TRI STAR
EQUIPMENTS PVT. LTD.

The Complete Guide to

PUF Panels

Insights, Applications, and Specifications

Tristar Equipments Pvt Ltd.

30+ years of PUF Panel Expertise

tristareqp@gmail.com

+91 9823055138

tristarequipments.in

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What is a PUF Panel?

A Polyurethane Foam (PUF) panel is a construction material composed of a rigid polyurethane foam core, sandwiched between two layers of stainless steel or pre-painted galvanized iron (PPGI/PPGL). The panel's foam core provides excellent thermal insulation and structural stability, making it ideal for applications requiring temperature and humidity control, and energy efficiency.

PUF Panel Metal Finish (Skin)

PUF panels typically feature two metal skins that sandwich the polyurethane foam core. These skins are crucial for the structural integrity and thermal performance of the panels.

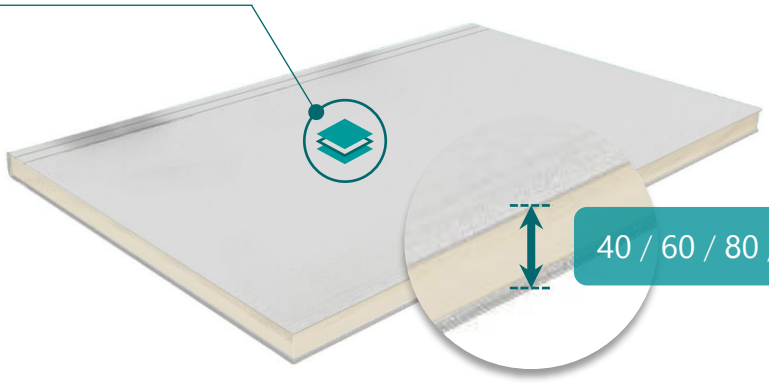
Stainless steel (SS304) and Pre-painted Galvanized Iron (PPGI) are commonly selected for PUF panels due to their superior properties:

Stainless Steel: Known for its corrosion resistance, durability, and hygienic properties, stainless steel is ideal for industries where cleanliness is critical, such as pharmaceuticals, food processing, and cold storage. It also provides excellent resistance to chemicals, making it suitable for harsh environments.

Metallic Silver	Matte, Glossy, Mirror	0.6 / 0.8 / 1.0 mm Thk.

PPGI: PPGI panels are coated with a layer of paint, which enhances corrosion resistance and provides aesthetic appeal. They are lightweight yet strong, making them suitable for large structures like warehouses, prefabricated buildings, and cold rooms. The coating also offers UV resistance, ensuring long-term durability.

White/Cream + Profiling	Matte (Standard)	0.5 / 0.6 mm Thk.



PUF Panel Thickness

PUF Panels at Tristar are available in the below thickness:

40 / 60 / 80 / 100 / 120 / 140 / 150 mm

Greater the thickness,
Better the thermal insulation.

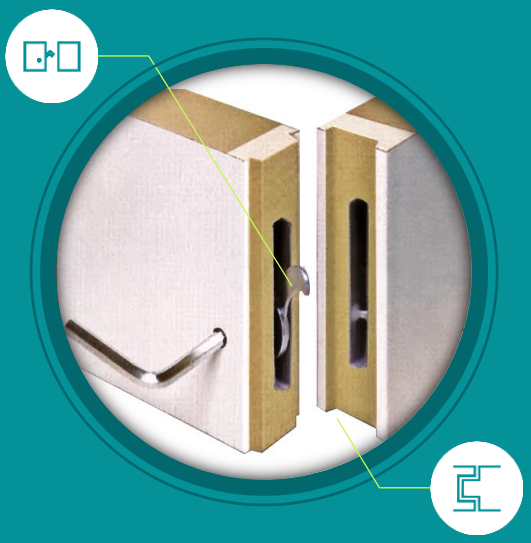
These materials are chosen for their ability to provide robust protection to the PUF core, extend the lifespan of the panels, and cater to industry-specific requirements.

PUF Panel Interlocking Mechanism

Large PUF structures consist of multiple PUF panels securely joined together using interlocking systems. Here are the key interlocking methods used:

Cam Lock System

- Cam locks embedded in the panel edges securely fasten them together for enhanced stability.
- This feature is ideal for cold storage and pharmaceutical applications, ensuring an airtight seal to minimize energy loss and maintain consistent internal temperatures.

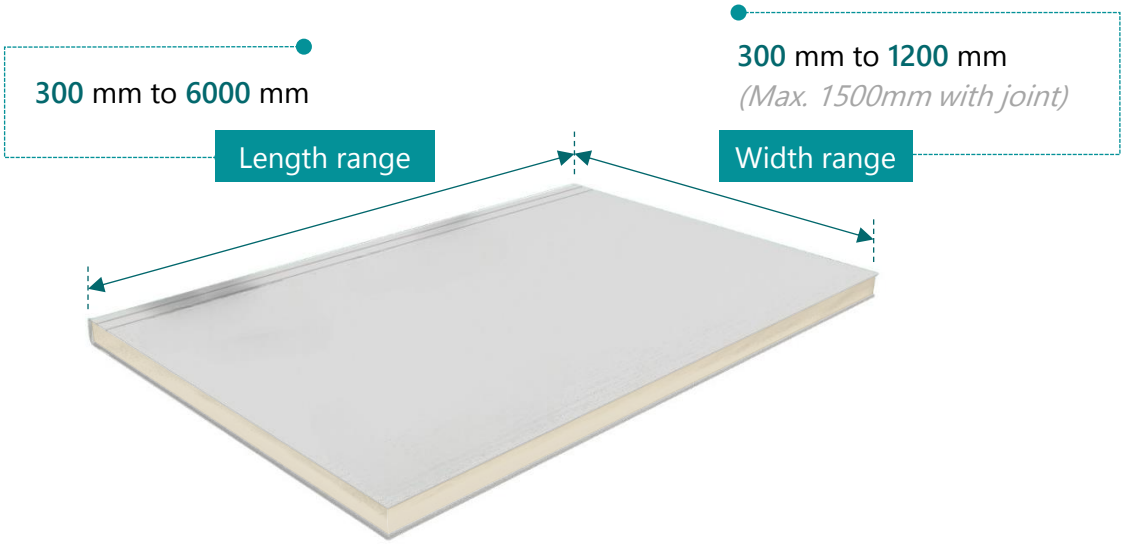


Tongue and Groove System

- The tongue and groove design enables panels to interlock seamlessly through matching ridges (tongue) and recesses (groove)
- This design enhances stability and alignment, allowing for faster installation and a uniform finish

PUF Panel sizes, Room sizes & Customization

Following are the available dimension ranges for a single PUF Panel at Tristar:



Generally, a standard size of **3000 mm (L) x 1200 mm (W)** is preferred for common applications.

At Tristar, we *customize* the panel sizes, and hence the room sizes based on your application.

When determining the size of a PUF-insulated room, several factors should be considered, such as :

Industry application

The type of industry determines the required storage environment. *(Cold storage/ dairy/pharma, etc.)*

Stored products

The nature of the goods, and their volume impacts room size and temperature and other factors.

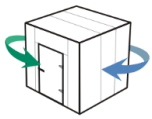
Available space

The room size can be designed to optimally fit into the available space.

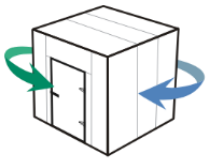
Construction layout

The design must align with the building's existing structure.

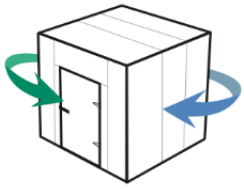
Below are generally preferred room size as per common applications:



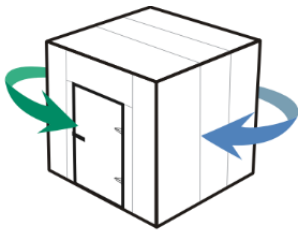
10 X 10 x 10 ft
1000 CFT



15 X 10 x 10 ft
1500 CFT



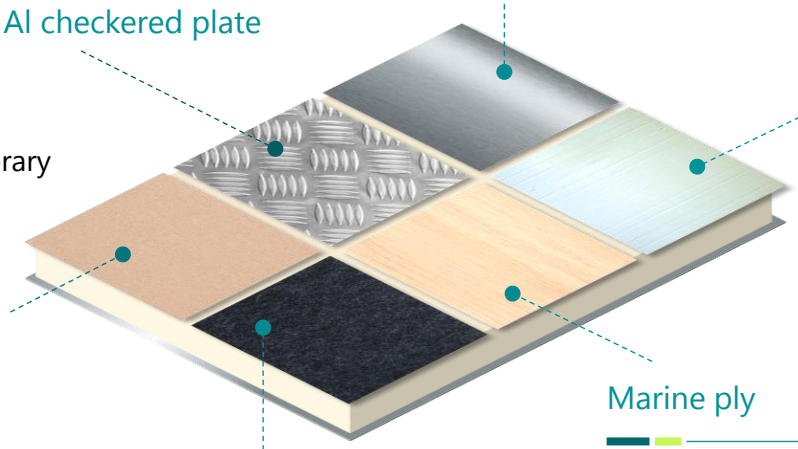
20 X 10 x 10 ft
2000 CFT



20 X 15 x 10 ft
3000 CFT

Room Flooring material selection

The flooring in cold rooms and insulated spaces plays a crucial role in maintaining temperature and durability. Different flooring options are selected based on factors like load-bearing capacity, resistance to moisture, hygiene standards, and ease of cleaning. These options cater to the unique needs of various industries. Below are the various flooring options available at Tristar:



Highly corrosion-resistant, durable, easy to clean - ideal for hygienic settings

Stainless Steel - SS304 Matte

Slip-resistant, lightweight, and fit for high foot traffic

Al checkered plate

GI Pre-coated

Corrosion-resistant, cost-effective, and easy to install

Lightweight, temporary use, Commonly used with bare PUF sheets

Paper

Marine ply

Strong, moisture-resistant base material, commonly combined with others

Tar felt

Primarily used with concrete flooring and paper for enhanced durability and moisture resistance (waterproofing)

Everything about PUF Doors

When selecting doors for cold rooms and insulated spaces, it is crucial to choose the appropriate type based on opening style, door leaf configuration, and fitting design. Below is a detailed breakdown of the door types we offer:

Opening type

Hinged Door

Durable, reliable seal, opens outward and/or inward.

Sliding Door

Space-saving, smooth operation, ideal for restricted spaces.

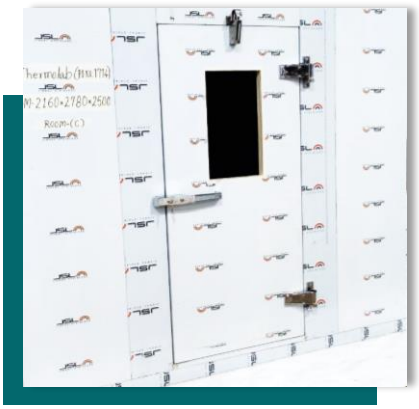
Door Leaf type

Single Door

Versatile, compact, fit for smaller openings

Double Door

Wider access, ideal for larger storage spaces



Fitting type

Flush Door

Seamless finish, sleek look, fits with cleanroom aesthetics.

Projected Door

Provides extra clearance, heavy-duty and secure.

Specialized door

Hatch Door

Utilized for smaller access points, commonly employed in applications requiring limited entry. (e.g., Chocolate manufacturing lines)

Selecting the right Door Accessories

Selecting the right accessories for cold storage doors is essential to maintain efficiency and prolong the lifespan of the cold room. At Tristar, we expertly select and fit a wide range of cold storage door accessories, designed to ensure optimal insulation, durability, and ease of use.

Hinges
Available in double knuckle, reversible reach-in etc.

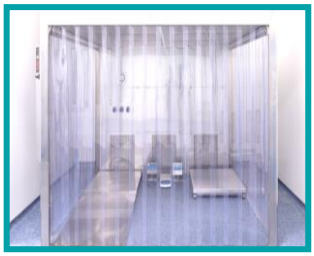
Door Closer
Smooth, automatic closure, minimum temperature loss

Latch – Handle set
Airtight sealing secure access

Magnetic Gasket
Airtight sealing; maintains consistent temperature

Glass view window
Visual monitoring without compromising thermal integrity

Door Heater
Prevents condensation and frost buildup



Strip Curtain
Controls temperature and contamination, ideal for high-traffic areas

With years of experience in the industry, Tristar ensures that every cold room door accessory is expertly selected and fitted based on your specific needs. From heavy-duty hinges to energy-saving gaskets, we tailor our solutions to enhance the performance of your insulated doors, maintaining their efficiency and durability over the long term.

Structural Specifications of PUF

Specifications	Values
Density	40 ± 2 kg/m^2
Closed cell content	90 to 95 %
Compressive strength at 10% deformation	2.1 kg/cm^2
Tensile strength	3.7 kg/cm^2
Bending strength	4.0 kg/cm^2
Flammability (Fire resistance)	SE (Self-Extinguishing)
Water absorption at 100% RH (Relative Humidity)	0.2% of Volume
Load bearing capacity	200 kg/m^2
Wind Resistance	1.5 to 4 N/m^2 (based on thickness)

Dimensional Stability of PUF at extreme temperatures

Temperature	Dimensional Stability (% change in dimensions)
-25°C	0.1%
+40°C	0.1%
+100°C	0.4%

Thermal Properties of PUF

The Thermal Transmittance, commonly known as U-value is a key measure of how effectively a material keeps heat from flowing through it. Simply put, the lower the U-value, the better the insulation performance. The U value of a material depends on its thickness. Below is the table specifying the U value of PUF at various thicknesses which are available at Tristar.

Thickness (mm)	U value ($W/m^2°C$)
40	0.46
60	0.36
80	0.28
100	0.21
120	0.19
150	0.17

The U-value measures how well a material insulates against heat transfer; the lower the U-value, the better. For instance, a PUF panel with a U-value of 0.36 $W/m^2°C$ insulates more effectively than concrete, brick, or even Polystyrene, which have higher U-values and allow more heat to pass through. This makes PUF an optimal choice for maintaining consistent temperatures.

Other thermal specifications:

Specifications	Values	Description
Thermal Conductivity	0.020 - 0.024 W/m·K	This measures how well the panel keeps heat in or out. Lower values mean better insulation.
R-Value (40 mm)	1.67	This indicates the panel's resistance to heat flow. Higher values mean more efficient insulation.
Temperature Range	-40°C to 80°C	This shows the temperature limits in which the panel works effectively without losing insulation.

Industry Applications of PUF Panels

PUF panels offer versatile solutions across industries, providing insulation, energy efficiency, and structural integrity. Below is a summary of key applications of PUF Panels:

Walk-in cold chambers, Pre-cooling rooms, Ripening chambers, Ante-rooms, Pack houses, Deep freezers

Stability chambers, Clean rooms, Incubators, Environmental testing rooms, Humidity chambers

Multi-commodity storages, Controlled atmosphere chambers, Pre-cooling rooms, Pack houses

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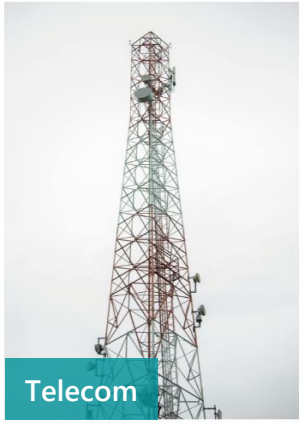
Telecom chambers, Equipment storage, Data centre insulation



Chocolate manufacturing, Storage chambers, Temperature-controlled production facilities

Insulated roofing systems, Wall cladding for industrial and commercial buildings

Cold rooms for beverage storage, Environmental testing chambers, Wine processing

Precision insulation, moisture control, hygiene and modularity make PUF panels the ideal choice across industries

Controlled atmosphere rooms, Multi-commodity storages for flowers

Temperature-controlled packaging areas

Why Tristar ?

With over 30 years of expertise, Tristar has mastered the art of manufacturing high-quality insulated rooms using advanced PUF panels. We cater to industries where precision is critical, including pharmaceuticals, biotech, food, and beverage sectors. As an ISO 9001:2000 certified company, our reputation is built on uncompromising quality. Every product we manufacture undergoes strict quality checks to meet rigorous BS and EN standards, ensuring durability, efficiency, and reliability.

Our state-of-the-art, 41,000 square foot manufacturing facility in Pimpalgaon (Baswant) allows us to combine cutting-edge technology with years of experience. Whether it's our PUF insulated panels, roofing systems, or specialized cold storage solutions, we deliver exceptional products tailored to meet the evolving needs of our clients across diverse industries.

Our journey began with the vision of the late Mr. Prabodh Bambardekar, a pioneering leader whose problem-solving expertise, decisive leadership, and unwavering ethics laid the foundation for our company. His legacy of integrity and innovation has shaped Tristar into what it is today. Now, under the leadership of Miss Neeti Bambardekar, a bold and forward-thinking director, Tristar continues to uphold its founding principles while embracing modern strategies. Neeti's energetic approach, sharp communication skills, and determination ensure that the company not only honours its past but also evolves with the future.

Get in touch

tristareqp@gmail.com
Click to send

+91 9823055138

https://www.tristarequipments.in/
Click to visit

Office - M.I.D.C. Ambad, Nashik, Works - Pimpalgaon (Baswant), Nashik

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30+ years of PUF Panel Expertise