



p r o d u c t

CATALOGUE

SHAPE YOUR
FUTURE!

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Besides the high quality sandwich panels, offered in a wide range of types and dimensions, our client can rely on a professional advice and support in solving different cases in the face of our well-trained sales representatives and engineering team, which develops drawings of all the parts of the building, prepares installation plans and conformed with them delivery schedules, calculates the quantity and cost of all the necessary panels and equipment of the project in the part fencing. Due to the construction companies, who are our partners, we can offer both professional help in the site construction with our panels and all the necessary equipment for their completion. Our clients can rely on our expert help during all site construction stages with sandwich panels after its construction assembly.

OUR VALUES:

We look in the future
We do not sell products – we offer solutions
Honesty and professionalism

OUR GOALS:

To understand client need and expectations, offering individual solutions corresponding to both of them.
To be heralds of innovations and ethics in the business field we work in.
To develop our products in a direction, facilitating and simplifying the construction process continuously and progressively.

OUR MISSION:

To become an example and a herald of the model:
“Bulgarian product is a symbol of quality!”

Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

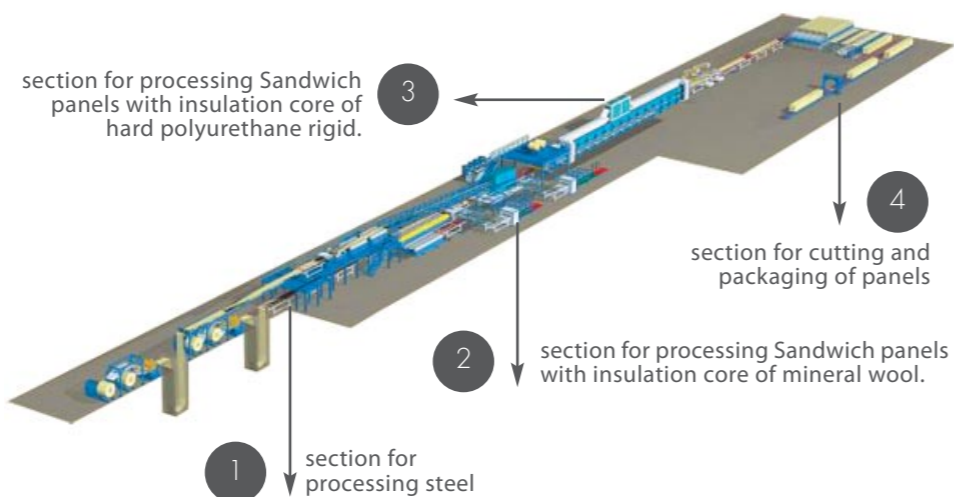
The plant, situated on 65'000 sq. m. on the territory of the village of Yana, near Sofia, has immediate access to the Hemus highway, connection with Trakia highway and its own rail approach. The project started in January 2007. Investment amount exceeds 11 million Euros and now the newly built factory has the most modern equipment for continuous production of sandwich panels.

The production line is designed and manufactured according to the latest technology achievements for continuous production by the leading Italian company PU.MA. This technology is characterized by very high production capacity, continuity of processes and fully automated control.

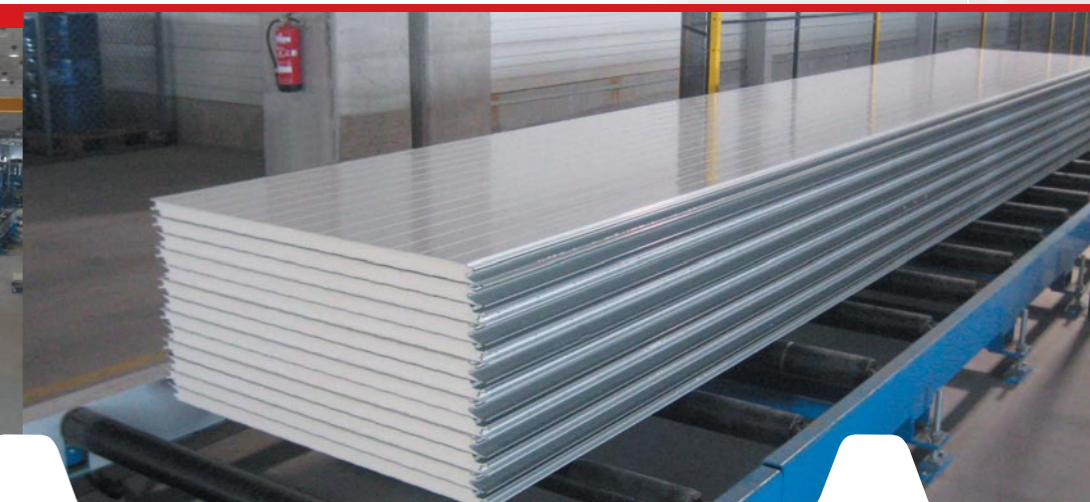
The line consists of four main groups of machines:

PRODUCTION

Scheme of the production line



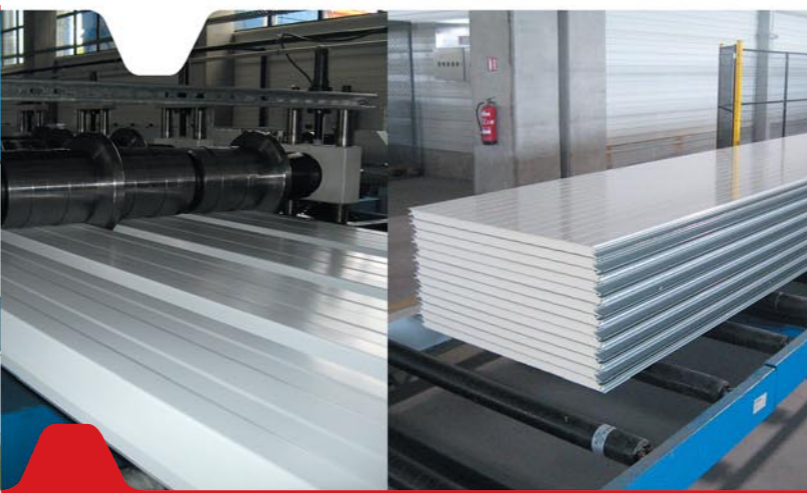
- Section for processing steel coils, operated by an operator - coils are loaded from storage. The operator forms two steel sheets.
- Section for processing Sandwich panels with insulation core of mineral wool, operated by two operators + one support staff, where the mineral wool sheets are loaded.
- Section for processing Sandwich panels with insulation core of polyurethane, operated by two operators. There to the necessary chemicals are submitted from an automated warehouse. Right after it is double-belt conveyors, setting the high



performance. Chemicals are supplied by leading manufacturers of such materials as BASF and Huntsman.

- Section for cutting and packaging of panels, operated by two operators + one support staff.
- The process is managed by shift manager, synchronizing the work of the different sections.
- Staff work is expressed mostly of monitoring the technological processes.





c h a p t e r

PRODUCTS



Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

"Technopanel" develops, manufactures and markets complete facade and roof systems composed of sandwich panels with insulation core of polyurethane rigid foam (**PUR**), polyisocyanurate rigid foam (**PIR**) or rock wool (**MW**) and finishing facings of galvanized and protected with polyester coat steel sheets.

Sandwich panels are produced by the highest quality materials with modern production technology which is ensuring excellent physical and mechanical properties. Thanks to it, sandwich panels are widely applied. An important advantage result from high stiffness of sandwich panels is decrease of support elements (purlins, beams, etc.), which is conducive to material savings in the supporting structure and naturally also a saving in the total installation time.

IMPORTANT INFORMATION FOR sandwich panels

Fully mechanical joining methods

Panel joining methods include simultaneous joint panel-panel and joining of these elements with the supporting structure. The junction between wall elements is achieved as a rule through tongue-and-groove (through fix) or double tongue-and-groove (secret fix) joint. The method used with roof panels is the standard crown lapping of additional profile with neighbouring panel. Important advantages of the high quality wall panels are easy assembly, solidity and consistent joints. The methods of panel joining known to us are up to 100 times more airtight than high quality window joinery. Vapour diffusion-proof joints are applied at freezing rooms and chambers of temperatures below zero.

Structural applicability

Structural applicability and heights of buildings do not limit sandwich panel application. Building geometry is limited only by the chosen type of primary structure.

Reconstruction and extension

Thanks to sandwich panel's constructive flexibility, the buildings could be easily expanded and renovated without serious interruption of the building activities. In principle there are no technical or economical limits to the complete movement of a building.

Expenses and depreciation

Material and assembly expenses of construction with sandwich panels are similar to the alternative construction methods. But if operational and maintenance expenses are considered, sandwich panels have undoubted advantages which increase taking account of energy savings. The design and structure of sandwich panels allows easier achievement of roof and wall enclosure impermeability compared to other solutions. Sandwich panel enclosing feature much less own weight compared to alternative methods which is leading to decrease of bearing structure expenses. Sandwich panels stand out with their very low maintenance needs. The high quality coating guarantees long-term corrosion protection.

Space saving

Because of its thin wall construction, external and internal walls take up much less surface area with sandwich panel construction than with the solid method of construction. For the same thermal transmittance value (U), the sandwich panel is much thinner than a solid wall. For this reason, it is realized a measurable increase in the proportion of useable area to the total covered area when compared to the solid method of construction. To achieve the $U=0.3(W/m^2K)$ a polyurethane cored sandwich panel would need to be 80 mm thick, a rock wool cored sandwich panel – 100 mm thick, while a solid wall would need to be 365 mm thick with inside and outside plaster as well as additional 80 mm of external insulation. This wall structure leads to a total thickness of 465 mm.

Thermal insulation and energy saving

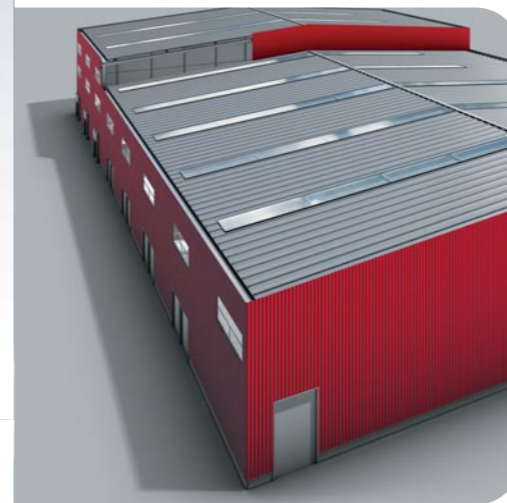
Because of their metallic facings, the sandwich panels are absolutely impermeable to water vapor diffusion. The exceptional thermal performance lies in the physical properties of the polyurethane rigid foam and in the tightness of the joint technique. Rigid polyurethane possesses the lowest heat transmission property of all commonly used thermal insulation materials. For this reason it is possible to attain high insulation capacities with relatively thin sandwich panels.

Fire protection

Sandwich panels with core insulation of polyurethane rigid foam have a class of reaction to fire of C-s, d0, panels with core insulation of polyisocyanurate rigid foam have a class of reaction to fire of B-s2, d0 and those with insulation core of rock wool – A2-s,d0. Wall panels offered by Technopanel are certified by the indicator of fire resistance. The results are presented in tabular form in the "Wall panels" and "Roof panels" chapters. Testing and classification of wall panels is made pursuant to EN 1364-1, and of the roof panels - according to EN 1365-2. In strict adherence to fire protection, as well as fire prevention requirements and safety regulation, one can count on sandwich panel construction to be one of the safest methods of construction.

Acoustic protection

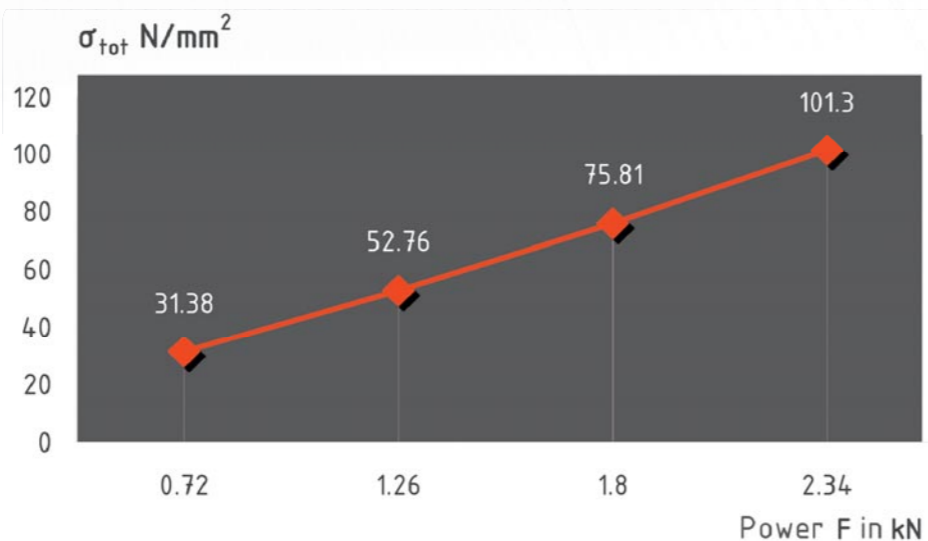
It is a law of physics that noise suppression improves with increasing mass while the declared aim of light-weight construction methods is to use light materials. There is a direct contradiction, therefore, in the optimum fulfillment of both requirements. This does not mean that one must do without acoustic protection in lightweight construction. Sandwich panels with insulation of rock wool and with thickness of 80 mm reduce the noise level with $R'w = 28dB$ at a density of $100 kg/m^3$, therefore it has very good acoustic properties. These results were obtained in an accredited laboratory tests. Test data are summarized in protocols that Technopanel provides customers.



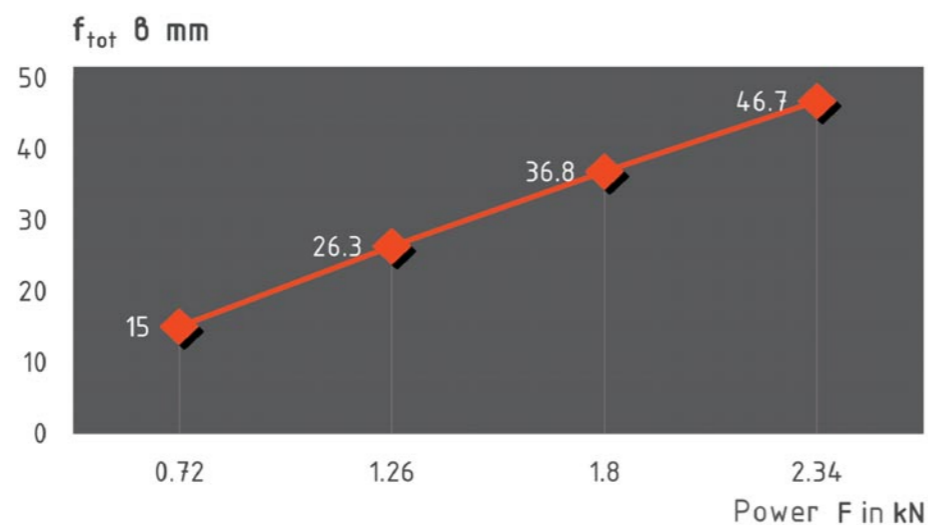
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Mechanical properties of the insulating material and metal surfaces combine very well in the structure of the sandwich panel to allow a significant increase of bending resistance of the panel. Three-layer sandwich panel has a significantly higher bending resistance than the sum of the resistances of the metal surfaces and the insulation core. Two thin sheets and thick insulating layer of polyurethane rigid foam have practically zero bending resistance alone. Due to the adhesion of polyurethane foam to the metal cladding that has occurred in the foam phase, it has been formed the so-called cross-section type "sandwich". Measurements show high levels of bending resistance and low values of the deflection of the beam from such panel.

Average values of the measured stresses at the top and bottom metal surfaces of the "sandwich" beam.



Average values of realized deflections of the "sandwich" beam.



STRUCTURAL FEATURES OF sandwich panels

In addition to the favorable behavior under load of sandwich type construction, the enhancement of metal surfaces, due to the insulating core, increase the bearing capacity. This effect is especially advantageous for sandwich panels with thin, smooth or almost smooth surfaces, reaching high strength, but without the effect of reinforcement tend to early buckling or formation of crumple under the compressive stresses. For this the greater is the adhesion of polyurethane foam to the steel sheets, the more it prevents crushing of the cladding surfaces. In this case insulation core acts like amplifying elastic foundation. With increasing hardness of the core, distances between crushings on the coatings are becoming smaller with reaching the critical load. This leads to a favorable increase of the critical stress. Therefore, increased stiffness of the core correspond increased bearing capacity. Thanks to the elastic foundation there can be reached stresses significantly greater than in non-reinforced surfaces.

Without link between components

admissible load ≈ 0kN/m²

With a link between components

admissible load 1.18kN/m²

Exemplary dimensions:

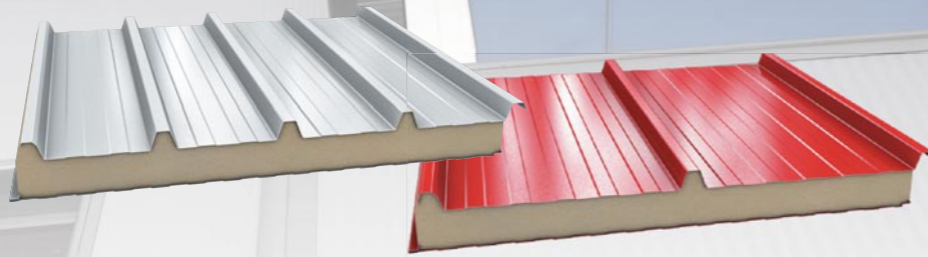
- metal surface /outer/: t_{k,1}=0.5mm
- metal surface /inner/: t_{k,2}=0.45mm
- insulating layer: PUR, r=41kg/m³
- insulation thickness: d=60mm
- effective width: b=1.00m
- loading: short-term

The profile of metal facings also affects the critical stresses. This can be found in the difference between smooth and profiled facings. Compared with those with smooth surface profiled sheets has multiple lengthwise edges that prevent any local distortion and crushing.

$\sigma^c = 0.5 \sqrt{E_s \cdot G_s}$
σ^c - admissible stress

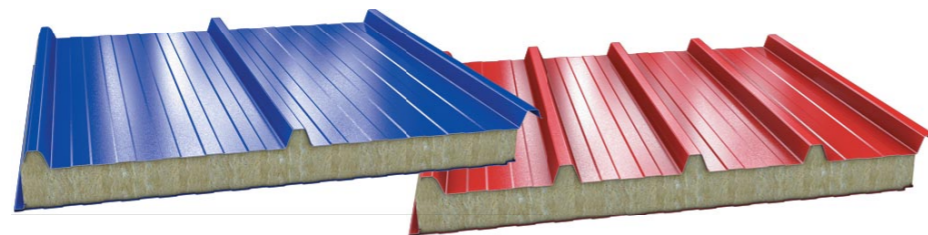
ADMISSIBLE LOADS FOR Roof panels

Admissible loads in kg/m² for **TTOP** PU



	thickness of the panel S, mm	thickness of the steel sheet		statistical scheme										
				continuous beam					simple beam					
				internal	external	l=1,5 m	l=2,0 m	l=2,5 m	l=3,0 m	l=3,5 m	l=1,5 m	l=2,0 m	l=2,5 m	l=3,0 m
3 ribs	30	0.45 mm	0.5 mm	-	-	-	-	-	-	-	-	-	-	-
	40	0.45 mm	0.5 mm	475	293	186	124	101	348	221	127	101	65	
	50	0.45 mm	0.5 mm	520	310	203	143	114	389	250	165	117	73	
	60	0.45 mm	0.5 mm	639	335	237	162	120	444	289	183	131	99	
	80	0.45 mm	0.5 mm	713	377	297	200	150	602	312	238	150	120	
	100	0.45 mm	0.5 mm	740	403	316	221	175	629	338	252	166	136	
5 ribs	120	0.45 mm	0.5 mm	765	419	342	248	189	642	349	276	180	150	
	30	0.45 mm	0.5 mm	-	-	-	-	-	-	-	-	-	-	
	40	0.45 mm	0.5 mm	573	351	269	191	137	525	303	221	143	89	
	50	0.45 mm	0.5 mm	610	472	325	238	173	562	407	262	180	123	
	60	0.45 mm	0.5 mm	686	509	341	245	180	644	451	284	192	131	
	80	0.45 mm	0.5 mm	842	552	359	263	189	808	507	318	219	149	
100	0.45 mm	0.5 mm	941	592	374	279	200	903	544	347	236	174		
120	0.45 mm	0.5 mm	1012	637	429	305	223	940	580	373	270	203		

Admissible loads in kg/m² for **TTOP** MW

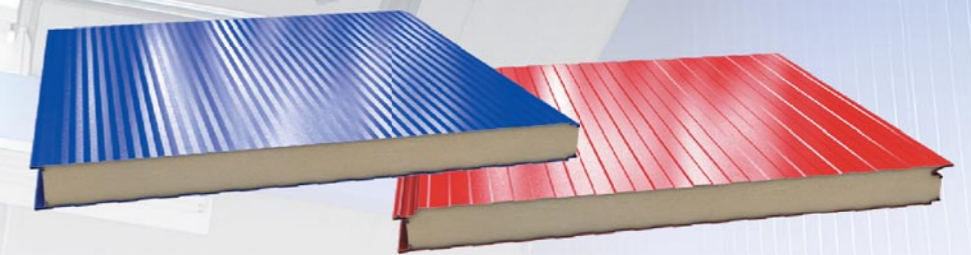


	thickness of the panel S, mm	thickness of the steel sheet		statistical scheme									
				continuous beam					simple beam				
				internal	external	l=1,5 m	l=2,0 m	l=2,5 m	l=3,0 m	l=3,5 m	l=1,5 m	l=2,0 m	l=2,5 m
3 ribs	50	0.5 mm	0.5 mm	172	112	90	75	60	150	97	75	60	45
	60	0.5 mm	0.5 mm	187	131	105	87	71	165	115	88	74	57
	80	0.5 mm	0.5 mm	225	165	135	112	97	195	150	120	105	82
	100	0.5 mm	0.5 mm	253	183	160	127	107	233	164	141	118	94
5 ribs	120	0.5 mm	0.5 mm	300	230	190	150	120	250	210	160	130	105
	50	0.5 mm	0.5 mm	230	150	120	100	80	200	130	100	80	65
	60	0.5 mm	0.5 mm	263	177	147	119	97	222	153	121	101	79
	80	0.5 mm	0.5 mm	300	220	180	150	130	260	200	160	140	110
100	0.5 mm	0.5 mm	328	237	194	162	146	270	218	185	162	146	
120	0.5 mm	0.5 mm	370	270	230	200	180	310	270	220	190	150	

ADMISSIBLE LOADS FOR Wall Panels

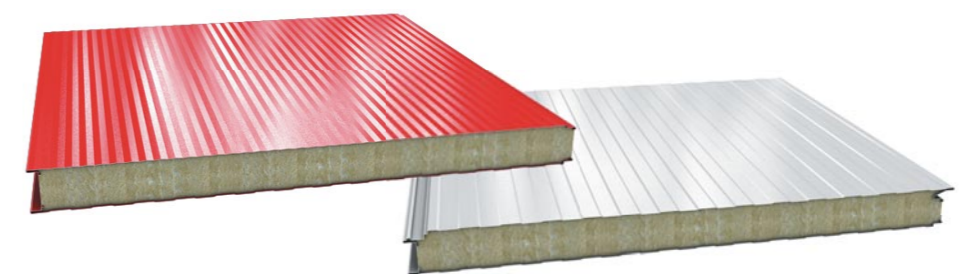
In the design phase, architects and engineers have access to information about the ability of sandwich panels of bridging certain distances at various loads. This information is provided in tabular about the products of Technopanel EAD.

Admissible loads in kg/m² for **TFACE** PU



	thickness of the panel S, mm	thickness of the steel sheet		statistical scheme											
				continuous beam						simple beam					
				internal	external	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m	l=4,5 m	l=5,0 m	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m
25	0.45 mm	0.5 mm	-	-	-	-	-	-	-	-	-	-	-	-	-
40	0.45 mm	0.5 mm	161	118	67	-	-	-	136	92	57	-	-	-	
50	0.45 mm	0.5 mm	164	127	85	60	-	-	140	100	60	-	-	-	
60	0.45 mm	0.5 mm	197	157	131	96	67	52	157	144	107	76	51	40	
80	0.45 mm	0.5 mm	213	173	150	120	102	71	176	169	123	101	78	50	
100	0.45 mm	0.5 mm	235	180	168	142	103	80	197	172	130	110	86	60	
120	0.45 mm	0.5 mm	267	219	185	159	142	123	243	199	168	144	136	111	
150	0.45 mm	0.5 mm	337	277	234	202	181	157	307	252	213	183	176	142	
180	0.45 mm	0.5 mm	350	303	253	230	209	179	328	275	224	204	193	164	

Admissible loads in kg/m² for **TFACE** MW



	thickness of the panel S, mm	thickness of the steel sheet		statistical scheme											
				continuous beam						simple beam					
				internal	external	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m	l=4,5 m	l=5,0 m	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m
50	0.5 mm	0.5 mm	100	80	60	55	50	40	80	70	50	45	43	-	
60	0.5 mm	0.5 mm	121	97	79	68	63	52	102	83	62	57	56	-	
80	0.5 mm	0.5 mm	150	120	100	90	83	67	135	100	80	75	80	55	
100	0.5 mm	0.5 mm	235	150	130	110	100	80	200	140	110	95	94	70	
120	0.5 mm	0.5 mm	280	210	170	140	125	100	250	185	150	120	110	85	
150	0.5 mm	0.5 mm	295	223	181	153	137	107	267	210	172	141	124	102	

ADMISSIBLE LOADS FOR Wall Refrigerator Panels

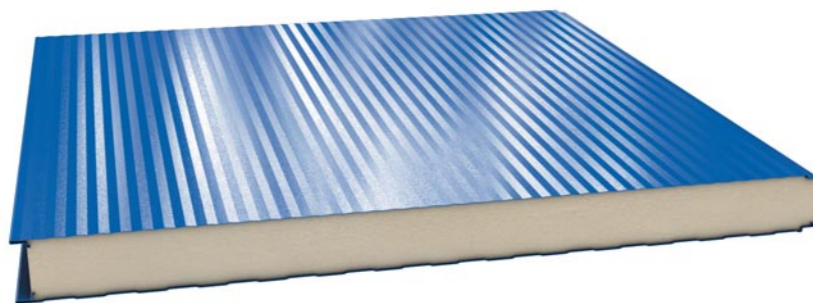
PANELS FOR REFRIGERATOR CHAMBER WITH **POSITIVE TEMPERATURES**



Admissible loads in kg/m² for **TFACE PU**

thickness of the panel S, mm	thickness of the steel sheet		statistical scheme											
			continuous beam						simple beam					
	internal	external	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m	l=4,5 m	l=5,0 m	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m	l=4,5 m	l=5,0 m
60	0.45 mm	0.5 mm	197	157	131	96	67	52	157	144	107	76	51	40
80	0.45 mm	0.5 mm	213	173	150	120	102	71	176	169	123	101	78	50
100	0.45 mm	0.5 mm	235	180	168	142	103	80	197	172	130	110	86	60
120	0.45 mm	0.5 mm	267	219	185	159	142	123	243	199	168	144	136	111

PANELS FOR REFRIGERATOR CHAMBERS WITH **NEGATIVE TEMPERATURES**



Admissible loads in kg/m² for **TFACE PU**

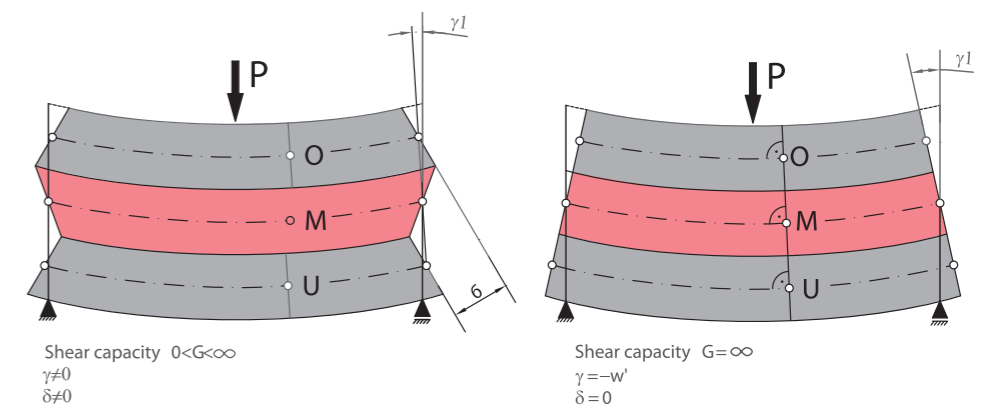
thickness of the panel S, mm	thickness of the steel sheet		statistical scheme											
			continuous beam						simple beam					
	internal	external	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m	l=4,5 m	l=5,0 m	l=2,5 m	l=3,0 m	l=3,5 m	l=4,0 m	l=4,5 m	l=5,0 m
120	0.45 mm	0.5 mm	267	219	185	159	142	123	243	199	168	144	136	111
150	0.45 mm	0.5 mm	337	277	234	202	181	157	307	252	213	183	176	142
180	0.45 mm	0.5 mm	350	303	253	230	209	179	328	275	224	204	193	164

To perform accurate calculations for the components examined in the methodology of calculation of the sandwich elements, we must first take account of external loads as dead load, snow, wind. Then, two additional loads are of particular importance in assessing the bearing capacity of sandwich panels: stresses resulting from temperature differences in the two surfaces of the panel and creeping of the insulation layer as a result of tangential stresses in it (especially developed in synthetic materials).

Due to the excellent thermal insulation provided by the rigid polyurethane foam, unilateral thermal radiation (eg sunshine) leads to a significant temperature difference between exposed and unexposed surface. High thermal conductivity and coefficient of thermal expansion, typical of metals, creates tensions in cross-sectional type "sandwich" and cause distortion of the panel.

Unlike metals, synthetic materials have the common property of creeping during continuous loading. Initially, shear distortions give rise to elastic reactionary forces. If the load remains constant, purely elastic distortions continuously increase over time due to the creep of the polymer.

As with any new construction method, a series of special cases are of structural importance for sandwich panels, mainly because of the rigid polyurethane foam. In assessing the load must be considered the tangential stresses in the insulation layer.



Bernoulli hypothesis of flatness of the cross sections is not applicable. There should be taken into account deformations and related stress due to distortion of the insulating layer. Calculations that take "stiff link" between the components of the sandwich panel would lead to increased bearing capacity of the panels and incorrect dimensioning.



Polyurethane is an insulating material composed of two individual components (polyol and isocyanate), that react chemically with each other when mixed. Depending on the reaction time of the material, it is ready for use within a few minutes afterwards. The product of that reaction is a polyurethane rigid foam (PUR), characterized by closed cell structure and density $\rho=41 \text{ kg/m}^3$.

Like other light polymers with cell structure, the polyurethane has excellent thermal insulation properties. Its nominal thermal conductivity is $\lambda=0,028\text{W/m}^\circ\text{K}$, which ranks it among the most effective materials for thermal insulation.

Among the main advantages of this material is ordered and the fact that it has good compression resistance and dimensional stability at high temperature range – from -30° to $+80^\circ \text{ C}$.

With respect to acoustic capability, the polyurethane is not among the most effective materials, but its acoustic characteristics allow a reasonable degree of comfort in the rooms.

The content of closed cells in the polyurethane is more than 95%, which makes it besides good heat insulator and waterproofing product.

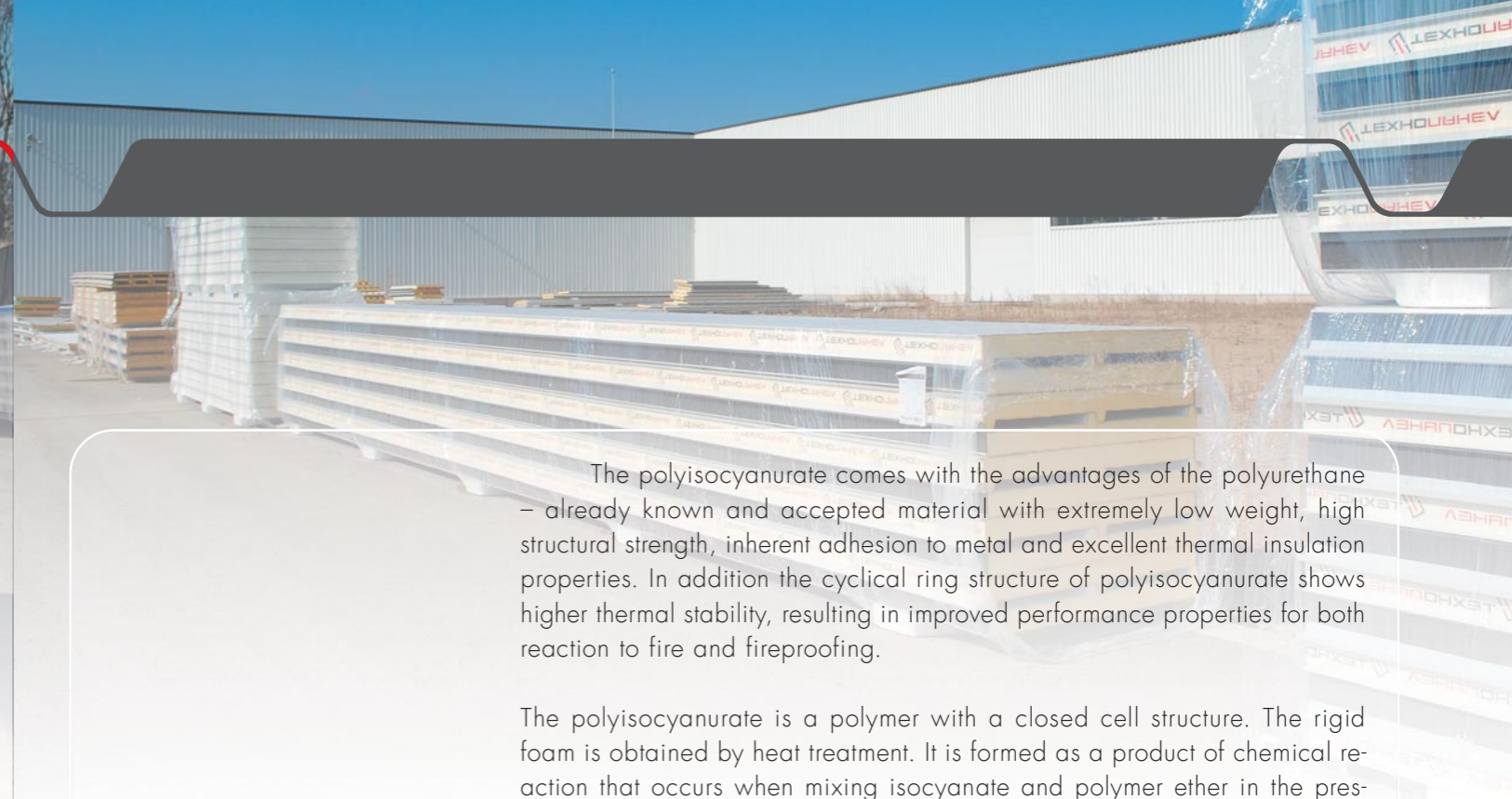
The extremely light weight, high structural strength and intrinsic adhesion to metals make the polyurethane ideal material for insulating core of the sandwich panels.

Along with all advantages of the polyurethane should be also mentioned:

- Reducing of the operating and maintenance costs
- Recyclable material
- Zero potential for ozone depletion
- Virtually no potential to contribute to global warming



POLYURETHANE



The polyisocyanurate comes with the advantages of the polyurethane – already known and accepted material with extremely low weight, high structural strength, inherent adhesion to metal and excellent thermal insulation properties. In addition the cyclical ring structure of polyisocyanurate shows higher thermal stability, resulting in improved performance properties for both reaction to fire and fireproofing.

The polyisocyanurate is a polymer with a closed cell structure. The rigid foam is obtained by heat treatment. It is formed as a product of chemical reaction that occurs when mixing isocyanate and polymer ether in the presence of a catalyst, promoting the molecules to restructure and link, and blowing agent to create closed cells.

As a result of the high temperature and specific catalysts are formed cyclical ring structures, characterized by very strong chemical bonds, whose rupture needs a lot of energy. That explains the high thermal resistance and increased compressive strength of the polyisocyanurate rigid foam.

The compressive strength is an important physical property, due to which is the ability of the polyisocyanurate rigid foam to retain its shape when there is a force or load. The compressive strength of polyisocyanurate is in the range from 110kPa to 170kPa

The polyisocyanurate is essentially an improvement of the polyurethane. Due on particularly this are its advantages:

- Increased compressive strength
- Increased fire resistance
- Improved reaction to fire
- Excellent thermal performance
- Waterproofing product
- Reducing of the operating and maintenance costs
- Recyclable material
- Zero potential for ozone depletion
- Virtually no potential to contribute to global warming



POLYISOCYANURATE

The technology for producing mineral wool is taken from the nature. In observations of volcanic eruptions in Hawaii, were found threads. The material they were made has excellent characteristics and can be used as a thermo insulator. The threads of the mineral wool combine stability and durability of stone and insulating properties of wool.

Its main advantage over the other materials used for insulation is that it's virtually non-combustible material. It does not shrink or expand under the influence of ambient temperature, as it has almost zero thermal expansion. Thanks to its excellent insulation qualities, the technical characteristics of the mineral wool do not change at high temperature. For this reason, mineral wool products can not only prevent the spread of flame fire, but to protect the equipment with flammable materials and keep warmth in cold climates. When there is a fire the mineral wool fibers withstand without melting at temperature higher than 1000°C, which makes them an ideal fire protection barrier.

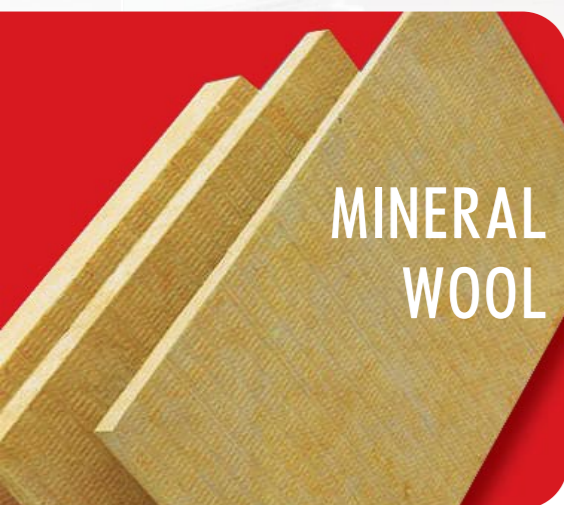
Other irrefutable advantage of the mineral wool is sound absorption property. It is built of basalt fibers with air cavities, which gives it excellent acoustic properties as it reduces the vertical sound waves between the surfaces of wall, improves the sound insulation from airborne noise, reducing reverberation time.

The mineral wool has very good resistance to mechanical impact. The material does not change its shape and dimensions throughout its lifetime.

The mineral wool often looks wet if it had been exposed to rain. In fact only a few millimeters from the surface layer are wet. The mineral wool is water repellent material that does not absorb moisture. Moisture from the surface of the material can't penetrate it. So the material stays dry, keeping its extreme thermo insulating properties.

Thanks to its porous structure the mineral wool is vapor porous material – vapors can freely pass through it.

And last but not least – the mineral wool is completely environmental friendly material because it is made from natural products. It does not contain asbestos and toxic substances. The mineral wool is not a medium for microbial growth does not attach rodents, is harmless to humans.



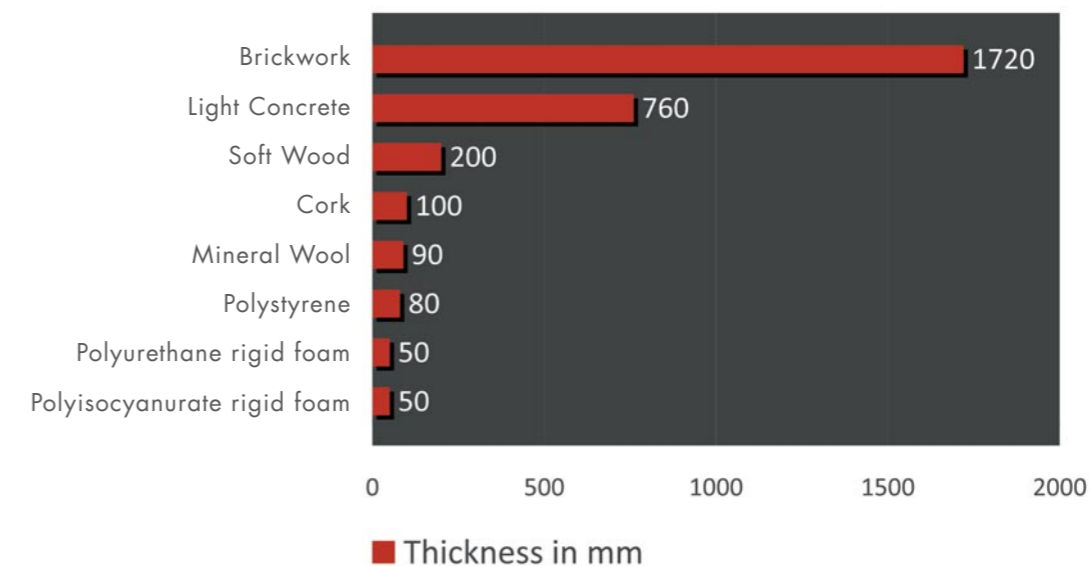
THERMAL conductivity

Sandwich panels are made of high quality materials that provide them excellent physical and mechanical properties and therefore have a wide range of applications.

Due to their metal surfaces, sandwich panels are completely waterproof. Outstanding thermal insulation qualities are due to the physical properties of polyurethane rigid foam (**PUR**), which has the lowest heat transmission properties of all commonly used insulation materials. For its part, mineral wool is incombustible material and has excellent acoustic properties.

Polyisocyanurate rigid foam - (**PIR**) and combines the advantages of polyurethane and mineral wool. It is characterized with equally good insulating properties as polyurethane foam, but with greatly improved indicators of fire resistance.

Thickness necessary for reaching of the quotient $U=0.41 \text{ W/m}^2\text{K}$



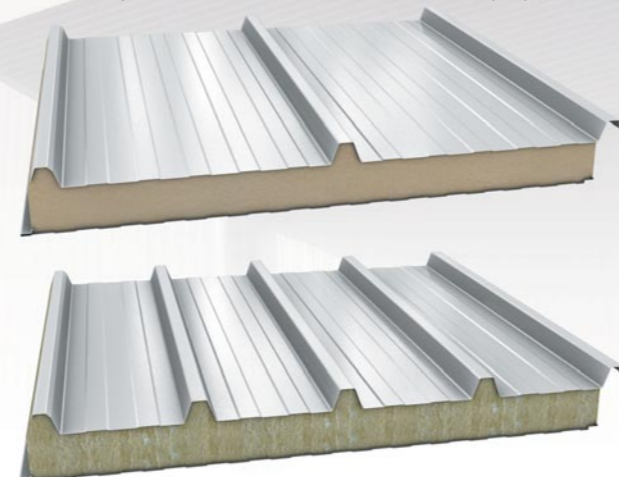
The product range of the firm includes the following major business lines: **TTOP**, **TFACE**, **WALL REFRIGERATOR PANELS** and **PIR PLATES**

TTOP product line consists of panels, ribbed with three **TTOP 3** (Fig. 1) and five ribs **TTOP 5** (Fig. 2) and insulation of polyurethane, polyisocyanurate and rock wool. They are suitable for any kind of insulated roofs with minimal slope inclination of 7%.

Фиг.1 Three ribs panel **TTOP** with insulation core of polyurethane



Фиг.3 Joint between **TTOP** roof panels with mineral wool insulation core



Фиг.2 Five ribs panel **TTOP** with insulation core of mineral wool

TFACE product line consists of panels **TFACE T** (fig. 4) - through fixing (Fig. 5) and **TFACE S** (Fig. 6) - secret fixing (fig. 7).

Фиг.4 Wall panel **TFACE T** with T-profile of the sheets



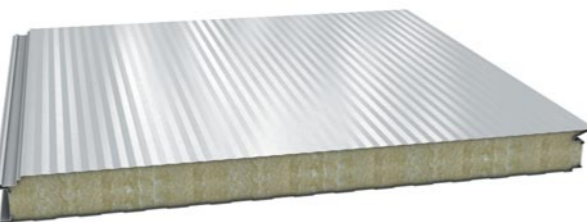
Фиг.5 Joint between **TFACE T** wall panels with polyurethane insulation core



Фиг.6 Wall panel **TFACE S** with V-profile of the sheets



Фиг.7 Joint between **TFACE S** wall panels with insulation core of mineral wool

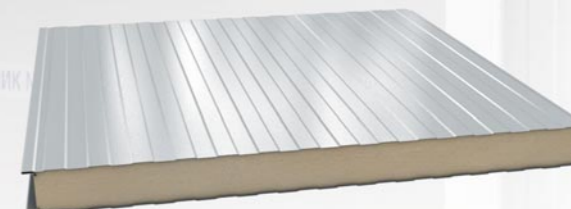


Wall refrigerator panels **FRIGOPANEL** belongs to **TFACE T** family.

Depending on their thickness, panels could be for refrigerator chambers with positive temperatures and, panels for refrigerator chambers with negative temperatures.



Wall refrigerator panels **FRIGOPANEL** with T-profile of the sheets



The **PIR PLATES** family includes: **TDUCT** and **THERM** lines, used respectively for making air ducts and for thermal insulation of both roofs and walls.



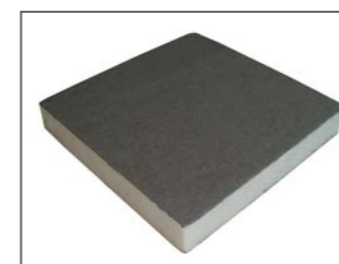
TDUCT

PIR - plates **TDUCT** with insulation of polyisocyanurate rigid foam (**PIR**), cached on both sides with aluminum foil. They are suitable for making air ducts for building ventilation and air conditioning.

TDUCT are distinguished with:

- high bearing capacity- 140kPa /self-supporting - no further bearing structure/
- difficult combustible product with a guaranteed high class of reaction of fire;
- extremely good thermal insulation – $\lambda = 0.022 \text{ W/mK}$;
- corrosion resistant and airtight, thanks to the aluminum foil;
- lightweight - $\rho = 50 \text{ kg/m}^3$ /extremely light material conducive to lighter supporting structure and the weight of construction elements /
- easy to use and assembling

We offer **TDUCT** in the following standard sizes: 1200/4000/30; 1000/4000/30;



THERM

THERM insulation boards with a core of polyisocyanurate rigid foam, double-masked with aluminum foil, paper or combinations of them.

THERM are suitable for insulation of both walls as well as roofs and floors.

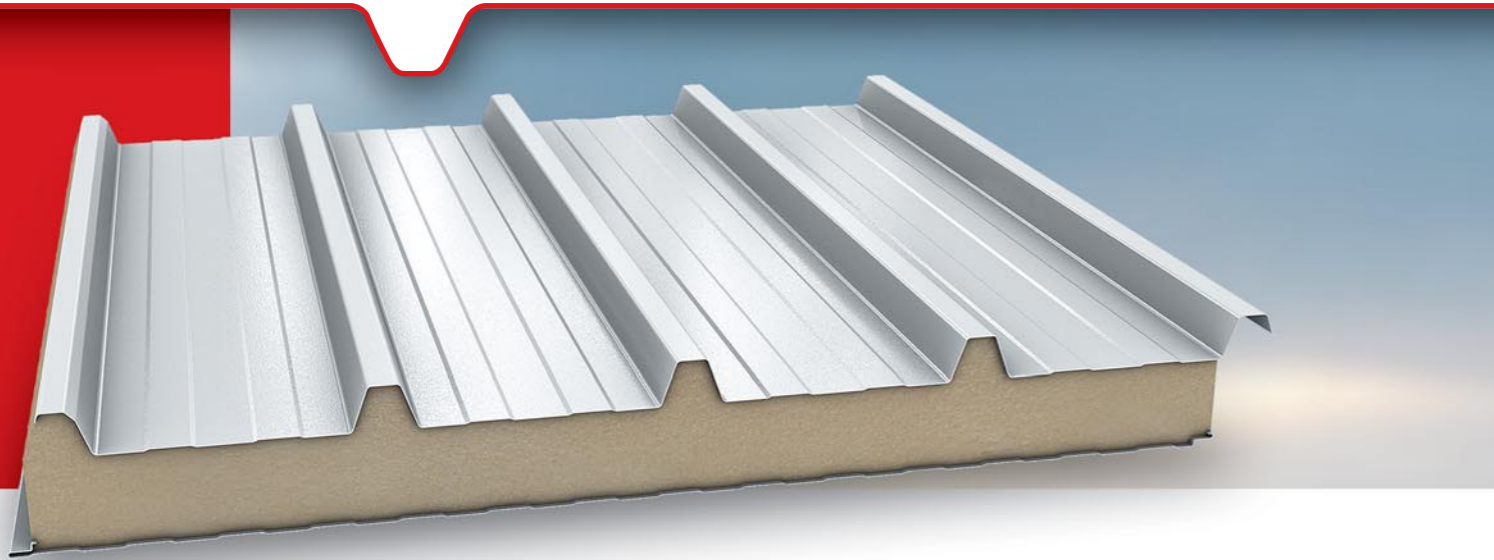
The boards have the following characteristics:

- Thermal insulation - $\lambda = 0.022 \text{ W/mK}$
- Density - $\rho = 30 \text{ kg/m}^3$
- difficult combustible product with a guaranteed high class of reaction of fire;
- water absorption – less than 2% of the PIR-core.
- Compressive strength - $\geq 140 \text{ kPa}$

THERM is available in the following standard sizes:

1200/2400/d*; 600/2400/d*; (* d = 30; 40; 50; 60; 80; 100mm)

MAIN product lines



c h a p t e r

ROOF
panels



Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

The **TTOP** roof panels with insulation core of rigid polyurethane foam (**PUR**), rigid polyisocyanurate foam (**PIR**) or mineral wool (**MW**) are suitable for every type of insulated roofs at a minimum inclination of 7%. Problems like leakages and dust are completely eliminated by precise and flawless assembly of the panels.

Thanks to the exceptional loading capacity and their low own weight **TTOP** panels enable the reaching of greater distances between the purlins, which results in saving material from the supporting structure and reducing execution time. They can be with 3 or 5 ribs and the outer layers are hot dip galvanized steel sheets with finishing polyester coloured coating.

Standard thicknesses of the **TTOP** panels vary between 30 – 120mm.

- Covering width - 1000 mm
- Maximum length - 15000 mm

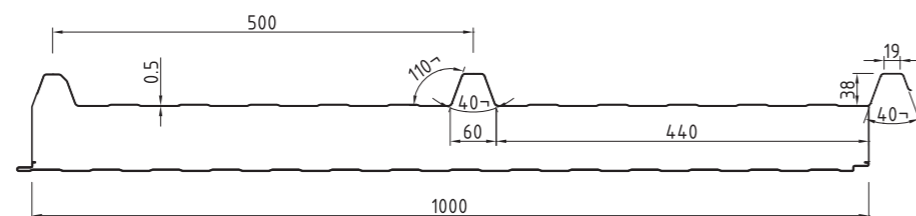
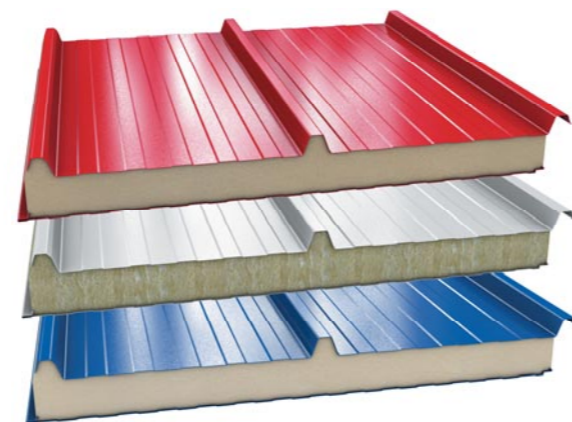
TTOP

TTOP 3 – Roof panels with three ribs

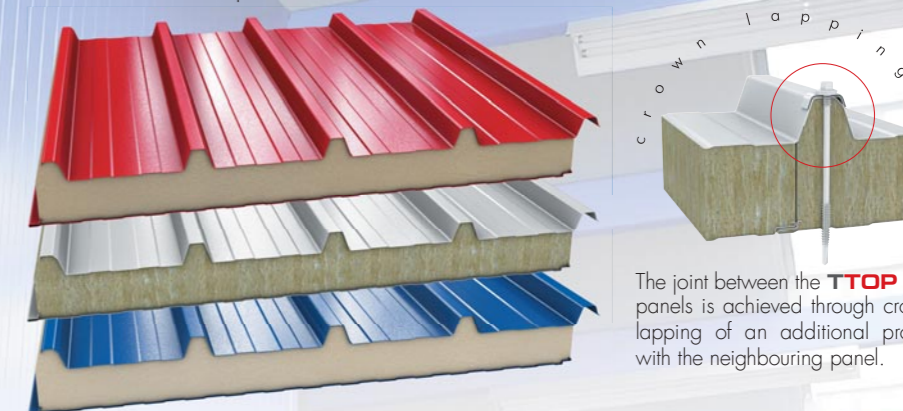
PUR insulation

MW insulation

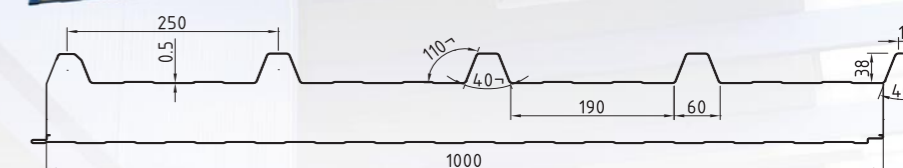
PIR insulation



TTOP 5 – Roof panels with five ribs



The joint between the **TTOP** roof panels is achieved through crown lapping of an additional profile with the neighbouring panel.



TTOP PU		polyurethane rigid foam						
thickness of the panel	(mm)	30	40	50	60	80	100	120
height of the rib	(mm)	38	38	38	38	38	38	38
thickness of the steel sheet	external	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	internal	0.45	0.45	0.45	0.45	0.45	0.45	0.45
weight of the panel with 3 ribs *	(kg/m ²)	9.53	9.93	10.33	10.73	11.53	12.33	13.13
weight of the panel with 5 ribs *	(kg/m ²)	9.85	10.25	10.65	11.05	11.85	12.65	13.45
coefficient of thermal conduction**	U(W/m ² K)	0.68	0.52	0.43	0.36	0.27	0.22	0.19

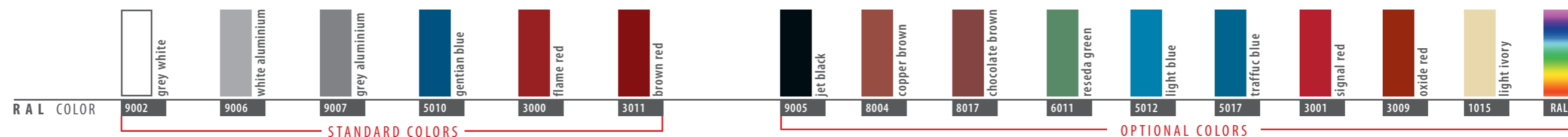
* the weight of the panel is calculated for density of the polyurethane rigid foam 40 kg/m³; ** λ = 0,023 W/mK

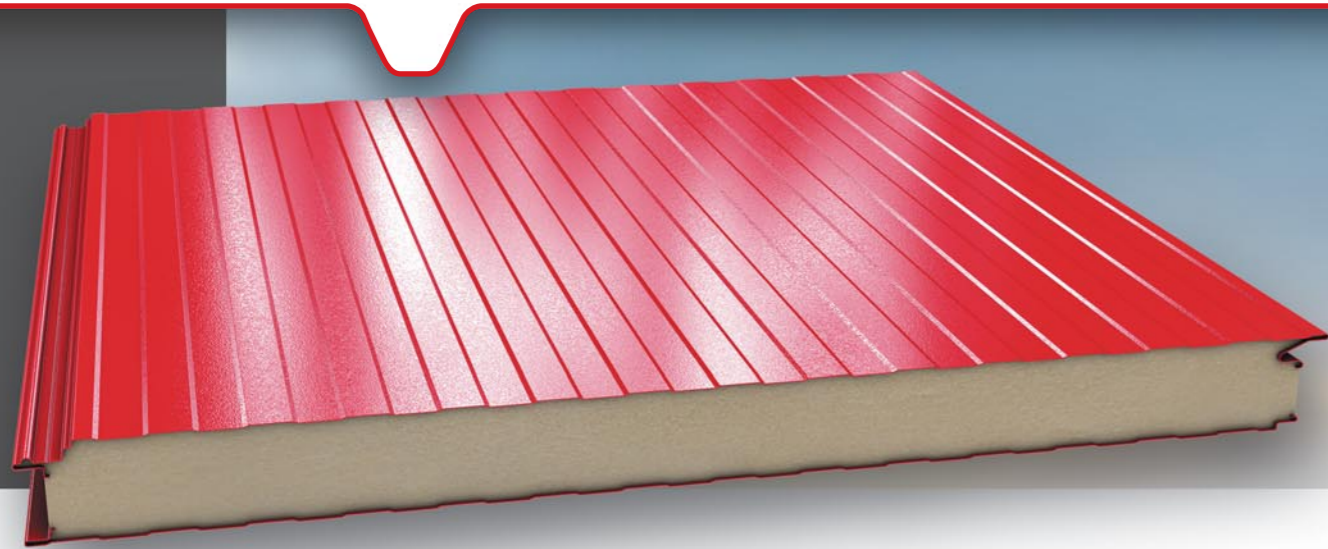
TTOP PIR		polyisocyanurate rigid foam						
thickness of the panel	(mm)	30	40	50	60	80	100	120
height of the rib	(mm)	38	38	38	38	38	38	38
thickness of the steel sheet	external	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	internal	0.45	0.45	0.45	0.45	0.45	0.45	0.45
weight of the panel with 3 ribs *	(kg/m ²)	9.59	10.01	10.43	10.85	11.69	12.53	13.37
weight of the panel with 5 ribs *	(kg/m ²)	9.91	10.33	10.75	11.17	12.01	12.85	13.69
coefficient of thermal conduction**	U(W/m ² K)	0.65	0.50	0.41	0.35	0.26	0.21	0.18

* the weight of the panel is calculated for density of the polyisocyanurate rigid foam 42 kg/m³; ** λ = 0,022 W/mK

TTOP MW		mineral wool				
thickness of the panel	(mm)	50	60	80	100	120
height of the rib	(mm)	38	38	38	38	38
thickness of the steel sheet	external	0.50	0.50	0.50	0.50	0.50
	internal	0.50	0.50	0.50	0.50	0.50
weight of the panel with 3 ribs *	(kg/m ²)	14.23	15.23	17.23	19.23	21.23
weight of the panel with 5 ribs *	(kg/m ²)	14.55	15.55	17.55	19.55	21.55
coefficient of thermal conduction**	U(W/m ² K)	0.59	0.50	0.39	0.31	0.26
fire resistance	min	-	-	REI60	REI60	REI60

* the weight of the panel is calculated for density of the mineral wool 100 kg/m³; ** λ = 0,033 W/mK





c h a p t e r

WALL
panels



Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

The **TFACE** wall panels with insulation core of rigid polyurethane foam (**PU**), polyisocyanurate rigid foam (**PIR**) or mineral wool (**MW**) are used for facades of industrial and office buildings, production halls, warehouses, sport halls, hypermarkets, business centers, garages, gas stations, etc. They are suitable for almost all kinds of sites, which require good insulation, quick assembly and aesthetic look of the building.

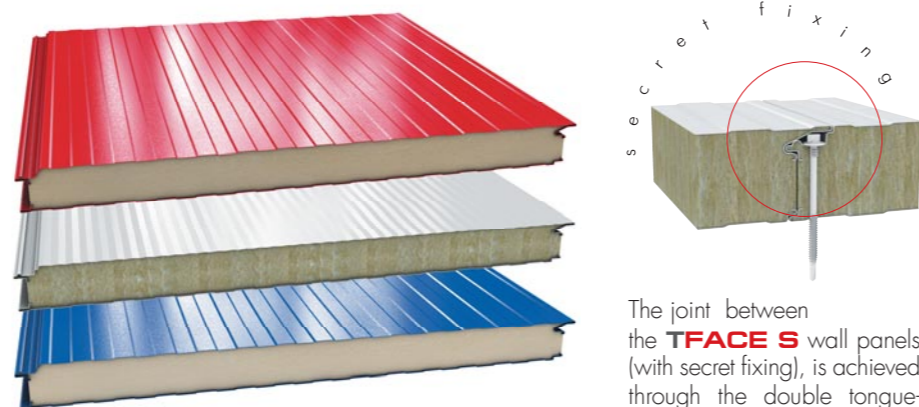
The panels have typical ribbing or smooth surface and the outer and inner layers are hot dip galvanized steel sheets with finishing polyester coloured coating.

The joining methods between the **TFACE** wall panels allow vertical, as well as horizontal assembly. This, in combination with the different types of profiling of the steel sheet gives the opportunity for a variety of architectural solutions and brings an aesthetic look of the facades, and the density of the joints guarantees water-proof and thermal insulation reliability.

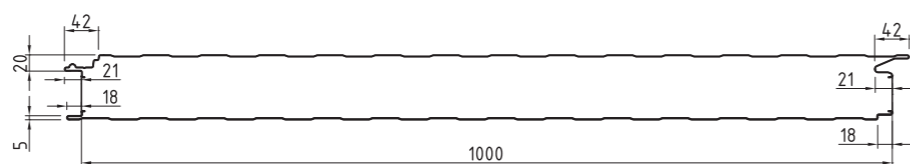
Standard thicknesses of the **TFACE** panels vary between 25 – 200 mm.

- Covering width – 1000 mm
- Maximal length – 15000 mm

TFACE S – Wall panels with secret fixing

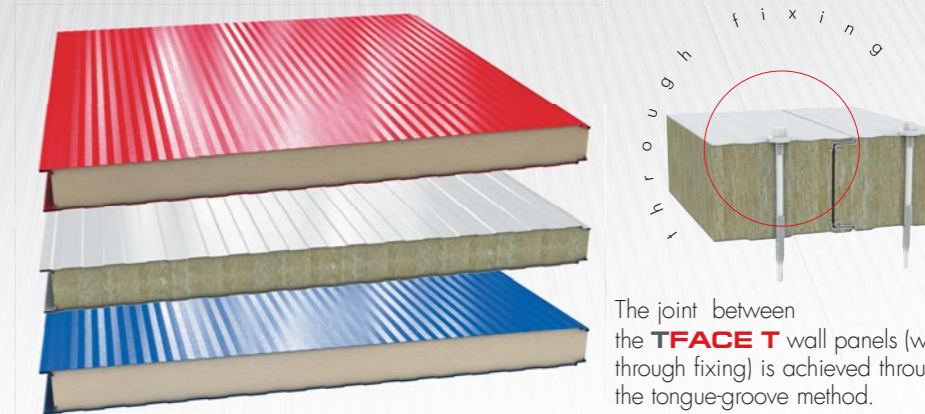


The joint between the **TFACE S** wall panels (with secret fixing), is achieved through the double tongue-groove method.

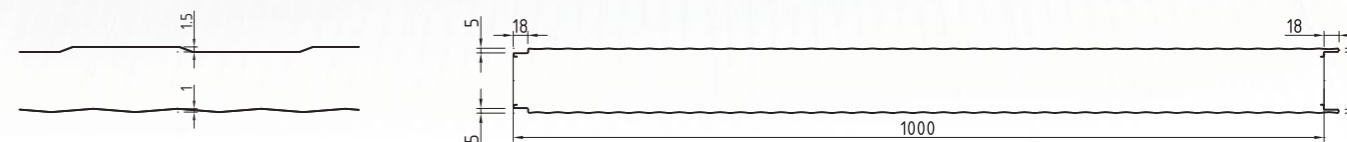


TFACE

TFACE S – Wall panels with through fixing



The joint between the **TFACE T** wall panels (with through fixing) is achieved through the tongue-groove method.



TFACE PU		polyurethane rigid foam															
		through fixing										secret fixing					
		thickness of the panel (mm)		25	30	50	60	80	100	120	150	180	40		50	60	80
thickness of the steel sheet	external	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	internal	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
weight of the panel *	(kg/m ²)	8.90	9.10	9.90	10.30	11.10	11.90	12.70	13.90	15.10	9.93	10.33	10.73	11.53	12.33	13.13	
coefficient of thermal conduction**	U(W/m ² K)	0.80	0.68	0.43	0.36	0.27	0.22	0.19	0.15	0.13	0.52	0.43	0.36	0.27	0.22	0.19	
fire resistance	min	-	-	-	EI15	EI15	EI15	EI15	EI15	EI15	-	-	EI15	EI15	EI15	EI15	

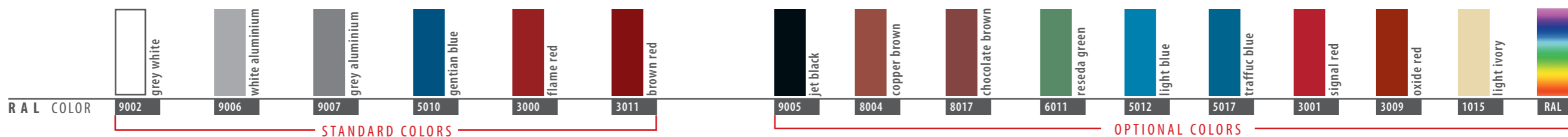
* the weight of the panel is calculated for density of the polyurethane rigid foam 40 kg/m³; ** λ = 0,023 W/mK

TFACE PIR		polyisocyanurate rigid foam															
		through fixing										secret fixing					
		thickness of the panel (mm)		25	30	50	60	80	100	120	150	180	40		50	60	80
thickness of the steel sheet	external	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
	internal	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	
weight of the panel *	(kg/m ²)	8.95	9.16	10.00	10.42	11.26	12.10	12.94	14.20	15.46	10.01	10.43	10.85	11.69	12.53	13.37	
coefficient of thermal conduction**	U(W/m ² K)	0.77	0.65	0.41	0.35	0.26	0.21	0.18	0.14	0.12	0.50	0.41	0.35	0.26	0.21	0.18	
fire resistance	min	-	-	-	-	EI30	EI30	EI30	EI30	EI30	-	-	-	EI30	EI30	EI30	

* the weight of the panel is calculated for density of the polyisocyanurate rigid foam 42 kg/m³; ** λ = 0,022 W/mK

TFACE MW		mineral wool													
		through fixing							secret fixing						
		thickness of the panel (mm)		50	60	80	100	120	150	50		60	80	100	120
thickness of the steel sheet	external	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
	internal	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
weight of the panel *	(kg/m ²)	13.80	14.80	16.80	18.80	20.80	23.80	14.23	15.23	17.23	18.75	21.23			
coefficient of thermal conduction**	U(W/m ² K)	0.59	0.50	0.39	0.31	0.26	0.21	0.59	0.50	0.39	0.31	0.26			
fire resistance	min	EI60	EI60	EI60	EI60	EI120	EI120	EI60	EI60	EI60	EI60	EI120			

* the weight of the panel is calculated for density of the mineral wool 100 kg/m³; ** λ = 0,033 W/mK



Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

FRIGOPANEL TFACE T

is a family of self-standing panels with polyurethane insulation.

This family has assembling of cog - groove intended to build refrigerator storing premises with positive and negative temperatures, and it is designed to provide complete decisions for refrigerator industry, providing the following advantages:

- LOW HEAT PERMEABILITY
- WATER PROOF SURFACE
- LOWWEIGHT
- NICE AESTHETIC LOOK
- DURABILITY
- EASY AND FAST MOUNTING



FRIGOPANEL TFACE T

PANELS FOR REFRIGERATOR CHAMBER WITH **POSITIVE TEMPERATURES**

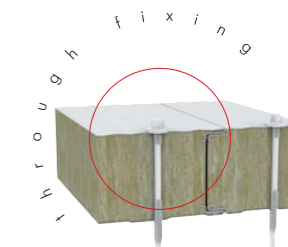
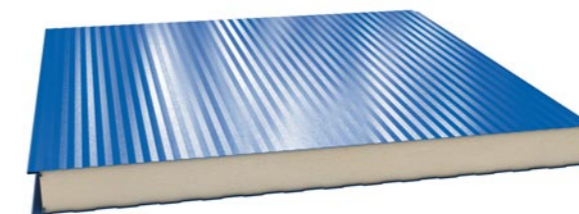
FRIGOPANEL TFACE T is a family of self-standing panels with polyurethane insulation, useful width of 1000 mm, with thickness of 60, 80, 100, 120 mm.

This family has assembling of cog - groove intended to build refrigerator storing premises with positive temperatures, and it is designed to provide complete decisions for refrigerator industry.

TFACE T		polyurethane rigid foam			
thickness of the panel	(mm)	60	80	100	120
thickness of the steel sheet	external	0.50	0.50	0.50	0.50
	internal	0.45	0.45	0.45	0.45
weight of the panel *	(kg/m ²)	10.30	11.10	11.90	12.70
coefficient of thermal conduction**	U(W/m ² K)	0.36	0.27	0.22	0.19
fire resistance	min	E115	E115	E115	E115

* the weight of the panel is calculated for density of the polyurethane rigid foam 40 kg/m³; ** λ = 0,023 W/mK

FRIGOPANEL – Wall refrigerator panels



The joint between the **TFACE T** wall panels (with through fixing) is achieved through the tongue-groove method.

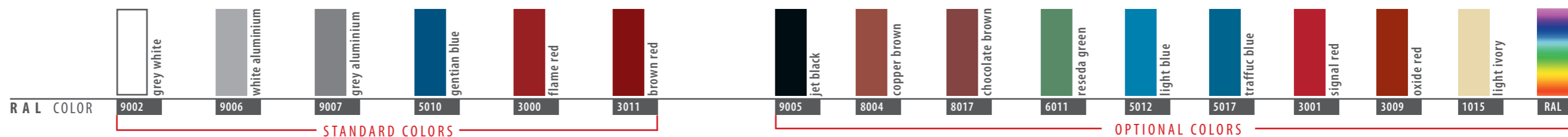
PANELS FOR REFRIGERATOR CHAMBER WITH **NEGATIVE TEMPERATURES**

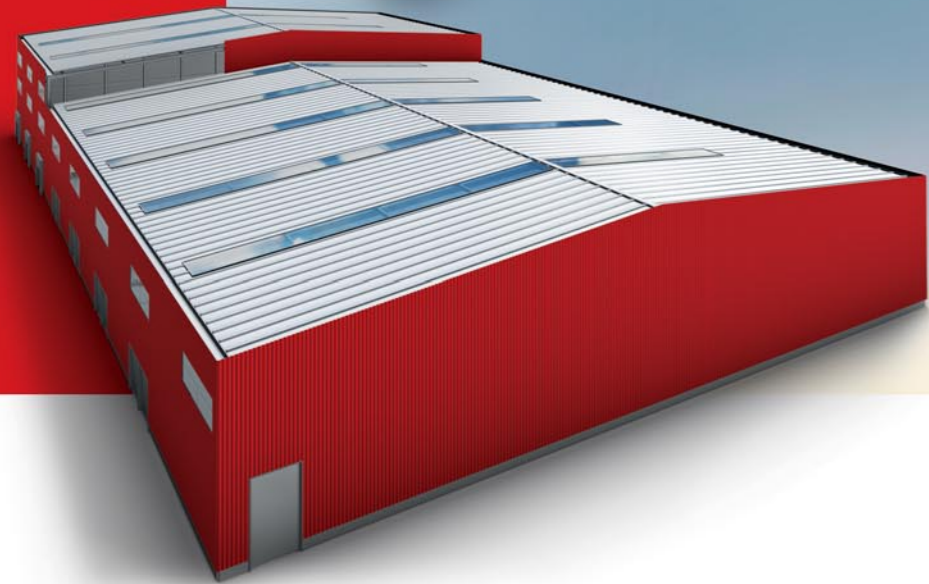
FRIGOPANEL TFACE T is a family of self - standing panels with polyurethane insulation, useful width of 1000 mm, with thickness of 120, 150, 180 mm.

This family has assembling of cog - groove intended to build refrigerator storing premises with negative temperatures, and it is designed to provide complete decisions for refrigerator industry.

TFACE T		polyurethane rigid foam		
thickness of the panel	(mm)	120	150	180
thickness of the steel sheet	external	0.50	0.50	0.50
	internal	0.45	0.45	0.45
weight of the panel *	(kg/m ²)	12.70	13.90	15.10
coefficient of thermal conduction**	U(W/m ² K)	0.19	0.15	0.13
fire resistance	min	E115	E115	E115

* the weight of the panel is calculated for density of the polyurethane rigid foam 40 kg/m³; ** λ = 0,023 W/mK





c h a p t e r

SYSTEMS

Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

The roof panels from the **TTOP** product line are the main element of the roof system **T-ROOF**. Through this system Technopanel offers a rational solution to achieve excellent technical characteristics and durability of the roof. The area of application of the roof panels **TTOP** is extremely broad. They are suitable for manufacturing, warehousing, retail and office buildings, sports halls, as well as representative buildings of varied architecture, where the flawless vision is paramount.

The rich variety of colors and profile of the panels provide a wide creative freedom in design. To maximum facilitate architects and designers **TECHNOPANEL** offers a wide variety of details and provide all materials necessary for their implementation.

T ROOF



T Classic WALL

In the basis of the facade system **T-ClassicWALL** are wall panels with through fix **TFACE T**. They are lightweight and easy to install. These panels are designed for use in buildings with a standard form and structure, where the focus is on functionality and rationality. That kind of constructions are all industrial and warehouse buildings, sports halls, plus and minus freezers and others. However the practicality of these panels does not exclude esthetic vision. The wide range of colors and different types of ribbed sheets gives clients extensive opportunities to express their individual ideas: classical or modern, impressive or modest.

The **TFACE T** panels allow to be mounted both horizontally and vertically. For both installation options Technopanel offers standard solutions for all types of set, as well as developing new and individual details, designed to satisfy the high requirements of our customers.

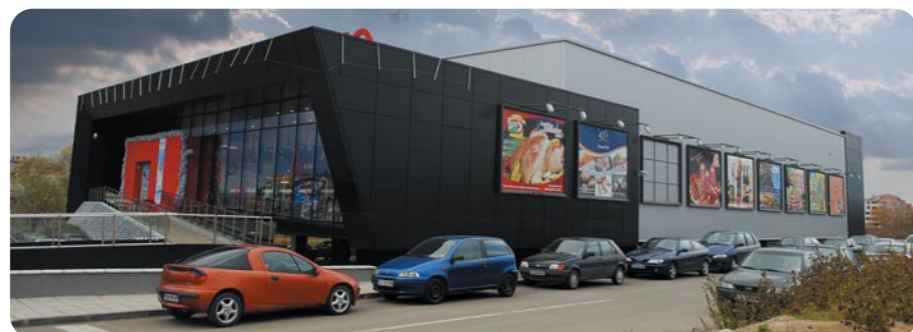


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The main elements of the facade system **T-SecretWALL** are the wall panels with secret fix **TFACE S**. The absence of visible screws on the facade makes them suitable for use in prestigious industrial and commercial buildings where esthetics is essential. Nevertheless behind the elegant solution with panels **TFACE S**, you will always find a practical and easy to use product carrier to the idea that it is possible to combine beauty and functionality. When working with our products offered in a wide range of colors and types of ribbed sheets you can release your imagination and create individual solutions, even in very complicated projects.

The **TFACE S** panels allow to be mounted both horizontally and vertically. **TECHNOPANEL** offers standard and individual solutions for the finishing elements to achieve the esthetic integrity of the facades.

T Secret WALL



c h a p t e r

**ADDITIONAL
information**



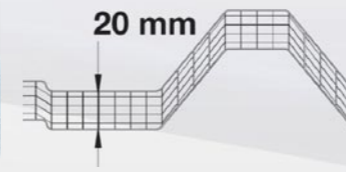
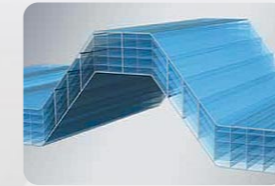
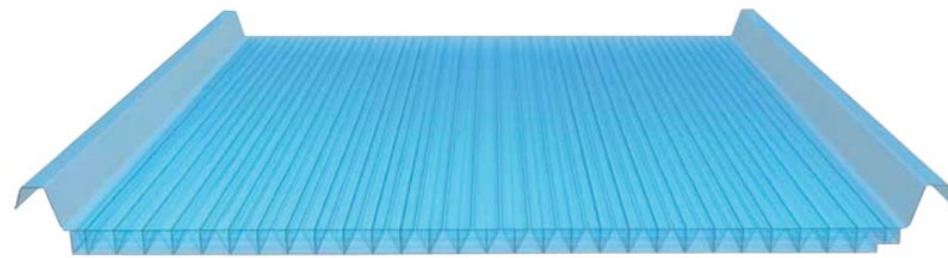
Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

Technopanel offers to its clients polycarbonate panels, directly imported from Switzerland. This product is an excellent material for the realization of natural roof lighting. Natural lighting has many advantages – it does not require additional resources and leads to the realization of significant energy savings.

Key features of polycarbonate panels are:

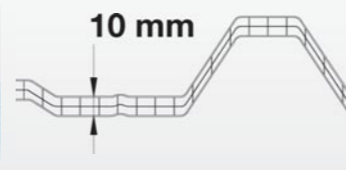
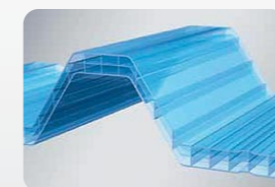
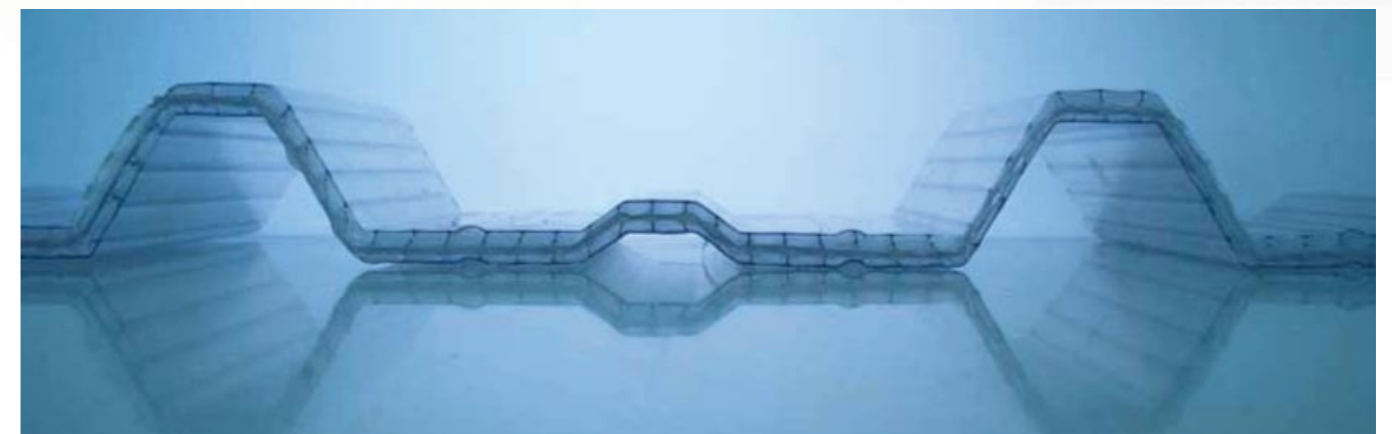
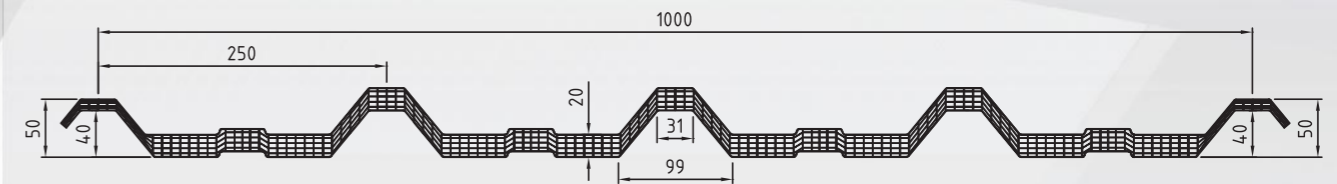
- Extremely small dead weight
- Good thermal insulation
- High strength characteristics
- Excellent light transmission
- UV protection

POLYCARBONATES



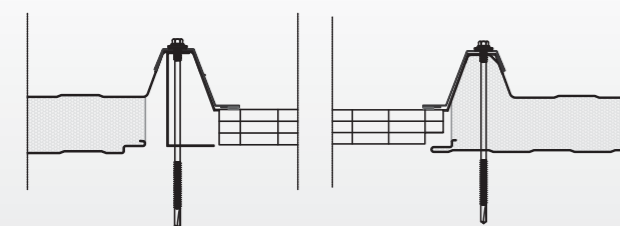
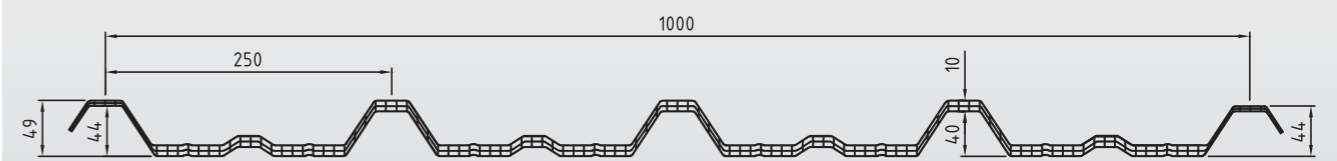
GRECALITE 40/20

Thickness	mm	20
Useful width	mm	1000
Coefficient of thermal conduction	U(W/m ² K)	1.8
Light transmission	clear	% 49
	opal	% 35



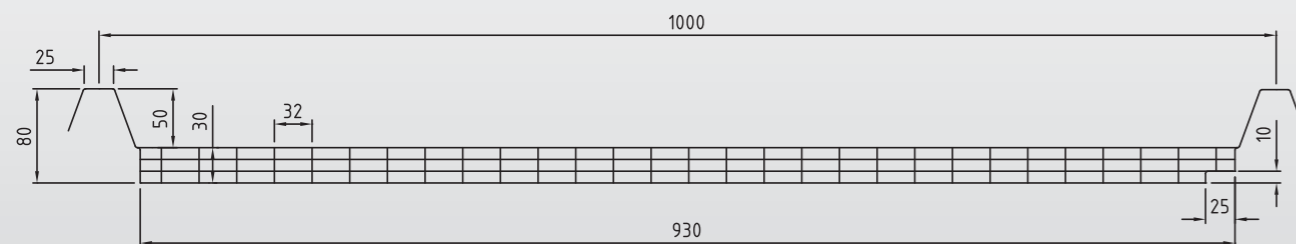
GRECALITE 40/10

Thickness	mm	10
Useful width	mm	1000
Coefficient of thermal conduction	U(W/m ² K)	2.8
Light transmission	clear	% 72
	opal	% 60



VEGA 30

Thickness	mm	30
Useful width	mm	1000
Coefficient of thermal conduction	U(W/m ² K)	1.6
Light transmission	clear	% 52
	opal	% 35

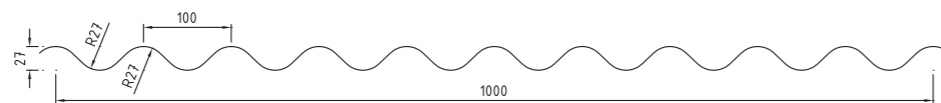
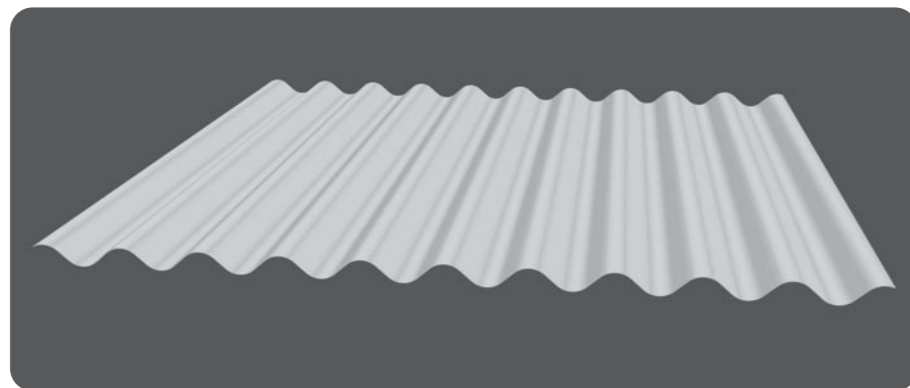


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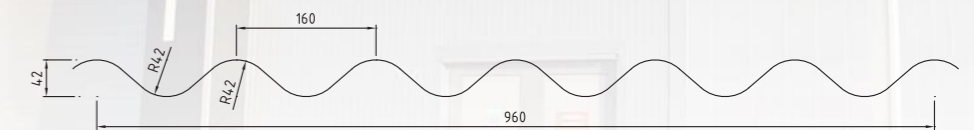
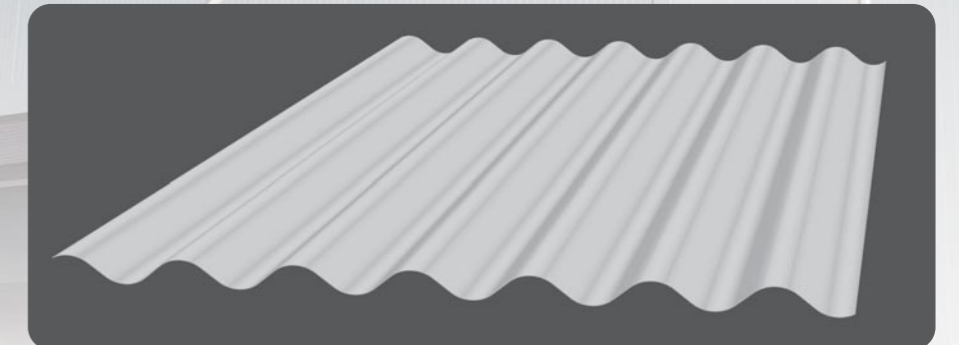
STEEL sheets

For more extensive coverage of the needs of its clients, **TECHNOPANEL** offers profiled steel sheets in a wide range of heights of the profile. Profiled steel sheets are a good alternative for facade and roof solutions. Typical of this material is easy installation, guaranteed water-proofing, high corrosion resistance.

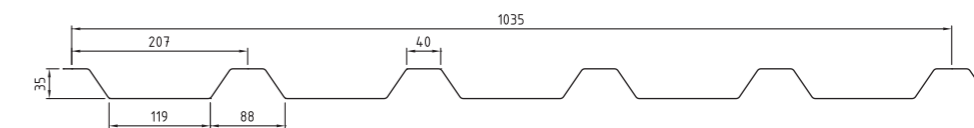
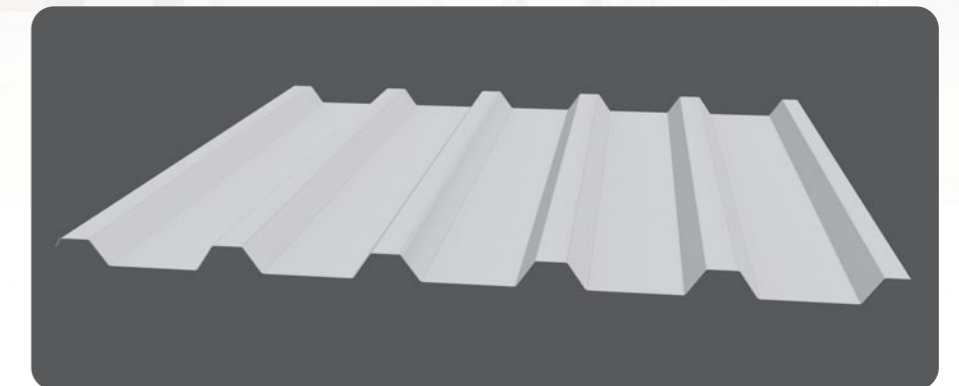
W 27		
Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.50	5.0	1000 / 800
0.60	6.0	
0.70	7.0	Lmin = 2000 Lmax = 15000
0.75	7.5	
0.80	8.0	
0.88	8.8	
1.00	10.0	



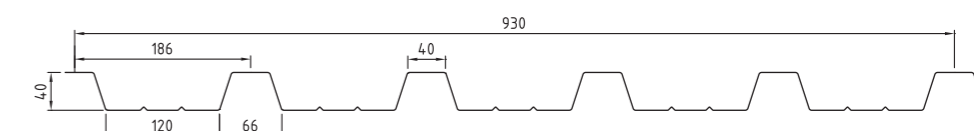
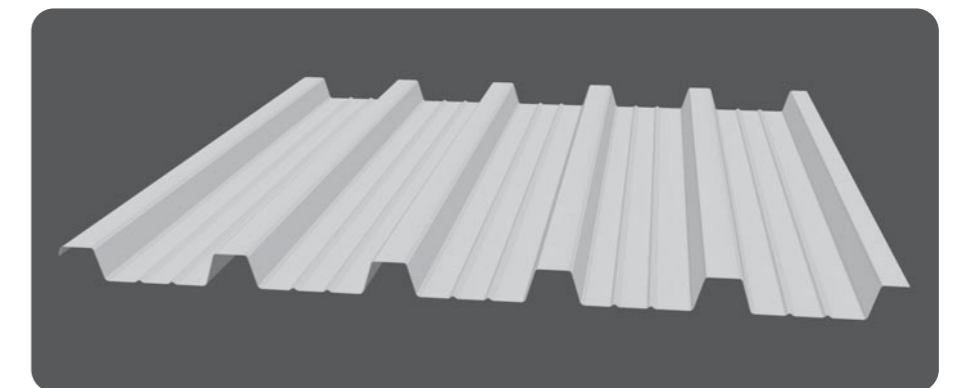
W 42		
Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.60	6.25	960
0.75	7.80	
0.8	2.95	Lmin = 0 Lmax = 12000
Aluminium		
0.88	9.15	
1.00	10.40	



LT 35		
Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.50	4.85	1035
0.60	5.80	
0.70	6.80	Lmin = 0 Lmax = 18000
0.75	7.30	
0.80	7.75	
0.88	8.50	
1.00	9.70	

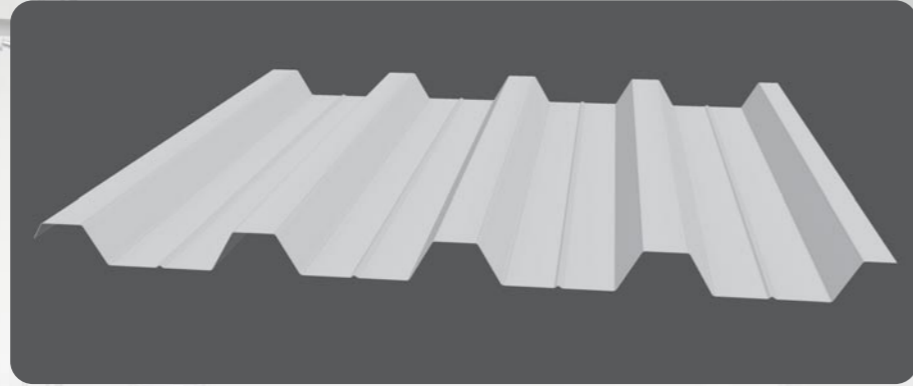


LT 40		
Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.50	5.40	930 / 744
0.60	6.45	
0.70	7.50	Lmin = 0 Lmax = 15000
0.75	8.05	
0.80	8.60	
0.88	9.45	
1.00	10.75	



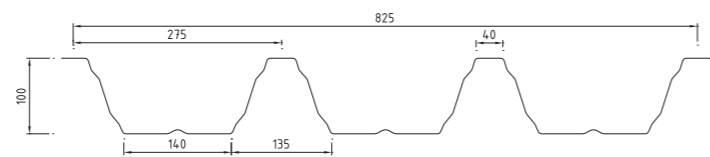
LT 50

Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.50	5.05	992 Lmin =3000 Lmax =15000
0.60	6.06	
0.70	7.07	
0.75	7.57	
0.80	8.08	
0.88	8.88	
1.00	10.10	



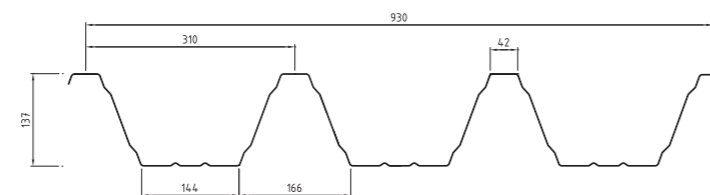
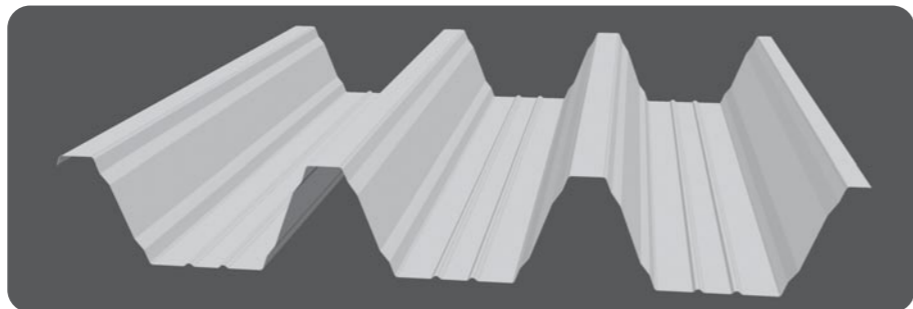
TR 100

Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.75	9.0	825 Lmin =3000 Lmax =15000
0.88	10.6	
1.00	12.0	
1.25	15.0	
1.50	18.0	



TR 135

Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.75	9.7	930 Lmin =0 Lmax =24000
0.88	11.4	
1.00	13.0	
1.25	16.2	
1.50	19.5	



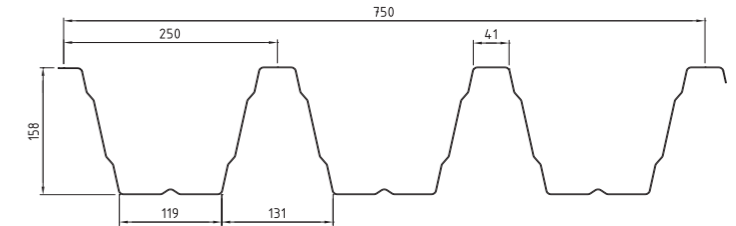
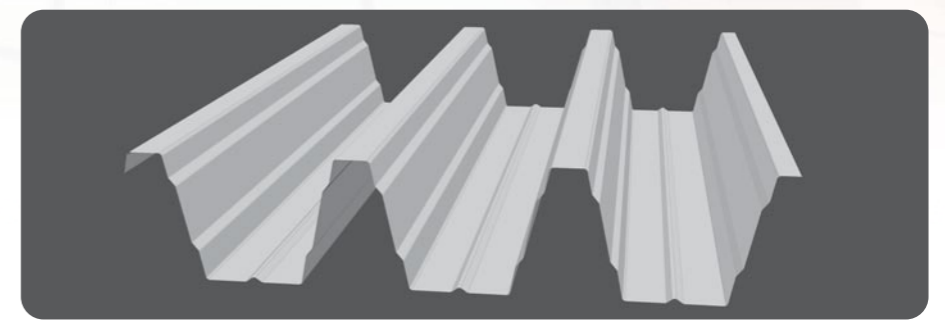
TR 150

Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.75	10.7	840 Lmin =0 Lmax =24000
0.88	12.6	
1.00	14.3	
1.25	17.9	
1.50	21.5	



TR 160

Thickness (mm)	Weight (kg/m ²)	Useful area (mm)
0.75	12.1	750 Lmin =0 Lmax =24000
0.88	14.2	
1.00	16.1	
1.25	20.1	
1.50	24.2	

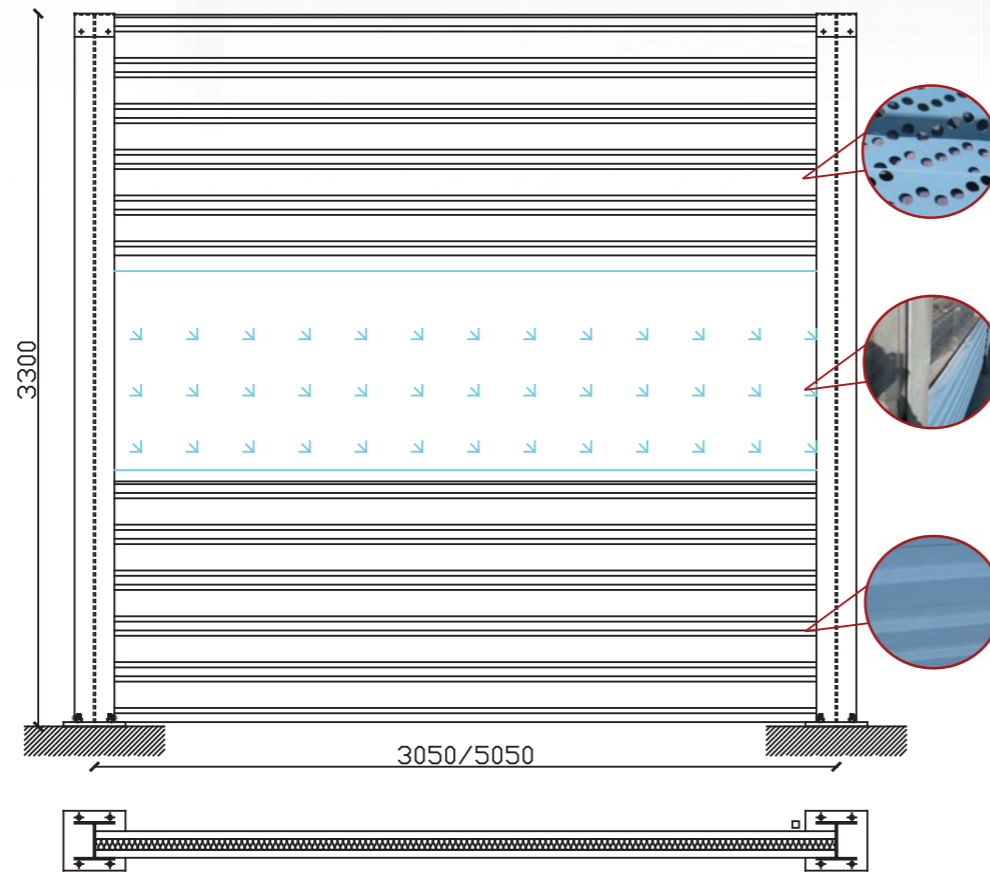


Technopanel EAD is the Bulgarian company, which develops, manufactures and markets roof and wall cladding systems composed of sandwich panels for the needs of the industrial construction. A Member Of Balkanstroy Group.

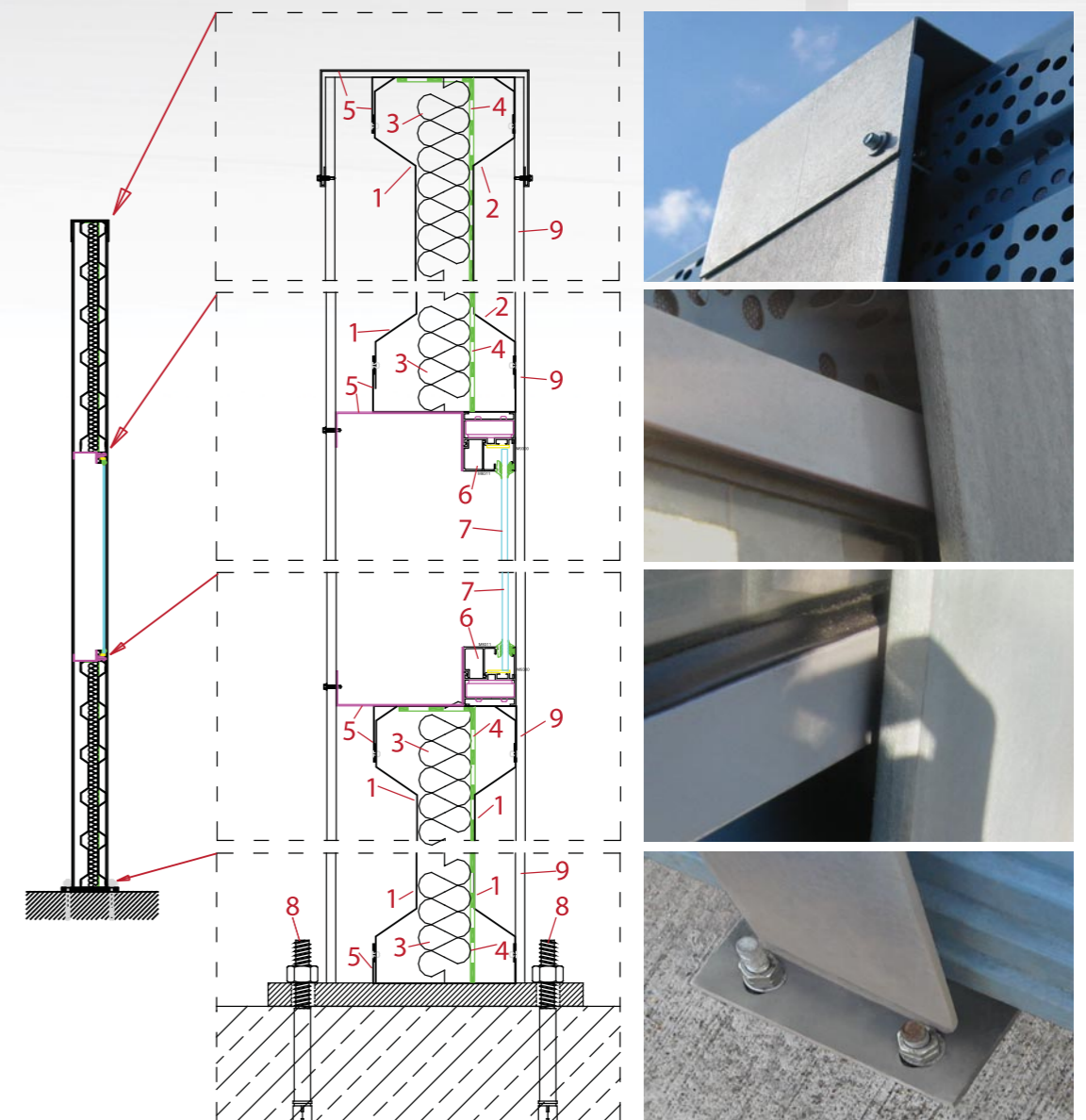
Sound-absorbing wall has the aim of reducing and divert the noise from passing vehicles, to improve the lives of the people living near busy road arteries.

It is composed of three elements in height: a thick wall, transparent wall, a porous wall. The first aims ingesting of large vibrations and the diversion of some of them up. The second has the same purpose as the first, but transmits light in order to improve illumination of the roadway. The third aims to absorb weak vibration, diverted from the first two.

ROAD NOISE barriers



Sound-absorbing wall



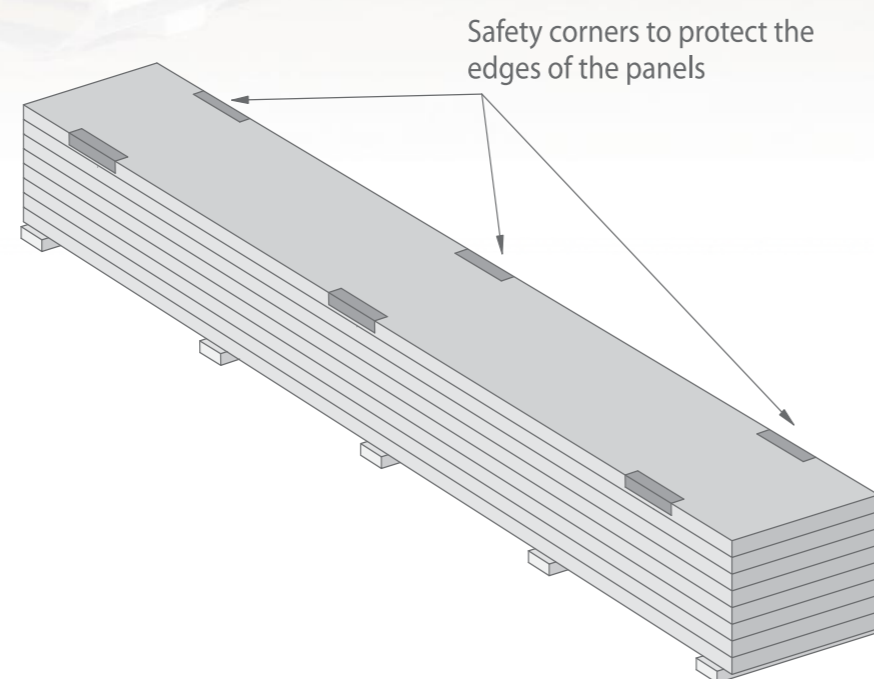
- | | |
|-----------------------------------|------------------------|
| 1 - LT profiled sheets | 6 - Aluminium profile |
| 2 - perforated LT profiled sheets | 7 - plexiglass 5mm/8mm |
| 3 - mineral wool | 8 - anchor |
| 4 - steam insulation | 9 - double T profile |
| 5 - cold bended profile | |

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INSTRUCTIONS FOR HANDLING, STORAGE AND ASSEMBLY OF SANDWICH PANELS TECHNOPANEL

PACKING

Sandwich panels are being delivered on stacks. To ensure protection of the edges of the panel in loading and unloading activities carried out by crane with lifting belts, stacks need to be reinforced at the bottom and at the top with protective angular elements that accompany the panels in each expedition.



MAXIMUM VALUES OF THE STACK	MEASURE	SIZE
maximum weight of the stack	kg	2150
maximum length of the stack	mm	13500
maximum width of the stack	mm	1200
maximum height of the stack	mm	1200

TRANSPORT

The sandwich panels can be transported only by roadworthy trucks.

Load-carrying surfaces must be clean. No nails or other sharp objects can protrude from the truck bed or its walls. Protruding objects have to be properly secured to avoid damage to the panels.

INSTRUCTIONS FOR HANDLING, STORAGE AND ASSEMBLY

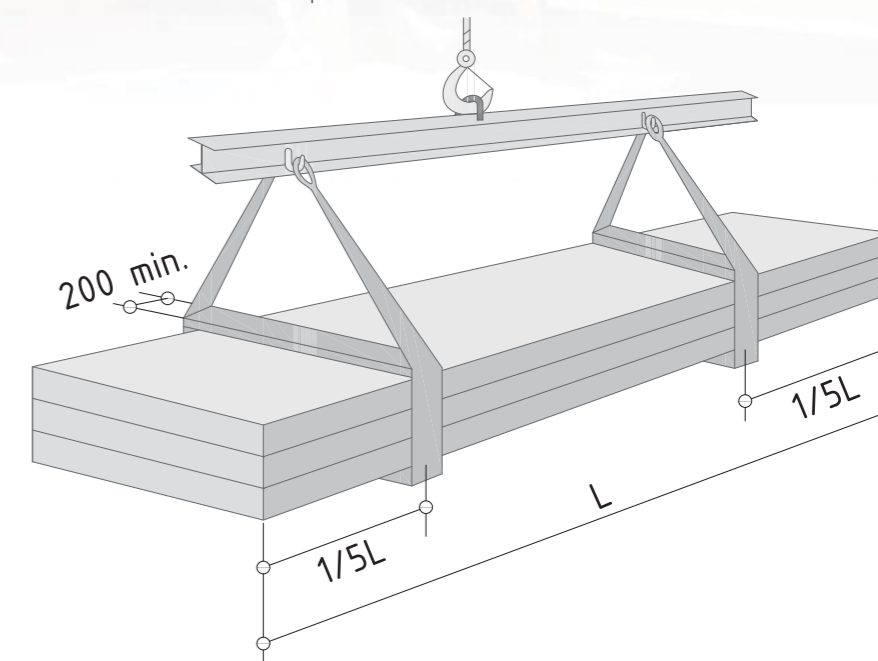
The vehicle has to be long enough to ensure complete support coverage for the loaded package. The package is allowed to protrude no more than 1.5 m out of the truck bed. The recommendation loading space width ranges is about 2500 mm, whereas the maximum traveling speed cannot exceed 70 km/h.

The vehicle to carry the panels should be equipped with cargo straps to ensure the cargo on the vehicle bed. Number of the straps depends upon the panels length; the straps should be spaced approximately every 2 m. In case of flashing packages are being transported with the panel packages, they should be fastened separately.

The panels should be checked for defects upon delivery. Claims must be specified in the consignment note and accompanying documents, that the recipient or his attorney has signed, and be notified immediately in writing to the competent office outlets according to the sale contract.

UNLOADING

The unloading of the panels should proceed in a manner shown in the drawing below. (Unloading with slings can result in damage to the panels / stacks of panels)! If the stack is long particular attention should be paid to the bending and deflection. These problems are eliminated with the use of a crane beams and sleepers.

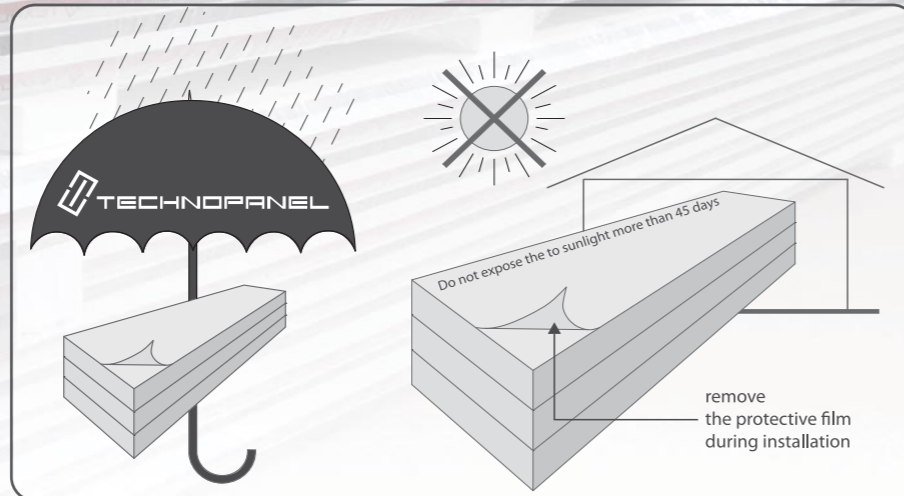


Stacks up to 6m can be raised and forklifts.

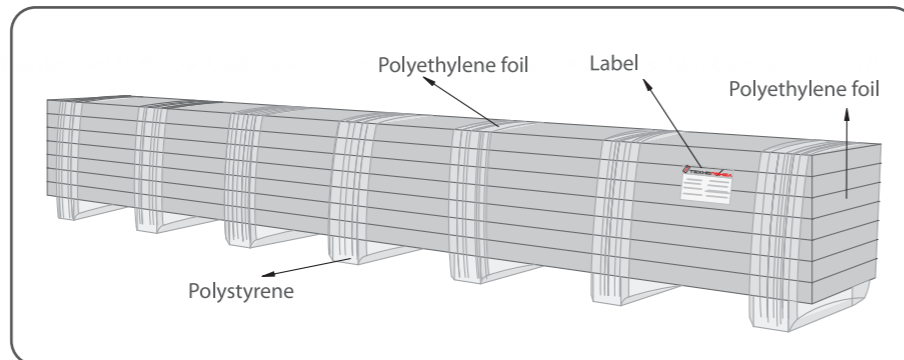
Packets with length of 6m to 13,5 m should be lifted by crane or with forklift for long panels. To ensure protection of the edges of the panel in loading and unloading activities carried out by crane with lifting belts, stacks need to be reinforced at the bottom and at the top with protective angular elements that accompany the panels in each expedition.

STORAGE CONSIDERATIONS

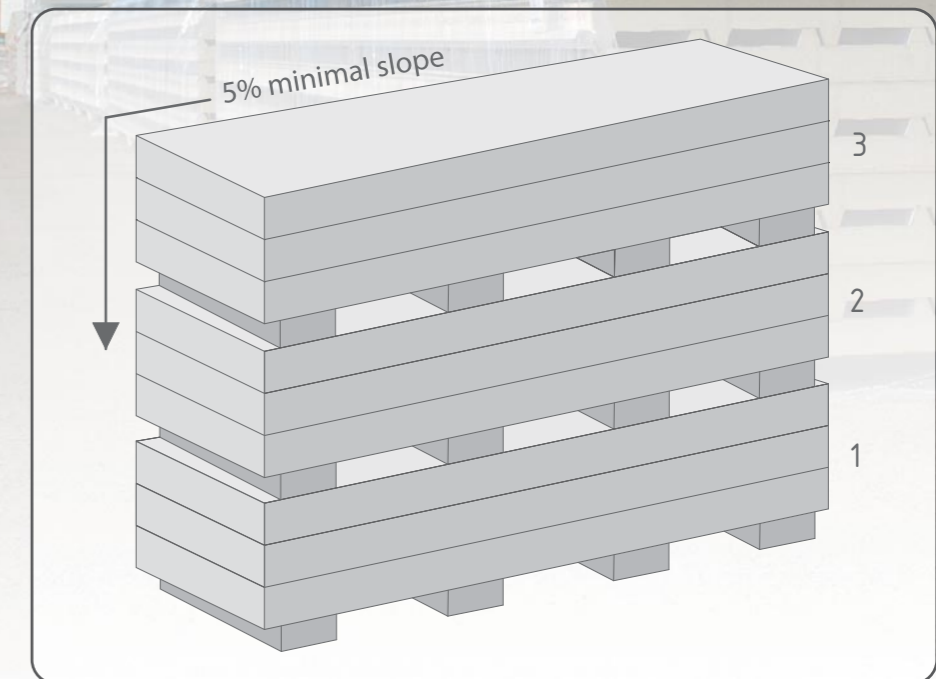
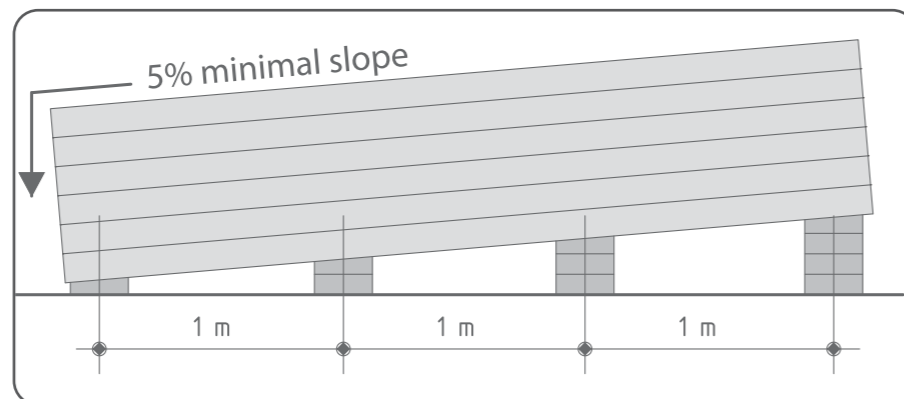
Do not keep the package of panels at a job site or warehouse more than 3 months. To protect the package from the collected water at the base put wooden or polystyrene block trough the long side with minimum height 100 mm. Stacking yard must be open to air circulation.



If the package of panels at a jobsite cannot be stored inside, be sure to wrap the packages with polyethylene covering. The covering needs to be applied



in a manner that does not allow water to accumulate in the package. At a minimum, cover the packages with a tarp! Keep the tarp covering open at the bottom so that water can flow away freely and so that the packages can have freely airflow to allow the packages to dry if for some reason condensation does occur.



Put the packages with 5% slope, in order to prevent the water collection between the panels!

Do not store more than three packages one on top of another and place spacers or board between them!

WEATHER CONDITIONS

The following weather conditions are of critical importance for assembly of sandwich panels.

- Due to the relatively low weight-surfaces ration of the panels, the wind speed should not exceed 9 m/s.
- The panels should not be installed during snow and rain falls or during a dense fog.
- The panel assembly should be stopped when the visibility reduces at dusk and there is no artificial light provided.
- Sealing operations should not be performed in the ambient temperature above 4 °C.

PREPARING FOR INSTALATION WORK

Before attempting to install the sandwich panels proceed as follow.

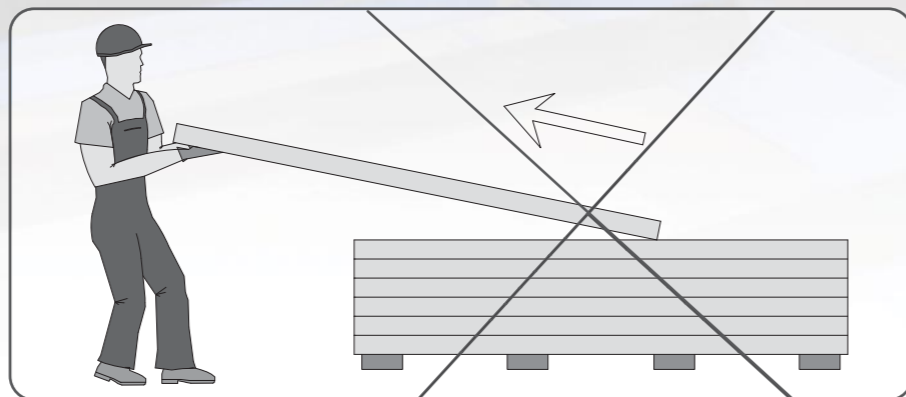
- Check the structure for compliance with design specifications and construction accuracy.
- Make sure the spacing of purlins, columns and spandrel beams is consistent with the guidelines contained in the static load tables.
- Make sure the purlins/ columns/ spandrel beams surfaces form a plane.
- Prepare necessary tools for assembly of panels.

Proper structure preparation will facilitate the assembly, and result in faultless performance of fasteners and joints, ensuring esthetical building finish.

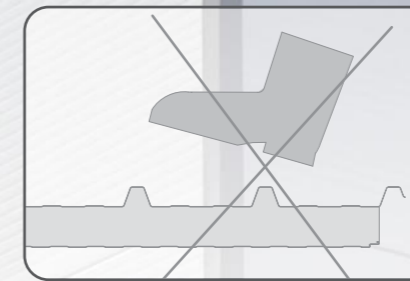
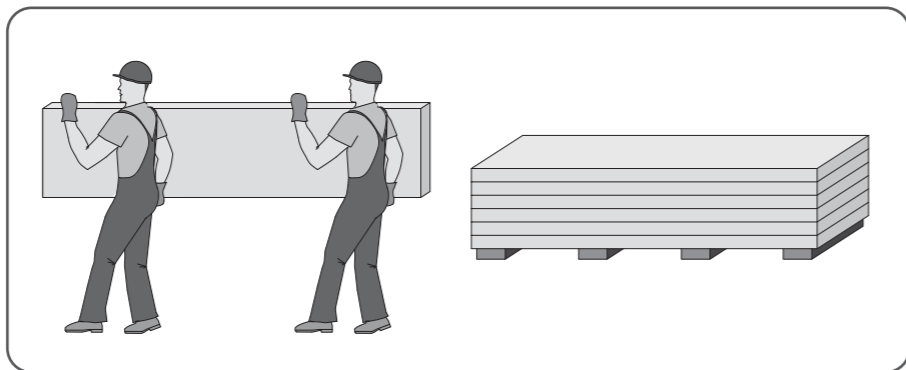
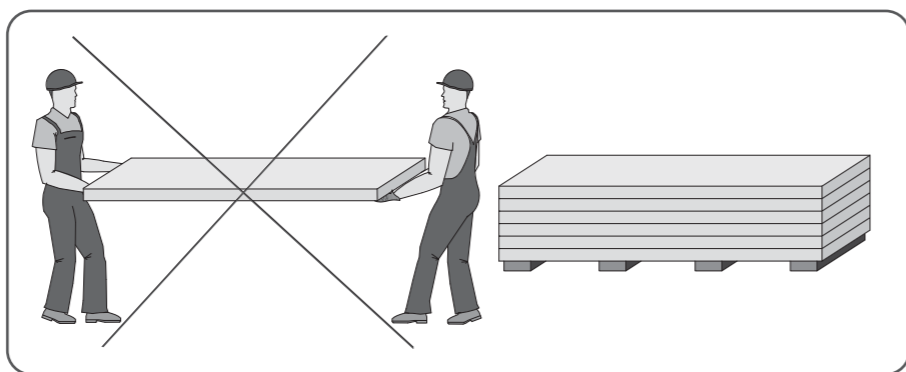
INSTALLATION

In order to prevent the high-quality panels from being damaged, they must be handled with care. It is recommended that clean gloves are worn. Usually the panel edges have a type of burr from the searing operation and the paint film can be scratched through to the zinc containing coating when panels are slid across one another. At any location where the paint is compromised, the metallic coating begins to corrode more rapidly and life of the prepainted panel is adversely affected.

Do not sweep the panels from the package in the manner shown in the drawing below. Pulling and dragging the panels can cause scratches. Grasp both sides and lift by pushing in the lateral direction!



When removing single panels from a package, make sure that any distortion, bending and localized loads on the panels are avoided! The panels should be transported vertically!



Sure any packages that have already been opened to protect them against storm.

Worker's footwear can also cause similar scratching damage. It is important that shoes or boots do not allow small stones, steel drillings, etc., to be embedded into the soles.

During the installation of the panels there are often trimming operations on site needed. In those cases the following must be taken into account:

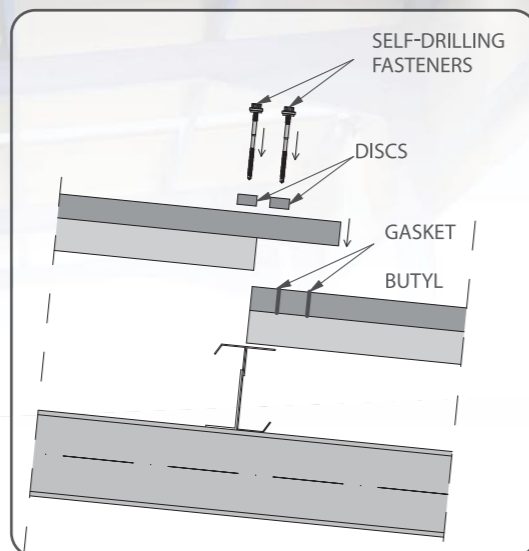
- Before beginning the cutting procedure, measure and mark the cutting line on every panel. The line must be clear and without complicated shapes.
- During the cutting procedure, the panels must be laid horizontally and must be well supported on a workbench or on level supports with a soft surface (e.g. a wooden palette with polystyrene pieces, etc).
- Openings in roof and wall components, before the panel is assembled, weaken its cross-sectional structure, therefore adequate stiffening should be provided in those places.
- The cutting of roof covering materials is also possible when they have already been fixed in their final position on the metal frame of the building. In this case, make sure that they are firmly in place and not liable to wobble as they are being cut.
- If the panel is thick and it is difficult to cut the outer steel sheet and the inner aluminum/paper sheet of the panel at the same time, then the cutting line must be marked on both metal sheets so that the cutting can be carried out in two steps.
- During the installation often are formed clippings and/or filings as a result of cutting the panel or using self-drilling screws. If they are not removed promptly from the panel surface they will corrode and cause rust staining, which is undesirable especially if the paint color is bright. Too often this staining is considered as a prerequisite for damage to the panels and their aesthetics. All chips must be removed immediately from the surface of the panel.
- The cutting tools must make the cutting clean and easy and must not damage the panel surface. For this reason, it is suggested that the cutting be done using a disk saw rather than a cutting wheel, with suitable guides for the best cutting line. Moreover, the disk saws must be of high quality to avoid damage to the cutting surface.

Where there is a low-slope roof, the possibility of water ponding is real. Even though the slope design might be adequate to provide for free drainage, there might be local issues that lead to ponding water. Small dents caused by workers (walking or placement of tools etc.), can leave behind areas that do not experience free drainage. If free drainage is not allowed, the pond may lead to paint blistering, then to paint detachment in large areas, and then to more aggressive corrosion of the metallic coating beneath the paint. After erection, settling of the building may lead to improper roof drainage.

To prevent water to pond you should comply with the requirements for a minimum gradient of the slope as follows:

- 5% for roofs of continuous panels without transverse joining and skylights.
- 7% for roofs of joint panels or with skylights.

Overlapping is required in many cases: for practical reasons and also because of expansion due to temperature changes, when the required length of a roof panel is much more than the maximum allowed for a roof construction (more than 1.5m). In these cases two shorter panels are used which are installed on the roof in a line. To ensure water permeability of connection the overlapping length must be in the range (100-200) mm.

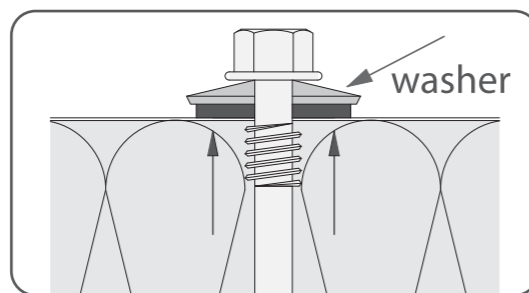


Essential in the performance of roofs is that due to the overlapping application of the panels it is carried downwind. The project of the roof where it is necessary to use overlapping panels must be consistent with the prevailing wind direction for the region. The plan of the roof must clearly show the direction of assembly and the wind, so placing the panels to be correct. The direction of installation is essential to reduce the risk of water penetration through the roof of the building.

The panels and their installation widths shall be marked prior to installation plan. When assembling the first element should be aligned and fastened exactly as planned. Adjustment of the next panel by pulling and pushing is not possible. Subsequent panels can then be installed without a problem. It is recommended to control the tolerances of the elements and therefore to be taken into account. Reconciliation of adjustments must also be taken into account in the assembly plan.

Use manufacturer recommended self-drilling fasteners for fixing the sandwich panels. The fastener type will depend upon the load carrying and the thickness of the panel being assembled. In order to achieve adequate fastening of the panel to the structure it is essential to maintain perpendicular fastener position while fixing, therefore the use of a special screw guns fitted with heads for long fasteners is highly recommended.

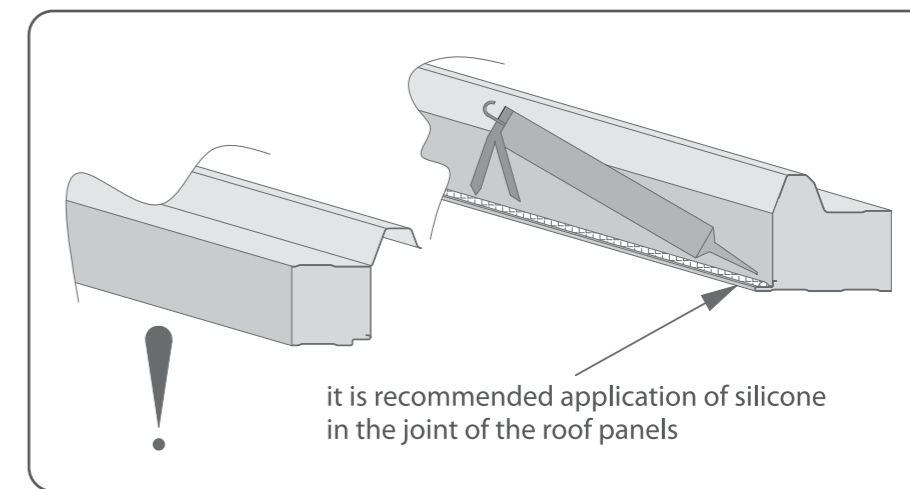
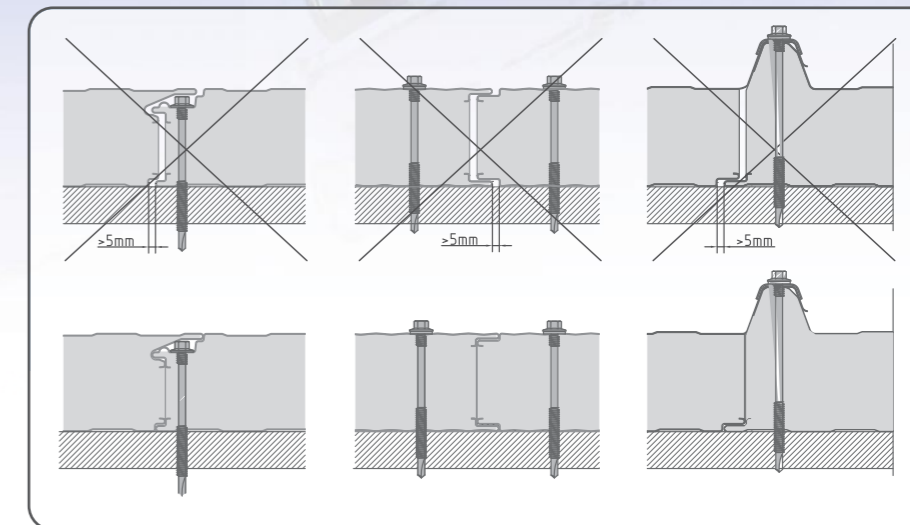
Use stainless steel fasteners for fixing panels to structures where the following conditions are preset:



- The atmosphere inside is characterized by a permanent moisture content of above 70%.
- Chemically aggressive atmosphere is present inside.
- The equipment stored requires particular protection.

Thanks to specially designed support threads with no thread under fastener head and a washer with EPDM vulcanized layer, watertight and durable fastening is achieved in one operation, which eliminates clearance between the sandwich panel and its base.

During the installation should be paid special attention to the density of connections. There should be no air space in the longitudinal joint between adjacent panels.



PROTECTIVE FILM

The protective foil is placed to avoid contamination and mechanical damage during transportation and installation of panels. It should be removed immediately upon completion of installation works, as it is fragile due to weather conditions and then gets difficult to be removed or not completely removable. In place of the cross-splice film panels must be removed before installation. If the panels have a stay on site for awhile before installation, make sure the film will be removed no later than three months after receiving notification of ready goods.

Do not expose panels with applied protective film to direct sunlight!

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As a producer Technopanel establishes, documents and maintains a system of factory production control (**FPC**), to ensure that products provided on the market comply with the stated performance characteristics. **FPC** is a constant internal control of the production, performed by the manufacturer. **FPC** system consists of procedures, regular inspections and tests and/or assessments and usage of the results to control raw materials and other materials or components, equipment, production processes and products.

In order to guarantee the high quality of our products, we have laboratory equipment for factory production control by the product standard BDS EN14509 of the German company **Zwick Roell**, that has proven itself as the best manufacturers of physical and mechanical test equipment.

Especially for Technopanel it has been designed 30 kN apparatus, covering all methods of mechanical testing of sandwich panels, with insulation of polyurethane and polyisocyanurate as well as mineral wool. The machine is unique in Europe. It has software specifically designed for the needs of the company and enabling determination of all parameters.



TECHNOPANEL panels are certified for fire resistance, fire response, strength, thermal properties and healthcare assessment of viability. Proven qualities of the panels are subject to constant quality control. Technopanel cover quality standard **ISO 9001**. This means that all processes from raw materials to the manufacture and delivery are carried out in accordance with the certified system for quality management.

QUALITY AND certification

CERTIFICATE FOR QUALITY MANAGEMENT ISO 9001



CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

TECHNOPANEL JSC
1805, Yana village
Bulgaria

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards:

BS EN ISO 9001:2008 EN ISO 9001:2008 ISO 9001:2008

The Quality Management System is applicable to:

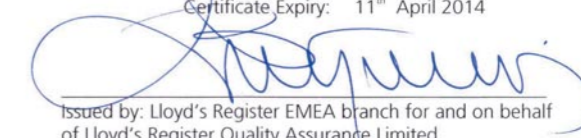
Manufacturing of thermo-insulating sandwich panels with core of polyurethane foam (PUR), polyisocyanurate foam (PIR), mineral wool (MW) and roll formed metal sheets for structural and industrial applications. Wholesale of metal sheets and flashings.

Approval
Certificate No: SOF6011660

Original Approval: 12th April 2011

Current Certificate: 12th April 2011

Certificate Expiry: 11th April 2014



Issued by: Lloyd's Register EMEA branch for and on behalf of Lloyd's Register Quality Assurance Limited.



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This document is subject to the provision on the reverse

81A Bulgaria Blvd, 1404 Sofia, reg. number 121726037

This approval is carried out in accordance with the LRQA assessment and certification procedures and monitored by LRQA. The use of the UKAS Accreditation Mark indicates Accreditation in respect of those activities covered by the Accreditation Certificate Number 001.

Proof of extreme precision and liability of the orders, high quality of the products and attitude towards clients are the received from Technopanel JSC references.

Warehouses and offices of INKOFOODS
Sofia



Car service and showroom of "SOFIA AUTO"
Sofia



PENNY MARKET
Pazardzhik



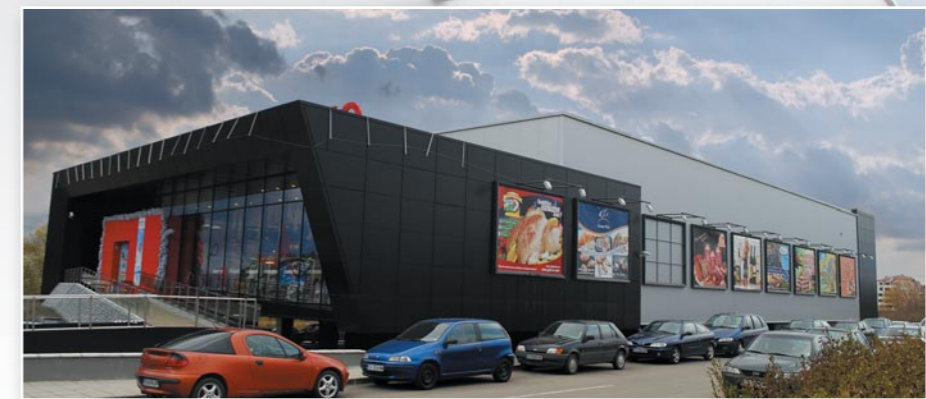


IMPAS
Sofia



FANTASTICO
Sofia

ATAROKLIMA
Plovdiv





Plant for production
of plasterboard and dry
construction mixtures
TECHNOGIPS
Radnevo





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