



MANUFACTURED IN:



TECHNICAL MANUAL

ISORAY

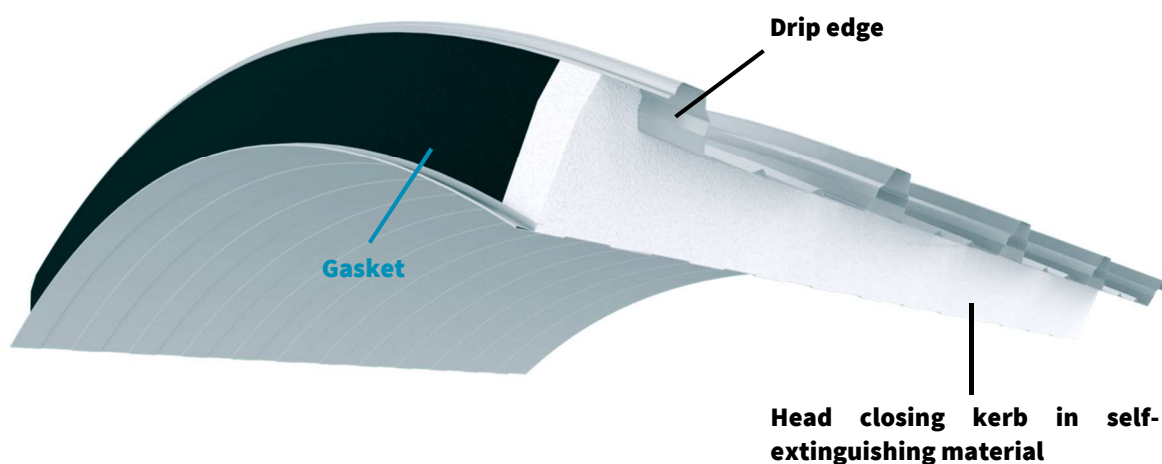
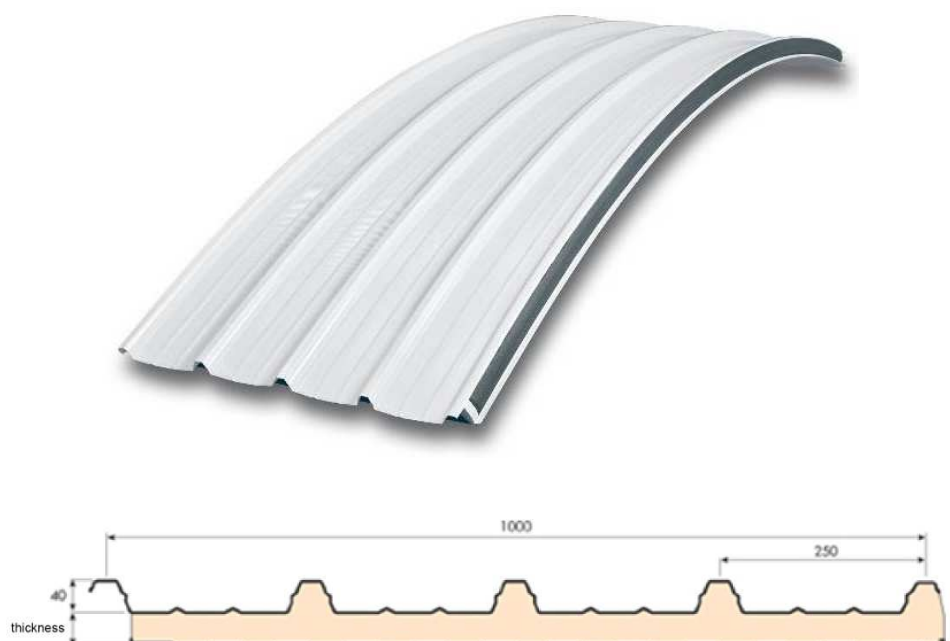
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ISORAY

DESCRIPTION

Double skin, self-supporting, 5-rib sandwich panel for roofing with polyurethane insulating core, pre-bent with radius of 3.3m and 6m radius. Designed to make roofs with flat prefabricated structures in prestressed reinforced concrete. It assures waterproofness, high thermal insulation, excellent intrados finish and high load performance. The 5 ribs assure high sturdiness and capacity.



GEOMETRIC FEATURES

	ISORAY3.3	ISORAY 6
Max. length	3.2	5.5
Curvature radius (m)	3.3	6
Useful Pitch (mm)	1000	
Insulating Thickness (mm)	40-50-60-80	40-50-60-80-100
External face	Ribbed metal sheet with 5 ribs: -rib height 40 mm -rib pitch 250 mm	
Internal face	micro-ridged lightly profiled metal sheet	

METAL FACINGS

- SENDZIMIR system hot dip galvanised steel by continuous process (UNI EN 10346) and pre-painted by means of a coil coating continuous process with different painting cycles based on end use (see: "Guide to Choosing Pre-painted").
- 3000 or 5000 series aluminium alloys with pre-painted finish with the cycles mentioned in the previous point, with a natural or embossed effect.
- In case of aluminium facings, these must be preferably applied on both sides: in fact, if different materials are used on the two sides, the panel may distort and bend due to the different thermal expansion coefficients of the faces.

PROTECTION OF THE PRE-PAINTED FACES

All pre-painted metal facings are supplied with an adhesive polyethylene protective film that prevents damage to the paint layer. If the material is specifically requested without protective film, Isopan assumes no liability in case of damages to the paint. The protective film that covers the pre-painted panels must be completely removed during assembly and, in any case, within sixty days after the material preparation.

It is also recommended not to expose the panels covered by a protective film to direct sunlight.

INSULATION

Made with expanded rigid polyurethane foam, having the following physical and mechanical features:

- Compressive strength ≥ 0.11 MPa (at 10% of deformation)
- Tensile strength ≥ 0.10 MPa
- Shear strength ≥ 0.10 MPa
- Thermal conductivity coefficient $\lambda = 0.022$ W/mK
- The 95% closed cells guarantee an anhygroscopic structure

Thermal conductivity coefficient K

Panel thickness (mm)	40	50	60	80	100
K [W/m²K]	0.45	0.38	0.32	0.25	0.20

PANEL WEIGHT

Sheet thickness (mm)		Nominal panel thickness (mm)				
		40	50	60	80	100
0,5/0,5	kg/m ²	10,3	10,7	11,2	11,9	12,7

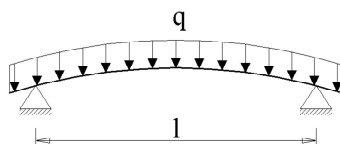
STATIC FEATURES

The resistance values refer to a panel assembled horizontally and subject to the action of a distributed load; the calculation method used by ISOPAN does not consider the thermal effects, which are verified by the designer. However, the creep effect is considered for the insulating material due to accidental overloads. Depending on the weather conditions of the installation location and the colour of the external face, if the designer feels a detailed verification of the stresses caused by thermal actions and long-term effects is necessary, he/she should contact the ISOPAN Technical Office. The designer is still responsible for checking the fastening systems, based on their number and the way they are placed.

Below are some examples of indicative load bearing tables:

The indications included in the following tables doesn't take into account the thermal load effects. Furthermore, the indicative values reported may not be used to replace the project calculations drawn up by a qualified technician, who will have to validate these instructions in accordance with the laws in the country of installation of the panels.

- panel on two supports:



ISORAY PANEL 3.3 STEEL SHEETS 0.5 / 0.5 mm						
INSULATING THICKNESS [mm]	CALCULATION GAP m					
	1	1.5	2	2.5	2.75	3
	ADMISSIBLE LOADS (STATIC DIAGRAM) [kg/mq]					
40	410	370	290	250	230	210
50	490	425	340	280	260	240
60	590	490	380	300	275	260
80	690	555	400	315	290	270

ISORAY PANEL 3.3 EXTERNAL ALUMINIUM SHEET 0.6 mm INTERNAL STEEL SHEET 0.5 mm						
INSULATING THICKNESS [mm]	CALCULATION GAP m					
	1	1.5	2	2.5	2.75	3
	ADMISSIBLE LOADS (STATIC DIAGRAM) [kg/mq]					
40	400	250	210	180	165	150
50	480	315	260	210	185	170
60	580	380	290	230	195	180
80	660	445	310	245	205	190

ISORAY PANEL 6 STEEL SHEETS 0.5 / 0.5 mm											
INSULATING THICKNESS [mm]	CALCULATION GAP m										
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	5.7
	ADMISSIBLE LOADS (STATIC DIAGRAM) [kg/mq]										
40	390	256	190	190	170	150	110	85	75	62	58
50	490	323	240	220	200	170	130	100	83	67	62
60	590	390	280	240	220	190	150	120	90	73	68
80	800	520	348	283	264	234	198	173	117	91	85
100	913	588	383	305	282	255	224	200			

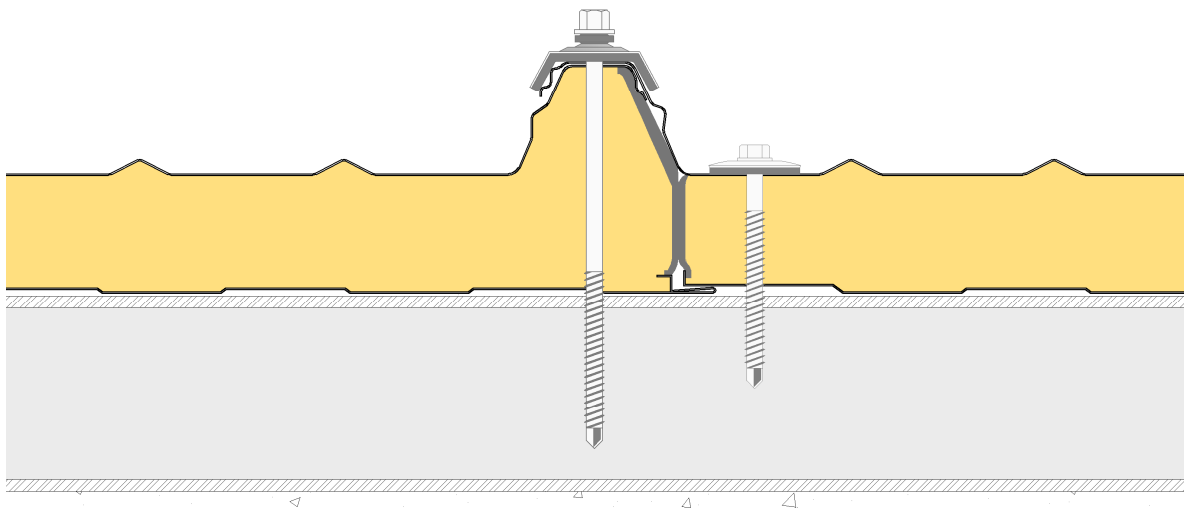
ISORAY PANEL 6 EXTERNAL ALUMINIUM SHEET 0.6 mm INTERNAL STEEL SHEET 0.5 mm											
INSULATING THICKNESS [mm]	CALCULATION GAP m										
	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	5.7
	ADMISSIBLE LOADS (STATIC DIAGRAM) [kg/mq]										
40	390	256	190	182	150	130	80	70	60	50	48
50	490	323	240	210	170	150	100	85	65	52	50
60	590	390	270	230	180	160	110	105	70	55	50
80	787	511	342	271	218	197	145	127	82	65	61
100	889	573	372	292	233	215	164	140			

Note: The red figures indicate admissible loads of the panel solidly anchored to the support.

JOINT

The joint is fitted with a continuous gasket, inserted during production. The joint shape is specifically designed to prevent leaks and reduce thermal bridges.

Isopan recommends using the PVC casing, which may be especially useful in concealing the thin gap created in the panel intrados in the coupling area. It may also prevent any water seepage and condensation phenomena, frequent in environments featuring especially high humidity and temperatures.



TOLERANCES (ANNEX D EN 14509)

- Metal sheet thickness: according to the reference standards for the products used
- Panel thickness: ± 2 mm
- Length: if ≤ 3000 mm ± 5 mm; if > 3000 mm ± 10 mm
- Width (useful pitch): ± 5 mm
- Chord line: ± 3 %
- Curvature radius: ± 2 %
- Off square: max. 3 mm
- Coupling (Dev. < 3000 mm): ± 4 mm
- Coupling (Dev. ≥ 3000 mm): ± 5 mm

BROOF

The external fire resistance classification system for roofing (Broof) is based on four test levels that simulate different fire triggering and development conditions:

- **t1**: burning brand alone
- **t2**: burning brand and wind
- **t3**: burning brand, wind and solar radiation
- **t4**: burning brand, wind and supplementary radiant heat

The panel may be Broof t3 certified; please contact the Isopan Technical Department to check what classifications have been obtained based on the type of insulating material and metal support.

WATER PERMEABILITY

The resistance of a sandwich panel assembly to driving rain under air pressure must be subjected to testing according to **EN 12865**.

The panel may be certified based on water permeability classification; please contact the Isopan Technical Department to check what classifications have been obtained based on the type of joint.

RESTRICTIONS OF USE

- A thermohygroscopic check should be performed during the design stage. In certain conditions (e.g. high indoor humidity level) condensation can appear on the internal face of the panel with consequent dripping inside the building. If these conditions persist long enough, they can accelerate the natural degradation of the organic facing of the face itself.
- **Due to solar radiation, the external face of the panel can reach relatively high temperatures. In some cases, it can reach a temperature of 80+90°C.** A high temperature gradient should cause the panel deflection the panel and wrinkle the metal sheet. The occurrence of the problem may be limited with an accurate design, taking into account environmental conditions, length, colour of the panels and the number of fastening elements. **(See the "Thermal expansion" section).**

GENERAL DESIGN INSTRUCTIONS

The roof panels generally require, during the design phase, a load-bearing structure able to absorb the external loading stress that will not submit the metal supports of the panels to excessive and permanent distortions to the detriment of their basic characteristics. When choosing panel types in the design stage, some parameters related to environmental actions should be considered, such as:

- **Wind action:** depends on the climatic zone of the building installation; the values vary depending on the wind speed, with consequent greater or lesser load pressure on the exposed surfaces (affects the type and number of panel fastening systems).
- **Snow load:** depends on the elevation above sea level compared to the one at the building construction site. The formation of water puddles resulting from snowmelt must be taken into account, which can expose the overlapping joints to being pressed under a load of water and possibly create infiltrations. It is recommended to implement appropriate tinwork systems (or suitable constructive measures) to ensure normal water run-off.
- **Thermal stress:** largely depends on the colour of the external surface of the panel and the building exposure, and can induce significant system deformations.
- **Atmospheric corrosion:** depends on the environment where the panels are installed (marine, industrial, urban, rural); mainly affects the degree of corrosiveness on the panel surfaces. In this regard, suitable metallic or organic facings should be chosen (refer to the available documentation or contact the Isopan Technical Department).
- **Rainfall:** Isopan recommends requesting the gutter arrangement in order to make a drip edge and prevent any leaks into the insulating material or inside the building. After completing panel and tinwork element assembly, make sure no foreign material or processing scraps are left on the facing elements, as these may trigger corrosion phenomena, prevent proper rainwater draining or create a build-up of aggressive, undesired substances.

In order to make up for possible lack of material due to damages during handling and assembly, Isopan recommends procuring spare panels (quantity equal to approximately 5% of the total).

THERMAL EXPANSION

All the materials used to build the roofs, especially metals, are subject to **thermal expansion and contraction** phenomena, due to temperature changes. The stresses due to metal sheet thermal expansions act on the roofing and can cause functional and structural product anomalies, particularly in case of:

- Significant panel length ($L > 5000$ mm);
- Solar radiation;
- Medium and dark colours;
- High panel thickness;
- Inadequate sheet thickness (< 0.6 mm).

These stresses are exerted on the head of the fastening element, with bend and shear stress in the event of fastening on rib. These are important parallel to the ribbing, as transversally, they are cancelled out by the flexibility of the metal sheet profile itself.

Material	Thermal expansion coefficient ($^{\circ}\text{C}^{-1}$)
Aluminium	23.6×10^{-6}
Steel	12.0×10^{-6}

- Linear thermal expansion coefficient values -

Type of facing		Surface temperature ($^{\circ}\text{C}$)	
		Min.	Max.
Insulated	Light	-20	+60
	Dark	-20	+80

Where "insulated" means that an insulating core is inserted between the external sheet and the structure; "light or dark" means the surface colour of the sheet.

- Temperature range -

For high surface temperature values, linear extension of the metal support must be absorbed by the system. If this is not so, tensions occur that discharge near the sheet section changes by effect of the shape variation. Furthermore, cyclical temperature changes associated to day-night or freeze-thaw differences cause uncontrollable cyclical stresses that fatigue the support elements. These stresses can exceed the material yield point (formation of bubbles) or the failure limit.

In the event of **Aluminium** panel installation, we recommend using stainless steel screws with cap and specific anti-electrolyte corrosion washer.

For anything that is not expressly indicated, refer to the **Isopan General Sales Conditions** and annexes.

FASTENING INSTRUCTIONS

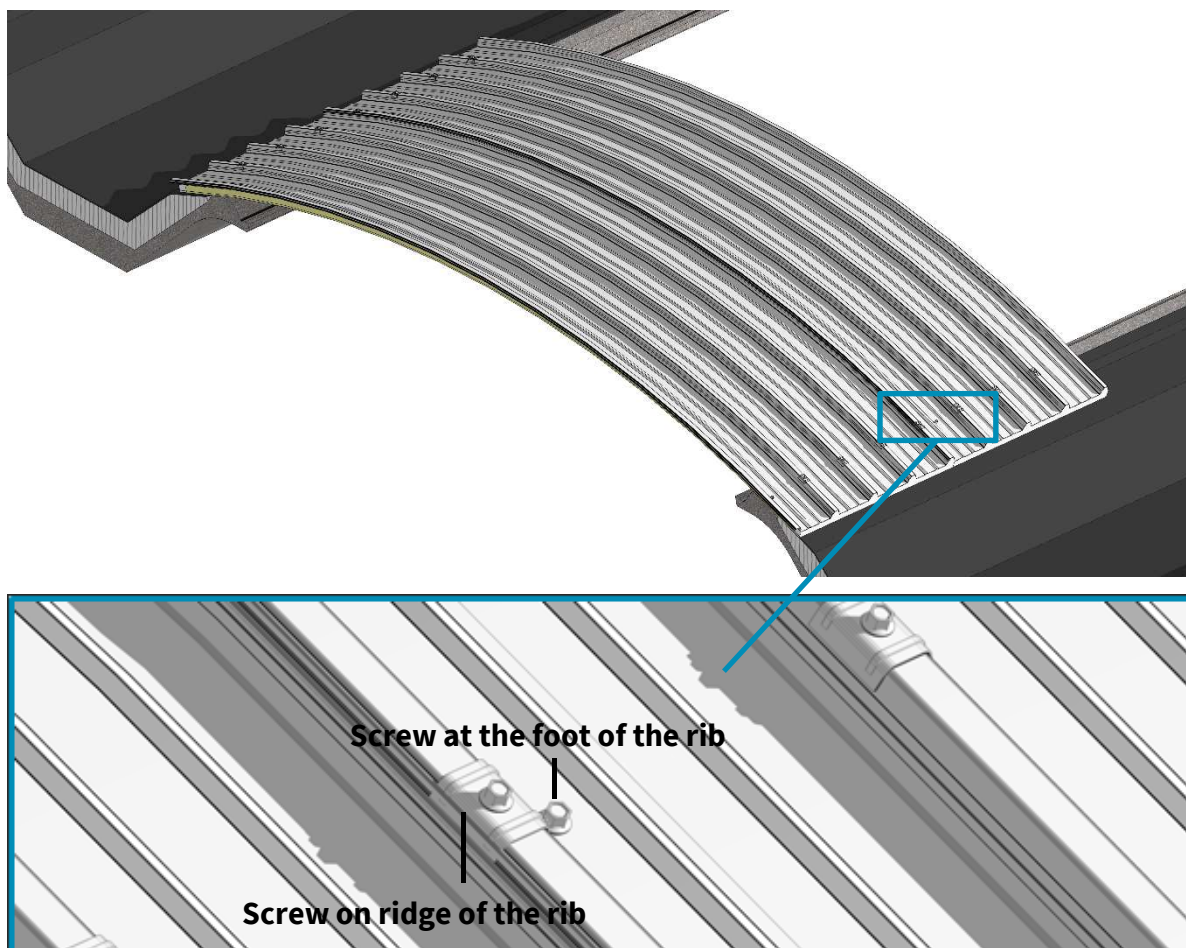
The purpose of the fastening elements is to efficiently anchor the panel to the load-bearing structure; the type of fastening unit depends on the type of face. The number and position of the fastening elements must guarantee resistance to the stresses induced by dynamic loads, which can also exist in depression.

Appropriately coated carbon steels or austenitic type stainless steels must be chosen as suitable materials to fasten panels. Pay particular attention to the compatibility of the steel and aluminium materials in order to prevent the formation of galvanic currents.

Roof panel fastening

The panels must be installed opposite the direction of the prevailing winds, frequently checking to make sure they are parallel and aligned. The number of fastenings depends on the loads connected to the geographical area.

Pay particular attention to the compatibility of the steel and aluminium materials in order to prevent the formation of galvanic currents.



***Note: should the panels not fit perfectly between the ribs, Isopan recommends applying stitching screws.**

Fastening methods

Fastening varies according to the design to be constructed and on the panel application system at the construction site. Isopan recommends contacting its Technical Department to make a correct choice according to use.

Adjacent panels must be fastened independently, placing a fastening unit at the foot of each empty overlapping rib. This operation promotes the best possible alignment of the sheets to the intrados, which must however be carefully monitored during site installation. One fastening unit must be placed for each overlapping rib with relevant cap.

For gaps exceeding 4m, in order to maintain appropriate overlap closure, apply additional intermediate fasteners in the direction of the panel gap, for each overlapping rib, using short stitching screws or appropriate rivets. One of these fastenings is to be applied on the ridge of the rib every metre.

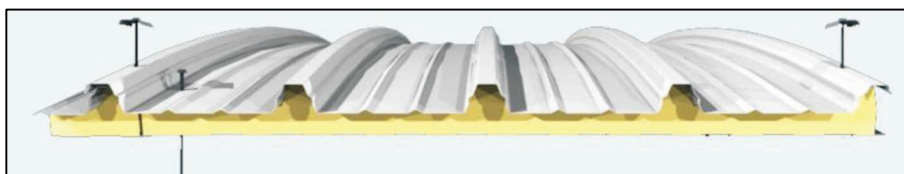
The product's load-bearing structures that will support the roof made with curved panels must be accurately checked before installing the roof. The following features are especially significant:

- Ensure there is no warpage between supports (beams not slanting);
- Ensure perfect planarity of supports;
- Ensure there are no level differences in supports at the ends of each individual panel.

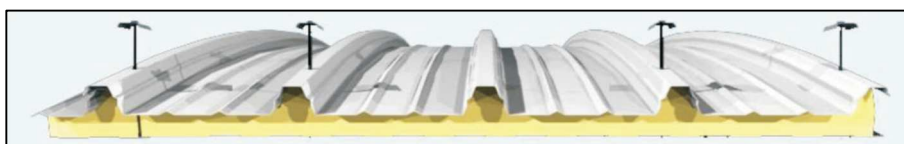
Failure to comply with even just one of the above requirements could give rise to incorrect installation, which would manifest itself in excessive misalignment at the intrados of the curved panel internal surfaces. This phenomenon would give rise, in these cases, to the unsightly "spacing" between the borders of adjacent panels, which would be unavoidably conspicuous, despite the panels having been manufactured up to the highest standards and duly tested -- in other words, when taken individually, the panels could easily fall within the indicated tolerances.

Isopan S.p.A. therefore disclaims any liability for installations that do not adhere to and/or take into account the above indications.

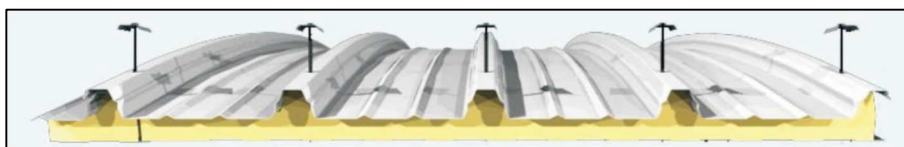
Fastening requirements



Span (m)	Admissible load (kg/m ²)
L < 3	< 130



Span (m)	Admissible load (kg/m ²)
L < 3	> 130
3 < L < 4	< 130

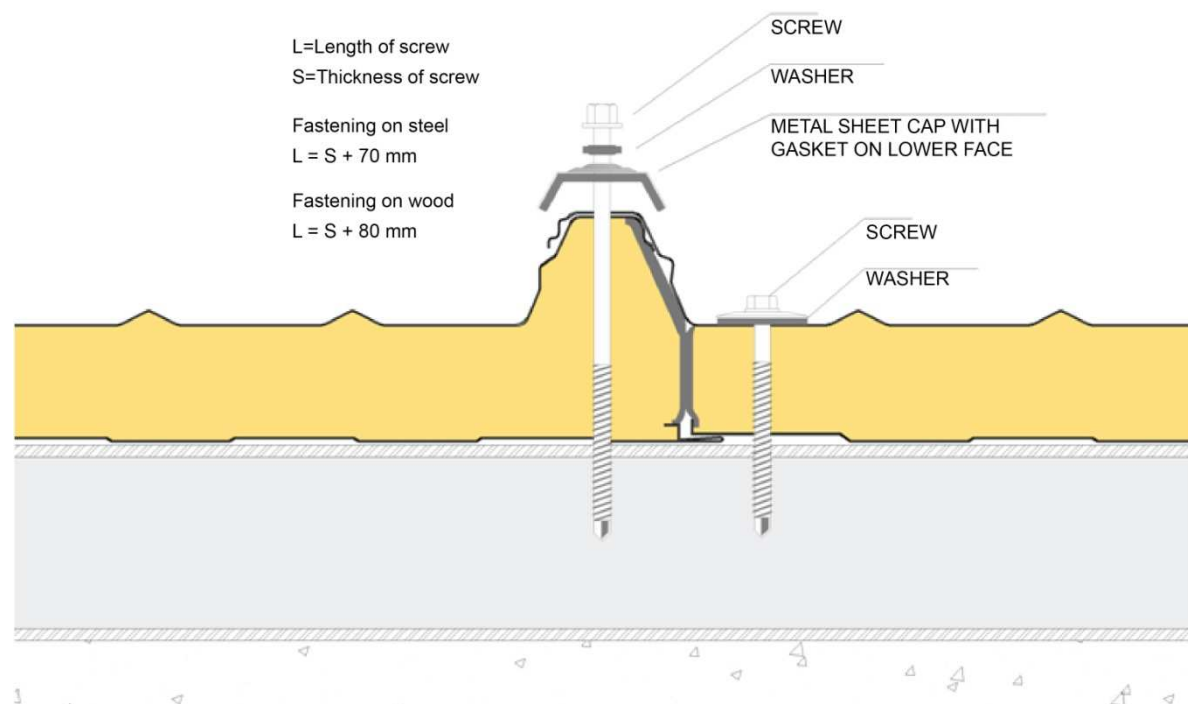


Span (m)	Admissible load (kg/m ²)
3 < L < 4	> 130
L > 4	Any

Upon request, as an alternative to the above self-threading screws, Isopan S.p.A. supplies other sets of screws that are better suited to specific site requirements.

Screw length

The proper screw length depends on panel thickness and on the type of support (steel, wood). When installing roof panels, caps must be used on the overlapping rib.



SPECIFICATIONS OF PANEL FASTENING FOR WALKABILITY

It is specified that walkability limit refers to a non-permanent capacity value, concerning occasional worker access for installation, fastening or special maintenance, such as visual inspection of the roof condition.

ASSEMBLY INSTRUCTIONS

The correct sequence of assembly operations is the following:

Preliminary operations

- Verify that the supports are properly aligned.
- Pay particular attention to the contact points between the supports and the panel support plates to avoid phenomena linked to electrochemical corrosion if incompatible metals are coupled. For this purpose, elastomer or expanded resin strips may be applied as separators.
- Ensure that the site area has appropriate storage and handling capacity in order to prevent material damage.
- Use suitable tools (toothed circular saw, jigsaw, shears, nibbler) for on-site cutting operations. The use of equipment that produces metallic sparks (e.g. abrasive discs, disc cutter) is absolutely not recommended.
- Use suitable handling systems, particularly for long or heavy panels, in order to prevent safety risks on site and damages to the product.

The Isoray standard production panel is fitted with “drip edges” of 50 mm each, whose purpose is to prevent any water from leaking into the insulating material. Head overlapping of 2 Isoray panels is not possible.

Using acetic silicones is prohibited as they tend to attack the pre-painted galvanised face and form incipient oxidation. It is best to use single component sealant silicones with neutral curing that tend to harden due to the air humidity and, being free of solvents, do not attack the paint.

Assembly

- Install gutters and any sub-ridges and connection ridge caps.
- Remove the protective film from the panels, if any.
- Ensure perfect orthogonality to the underlying structure.
- Systematically fasten the elements after ensuring they match correctly. All the residual materials must be quickly removed, with special attention to metallic residues.
- Check and clean the roof, with particular attention to metal scraps, fastenings and fittings with door and window frames. After completing panel and tinwork element assembly, make sure no foreign material or processing scraps are left on the roof, as these may trigger corrosion phenomena, prevent proper rainwater draining or create a build-up of aggressive, undesired substances.

PACKAGE COMPOSITION

The panels are normally supplied packaged and wrapped with extensible polyethylene film; the standard composition of the package is as shown below:

ISORAY 3.3		
Panel thickness (mm)	from → to (mm)	No. of panels per package
40	0 → 1900	13
	1900 → 2800	12
	2800 → /	11
50	0 → 1100	12
	1100 → 2400	11
	2400 → /	10
60	0 → 2400	10
	2400 → /	9
80	0 → 2200	9
	2200 → 3400	8
	3400 → /	7

ISORAY 6		
Panel thickness (mm)	from → to (mm)	No. of panels per package
40	0 → 2500	13
	2500 → 3800	12
	3800 → 4700	11
	4700 → 5600	10
	5600 → /	9
50	0 → 1600	12
	1600 → 3400	11
	3400 → 4500	10
	4500 → 5500	9
	5500 → /	8
60	0 → 3200	10
	3200 → 4600	9
	4600 → 5600	8
	5600 → /	7
80	0 → 1600	9
	1600 → 3800	8
	3800 → 5200	7
	5200 → /	6
100	0 → 3400	7
	3400 → /	6

Package compositions and types of packaging other than standard must be explicitly requested when ordering.

TRANSPORT AND STORAGE

Lorry loading

- The packages of panels are loaded on lorries, usually two in width and two in height. The packages include polystyrene spacers at the base, which are thick enough to allow for the lifting straps.
- The goods are arranged on the vehicles so as to ensure safe transportation and integrity of the material, in accordance with the requirements of the carrier, who is solely responsible for load integrity. Pay special attention to ensure the weight bearing on the bottom package, as well as the pressure exerted in the tying points, do not cause damage and the straps do not distort the shape of the product in any way.
- Isopan assumes no liability for loading lorries that are already partially occupied by other materials, or that do not have a suitable loading floor.

Customers who will pick up the material must instruct the drivers accordingly.

Lorry unloading with crane

- Use any type of crane equipped with spreader beam and equipped straps. Isopan can advise customers on the choice of spreader beams and straps. By using correct lifting systems, the panels will not be damaged.
- Never use chains or metal cables for lifting under any circumstances. As a general rule, sling the packages leaving about 1/4 of their length protruding from each end.

Lorry unloading with forklifts

- If the lorries are unloaded using a forklift, the length of the packages and their possible bending should be taken into account in order to prevent damages to the bottom of the package.
- The forks must be wide and long enough in order not to damage the product. When possible, protective material against surface abrasion and scratches should be applied between the fork and the package.

Indoor storage (Annex A)

- The materials must be stored in ventilated indoor facilities that are free of dust and humidity and not subject to temperature changes.
- Moisture that can penetrate (rain) or form (condensation) between two panels can damage the facings since it is particularly aggressive on metals and facings, with subsequent oxidation.
- Pre-painted facings may be more exposed to the negative consequences of combined heat/humidity conditions.

Outdoor storage (Annex A)

- If the packages and accessories are stored outdoors, the surface must absolutely be inclined longitudinally to prevent moisture from accumulating and to allow water run-off and natural air circulation.
- If storage is not shortly followed by pick-up for installation, it is advisable to cover the packages with a protective tarp, assuring impermeability as well as adequate ventilation to prevent condensate from accumulating and puddles of water from forming.

Storage terms (Annex A)

- Based on experience, in order to maintain original product performance, continuous indoor storage in closed and ventilated facilities should not exceed six months, while outdoor storage should never exceed sixty days from the date of production. These terms refer to the properly stored product, as instructed in the "storage" chapter in Annex A. However, the materials must always be protected against direct sunlight, as it may cause alterations.
- In case of transport in containers, the products must be removed from the containers as soon as possible and, however, no later than 15 days from the loading date, to prevent deterioration of the metal supports and organic coatings (e.g. blistering). Moisture inside the container must absolutely be avoided. Upon customer request, Isopan can provide special packages that are more suitable for transport in containers.

PACKAGING

Isopan suggests carefully choosing the type of packaging depending on destination, type of transport, conditions and length of storage.

To choose the correct type of packaging, please refer to the "**Packaging and Services**" document on www.isopan.com.

DURABILITY

Product durability depends on the intrinsic features of the panel used in relation with its final use. The panel, including the features of the metal supports, must be chosen after the roof has been properly designed.

In this regard we recommend, if necessary, using the Isopan documentation, also available on the web (www.isopan.com), and/or the reference standards.

MAINTENANCE

All types of facings, including those made with metal sandwich panels, require maintenance.

The type and frequency of maintenance activities depend on the product used for the external facing (steel, aluminium); in any case, we recommend periodically inspecting the building (at least once a year), in order to assess its conditions.

In order to maintain the aesthetic and physical properties of the elements and to extend the efficiency of the protective facing, it is also recommended to regularly clean the roof, paying special attention to the areas that could facilitate rain water stagnation, where substances that are harmful to the durability of the metal support may be concentrated.

If you notice any problems following an on-site inspection, you must react immediately in order to restore the initial general conditions (e.g. restoring the paint where there are local abrasions or scratches).

Upon customer request, Isopan can provide useful information to solve some problems related to this topic.

SAFETY AND DISPOSAL

Pursuant to Directive 68/548/EEC the sandwich panel does not require labelling. To meet customer requirements, Isopan has drawn-up a "Technical details for safety" document, to be referenced for any kind of information related to safety.

Caution: all information contained in the product data sheets must be validated by a qualified technician according to the laws in force in the country where the panels are installed.

Technical specifications and features are not binding. Isopan reserves the right to make changes without prior notice; the latest documentation is available on our website www.isopan.com. For whatever is not explicitly specified herein, please refer to the "General conditions of sale of the corrugated metal sheets, insulated metal panels and accessories".

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Annex A

LORRY UNLOADING WITH CRANE

For lifting, the packages must always be sling in at least two points. The distance between them must be no less than half the length of the packages.

Lifting should be possibly carried out using synthetic fibre straps (Nylon) no thinner than 10 cm, so that the load is distributed on the strap and does not cause distortion.

(see Figure 1)

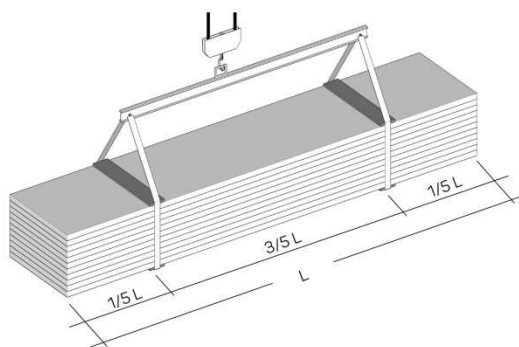


Figure 1

Suitable spacers must be placed under and above the package, made of sturdy solid wood or plastic elements to avoid direct contact of the strap with the package.

These spacers must be at least 4 cm longer than the width of the package and be at least as wide as the strap.

Make sure that the straps and supports cannot move during lifting and that manoeuvres are performed cautiously.

LORRY UNLOADING WITH FORKLIFTS

If the lorries are unloaded with a forklift, take into account the length of the packages and their possible bending in order to avoid damaging the bottom of the package and/or to the extreme failure limit of the panels.

We recommend using forklifts that are suitable for handling panels and similar products.

STORAGE

The packages must always be kept off the ground both in the warehouse and, more so, at the construction site. They must have plastic foam supports with flat surfaces longer than the width of the panels and at a distance adequate to the features of the product.

The packages should preferably be stored in dry facilities to prevent stagnation of condensation water on inner, less ventilated, elements, which is particularly aggressive on metals, resulting in the formation of oxidation.

The panels must be stored in dry ventilated facilities; should this not be possible, open the packages and ventilate the panels (spacing them from one other). If the panels remain packaged outdoors, the galvanised facing may oxidise (white rust) even after a few days, due to electrolytic corrosion.

The panels must be stored to facilitate water run-off, especially when it is necessary to temporarily store them outside (see Figure 2).

If storage is not shortly followed by pick-up for installation, it is advisable to cover the packages with protective tarps.

To maintain original product performance, continuous indoor storage in ventilated facilities should not exceed six months, while outdoor storage should never exceed 60 days. Packages stored at a height must always be properly bound to the structure.

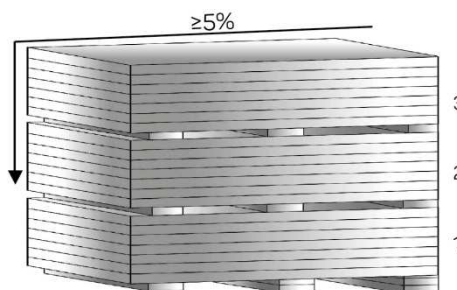


Figure 2

PRE-PAINTED FACES



In case of prolonged storage, the pre-painted products must be stored indoors or under a canopy. There is the risk that stagnant humidity may attack the paint layer, causing it to detach from the galvanised support. It is not advisable to let more than two weeks elapse from when the products were stored at the site.

In case of container transport, the products must be removed from the container within 15 days from the loading date in order to prevent the metal supports from deteriorating.

PANEL HANDLING

The panels must be handled using adequate protection equipment (safety shoes, gloves, overalls, etc.) in compliance with current regulations.

The individual element must always be manually handled by lifting the element without dragging it on the ground and turning it sideways beside the package; it must be transported by at least two people according to the length, keeping the element on its side. (see Figure 3)

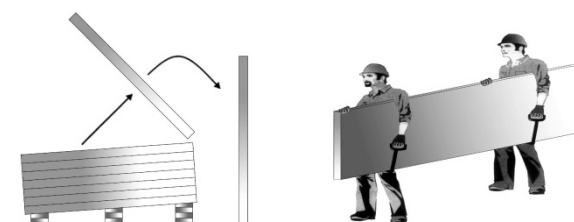


Figure 3
 Handling equipment as well as gloves must be clean and such as not to damage the items.

INSTALLATION

The panel installation personnel must be qualified and know the correct technique to perform the work in a workmanlike manner. If required, the seller can provide appropriate guidance and instructions.

The installation personnel must be equipped with footwear with soles that do not damage the external surface of the panel.

On-site cutting operations must be done with suitable tools (jigsaw, shears, nibbler, etc.).

We do not recommend using tools with abrasive discs.

To fasten the panels, it is advisable to use devices that can be provided by the seller.

Tighten the screws using a screwdriver with torque limitation.

For roofs with pitch elements without intermediate joints (overlaps), the slope should usually be no less than 7%. For slopes below that, the seller's requirements must be implemented.

In case of head overlaps, the slope should take into account the type of joint and material used, as well as the specific environmental conditions.

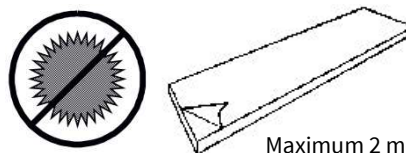
During panel assembly and, in particular, in roofs, it is necessary to immediately remove all residual materials paying special attention to metal ones that may cause early deterioration of the metal faces by oxidising.

PROTECTIVE FILM

The pre-painted metal facings are supplied upon request with adhesive polyethylene protective film that prevents damage to the paint layer.

The protective film covering the pre-painted panels must be completely removed during assembly or, in any case, within 60 days from material preparation.

It is also recommended not to expose the panels covered with protective film to direct sunlight.



Maximum 2 months

For the panels expressly requested without protective film, special care is required during handling on site and installation.

MAINTENANCE

The main routine maintenance operation is cleaning the panels. The panel surfaces that, following visual inspection, are found to be dirty or oxidised can be washed with soap and water using a soft brush. The cleaning water pressure can be applied up to 50 bar, but the jet must not be too close or perpendicular to the surfaces. Near the joints the water must be sprayed at a sufficient angle not to undermine their tightness.

YEARLY CHECKS OF THE ISOPAN PANELS

WHAT TO INSPECT	CORRECTIVE ACTIONS
Conditions of the pre-painted surfaces (cracks and colour unevenness)	Assess the condition of the surfaces Repaint where possible
Scratches and dents	Repaint and repair dents
Fastening screws	Remove a screw and check if oxidised Tighten the screws where necessary
Angle parts of cut	Check the state of oxidation Clean and repaint

These provisions are taken from the General Conditions of Sale.



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INSULATING DESIGN

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