

# Technical Guide: Sandwich Panels

## Complete Reference

### General Overview of Sandwich Panels

Sandwich panels are composite building materials consisting of three layers: two outer metal facings (typically galvanized steel, galvalume, or aluminum) with an insulating core material between them. This construction provides excellent thermal insulation, structural strength, and weather resistance while maintaining a lightweight profile.

#### Core Benefits:

- Superior thermal insulation properties
- Lightweight yet structurally robust
- Quick and efficient installation
- Cost-effective building solution
- Excellent weather resistance
- Wide range of applications

## 1. PUR (Polyurethane) Roof Sandwich Panels

### Technical Specifications

Parameter	Specification
Core Material	High-Density Rigid Polyurethane (PUR) Foam
Core Density	38-42 kg/m <sup>3</sup>
Thermal Conductivity	0.022-0.028 W/m·K



Panel Thickness	40mm, 50mm, 60mm, 75mm, 80mm, 100mm, up to 150mm
Facing Material	Pre-painted Galvanized Steel/Galvalume/Aluminum
Sheet Thickness	0.40mm to 0.70mm
Standard Width	1000mm
Panel Length	Customizable up to 18 meters
Fire Classification	B2-B3
Service Temperature	-50°C to +100°C

## Key Features

**Exceptional Thermal Performance:** PUR panels offer outstanding thermal insulation with low thermal conductivity, significantly reducing energy consumption for heating and cooling systems.

**Structural Integrity:** Despite their lightweight nature, PUR panels provide remarkable strength and load-bearing capacity, contributing to overall building stability.

**Durability:** Engineered to withstand harsh weather conditions, humidity, and UV exposure with minimal maintenance requirements.

**Installation Efficiency:** Prefabricated design allows for rapid installation, reducing labor costs and project timelines.

## Applications

- Industrial warehouses and manufacturing facilities
- Cold storage and refrigeration units
- Commercial buildings and shopping centers
- Agricultural buildings and livestock facilities
- Logistics and distribution centers

## Installation Guidelines

### Pre-Installation Requirements:

- Verify structural supports meet design specifications
- Ensure minimum support width of 120mm for end connections
- Apply anti-corrosion coating to metal components
- Prepare expansion joints of minimum 20mm between panels

### Installation Process:

1. Begin installation from corner positions
2. Install panels from bottom to top for structural stability
3. Use minimum 3 fasteners for end supports, 2 for intermediate supports
4. Maintain 40mm minimum distance from panel edges for fasteners
5. Apply PUS sealing tape or installation foam for expansion joints

## 2. PIR (Polyisocyanurate) Roof Sandwich Panels

### Technical Specifications

Parameter	Specification
Core Material	Polyisocyanurate (PIR) Foam
Core Density	35-38 kg/m <sup>3</sup>
Thermal Conductivity	0.020-0.026 W/m·K
Panel Thickness	50mm, 75mm, 100mm (customizable 30mm to 150mm)
Facing Material	Pre-painted Galvanized Steel



Sheet Thickness	0.40mm to 0.90mm
Standard Width	1000mm
Fire Classification	B-s2,d0
Approval	Dubai Civil Defence (DCD) Approved
U-Value	As low as 0.18 W/m <sup>2</sup> ·K

## Key Features

**Superior Fire Resistance:** PIR foam contains higher aromaticity, providing enhanced thermal stability and fire resistance compared to PUR panels. The material chars when exposed to fire, preventing flame spread.

**Enhanced Thermal Performance:** PIR panels offer superior thermal efficiency with lower thermal conductivity values, making them ideal for energy-conscious applications.

**Dubai Civil Defence Approval:** All PIR panels are DCD-approved, ensuring compliance with UAE fire safety regulations.

**Dimensional Stability:** PIR maintains better dimensional stability under temperature variations compared to other foam cores.

## Applications

- High-rise commercial buildings
- Industrial facilities requiring enhanced fire safety
- Government and institutional buildings
- Projects requiring DCD approval
- Energy-efficient building designs

## Installation Considerations

#### Fire Safety Compliance:

- Ensure proper joint sealing to maintain fire rating integrity
- Use approved fastening systems to preserve fire resistance
- Follow DCD installation guidelines for certified performance

#### Thermal Bridge Prevention:

- Minimize thermal bridging through proper joint design
- Use continuous insulation approach
- Seal all penetrations and connections properly

### 3. PUR Wall Sandwich Panels

#### Technical Specifications

Parameter	Specification
Core Material	Rigid Polyurethane (PUR) Foam
Core Density	38-42 kg/m <sup>3</sup>
Thermal Conductivity	0.022-0.028 W/m·K
Panel Thickness	50mm, 75mm, 100mm, 120mm, 150mm
Facing Material	Pre-painted Steel/Aluminum
Sheet Thickness	0.40mm to 0.90mm
Installation	Vertical or horizontal orientation
Joint System	Tongue-and-groove interlocking
Sound Reduction	25-30 dB



## Key Features

**Versatile Installation:** Can be installed vertically or horizontally depending on architectural requirements and structural considerations.

**Excellent Insulation:** Provides superior thermal insulation for wall applications, reducing HVAC energy consumption.

**Acoustic Performance:** Offers good sound insulation properties for noise reduction in industrial and commercial environments.

**Weather Resistance:** Protective coatings provide long-term resistance to environmental factors.

## Applications

- Industrial building envelopes
- Commercial facade systems
- Warehouse and distribution center walls
- Agricultural building cladding
- Partition walls in industrial facilities

## Installation Methods

### Vertical Installation:

- Start from building corners and proceed along the perimeter
- Begin at plinth level and work upward
- Install plinth cover and support profiles before panel installation
- Maintain minimum 400mm spacing for fasteners

#### Horizontal Installation:

- Install from bottom to top to prevent moisture infiltration
- Ensure proper overlap and sealing between horizontal courses
- Use appropriate flashing and weatherproofing details

## 4. PIR Wall Sandwich Panels

### Technical Specifications

Parameter	Specification
Core Material	Polyisocyanurate (PIR) Foam
Core Density	35-38 kg/m <sup>3</sup>
Thermal Conductivity	0.020-0.026 W/m·K
Panel Thickness	50mm, 75mm, 100mm, 120mm, 150mm
Fire Classification	B-s2,d0
Joint System	Interlocking tongue-and-groove
Water Absorption	Very low
Service Life	25+ years with proper maintenance

### Key Features

**Enhanced Fire Safety:** PIR core provides superior fire resistance for wall applications, making it suitable for buildings with stringent fire safety requirements.

**Low Water Absorption:** PIR foam has very low water absorption properties, enhancing durability in humid environments.

**Dimensional Stability:** Maintains structural integrity under varying temperature and humidity conditions.



**Energy Efficiency:** Superior thermal performance contributes to building energy efficiency and HVAC cost reduction.

## Applications

- Commercial building facades requiring fire resistance
- Industrial facilities with fire safety requirements
- Institutional buildings (hospitals, schools)
- High-rise construction projects
- Buildings requiring LEED or sustainability certifications

## 5. Rockwool Roof Sandwich Panels

### Technical Specifications

Parameter	Specification
Core Material	Mineral Wool (Stone Wool)
Core Density	100-140 kg/m <sup>3</sup>
Thermal Conductivity	0.033-0.045 W/m·K
Fire Classification	A1 (Non-combustible)
Panel Thickness	50mm, 75mm, 100mm, 120mm, 150mm, 200mm
Fire Resistance	Minimum 120-minute integrity (EI 120)
Compressive Strength	≥120 kPa for roof applications
Sound Reduction	Excellent acoustic insulation
Temperature Resistance	Up to 1000°C



## Key Features

**Exceptional Fire Resistance:** A1 fire classification means the material is non-combustible and does not contribute to fire spread.

**Superior Acoustic Performance:** Mineral wool provides excellent sound insulation, making it ideal for noise-sensitive applications.

**High Temperature Resistance:** Can withstand extreme temperatures without degradation, suitable for industrial applications.

**Moisture Resistance:** Stone wool is naturally moisture-resistant and maintains properties in humid conditions.

**Environmental Sustainability:** Made from natural and recycled materials, contributing to green building certifications.

## Applications

- Industrial facilities with high fire risk
- Petrochemical and energy plants
- Buildings requiring superior fire protection
- Acoustic-sensitive environments
- High-temperature industrial processes
- NEOM and sustainable construction projects

## Fire Safety Benefits

**Non-Combustible Core:** Mineral wool does not burn, melt, or emit toxic gases when exposed to fire.

**Structural Fire Resistance:** Maintains structural integrity during fire exposure, providing safe evacuation time.



**Smoke Control:** Does not contribute to smoke generation during fire events.

## 6. Rockwool Wall Sandwich Panels

### Technical Specifications

Parameter	Specification
Core Material	Mineral Wool (Stone Wool)
Core Density	100-120 kg/m <sup>3</sup>
Thermal Conductivity	0.037-0.045 W/m·K
Fire Classification	A1 (Non-combustible)
Panel Thickness	50mm, 75mm, 100mm, 120mm, 150mm, 200mm
Compressive Strength	≥80 kPa for wall applications
Sound Reduction Index	40-55 dB depending on thickness
Moisture Resistance	Excellent
Chemical Resistance	High resistance to industrial chemicals

### Key Features

**Fire Compartmentalization:** Excellent for creating fire-resistant partitions and building separations.

**Acoustic Insulation:** Superior sound dampening properties for industrial and commercial noise control.

**Chemical Resistance:** Resistant to most industrial chemicals and aggressive environments.

**Dimensional Stability:** Maintains form and properties under varying environmental conditions.

**Vapor Permeability:** Allows moisture vapor transmission while resisting liquid water penetration.



## Applications

- Fire-rated partition walls
- Industrial facilities with chemical exposure
- Power plants and energy facilities
- Acoustic barriers and sound control
- Clean room and pharmaceutical facilities
- High-security and institutional buildings

## Installation Requirements

### Structural Considerations:

- Heavier than PUR/PIR panels, requiring adequate structural support
- Use appropriate lifting equipment for installation
- Ensure proper load distribution on supporting structures

### Sealing Requirements:

- Apply soft mineral wool to expansion joints between panels
- Use appropriate sealants compatible with mineral wool
- Maintain fire rating integrity through proper sealing

## General Installation Best Practices

## Pre-Installation Planning



### **Design Documentation Review:**

- Verify all panel specifications match project requirements
- Confirm fastener types, spacing, and quantities
- Review structural support adequacy
- Check expansion joint locations and details

### **Site Preparation:**

- Level and clean installation surfaces
- Install temporary safety barriers and access equipment
- Organize panel delivery and storage areas
- Coordinate lifting equipment and crew scheduling

## **Quality Control Measures**

### **Material Inspection:**

- Check panel dimensions and profiles before installation
- Verify core material specifications and certifications
- Inspect for transportation damage or deformation
- Confirm color matching and coating integrity

### **Installation Monitoring:**

- Use appropriate measuring tools (level, plumb bob, measuring tape)
- Verify panel alignment and positioning regularly



- Check fastener installation depth and spacing
- Monitor joint sealing and weatherproofing quality

## Safety Requirements

### Personnel Protection:

- Use appropriate personal protective equipment
- Follow fall protection protocols for elevated work
- Ensure proper training for lifting equipment operation
- Maintain clear communication protocols

### Environmental Considerations:

- Monitor weather conditions for safe installation
- Protect panels from moisture during installation
- Account for thermal expansion during hot weather
- Plan for wind load considerations during lifting

## Maintenance and Longevity

### Routine Maintenance

#### Inspection Schedule:

- Annual visual inspection of panel condition
- Check joint sealing and fastener integrity



- Monitor for signs of thermal bridging or air leakage
- Verify drainage system functionality

#### **Cleaning and Care:**

- Use appropriate cleaning methods for facing materials
- Avoid harsh chemicals that may damage coatings
- Maintain clear drainage paths around panels
- Address minor repairs promptly to prevent escalation

## **Performance Optimization**

#### **Energy Efficiency Monitoring:**

- Track building energy consumption patterns
- Identify areas of thermal performance degradation
- Plan proactive maintenance to maintain insulation properties
- Consider thermal imaging inspections for large installations

This comprehensive technical guide provides the foundation for creating individual PDF documents for each panel type. Each section can be expanded into a standalone technical guide with additional details, installation diagrams, and project-specific applications for your Saudi Arabian market focus.

The guides will establish Ghosh Groups as a technical authority while providing valuable resources for engineers, architects, and contractors evaluating sandwich panel solutions for their projects