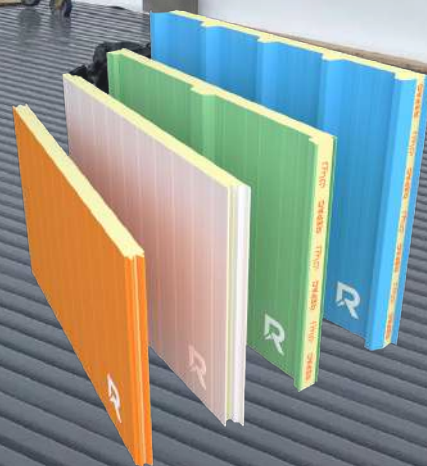


VERSATILE
APPLICATIONS WITH
A SINGLE SOLUTION

Selection Guide

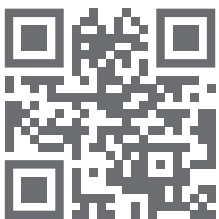
SANDWICH PANELS





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What are

SANDWICH PANELS ?!

SANDWICH PANEL

VERSATILE APPLICATIONS WITH A SINGLE SOLUTION

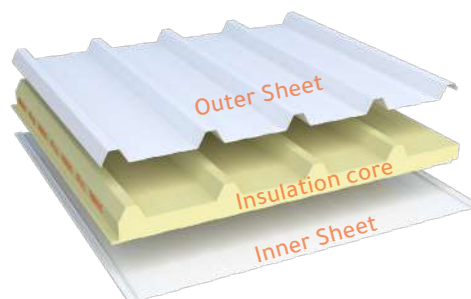


Over the past few decades, sandwich panels have emerged as a groundbreaking solution in the construction industry. These self-supporting components serve dual roles—acting as partitions (for roofs or walls) while also providing essential thermal insulation. The external layers boast robust mechanical strength, while the inner core excels in insulating performance.

SANDWICH PANEL LAYERS

Sandwich panels are a type of high-performing construction material composed of three layers: two outer layers (often called skins) made from robust materials like metal and a core material sandwiched between them, core is usually a lightweight material such as foam and rock wool.

This structure gives them a high strength-to-weight ratio, making them ideal for various applications where both rigidity and lightweight properties are essential.





Advantages - Applications

SANDWICH PANELS

SandwichPanel Advantages



Sandwich panels offer several advantages, making them a popular choice in various industries. Here are some key benefits:

Thermal Insulation

The core material, often made of foam or mineral wool, provides excellent thermal



Air and Water Tightness

Sandwich panels prevent air and water leakage, with a watertight structure, sandwich panels ensure active hydro-insulation against natural conditions



Energy Saving

thermal efficiency contributes to creating energy-efficient structures by maintaining indoor temperatures effectively, reducing the need for excessive heating or cooling



Light weight- Ease of Handling

Despite their strength, sandwich panels are lightweight, making them easier to transport and install



High Strength-to-Weight Ratio

The combination of strong outer layers and a lightweight core gives sandwich panels a high strength-to-weight ratio, ensuring durability without adding excessive weight



Quick Installation- Time-Saving

Prefabricated panels can be quickly assembled on-site, reducing construction time and labor costs



Versatility- Wide Range of Applications

Suitable for various uses, including walls, roofs, and floors in buildings,



Aesthetic Flexibility- Design Options

Available in various finishes and colors, allowing for aesthetic customization to match different architectural styles



Fire Resistance- Safety

Many sandwich panels are designed with fire-resistant cores, enhancing the safety of buildings.



Sound Insulation- Noise Reduction:

The core material can provide sound insulation, ideal for environments where noise control is important.



"These features depend on the type of insulation used in the sandwich panel. Each insulation type has distinct characteristics that set it apart, based on the intended purpose."

SandwichPanel Applications



Certainly! Sandwich panels have become a game-changer in the construction industry due to their versatility and practicality. Let's explore some common

Industrial Facilities and Commercial Buildings

Sandwich panels find extensive use in industrial structures, warehouses, factories, and commercial buildings. Their combination of insulation and structural strength makes them ideal for these environments.

PIR / PUR

Rock Wool



Cold Storages and Refrigerated Warehouses

The excellent thermal insulation properties of sandwich panels make them perfect for cold storage facilities. They help maintain consistent temperatures and reduce energy costs.

PIR / PUR



Residential Buildings:

In residential construction, sandwich panels are used for walls, roofs, and floors. They provide insulation, soundproofing, and durability.

PIR / PUR

Rock Wool

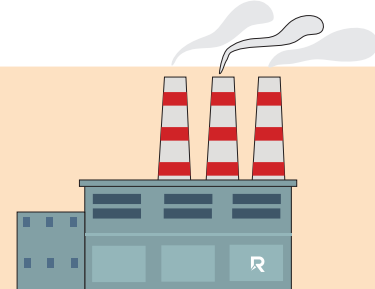


Power Plants and Energy Facilities:

Sandwich panels are employed in power plant structures, including control rooms, substations, and equipment enclosures. Their fire resistance and thermal performance are crucial in these settings.

PIR / PUR

Rock Wool



Choosing the right sandwich panel for a project depends on the project-specific requirements and the specific characteristics of the sandwich panel itself.

Applications



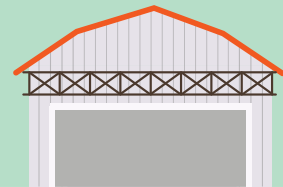
Certainly! Sandwich panels have become a game-changer in the construction industry due to their versatility and practicality. Let's explore some common

Agricultural and Husbandry Buildings

From barns to poultry houses, sandwich panels offer an efficient solution for agricultural structures. They protect livestock, equipment, and crops while ensuring proper insulation.

PIR / PUR

Rock Wool



Tradeshow Industry Booths Buildings

Lightweight sandwich panels are commonly used for trade show booths, office partitions, and interior walls. They allow for quick assembly and offer aesthetic appeal.

PIR / PUR

Rock Wool

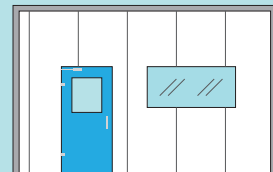


Clean Rooms

Cleanroom sandwich panels combine hygienic surfaces with seamless interlocking, creating an airtight barrier that prevents contamination and maintains a controlled environment.

PIR / PUR

Rock Wool

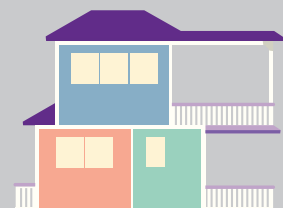


Caravans, Offices and administration buildings

Sandwich panels offer lightweight construction, excellent insulation, and durability. They replace traditional heavy frames, making buildings like caravans more efficient, comfortable, and quickly built.

PIR / PUR

Rock Wool



Choosing the right sandwich panel for a project depends on the project-specific requirements and the specific characteristics of the sandwich panel itself.



Selection Guide

SANDWICH PANELS ?!



Given the unique functions and requirements of each building, the selection of sandwich panels varies based on factors such as thermal, acoustic, hydro insulation, and fire resistance needs. Choosing the appropriate insulation core in alignment with your building's specific requirements significantly impacts the overall performance of the sandwich panel.

This comprehensive guide provides detailed specifications and considerations to assist you in choosing the optimal panel for your project."

● MATERIALS AND COMPOSITION

Sandwich panels are a type of high-performing construction material composed of three layers: two outer layers (often called skins) made from robust materials like metal and a core material sandwiched between them,

CORE

SKIN LAYERS



CORE of sandwich panels



The core of sandwich panels can be made from a variety of materials, each offering different properties and benefits. Here are some common core materials:

PIR _ Polyisocyanurate



polyisocyanurate is formed when the main components of the polyurethane foam chemically react at different mixture quantities. PIR rigid foam is the version of polyurethane with higher, enhanced fire resistance performance due to the difference in its structure. In case of a fire, the formation of smoke is very low when compared to polyurethane.

PUR _ Polyurethane



Polyurethane is a rigid foam created by mixing polyol and isocyanate with catalysts under high pressure. It offers superior thermal insulation due to its closed cell structure, high dimensional stability, water resistance, and high compressive strength. Additionally, it does not support bacterial growth.

Rock Wool _ Mineral



Stone wool is derived from quarried igneous lithologies such as dolerite and recycled steel waste. Insulants are fabricated by melting the constituent elements at high temperature and pressure and spinning the melted material into fibres. The insulation is produced in a variety of densities depending on desired function.

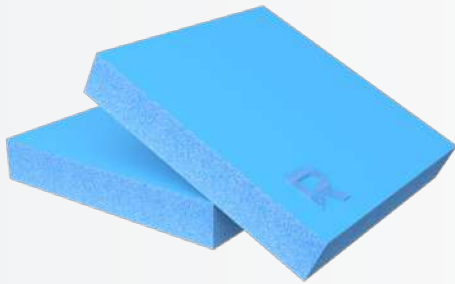
EPS _ Expanded Polystyrene



Expanded polystyrene (EPS) insulation is manufactured from small beads of polystyrene, combined with a pentane blowing agent. Exposure to heat expands the polystyrene beads. EPS insulation boards are produced by expanding beads via heat within moulds to achieve the desired shape and fuse the beads.

OTHER INSULATION MATERIAL FOR THE BUILDING SECTOR

XPS _ Extruded Polystyrene



Extruded polystyrene (XPS) is manufactured by combining polystyrene with a blowing agent under pressure. The release of pressure forces the material to expand into a foam, it is then shaped, cooled and cut to the desired specifications.

Glass Wool



Glass wool insulation is made in a similar way to stone wool. Glass wool is generated from silica (sand), glass, limestone and soda ash. The insulation is produced in a variety of densities depending on the desired function. Varying densities result in varying levels of thermal resistance (λ)

SANDWICH PANEL CORE SELECTION TABLE

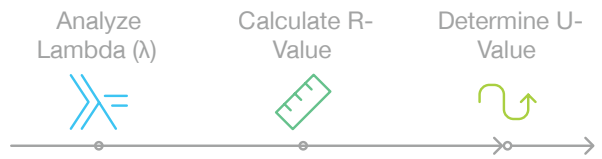
Utilize our Sandwich Panel Selection Table to choose the insulation material that best aligns with your building's specific features and requirements

R	Core of sandwich panels				Other insulations	
	PIR	PUR	Rock Wool	EPS	XPS	Glass Wool
Thermal Insulation	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★
Reaction to fire	★★★	★★	★★★★	★	★	★★★★
Sound Insulation	★★	★★	★★★★	★	★★	★★★★
Light weight/ m ³	★★★	★★★	★★	★★★★	★★★	★★★
Water vapor diffusion resistance	★★★★	★★★★	★	★★	★★★★	★
Compressive strength	★★★	★★★	★★	★★★★	★★★★	★
	19 / 24	18 / 24	16 / 24	14 / 24	17 / 24	15 / 24
	★★★★ Very Good		★★★★ Good		★★ Medium	★ Poor

Use the provided illustration as guidance, but always verify a product's classification before using it.

CHARACTERIZATION OF INSULATION MATERIALS

A review of the main international standards for the evaluation of product characteristics



● Thermal characterization

Thermal conductivity (λ or k) (W/mK)

Lower (λ)
Better

λ

The lambda value (λ) is the energy transmission rate through 1m² of (λ). Represents how efficiently a material conducts heat. The lower the lambda value, the better it performs.

Thermal resistance (R-value) (m²K/W)

Higher (R)
Better

R

R-value shows how good a material is at resisting the flow of heat. The higher the R-value of an insulation product, the better it performs. R-value takes both (λ) of a material and the actual thickness into account
R-value = thickness of material in meter / thermal conductivity (λ)

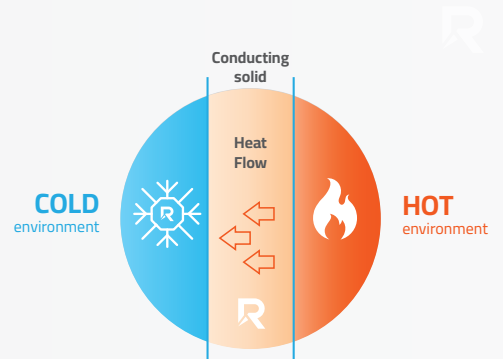
U-value

(W/m²K)

Lower (U)
Better

U

The U-value (also known as thermal transmittance) is a measure of how heat flows through a building component the sum of the R-values of the layers that make up the element
Lower U-values indicate better insulating properties.



$$R = \text{Thickness (m)} / \lambda$$

$$R_T = R_1 + R_2 + R_3$$

$$U = 1/R_T$$

Units / (W) watts (K) kelvin (m) meter

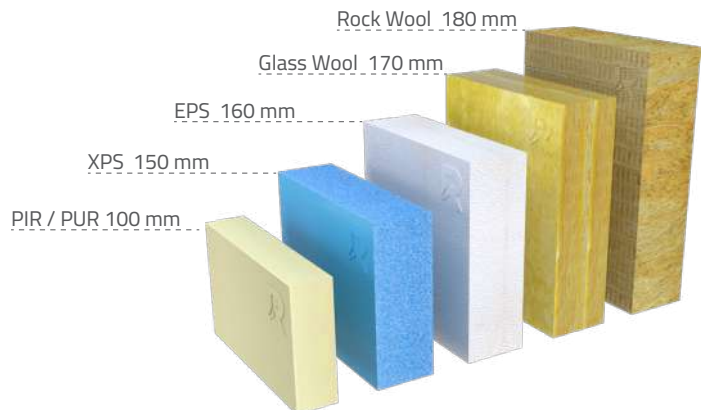
Example

PIR panel thickness = 10 cm

Thermal conductivity (λ) = 0.022 (W/mK)

R-value = thk. / λ = 0.1 / 0.022 = 4.54 (m²K/W)

U-value = 1 / RT = 1 / 4.54 = 0.22 (W/m²K)



Due to its superior thermal performance, PIR insulation offers optimal insulation value. This means that a thinner layer of PIR insulation can achieve the same insulation properties as a thicker layer of other materials

The diagram shows the typical thicknesses of different wall insulation materials needed to achieve an R value of 4.54

CHARACTERIZATION OF INSULATION MATERIALS

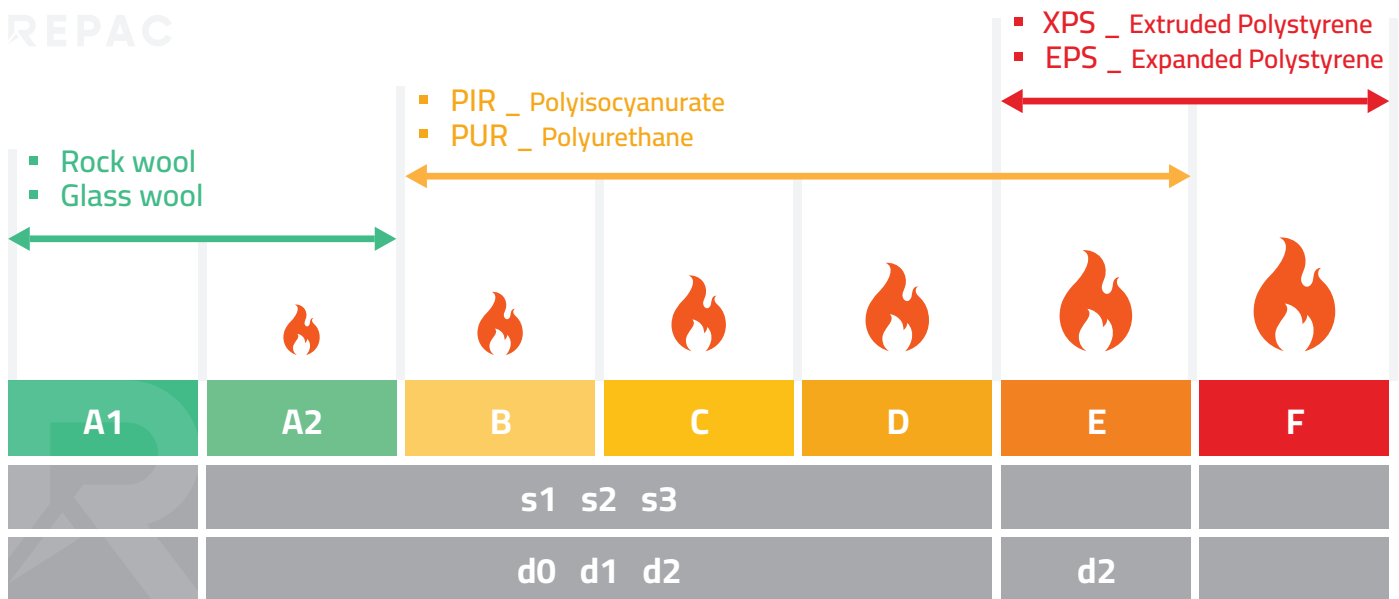
● Reaction to fire

The behavior of insulation materials under fire may be responsible of serious safety issues
The European standard EN 13501-1 defines a rating system based on the parameters listed



Test Standards for EN 13501-1 Classification for Construction Products

for more information please visit www.repacllc.com



A1 performing better than A2	Non Combustible	A1
		A2
Really Limited Contribution to fire	Combustible	B
Limited Contribution to fire		C
Medium Contribution to fire		D
High Contribution to fire		E
Highly Combustible		F

Smoke	s1	Emission of smoke absent or weak
	s2	Emission of smoke of average intensity
	s3	Emission of smoke of high intensity

Droplets	d0	No Dripping
	d1	Slow Dripping
	d2	High Dripping



Use the provided illustration as guidance, but always verify a product's actual Euroclass Reaction to Fire Classification before using it

CHARACTERIZATION OF INSULATION MATERIALS

● Acoustic characterization

Acoustic insulation, also known as soundproofing, involves using specific materials and techniques to prevent or reduce the propagation of sound waves. By doing so, it helps maintain a quieter and more comfortable environment.



Building materials can be characterized in terms of their ability to contrast sound transmission and to absorb impinging sound waves

Rockwool ★★★★★
is an excellent sound absorber. Its dense and fibrous structure makes it effective at reducing airborne sound transmission, contributing significantly to acoustic comfort in buildings

Glasswool ★★★
doesn't excel in sound absorption, it still contributes to acoustic comfort. Its fibrous structure helps dampen sound to some extent

PUR / PIR ★★
While their primary purpose is thermal insulation, they don't inherently contribute significantly to sound absorption. However, if faced with punctured or ripped facings, their acoustic properties may decline

XPS ★★
doesn't specifically excel in sound absorption. Its primary focus is on thermal insulation, but it does provide some minor sound-dampening properties.

EPS ★
is not primarily designed for sound absorption. However, its cellular structure can provide minimal sound attenuation.

Acoustic insulation finds practical use in:
Recording Studios, Theaters and Cinemas, Residential Buildings, Office Spaces, Industrial Facilities and generator rooms.

● Water vapor resistance factor (μ -value)

Water vapor resistance measures a material's ability to resist the passage of water vapor. It shows how reluctant the material is to let moisture diffuse through its structure, often compared to the properties of air



When we talk about insulation materials, their water vapor resistance matters because it affects how well they can prevent moisture from passing through walls, floors, ceilings, or roofs

CHARACTERIZATION OF INSULATION MATERIALS

● Water absorption

Water absorption for insulation materials refers to the amount of water that a material can absorb when it is exposed to moisture. It is typically expressed as a percentage of the material's dry weight or volume after being immersed in water for a specified period. This property is crucial because water absorption can affect the thermal performance and structural integrity of the insulation material.



● Compressive strength

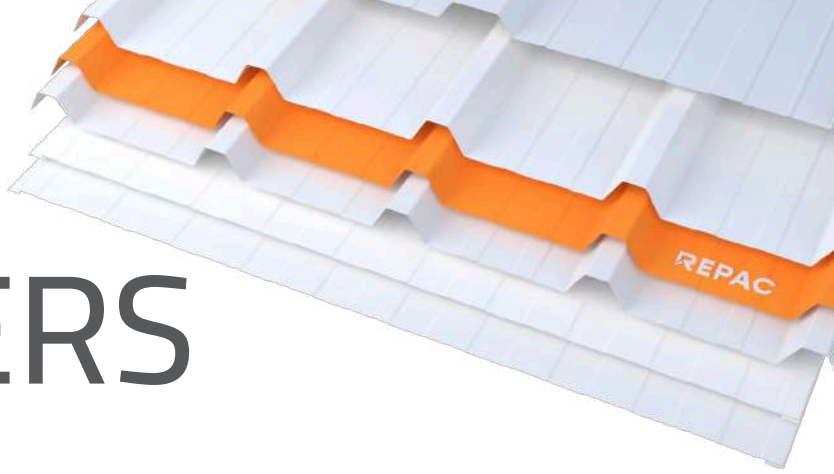
Compressive strength for insulation materials refers to the ability of the material to withstand loads that tend to reduce its size. It is measured by the amount of force per unit area that the material can endure before it deforms or fails. This property is crucial for insulation materials used in applications where they must support loads, such as in floors, roofs, or walls



CHARACTERIZATION OF INSULATION MATERIALS TABLE

R	Core of sandwich panels				Other insulations	
	PIR	PUR	Rock Wool	EPS	XPS	Glass Wool
Density (kg/m ³)	30-45	30-45	40-200	15-35	20-40	15-75
Thermal conductivity λ (W/mK) (EN 13165, EN14509)	0.018-0.028	0.022-0.040	0.033-0.045	0.031-0.038	0.032-0.037	0.031-0.037
Reaction to Fire (EN 13501-1)	B-s1, d0 B-s2, d0	B-s2, d0 B-s3, d0	A1	E	E	A1
Closed cell ratio (%)	90-95%	90-95%	open-cell	80-90%	95-100%	open-cell
Water vapor diffusion resistance (μ-value) (EN 12086)	30-150	30-170	1-1.3	20-70	80-250	1-1.1
Water absorption (by volume %)	<2%	<2%	-	2-4%	0.3%	-
Weighted sound reduction R _w (dB)	16-25	16-25	30-34	6-10	15-18	24-32
Compressive strength (KPa) (EN 826, 10% deformation)	95-120	95-120	60-75	70-220	100-700	-

Table reports thermal insulation properties, fire classification and water vapor diffusion resistance factor of some insulation materials. Data reported in Table were obtained from datasheets of product manufacturers.



SKIN LAYERS

Outer Layers (Skins): These are the robust, protective layers that face outward and cover the insulation material from both sides. They provide structural integrity, weather resistance, and aesthetics. Metal skins, such as aluminum or steel, are commonly used due to their durability and corrosion resistance. However, other materials like fiberglass or wood can also serve as skins.

Choosing the right outer layers (skins) for a sandwich panel is crucial for achieving optimal performance and durability. Let's dive into some considerations

1. Material Selection:

- The outer layers of sandwich panels are typically made from materials like metal (such as aluminum or steel) or other rigid substances.
- Consider the structural requirements of your project. If the panel needs to bear heavy loads or withstand external forces, opt for skins with high strength and durability.
- Metal skins are popular due to their corrosion resistance, longevity, and ability to provide structural support.

3. Aesthetics and Design:

- Sandwich panels are used in various applications, including residential, commercial, and industrial buildings.
- Consider the desired aesthetics. Metal skins can be coated or finished in different colors and textures.
- If the panel will be visible, choose skins that enhance the overall appearance.



2. Functionality and Environment:

Outer Sheet should be resistant to:

- Temperature Changes: Ensure the material can handle temperature fluctuations without warping or deforming.
- UV Rays: If the panel will be exposed to sunlight, select a skin that resists UV degradation.
- External Effects: Consider impacts, abrasion, and weathering.

Inner Sheet should be resistant to:

- Chemical and Physical Effects: It may come into contact with cleaning agents, moisture, or other substances.
- Condensation: If the inner atmosphere of the building leads to condensation, choose a material that won't be adversely affected.

4. Fire Resistance:

- Depending on the application, you might need fire-resistant skins.

5. Weight Considerations:

- Sandwich panels are valued for their lightweight construction.
- If weight reduction is critical (e.g., in seismic-prone areas), choose skins that contribute to overall lightness.

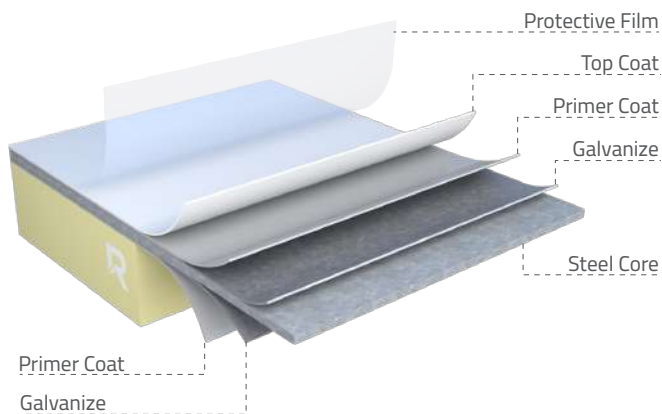
Remember that the choice of outer layers impacts the panel's overall performance, so assess your specific project requirements carefully. Whether it's a sleek façade or an industrial warehouse, the right skins will make a difference!

SKIN LAYERS MATERIAL OF SANDWICH PANELS



● PPGI_ Pre-Painted Galvanised Iron

Corrosion Resistance: Zinc coating provides excellent protection against rust.
 Strength: High tensile strength, making it suitable for structural applications.
 Aesthetic: Available in various colors and finishes.



● Aluminum

Lightweight: Easier to handle and install.
 Corrosion Resistance: Naturally resistant to rust and corrosion.
 Reflectivity: Reflects heat and light, contributing to energy efficiency.
 Decorative appearance

● Stainless Steel

Hygienic: Easy to clean and maintain, making it ideal for sanitary environments.
 Strength: High strength and durability.
 Corrosion Resistance: Excellent resistance to rust and staining.

● Other skins

- Fiberglass Reinforced Plastic
- Membrane sheet
- Aluminum Foil

	PPGI	Aluminum	Stainless Steel
Thickness (mm)	0.3 - 0.4 - 0.5 - 0.6 - 0.7	0.5 - 0.6 - 0.7	0.5
Zinc Coating	Z100 (G30) - Z120 (Z40) - Z180 (G60) - Z275(Z90) Aluzinc (AZ100) - (AZ150)	-	-
Top Coating	Polyester 20 microns - PVDF 25 microns Plastisol 100-120 microns - PVC 120-800 microns	Polyester 20 microns - PVDF 25 microns Plastisol 100-120 microns - PVC 120-800 microns	-
Grade	-	-	AISI 304 - AISI 316

"The skins must be covered with a 35-micron transparent polyethylene film to protect against dust and scratches."

Coating Types



Polyester (PE)

Polyester coatings are economical and versatile, offering various color and gloss options. They are highly resistant to flexibility, abrasion, corrosion, humidity, and impact. Application thickness ranges from 20-25 µm to 60 µm, depending on usage and performance needs. This is the most common type of paint.

PVDF

It provides exceptional resistance to ambient conditions, high corrosion strength, and protection against chemical oils. Additionally, it offers superior resistance to chemicals and UV rays. This coating type boasts the highest color persistence and light stability, making it ideal for premium roof and wall claddings.

Plastisol

Plastisol coatings are known for their high application thickness (100-120 µm) and excellent corrosion and humidity resistance. They are ideal for embossing but have lower color and gloss resistance, making them suitable for cold storage and humid climates where UV resistance is less critical.

PVC

PVC films, laminated on aluminum or galvanized steel, are ideal for indoor and outdoor use, especially in cold storage due to their high corrosion and humidity resistance. Thickness ranges from 120 µm to 800 µm, offering various textures for aesthetic appeal.



REPAC REPAC REPAC REPAC REPAC

SANDWICH PANELS

SHAPES



Sandwich panels come in various shapes and configurations to suit different construction needs. Here are some common shapes and types:

● Flat Panels



These are the most common type, used for walls and floors. They provide a smooth, even surface
Flat panels are divided into several types:

Cold store & Visible Fix (Wall - Ceiling) ●

Installation: The screws or fasteners are visible on the surface of the panel in case of facades. It can be installed horizontally and vertically, and Tongue and groove fastening with the use of flashing and accessories in cold rooms.

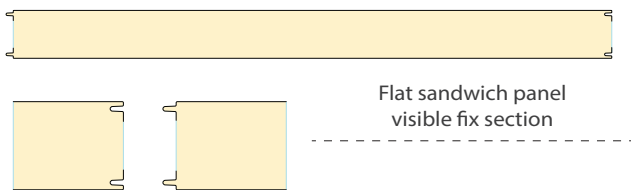
Advantages:

Ideal in cold and freezing rooms because it ensures tight connections between panels.

Ease of Installation: Generally quicker and simpler to install.

Maintenance: Easier to inspect and replace individual panels if needed.

Applications: Commonly used in cold storage, Production hall, industrial buildings and warehouses.



Flat sandwich panel visible fix section

Hidden Fix (Facades) ●

Installation: The screws or fasteners are concealed within the panel joints, providing a smooth and uninterrupted surface.

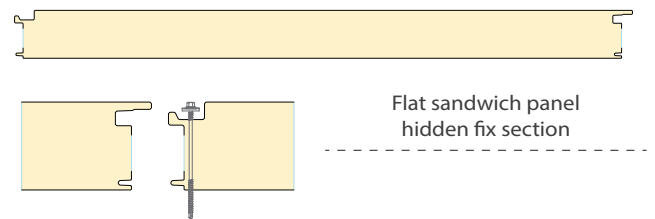
It can be installed horizontally and vertically.

Advantages:

Aesthetic Appeal: Provides a clean, sleek look with no visible fasteners, ideal for architectural applications.

Durability: Reduced risk of rust and corrosion at fastener points due to their non-exposed to weather conditions, which provides a longer warranty and lifespan.

Applications: Preferred for commercial buildings, facades, and any project where appearance is important.



Flat sandwich panel hidden fix section

Acoustic wall panel ●

The perforated interior design and the rock wool insulation provides high acoustic performance. Acoustic wall panels are designed to absorb and dampen sound waves, reducing noise levels and improving sound quality in various environments.

Additionally, rock wool's fire-resistant properties make it ideal for use in buildings with high fire risk.

Installation: It may be a visible or hidden fix.

Applications: Commonly used in Offices, Recording Studios, Theaters and Auditoriums, Schools, Universities and generator rooms



Acoustic flat sandwich panel visible fix section



Acoustic flat sandwich panel hidden fix section

● Corrugated Panels



These have a wavy surface, which adds strength and rigidity. They are often used for roofing. Corrugated panels are divided into several types:

Visible Fix (Roof) ●

Installation: The screws or fasteners are visible on the surface of the panel.

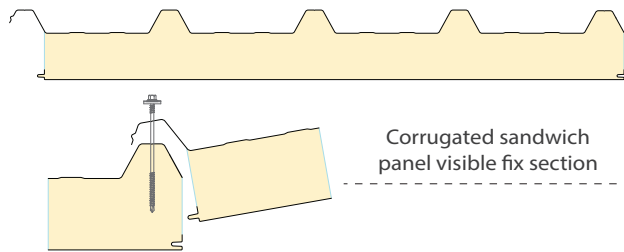
Advantages:

Ease of Installation: Generally quicker and simpler to install.

Cost-Effective: Often less expensive due to simpler installation and fewer materials required.

Their wavy surface enhances strength and rigidity more effectively than other designs.

Applications: Commonly used in industrial buildings, warehouses, and areas where aesthetics are less critical.



Hidden Fix (Roof) ●

Installation: The screws or fasteners are concealed within the panel joints, providing a smooth and uninterrupted surface.

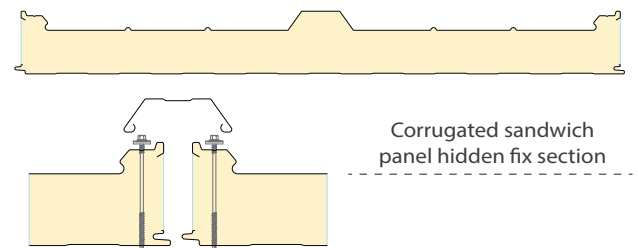
Advantages:

Aesthetic Appeal: Provides a clean, sleek look with no visible fasteners, ideal for architectural applications.

Durability: Reduced risk of rust and corrosion at fastener points due to their non-exposed to weather conditions, which provides a longer warranty and lifespan.

Enhanced Performance: Often offers better weather resistance and thermal performance due to fewer penetrations.

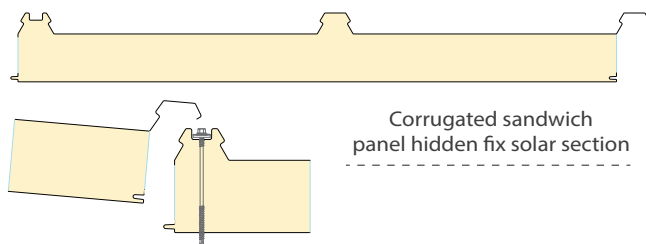
Applications: Preferred for commercial buildings, facades, and any project where appearance is important.



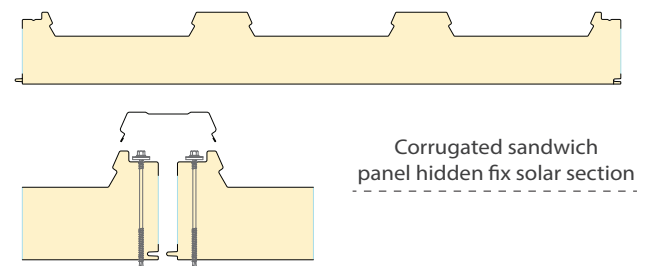
Solar Panel (Kind of Hidden Fix Roof) ●

These panels are specifically designed to facilitate the installation of solar panels using a clamp system. This method allows for the attachment of solar panels without the need to drill into the sandwich panel surface, thereby preventing corrosion and maintaining the integrity of the waterproofing.

Applications: Commonly used in industrial buildings, Commercial Buildings and Residential Buildings.



Another profile shape for solar panel



● Corrugated Panels



These have a wavy surface, which adds strength and rigidity. They are often used for roofing. Corrugated panels are divided into several types:

PVC Membrane Roof Panel ●

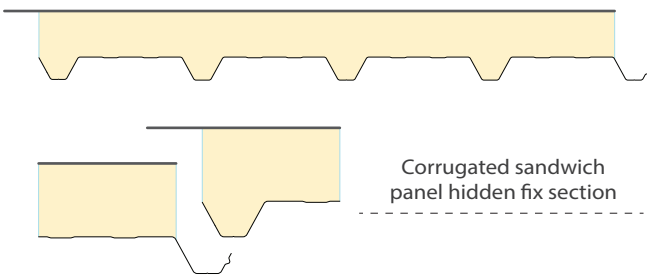
Typically consists of a top membrane layer, an insulating core, and a bottom layer, often made of metal or another durable material

Advantages:

The membrane layer offers superior resistance to UV rays, extreme temperatures, and moisture, making it ideal for various climates.

It offers robust waterproof insulation with a smooth surface, ensuring long-term protection against rust and corrosion.

Applications: Commonly used in Low-Slope Roofs, Industrial Buildings and Commercial Buildings



Acoustic Roof Panel ●

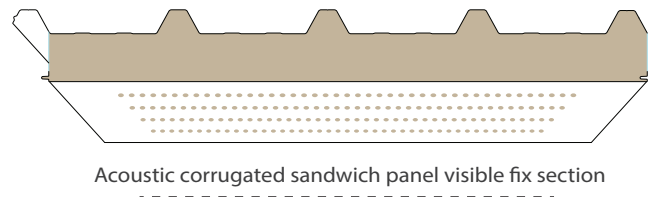
Installation: The screws or fasteners are visible on the surface of the panel.

Advantages:

The perforated interior design and the rock wool insulation provides high acoustic performance. Acoustic wall panels are designed to absorb and dampen sound waves, reducing noise levels and improving sound quality in various environments.

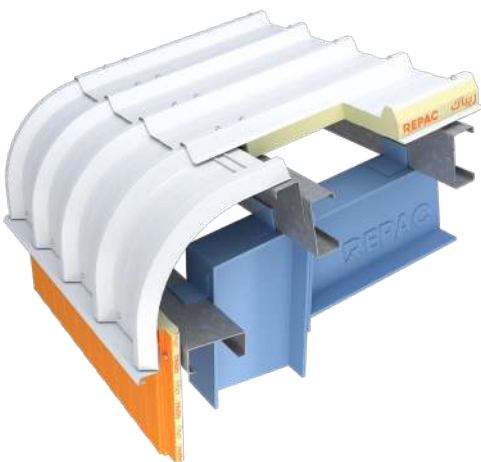
Additionally, rock wool's fire-resistant properties make it ideal for use in buildings with high fire risk.

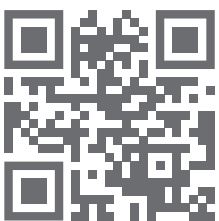
Applications: Commonly used in Offices, Recording Studios, Theaters and Auditoriums, Schools, Universities and generator rooms.



Curved Panels ●

Used for architectural designs that require a curved surface, such as domes or arches.





For comprehensive information on sandwich panels, including installation methods and detailed guidelines, please visit our website.



NOTES

A series of horizontal dotted lines for taking notes.

