STYROFOAM®

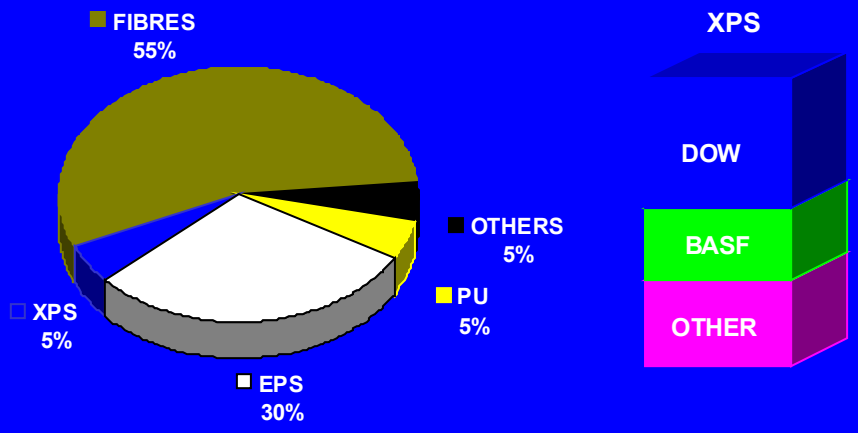
extruded polystyrene foam insulation

DOW CHEMICAL COMPANY - STYROFOAM

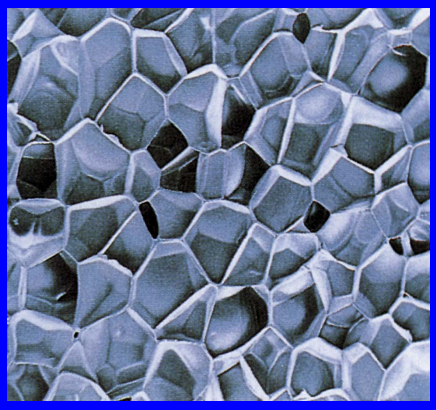
- **Dow Chemical Company**
  - founded in 1897 by Herbert H. Dow
  - 2nd largest chemical company of the World
  - XPS global market leader - 50% market share
  - 11 Styrofoam manufacturing sites in Europe
- **STYROFOAM**
  - invented in 1941 - buoyancy billets for the U.S. Navy
  - 1940s: application for insulation purpose - cold stores
  - 1950s: inverted roofs - ROOFMATE
  - 1964: first European manufacturing site - Terneuzen (Holland)
  - 1980s: first larger projects in Central Eastern Europe
  - 1991: manufacturing site in Hungary (Balatonfűzfő)

STYROFOAM - MANUFACTURING SITES IN EUROPE

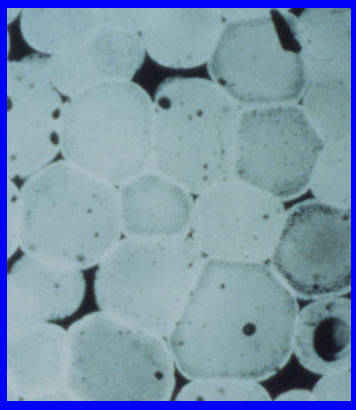
MARKET SHARE OF INSULANTS IN EUROPE



STYROFOAM - *CLOSED CELL STRUCTURE*



STYROFOAM



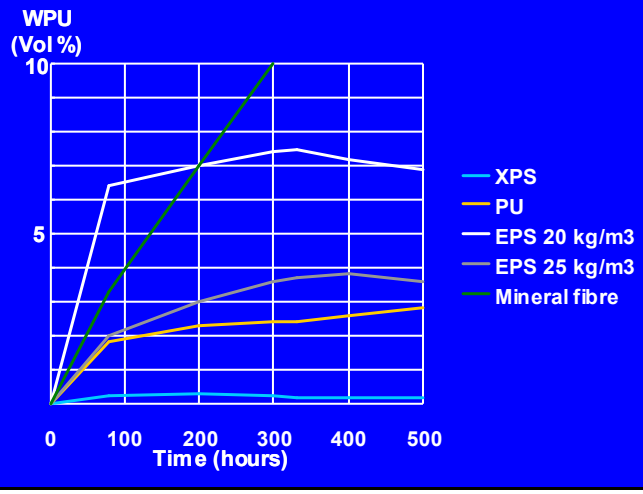
EXPANDED PS

XPS INSULATION - ADVANTAGES, PROPERTIES

- Consistantly high insulation value
- Negligible water absorption (<0.5 Vol%/ 28 days imm.)
- High compressive strength (200 - 700 kPa)
- Resistance to freeze-thaw cycles
- Dimensional stability, stiffness
- Resistance to rotting and aging
- Simple and precise installation methods

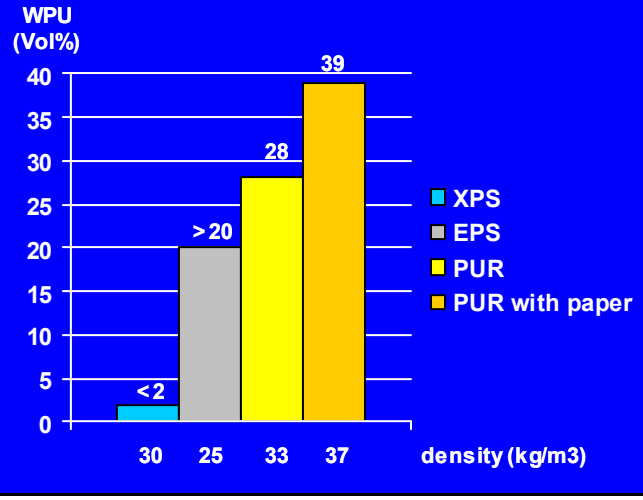
WATER ABSORPTION OF INSULATION MATERIALS

WATER ABSORPTION BY LONG-TERM IMMERSION



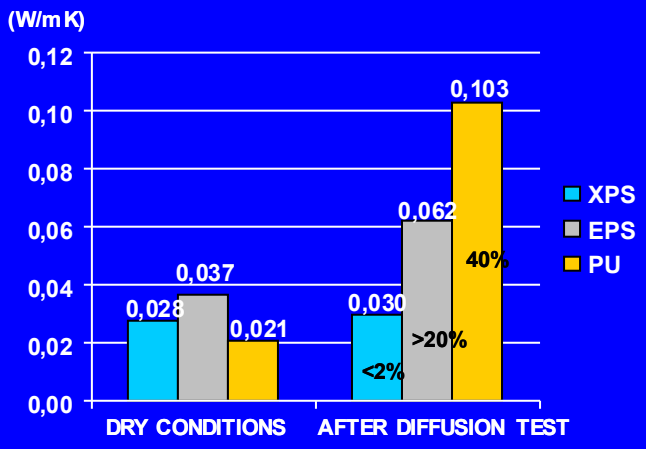
WATER ABSORPTION OF INSULATION MATERIALS

WATER ABSORPTION OF PLASTIC FOAMS BY LONG-TERM DIFFUSION



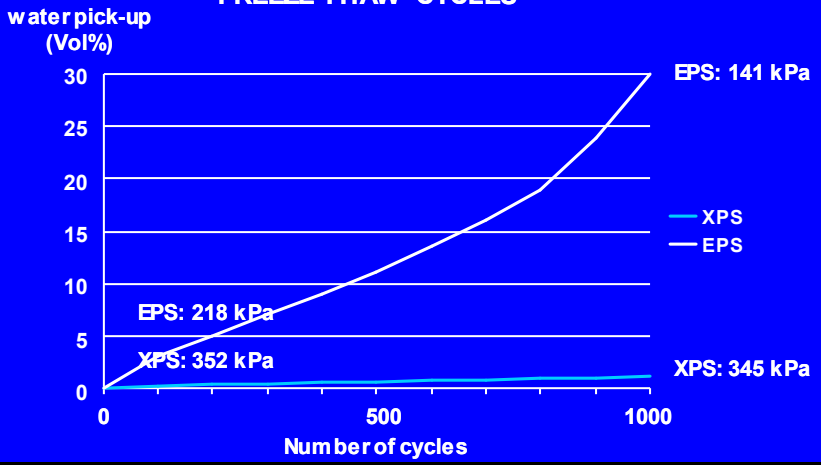
WATER ABSORPTION OF INSULATION MATERIALS

IMPACT OF WATER ABSORPTION BY DIFFUSION TO THERMAL CONDUCTIVITY

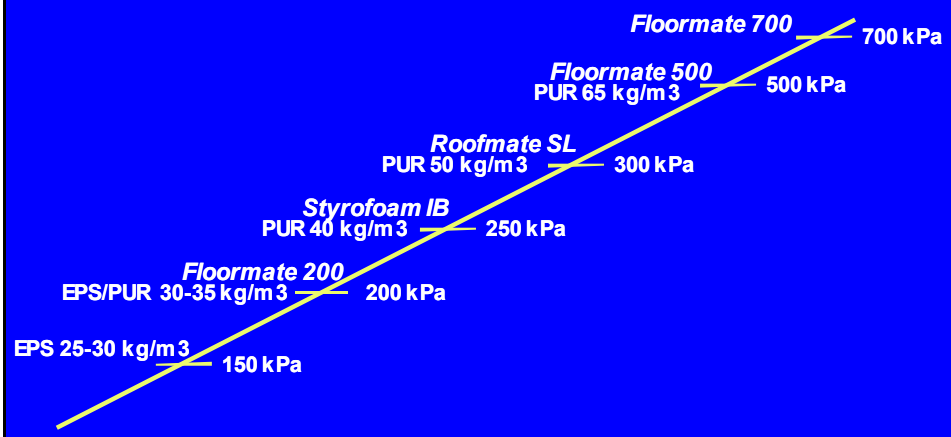


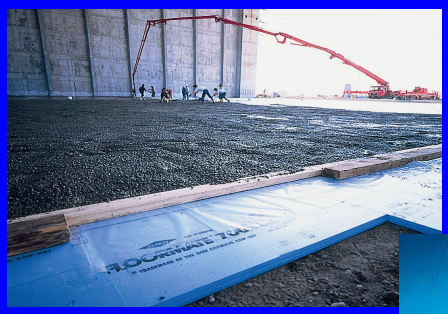
WATER ABSORPTION OF INSULATION MATERIALS

WATER ABSORPTION AND CHANGE OF COMPRESSIVE STRENGTH BY FREEZE-THAW CYCLES



COMPRESSIVE STRENGTH OF PLASTIC FOAMS





ENVIRONMENTAL REGULATIONS ABOUT OZONE DEPLETING SUBSTANCES

- Montreal Protocol - ban of CFCs by 1996
- EC 30/1994 and 2037/2000 EU Regulations
  - Ban of HCFCs used for manufacturing XPS: as of January 1, 2002
  - Ban of HCFCs used for manufacturing PU: as of January 1, 2003
  - Ban of HCFCs used for all foam products: as of January 1, 2004
- Implementation in Dow - STYROFOAM production:
  - by 2002 all STYROFOAM plants in the EU + Hungary have been converted into HCFC-free technology
  - plant in Turkey remains using HCFC blowing agent

CFC: Chloro-Fluoro-Carbonate ("saturated freon")
HCFC: Hydro-Chloro-Fluoro-Carbonate ("soft freon")
HFC: Hydro-Fluoro-Carbonate (non-freon substance)

XPS FOAM BLOWING AGENT GASES - WHY CO2?

CFC/HCFC TECHNOLOGY	ODP	GWP
• CFC-12 ("saturated freon", for SF till 1992)	100 %	8500
• HCFC-142b/22 ("soft freon", for SF 1992-1999)	11 %	3700
• HCFC-142b/CO2 ("soft-freon", for SF 2000-2001)	6.5 %	2000

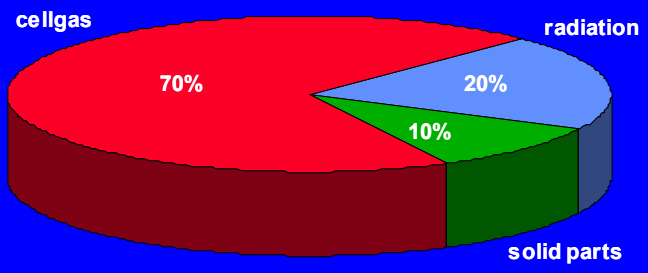
HCFC-FREE TECHNOLOGIES	ODP	GWP
• CO2 (STYROFOAM-A, competition)	0	1
• HFC-134a (STYROFOAM-X with low λ-value)	0	1300
• HFC-152a (Competition for high thickness)	0	300

ODP = Ozone Depletion Potential
GWP = Global Warming Potential (greenhouse-effect)

Styrofoam

THERMAL CONDUCTIVITY

CONTRIBUTION OF THE COMPONENTS TO THE THERMAL CONDUCTIVITY

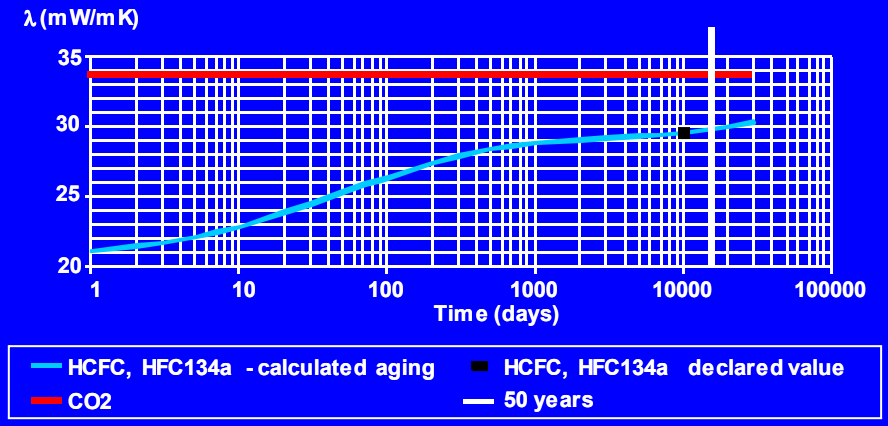


During a continous diffusion process there is an exchange of gases. The cell gas contains less and less blowing agent and more air. While the λ-value of the air is higher than the λ-value of the blowing agent gas, the value of the thermal conductivity is increasing up to a limit value. The declared aged value is the reference value of the lambda reflected to the estimated life-term of the product (50 years).

Styrofoam

THERMAL CONDUCTIVITY

XPS (50 mm) WITH EXTRUSION SKIN



THERMAL CONDUCTIVITY

Determination of aged design value by ÖNORM / DIN

- HCFC: λ_{90d} + 20% — 0.027 ⇒ 0.032 (WLG035); 0.024 ⇒ 0.029 (WLG030)
- CO2: λ_{90d} + 5% — 0.033 ⇒ 0.035 (WLG035); 0.036 ⇒ 0.038 (WLG040)
- HFC134a: λ_{90d} + 20% — 0.027 ⇒ 0.032 (WLG035)

Declared value by EN13164 XPS Product Standard 2001

- HCFC (slicing method+90/90%) — 0.027 ⇒ 0.029/0.030; 0.024 ⇒ 0.027/0.028
- CO2 (90/90%) — 0.033 ⇒ 0.034/0.035; 0.036 ⇒ 0.036/0.038
- HFC134a (slicing method+90/90%): 0.027 ⇒ 0.029/0.030

Application related design value by EN ISO 10456 norm

XPS COMPETITION

- **HCFC-free products:**
  - Dow: Styrofoam-A (CO2), Styrofoam-X (HFC134a)
  - BASF: Styrodur C (CO2)
  - Poliglas: Glascofoam N (CO2), Glascofoam III (HFC152a), Glascofoam IV (HFC134a?)
  - Austrotherm: Austrotherm TOP (CO2), Austrotherm XPS (HFC152a)
- **Austria, Switzerland**
  - Since January, 2000 only HCFC-free products!

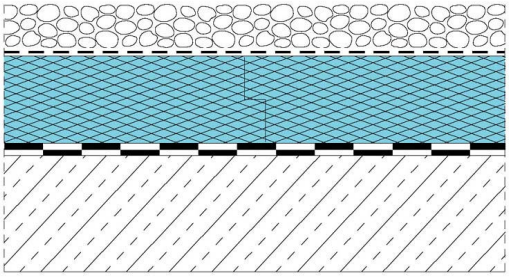
STYROFOAM - *INSULATION FROM CELLAR TO ROOF*

- ROOFMATE SL
- ROOFMATE LG
- ROOFMATE TG
- PERIMATE DI
- FLOORMATE 200
- FLOORMATE 500
- FLOORMATE 700
- STYROFOAM IB
- AGMATE TG

STYROFOAM - *MAIN CONSTRUCTION APPLICATIONS*

Inverted flat roofs

STANDARD BUILD-UP

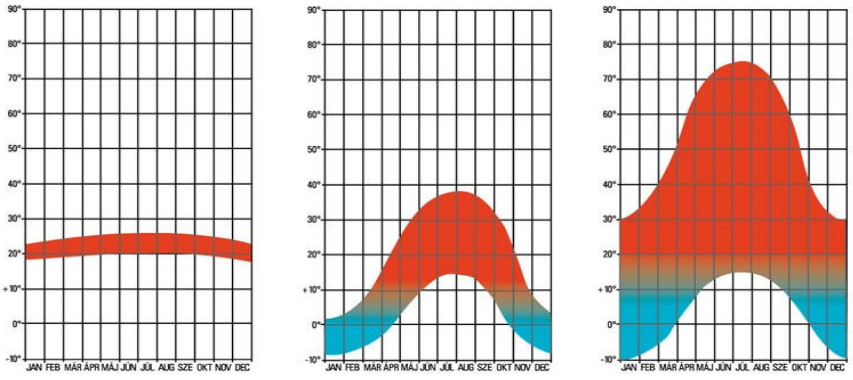


- 5 cm gravel ballast (16/32 mm)
- diffusion open separation layer
- ROOFMATE SL insulation, (SINGLE LAYER!)
- waterproofing membrane
- reinforced concrete slab

Inverted flat roofs

TEMPERATURE OF THE WATERPROOFING MEMBRANE

Inverted roof *Conventional roof+gravel* *Conventional roof*



Inverted flat roofs

ADVANTAGES OF INVERTED ROOFS

- protection to the waterproofing membrane against
  - UV-radiation,
  - temperature extremes,
  - mechanical effects.
  - ⇒ longer life expectancy (45-50 years)
- simple build-up (building physics)
  - negligible risk of condensation
  - additional vapour barrier is not needed
- easy, weather independent installation
- simple application at renovation

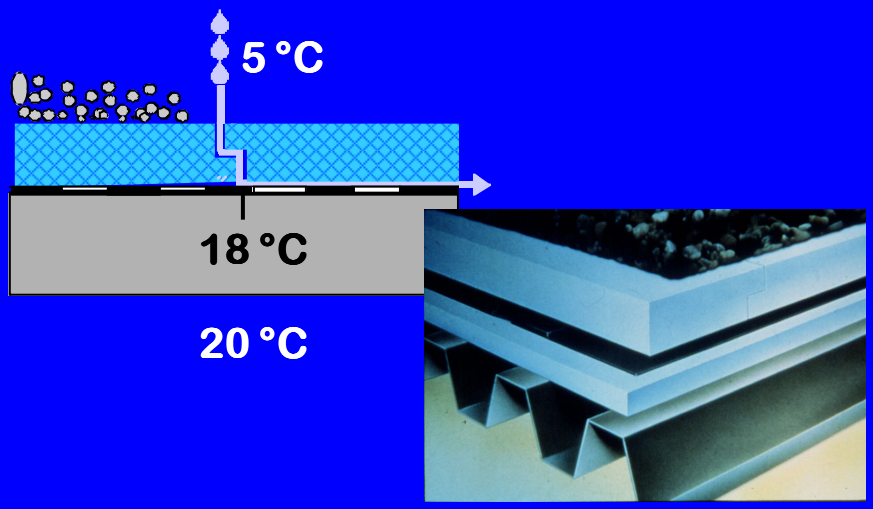
Inverted flat roofs

REQUIREMENTS TO THE DIFFERENT STRUCTURAL LAYERS

- Load bearing structure
  - sufficient load-bearing capability
  - a minimal mass (heat storage capacity) required - reinf. concr.slab
  - light-weight structures:
    a minimal thermal resistance required - R≥0.15 m2K/W
  - slope (1-3%)
- Waterproofing membrane
  - rot resistant reinforcment / basis
  - XPS compatible
- Thermal insulation: extruded polystyrene foam (XPS)
  - ROOFMATE SL, FLOORMATE 500, FLOORMATE 700
- Separation layer ➡ plastic geotextile
  - diffusion open, low water retention capability, rot resistant
  - high tensile strength

Inverted flat roofs

HEAT STORAGE CAPACITY OF ROOF STRUCTURE



Inverted flat roofs

REQUIREMENTS TO THE INSULATION MATERIAL

- Compressive strength: ≥ 300 kPa
- Water absorption
  - 28 days immersion (EN12088) ≤ 0.5 Vol.%
  - 28 days diffusion (EN12089) ≤ 3.0 Vol.%
  - 300 freeze-thaw cycles (EN12091) ≤ 1.0 Vol.%

Inverted flat roofs

XPS vs. "SUPER" EPS

	ROOFMATE SL-A	"super" EPS
Density (kg/m3)	≥ 32	≥ 30
Thermal conductivity (W/mK)	0.034/0.036	0.035
Compressive strength (kPa)	≥ 300	≥ 180-200
Long-term comp. strength (kPa)	≥ 110	≥ 36-60
Water absorption (Vol%)		
- 28 days immersion	0.2 (≤ 0.5)	0.7-4
- 28 days diffusion test	0.5-2 (≤ 3.0)	1-8
- 300 freeze-thaw cycles	<1.0 (≤ 1.0)	5-15

Inverted flat roofs

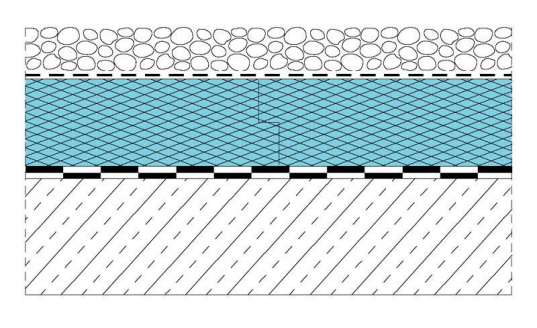
ROOFMATE SL

		ROOFMATE SL-A	ROOFMATE SL-X
Density, min.	kg/m³	32	30
Thermal conductivity - λ_d	W/mK	≤ 80 mm: 0,035 100-120 mm: 0,036 >120 mm: 0,038	≤ 120 mm: 0,029 > 120 mm: 0,031
Compressive strength	N/mm²	0,30	0,30
Diffusion resistance fact.	μ	200-80	200-80
Water pick-up by imm.	Vol%	< 0,5	< 0,5
Combustibility (by DIN 4102)		B1	B1
Dimensions	mm	1250 x 600	1250 x 600

Edge profile: shiplap
Surface: skin

Inverted flat roofs

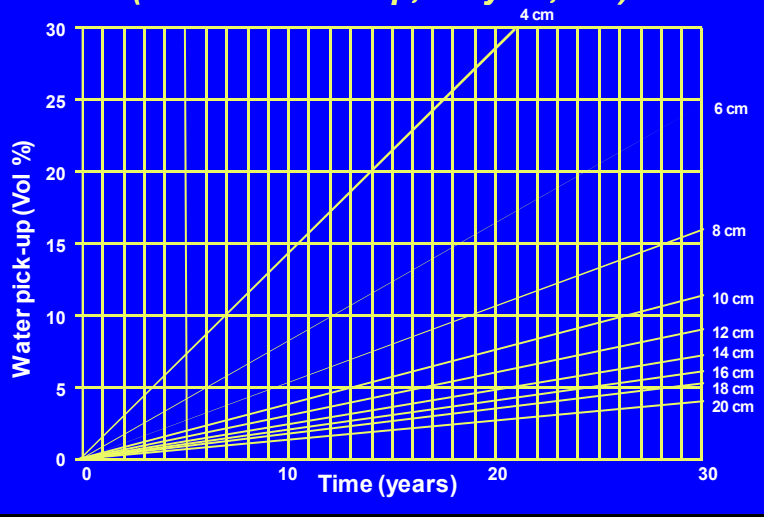
STANDARD BUILD-UP WITH GRAVEL REDUCTION



- 5 cm gravel ballast (16/32 mm)
- *Typar* diff. open plastic geotextile
- ROOFMATE SL insulation (SINGLE LAYER!, staggered joints)
- waterproofing membrane
- reinforced concrete slab

Inverted flat roofs

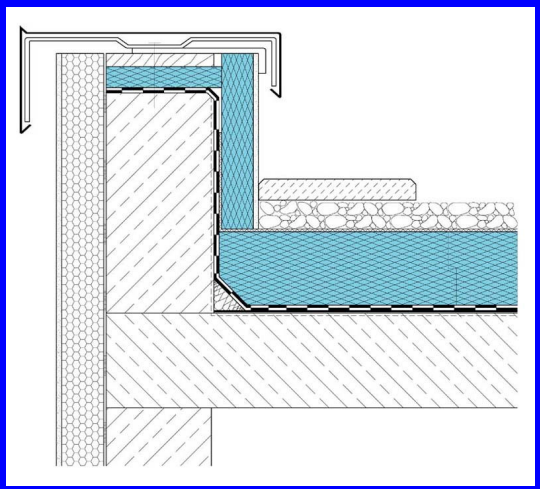
MAX. WATER ABSORPTION OF XPS
(incorrect build-up, 2-layers, etc.)



Inverted flat roof with gravel ballast

Inverted flat roof with gravel ballast

PARAPET DETAIL



Inverted flat roofs

INVERTED ROOFS WITH LIGHT-WEIGHT BALLAST

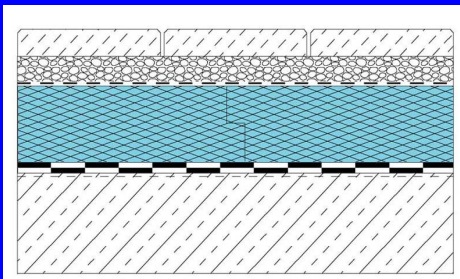
Inverted flat roofs - terrace roofs

TERRACE ROOFS

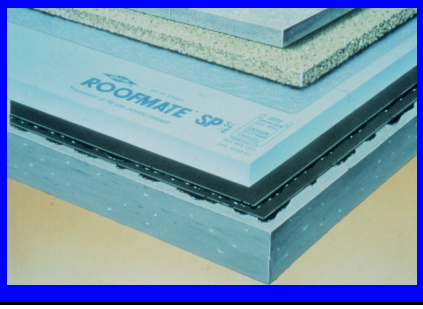
- Concrete paving slabs on crushed gravel bed
- Concrete paving slabs on distance holders
- Adhered tiles on reinforced concrete slab

Inverted flat roofs - terrace roofs

PAVING SLABS ON CRUSHED GRAVEL BED

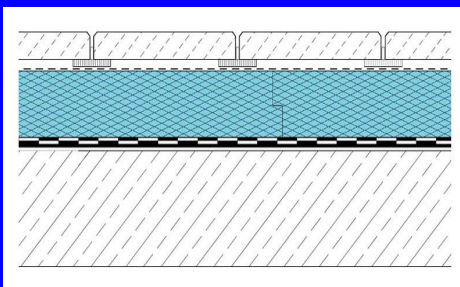


- Concrete paving slabs
- 3 cm 4/8 mm crushed gravel bed on diffusion open separation layer (*Typar*)
- ROOFMATE SL insulation
- Waterproofing membrane
- Reinforced concrete slab



Inverted flat roofs - terrace roofs

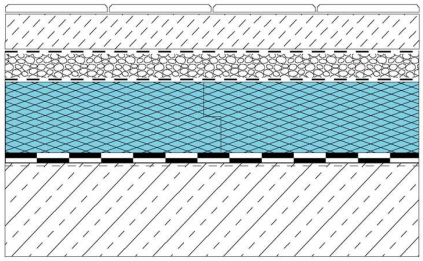
PAVING SLABS ON DISTANCE HOLDERS



- Concrete paving slabs on spacers
- Diffusion open separation layer (*Typar*)
- ROOFMATE SL insulation
- Waterproofing membrane
- Reinforced concrete slab

Inverted flat roofs - terrace roofs

ADHERED TILES ON CONCRETE SLAB



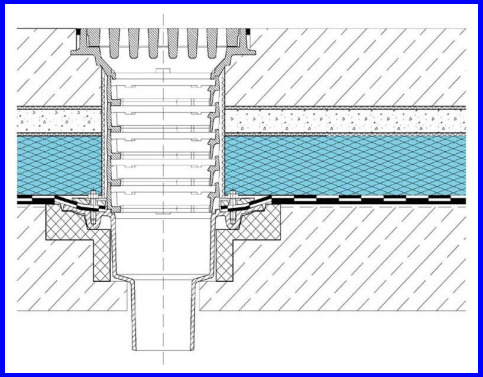
- Tiles adhered to reinf.concrete slab + diffusion open separation layer
- Crushed gravel bed on diffusion open separation layer
- ROOFMATE SL insulation
- Waterproofing membrane
- Reinforced concrete slab

Inverted flat roofs - terrace roofs

Vehicle accessed inverted flat roofs

Vehicle accessed inverted flat roofs

PARKING DECKS WITH REINFORCED CONCRETE SLAB

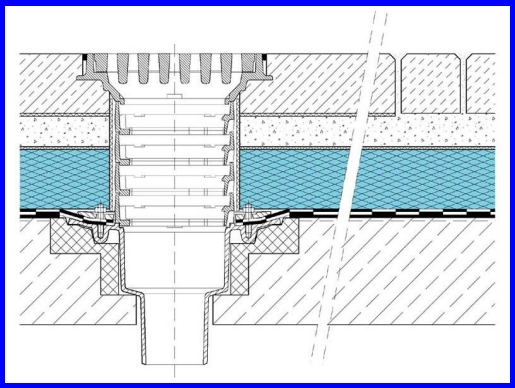


- 1 - Load distribution slab - min. 10 cm
- 2 - Diffusion open separation layer
- 3 - 3 cm 4/8 mm crushed stone diff. layer
- 4 - Diffusion open separation layer (*Typar*)
- 5 - FLOORMATE 500 / (FLOORMATE 700)
- 6 - Waterproofing membrane
- 7 - Reinf. concrete slab (1.5-2.5% slope)

Vehicle accessed roofs with concrete slab

Vehicle accessed inverted flat roofs

PARKING DECKS WITH INTERLOCKING PAVING BLOCKS



1 - Concrete paving blocks - min. 10 cm

2 - 5 cm 2/8 mm crushed gravel bed

3 - Diffusion open separation layer (*Typa*

4 - FLOORMATE 700 / (FLOORMATE 500)

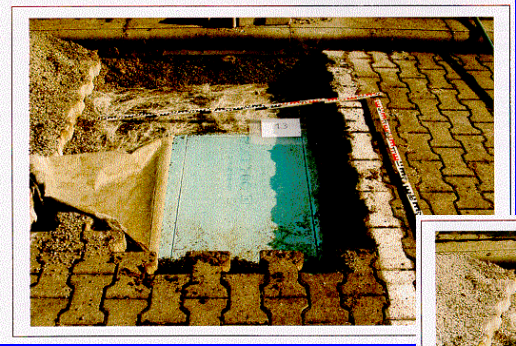
5 - Waterproofing membrane

6 - Reinf. concrete slab (1.5-2.5% slope)

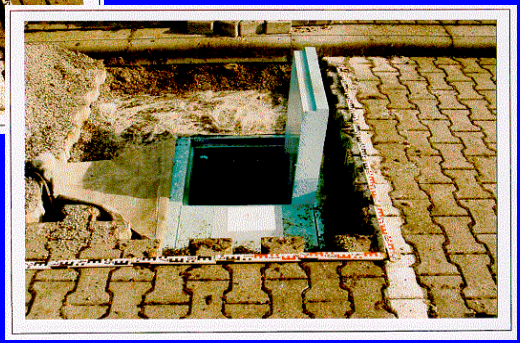
Parking decks with interlocking paving blocks

Parking decks with interlocking paving blocks

Parking decks with interlocking paving blocks

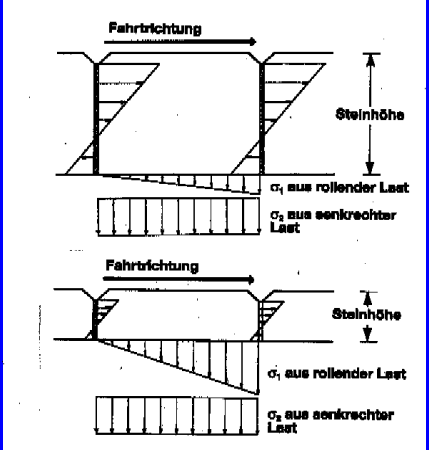


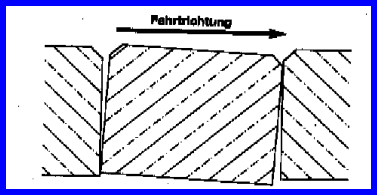
Important:
- shape / profile of elements: interlocking!
- framing of the paved areas

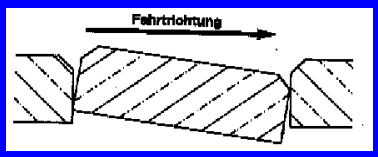


Parking decks with interlocking paving blocks

LAYING PRINCIPS - THICKNESS OF THE ELEMENTS

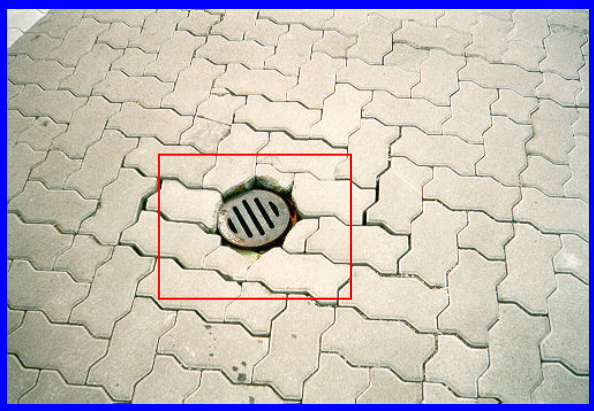






Parking decks with interlocking paving blocks

LAYING PRINCIPS - FRAMING OF WATER-OUTLETS, ETC.

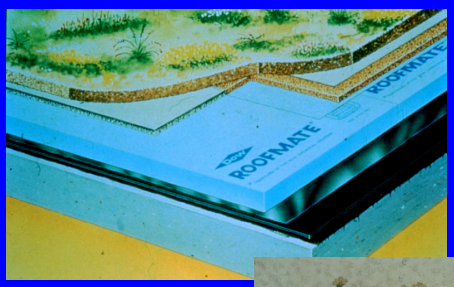


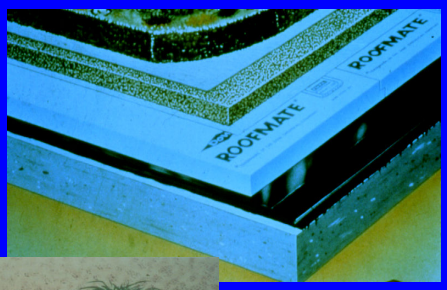
Inverted flat roofs - parking decks

EXPECTED AVERAGE MOISTURE CONTENT OF THE INSULATION AFTER 25 YEARS

- Parking deck with interlocking paving blocks
  - 60 - 120 mm insulation: 5 - 7 Vol%
- Parking deck with reinforced concrete slab
  - 50 - 120 mm insulation: 2 - 6 Vol%

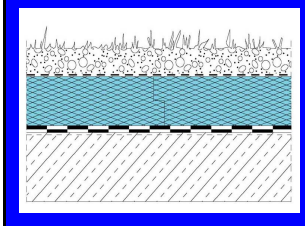
Inverted flat roofs - green roofs





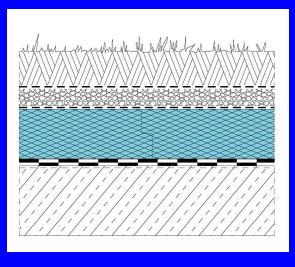
Inverted flat roofs - green roofs

Extensive green-roof with mineral substrate, no separate drainage



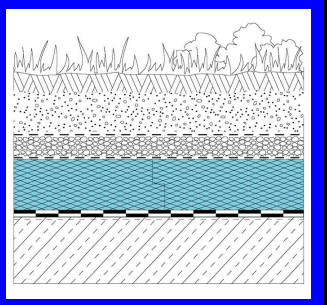
- 6-10 cm mineral substrate
- separation layer (*Typar*)
- ROOFMATE SL insulation
- waterproofing membrane
- load bearing slab (2% slope)

Extensive green-roof with drainage



- vegetation / soil / substarte
- separation layer (*Typar*)
- drainage (gravel, EPS-board, plastic plate…)
- separation layer (*Typar*)
- ROOFMATE SL insulation
- waterproofing membrane
- load bearing slab (2% slope)

Intensive green-roof with drainage

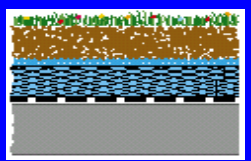


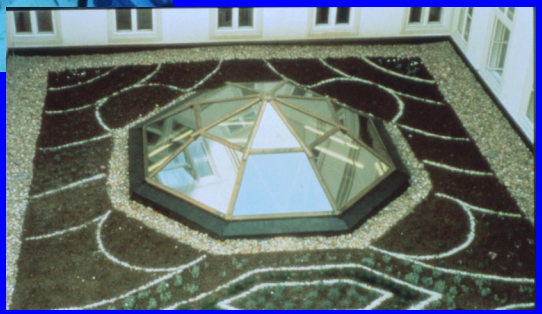
Inverted flat roofs - green roofs

Extensive green-roofs
- light-weight build-up
- minimal maintenance need
- no need for water-supply

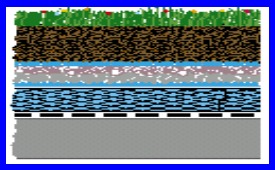
Intensive roof gardens
- full value green area
- heavy-weight build-up
- continous maintenace, water-supply

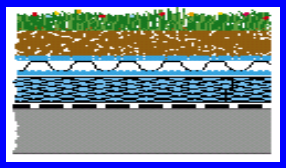
Extensive green-roofs



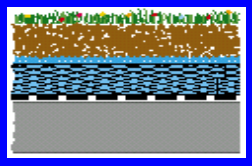


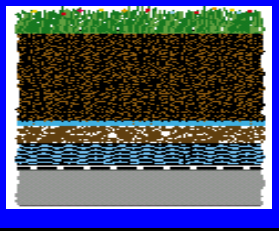
Extensive green-roofs





Extensive and intensive green-roofs





Intensive green-roofs/terraces

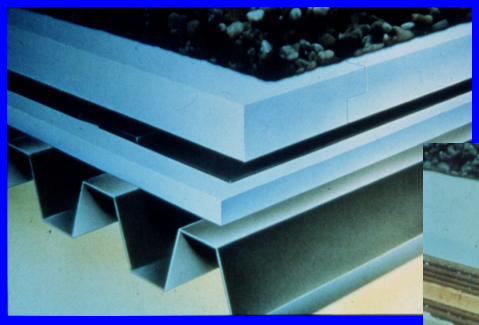
Inverted flat roofs - green roofs

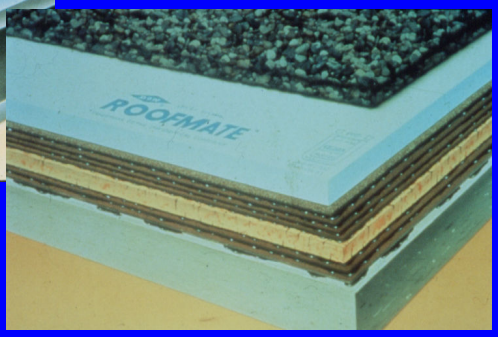
EXPECTED AVERAGE MOISTURE CONTENT OF THE INSULATION AFTER 25 YEARS

- Extensive green-roof with mineral substrate:
  - insulation 60-120 mm: 3-4 Vol%
  - insulation >120 mm: 2-3 Vol%
- Extensive green-roof with drainage:
  - insulation 60-120 mm: 2-6 Vol%
  - insulation >120 mm: ~ 2 Vol%
- Intensive roof garden with drainage:
  - insulation 60-120 mm: ~ 6 Vol%
  - insulation > 120 mm: 3-5 Vol%

Inverted flat roofs

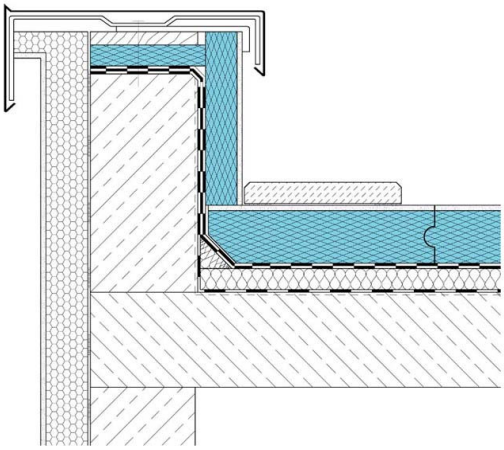
DUO-ROOF / PLUS-ROOF





Inverted flat roofs

PLUS-ROOF WITH LIGHT-WEIGHT BALLAST



- ROOFMATE LG insulation
- waterproofing membrane
- reinforced concrete slab

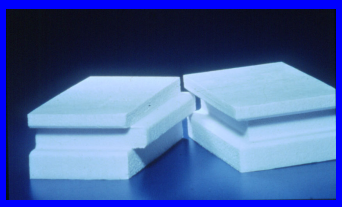
ROOFMATE TG
AGMATE TG
INSULATION OF PITCHED ROOFS

Insulation of pitched roofs

ROOFMATE TG-A / AGMATE TG-A

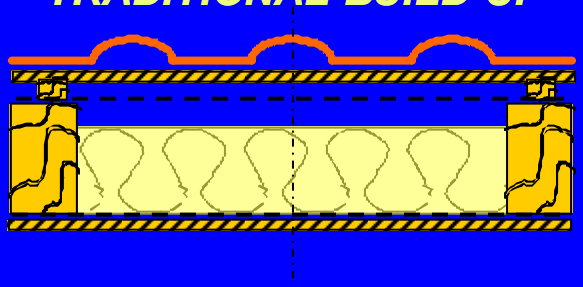
Density, min.	kg/m^3	32
Thermal conductivity - λ_d	W/mK	0,034/0,036
Compressive strength	N/mm^2	0,30
Vapour diffusion resist.	μ	200-80
Water pick-up by imm.	Vol%	< 0,5
Combustibility (by DIN 4102)		B1
Dimensions	mm	2500/2400 x 600

Edge profile: Tongue and Groove
Surface: smooth skin



Insulation of pitched roofs

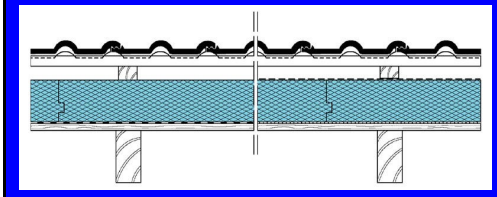
TRADITIONAL BUILD-UP

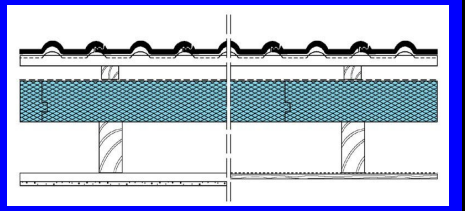


Mineral fibre insulation between the rafters:
- *single or double ventilation*
- *thermal bridge at rafters ⇒ additional insulation*

Insulation of pitched roofs

BUILD-UP WITH ROOFMATE TG / AGMATE TG INSULATION





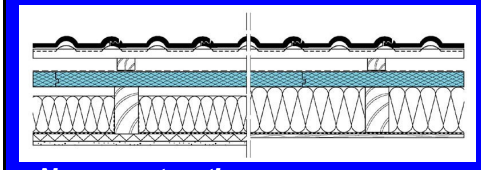
High strength XPS insulation boards above rafters:
- *continous insulation layer*
- *no thermal bridges*
- *rigid basis for the covering*

Insulation of pitched roofs

Insulation of pitched roofs

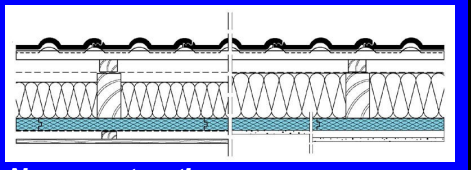
ROOFMATE TG / AGMATE TG

AS ADDITIONAL INSULATION



New construction:
- *ROOFMATE TG: during roof installation*
- *insulation between rafters: at finishing works*
- *vapour barrier is needed!*

Roof refurbishment:
- *additional insulation without removing the internal finishing*



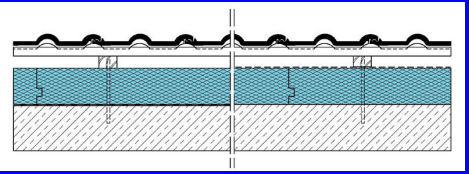
New construction:
- *diffusion open underlayer membrane: TYVEK®*
- *insulation between rafters fills the full void*

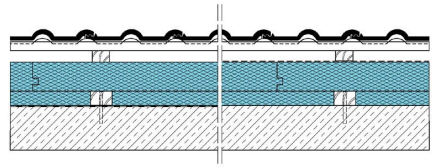
Roof refurbishment:
- *vapour barrier is needed!*

Styrofoam

Insulation of pitched roofs

ROOFMATE TG / AGMATE TG
FOR INSULATING CONCRETE PITCHED ROOFS





Single layer insulation:
- ROOFMATE / AGMATE ≤ 120 mm
- bituminous membrane on the concrete deck or diffusion-open TYVEK® sheet above the insulation

Two-layer insulation:
- in case of high overall thickness
- simple fixing

Styrofoam

Insulation of pitched roofs

AGMATE TG - *INSULATION OF AGRICULTURAL BUILDINGS*

INSULATING SUSPENDED CEILING WITH NO ADDITIONAL SURFACE FINISHING. RESISTANT TO HIGH PRESSURE CLEANING AND DESINFECTION.

PERIMATE, ROOFMATE

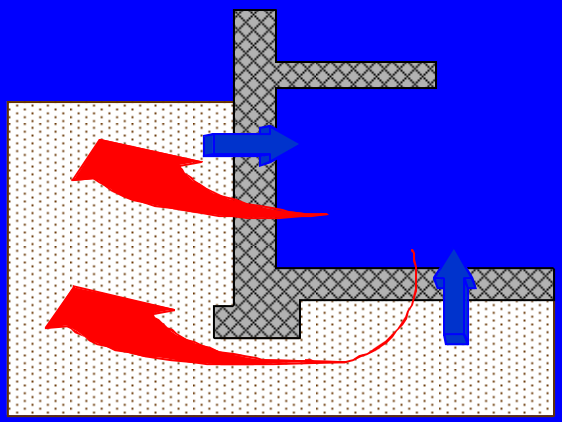
INSULATION, PROTECTION AND DRAINAGE FOR CELLAR WALLS

ROOFMATE SL

PERIMATE DI

Insulation of cellar walls

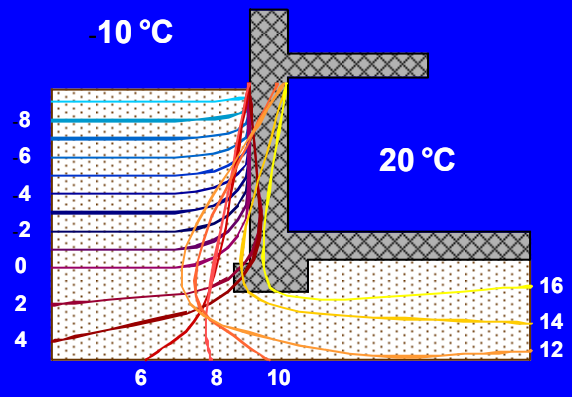
HEATLOSS TOWARDS THE SOIL



Styrofoam

Insulation of cellar walls

UNINSULATED HEATED CELLAR



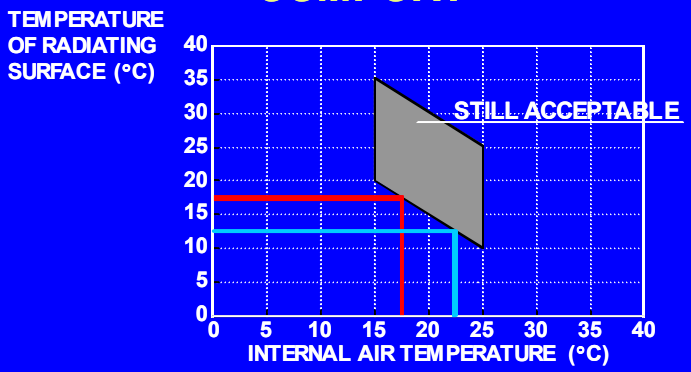
SCHEMATIC VIEW OF ISOTHERMS

(ref: Zum Mass der Waermedaemmung im Erdbereich)

Styrofoam

Insulation of cellar walls

COMFORT



Δt (surface - air) $\leq$ 2 °C

RISK OF CONDENSATION { INSUFFICIENT VENTILATION
MINIMAL RATE OF HEATING

Insulation of cellar walls

INSULATION ... WHERE ?

INSIDE

- CONDENSATION RISK
- REDUCED FLOOR AREA
- INTERNAL FINISHING IS NEEDED

OUTSIDE

- UTILIZED HEAT STORAGE CAPACITY OF THE WALL
- NO CONDENSATION RISK
- INSULATION EXPOSED TO SEVERE LOADS
  - PERMANENT MOISTURE
  - FREEZE-THAW CYCLES
  - LONG-TERM LOADS (SOIL PRESSURE)
- MECHANICAL EFFECTS

Insulation of cellar walls

ROOFMATE SL - *INSULATION AND MECHANICAL PROTECTION*

Insulation of cellar walls

REQUIREMENTS TO THE INSULATION MATERIAL

- Compressive strength: ≥ 300 kPa
- Water absorption
  - 28 days immersion (EN12088) ≤ 0.5 Vol.%
  - 28 days diffusion (EN12089) ≤ 3.0 Vol.%
  - 300 freeze-thaw cycles (EN12091) ≤ 1.0 Vol.%

Insulation of cellar walls

XPS vs. "SUPER" EPS

	ROOFMATE SL-A	"super" EPS
Density (kg/m3)	≥ 32	≥ 30
Thermal conductivity (W/mK)	0.034/0.036	0.035
Compressive strength (kPa)	≥ 300	≥ 180-200
Long-term comp. strength (kPa)	≥ 110	≥ 36-60
Water absorption (Vol%)		
- 28 days immersion	0.2 (≤ 0.5)	0.7-4
- 28 days diffusion test	0.5-2 (≤ 3.0)	1-8
- 300 freeze-thaw cycles	<1.0 (≤ 1.0)	5-15

Insulation of cellar walls

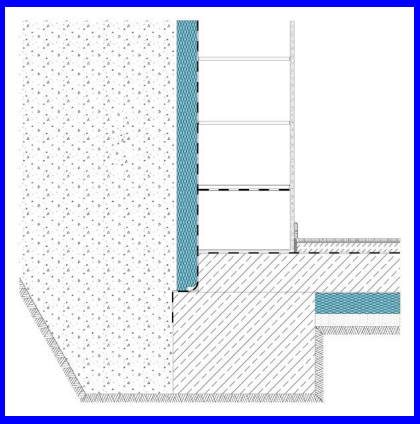
ROOFMATE SL-A

Density, min.	kg/m^3	32
Thermal conductivity - λ_d	W/mK	0,034/0,036
Compressive strength	N/mm^2	0,30
Vapour diffusion resist.	μ	200-80
Water pick-up by imm.	Vol%	< 0,5
Combustibility (by DIN 4102)		B1
Dimensions	mm	1250 x 600

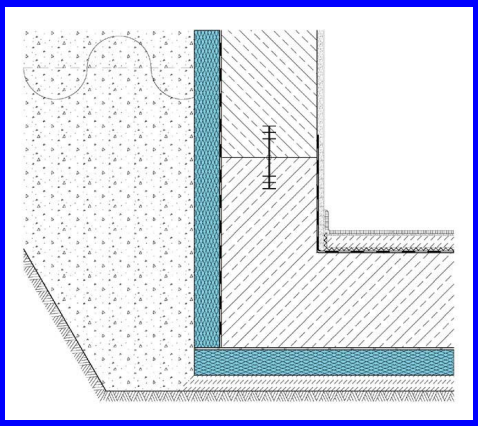
Edge profile: ShipLap
Surface: smooth skin

Insulation of cellar walls

ROOFMATE SL - *APPLICATION*



At normal moisture conditions



In static ground-water

Styrofoam

Insulation of cellar walls

ROOFMATE SL - *APPLICATION*

FIXING OF ROOFMATE SL BOARDS:
SOLVENT FREE COLD BITUMINOUS ADHESIVE
- at normal conditions: 6 spots
- in ground-water:
  - if vertical drainage exists: bonding by spots
  - static ground-water: full surface bonding

Styrofoam

Insulation of cellar walls

Insulation and drainage of cellar walls

PERIMATE DI-A

Density, min.	kg/m^3	32
Thermal conductivity - λ_d	W/mK	0,034/0,036
Compressive strength	N/mm^2	0,30
Diffusion resistance fact.	μ	200-80
Water pick-up by imm.	Vol%	< 0,5
Combustibility (by DIN 4102)		B2
Dimensions	mm	1250 x 600

Edge profile: shiplap
Surface: smooth skin + grooves and geotextile

Insulation and drainage of cellar walls

PERIMATE DI - *INSULATION, PROTECTION AND DRAINAGE*

Insulation and drainage of cellar walls

PERIMATE DI - *INSULATION, PROTECTION AND DRAINAGE*

FLOORMATE, ROOFMATE

INSULATION OF FLOORS

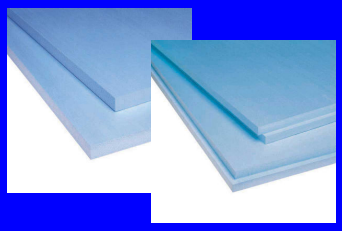
ROOFMATE SL
FLOORMATE 200
FLOORMATE 500
FLOORMATE 700

Floor insulation

FLOORMATE / ROOFMATE SL

		FM200-A	FM500-A	FM700-A
Density, min.	kg/m^3	32	38	38
Thermal conductivity - λ_d	W/mK	0,034	0,035/0,037	0,036/0,038
Compressive strength	N/mm^2	0,20	0,50	0,65
Diffusion resistance fact.	μ	200-80	220-150	220-150
Water absorp. by immersion	Vol%	< 0,5	< 0,5	< 0,5
Combustibility (by DIN 4102)		B1	B1	B1
Dimensions	mm	1200x600	1250x600	1250x600

Edge profile: butt edge (FM200-A) / shiplap
Surface: smooth skin



Floor insulation

INSULATION OF GROUND BEARING FLOORS

BELOW THE SLAB

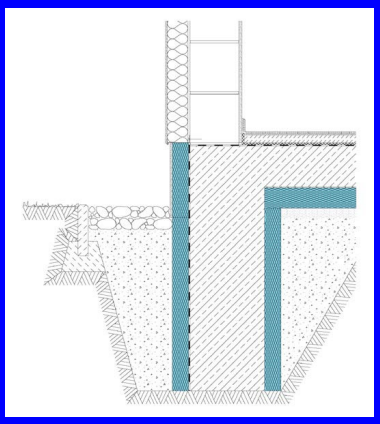
ABOVE THE SLAB

RESIDENTIAL FLOORS

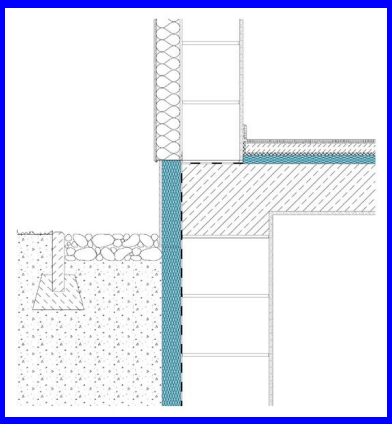
Floor insulation

INSULATION OF GROUND BEARING FLOORS

BELOW THE SLAB

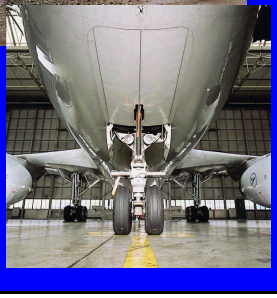


ABOVE THE SLAB



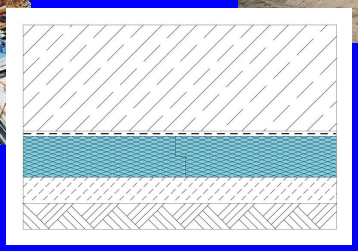
Floor insulation

INSULATION OF INDUSTRIAL FLOORS



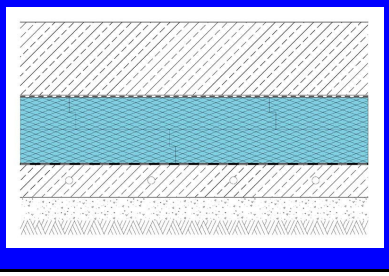
Floor insulation

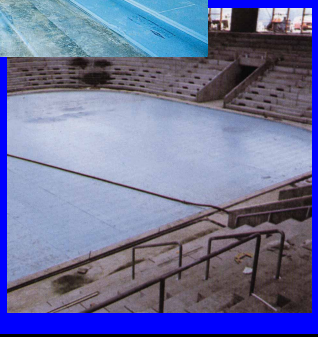
INSULATION OF FOUNDATION SLAB



Floor insulation

INSULATION OF COLD STORES, ICE-RINKS





Floor insulation

FLOOR HEATING

INSULATION OF THERMAL BRIDGES AND FACADE WALLS

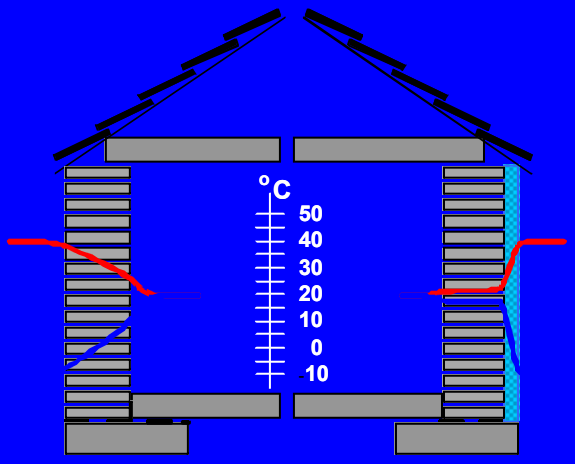
STYROFOAM IB

ROOFMATE

Styrofoam

Insulation of thermal bridges and facade walls

EXTERNAL WALL INSULATION



PRODUCTS:
- expanded PS
- rockwool
- woodwool-EPS
- extruded PS

CRITICAL POINTS:
- quality of installation
- details
- construction schedule
- selection of the suitable system

Styrofoam

Insulation of thermal bridges and facade walls

STYROFOAM IB
INSULATION OF THERMAL BRIDGES AND FACADE WALLS

Insulation of thermal bridges and facade walls

STYROFOAM IB-A

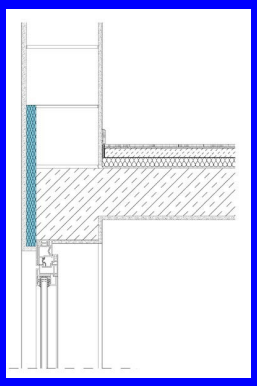
Density, min.	kg/m^3	32
Thermal conductivity - λ_d	W/mK	0,035/0,037
Compressive strength	N/mm^2	0,25
Diffusion resistance fact.	μ	150-100
Water absorption by imm.	Vol%	< 1,5
Combustibility (by DIN 4102)		B1
Dimensions	mm	1250 x 600

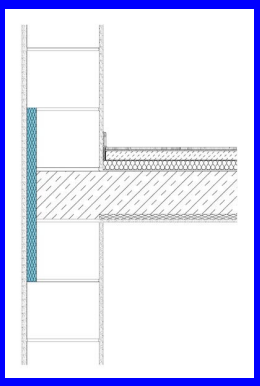
Edge profile: butt edge
Surface: planed (rough)

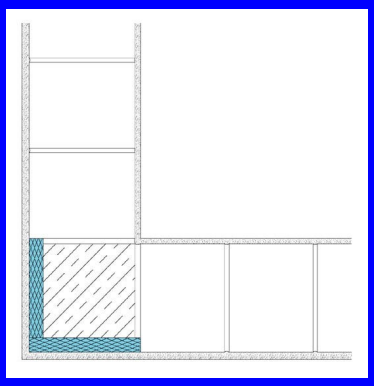
Insulation of thermal bridges and facade walls

STYROFOAM IB

FOR STRUCTURES FREE OF THERMAL BRIDGES





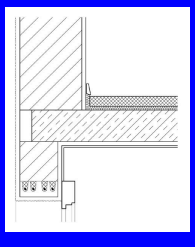


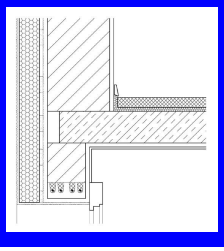
Styrofoam

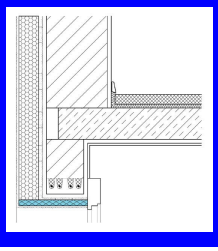
Insulation of thermal bridges and facade walls

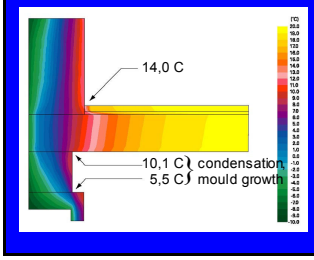
STYROFOAM IB

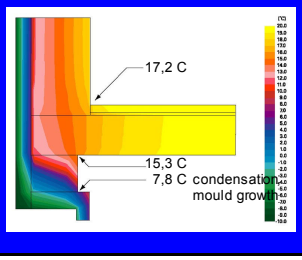
FOR STRUCTURES FREE OF THERMAL BRIDGES

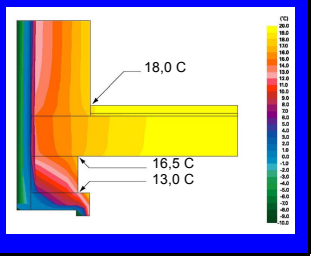












Styrofoam

Insulation of thermal bridges and facade walls

STYROFOAM IB

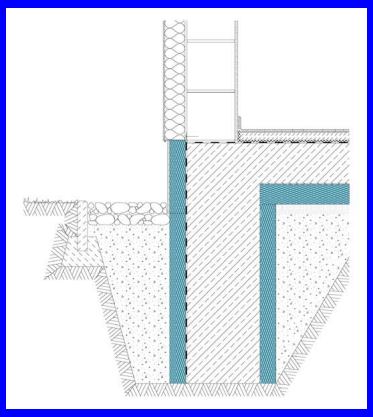
FOR STRUCTURES FREE OF THERMAL BRIDGES

APPLICATION:
IN-SITU (LOST-FORM) OR INSTALLED AFTER COMPLETING THE CONCRETE STRUCTURES, FIXED BY ADHESION AND MECHANICAL FASTENING

Styrofoam

Insulation of thermal bridges and facade walls

STYROFOAM IB
SOCKLE INSULATION



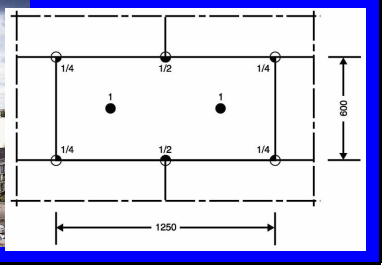
Styrofoam

Insulation of thermal bridges and facade walls

STYROFOAM IB
INSULATION OF FACADE WALLS WITH RENDERING

APPLICATION:
- lost form or adhesion + mechanical fixing

COATING SYSTEMS:
- thin coating system with glass fabric reinforcement
- traditional type of thick cement based plaster with using spot welded, galvanized reinforcement mesh



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Insulation of thermal bridges and facade walls

STYROFOAM IB
INSULATION OF FACADE WALLS WITH RENDERING

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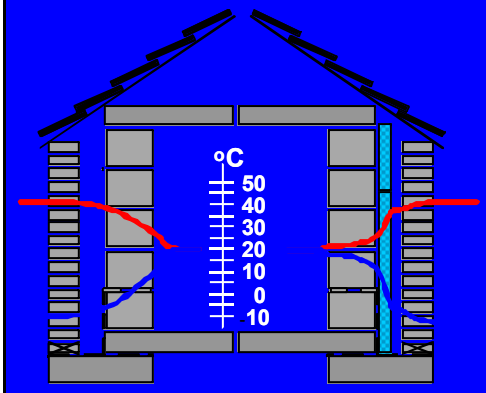
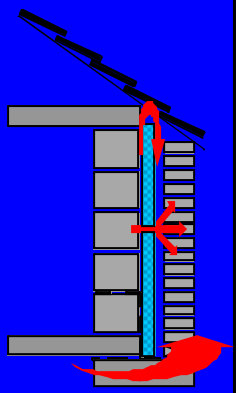
Insulation of thermal bridges and facade walls

INSULATION OF MULTI-LAYER WALLS



PRODUCTS:
- expanded PS
- fibres
- extrudedt PS
- foamglass

CRITICAL POINTS:
- air circulation
- details
- thermal bridges
- wall ties
- quality of installation



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Insulation of thermal bridges and facade walls

ROOFMATE SL / ROOFMATE TG

INSULATION FOR MULTI-LAYER WALL STRUCTURES

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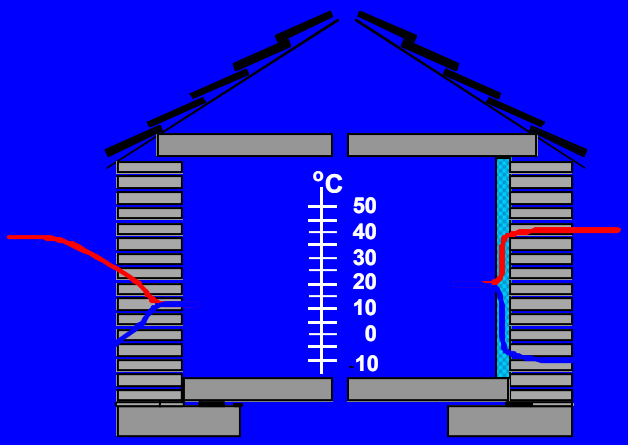
Insulation of thermal bridges and facade walls

INTERNAL WALL INSULATION



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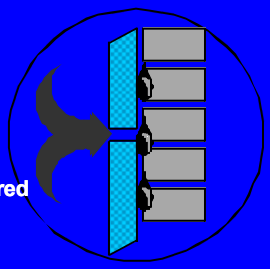
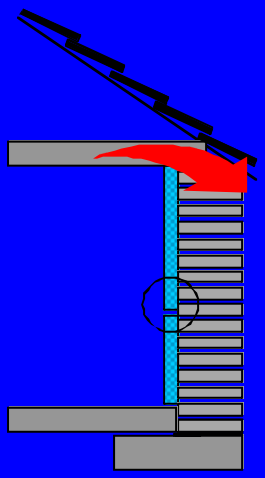
Insulation of thermal bridges and facade walls

INTERNAL WALL INSULATION

PRODUCTS:
- extruded PS
- expanded PS
- battens + fibres + PE-foil

CRITICAL POINTS:
- condensation risk
- thermal bridges
- details
- heat storage capacity ignored
- increased thermal shocks
- accuracy of installation





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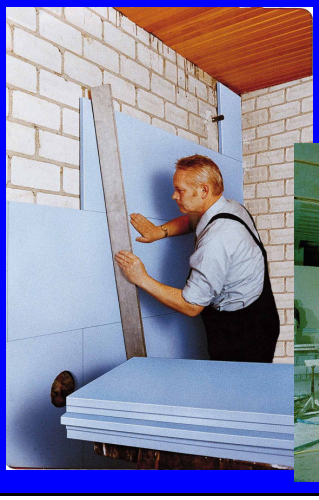
Insulation of thermal bridges and facade walls

STYROFOAM IB
INTERNAL WALL INSULATION



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SPECIFICATION OF XPS VS. COMPETITION

Application	Chance to be specified/sold
Inverted roof	HIGH, few alternatives
Conventional flat roof	low, alternatives available (EPS)
Pitched roof	low, alternatives available (MF)
Perimeter	HIGH, few alternatives
Floors (heavy loaded)	HIGH, few alternatives
External walls	low, alternatives available (EPS)
Cavity walls	low, alternatives available (EPS, MF)
Soil / roads	economic situation

→ In applications where XPS has a strong comp. adv. (i.e. compr. strength, water resistance, stability) project losses are minimal.