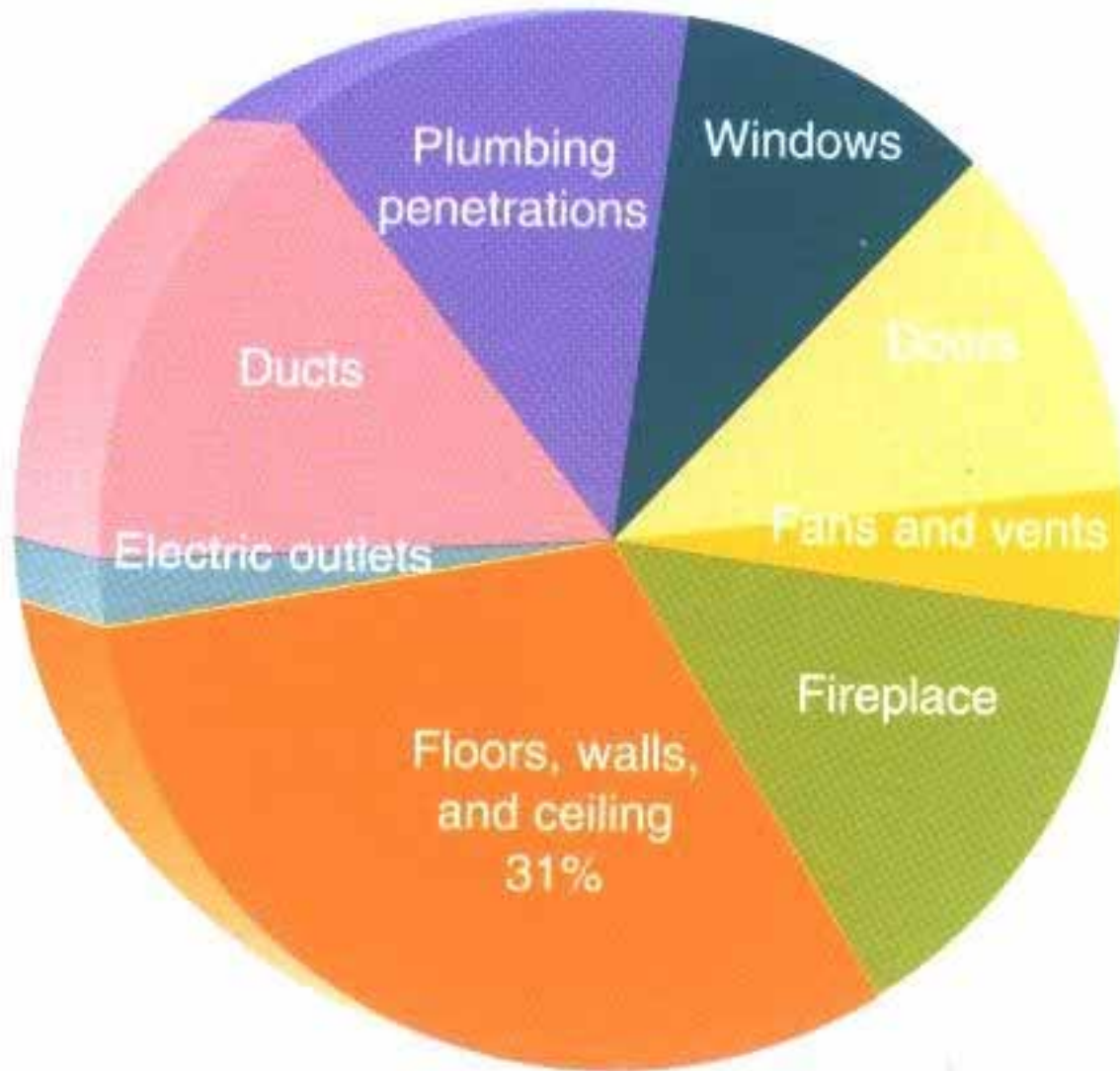


# THERMAL INSULATION SYSTEMS FOR BUILDINGS



## *Heat loss in a building*



# Thermal Insulation

## **Purpose**

**Create a barrier to the heat / cold flow**

## **TRANSMISSION OF HEAT**

**by conduction**

**by convection**

**by radiation**

**Sensitivity: water and moisture**

# **IDEAL INSULATION MATERIAL**

- **MAINTAIN “R” VALUE OVER TIME**
- **HIGHEST MOISTURE RESISTANT**
- **GOOD MECHANICAL PROPERTIES**
- **DIMENSIONAL STABLE**
- **FIRE RESISTANT**

# **INSULATION MATERIALS**

**Perlite**

**Mineral Fiber**

**Bead Board (Thermo Cole)**

**Polyurethane**

**Extruded Polystyrene**

# INSULANTS

## A. LOOSE FILL GRANULATES

- PERLITE
- VERMICULITE

### ADVANTAGES

- Easy to handle
- Fire resistant

### DISADVANTAGES

- Low insulation value
- Space lost (thickness)
- Moisture flow
- Condensation problem
- Limited usage

## **B. MINERAL FIBRES**


- **GLASSFIBRE**
- **ROCKWOOL**
- **PERLITE BOARDS**

### **ADVANTAGES**

- **Medium insulation**
- **Fire resistant**
- **Large product mix**
- **Long history**

### **DISADVANTAGES**

- **High moisture absorption**
- **Weak mechanical properties**
- **Poor handling**
- **No dimensional stability**

A microscopic image showing a dense network of fine, fibrous glass wool. The fibers are light brown and appear to be randomly oriented. In the center-right portion of the image, there is a distinct, darker, and more densely packed cluster of fibers, possibly representing a point of fiber entanglement or a specific structural feature. The overall texture is fibrous and porous.

GLASSWOOL 22—50

# BEAD BOARD PROPERTIES

## ADVANTAGES

- **Easy handling**
- **Good Insulation value**
- **Sufficient fire resistance**  
(when treated)

## DISADVANTAGES

- **Voides between beads**
- **Significant water pick-up**
- **High moisture absorption**
- **Medium mechanical prop.**
- **Batch process – wet**
- **No quality control**

A micrograph showing a cross-section of plant tissue. The cells are roughly hexagonal or polygonal in shape, with distinct cell walls. The cytoplasm is stained a light blue color, and there are several dark, circular spots scattered throughout the cells, likely representing nuclei or other organelles. The overall appearance is that of a dense, organized cellular structure.

PS 30 - 50

# RIGID POLYURETHANE FOAM

## ADVANTAGES

- Highest insulation value
- Easy handling
- Sufficient fire resistance (when treated)
- Fast application\*
- Ready made build-up roofing\*

## DISADVANTAGES

- Moisture absorption
- Ageing insulation
- Not 100% closed cell
- Weather and temperature dependant\*
- Control of density\*
- Highly dependant on labour skill\*
- Little quality control (small unit)
- Toxic fumes

\* RELATED TO SPRAY PU FOAM

PUR 40 — 50



# EXTRUDED POLYSTYRENE FOAM

## ADVANTAGES

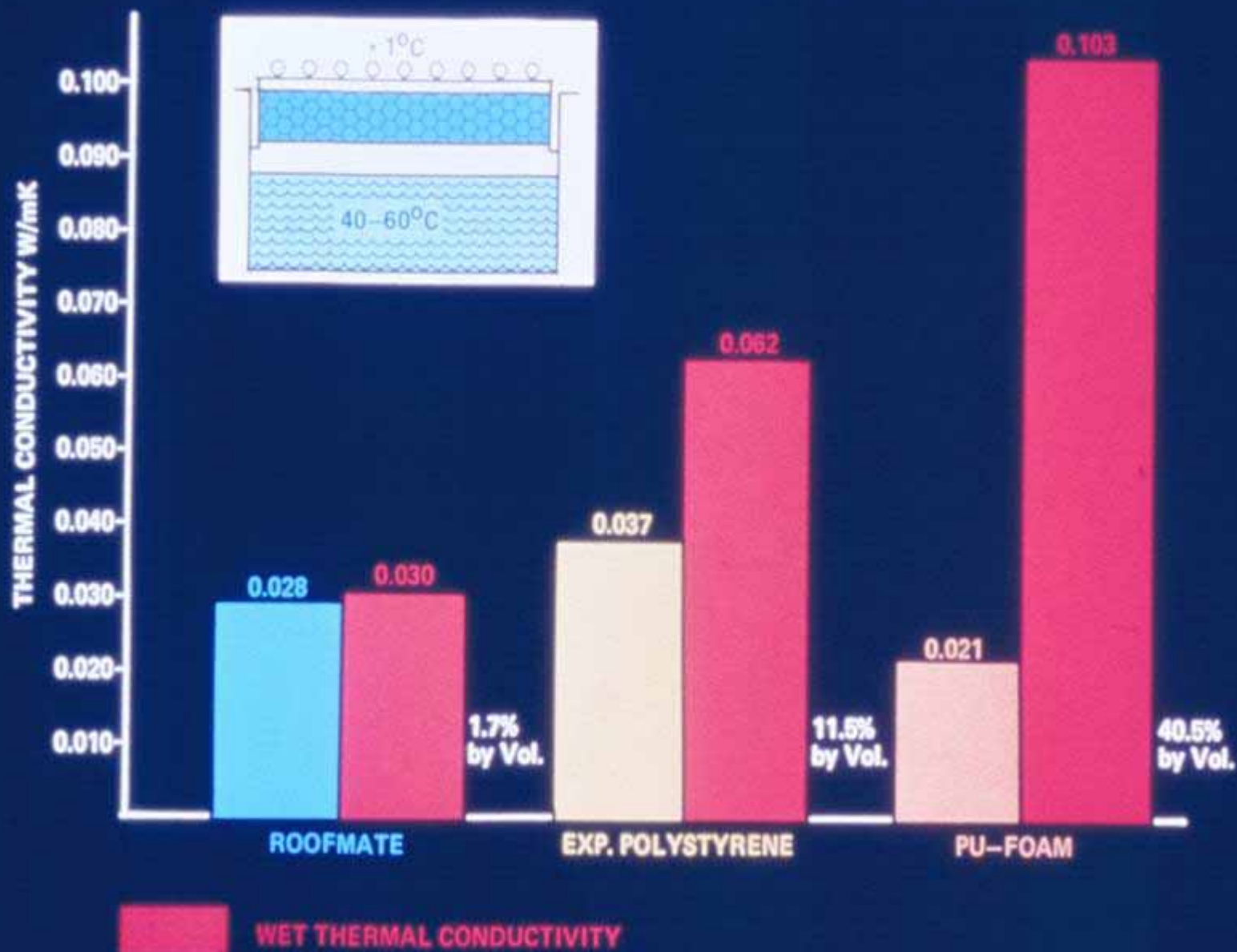
- **100% homogenous closed cell structure**
- **No water pick-up**
- **Very low moisture absorption**
- **Good and permanent insulation**
- **Excellent mechanical properties**
- **Sufficient fire resistance.**  
**B1.**
- **Permanent quality control**

## DISADVANTAGES

- **UV sensitive**

RM(34) - 50

## THERMAL CONDUCTIVITY vs. WATER PICK-UP



# THERMAL INSULATION

## APPLICATIONS

Roof

Wall

Floor

Perimeter

Sandwich Panels

Cold Store

# ROOFING

- CONVENTIONAL
- UP SIDE DOWN / INVERTED ROOF

Difference between the two is the placing of waterproofing membrane

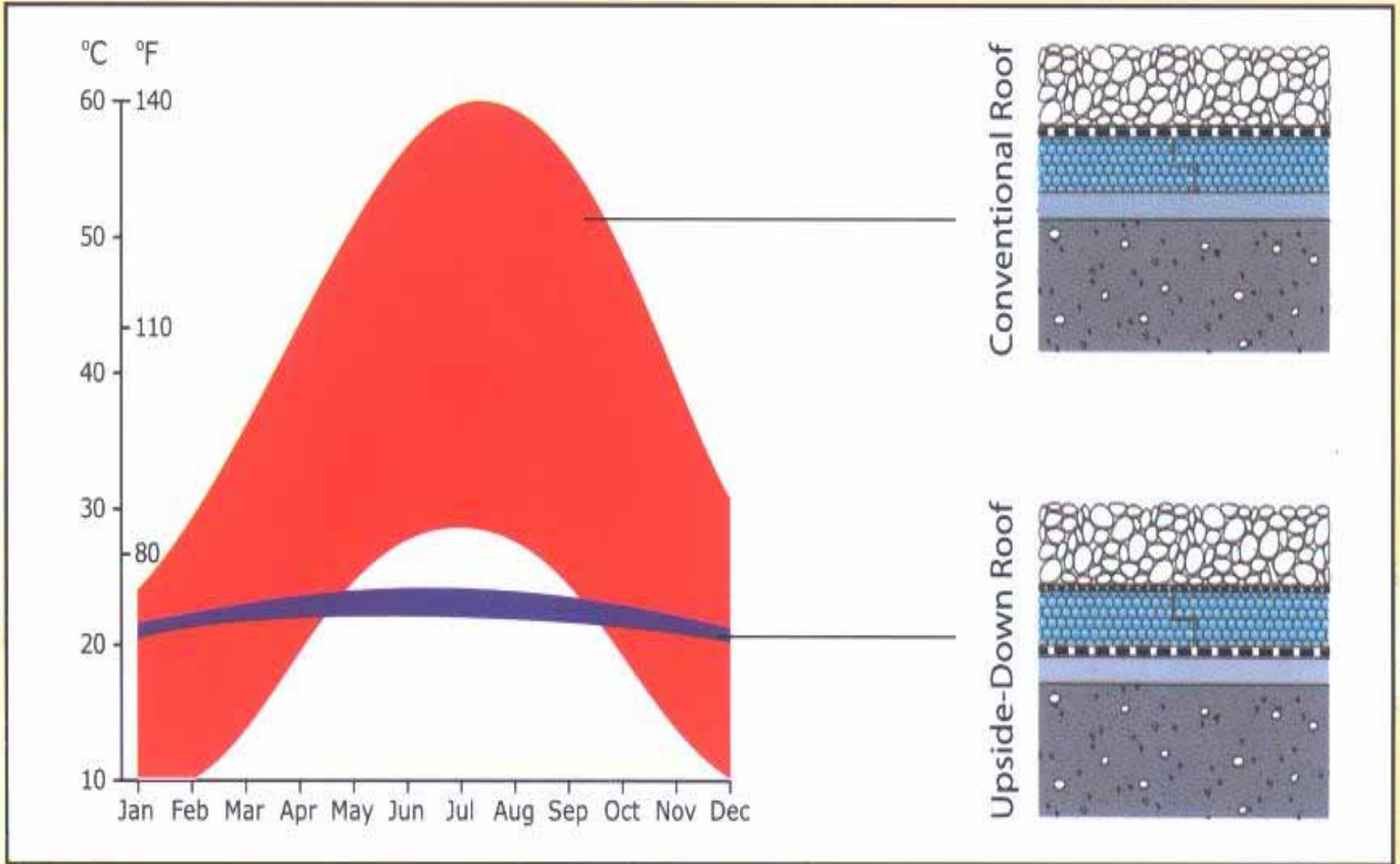
# CONVENTIONAL ROOFING SYSTEM

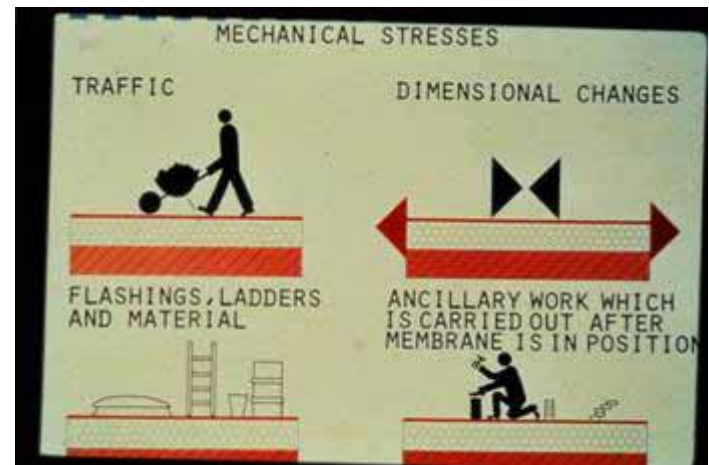
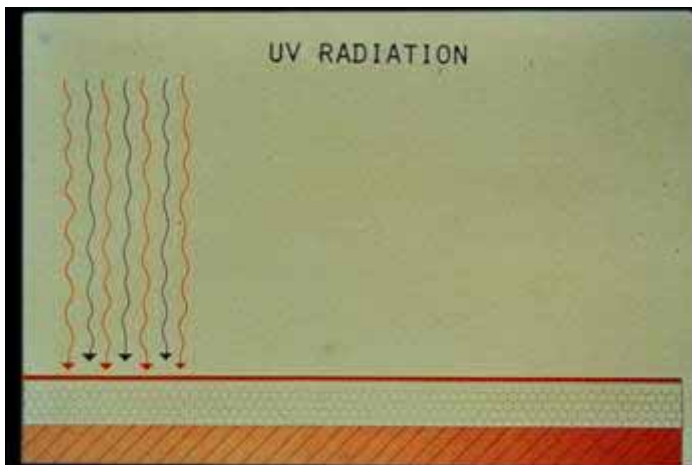
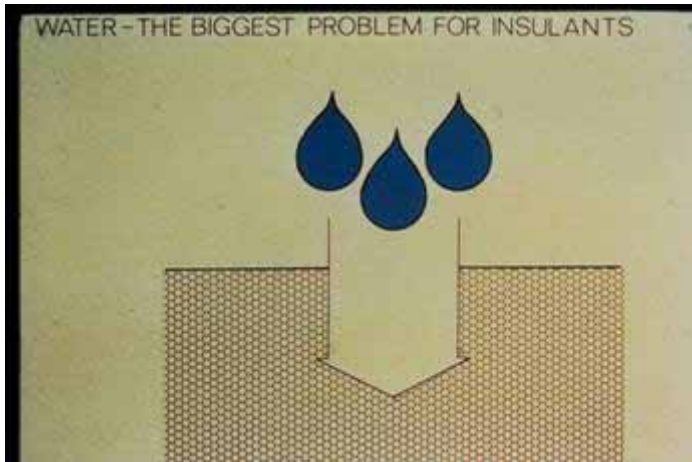
Membrane is placed over the thermal insulation

# INVERTED ROOFING SYSTEM

Membrane is placed under the thermal insulation

Chart below shows variations in the water proofing membrane temperature in the upside-down roof and in the gravel ballasted conventional roof (monthly average maximum and minimum day and night values).

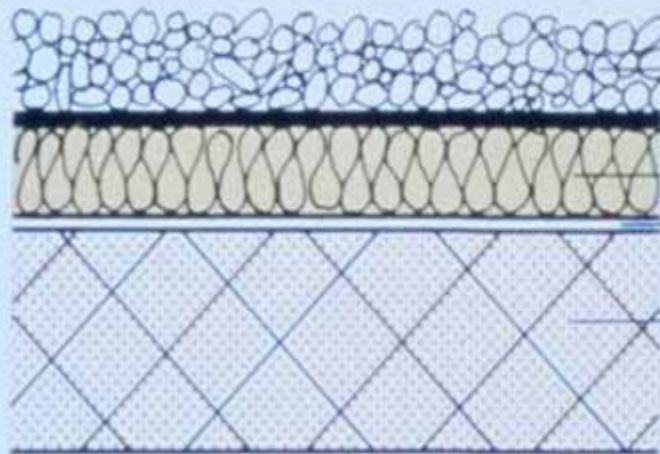




# SOLUTION

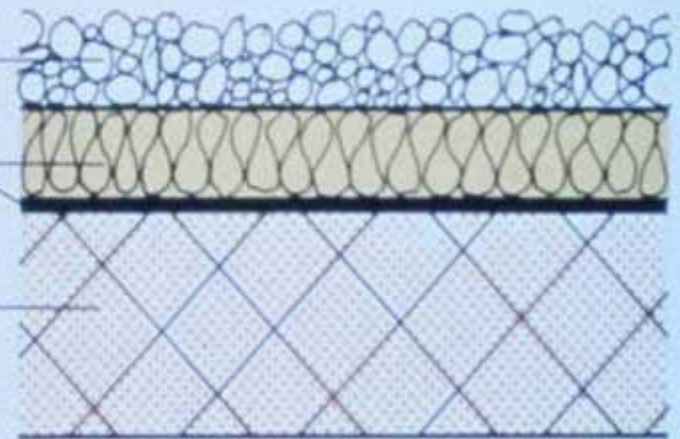
## " INVERTED ROOF "

CONVENTIONAL



Gravel  
Protection  
Membrane  
Insulation  
Vapour barrier  
Deck

INVERTED ROOF

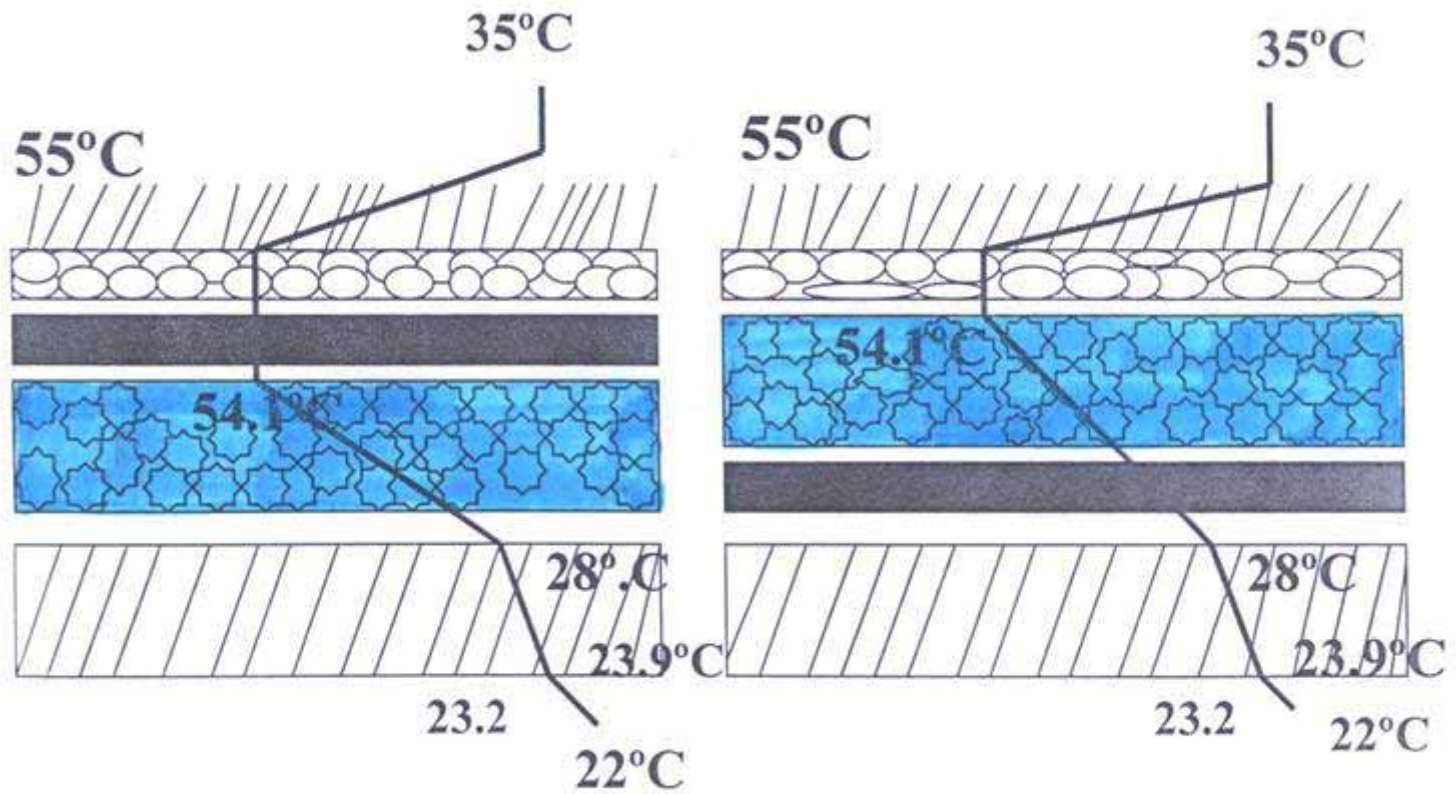


# ADVANTAGES OF INVERTED ROOFING SYSTEM

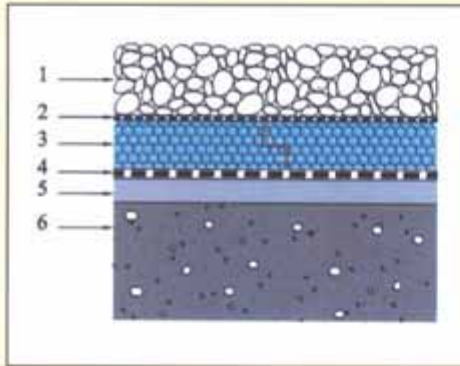
- PROTECTION OF MEMBRANE
  - from extreme temperature cycles
  - from mechanical damages
- ELIMINATION OF VAPOUR BARRIER
- INSTALLATION SPEED INCREASED
- MAINTENANCE COSTS REDUCED
- INCREASE OF MEMBRANE LIFE

# Conventional

# INVERTED



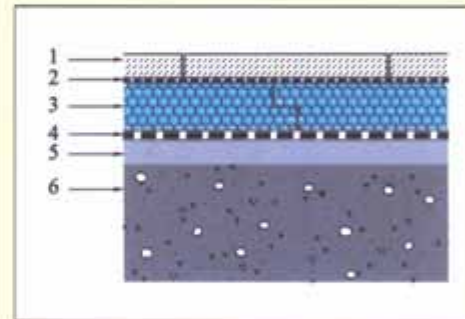
**Upside Down Roof**  
Gravel Protection



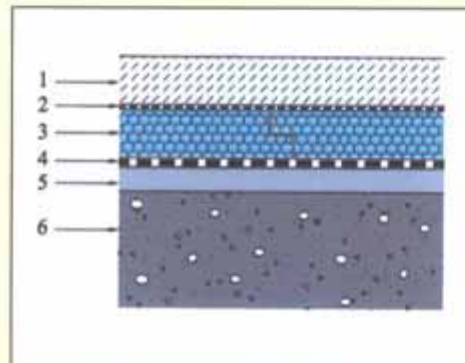
1. Gravel layer 15 - 30 mm ( 5/8" - 1 1/4" )
2. Separation layer ( Typar )
3. Roofmate SL
4. Waterproofing membrane \*
5. Screed to fall
6. Roof deck

**Upside Down Roof**  
Concrete Pavers

1. Concrete pavers loose laid
2. Separation layer ( Typar )
3. Roofmate SL
4. Waterproofing membrane \*
5. Screed to fall
6. Roof deck



**Upside Down Roof**  
In Situ Concrete Slab



1. Reinforced in-situ concrete
2. Separation layer ( Typar )
3. Roofmate SL
4. Waterproofing membrane \*
5. Screed to fall
6. Concrete roof deck

\* When single layer PVC-plastic membranes are used, a protection layer has to be applied between the Roofmate boards and the membrane.







## Insulating Inverted Flat Roofs



Figure 1.1: A large, long, low-profile building with a green roof, situated in a vast, flat, open field under a clear blue sky. The foreground is a mix of green grass and brown dirt paths. A circular manhole cover is visible in the lower-left foreground.



**Walls**

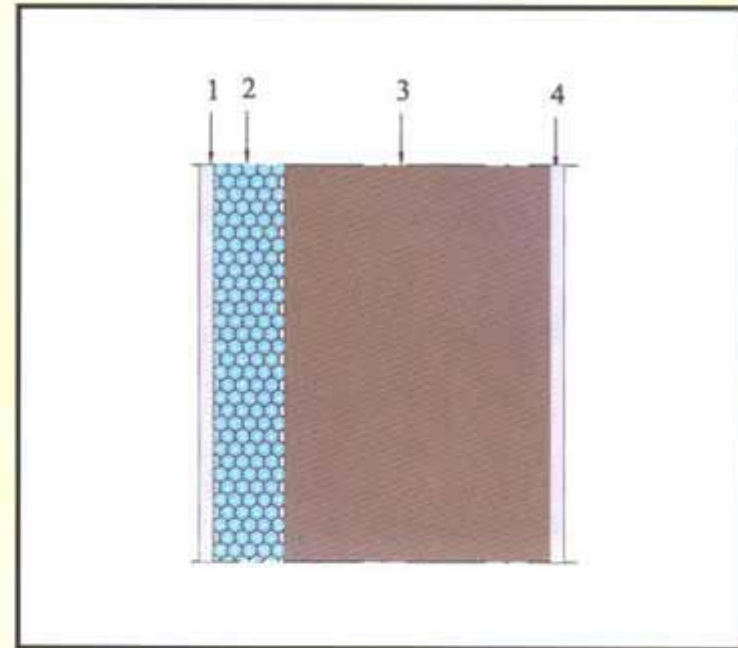
**Applications**

# CAVITY WALL



# WITH GYPSUM BOARDS

## Interior Wall Insulation



or

b) Gypsum wallboard (min. 9.5 mm thick),  
cement boards (min. 8 mm thick).

2) **Styrofoam SM\*** or **Wallmate CW\***, fixed with a compatible adhesive or mechanically by means of metal studs or wood battens. The metal rib lath is installed over the insulation and fixed to the wall through the insulation by means of screws. Alternatively, **Styrofoam\* Plasterboard Laminate** or **Wallmate\*** with **Gypsum Board (WMGB)** as one factory



**Floor**

**Application**

*\*\*Trademark of The Dow Chemical Co.*



The photograph shows **Floormate\*** boards being laid over the blinding concrete with damp-proof membrane.

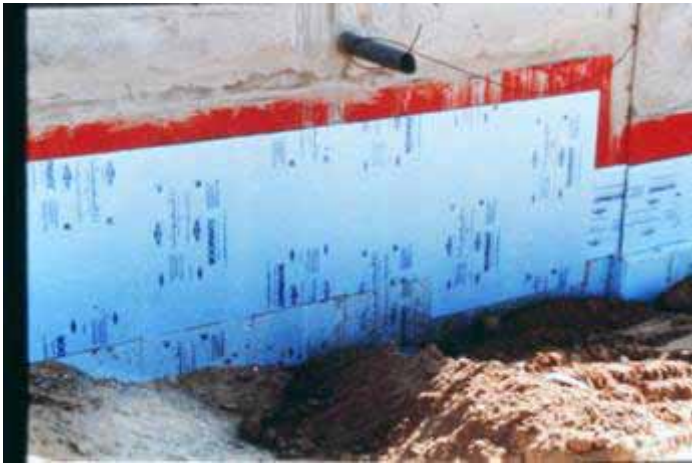
# Cold Store



Perimeter

Application

# Perimeter Application



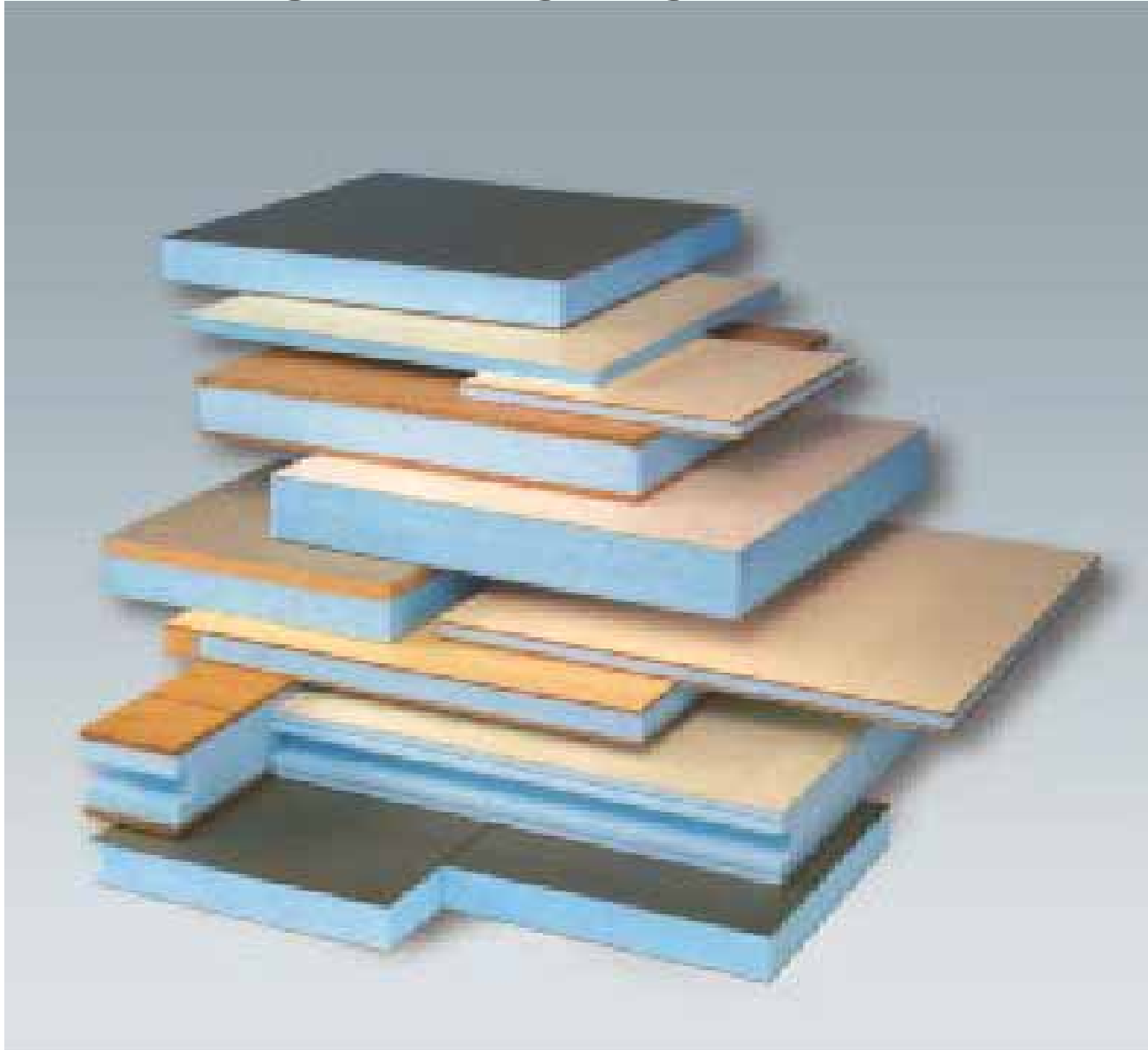
**Agricultural  
&  
Industrial  
Applications**







# Composite Panels with STYROFOAM\*




# Various Applications



Roof pavers on spacers over **Roofmate**®



**Styrofoam HI** 

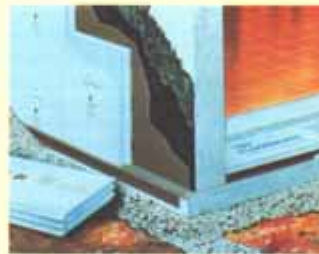
Various specialty applications



Roof: Installation of single-ply waterproofing membrane



Butler CMR-24 steel roof with **Styrofoam**® insulation



Perimeter insulation waterproof membrane protection and drainage items



STO (EIFS) exterior insulation and finish system



Coldstore flooring



Hockey arena - Ice Rink



Parking deck build up with reinforced concrete slab as wearing surface



Agricultural application / farms



Parking deck - section



Insulation behind marble



**THANK YOU**

