IZOPANEL®

Technical catalogue

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GENERAL INFORMATION

Sandwich panels may be used for building walls and roofs of buildings and also for building enclosures of industrial equipment, air conditioning devices, etc. Such panels are manufactured in a continuous process of joining the insulating core with external lining, most often metal plates. The final product is a sandwich panel which consists of several layers. Metal lining protects against weather conditions, such as rain or snow and also performs decorative function. These panels are also resistant to corrosive factors. They keep their parameters when exposed to moisture, steam, snow, chemicals or other difficult conditions.
The core, made of PIR/PIR+ polyisocyanurate foam, EPS expanded polystyrene boards or MWF mineral wool, guarantees thermal and acoustic insulation. When joined with the lining, it becomes a barrier protecting against fire, snow load, wind, temperature and other factors.

Some of the benefits of using Izopanel sandwich panels are:

Excellent thermal insulation. Thermal conductivity of panels with polyisocyanurate foam core is $\lambda = 0{,}022$ W/m*K.

Excellent protection against weather conditions, maintaining properties and appearance for many years. When coating is properly selected according to local conditions, several years' durability of panels can be reached without any problem.

Complete seal against precipitations, snow and dampness. Perfectly finished joints ensure complete waterproofness for many years, if installation standards are followed.

Sound absorption. Properly selected core material can give perfect noise insulation parameters. They are particularly important if insulation of outside noise, reduction of industrial noise propagation to the outside of the building or noise reduction within the building is required.

Fire resistance properties according to the needs. Using proper type of core can ensure that fire resistance class up to EI120 (mineral wool) is reached. This enables protection of escape routes and separation of fire compartments from each other.

Easy and quick installation, low construction costs. As a result, lower operating costs over the years. A 50 mm mm thick PIR/PIR+ foam panel has the same heat-transfer coefficient U as a 75 cm thick aerated concrete wall, 60 cm thick structural clay tile wall or a 190 cm thick brick wall.

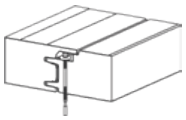
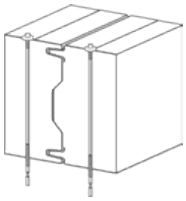
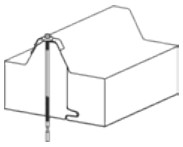
Good strength parameters. Roof panels can withstand the load of snow and wind depending on their thickness and climatic zone, with supports' span of more than 3 m. In most cases, wall panels can be used with supports' span of up to 6 m. This results in real savings in terms of the supporting structure, and thus overall costs of the entire building.

We have managed to combine all of the above benefits to the user with benefits to the natural environment. Total power input in the production of the material used for thermal insulation of the building, on average, pays for itself after two or three years from installation. Materials used in production are recyclable. Steel can be easily reused. Waste core materials can also be recycled, while production of the panels itself is not harmful to the environment.

DESCRIPTION OF APPLICATION

The scope of application of sandwich panels is very wide: in storage halls, production halls, small and large commercial facilities, public utility buildings, such as gymnasiums and swimming pools, farm facilities, such as barns, poultry houses, mushroom-growing cellars. They are suitable for food storages, cold stores and freezers. Sandwich panels may also be used in food processing plants. In all locations requiring hygienic conditions, with no effect on food in contact with panels, and resistance to chemicals used in food processing and cleaning.
IZOPANEL sandwich panels may be used as walls of buildings, both external and internal, roofs and suspended ceilings in halls with additional protection.
With proper coating, they can be very durable in areas with salty conditions (such as seaside regions) or high levels of industrial pollution. For more information on the principles of selection of lining material see "Panel lining, types and profiles" section.
Izopanel sandwich panels should be used based on a technical project drawn up for a particular construction object by an authorised specialist and completed in accordance with applicable norms, technical knowledge principles and legal acts, in particular in accordance with the Building Law Act of 7 July 1994 and the Regulation of the Minister of Infrastructure on technical conditions applicable to buildings and their location of 12 April 2002, as amended.

TYPES OF IZOPANEL SANDWICH PANELS

		Core type					
		PIR/PIR+		EPS		MWF	
		core made of stiff polyisocyanurate foam		core made of expanded polystyrene		core made of mineral wool	
		thickness [mm]	modular width [mm]	thickness [mm]	modular width [mm]	thickness [mm]	modular width [mm]
	Wall panel with visible fastening. To be installed on walls vertically or horizontally.	40 60 80 100 120** 140 160 180 200	1150 or 1080* or 1000* or 1200	50 60 75 80 100 120 125 140 150 160 175 180 200 250	1150	60 80 100 120 140 150 160 175 200	1150
	Wall panel with hidden fastening. To be installed on walls vertically or horizontally.	60 80 100 120	1080 or 1000*	–	–	–	–
	Insulating panel for freezers and cold stores, for walls and suspended ceilings.	120 140 160 180 200 220	1150 or 1080* or 1000* or 1200	–	–	–	–
	High profile roof panel***.	60 80 100 120 140 160	1080	60 75 80 100 120 125 140 150 160 175 200 250	1080	60 80 100 120 140 150 160 175 200	1080
thermal conductivity λ [W/m*K]		0,022 / 0,021		0,040		0,040	
typical fire resistance class		EI 15/EI 30		–		EI 120	
specific acoustic resistance coefficient R_w		27		24		31	

* Modular width available on an individual order.
** Labyrinth joints can be found on 120 mm-thick PIR/PIR+ core panels and thicker.
*** For panels with PIR/PIR+ core, roof panel with straight lock – IzoRoof+ is also available

LABELLING

Standard labelling of IZOPANEL sandwich panels has the following format:

Lining type is defined as follows:

- **z** - (external) – lining location on the panel
- **c** - (0.50 mm) – lining thickness
- **SP** - (code according to "Coat charts" section) – specifies coat type
- **9010** - (number according to RAL palette) – specifies coat colour
- **F** - (foil) – indicates the presence of protective film on lining

PIR, PIR+ SANDWICH PANELS

BENEFITS

IZOPANEL PIR and PIR+ sandwich panels have polyurethane-based foam cores. PIR/PIR+ foam is a material with excellent insulating and thermal properties, which is reflected by thermal conductivity rating.

λ = 0,021 W/m*K (PIR+)
λ = 0,022 W/m*K (PIR)

This foam is a good noise insulation material which is characterized by specific acoustic resistance coefficient:

R_w= 25-27 dB

and acoustic absorption coefficient:

α_w = 0,15

Our PIR/PIR+ sandwich panels are non-flammable due to the properties of PIR foams.

B
Flash resistant

Panels with foam core give very good results in burning behaviour tests, depending on foam type and thickness, their fire resistance class is

EI 15 (PIR)
EI 30-60 (PIR+)

Proper joint profile guarantees perfect leakproofness, preventing air infiltration and ensuring steam and blowing rain resistance.

PIR/PIR+ panels manufacturing programme includes three types of wall panels and one type of roof panels.

Wall panels are available in three types:

- **IzoWall**

Standard wall panel. Thickness range: 40 to 200 mm. Suitable for walls, to be installed vertically or horizontally. Fastening to the structure with screws through the panels.

- **IzoGold**

Wall panel with hidden fasteners. Thickness range: 60 to 120 mm. Suitable for walls, to be installed vertically or horizontally. Fastening to the structure with screws inside panel joint. These panels form a smooth facade with no visible joints.

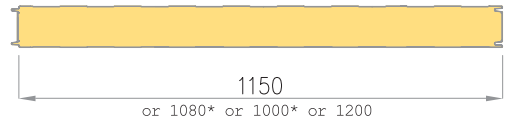
- **IzoCold**

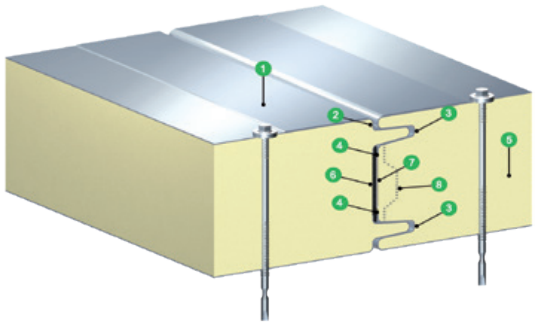
Cold store panel, with reverse heat flow direction. Unlike the standard panels, their joints have no soft seals and aluminium seals which could form a thermal bridge. In order to eliminate heat flow, the core has a tongue-and-groove joint. Thickness range: 120 to 220 mm. Suitable for walls of cold stores and freezers, as well as ceilings and suspended ceilings. Panels to be installed outside building structure.

Roof panels are available in two types:

- **IzoRoof / IzoRoof+**

Suitable for pitched roof with small and medium pitch angle. These panels have trapezoidal outer surface. Thickness range: 60 to 160 mm. On request IzoRoof/IzoRoof+ panels are sent with a transverse cut of the lower lining intended to be joined in length. The cutting line determines the edge of the core part which is removed at the assembly to allow the sandwich panels to overlap. The lap joint may be left-sided or right-sided. Technical drawing in the "Storage, transport, installation and service rules" section presents the principle of determining the side of the lap joint.





IzoWall PIR/PIR+

Sandwich panel with polyisocyanurate or polyurethane core - visible fastening.

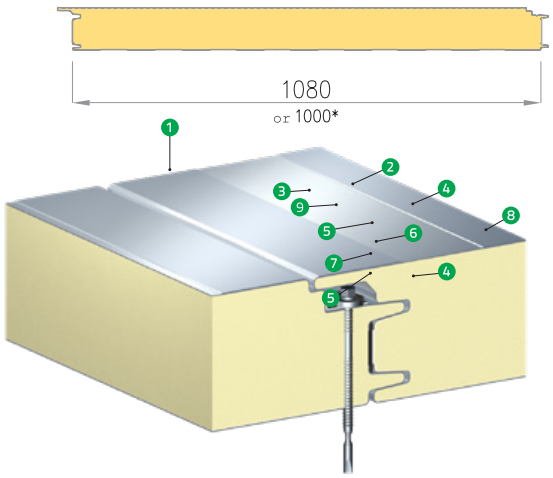
1. Profiled lining with a unique surface design.
2. Large bend radii guarantee durability of lining protective coatings.
3. Double panel lock guarantees best fire resistance properties.
4. Profiled edges facilitate assembly and ensure proper thermal insulating power.
5. Core made of stiff, freon-free, self-extinguishing PIR/PIR+ foam with very good thermal insulation properties.
6. Seamless polyurethane seal keeps proper thermal insulating power and tightness of joint - applied in manufacture.
7. Protecting strip prevents diffusion, water and gas infiltration and steam penetration into the insulating core.
8. Labyrinth joints incorporated in 120 to 200 mm-thick boards.

Suitable for building external and internal walls of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities. Vertical or horizontal installation.
PIR/PIR+ core - stiff polyisocyanurate foam, thermal conductivity rating PIR: λ = 0,022 W/m*K, PIR+: λ = 0,021 W/m*K, improved burning behaviour.
Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties									
thickness	40	60	80	100	120	140	160	180	200
modular width [mm]	1150 or 1080* or 1000* or 1200								
total width [mm]	modular width +18 mm								
length [mm]	2000 - 16000**								
weight 0,5/0,4 [kg/m²]	9,0	9,8	10,6	11,4	12,2	13,0	13,8	14,6	15,4
weight 0,5/0,5 [kg/m²]	9,8	10,6	11,4	12,2	13,0	13,8	14,6	15,4	16,2
Insulating power									
U PIR+ [W/m²K]	0,55	0,35	0,26	0,21	0,18	0,15	0,13	0,12	0,11
U PIR [W/m²K]	0,57	0,37	0,27	0,22	0,18	0,16	0,14	0,12	0,11
Burning behaviour									
PIR+ fire resistance	–	EI15***	EI15	EI 30	EI 30	EI 30	EI 30	EI 30	EI 30
PIR fire resistance	–	–	EI15	Ei 15	EI 15	Ei 15	EI 15	EI 15	EI 15
PIR+ reaction to fire	–	B-s2, d0		B-s1, d0					
PIR reaction to fire	B-s2, d0								
fire propagation	NRO								
Acoustic properties									
acoustic resistance coefficient:									
R_w [dB]	25								
R_{A1} [dB]	23								
R_{A2} [dB]	20								
acoustic absorption coefficient α_w	0,15								
Leakproofness									
Air permeability: pressure	n = 0,8388, C = 0,0116								
Air permeability: suction	n = 1,1072, C = 0,0074								
Blowing rain resistance	A class - absolute leakproofness at 1200 Pa								
Corrosion resistance	External claddings: RC3, internal claddings: RC2 ****								

* modular width available on an individual order.
** maximum length depending on the panel colour – see the "Tips for colour selection" section
*** classification valid if using a heat resistant sealing
**** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark.



IzoGold PIR/PIR+

Wall panel with polyisocyanurate or polyurethane core - hidden screw fasteners.

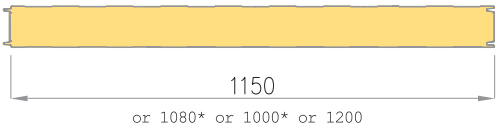
1. Profiled lining with a unique surface design.
2. Hidden fastener gives the facade a uniform appearance.
3. Large bend radii guarantee durability of lining protective coatings.
4. Double panel lock guarantees best fire resistance properties.
5. Profiled edges facilitate assembly and ensure proper thermal insulating power.
6. Seamless polyurethane seal keeps proper thermal insulating power and tightness of joint - applied in manufacture.
7. Protecting strip prevents diffusion, water and gas infiltration and steam penetration into the insulating core.
8. Core made of stiff, freon-free, self-extinguishing PIR/PIR+ foam with very good thermal insulation properties.
9. L-02 fastener ensuring load distribution.

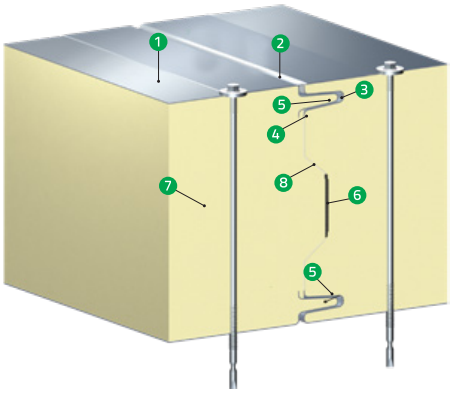
Suitable for building external and internal walls of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities. Vertical or horizontal installation.
PIR/PIR+ core - stiff polyisocyanurate foam, thermal conductivity rating PIR: λ = 0,022 W/m*K, PIR+: λ = 0,021 W/m*K, improved burning behaviour.
Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties				
thickness	60	80	100	120
modular width [mm]	1080 or 1000*			
total width [mm]	modular width +18 mm			
length [mm]	2000 - 16000**			
weight 0,5/0,4 [kg/m²]	10,0	10,8	11,6	12,4
weight 0,5/0,5 [kg/m²]	10,9	11,7	12,5	13,3
Insulating power				
U PIR+ [W/m²K]	0,40	0,28	0,22	0,18
U PIR [W/m²K]	0,42	0,29	0,22	0,19
Burning behaviour				
PIR fire resistance	-		EI 15	
PIR+ fire resistance	-		EI 15	
PIR/PIR+ reaction to fire	B-s2, d0			
fire propagation	NRO			
Acoustic properties				
acoustic resistance coefficient:				
R_w [dB]	26			
R_{A1} [dB]	23			
R_{A2} [dB]	21			
acoustic absorption coefficient α_w	0,15			
Leakproofness				
Air permeability: pressure	n = 0,7578, C = 0,0335			
Air permeability: suction	n = 0,7778, C = 0,0115			
Blowing rain resistance	A class - absolute leakproofness at 1200 Pa			
Corrosion resistance	External claddings: RC3, internal claddings: RC2 ***			

* modular width available on an individual order.
** maximum length depending on the panel colour – see the "Tips for colour selection" section
*** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark.





IzoCold PIR/PIR+

Cold store panel with polyisocyanurate or polyurethane core.

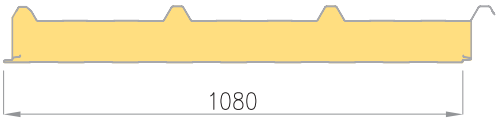
1. Profiled lining with a unique surface design.
2. Sealant applied at the construction site (optional).
3. Large bend radii guarantee durability of lining protective coatings.
4. Profiled edges facilitate assembly and ensure proper thermal insulating power.
5. Double panel lock guarantees best fire resistance properties.
6. Labyrinth core joint eliminates thermal bridge.
7. Core made of stiff, freon-free, self-extinguishing PIR/PIR+ foam with very good thermal insulation properties.
8. Polyurethane foam applied at assembly.

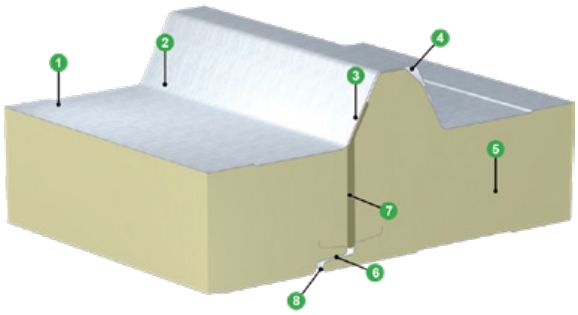
Suitable for external and internal walls as well as ceilings and suspended ceilings of cold stores and freezers. These panels should be installed outside building structure.
PIR/PIR+ core - stiff polyisocyanurate foam, thermal conductivity rating PIR: λ = 0,022 W/m*K, PIR+: λ = 0,021 W/m*K, improved burning behaviour.
Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties						
thickness	120	140	160	180	200	220
modular width [mm]	1150 or 1080* or 1000* or 1200					
total width [mm]	modular width +18 mm					
length [mm]	2000 - 16000**					
weight 0,5/0,4 [kg/m^2]	12,2	13,0	13,8	14,6	15,4	16,2
weight 0,5/0,5 [kg/m^2]	13,0	13,8	14,6	15,4	16,2	17,0
Insulating power						
U PIR + [W/m^{2}K]	0,18	0,15	0,13	0,12	0,11	0,10
U PIR [W/m^{2}K]	0,18	0,16	0,14	0,12	0,11	0,10
Burning behaviour						
PIR fire resistance	EI 15	EI 15	EI 15	EI 15	EI 15	EI 15
PIR+ fire resistance	EI 30	EI 30	EI 30	EI 30	EI30/EI60***	EI30/EI60***
PIR+ reaction to fire	B-s1, d0					
PIR reaction to fire	B-s2, d0					
fire propagation	NRO					
Acoustic properties						
acoustic resistance coefficient:						
R_w [dB]	27					
R_{A1} [dB]	24					
R_{A2} [dB]	22					
acoustic absorption coefficient α_w	0,15					
Leakproofness						
Air permeability: pressure	n = 1,1983, C = 0,0022					
Air permeability: suction	n = 1,0141, C = 0,0036					
Blowing rain resistance	A class - absolute leakproofness at 1,200 Pa					
Corrosion resistance	External claddings: RC3, internal claddings: RC2 ****					

* modular width available on an individual order.
** maximum length depending on the panel colour – see the "Tips for colour selection" section
*** panels sewn by screws on both sides every 150 mm
**** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark.





IzoRoof+ PIR/PIR+

Roof panel with polyisocyanurate or polyurethane core. High surface profile.

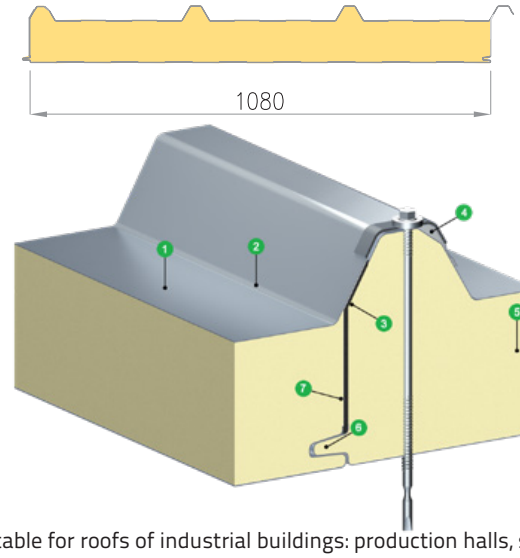
1. Profiled lining with a unique surface design
2. Large lining bend radius guarantees durability of the protective coating.
3. CSeamless polyurethane seal, applied in manufacture, guarantees joint tightness
4. Capillary action preventing chamber.
5. Core made of stiff, freon-free, self-extinguishing PIR/PIR+ foam with very good thermal insulation properties.
6. Profiled edges guarantee tightness of joint
7. Protecting strip prevents diffusion, water and gas infiltration and steam penetration into the insulating core.
8. Bottom straight lock ('shelf – lap" joint)

Suitable for roofs of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities.
PIR/PIR+ core - stiff polyisocyanurate foam, thermal conductivity rating PIR: λ = 0,022 W/m*K, PIR+: λ = 0,021 W/m*K improved burning behaviour.
Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties						
thickness	60	80	100	120	140	160
modular width [mm]	1080					
total width [mm]	modular width +74 mm					
length [mm]	2000 - 16000*					
weight 0,5/0,4 [kg/m^2]	10,2	11,0	11,8	12,6	13,4	14,2
weight 0,5/0,5 [kg/m^2]	11,1	11,9	12,7	13,5	14,3	15,1
Insulating power						
U PIR+ [W/m^{2}K]	0,34	0,26	0,21	0,17	0,15	0,13
U PIR [W/m^{2}K]	0,35	0,27	0,21	0,18	0,16	0,14
Burning behaviour						
PIR+ fire resistance	–		REI 20			
PIR fire resistance	–	–	REI 15			
PIR+ reaction to fire	B-s2, d0					
PIR reaction to fire	B-s2, d0					
reaction to external fire PIR/PIR+	B_{ROOF} (t_1)					
Acoustic properties						
acoustic resistance coefficient:						
R_w [dB]	26					
R_{A1} [dB]	24					
R_{A2} [dB]	21					
acoustic absorption coefficient α_w	0,15					
Leakproofness						
Air permeability: pressure	n = 0,6443, C = 0,1098					
Air permeability: suction	n = 0,4498, C = 0,2433					
Blowing rain resistance	A class - absolute leakproofness at 1,200 Pa					
Corrosion resistance	External claddings: RC3, internal claddings: RC2 **					

*maximum length depending on the panel colour – see the "Tips for colour selection" section
** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Płyty są produkowane zgodnie z normą PN-EN 14509:2013 i posiadają oznakowanie znakiem CE



IzoRoof PIR/PIR+

Roof panel with polyisocyanurate or polyurethane core. High surface profile.

1. Profiled lining with a unique surface design.
2. Large lining bend radius guarantees durability of the protective coating.
3. Seamless polyurethane seal, applied in manufacture, guarantees joint tightness
4. Capillary action preventing chamber.
5. Core made of stiff, freon-free, self-extinguishing PIR/PIR+ foam with very good thermal insulation properties.
6. Profiled edges guarantee tightness of joint
7. Protecting strip prevents diffusion, water and gas infiltration and steam penetration into the insulating core.
8. Bottom straight lock ('shelf – lap" joint)

Suitable for roofs of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities.
PIR/PIR+ core - stiff polyisocyanurate foam, thermal conductivity rating PIR: λ = 0,022 W/m*K, PIR+: λ = 0,021 W/m*K improved burning behaviour.
Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties						
thickness	60	80	100	120	140	160
modular width [mm]	1080					
total width [mm]	modular width +74 mm					
length [mm]	2000 - 16000*					
weight 0,5/0,4 [kg/m²]	10,2	11,0	11,8	12,6	13,4	14,2
weight 0,5/0,5 [kg/m²]	11,1	11,9	12,7	13,5	14,3	15,1
Insulating power						
U PIR+ [W/m²K]	0,34	0,26	0,21	0,17	0,15	0,13
U PIR [W/m²K]	0,35	0,27	0,21	0,18	0,16	0,14
Burning behaviour						
PIR+ fire resistance	–		REI 30	REI 30	REI 30	REI 30
PIR fire resistance	–	–	REI 15	REI 15	REI 15	REI 15
PIR+ reaction to fire	B-s2, d0		B-s1, d0			
PIR reaction to fire	B-s2, d0					
reaction to external fire PIR/PIR+	B_{ROOF} (t_1)					
Acoustic properties						
acoustic resistance coefficient:						
R_w [dB]	26					
R_{A1} [dB]	24					
R_{A2} [dB]	21					
acoustic absorption coefficient α_w	0,15					
Leakproofness						
Air permeability: pressure	n = 0,6662, C = 0,0177					
Air permeability: suction	n = 1,2430, C = 0,0044					
Corrosion resistance	External claddings: RC3, internal claddings: RC2 **					
Blowing rain resistance	A class - absolute leakproofness at 1,200 Pa					
Corrosion resistance	External claddings: RC3, internal claddings: RC2 **					

*maximum length depending on the panel colour – see the "Tips for colour selection" section
** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark.

EPS SANDWICH PANELS

BENEFITS

The core of IZOPANEL EPS sandwich panels is made of expanded polystyrene boards. Expanded polystyrene has very good insulating and thermal properties, which is reflected by thermal conductivity rating:

λ = 0,040 W/m*K

Panels with EPS core also have satisfactory noise insulation properties which are characterized by specific acoustic resistance coefficient:

R_w = 23-24 dB

Including the burning behaviour of panels with EPS core the product can be classified as fire retardant

NRO
fire retardant

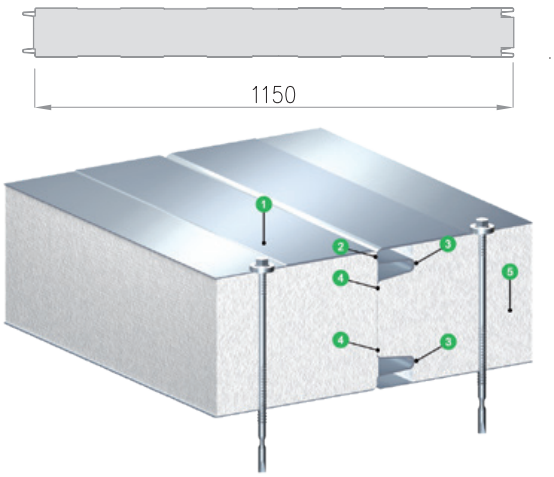
Proper joint profile guarantees perfect leakproofness, preventing air infiltration and ensuring steam and blowing rain resistance.

Wall panels are available in single type:
- **IzoWall**

Standard wall panel. Thickness range: 50 to 250 mm. Suitable for walls, to be installed vertically or horizontally. Fastening to the structure with screws through the panels.

Roof panels are available in single type:
- **IzoRoof**

Suitable for pitched roof with small and medium pitch angle. These panels have trapezoidal outer surface. Thickness range: 60 to 250 mm. IzoRoof panels can be joined in length on the overlap. Such panels are sent with a cross-cut of the lower lining on customer's request. The lining cutting line defines the edge of the core part, which is removed at the assembly to allow the plates to be connected.



IzoWall EPS

Wall panel with expanded polystyrene core.
Visible screw fastening.

.

1. Profiled lining with a unique surface design.
2. Large bend radii guarantee durability of lining protective coatings.
3. Double panel lock guarantees leakproofness.
4. Profiled edges facilitate assembly.
5. EPS core.

Suitable for building external and internal walls of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities. Vertical or horizontal installation.

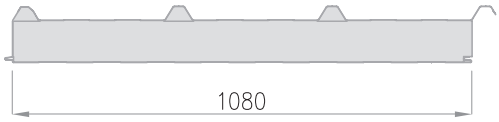
EPS core - expanded polystyrene, $\lambda = 0{,}040$ W/m*K.

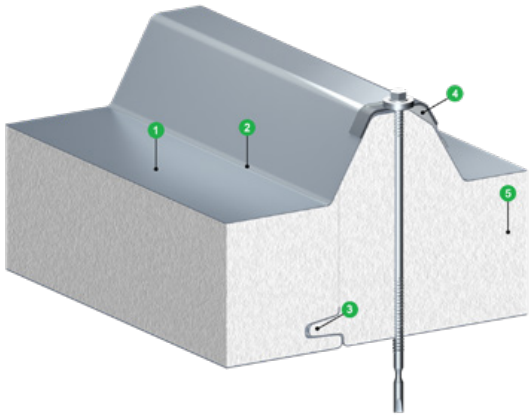
Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties														
thickness	50	60	75	80	100	120	125	140	150	160	175	180	200	250
modular width [mm]	1150													
total width [mm]	modular width +18 mm													
length [mm]	2000 - 13000*													
weight 0,5/0,4 [kg/m^2]	8,4	8,6	8,8	8,9	9,2	9,5	9,6	9,8	9,9	10,1	10,3	10,4	10,7	11,4
weight 0,5/0,5 [kg/m^2]	9,3	9,4	9,7	9,7	10,0	10,3	10,4	10,6	10,8	10,9	11,2	11,3	11,5	12,3
Insulating power														
U [W/m^{2}K]	0,74	0,62	0,51	0,46	0,38	0,31	0,31	0,27	0,26	0,24	0,22	0,21	0,20	0,16
Burning behaviour														
reaction to fire	E													
fire propagation	NRO													
Acoustic properties														
acoustic resistance coefficient:														
R_w [dB]	NPD													
R_{A1} [dB]	NPD													
R_{A2} [dB]	NPD													
acoustic absorption coefficient α_w	-													
Leakproofness														
Air permeability	≤ 1,5 m^3/h*m^2 at pressure difference of 50 Pa													
Blowing rain resistance	NPD													
Corrosion resistance	NPD													

* maximum length depending on the panel colour – see the "Tips for colour selection" section
** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark.





IzoRoof EPS

Roof sandwich panel with expanded polystyrene core. High surface profile.

1. Profiled lining with a unique surface design.
2. Large lining bend radius guarantees durability of the protective coating.
3. Profiled edges guarantee tightness of joint.
4. Capillary action preventing chamber.
5. EPS core.

Suitable for roofs of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities.

EPS core - expanded polystyrene, λ =0,040 W/m*K.

Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties												
thickness	60	75	80	100	120	125	140	150	160	175	200	250
modular width [mm]	1080											
total width [mm]	modular width +74 mm											
length [mm]	2000 - 15000*											
weight 0,5/0,4 [kg/m^2]	8,8	9,0	9,1	9,4	9,7	9,7	10,0	10,2	10,3	10,5	10,9	11,7
weight 0,5/0,5 [kg/m^2]	9,7	9,9	10,0	10,3	10,6	10,7	10,9	11,0	11,2	11,4	11,8	12,5
Insulating power												
U [W/m^{2}K]	0,60	0,49	0,47	0,38	0,32	0,30	0,28	0,26	0,24	0,22	0,19	0,16
Burning behaviour												
reaction to fire	-											
fire propagation	B_{ROOF} (t_1)											
Acoustic properties												
acoustic resistance coefficient:												
R_w [dB]	NPD											
R_{A1} [dB]	NPD											
R_{A2} [dB]	NPD											
acoustic absorption coefficient α_w	-											
Leakproofness												
Air permeability	≤ 1,5 m^3/h*m^2 at pressure difference of 50 Pa											
Blowing rain resistance	NPD											
Corrosion resistance	NPD											

* maximum length depending on the panel colour – see the "Tips for colour selection" section
** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark.

MWF SANDWICH PANELS

BENEFITS

The core of IZOPANEL MWF sandwich panels is mineral wool (stone wool). MWF has good insulating and thermal properties, which is reflected by thermal conductivity rating.

λ = 0,040 W/m*K

MWF panels also have very good noise insulation properties which is characterized by specific acoustic resistance coefficient:

R_w= 31-32 dB

and acoustic absorption coefficient:

α_w = 0,15

Including the burning behaviour of sandwich panels with mineral wool core the product can be classified as

A2
Non-flammable

Panels with MWF core show very good results of fire resistance tests. Depending on the core thickness their fire resistance class is

EI 120

Proper joint profile guarantees perfect leakproofness, preventing air infiltration and ensuring steam and blowing rain resistance.

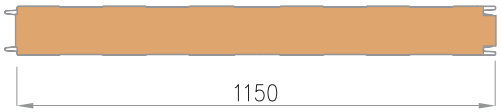
MWF panels manufacturing programme includes single type of wall panel and single type of roof panel.

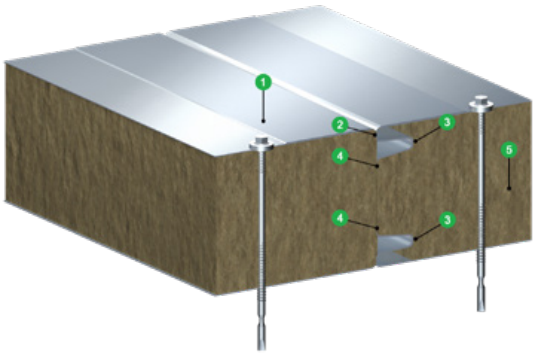
Wall panels are available in single type:
- **IzoWall**

Standard wall panel. Thickness range: 60 to 250 mm. Suitable for walls, to be installed vertically or horizontally. Fastening to the structure with screws through the panels.

Roof panels are available in single type:
- **IzoRoof**

Suitable for pitched roof with small and medium pitch angle. These panels have trapezoidal outer surface. Thickness range: 60 to 200 mm. IzoRoof panels can be joined in length on the overlap. Such panels are sent with a cross-cut of the lower lining on customer's request. The lining cutting line defines the edge of the core part, which is removed at the assembly to allow the plates to be connected.





IzoWall MWF

Sandwich panel for walls with mineral wool core. Visible screw fastening..

1. Profiled lining with a unique surface design.
2. Large bend radii guarantee durability of lining protective coatings.
3. Double panel lock guarantees best fire resistance properties.
4. Profiled edges facilitate assembly and ensure proper thermal insulating power.
5. Core made of hard incombustible mineral wool (MWF).

Suitable for building external and internal walls of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities. Vertical or horizontal installation.

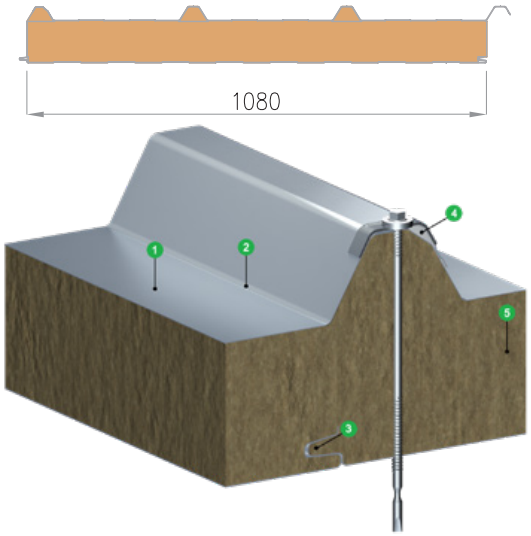
Mineral wool core, λ = 0,040 W/m*K.

Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties									
thickness	60	80	100	120	140	150	160	175	200
modular width [mm]	1150								
total width [mm]	modular width +18 mm								
length [mm]	2000 - 13000*								
weight 0,5/0,5 [kg/m²]	15,4	17,6	19,8	22,0	24,2	25,3	26,4	28,0	30,8
weight 0,5/0,6 [kg/m²]	16,2	18,4	20,6	22,8	25,0	26,1	27,2	28,9	31,6
weight 0,6/0,6 [kg/m²]	17,1	19,3	21,5	23,7	25,9	27,0	28,1	29,8	32,5
Insulating power									
U [W/m²K]	0,64	0,48	0,39	0,33	0,28	0,26	0,25	0,23	0,20
Burning behaviour									
fire resistance	-	EI 45	EI 60			EI 120			
reaction to fire	A2-s1, d0								
fire propagation	NRO								
Acoustic properties									
acoustic resistance coefficient:									
R_w [dB]	31								
R_{A1} [dB]	30								
R_{A2} [dB]	28								
acoustic absorption coefficient α_w	0,15								
Leakproofness									
Air permeability: pressure	n = 0,8388, C = 0,0116								
Air permeability: suction	n = 1,1072, C = 0,0074								
Air permeability	Absolute leakproofness at pressure difference of -50/+50 Pa								
Blowing rain resistance	A class - absolute leakproofness at 1,200 Pa								
Corrosion resistance	External claddings: RC3, internal claddings: RC2**								

* maximum length depending on the panel colour – see the "Tips for colour selection" section
** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark



IzoRoof MWF

Roof sandwich panel with mineral wool core. High surface profile.

1. Profiled lining with a unique surface design.
2. Large lining bend radius guarantees durability of the protective coating.
3. Capillary action preventing chamber.
4. Core made of hard incombustible mineral wool (MWF).
5. Profiled edges guarantee tightness of joint

Suitable for roofs of industrial buildings: production halls, storage buildings, commercial halls, shopping centres, farm facilities.

Mineral wool core, λ = 0,040 W/m*K.

Steel sheet lining with anticorrosive protection depending on the intended use.

Mechanical properties									
thickness	60	80	100	120	140	150	160	175	200
modular width [mm]	1080								
total width [mm]	modular width +74 mm								
length [mm]	2000 - 13000*								
weight 0,5/0,5 [kg/m^2]	15,6	17,8	20,0	22,2	24,4	25,5	26,6	28,3	31,0
weight 0,5/0,6 [kg/m^2]	16,5	18,7	20,9	23,1	25,3	26,4	27,5	29,2	31,9
weight 0,6/0,6 [kg/m^2]	17,4	19,6	21,8	24,0	26,2	27,3	28,4	30,1	32,8
Insulating power									
U [W/m^{2}K]*	0,63	0,48	0,39	0,33	0,28	0,26	0,25	0,23	0,20
Burning behaviour									
fire resistance	-	REI 60							
reaction to fire	A2-s1, d0								
fire propagation	B_{ROOF} (t_1)								
Acoustic properties									
acoustic resistance coefficient:									
R_w [dB]	32								
R_{A1} [dB]	31								
R_{A2} [dB]	28								
acoustic absorption coefficient α_w	0,15								
Leakproofness									
Air permeability : presure	n = 0,6662, C = 0,0177								
Air permeability : suction	n = 1,2430, C = 0,0044								
Blowing rain resistance	A class - absolute leakproofness at 1,200 Pa								
Corrosion resistance	External claddings: RC3, internal claddings: RC2**								

* maximum length depending on the panel colour – see the "Tips for colour selection" section
** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

Panels are manufactured in accordance with PN-EN 14509:2013 and have the CE mark

LINING TYPES AND COLOURS

In standard option, lining is made of hot rolled DX51, S250GD, S280GD, S320 GD steel sheet. The steel sheet is coated on both sides with inorganic, zinc or aluzinc protective coat. Minimum thickness of the inorganic layer for outdoor applications is 225 g/m2 of zinc or 150 g/m2 of aluzinc coat. The aluzinc coat, due to its smaller density, gives the same thickness of layer, measured in microns, with lower mass. Paint coat is the final protective layer. Normally, it is a polyester coat with thickness of 25 microns. For applications in non-standard environmental conditions, different thickness values and different types of paint coats are recommended. Proper choice of a coat according to local conditions will guarantee a long and trouble-free functioning of the panels. In standard option, lining thickness is 0.4 mm (inside) and 0.5 mm (outside) in panels with EPS, PIR/PIR+ core. In MWF panels, lining thickness is normally 0.5 mm on both sides. In non-standard options, the thickness of the panel lining may be 0.5 mm (inside) and 0.6 mm (outside).
Panels are covered with a protective film on both sides. This film protects layers during the transport and the assembly. The protective film must be removed within 1 month from the date of manufacture and no later than 3 weeks after the panel exposure to sunlight (date of manufacture is marked on each packet of the panels delivered).

PROPER SELECTION OF PANELS FOR VARIOUS CONDITIONS

Lining of sandwich panels is exposed to various aggressive factors causing corrosion, discolouration or blooming. Such factors are substances present in the external atmosphere, such as water, moisture and chemicals contaminating the environment. These can also be chemicals generated as a result of the operations carried out at the facility. Moisture in gymnasiums, swimming pools and car wash facilities, substances produced by animals, such as ammonia, side products of chemical processes taking place inside the building or aggressive cleaning agents used in order to maintain high sanitary standards at food processing plants. Additionally, UV radiation may have destructive effect on the appearance of the lining, causing loss of gloss and colour.
In order to make a proper choice regarding the type of the lining according to the environmental conditions, and thus ensure long and trouble-free use of the panels, users must take into account all the above mentioned factors.
The effect of external conditions on durability of the lining is specified by EN ISO 12944-2 standard.
The standard divides environment types into classes of aggressiveness, based on the rate of degradation of zinc protective coat. The table below presents the classes of aggressiveness:

Zinc thickness loss in the 1st year of use			Examples of environments typical for temperate climate (informational purposes only)	
Corrosivity class according to EN ISO 12944-2		M	Indoors	Outdoors
C1	very low	< 0.1	Heated buildings with clean atmosphere, e.g. offices, shops, schools, hotels.	N/A
C2	low	0.1-0.7	Non-heated buildings with temporary condensation, e.g., store rooms, gymnasiums.	Slightly polluted environments. Mainly rural areas.
C3	moderate	0.7-2.1	Rooms with high relative humidity and certain air pollution, e.g., food processing plants, laundries, breweries, dairies.	Urban and industrial atmosphere with moderate SO2 pollution. Coastal areas with low salinity.
C4	high	2.1-4.2	Chemical plants, swimming pools, shipyards.	Industrial and coastal areas with moderate salinity.
C5-I	very high (industrial)	4.2-8.4	Buildings or areas with nearly permanent condensation and heavy pollution.	Industrial areas with high relative humidity and aggressive atmosphere.
C5-M	very high (maritime)	4.2-8.4	Buildings or areas with nearly permanent condensation and heavy pollution.	Coastal and insular areas with high salinity.

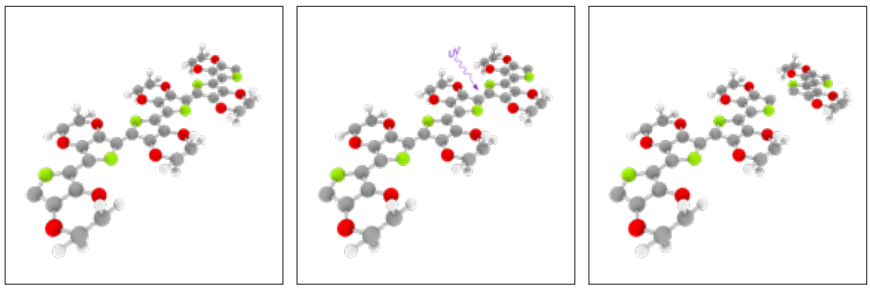
UV EFFECT

Under natural conditions, paint coats are subject to degradation, apart from chemicals, caused by destructive effect of ultraviolet radiation (UV). Resistance of paint coats to ultraviolet radiation mainly depends mainly on the type of the used membrane forming substances as well as special additives - photo stabilisers.
Solar radiation reaching the Earth includes:

- infrared radiation with wavelength between 700 and 4,000 nm,
- visible light with wavelength between 400 and 700 nm,
- UV-A radiation with wavelength between 315 and 400 nm,
- UV-B radiation with wavelength between 280 and 315 nm,
- UV-C radiation with wavelength between 100 and 280 nm (absorbed by the atmosphere).

Photodegradation of polymers, including membrane forming substances of paint coats, is based on inducing reactions of radicals which lead to shortening of the polymer chain. This process is a direct effect of absorbing radiation quanta by polymer functional

groups. The effect of radiation depends on the length of the lightwave and its intensity. Therefore it can be assumed that the more the paint coat is subjected to the destructive effects, the more exposed it is to the sunlight with little reduction of the ultraviolet spectrum. The UV radiation can be absorbed by the Earth's atmosphere. Such absorption becomes more efficient if the stratum is thicker. In elevated locations, such as mountainous regions, the atmosphere stratum is much thinner, which results in higher UV radiation penetration to the Earth's surface.



Polymer particle disintegration by a beam of UV radiation

When choosing a paint coat in terms of the resistance to UV radiation the following conditions should be analysed:
- geographical location (elevation, metres above sea level),
- exposure to sunlight (North - South),
- expected period of the facility operation,
- importance of aesthetic aspects for a given facility (representative objects, etc.).

AGGRESSIVE FACTORS IN SPECIAL PURPOSE BUILDINGS (AGRICULTURE, FOOD INDUSTRY, ETC.)

In special purpose buildings, where various industrial processes take place and harmful chemical substances are produced, contact with caustic liquids is likely and paint coats are exposed to adverse conditions. Therefore it is important these are taken into account when choosing indoor protective layers.

Agriculture

One of the most specific environments where IZOPANEL panels are installed are buildings where animals are kept. Very often lining of the panels is exposed to animal excrements containing ammonia and its derivatives mainly. Ammonia is a very aggressive substance, and on the contact with it most layers corrode and deteriorate rapidly. Therefore, FarmCoat is a perfect solution to be applied under such conditions.

Food industry

As far as panels and their lining in food industry applications are concerned, it is required, above all, that panels and their lining have no effect on the food products when in a direct contact. This feature should be confirmed by proper hygienic certificates issued by the National Institute of Hygiene (PZH) or by the lining supplier. Risk factors for the coats are as follows: presence of caustic organic substances of animal origin as a gas or a liquid (blood, acids, fats), effect of more or less aggressive cleaning agents used in order to maintain high sanitary standards or substances used in food processing, such as acids, vinegar, etc.
For this we recommend two types of coats from offer: FoodCoat or FoodSafe. For detailed description of these layers see the "Coat charts" section.

Freezers, cold stores, food stores

Also here, similar requirements apply as those the lining should meet in the food industry applications. It can be assumed that their intensity is lower, however, amplified by an additional negative factor as low temperature. In most cases, standard coat is sufficient. However, if conditions are combined in a certain way, the use of FoodCoat or FoodSafe coats is worth considering.

TIPS FOR COLOUR SELECTION

Normally sandwich panels consist of three layers: internal lining, core and external lining. Owing to the variety of physical properties of these layers, in terms of thermal expansion, rigidity, insulating power, these panels are subject to harmful effects caused by different indoor and outdoor temperatures. Steel, being a material with much higher linear thermal expansion rating, under the temperature, is subject to greater expansion and shrinkage than the core. Steel is also joined with the lining thanks to the adhesive forces. This causes tangent stresses which can be transferred to a certain extent by the joint of the steel sheet and the core. When the limit values are exceeded, however, layers can be separated, bubbles formed or, on the contrary, lining can be depressed or bulges formed.

The difference in the expansion properties of steel and the core material becomes greater when the surface temperature is higher, and this is related to the level of the radiation absorption, so the colour. Light coloured panels are less susceptible to the occurrence of this

phenomenon (stresses do not reach limit values), while with dark and very dark colours the influence of temperature must be taken into account with particular care and added up to the values of other loads. In extreme cases, this effect can cause corrugation of steel sheet or its brittle or fatigue fractures. In order to prevent this problem, it is recommended to reduce the length of individual panels or even eliminate dark colours and replace them with lighter ones. In addition, this factor should be taken into consideration and thermal movements should be accounted for.
Another harmful effect results from the fact that sandwich panels always operate between two environments with different temperatures. Normally, indoor temperature is above zero (+20°C) while the outside temperature is sub-zero (-30°C). Quite opposite conditions may occur in the case of freezers where indoor temperature may reach even -40°C while outdoors +30°C. As a result, external and internal lining behave differently - cold lining shrinks while warm lining expands, which causes bending of the entire panel.
Such bending must also be included when calculating the total combination of loads.
In order to assess the influence of thermal loads on the panels, all available colours have been divided into three brightness groups, based on the degree of heat absorption.

According to the PN-EN 14509:2013 standard, the temperature of external lining (T1) reaches maximum value in summer, and depends on the colour and the degree of reflection of the surface. The T1 values that are minimum values for load capacity calculations and sufficient for calculating limit conditions of use are as follows:

Very light colours **R_G = 75-90 T_1 = +55°C**
Light colours **R_G = 40-74 T_1 = +65°C**
Dark colours **R_G= 8-39 T_1 = +80°C**

Where R_G is the reflection grade in relation to magnesium oxide = 100%

COLORS ACCORDING TO RAL PALETTE

I group - very light colours

II group - light colours

III group - dark colours

Note:
RAL colour system indicates colours with a certain accuracy and tolerance. It is possible that two types of paint, classified as the same colour according to RAL, may look different when compared. Due to the fact that slight differences in the shade of coats are unavoidable, even when products are from the same supplier, we recommend that precise planning of cutting and installation is performed in order to obtain uniform colour of the facade. It is even more likely that shade differences occur when part of the structure is assembled after a certain period of time. Inevitable loss of colour and gloss caused by UV radiation results in a noticeable change in shading after a few months, even if the steel sheet comes from the same supplier. An effective solution for this issue is to design and install a decorative element separating the two surfaces as flashing, drain pipe, etc.
Colours presented herein are for reference only and may differ from the actual colours. In order to determine a proper colour, use a RAL colour sampler.
When an element with metallic colour lining is rotated by 180 degrees, colour differences are noticeable. When installing the panels with colour lining check the colour of the facade (every fifth element checked from the distance of at least 25 m). Any and all objections regarding the colours after the completion of works at the facility shall not be accepted and Izopanel is released of any warranty liability regarding the differences in the shades.
Taking into consideration the panel type and lining colour, Izopanel sandwich panels are manufactured in the following permissible lengths:

PERMISSIBLE LENGTHS CHART

CORE	PANEL TYPE	COLOUR GROUPS		
		I [m]	II [m]	III [m]
PIR/PIR+	IzoWall / IzoGold / IzoCold	16	12	9
	IzoRoof / IzoRoof+	16	15	12
MWF	IzoWall	13	9	6
	IzoRoof	13	11	9
EPS	IzoWall	13	9	6
	IzoRoof	15	11	9

Failure to follow the above guidelines may cause deformation of panel surface and local loss of stability, for which the producer shall not be held responsible.

LINING

	STANDARD	PREMIUM			SPECIAL	
Coat type	SP	HDS	HDX	Prisma	FarmCoat	FoodSafe
Thickness [microns]	25	35	55	50	35	120
Surface finish	smooth	smooth	granular	granular	smooth	smooth
Bend adhesion	≤ 2 T	≤ 1 T	≤ 1 T	≤ 1 T	≤ 1 T	≤ 1 T
Flexibility	≤ 3 T	≤ 2 T	≤ 1,5 T	≤ 2 T	≤ 2 T	≤ 1 T
Impact resistance	18J	18J	18J	18J	18J	–
Surface hardness (pencil classification)	HB-H	HB – H	F-H	HB-H	HB - H	–
Scratch resistance (Clemen)	≥ 2,0 kg	≥ 2,2 kg	≥ 3,0 kg	≥ 2,2 kg	≥ 2,0 kg	3,5 - 4 kg
Corrosion resistance (salt spray test) in hours	360	500	700	1000	360	500
Humidity resistance (QCT) in hours	1000	1500	1500	1000	1500	–
Corrosion resistance class	RC3/RC2*	RC4	RC5	RC5	RC3	–
UV resistance (QUV [UVA + H2O] [2,000 hours]) - gloss retention	≥ 30%; Δ E ≤ 5	≥ 80%; Δ E ≤ 2	≥ 80%; Δ E ≤ 2	≥ 80%; Δ E ≤ 2	≥ 60%; Δ E ≤ 3	–
UV resistance category	RUV2	RUV4	RUV4	RUV4	RUV3	–
Acid and alkali resistance	3	3-4	3-4	3-4	3-4	–
Alcohols and aliphatic solvents resistance	4	4	4	4	4	–
Ketone resistance	2	2	2	2	4	–
Aromatic solvents resistance	3-4	3-4	3-4	3-4	4	–
Mineral oil resistance	4	4	4	4	4	–

STAINLESS STEEL

PIR/PIR+ panels are also manufactured with stainless steel cladding.

Designation according to EN 10088	Designation according to AISI/ASTM	Chemical composition (%)								
		C	Si	Mn	P max	S	N	Cr	Mo	Ni
1.4301	304	≤ 0.07	≤ 1.00	≤ 2.00	0.045	≤ 0015	≤ 0.11	17.50 - 19.50	–	8.00 - 10.50

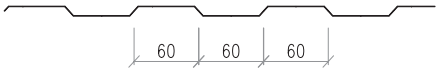
Standard external surface finishing - 2b

* The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.

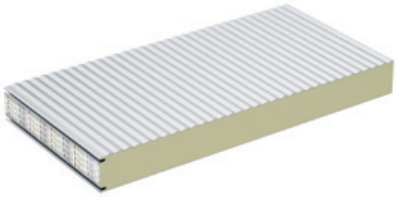
PROFILE TYPES

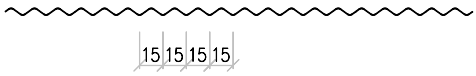
Thanks to the variety of profile types of IZOPANEL sandwich panels lining and a wide selection of paint coats in various colours, our products can give a unique character to any building.

L linear



M corrugated





BP smooth*

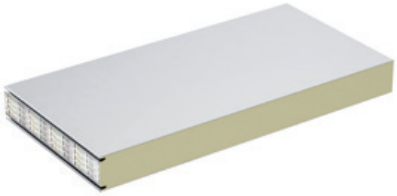


Table 1. Profiling combinations for wall and cold storage cladding

Panel type	Modular width	Outer cladding			Inner cladding		
		L	M	BP****	L	M	BP****
IzoWall PIR/PIR+	1150	x	x	x	x	x	x
	1200**		x	x		x	x
	1080**	x	x	x	x	x	x
	1000**	x	x	x	x	x	x
IzoCold PIR/PIR+	1150	x	x	x	x	x	x
	1200**		x	x		x	x
	1080**	x	x	x	x	x	x
	1000**	x	x	x	x	x	x
IzoGold PIR/PIR+	1080	x	x	x	x	x	x
	1000**	x	x	x	x	x	x
IzoWall MWF	1150	x	x	x***	x	x	x***
IzoWall EPS	1150	x	x	x***	x	x	x***

Table 2. Profiles combinations for roof cladding

Panel type	Modular width	Outer cladding	Inner cladding		
		TR	L	M	BP*****
IzoRoof/IzoRoof+	1080	x	x	x	x
IzoRoof MWF	1080	x	x	x	x
IzoRoof EPS	1080	x	x	x	x

* in BP profile (smooth), slight corrugation of the surface is possible; the permissible deviation from the flatness is specified in the PN-EN 14509:2013 standard
** modular width available on an individual order.
*** recommended cladding thickness: 0,6mm
**** recommended cladding thickness for PIR/PIR+ panels: min. 0,5mm
***** recommended cladding thickness: min. 0,5mm

Coat charts

IZOPANEL®

Coat catalogue chart

STANDARD Coat

Intended use:	Regions with low atmosphere aggressiveness. Structures not exposed to excessive UV radiation.
Coat code	SP
Properties:	
Sheet gauge	0,50 mm
Metal coat	Zn225 - zinc, both sides, 225 g/m^2 AlZn 150 - aluzinc, both sides 150 g/m^2 - used only on inner cladding
Organic coat	Modified thermosetting polyester coat - ground coat: 5 microns - prime coat: 20 microns
Mechanical strength:	
Coat adherence	≤ 2 T
Coat flexibility	≤ 3 T
Impact resistance	18J
Surface hardness (pencil classification)	HB-H
Scratch resistance (Clemen)	≥ 2,0 kg
Corrosion resistance:	
Salt spray test	360 hours
Humidity resistance - condensation (QCT)	1000 hours
Corrosion resistance class	**RC3/RC2***
Chemical resistance:	
Acid and alkali resistance	Good
Solvent resistance:	
Aliphatic compounds and alcohols	Very good
Ketones	Low
Aromatic compounds	Good to very good
Mineral oil resistance	Very good
Ammonia resistance	Low
Resistance in contact with household products	Very good
UV resistance:	
QUV test (UVA + H2O) (2,000 hours)	ΔE ≤ 5; gloss retention ≥ 30%
UV resistance class	RUV2
Appearance:	
Surface finish	smooth
Gloss (Gardner 60°)	30 GU
Colours:	
STANDARD 1	9010 9002
STANDARD 2	7035 9006
Other	To be agreed with the manufacturer
Other features:	Designed for long-term application in moderately aggressive environments with corrosivity category C1-C3 - for most applications in Europe

*** The RC2 corrosion resistance class refers to standard corrosion protection used only on internal cladding. Higher corrosion resistance category on special order.**

Coat catalogue chart

HDS Coat

Intended use:	Regions with increased environmental corrosivity. Regions with increased level of UV radiation (above 900 metres above sea level).
Coat code	GS
Properties	
Sheet gauge	0,50 mm
Metal coat	Zn225 - zinc, both sides 225 g/m^2
Organic coat	Modified thermosetting polyester-polyurethane coat - ground coat: 15 microns - prime coat: 20 microns
Mechanical strength:	
Coat adherence	≤ 1 T
Coat flexibility	≤ 2 T
Impact resistance	18J
Surface hardness (pencil classification)	HB-H
Scratch resistance (Clemen)	≥ 2,2 kg
Corrosion resistance:	
Salt spray test	500 hours
Humidity resistance - condensation (QCT)	1,500 hours
Corrosion resistance class	**RC4**
Chemical resistance:	
Acid and alkali resistance	Good to very good
Solvent resistance:	
Aliphatic compounds and alcohols	Very good
Ketones	Low
Aromatic compounds	Good to very good
Mineral oil resistance	Very good
Ammonia resistance	Low
Resistance in contact with household products	Very good
UV resistance:	
QUV test (UVA + H2O) (2,000 hours)	ΔE ≤ 2; gloss retention ≥ 80%
UV resistance class	RUV4
Appearance:	
Surface finish	smooth
Gloss (Gardner 60°)	30 GU
Colours:	
STANDARD 1	9010
STANDARD 2	9006, 7035
Other	To be agreed with the manufacturer
Other features:	Designed for long-term application in aggressive environments with corrosivity category C4

Coat catalogue chart

HDX Coat

Intended use:	Regions with very high environmental corrosivity. Regions with very high level of UV radiation. Structures for which colour stability and appearance are very significant.
Coat code	GX
Properties	
Sheet gauge	0,50 mm
Metal coat	Zinc, both sides, 275 g/m^2
Organic coat	Modified thermosetting polyurethane coat - ground coat: 25 microns - prime coat: 30 microns
Mechanical strength:	
Coat adherence	≤ 1 T
Coat flexibility	≤ 1,5 T
Impact resistance	18J
Surface hardness (pencil classification)	F-H
Scratch resistance (Clemen)	≥ 3,0 kg
Corrosion resistance:	
Salt spray test	700 hours
Humidity resistance - condensation (QCT)	1,500 hours
Corrosion resistance class	**RC5**
Chemical resistance:	
Acid and alkali resistance	Good to very good
Solvent resistance:	
Aliphatic compounds and alcohols	Very good
Ketones	Low
Aromatic compounds	Good to very good
Mineral oil resistance	Very good
Ammonia resistance	Low
Resistance in contact with household products	Very good
UV resistance:	
QUV test (UVA + H2O) (2,000 hours)	ΔE ≤ 2; gloss retention ≥ 80%
UV resistance class	RUV4
Appearance:	
Surface finish	granular
Gloss (Gardner 60°)	30 GU
Colours:	
STANDARD 1	9010
STANDARD 2	9006
Other	To be agreed with the manufacturer
Other features:	Designed for long-term application in very aggressive environments with corrosivity category C5

Coat catalogue chart

Farm Coat

Intended use:	Food industry. Aggressive and damp interior conditions, approved for contact with food. **ONLY AS INTERNAL CLADDING OF A SANDWICH PANEL**
Coat code	GF
Properties:	
Sheet gauge	0,50 mm
Metal coat	Zinc, both sides, 275 g/m^2
Organic coat	Modified thermosetting polyester coat - ground coat: 15 microns - prime coat: 20 microns
Mechanical strength:	
Coat adherence	≤ 1 T
Coat flexibility	≤ 2 T
Impact resistance	18J
Surface hardness (pencil classification)	HB-H
Scratch resistance (Clemen)	≥ 2 kg
Corrosion resistance:	
Salt spray test	360 hours
Humidity resistance - condensation (QCT)	1,500 hours
Corrosion resistance class	**RC3**
Chemical resistance:	
Acid and alkali resistance	Good to very good
Solvent resistance:	
Aliphatic compounds and alcohols	Very good
Ketones	Very good
Aromatic compounds	Very good
Mineral oil resistance	Very good
Ammonia resistance	**Very good**
Resistance in contact with household products	Very good
UV resistance:	
QUV test (UVA + H2O) (2,000 hours)	ΔE ≤ 3; gloss retention ≥ 60%
UV resistance class	RUV3
Appearance:	
Surface finish	smooth
Gloss (Gardner 60°)	30 GU
Colours:	
STANDARD 1	9010
STANDARD 2	–
Other	To be agreed with the manufacturer
Other features:	Very good chemical resistance, with particular consideration of ammonia.

Coat catalogue chart

Food Safe

Intended use:	Refrigeration and food industry. Aggressive and damp interior conditions. **Approved for contact with food.**
Coat code	FS
Properties:	
Sheet gauge	0,50 mm
Metal coat	Zinc - 275g/m^2
Organic coat	Polyvinyl coat: 120 microns
Mechanical strength:	
Coat adherence	≤ 1 T
Coat flexibility	≤ 1 T
Impact resistance	No defects
Surface hardness (pencil classification)	–
Scratch resistance (Clemen)	3,5 - 4 kg
Corrosion resistance:	
Salt spray test	500 hours
Humidity resistance - condensation (QCT)	–
Corrosion resistance class	N/A
Temperature resistance:	–
Continuous exposure	100 hours at 70°C
Chemical resistance:	
Acid and alkali resistance	–
Solvent resistance:	
Aliphatic compounds and alcohols	–
Ketones	–
Aromatic compounds	–
Mineral oil resistance	–
Ammonia resistance	–
Resistance in contact with household products	–
UV resistance:	
QUV test (UVA + H20) (2,000 hours)	–
UV resistance class	–
Appearance:	
Surface finish	smooth
Gloss (Gardner 60°)	–
Colours:	
STANDARD 1	9010
STANDARD 2	–
Other	To be agreed with the manufacturer
Other features:	Anticorrosive protection, possibility of modification: bending, profiling, extrusion.


IZOPANEL®

Properties of sandwich panels

		PIR		PIR+		EPS		MWF	
		λ	U	λ	U	λ	U	λ	U
		W/m*K	W/m²*K	W/m*K	W/m²*K	W/m*K	W/m²*K	W/m*K	W/m²*K
IzoWall	40	0,022	0,57	0,021	0,55	0,040	–	0,040	–
	50		–		-		0,74		–
	60		0,37		0,35		0,62		0,64
	75		–		-		0,51		–
	80		0,27		0,26		0,46		0,48
	100		0,22		0,21		0,38		0,39
	120		0,18		0,18		0,31		0,33
	125		–		-		0,31		–
	140		0,16		0,15		0,27		0,28
	150		–		-		0,26		0,26
	160		0,14		0,13		0,24		0,25
	175		–		-		0,22		0,23
	180		0,12		0,12		0,21		–
	200		0,11		0,11		0,20		0,20
	250		–		-		0,16		–
IzoGold	60		0,42		0,40		–		–
	80		0,29		0,28		–		–
	100		0,22		0,22		–		–
	120		0,19		0,18		–		–
IzoCold	120	0,022	0,18	0,021	0,18		–		–
	140		0,16		0,15		–		–
	160		0,14		0,13		–		–
	180		0,12		0,12		–		–
	200		0,11		0,11		–		–
	220		0,10		0,10		–		–
IzoRoof*	60	0,022	0,35	0,021	0,34		0,60		0,63
	75		–		-		0,49		–
	80		0,27		0,26		0,47		0,48
	100		0,21		0,21		0,38		0,39
	120		0,18		0,17		0,32		0,33
	125		–		-		0,30		–
	140		0,16		0,15		0,28		0,28
	150		–		-		0,26		0,26
	160		0,14		0,13		0,24		0,25
	175		–		-		0,22		0,23
	200		–		-		0,19		0,20
	230		–		-		–		–
	250		–		-		0,16		–

The calculations have been made on the basis of the tests of the thermal conductivity rating according to the standard. Using the thermal conductivity rating determined experimentally, heat transfer coefficient U has been calculated. For the calculations, it has been assumed that the temperature of operation for all panels, except for IzoCold, is +10°C.
Technical documentation of any facility should include: spot and linear values of heat transfer coefficients for individual barriers, designed temperature values for individual rooms as well as values of relative air humidity for which water vapour condensation occurs.
In the case of cold stores and freezer chambers, we recommend that selection of panels should be based on heat flux density. This value should be below 10 W/m²

* For panels with PIR/PIR+ core, roof panel with straight lock – IzoRoof+ is also available

In the below chart heat flux density values are provided for Izopanel panels depending on the temperature difference on both sides of panels:

Heat flux density for PIR/PIR+ panels [W/m²]											
Temperature difference ΔT [°C]	Panel type										
	Izo Wall PIR PIR+ 40	Izo Wall PIR PIR+ 60	Izo Wall PIR PIR+ 80	Izo Wall PIR PIR+ 100	Izo Wall PIR PIR+ 120	Izo Cold PIR PIR+ 120	Izo Cold/ IzoWall PIR PIR+ 140	Izo Cold/ IzoWall PIR PIR+ 160	Izo Cold/ IzoWall PIR PIR+ 180	Izo Cold/ IzoWall PIR PIR + 200	Izo Cold PIR PIR+ 220
	Heat transfer coefficient U [W/m²*K]										
	0,57	0,37	0,27	0,22	0,18	0,18	0,16	0,14	0,12	0,11	0,10
10	5,70	3,70	2,70	2,20	1,80	1,80	1,60	1,40	1,20	1,10	1,00
15	8,55	5,55	4,05	3,30	2,70	2,70	2,40	2,10	1,80	1,65	1,50
20	11,40	7,40	5,40	4,40	3,60	3,60	3,20	2,80	2,40	2,20	2,00
25	14,25	9,25	6,75	5,50	4,50	4,50	4,00	3,50	3,00	2,75	2,50
30	17,10	11,10	8,10	6,60	5,40	5,40	4,80	4,20	3,60	3,30	3,00
35	19,95	12,95	9,45	7,70	6,30	6,30	5,60	4,90	4,20	3,85	3,50
40	22,80	14,80	10,80	8,80	7,20	7,20	6,40	5,60	4,80	4,40	4,00
45	25,65	16,65	12,15	9,90	8,10	8,10	7,20	6,30	5,40	4,95	4,50
50	28,50	18,50	13,50	11,00	9,00	9,00	8,00	7,00	6,00	5,50	5,00
55	31,35	20,35	14,85	12,10	9,90	9,90	8,80	7,70	6,60	6,05	5,50
60	34,20	22,20	16,20	13,20	10,80	10,80	9,60	8,40	7,20	6,60	6,00
65	37,05	24,05	17,55	14,30	11,70	11,70	10,40	9,10	7,80	7,15	6,50
70	39,90	25,90	18,90	15,40	12,60	12,60	11,20	9,80	8,40	7,70	7,00
75	42,75	27,75	20,25	16,50	13,50	13,50	12,00	10,50	9,00	8,25	7,50
80	45,60	29,60	21,60	17,60	14,40	14,40	12,80	11,20	9,60	8,80	8,00
85	48,45	31,45	22,95	18,70	15,30	15,30	13,60	11,90	10,20	9,35	8,50
90	51,30	33,30	24,30	19,80	16,20	16,20	14,40	12,60	10,80	9,90	9,00
95	54,15	35,15	25,65	20,90	17,10	17,10	15,20	13,30	11,40	10,45	9,50
100	57,00	37,00	27,00	22,00	18,00	18,00	16,00	14,00	12,00	11,00	10,00

BURNING BEHAVIOUR

Fire safety issues, burning behaviour and fire consequences are becoming more and more significant aspects in the building designing. Using materials with better fire resistance parameters has become essential due to the currently valid regulations, awareness of hazards among the investors and changing policy of insurance companies. The requirements for wall and roof materials depend on the purpose of the building, fire load inside - that is the amount of combustible materials, distance to other structures and the category of hazard to human life.

Various building materials behave differently during the fire. In order to make the classification of materials within the scope of burning behaviour more clear, Euroclass rating has been introduced. This classification enables testing of reaction to fire of various materials according to uniform principles. It determines three major parameters: the influence of a given material on fire propagation, volume and rate of smoke production - which is the cause of the majority of deaths in fires, and also occurrence of burning droplets (material debris).
The chart below presents the Euroclass division and basic requirements:

Euroclass	burning behaviour	contribution to fire	FIGRA
A1	no flame attack	non-flammable, negligible calorific potential, no contribution to fire	–
A2	no flame attack	non-flammable, low calorific potential, insignificant contribution to fire	< 120 W/s
B	no flame attack	flame retardant, very limited contribution to fire	< 120 W/s
C	no flame attack in 100 kW heat flux, flame attack in 300 kW heat flux no sooner than after 10 minutes	limited but noticeable contribution to fire	< 250 W/s
D	flame attack no sooner than after 2 minutes in 100 kW heat flux	significant contribution to fire	< 750 W/s
E	flame attack sooner than after 2 minutes in 100 kW heat flux	crucial contribution to fire	> 750 W/s
F	no requirements	not specified	no requirements

FIGRA - FireGrowthRate. Coefficient for fire growth rate.

For materials that cannot be included in A1 class, two previously mentioned parameters are determined: smoke production and burning droplets. Smoke causes more deaths than the flame itself. High volume of smoke hinders rescue action, spreads panic and confusion..

Classification	Description
s1	almost no smoke
s2	medium volume and density of smoke
s3	large volume of thick smoke

Burning droplets may cause burns and create new pockets of fire.

Classification	Description
d0	no burning droplets
d1	few burning droplets
d2	high number of flaming droplets and particles

Example of Euroclass labelling:

A1 - Euroklasa A1 is the only one which is not followed by any additional classifications.

B-s2, d0 - all other Euroclass ratings have additional classifications. This particular rating indicates a slow-burning material which produces medium volume of smoke and does not produce burning droplets or particles.

Currently Polish legislation (Regulation of the Minister of Infrastructure on technical requirements applicable to buildings and their location of 12 April 2002) does not refer directly to Euroclass ratings. Descriptive classification is still valid (flammable, slow-burning, non-flammable), however adjustment of Polish regulations to the EU acts should be expected.

FIRE RESISTANCE

Fire resistance of a barrier, that is wall or roof, means the time for which such barrier is able to keep its specific properties in terms of:

R – load capacity
E – leakproofness
I – insulating power

R parameter indicates the time for which a loaded element is able to maintain its load capacity, not exceeding the limit values of load capacity and safety of operation. For sandwich panels this parameter applies to roof panels.
E parameter indicates the time for which the barrier is able to become tight to flames and smoke.
I parameter indicates the time for which the barrier is able to meet the insulating power condition and prevent the standard limit temperature values from being exceeded on the side that is not exposed to flames.
Some other secondary parameters for sandwich panels, are also under assessment: W – transmittance. This classification is reflected directly in the requirements for buildings.
According to the Regulation of the Minister of Infrastructure on technical requirements applicable to buildings and their location of 12 April 2002 (Journal of Laws No. 75, item 690), fire load classification is used for industrial buildings with one overground storey.
Fire safety issues, burning behaviour and fire consequences are becoming more and more significant aspects in the building designing. Using materials with better fire resistance parameters has become essential due to the currently valid regulations, awareness of hazards among the investors and changing policy of insurance companies. The requirements for wall and roof materials depend on the purpose of the building, fire load inside the building - that is the amount of combustible materials, distance to other structures and the category of hazard to human life.
The following page provides summary on fire resistance of Izopanel sandwich panels.

DETAILED INFORMATION ON FIRE RESISTANCE OF IZOPANEL PANELS
EUROCLASS - REACTION TO FIRE

Panel type	Core thickness	Fire resistance class			Fire impact	Fire resistance class for construction
IzoWall PIR+	≥ 60 mm	E30	EI15	EW60	from outside from inside	no lower than panel resistance class
	≥ 80 mm	E15	EI15	EW20	from outside from inside	no lower than panel resistance class
	≥ 100 mm	E30	EI30	EW30	from outside from inside	no lower than panel resistance class
	≥ 120 mm	E30	EI30	EW30	from outside from inside	no lower than panel resistance class
		E20	EI20	EW20	from outside from inside	no lower than panel resistance class
		E15	EI15	EW15	from outside from inside	no lower than panel resistance class
IzoCold PIR+	≥ 120 mm	E30	EI30	EW30	from outside from inside	no lower than panel resistance class
		-	EI15	-	from outside from inside	no lower than panel resistance class
	≥200mm	E90*	EI30*	EW60*	from outside from inside	no lower than panel resistance class
		E120*	EI60*	EW60*	from outside from inside	no lower than panel resistance class
IzoGold PIR+	≥ 100 mm	E15	EI15	EW15	from outside from inside	no lower than panel resistance class
IzoWall PIR	≥ 80 mm	E15	EI15	EW20	from outside from inside	no lower than panel resistance class
IzoCold PIR	≥ 120 mm	E20	EI15	EW20	from outside from inside	no lower than panel resistance class
		E15	-	EW15	from outside from inside	no lower than panel resistance class
IzoGold PIR	≥ 100 mm	E15	EI15	EW15	from inside	no lower than panel resistance class
IzoWall MWF	≥ 80 mm	E45	EI45	EW45	from outside from inside	no lower than panel resistance class
		E30	EI30	EW30	from outside from inside	no lower than panel resistance class
		E20	EI20	EW20	from outside from inside	no lower than panel resistance class
	≥ 100 mm	E60	EI60	EW60	from outside from inside	no lower than panel resistance class
		E45	EI45	EW45	from outside from inside	no lower than panel resistance class
		E30	EI30	EW30	from outside from inside	no lower than panel resistance class
	≥ 150 mm	E120	EI120	EW120	from outside from inside	no lower than panel resistance class
		E90	EI90	EW90	from outside from inside	no lower than panel resistance class
		E60	EI60	EW60	from outside from inside	no lower than panel resistance class

* panels sewn by screws on both sides every 150 mm

Panel type	Core thickness	Fire resistance class			Fire resistance class for construction	Max. support spacing	Slope angle of roofing
IzoRoof PIR	≥ 100 mm	R60	RE60	REI15	no lower than panel resistance class	≤ 3m	0^0 - 15^0
IzoRoof PIR+	≥ 100 mm	R60	RE60	REI30	no lower than panel resistance class	≤ 3m	0^0 - 15^0
IzoRoof+ PIR	≥ 100 mm	R60	RE60	REI15	no lower than panel resistance class	≤ 3m	0^0 - 15^0
IzoRoof+ PIR+	≥ 100 mm	R90	RE90	REI20	no lower than panel resistance class	≤ 3m	0^0 - 15^0
IzoRoof MWF	≥ 80 mm	R60	RE60	REI60	no lower than panel resistance class	≤ 2,4m	0^0 - 15^0

NOTE: Recommended slope angle of roofing is min. 3°.

LOAD CAPACITY

Load capacity charts – the simplest designing method

The drawn load capacity charts included herein are the simplest, most reliable and the fastest method for choosing sandwich panels in terms of their load capacity. These charts include combinations of loads in most standard cases, that is dead load, wind and thermal load in case of walls or dead load, snow, wind and creep in case of roofs.
In this case, the designing procedure is limited to determining specific loads and comparing them with the values in the load capacity charts. In case of structures with non-standard components or when load combination is non-standard (e.g. temperature differences other than the estimated values), specific designing procedure is required.

General information

Sandwich panels are complex structural elements. Most often they consist of three layers, two of which are thin steel sheet lining with low density as well as high strength and modulus of elasticity. The third layer is a thick core with low density, strength and modulus of elasticity. As a result, such composite is much stronger than its components used separately. It can be assumed that the lining is responsible for carrying normal stresses, while the core is for carrying shear stresses. For example, if such structure is bent, its behaviour can be compared to a double-tee bar. Upper lining (upper flange) carries the compressive stress, while the lower lining (lower flange) – the tensile stress.
Whereas the core (web), as a result of the shearing forces, carries the shearing stress.
Sandwich panels, as the wall or roof components, must carry permanent loads, variable loads and interactions caused by long-term effects.
Permanent loads:
- panel dead load,
- weight of permanent structures that load the sandwich panel,
- other permanent loads, e.g. temperature in cold stores.

Variable loads:
- snow,
- service load,
- wind load,
- structural loading,
- climatic effects, for instance those related with temperature difference between the internal and the external lining of the sandwich panel.

Panel strength

Strength parameters required for the calculations are determined on the basis of the Initial Type Testing and current testing set by the Factory Production Control. These values include possible statistical deviations resulting from any irregularities of the production process.

Designing procedures

These procedures are consistent with PN-EN 14509:2013 standard (panels with PIR/PIR+ and MWF core). They refer to the safety of the structure with respect to ultimate limit state (ULS) and serviceability limit state (SLS). Standard load combinations, load safety coefficients, strength parameters according to the Initial Type Testing and the Factory Production Control, along with material factors are included.
It can be assumed that in most cases load capacity of a sandwich panel includes two components:
- for bending moments, into M_F moment component in metal lining and M_S (core part) component distributed into normal forces N_{F1} and N_{F2} within the lining; in case of flat linings M_F component is negligible.
- for shearing forces, into V_F shearing force component within the lining and V_S component within the core; similarly, in case of flat linings V_F component is negligible.

Thermal load

Wall panels are designed for work in conditions under which their sides are exposed to different temperatures. As a result, internal and external lining expand unevenly, which is equivalent to applying a bending moment. These loads must be taken into account in the designing procedure.
Temperature for the serviceability limit state (SLS) should be chosen according to the chart below. The determinant of classification into a given group is the Reflection Grade (RG) compared to reflection of a surface covered with magnesium oxide (MgO).

Very light colours	R_G = 75–90%	T_{zew} = +55 °C
Light colours	R_G = 40–74%	T_{zew} = +65 °C
Dark colours	R_G = 8–39%	T_{zew} = +80 °C

Winter value of external wall surface temperature (T_{ext}), depending on the geographical location, should range from -10°C to -30°C. In case of roofs, the value of external temperature T_{ext} should be 0°C, assuming that in most unfavourable load conditions roof is covered with snow, and its temperature near the panel surface is exactly 0°C.
The value of indoor temperature T_{int} inside standard structures should be 20°C in winter and 25°C in summer. Indoor temperatures in cold stores or freezers result from the technical design.

Sandwich panel selection guidelines ensuring durability and safety of usage.

- Colour group II and III panels should be used in static arrangement of a single-span beam .
- **If panels are exposed to extreme temperature differences (freezers, cold stores) please use colour group I panels.**
- In case of colour group II and III panels, it is recommended to pay particular attention to solutions which compensate deformations, enabling deformation of the panel itself without generation of additional stress.
- It is advisable to pay particular attention to maintenance works on installed panels. Improper maintenance and soiling of panels may cause darkening of the panel colour, which in turn may lead to occurrence of unexpected thermal stress and destruction of panels.
- Uneven assembly of load-bearing structure of an object or its excessive non-linear settlement may considerably decrease load capacity of installed sandwich panels.
- In case of panels with openings the edge length of which exceeds 300 mm, it is advisable to reinforce panels with substructure or suitable "replacements".
- In case of suspended ceilings assembled using Izopanel wall panels, it is recommended to support them linearly at both ends. Choosing panel thickness and span, it is important to use Strength tables, with the reservation that the maximum permissible technological load on a fastened panel is the load of one worker carrying out assembly procedures.
- When applying a 0.4mm thick sheet for sandwich panel lining, there is an increased risk of deformations (ripples) to appear on the surface. Such ripples have no negative effect on technical parameters of sandwich panels and are considered as an aesthetic defects only.

LEAKPROOFNESS

Air permeability through panel joints and resistance to blowing rain have been tested in order to determine leakproofness of walls and roofs constructed of IZOPANEL sandwich panels.

Air permeability

Air permeability has been checked in accordance with PN-EN 12114:2003 standard.
The test consisted in precise determining the volume of air leaking through the joint from one side to the other, with different pressure values on both sides of the barrier (-50 Pa/ +50 Pa).
The test showed absolute leakproofness and no air transfer through the barrier.
Conclusion: IZOPANEL sandwich panels meet the requirements of the standard.
In practice, this means that walls or roofs built of IZOPANEL sandwich panels constitute airtight barriers. Therefore, there is no heat loss, which is an inseparable effect of air transfer. Absolute leakproofness of IZOPANEL sandwich panels is followed by high energy efficiency of the barriers.
Ventilation of rooms built of IZOPANEL sandwich panels is highly important though. Absolute leakproofness of wall and roofs made of IZOPANEL sandwich panels prevents transfer of moisture from the interior to the outside. If ventilation systems are not designed properly, it may lead to outdropping onto the walls and unfavourable conditions inside the building.

Blowing rain resistance

Blowing rain resistance has been tested according to PN-EN 12865:2004 standard.
During the test sections of walls and roofs made of IZOPANEL sandwich panels are sprayed with water under pressure. The tests showed that panels subjected to total water pressure of 1,200 Pa are absolute leakproof, and can be classified in the **highest leakproofness category - A class**. This means that a barrier made of IZOPANEL sandwich panels prevents rain water leakage into the interior of the building.

ACOUSTIC PROPERTIES

According to the PN-EN 14509:2013 standard, acoustic properties of sandwich panels must be tested. The test is to determine the level of noise on both sides of the barrier - on the side of the source of the noise and on the other side. Measurement is taken in 16 bands, from 100 Hz to 3,150 Hz, every 1/3 octave. On the basis of these 16 results, a complete insulating capacity profile is created. The obtained diagram is adjusted to the standard reference curve, reflecting human ear sensitivity in individual bands so that the two curves are adjusted to each other as much as possible. The value which is the result of such adjustment for the frequency of 500 Hz is the:

R_w – proper acoustic resistance coefficient

This coefficient is the measure of the overall insulating capacity, within the entire range of the audible spectrum.
This coefficient does not inform however about insulating properties of the barrier in specific ranges of the acoustic spectrum. In order to determine the noise insulating properties in detail, two additional indexes are determined, correcting the Rw coefficient to values proper for the area of high and low frequencies:

C – low frequency spectral adaptive index
C_{tr} – high frequency spectral adaptive index (traffic)

Using these parameters additional insulating capacity indexes are determined:

$$R_{A1} = R_w - C$$

The R_{A1} index determines barrier properties in the range of low tones, such as fast road traffic, railway traffic, aircrafts flying nearby, sounds of everyday life, human speech, etc.

$$R_{A2} = R_w - C_{tr}$$

The R_{A1} index determines barrier properties in the range of high tones, such as slow road traffic, disco music, etc.
An additional parameter determining acoustic properties of sandwich panels is the:

reverberation acoustic absorption coefficient
α_w = absorbed/reflected energy

Barriers with higher α_w coefficient reflect less energy back to the inside, which means that they dampen the echo (reverberation) indoors better. Reverberation is intensified in rooms with barriers with lower α_w coefficient.

			R_w	C	C_{tr}	R_{A1}	R_{A2}	α_w
			dB	dB	dB	dB	dB	
PIR/PIR+	IzoWall	40	27	-3	-5	24	22	0,15
		60	25	-2	-5	23	20	
		80	25	-2	-5	23	20	
		100	25	-2	-5	23	20	
		120	25	-2	-5	23	20	
		140	25	-2	-5	23	20	
		160	25	-2	-5	23	20	
		180	25	-2	-5	23	20	
		200	25	-2	-5	23	20	
	IzoGold	60	26	-1	-4	25	22	
		80	27	-4	-6	23	21	
		100	27	-4	-6	23	21	
		120	27	-4	-6	23	21	
	IzoCold	120	25	-2	-5	23	20	
		140	25	-2	-5	23	20	
		160	25	-2	-5	23	20	
		180	25	-2	-5	23	20	
		200	25	-2	-5	23	20	
		220	27	-3	-5	24	22	
	IzoRoof/ IzoRoof+	60	26	-2	-5	24	21	
		80	26	-2	-5	24	21	
		100	26	-2	-5	24	21	
		120	26	-2	-5	24	21	
		140	26	-2	-5	24	21	
		160	26	-2	-5	24	21	

			R_w	C	C_{tr}	R_{A1}	R_{A2}	α_w
			dB	dB	dB	dB	dB	
EPS	IzoWall	40	23 (24)*	-2	-4	21 (22)	18 (19)	–
		50	23 (24)*	-2	-4	21 (22)	18 (19)	
		60	23 (24)*	-2	-4	21 (22)	18 (19)	
		75	23 (24)*	-2	-4	21 (22)	18 (19)	
		80	23 (24)*	-2	-4	21 (22)	18 (19)	
		100	23 (24)*	-2	-4	21 (22)	18 (19)	
		120	23 (24)*	-2	-4	21 (22)	18 (19)	
		125	23 (24)*	-2	-4	21 (22)	18 (19)	
		140	23 (24)*	-2	-4	21 (22)	18 (19)	
		150	23 (24)*	-2	-4	21 (22)	18 (19)	
		160	23 (24)*	-2	-4	21 (22)	18 (19)	
		175	23 (24)*	-2	-4	21 (22)	18 (19)	
		180	23 (24)*	-2	-4	21 (22)	18 (19)	
		200	23 (24)*	-2	-4	21 (22)	18 (19)	
		250	23 (24)*	-2	-4	21 (22)	18 (19)	
	IzoRoof	60	23 (24)*	-2	-4	21 (22)	18 (19)	
		75	23 (24)*	-2	-4	21 (22)	18 (19)	
		80	23 (24)*	-2	-4	21 (22)	18 (19)	
		100	23 (24)*	-2	-4	21 (22)	18 (19)	
		120	23 (24)*	-2	-4	21 (22)	18 (19)	
		125	23 (24)*	-2	-4	21 (22)	18 (19)	
		140	23 (24)*	-2	-4	21 (22)	18 (19)	
		150	23 (24)*	-2	-4	21 (22)	18 (19)	
		160	23 (24)*	-2	-4	21 (22)	18 (19)	
		175	23 (24)*	-2	-4	21 (22)	18 (19)	
		200	23 (24)*	-2	-4	21 (22)	18 (19)	
		250	23 (24)*	-2	-4	21 (22)	18 (19)	
MWF	IzoWall	40	31	-1	-3	30	28	0,15
		50	31	-1	-3	30	28	
		60	31	-1	-3	30	28	
		75	31	-1	-3	30	28	
		80	31	-1	-3	30	28	
		100	31	-1	-3	30	28	
		120	31	-1	-3	30	28	
		140	31	-1	-3	30	28	
		150	31	-1	-3	30	28	
		160	31	-1	-3	30	28	
		175	31	-1	-3	30	28	
		200	31	-1	-3	30	28	
		230	31	-1	-3	30	28	
		250	31	-1	-3	30	28	
	IzoRoof	60	32	-1	-4	31	28	
		75	32	-1	-4	31	28	
		80	32	-1	-4	31	28	
		100	32	-1	-4	31	28	
		120	32	-1	-4	31	28	
		125	32	-1	-4	31	28	
		140	32	-1	-4	31	28	
		150	32	-1	-4	31	28	
		160	32	-1	-4	31	28	
		175	32	-1	-4	31	28	
		200	32	-1	-4	31	28	
		230	32	-1	-4	31	28	
		250	32	-1	-4	31	28	

*for sheet gauges of 0.4/0.5 mm (for 0.5/0.5 mm)

DIMENSIONS, TOLERANCES AND IMPERFECTIONS

Deviations in dimensions and physical properties may influence the behaviour panels during their use. Therefore, it is essential that they are within adequately tight range, so that the quality of the products delivered to the customer remains unchanged..

Table 3 – Dimensional tolerances for sandwich panels	
Size	Tolerance (permissible maximum)
Sandwich panel thickness	D ≤ 100 mm ± 2 mm
	D > 100 mm ± 2%
Deviation from flatness (according to measurement over L length)	For L = 200 mm deviation from flatness 0.6 mm
	For L = 400 mm deviation from flatness 1.0 mm
	For L > 700 mm deviation from flatness 1.5 mm
Metal section (rib) height	5 < h ≤ 50 mm ± 1 mm
	50 < h ≤ 100 mm ± 2,5 mm
Section bracing height	d_s ≤ 1 mm ± 30% d_s
	1 mm < d_s ≤ 3 mm ± 0,3mm
	3 mm < d_s ≤ 5 mm ± 10% d_s
Sandwich panel length	L ≤ 3 m ± 5 mm
Sandwich panel width	w ± 2 mm
Deviation from rectangularity	s ≤ 0.6% × w (nominal covering width)
Deviation from straightness in lines (over length) in the longitudinal direction	1 mm per one metre of length, max. 5 mm
Buckling	2 mm per one metre of length, max. 20 mm
	8.5 mm per one metre of width for flat sections or for profiled – h ≤ 10 mm
	10 mm per one metre of width of the sections – h > 10 mm
Section pitch (p)	For h ≤ 50 mm p: ± 2 mm
	For h > 50 mm p: ± 3 mm
Rib width (b_1) and wave hollow width (b_2)	For b_1 ± 1 mm
	For b_2 ± 2 mm

Test procedures are described in detail in the PN-EN 14509:2013 standard.
Moreover, that there is no deterioration of panel performance characteristics if:
- During the production process, there occurred core damage which was then repaired with use of cartridge-applied low-pressure polyurethane foam.
- On the panel core, there are polyurethane adhesive runs, whereas when the panel is formed the runs will not be visible.
- As a result of the production process, there was a lining shift in any direction by 2 mm greater than given in Table 3.
- During the production process, there occur groove damages reaching up to 50% of its nominal depth.

ENVIRONMENTAL PROTECTION

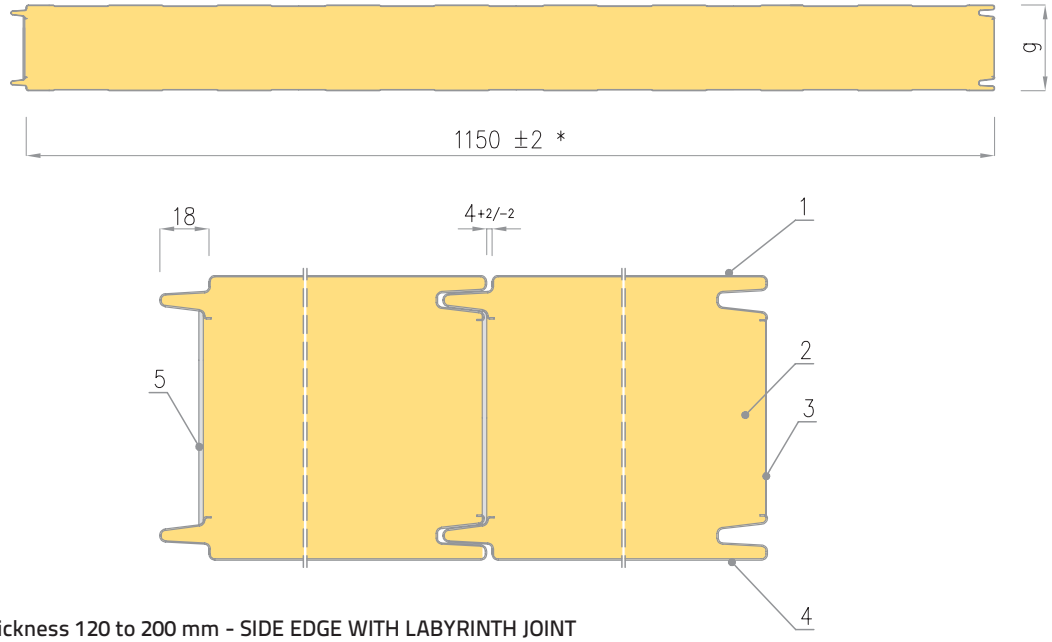
Civilization growth contributes to the growing environmental impact. Rapid growth of population resulted in the necessity of reducing the consumption of non-renewable resources and CO_2 emissions.
Our life cycle assessment (LCA) and life cycle cost (LCC) analyses include costs and consumption of energy during the production, transport, installation, use and final disposal of the product.
In order to reduce production of plastics based on non-renewable resources (currently 50,000,000 tons in Europe!), the best solution is to replace them with natural resources, such as mineral wool, wood, cement or steel. The amount of produced plastics is too high however, and it would consume 150,000 tons of alternative resources, while energy consumption in the entire life cycle of products would increase from 4 million GJ/year up to 7 million GJ/year. That amounts to 60 million tons of oil, and in other words, one gigantic tanker a day. The result would be the increase in the emission of greenhouse gases by approximately 120 million tons per year, which is 40% of the reduction of the emission of these gases, as adopted in the Kyoto Protocol.
In the case of insulating products, the cost of the operational period the has greatest impact on the total cost of the product and the greatest significance for the environment.
Recycling is not always the most environmentally friendly solution. Although all polyurethanes may be recycled, it requires a great deal of energy though. In such situation, the process of energy recovery seems more efficient. In the European Union, these materials [b1] are neutralised in the process of clean and careful incineration in which contaminants are filtered and energy is generated through combustion.
The production of polyurethanes takes less than 0.1% of the global oil consumption, which means even 100 times larger savings for the environment. By applying them in products, such as insulating panels or refrigerators, contributes to lowering of the energy consumption. Due to their durability and good properties, polyurethanes may be used longer in comparison with other substances, which results in saving additional energy (in relation to the energy used for their production).
Energy required to produce polyurethane insulation for one building, thanks to thermal insulation, is saved within a consecutive year.

Technical drawings*

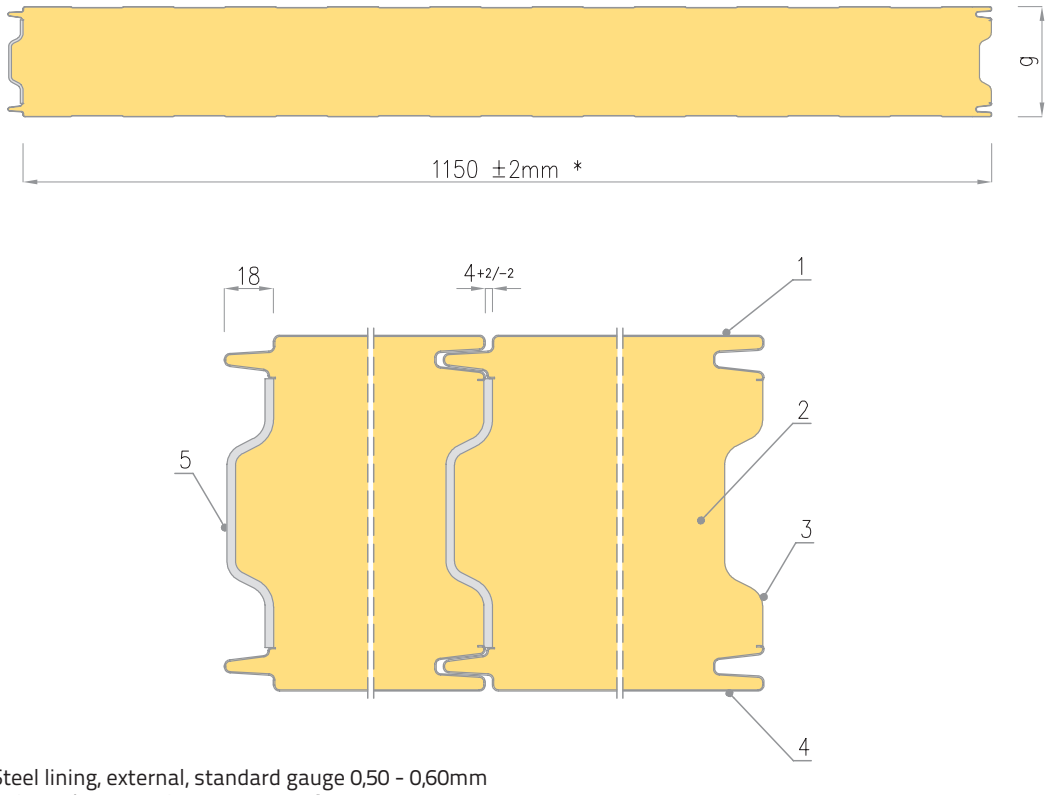
* scope of suggested solutions for structural elements with use of Izopanel sandwich panels; application of solutions not included herein is permissible, on condition these are compliant with the rules of the art.

Drawing 1.1
IzoWall PIR/PIR+ - wall sandwich panel with visible fastening, polyurethane / polyisocyanurate foam core

VARIANT 1 - Thickness 40mm to 100mm - STRAIGHT EDGE



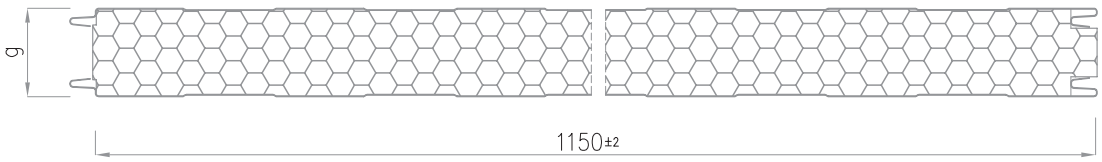
VARIANT 2 - Thickness 120 to 200 mm - SIDE EDGE WITH LABYRINTH JOINT

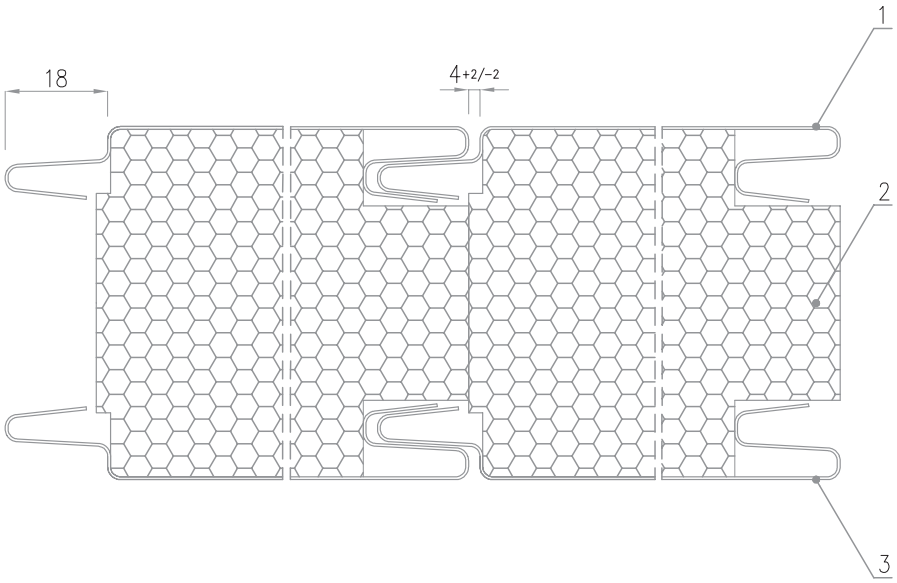


1. Steel lining, external, standard gauge 0,50 - 0,60mm
2. Polyurethane / polyisocyanurate foam core
3. Protection strip preventing diffusion and water infiltration
4. Steel lining, internal, standard gauge 0,40 - 050mm
5. Factory-applied soft seal on side edge from the male lock side

* 1150mm - standard modular width of the panel
1000mm, 1080mm - modular widths available on request

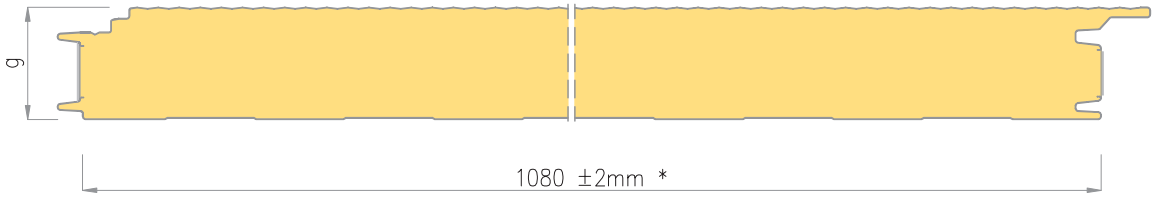
Drawing 1.2
IzoWall MWF / EPS - wall sandwich panel with visible fastening, mineral wool core (MWF) or expanded polystyrene (EPS)

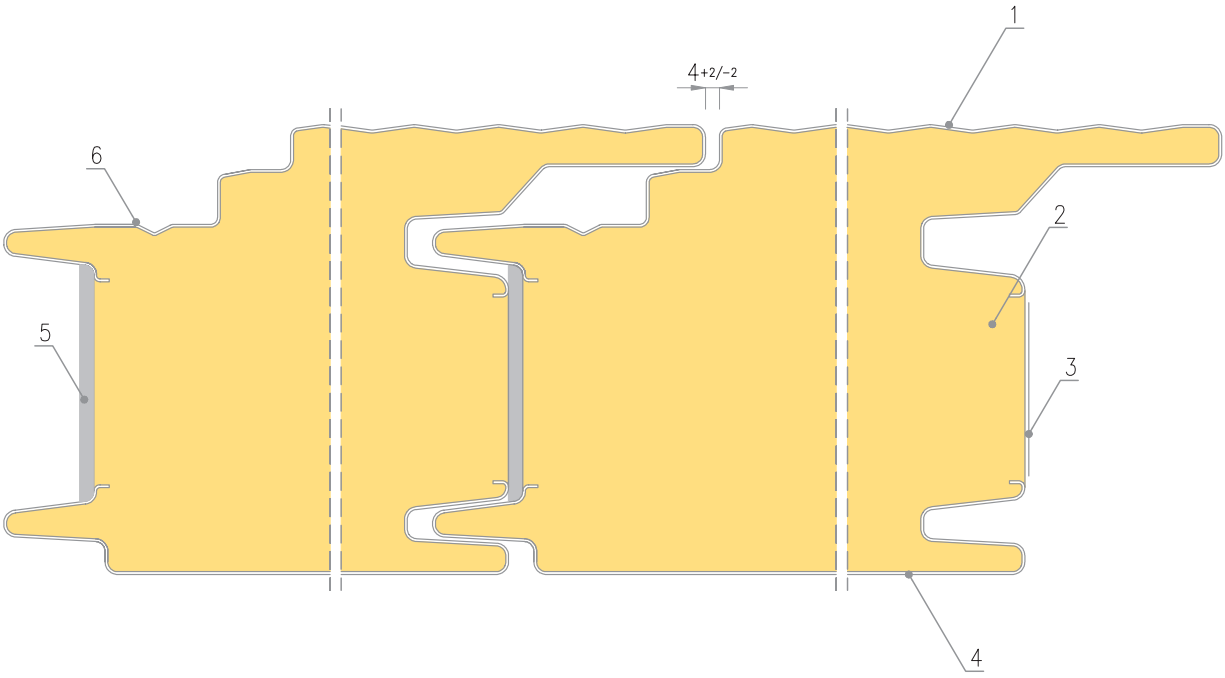




1. Steel lining - external, standard gauge 0,40-0,50mm(EPS), 0.50-0.60 mm(MWF)
2. Mineral wool(MWF) or expanded polystyren(EPS) core
3. Steel lining - internal, standard gauge 0.50 - 0.60 mm

Drawing 2
IzoGold PIR/PIR+ - wall sandwich panel with hidden fastening, polyurethane / polyisocyanurate foam core

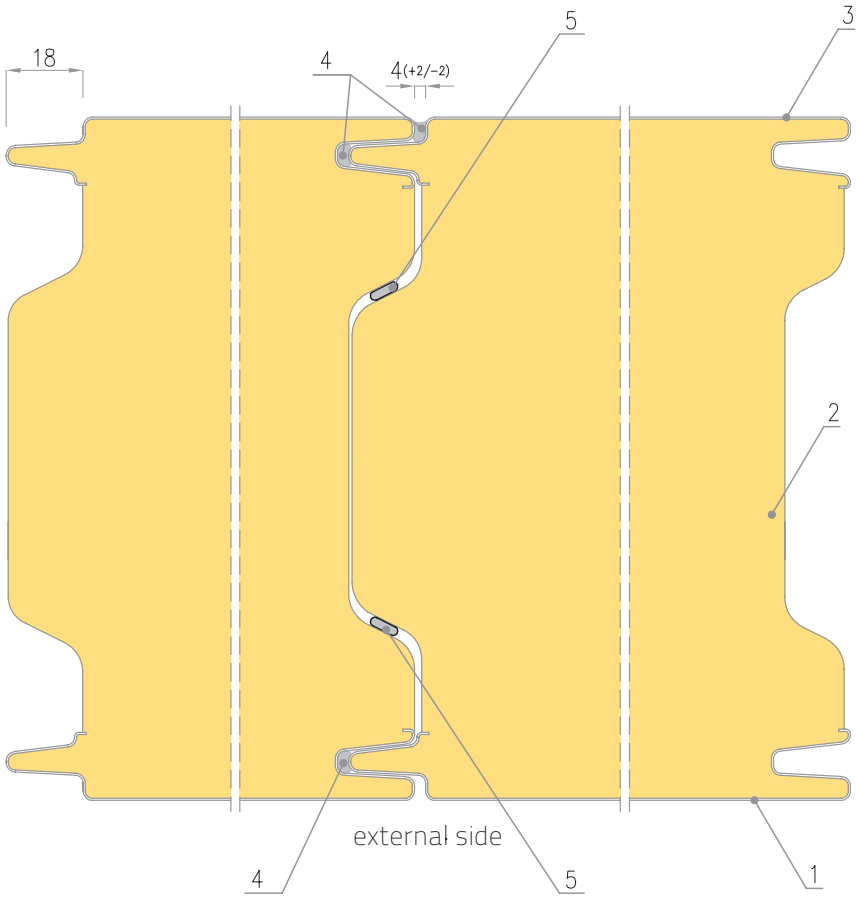




1. Steel lining, external, standard gauge 0.50-0.60 mm
2. Polyurethane / polyisocyanurate foam core
3. Protection strip preventing diffusion and water infiltration
4. Steel lining, internal, standard gauge 0.40-0.50 mm
5. Polyurethane seal
6. Fastening screw slot

* 1080 mm - standard modular width of the panel
  1000mm - modular width available on request

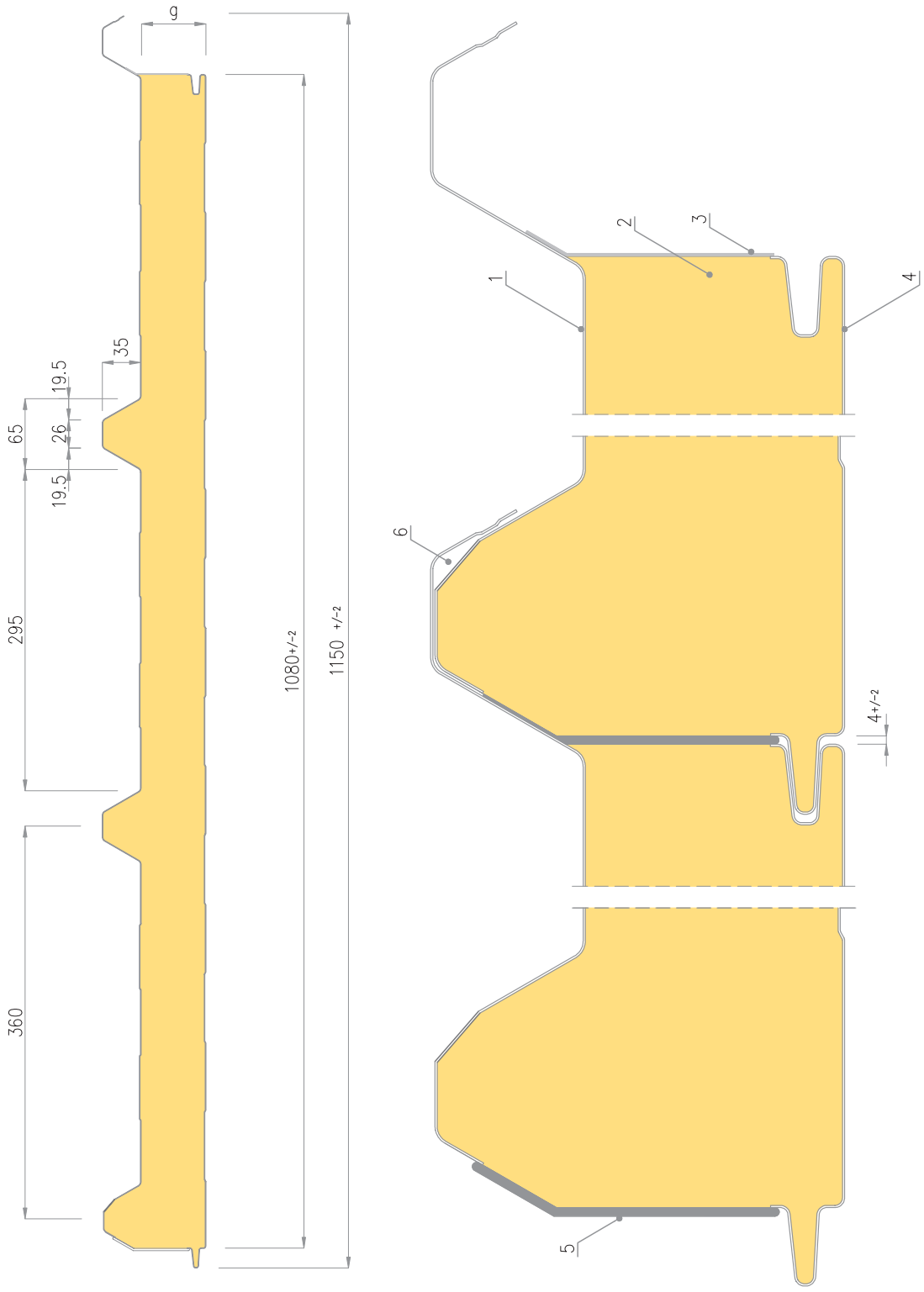
Drawing 3.
IzoCold PIR/PIR+ - wall sandwich panel, polyurethane / polyisocyanurate foam core



1. Steel lining, external, standard gauge 0.50 - 0.60 mm
2. Polyurethane / polyisocyanurate foam core
3. Steel lining, internal, standard gauge 0.40 - 0.50 mm
4. Permanently plastic sealant applied at assembly
5. Polyurethane foam applied at assembly

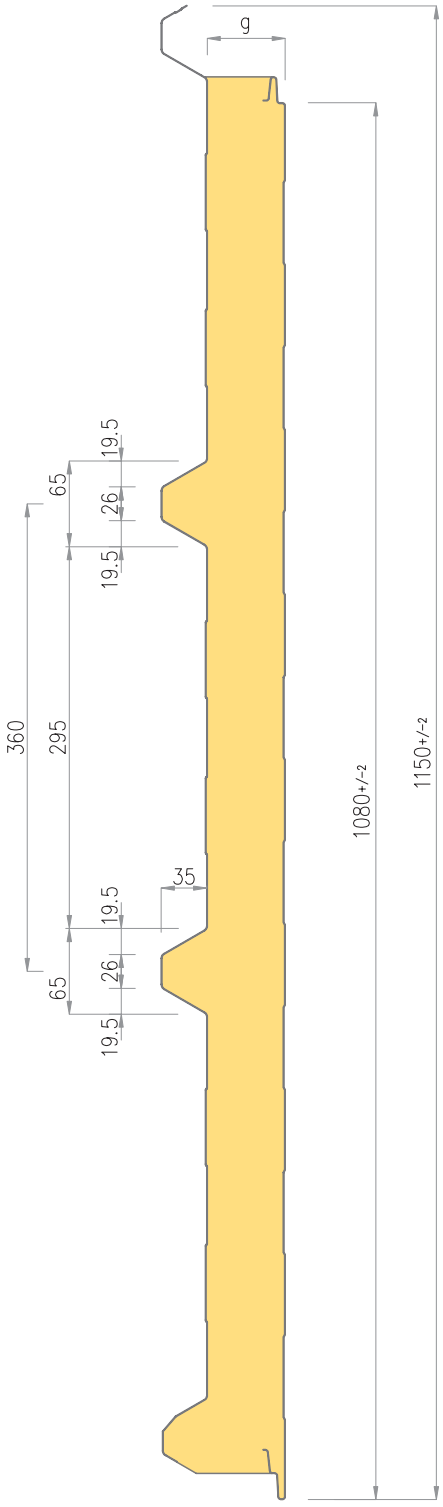
* 1150 mm - standard modular width of the panel
1000mm, 1080mm - modular widths available on request

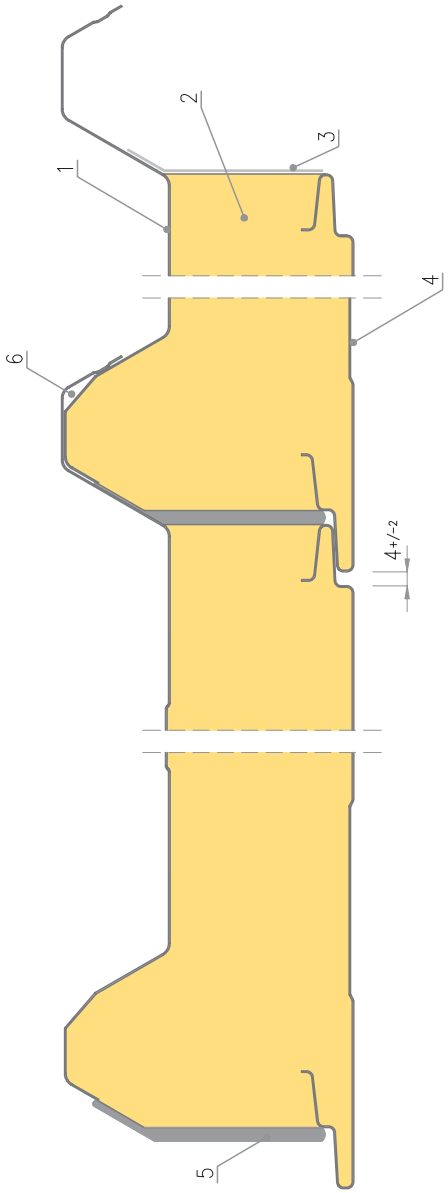
Drawing 4.1
IzoRoof PIR/PIR+ - roof sandwich panel, polyisocyanurate foam core



1. Steel lining, external, standard gauge 0.50-0.60 mm
2. Polyurethane / polyisocyanurate foam core
3. Protection strip preventing diffusion and water infiltration
4. Steel lining, internal, standard gauge 0.40-0.50 mm
5. Polyurethane seal
6. Capillary chamber
7. Internal side profile types as in IzoWall panels, one profile type available on the external side

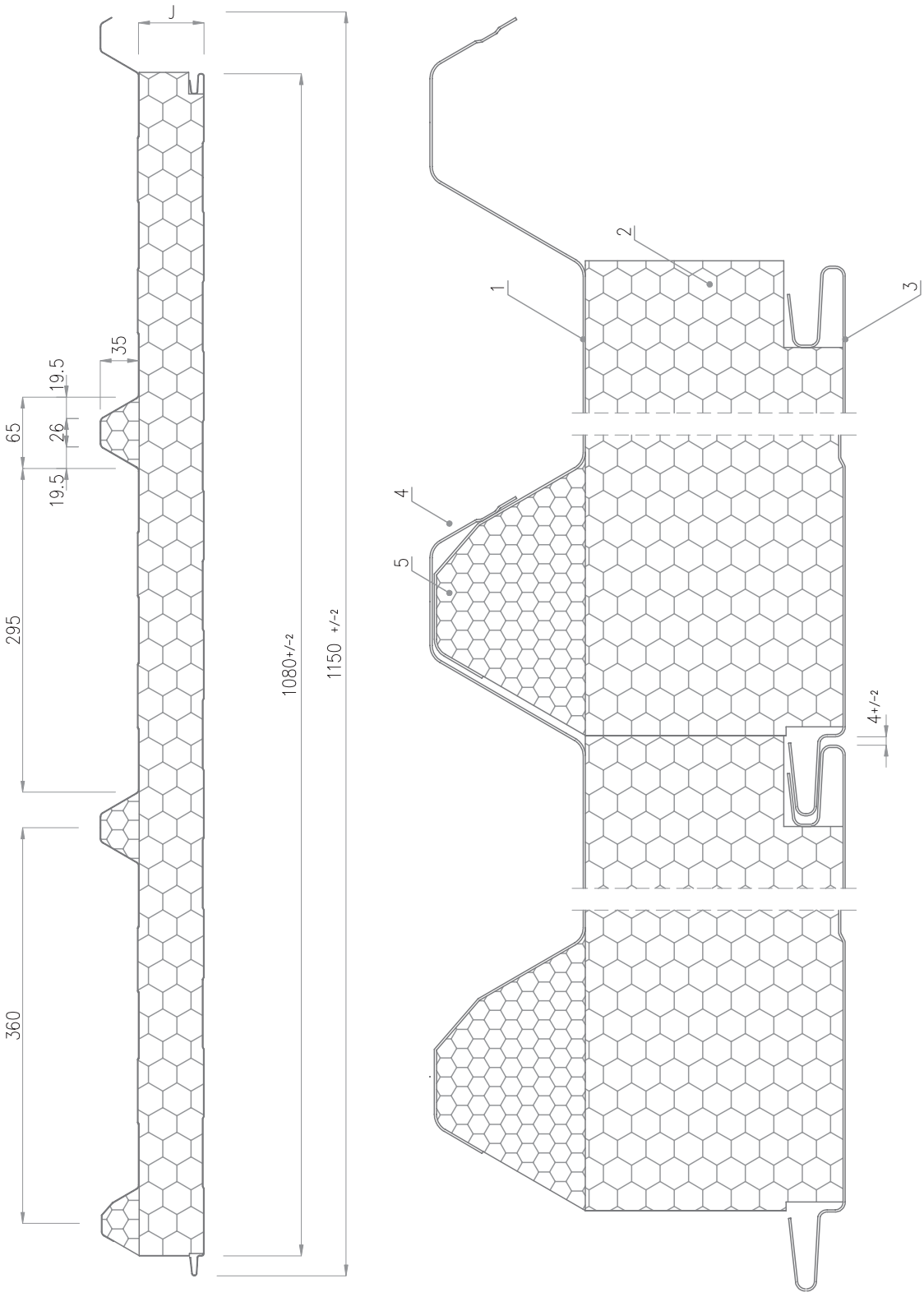
Drawing 4.2
IzoRoof PIR/PIR+ - roof sandwich panel, polyisocyanurate foam core
STRAIGHT panel joint.





1. Steel lining, external, standard gauge 0.50-0.60 mm
2. Polyurethane / polyisocyanurate foam core
3. Protection strip preventing diffusion and water infiltration
4. Steel lining, internal, standard gauge 0.40-0.50 mm
5. Polyurethane seal
6. Capillary chamber
7. Internal side profile types as in IzoWall panels, one profile type available on the external side

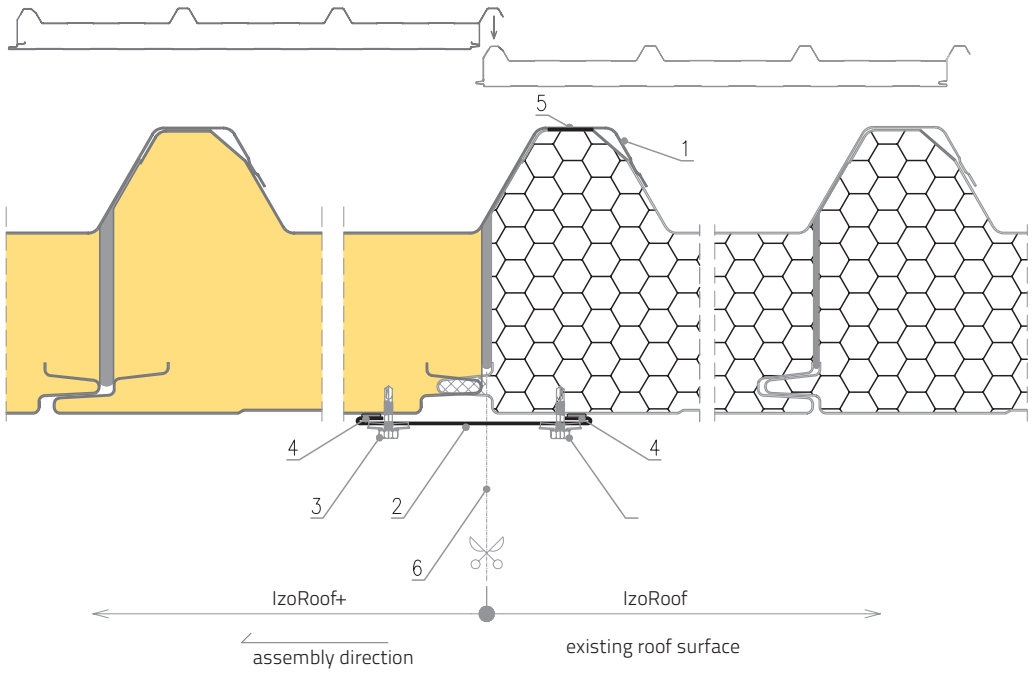
Drawing 4.3
IzoRoof MWF/EPS - roof sandwich panel, mineral wool core (MWF) or expanded polystyrene (EPS)



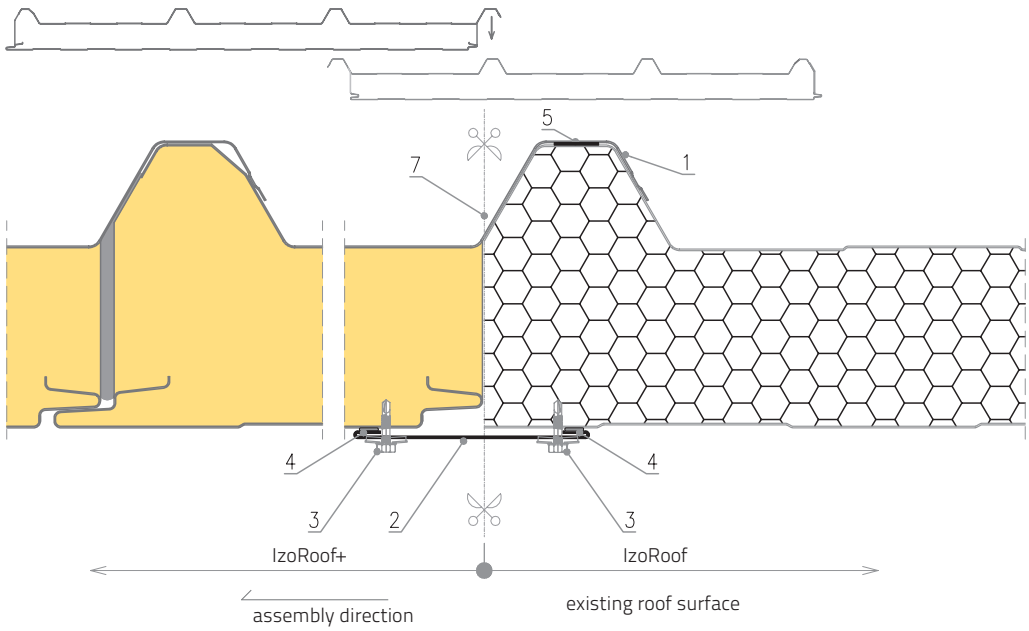
1. Steel lining, external, standard gauge 0,40 – 0,50mm(EPS), 0,50-0,60mm (MWF)
2. Mineral wool (MWF) or expanded polystyrene (EPS) core
3. Steel lining, internal, standard gauge 0.50-0.60 mm
4. Capillary chamber
5. Trapezoid filling - EPS expanded polystyrene foam or mineral wool
6. Internal side profile types as in IzoWall panels, one profile type available on the external side

Drawing 4.5
Joint of IzoRoof+ panel to IzoRoof panel installed in existing roof surface – dteailed view

VARIANT 1
Outer edge of panel in existing roof surface - male lock (full rib)

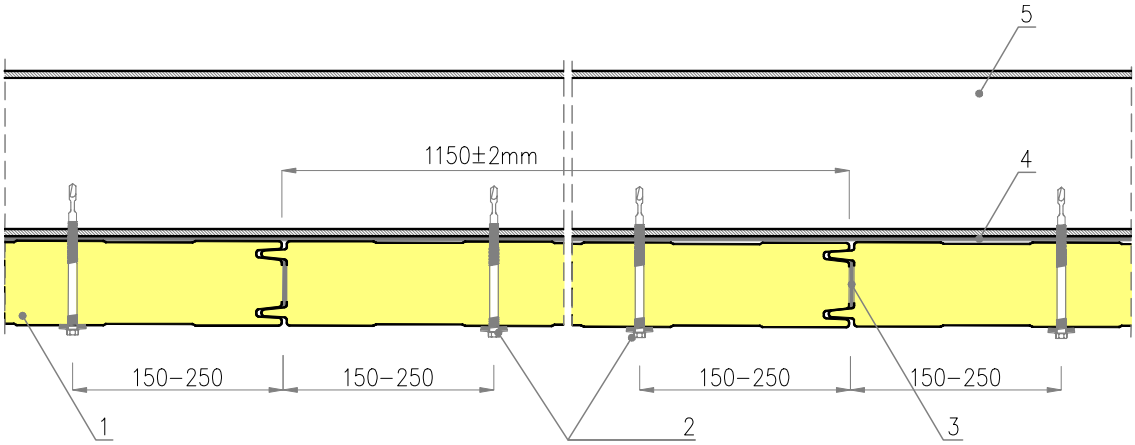


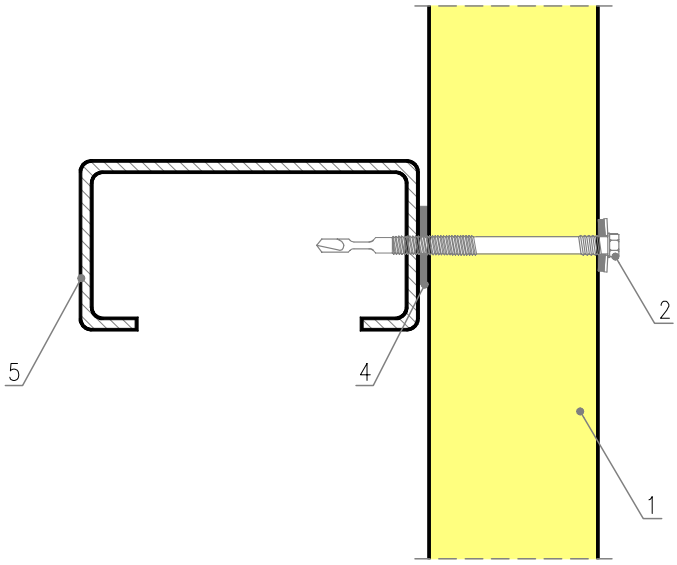
VARIANT 2
Outer edge of panel in existing roof surface - female lock (empty rib)



1. Empty rib of added panel (IzoRoof+)
2. Masking flashing
3. Self tapping screw with EPDM washer
4. Sealant or butyl tape
5. Butyl tape applied on rib of panel at existing roof surface
6. Cutting line for male lock (bottom) of existing panel - collision with added panel
7. Cutting line for existing panel - to be located at the edge of full rib

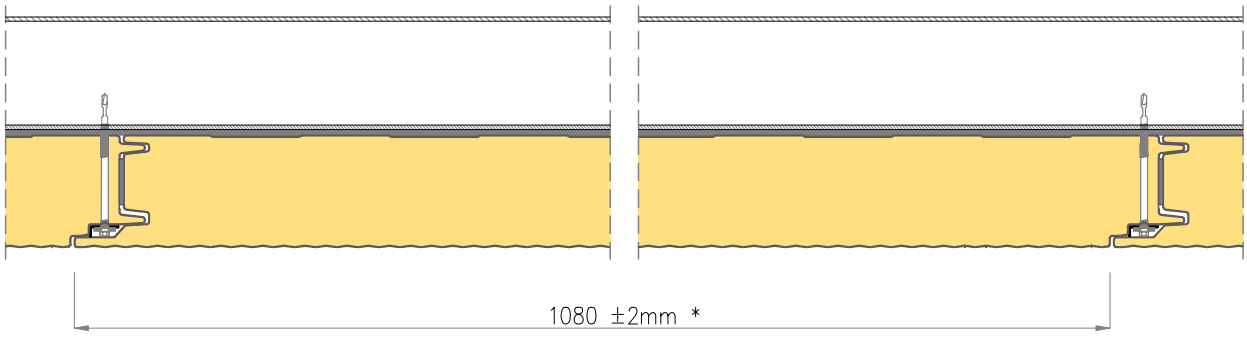
Drawing 5
IzoWall PIR/PIR+; MWF; EPS - vertical layout, fastening to the structure

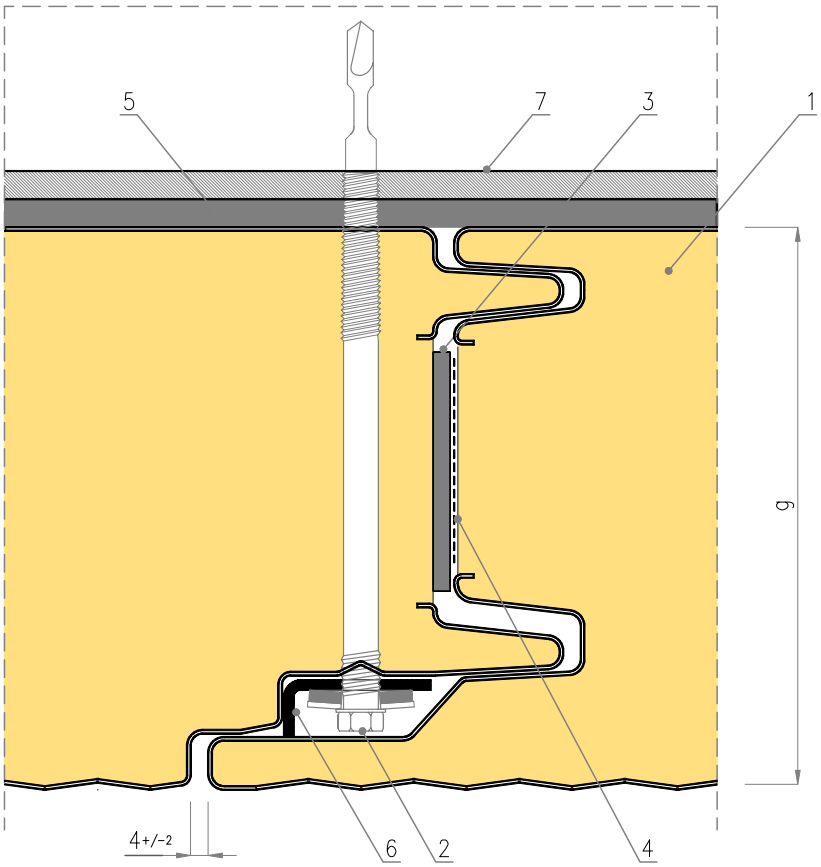




1. IzoWall panel
2. Drive screw with EPDM washer
3. Polyurethane seal
4. Self-adhesive PES sealing tape
5. Steel section, according to the design of the structure

Drawing 6
IzoGold PIR/PIR+ - vertical layout, fastening to the structure

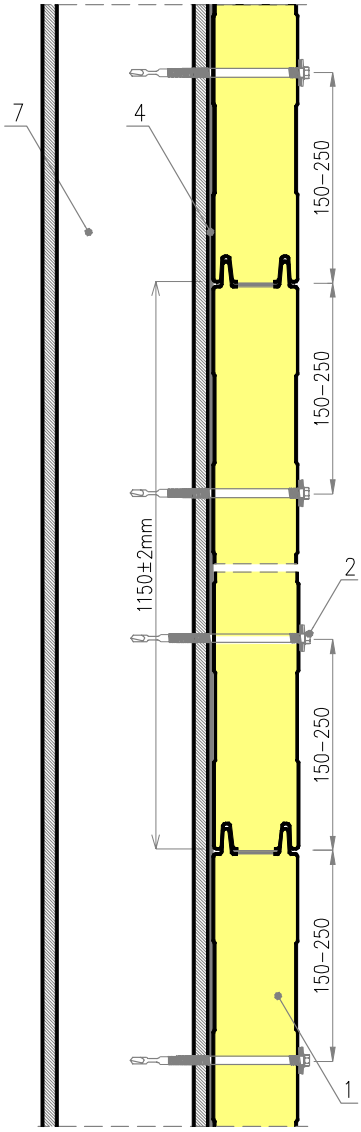




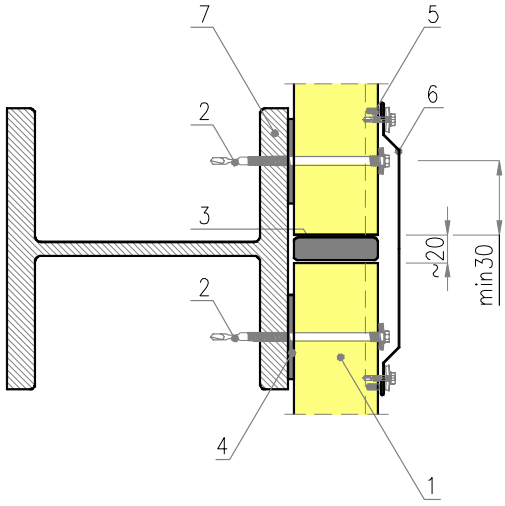
1. IzoGold PIR/PIR+ panel
2. Drive screw with EPDM washer
3. Polyurethane seal
4. Self-adhesive PES sealing tape
5. L-02 fastener
6. Steel section, according to the design of the structure

* 1080mm - standard modular width of the panel
1000mm - modular width available on request

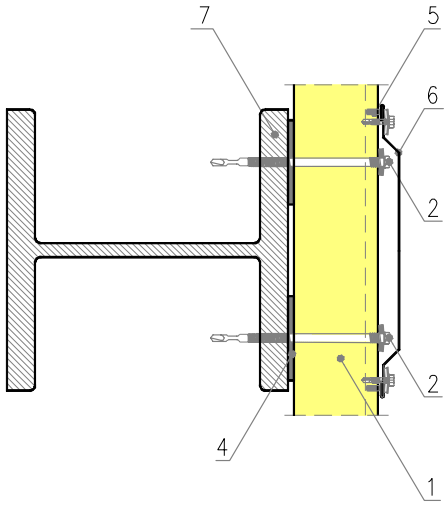
Drawing 7
IzoWall PIR/PIR+; MWF; EPS - horizontal configuration, fastening to the structure



PANEL JOINT

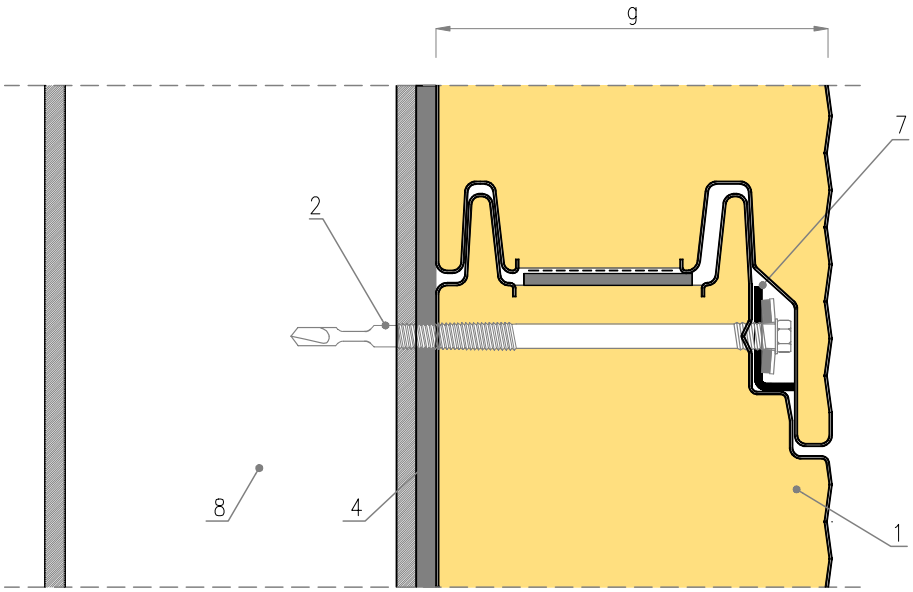


INTERMEDIATE SUPPORT

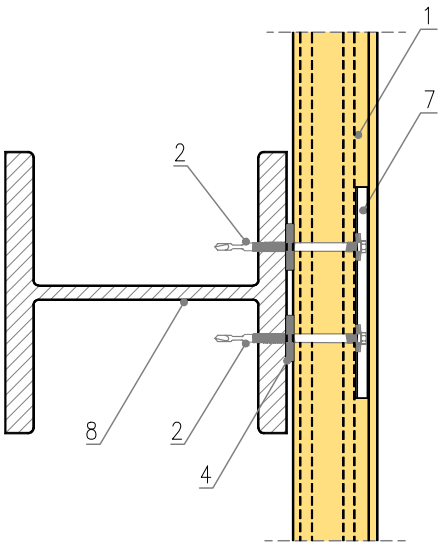


1. IzoWall panel
2. Drive screw with EPDM washer
3. Polyurethane foam as ~20 mm movement joint fill
4. Self-adhesive PES sealing tape
5. Sealant, permanently plastic
6. Ob-35 flashing
7. Steel section, according to the design of the structure

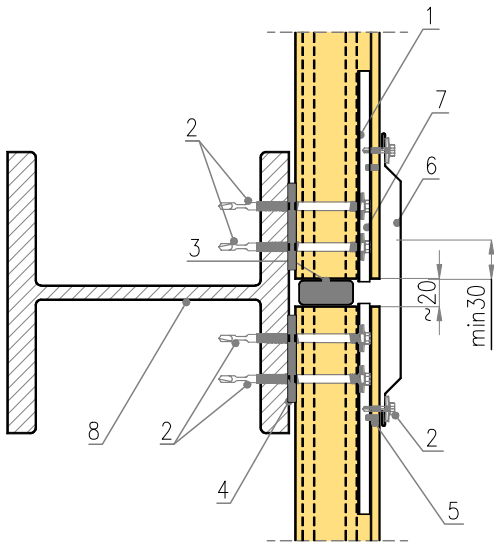
Drawing 8
IzoGold PIR/PIR+ - horizontal configuration, fastening to the structure



INTERMEDIATE SUPPORT



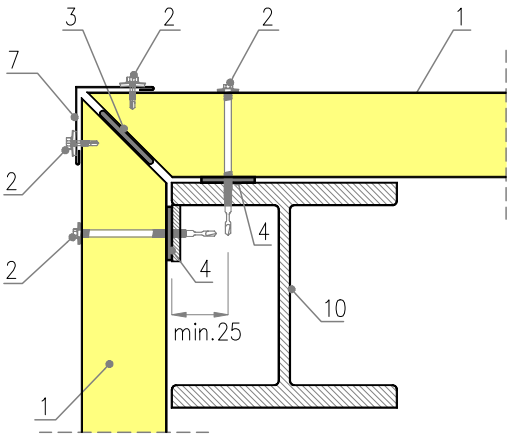
PANEL JOINT



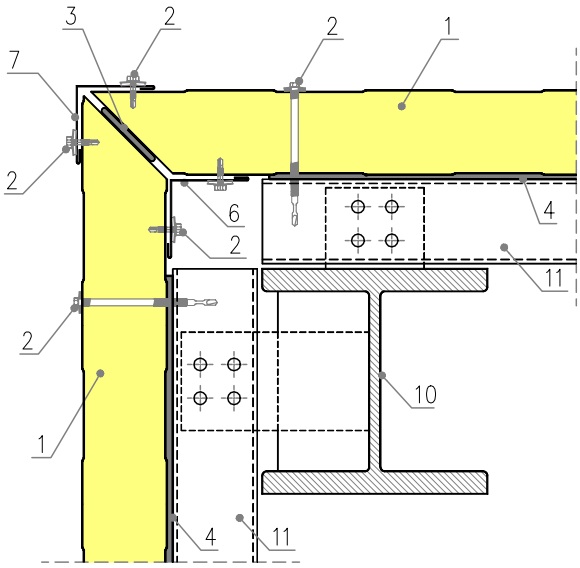
1. IzoGold PIR/PIR+ panel
2. Drive screw with EPDM washer (optionally two fasteners next to each other)
3. Polyurethane foam as ~20 mm movement joint fill
4. Self-adhesive PES sealing tape
5. Sealant, permanently plastic
6. Ob-35 flashing
7. L-02 fastener
8. Steel section, according to the design of the structure

Drawing 9
IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ - corner joint

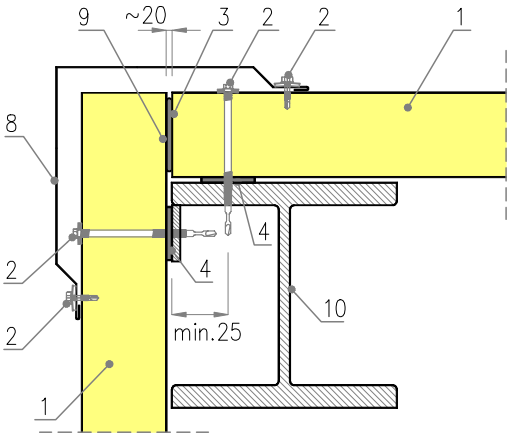
Type I - horizontal arrangement



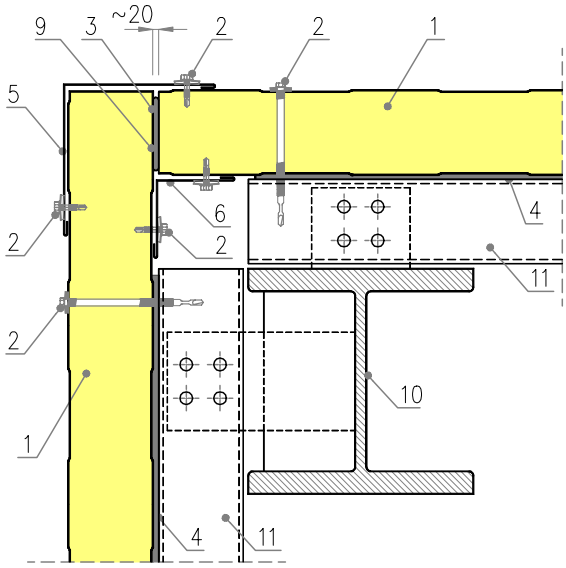
Type I - vertical arrangement



Type II - horizontal arrangement

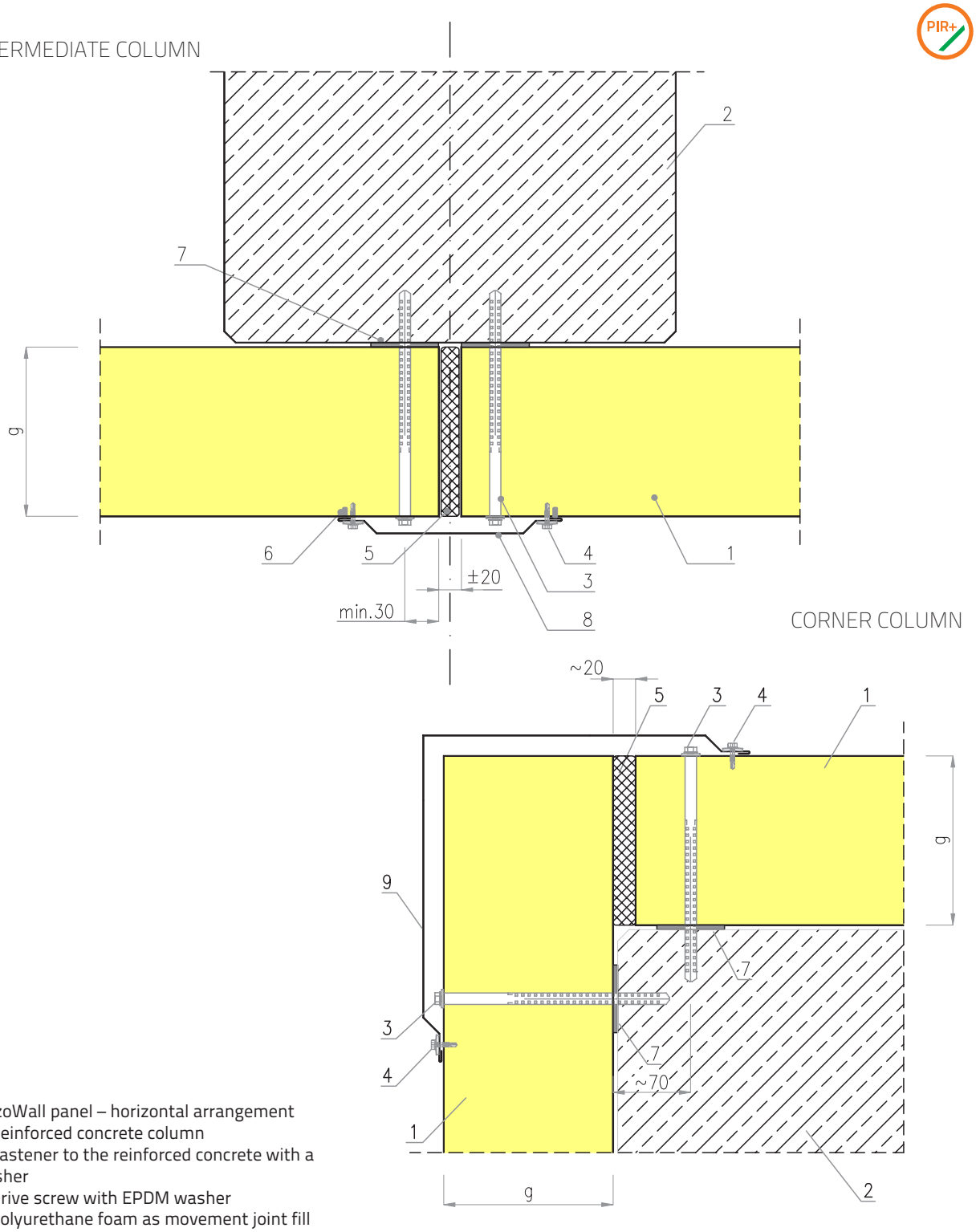


Type II - vertical arrangement



1. IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ panel
2. Drive screw with EPDM washer
3. Polyurethane foam
4. Self-adhesive PES sealing tape
5. Ob-10 flashing
6. Ob-11 flashing
7. Ob-12 flashing
8. Ob-42 flashing
9. Facing locally cut out for stricter thermal performance requirements
10. Steel column according to the design of the structure
11. Steel purlin according to the design of the structure

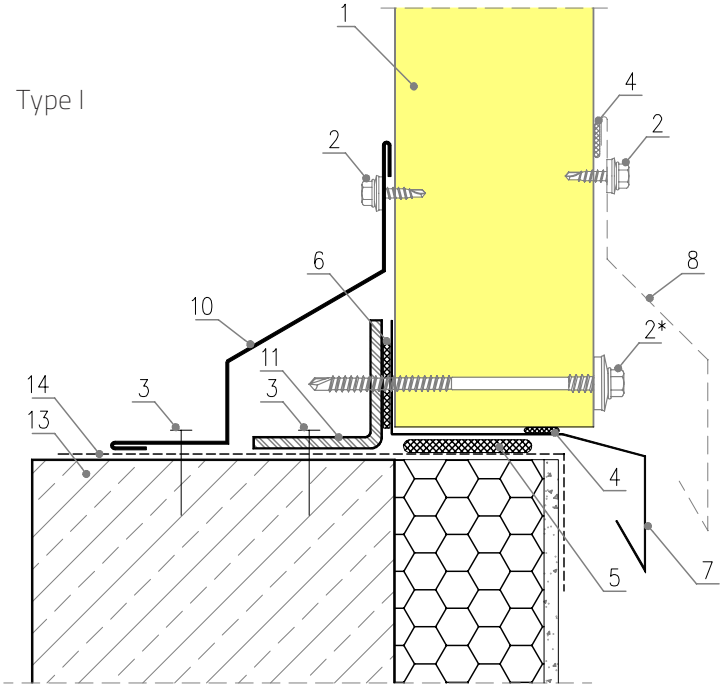
Drawing 10
IzoWall PIR/PIR+ - fastening panels to reinforced concrete column, horizontal arrangement



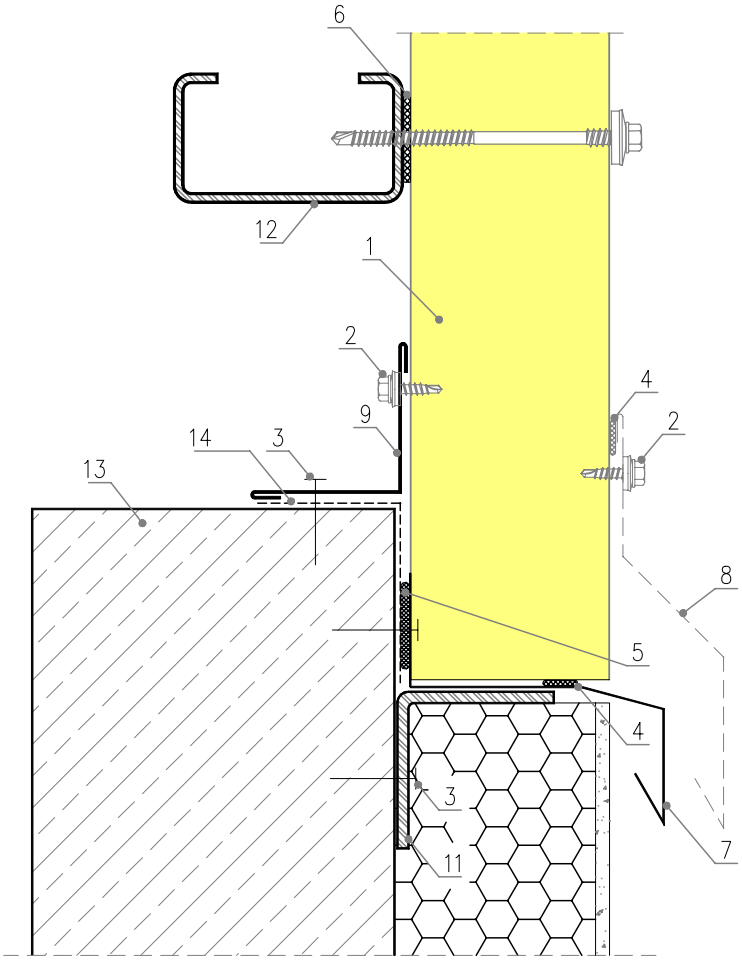
1. IzoWall panel – horizontal arrangement
2. Reinforced concrete column
3. Fastener to the reinforced concrete with a washer
4. Drive screw with EPDM washer
5. Polyurethane foam as movement joint fill
6. Sealant, permanently plastic
7. Self-adhesive PES sealing tape
8. Ob-35 flashing
9. Ob-42 flashing

Drawing 11
IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ - vertical configuration, ground beam joint

Type I



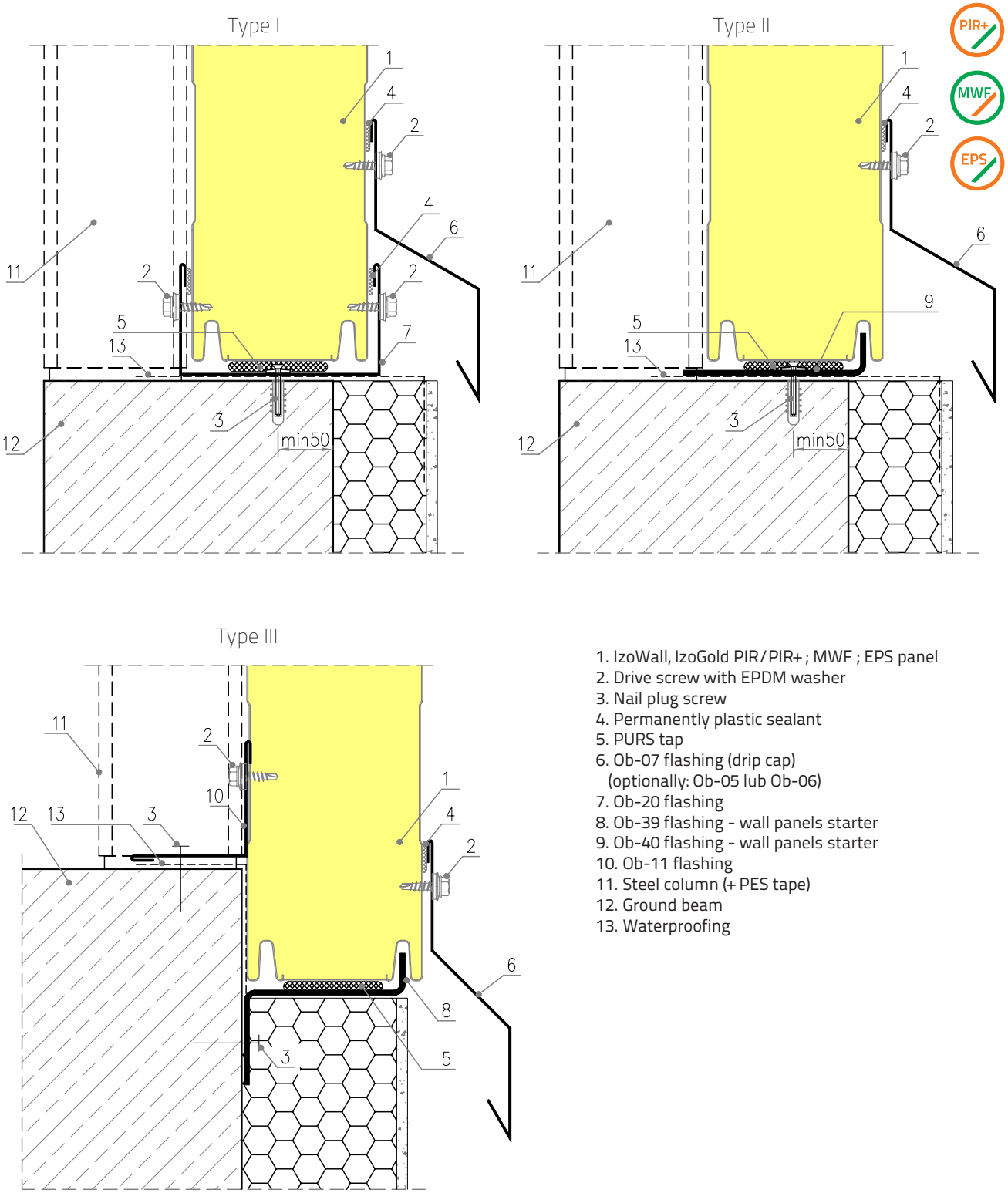
Type II



1. IzoWall PUR/PIR/PIR+ ; MWF ; EPS and IzoGold PUR/PIR/PIR+ panel
2. Drive screw with EPDM washer
3. Nail plug screw
4. Permanently plastic sealant
5. PURS tape / polyurethane foam
6. PES tape
7. Ob-45 flashing (drip cap)
8. Optional facade drip cap Ob-05, Ob-06 or Ob-07
9. Ob-11 flashing
10. Optional custom masking flashing (dimensions depends on the type of steel section)
11. Steel section L-profile, according to the design of the structure
12. Steel section - wall beam
13. Ground beam
14. Waterproofing

Notice:
* For IzoGold, It is recommended to use 2 screws and L-02 connector on every support

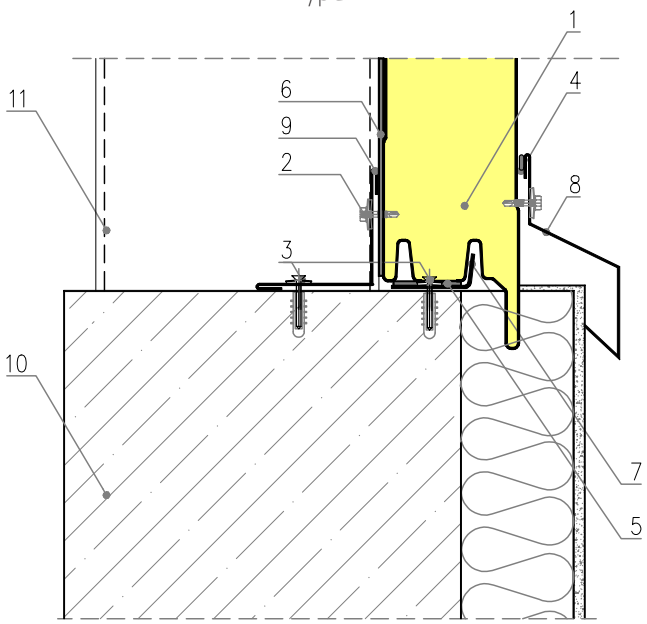
Drawing 12
IzoWall PIR/PIR+; MWF; EPS - horizontal configuration, ground beam joint



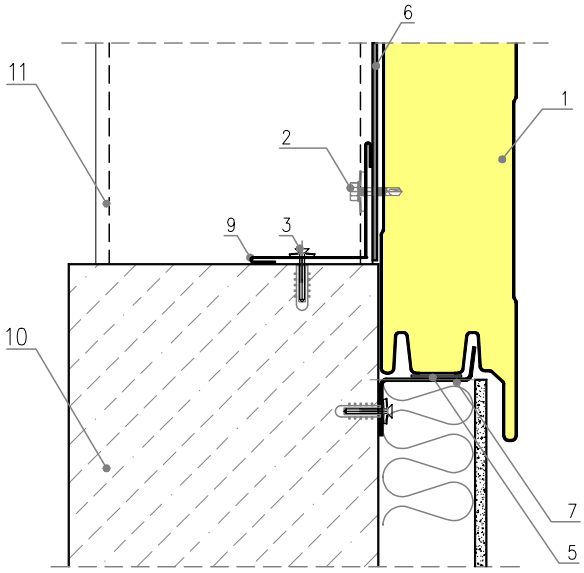
1. IzoWall, IzoGold PIR/PIR+ ; MWF ; EPS panel
2. Drive screw with EPDM washer
3. Nail plug screw
4. Permanently plastic sealant
5. PURS tap
6. Ob-07 flashing (drip cap)
   (optionally: Ob-05 lub Ob-06)
7. Ob-20 flashing
8. Ob-39 flashing - wall panels starter
9. Ob-40 flashing - wall panels starter
10. Ob-11 flashing
11. Steel column (+ PES tape)
12. Ground beam
13. Waterproofing

Drawing 13
IzoGold PIR/PIR+ - horizontal configuration, ground beam joint

Type I

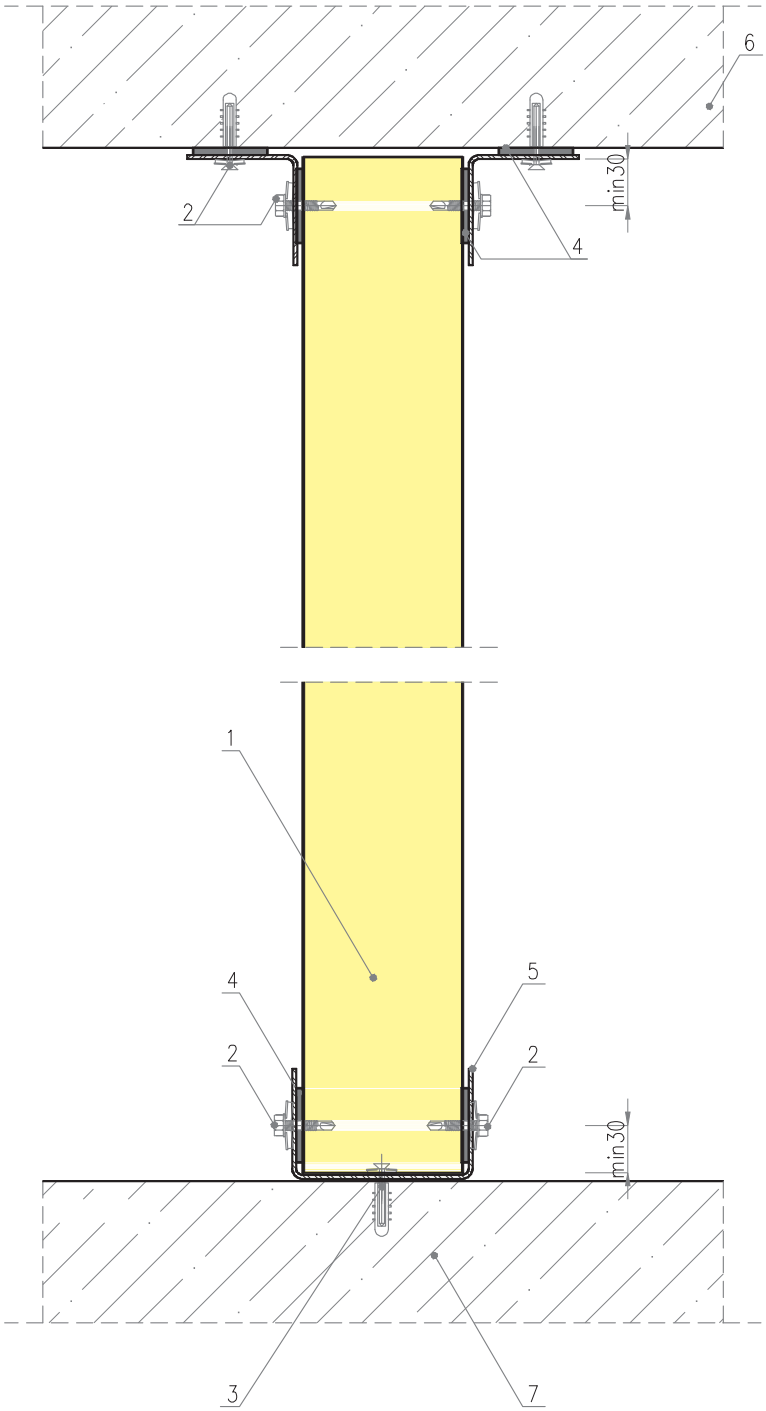


Type II



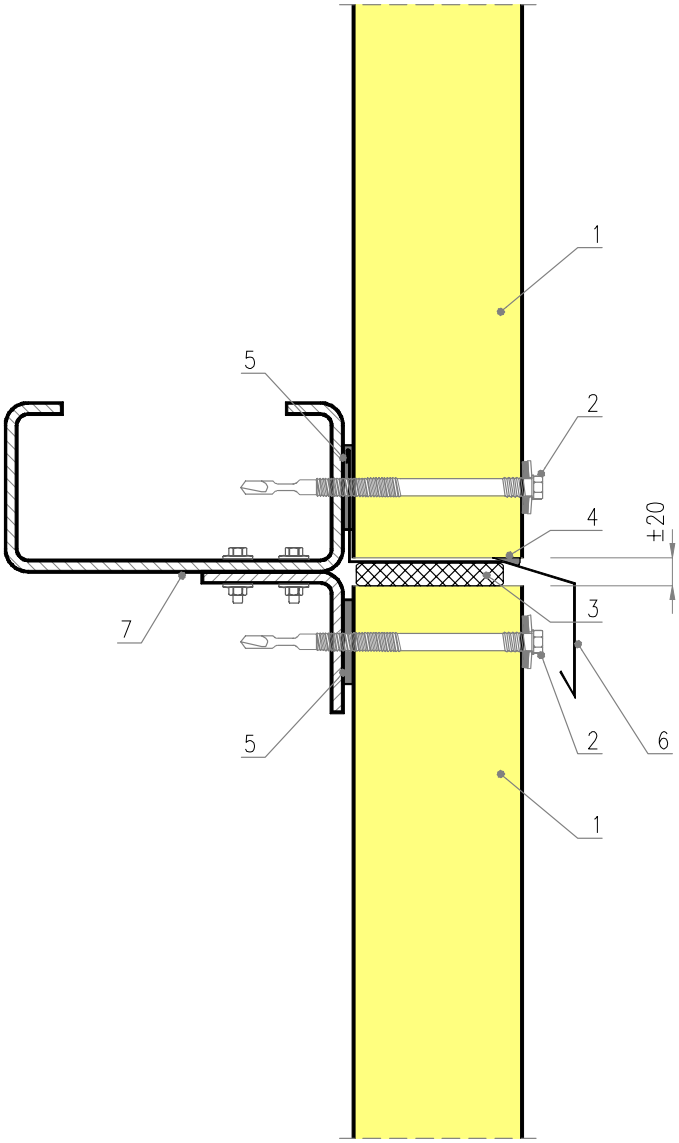
1. IzoGold PIR/PIR+ panel
2. Drive screw with EPDM washer
3. Nail plug screw
4. Sealant, permanently plastic
5. PURS tape / polyurethane foam
6. Self-adhesive PES sealing tape
7. Custom Ob-00 flashing (specify parameters and section drawing)
8. Ob-07 flashing
9. Ob-11 flashing
10. Ground beam
11. Steel section, according to the design of the structure

Drawing 14
IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ - partition wall



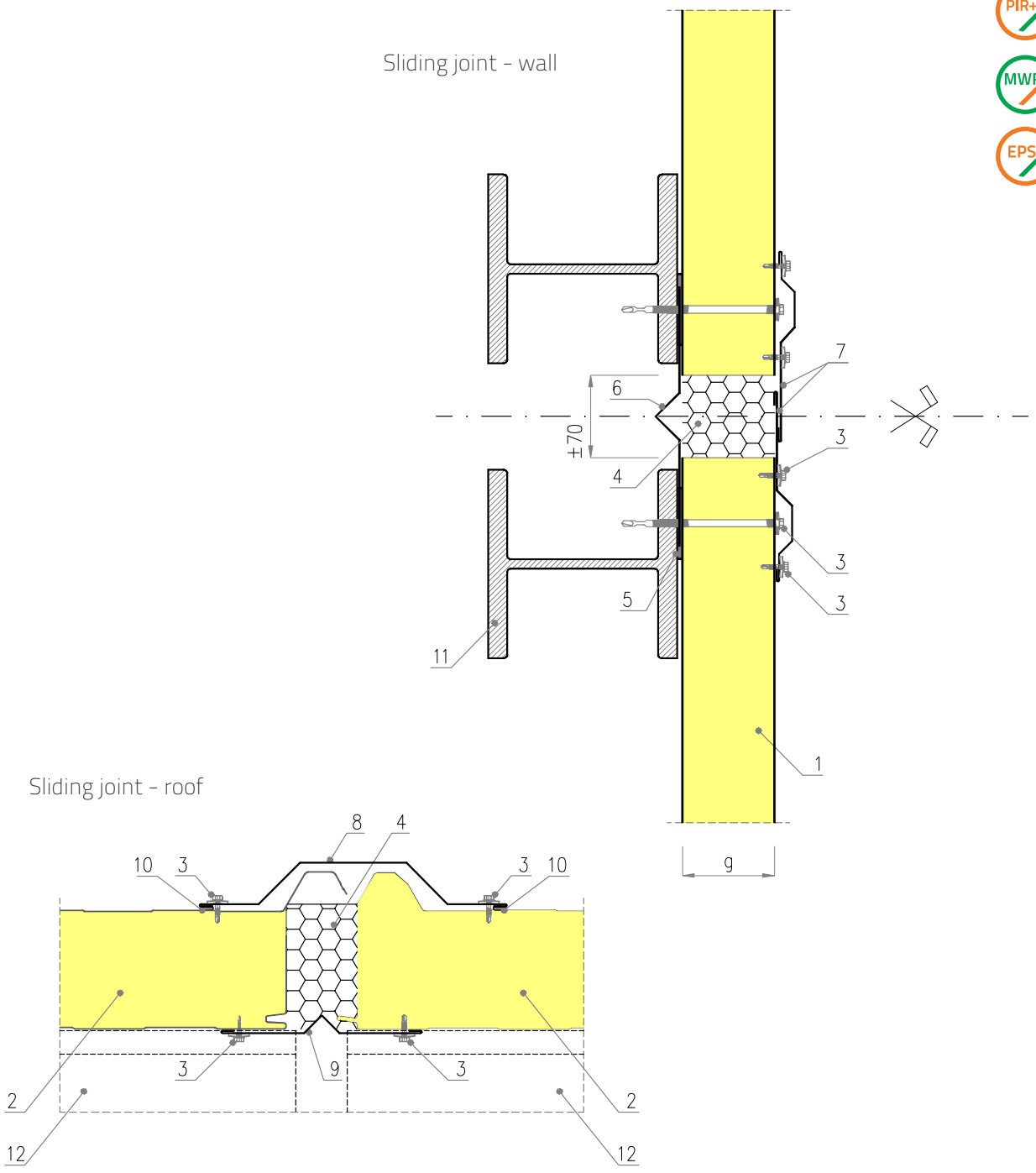
1. IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ panel
2. Drive screw with EPDM washer
3. Nail plug screw
4. Self-adhesive PES sealing tape (recommended)
5. U-beam, cold-bent
6. Ceiling
7. Concrete foundation

Drawing 15
IzoWall PIR/PIR+; MWF; EPS - joining panels lengthwise, vertical configuration - high objects



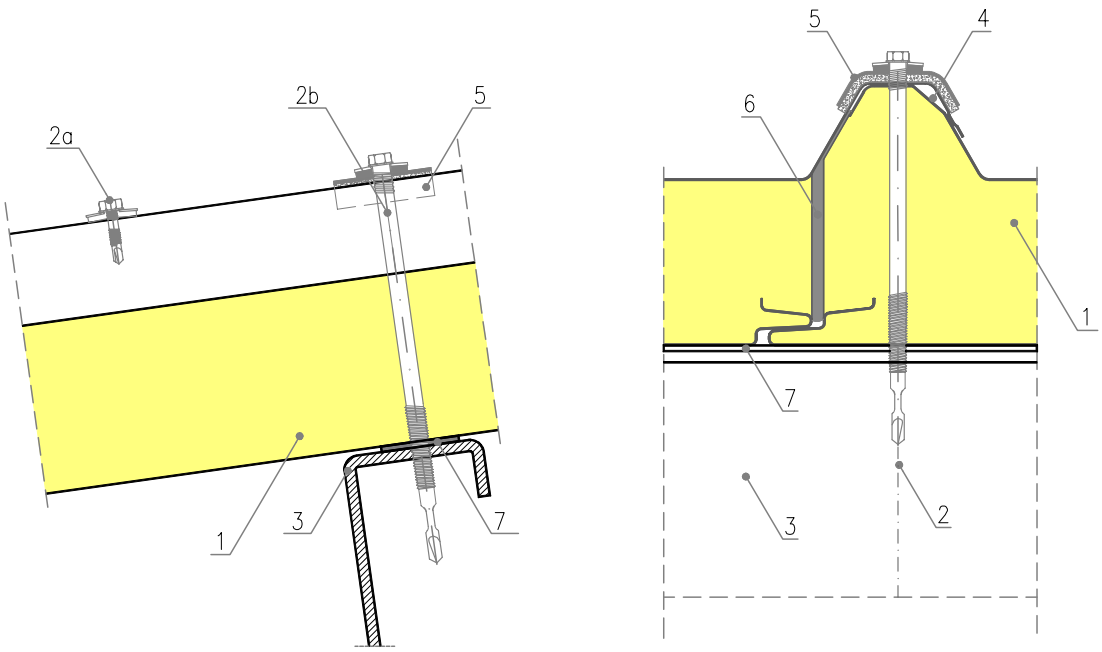
1. IzoWall wall panel
2. Drive screw with EPDM washer
3. Polyurethane foam or impregnated PU gasket
4. Sealant
5. Self-adhesive PES sealing tape
6. Custom flashing (drip cap)
7. Steel section, according to the design of the structure

Drawing 16
IzoWall, IzoRoof PIR/PIR+; MWF; EPS - sliding joint

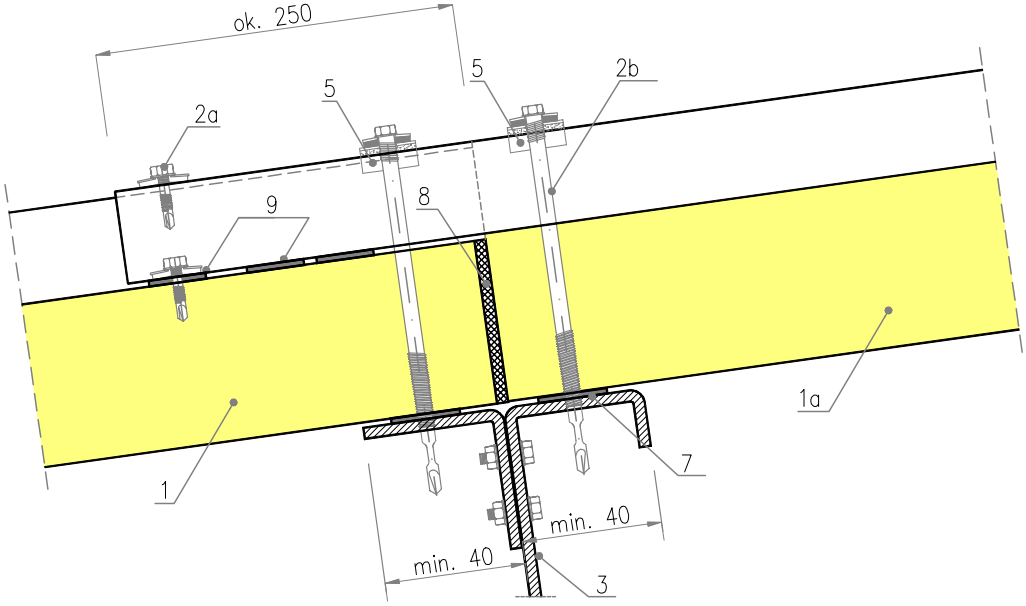


1. IzoWall panel
2. IzoRoof panel
3. Drive screw with EPDM washer
4. Insulation applied during assembly
5. Self-adhesive PES sealing tape
6. Internal custom flashing (sliding joint - wall)
7. External custom flashing (sliding joint - wall)
8. Top custom flashing (sliding joint - roof)
9. Bottom custom flashing (sliding joint - roof)
10. Sealant, permanently plastic
11. Steel column according to the design of the structure
12. Roof construction (purlins)

Drawing 17
IzoRoof PIR/PIR+; MWF; EPS - fastening to the structure with lateral panel joint



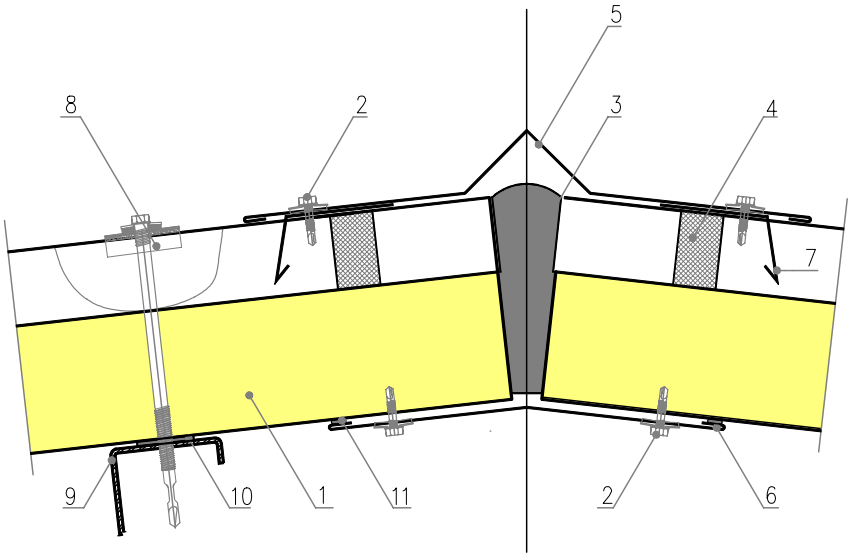
Joining roof panels lengthwise



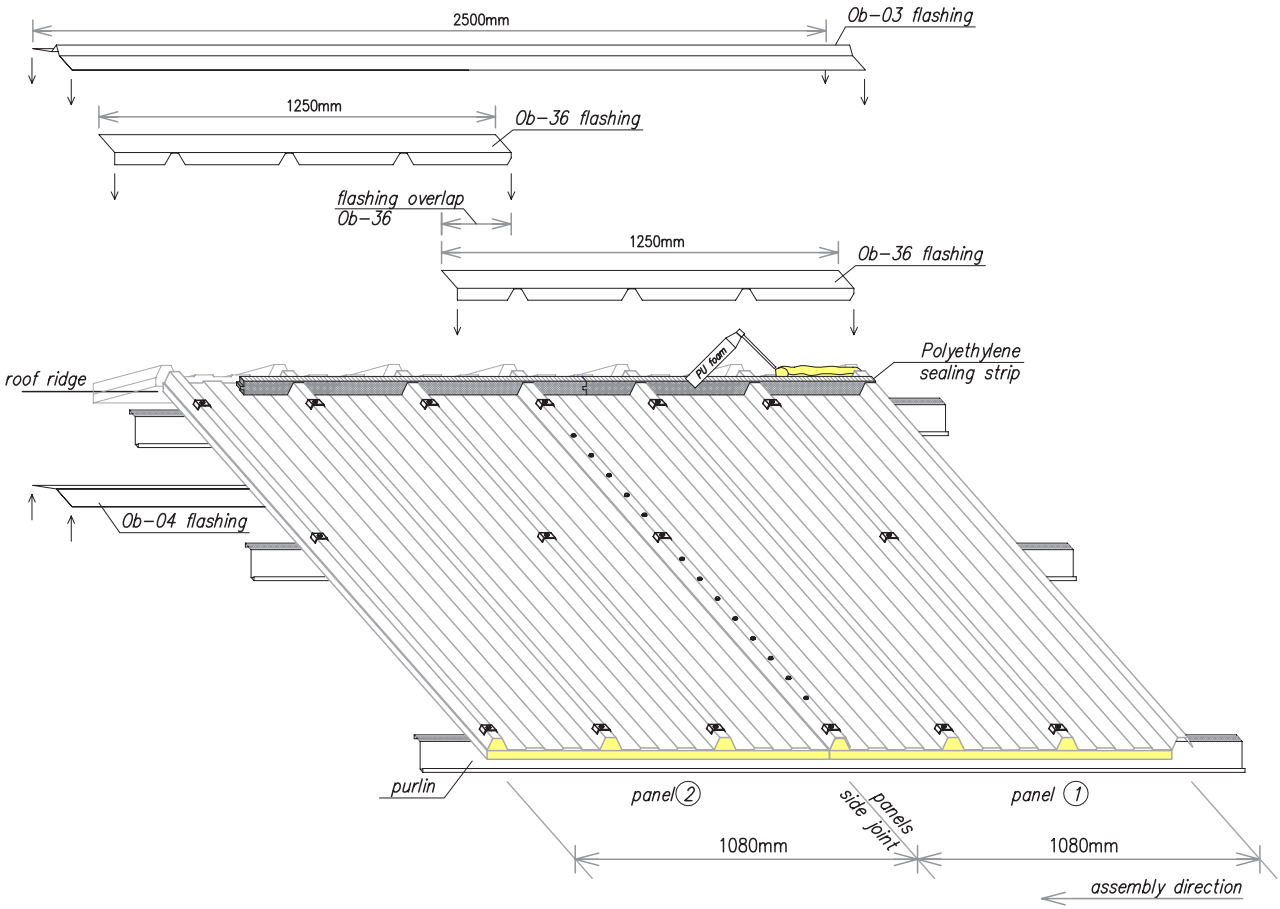
1. IzoRoof PIR/PIR+; MWF; EPS panel
1a. IzoRoof panel with undercut core - removal of the core fragment on assembly; panel produced with pre-cut bottom cladding
2. Drive screws axis
2a. Drive screw with EPDM washer (for lateral joining of panels - recommended span of 30 cm)
2b. Drive screw with EPDM washer (fastening panels to the structure)
3. Purlin
4. Capillary chamber
5. L-03 fastener
6. Polyurethane seal
7. Self-adhesive PES sealing tape
8. PURS tape or polyurethane foam
9. Butyl tape, min. 2 strips minimum (3 strips recommended for low slope)

In the case of consider connection of roof panels undercut with different types of cores in the project, please contact Izopanel Sales Department.

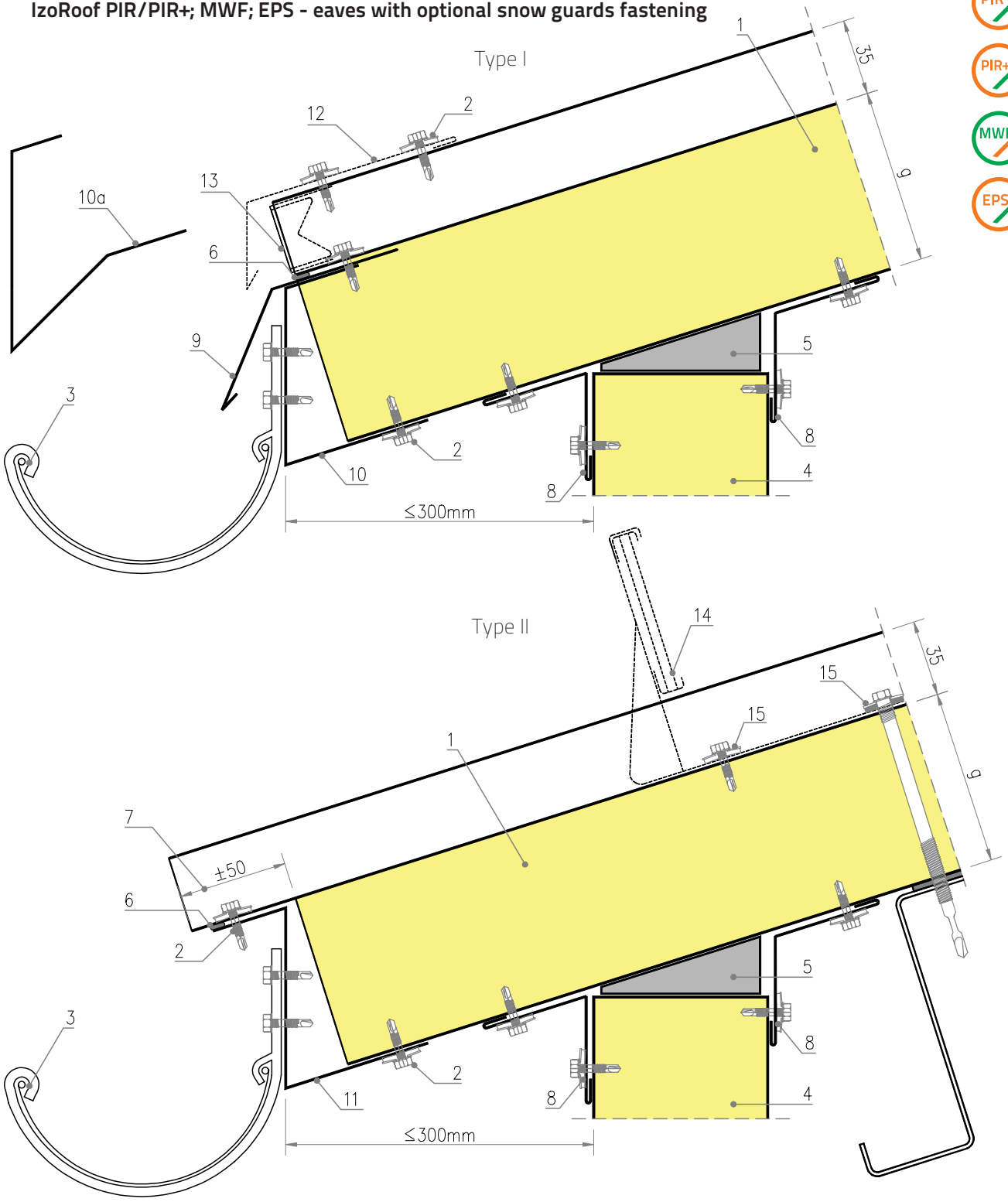
Drawing 18
IzoRoof PIR/PIR+; MWF; EPS - roof ridge



1. IzoRoof PUR/PIR/PIR+ ; MWF ; EPS panel
2. Drive screw with EPDM washer
3. Polyurethane foam
4. Polyethylene sealing strip
5. Ob-03 roof flashing
6. Ob-04 roof flashing
7. Ob-36 roof flashing
8. L-03 fastener "saddle washer"
9. Purlin
10. PES tape
11. Permanently plastic sealant



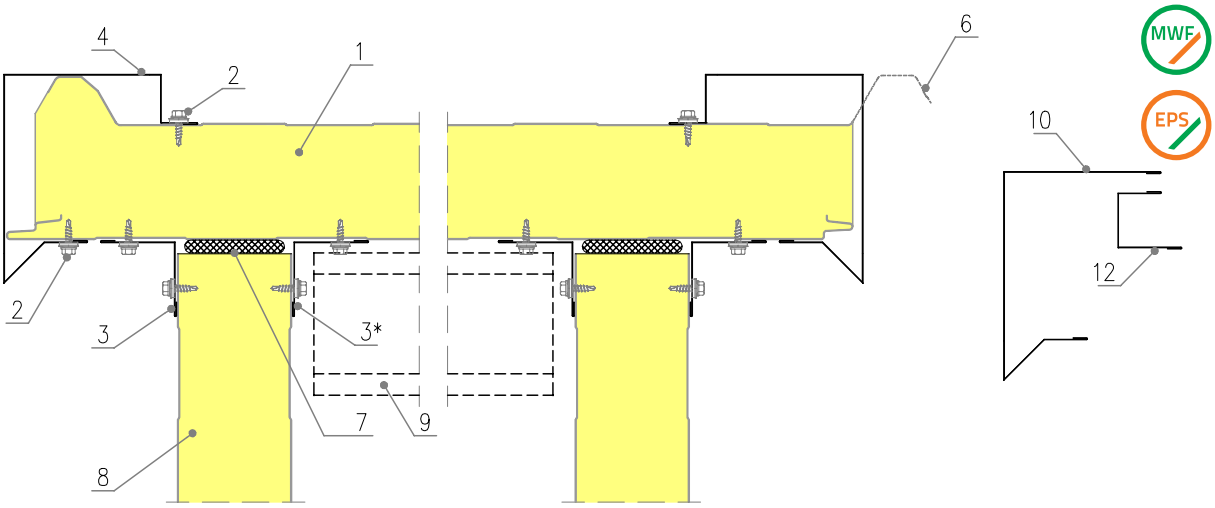
Drawing 19
IzoRoof PIR/PIR+; MWF; EPS - eaves with optional snow guards fastening



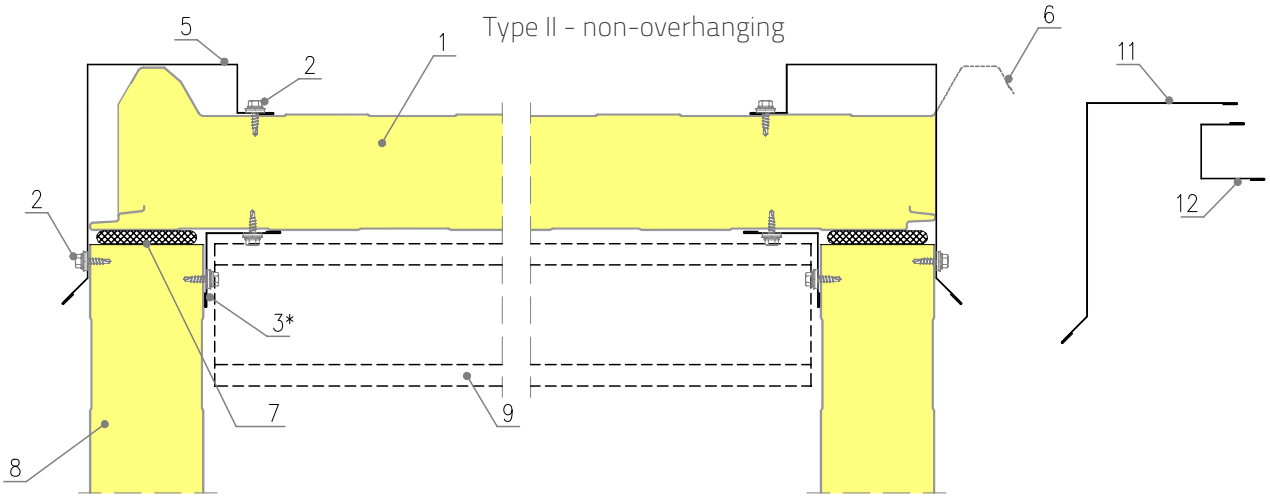
1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Drive screw with EPDM washer
3. Gutter and steel gutter bracket
4. IzoWall/IzoGold wall panel
5. Polyurethane assembly foam
6. Sealant
7. Alternatively panel undercut at eaves
8. Ob-11 flashing
9. Flashing Ob-18 (verge trim)
10. Ob-19 flashing g=0,88 mm
10a. Custom flashing instead of Ob-19 flashing for panel with thickness 80 mm
11. Verge trim individual for an alternative of panel with undercut (Ob-00), g=0.88mm
12. Ob-34 (eaves masking strip)
13. Alternatively rib plugs instead of Ob-34, 14. Alternatively system-specific snow guard
15. Snow guard fastening screws

Drawing 20
IzoRoof PIR/PIR+; MWF; EPS - top wall panel joining element

Type I - overhanging



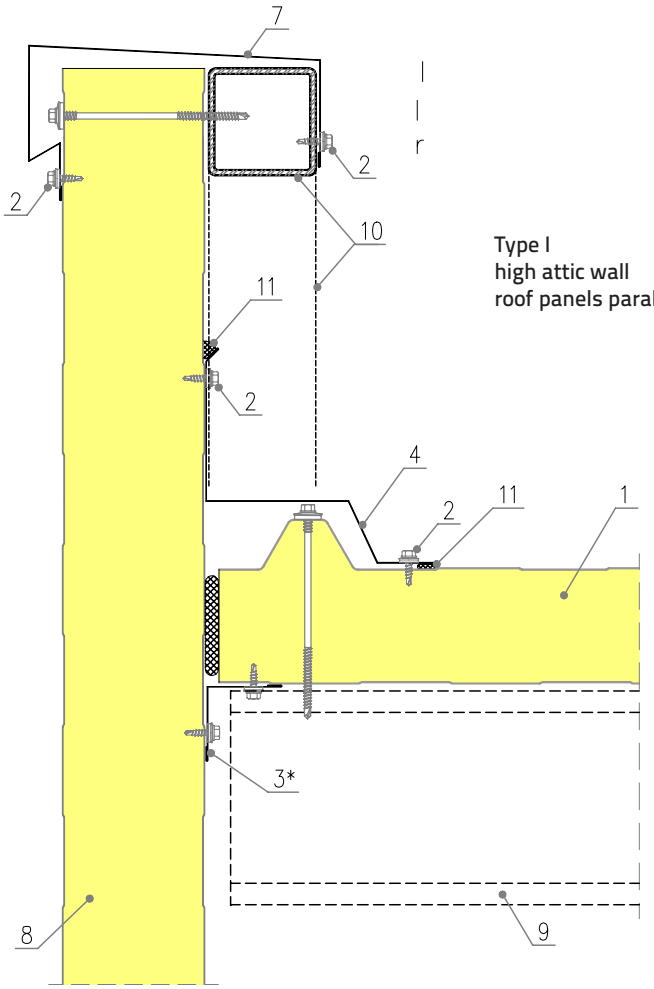
Type II - non-overhanging



1. IzoRoof PUR/PIR/PIR+ ; MWF ; EPS panel
2. Drive screw with EPDM washer
3. Ob-11 roof flashing
4. Ob-29 roof flashing
5. Ob-30 roof flashing
6. Cut at the construction site
7. Polyurethane foam
8. IzoWall / IzoGold wall panel
9. Roof panel support (purlin)+PES tape
10. Optionally Ob-31+Ob-37 flashings instead od Ob-29
11. Optionally Ob-32+Ob-37 flashings instead od Ob-30
12. Ob-37 flashing

Notice:
*** Depending on the design solution, a steel L-profile may be used instead of Ob-11 flashing.**

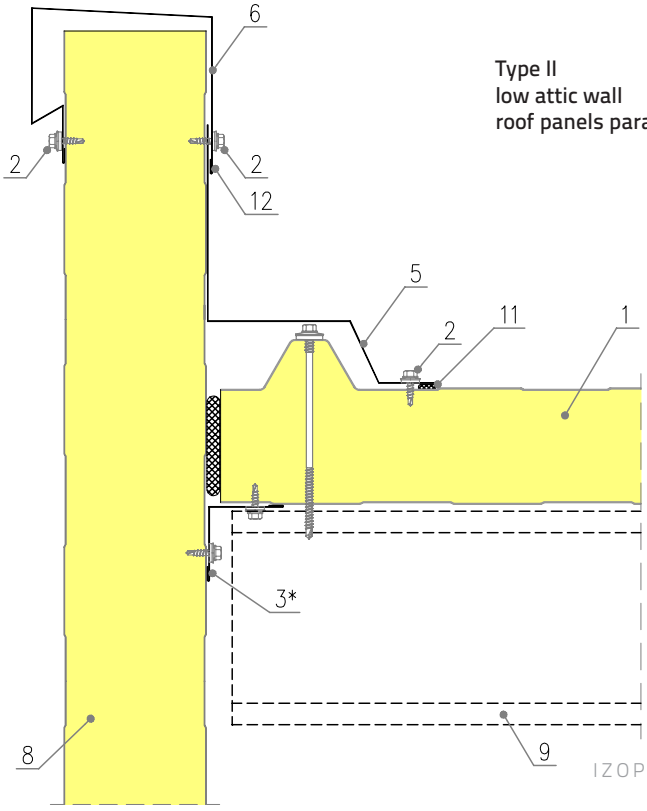
Drawing 21
IzoRoof PIR/PIR+; MWF; EPS - joint of top wall panel protruding over the roof



Type I
high attic wall
roof panels parallel to the wall

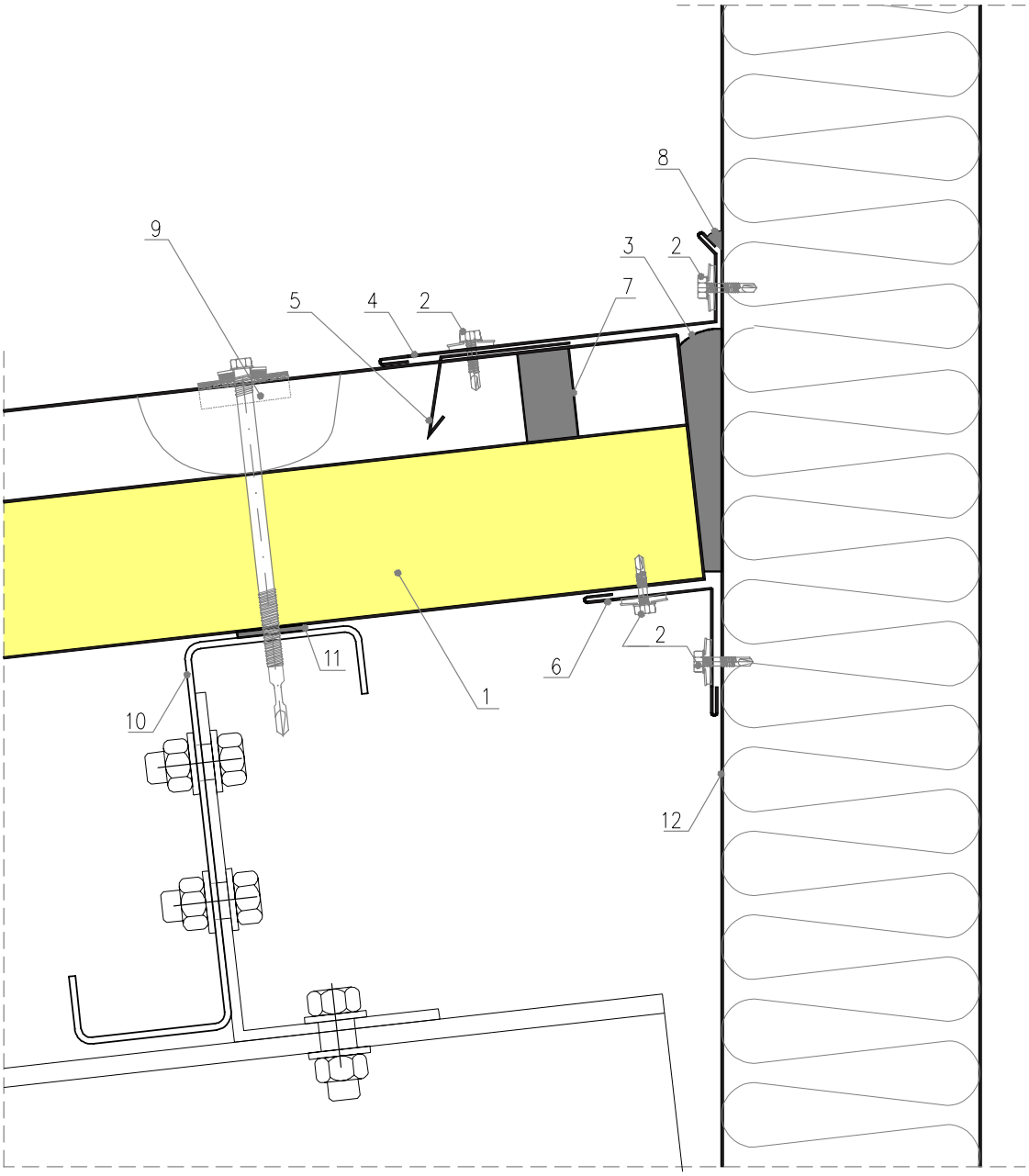
1. IzoRoof PUR/PIR/PIR+ ; MWF ; EPS panel
2. Drive screw with EPDM washer
3. Polyurethane foam
4. Ob-21 flashing
5. Ob-21a flashing
6. Ob-38 custom flashing
7. Custom Ob-00 flashing (specify parameters and section drawing)
8. IzoWall / IzoGold wall panel
9. Roof panel support (purlin) + PES tape
10. Attic wall construction
11. Permanently plastic sealant

Notice:
* Depending on the design solution, a steel L-profile may be used instead of Ob-11 flashing.



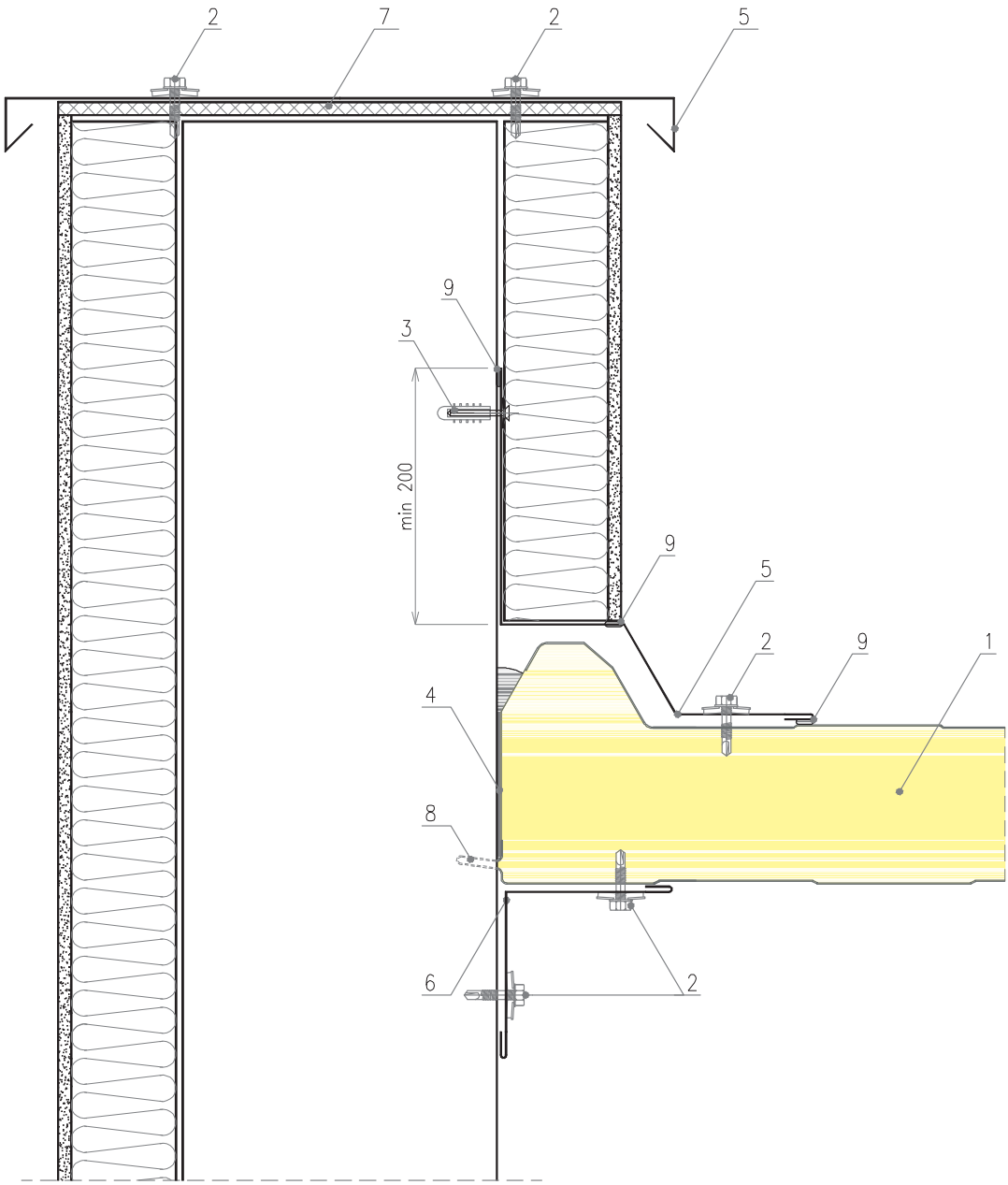
Type II
low attic wall
roof panels parallel to the wall

Drawing 22
IzoRoof PIR/PIR+; MWF; EPS - roof edge next to higher building's wall



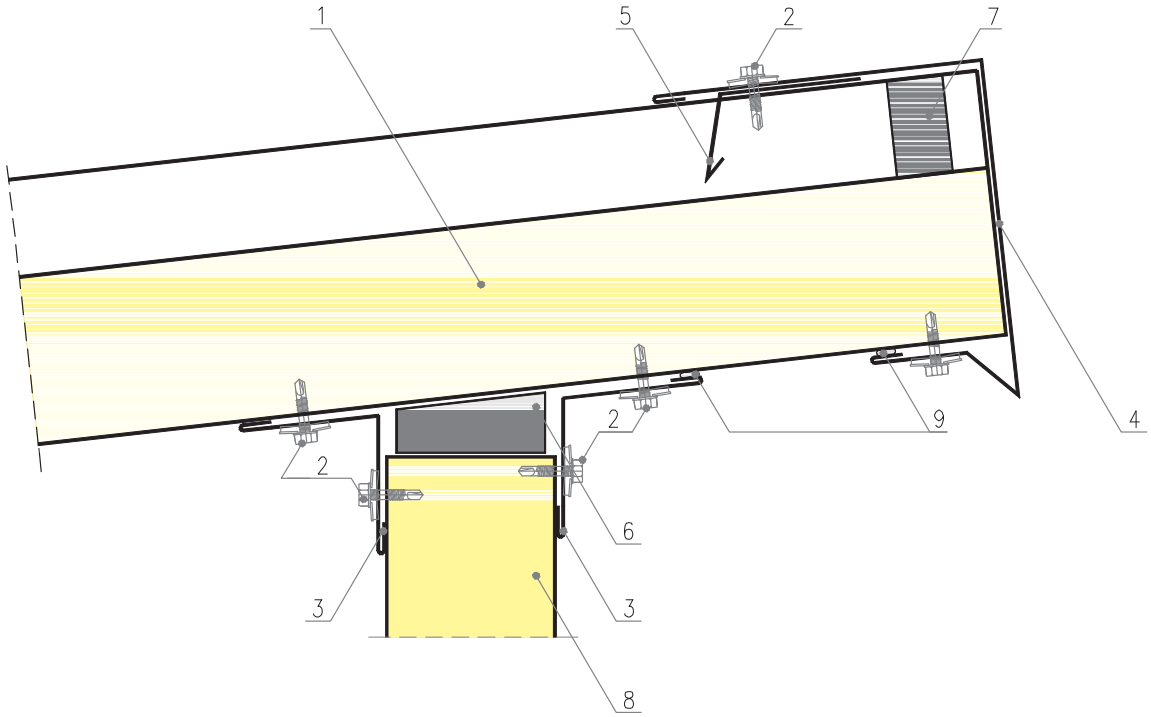
1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Drive screw with EPDM washer
3. Polyurethane foam
4. Custom Ob-00 flashing (specify parameters and section drawing)
5. Ob-36 flashing
6. Ob-11 flashing
7. Polyethylene sealing strip adjusted to IzoRoof panel profile
8. Sealant
9. L-03 fastener
10. Purlin
11. Self-adhesive PES sealing tape
12. Higher building's wall

Drawing 23
IzoRoof PIR/PIR+; MWF; EPS - joint of brick wall protruding over the roof



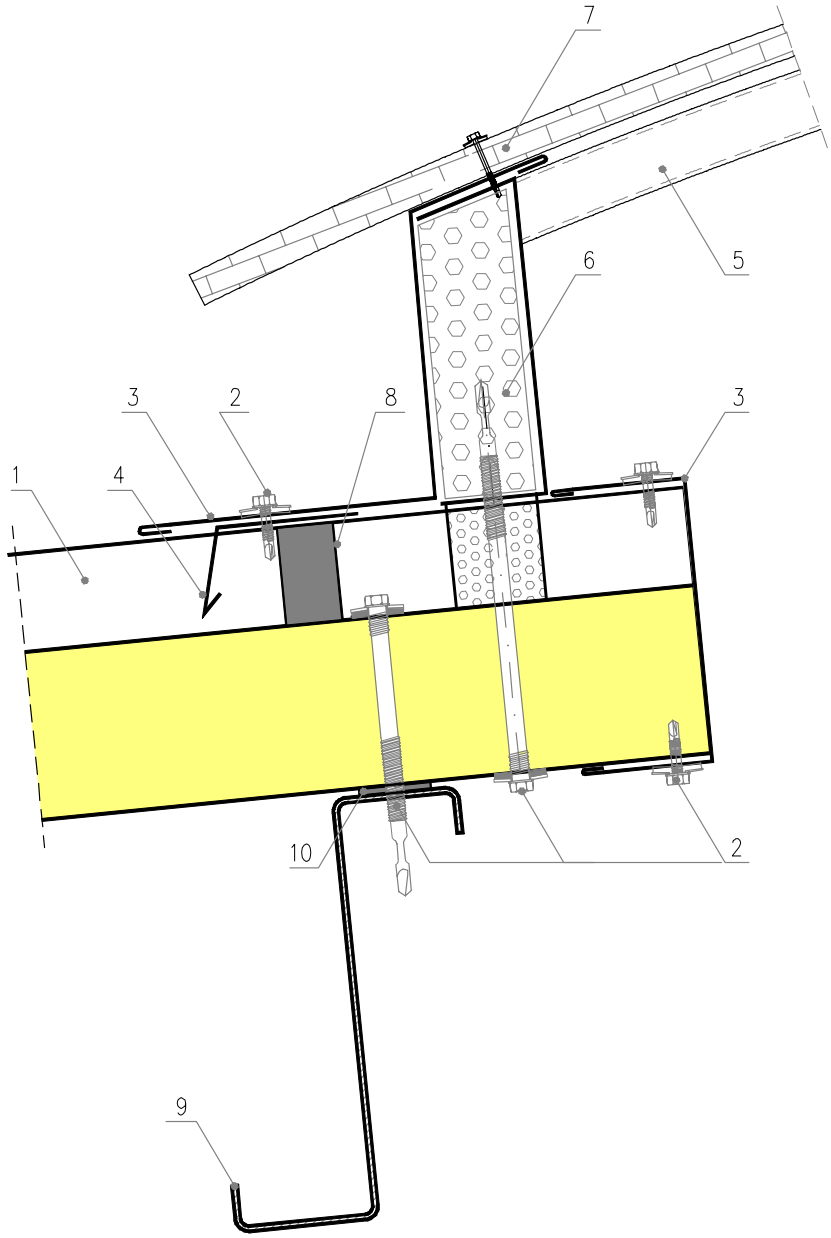
1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Drive screw with EPDM washer
3. Nail plug screw
4. Polyurethane foam
5. Custom Ob-00 flashing (specify parameters and section drawing)
6. Ob-11 flashing
7. Panel for flashing installation (e.g. OSB panel)
8. To be cut at the construction site
9. Sealant, permanently plastic

Drawing 24
IzoRoof PIR/PIR+; MWF; EPS - joint of higher edge of a monopitched roof



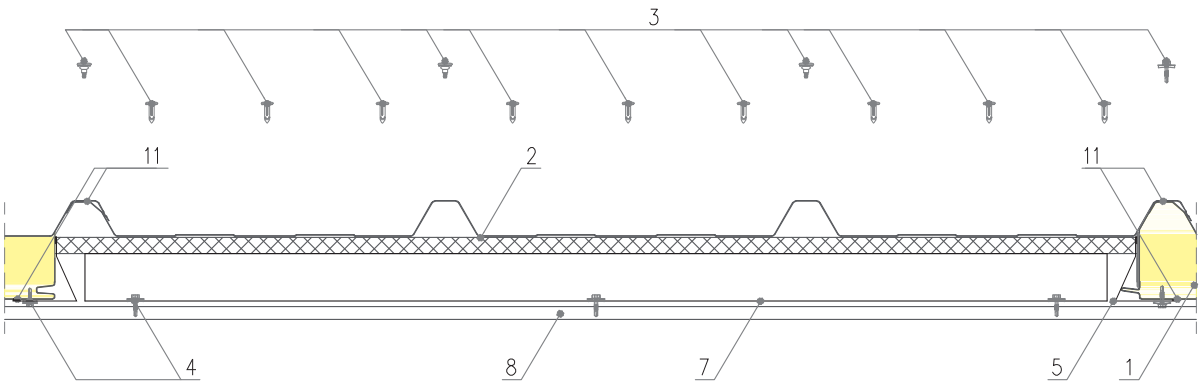
1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Drive screw with EPDM washer
3. Ob-11 flashing
4. Ob-31 flashing
5. Ob-36 flashing
6. Polyurethane foam
7. Polyethylene sealing strip adjusted to IzoRoof panel profile
8. IzoWall/IzoGold wall panel
9. Sealant, permanently plastic

Drawing 25
IzoRoof PIR/PIR+; MWF; EPS - ridge skylight

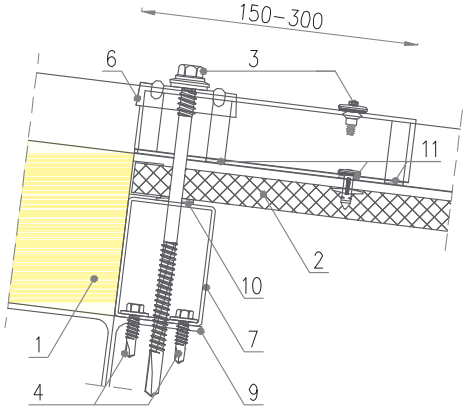


1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Drive screw with EPDM washer
3. Custom Ob-00 flashing
(specify parameters and section drawing)
4. Ob-36 flashing
5. Skylight frame
6. Expanded polystyrene
7. Polycarbonate
8. Polyethylene sealing strip adjusted to IzoRoof panel profile
9. Purlin
10. Self-adhesive PES sealing tape

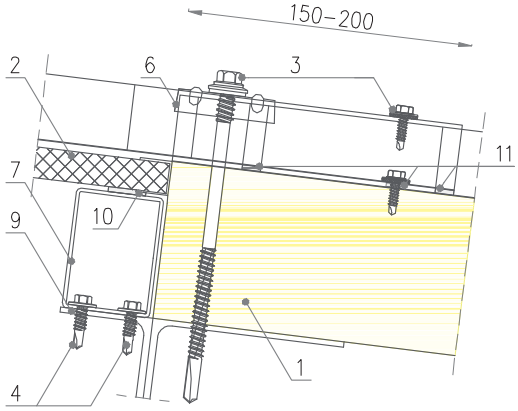
Drawing 26
IzoRoof PIR/PIR+; MWF; EPS - strip skylight



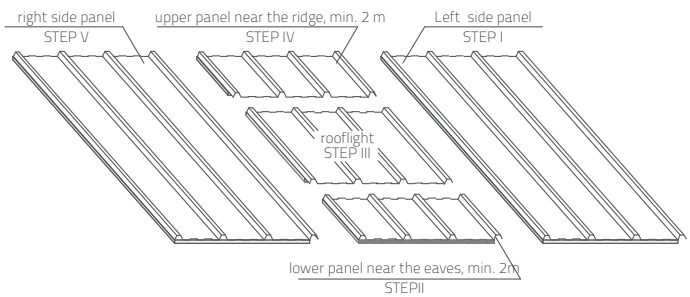
Joint on the longer side of the roof panel with skylight on the side of the roof ridge



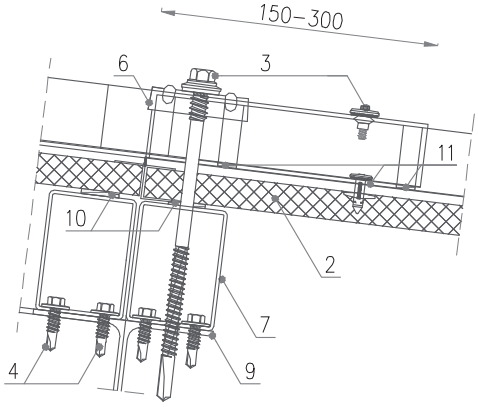
Joint on the longer side of the roof panel with skylight on the side of the eaves



Assembly direction

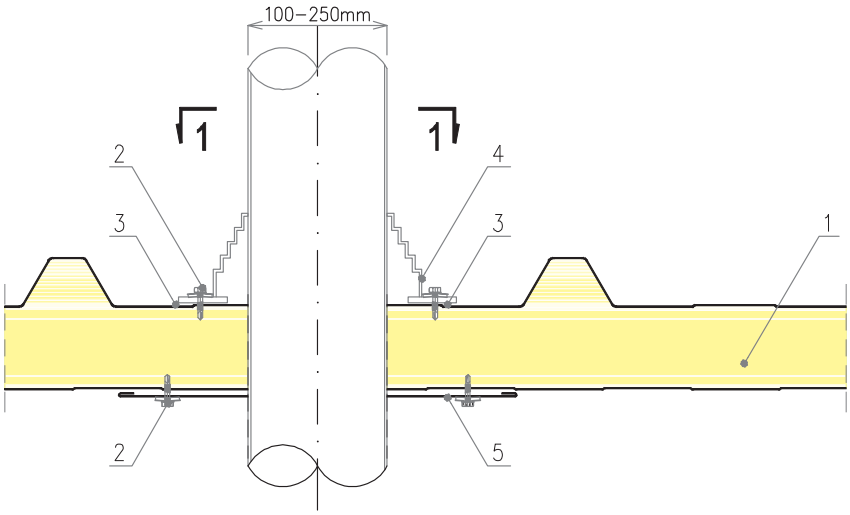


Longitudinal joint of the skylights



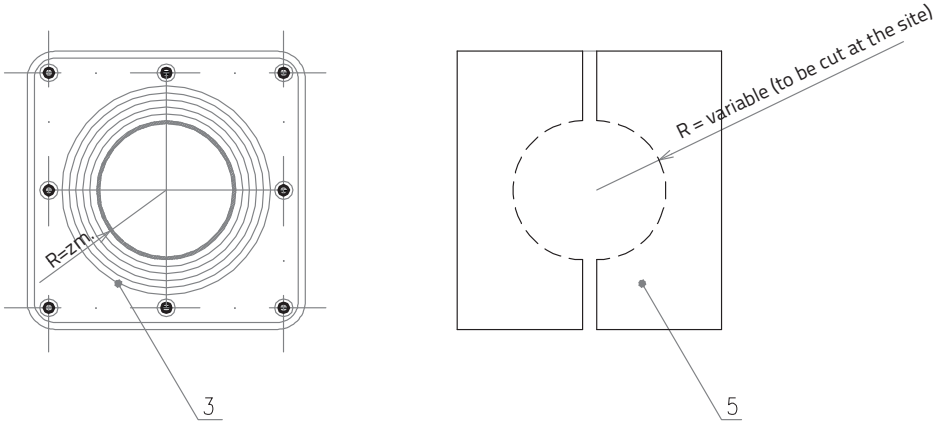
1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Polycarbonate panel with resin and glass facing
3. System screws and rivets - every 300 mm on the edges
4. Drive screw with EPDM washer
5. Ob-44 flashing
6. L-03 fastener
7. Spacer
8. Purlin
9. Substructure, if purlins width < 100 mm
10. Self-adhesive PES sealing tape
11. Butyl tape

Drawing 27
IzoRoof PIR/PIR+; MWF; EPS - roof penetration



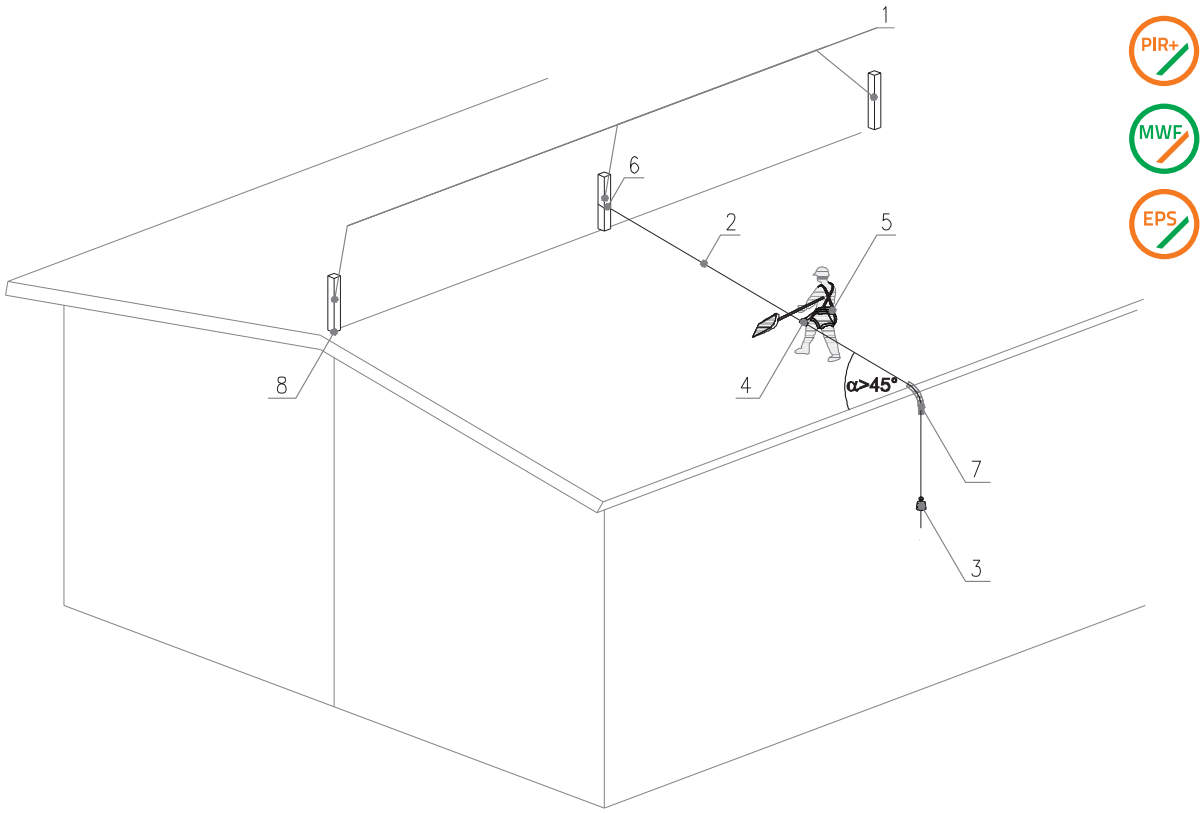
Collar size	1	2	3	4	5	6	7	8	9
Outer diameter of the pipe [mm]	5-50	44-82	6-127	75-160	108-190	125-230	150-280	175-330	154-483

CROSS SECTION 1-1



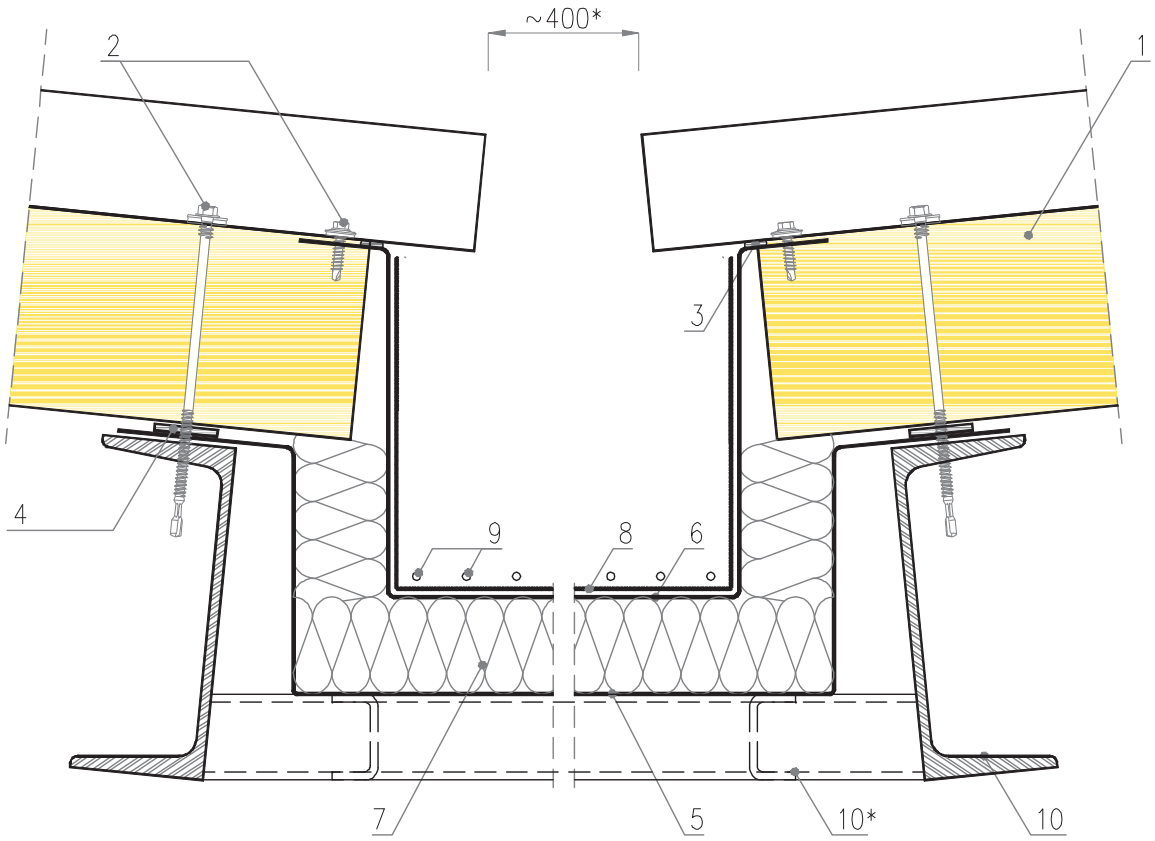
1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Drive screw with EPDM washer
3. Rubber based roof sealant
4. Pipe sealing collar (e.g. PIPECO / EPDM)
5. Custom Ob-00 flashing (specify parameters and section drawing)

Drawing 28
IzoRoof PIR/PIR+; MWF; EPS - roof maintenance systems



1. Structural Anchors according to PN-EN 795:1999/A1:2003 – must be arranged in consultation with the Designer of the structure.
2. Rope should run at an angle not smaller than 45° to the roof edge.
3. Small deadweight guarantees constant tension of the rope and stability.
4. Fall arrester according to PN-EN 353-2:2005 (device guide should be anchored to the structural anchor and loaded with a small deadweight for stability).
5. Body harness according to PN-EN 361:2005, fall arrester mechanism should be connected to a body harness clamp. Removable flexible sheath.
6. In order to reduce reaction on people and structure as a result of a possible fall, use of properly selected fall arresters is recommended..
7. Removable flexible sheath.
8. Sealing of any intersection points between the structure and IzoRoof board to be carried out according to Fig. 27 – IzoRoof PIR/PIR+; MWF; EPS – roof pass.
9. All bearing parts of the system should be made of stainless steel according to the Polish Standards, in particular:
   PN-EN 795:1999/A1:2003 Protection against falls from a height - Anchor devices - Requirements and testing.
   PN-EN 363:2008 Personal fall protection equipment - Personal fall protection systems.
   PN-EN 365:2006 Personal protective equipment against falls from a height - General requirements.

Drawing 29
IzoRoof PIR/PIR+; MWF; EPS - internal gutter at the joint of roof panels

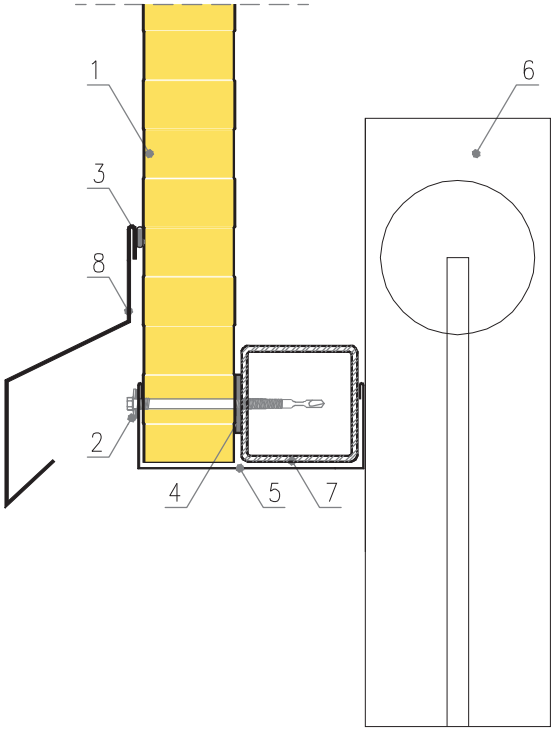


1. IzoRoof PIR/PIR+; MWF; EPS panel
2. Drive screw with EPDM washer
3. Sealant, permanently plastic
4. Self-adhesive PES sealing tape
5. External profile of the gutter – individual, load-bearing*
6. Internal profile of the gutter – individual*
7. Thermal insulation
8. Water insulation
9. Trough heating
10. Steel section*

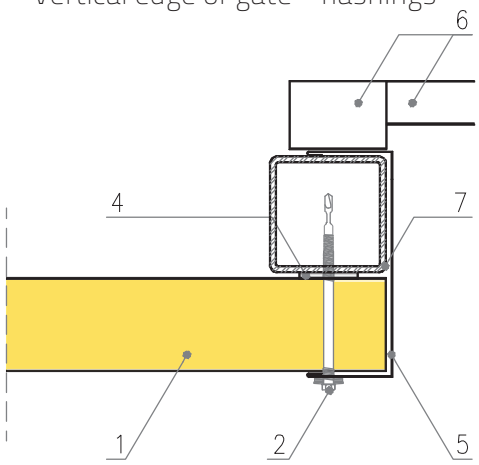
* Trough dimensions, its support and heating installation should be selected considering slopes and trough functions, individually by a designer

Drawing 30
IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ - joining panels with gate's edge - flashings

Horizontal edge of gate – flashings



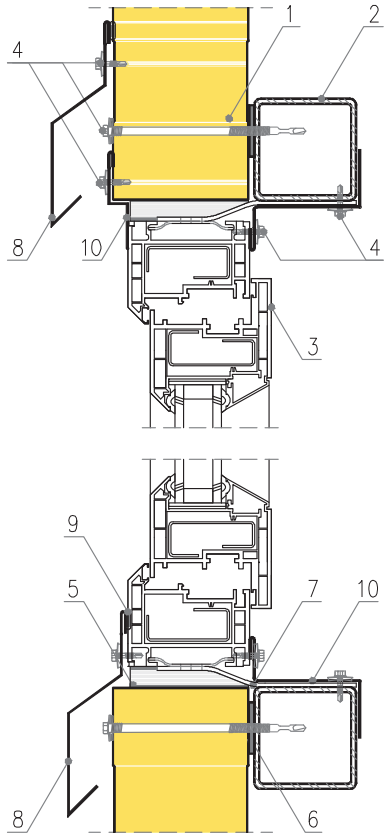
Vertical edge of gate – flashings



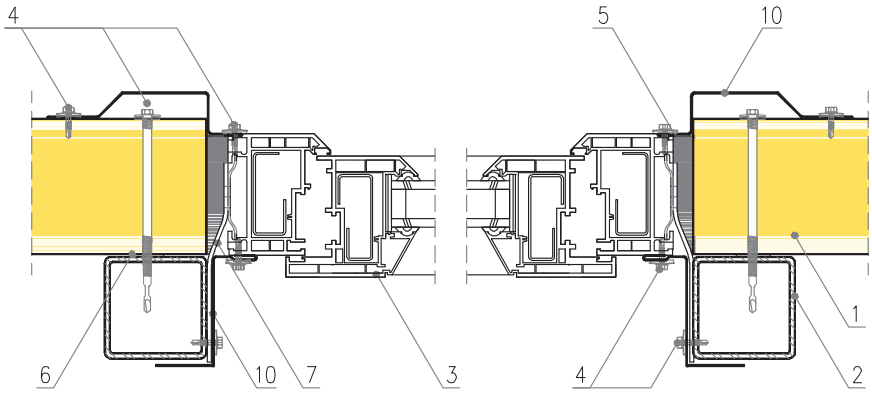
1. IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ panel
2. Drive screw with EPDM washer
3. Sealant, permanently plastic
4. Self-adhesive PES sealing tape
5. Ob-20 flashing
6. Gate elements
7. Steel section, according to the design of the structure
8. Ob-07 flashing

Drawing 31
IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ - joining panels with window's edge

Horizontal edge of window – flashings



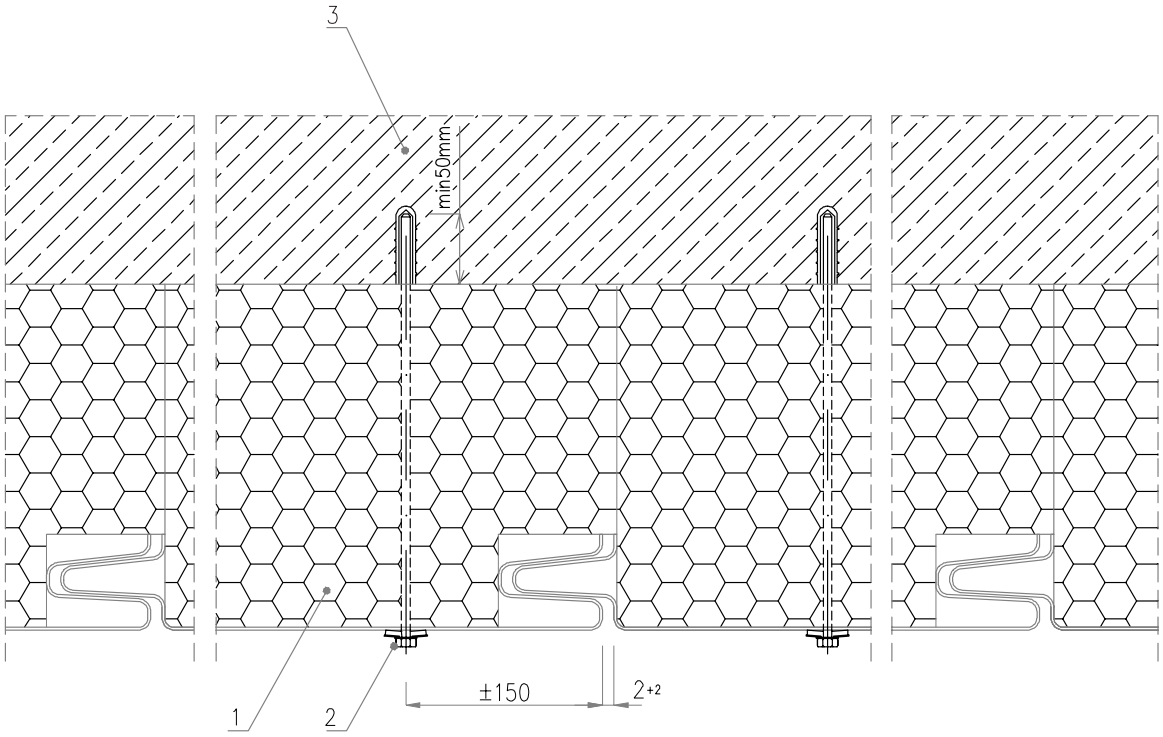
Vertical edge of window – flashings



1. IzoWall PIR/PIR+; MWF; EPS and IzoGold PIR/PIR+ panel
2. Steel section, according to the design of the structure
3. Window with a handle and a fastener
4. Drive screw with EPDM washer
5. Polyurethane foam
6. Self-adhesive PES sealing tape
7. Window anchor
8. Ob-07 flashing
9. Sealant, permanently plastic
10. Custom Ob-00 flashings

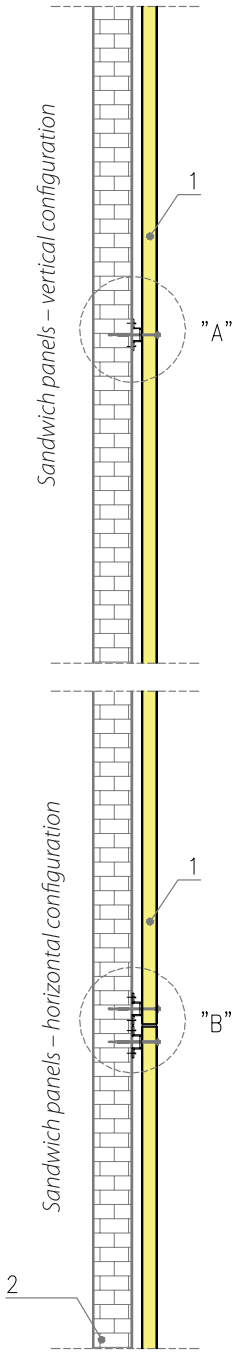
* According to PN-84/B-03230, reinforcing substructure is recommended for holes with edges > 300 mm.

Drawing 32
IzoWall EPS - use of sandwich panel with one-side steel lining

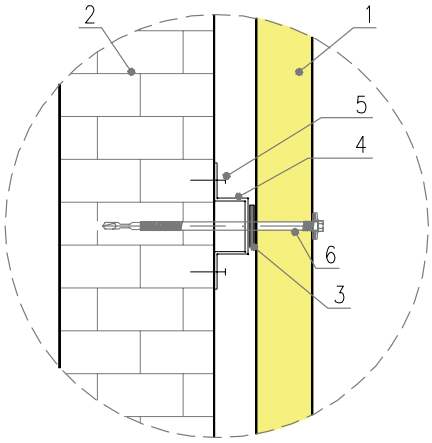


1. IzoWall EPS panel with one-side steel lining
2. Steel fastener with galvanized coating
3. Basis for panels (masonry, reinforced concrete)

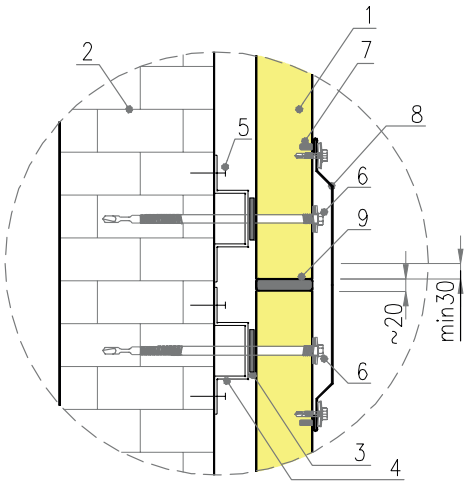
Drawing 33
IzoPanel PIR/PIR+; MWF; EPS - sandwich panels - assembly to wall (masonry of rainf. concrete)



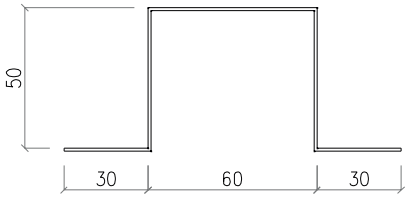
VERTICAL CONFIGURATION - INTERMEDIATE SUPPORT
Detail "A"



HORIZONTAL CONFIGURATION - PANEL JOINT
Detail "B"



Custom steel section, thickness min. 1.00 mm

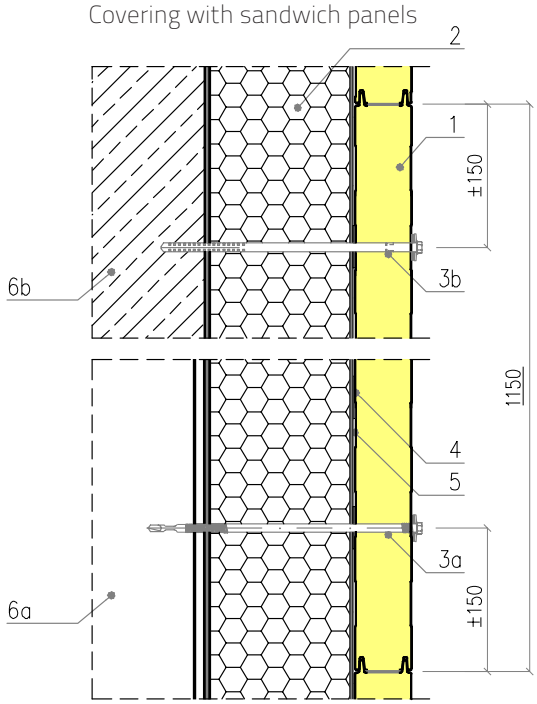


1. Izopanel wall panel
2. Masonry wall
3. Self-adhesive PES sealing tape
4. Custom steel section according to the drawing*
5. Steel anchor**
6. Drive screw with EPDM washer
7. Sealant, permanently plastic
8. Ob-35 flashing
9. Polyurethane foam as ~20 mm movement joint fill

* Shape and location of steel section 4 must enable proper assembly of fasteners (drive screws).
** Type and spacing of steel anchors 5 must be defined according to the loads.

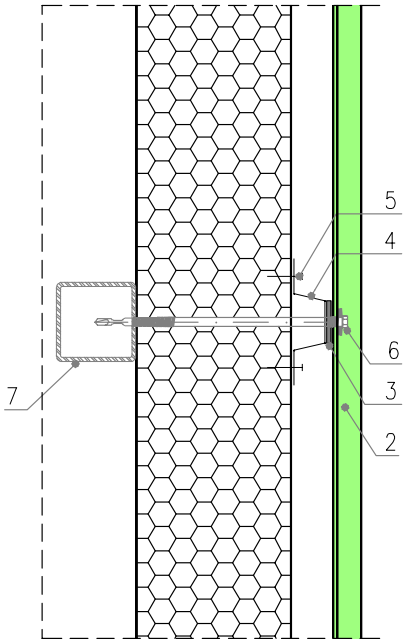
Drawing 34
IzoPanel PIR/PIR+; MWF; EPS - assembly of additional elevation on existing panels

Variant A
Covering with sandwich panels



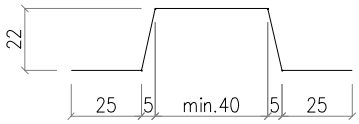
1. Izopanel sandwich panel (horizontal configuration)
2. Existing light cladding panels
3a. Drive screw with EPDM washer*****
3b. Fastener to the reinforced concrete with EPDM washer*****
4. PES tape vertically along fasteners line
5. PES tape horizontally (3 rows for each panel)
6a. Steel column
6b. Reinforced concrete column

Variant B
Covering with trapezoidal/corrugated sheet



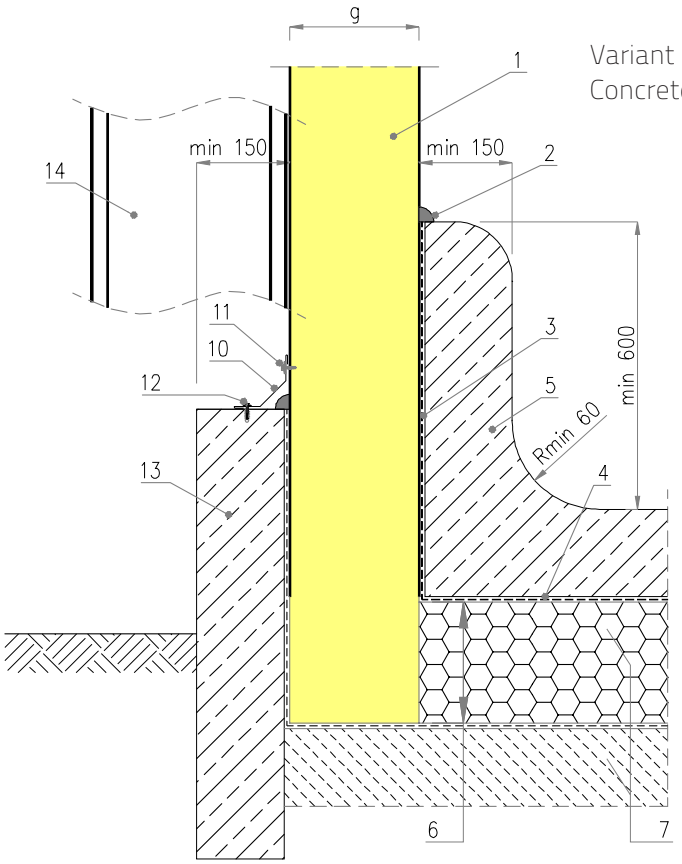
1. Izopanel sandwich panel (horizontal configuration)
2. Trapezoidal/corrugated sheet*
3. Self-adhesive PES sealing tape
4. Custom steel section according to the drawing**
5. Galvanized self-drilling fastener 4.8 x 20 mm***
6. Drive screw with EPDM washer*****
7. Steel section according to the design of the structure

Custom steel section of sheet 0.88 mm

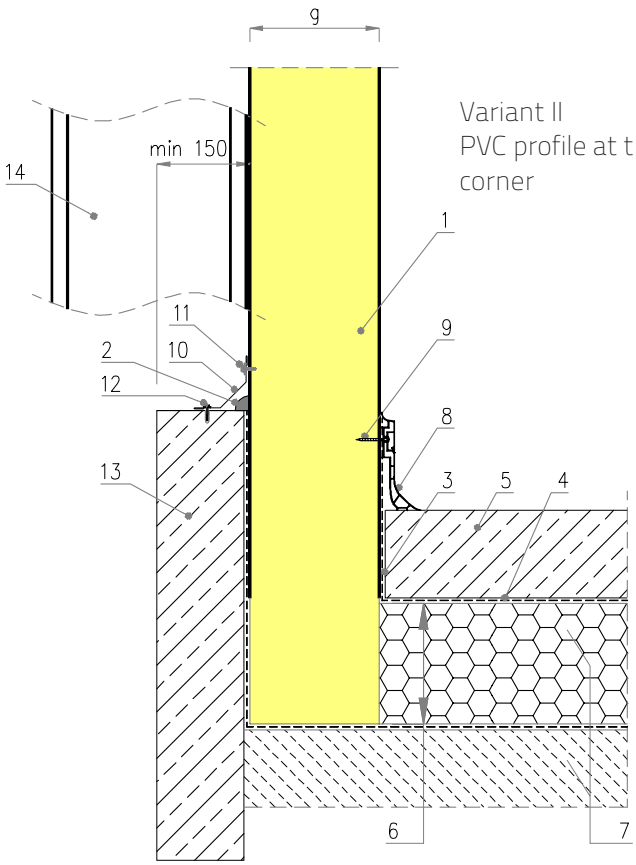


* Additional elevation assembly should have configuration compatible with existing one.
** Shape and location of steel section 5 must enable proper assembly of fasteners (drive screws). It should be installed close to the line of existing panels fasteners.
*** Fasteners 6 should be installed interlocked, every approx. 300 mm.
**** In order to avoid collision, fasteners 7 should be placed with offset from the existing fasteners. Fasteners 7 are coated in covering colour.
***** In case of existing panels with exposed fasteners, dismantling project should be developed so as to avoid a risk of the panel detachment from the support. Connectors 3a and 3 b serve as fasteners to both existing and new panels.

Drawing 35
IzoCold PIR/PIR+ - joint of cold storage panels with concrete and PVC corner



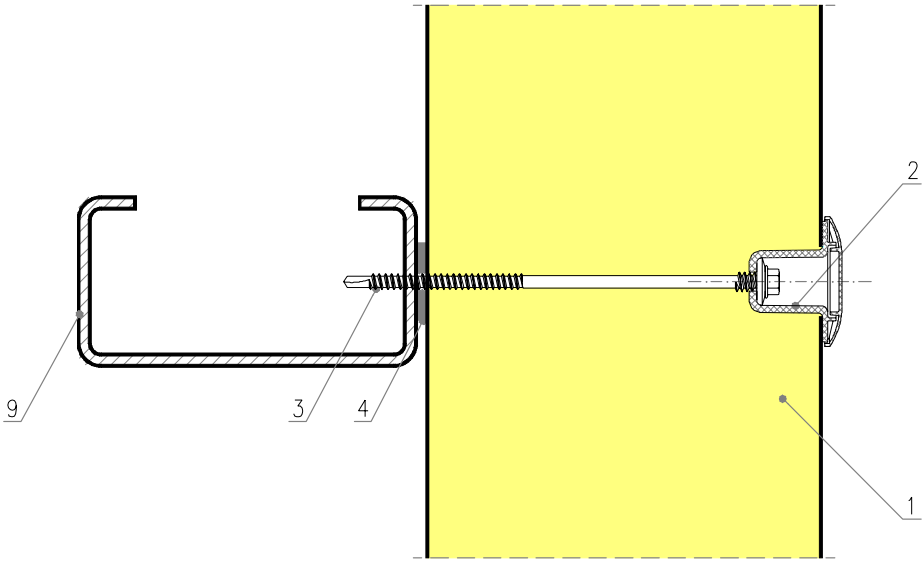
Variant I
Concrete slab at the corner

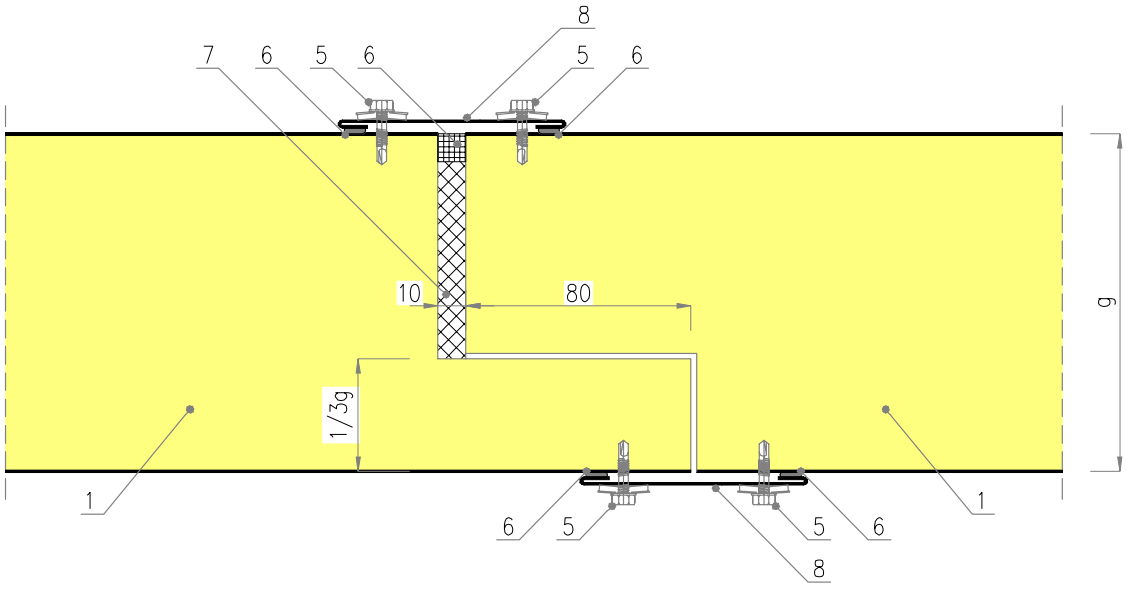


Variant II
PVC profile at the corner

1. IzoCold PIR/PIR+ panel
2. Sealant, permanently plastic
3. Vertical dampproof course
4. Horizontal dampproof course
5. Concrete floor
6. Remove the cladding to the height of the thermal insulation
7. Thermal insulation according to the design
8. PVC profile at the corner
9. Stainless steel self-drilling screw with washer
10. Ob-15 flashing
11. Drive screw with EPDM washer (optionally leakproof rivet 4.0 x 10 mm)
12. Nail plug screw
13. Ground beam
14. Steel section according to the design

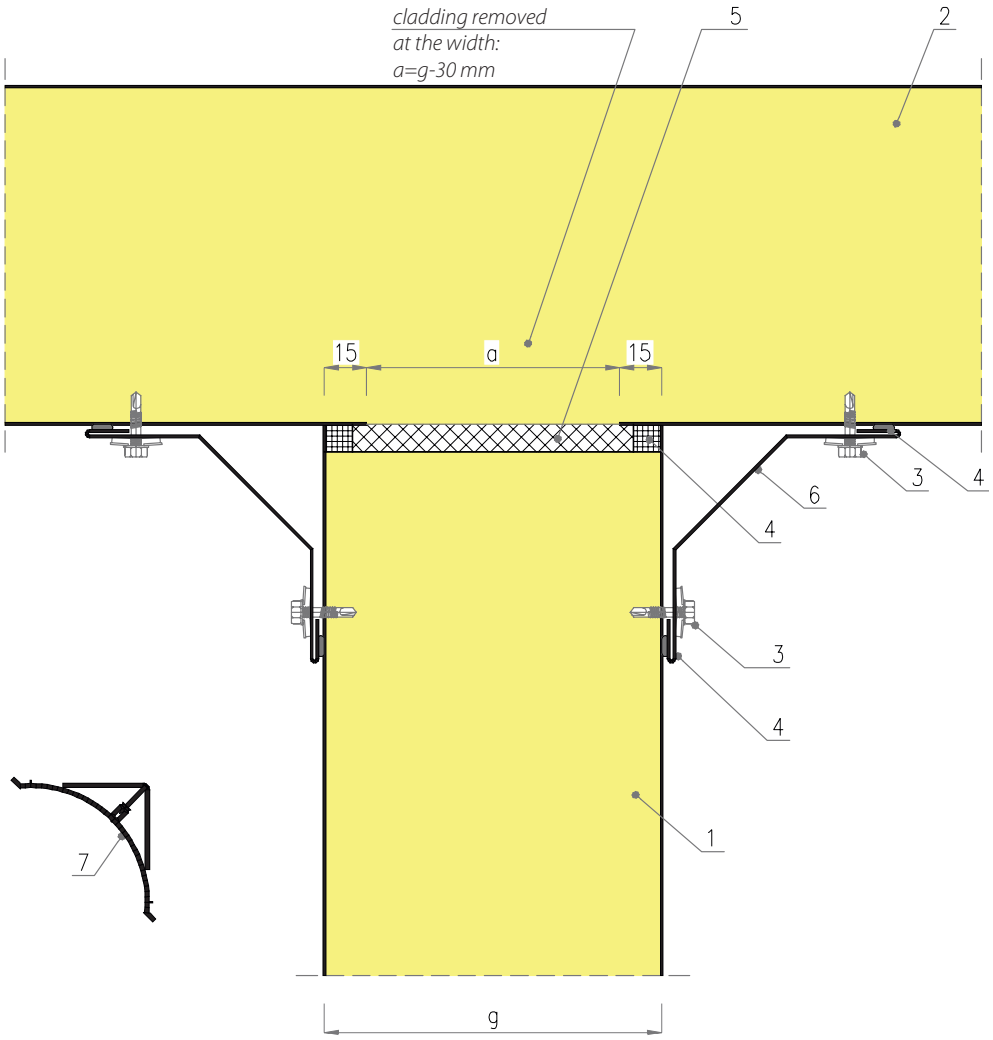
Drawing 36
IzoCold PIR/PIR+ - fastening cold storage panels with the use of LAX fasteners, joining of cold storage panels along their length





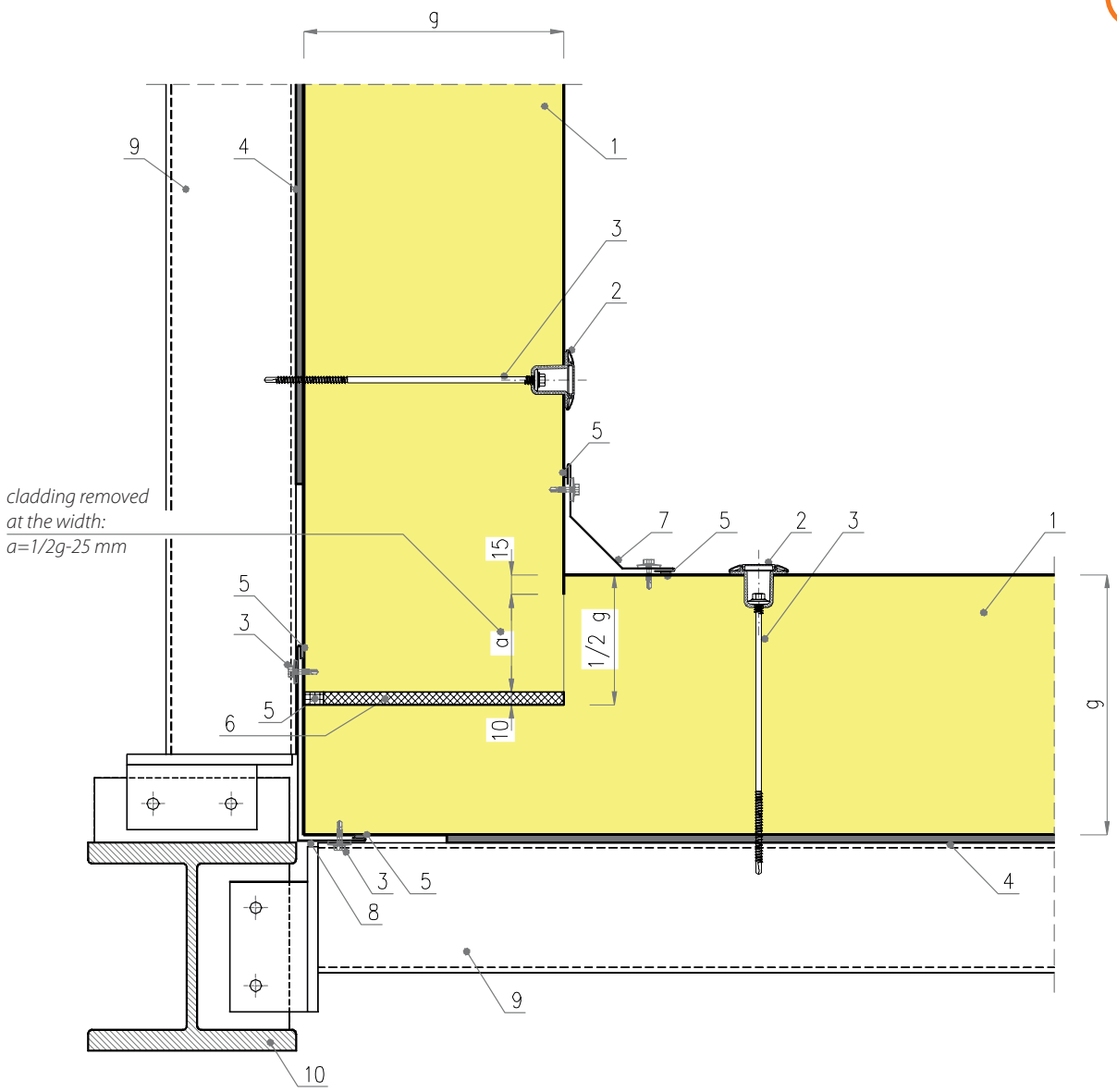
1. IzoCold panel
2. LAX fastener for thermal bridge reduction (bush + EPDM seal + cap)
3. Drive screw with EPDM washer for cold storage panels fastening
4. Self-adhesive PES sealing tape
5. Drive screw with EPDM washer for flashing fastening
6. Sealant, permanently plastic
7. Polyurethane foam
8. Ob-23 flashing
9. Steel section according to the design of the structure

Drawing 37
IzoCold PIR/PIR+ - joint of external wall or ceiling with partition wall



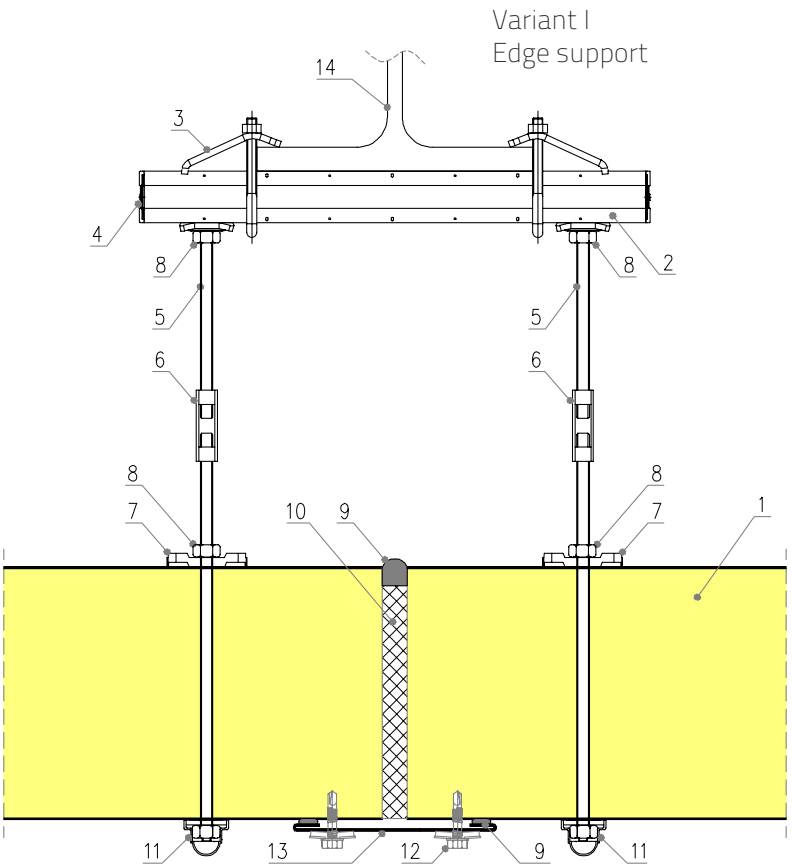
1. IzoCold PIR/PIR+ panel - partition wall
2. IzoCold PIR/PIR+ panel - external wall or ceiling
3. Drive screw with EPDM washer (optionally leakproof rivet 4.0 x 10 mm)
4. Sealant, permanently plastic
5. Polyurethane foam
6. Ob-15 flashing
7. Optionally PVC corner profile (instead of Ob-15 flashing)

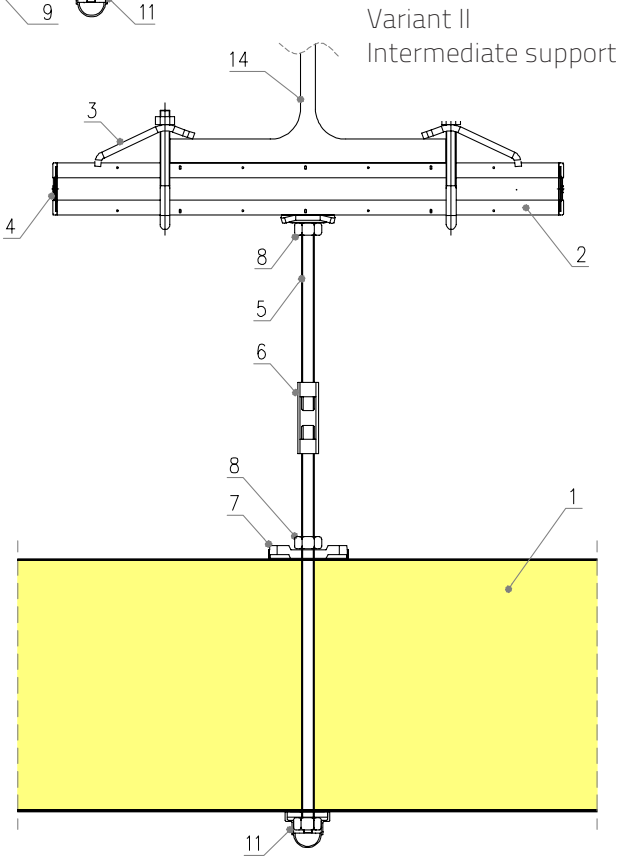
Drawing 38
IzoCold PIR/PIR+ - fastening cold storage panels in the corner



1. IzoCold PIR/PIR+ panel
2. LAX fastener for thermal bridge reduction (bush + EPDM seal + plug)
3. Drive screw with EPDM washer
4. Self-adhesive PES sealing tape
5. Sealant, permanently plastic
6. Polyurethane foam
7. Ob-15 flashing
8. Custom Ob-00 flashing (specify parameters and section drawing)
9. Steel purlin according to the design of the structure
10. Steel column according to the design of the structure

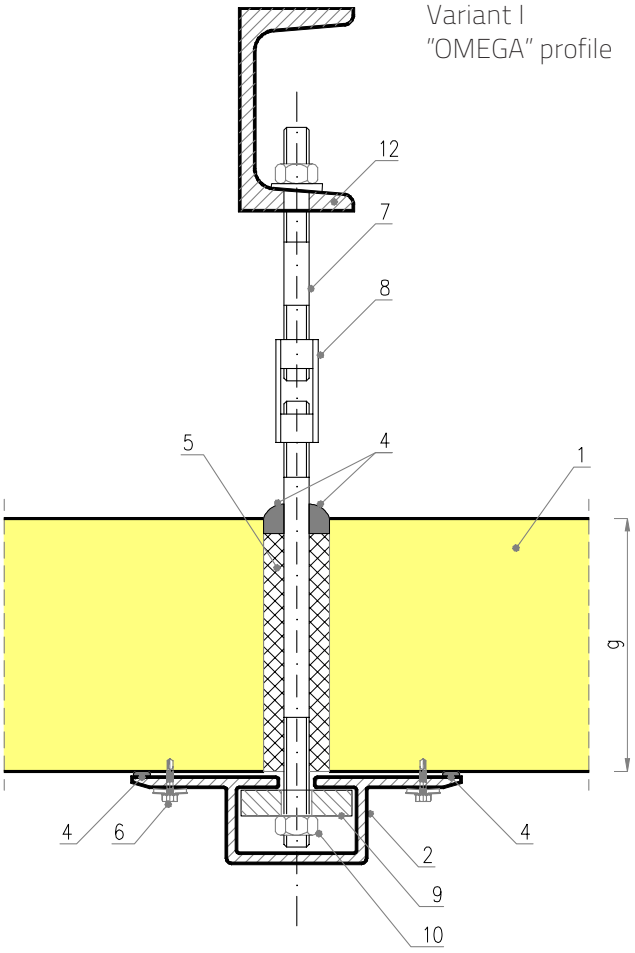
Drawing 39
IzoCold PIR/PIR+ - suspending cold storage panels with the use of HILTI system

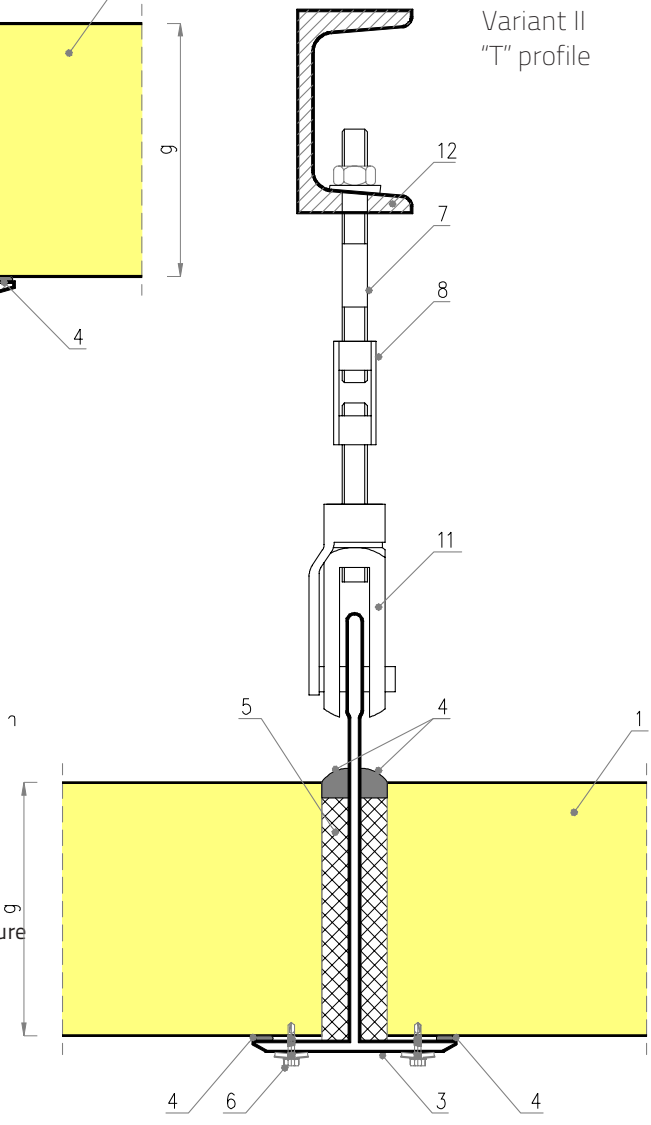




1. IzoCold PIR/PIR+ panel
2. System splint, type MQT-41
3. System clamp, type MQT-21-41
4. System plug, type MQZ-E41
5. Threaded steel bar M10, every max. 1.5 m
6. Turnbuckle
7. System splint, type MQZ-L11
8. M10 nut
9. Sealant, permanently plastic
10. Polyurethane foam
11. M10 nut with protective cap
12. Drive screw with EPDM washer
    (optionally leakproof rivet, 4.0 x 10 mm)
13. Ob-23 flashing
14. Steel section according to the design of the structure

Drawing 40
IzoCold PIR/PIR+ - suspending panels with the use of "T" and "OMEGA" profiles

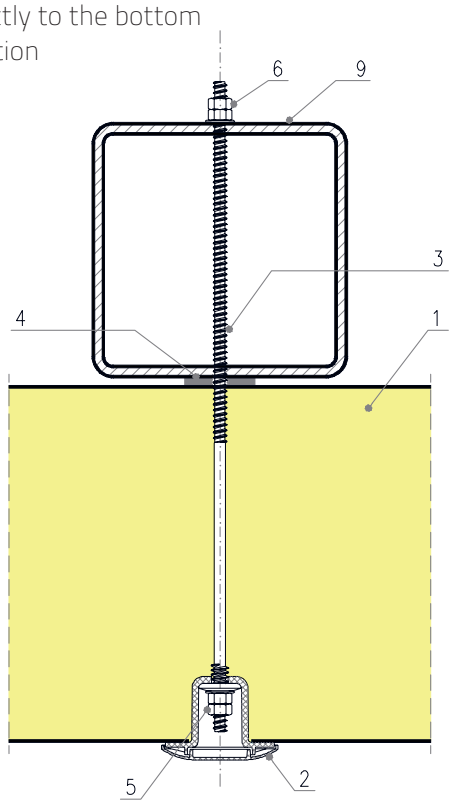




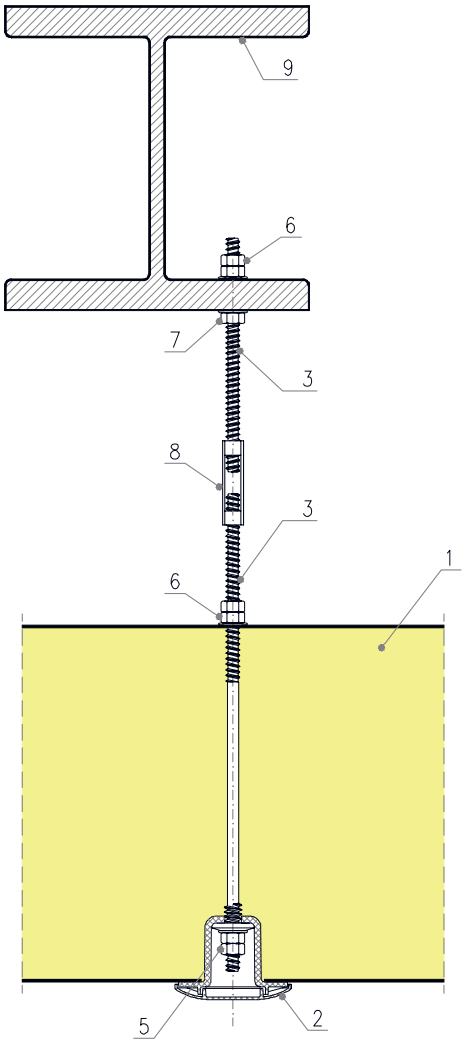
1. IzoCold PIR/PIR+ panel
2. "OMEGA" system profile (polyester)
3. "T" system profile (aluminium)
4. Sealant, permanently plastic
5. Polyurethane foam
6. Drive screw with EPDM washer
   (optionally leakproof rivet, 4.0 x 10 mm)
7. Threaded steel bar M10 or M12, every max. 1.5 m
8. Turnbuckle
9. Spacer
10. M10 or M12 nut
11. System clamp (hanger)
12. Steel section according to the design of the structure

Drawing 41
IzoCold PIR/PIR+ - suspending panels with the use of LAX system fasteners

Variant I
suspending on threaded steel bars directly to the bottom of steel section



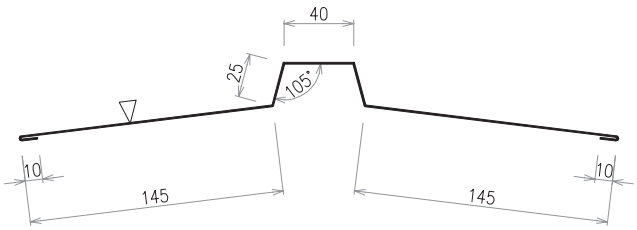
Variant II
suspending on threaded steel bars with maintaining space above the panels

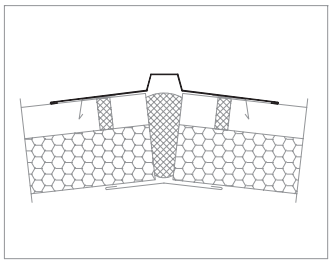


1. IzoCold PIR/PIR+ panel
2. LAX fastener for thermal bridge reduction (bush + EPDM seal + plug)
3. Threaded bar - diameter and spacing according to the design
4. Self-adhesive PES sealing tape
5. Nut + locknut, EPDM washer + steel washer
6. Nut + locknut + steel washer
7. Nut + steel washer
8. Turnbuckle
9. Steel purlin or bottom trussed rafter strip according to the design of the structure

Typical flashings for Izopanel sandwich panels

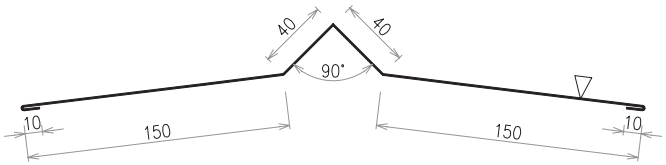
Drawing 52. Ob-02 flashing "Roof ridge - trapezoid"

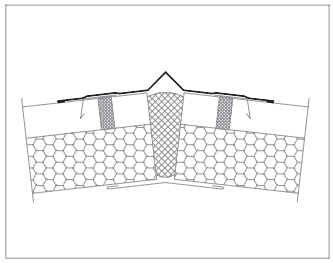




unfolding: s=400mm
sheet gauge: g=0,50mm

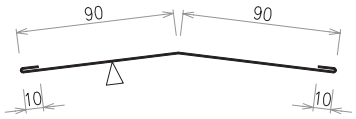
Drawing 53. Ob-03 flashing "Roof ridge - standard"

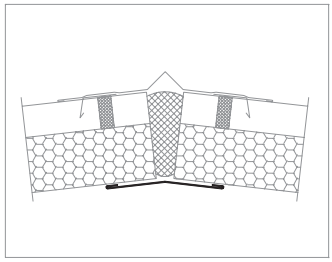




unfolding: s=400mm
sheet gauge: g=0,50mm

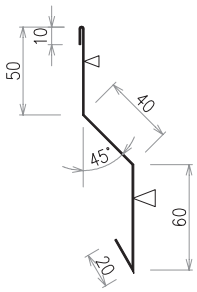
Drawing 54. Ob-04 flashing "Lower roof ridge"

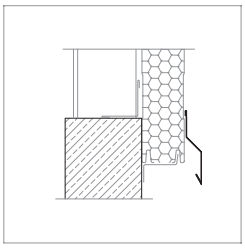




unfolding: s=200mm
sheet gauge: g=0,50mm

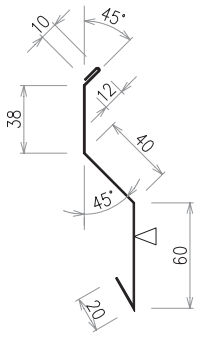
Drawing 55. Ob-05 flashing "Fasade drip cap-narrow"

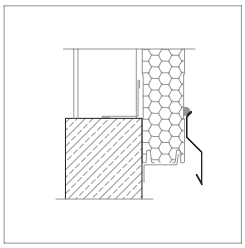




unfolding: s=180mm
sheet gauge: g=0,50mm

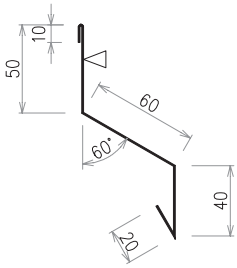
Drawing 56. Ob-06 flashing "Fasade drip cap-with a bend"

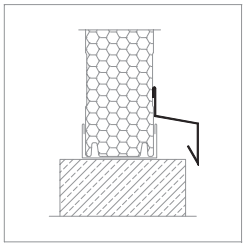




unfolding: s=180mm
sheet gauge: g=0,50mm

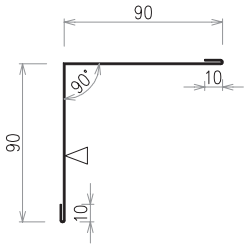
Drawing 57. Ob-07 flashing "Fasade drip cap"

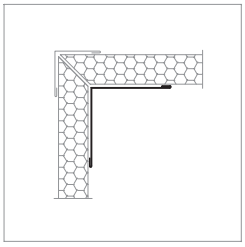




unfolding: s=180mm
sheet gauge: g=0,50mm

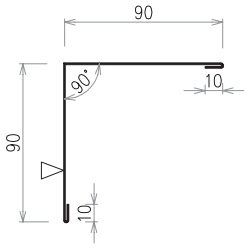
Drawing 59. Ob-09 flashing "Large inner corner"

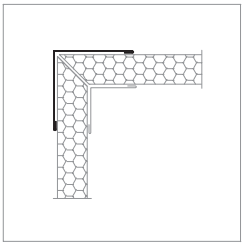




unfolding: s=200mm
sheet gauge: g=0,50mm

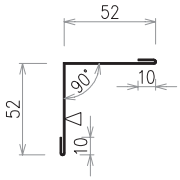
Drawing 60. Ob-10 flashing "Large outer corner"

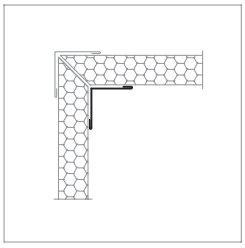




unfolding: s=200mm
sheet gauge: g=0,50mm

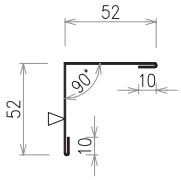
Drawing 61. Ob-11 flashing "Small inner corner"

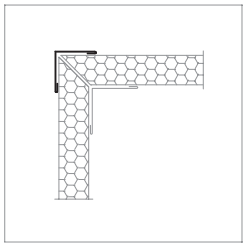




unfolding: s=125mm
sheet gauge: g=0,50mm

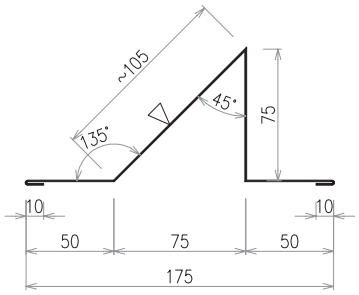
Drawing 62. Ob-12 flashing "Small outer corner"

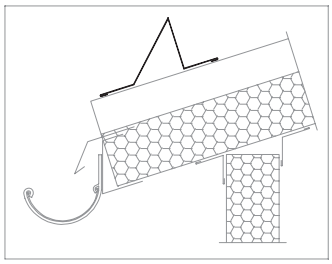




unfolding: s=125mm
sheet gauge: g=0,50mm

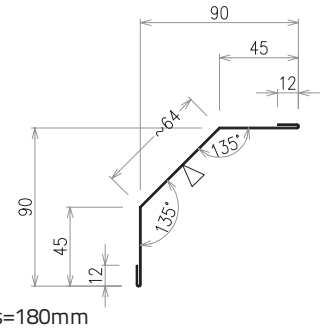
Drawing 64. Ob-14 flashing "Anti-snow guard rail"

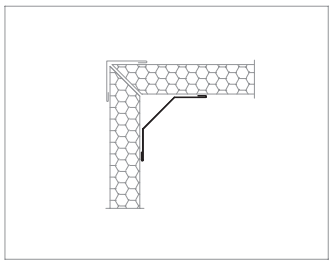




unfolding: s=300mm
sheet gauge: g=0,50mm

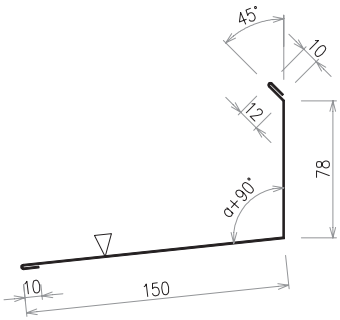
Drawing 65. Ob-15 flashing "Broken inner corner"

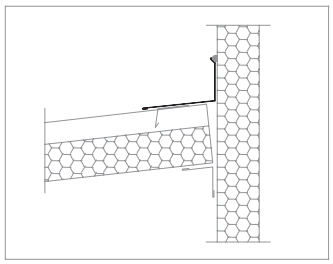




unfolding: s=180mm
sheet gauge: g=0,50mm

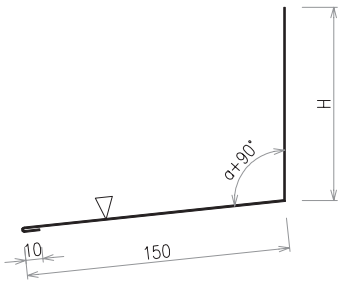
Drawing 67. Ob-17 flashing "Wall flashing - Type I"

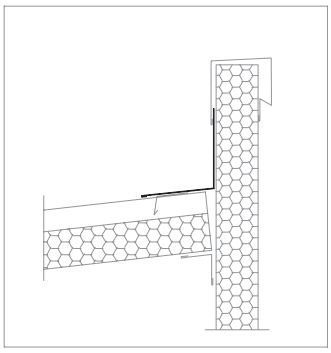




unfolding: s=260mm
sheet gauge: g=0,50mm
a - roof slope

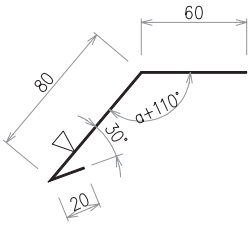
Drawing 67.1. Ob-17.1 flashing "Wall flashing - Type II"

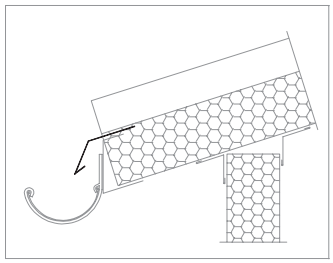




unfolding: custom
sheet gauge: g=0,50mm
a - roof slope

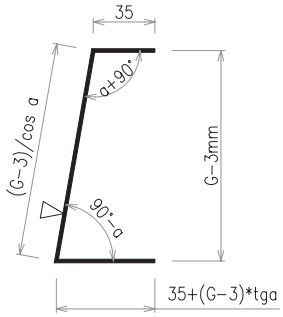
Drawing 68. Ob-18 flashing "Gutter flashing for Ob-19"

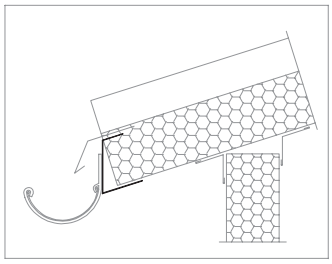




unfolding: s=160mm
sheet gauge: g=0,50mm
a - roof slope

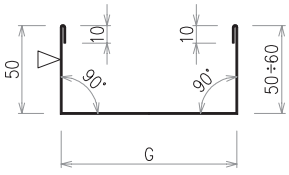
Drawing 69. Ob-19 flashing "Gutter downside flashing - type C"

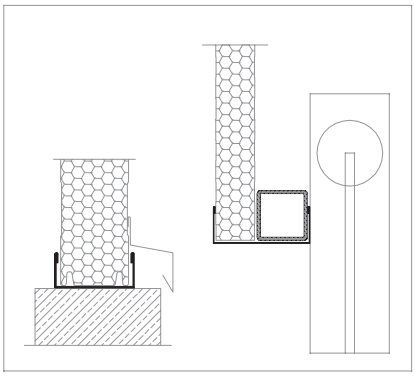




unfolding: custom
sheet gauge: g=0,88mm
a - roof slope
G -panel thickness

Drawing 70. Ob-20 flashing "C1 starter"

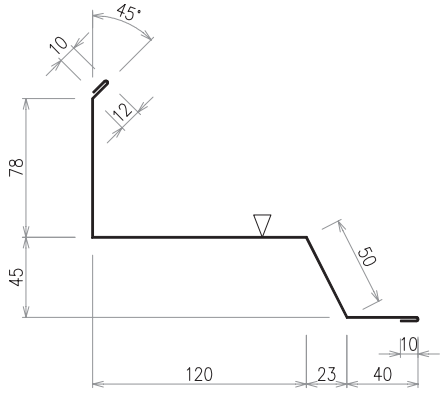


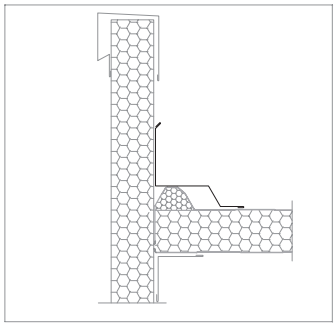


G [mm]	unfolding [mm]	weight [kg/mb]
40	160	0,64
50 60	180	0,72
75 80	200	0,80
100 120	240	0,96
125 140	260	1,04
150	280	1,12
160 180	300	1,20
200 220	340	1,36

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

Drawing 71. Ob-21 flashing "Wall flashing - type III"

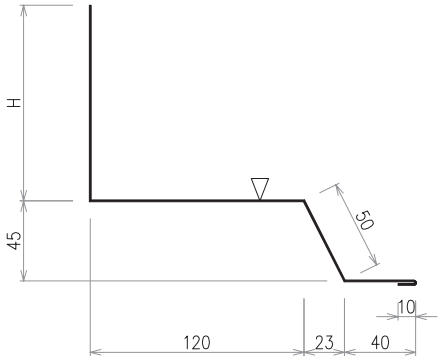


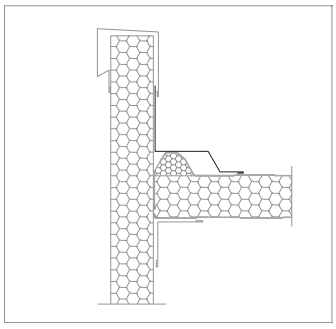


unfolding: s=300mm
sheet gauge: g=0,50mm

Drawing 71.1. Ob-21.1 flashing "Wall flashing - type IV"

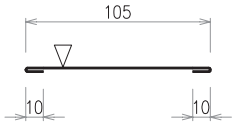
unfolding: custom
sheet gauge: g=0,50mm
H - custom

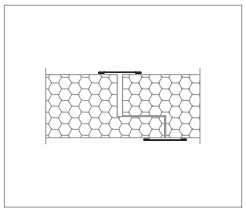




Drawing 73. Ob-23 flashing "Masking strip"

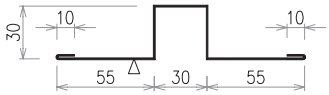
unfolding: s=125mm
sheet gauge: g=0,50mm

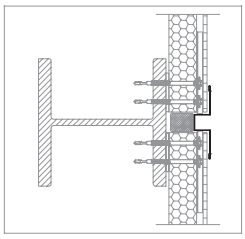




Drawing 74. Ob-24 flashing "Masking strip, sunken"

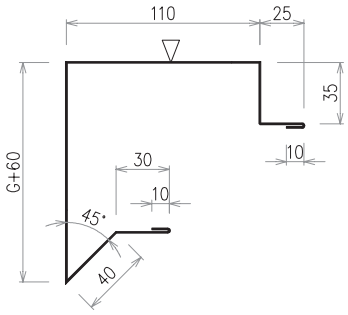
unfolding: s=220mm
sheet gauge: g=0,50mm

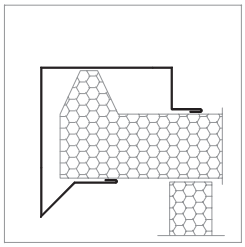




Drawing 79. Ob-29 flashing "IzoRoof panel wind beam, type I - overhang"

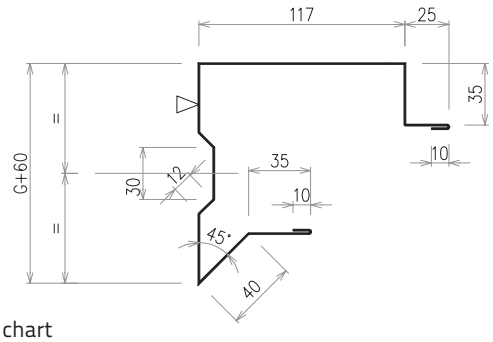
unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

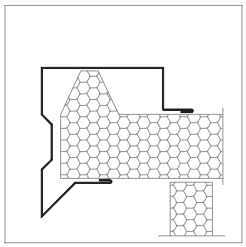




G [mm]	unfolding [mm]	weight [kg/mb]
60	380	1,52
80	400	1,60
100	420	1,68
120	440	1,76
140	460	1,84
160	480	1,92

Drawing 79.1. Ob-29.1 flashing "IzoRoof panel wind beam, type II - overhang+valley"



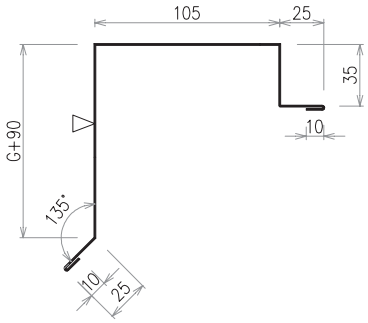


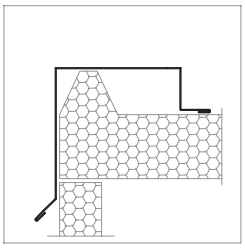
G [mm]	unfolding [mm]	weight [kg/mb]
60	400	1,60
80	420	1,68
100	440	1,76
120	460	1,84
140	480	1,92
160	500	2,00

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

Drawing 80. Ob-30 flashing "IzoRoof panel wind beam, type III - no overhang"

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

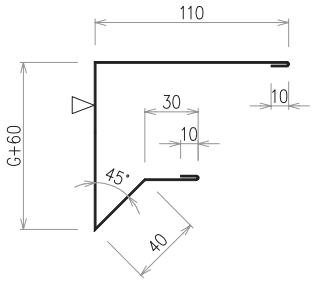


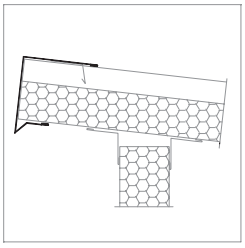


G [mm]	unfolding [mm]	weight [kg/mb]
60	360	1,44
80	380	1,52
100	400	1,60
120	420	1,68
140	440	1,76
160	460	1,84

Drawing 81. Ob-31 flashing "IzoRoof panel wind beam, type IV - overhang"

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

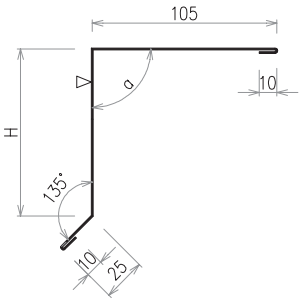


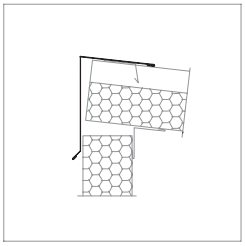


G [mm]	unfolding [mm]	weight [kg/mb]
60	320	1,28
80	340	1,36
100	360	1,44
120	380	1,52
140	400	1,60
160	420	1,68

Drawing 82. Ob-32 flashing "IzoRoof panel wind beam, type V - no overhang"

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness
H - custom
a - custom, specified in degrees

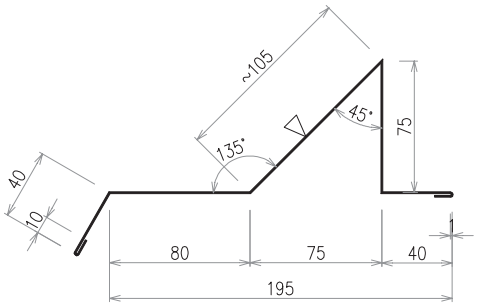


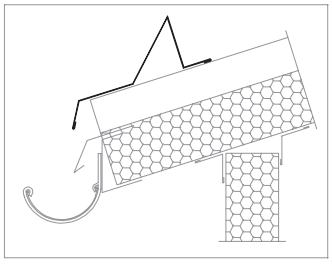


G [mm]	unfolding [mm]	weight [kg/mb]
60	300	1,20
80	320	1,28
100	340	1,36
120	360	1,44
140	380	1,52
160	400	1,60

Drawing 83. Ob-33 flashing "Eaves masking strip with anti-snow guard rail"

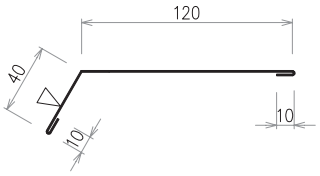
unfolding: s=300mm
sheet gauge: g=0,50mm

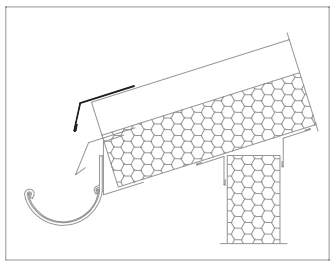




Drawing 84. Ob-34 flashing "Eaves masking strip"

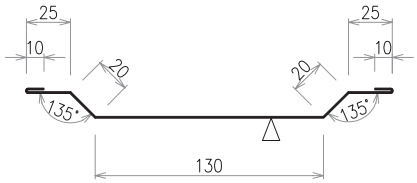
unfolding: s=180mm
sheet gauge: g=0,50mm

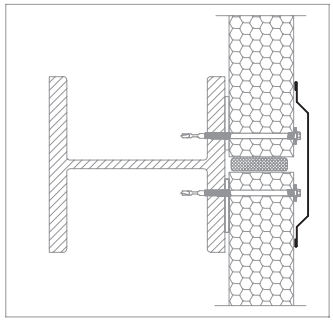




Drawing 85. Ob-35 flashing "Panel joint masking strip"

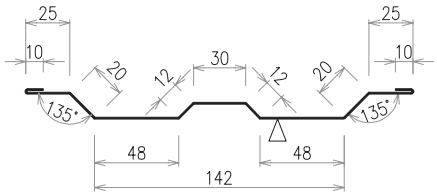
unfolding: s=240mm
sheet gauge: g=0,50mm

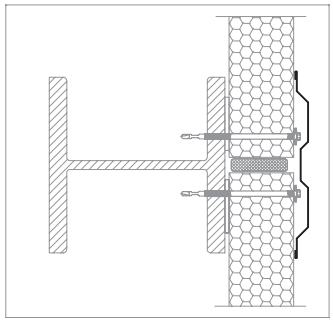




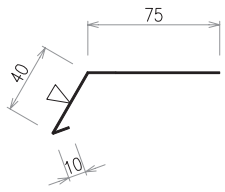
Drawing 85.1. Ob-35.1 flashing "Panel joint masking strip with valley"

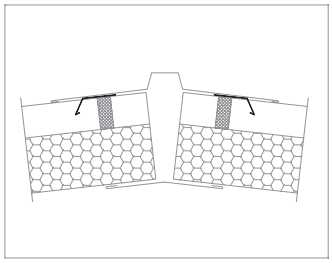
unfolding: s=260mm
sheet gauge: g=0,50mm

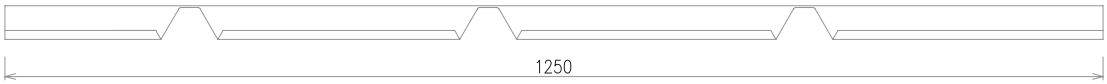




Drawing 86. Ob-36 flashing "Roof ridge masking strip"

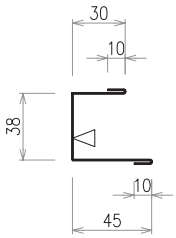


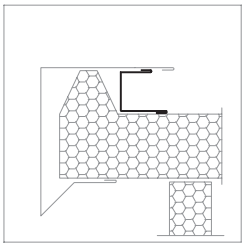




Drawing 87. Ob-37 flashing "Closing section"

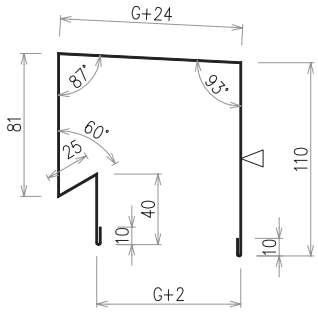
unfolding: s=133mm
sheet gauge: g=0,50mm

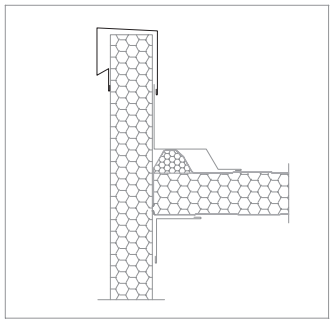




Drawing 88. Ob-38 flashing "Attic wall cap"

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

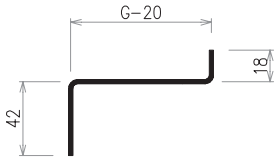




G [mm]	unfolding [mm]	weight [kg/mb]
40	340	1,36
60	360	1,44
80	380	1,52
100	400	1,60
120	420	1,68
140	440	1,76
150	450	1,80
160	460	1,84
180	480	1,92
200	500	2,00

Drawing 89. Ob-39 flashing "Starter for sandwich panels-IzoGold (type I)"

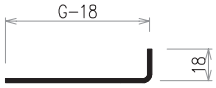
unfolding: see chart
sheet gauge: g=1,5mm
G - panel thickness



G [mm]	unfolding [mm]	weight [kg/mb]
40	80	0,96
60	100	1,20
80	120	1,44
100	140	1,68
120	160	1,92
140	180	2,16
150	190	2,28
160	200	2,40
180	220	2,64
200	240	2,88

Drawing 90. Ob-40 flashing "Starter for sandwich panels (type II)"

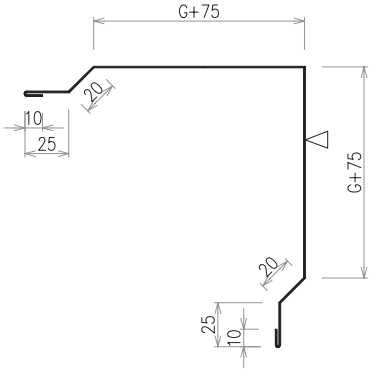
unfolding: see chart
sheet gauge: g=1,5mm
G - panel thickness

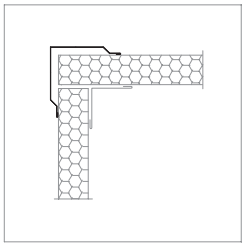


G [mm]	unfolding [mm]	weight [kg/mb]
40	40	0,48
60	60	0,72
80	80	0,96
100	100	1,20
120	120	1,44
140	140	1,68
150	150	1,80
160	160	1,92
180	180	2,16
200	200	2,40

Drawing 92. Ob-42 flashing "Outer masking corner"

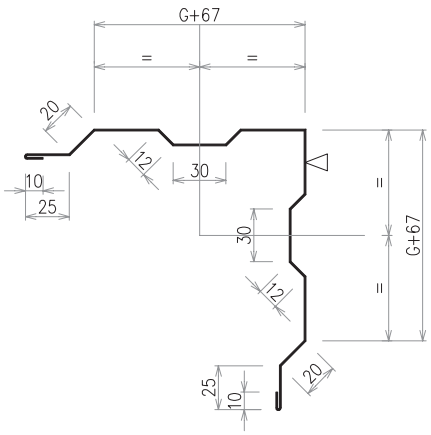
unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

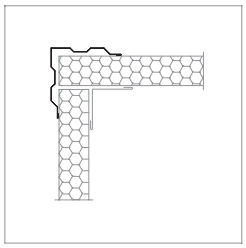




G [mm]	unfolding [mm]	weight [kg/mb]
40	340	1,36
60	380	1,52
80	420	1,68
100	460	1,84
120	500	2,00
140	540	2,16
150	560	2,24
160	580	2,32
180	620	2,48
200	660	2,64

Drawing 92.1. Ob-42.1 flashing "Outer masking corner with valley"

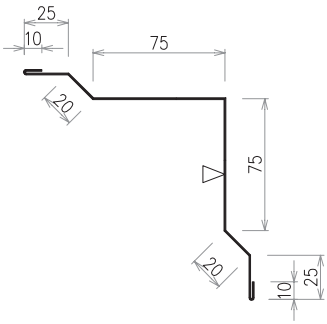


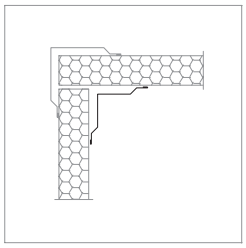


G [mm]	unfolding [mm]	weight [kg/mb]
40	340	1,36
60	380	1,52
80	420	1,68
100	460	1,84
120	500	2,00
140	540	2,16
150	560	2,24
160	580	2,32
180	620	2,48
200	660	2,64

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

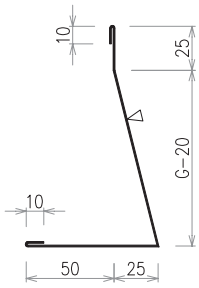
Drawing 93. Ob-43 flashing "Inner masking corner"

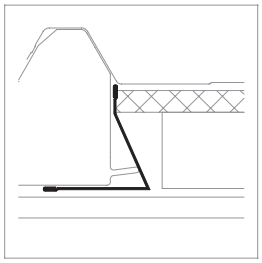




unfolding: s=260mm
sheet gauge: g=0,50mm

Drawing 94. Ob-44 flashing "Inner skylight flashing"

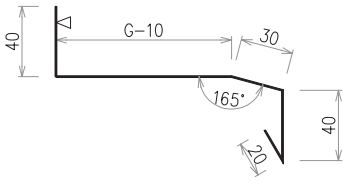


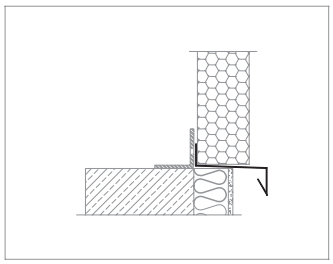


G [mm]	unfolding [mm]	weight [kg/mb]
60	165	1,16
80	185	1,30
100	205	1,44
120	225	1,58
140	245	1,73
160	265	1,87

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

Drawing 95. Ob-45 flashing "Substructure drip flashing"



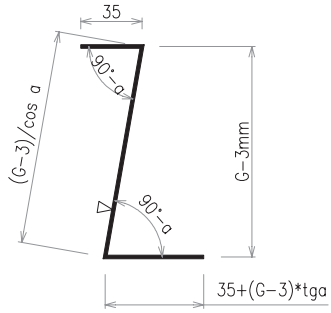


G [mm]	unfolding [mm]	weight [kg/mb]
40	160	0,64
60	180	0,72
80	200	0,80
100	220	0,88
120	240	0,96
140	260	1,04
150	270	1,08
160	280	1,12
180	300	1,20
200	320	1,28

unfolding: see chart
sheet gauge: g=0,50mm
G - panel thickness

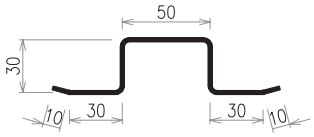
Drawing 96. Ob-46 flashing "Gutter downside flashing - type Z"

unfolding: custom
sheet gauge: g=0,88mm
a - roof slope
G - panel thickness



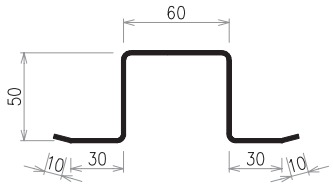
Drawing 97. Ob-47 flashing "Omega profile 30"

unfolding: s=190mm
sheet gauge: g=1,50mm

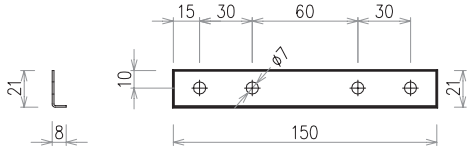


Drawing 98. Ob-48 flashing "Omega profile 50"

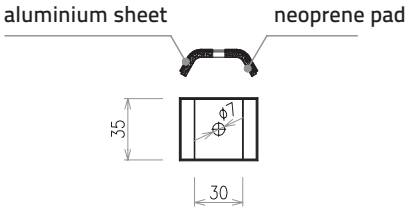
unfolding: s=240mm
sheet gauge: g=1,50mm



Drawing 99. L-02 fastener "IzoGold PIR/PIR+ panel connector"

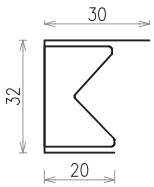


Drawing 100. L-03 fastener "Saddle washer"

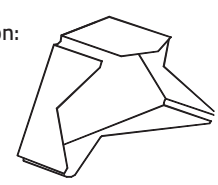


Drawing 101. Rib plug for roof panel "Z1"

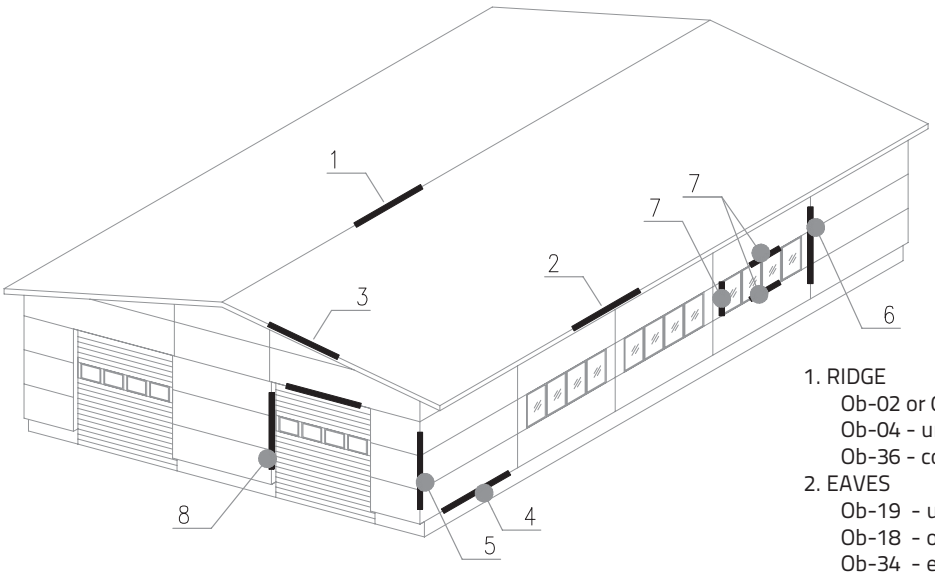
side view:

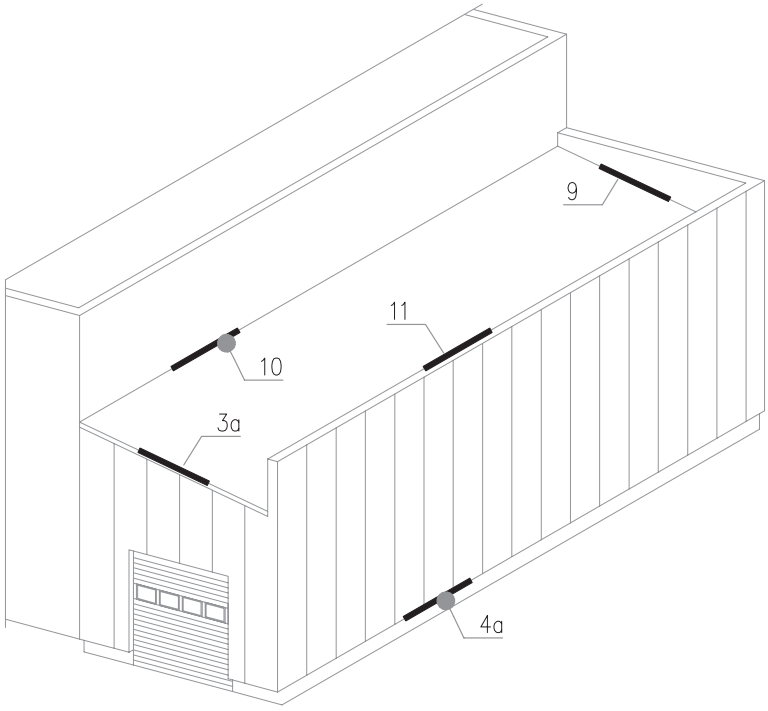


axonometric projection:



Drawing 102
Basic system flashings of typical hall - example





1. RIDGE
   - Ob-02 or 03 - ridge
   - Ob-04 - under-ridge
   - Ob-36 - cover flashing
2. EAVES
   - Ob-19 - under-gutter strip
   - Ob-18 - over-gutter strip
   - Ob-34 - eaves masking strip (or rib plugs)
   - Ob-11 - small inner corner

3. WIND BLADE FLASHING (with overhang)
   - Ob-29 - wind beam, typ I-with overhang
   - Ob-11 - small inner corner

3a. WIND BLADE FLASHING (without overhang)
   - Ob-30 - wind beam, typ III-no overhang
   - Ob-11 - small inner corner

4. CONNECTION WITH GROUND BEAM (type I)
   - Ob-05 (06)(07) - fasade drip cap
   - Ob-39 or Ob-40 - panels starter

4a. CONNECTION WITH GROUND BEAM (type II)
   - Ob-45 - substructure drip flashing

5. CORNER
   - Ob-42 - outer masking corner

6. PANELS JOINT
   - Ob-35 - panel joint masking strip

7. WINDOW
   - Ob-05 (06)(07) - fasade drip cap
   - Ob-00 - custom flashing (depends on window and construction type)

8. GATE
   - Ob-07 - fasade drip cap
   - Ob-20 - closing flashing

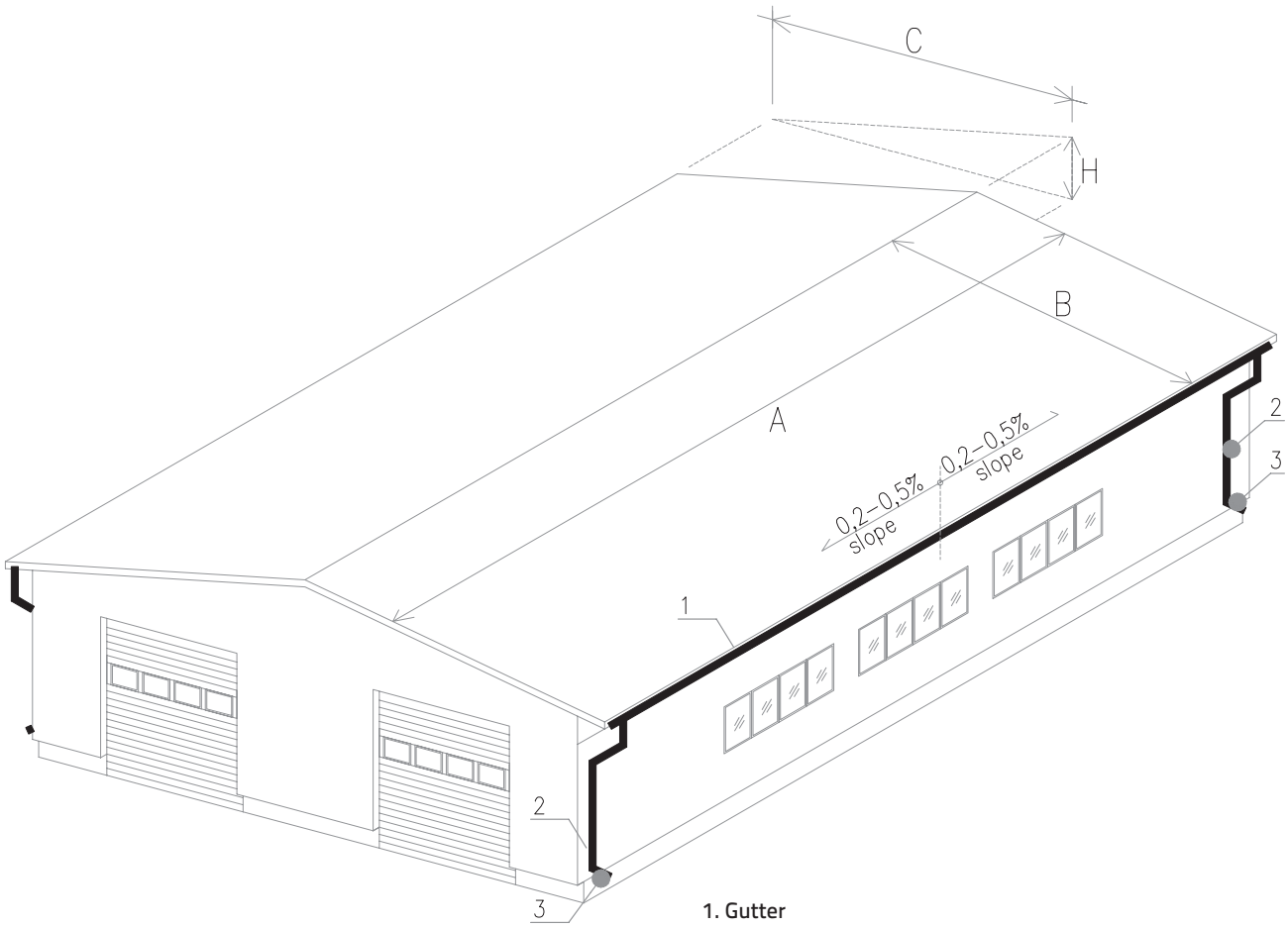
9. EDGE ROOF/WALL - PARALLEL TO PANELS
   - Ob-21 - masking flashing
   - Ob-11 - inner corner, small

10. EDGE ROOF/WALL - RECTANGULAR TO PANELS
   - Ob-17 - masking flashing
   - Ob-11 - inner corner, small

11. ATTIC WALL CLOSING
   - Ob-36 - attic wall flashing

NOTES:
Maximum flashing length: 6,4m
Recommended overlap length: 15cm - external flashings
5cm - internal flshings
Recommended number of farmer screws: ~3pcs/m/flashing edge

Drawing 103. Basic rules for installing gutter systems for Izopanel sandwich panels



1. Gutter
mounting - gutter hooks: spacing ±600mm

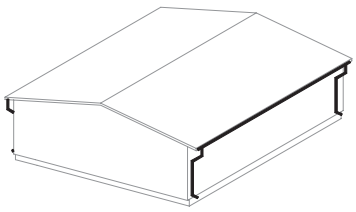
2. Downpipe
mounting - clamps: spacing ±2000mm

3. Spout pipe (±200mm above terrain level)

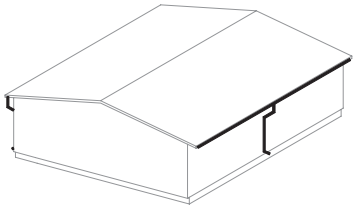
Appropriate selection of accessories according to the manufacturer's guidelines.

DETERMINING THE EFFECTIVE ROOF SURFACE:
slope < 10°: E_p = A x B
slope > 10°: E_p = (C+H/2) x A

DCHOICE OF GUTTER SYSTEM:



125 / 90 *< 200m2
135 / 90 *< 220m2
150 / 100 *< 300m2
* roof surface



125 / 90 *< 100m2
135 / 90 *< 110m2
150 / 100 *< 200m2
* roof surface

* according to the guidelines of the Flamingo gutter system - by Budmat
125 / 90 = gutter diameter / downpipe diameter

STORAGE, TRANSPORT, INSTALLATION AND SERVICE RULES

Sandwich panels may be easily damaged if handled improperly, on each stage from the production to the installation in a building, as well as in the servicing process. Therefore, several basic rules must be followed at any time.

Storage and transport conditions

Packaging
Panels leave the production plant in packets. The amount of panels in a package depends on the type of the panel, its thickness and length. Upon customer's individual request, panels may be delivered in a non-standard packaging, with different amount of panels or different order of panels in a package. However, transport restrictions must be taken into account, as well as the fact that in certain cases costs of transport might be higher.

Protective film
During production panels are laminated with a protective film on one side or on both sides, depending on the type. It protects the surface of the lining against damage during production, transport and installation. This is only a temporary solution. If exposed to weather conditions, and sunlight in particular, the foil may vulcanise to the metal and in consequence, it may be impossible to remove the protective film. For this reason the film should be removed no later than 1 month from the panel production date and no later than after 3 weeks of exposure of the panel to sunlight. Remove protective film in ambient temperature within +5°C and +35°C. Date of manufacture is specified on each package of panels delivered to the customer.

Panel transport
Production, packaging, transport and arrangement of panels on a transport mean are subject to Izopanel planning processes. In case of any individual expectations in this respect, customers should provide appropriate information during order submission In most cases, Izopanel delivers panels to a site specified by the customer using special open-top vehicles which guarantee transport safety. If the transport is to be arranged by the Customer, a few basic principles should be taken into account:
- panels are loaded at the production plant with use of forklift trucks,
- only technically fit vehicles may be used for the transport of sandwich panels,
- loading platform must be flat and clean, with no sharp protruding parts,
- open semitrailers, without canvas cover, with minimum width of 250 cm are recommended. In the case of semitrailers with canvas cover, it might be difficult to place two packets of panels side by side,
- a packet of panels is allowed to extend beyond the rear edge of the vehicle up to 1.5 m (except MWF panels that may extend only up to 0.5 m),
- the vehicle must be equipped with ratchet straps, at least 2 pieces per two packages - if loaded in two rows or 2 pieces per packet, if loaded in a single row. Packets should be secured with ratchet straps placed at least every 3 metres, - do not place packets with panels on top of other goods.

Unloading
Panels delivered to the construction site may be unloaded with use of a forklift truck or a crane. In both cases packets of panels have to be properly secured against damage. Place soft pads with proper width (approx. 15-20 cm) on the fork of the forklift truck or install crane sling securely. While unloading, follow general safety precautions for hoisting equipment operation.

Storage
There are no special requirements for storage of panels before installation if storage period is no longer than one week. It is essential to provide an appropriate number of supports and place them on a flat surface to prevent bending or local damage if the weight of the panels is not distributed evenly on all supports. In case of storing panels for a longer period, packets should be placed on supports with a proper slope, so that rain water is drained naturally. Remember also that there is a risk of vulcanisation of foil and metal, as mentioned above. Additionally, panels should be separated with spacers to ensure free airflow.

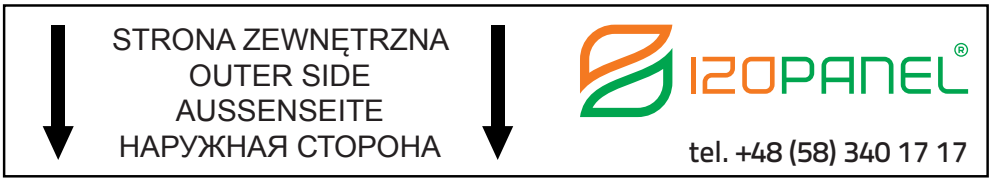
Structure check
Before installation of panels, supporting structure must be checked in terms of its consistency with the design and allowable tolerances. Deviation tolerances of purlin, transom and wall deviation from flatness and straightness in lines must be checked with particular care. If any deviations are found, investor's representatives must be notified. Installing panels on a structure which does not meet the requirements may result in damaging the panels and be basis for not being granted the warranty. To avoid any mistakes, panel length and maximum span must be rechecked in accordance with strength tables and permissible panel lengths table.

Installation rules
Installation of sandwich panels is relatively simple in comparison with other methods of building walls and roofs, however, it should be performed by professional personnel, using appropriate equipment. Quality of each panel and condition of organic coat must be checked thoroughly before installation. Any faults and damages found, should be reported to the manufacturer before installation. Installation of sandwich panels should be in atmospheric conditions taking into account the specificity of the material. The ambient temperature should be within the range from -5 degree C to 20 degree C, using sandwich panels with dark colored lining, ambient temperature should be higher than 10 ° C. Work on the application of sealing mats should be carried out at ambient temperature of not less than 4 degrees C.

Basic installation tools:
- driver with adjustable torque,
- driver bit for screw over tightening and indenting panel surface,
- cold cutting tool. Angle grinders are not acceptable. Firstly, as a result of heating of lining edges protective paint and zinc coat is damaged and corrosion centres form. What is more, EPS core may ignite as a result of contact with sparks and fire, later on it may propagate inside the panel,
- other basic tools, such as meter, level, plate shears, sealant gun,
- suction cup handles would be very useful for transport and installation of panels.

Installation of wall panels
IZOPANEL sandwich panels have two sides: external and internal. The internal side is marked with a coloured film. Panels must not be installed reversely. An accidental installation reversely may result in a noticeable difference of wall colour. Additionally, in relation to the technology of production, external side is always smoother and core adherence to lining is better.
It is recommended that panels are installed in the order in which they are placed in the packet and in the order of packets' delivery. This should reduce the risk of occurrence of differences in the colour of neighbouring panels. Colour uniformity should be checked as frequent as possible, particularly in case of metallic colours. To carry out such inspection, after having removed the protective film, watch the surface of the wall at different angles from the distance of approximately 25 metres. If there are any differences, immediately notify the manufacturer.
Panels should be fastened to the structure with use of dedicated galvanised or stainless steel screws recommended by the manufacturer. Use clutch drivers to install the fasteners. In case of panels with visible fastening system pay special attention to the torque.
When assembling boards fitted with hidden IZOPANEL fasteners, implement additional L-02 washers. This washer improves bearing capacity of the joint and also reduces the risk of occurrence of indentations in the area around the fastener. In the past cases of damaging of the panel surface were reported. These were caused by tightening screws with excessive torque, without using such washer.
When installing a neighbouring panel, pay attention to press it properly to the previously installed panel, so the width of the gap between them corresponds to the value specified in the technical drawings. Standard amount and location of fasteners is specified in the reference drawing 'location and amount of fasteners" at the end of this section.

Installation of roof panels
When determining the direction of roof panels' installation, give consideration to the prevailing wind direction. Wind should blow in the direction of the lap joints of the roof panels. Installing panels in the opposite direction may increase the risk of rain water leaking to the interior of the building.

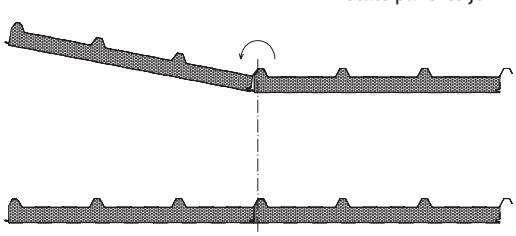


Before installation, check roof rectangularity and position the first panel carefully so it is perpendicular to the eaves. This will eliminate the risk of joint offsets in the neighbouring panels and then facilitate further installation of eaves flashing and gutter.
Remove protective film from the inner side before installing the next panel.
Check linearity of the lower joint before panel installation. Possible local deformations may hinder assembly of the panels and impair the appearance of the underside of the roof.
Panels should be fastened with IZOPANEL recommended screws. The warranty is void if the distances between the edges of the panels and fastener axes, specified in the catalogue drawings, are not followed. Additional screw washers, or the so-called saddle washers as given in Drawing 17, are recommended for IzoRoof panels. Their application significantly reduces the risk of roof leaking and increases mechanical endurance of the fastening. For similar reasons, also basing on Drawing 17, drive screws which fasten panels must be placed every 30 cm in longitudinal panel joint axis.
IZOPANEL offers two solutions for joining roof panels:
- STANDARD version
- TIGHT version
In the TIGHT version use a double sided adhesive butyl seal, applied over the entire joint length between the metal panel joints and saddle washers. This version of joint is particularly recommended for roof surfaces with a slight slope and for panels joined over their lengths.

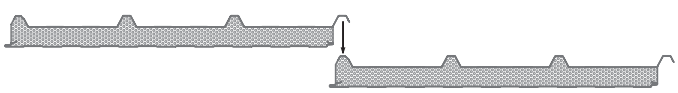
Remove protective film from the panels after installation and no later than 30 days from the manufacture.
Remove protective film in ambient temperature within +5°C and +35°C. Failure to follow this recommendation shall release the manufacturer from liability for the damages involved.
Remove all residues and dirt from the assembled surface (in particular filings left after cutting and drilling). Next, check all surfaces and repair any scratches with a touch-up paint. Standard amount and location of fasteners is specified in the reference drawing 'location and amount of fasteners" at the end of this section.

On request IzoRoof/IzoRoof+ panels are sent with a transverse cut of the lower lining intended to be joined in length.

IzoRoof

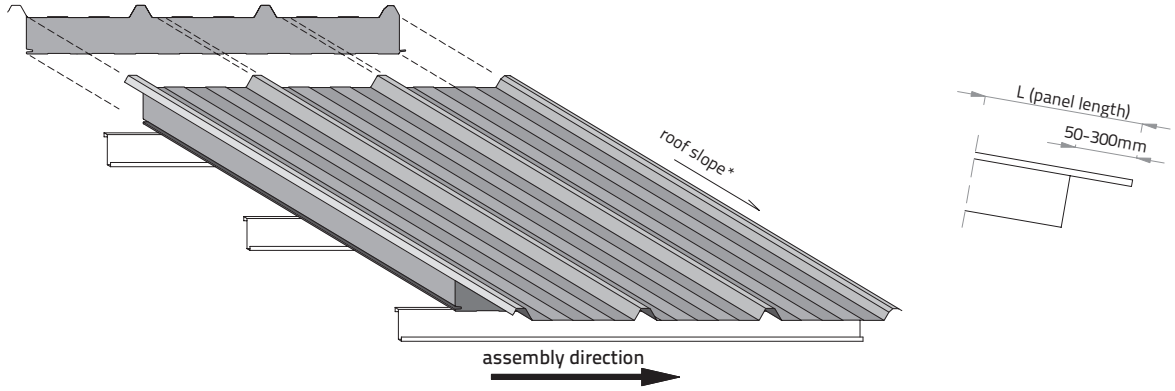


IzoRoof+

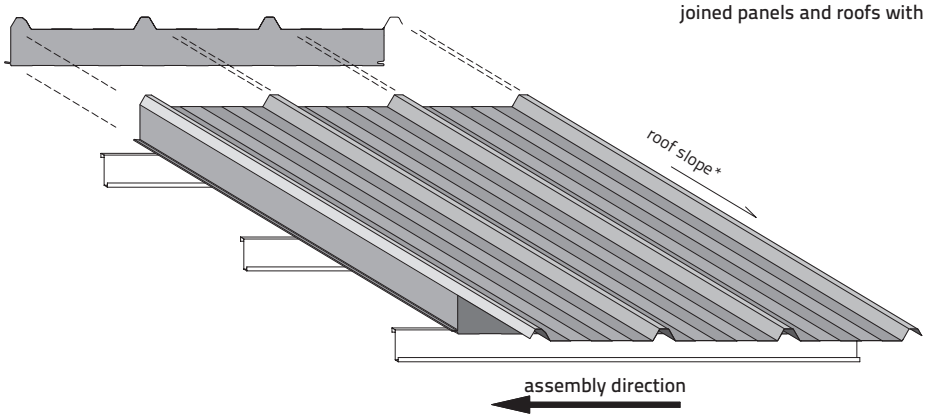


The cutting line determines the edge of the core part which is removed at the assembly to allow the sandwich panels to overlap. The principle of determining the direction of undercutting is shown on the drawing below.

Panel with left-sided joint



Panel with right-sided joint



*Minimum longitudinal roof slope for whole panels without skylights is 5%

***Recommended minimum longitudinal roof slope for joined panels and roofs with skylights is 7%**

Service, maintenance and conservation

Once installation is completed, remove all residues and dirt from panels, in particular filings which can damage the surface or initiate early corrosion processes. At least once a year inspect all parts of the structure with installed sandwich panels. Clean all found surface damages and repair using a touch-up paint to eliminate potential centres of corrosion.

Mild water soluble detergents with an appropriate chemical composition should be used for systematic maintenance. Cleaning should be carried out manually with the use of a sponge or cotton material, after the cleaning panels should be rinsed with water. As a rule, rain is enough to maintain natural cleanliness of external elevations, however in case of excessive dirt, pressure devices can be used for cleaning. The above conservation procedures should be conducted under temperatures above zero.

Snow should be removed from roofs with particular care. Thin outer lining can be damaged easily when scratched by a sharp edge of a snow shovel. Improper footwear can also cause damage. Use tools with rubber or plastic edges to prevent scratching panels while removing snow, otherwise warranty shall become void. Potential damage to the metal lining will become a centre of corrosion or a spot through which water may get inside the panel, leak to the interior or remain within the insulating core, impairing panel properties. Fastening screws may loosen as a result of impacts.

Persons performing works on the roof should be properly trained within the scope of works at heights and have all required certificates allowing to perform such works. While performing works at heights they must be secured against falls from heights. Moreover, when performing works on the roof they should wear safety shoes (slip protection), however this footwear should not cause any damage to the protective layer of the sandwich panels. Load capacity of sandwich panels is limited, therefore only one worker should stand on each span of the panel.

Removal of minor damages.
The delivered sandwich panels can be built in a facility and as a rule, are covered with additional protective film which protects surface layers against any damage. Minor surface damages may however occur in the course of even the most thoroughly conducted production process, transport, loading, unloading of panels or cutting them at a construction site. As a rule, such damages do not reach the inside of the protective system consisting of a metal layer (layer of zinc or aluminium and zinc) and a custom protective coat, and therefore can be eliminated in the with simple treatments. No painting is required for treatment of minor scratches of surface which do not damage steel sheet core, unless there are additional requirements related to aesthetic features of a building.
Quality of each panel and condition of organic coat must be checked thoroughly before installation. **Any faults and damages found, should be reported to the manufacturer before installation.**

Minor painting
Local scratches reaching steel sheet core must be painted with paints of suitable colour and composition. An important requirement is that a paint must be suitable for drying in open air, therefore thermosetting lacquers are not recommended. Basic polyester lacquers (even the ones used in car industry) or paints suitable for zinc coats are used for painting polyester coats (SP). For specialized coats (e.g. HDX, FoodSafe), we recommend consulting the manufacturer of the metal sheet to discuss each case individually.
Application of lacquer layer is an important issue. All specks and dust must be removed before painting. Exceptionally deep scratches must be treated with fine-grained sandpaper (min. grammage of 500), carefully not to damage unaffected surface. Only after being treated with sandpaper, scratches can be cleaned, degreased and covered with lacquer.
Painting should be carried out with a soft paintbrush with conical ending. Apply as small amounts of lacquer as possible on the scratch only. Also pay particular attention to the direction of applying the lacquer, especially in case of metallic coats such as RAL 9006, RAL 9007. Application in proper direction will reduce the visibility of conducted refurbishment to a minimum. For smaller surfaces, it is not recommended to apply paint by spraying due to differences in colour tones.

Painting of larger surface areas
In case of larger damages of coat, whole surfaces must be painted Due to a range of conditions (coat type, weather conditions) and different reasons of scratching, there can be a need for carrying out non-standard preparation procedures or implementing individual painting techniques. Due to different ageing reactions of original and refurbished parts, surfaces covered with lacquer can be, to some extent, of different colour tone when compared to the original colour. Therefore, it is recommended to apply lacquer on all visible surfaces by marking a distinct border between neighbouring areas considering a final visual effect of the whole object.

Dents
Apart from scratches, disturbances in geometry of sandwich panels, caused by random incidents, constitute an individual problem. Similar to other construction elements, sandwich panels also have a wide range of permissible tolerances. Dimensional tolerances of sandwich panels (including minor imperfections in form of dents) are specified in PN-EN 14509:2013, section 5.2.5 Compliance of panel imperfections with standard criteria ensures their minimal impact on endurance, functional features and safety of using panels. Appendix D of the PN-EN 14509:2013 standard must be closely followed when conducting measurements. It presents a detailed methodology for conducting measurements of imperfections. Measurements carried out in accordance with the appendix guidelines are the only measurements which can be considered binding.
Minor body and paint repair must be conducted in case dent dimensions are beyond the norm. Then a thorough inspection of panel surface condition and detailed identification of the area subject to repair should be carried out before the beginning of repair works. Unaffected area of the panel should be secured, the area with dents should be polished thoroughly to ensure more efficient application of layers. The next step of body and paint repair is application of anticorrosive base coat and selection of suitable polyester putty. t is recommended to choose anticorrosive base coat with protective capacity no lower than the capacity of the original base coat. election of putty should be based on its proper endurance and adhesion. Area subject to repair must be thoroughly polished after all the materials are applied. This will make the repaired area unnoticeable. The final step within the repair works is painting of the surface. The same lacquers should be used for repair works as in the case of standard body and paint repairs, taking into consideration guidelines specified in the 'Painting of larger surface areas" section.

Loosening of metal sheet

Sandwich panels should be handled with particular care at construction site to avoid any damage which could be a result of improper transport, cutting at the site or installation of panels.

Panels must be cut with the use of suitable tools, i.e. jigsaws and unused blades suitable for sandwich panels of proper length and min. teeth density of 18 TPI. The speed of cutting should be adjusted to an individual panel type. Cut edge should be even, splinter-free, and the metal sheet should not loosen as a result of improper 'jerky" cutting. Loosening of metal sheet can occur also as a result of improper transport of panels or irregularities of installation process (for more information see 'Load capacity" section, 'Sandwich panel selection guidelines ensuring durability and safety of usage" subsection).

In case of panels in which minor loosening occurred at the edges (except for minor loosening which is too small for application of glue), it is important to check if there are no elements between metal sheet and the core before combining them with single-component polyurethane or polychlorobutadiene-based adhesive. Next, the glued area should be reinforced with pressure-bearing elements (or in case of openings – with frames) and fastened with fasteners suitable for sandwich panels.

Visual core imperfections

Sandwich panels are a construction material with a composite structure. As a rule, steel lining is responsible for handling normal stresses whereas the core is responsible for distribution of joint stresses. Due to different roles of particular elements of sandwich panels, they possess other mechanical features. Thus, panel core can be characterised by a relatively high shear modulus and shear resistance, however, it is sensitive to a direct mechanical impact.

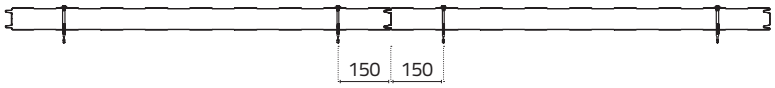
Being aware of the above facts, IZOPANEL, producer of sandwich panels, employs special protective films and seals on longer edges of panels with polyurethane core (visual imperfections are particularly visible on them) to protect panel core against unfavourable impact of external factors. Despite these protective measures, it is not always possible to avoid damages in these areas during transport, loading / unloading of panels or in the course of installation works carried out at construction site. Therefore, sometimes core imperfections need to be repaired at construction site with the use of expanded polyurethane foam applied with a cartridge or by applying polyurethane adhesive on a seal. Performance of the above procedures has no influence on functional features of panels which maintain the high level declared by IZOPANEL. Similar correction based on removal of excessive foam from panel lock or local adjustment of its profile can also be needed in the area of the lock.

Location and amount of fasteners

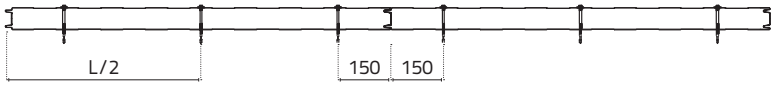
Most common fastening configurations are presented below. Specified values must be verified in proper calculations for a given structure to make sure that the load placed on a fastener does not exceed its load capacity.

IzoWall

In normal area, 2 fasteners per panel over each support, 150-250 mm from panel joint



In edge area, 2 fasteners per panel over each support, 150-250 mm from panel joint and 1 in the middle



IzoGold

In normal area, 1 set of fasteners per panel over each support, a set consists of two screws with EPDM washers and L-02 fastener

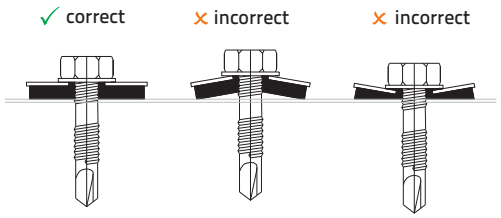
In edge area, 1 set of fasteners per panel over each support, a set consists of two screws with EPDM washers and L-02 fastener

IzoRoof (IzoRoof+)

In normal area, 2 fasteners per panel over each support

In edge area, 3 fasteners per panel over each support

Fastener must be tightened so that optimal pressure on metal sheet and tightness of an opening is ensured. f the pressure is too low, it can cause inefficient load capacity of fastener and lack of tightness. On the other hand, if the pressure is too high, it can cause deformation of metal sheet around the fastening as well as overstraining of screws.



When choosing fasteners, it is important to check their parameters which specify their drilling capacity. One fastener type is used for installation of panels in a thin walled element and a different one - in an element which is several millimetres thick. Material into which a fastener is drilled also has an influence on its length. As a rule, to determine fastener length, approx. 35 mm should be added to the thickness of a sandwich panel in steel structure. In case of installation in wood or concrete, approx. 50 mm should be added and in this case, it is also important to remember about a wall plug or a self-taping fastener with a special shape of thread.

Notes

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