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XPS BLUE BOARD MANUAL

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A: INTRODUCTION

High Performance Rigid Thermal Insulation

FUTURE FOAMS XPS BLUE BOARD is a high performance rigid extruded polystyrene board used for thermal insulation. It is manufactured using a continuous extrusion method for creating a consistent rigid board free of CFC gases. Unlike other polystyrene products it has no voids between the cells, so it does not have a 'bead' structure appearance. The process permits accurate control of thermal and mechanical properties, producing very consistent quality material.



FUTURE FOAMS XPS BLUE BOARD has a closed cell structure, giving it a range of benefits superior to many alternative thermal insulation materials

These benefits are:

- **R-Value Performance**

FUTURE FOAMS XPS BLUE BOARD offers excellent long term R-Values that per unit thickness are superior to most alternative common insulation products. It also is a better insulator for lower temperatures and can be used in applications as low as -170°C.

- **Compressive Strength**

FUTURE FOAMS XPS BLUE BOARD has both high and uniform compressive strength values throughout the board. From 250 to 700 kPa at 5% OR 10% compression, therefore it has better resistance to sustained loads and long term compressive creep than most alternatives making it ideal for cold store floors and high load applications.

- **Dimensional Stability and Inert**

There are increasing concerns about the stability of certain plastic foams in some applications. FUTURE FOAMS XPS BLUE BOARD has been used and tested extensively and does not pose dimensional stability problems.

FUTURE FOAMS XPS BLUE BOARD is both chemically and physiologically inert. It creates no dust and will not support mould or mildew. It is also non allergenic.

- **Superior Water Resistance**

The cell structure of FUTURE FOAMS XPS BLUE BOARD enables it to resist all form of water and moisture penetration. To a point where there is no long term moisture sensitivity. Closed Cell extruded polystyrene provides a high moisture resistance and very low vapour permeability. Water resistance of any insulation is critical because the thermal conductivity of water is 20 times that of air. The presence of even small percentages of water can severely compromise performance of insulation.

B: PRODUCT DATA

Product: Future Foams XPS

Colour: Blue

End Use: Insulation

Nominal Composition: Extruded Polystyrene

Nominal Mass per Unit/Density: 32 -35 kg/m³

Board Dimensions: 2500 x 600mm

Board Thicknesses: 25mm, 30mm, 50mm, 75mm and 100mm

Testing Facility: AWTA Product Testing Australia

Test Date: November 2015

Steady State Thermal Transmission Properties

Testing Method: ASTM C518-2010 (NATA Accredited)

Product Thickness: 50 mm

Thermal Conductivity: .0288 W/m.K @ 23°C

Thermal Resistance (R Value): 1.74 m²K/W

Compressive Resistance Properties

Testing Method: ASTM C165-07 Procedure A

Deformation Load at 10% Result: 359kPa

Water Vapour Transmission Properties

Testing Method: ASTM E96-2012 (NATA Accredited)

Temperature: 24.8°C

Humidity: 53.7 %

Permeance: $2.39 \cdot 10^{-7}$ g/Pa.m².S

Water Absorption of Core Materials for Structural Sandwich Conditions

Testing Method: ASTM C272-2007

Increase in Weight: 10.2%

Fire Tests on Building Materials, Components and Structures

Testing Method: AS/NZS 1530.3-1999 (NATA Accredited)

Nominal Thickness: 50 mm

Ignition Time: 11.48 min

Flame Propagation time: Nil sec

Heat Release integral: 71.2 KJ/m²

Smoke Release, log d: -0.4524

Optical Density, d: 0.3617 / metre

Regulatory Indices:

Ignitability Index: 9 (Range 0-20)

Spread of Flame Index: 0 (Range 0-10)

Heat Evolved Index: 2 (Range 0-10)

Smoke Developed Index: 6 (Range 0-10)

Heat and Smoke Release Rates for Materials and Products using an Oxygen Consumption Calorimeter

Testing Method: AS/NZS 3837-1998 (NATA Accredited)

Nominal Thickness: 50 mm

Average Heat Release: 130.5 kW/m²

Average Specific extinction area: 1076.2 m²/kg

Irradiance: 50kW/m²

Exhaust flow rate: 24 L/sec

Time to sustained flaming: 22 sec

Test Duration: 314 sec

Peak heat release after ignition: 332.1 kW/m²

Average heat at 60s: 258.9 kW/m²

Average heat at 180s: 199.1 kW/m²

Average heat at 300s: 130.5 kW/m²

Total heat release: 37.9 MJ/m²

Average effective heat of combustion: 28.6 MJ/kg

Initial thickness: 38.0 mm

Initial mass: 12.5g

Mass remaining: 0.1 g Mass percentage pyrolysed: 99.2 %

Mass loss: 12.4 g Average rate of mass loss: 4.6 g/m².s

Dimensions: Standard size is 2500mm x 600mm
 Other dimensions available on request

Thicknesses: Standard thicknesses are: 25mm, 30mm, 50mm, 75mm, and 100mm
 Other thicknesses available on request

Type of Edge: Straight Edge
 Tongue and Groove and Ship-lapped edges available on request

Colour: Blue

Flame Retardant: Additive has been added to all of our boards

Surface: Rough planed face (without skin) for 75mm and 100mm thickness
 Smooth face (with skin) for 25mm, 30mm and 50mm.

No CFC's are used in the manufacture of FUTURE FOAMS XPS BLUE BOARD.

Fire Retardant Ratings

| Item | | Testing Item | Unit | Technical Requirements |
|------|-------------|---|------|------------------------|
| 1 | FR B1 Grade | Average Remaining Length | mm | ≥ 150 |
| | | Average Peak Value of Smoke Temperature | °C | ≤ 200 |
| | | Min. Remaining Length | mm | > 0 |
| 2 | FR B2 Grade | Whther to Ignite Filtering Paper | --- | Can Not |
| | | Fame Height | mm | ≤ 150 |
| 3 | | Smoke Density Rating (SDR) | --- | ≤ 75 |

C: APPLICATIONS

Residential

Cathedral Ceiling, under floor and slab, Cavity Walls, Siding Insulation

- Performs the dual function of both vapour barrier and thermal insulation and does away with the need for foil and fibreglass used together or separately.
- Provides superior thermal insulation in ceilings, walls and under both timber and concrete slab floors reducing heating & cooling costs, becoming very cost effective in a short time.
- When fixed on the outside of timber studs or inner brick layer during construction it encloses the house in a blanket of thermal insulation.

Commercial Building

Slab Insulation, Retrofitting Wall Panels, Roofing Systems, Thermal Break

- The roofing systems developed for roof or slab insulation for long term performance.
- Tanking membrane protection – where the insulation is buried FUTURE FOAMS XPS BLUE BOARD's moisture resistance and long term compressive resistance is fully utilised.

Agricultural Buildings

Mushroom growing, Poultry and pig sheds, Vegetable storage, Wine Storage.

- Using FUTURE FOAMS XPS BLUE BOARD in poultry & pig growers yield better feed conversion, greater flock density, fuel savings, humidity control, a more valuable building and optimum production year round.
- Samples tested after 17 years in service in poultry sheds in the USA showed the insulation retained all of its original designed R-Value.
- Buildings insulated with FUTURE FOAMS XPS BLUE BOARD will not have the problems of corrosion and rot caused by absorption of moisture by other insulation.

Cold Storage

Cool room & freezer panel, Slab Floor insulation, High performance doors

- Used extensively in cold stores and freezers because of its long term R-value retention, resistance to moisture and high compression strength.
- Compressive properties of any thermal insulation are vital in ensuring long term trouble-free performance of a working floor.
- FUTURE FOAMS XPS BLUE BOARD has the best high compressive strength, compressive modulus and long term compressive creep values.



Pools, Spas & Ice Rinks

- In-ground spa and swimming pools are insulated with FUTURE FOAMS XPS BLUE BOARD during construction and spa covers made of FUTURE FOAMS XPS BLUE BOARD to save on heating costs.
- Primary Insulation under major ice rinks

Panels

Truck bodies, Sandwich panel core, Architectural cladding, and Motor home panels

- FUTURE FOAMS XPS BLUE BOARD is selected as quality slab core by all types of panel manufacturers in many countries.
- Studies show refrigerated truck bodies with urethane core have picked up 2 tonne in weight by water absorption and condensation causing the refrigeration unit to over work, dramatically increasing fuel costs. The problem is virtually eliminated with FUTURE FOAMS XPS BLUE BOARD.
- When only a small cavity is available, as is the case with caravans, campervans or motor homes, then FUTURE FOAMS XPS BLUE BOARD is a perfect product to utilise because of its strength, thermal properties and weight saving.

Fabrication and Packaging

- Critical separation between hot and cold areas in refrigeration display case use FUTURE FOAMS XPS BLUE BOARD for its high resistance to water and vapour drives. Fabrication of small parts to customer specifications.
- Utilised in packaging due to its high load i.e. compressive strength. Some unusual applications are pack glass separators, door separators (solid core and insulation cabinet doors)
- For moulding and support in radiotherapy and oncology, FUTURE FOAMS XPS BLUE BOARD is used due to its higher melting point, finer cell structure, strength and ease of handling.

Flotation

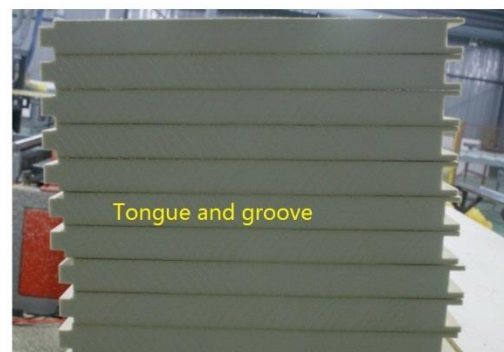
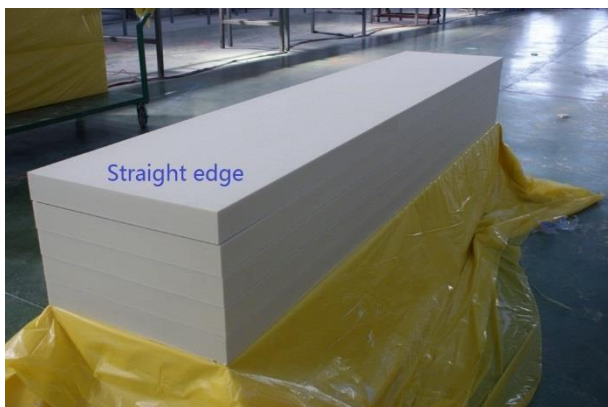
- Used as flotation for marina pontoons FUTURE FOAMS XPS BLUE BOARD resists moisture uptake and algae growth.

Model Making

- FUTURE FOAMS XPS BLUE BOARD is stable, easily shaped, emits no odour and does not cause skin or respiratory irritation and the small closed cell structure allows fine surface finish and easy painting.

Surfboards

- Surfboards manufactured from FUTURE FOAMS XPS BLUE BOARD are durable, strong and as they absorb virtually no moisture can continue to be used even when the surface coating is damaged.
- In high quality competition surfboards, sailboards, sand boards and light weight rescue craft FUTURE FOAMS XPS BLUE BOARD's combined physical and water resistant properties make it the premium flotation foam.



D: INSTALLATIONS

FUTURE FOAMS XPS BLUE BOARD is ideal for energy conservation and efficiency in all types of industrial or commercial buildings and in dwellings.

Installation types ...

- i) Inverted Roof Insulation
- ii) Slope Roof Heat Insulation System
- iii) Single Layer Roof System steel structure
- iv) Single Layer Roof System concrete or steel structure
- v) Planted Roof System
- vi) Cavity wall insulation
- vii) Exterior Wall Insulation Rendered or Decorated

Storage and Handling...

Boards are to be protected from adverse weather conditions and direct sunlight for the storage period. Unused materials should be stored in covered areas away from direct sunlight and ultra-violet rays.

Insulation boards once placed on the roof should not be left exposed. It is recommended that the insulation be immediately covered with the follow up system – e.g.: paving slabs, screed, sheeting, etc. to avoid possible degradation.

Dust could settle on the face of the board if stored in dusty conditions. Wipe clean with damp cloth before installation.

Soot from diesel smoke could be attracted to the product. If you envisage construction plant in the vicinity after board has been installed, then wipe board down with damp cloth in water softener solution available from us, before installation.

Surface damage can be expected if product is not handled with care.

Fasteners

A variety of products can be used to fix this product to another surface.

If using an adhesive, we recommend using Liquid Nails FAST. This is a water based adhesive which is polystyrene friendly. Future Foams can supply this product in caulking gun tubes.

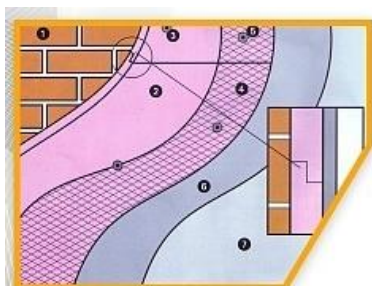
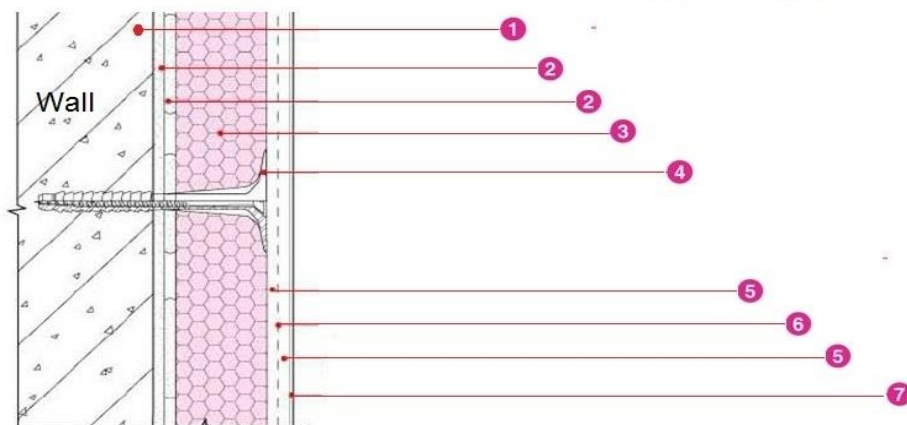
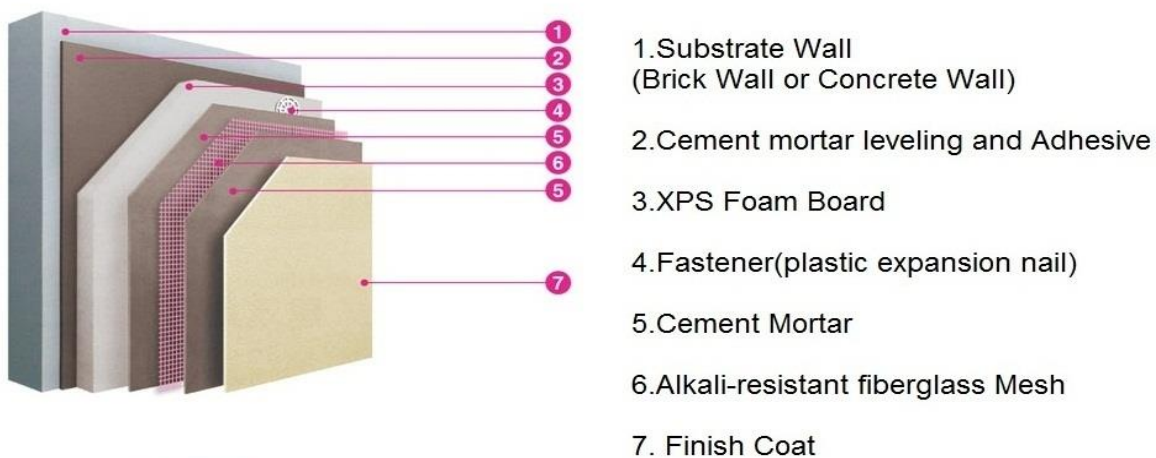
Insulation anchors are available for Ramset and Hilti splay guns at different lengths depending on the board thickness you are trying to fix. For a Ramset gun, the anchors are available through the Coventry's. For

Hilti fasteners you can purchase directly from Hilti via their website. www.hilti.com.au

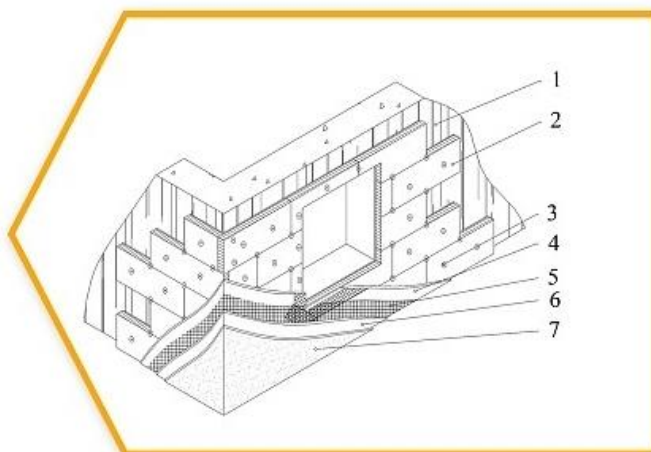


Standard Wall Installation

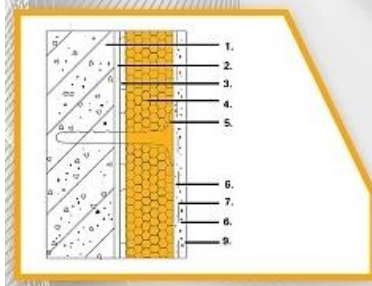
Regular application of XPS Foam for wall insulation in china(only for reference)



1. Brick Wall, Block Wall or Concrete Wall
(1 Cement; 3 Mortar Leveling Blanket)
- 2.Special Bond (not applied in Old House re-building)
- 3.XPS Foam Board thickness determined by design requirement
- 4.Fastener (plastic expansion nail + self-tapping screw)
- 5.Alkali-proof Glass Fiber
- 6.Polymer Mortar
- 7.Flexible Coating or Decoration Block



- 1.Wall Base
- 2.Extruded Foam Board
- 3.Fastener
- 4.Bottom Mortar Layer
- 5.Glass Fiber
- 6.Top Mortar Layer
- 7.Decorative Layer

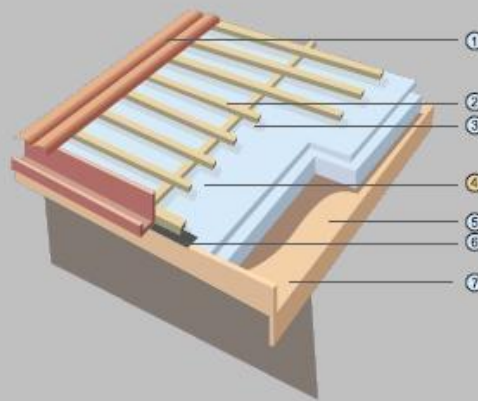


- 1.Brick Wall, Block Wall or Concrete Wall
- 2.1 Cement; 3 Mortar Leveling Blanket
- 3.Special Glue (not applied in Old House re-building)
- 4.XPS Foam Board thickness determined by design requirement
- 5.Fastener (plastic expansion nail + self-tapping screw)
- 6.Polymer Mortar
- 7.Alkali-proof Glass Fiber
- 8.Polymer Mortar
- 9.Flexible Coating or Decoration Brick

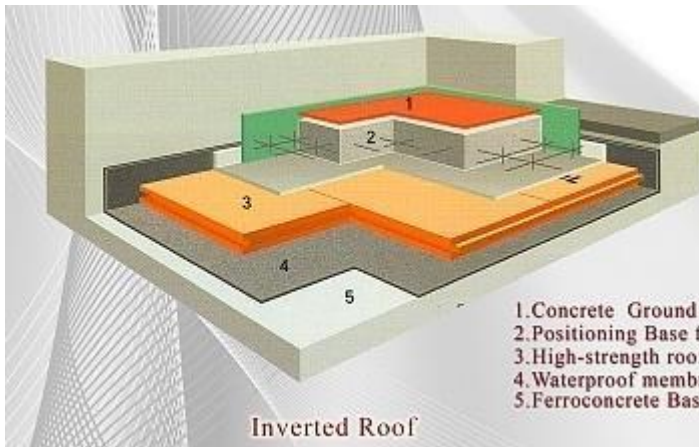
Inverted Roof Systems

Insulating inverted roofs and wall

According to the investigation, the position of the insulation within the construction is an important factor which affects the longevity of flat roofs. The inverted roof concept overcomes the problem caused by wide temperature variation with the action of placing thermal insulation above the waterproof layer, maintaining it at an even temperature close to that of the building interior and protecting it from the damaging effects of UV radiation and from mechanical damage.



- ① Reinforced concrete or fill-slab layer
- ② Tile grid
- ③ Nonwoven insulation layer
- ④ ROOFCARE™ XPS insulation board
- ⑤ Rainproof layer
- ⑥ Cement mortar levelling layer
- ⑦ Roof deck



1. Concrete Ground Tile
2. Positioning Base for Concrete Ground Tile
3. High-strength roof board
4. Waterproof membrane (need protective layer when necessary)
5. Ferroconcrete Base

Inverted Roof

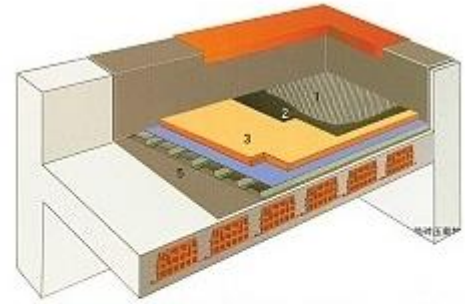
Slope Roof Insulation System



1. Roof board
2. Damp-proof layer
3. Leveling layer
4. Roofing grass-roots

Slope Roof Heat-insulation System

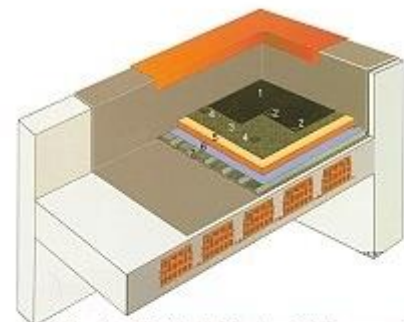
Single Coiled Material Layer Roof System (concrete / steel structure)



Single Coiled Material Layer Roof System (concrete or steel structure)

- 1.Cobblestone or concrete ground tile ballast
- 2.EPDM single-layer membrane waterproofing system
- 3.Roof board
- 4.Polyethylene film or self-adhesive modified bitumen membranes

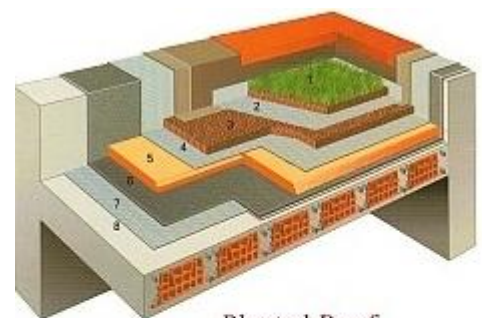
Single Coiled Material Layer Roof System (steel structure)



Single Coiled Material Layer Fixing Roof System (steel structure)

- 1.EPDM, TPO/FPO, PVC single-layer membrane waterproofing system
- 2.waterproofing membranes fixer
- 3.Non-woven fabrics isolation layer
- 4.professional insulation board fixer
- 5.Roof board
- 6.Polyethylene film or self-adhesive modified bitumen membranes
- 7.Metal Roof

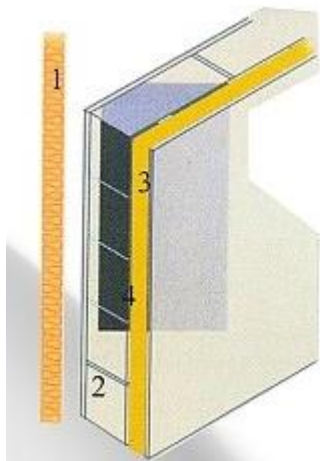
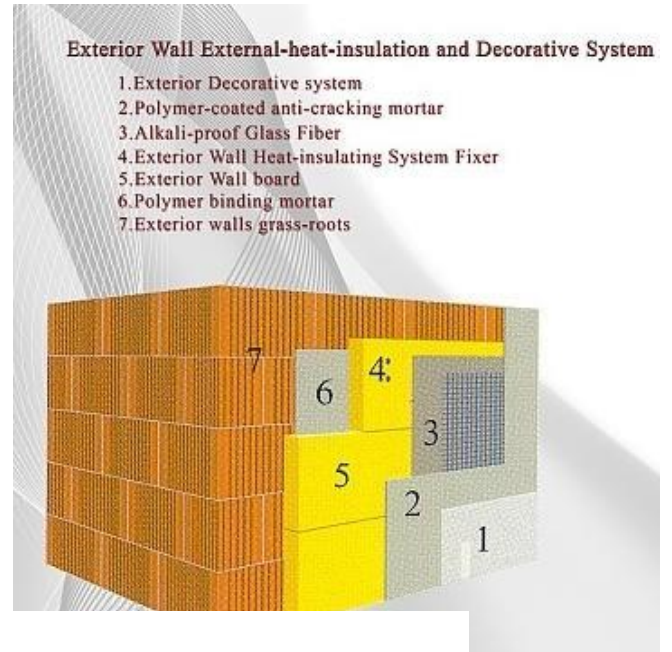
Planted Roof



Planted Roof

- 1.Plant or vegetation
- 2.Non-woven filter fabric
- 3.Plastic water storage and drainage composite plate
- 4.Waterproof breathable film or anti-root puncture membrane
- 5.Roof board
- 6.Waterproof breathable membrane (need protective layer when necessary)
- 7.Slope layer and leveling layer
- 8.Ferroconcrete grassroots

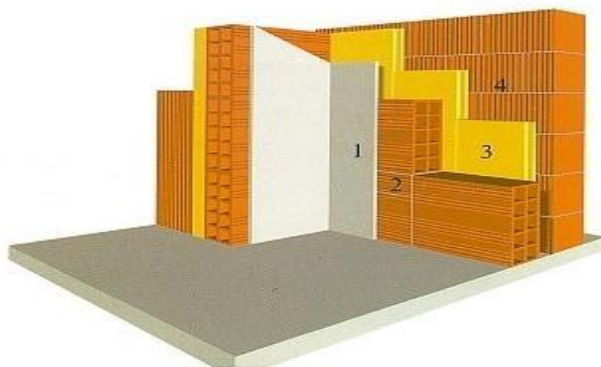
Exterior Wall Decorative System



Exterior Wall Inner-heat-insulation and Decorative System

- 1.Decorative System
- 2.Masonry Wall
- 3.Laminated Extrusion Board
- 4.Grass-roots

Double Layer Sandwich System



Double Layer Sandwich Wall Heat-insulation System

- 1.Exterior Decoration System
- 2.Wall Connecting Components and Support Plate
- 3.Special Exterior Wall Board(Partial Filling)
- 4.Inner Layer Masonry wall

E: FUTURE FOAMS XPS BLUE BOARD MSDS

1 - Chemical Product and Company Identification

Material Name: Extruded Polystyrene Foam (XPS)

2 – Composition

| CAS # | Component | Percent by Weight |
|------------|--|-------------------|
| 9003-53-6 | Polystyrene | 80-100 |
| 75-68-3 | 1-Chloro-1,1-difluoroethane(HCFC-142b) | 4.8-7.2 |
| 75-45-6 | Difluorochloromethane (HCFC-22) | 3.2-4.8 |
| 14807-96-6 | Talcum Powder | 0.1-0.8 |

3 - Hazards Identification

Appearance and Odor: Yellow, pink or blue closed-cell foam without odor.

Potential Health Effects

Inhalation: Dusts produced by cutting or drilling of this product may cause irritation of the nose, throat, and respiratory tract.

Skin Contact: Dust produced from cutting or drilling from this product may cause itching and short-term irritation.

Eye Contact: Dust produced from cutting or drilling of this product may cause slight irritation to the eyes.

Ingestion: Ingestion of this product is unlikely. However, ingestion of product may produce gastrointestinal irritation and disturbances.

4 - First Aid Measures

Inhalation: If dust from cutting or drilling is inhaled, immediately remove the affected person to fresh air. If symptoms persist, get medical attention. If irritation persists get medical attention.

Skin Contact: For skin contact, wash with mild soap and running water. If irritation persists get medical attention.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes. If irritation persists get medical attention.

Ingestion: Ingestion of this material is unlikely. If it does occur, watch the person for several days to make sure that partial or complete intestinal obstruction does not occur. Do not induce vomiting unless directed to do so by medical personnel.

5 - Fire Fighting Measures

Extinguishing Media: Water, carbon dioxide, or dry chemical

Unusual Fire & Explosion Hazards: Produces dense black smoke while burning. Grinding, sawing or fabrication activities of the foam can produce dust particles, which may under certain conditions form explosive dust atmospheres that can be ignited.

Fire-Fighting Instructions: Use self-contained breathing apparatus (SCBA) and full bunker turnout gear in a sustained fire.

Fire-Fighting Instructions: Use self-contained breathing apparatus (SCBA) and full bunker turnout gear in a sustained fire.

Hazardous Combustion Products: Primary combustion products are carbon monoxide, carbon dioxide, and styrene. The HCFC-142B and HCFC-22 ingredients thermally decompose at temperatures in the order of 430°C (805°F). The decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide, fluorine, and chlorine. Other undetermined hydrocarbon fractions could be released in small quantities.

6 - Accidental Release Measures

Containment Procedures:

Dust from cutting or drilling this material will settle out of the air. If concentrated on land, it can then be scooped up for disposal as a non-hazardous waste. In water this material will float and disperse with wind and current. Contain the material with booms and pick up with absorbents or adsorbent materials, or remove with a vacuum truck.

Clean-Up Procedures:

Scoop up material and put into a suitable container for disposal as a non-hazardous waste.

Response Procedures: Isolate area. Keep unnecessary personnel away.

7 - Handling and Storage

Handling Procedures: No special procedures are required for this material.

Avoid inhaling dusts or vapors. Avoid eye and excessive skin contact. Use only with adequate ventilation. As with all chemicals, good industrial hygiene practices should be followed when handling this material. Special care must be taken to avoid buildup of dusts.

Storage Procedures: No special procedures are required for this material.

8 – Exposure Controls / Personal Protection

Ventilation: Grinding sawing or fabrication activities of the foam can produce dust particles, which may under certain conditions form explosive dust atmospheres that can be ignited.

Respiratory Protection: Use respiratory protection in accordance with your company's respiratory protection program, local regulations

Skin Protection: Normal work clothing (long sleeved shirts and long pants) is recommended.

Eyes/Face Protective Equipment: Wear safety glasses or goggles.

9 - Physical & Chemical Properties

Appearance: Yellow, pink or blue foam **Odor:** None
Physical State: Solid
Boiling Point: Decomposes over 600°F (316°C)
Solubility (H₂O): Insoluble
Specific Gravity: (Water=1): 0.021-0.064
Freezing Point: Softens at 220°F (104°C)
Physical Properties: **Additional Information**
No additional information available.

10 - Chemical Stability & Reactivity Information

Stability: This is a stable material.

Conditions to Avoid: Avoid dispersion of dust in air.

Incompatible Materials: Hydrocarbons, esters and amines.

Hazardous Decomposition Products:

Primary combustion products are carbon monoxide, carbon dioxide, and styrene. Other undetermined hydrocarbon fractions could be released in small quantities. The HCFC-142B and HCFC-22 ingredients thermally decompose at temperatures in the order of 430°C (805°F). The decomposition products include hydrogen fluoride, hydrogen chloride, carbon monoxide, carbon dioxide, fluorine, and chlorine.

Hazardous Polymerization: Will not occur.

11 - Toxicological Information

General Product Information:

Dusts from cutting and drilling may cause mechanical irritation to eyes and skin. Ingestion may cause transient irritation of throat, stomach and gastrointestinal tract. Inhalation may cause coughing, nose and throat irritation, and sneezing. Higher exposures may cause difficulty breathing, congestion, and chest tightness.

Carcinogenicity:

There is no known chronic health effects connected with long-term use or contact with these products.

12 - Ecological Information

Ecotoxicity: No data available for this product. This material is not expected to cause harm to animals, plants or fish

Environmental Fate: No data available for this product.

13 - Disposal Considerations

A: General Product Information:

Material, if discarded, is not expected to be a characteristic hazardous waste under RCRA.

Disposal Instructions: Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

14 - Transportation Information

Shipping Name: Not regulated for transport.
Hazard Class: None
Packing Group: None
Required Label(s): None
Additional Info.: None

15 - Regulatory Information

This material contains information regulated in the standard of GB/T 10801.2-2002.
Acute Health Hazard: No
Chronic Health Hazard: No
Sudden Release of Pressure Hazard: No
Reactive Hazard: No

16 - Other Information

This is a revised MSDS with updated contact information and product names. Read this information carefully.

For further information, please refer to the following standard: GB/T 10801.2-2002

G: 15 YEAR THERMAL LIMITED WARRANTY

Future Foams hereby warrants to the owner of the building/structure upon which the insulation was installed that, for a period of fifteen (15) years, commencing with the date of company invoice, that the insulation's actual thermal resistance will not vary by more than ten (10) percent from the minimum R-value identified in ASTM C578 on insulation. If the insulation is determined by sampling and tests (conducted as provided below) to not meet warranty value, Future Foams will deliver to the owner of the building on which the insulation was initially installed a quantity of substantial equivalent product to replace the non-performing insulation or, in the alternative, at Future Foams' sole discretion, refund to the owner the original purchase price of the non-performing insulation. In no event shall Future Foams be liable for any other costs or damages, including labour costs. Total Future Foams expense for the life of this warranty will be limited to the original purchase price of the insulation.

CONDITIONS / EXCLUSIONS

The following conditions/exclusions apply to this Warranty:

- A. Future Foams' obligations under this warranty are applicable only to insulation supplied.
- B. Insulation must be installed in typical building and construction assemblies (including roofing) in strict accordance with all applicable Future Foams specifications, recommendations and guidelines that were in effect at the time of such installation.
- C. The building must be owned by the claimant at the time of any warranty claim.

- D. This warranty shall be void if, in Future Foams sole judgment, there is damage to the insulation resulting from improper handling and installation, maintenance, intentional or unintentional misuse, negligence, impact of falling objects, vandalism, earthquake, lightning, hurricane, flood, fire, hailstorm, high wind, tornado, excessive UV exposure, cascading roof/floor water, ponding water, immersion in water, non-diffusion open assemblies, or failure or distortion in the walls or foundation of the building/structure, including settling of the building or movement of framing members.
- E. Insulation must be stored prior to installation in accordance with Future Foams recommendations.**
- F. Future Foams does not warrant the compatibility of any other products, whether manufactured by Future Foams or not, including (but not limited to) any roofing membranes or coatings.
- G. Building and/or construction practices unrelated to building materials could greatly affect moisture and the potential for mould formation. No material supplier including Future Foams can give assurance that mould will not develop in any specific system or product.

INSULATION SAMPLING/TESTING

All sampling shall be conducted in accordance with sampling procedures prescribed by Future Foams, and samples of the insulation shall only be taken in the presence of an authorized Future Foams representative.

Testing of insulation samples shall be in accordance with ASTM C518, or the then closest Future Foams-approved effective equivalent thereof. Insulation samples shall be conditioned to equilibrium prior to testing. All sampling and testing costs (including but not limited to costs of insulation covering removal and replacement) shall be at the owner's sole expense.