ISOPAR®

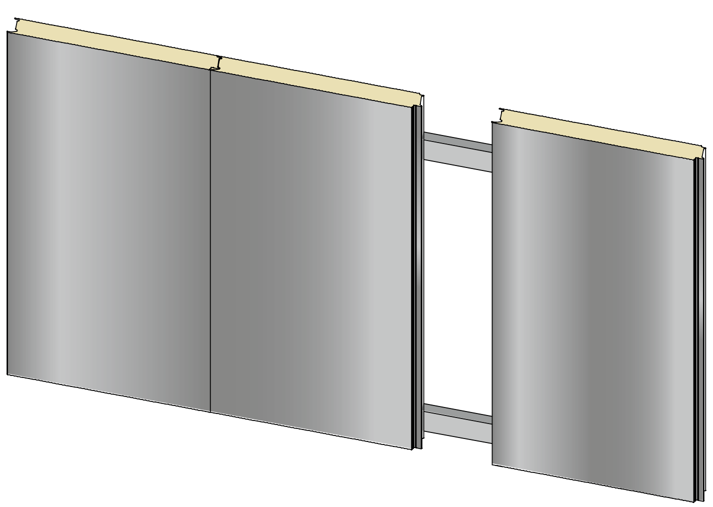
PRODUCT FOR WALLS

MILANO
lattonedil
INSULATES AND PROTECTS OVER TIME

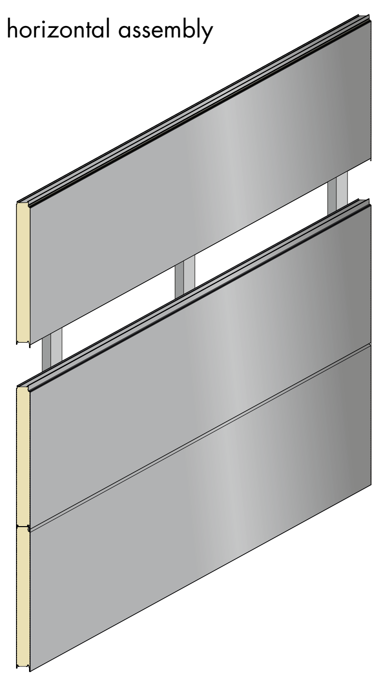
ISOPAR®

ISOPAR® is a self-bearing flat panel with exposed fastening, specific for moving walls, pre-fabricated boxes, refrigerators, exhibition stands, sliding doors, counter ceilings, and is an ideal component for designs requiring a light, solid and insulating product.
The panel can be installed vertically or horizontally:

Example of vertical assembly



Example of horizontal assembly



GEOMETRIC CHARACTERISTICS OF ISOPAR® WALL PANEL

PRODUCT	ISOPAR®
LENGTH (m)	Upon request of continuous production
USEFUL WIDTH (mm)	1000
PANEL THICKNESS (mm)	25 30 35 40 50 60 80 100 120 150 180 200
EXTERNAL SUPPORT MATERIAL AND AVAILABLE THICKNESS (mm)	Steel (stainless or galvanized) from 0.4 to 1 Aluminium from 0.6 to 1
INTERNAL SUPPORT MATERIAL AND AVAILABLE THICKNESS (mm)	Steel (stainless or galvanized) from 0.4 to 1 Aluminium from 0.6 to 1

METAL SUPPORTS AVAILABLE FOR ISOPAR® PANEL

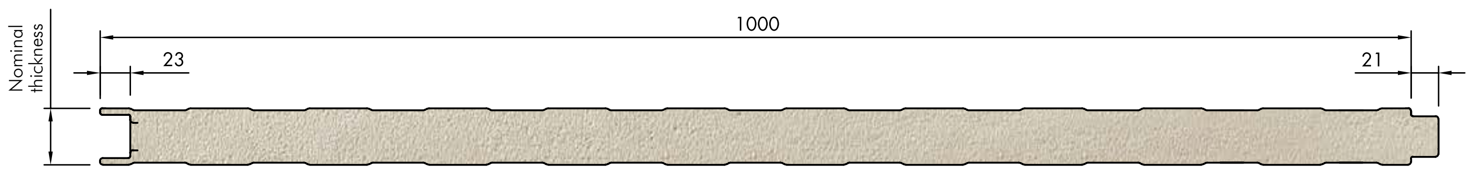
- **Galvanised steel:** Sendzimir **(UNI EN 10346)** continuous hot process with phosphating treatment for improved protection against oxidation. Painting consisting of a coat of primer and a film of acrylic paint (or PVDF) on the external surface and a coat of primer to favour the adhesion of the polyurethane on the internal surface.
  Natural or embossed finish.

- **Aluminium alloy:** series 3000 or 5000 with painting consisting of a coat of primer and a film of acrylic paint (or PVDF) on the external surface and a coat of primer to favour the adhesion of the polyurethane on the internal surface.
  Natural or embossed finish. It is suggested to use the same material for the internal and external support in order to have the same thermal dilation coefficients.

- **Stainless steel AISI 304 or 316:** stainless steel AISI 316 is particularly resistant to corrosion in aggressive environments: marine areas, at the centre of big cities subject to high industrial pollution, in atmospheres rich of chlorine.
  The internal surface is treated mechanically, creating roughness to favour the adherence of the polyurethane.
  The choice of the stainless steel may cause imperfections on the reflecting surface.

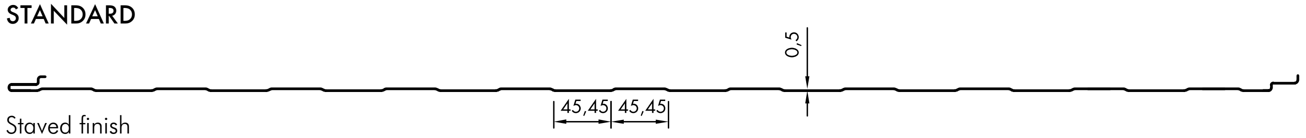
- **Pre-varnished stainless steel:** painting consisting of a coat of primer and a film of acrylic paint (or PVDF) on the external surface and a coat of primer to favour the adhesion of the polyurethane on the internal surface.

ISOPAR® PANEL SECTION



MICRO-RIBBING OF THE LOWER SIDE OF ISOPAR® PANEL

STANDARD

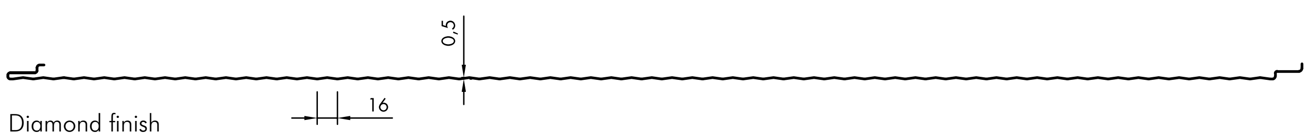


Staved finish

UPON REQUEST

Striped finish

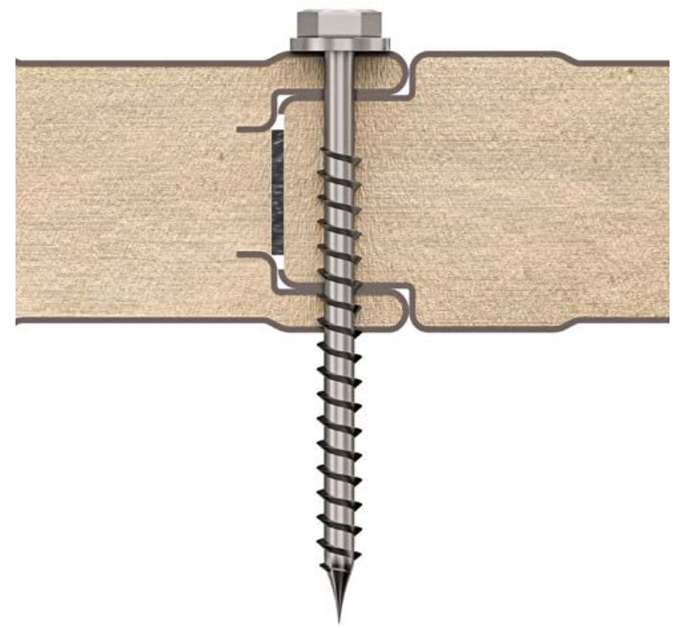
Smooth finish



Diamond finish

JOINT

The geometry of the joint of the wall panels with exposed fastening is specifically studied and built to ensure utmost product functionality. The joint features a continuous sealant, applied upon request during the production phase.



TOLERANCES

EN 14509 standard foresees the following tolerances which must be abide to by the manufacturers of sandwich panels:
The thickness of the finishes must comply with the reference standard for the products used;

1. The panel thickness is in nominal value, considering:
   ± 2 mm of tolerance for D ≤ 100mm.
   ± 2% of tolerance for D ≤ 100mm.

2. The panel length foresees the following tolerances:
   ± 5 mm if panel ≤ 3000 mm.
   ± 10 mm if panel > 3000 mm.

3. The profile pitch foresees the following tolerances:
   ± 2 mm if h ≤ 50mm.
   ± 3 mm if h > 50 mm.

DESIGN GUIDELINES

A bearing structure must be foreseen since the design phase for the use of the wall panel, able to absorb external load stresses and avoid deformations of the panels' metal finish.
Sector operators are therefore invited to consider the following parameters:

- Wind load. For the calculation, refer to applicable laws and **UNI EN 1991-2-4** standard. Italy was divided in 9 areas, each one was associated a reference speed ranging from 25 m/s to 31 m/s. The negative wind action, the depression, could sum to a potential internal pressure, thus causing stresses exceeding 2 KN/m^2.
  Close attention must be paid to the fastening system.
- Thermal dilation, mainly caused by the heat of the external side of the panels and exposure of the same to solar radiation;
- Aggressive action of atmospheric agents. The supports and finishes must be chosen keeping in consideration the particular environment where they will be installed, according to the classification set forth by UNI 8627 standard, point 7.1.7:
  - Marine
  - Industrial
  - Urban
  - Rural

Moreover, it is necessary to know the concentration of UV rays that may damage unsuitable paints.
Lattonedil® recommends its customers to calculate stock panels, equal to about 5% of the total supply, to repair any damages to the material during the handling and assembly phase.

THERMAL DILATIONS

Thermal dilation and contraction are recurring phenomena in the construction field: all the materials used to build the walls indeed, are subject to this phenomenon and may cause functional or structural anomalies in the finished product, especially in the following cases:

– Panel length exceeding 5000 mm;
– High solar radiation;
– Dark colours;
– High panel thickness;
– Unsuitable thickness of metal finishes.

Material	Linear thermal dilation coefficient (°C-1)
Stainless steel	17 x 10^{-6}
Steel	12 x 10^{-6}
Aluminium	23,6 x 10^{-6}

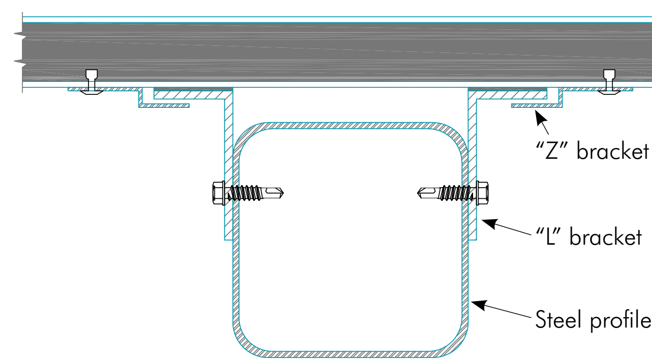
Example of elongation and coupling calculation due to dilation
Installation data:
Roof material: Aluminium
Pitch length: 10m.
Temperature of the metal upon assembly: 50 °C.

A thermal excursion of 50°+10° = 60°C
is obtained with a winter temperature of -10°C.
The aluminium component will shrink by:
23,6 x 10^{-6} (mm/°C al m) x 60 (°C) x 10 (m) = 14,16 mm

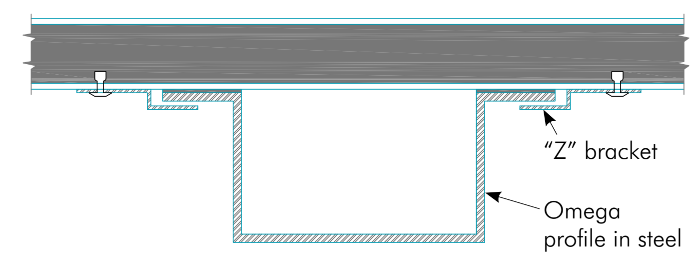
The linear dilation or contraction of the metal finish, which occur when the external side of the panel is exposed to intense solar radiation or subject to significant thermal excursions such as the transition from day-night and/or frost-melting, must be absorbed by the system.
Otherwise, the phenomenon triggers increasing stresses that discharge near the changes of profile section causing the deformation of the panels such as, for example, the formation of bubbles or cracks that compromise structural and mechanical characteristics. To avoid these issues, the following measures can be adopted:
– Do not use dark colours to manufacture long panels;
– Use suitable thicknesses for metal supports;
– Favour the panel segmentation;
– Opt for a suitable fastening solution, according to Lattonedil® assembly instructions.

Intermediate release to clear cutting actions:

Solution 1



Solution 2



COLOURS FOR SUPPORTS

STANDARD COLOURS

White-grey

SPECIAL COLOURS

RAL 9010 RAL 1015 RAL 1019 RAL 7006

RAL 7015 RAL 7016 RAL 7022 RAL 8011 RAL 8017

RAL 5024 RAL 5010 RAL 5008 RAL 5011 RAL 9006

RAL 1037 RAL 6021 RAL 6011 RAL 6005 RAL 9007

Wood colour

THE COMPLETE SAMPLE BOOKLET OF RAL COLOURS IS AVAILABLE UPON REQUEST

Request information at our offices to create Isopar® panel with any RAL colour.

For information concerning the actual stock availability, thickness of supports that can be produced, non-standard colours, warranties and types of supports, please contact our Technical Office.
Colour may differ based on the production lot, therefore the evenness of the tone can be guaranteed with supports in the same production lot.

PROTECTION OF THE SUPPORTS

Lattonedil® supplies the finished product with protective film in adhesive polyethylene to protect pre-painted metal supports.
The film must be completely removed during the assembly phase or, at the latest, within thirty days from the preparation of the material.
The panels supplied with protective film must not be exposed to direct sun light.
Upon explicit customer's request, Lattonedil® supplies the finished product also without protective film. In this case, Lattonedil® shall not be held liable for potential damages to the painting layer of the metal supports.

FIRE BEHAVIOUR

FIRE REACTION

EN 13501-1 European standard "Fire classification of construction products and building elements" provides for the fundamental parameters to catalogue construction materials based on fire reaction, meaning how a combustible material performs in case of fire.
7 main classes (Euro- classes) were defined and identified with a letter, A1 (non-combustible materials), A2, B, C, D, E and F (non-classified products), to which penalising sub-classes are associated concerning dripping, intended as production of drops and flaming particles, (d0, d1 and d2), and those concerning the production of smoke, in terms of opacity and reduction of visibility, (s1, s2 and s3).

SMOKE PRODUCTION	
s1	Absence of smoke emissions
s2	Weak smoke emission
s3	Intense smoke emission

DRIPPING	
d0	Absence of flaming particles
d1	Small quantity of flaming particles
d2	Many flaming particles

FIRE BEHAVIOUR FROM THE EXTERIOR TO THE INTERIOR
B ROOF POLYURETHANE PANELS

PANEL	THICKNESS MM	
ISOPAR B2 Steel 0,4 + Steel 0,4	FROM 30 TO 200	B-S2, d0

FIRE BEHAVIOUR CLASSES

POLYURETHANE PANEL	THICKNESS MM	FIRE REACTION	FIRE RESISTANCE 30'	60'	90'	120'	180'
ALL TYPES OF LATTONEDIL PRODUCTS		F (pursuant to EN-13501/1 standard)					

Lattonedil® Technical Office is available to provide further information in this regard.

CHARACTERISTICS OF THE INSULATION MATERIAL OF ISOPAR® PANEL

Isopar® consists of an insulating core in thermo-setting polyurethane foam. The reaction, of exothermal type, brings the raw material initially in liquid state, to the solid state with high adhesion properties.
The characteristics are as follows:
– Polyurethane foam (PUR) applied with continuous method
– Density "with film": 40 kg/m^3
– Density "without film": 36-38 kg/m^3
– Useful thermal conductivity λ = 0.023 W/mK
– Adhesion value: 1 kg/cm^2
– Resistance to compression at 10% of deformations: ≥ 1.2 kg/cm^2
– Resistance to traction: ≥ 0.10 kg/cm^2
– Resistance to cut: ≥ 0.10 kg/cm^2
– Waterproofing: ≥ 95%
– Operating temperature: from -40°C to +80°C

Thermal transmission coefficient "U"
It is a compulsory parameter to obtain the EC marking of the double-support panels (according to **UNI EN 14509** standard) and defines the panel's tendency to exchange energy: the grater this parameter, the higher is the quantity of energy exchanged, therefore the lower the insulating power.

PANEL THICKNESS (mm)	25	30	35	40	50	60	80	100	120	150	180	200	220	240
U TRANSMISSION (W/m^{2}K)	0,84	0,71	0,62	0,55	0,44	0,37	0,28	0,22	0,19	0,15	0,12	0,11	0,10	0,09

Thermal resistance coefficient "R"
The thermal resistance coefficient represents the panel's ability to resist heat transmission, the higher is the thermal resistance, the better will be the component's insulation.

PANEL THICKNESS (mm)	25	30	35	40	50	60	80	100	120	150	180	200	220	240
THERMAL RESISTANCE R (m^{2}K/W)	0,73	0,61	0,53	0,47	0,38	0,32	0,24	0,19	0,16	0,13	0,11	0,10	0,09	0,08

RECOMMENDATIONS OF USE

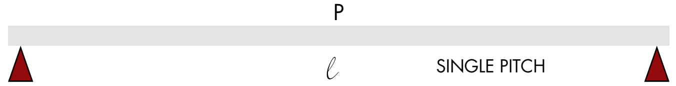
– Lattonedil® recommends checking the thermohygrometric state of the place where the panels will be installed during the design phase (humidity rate, thermal variations) **to prevent the formation of condensate on the internal side of the panel**, and consequent dripping inside the room.

– Lattonedil® informs that solar radiation may cause a significant increase of the temperature in the external side of the panels, up to 80-90°C when built with dark colours.
This may lead to the **product deformation and wrinkling of the sheet**. Therefore, Lattonedil® recommends to evaluate the environmental conditions during the design phase and define the panel characteristics accordingly (length, colour, fastening systems) to avoid this phenomenon (see par. "thermal dilations").

STATIC BEHAVIOUR

UNI EN 14509 European standard defines self-bearing:
"Panel capable of supporting, by virtue of its material and shape, its self-weight and in the case of panels fixed to spaced structural supports, all applied loads (snow, wind, air, pressure), and transmitting these loads to the supports".
The static characteristics of Isopar® comply with the above definition. The maximum distances between the supports of a panel installed horizontally are indicated as an example, according to the panel thickness, and an evenly distributed load (thermal effects are not considered).
The indicated static characteristics are merely indicative for the customer.
To check the static properties of each single design, please contact a qualified technician as set forth by applicable laws.

Static properties (kg/m²)



EXTERNAL façade:
Steel 0,4 mm
INTERNAL façade:
Steel 0,4 mm

PANEL THICKNESS (mm)	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	WEIGHT (Kg/m²)
25	165	90	70								**6,68**
30	190	110	85	65							**6,86**
35	215	125	100	80	55						**7,04**
40	236	145	115	90	65	50					**7,22**
50	297	185	150	115	85	65	50				**7,61**
60	357	225	180	140	105	80	60	50			**8,00**
80	460	305	245	190	140	105	85	65			**8,78**
100	515	385	305	240	175	135	105	85			**9,56**
120	620	465	370	290	215	165	130	105			**10,34**
150	775	580	465	365	270	205	160	130			**11,51**
180	935	700	560	440	325	245	195	155			**12,68**
200	1000	780	625	490	360	275	215	175			**13,46**
220	1000	860	685	540	395	305	240	195			**14,22**
240	1000	940	750	590	435	330	260	210			**14,98**
	Calculation of static dimensioning performed as set forth by Annex E of UNI EN 14509 standard. Normal arrow limit: 1/200 ℓ										

Usual support width:
120 mm

EXTERNAL façade:
Aluminium 0,6 mm
INTERNAL façade:
Steel 0,4 mm

PANEL THICKNESS (mm)	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	WEIGHT (Kg/m²)
25	165	90	70								**6,68**
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240	1000	940	750	590	435	330	260	210			**14,98**
	Calculation of static dimensioning performed as set forth by Annex E of UNI EN 14509 standard. Normal arrow limit: 1/200 ℓ										

Usual support width:
120 mm

ASSEMBLY INSTRUCTIONS

WALL PANELS WITH EXPOSED FASTENING

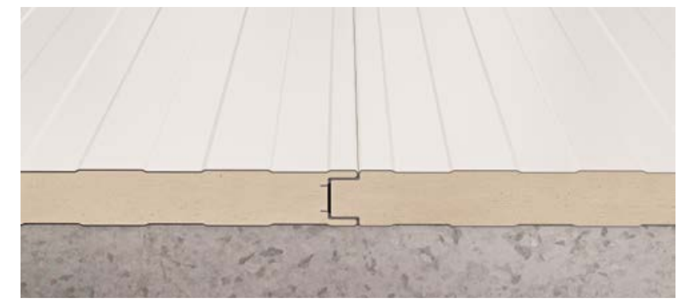
The panels are generally anchored to metal profiles, located transversally to the sense of the same panels, in turn suitably secured to the bearing structure of the building according to design conditions concerning stability.
The panels are fastened to the structure through the devices foreseen by the system. The number of fastening elements varies according to different dynamic situations where the building is located. In general, a fastening element must be used for each panel near each of the support profiles. In areas particularly exposed to wind action, the density of the fastening elements must be determined by the designer case by case, suitably increasing the number where foreseen.

VERTICAL INSTALLATION

After installing the bottom flashing, secured to the structure horizontally, install the panels following the directions of the main winds, with the male facing the wind direction (Fig. A). Install the first panel paying attention to check its perfect verticality, and secure it on the wall railing using the supplied screws. Before installing the following panel, make sure that the contact areas are clean and no residues or polyurethane foam burrs are present. Make sure coupling is performed correctly and secure the panel.
Similarly, proceed with the installation of the next panels until the end of the wall. At the end of each cutting, drilling and fastening activity, remove the metal chips thoroughly to clean the surfaces (Fig. B).

Fig. A

Fig. B



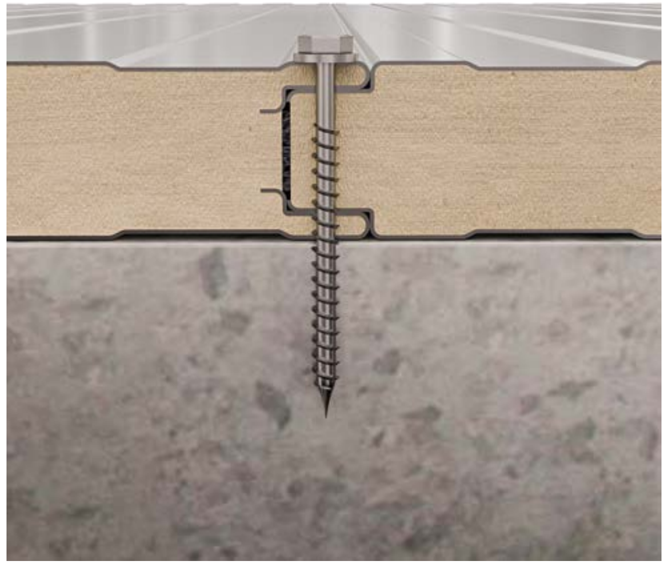
HORIZONTAL INSTALLATION

Position the first panel with the male side upward, checking its perfect horizontality, and then secure it on the wall railings using the supplied screws.
Before installing the following panel, make sure that the contact areas are clean and no residues or polyurethane foam burrs are present.
Position the second panel by inserting the female side on the male of the first panel below (Fig. C).

Warnings:
- The horizontal assembly must be performed keeping the male upward, this way the joint is able to prevent the infiltration of rain water from the exterior;
- The position of the fastening elements must always guarantee resistance to stresses, including depression forces;
- Pay utmost attention during installation, always checking the perfect horizontality of the panels.

Fig. C

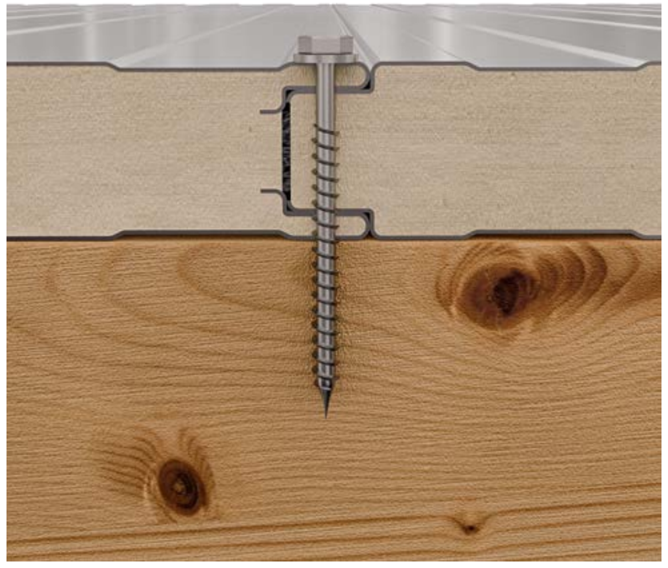
Fig. D



STRUCTURAL FASTENING OF ROOF PANELS ON METAL SUPPORT STRUCTURE

Fastening groups with self-threading and self-drilling screw through iron are used, with hexagonal head, diameter 6.3 mm and variable length, according to the panel thickness.
Pre-varnished caps in sheet or aluminium with pre-mounted foam below and PVC sealing washer are used.

PANEL THICKNESS (mm)	SCREW LENGTH (SUGGESTED)
30	Ø 6,3 x 60 mm.
40	Ø 6,3 x 70 mm.
50	Ø 6,3 x 80 mm.
60	Ø 6,3 x 90 mm.
80	Ø 6,3 x 110 mm.
100	Ø 6,3 x 130 mm.
120	Ø 6,3 x 150 mm.
150	Ø 6,3 x 180 mm.
160	Ø 6,3 x 190 mm.
180	Ø 6,3 x 210 mm.
200	Ø 6,3 x 230 mm.

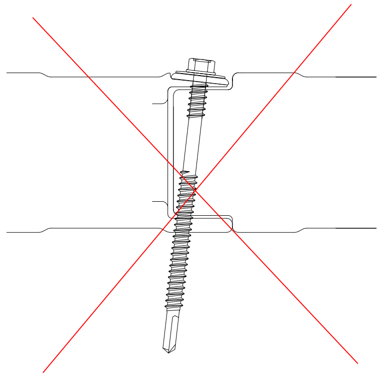


STRUCTURAL FASTENING OF ROOF PANELS ON WOOD SUPPORT STRUCTURE

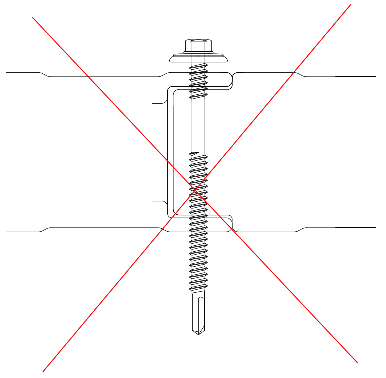
Fastening groups with self-threading and self-drilling screw through wood are used, with hexagonal head, diameter 6.5 mm and variable length, according to the panel thickness.
Pre-varnished caps in sheet or aluminium with pre-mounted foam below are used.

PANEL THICKNESS (mm)	SCREW LENGTH (SUGGESTED)
30	Ø 6,5 x 70 mm.
40	Ø 6,5 x 80 mm.
50	Ø 6,5 x 90 mm.
60	Ø 6,5 x 100 mm.
80	Ø 6,5 x 120 mm.
100	Ø 6,5 x 140 mm.
120	Ø 6,5 x 160 mm.
150	Ø 6,5 x 180 mm.
160	Ø 6,5 x 200 mm.
180	Ø 6,5 x 220 mm.
200	Ø 6,5 x 240 mm.

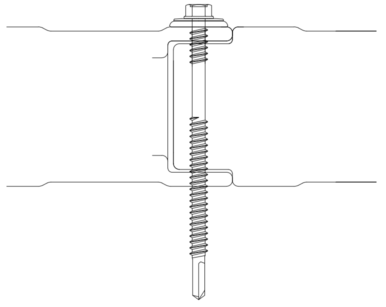
PROPER APPLICATION OF THE FASTENINGS

A


A = A too-high tightening torque has been applied, that deformed the sheet and compromised the optimal closing of the interlock. The product aesthetic functionality is no longer guaranteed.

B


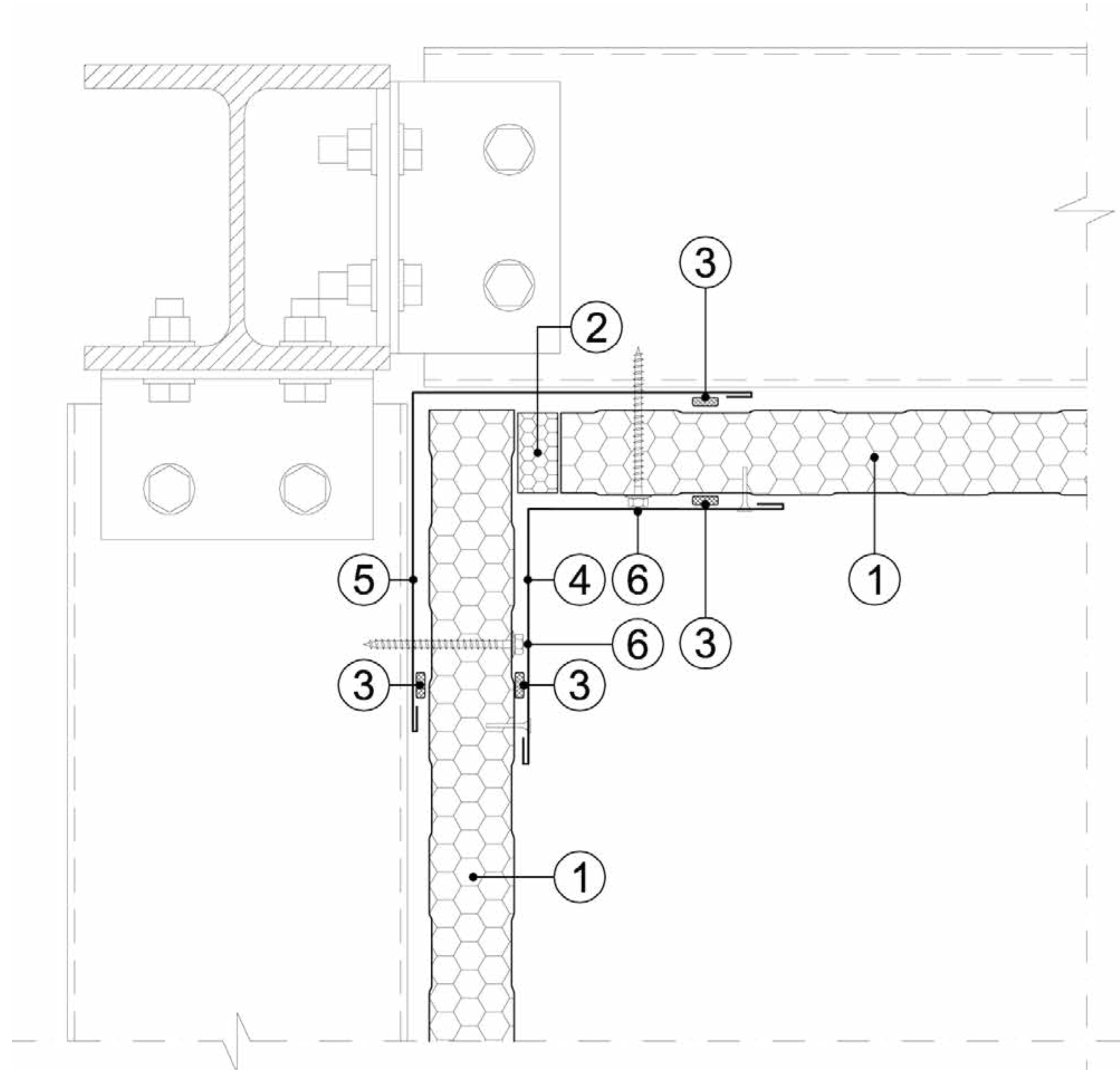
B = In this case the applied tightening torque is not sufficient to guarantee the proper fastening of the panel to the structure.

C


C = The applied tightening torque is optimal as it guarantees the proper fastening of the panel to the structure and the product aesthetic functionality.

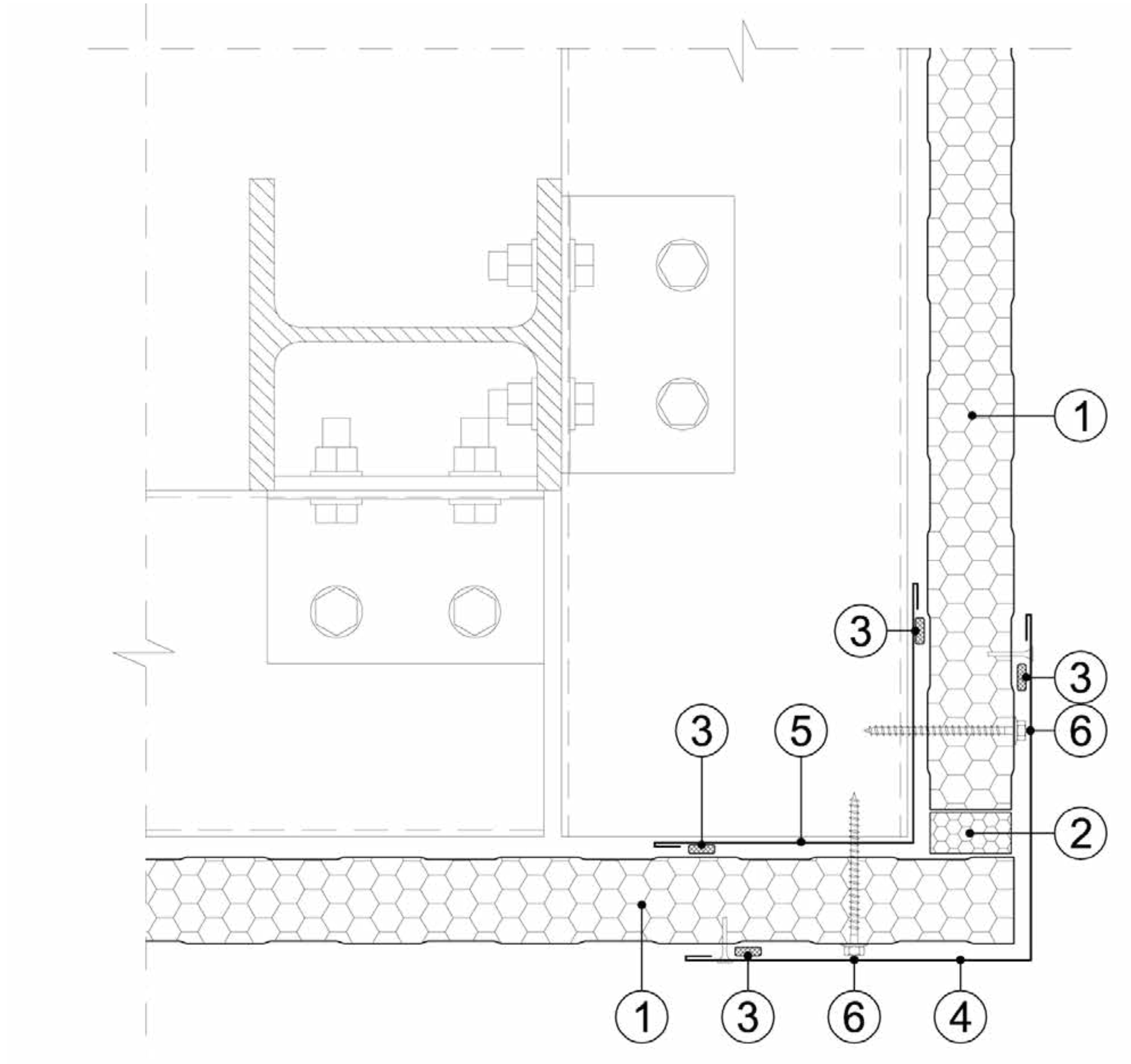
1) DETAIL OF INTERNAL CORNER

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.



1 - wall panel
2 - insulating material
3 - adhesive sealant
4 - sheets for internal closure
5 - sheets for external closure
6 - fastening of wall panel

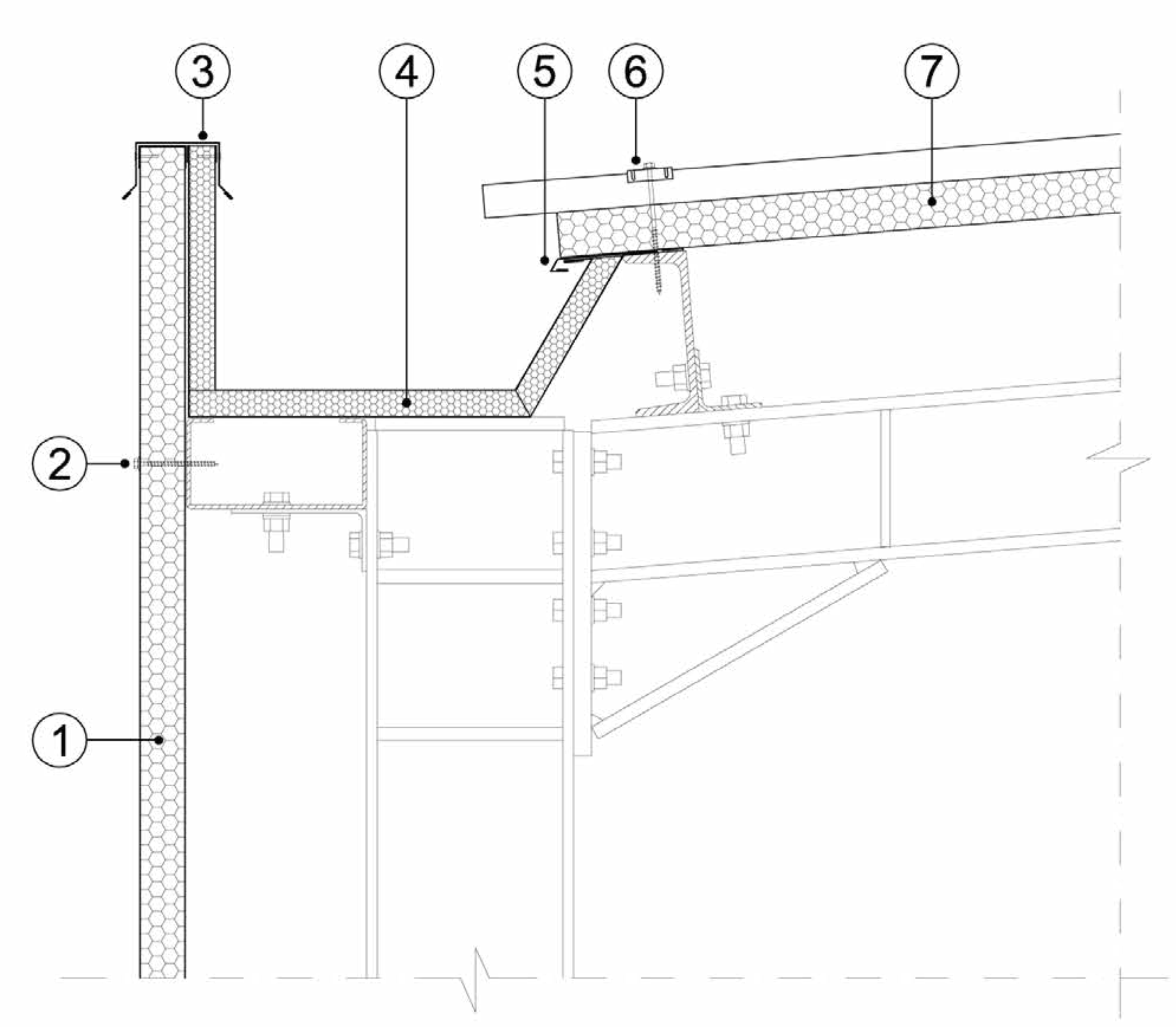
2) DETAIL OF EXTERNAL CORNER



1 - wall panel
2 - insulating material
3 - adhesive sealant
4 - sheets for external closure
5 - sheets for internal closure
6 - fastening of wall panel

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.

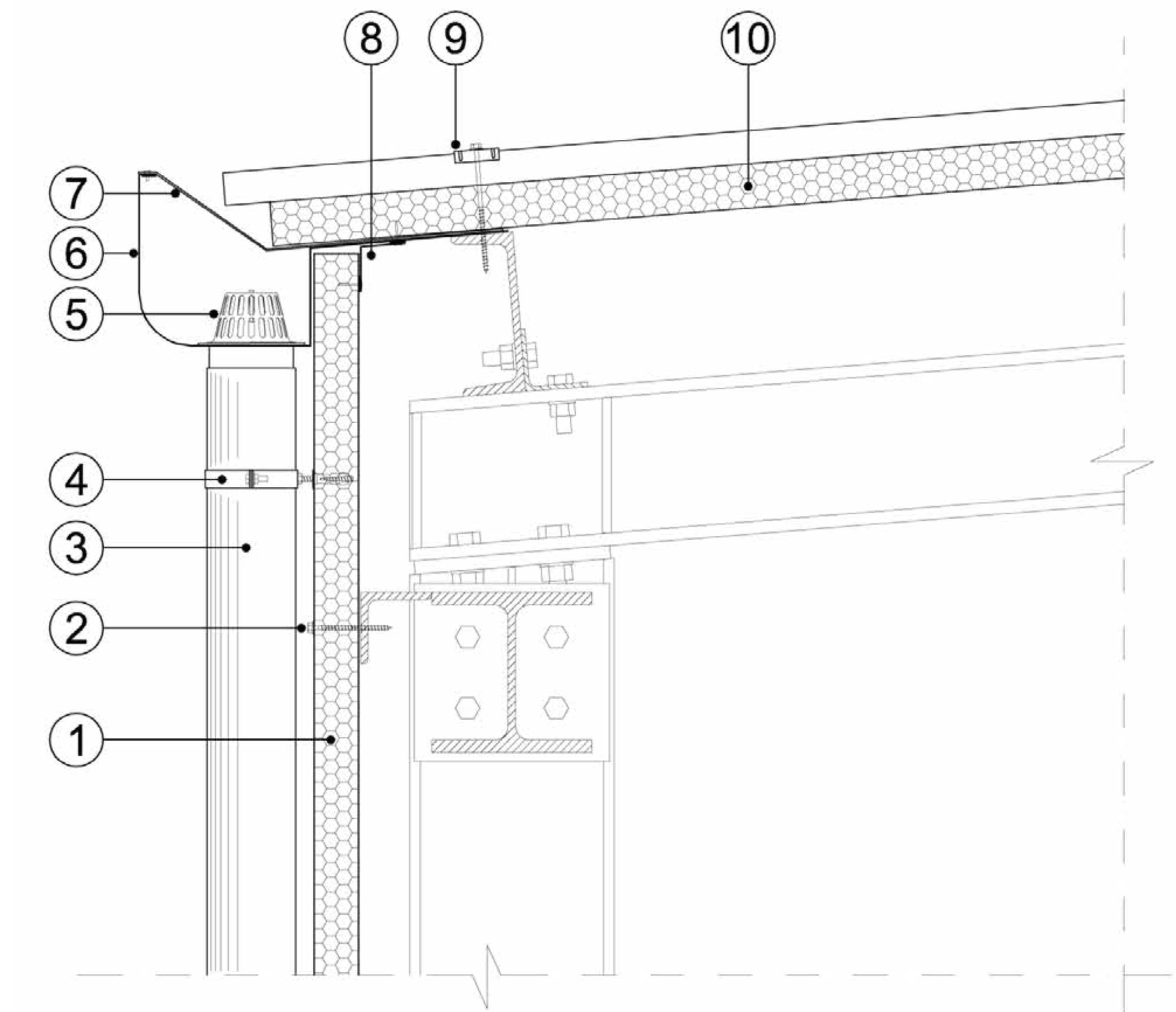
3) EMBEDDED GUTTER DETAIL



1 - wall panel
2 - fastening of wall panel
3 - sheets for head closure
4 - eaves in sheet and insulation
5 - drip sheet
6 - fastening of roof panel
7 - roof panel

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.

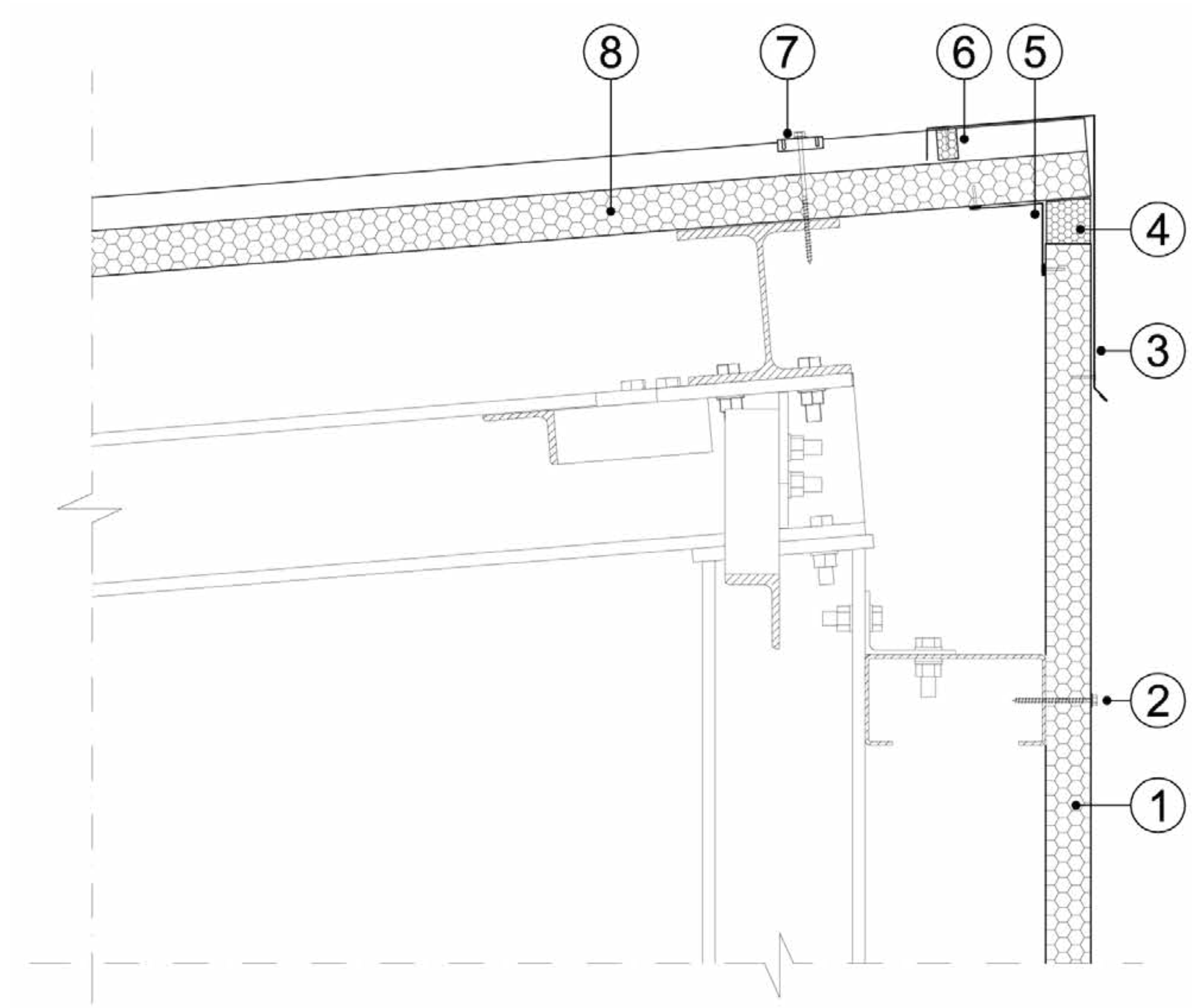
4) EAVES DETAIL



1 - wall panel
2 - fastening of wall panel
3 - downpipe
4 - securing of the downpipe
5 - guard gutter covers
6 - eaves
7 - eaves support element
8 - sheets for internal closure
9 - fastening of roof panel
10 - roof panel

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.

5) WALL RIDGE JOINING DETAIL

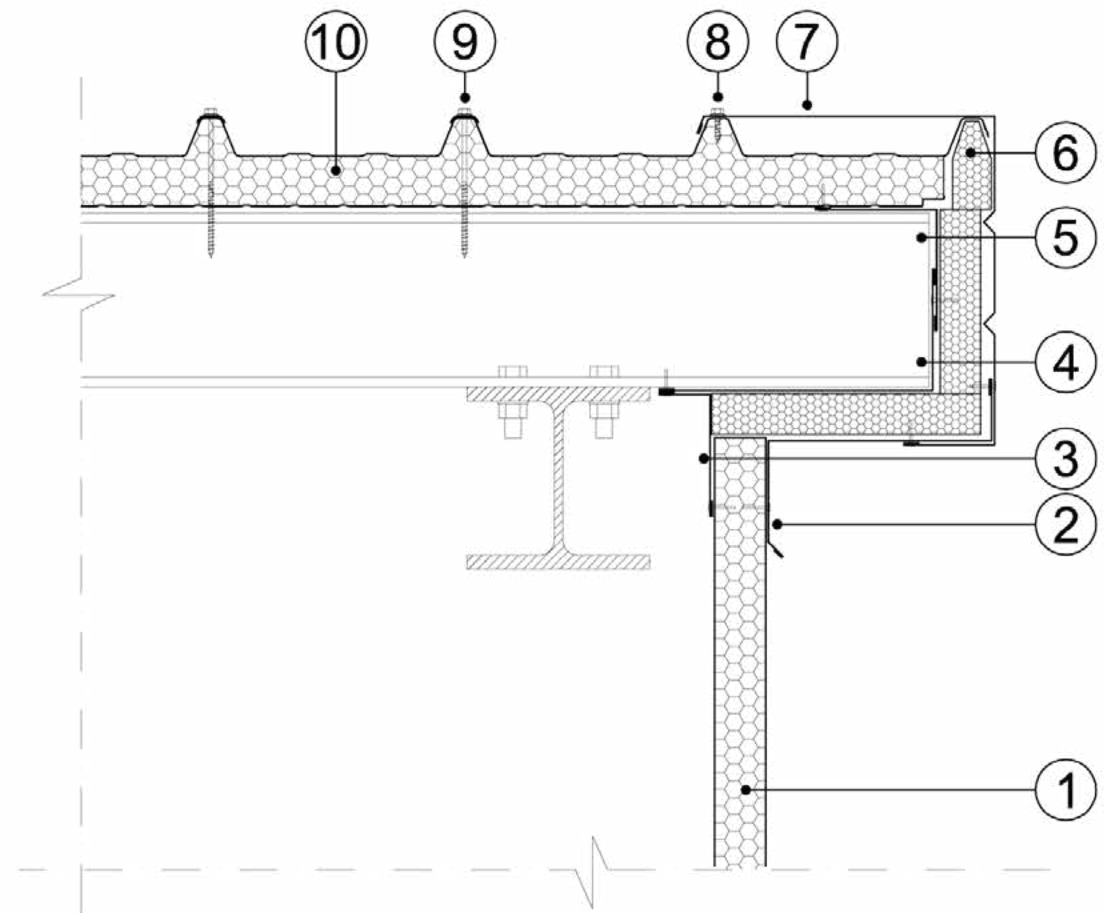


1 - wall panel
2 - fastening of wall panel
3 - die-cut metal sheets for external closure
4 - insulating material
5 - sheets for internal closure
6 - under-ridge punched seal
7 - fastening of roof panel
8 - roof panel

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.

6) WALL ROOF DETAIL WITH OVERHANG

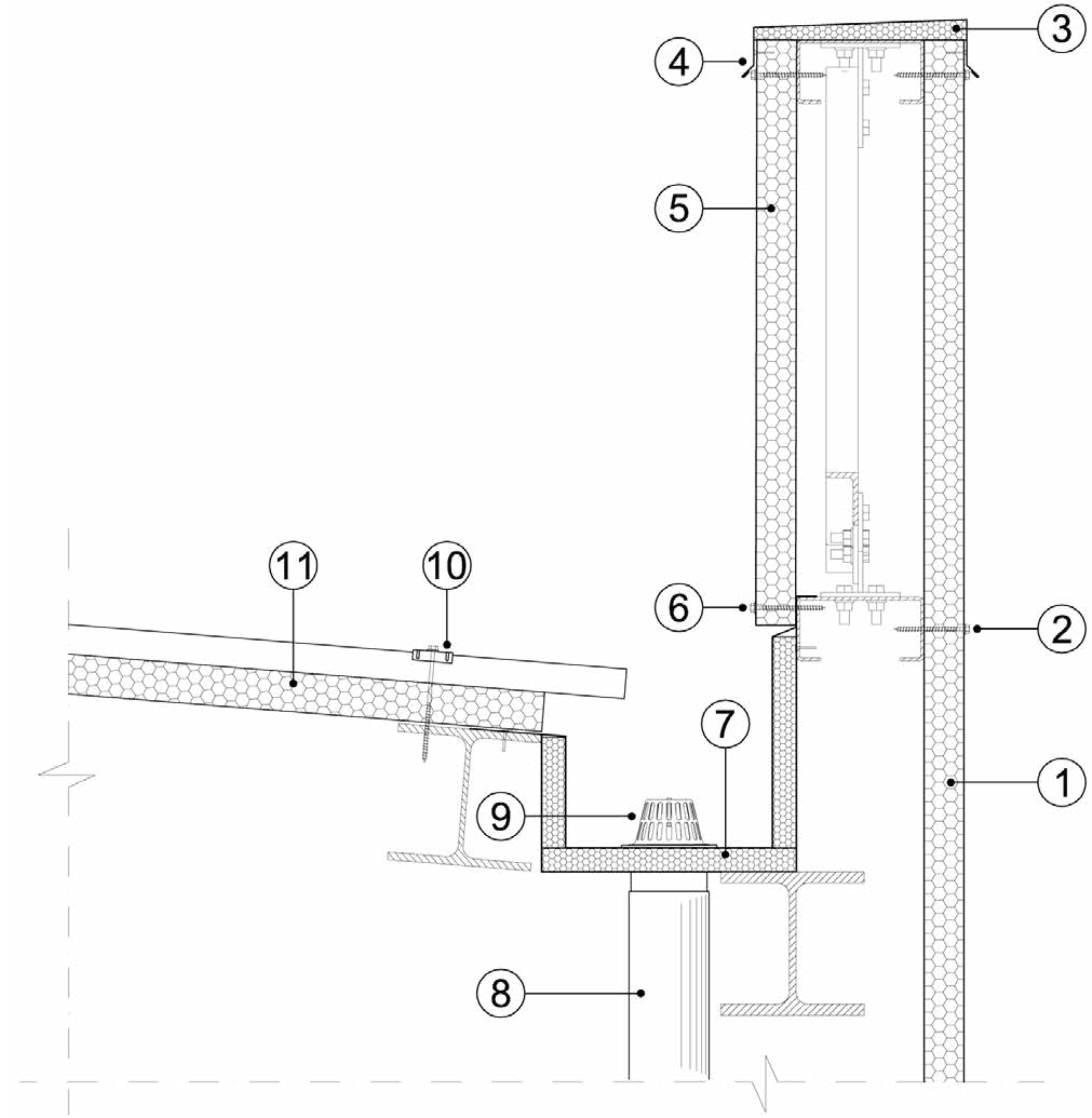
The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.



1 - wall panel
2 - sheets for external closure
3 - sheets for internal closure
4 - sheets for internal closure
5 - sheets for internal closure
6 - insulating material
7 - metal sheets for external closure
8 - fastening of metal sheets
9 - fastening of roof panel
10 - roof panel

7) PARTITION DETAIL

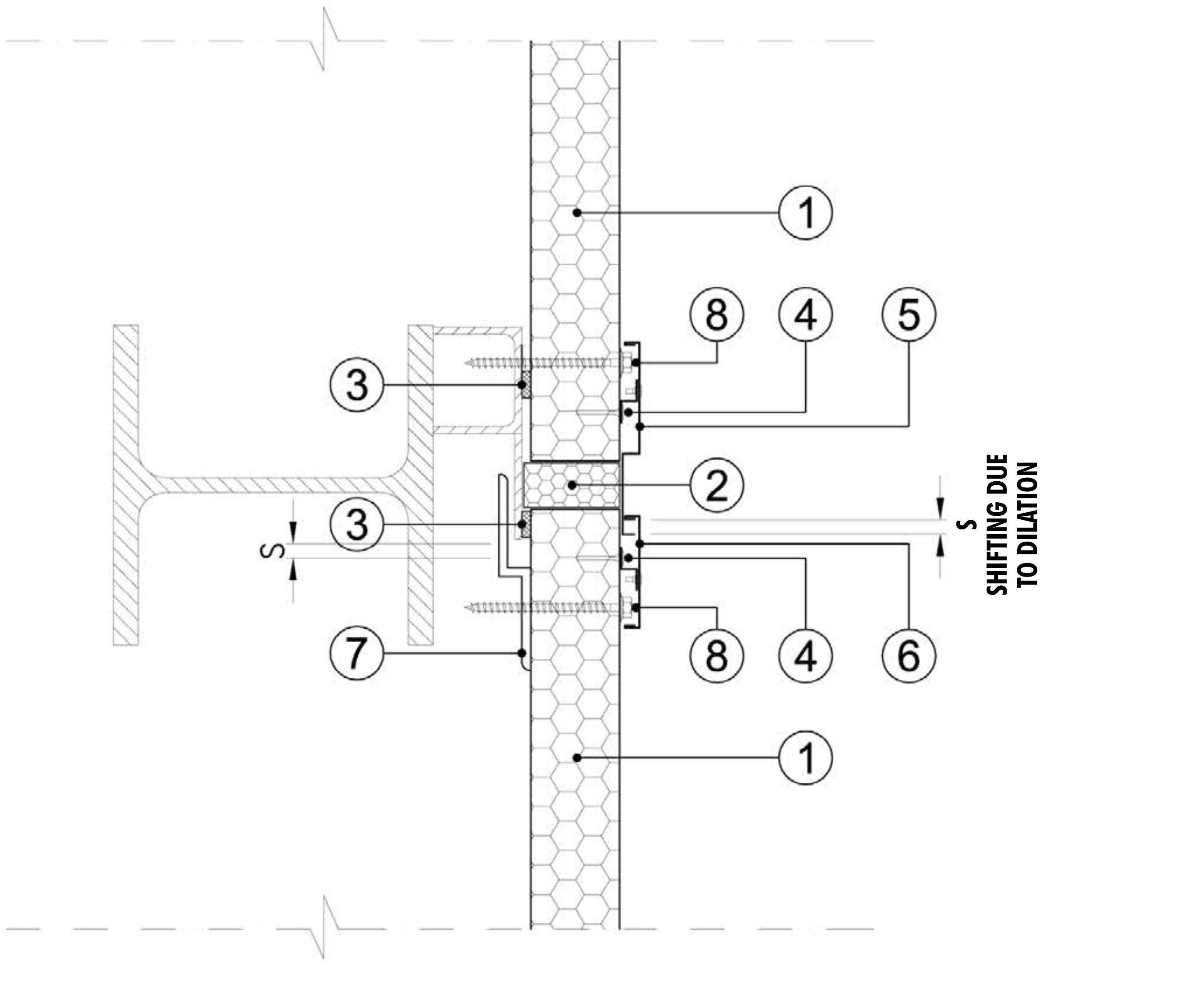
The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.



1 - wall panel
2 - fastening of wall panel
3 - insulating material
4 - sheets for external closure
5 - wall panel
6 - fastening of wall panel
7 - eaves in sheet and insulation
8 - downpipe
9 - guard gutter covers
10 - fastening of roof panel
11 - roof panel

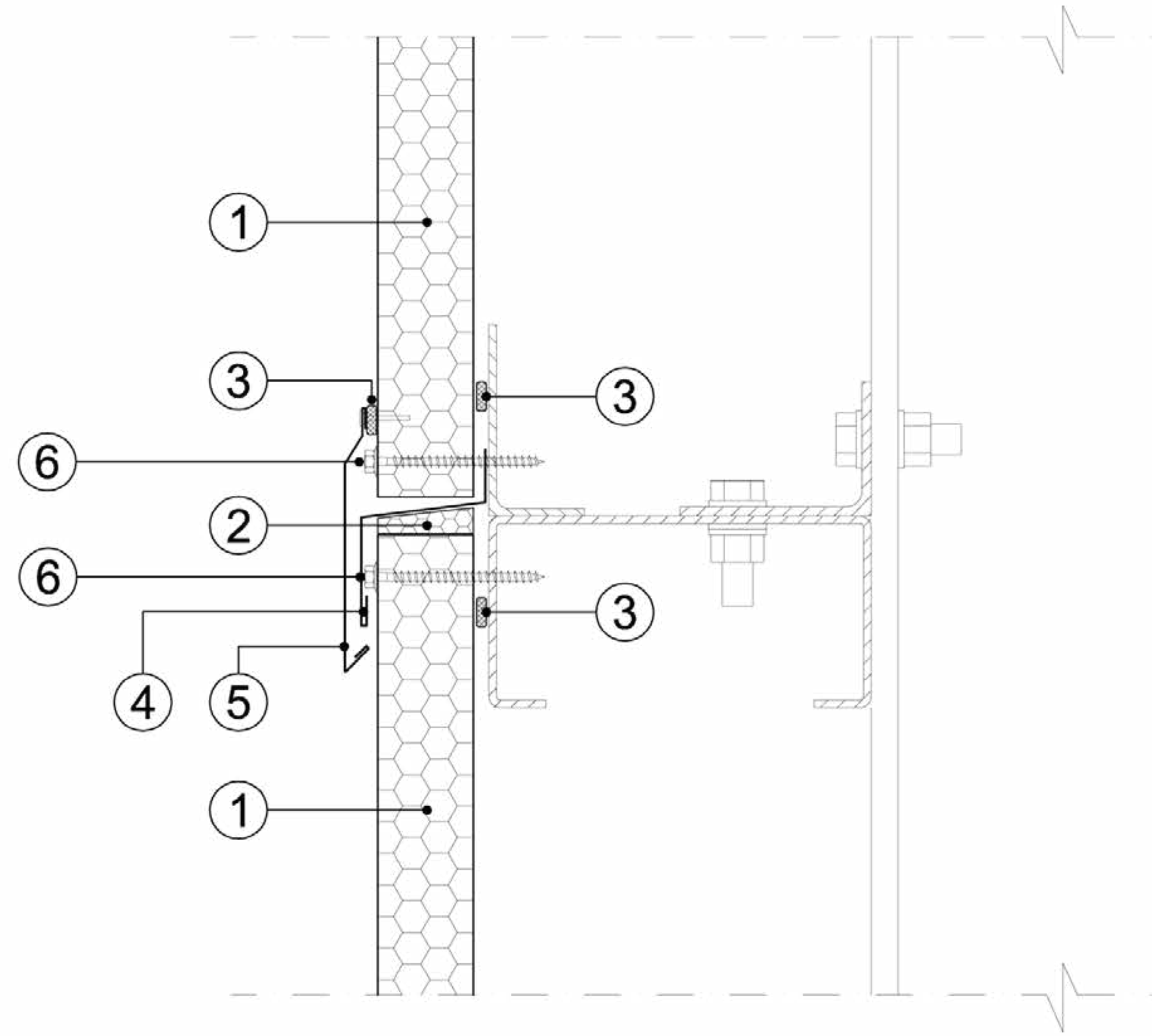
8) DETAIL OF VERTICAL JOINT WITH DILATION BRACKET

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.



1 - wall panel
2 - insulating material
3 - adhesive sealant
4 - support sheet
5 - joint connection sheet
6 - joint connection sheet
7 - sliding profile
8 - fastening of wall panel

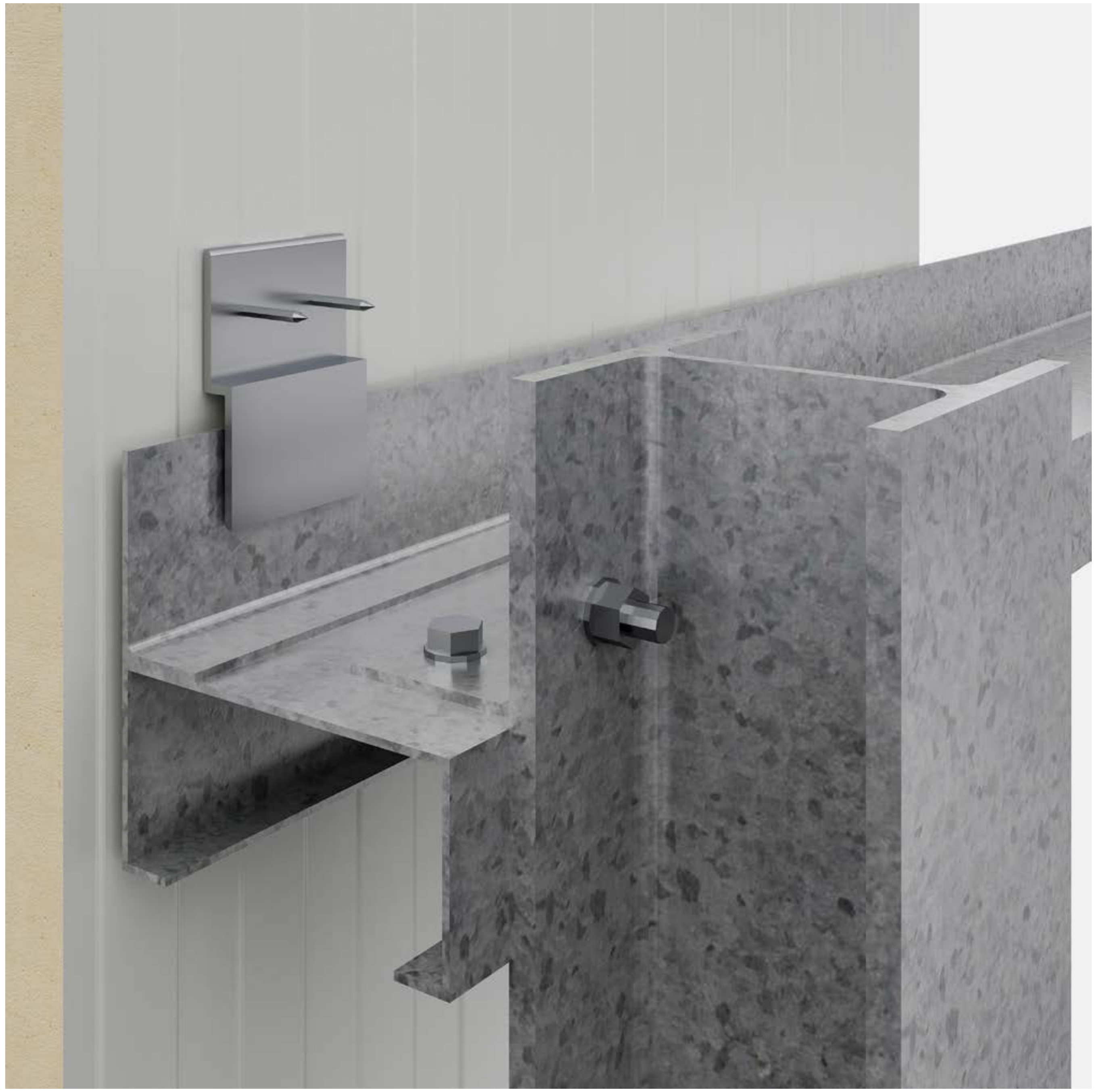
9) DETAIL OF HORIZONTAL JOINT (BUTT/BUTT)

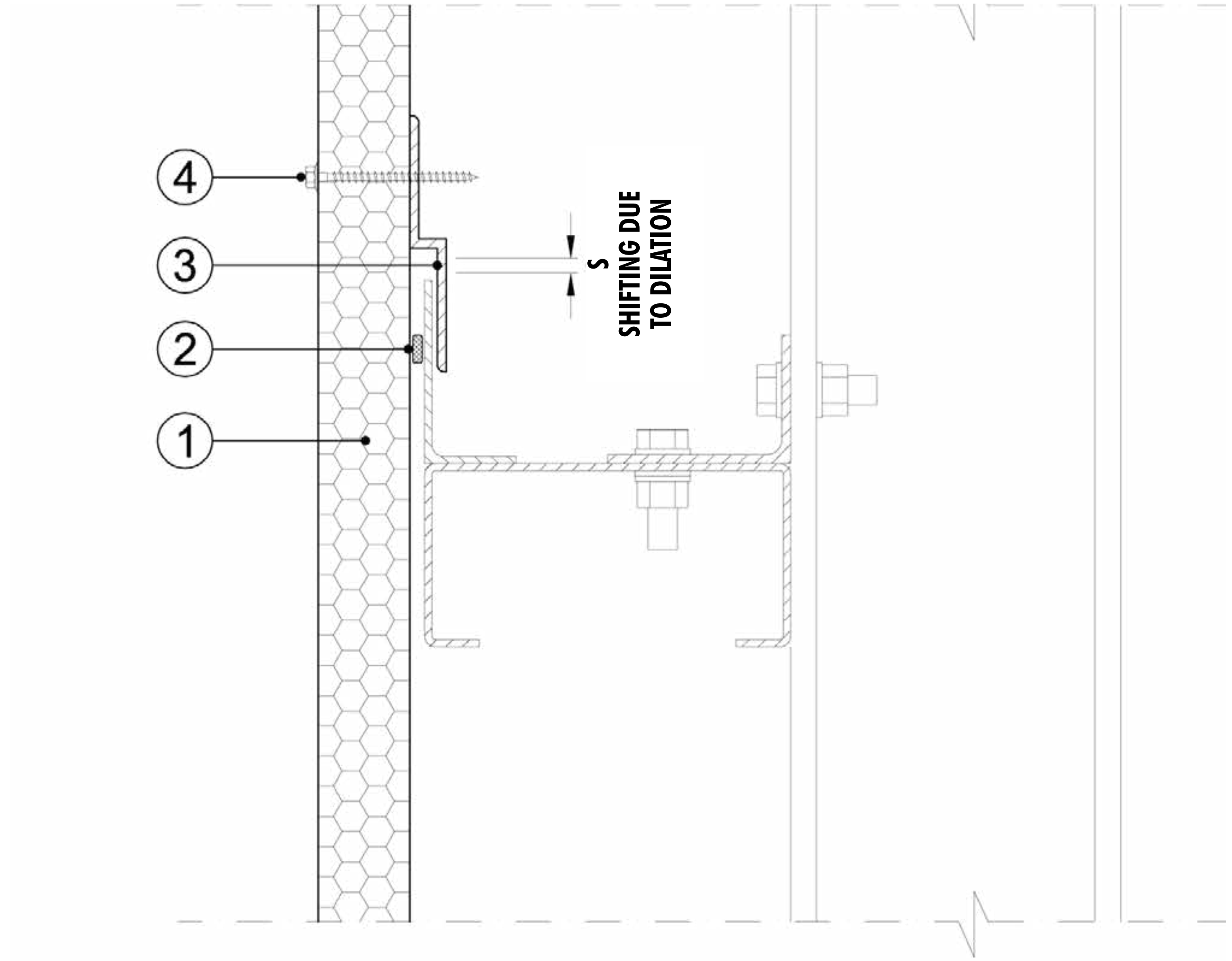


1 - wall panel
2 - insulating material
3 - adhesive sealant
4 - drip sheet
5 - joint covering sheet
6 - fastening of wall panel

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.

10) DETAIL OF SLIDING BRACKET FOR DILATIONS

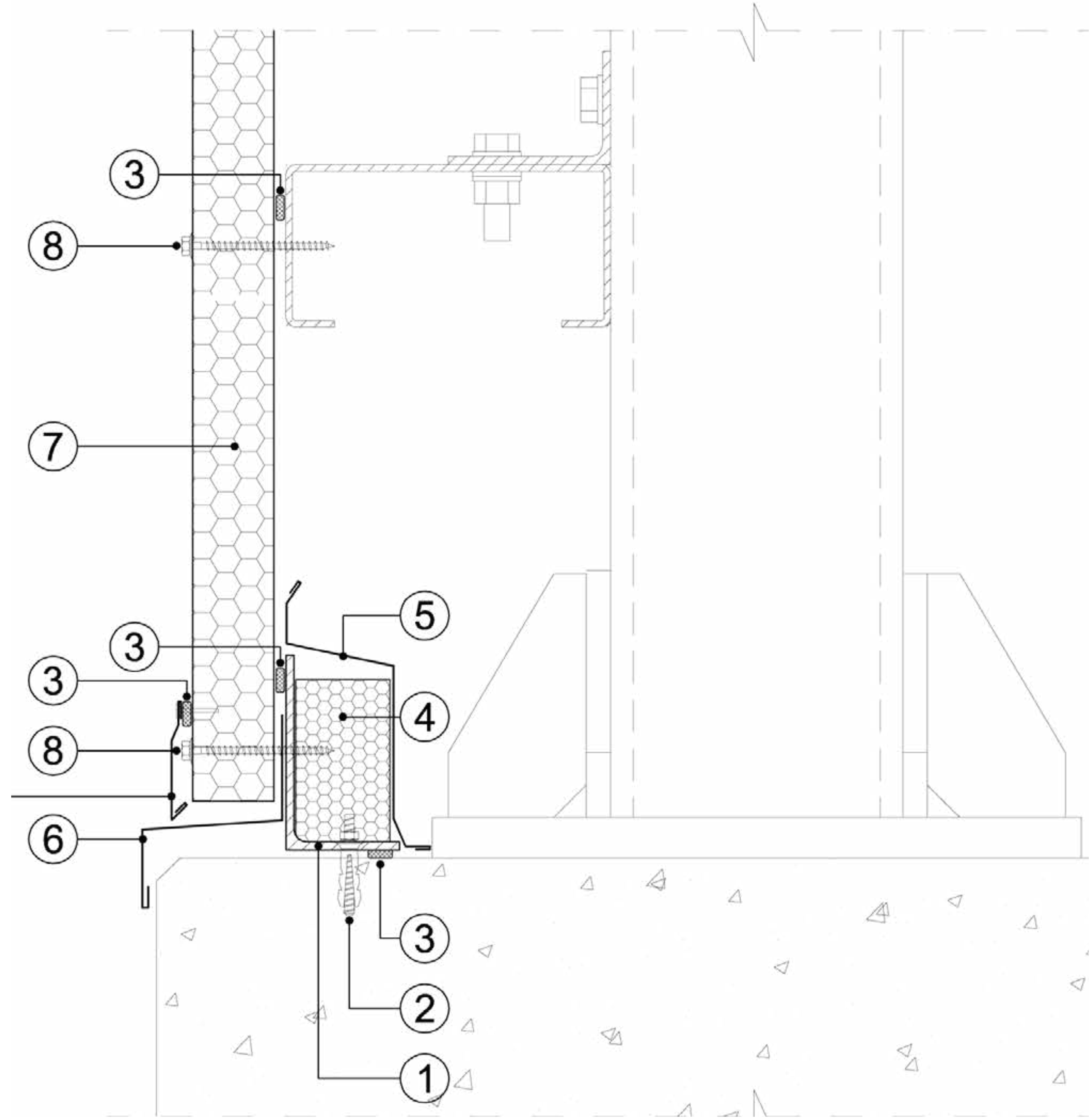




1 - wall panel
2 - adhesive sealant
3 - sliding profile
4 - fastening of wall panel

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.

11) DETAIL OF GROUND FASTENING



1 - lower end stop profile
2 - bracket fastening
3 - adhesive sealant
4 - insulating material
5 - finish internal sheet
6 - drip sheet
7 - wall panel
8 - fastening of wall panel
9 - fastening covering sheet

The proposed solution is merely indicative and is not part of the design.
The designer or Works Manager has the task to review, evaluate and integrate it with further sealing and/or closing elements.

PACKAGING AND PACKING MATERIALS

Point 9.9.1 of **UNI 10372:2004** standard is quoted in full.
"To maintain their durability once installed, the metal roof elements must not be damaged during storage, transport, handling and installation activities. Therefore, it is advised to foresee temporary protection systems for the products, based on the required performances, especially those of aesthetic nature. During manufacturing phases, the aforesaid materials are generally protected with a polyethylene film (adhesive or simple contact) or with other solutions.
During the following phases, precautions must be adopted in order to guarantee the following aspects:
– protection of surface from abrasion phenomena, especially during handling;
– protection of angles and edges against impacts and crashing;
– protection against the stagnation of water or condensed humidity;
– protection of elements subject to the weight of the entire package or stacked packages, against permanent deformations.
The ribbed sheets and panels are generally placed inside packages. The number of sheets inside a package is such to contain the overall weight of the same package within the limits set by available lifting and transport means. In general the materials used to prepare the package are: wood, expanded plastic materials, carton, polyethylene film (thermoretractable or extensible) or others; bindings are made with straps (when with iron wires) and suitable protections (corner bumpers, etc...). The straps must not be used as slinging for lifting." It is also suggested to foresee and properly indicate grabbing points for following handling and lifting operations. The packages containing the product must be therefore equipped with a support system such to distribute the weight homogenously and facilitate the grabbing of the package for handling. For example, the support system can be constituted by joists of plastic or foam material or dry wood or again sheets of composite materials, located at suitable inter-axes according to the characteristics of the product. The packaging must be properly defined during ordering based on the transport methods (for example crates or boxes for transport that foresee transfers, shipping via rail or sea). Based on the performances required to the product, a suitable type of packaging must be foreseen. The preparation of packages will take place according to the parameters set by the manufacturer. Each package contains the following panels, variables depending on the thickness:

PANEL THICKNESS (mm)	30	40	50	60	80	100	120	150	160	180	200
No. panels per package	16	12	12	10	8	6	6	4	4	4	4

Possible different subdivisions of elements and/or particular packages, based on specific Buyer's needs must be agreed when the order is placed.

TRANSPORT

Point 9.9.2 of **UNI 10372:2004** standard is quoted in full.
"The transport of packages must take place with suitable means so that:
– packages are laid on spacers made of wood or foam plastic materials, located at a suitable distance between each other, according to the characteristics of the product (Fig. 1);
– the support surface is compatible with the shape of the package (flat if the package is flat, if the package is curved, a support must be created that has the same curvature);
– the overlapping of packages always takes place by interposing suitable spaces if not already included in the package, in wood or foam plastic materials;
– packages must not have inclinations that exceed 1 m;
– the points in which packages must be slung for lifting must be clearly indicated, in case these cannot be identified otherwise;
– any other indication of the manufacturer must be complied with."
In particular, packages must be positioned on a flat surface and below them spaces must be located made of wood or foam plastic material of suitable dimensions and number in vertical position.
The packages must be secured by the carrier to the transport vehicle through transversal slinging with belts located at a maximum inter axis of 3 m and in any case, every package must foresee at least two transversal slinging. The load must always travel covered and the side exposed to the driving sense must be rendered water tight.
The Buyer that picks it up, must instruct the drivers in this regard. Loading must take place on a free and clean surface.
Vehicles which are already partially occupied by other materials or boast an unsuitable surface will not be accepted for loading. The goods are positioned on the vehicles, following the instructions of the carrier, who is the only one liable for the integrity of the load, who must pay particular attention so that the weight to which the lower package is subject, as well as the pressure exercised on slinging points, do not cause damages and that belts do not deform the product. Particular loading conditions can be accepted only upon written request of the Buyer, who will be fully liable in this regard.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

STORAGE

Point 9.9.3 of **UNI 10372:2004** standard is quoted in full:
"The shape of the elements is also studied to allow storage through stacking so as to reduce storing and transport bulk to the minimum; attention must anyhow be paid to avoid damages to the surfaces during stacking. The packages must always be kept lifted from the ground both in the warehouse and in the yard; they must have supports preferably made of wood or foam plastic materials and flat surfaces of length greater than the width of the sheets, placed at suitable distance according to the product's characteristics. The support surface is compatible with the shape of the packages; flat if the package is flat, if the package is curved, a support must be created that has the same curvature. The packages must be deposited in non humid places, otherwise stagnations of condensate water will occur on interior elements which are less ventilated, that are particularly aggressive on metals, with consequent formation of oxidation products (for example white rust in case of zinc). The packages must be deposited so as to favour the run-off of waters, especially when they must be temporarily stored outdoors (Fig. 2)." If storing does not take place right after picking up the product for installation, the packages must be covered with protection covers.
Attention must also be paid to possible phenomena of electrochemical corrosion in case of contacts between different metals also during the storage period and phenomena of contraction and thermal expansion that generate convexity e concavity in the panels (Figs. 3 and 4). In general, it is suggested not to place packages onto each other; in case it is possible to stack them due their modest weight, spacers made of wood or foam plastic materials must be arranged between them with a support base as wide as possible and in suitable number always positioned in proximity of the supports of the packages below (Fig. 5). The best storing conditions are obtained in closed rooms, with light ventilation, free of humidity and dust. In any case, and in particular for storage inside the building yard, a stable support surface must be provided, which prevents water stagnation. The positioning of packages must not take place in areas located nearby work activities (for example: cutting of metals, sand blasting, painting, welding, etc.) or in areas where the transit or parking of operative means may cause damages (impacts, splashes, discharge gases, etc.). Maximum three packages can be stacked onto each other, with an overall height of approximately 2.6 metres, and in this case, the supports must be properly thickened. In case the materials are covered by a protective film, this must be removed during assembly or anyhow within thirty days from the preparation date of the materials and on condition that the packages are placed in a shaded, covered, ventilated place and protected from any type of bad weather (Fig. 6). Possible additional specific Supplier's instructions must be followed. Based on the knowledge acquired, in order to retain the original characteristics of the product, it is suggested, aside from following the previous rules, not to exceed six months of storage in a closed and ventilated environment, while the storage period outdoors must not exceed sixty days. In any case, the materials must be always protected from direct solar light, since this may cause alterations.
In case of protection through a cover, water tightness must be ensured, and also suitable ventilation to avoid condensate stagnation and the formation of water pockets.

Fig. 7

Fig. 8

IMPROPER TRANSPORT

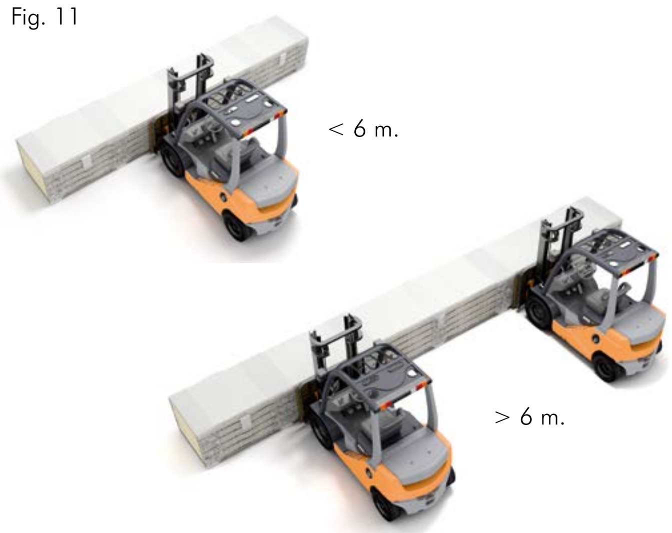
Fig. 9

Fig. 10

LIFTING AND HANDLING

Point 9.9.4 of **UNI 10372:2004** standard is quoted in full.
"The packages must be always slung at least in two points, spaced from each other not less than the half of the length of the same packages.
Lifting must preferably take place with belts in synthetic fabric (nylon) of width lot less than 10 cm so that the load on the belt is distributed and does not cause deformations". Suitable spacers must be used, located below and above the package, made by sturdy flat elements in wood or plastic material, which prevent the direct contact of the belts with the package (Fig. 7).
These spacers must be at least of a length of 4 cm greater than the width of the package and the width must not be less than that of the belt (Fig. 8). In any case, lower spacers must be of such width so as to avoid that the weight of the package causes permanent deformations to lower elements.
Attention must be paid so that slinging and supports do not move during lifting and that manoeuvres are performed cautiously and gradually. Deposing of packages on the cover's structure must take place only on surfaces suitable to support them, in terms of resistance and support and safety conditions, also in relation to other works in progress. It is suggested to always request the authorization for the deposit to the works management."
Handling of the elements must take place by using suitable protection means (gloves, safety shoes, overalls, etc.), in compliance with current legislations.
Manual handling of the single element must always take place by lifting the same element without dragging it on the lower one, and rotating it on its side besides the package; transport must be carried out by two people based on the length, keeping the element on the side (Fig. 9). Grabbing equipment, such as for example work gloves, must be clean and such not to cause damages to the elements.
The use of crane with a rocker arm and belts (Fig. 10) or forklifts (Fig. 11) is advised.
The packages deposited at considerable height must always be bond to structures.

Fig. 11



RECOMMENDATIONS TO ASSEMBLE

INTRODUCTION
These recommendations intend to supply an informative reference support for the assembly of ribbed sheets and insulted metal panels. They are anyhow integrative of standard **UNI 10372:2004** "Discontinuous roof - Instructions for the design and execution with metal elements in sheets". Each work must keep in consideration the needs of the specific yard, which will be equipped with suitable equipment for handling and installation, in compliance with the current legislation on safety and accident prevention.
The company in charge of the installation of ribbed sheets/ panels, in addition to know the characteristics of the materials used, must dispose of qualified staff suitable for the yard's work, ensuring the correct execution of the work in compliance with the design specifications. The non-compliance with these Recommendations and the improper execution of the yard's works, relieve the Seller from any liability.
Efficient organization and coordinated activities inside the yard ensure the best conditions of the work.

THE STRUCTURAL ELEMENTS
The products covered hereby, unless otherwise expressly agreed in writing and with the Seller, do not contribute in any way to the global or partial stability of the building structure; they are therefore not suitable for vertical-horizontal loads or permanent static loads (except their own weight). In fact, they are based on an existing structure, which must have been properly calculated and considered suitable by the Buyer for the positioning and installation of the products themselves, as they only have the function of cover/coating and/or improve the building's energy level.
Equal preventive assessment must be carried out by the Buyer in order to verify that the panels with polyurethane foam insulation are not used in constructions that result in excessively high or excessively low operating temperatures that could cause a change of the main components of the panels.
The ribbed sheets/panels can be used in civil and industrial building for the construction of roofs, walls and floors; they can be erected on every type of support structure: metal carpentry, normal and pre-stressed concrete, wood.
The support structures and relative fastening devices with the ribbed sheets/panels have to be adequately measured and they have to satisfy the forecasted design conditions with regards to safety, stability and functionality.
The ribbed sheets and metal panels are quick and easy to install, with the possibility of covering in one single section the entire length of the roof pitch meaning the entire height of the wall or more bays of the floor.
The length of the elements is mainly influenced by needs of transportation and handling, and also by the nature of the material used and by the production technology. It is recommended that the bearing surfaces are compatible with the use and modality of fastening of the ribbed sheets and of the insulated metal panel.

PRELIMINARY OPERATIONS
Before starting the assembling work on the construction site, the installer must::

1. view the project's drawings and follow the relative regulations;
2. proceed with the check-up of the support structures' alignments of the ribbed sheets/panels;
3. check that the surfaces of the support structures, which will be in contact with the ribbed sheets/panels, are compatible among themselves or otherwise protected by possible corrosions due an electro-chemical effect;
4. make sure that there are no interferences with overhead electrical lines in the manoeuvring platform of the ribbed sheets/panels;
5. make sure that the work on the ground and on the upper level is compatible with the other construction activities;
6. verify the suitability of the construction area for storing and handling the material, making sure that the material does not sustain damages.

The installer must carry out all the assembly operations in conformity with and respecting the safety standards in effect.
The personnel in charge of installation has to be equipped with footwear with soles so that they would not cause any damages to the external hangings. For cutting operations on the construction site proper tools have to be used (jigsaw, shear, nibbler, etc...).
The use of tools with abrasive discs is not recommended.
For assembling operations it is recommended to use a screwdriver with torque restraint. It is necessary to carry out, for the roof panels particularly, a perfect overlapping and matching of the elements in order to avoid condensate phenomena.

INSTRUCTIONS FOR THE INSPECTION AND MAINTENANCE

All constructions require a systematic periodical inspection and programmed maintenance in order to ensure functionality over time and maintenance of the performance requirements of the building. The assessment during the inspection concerns roof and wall elements and also complementary works (joints, anchoring devices, ridges, ridge caps, snow stoppers, eaves, drain pipes) and possible technological systems (ridge caps, smoke vents, exhaust vents, protection against lightning, etc.).

INSPECTION

While installing or as soon as the insulated metal panels or ribbed sheets have been installed, the assembly firm will remove all the material which is no longer needed, including possible traces of the temporary protective film. In particular, the firm must pay the utmost attention when removing the metal chips and abrasive elements deposited on the roof.
The delivery of works can anyhow take place after the facade (roofs and/or walls, including finishing elements and in particular eaves) has been properly cleaned and it is free of any foreign body.
Inspections must take place at regular intervals, the first upon delivery of works or during testing.
Testing concerns the functionality of the specific object (roof and/or wall) and of the building as a whole according to the design requirements or contractual relations between supplier or general contractor firm or assembly firms with the client.
Inspections must take place every six months (preferably during spring and autumn every year). During the first inspection, the assembly firm or general contractor firm or client, according to the specifications or agreement between the parties, must check that no foreign materials or manufacturing residues have been left, so as to trigger corrosion phenomena or damages to the building facade, or they may prevent proper run-off of rain waters. It must be checked anyhow that no accumulation of unwanted substances occurs, such as dusts, sands, leaves, etc. The client must be also notified about potential weak points (see absence of surface protection) on the entire facade that could generate sources or corrosion (electrochemically) with consequent early deterioration phenomena also with regards to the aesthetic aspect of the building (see rust drippings).
Attention must be also paid to the location of the building: it must be pointed out to the client the type of atmosphere on site and also possible sources (see fumes) of accelerated corrosion caused by adjacent buildings (the type of existing atmosphere must be known prior to purchase the materials).
The following inspections concern the general conditions of the facade: preservation state (durability) and functionality of ribbed sheets and/or insulted metal panels, and all finishing and/or complementary elements, including ridges, ridge caps, eaves, water tightness of fasteners, possible seals, which may affect the building facade, monitoring the progression of physiological and pathological aging, in order to schedule ordinary and extraordinary maintenance operations that may be needed.
At the same time, the efficiency of the run-off system of rain waters must be checked as well as of other technological systems.

MAINTENANCE

The building facade, as any other work, must be periodically checked in order to detect in time possible inconveniences which may occur and be able to face them promptly, thus reducing maintenance fees to the minimum.
The maintenance operations also concern the main finishing works (see anchoring devices and interfacing devices with the support structure) and secondary ones (see outlets of drain pipes) which may compromise the general conditions of the facade.
Scheduled ordinary maintenance must be scheduled and performed by the client with a frequency based on the results of the inspections and on the operating conditions of the building and also on the existing environmental situation and operating conditions. It is anyhow aimed at the maintenance or adapting of the functional needs of the facade. Regular cleaning of the roof and wall surface may be sufficient, or localized interventions may be needed due to failures, scratches and damages.
Possible dirt spots are a sign of the evaporation of liquids that washed out the surfaces; therefore, during maintenance, in addition to eliminate them, the cause for stagnations must be also eliminated (see sagging of eaves that have been walked on, settling of structural works, cracking of ridges and ridge caps, etc.).
If the outcome of the inspections brings out preservation problems, an extraordinary maintenance operation must be carried out by the client, in order to restore initial conditions.
Interventions are carried out upon the early appearance of corrosion phenomena on metal elements which have not been evaluated during the design phase, and if the general condition of the façade is compromised due to finishing works which do not comply with durability terms or caused by non-related factors (see expansions, aging, condensation, electro-chemical incompatibility new polluting sources, changed intended of use, etc.).
These Instructions regulate the contractual relations between the Seller and the Buyer (receiver of the invoice).
The non-compliance with inspection and maintenance operations and improper execution relieve the Seller from any liability during the period from the shipping of the material to the time limits within which legal actions can be brought forward.
The Buyer commits to comply and enforce compliance with these Instructions, within the limits of the Seller's obligations, established by the applicable legislation (requirements, limits, expiry). For third parties involved by the Buyer, it is meant: trading firms, building firms, assembly operators, contractors and clients, owners of the building and following owner that may intervene in property transfers.
The commitment to carry out inspection and maintenance operations binds the Buyer towards the Seller. The Buyer transfers in turn this commitment when it becomes Seller and so on, up to the owner of the building.
To authorize inspection and maintenance operations, the client must anyhow undersign the acceptance and perform said interventions at its expenses, which must be indicated in chronological order on a specific registry with all the technical information found, and with the description of ordinary and extraordinary maintenance works.
This register is established by the owner and is managed and updated daily by the same owner or through delegation. The register must be available and must be able to be consulted as a document of ordinary management of the building, within the related legal terms of the Seller.
The supplies of insulated metal panels and ribbed sheets must be noted on the register, indicating the name of the supplier, details of the order, type and characteristics of the material (also catalogue references), the date of deliveries at the yard and related shipping documents, as well as the installation schedule.
The following names (and offices) must also be indicated in the registry: designer, works director, general firm, assembly firm (or single contractual relations between supplier or general firm or single operators). The identification and traceability of the supplies must be ensured as long as these instructions will be valid, which will be no longer applicable once the relations with the manufacturer of insulated metal panels or ribbed panels have ended.

Certified company:
UNI EN ISO 9001:2008
certificate no. 4674

0497

The technical data and characteristics are indicative.
Lattonedil® reserves the right to make changes without notice, the updated documents can be found on our website at www.lattonedil.it.
For any further information, please see the "General Sales Conditions of corrugated sheets, insulated metal panels and accessories" released by UNICMI (Unione nazionale delle industrie delle costruzioni Metalliche dell'involucro e dei serramenti). In compliance with Directive 89/106/EC, Presidential Decree no. 246 of 21/04/1993 and Presidential Decree no. 499 of 10/12/1997, the panel is labelled pursuant to EN 14509 standard.

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Lattonedil Manuale Tecnico Isopar - REV. 01 - 2018 - GB

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