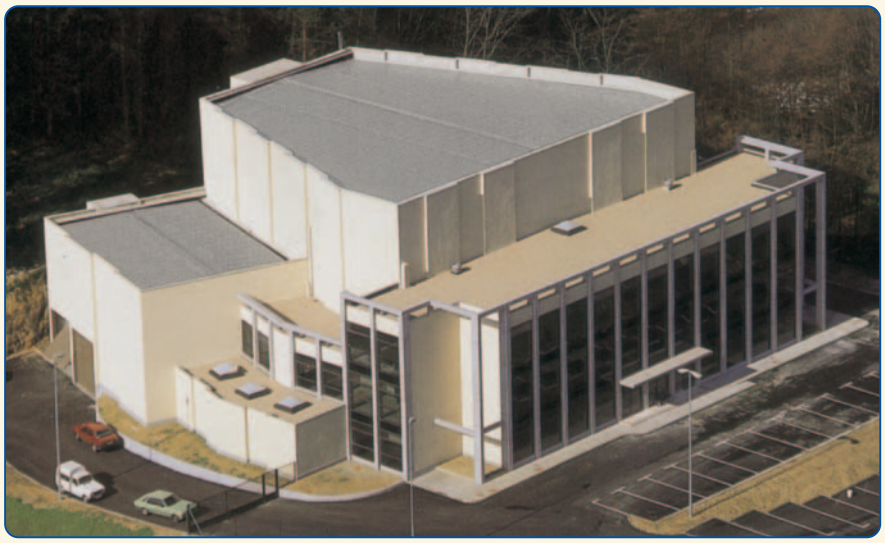


TABLE OF SAFE SPANS

The spans *l* in metres, as a function of a uniformly distributed overload **p** (daN/m²), have been calculated to provide a deflection f ≤ *l*/200 considering only the sheet as the resisting cross-section (the contribution of the polyurethane has not been taken into account) in accordance with standard UNI CNR - 10022/84 and the AIPPEG design guidelines. Data for the 0.5mm thickness sheet has been obtained from laboratory tests.

MONOROOF® A 38

S mm	K Kcal/m² h °C	K Watt/m² °C	Panel weight kg/m² 0,5	Panel weight kg/m² 1,0
30	0,51	0,59	6,04	10,81
40	0,40	0,46	6,42	11,19
50	0,33	0,38	6,80	11,57
60	0,28	0,33	7,18	11,95
80	0,22	0,25	7,94	12,71

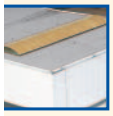
p p p

Sheet thickness mm.	p = daN/m²	80	100	120	150	200	250	300
0,5	*l* =	1,96 2,42	1,82 2,17	1,72 1,97	1,60 1,76	1,45 1,53	1,35 1,38	1,25
0,6	*l* =	2,16 2,69	1,99 2,41	1,89 2,20	1,74 1,97	1,60 1,71	1,47 1,53	1,38 1,40
0,8	*l* =	2,56 3,27	2,38 2,94	2,23 2,69	2,08 2,41	1,90 2,08	1,75 1,87	1,65 1,70
1,0	*l* =	2,84 3,69	2,64 3,30	2,48 3,01	2,30 2,70	2,10 2,34	1,95 2,10	1,84 1,92

p

Sheet thickness mm.	p = daN/m²	80	100	120	150	200	250	300
0,5	*l* =	1,60 1,85	1,47 1,66	1,40 1,50	1,29 1,36	1,16 1,18	1,05	0,97
0,6	*l* =	1,74 2,16	1,63 1,93	1,52 1,75	1,43 1,58	1,29 1,37	1,19 1,22	1,11 1,13
0,8	*l* =	2,08 2,69	1,93 2,40	1,82 2,19	1,69 1,96	1,53 1,70	1,43 1,52	1,35 1,40
1,0	*l* =	2,29 3,06	2,14 2,73	2,00 2,49	1,87 2,23	1,70 1,94	1,58 1,73	1,48 1,59

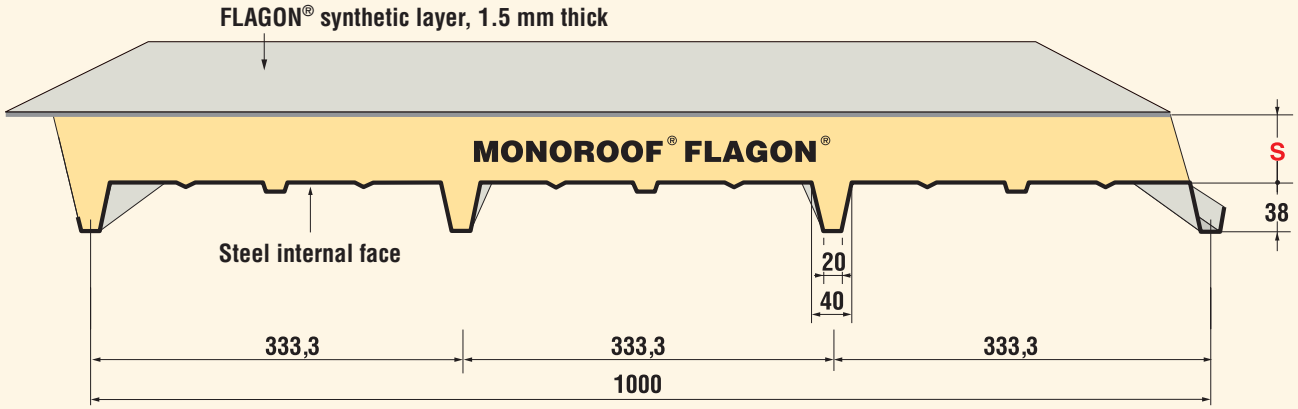
Values in red have no deflection limits.



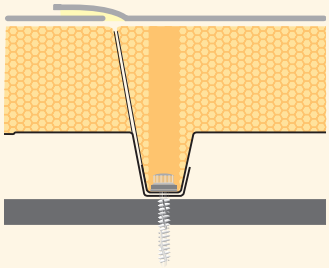
MONOROOF® FLAGON®

flat and pitched polyurethane-insulated roof system, waterproofed

Self-supporting insulated metal panel, **pre-waterproofed with FLAGON® SYNTHETIC LAYER**, for flat and pitched roofs. The synthetic layer in flexible PVC, 1.5mm thick, is reinforced with a 50g/m² layer of glassfibre and a 120g/m² polyester non-woven fabric.



Joint detail



Chemical and physical characteristics of the waterproof layer	Values	Test method
Ultimate tensile strenght	≥ 600 N/5 cm	UNI 8202/8
Ultimate elongation	≥ 80%	UNI 8202/8
Dimensional stability when hot	≤ 0,1%	UNI 8202/17
Resistance to static punching	Ps5	UNI 8202/11*
Resistance to dynamic punching	Pd3	UNI 8202/12*
Cold bending (2 mm spindle)	≤ -20°C	UNI 8202/15*
Accelerated ageing on exposure to light, no flaws after:	5000 h	DIN 53387
Waterproofing (6h with 0.5 Mpa)	Impermeabile	UNI 8202/21
Resistance to hail	≤ 23 m/s	SIA 280/8*
Coded designation UNI 8818: PVC 01-00-11		

* Test carried out in panel

TABLE OF SAFE SPANS

The spans *l* in metres, as a function of a uniformly distributed overload p (daN/m²), have been calculated to provide a deflection f ≤ *l*/200 considering only the sheet as the resisting cross-section (the contribution of the polyurethane has not been taken into account) in accordance with standard UNI CNR - 10022/84 and the AIPPEG design guidelines. Data for the 0.5mm thickness sheet has been obtained from laboratory tests.

MONOROOF® FLAGON® A38

S mm	K Kcal m²h°C	K Watt m²°C	Panel weight kg/m² 0,5	Panel weight kg/m² 1,0
30	0,51	0,59	6,04	10,81
40	0,40	0,46	6,42	11,19
50	0,33	0,38	6,80	11,57
60	0,28	0,33	7,18	12,95
80	0,22	0,25	7,94	12,71

Sheet thickness mm	p = daN/m²	80	100	120	150	200	250	300
0,5	*l* =	1,96	1,82	1,72	1,60	1,45	1,35	1,25
0,6	*l* =	2,16	1,99	1,89	1,74	1,60	1,47	1,38
0,8	*l* =	2,56	2,38	2,23	2,08	1,90	1,75	1,65
1,0	*l* =	2,84	2,64	2,48	2,30	2,10	1,95	1,84

p = daN/m²	80	100	120	150	200	250	300
l =	1,60	1,47	1,40	1,29	1,16	1,05	0,97
l =	1,74	1,63	1,52	1,43	1,29	1,19	1,11
l =	2,08	1,93	1,82	1,69	1,53	1,43	1,35
l =	2,29	2,14	2,00	1,87	1,70	1,58	1,48

PANEL FOR FARM ROOFING

Self-supporting metal panel, insulated with polyurethane foam, suitable for pitched roofs with a minimum slope of 7%. The external face of the panel is formed by a corrugated supporting sheet; according to the various conditions of external aggressions to the farm, this sheet can be made in pre-painted galvanized steel, natural or pre-painted aluminum, or stainless steel. The thickness of the polyurethane thermal insulator, featuring a self-extinguishing formula, is variable: 30 to 80 mm (excluding the corrugation), according to the environmental conditions in the installation sites.
The internal supporting panel is made in FLAGON TS plasticized PVC, and is strongly resistant to microorganisms, bacteria, and vapors and condensations filled with organic acids that are usually found in farms.

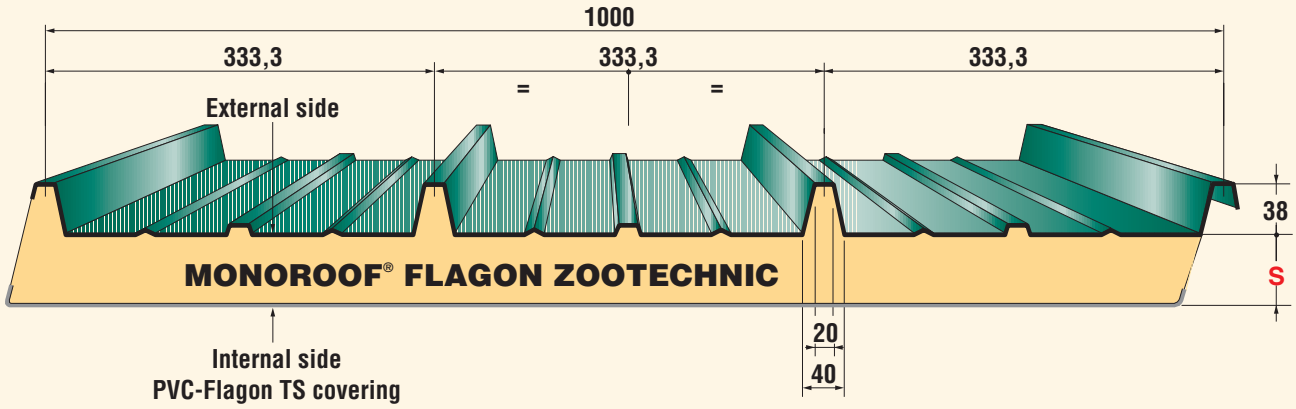


TABLE OF SAFE SPANS FOR SHEET STEEL

l spans (in meters) relevant to the uniformly distributed overload p (daN/m²) were calculated in such a way as to guarantee a deflection f≤ *l*/200, considering as the supporting section the steel sheet only (the polyurethane strength has been neglected), in compliance with UNI CNR - 10022/84 standards and the AIPPEG design. The values indicated for 0.5 mm thick steel sheet come from laboratory tests.

S mm	K Kcal/m² h °C	K Watt/m² °C	Panel weight kg/m² 0,5	Panel weight kg/m² 1,0
30	0,51	0,59	6,04	10,81
40	0,40	0,46	6,42	11,19
50	0,33	0,38	6,80	11,57
60	0,28	0,33	7,18	11,95
80	0,22	0,25	7,94	12,71

Sheet thickness mm.	p = daN/m²	80	100	120	150	200	250	300
0,5	*l* =	2,07	1,85	1,69	1,50	1,31	1,18	1,08
0,6	*l* =	2,40	2,16	1,96	1,75	1,52	1,37	1,24
0,8	*l* =	3,00	2,69	2,45	2,20	1,90	1,70	1,55
1,0	*l* =	3,31 3,42	3,04 3,05	2,79	2,49	2,17	1,94	1,76

p = daN/m²	80	100	120	150	200	250	300
l =	2,01 2,16	1,88 1,94	1,76	1,59	1,38	1,23	1,13
l =	2,18 2,41	2,01 2,16	1,91 1,97	1,76	1,52	1,38	1,24
l =	2,47 2,93	2,30 2,63	2,17 2,4	2,00 2,15	1,83 1,87	1,67	1,52
l =	2,68 3,30	2,48 2,96	2,34 2,70	2,18 2,42	1,97 2,09	1,84 1,88	1,71

Red values have no deflection limitations.

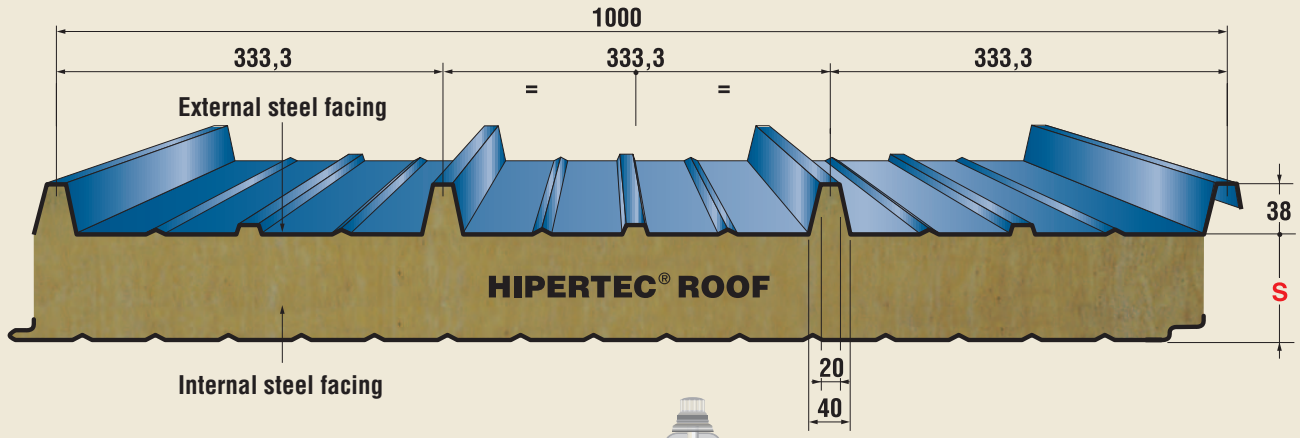
The presence of organic acids, which is typical of breeding farms, suggested us to design a special product to be used as farm roofing. This panel must guarantee the following features:

- **The internal surface, formed by the FLAGON TS covering, must guarantee a high level of environmental health, that cannot be attacked by vapors and acid condensations, and that can be easily cleaned with water cleaners.**
- **The thermal insulation must protect the animals from dangerously high temperatures in the periods of maximum insulation, and be also sufficient to protect the animals from harsh winter temperatures.**
- **The supporting sheet must stand the external environmental conditions, which may be also affected by leakages of acid vapors from inside. The most suitable metal will be selected based on these conditions from time to time.**
- **The formulation of the FLAGON TS covering does not contain any toxic substances that may be a source of pollution for the air around the area where the covering is used.**

HIPERTEC® ROOF

Profiled roof system, p ≥ 7% insulated with efficient thermal and acoustic Rockwool insulation.

Self-supporting metal panel system insulated with Rockwool for roof and wall applications, which require a high degree of fire resistance.
The **HIPERTEC® ROOF** panel, manufactured in accordance with a system patented by Metecno, consists of a profiled external steel sheet and an internal micro-ribbed steel sheet, with an insulation core of orientated fibre high density Rockwool, arranged perpendicularly to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversely compacted, in such a way as to completely fill the space between the metal facings.
Maximum panel length: 15,500 mm.



Joint detail

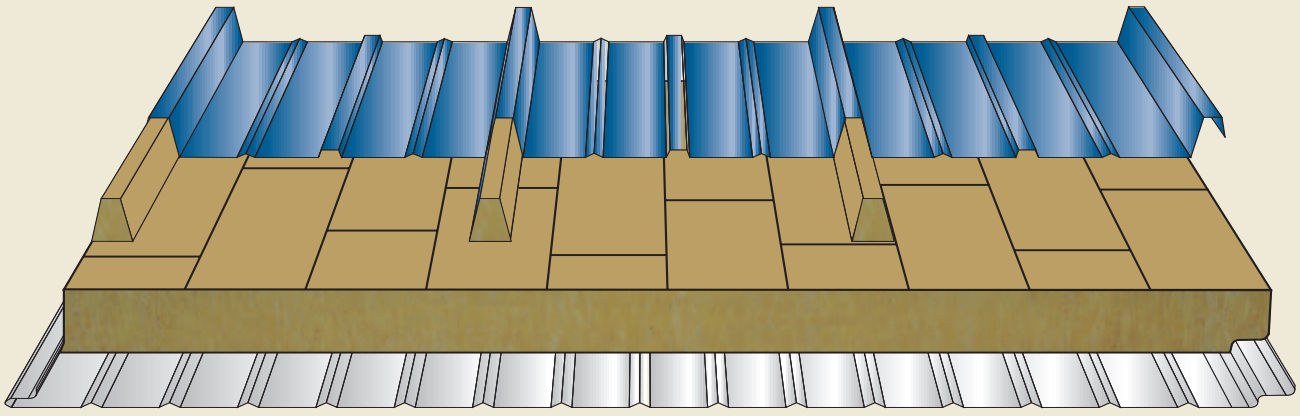


TABLE OF SAFE SPANS

Minimum values with steel sheets, thickness 0.6 + 0.5mm. The spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m²), have been obtained from tests carried out in ICITE laboratories and calculated to provide:

- Deflection limit: f ≤ l/200 of the span
- Operation stresses: 1/2.5 of the breaking moment and 1/2.5 of the breaking cut.
- Permissable deformation: 2% of the panel thickness with a safety co-efficient of 1.5.

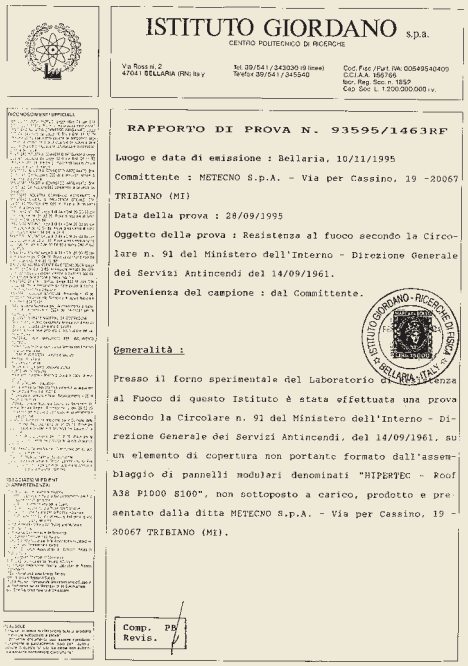
S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² Steel thickness 0,6+0,5	p = daN/m²	p … p … p (l) 80	100	120	150	200	250	300	p (l) 80	100	120	150	200	250	300
50	0,61	0,71	16,22	*l* =	4,55	3,78	3,23	2,65	2,02	1,67	1,32	3,98	3,65	3,23	2,65	2,02	1,67	1,32
80	0,41	0,47	19,22	*l* =	5,96	5,56	4,83	3,96	3,06	2,49	2,12	5,14	4,81	4,51	3,96	3,06	2,49	2,12
100	0,33	0,39	21,22	*l* =	6,06	5,76	5,46	4,83	3,75	3,05	2,58	5,66	5,28	4,96	4,59	3,75	3,05	2,58
120	0,28	0,33	23,22	*l* =	6,10	5,87	5,64	5,28	4,41	3,60	3,04	6,15	5,73	5,39	4,97	4,39	3,60	3,04

RESISTANCE TO FIRE

Resistance to fire is the ability of the building element to limit the spread of flame, and retain the integrity of the thermal insulation for a period of time. The performance of panel systems when tested is expressed in minutes from ignition to the conclusion of the test, which is determined as the failure point at which the panels ceases to comply with the requirements of the specific test. The significant test performances are as follows:

MECHANICAL STRENGTH (R)
IMPERMEABILITY TO GAS (E)
THERMAL INSULATION (I)

The **HIPERTEC® ROOF** panel was tested at the Istituto Giordano S.p.A. on an unloaded structure in compliance with circular no. 91 of 14/9/61 and the following results were obtained:



ISTITUTO GIORDANO s.p.a.
CENTRO POLITECNICO DI RICERCHE

RAPPORTO DI PROVA N. 93595/1463RF

Luogo e data di emissione : Bellaria, 10/11/1995
Committente : METECNO S.p.A. - Via per Cassino, 19 -20067 TRIBIANO (MI)
Data della prova : 28/09/1995
Oggetto della prova : Resistenza al fuoco secondo la Circolare n. 91 del Ministero dell'Interno - Direzione Generale dei Servizi Antincendi del 14/09/1961.
Provenienza del campione : dal Committente.

Generalità :

Presso il forno sperimentale del Laboratorio di Resistenza al Fuoco di questo Istituto è stata effettuata una prova secondo la Circolare n. 91 del Ministero dell'Interno - Direzione Generale dei Servizi Antincendi, del 14/09/1961, su un elemento di copertura non portante formato dall'assemblaggio di pannelli modulari denominati "HIPERTEC - Roof A38 P1000 S100", non sottoposto a carico, prodotto e presentato dalla ditta METECNO S.p.A. - Via per Cassino, 19 - 20067 TRIBIANO (MI).

Comp. PB
Revis.

ROOF POSITION

HIPERTEC® ROOF thickness 100 REI 120 certificate no. 93595 / 1463 RF
HIPERTEC® ROOF thickness 80 REI 60 certificate no. 93594 / 1462 RF
HIPERTEC® ROOF thickness 50 REI 30 certificate no. 93593 / 1461 RF

WALL POSITION

HIPERTEC® ROOF thickness 100 REI 120 certificate no. 110355 / 1693 RF
HIPERTEC® ROOF thickness 80 REI 45 certificate no. 109609 / 1682 RF
HIPERTEC® ROOF thickness 50 REI 30 certificate no. 109608 / 1681 RF

MAJOR TECHNICAL PRODUCT CERTIFICATES

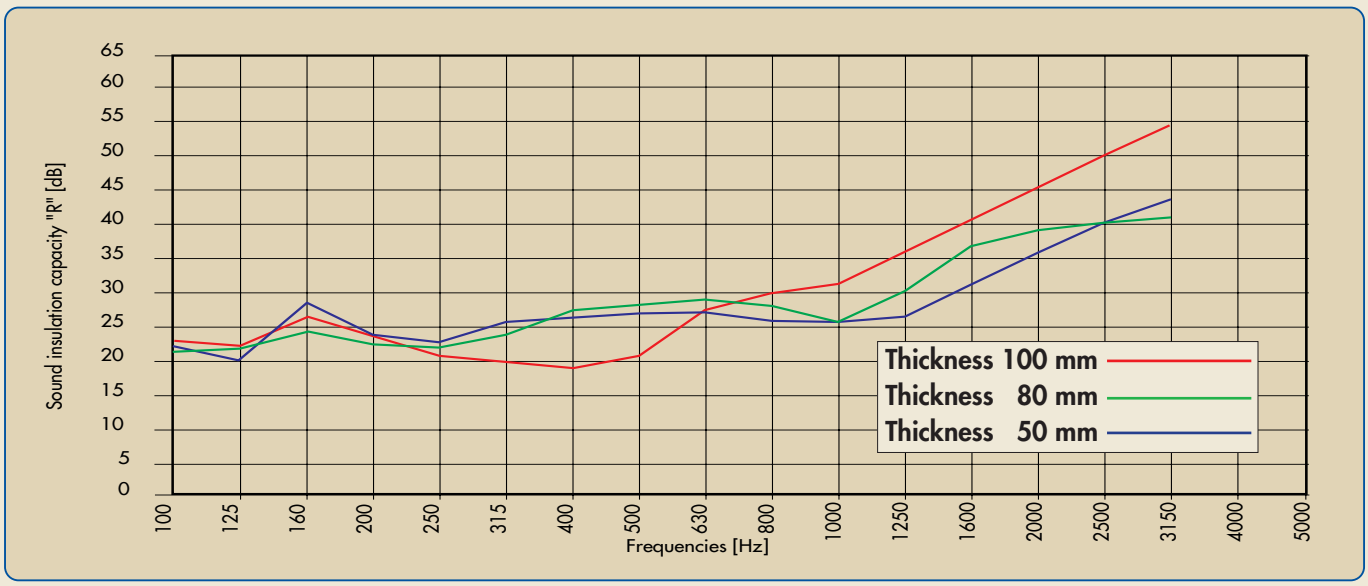
Agrément Tecnico ICITE 518 / 98 - ATEX CSTB 925
Zulassung DIBE Z - 10.4 - 237

REACTION TO FIRE

Reaction to fire is the degree in which a material resists combustion. With regard to this, materials are assigned a class (0 through 5), the higher the class, the higher the degree of combustion.
The **HIPERTEC® ROOF** panels, thicknesses 50 - 80 - 100 mm, tested at the Istituto Giordano S.p.A., pursuant to the Ministerial Decree of 26/6/84, **were classified 0/1 for reaction to fire, both in the roof position and in the wall position.**
Since the panel consists of two steel facings with a layer of Rockwool insulation sandwiched between, the Class O refers to the external surfaces, with Class 1 referring to the insulation core.
Tests have been also made at foreign Institutes with the following results:
Germany: Panel class B1, insulation class A1 - France: class M0.

SOUND INSULATION

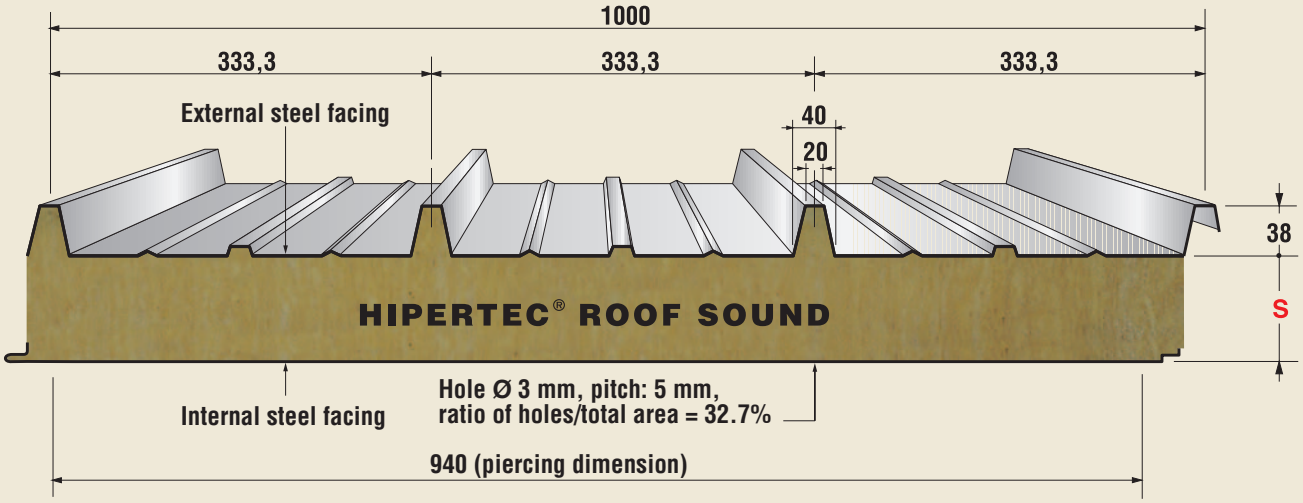
The sound insulation of a material (for example, a panel) is given by the ability to reduce the passage of sound energy between two locations.
The **HIPERTEC® ROOF** panel has been tested to UNI 8270/7 and ISO 717/82 standards and, for the thicknesses 50 - 80 - 100 mm, obtained valuation indices of **Rw** = 29-30 dB.



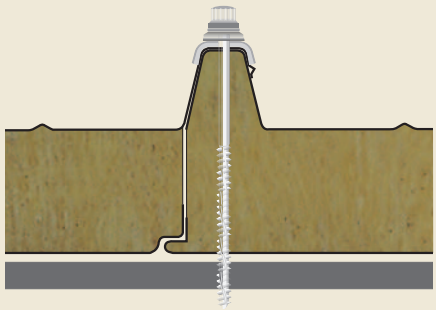
HIPERTEC® ROOF SOUND

Profiled roof system, p ≥ 7% isolated with sound absorbent Rockwool.

Self-supporting panel system, insulated with Rockwool for roof and wall applications, requiring a high degree of resistance to fire, combined with sound absorption.
The **HIPERTEC® ROOF SOUND** panel is manufactured in accordance with a system patented by Metecno and consists of a profiled external steel facing, an internal flat, but perforated liner, with an insulation core of high density orientated Rockwool, arranged perpendicular to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversally compacted, in such a way as to completely fill the void between the two metal facings, including the profiled trapezoidals.



Joint detail



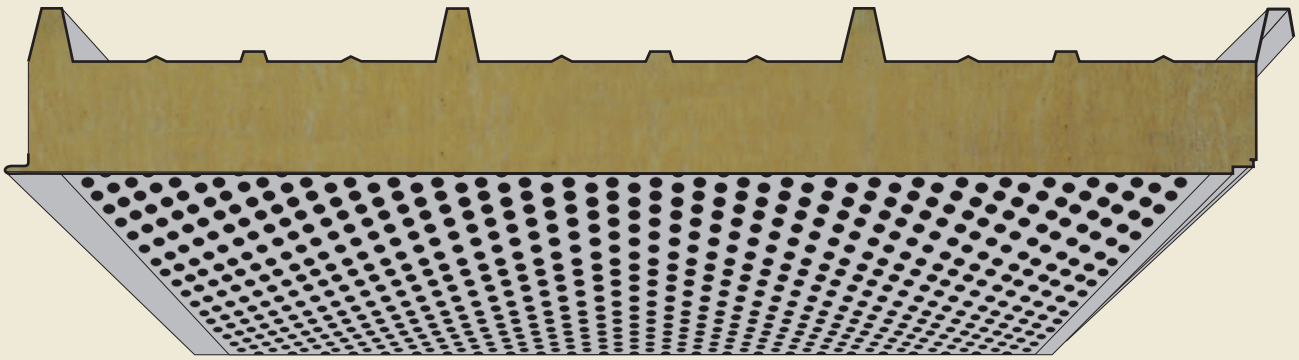


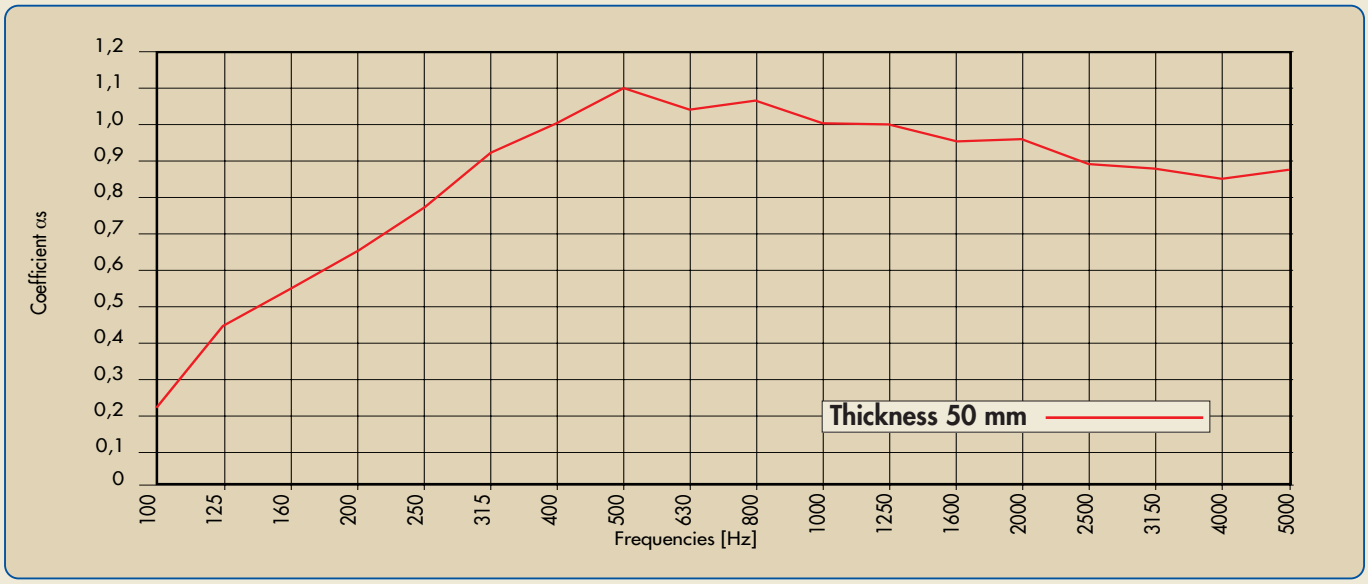
TABLE OF SAFE SPANS

Minimum values with steel sheets, thickness 0.6 + 0.5 mm. The spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m²), have been obtained from tests carried out in Metecno laboratories and calculated to provide a deflection limit: f ≤ *l*/200 of the span and a minimum safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6+0,5	p = daN/m²	80	100	120	150	200	250	300	80	100	120	150	200	250	300
					p	p	p					p						
					△ *l* △ *l* △ *l* △							△ *l* △						
50	0,61	0,71	14,79	*l* =	3,56	3,18	2,90	2,59	2,25	2,01	1,84	3,18	2,84	2,56	2,32	2,01	1,80	1,64
80	0,41	0,47	17,79	*l* =	4,14	3,70	3,35	3,02	2,62	2,34	2,13	3,70	3,31	3,00	2,70	2,34	2,10	1,91
100	0,33	0,39	19,79	*l* =	4,48	4,01	3,67	3,27	2,84	2,54	2,31	4,01	3,58	3,25	2,93	2,54	2,27	2,07

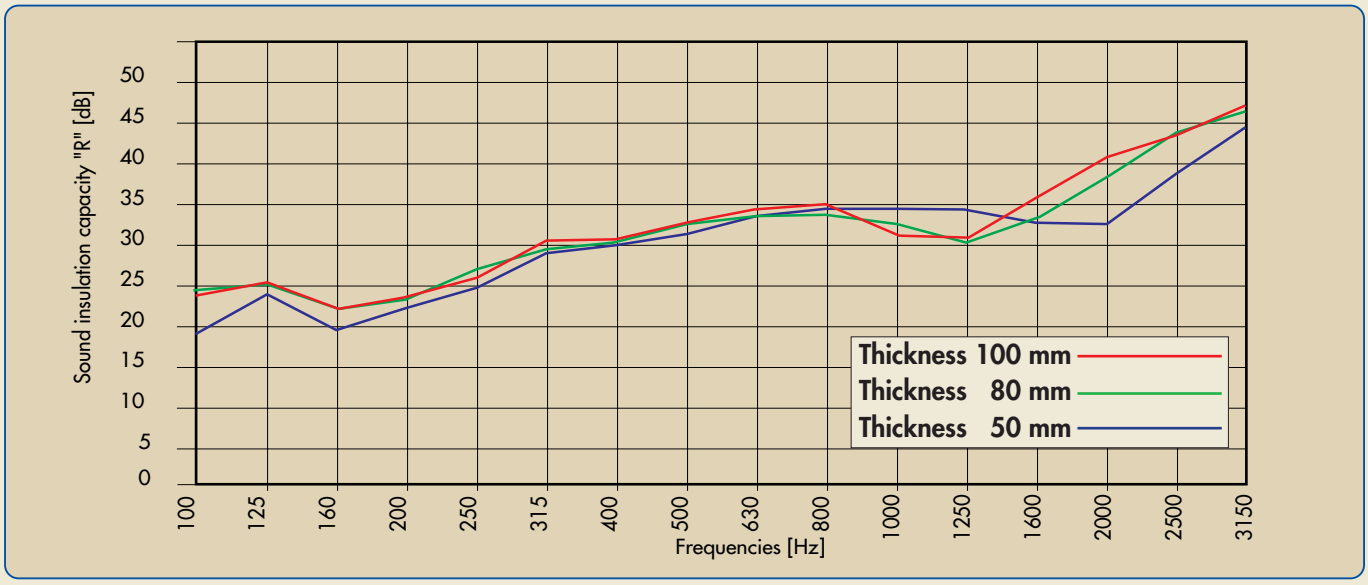
SOUND ABSORPTION

The **HIPERTEC® ROOF SOUND** panel is particularly suitable for **acoustic control**, providing excellent sound absorption qualities over a wide range frequency spectrum.
Tests in echo chambers conducted to ISO 354/85 standards on 50, 80 and 100 mm thick panels produced **DELTA LA** sound absorption indices of between **12 and 19 dB (A)**.
The graph below shows the curve of the absorption coefficients at the various frequencies for the 50 mm thick panel.



SOUND INSULATION

The **HIPERTEC® ROOF SOUND** panel has been tested to ISO 717/82 standards and obtained indices of RW = 33.5-35 dB for the 50, 80 and 100 mm thick panels.
The curves of the absorption coefficients of the 100, 80 and 50 mm thick **HIPERTEC® ROOF SOUND** panels at the various frequencies are shown in the graph below.



RESISTANCE TO FIRE

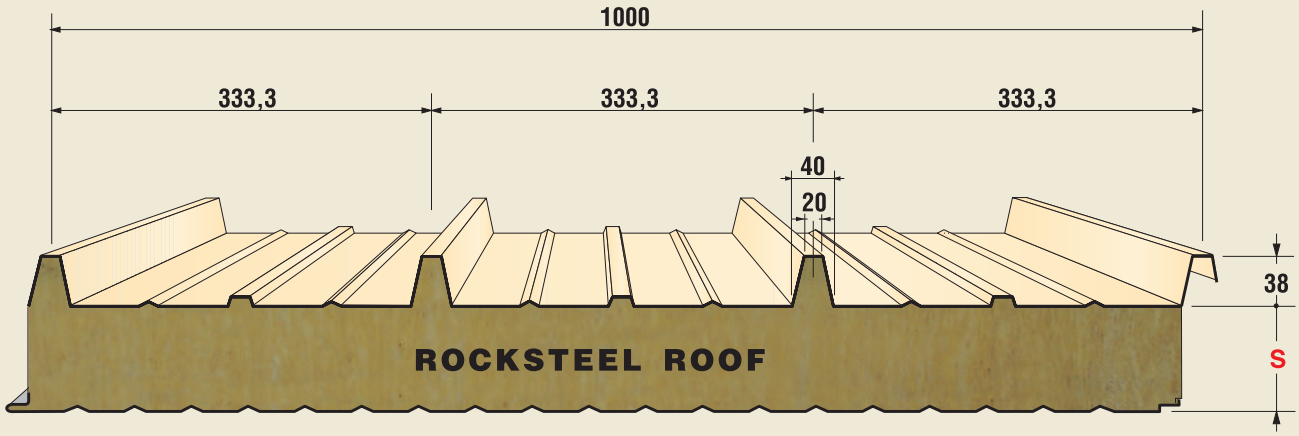
HIPERTEC® ROOF SOUND panels have been tested at the Istituto Giordana S.p.A. on an unloaded structure in accordance with Circular no. 91 of 14/9/61 and obtained the following results:

HIPERTEC® ROOF Thickness 100 REI 90 certificate no. 111478 / 1718 RF
HIPERTEC® ROOF Thickness 80 REI 60 certificate no. 111479 / 1719 RF

ROCKSTEEL ROOF

Profiled roof system, p ≥ 7% insulated with a Rockwool core, with fire reaction certification.

Self-supporting panel system, insulated with Rockwool for roof and wall applications.
The **ROCKSTEEL® ROOF** panel, is manufactured in accordance with a system patented by Metecno, and consists of a profiled external steel facing, an internal micro-ribbed liner, with an insulation core of high density orientated Rockwool, arranged perpendicular to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversally compacted, in such a way as to completely fill the void between the two metal facings, including the profiled trapezoidals.



EXTERNAL AND INTERNAL SHEET

The following materials can be used:

– Prepainted galvanised steel S 280 GD
– Stainless steel AISI 304 - or **AISI 430**
Nominal thickness: 0.5 - 0.6 - 0.8 mm
Paint: METCOLOR System

INSULATION

Rockwool, density: 75 kg./m³
Thickness: 50 - 80 - 100 - 120 mm.

REACTION TO FIRE

Reaction to fire is the degree in which a material resists combustion. With regard to this, materials are assigned a class (0 through 5): the higher the class, the higher the degree of combustion.
The **ROCKSTEEL® ROOF** panels, 50 - 80 - 100 - 120 mm thick, tested at the Istituto Giordano S.p.A., pursuant to the Ministerial Decree of 26/6/84, **were classified 0/1 for reaction to fire in the roof position.**
Since the panel consists of two steel sheets with a layer of rock wool in between, the class 0 refers to the external surface and the class 1 to the insulation.

TABLE OF SAFE SPANS

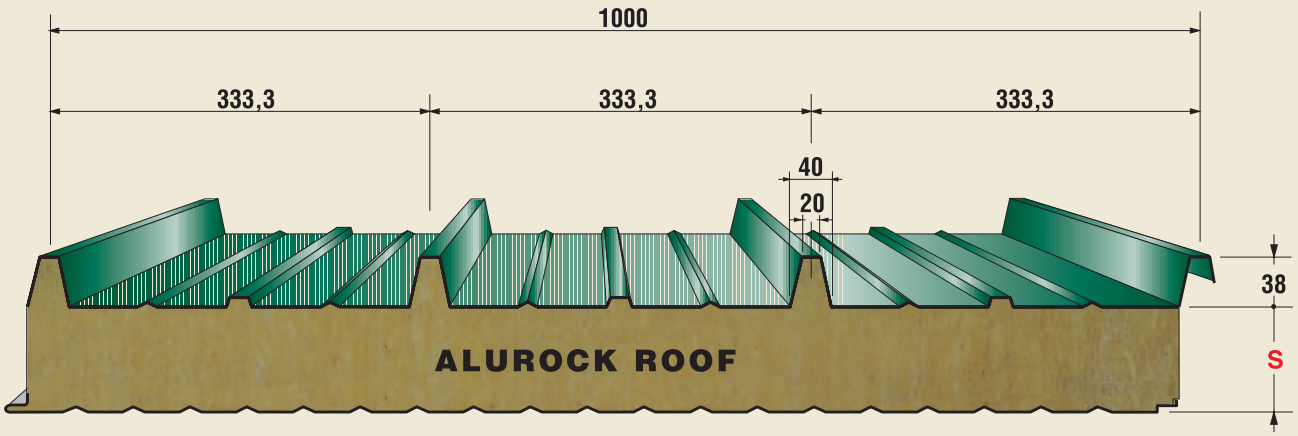
Minimum values with steel sheets, thickness 0.5 + 0.5 mm. The spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m²), have been obtained from tests carried out in Metecno laboratories and calculated to provide a deflection limit: f ≤ *l*/200 of the span and a minimum safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,5+0,5	p = daN/m²	80	100	120	150	200	250	300	80	100	120	150	200	250	300
					p p p							p						
					△ *l* △ *l* △ *l* △							△ *l* △						
50	0,59	0,68	13,7	*l* =	3,52	2,98	2,59	2,16	1,71	1,41	1,18	3,06	2,59	2,25	1,88	1,49	1,23	1,03
80	0,40	0,46	15,9	*l* =	4,76	4,26	3,70	3,02	2,29	1,84	1,54	4,14	3,70	3,22	2,63	1,99	1,60	1,34
100	0,32	0,38	17,4	*l* =	5,45	4,69	3,94	3,20	2,43	1,96	1,63	4,74	4,08	3,43	2,78	2,11	1,70	1,42
120	0,28	0,32	18,9	*l* =	6,13	5,12	4,29	3,48	2,65	2,13	1,78	5,33	4,45	3,73	3,03	2,30	1,85	1,55

ALUROCK ROOF

Profiled roof system, p ≥ 7% insulated with a Rockwool core.

Self-supporting panel system, insulated with Rockwool for roof and wall applications.
The **ALUROCK® ROOF** panel, is manufactured in accordance with a system patented by Metecno, and consists of a profiled external aluminium facing, an internal micro-ribbed aluminium liner, with an insulation core of high density orientated Rockwool, arranged perpendicular to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversally compacted, in such a way as to completely fill the void between the two metal facings, including the profiled trapezoidals.



EXTERNAL AND INTERNAL SHEET

Prepainted or unpainted 3003 - 3103 aluminium alloy

Nominal thickness: 0.8 mm
Paint: METCOLOR System
Surface finishing: Flat, micro-ribbed

INSULATION

Rockwool, density: 75 kg./m³
Thickness: 50 - 80 - 100 -120 mm.

REACTION TO FIRE

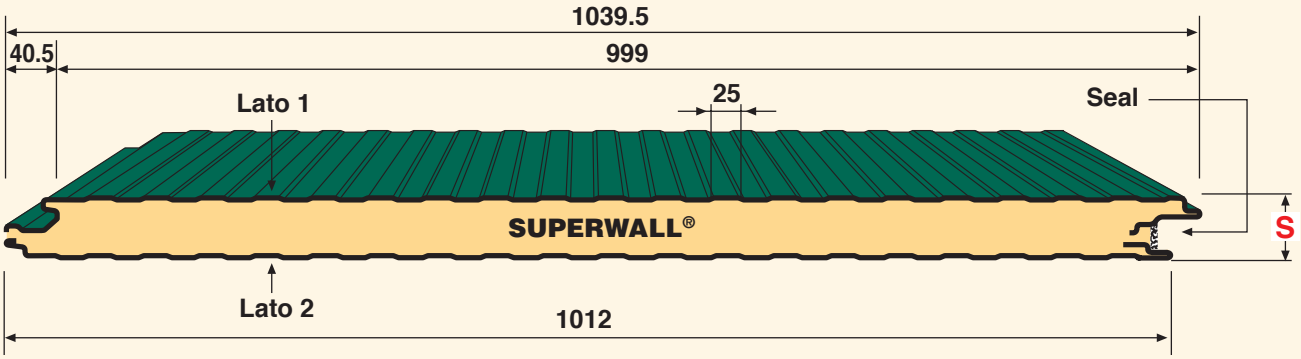
ALUROCK ROOF panels, tested at the Istituto Giordano according to the Ministerial Decree dated June 26, 1984, were certified as complying with Class 0/1 specifications in a roofing position.

TABLE OF SAFE SPANS

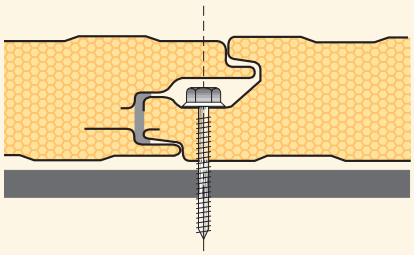
Minimum values with steel sheets, thickness 0.8 + 0.8 mm. The spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m²), have been obtained from tests carried out in Metecno laboratories and calculated to provide a deflection limit: f ≤ *l*/200 of the span and a minimum safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

S mm	K Kcal m²h°C	K Watt m²°C	Panel weight kg/m² 0,8+0,8	p = daN/m²	80	100	120	150	200	250	300	80	100	120	150	200	250	300
					p p p							p						
					△ *l* △ *l* △ *l* △							△ *l* △						
50	0,59	0,68	9,6	*l* =	3,20	2,91	2,68	2,26	1,70	1,37	1,14	2,86	2,60	2,39	2,02	1,52	1,22	1,02
80	0,40	0,46	11,9	*l* =	4,16	3,77	3,47	2,96	2,23	1,79	1,50	3,71	3,37	3,10	2,64	1,99	1,60	1,34
100	0,32	0,38	13,4	*l* =	4,76	4,33	3,88	3,12	2,36	1,90	1,59	4,25	3,87	3,46	2,79	2,11	1,70	1,42
120	0,28	0,32	14,9	*l* =	5,33	4,86	4,22	3,40	2,58	2,07	1,74	4,76	4,34	3,77	3,04	2,30	1,85	1,55

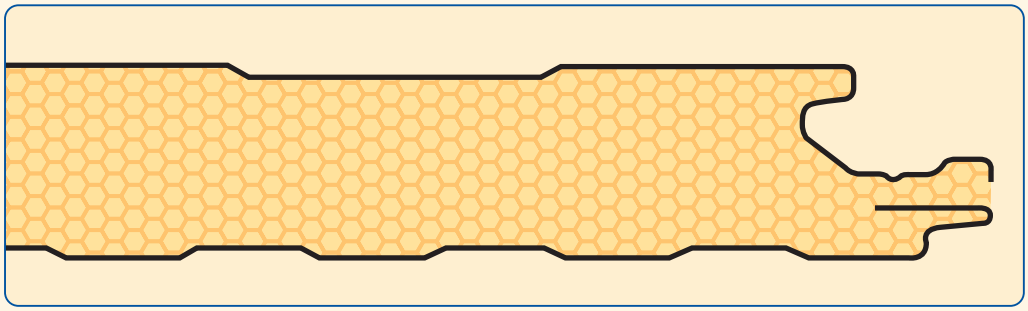
Self-supporting insulated metal panels system, with a concealed-fix for high quality aesthetic finish, suitable for use on industrial and commercial developments, as well as internal building partitions.



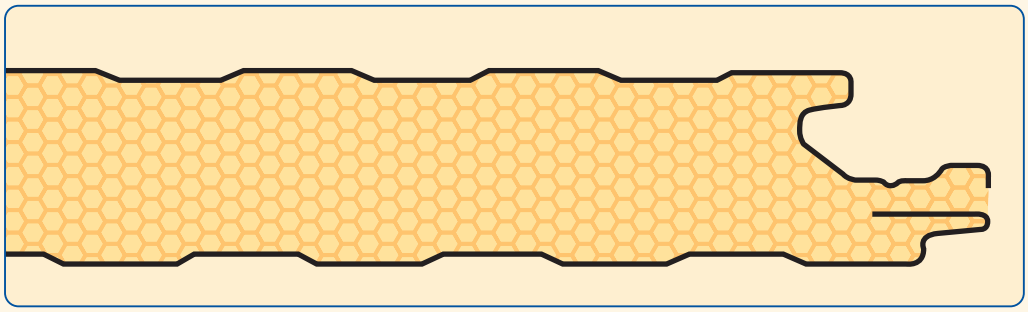
Joint detail



Panels can be assembled in a vertical position



External finish with large staves



External finish with staves

TABLE OF SAFE SPANS

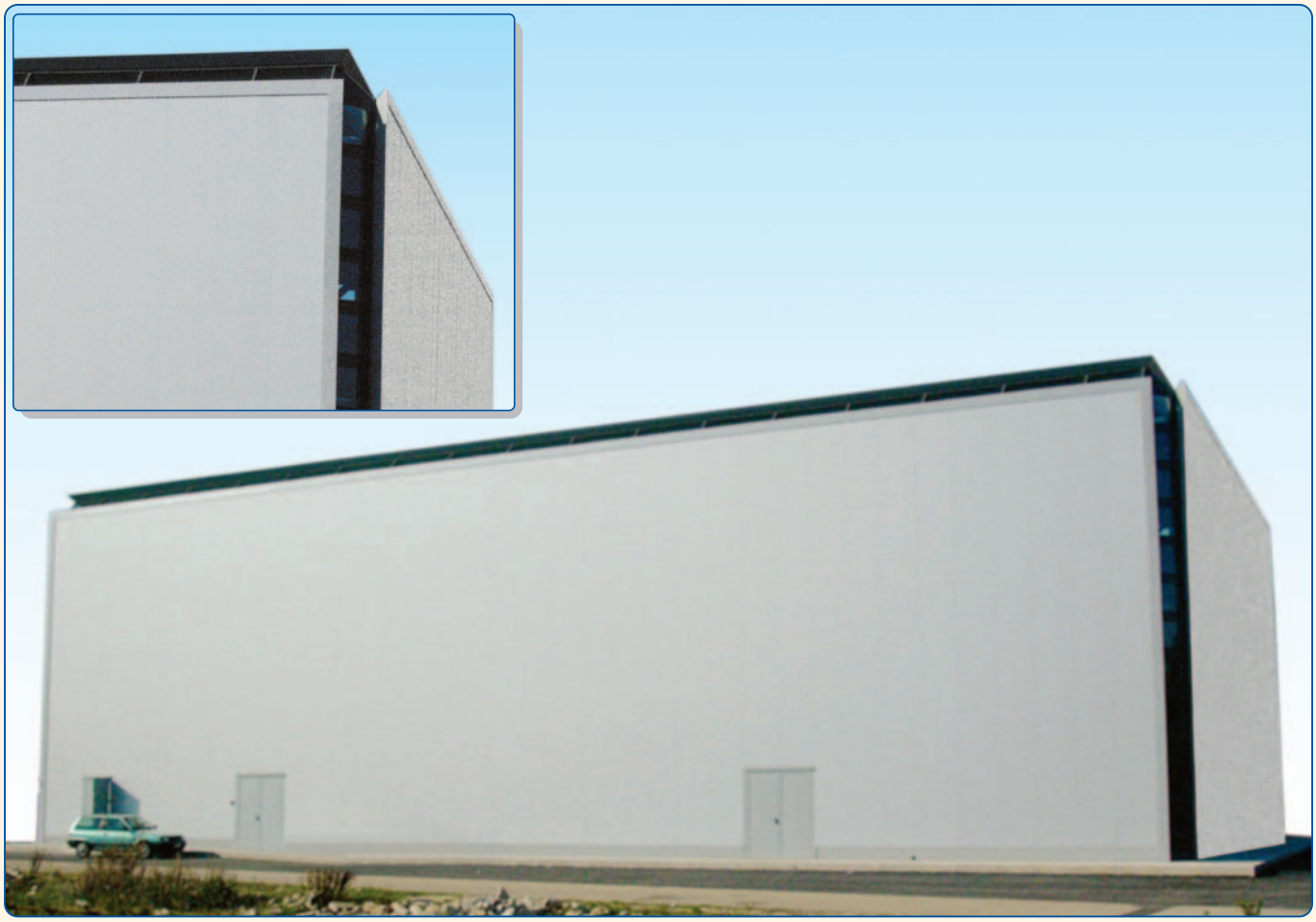
Minimum guaranteed values with steel sheets as thick as indicated. *l* spans (in meters) relevant to a uniformly distributed overload **p** (daN/m²) were calculated, based on experimental data, in such a way as to guarantee a deflection f≤ *l*/200, and a safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

steel - steel (thickness 0,5+0,4)

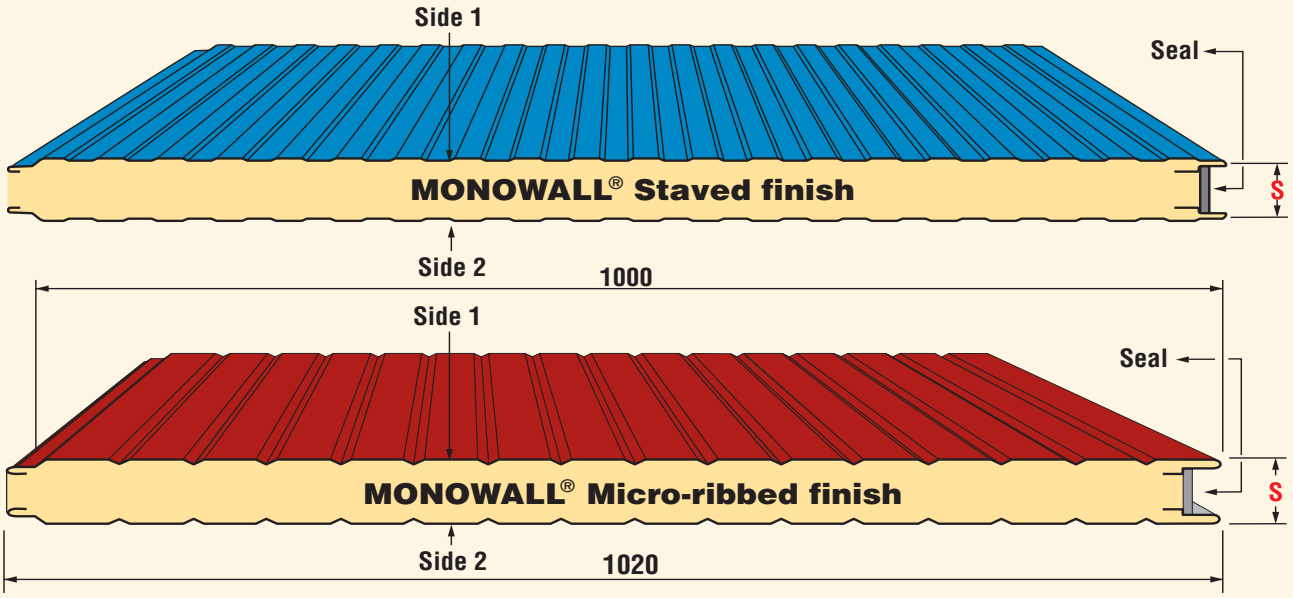
S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,5+0,4	p = daN/m²	p p p l l l					p l				
					60	80	100	120	150	60	80	100	120	150
40	0,43	0,50	9,28	*l* =	3,40	3,20	3,00	2,80	2,50	3,10	2,90	2,70	2,50	2,20
50	0,35	0,41	9,66	*l* =	3,90	3,65	3,40	3,10	2,75	3,45	3,20	2,95	2,75	2,40
60	0,29	0,34	10,04	*l* =	4,40	4,10	3,75	3,45	3,00	3,80	3,55	3,30	3,00	2,60
80	0,22	0,26	10,80	*l* =	5,00	4,65	4,25	3,90	3,35	4,30	4,00	3,70	3,35	2,90
100	0,18	0,21	11,56	*l* =	4,90	4,45	4,10	3,75	3,20	5,80	5,15	4,75	4,30	3,70
120	0,15	0,18	12,32	*l* =	5,50	4,90	4,50	4,10	3,50	6,40	5,70	5,25	4,75	4,05

aluminium - aluminium (thickness 0,6+0,6)

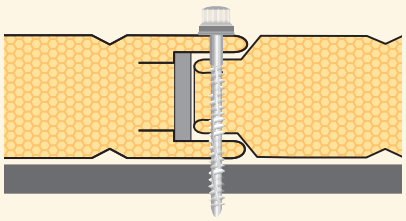
S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,6	p = daN/m²	p p p l l l					p l				
					60	80	100	120	150	60	80	100	120	150
40	0,43	0,50	5,07	*l* =	2,75	2,39	2,11	1,90	1,66	2,34	2,06	1,84	1,67	1,49
50	0,35	0,41	5,45	*l* =	3,26	2,84	2,52	2,27	1,99	2,76	2,44	2,19	1,99	1,77
60	0,29	0,34	5,83	*l* =	3,74	3,26	2,90	2,62	2,32	3,16	2,79	2,51	2,29	2,04
80	0,22	0,26	6,59	*l* =	4,34	3,78	3,36	3,04	2,69	3,79	3,35	3,01	2,75	2,45
100	0,18	0,21	7,35	*l* =	4,30	3,79	3,41	3,11	2,77	4,86	4,24	3,77	3,41	3,02
120	0,15	0,18	8,11	*l* =	4,74	4,19	3,77	3,44	3,06	5,31	4,63	4,12	3,72	3,29



Self-supporting metal panels insulated with polyurethane for use in industrial and commercial buildings, refrigerated rooms with positive temperature, and partitions in general.



Joint detail



IMPORTANT: In the assembly stage, attention to the correct positioning of the painted side: the side marked with "EXTERNAL" must face the outside.

TABLE OF SAFE SPANS

Minimum guaranteed values with steel sheets as thick as indicated. Spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m²), have been obtained from experimental data and calculated to provide a deflection limit: f ≤ *l*/200 of the span and a minimum safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

steel - steel (thickness 0,4+0,4)

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,4+0,4	Panel weight kg/m² 0,6+0,6	p = daN/m²	p p p l l l	60	80	100	120	150	p l	60	80	100	120	150
25	0,66	0,77	7,70	11,08	*l* =		2,05	1,90	1,75	1,65	1,55		1,75	1,60	1,50	1,40	1,30
30	0,56	0,65	7,89	11,23	*l* =		2,60	2,45	2,30	2,05	1,85		2,25	2,10	1,90	1,80	1,65
35	0,48	0,56	8,08	11,46	*l* =		3,20	3,00	2,80	2,50	2,20		2,80	2,60	2,40	2,20	2,00
40	0,43	0,50	8,27	11,65	*l* =		3,40	3,20	3,00	2,80	2,50		3,10	2,90	2,70	2,50	2,20
50	0,35	0,41	8,65	12,03	*l* =		3,90	3,65	3,40	3,10	2,75		3,45	3,20	2,95	2,75	2,40
60	0,29	0,34	9,03	12,41	*l* =		4,40	4,10	3,75	3,45	3,00		3,80	3,55	3,30	3,00	2,60
80	0,22	0,26	9,79	13,17	*l* =		5,20	4,65	4,25	3,90	3,35		4,50	4,00	3,70	3,35	2,90
100	0,18	0,21	10,59	13,99	*l* =		5,80	5,15	4,75	4,30	3,70		4,90	4,45	4,10	3,75	3,20
120	0,15	0,18	11,35	14,75	*l* =		6,40	5,70	5,25	4,75	4,05		5,50	4,90	4,50	4,10	3,50

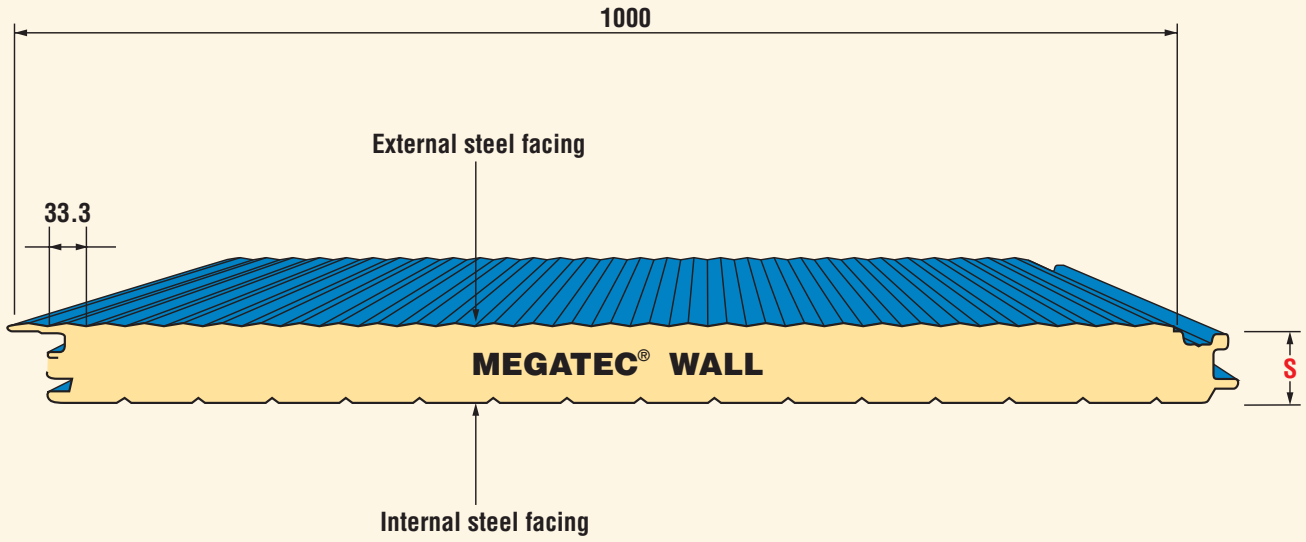
aluminium - aluminium (thickness 0,6+0,6)

S mm	K Kcal/m².h.°C	K Watt/m².°C	Panel weight kg/m² 0,6 + 0,6	p = daN/m²	p p p l l l	60	80	100	120	150	p l	60	80	100	120	150
40	0,43	0,50	4,99	*l* =		2,75	2,39	2,11	1,90	1,66		2,34	2,06	1,84	1,67	1,49
50	0,35	0,41	5,37	*l* =		3,26	2,84	2,52	2,27	1,99		2,76	2,44	2,19	1,99	1,77
60	0,29	0,34	5,75	*l* =		3,74	3,26	2,90	2,62	2,32		3,16	2,79	2,51	2,29	2,04
80	0,22	0,26	6,51	*l* =		4,34	3,78	3,36	3,04	2,69		3,79	3,35	3,01	2,75	2,45

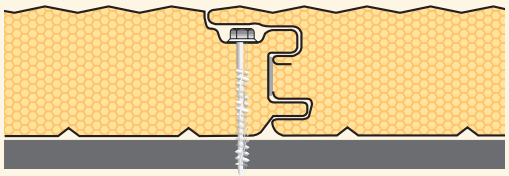
MEGATEC® WALL

Concealed-fix polyurethane insulated wall panel system

Self-supporting metal panel system, insulated with rigid polyurethane foam, with a concealed-fixing method for high quality industrial and commercial buildings, where good aesthetics are paramount.
The special double labyrinth joint of this panel, provides mechanical resistance and insulation superior to any other wall panel product of this kind, the panel external micro-V increases the aesthetic appeal of this panel, which can be orientated both vertically and horizontally as required.



Joint detail



Panels can be assembled either horizontally or vertically

TABLE OF SAFE SPANS

Minimum values with steel sheets, thickness 0.7 + 0.5 mm. Spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m²), have been obtained from experimental data and calculated to provide a deflection limit: f ≤ *l*/200 of the span and a minimum safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

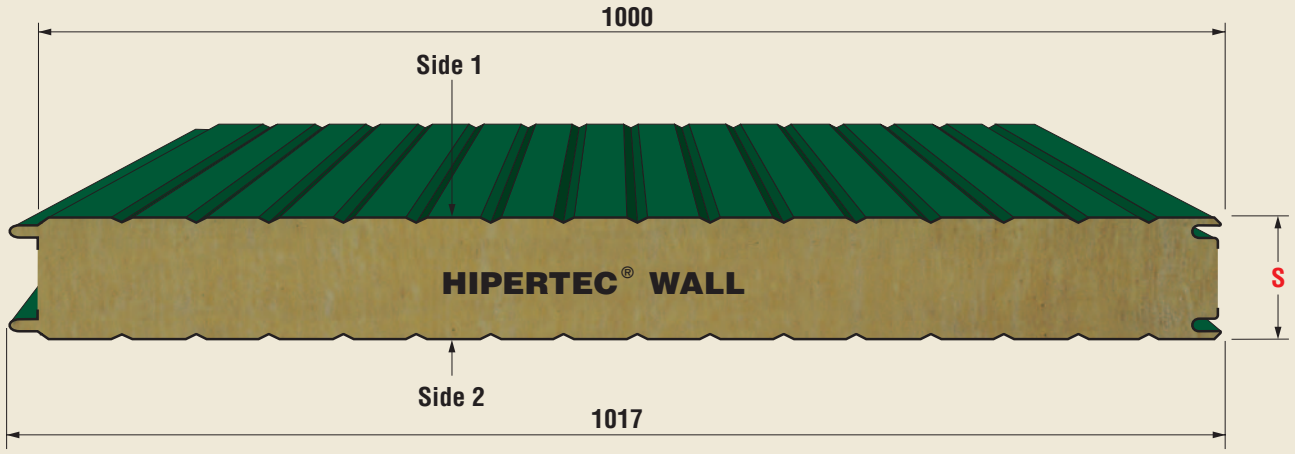
steel - steel

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m²		p	p	p		p				
					△ *l* △ *l* △ *l* △				△ *l* △				
			0,7+0,5	p = daN/m²	60	80	100	120	150	60	80	100	120	150
70	0,25	0,29	12,42	*l* =	4,80	4,40	4,00	3,70	3,20	4,20	3,80	3,60	3,20	2,75
80	0,22	0,26	12,82	*l* =	5,20	4,65	4,25	3,90	3,35	4,50	4,00	3,70	3,35	2,90
100	0,18	0,21	13,63	*l* =	5,80	5,15	4,75	4,30	3,70	4,90	4,45	4,10	3,75	3,20

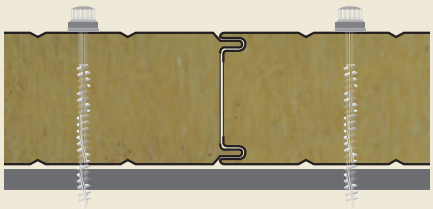
HIPERTEC® WALL

Profiled wall system, insulated with fire resistant Rockwool insulation.

Self-supporting metal panel system insulated with Rockwool for wall and partition applications, which require a high degree of fire resistance and acoustic insulation.
The **HIPERTEC® WALL** panel, manufactured in accordance with a system patented by Metecno, consists of two micro-ribbed steel sheets, with an insulation core of orientated fibre high density Rockwool, arranged perpendicularly to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversely compacted, in such a way as to completely fill the space between the metal facings.



Joint detail



IMPORTANT: In the assembly stage, pay attention to the right position of the painted side: the side marked with "EXTERNAL" must face the outside.

TABLE OF SAFE SPANS

Minimum guaranteed values with 0.6 + 0.6 mm thick steel sheets. *l* spans (in meters) relevant to a uniformly distributed overload **p** (daN/m²) were taken from structural tests that were carried out at ICITE laboratories for 50, 80, 100, and 120 mm thick panels, and at our laboratories for 150 mm thick panels. Spans were calculated in such a way as to guarantee simultaneously:
- max. deflection: f = *l*/200;
- working stress: 1/25 of the breaking moment and 1/2.5 of the breaking cut.

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,6	p = daN/m²	40	60	80	100	120	150	40	60	80	100	120	150
					p	p	p	p	p	p	p	p	p	p	p	p
					△ *l* △	*l* △	*l* △	*l* △	*l* △	*l* △	△ *l* △	*l* △	*l* △	*l* △	*l* △	*l* △
50	0,65	0,75	16,05	*l* =		3,75	2,84	2,31	1,94	1,57	4,75	3,97	3,33	2,67	2,24	1,81
80	0,42	0,49	19,05	*l* =			4,50	3,65	3,08	2,48	6,17	5,05	4,38	3,91	3,54	2,88
100	0,34	0,40	21,05	*l* =				4,55	3,82	3,09	6,92	5,65	4,89	4,38	3,99	3,56
120	0,29	0,34	23,05	*l* =					4,58	3,71	7,60	6,17	5,34	4,80	4,38	3,92
150	0,23	0,27	26,05	*l* =					4,66	3,77	8,44	6,89	5,97	5,34	4,87	4,34

RESISTANCE TO FIRE

The fire-resistance of a product is measured by means of a furnace brought up to a temperature of more than 1000°C in accordance with a given standardised curve. The test measures the product's capacity to conserve through time certain significant parameters, such as:

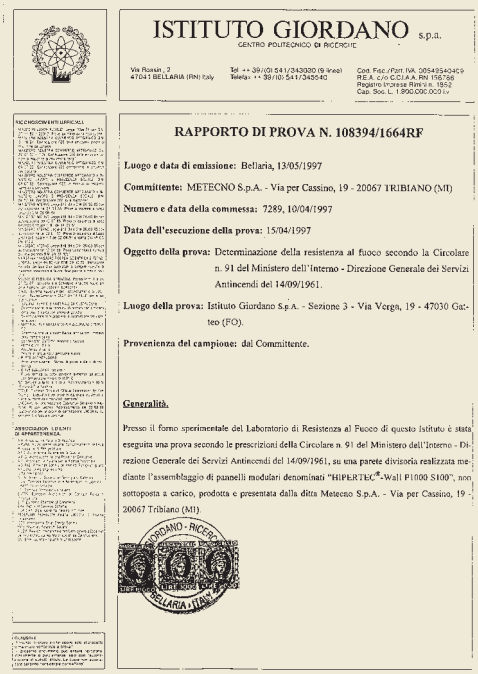
MECHANICAL STRENGHT (R)
IMPERMEABILITY TO GAS (E)
THERMAL INSULATION (I)

The **HIPERTEC® WALL** panel was tested at the Istituto Giordano S.p.A. on an unloaded structure in compliance with circular no. 91 of 14/9/61 and the following results were obtained:

HIPERTEC® WALL thickness 100 REI 120 certificate no. 108394 / 1664 RF
HIPERTEC® WALL thickness 80 REI 60 certificate no. 108395 / 1665 RF
HIPERTEC® WALL thickness 50 REI 30 certificate no. 108396 / 1666 RF

Tests have been also made at foreign Institutes with the following results:

HIPERTEC® WALL thickness 120 F–120' Germany, certificate M.P.A. 3713/4891
HIPERTEC® WALL thickness 100 F–90' Germany, certificate M.P.A. 3713/4891
HIPERTEC® WALL thickness 100 F–90' Austria, certificate IBS 3811/98
HIPERTEC® WALL thickness 100 120' Holland, certificate T.N.O. 2000-CVB-R01872
HIPERTEC® WALL thickness 80 30' France, certificate C.S.T.B. RS 99 – 069
HIPERTEC® WALL thickness 80 F–60' Germany, certificate M.P.A. 3713/4891



ISTITUTO GIORDANO s.p.a.
CENTRO POLITECNICO DI RICERCHE

RAPPORTO DI PROVA N. 108394/1664RF

Luogo e data di emissione: Bellaria, 13/05/1997

Committente: METECNO S.p.A. - Via per Cassino, 19 - 20067 TRIBIANO (MI)

Numero e data della commessa: 7289, 10/04/1997

Data dell'esecuzione della prova: 15/04/1997

Oggetto della prova: Determinazione della resistenza al fuoco secondo la Circolare n. 91 del Ministero dell'Interno - Direzione Generale dei Servizi Antincendi del 14/09/1961.

Luogo della prova: Istituto Giordano S.p.A. - Sezione 3 - Via Vergo, 19 - 47030 Gatteo (FO).

Provenienza del campione: dal Committente.

Generalità.

Presso il forno sperimentale del Laboratorio di Resistenza al Fuoco di questo Istituto è stata eseguita una prova secondo le prescrizioni della Circolare n. 91 del Ministero dell'Interno - Direzione Generale dei Servizi Antincendi del 14/09/1961, su una parete divisoria realizzata mediante l'assemblaggio di pannelli modulari denominati "HIPERTEC®-Wall P1000 S100", non sottoposta a carico, prodotta e presentata dalla ditta Metecno S.p.A. - Via per Cassino, 19 - 20067 Tribiano (MI).

REACTION TO FIRE

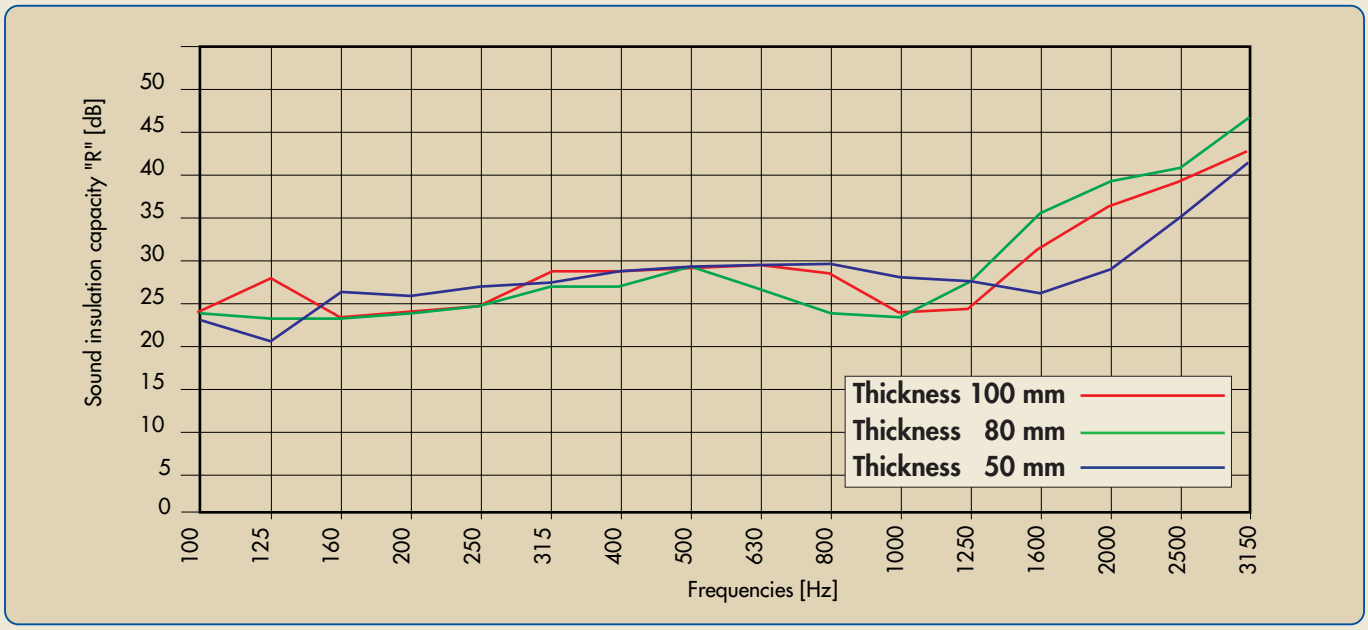
Reaction to fire is the degree in which a material resists combustion. With regard to this, materials are assigned a class (0, 1, 2, 3, 4, and 5): the higher the class, the higher the degree of combustion.
HIPERTEC®WALL panels, thicknesses 50 - 80 -100 mm, tested at the Istituto Giordano S.p.A., pursuant to the Ministerial Decree of 26/6/84, were **classified 0/1 for reaction to fire in the wall position**.
Since the panel consists of two steel sheets with a layer of rockwool inbetween, the class 0 refers to the external parameter and the class 1 to the insulation.
Tests have been also made at foreign Institutes with the following results:
Germany: Panel class B1, insulation class A1 - France: class M0.

MAJOR TECHNICAL PRODUCT CERTIFICATES

- Agrément tecnico ICITE 510/98
- Zulassung dibt Z-10.4-237
- Avis technique CSTB 2/01-866

SOUND INSULATION

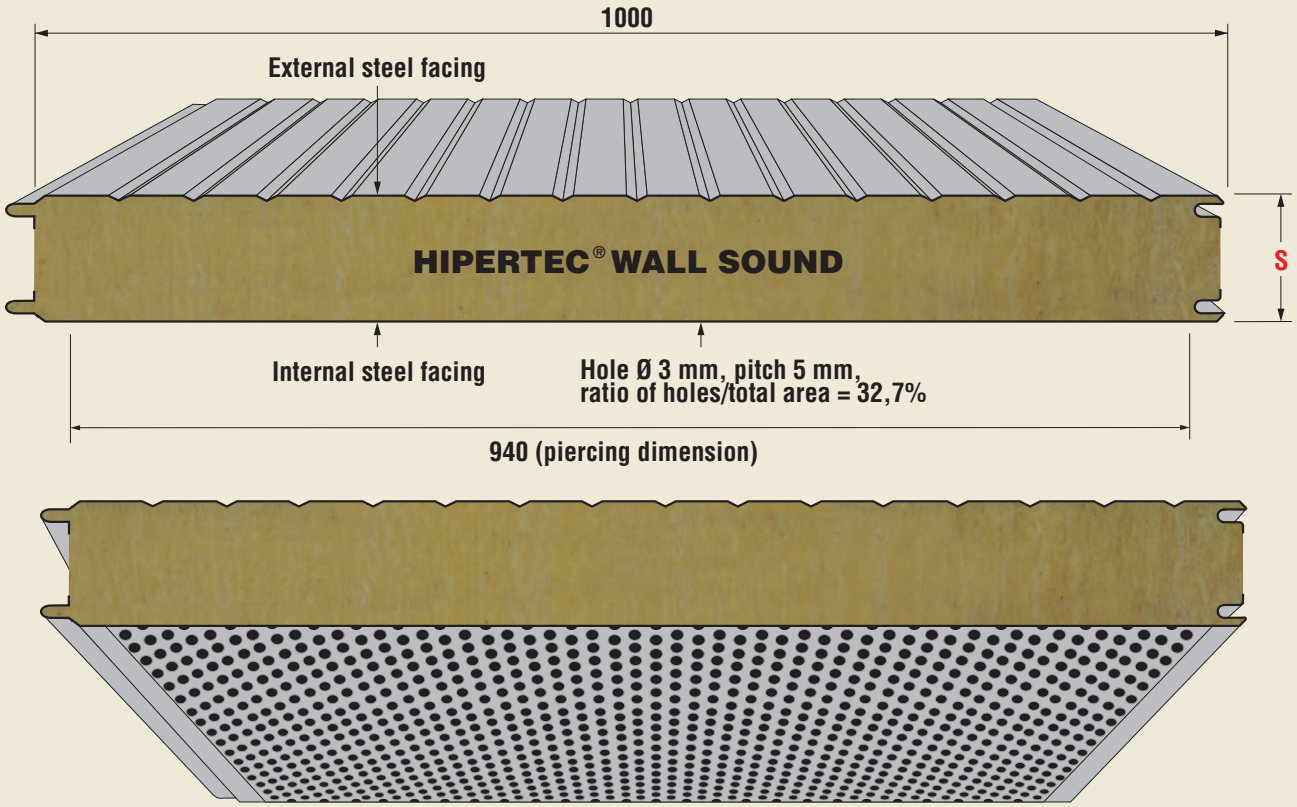
The sound insulation of a material (for example, a panel) is given by its ability to reduce the passage of energy between two places.
The **HIPERTEC®WALL** panel has been tested to UNI 140/3/78 and ISO 717/82 standards and, for the thicknesses 50-80-100 mm, obtained valuation indices of **Rw**= 30-30.5 dB.



HIPERTEC® WALL SOUND

Fire-resistant wall system, insulated with sound absorbent Rockwool.

Self-supporting panel system, insulated with Rockwool for wall and partition applications, requiring a high degree of resistance to fire, combined with sound absorption.
The **HIPERTEC® WALL SOUND** panel, is manufactured in accordance with a system patented by Metecno, and consists of a micro-ribbed external steel facing, an internal flat, but perforated liner, with an insulation core of high density orientated Rockwool, arranged perpendicular to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversally compacted, in such a way as to completely fill the void between the two metal facings.



Joint detail

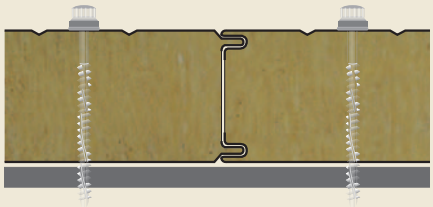


TABLE OF SPANS

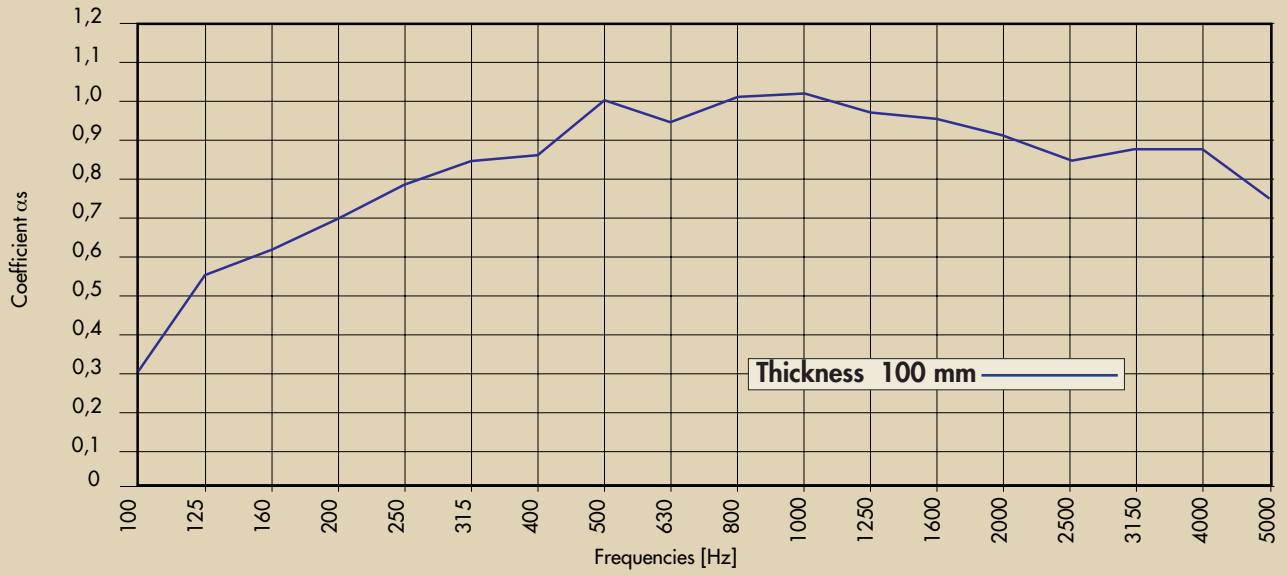
Minimum values with steel sheets, thickness 0.6 + 0.6 mm. The spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m²), have been obtained from tests carried out in Metecno laboratories and calculated to provide a deflection limit: f ≤ *l*/200 of the span and a minimum safety co-efficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

S mm	K Kcal m² h °C	K Watt m² °C	Panel weight kg/m² 0,6 + 0,6	p = daN/m²	p p p l l l	60	80	100	120	150	p l	60	80	100	120	150
50	0,65	0,75	14,37	*l* =		2,34	2,19	2,04	1,86	1,65		2,07	1,92	1,77	1,65	1,44
80	0,42	0,49	17,37	*l* =		3,12	2,79	2,55	2,34	2,01		2,70	2,40	2,22	2,01	1,74
100	0,34	0,40	19,37	*l* =		3,48	3,09	2,85	2,58	2,22		2,94	2,67	2,46	2,25	1,92

SOUND ABSORPTION

The **HIPERTEC® WALL SOUND** panel is particularly suitable for **acoustic control**, providing excellent sound absorption qualities over a wide range frequency spectrum. Tests in echo chambers conducted to ISO 354/85 standards in 50 - 80 - 100 mm thick panels produced a Δ **La** sound absorption index of between **10-11 dB (A).**

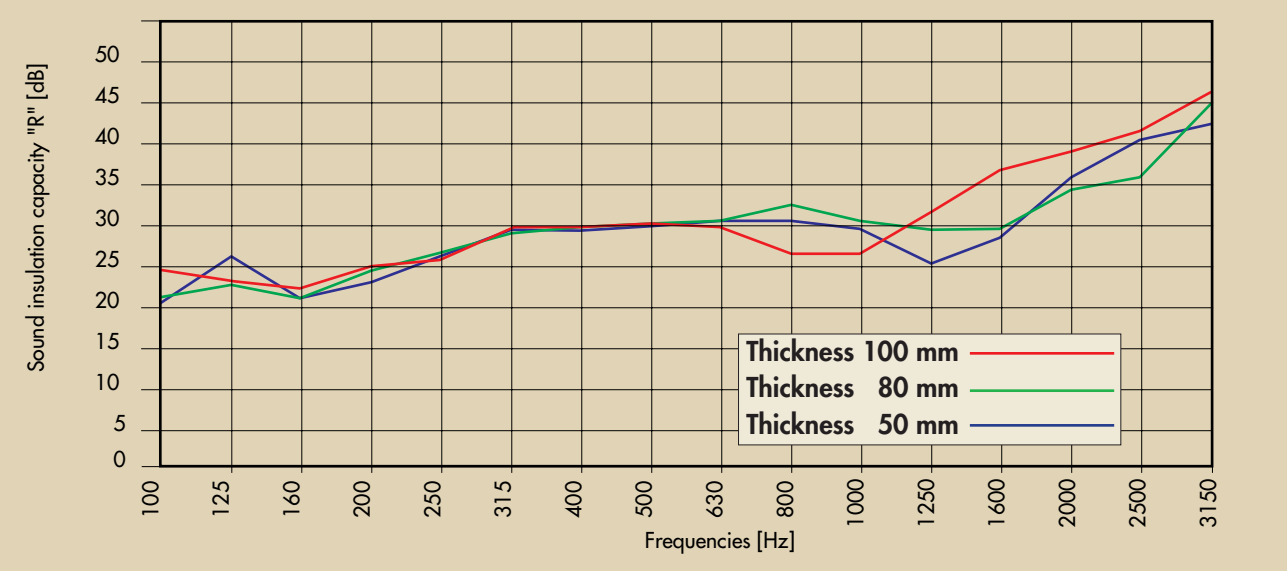
The graph below shows the curve of the absorption coefficients at the various frequencies for the 100 mm thick panel.



SOUND INSULATION

The **HIPERTEC® WALL SOUND** panels have been tested to ISO 717/82 standards and obtained indices of **Rw** = 31.5-33 dB for the 50, 80 and 100 mm thick panels.

The curves of the absorption coefficients of the 100, 80 and 50 mm thick **HIPERTEC® WALL SOUND** panels at the various frequencies are shown in the graph below.



RESISTANCE TO FIRE

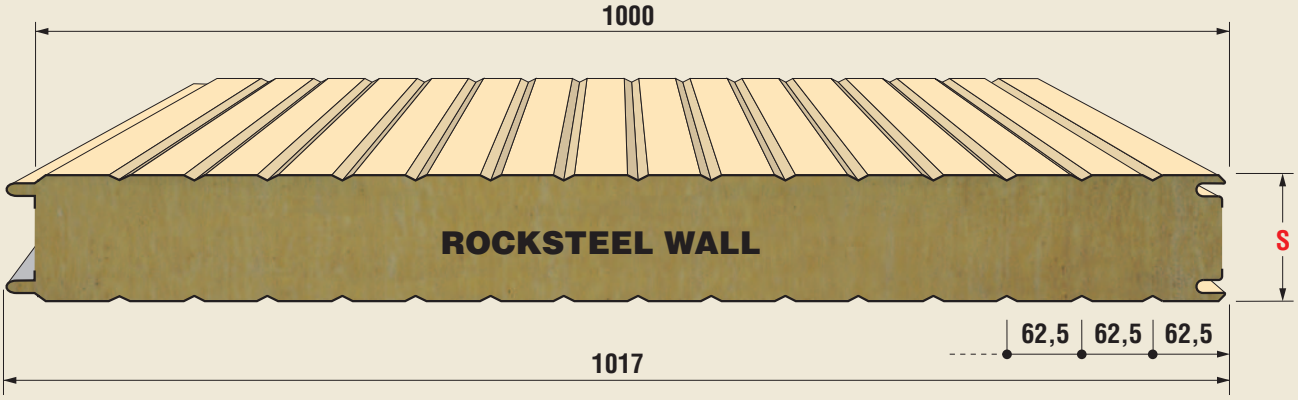
HIPERTEC® WALL SOUND panels have been tested at the Istituto Giordano S.p.A. on unloaded structures in accordance with Circular no. 91 of 14/9/61 and obtained the following results:

HIPERTEC® WALL thickness 100 REI 60 certificate no. 111480/1720 RF
HIPERTEC® WALL thickness 80 REI 45 certificate no. 111477/1717 RF

ROCKSTEEL WALL

Wall panel system, insulated with a Rockwool core, with fire reaction certification.

Self-supporting metal panel system insulated with Rockwool for wall and partition applications.
The **ROCKSTEEL® WALL** panel, manufactured in accordance with a system patented by Metecno, consists of two micro-ribbed steel sheets, with an insulation core of orientated fibre high density Rockwool, arranged perpendicularly to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversely compacted, in such a way as to completely fill the space between the metal facings.



EXTERNAL AND INTERNAL SHEET

The following materials can be used:

– Prepainted galvanised steel S 280 GD
– Stainless steel AISI 304 - or **AISI 430**
Nominal thickness: 0,5 - 0,6 - 0,8 mm
Paint: METCOLOR system

INSULATION

Rockwool, density: 75 kg./m^3
Thickness: 50 - 80 - 100 - 120 mm.

IMPORTANT: In the assembly stage, pay attention to the right position of the painted side: the side marked with "EXTERNAL" must face the outside.

REACTION TO FIRE

Reaction to fire is the degree in which a material resists combustion. With regard to this, materials are assigned a class (0 through 5): the higher the class, the higher the degree of combustion.
The **ROCKSTEEL® WALL** panels, thicknesses 50 - 80 - 100 - 120 mm, tested at the Istituto Giordano S.p.A., pursuant to the Ministerial Decree of 26/6/84, **were classified 0/1 for reaction to fire in the wall position**.
Since the panel consists of two steel sheets with a layer of rock wool in between, the class 0 refers to the external surface and the class 1 to the insulation.

TABLE OF SAFE SPANS

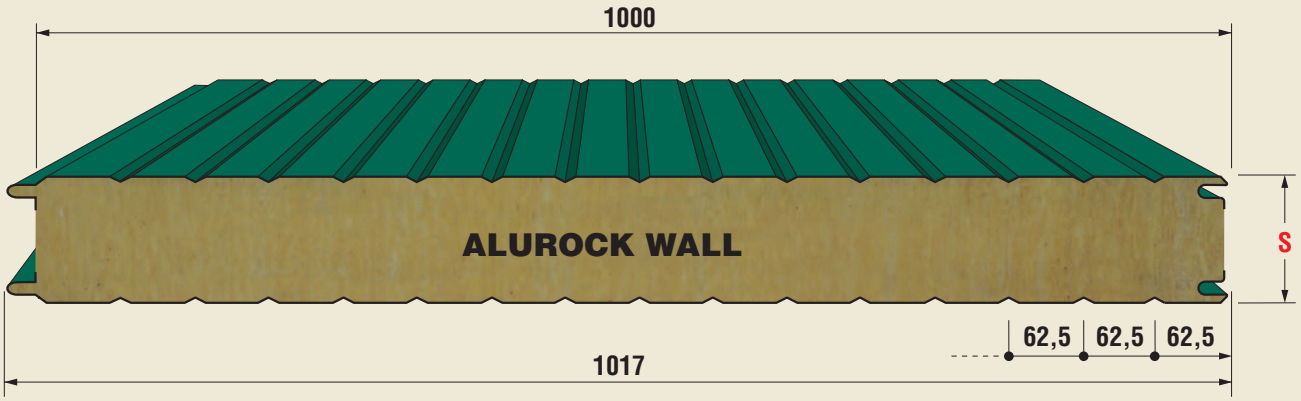
Minimum values with steel sheets, thickness 0.6 + 0.6 mm. The spans *l* in metres, as a function of a uniformly distributed load **p** (daN/m^2), have been obtained from tests carried out in Metecno laboratories and calculated to provide a deflection limit: f ≤ *l*/200 of the span and a minimum safety co-efficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,5 + 0,5	p = daN/m²	40	60	80	100	120	150	40	60	80	100	120	150
					p p p						p					
					△ l △ l △ l △						△ l △					
50	0,65	0,75	12,9	*l* =	4,38	3,58	2,73	2,18	1,82	1,45	3,92	3,20	2,46	1,96	1,64	1,31
80	0,42	0,49	15,1	*l* =	5,55	4,53	3,92	3,51	2,93	2,34	4,96	4,05	3,51	3,14	2,64	2,11
100	0,34	0,40	16,6	*l* =	6,21	5,07	4,39	3,93	3,58	2,94	5,55	4,53	3,93	3,51	3,21	2,64
120	0,29	0,34	18,1	*l* =	6,80	5,55	4,81	4,30	3,93	3,51	6,08	4,97	4,30	3,85	3,51	3,14

ALUROCK WALL

Aluminium wall system, insulated with Rockwool

Self supporting aluminium panel insulated with Rockwool for walls and internal partitions.
The **ALUROCK® WALL** panel, manufactured according to METECNO'S patented production system, consists of two micro-ribbed steel sheets with a sandwich layer of orientated fibre Rockwool, arranged perpendicularly to the plane of the panel and positioned in strips, laid longitudinally with off-set joints and transversally compacted completely filling the space between the two metal sheets.
Maximum panel length: L = 15,500mm
The "sound" version with a perforated internal metal sheet is also available.



EXTERNAL AND INTERNAL SHEET

Prepainted or unpainted aluminium alloy 3003 - 3103

Nominal thickness: 0.8 mm
Paint: METCOLOR system
Surface finishing: Flat, micro-ribbed

INSULATION

Rockwool density: 75 kg./m³
Thickness: 50 - 80 - 100 - 120 mm.

IMPORTANT: In the assembly stage, pay attention to the right position fo the painted side: the side marked "EXTERNAL" must face the outside.

REACTION TO FIRE

ALUROCK WALL panels, tested at the Istituto Giordano according to the Ministerial Decree dated June 26, 1984, were certified as complying with Class 0/1 specifications in a wall position.

TABLE OF SPANS

Minimum values with steel sheets, thickness 0.8 + 0.8 mm. The spans *l* in metres, as a function of a uniformly distributed overload p /daN/m², have been obtained from tests carried out in Metecno laboratories, calculated to provide a deflection F ≤ *l*/200 and a minimum safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations.

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,8 + 0,8	p = daN/m²	p △ l △ l △ l △ 40	60	80	100	120	150	p △ l △ 40	60	80	100	120	150
50	0,65	0,75	9,0	*l* =	4,38	3,59	2,69	2,15	1,79	1,44	3,59	3,01	2,42	1,94	1,62	1,29
80	0,42	0,49	11,3	*l* =	6,02	4,93	4,24	3,49	2,91	2,32	4,93	4,14	3,62	3,14	2,62	2,09
100	0,34	0,40	12,8	*l* =	6,77	5,53	4,79	4,28	3,65	2,92	5,73	4,81	4,21	3,78	3,28	2,63
120	0,29	0,33	14,3	*l* =	7,42	6,06	5,25	4,69	4,29	3,51	6,48	5,42	4,69	4,20	3,83	3,16

FRIMET® TP-SM

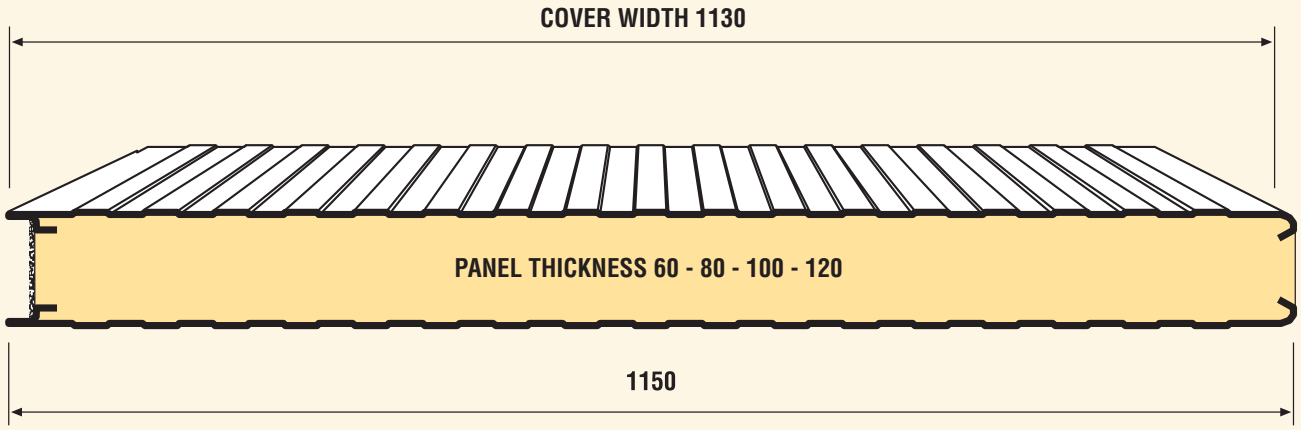
Micro-ribbed panel system, with dry joint

ABOVE-ZERO TEMPERATURE - MICRO-RIBBED

Frimet TP-SM is a range of self-supporting metal panels with state-of-the-art polyurethane with a micro-ribbed male-female joint for the construction of positive temperature cold storage warehouses and rooms.
The Frimet TP-SM range has been designed to provide a complete solution to the requirements of the cold storage industry, providing the following benefits:

HIGH THERMAL RESISTANCE, MECHANICAL RESISTANCE, DIMENSIONAL STABILITY, NON-WATER ABSORBENT, LIGHTWEIGHT, AESTHETICALLY PLEASING APPEARANCE, DURABILITY, EASE AND SPEED OF INSTALLATION.

The panels of the FRIMET BT-LM range are available with dry joints, cover width 1130mm, in 60 - 80 - 100 - 120mm thicknesses.



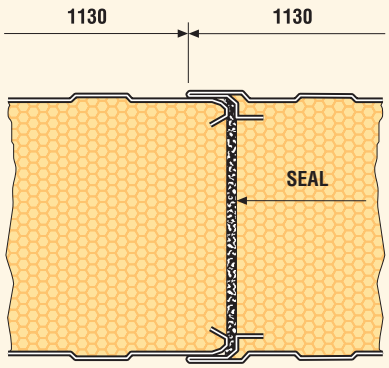


TABLE OF SAFE SPANS

Maximum spans with f ≤ *l*/200
Loads: panel weight + 20 daN/m² hollow
panel weight + 30 daN/m² hollow

steel - steel

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,5+0,5	Panel weight kg/m² 0,6+0,6	p = daN/m²	p.w. + 20 0,5+0,5	p.w. + 20 0,6+0,6	p.w. + 30 0,5+0,5	p.w. + 30 0,6+0,6
60	0,29	0,34	10,77	12,41	*l* =	4,80	5,00	4,40	4,60
80	0,22	0,26	11,53	13,17	*l* =	5,80	6,10	5,30	5,55
100	0,18	0,21	12,29	13,99	*l* =	6,80	7,20	6,20	6,55
120	0,15	0,18	13,05	14,75	*l* =	7,80	8,20	7,10	7,50

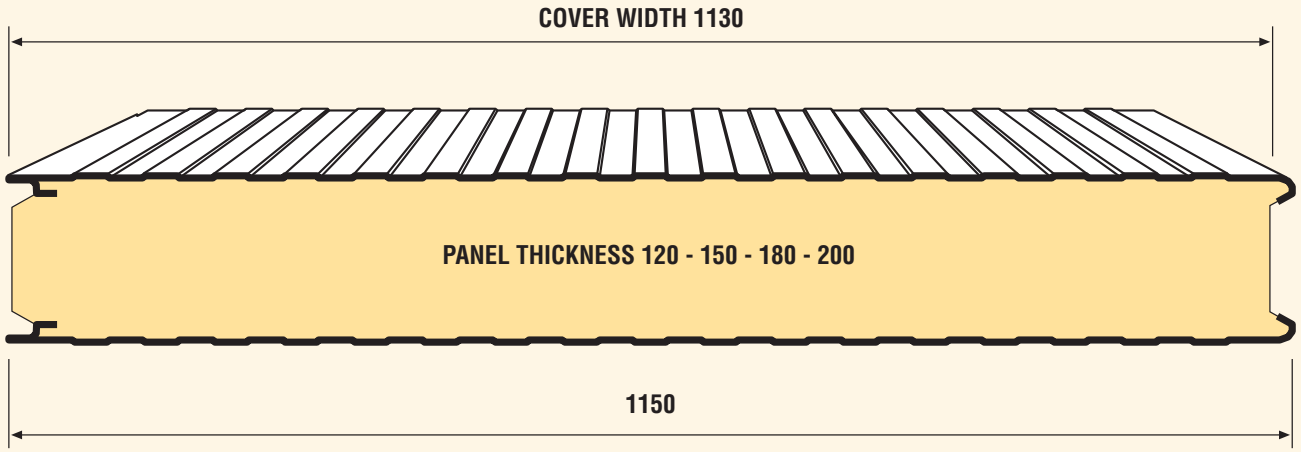
- Food and vegetable storerooms
- Slaughterhouses
- Food warehouses
- Dairy plants
- General food and storage facilities
- Prefabricated refrigerated warehouses

LOW TEMPERATURE - MICRO RIBBED

Frimet BT-LM is a range of self-supporting metal panels with state-of-the-art polyurethane with a labyrinth joint for the construction of positive temperature cold storage warehouses and rooms.
The Frimet BT-LM range has been designed to provide a complete solution to the requirements of the cold storage industry, providing the following benefits:

HIGH THERMAL RESISTANCE, MECHANICAL RESISTANCE, DIMENSIONAL STABILITY, NON-WATER ABSORBENT, LIGHTWEIGHT, AESTHETICALLY PLEASING APPEARANCE, DURABILITY, EASE AND SPEED OF INSTALLATION.

The panels of the FRIMET BT-LM range are available with self expanding seal joints, cover width 1130mm, in 120 - 150 - 180 - 200mm thicknesses.



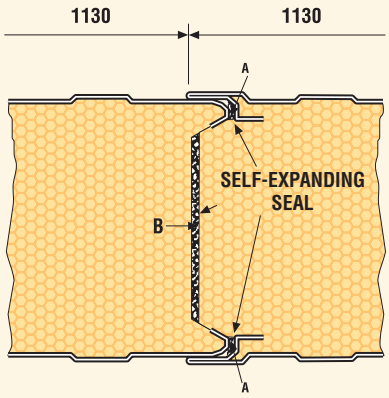


TABLE OF SAFE SPANS

Maximum spans with f ≤ *l*/200
Loads: panel weight + 20 daN/m² hollow
panel weight + 30 daN/m² hollow

steel - steel

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,5+0,5	Panel weight kg/m² 0,6+0,6	p = daN/m²	p.w. + 20 0,5+0,5	p.w. + 20 0,6+0,6	p.w. + 30 0,5+0,5	p.w. + 30 0,6+0,6
120	0,15	0,18	13,05	14,75	*l* =	7,80	8,20	7,10	7,50
150	0,12	0,14	13,85	15,49	*l* =	9,20	9,60	8,40	8,80
180	0,10	0,12	15,00	16,63	*l* =	10,40	11,00	9,50	10,00
200	0,09	0,11	15,76	17,39	*l* =	11,20	11,90	10,20	10,80

- Food and vegetable storerooms
- Slaughterhouses
- Food warehouses
- Dairy plants
- General food and storage facilities
- Prefabricated refrigerated warehouses

FRIMET® BT-IM

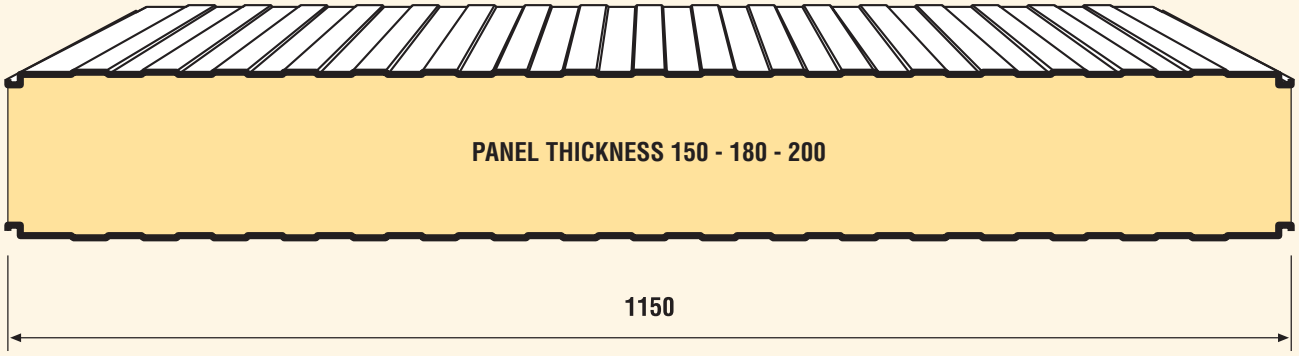
Micro-ribbed panel system,
with inserted cover cap

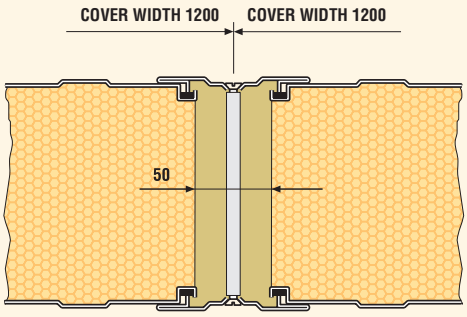
LOW TEMPERATURE - MICRO RIBBED INJECTED

Frimet BT-IM is a range of self-supporting metal panels with state-of-the-art polyurethane with an inserted cover cap joint for the construction of positive temperature cold storage warehouses and rooms.
The Frimet BT-IM range has been designed to provide a complete solution to the requirements of the cold storage industry, providing the following benefits:

HIGH THERMAL RESISTANCE, MECHANICAL RESISTANCE, DIMENSIONAL STABILITY, NON-WATER ABSORBENT, LIGHTWEIGHT, AESTHETICALLY PLEASING APPEARANCE, DURABILITY, EASE AND SPEED OF INSTALLATION.

The panels of the FRIMET BT-LM range are available with inserted joints, cover width 1200 mm, in 150 - 180 - 200 mm thicknesses.





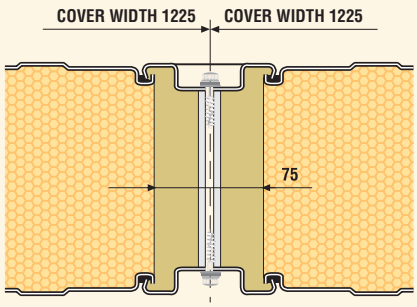


TABLE OF SAFE SPANS

Maximum spans with f ≤ *l*/200
Loads: panel weight + 20 daN/m² hollow
panel weight + 30 daN/m² hollow

steel - steel

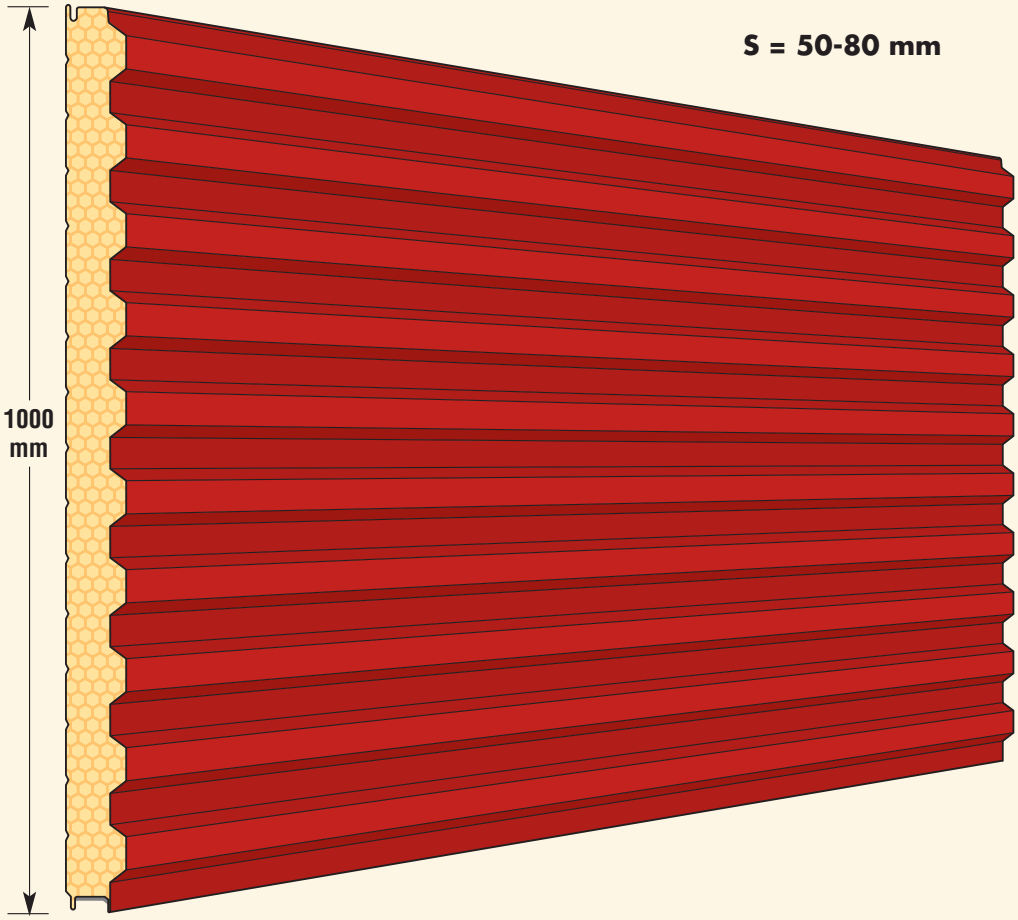
S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,5+0,5	Panel weight kg/m² 0,6+0,6	p = daN/m²	p.w. + 20 0,5+0,5	p.w. + 20 0,6+0,6	p.w. + 30 0,5+0,5	p.w. + 30 0,6+0,6
150	0,12	0,14	13,86	15,49	*l* =	9,00	9,50	8,20	8,60
180	0,10	0,12	15,00	16,63	*l* =	10,10	10,80	9,20	9,80
200	0,09	0,11	15,76	17,39	*l* =	11,00	11,60	9,70	10,60

- Food and vegetable storerooms
- Slaughterhouses
- Food warehouses
- Dairy plants
- General food and storage facilities
- Prefabricated refrigerated warehouses

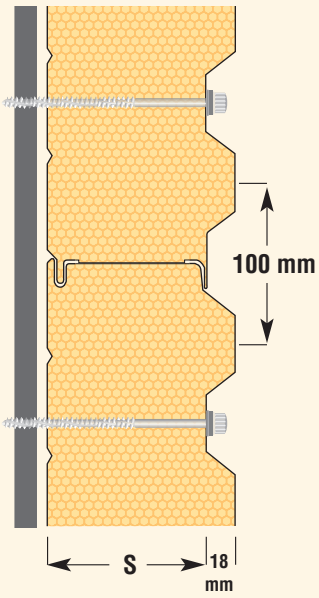
H-WALL® 10 P

Insulated wall system, with polyurethane

Self supporting metal panel, insulated with **polyurethane**, designed for horizontal wall panelling in industrial and commercial buildings. The panel density and, in particular, the deep trapezoidal profile, of the external metal sheet give the wall good strength, while spanning from column to column.
The panel reduces secondary steelwork requirements and gives the building a pleasant and elegant look. The internal side of the panel is flat, giving an aesthetically pleasing effect for a very wide range of applications.



Joint detail Longitudinal



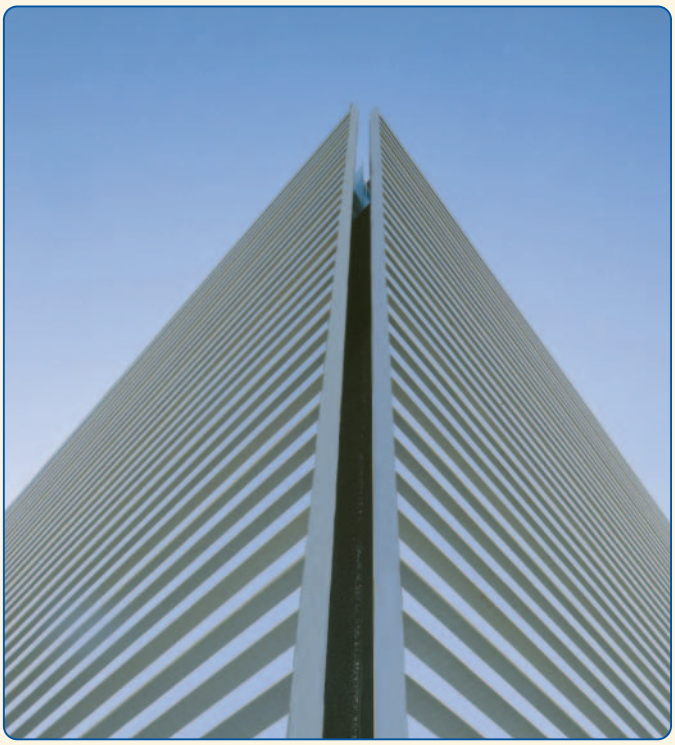


TABLE OF SAFE SPANS

Minimum guaranteed values with 0.6 (external) + 0.5 (internal) mm thick steel sheets. *l* spans (in meters) relevant to a uniformly distributed overload p (daN/m²) were determined, based on experimental data, in such a way as to simultaneously guarantee and comply with the three conditions listed here below:

1) safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations
2) deflection in span f ≤ *l*/200 caused by uniformly distributed loads
3) deflection in span f ≤ 20 mm caused by thermal summer and winter effects

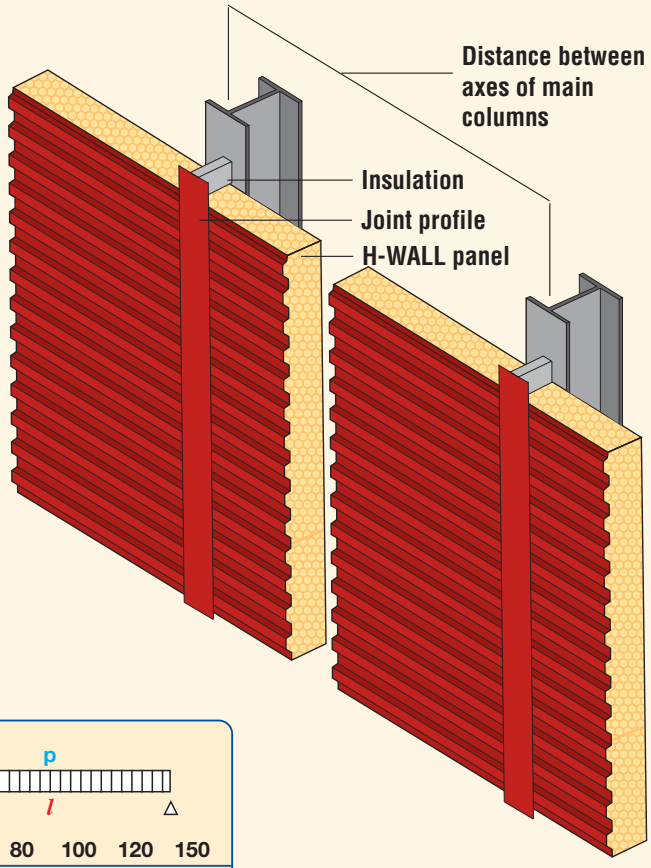
Values in red do not comply with condition no. 3 concerning the maximum deflection caused by thermal effects.

The deflection caused by thermal effects largely depends on the color of the external metal sheets; consequently, the following classification is adopted:

GROUP I (light colors)
RAL 1015 - RAL 7035 - RAL 9002 - RAL 9010 - MT 133

GROUP II (medium colors)
RAL 1032 - RAL 6021 - RAL 7037 - RAL 9006

GROUP III (dark colors)
RAL 3001 - RAL 3009 - RAL 5010 - RAL 5012 - RAL 6005
RAL 6029 - RAL 8014 - MT 134

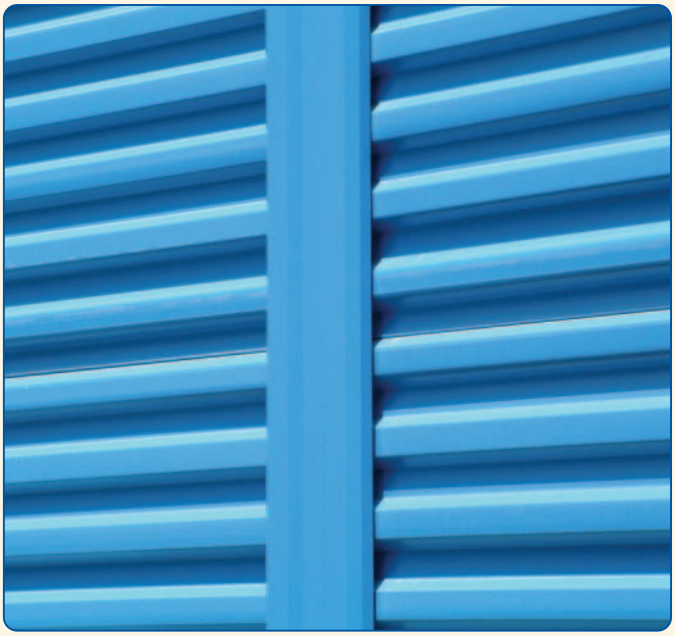


Single Spans

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	40	60	80	100	120	150
50	0,30	0,35	12,23	I	*l* =	5,06	4,24	3,72	3,34	3,04	2,71
				II	*l* =	4,56 5,06	4,24	3,72	3,34	3,04	2,71
				III	*l* =	3,91 5,06	3,91 4,24	3,72	3,34	3,04	2,71
80	0,20	0,23	13,37	I	*l* =	6,36 6,69	5,63	4,94	4,44	4,06	3,61
				II	*l* =	5,51 6,69	5,51 5,63	4,54	4,44	4,06	3,61
				III	*l* =	4,72 6,69	4,72 5,63	4,72 4,49	4,44	4,06	3,61

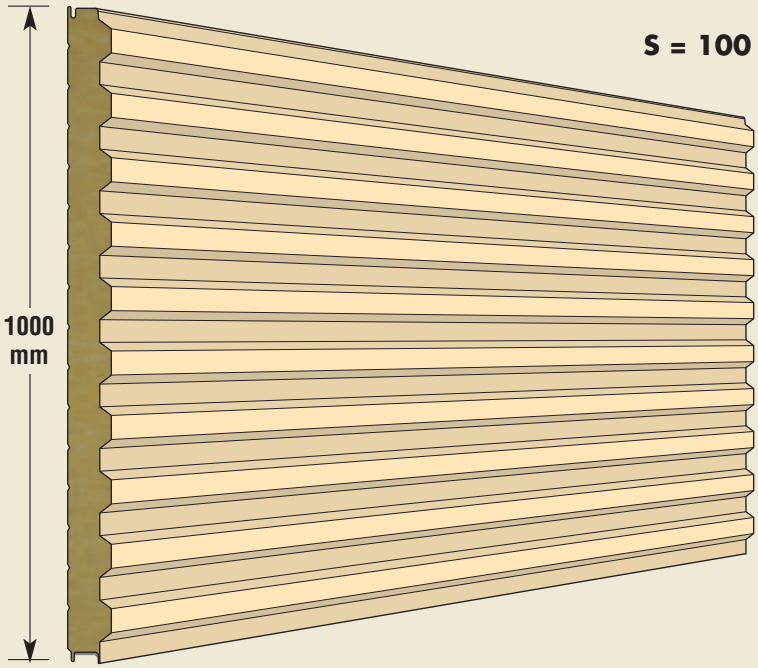
Multiple Spans

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel Weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	40	60	80	100	120	150	40	60	80	100	120	150
50	0,30	0,35	12,23	I, II, III	*l* =	6,50	5,50	4,83	4,36	3,99	3,56	5,15	4,59	4,14	3,79	3,38	
80	0,20	0,23	13,37	I, II, III	*l* =		7,13	6,30	5,71	5,25	4,71			5,15	5,00	4,49	



Self supporting metal panel, insulated with **Rockwool**, designed for horizontal wall panelling in industrial and commercial buildings. The panel density and, in particular, the deep trapezoidal profile, of the external metal sheet give the wall good strength, while spanning from column to column.
The panel reduces secondary steelwork requirements and gives the building a pleasant and elegant look. The internal side of the panel is flat, giving an aesthetically pleasing effect for a very wide range of applications.



Joint detail Longitudinal

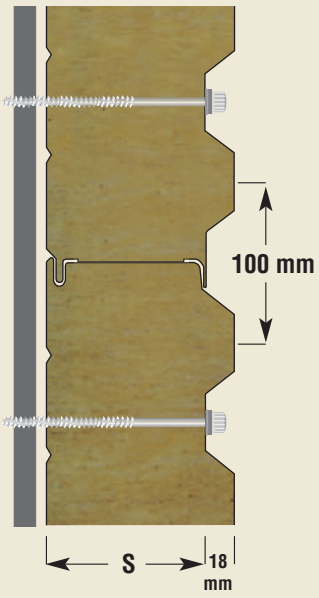


TABLE OF SAFE SPANS

Minimum guaranteed values with 0.6 (external) + 0.5 (internal) mm thick steel sheets. *l* spans (in meters) relevant to a uniformly distributed overload p (daN/m²) were determined, based on experimental data, in such a way as to simultaneously guarantee and comply with the three conditions listed here below:

1) safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations
2) deflection in span f ≤ *l*/200 caused by uniformly distributed loads
3) deflection in span f ≤ 20 mm caused by thermal summer and winter effects

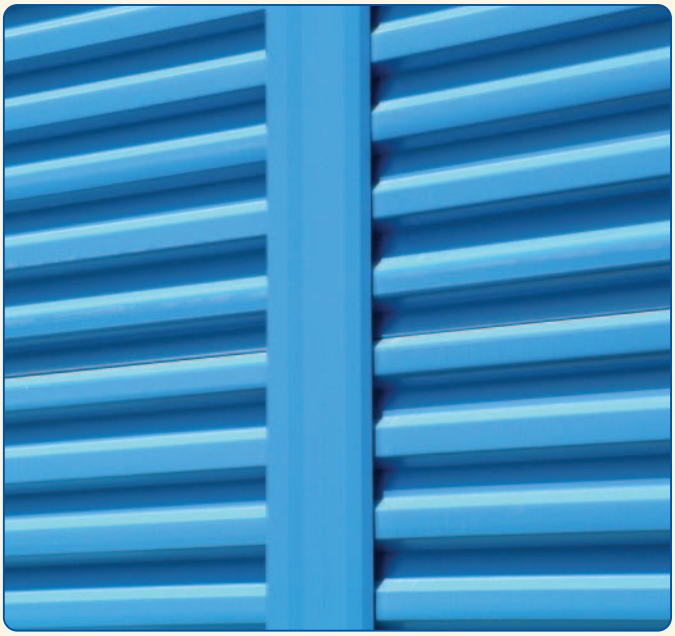
Values in red do not comply with condition no. 3 concerning the maximum deflection caused by thermal effects.

Single Spans

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	40	60	80	100	120	150
100	0,32	0,37	21,59	I	*l* =	7,00 8,02	6,85	6,10	5,45	4,53	3,62
				II	*l* =	6,07 8,02	6,07 6,85	6,07 6,10	5,45	4,53	3,62
				III	*l* =	5,18 8,02	5,18 6,85	5,18 6,10	5,18 5,45	4,53	3,62

Multiple Spans

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	60	80	100	120	150	120	150
100	0,30	0,35	12,23	I, II, III	*l* =	7,75	7,50	6,70	5,57	4,45	5,15	4,24

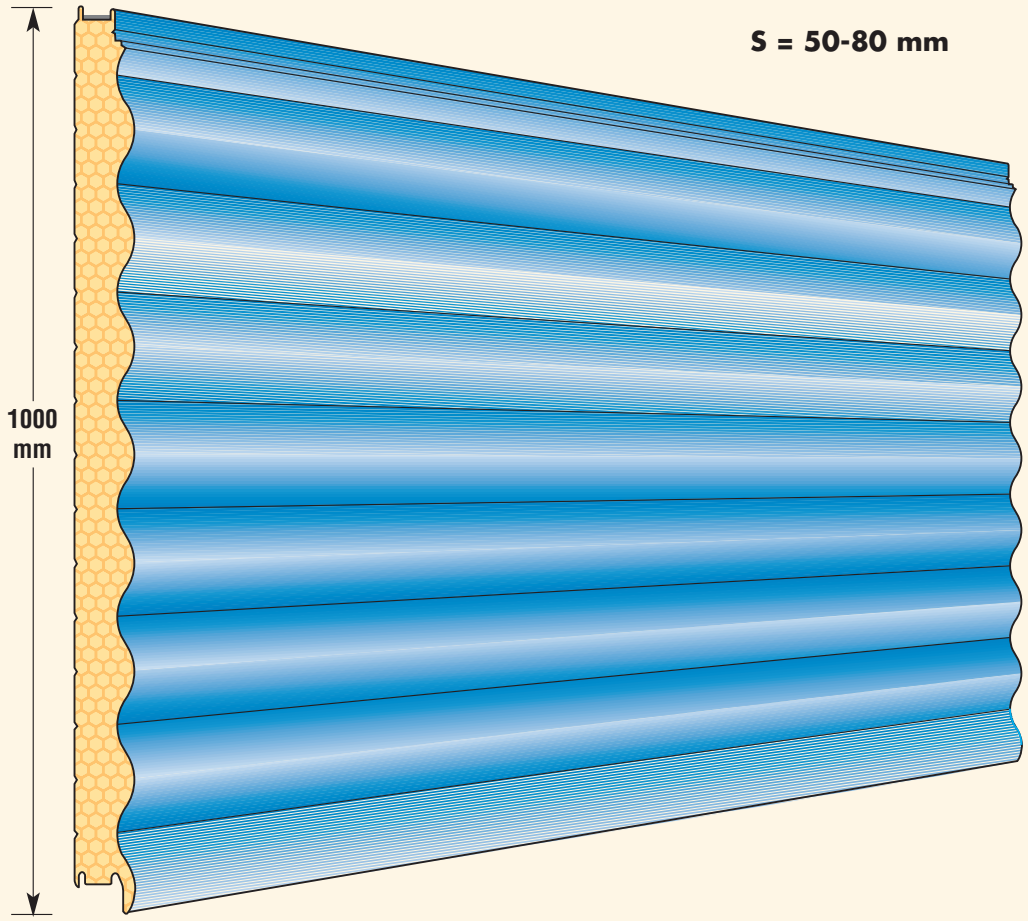





H-WALL® 8 P

Insulated wall system, with polyurethane with concealed fastenings

Self supporting metal panel, insulated with **polyurethane, with concealed fastenings**, designed for horizontal wall panelling in industrial and commercial buildings. The panel density and, in particular, the deep trapezoidal profile, of the external metal sheet give the wall good strength, while spanning from column to column.
Therefore the panel reduces secondary steelwork requirements.
Unlike H-Wall 10, the external sheet of **H-Wall 8** is corrugated and not profiled, and this gives the building a particularly innovative look. The internal side of the panel is flat, giving an aesthetically pleasing effect for a very wide range of applications.



Joint detail Longitudinal

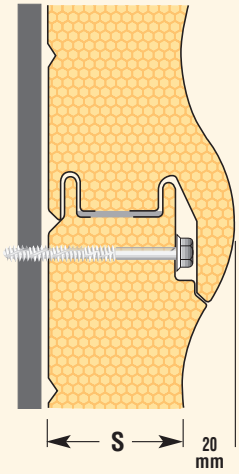


TABLE OF SAFE SPANS

Minimum guaranteed values with 0.6 (external) + 0.5 (internal) mm thick steel sheets. *l* spans (in meters) relevant to a uniformly distributed overload p (daN/m²) were determined, based on experimental data, in such a way as to simultaneously guarantee and comply with the three conditions listed here below:

1) safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations
2) deflection in span f ≤ *l*/200 caused by uniformly distributed loads
3) deflection in span f ≤ 20 mm caused by thermal summer and winter effects

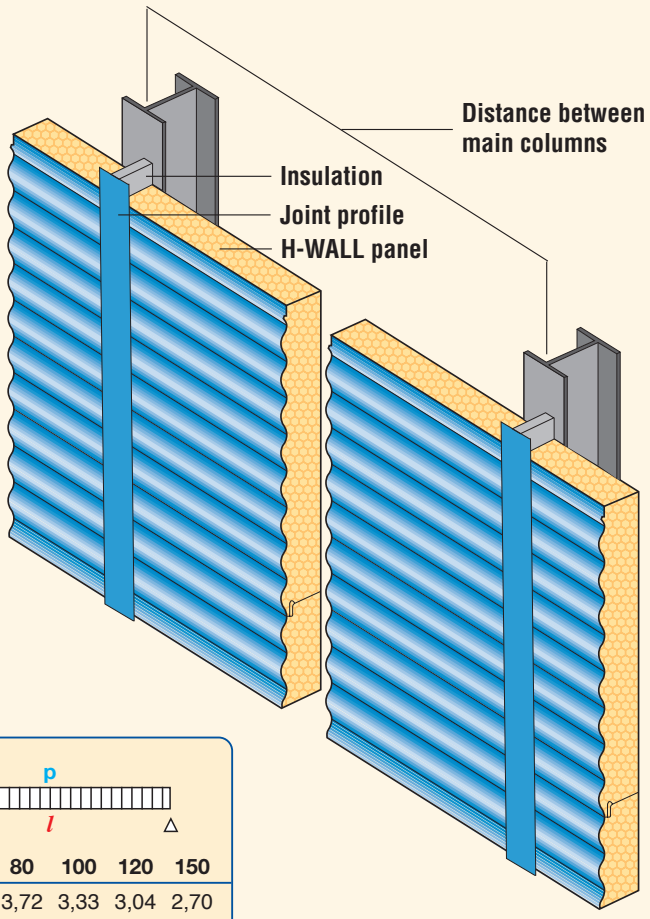
Values in red do not comply with condition no. 3 concerning the maximum deflection caused by thermal effects.

The deflection caused by thermal effects largely depends on the color of the external metal sheets; consequently, the following classification is adopted:

GROUP I (light colors)
RAL 1015 - RAL 7035 - RAL 9002 - RAL 9010 - MT 133

GROUP II (medium colors)
RAL 1032 - RAL 6021 - RAL 7037 - RAL 9006

GROUP III (dark colors)
RAL 3001 - RAL 3009 - RAL 5010 - RAL 5012 - RAL 6005
RAL 6029 - RAL 8014 - MT 134



Single Spans

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	40	60	80	100	120	150
50	0,29	0,34	12,26	I	*l* =	5,06	4,24	3,72	3,33	3,04	2,70
				II	*l* =	4,56 5,06	4,24	3,72	3,33	3,04	2,70
				III	*l* =	3,90 5,06	3,90 4,24	3,72	3,33	3,04	2,70
80	0,20	0,23	13,40	I	*l* =	6,37 6,72	5,65	4,95	4,45	4,06	3,61
				II	*l* =	5,52 6,72	5,52 5,65	4,95	4,45	4,06	3,61
				III	*l* =	4,71 6,72	4,71 5,65	4,71 4,95	4,45	4,06	3,61

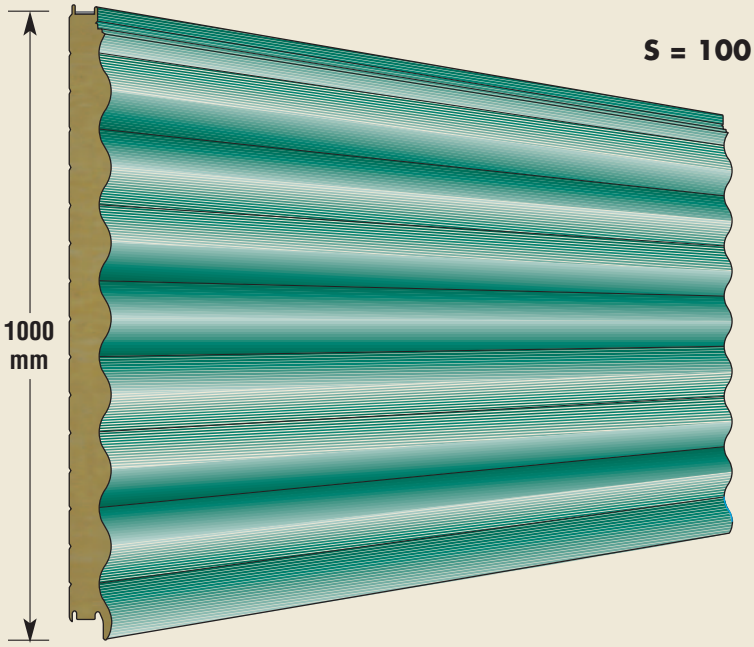
Multiple Spans

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	40	60	80	100	120	150	60	80	100	120	150
50	0,30	0,34	12,26	I, II, III	*l* =	6,51	5,50	4,84	4,36	3,99	3,56	5,15	4,60	4,17	3,81	3,41
80	0,20	0,23	13,40	I, II, III	*l* =	7,75	7,34	6,49	5,88	5,41	4,85				5,15	4,72

H-WALL® 8 M

Insulated wall system, with Rockwool with concealed fastenings

Self supporting metal panel, insulated with **Rockwool, with concealed fastenings**, designed for horizontal wall panelling in industrial and commercial buildings. The panel density and, in particular, the deep trapezoidal profile, of the external metal sheet give the wall good strength, while spanning from column to column.
Therefore the panel reduces secondary steelwork requirements.
Unlike H-Wall 10, the external sheet of **H-Wall 8** is corrugated and not profiled, and this gives the building a particularly innovative look. The internal side of the panel is flat, giving an aesthetically pleasing effect for a very wide range of applications.



Joint detail Longitudinal

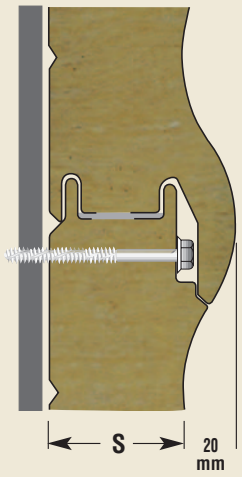


TABLE OF SAFE SPANS

Minimum guaranteed values with 0.6 (external) + 0.5 (internal) mm thick steel sheets. *l* spans (in meters) relevant to a uniformly distributed overload p (daN/m²) were determined, based on experimental data, in such a way as to simultaneously guarantee and comply with the three conditions listed here below:

1) safety coefficient that complies with the UEAtc standards for insulated panels, which have been established and are implemented by primary European Certifying Organizations
2) deflection in span f ≤ *l*/200 caused by uniformly distributed loads
3) deflection in span f ≤ 20 mm caused by thermal summer and winter effects

Values in red do not comply with condition no. 3 concerning the maximum deflection caused by thermal effects.

Single Spans

S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	40	60	80	100	120	150
100	0,31	0,36	21,67	I	*l* =	7,02 8,05	6,88	6,12	5,49	4,57	3,65
				II	*l* =	6,08 8,05	6,08 6,88	6,08 6,12	5,49	4,57	3,65
				III	*l* =	5,19 8,05	5,19 6,88	5,19 6,12	5,19 5,49	4,57	3,65

Multiple Spans

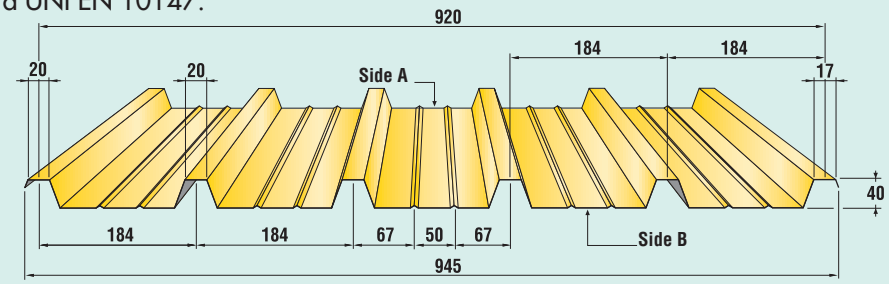
S mm	K Kcal/m²h°C	K Watt/m²°C	Panel weight kg/m² 0,6 + 0,5	Color group of external metal sheets	p = daN/m²	60	80	100	120	150	120	150
100	0,31	0,36	21,67	I, II, III	*l* =	7,75	7,53	6,75	5,62	4,49	5,15	4,27

TABLE OF SAFE SPANS

Uniformly distributed maximum load **p** daN/m² or N/m², with deflection f ≤ *l*/200. The red colour values do not envisage limitations to the deflection. The data in the table refers to calculations made pursuant to CNR 10022/84 and the AIPPEG design guidelines. S 280 GD steel standard UNI EN 10147.

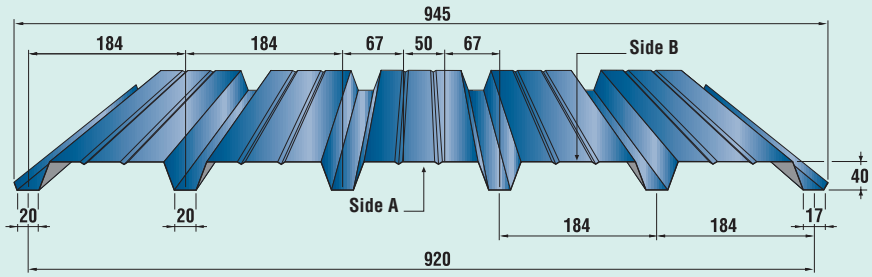
A40-P920-G6

Also available in aluminium alloy



S mm	Weight kg/m²	J cm⁴/m	Wp cm³/m	Wn cm³/m	*l* = m	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
						p p p △ *l* △ *l* △ *l* △												
0,6	6,25	14,05	5,13	4,37		725	460	320	230	175	135	110	90	70 75	55 60	- 50	- -	- -
0,7	7,29	16,56	6,05	5,22		865	550	380	275	210	165	130	105	85 90	65 75	50 60	- 55	- -
0,8	8,33	19,06	6,97	6,12	p = daN/m²	1015	645	445	325	245	190	155	125	95 105	75 85	55 75	- 60	- 55
1,0	10,41	24,08	8,80	7,92		1320	840	580	420	320	250	200	165	125 135	95 115	75 95	55 80	- 70
1,2	12,50	29,10	10,63	9,76		1625	1035	715	520	395	310	245	200	150 165	115 140	90 120	70 100	55 85
						p △ *l* △												
0,6	6,25	14,05	5,13	4,37		680	435	300	205 215	135 165	90 125	65 100	- 80	- 70	- 55	- 50	- -	- -
0,7	7,29	16,56	6,05	5,22		805	510	350	240 255	155 195	105 150	75 120	55 100	- 80	- 65	- 55	- 50	- -
0,8	8,33	19,06	6,97	6,12	p = daN/m²	925	590	405	275 295	180 225	125 175	90 140	65 115	- 95	- 80	- 65	- 55	- 50
1,0	10,41	24,08	8,80	7,92		1170	745	515	350 375	230 285	160 220	110 175	80 145	60 120	- 100	- 85	- 70	- 60
1,2	12,50	29,10	10,63	9,76		1415	900	620	425 450	280 340	190 265	135 215	100 175	70 145	55 120	- 100	- 85	- 75

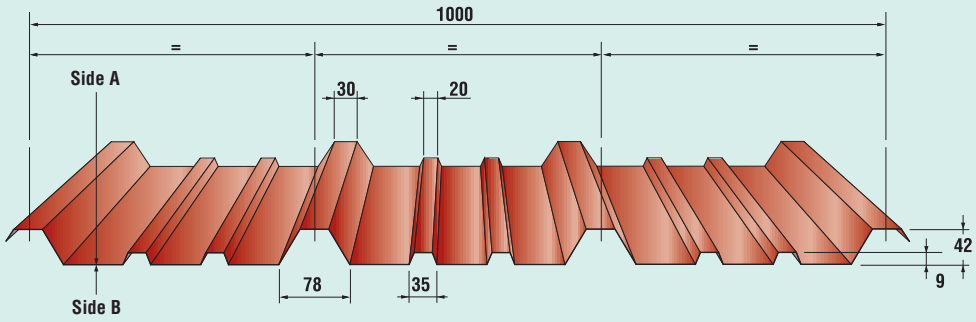
A40-P920-G6



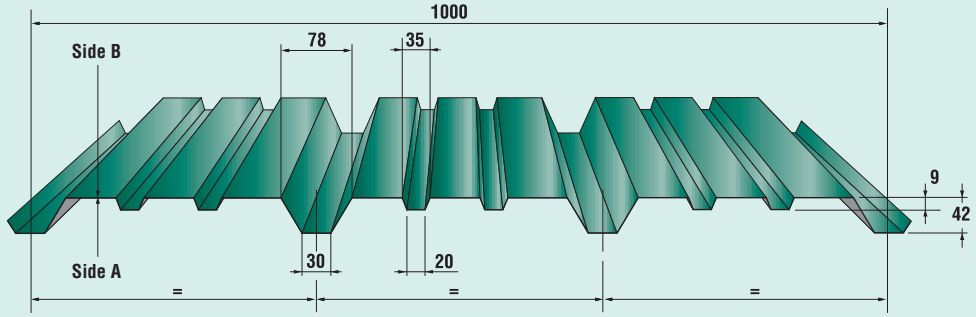
S mm	Weight kg/m²	J cm⁴/m	Wp cm³/m	Wn cm³/m	*l* = m	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
						p p p △ *l* △ *l* △ *l* △												
0,6	6,25	9,19	4,37	5,13		725	460	320	230	165 175	115 135	80 110	60 90	- 75	- 60	- 50	- -	- -
0,7	7,29	11,38	5,22	6,05		865	550	380	275	205 210	140 165	100 130	75 105	55 90	- 75	- 60	- 55	- -
0,8	8,33	13,60	6,12	6,97	p = daN/m²	1015	645	445	325	245	170 190	120 155	90 125	65 105	50 85	- 75	- 60	- 55
1,0	10,41	18,43	7,92	8,80		1320	840	580	420	320	235 250	165 200	120 165	90 135	70 115	50 95	- 80	- 70
1,2	12,50	23,59	9,76	10,63		1625	1035	715	520	395	300 310	215 245	160 200	120 165	90 140	70 120	55 100	- 85
						p △ *l* △												
0,6	6,25	9,19	4,37	5,13		580	365	210 250	130 185	85 140	55 105	- 85	- 70	- 55	- -	- -	- -	- -
0,7	7,29	11,38	5,22	6,05		690	440	260 300	160 220	105 165	70 130	50 100	- 85	- 70	- 55	- -	- -	- -
0,8	8,33	13,60	6,12	6,97	p = daN/m²	810	515	315 355	195 260	125 195	85 150	60 120	- 100	- 80	- 65	- 55	- 50	- -
1,0	10,41	18,43	7,92	8,80		1050	670	425 460	265 335	175 255	120 195	80 155	60 130	- 105	- 90	- 75	- 65	- 55
1,2	12,50	23,59	9,76	10,63		1295	825	550 570	340 415	225 315	150 245	105 195	75 160	55 130	- 110	- 90	- 80	- 65

A42-P1000-G4

Also available in aluminium alloy



S	Weight	J	Wp	Wn		p p p △ l △ l △ l △												
mm	kg/m²	cm⁴/m	cm³/m	cm³/m	l = m	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
0,6	5,75	14,75	4,70	4,57		760	485	335	240	185	145	115	95	75	55 65	- 55	- -	- -
0,7	6,70	17,39	5,74	5,46		910	580	400	290	220	170	140	110	90 95	70 80	55 65	- 55	- 50
0,8	7,66	20,02	6,60	6,35	p = daN/m²	1055	675	465	340	255	200	160	130	105 110	80 90	60 75	50 65	- 55
1,0	9,58	25,29	8,34	8,15		1355	865	595	435	330	260	205	170	130 140	100 120	80 100	60 85	50 75
1,2	11,50	30,56	10,08	9,95		1660	1055	730	530	405	315	255	205	160 170	120 145	95 120	75 105	60 90
						p △ l △												
0,6	5,57	14,75	4,70	4,57		625	395	270	200	140 150	95 115	70 95	50 75	- 60	- 50	- -	- -	- -
0,7	6,70	17,39	5,74	5,46		760	485	335	245	165 185	115 145	80 115	60 95	- 75	- 65	- 55	- -	- -
0,8	7,66	20,02	6,60	6,35	p = daN/m²	875	560	385	280	190 210	130 165	95 130	65 105	50 90	- 75	- 60	- 55	- -
1,0	9,58	25,29	8,34	8,15		1110	705	485	355	245 270	165 210	120 165	85 135	65 110	- 95	- 80	- 70	- 60
1,2	11,50	30,56	10,08	9,95		1340	855	590	430	295 325	200 255	145 205	105 165	75 135	60 115	- 95	- 80	- 70

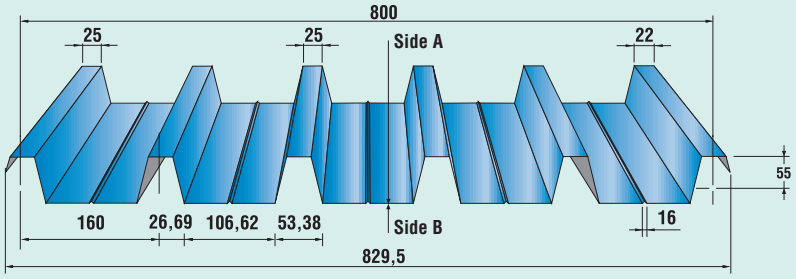


A42-P1000-G4

S	Weight	J	Wp	Wn		p p p △ l △ l △ l △												
mm	kg/m²	cm⁴/m	cm³/m	cm³/m	l = m	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00
0,6	5,75	12,90	4,57	4,70		760	485	335	240	185	145	115	85 95	65 75	50 65	- 55	- -	- -
0,7	6,70	15,70	5,46	5,74		910	580	400	290	220	170	140	105 110	80 95	60 80	- 65	- 55	- 50
0,8	7,66	18,60	6,35	6,60	p = daN/m²	1055	675	465	340	255	200	160	125 130	95 110	70 90	55 75	- 65	- 55
1,0	9,58	24,45	8,15	8,34		1355	865	595	435	330	260	205	165 170	125 140	95 120	75 100	60 85	- 75
1,2	11,50	30,31	9,95	10,08		1660	1055	730	530	405	315	255	205	155 170	120 145	95 120	75 105	60 90
						p △ l △												
0,6	5,57	112,90	4,57	4,70		605	385	265	185 190	120 145	85 115	60 90	- 75	- 60	- 50	- -	- -	- -
0,7	6,70	15,70	5,46	5,74		725	460	315	225 230	150 175	100 135	70 110	50 90	- 70	- 60	- 50	- -	- -
0,8	7,66	18,60	6,35	6,60	p = daN/m²	845	535	370	270	175 205	120 160	85 125	60 105	- 85	- 70	- 60	- 50	- -
1,0	9,58	24,45	8,15	8,34		1085	690	475	345	235 260	160 205	115 165	85 135	60 110	- 90	- 75	- 65	- 55
1,2	11,50	30,31	9,95	10,08		1325	840	580	425	290 320	200 250	140 200	105 165	75 135	55 115	- 95	- 80	- 70

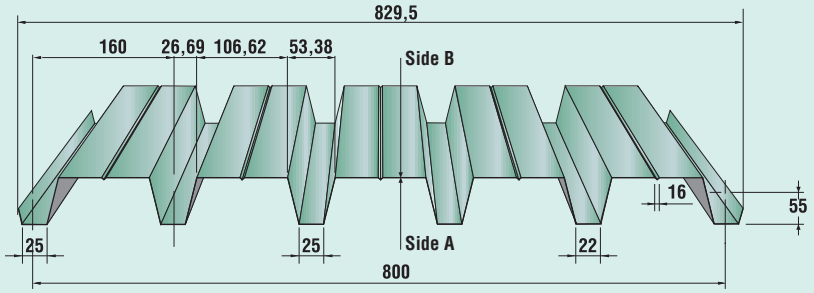
A55-P800-G6

Also available in aluminium alloy



S	Weight	J	Wp	Wn		p p p																
						△ l △ l △ l △																
mm	kg/m²	cm⁴/m	cm³/m	cm³/m	l = m	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,25	4,50	4,75	5,00	5,25	5,50	5,75
0,6	7,18	37,89	10,94	9,44		695	510	385	305	245	200	165	140	120	100 105	80 90	65 80	55 70	- 60	- 55	- 50	- -	- -
0,7	8,38	44,65	12,89	11,34		835	610	465	365	295	240	200	170	145	120 125	95 110	80 95	65 85	55 75	- 65	- 60	- 50	- -
0,8	9,58	51,42	14,85	13,24	p = daN/m²	975	715	545	425	345	280	235	200	170	135 145	110 125	90 110	75 100	60 85	50 75	- 70	- 60	- 55
1,0	11,97	64,95	18,75	17,14		1265	925	705	555	445	365	305	260	215 220	175 190	140 165	115 145	95 130	80 115	65 100	55 90	- 80	- 75
1,2	14,36	78,48	22,66	21,14		1560	1145	870	685	550	455	380	320	260 275	210 235	170 205	140 180	115 160	95 140	80 125	65 110	55 100	- 90
						p																	
						△ l △																	
0,6	7,18	37,89	10,94	9,44		645	470	360	260 280	185 225	135 185	105 155	80 130	60 110	50 95	- 80	- 70	- 65	- 55	- 50	- -	- -	- -
0,7	8,38	44,65	12,89	11,34		760	555	420	305 330	220 265	160 220	120 180	95 155	75 180	55 110	- 95	- 85	- 75	- 65	- 60	- 50	- -	- -
0,8	9,58	51,42	14,85	13,24	p = daN/m²	875	640	485	350 380	255 305	185 250	140 210	110 175	85 150	65 130	55 115	- 100	- 85	- 75	- 70	- 60	- 55	- 50
1,0	11,97	64,95	18,75	17,14		1105	810	615	445 485	320 390	235 320	180 265	140 225	110 190	85 165	65 145	55 125	- 110	- 95	- 85	- 75	- 70	- 60
1,2	14,36	78,48	22,66	21,14		1335	980	745	540 585	390 470	285 385	220 320	165 270	130 230	105 200	80 175	65 150	55 135	- 120	- 105	- 95	- 85	- 75

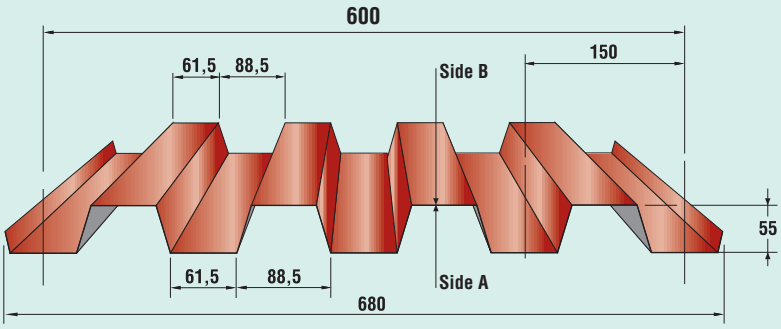
A55-P800-G6



S	Weight	J	Wp	Wn		p p p																
						△ l △ l △ l △																
mm	kg/m²	cm⁴/m	cm³/m	cm³/m	l = m	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,25	4,50	4,75	5,00	5,25	5,50	5,75
0,6	7,18	27,21	9,44	10,94		695	510	385	305	245	190 200	145 165	110 140	85 120	70 105	55 90	- 80	- 70	- 60	- 55	- 50	- -	- -
0,7	8,38	33,41	11,34	12,89		835	610	465	365	295	235 240	175 200	135 170	110 145	85 125	70 110	55 95	- 85	- 75	- 65	- 60	- 50	- -
0,8	9,58	40,22	13,24	14,85	p = daN/m²	975	715	545	425	345	280	215 235	165 200	130 170	105 145	85 125	70 110	55 100	- 85	- 75	- 70	- 60	- 55
1,0	11,97	53,86	17,14	18,75		1265	925	705	555	445	365	290 305	225 260	175 220	140 190	115 165	90 145	75 130	60 115	50 100	- 90	- 80	- 75
1,2	14,36	68,47	21,14	22,66		1560	1145	870	685	550	455	370 380	285 320	225 275	180 235	145 205	120 180	95 160	80 140	65 125	55 110	- 100	- 90
						p																	
						△ l △																	
0,6	7,18	27,21	9,44	10,94		555	400 405	265 310	180 240	130 195	95 160	70 130	55 110	- 95	- 80	- 70	- 60	- 55	- -	- -	- -	- -	- -
0,7	8,38	33,41	11,34	12,89		665	485	325 370	225 290	160 235	120 190	90 160	70 135	50 115	- 100	- 85	- 75	- 65	- 55	- 50	- -	- -	- -
0,8	9,58	40,22	13,24	14,85	p = daN/m²	780	570	395 435	275 340	195 275	145 225	110 185	80 155	65 135	50 115	- 100	- 85	- 75	- 65	- 60	- 50	- -	- -
1,0	11,97	53,86	17,14	18,75		1010	740	530 560	365 440	265 355	195 290	145 240	110 205	85 175	70 150	55 130	- 115	- 100	- 90	- 80	- 70	- 60	- 55
1,2	14,36	68,47	21,14	22,66		1245	910	675 695	470 545	335 440	250 360	190 300	145 250	110 215	90 185	70 160	55 140	- 125	- 110	- 95	- 85	- 75	- 70

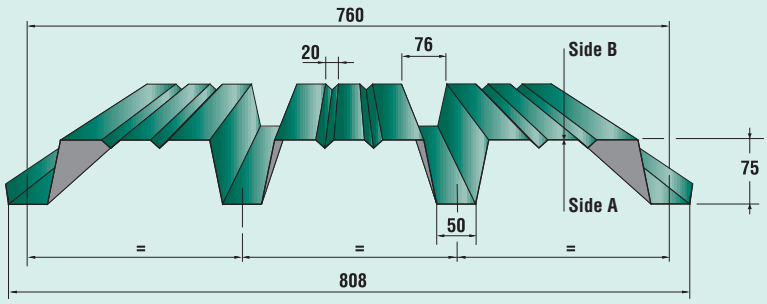
A55-P600-G5

Also available in aluminium alloy

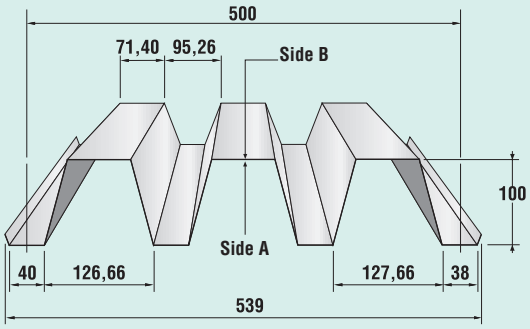


S	Weight	J	Wp	Wn		p △ l △ l △ l △														
mm	kg/m²	cm⁴/m	cm³/m	cm³/m	l = m	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,25	4,50	4,75	5,00
0,6	7,85	39,12	11,11	12,72		2099	1343	933	685	525	415	336	278	221 233	174 199	139 171	113 149	93 131	78 116	66 104	56 93	48 84
0,7	9,15	45,98	13,89	16,00		2640	1690	1173	862	660	521	422	337 349	260 293	204 250	164 216	133 188	110 165	91 146	77 130	65 117	56 106
0,8	10,45	54,90	16,85	19,53	p = daN/m²	3222	2062	1432	1052	806	637	516	403 426	310 358	244 305	195 263	159 229	131 201	109 178	92 159	78 143	67 129
1,0	13,10	73,46	23,27	26,81		4424	2831	1966	1444	1106	874	708	539 585	415 492	327 419	261 361	213 315	175 276	146 245	123 218	105 196	90 177
1,2	15,70	92,57	30,19	32,82		5415	3466	2407	1768	1354	1070	866	679 716	523 602	412 513	330 442	268 385	221 338	184 300	155 267	132 240	113 217
						p △ l △																
0,6	7,85	39,12	11,11	12,72		1467	939	652	479	367	277 290	202 235	152 194	117 163	92 139	74 120	60 104	49 92	41 81	35 72	-	-
0,7	9,15	45,98	13,89	16,00		1833	1173	815	599	458	326 362	238 293	179 242	138 204	108 174	87 150	70 130	58 115	48 102	41 91	35 81	-
0,8	10,45	54,90	16,85	19,53	p = daN/m²	2224	1423	989	726	554 556	389 439	284 356	213 294	164 247	129 211	103 182	84 158	69 139	58 123	49 110	41 99	35 89
1,0	13,10	73,46	23,27	26,81		3072	1966	1365	1003	742 768	521 607	380 491	285 406	220 341	173 291	138 251	113 218	93 192	77 170	65 152	55 136	47 123
1,2	15,70	92,57	30,19	32,82		3985	2550	1771	1301	635 996	656 787	479 638	360 527	277 443	218 377	174 325	142 283	117 249	97 221	82 197	70 177	60 159

A75-P760-G4



S	Weight	J	Wp	Wn		p △ l △ l △ l △														
mm	kg/m²	cm⁴/m	cm³/m	cm³/m	l = m	2,75	3,00	3,25	3,50	3,75	4,00	4,25	4,50	4,75	5,00	5,25	5,50	5,75		
0,6	7,56	81,22	17,55	14,73		321	270	230	198	173	152	135	120	108	97	85 88	74 80	65 74		
0,7	8,82	98,17	20,38	18,26		398	335	285	246	214	188	167	149	134	119 121	103 109	90 100	79 91		
0,8	10,08	115,35	23,63	21,93	p = daN/m²	478	402	343	295	257	226	200	179	160	140 145	121 131	105 120	92 109		
1,0	12,60	148,09	30,15	29,59		646	542	462	399	347	305	270	241	210 216	180 195	156 177	135 161	119 148		
1,2	15,12	178,92	36,59	37,21		812	682	581	501	437	384	340	299 303	254 272	218 246	188 223	164 203	143 186		
						p △ l △														
0,6	7,56	81,22	17,55	14,73		306	243 257	191 219	153 189	124 165	102 145	85 128	72 114	61 103	52 93	45 84	39 77	34 70		
0,7	8,82	98,17	20,38	18,26		356	293 299	231 255	185 220	150 191	124 168	103 149	87 133	74 119	63 108	55 98	48 89	42 81		
0,8	10,08	115,35	23,63	21,93	p = daN/m²	412	345 347	271 295	217 255	176 222	145 195	121 173	102 154	87 138	74 125	64 113	56 103	49 94		
1,0	12,60	148,09	30,15	29,59		526	442	348 377	279 325	226 283	187 249	156 220	131 197	111 176	96 159	83 144	72 132	63 120		
1,2	15,12	178,92	36,59	37,21		639	534 537	420 457	337 394	274 343	225 302	188 267	158 239	135 214	115 193	100 175	87 160	76 146		



A100-P500-G4

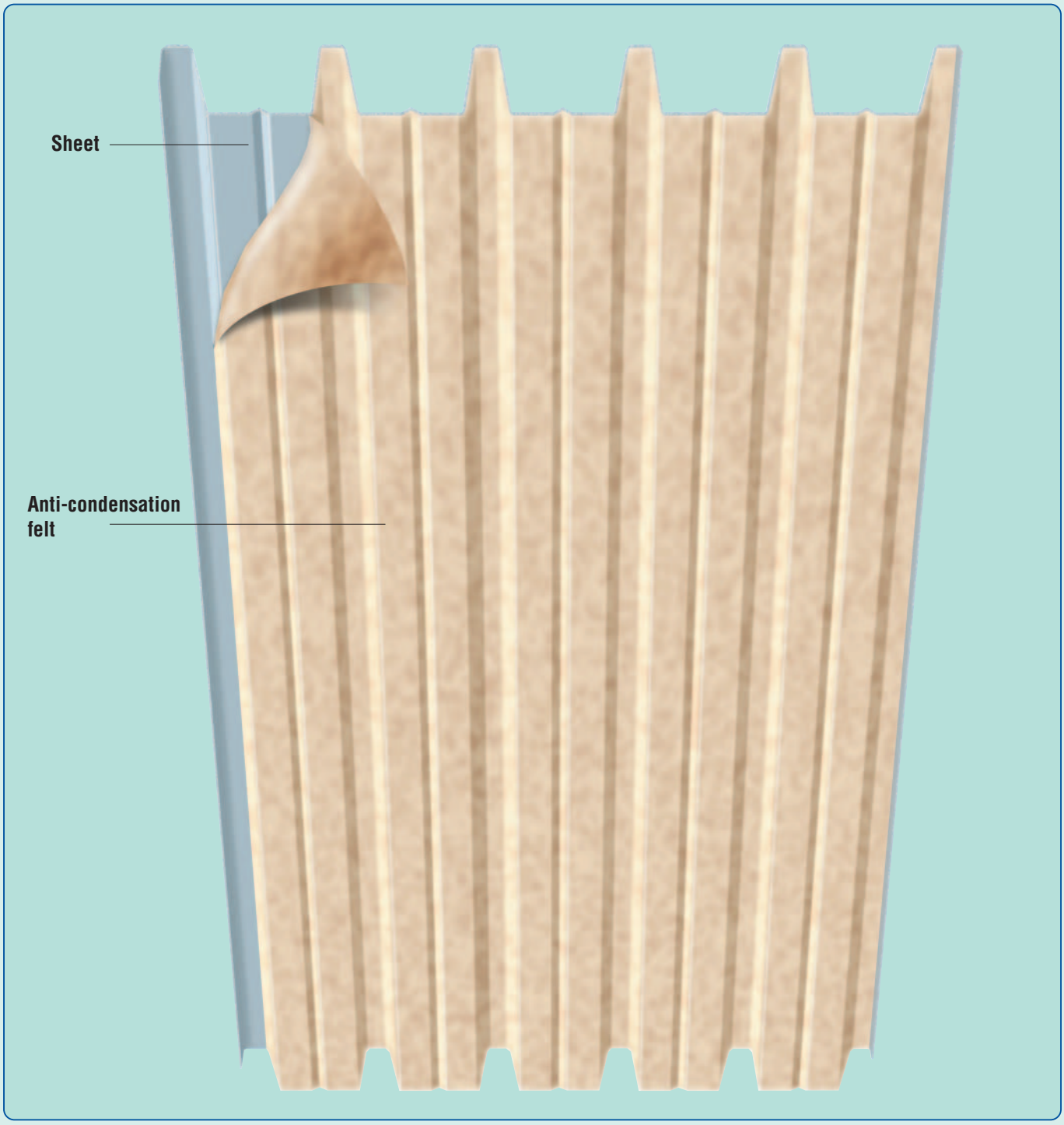
S mm	Weight kg/m²	J cm⁴/m	Wp cm³/m	Wn cm³/m	l=m	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,25	4,50	4,75	5,00	5,25	5,50	5,75	6,00
						p △ l △ l △ l △																
0,6	9,42	133,80	23,88	28,62		990	780	630	520	435	370	315	275	240	210	185	165	150	130 135	110 120	95 110	80 100
0,7	11,00	163,02	29,37	34,97		1220	960	775	640	535	455	390	335	295	260	230	205	185	160 165	135 150	115 135	100 125
0,8	12,56	192,62	35,23	41,70	p = daN/m²	1465	1155	930	770	645	545	470	405	355	315	275	245	220	185 200	160 180	140 165	120 150
1,0	15,70	255,04	48,07	54,79		200	1575	1275	1050	880	745	640	555	485	430	380	340	290 305	250 275	215 250	185 225	160 205
1,2	18,84	320,01	61,31	66,20		2550	2015	1625	1340	1125	955	820	710	620	550	485	435	370 390	315 350	270 320	235 290	205 265
						p △ l △ l △																
0,6	9,42	133,80	23,88	28,62		944	746	604	500	420	358	308	269	236	209	187	167	151	137	125	114	105
0,7	10,99	163,02	29,37	34,97		1154	912	739	610	513	437	377	328	289	256	228	205	185	167	153	140	128
0,8	12,56	192,62	35,23	41,70	p = daN/m²	1376	1087	881	728	612	521	449	391	344	305	272	244	220	200	182	166	153
1,0	15,70	255,04	48,07	54,79		1808	1429	1157	956	804	685	590	514	452	400	357	321	289	262	239	219	201
1,2	18,84	320,01	61,31	66,20		2185	1726	1398	1155	971	827	713	621	546	484	432	387	350	317	289	264	243
						p △ l △																
0,6	9,42	133,80	23,88	28,62		790	320	500	410	345	290	240 250 295	195 215 235	155 190 190	130 165 160	105 145 130	90 130 110	75 115 90	65 105 75	55 95 65	45 85 55	40 75 45
0,7	11,00	163,02	29,37	34,97		975	765	620	510	425	360	310 345	265 280	235 230	205 185	180 155	160 130	145 110	130 90	115 80	105 65	95 55
0,8	12,56	192,62	35,23	41,70	p = daN/m²	1170	920	745	610	510	435	370 460	320 370	280 305	245 250	220 205	195 175	175 145	155 125	140 105	130 90	115 75
1,0	15,70	255,04	48,07	54,79		1595	1260	1015	835	700	580 595	510	440	385	340	300	270	240	215	195	175	160
1,2	18,84	320,01	61,31	66,20		2040	1605	1295	1070	895	730 760	580 650	470 565	380 495	315 435	260 385	220 345	185 310	155 280	135 250	115 230	100 210

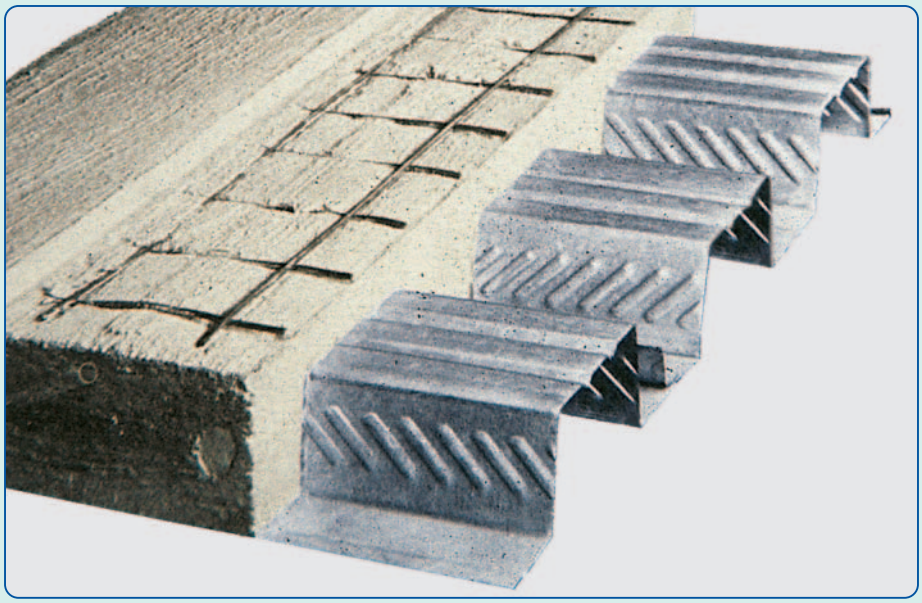
ABSOFILM® was designed and developed for the purpose of eliminating the problem of the formation of condensation on the inner surface of profiled sheets. The product consists of a profiled sheet bound to absorbent felt in polyester fibre, which provides the optimal absorption of water vapour.

The felt absorbs the condensation that forms in contact with the profiled sheet and then permits slow evaporation of the collected water. This creates a continuous cycle of absorption and evaporation during the hot hours of the day.

CHARACTERISTICS

Humidity absorption: approx. 350g per minute/m^2, suitable for normal requirements - tried tested on millions of square metres of **ABSOFILM®** produced and installed in Europe.
Felt colour: beige
Sheet colour: Metcolor
Reaction to fire class: M1 (French standards)
Types: A40/P920-G6, A42/P1000-G4, A55/P800-G6





DESCRIPTION OF THE SYSTEM

The **HI-BOND®** floor is constituted by a profiled sheet onto which a layer of concrete is poured. The sheet is bonded to the concrete by means of mouldings on the sheet which stop the concrete from slipping horizontally and detaching vertically. When the concrete is poured and until it has reached an appropriate level of hardening (stage 1), the weight of the concrete, the personnel and equipment used is borne by the sheet alone. Once the concrete has hardened (stage 2) the sheet and the concrete form a unified whole with all the characteristics of traditional reinforced concrete, where the sheet, after having performed the function of formwork, acts as a metal reinforcement. Appropriate crop ends must be provided to absorb the negative moments.

STANDARDS

The structural calculations of **HI-BOND®** were based on the following standards and recommendations:

- Ministerial Decree of 9/1/96
  Technical standards for the calculation, construction and testing of works in normal and re-stressed reinforced concrete and for steel structures.
- UNI-ONP 10022/84 Cold-rolled sections Instruction for use in constructions.
- UNI EN 10147 Steel sheets and strips for structural use, galvanised by continuous hot immersion.
  Technical supply conditions.
- CEN European Committee for Standardisation Eurocode 4: Design of composite steel and concrete structures.
- AIPPEG recommendations for the calculation of composite profiled sheet floors with concrete slabs.
- AIPPEG Instructions for the calculation of composite profiled sheet and concrete floors.

MATERIALS

PROFILED SHEETS: Envisage the use of Fe E 280 G steel, as defined in Standard UNI EN 10147 and equivalents, to obtain the Fe 360 mechanical performance laid down by Standard UNI-CNR 10022; the overall tension of the sheet must not exceed 180 N/mm^2.

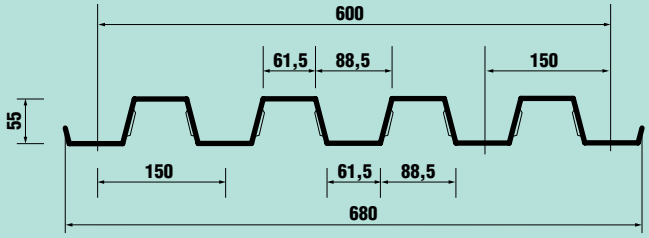
CONCRETE: Envisages the use of class Rck 250 concrete with an N/cm^2 which permits an operating tension of 85 N/cm^2, pursuant to the Min. Decree of 14.2.92.

STEEL FOR NEGATIVE MOMENTS: For this reinforcement, we suggest the use of steel bars of the Fe B 38K type with improved adherence, having a permitted tension of 215 N/mm^2.

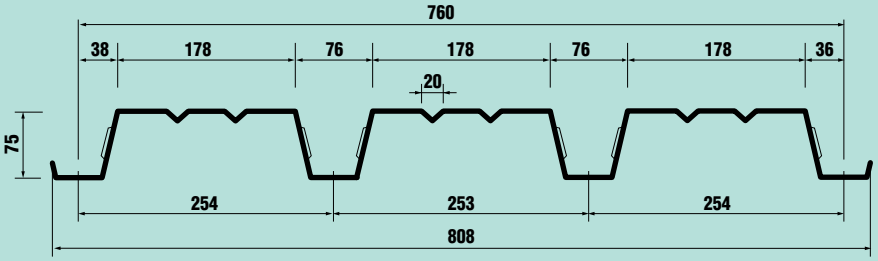
STATIC CHARACTERISTICS OF PROFILED SHEETS: The moments of inertia and the section moduli are calculated taking into account the reduction of the compressed elements resulting from the effects of both the positive and negative moments, as laid down in the UNI-CNR 10022 instructions.

CHARACTERISTICS OF THE FLOOR: The sections are calculated on the basis of reinforced concrete theory, which takes into account a coefficient of the module of elasticity of the steel and the concrete of N=15.

HI-BOND A55/P600 TYPE



HI-BOND A75/P760 TYPE



** Ask for the specific technical manual.*

THE ADVANTAGES OF THE HI-BOND® SYSTEM

- Almost immediate availability of floors for foot traffic. A team of three workers can lay 400 square metres of floor in eight hours - superior performance to any other system. In the most advanced sheet floor systems, no temporary support of the floor is necessary and floors can consequently be simultaneously constructed at various levels.

- A drastic reduction in the number of transport vehicles entering the building site. One truck can carry around 1000 square metres of floor sheets, subdivided into ten packages. The same truck could carry only 100 square metres of traditional prefabricated flooring, subdivided into 20 packages. Therefore, compared to traditional solutions, the rate of trucks entering the site is 1 to 10 in favour of the steel sheets.

- Reduced utilisation of hoisting equipment. A single crane can lift 1000 square metres of steel flooring in only 10 operations and distribute them to the various floors. To lift 1000 square metres of prefabricated flooring (in 5 sq.m. elements weighing around 1250 kg), the same crane would carry out 200 operations, so the ratio is 1 to 20 in favour of the steel sheets.

- Maximum versatility. This system will accept project variations, modifications, adaptations, cuts around columns etc. at any time during construction. As an extreme example, if there is no electricity supply, the sheets can be laid and fixed into position by a rivet gun.

The GT1 system was designed as the result of years of experience in the manufacturing of products destined for the industrial building sector and is covered by patent 84014/84. It is a system of curved sheets produced using the same materials, colours and profiles as other profiled sheets and panels manufactured by METECNO.
The sheets provide the following advantages:

- They are prefabricated
- Their high standard of technical and aesthetic finish meets all architectural requirements
- They are watertight and windtight. The curves are fixed to the structure by the same fastenings as those of panels and profiled sheets.
- They eliminate the need for metal sections, welding, sealing plugs and adaptations
- They totally eliminate the need for gutters and associated supports, headers, dilation joints, pipe unions, gratings, downspouts, etc.
- The headers consist of curved machine-finished components
- Seals, flashings, eaves barge boards normally associated with gutter assembly are eliminated
- There is a reduction in imposed loads on the roof of the building
- Longer life and less maintenance. A substantial reduction in installation and finishing times and costs

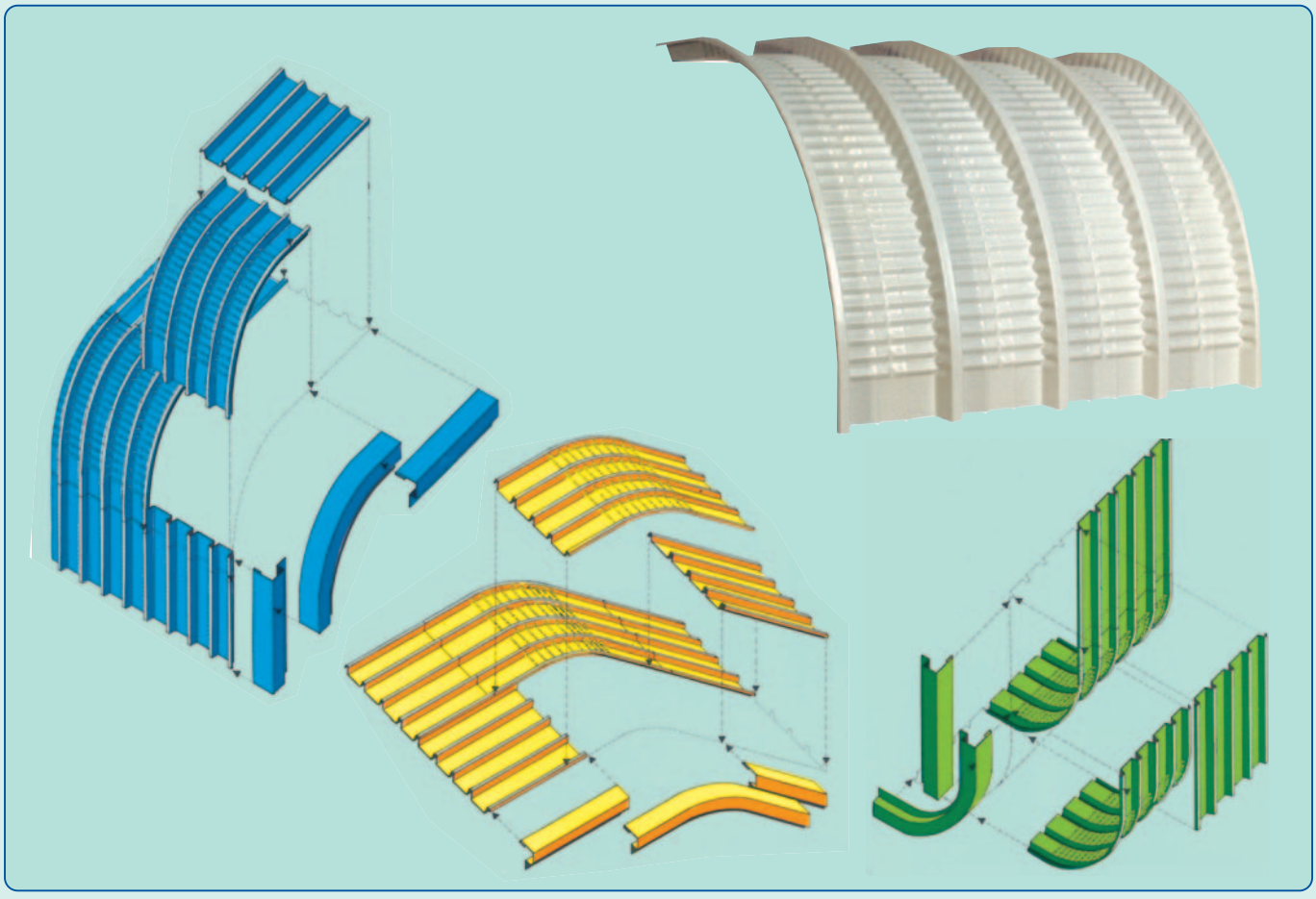


Figure 1A
GT1 system

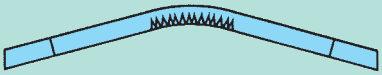


Figure 1B
Traditional roof ridge

Figure 2A
GT1 system

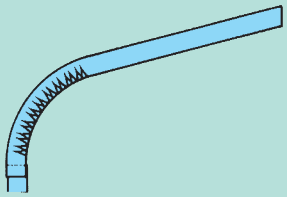
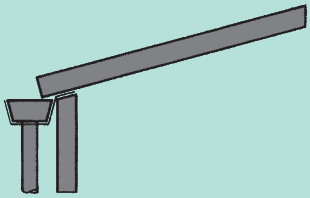
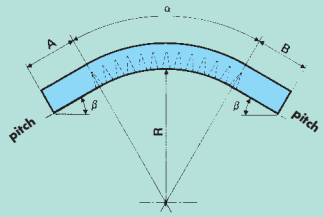


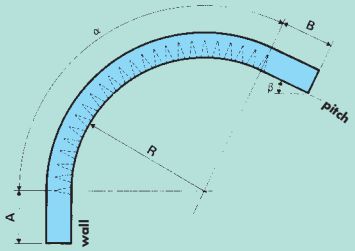
Figure 2B
Traditional gutter



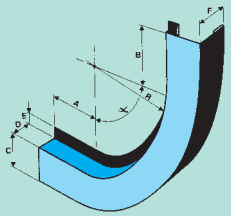
ROOF RIDGE



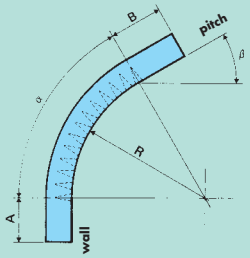
WALL-ROOF CONNECTION



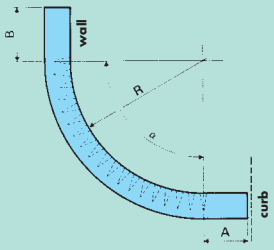
HEADER CONNECTION



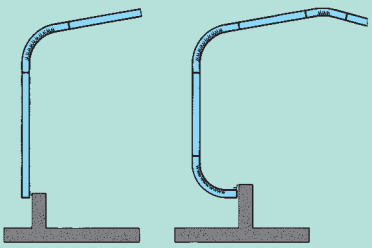
WALL-ROOF CONNECTION



CURB-WALL CONNECTION



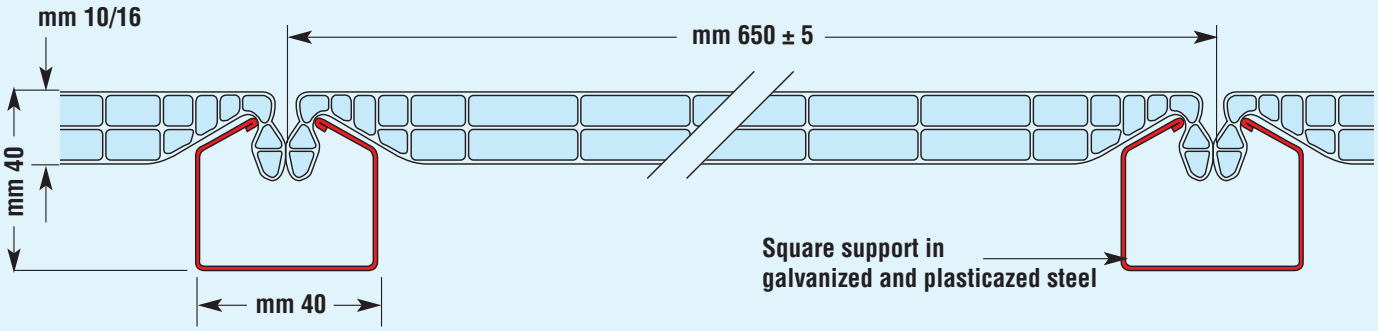
EXAMPLES APPLICATIONS



A and B = 200 mm minimum; R = Internal radius, 500 mm minimum
α = Angle of curvatures, β = Pitch of the roof

ROOFLIGHT

The pitched rooflight is made with a self-supporting honeycomb polycarbonate curved sheet, 10-16 mm thick.
It is supplied either as a single or double sheet, complete with headers, side support bars, spacers, plugs and fixing brackets.



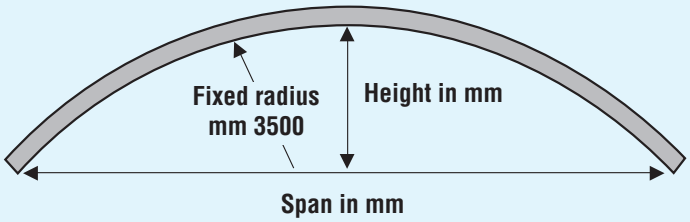
SPECIFICATIONS

For curved roofs with a fixed radius of 3500 mm, formed by:

- "U"-shaped extruded polycarbonate, 10/16 mm, self extinguishing Class 1, "K" = 1.9/2.3 Kcal/ma h°C; clear, pearlescent, smoked and green colour, 650 mm wide module, with heat-sealed ends, protected against UV rays, customised lengths.
- Self-supporting fastenings in galvanised plasticised steel, 1mm thick, grey or brown colour, square section with open joint, placed at a distance of 650 mm, customised lengths.
- Honeycomb polycarbonate closing ends and other finishing accessories provide the perfect seal to the system.

DEVELOPMENT TABLE WITH A FIXED RADIUS OF 3500 mm (Values expressed in mm)

Span	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
Height	80	110	150	190	240	290	340	400	500	560	640
Development	1530	1780	2050	2310	2580	2850	3130	3400	3730	4000	4300



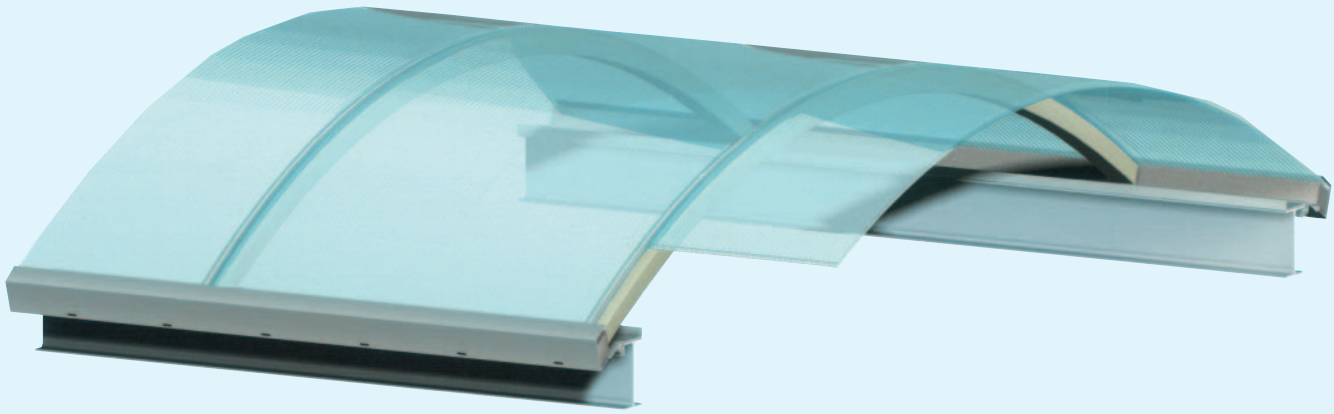
INDICATIVE CAPACITY LOADS WITH A FIXED RADIUS OF 3500 mm

Wind pressure 90 kg/mq Snow load 128 Kg/mq	
Span 1000 to 3250 mm	**Upright** square

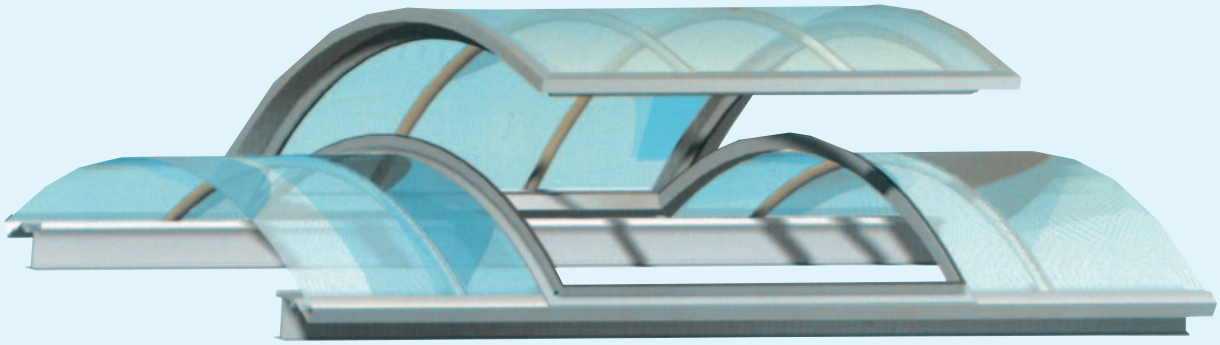
Wind pressure 90 kg/mq Snow load 92 Kg/mq	
Span 1000 to 3500 mm	**Upright** square

Wind pressure 90 kg/mq Snow load 68 Kg/mq	
Span 1000 to 4250 mm	**Upright** square

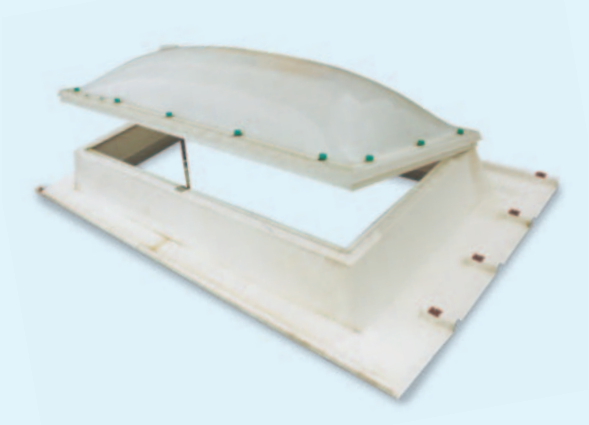
FIXED RIDGE SKYLIGHT - MF



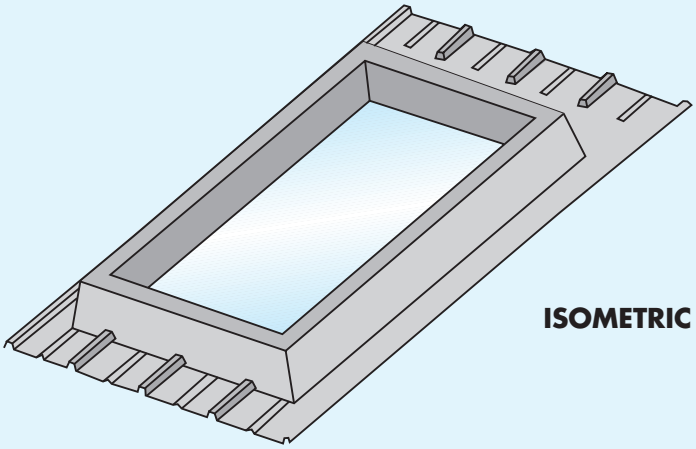
OPENABLE ROOFLIGHT ON ROOFTOP - MA



DOME SHAPED ROOFLIGHT ON PITCHED ROOF THAT CAN BE COUPLED WITH THE PANEL



Openable - MCA
Fixed - MCF



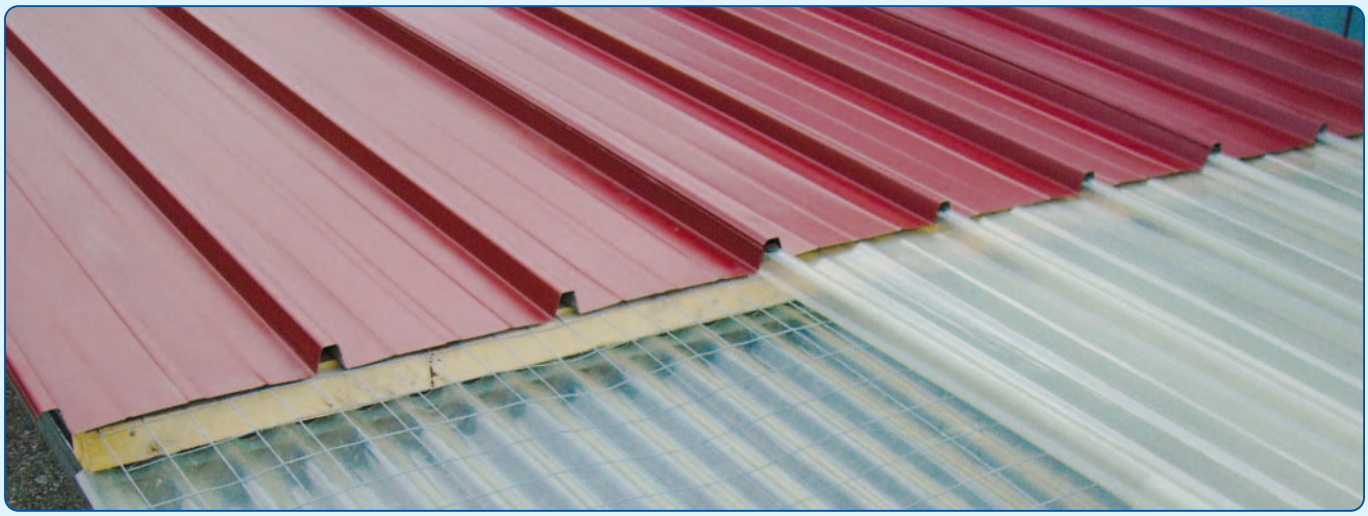
ISOMETRIC

Openable, manually or power operated with polycarbonate or acrylic domes, can be coupled with the **GLAMET A 38 P1000** roof panel.

SKYLIGHT ON ROOF PITCH - PLASTIC REINFORCED BY FIBERGLASS

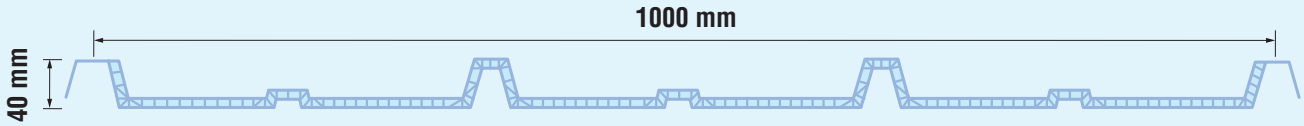
CHARACTERISTICS

- A38 profile in plastic reinforced by fiberglass with MELINEX protection plus an internal corrugated roll
- Available in lengths of up to 8 m



SKYLIGHT ON ROOF PITCH - POLYCARBONATE

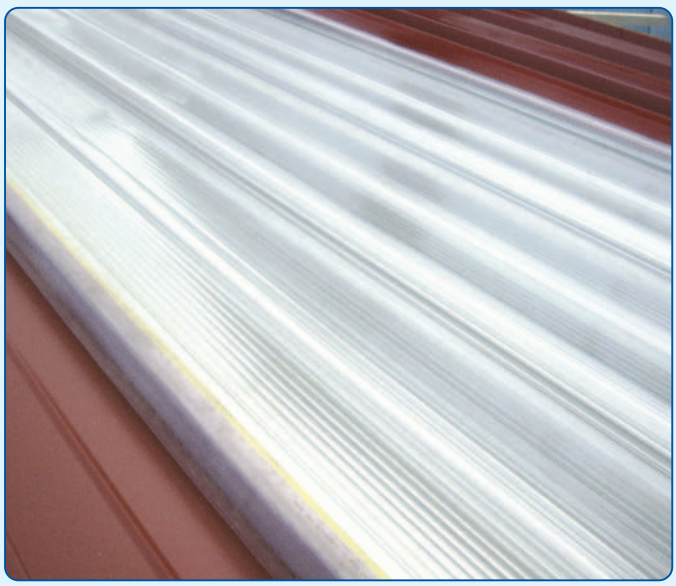
The skylight on roof pitch is made of a honeycomb polycarbonate with the same profile as the Glamet panel.



CHARACTERISTICS

Honeycomb polycarbonate with the following characteristics:

- Available in lengths of up to 12 metres
- Excellent thermal insulation properties (K = 2.8 Kcal/sq.m.H° C)
- Resistant to temperature changes (from -40° C to + 120° C)
- Highly resistant to atmospheric conditions (10 year guarantee against hail)
- Class 1 self-extinguishing and does not propagate toxic gases in case of fire
- Features a special anti-UV treatment (10 year guarantee)
- Available in 1 metre widths
- Excellent light diffusion
- Available colours: clear frosted, pearlescent frosted
- Lightweight, easily transportable and rapidly installed
- The rooflight must be installed with a safety net, as per current legislation

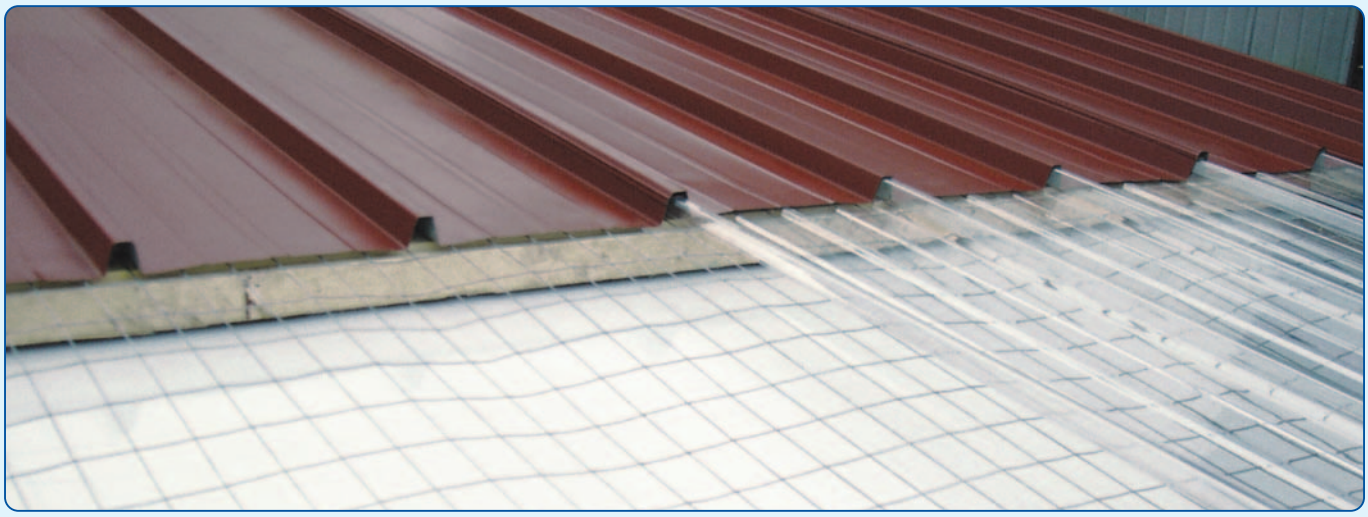


STATIC TEST WITH A UNIFORMLY DISTRIBUTED LOAD OVER A 2,000 mm SPAN WITH SIMPLE SUPPORT											
Load applicated kg/mq.	25	50	75	100	112	125	150	175	200	212	250
Sheet deflection mm.	16	45	51	65	67	75	78	86	90	93	100

SKYLIGHT ON ROOF PITCH - COMPACT POLYCARBONATE

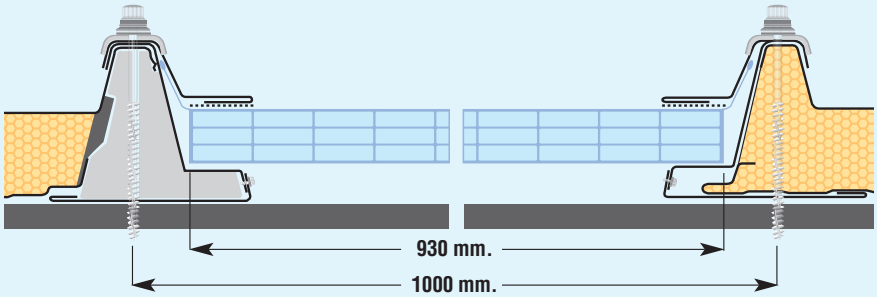
CHARACTERISTICS

- A38 profile in compact polycarbonate plus an internal flat honeycomb polycarbonate sheet
- Available in lengths of up to 8 m



SKYLIGHT ON ROOF PITCH - HONEYCOMB POLUCARBONATE

The skylight on roof pitch is made of four-wall honeycomb polycarbonate sheets forming three air spaces. It is suitable for assembly from the ridge to the pitch end.



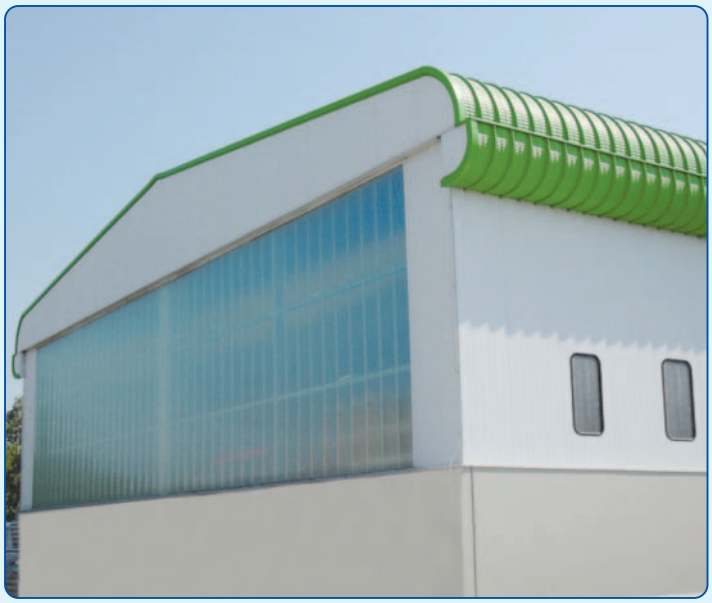
CHARACTERISTICS

Honeycomb polycarbonate with the following characteristics:

- Available up to 12m long
- Width: 930mm
- Thermal insulation rate, for thickness of 30 mm: K = 1.43 Kcal/m²h°C
- Thermal insulation rate, for thickness of 40 mm: K = 1.39 Kcal/m²h°C
- Operating temperature range: - 30° to + 120°C
- Guarantee: 10 years
- Self-extinguishing: Class 1
- UV protection on the external side
- Coefficient of thermal expansion: 0.065mm/mt°C
- Available colours: clear and diffusing pearlescent
- Light transmission: 70% clear and 35% pearlescent
- The rooflight must be installed with a safety net, as per current legislation

SAFE LOAD TABLE

Distance between supports (m)	Load (kg/mq.)	
	Thickness 30 mm	Thickness 40 mm
1,50	150	170
1,75	130	150
2,00	120	130
2,25	90	110
2,50	65	90



The windows incorporated in METECNO self-supporting insulated metal panels are made on a continuous production line giving a perfectly consistent product with assured reliability due to the production technology adopted in the factory.

- **MONOWALL® 1000 type B**
- **MONOWALL® 1000/S**

SAFE LOADS

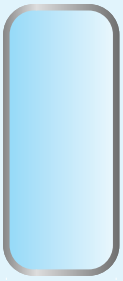
Panels with windows subjected to a wind force corresponding to 100 kg/m^2 must be mounted with a maximum centre-to-centre distance of 3 metres.
The maximum distance between the perimeter of the window and a wall support must be 300 mm.

The system provides the following advantages:

- The window is automatically inserted in the panel on the factory production line
- Consequently, it is perfectly watertight
- Available in different shapes and sizes
- Can be used to provide light and also for air change
- Can be positioned where the designer requires and where light is required
- Reduction in design time and risk
- Reduction in assembly time and elimination of installation errors
- Installation is a single operation, no hardware or window installers required
- An installed panel provides a finished job

WINDOWS WITH ALUMINIUM FRAME (Panels 40, 50, 60 mm thick)
Windows are made with aluminium extruded sections.
Seals are in neoprene with an additional silicone-based sealant.

FIXED



500 x 1500

500 x 500

Available in the following types and characteristics:
FLOAT GLASS transparent, 6 mm thick.
SAFETY GLASS: 3 mm + 3 mm thick, "Visarm" 33-type
DOUBLE GLAZED: 4-6-4 thick

RUBBER FRAMES (Panels 40, 50, 60 mm thick) - Windows with EPDM base elastomer frames.

Windows with EPDM base elastomer frames

FLAT FIXED

500 x 750
500 x 1500

500 x 500

Available in the following types and characteristics:
WIRED GLASS: 6 mm thick
DOUBLE GLAZED: 4-6-4 thick

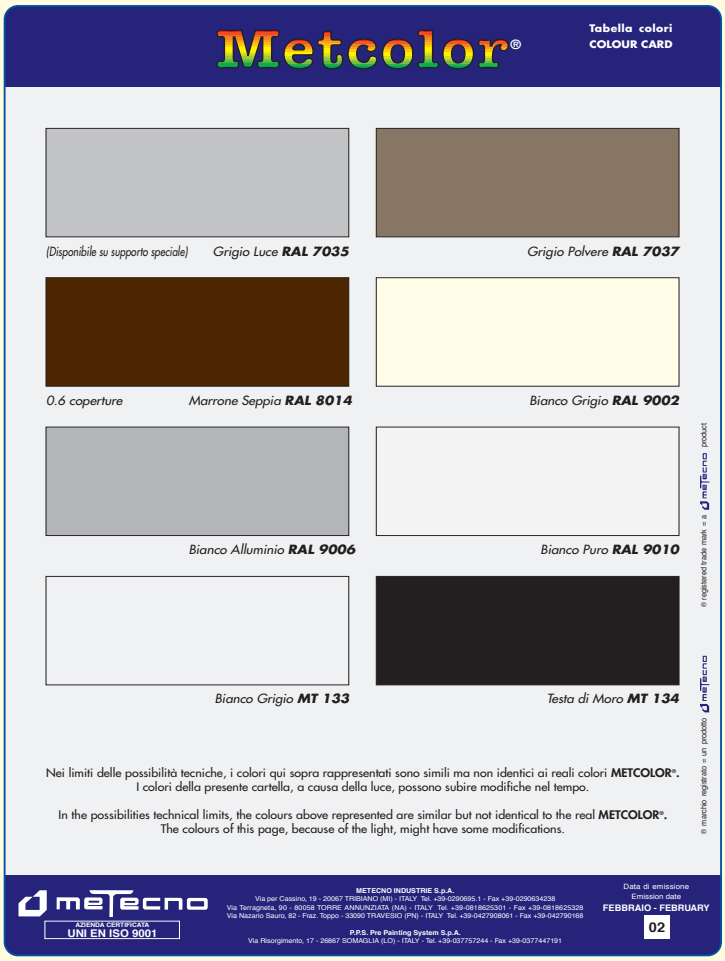
COATING SYSTEMS

For the manufacture of panels and sheets and for the end user, **COIL COATED** prepainting represents a complete solution to all technical and aesthetic requirements, providing the best technical/cost ratio of all protective finishes available today.

METECNO is the only Italian producer of profiled insulated metal panels to have integrated into its production processes the highly delicate stage of prepainting, by equipping itself with the most modern type of **COIL-COATING** line.

METECNO's exclusive painting system has been designed to meet the specific requirements of the end user and guarantees the durability of the underlying metal substrate.
This is an essential factor since, in the final analysis, the paint constitutes one of the main guarantees for long life of the structure.

Specific cycles are programmed for each individual order, with solutions that combine the standard polyesters with silicon-polyesters, polyurethane and thick PVC. The versatility of the plant means that an enormous variety of colours are available to satisfy the imagination and creativity of the most demanding designer, making a significant contribution to the aesthetic enhancement of the building.



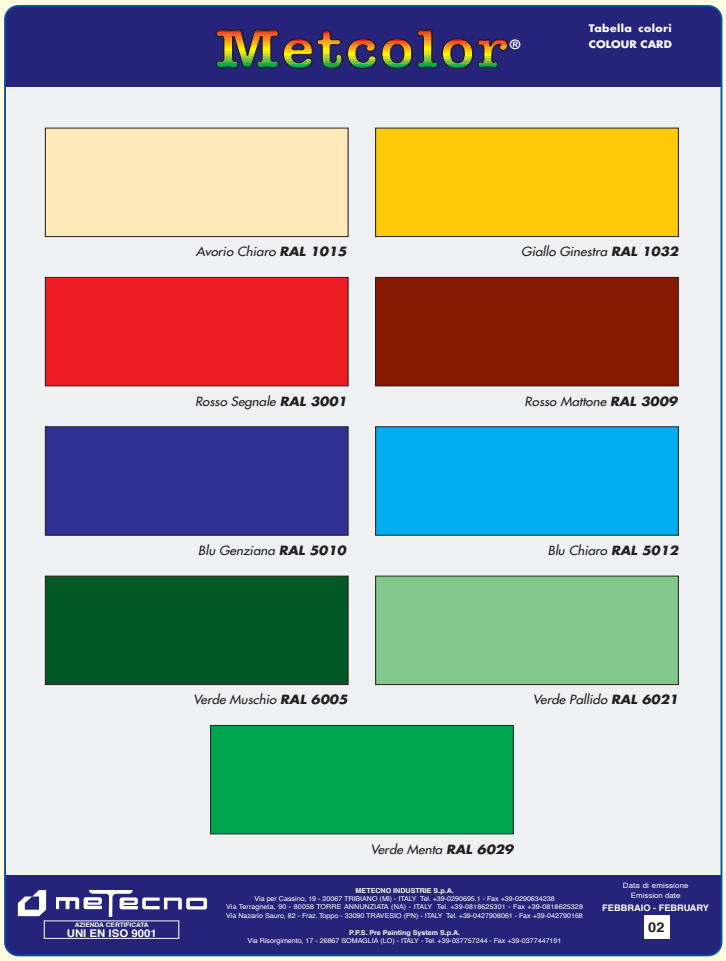
GUIDE TO THE USE OF METECNO PRE-PAINTED PANELS FOR OUTDOOR USE

Nominal thickness of the dry paint coating: 25 microns

Products	Environment						
	Rural	Urban	Industrial	Industrial Ser.	Marine	Marine Ind.	High UV
STANDARD (Polyesther)	suggested	suggested	to be examined	not suggested	to be examined	not suggested	suggested
SUPER (Super-polyesther)	suggested	suggested	to be examined	not suggested	suggested	to be examined	suggested
PVdF (Fluorurates)	suggested	suggested	suggested	to be examined	suggested	to be examined	suggested

suggested *to be examined on a case basis* *not suggested*

	Normative Reference	STANDARD	SUPER	PVdF
Nom. thickness	ECCA - T1	25 microns	25 microns	25 microns
Lead hardness	ECCA - T4	≥F	≥F	≥F
Degree of polymerisation	AICC - 23	≥100 M.E.K.	≥100 M.E.K.	≥100 M.E.K.
Adhesion	ECCA - T17	>95	>95	>95
Resistance to bending	ECCA - T17	adhésion 1T crackling 4T	adhésion 1T crackling 4T	adhésion 1T crackling 4T
Gloss	ECCA - T2	20 gloss*	20 gloss	30 gloss
Resistance to salt fog	ECCA - T8	≥500 h	≥750 h	≥500/750 h
Description		Polyester-base cycle with good roll-forming characteristics and fair resistance to aggressive environments	Superpolyester and siliconpolyester base with excellent roll-forming characteristics and good resistance to external exposure	Polyvinylidene fluoride base cycle with excellent roll-forming characteristics and high resistance to aggressive external exposure
	* 30 gloss per i colori MT 133 - MT 134			



STEEL

The metal support used for the Metecno pre-painting is cold-rolled and galvanized steel for hot dipping of structural quality called S 280 GD + Z according to UNI EN 10147 standards.
The surface look used for pre-painting is established by UNI EN 10142 standards and is obtained through skinpassing (surface cold-rolling) the galvanized sheet after reducing the flowering of zinc or through the use of anti-cracking galvanized sheets.
Before the true painting, the galvanized and skinpassed strip undergoes a pre-treatment divided into various stages, whose purpose is eliminating any undesirable greasy deposits and oxides, and preparing the surface with inert salts that enhance the grip and adhesion of the paint coat.
The pre-treated galvanized strip passes through the first painting head, which applies the first primer coat, and then through the first baking oven. In case of strips designed for the production of monolithic panels, a specific primer is necessary that guarantees the adhesion and grip of the polyurethane foam. When the strip passes through the second painting head and the second polymerizing oven, the final paint of the desired type and color is applied and baked.
Out of the existing paints, Metecno has selected three product lines, based on the opinion that this range is enough to face all kinds of weather conditions, from standard ones to the most aggressive ones.

1. STANDARD system

It is a polyester-based system with an excellent stability when exposed to weather conditions and a good resistance to chemicals.

2. SUPER system

These are superpolyester-based and silicone-polyester systems. The resulting films are characterized by high resistance to the exposure to the sun, and have an excellent resistance to chalking and color changing.

3. PVdF system

These systems are based on polyvinyldenfluorurate mixed in variable ratios with acrylic resins. Since these films are highly chemical inert, the life of these coatings is particularly long when they are applied to building elements that are in touch with the external environment.

The Metcno Coil Coating line can also manufacture Plastisol films, which are formed by a dispersion of PVC in a plasticizer; the thickness can vary between 100 and 200 microns. Plastisol films are suitable for particularly corroding environments, like iron metallurgic and chemical plants, but are mainly used in North European countries, where the insulation is lower than in the Mediterranean area. In fact, since these films are particularly sensitive to the UV rays, they easily chalk and change their color.

ALUMINIUM ALLOYS

In this case, the metal support used for the Metecno pre-painting is made of aluminum alloys of grade 3103 H16 or 3003 H26, according to the EN 485 standards. The aluminum strip is also subject, before painting, to a pre-treatment aimed at preparing the surface for the paint adhesion, although using different chemicals from those used for steel.
The strip is painted with the same methodology and process as those used for steel, and the painting cycles are the same as those described for steel, and also the behavior of the organic coatings is similar, considering the differences of the metal support.

UNI EN ISO 9001 CERTIFICATION

Federazione - *Federation*

CISQ

a member of IQNet

CERTIFICAZIONE ITALIANA DEI SISTEMI QUALITÀ AZIENDALI
ITALIAN CERTIFICATION OF COMPANY QUALITY SYSTEMS

IGQ

ISTITUTO ITALIANO DI GARANZIA DELLA QUALITÀ PER I PRODOTTI METALLURGICI

CERTIFICATO n.
CERTIFICATE No IGQ 9640

SI CERTIFICA CHE IL SISTEMA QUALITÀ DI
WE HEREBY CERTIFY THAT THE QUALITY SYSTEM OPERATED BY

Metecno Spa

UNITÀ OPERATIVE
OPERATIVE UNITS

Sede di Tribiano, unità di Somaglia e Travesio

Via per Cassino, 19
20067 Tribiano MI

È CONFORME ALLA NORMA
IS IN COMPLIANCE WITH THE STANDARD UNI EN ISO 9001:94

PER I SEGUENTI TIPI DI PRODOTTI - PROCESSI - SERVIZI
CONCERNING THE FOLLOWING KINDS OF PRODUCTS - PROCESSES - SERVICES

Pannelli metallici coibentati autoportanti con e senza oblò. Lamiere grecate, lamiere profilate e curvate, nastri preverniciati a coil-coating, nastri goffrati ed accessori per l'edilizia prefabbricata leggera

Structural metallic sandwich panels, with and without portholes. Trapezoidal, curved, roll formed metal sheets. Embossed, prepainted metal coils and accessories for prefabricated industrial buildings

IL PRESENTE CERTIFICATO È SOGGETTO AL RISPETTO DEL REGOLAMENTO PER LA CERTIFICAZIONE DEI SISTEMI QUALITÀ DELLE AZIENDE
THE USE AND THE VALIDITY OF THIS CERTIFICATE SHALL SATISFY THE REQUIREMENTS OF THE RULES FOR THE CERTIFICATION OF COMPANY QUALITY SYSTEMS

Prima emissione *First issue* 13/11/96
Emissione corrente *Current issue* 30/11/99
Data di scadenza *Expiring date* 30/11/2002

Il Direttore
Dario Agabbato
IGQ VIALE SARCA, 336 - 20126 MILANO

SINCERT

certificato stampato il 1999-11-25

METECNO S.p.A. has obtained the UNI EN ISO 9001 certification (figures 1 and 2) and pursues total quality objectives by process control, control of raw materials, control of finished products and design.
To optimise its pursuit of these objectives, METECNO decided to apply for UNI EN ISO 9001 certification, to re-affirm the company's dedication to quality control for total customer satisfaction.

fig.1

UNI EN ISO 9001 certificate issued by the Italian Quality Guarantee Institute for metallurgical products, a member of the C.I.S.Q. Federation (Italian Company Quality System Certification Institute).

IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

IQNet Registration No. IT-0204

This is to state that

Metecno Spa

Sede di Tribiano, unità di Somaglia e Travesio

Via per Cassino, 19
20067 Tribiano MI

holds the
Quality System Certificate

CISQ/IGQ 9640 (valid until 2002-11-30)

for the scope specified thereon and for the standard

ISO 9001

Signed for and on behalf of IQNet

Catherine Neville
President of IQNet

1999-11-30
Date

CISQ

Gianrenzo Prati
CISQ President

This document and the underlying certificate are recognized by all members of IQNet – The International Certification Network (registered association):

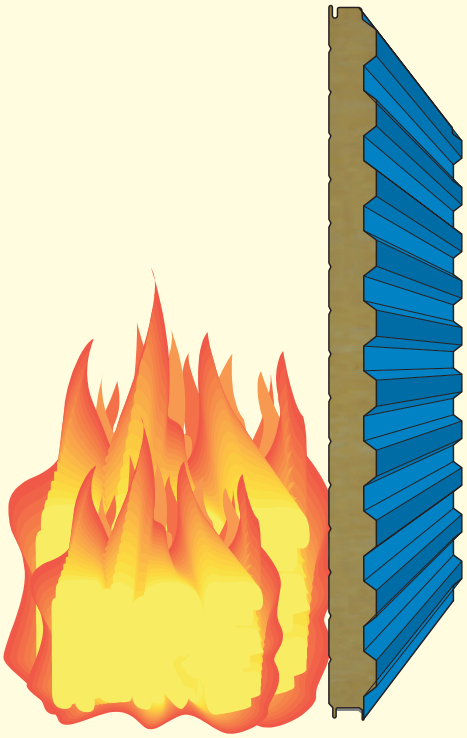
AENOR *Spain* **AFAQ** *France* **AIB-Vincotte Inter** *Belgium* **APCER** *Portugal* **CISQ** *Italy*
CQS *Czech Republic* **DQS** *Germany* **DS** *Denmark* **ELOT** *Greece* **FCAV** *Brazil* **ICONTEC** *Colombia*
IRAM *Argentina* **JQA** *Japan* **KEMA** *Netherlands* **KSA-QA** *Korea* **MSZT** *Hungary* **NCS** *Norway*
NSAI *Ireland* **OQS** *Austria* **PCBC** *Poland* **PSB** *Singapore* **QAS** *Australia* **QMI** *Canada* **SFS** *Finland*
SII *Israel* **SIQ** *Slovenia* **SIS-SAQ** *Sweden* **SQS** *Switzerland*

IQNet is represented in the USA by the following IQNet members: AFAQ, AIB-Vincotte Inter, CISQ, DQS, KEMA, NSAI and QMI

This document is only valid when presented with the member's certificate referenced above.
The issuing member indemnifies all other members from any claims arising from the existence of this document.
this certificate has been printed by IQG on: 1999-11-29

fig.2

International Certification Network certificate, issued on the basis of mutual recognition of the certificates issued by C.I.S.Q. Institutes and associated members of IQNET.



FIRE

BEHAVIOUR IN A FIRE

Establishing the behaviour of metal panels insulated with extruded polyurethane in a fire has always been difficult.
Additionally, the complexities of the various National Standards do not help matters.
This applies particularly to the "Reaction to the fire" and "Resistance to fire" concepts, which define the behaviour of materials.

REACTION TO FIRE

Reaction to fire is the degree to which a material resists combustion.
With regard to this, materials are assigned a class (0, 1, 2, 3, 4, 5): the higher the class, the higher the degree of combustion.
The fire reaction class is established through tests of small sized samples, which are carried out by following extremely strict standards, which vary from country to country.
For this reason, except for Class 0, which is an ISO standard, it is difficult to make any correlation between the classifications accepted by the various national standards.

Class 0

The non-combustibility test to assign Class 0 is carried out to the ISO-DIS 1182.2 standard, which envisages to a very small sample material to 750°C and checking the following parameters:

- Formation of flames
- Increase in temperature
- Loss of weight

In Italy, when the material passes this test, it is assigned Class 0, which in Germany is called A and in France MO.

Class 1-5

No organic substances achieve Class 0, so they must be classified with other methods. For the Italian laws, they are:

CSE RF 1/75/A	Suspended materials attacked by flames on both sides
CSE RF 2/75/A	Materials attacked by flames on one side
CSE RF 3/75/A	Materials subject to one flame and radiant heating

Methods CSE RF 1/75/A or CSE RF 2/75/A are used according to the type of material.
The Fire Reaction Class of the product is established by combining these categories.

The other European countries classify the fire reaction in a different way, and particularly:

GERMANY: B1 - B2 or B3 (DIN 4102)
The material is tested with a small flame (B2) and in a furnace as the walls of a fireplace. If it doesn't pass the B2 test, the last class (B3) is automatically assigned.

FRANCE: from M1 to M5 (ANFORM NFP 92-501)
The test is carried out by means of an "Epiradiateur", with the same attendance presence flames and head supplied by a radiating surface. The M1 class is the best one, while the M5 is the worst.

Ref: Ministerial Decree of 26.06.84 - Fire reaction classification and approval of materials for fire prevention purposes.

RESISTANCE TO FIRE

The resistance to fire is the ability of the building material to keep its mechanical stability, not to spread flames, or to have a thermal insulation for a certain period of time.
The resistance to fire is expressed as the time, in minutes, from the beginning of the heating period until the tested component ceases to comply with the requirements that it must meet.
The fire resistance test is carried out by following the instructions of Circular no. 91 of the Ministry of the Interior (1961), which requires the installation of a portion of wall (or floor) at the hole of a furnace. The furnace is heated following a well-defined temperature scale, and some parameters are controlled that help identify the fire resistance class of the material.
The following aspects are controlled:

1) Mechanical stability (symbol: R) 2) Resistance to flames, fumes and exhausts (symbol: E) 3) Thermal insulation (symbol: I)

The building material can have a variable fire resistance level, resulting from the combination of the REI, RE, R requirements.
In order to describe the potential behaviour of a building in case of fire, the regulation introduces a parameter, which is defined as the fire load. The final element is the quantity of heat that is developed from the combustion of all materials in a room: it is calculated considering the highest calorific powers of all combustible materials.
It is conventionally expresses in kg wood/m^2.
The building is divided into different classes according to its fire load.

Class 15 Class 30 Class 45 Class 60 Class 90 Class 120 Class 180

The Class number is correlated to the minimum time of resistance to fire, expressed in minutes, required from the building materials to guarantee the building a period of time in which some safety parameters are met.

Ref.: Circular of the Ministry of the Interior no. 91 dated 14.09.1961 / Circular of the Ministry of the Interior no. 53 dated 20.11.1982 / ISO - 834

THERMAL INSULATION

In the description of the several types of panels presented in this catalogue, the value of **K**, the thermal insulation coefficient, was given as a function of the types and the relevant thickness of the insulator used. It is probably useful, however, to give you some details for an easy comparison.

If x is the value of **K** for a polyurethane foam 5mm-thick panel, the thickness of other insulating materials that may be used is very different, when the same value of thermal insulation is required.

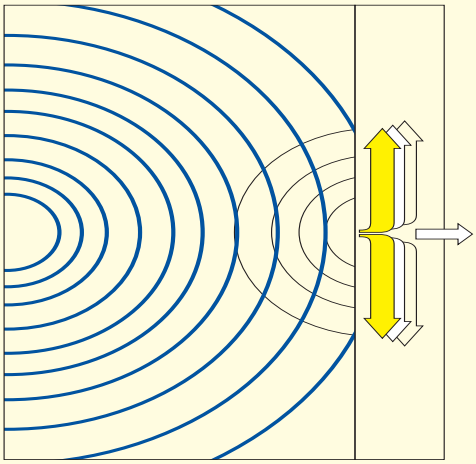
POLYURETHANE FOAM	5	cm	HARDBOARD	13	cm
POLYESTER	7,5	cm	WOOD BOARD	28	cm
ROCK WOOL	9	cm	CONCRETE BLOCK WALL	76	cm
CORK	10	cm	BRICK WALL	173	cm

The average densities used in the building industry were used for this comparison.

ACOUSTICS

SOUND INSULATION - SOUND ABSORPTION

The sound level is measured in decibels (dB), which are established by a given sound intensity and pressure, calculated in a logarithmic scale. When the sound is increased (reduced) by twofold the sound level increases (or decreases) by 10 dB.



Examples of sound pressure

1	- Light leaf rustling	20 dB
2	- Sound level in a reading room	30 dB
3	- Low-noise humming	40 dB
4	- Background noise at home	50 dB
5	- Standard conversation at the distance of 1 m	60 dB
6	- Background noise of computing machines	70 dB
7	- Compact sized car at 80 km/h	80 dB
8	- Automatic lathe	90 dB
9	- Turboprop engined airplane (inside)	100 dB
10	- Car Hooter	110 dB
11	- Pneumatic hammer	120 dB
12	- hydraulic press	130 dB
13	- 4-engine airplane (take-off)	140 dB
14	- Launching rocket	200 dB

SOUND INSULATION

The decibel scale is also used to measure the sound insulation. A barrier reduces the sound energy that hits it by a fixed ratio, which is constant for that type of building regardless of the sound source.

SOUND ABSORBING POWER

It is the capacity of the material to transform the sound energy into thermal energy (vibrations) and to reflect a very small portion. In environments built with traditional materials like bricks, marble and glass ....., which do not have a high sound absorbing power, the echo, caused by the wave reflection, is heard, which leads to the overall increase in the sound level, with often serious consequences for occupants. A pleasant and relaxing sensation for the ears can be experienced in acoustically designed rooms.

SOUND INSULATION POWER

It is the impossibility for the sound energy to pass through any material similar to other materials that are poor conductors of heat or electricity.
This capacity is a function of the mass of materials limited to some mechanical characteristics that make such materials, for specific frequencies, practically "transparent" to the sound and cause the echo effect.


HELLA