TECHNONICOL

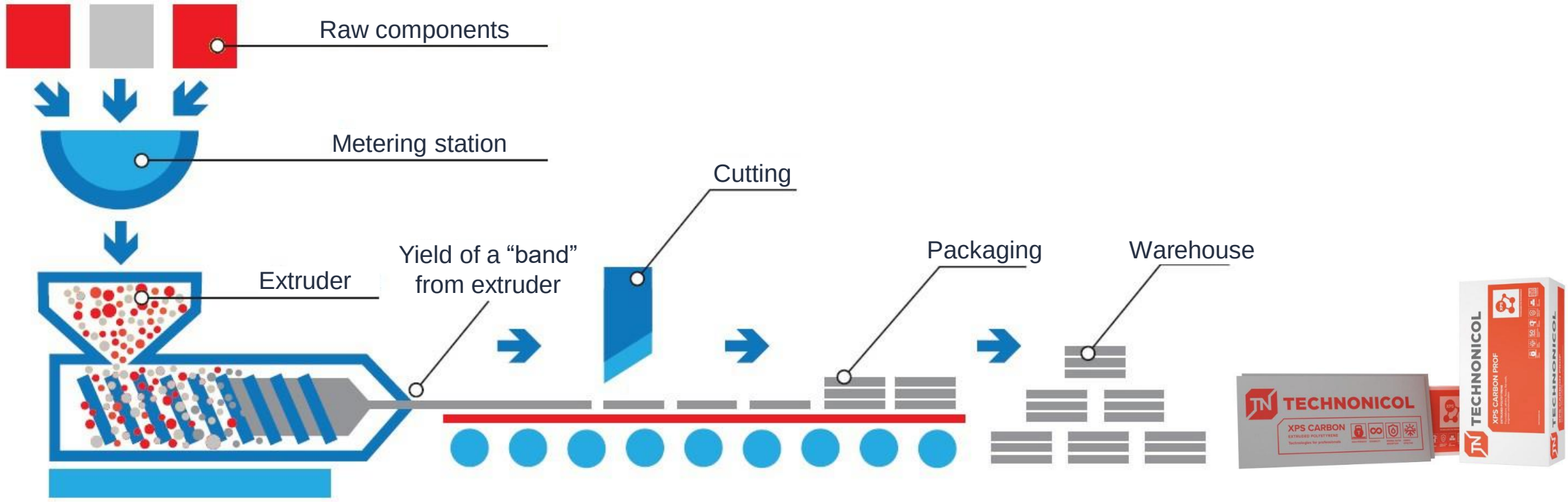
KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.

# XPS TECHNONICOL CARBON

A NEW GENERATION OF CONSTRUCTION MATERIALS

# EXTRUDED POLYSTYRENE PRODUCTION

**XPS PRODUCTION PRINCIPLE:**



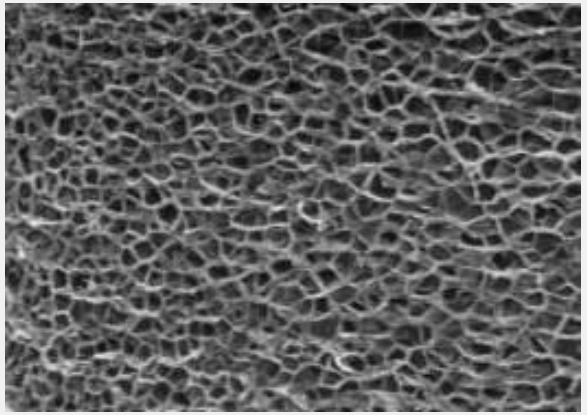
# EXTRUDED POLYSTYRENE STRUCTURE

**STRUCTURE OF XPS:**

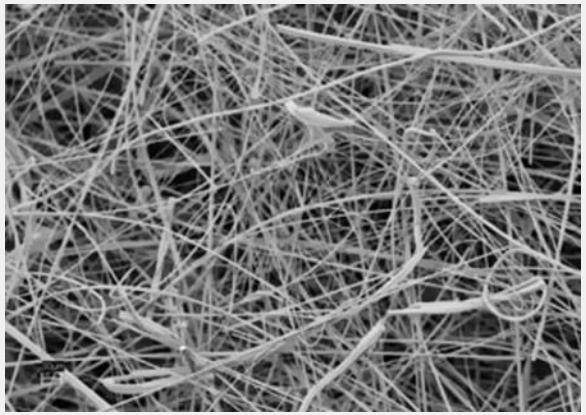
High-quality extruded polystyrene possesses closed-pore structure with equal cells throughout the material.

**Comparison of structure of various thermal insulation**

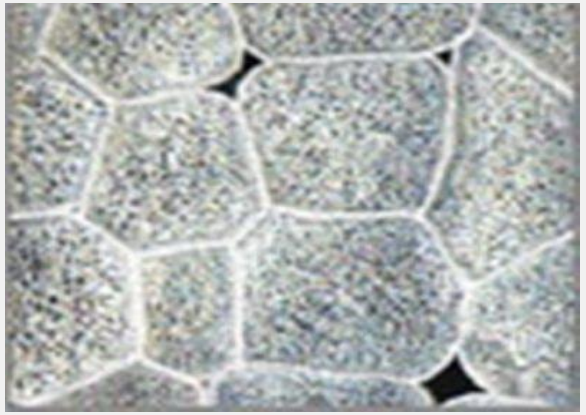
**XPS**



**STONE WOOL**

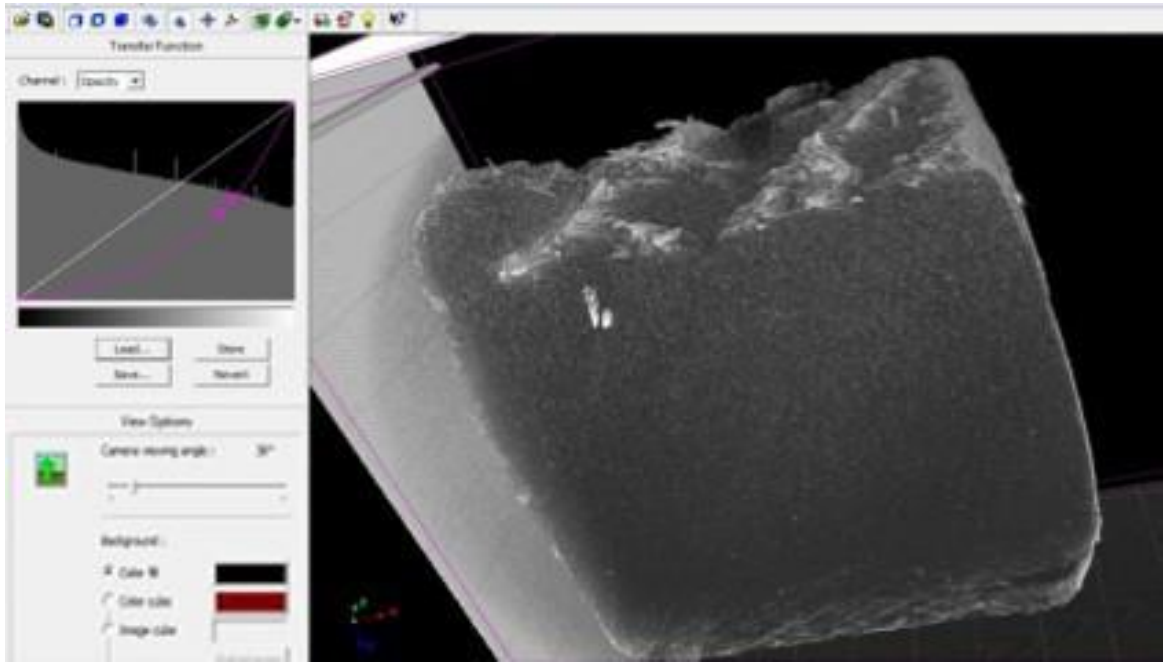


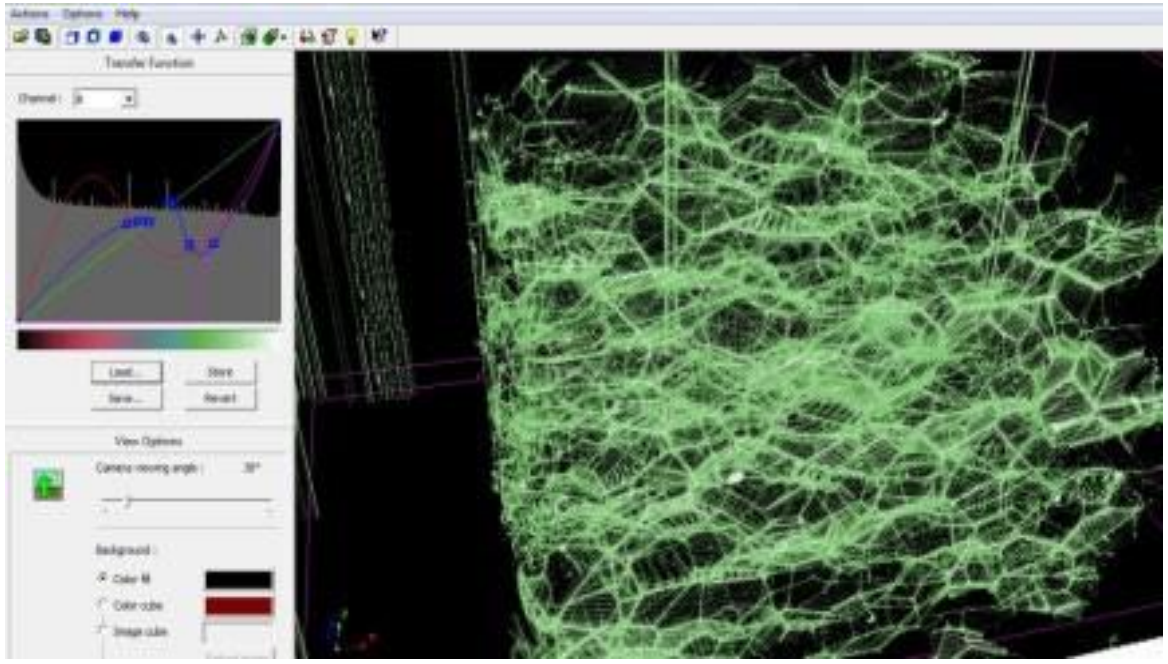
**EPS**



# EXTRUDED POLYSTYRENE STRUCTURE

## STRUCTURE: MICROTOMOGRAPHY – COMPARISON OF STRUCTURE OF VARIOUS XPS





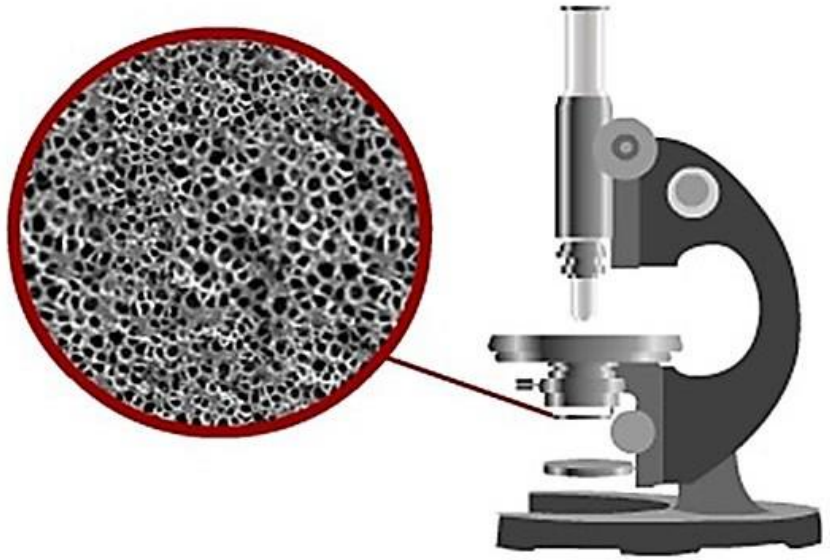
### XPS TECHNONICOL:

- Uniform structure
- Minimal size of the cells of 0.1-0.2 mm provides low water absorption and high strength of the material
- Long-life material

### ANOTHER XPS:

- Non-uniform structure
- Large cells, which lower strength of the material and increase water absorption of the material
- Short service life

# EXTRUDED POLYSTYRENE STRUCTURE



## STRUCTURE: UNIQUE COMPOSITION WITH NANOGRAPHITE

Since 2011 XPS TECHNONICOL is being produced with addition of nano-sized graphite particles to the structure of the material.

Unique nanographite technology enabled significant increase of thermal efficiency and physic-mechanical properties of thermal insulation.

# EXTRUDED POLYSTYRENE STRUCTURE

## ENERGY EFFICIENCY

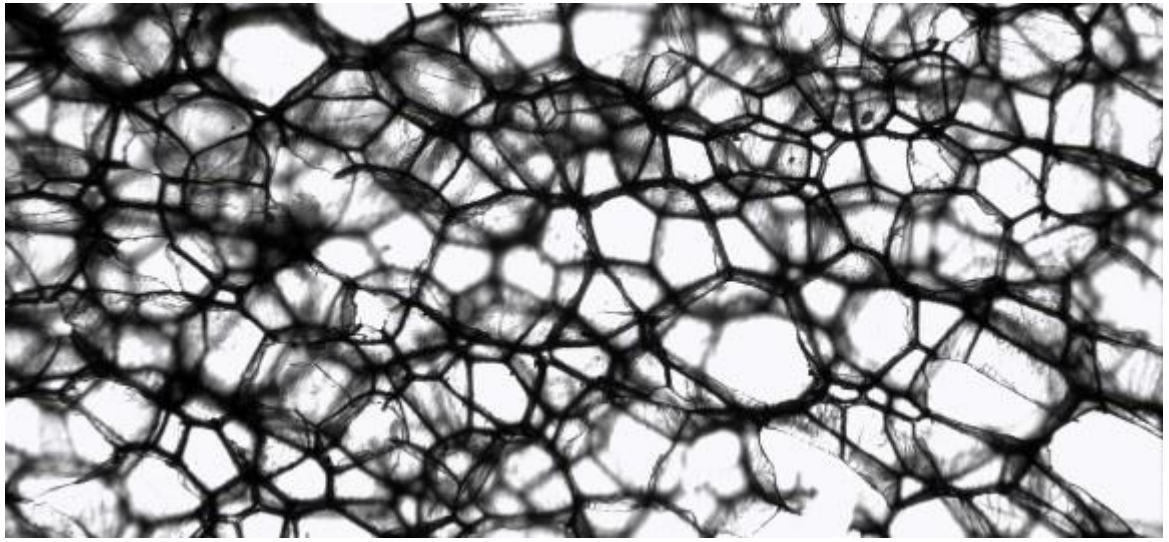
Thermal conductivity is a property of material to conduct heat throughout itself. The lower thermal conductivity, the warmer the material.

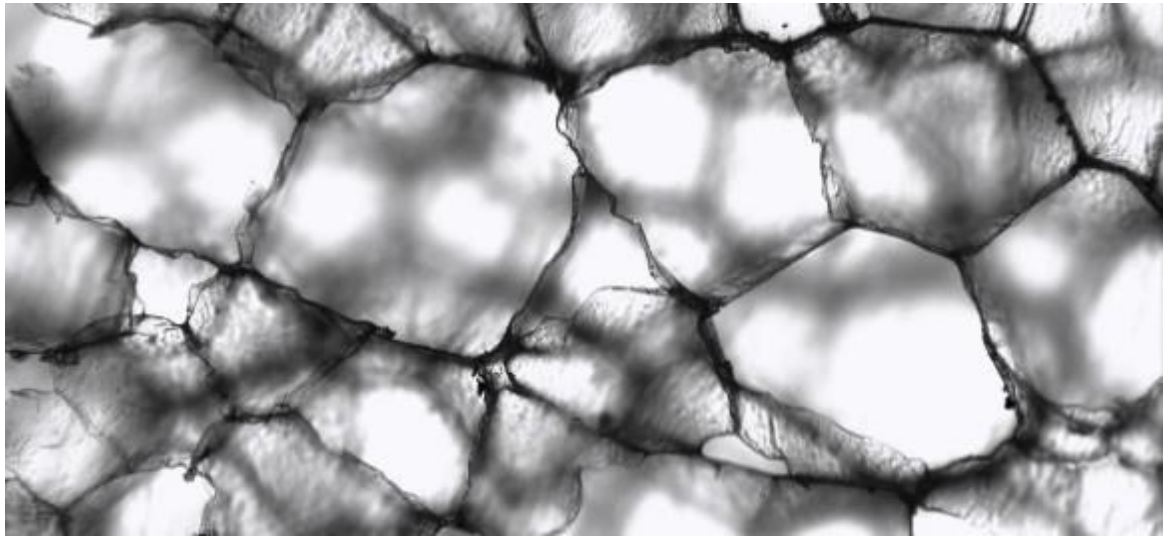
According to the results of the trials, thermal conductivity coefficient of XPS TECHNONICOL is 0.028-0.034 W/m*K.

Moreover, this value almost does not alter during operation. Due to low thermal conductivity coefficient XPS TECHNONICOL is an efficient thermal insulation.

Protects facilities from thermal losses. Warm winters, comfortable summers!

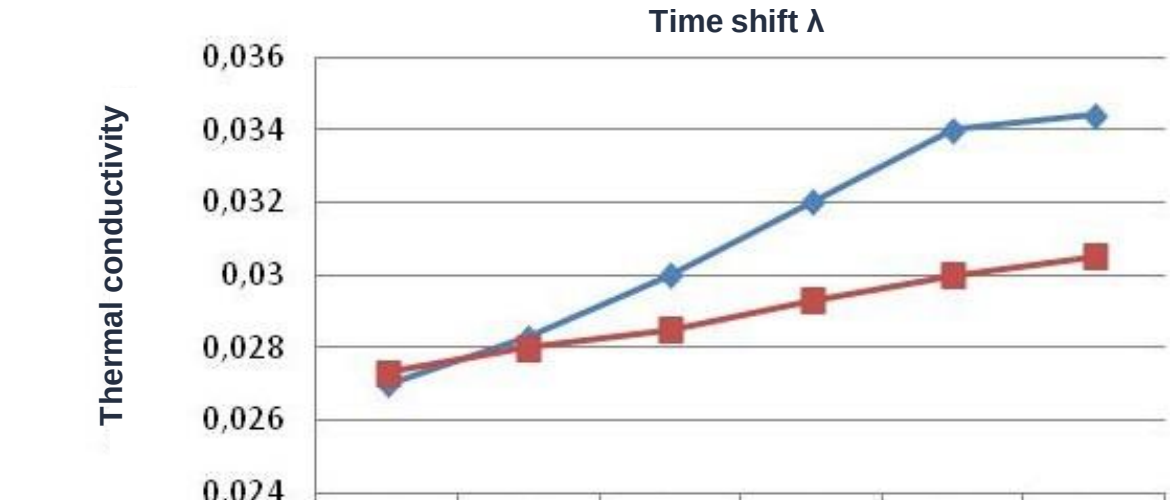
# PROPERTIES OF EXTRUDED POLYSTYRENE





## ENERGY EFFICIENCY

Thermal conductivity comparison of XPS TECHNONICOL and another XPS without graphite (carbon).

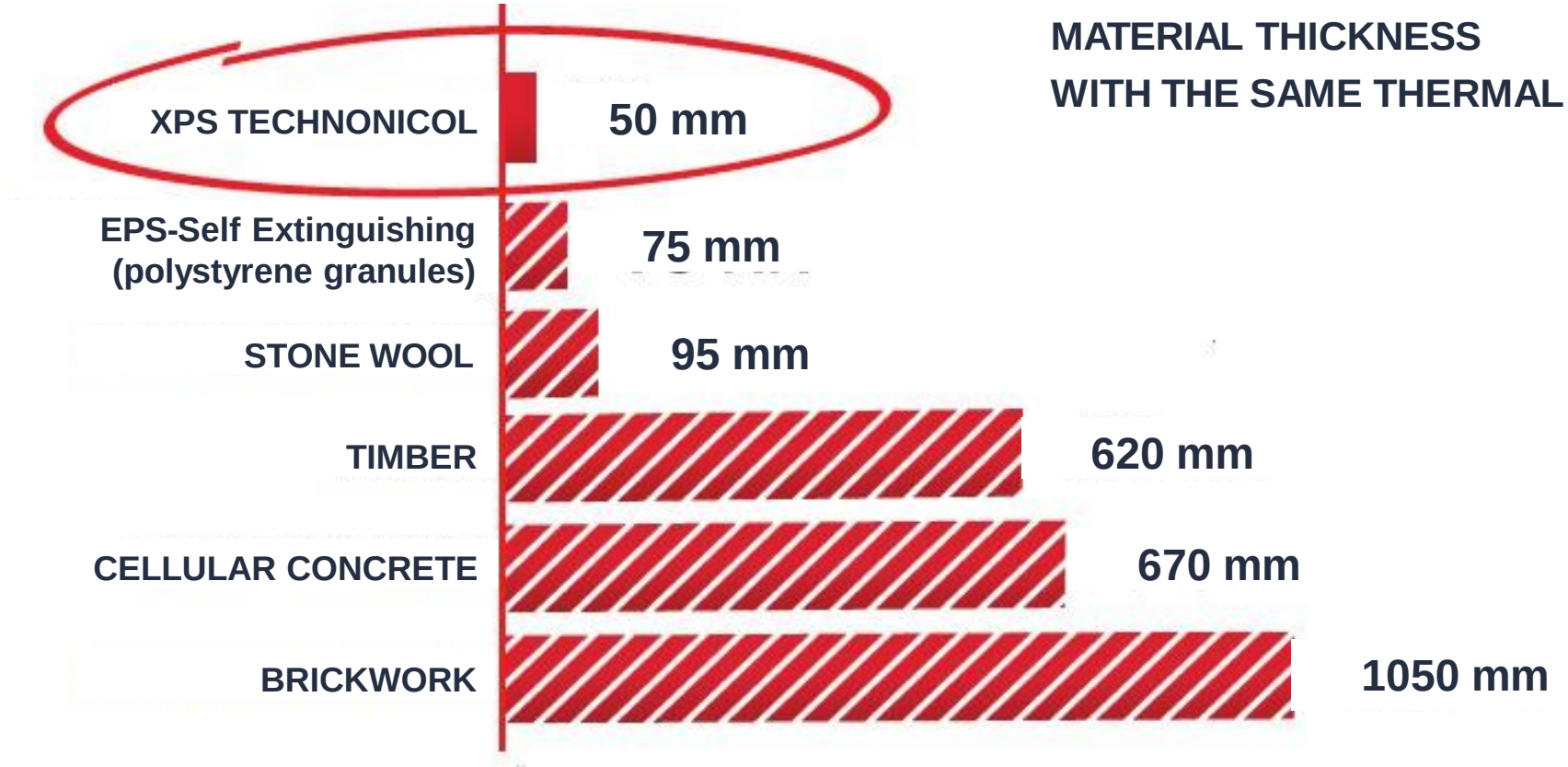



| | 0 | 0,5 | 1 | 2 | 4 | 6 |
|---|---|---|---|---|---|---|
| λ, XPS | 0,027 | 0,0283 | 0,03 | 0,032 | 0,034 | 0,0344 |
| λ, XPS CARBON | 0,0273 | 0,028 | 0,0285 | 0,0293 | 0,03 | 0,0305 |

# PROPERTIES OF EXTRUDED POLYSTYRENE

## ENERGY EFFICIENCY

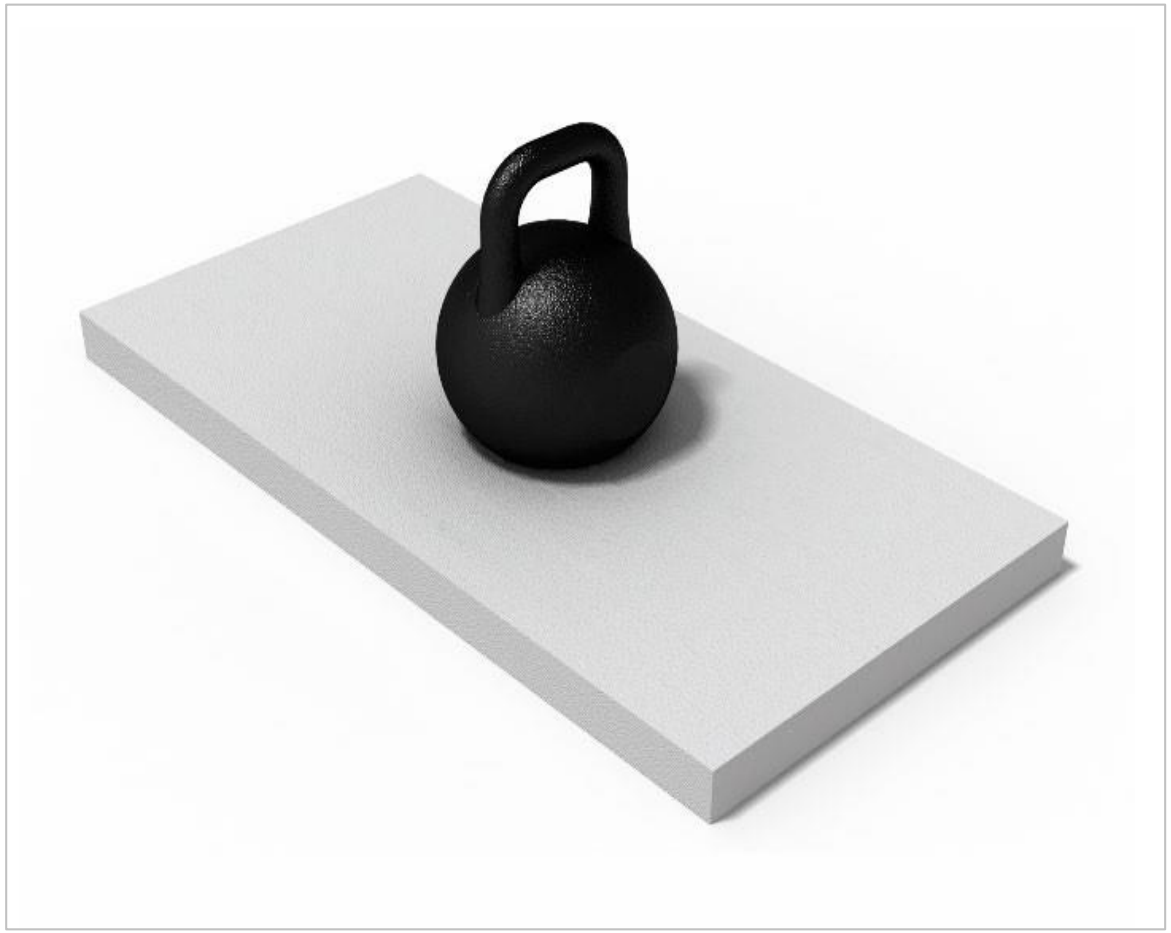
Due to low thermal conductivity coefficient one needs less amounts of XPS TECHNONICOL thermal insulation compared with other thermal insulations.




**MATERIAL THICKNESS**
**WITH THE SAME THERMAL RESISTANCE***

*This calculation is a recommendation.

# PROPERTIES OF EXTRUDED POLYSTYRENE



## HIGH STRENGTH

High strength enables using of XPS TECHNONICOL in loaded constructions:

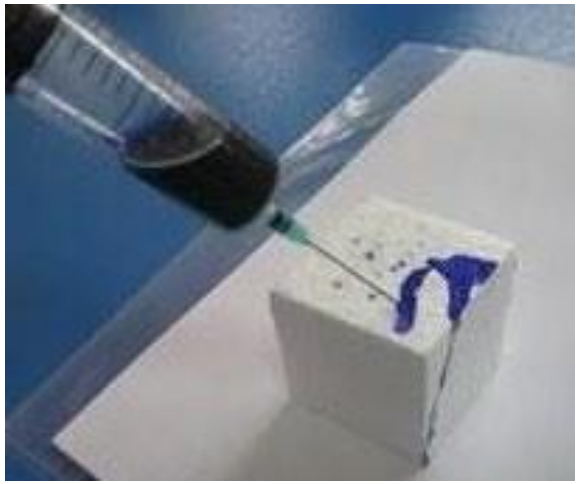
- Foundations
- Stylobate
- Load-bearing roofs
- Road construction

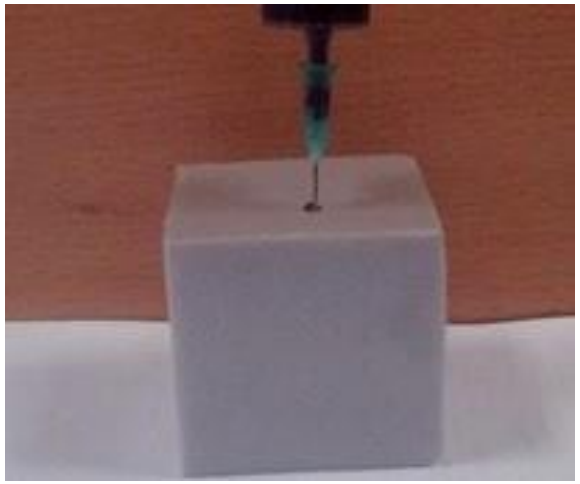
Types of strength:

- Compression strength at 10% deformation
- Bending strength

Compression strength at 10% linear deformation not less than 200 kPa = 20 tons per $m^2$.

# PROPERTIES OF EXTRUDED POLYSTYRENE





EPS

XPS TECHNONICOL

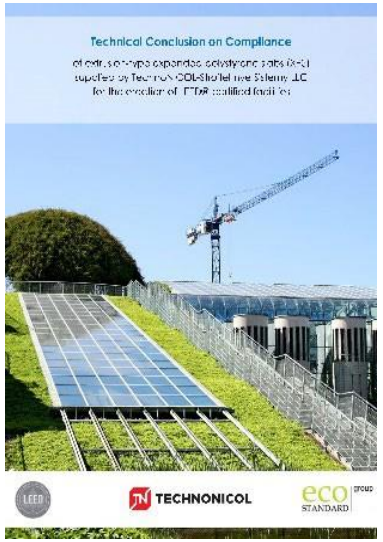
## MINIMAL WATER ABSORPTION

XPS TECHNONICOL possesses almost zero water absorption coefficient:

- Does not absorb water during operation
- Does not swell and disintegrates

The material does not lose its main properties with time, thus is highly durable.

# PROPERTIES OF EXTRUDED POLYSTYRENE





VITALITY LEAF GREEN CHOICE

CE

## ENVIRONMENT-FRIENDLY AND SAFE

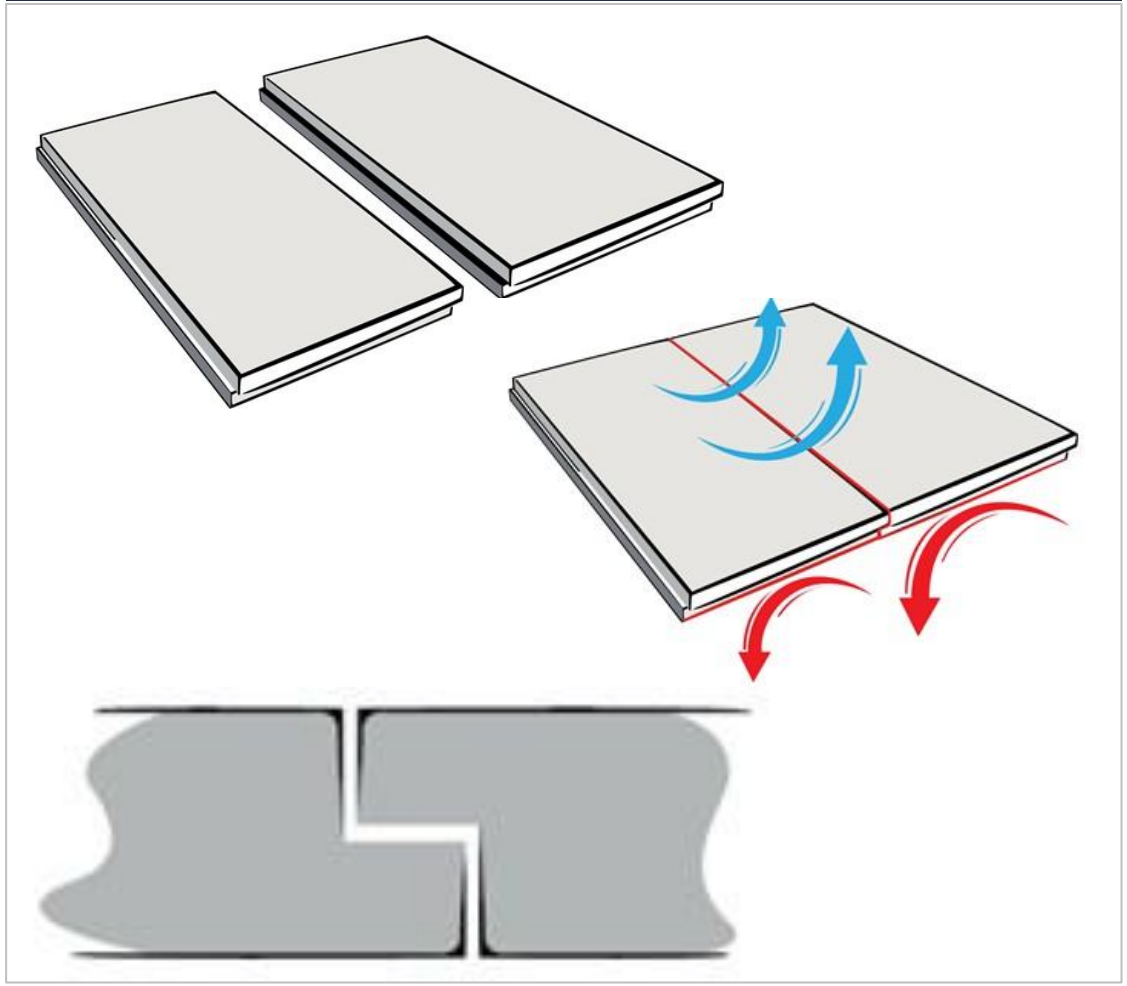
XPS TECHNONICOL is eco-friendly and safe, which is proved by the corresponding certificates:

- Eco-certificate VITALITY LEAF
- LEED expert evaluation
- Does not emit harmful agents
- Highly biostable (proved by Testing Center “Biostoykost” of MSU Ecocenter)
- Is not a nutrient for gnawers (proved by Institute for Disinfectology)

XPS is produced from general-purpose polystyrene. Food containers are also produced from such polystyrene.

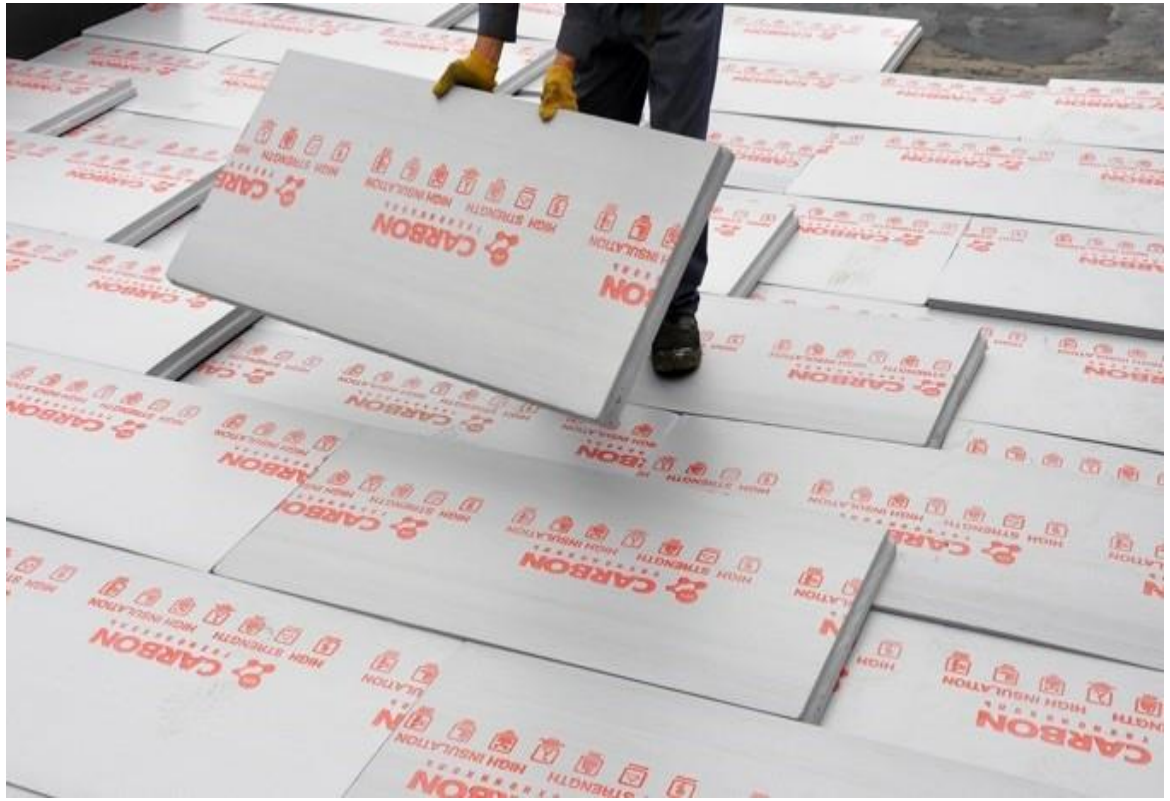
# PROPERTIES OF EXTRUDED POLYSTYRENE

## SIMPLE INSTALLATION



## APPLICATION TEMPERATURE

From -70 ˚C up to +75 ˚C.



# PROPERTIES OF EXTRUDED POLYSTYRENE

Unpacked product should be kept away from direct sun light!

**RELIABLE PACKAGE:**

- Precipitations have no impact on the product, thus the material can be stored outside
- Packed in “UV-film”, thus is not affected by the sun
- The product is palletized, which makes storage convenient and prevents the product from being thrown in all directions with the wind

# MATERIALS RANGE

TECHNONICOL

# EXTRUDED POLYSTYRENE RANGE

## AREAS OF APPLICATION:

TECHNONICOL CARBON ECO is used in buildings and constructions while arranging the thermal insulation of basements, roofs, floors and facades.

## TECHNONICOL CARBON ECO

XPS TECHNONICOL CARBON ECO is a thermal insulation material with uniformly distributed closed cells, which does not swell, shrink or absorb water. It is chemically resistant and is not a subject to putrefaction. The high strength of the material allows receiving an equal and simultaneously rigid base that essentially increases the durability of the whole thermal insulation system.

## DIMENSION:

- Length = 1180-4000 mm
- Width = 580-650 mm
- Thickness = 10-100 mm

| PRORETIES | PERFORMANCE |
|---|---|
| Thermal conductivity, λD, W/m*K | 0.028-0.034 |
| Thermal resistance (depending on thickness), RD, m²*K/W | 0.29-2.94 |
| Compressive stress at 10% deformation, kPa | ≥200 |
| Long term water absorption by immersion WL(T) 0.7, % | ≤0.7 |
| Reaction to fire – ignitability, Euroclass | F |

# EXTRUDED POLYSTYRENE RANGE

## AREAS OF APPLICATION:

TECHNONICOL CARBON PROF 300 is used in buildings and constructions while arranging the thermal insulation of basements, roofs, floors and facades, construction of railways and highways.

## TECHNONICOL CARBON PROF 300

XPS TECHNONICOL CARBON PROF 300 is a thermal insulation material with uniformly distributed closed cells, which does not swell, shrink or absorb water. It is chemically resistant and is not a subject to putrefaction. The high strength of the material allows receiving an equal and simultaneously rigid base that essentially increases the durability of the whole thermal insulation system.

## DIMENSION:

- Length = 1180-4000 mm
- Width = 580-650 mm
- Thickness = 50-200 mm

| PRORETIES | PERFORMANCE |
|---|---|
| Thermal conductivity, λD, W/m*K | 0.028-0.034 |
| Thermal resistance (depending on thickness), RD, m²*K/W | 1.47-5.88 |
| Compressive stress at 10% deformation, kPa | ≥300 |
| Long term water absorption by immersion WL(T) 0.7, % | ≤0.7 |
| Reaction to fire – ignitability, Euroclass | F |

# EXTRUDED POLYSTYRENE RANGE

## AREAS OF APPLICATION:

TECHNONICOL CARBON SOLID 500 is used in buildings and constructions while arranging the thermal insulation of basements, operated roofs, loaded floors, foundations of transportation facilities.

## TECHNONICOL CARBON SOLID 500

XPS TECHNONICOL CARBON SOLID 500 is a thermal insulation material with uniformly distributed closed cells, which does not swell, shrink or absorb water. It is chemically resistant and is not a subject to putrefaction. Record high compressive stress performance of the material at deformation makes TECHNONICOL CARBON SOLID 500 the best choice for the most important and complicated projects.

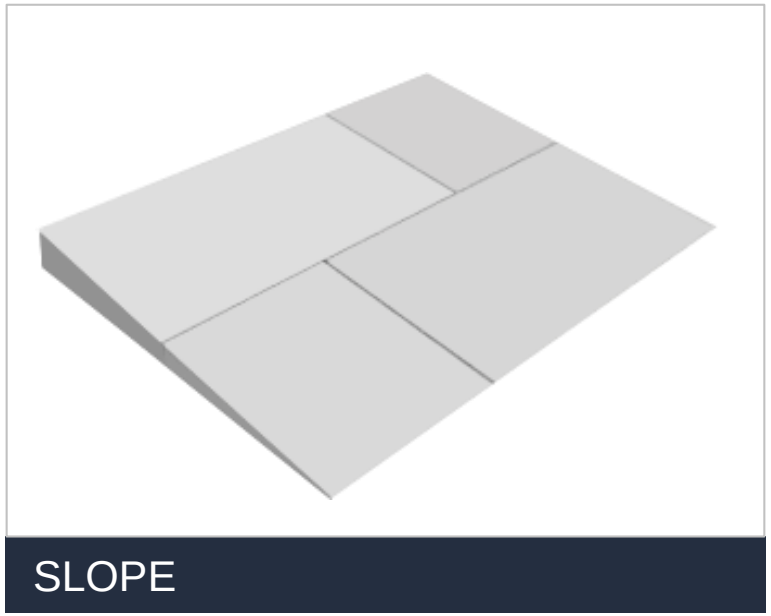
## DIMENSION:

- Length = 1180-4000 mm
- Width = 580-650 mm
- Thickness = 40, 50, 60, 100 mm

| PRORETIES | PERFORMANCE |
|---|---|
| Thermal conductivity, λD, W/m*K | 0.028-0.034 |
| Thermal resistance (depending on thickness), RD, m²*K/W | 1.18-2.94 |
| Compressive stress at 10% deformation, kPa | ≥500 |
| Long term water absorption by immersion WL(T) 0.7, % | ≤0.7 |
| Reaction to fire – ignitability, Euroclass | F |

# EXTRUDED POLYSTYRENE RANGE

## ADDITIONAL SLABS TYPE

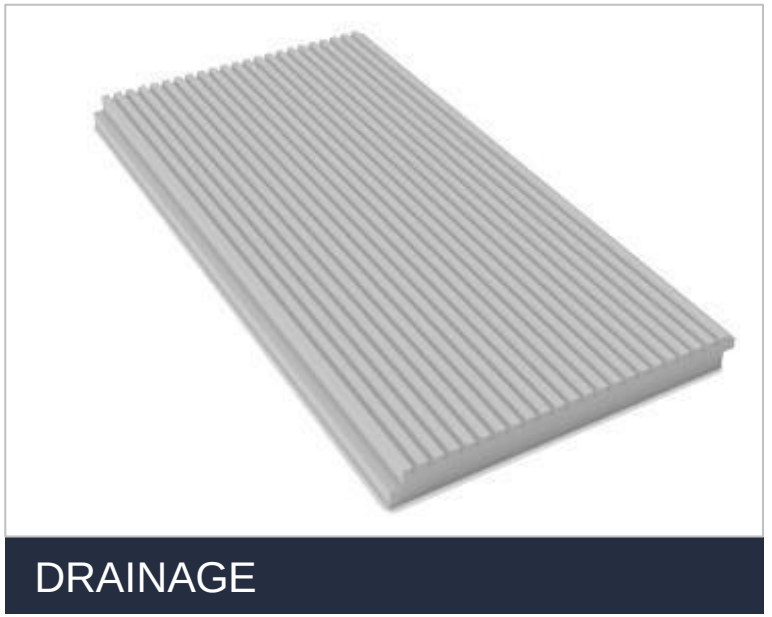


SLOPE

Slope shaped slabs are used to install the slope on flat roofs in order to drain water on the roof to funnels.

FACADE

Slabs with a rough surface are used to increase the adhesion of facade plaster.



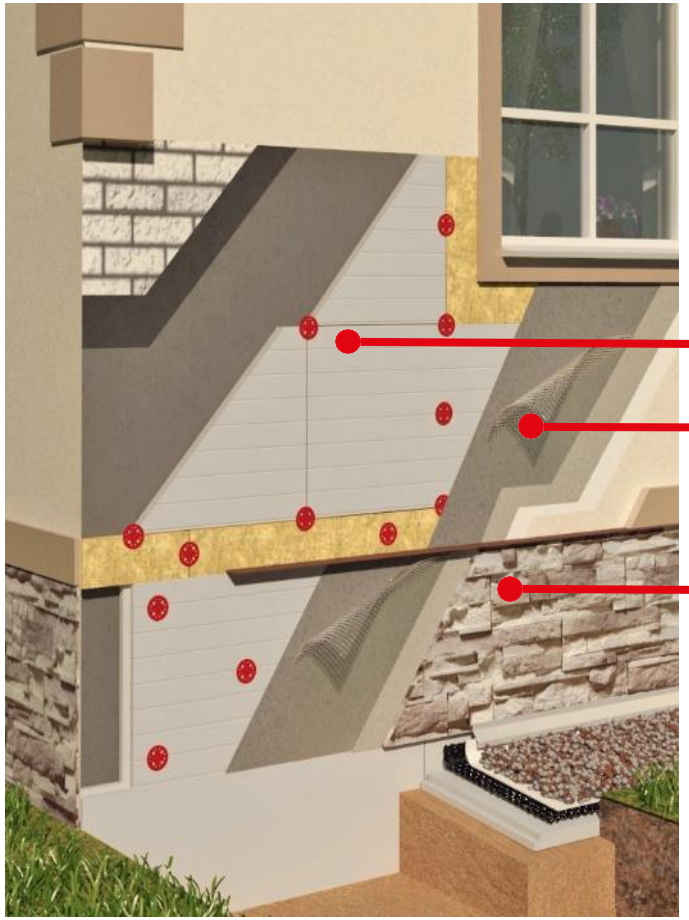
DRAINAGE

Slabs with grooves are used for construction of wall drainage and additional thermal insulation of the foundation.

# EXTRUDED POLYSTYRENE RANGE

## PLASTER FACADE

Plaster facade is a multilayer thermal insulation system.

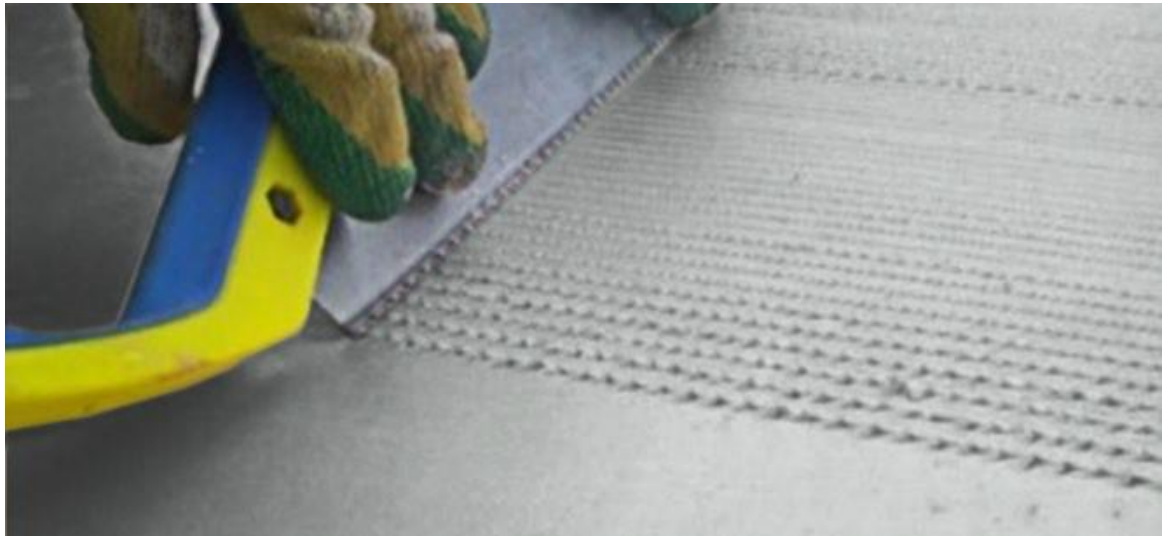


Thermal insulation layer

Reinforced plaster layer

Protective-decorative plaster layer

# EXTRUDED POLYSTYRENE RANGE



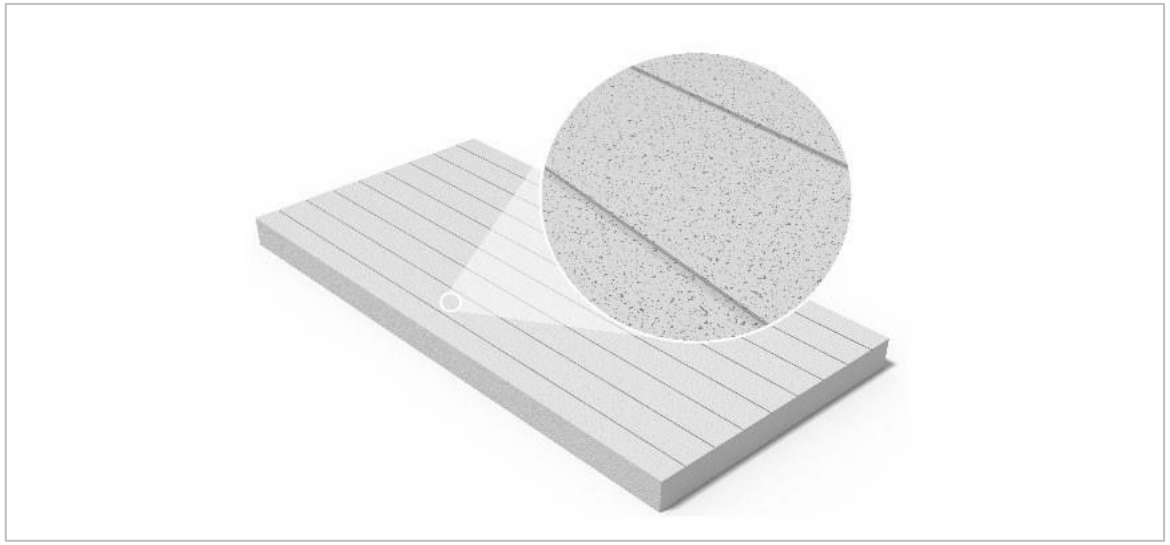
## EXAMPLE OF MANUAL TREATMENT OF THERMAL INSULATION SLABS

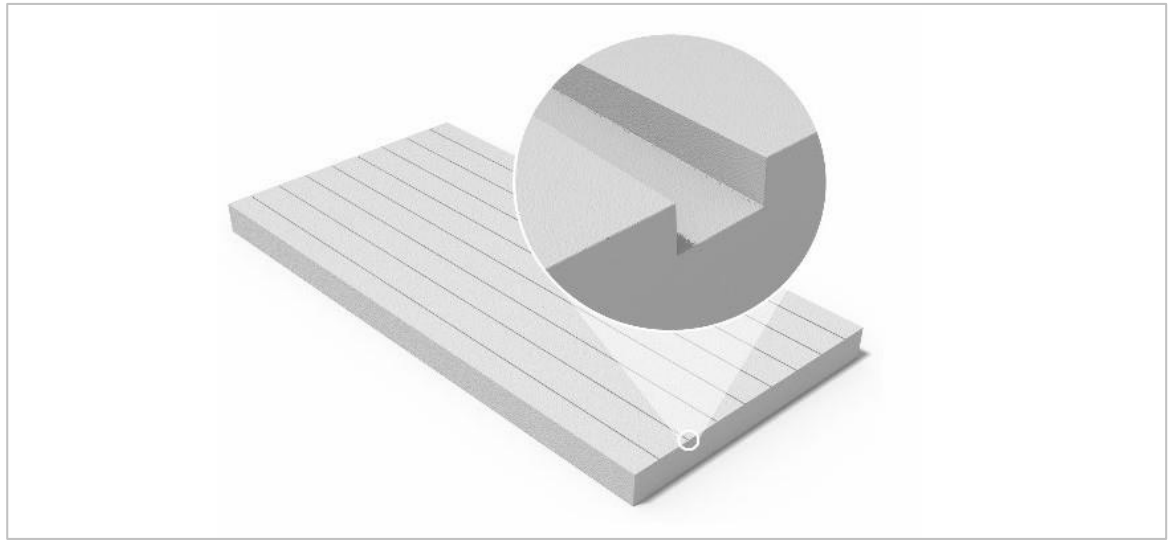
When there is no manufactured milling on the slabs, one has to treat the slabs manually with:

- Porcupines. Disadvantage – bad adhesion
- Panel saw, or metal brush. Disadvantage – labor-consuming

Manual treatment of thermal insulation slabs is inefficient

# EXTRUDED POLYSTYRENE RANGE





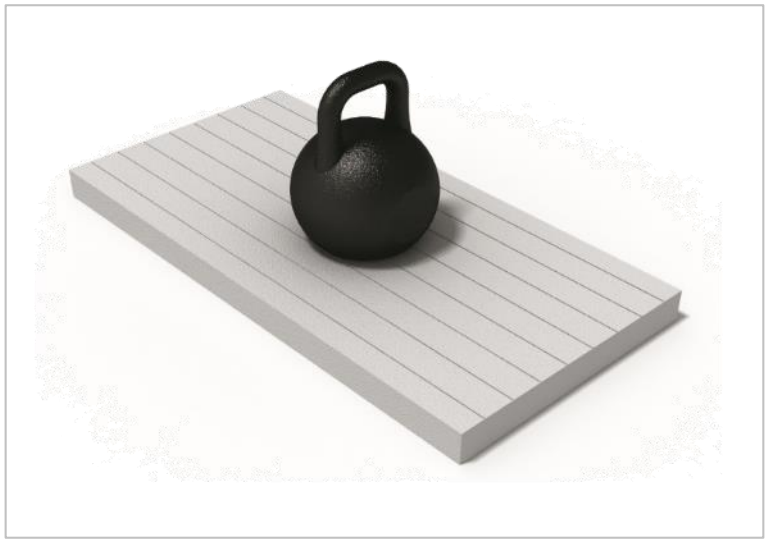
## HIGH ADHESION TO THE SURFACE

Special type of surface of XPS TECHNONICOL CARBON ECO FACADE slabs is achieved thanks to manufacturing milling technology:

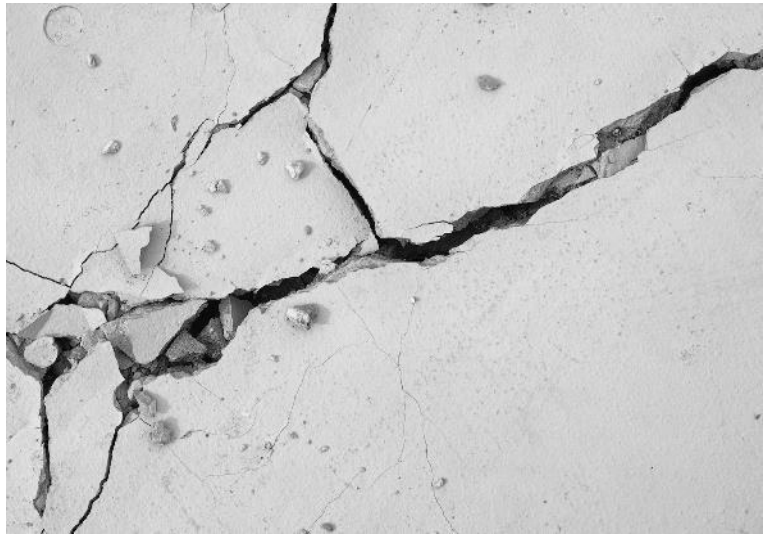
- Milled surface provides maximal adhesion with the surface and plaster
- Special micro-channels increase adhesion even more without overconsumption of plaster

# EXTRUDED POLYSTYRENE RANGE

## ADVANTAGES OF XPS IN THERMAL INSULATION OF FACADES



Compression strength at 10% linear deformation is not less than 200 kPa = 20 tons per $m^2$.



Low-strength thermal insulant.

High-strength thermal insulant.

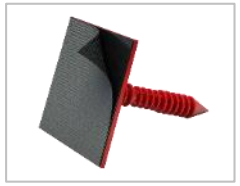

# INSTALLATION

TECHNONICOL

# EXTRUDED POLYSTYRENE INSTALLATION

## CHOOSING OF INSTALLATION METHOD

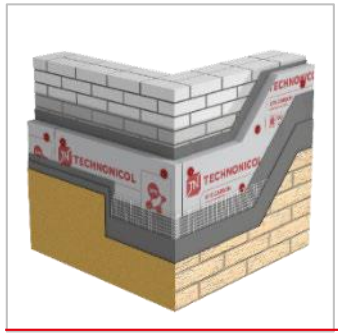
Fastening XPS to waterproofing



Fasteners TECHNONICOL
Consumption 4 pcs/m²


Mastic TECHNONICOL No.27
Consumption 0.6-1 kg/m²

Foam glue TECHNONICOL
Consumption 1 cartridge
per 10-12 m²

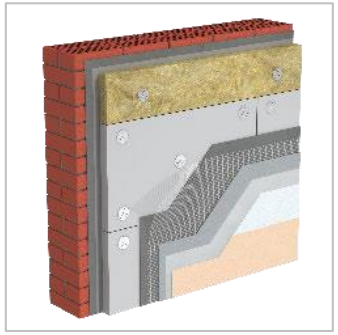



Fastening XPS on basement to decking

Adhesive compound for XPS
Consumption 5-6 kg/m²

Disk-shaped facade anchor.
Consumption 5-7 pcs/m²

Foam glue TECHNONICOL
Consumption 1 cartridge
per 10-12 m²

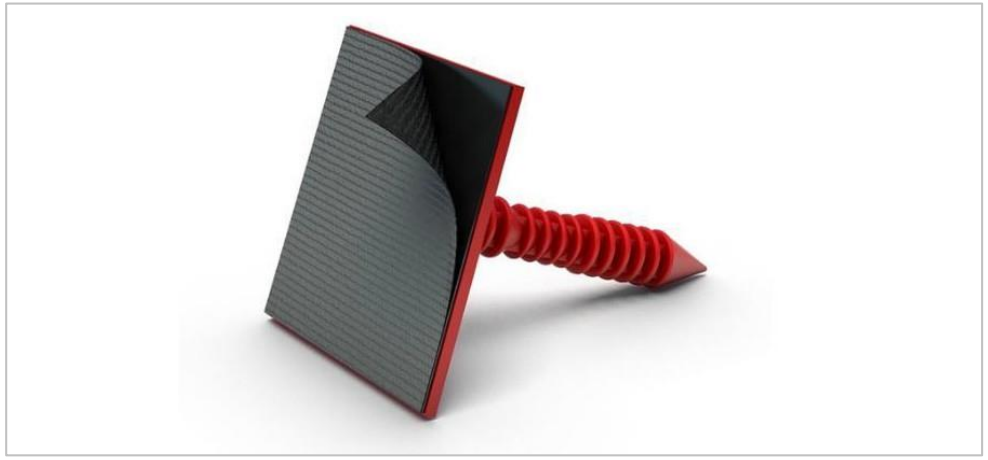


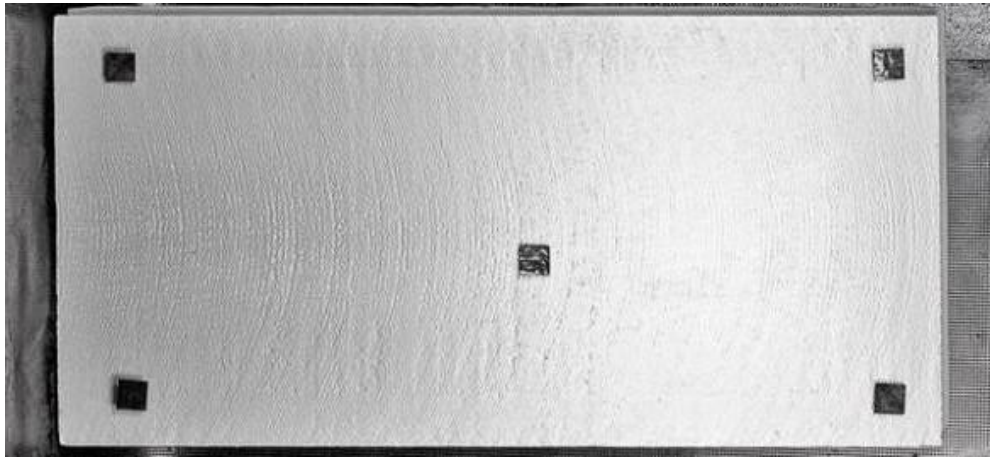
Fastening XPS on facade to decking

Adhesive compound for XPS
Consumption 5-6 kg/m²

Disk-shaped facade anchor.
Consumption 5-7 pcs/m²

# EXTRUDED POLYSTYRENE INSTALLATION





## FASTENERS TECHNONICOL – TO ADHERE XPS TO MEMBRANES

Fasteners are used for temporary fixation of extruded polystyrene slabs to bitumen or polymer-bitumen membranes in systems of foundation waterproofing. It is recommended to finish a backfilling within 3-5 days.

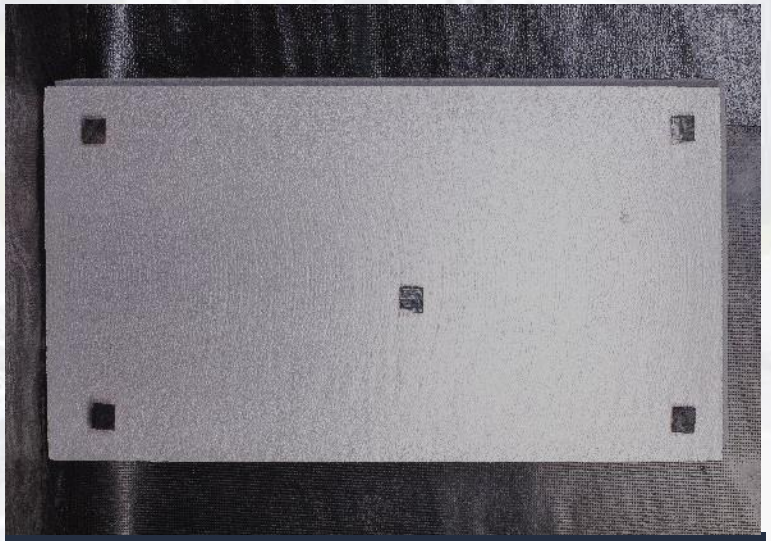
The fastener is made of low pressure polyethylene and is a stud with locking teeth and a flat pad with an adhesive layer that is protected by an easily removable siliconized film. Installation of fasteners must be carried out at a temperature ≥+10 °C.

Consumption of fasteners – 4 pcs/$m^2$.

| PRORETIES | No.01 | No.02 |
|---|---|---|
| Flat-width, mm | 40±2 | 65±1 |
| Flat-length, mm | 40±2 | 65±1 |
| Stud size, mm | 40±2 | 78.5±1 |
| Packaging, pcs/box | 200 | 100 |

# EXTRUDED POLYSTYRENE INSTALLATION

## INSTALLATION WITH FASTENERS TECHNONICOL



STEP 1

Drive in fasteners No.01 or No.02 in the thermal insulation slabs.

STEP 2

Remove protective film from the mastic side of the fastener.

STEP 3

Install the slabs in the designed position on the waterproofing bitumen material.

# EXTRUDED POLYSTYRENE INSTALLATION



## ADHESIVE COMPOUND FOR XPS

The compound is designed for adhesion of extruded polystyrene to polymer-bitumen insulation materials, as well as to concrete, metal and wooden surfaces in foundation insulation systems.

The mastic is applied as points or strips by using a spatula. The mastic should be applied to all corners and in the center of a fixed slab.

Store in dry place protected against sunlight at a temperature between -20 °C and +30 °C.

Guaranteed storage period 18 months.

| PRORETIES | PERFORMANCE |
|---|---|
| Strength of adhesion to the surface (with concrete and metal), MPa | 0.1 |
| Mass fraction of nonvolatile substances, % | 75-80 |
| Shear strength of glued bond, kN/m | 0.1 |
| Heat endurance, °C | +90 |

# EXTRUDED POLYSTYRENE INSTALLATION


## EXPANDING FOAM GLUE TECHNONICOL FOR POLYSTYRENE

Expanding Foam Glue TECHNONICOL is designed for fixing slabs of extruded or expanded polystyrene to the surface during the thermal insulation of roofs, external and internal walls, cellars, foundations, floors, both in new construction and in renovation. It is used for temporary fixation slabs of XPS and EPS plates to vertical surfaces:

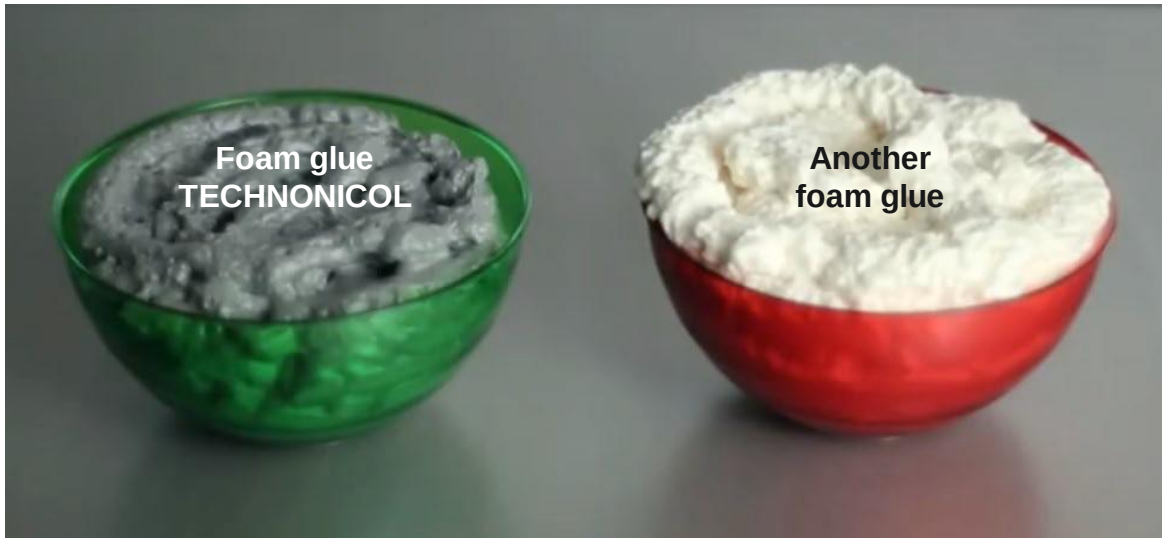
- Inside premises for thermal insulation of walls, interior partitions, balconies and loggias
- For thermal insulation of facade, basement or/and foundation

It is also used for:

- Fixing of cracks between heat-insulating slabs
- Adhesion of XPS and expanded polystyrene to various materials

| PRORETIES | PERFORMANCE |
|---|---|
| Time of the polymerization start, min | ≤15 |
| Curing time (at 20 °C and relative humidity over 50%), h | ≤2 |
| Adhesion strength with concrete, MPa | ≥0.4 |
| Adhesion strength with expanded polystyrene, MPa | ≥0.09 |

# EXTRUDED POLYSTYRENE INSTALLATION




## INSTALLATION WITH FOAM GLUE

For installation of XPS TECHNONICOL, use FOAM GLUE TECHNONICOL for extruded polystyrene:

- Minimal expansion
- Consumption: 1 cartridge of foam glue per 10-12 m2 – efficient
- Reliable fastening of slabs to any material

# EXTRUDED POLYSTYRENE INSTALLATION

## INSTALLATION WITH FOAM GLUE

STEP 1

Shake the cartridge.

STEP 2

Apply Expanding Foam Glue TECHNONICOL for XPS on the perimeter of the slab with a 2 cm gap from the edge, then apply a 2-3 cm wide strip of foam glue in the center of the slab.

STEP 3

Wait 7-10 minutes.

# EXTRUDED POLYSTYRENE INSTALLATION

## INSTALLATION WITH FOAM GLUE

STEP 4

Stick the slabs to the surface.

STEP 5

Seal the junctions.

STEP 6

Clean the gun from the foam.

# EXTRUDED POLYSTYRENE INSTALLATION

## INSTALLATION WITH ADHESIVE COMPOUND

STEP 1

Contour-dot application of adhesive compounds (for installation of slabs on decking with more than 3 mm irregularities).

STEP 2

Continuous application of adhesive compounds (for installation of slabs on decking with less than 3 mm irregularities) with notched trowel with 10-12 mm serrated edges.

# EXTRUDED POLYSTYRENE INSTALLATION

## MECHANICAL FASTENING


STEP 1

Impact-anchors to be driven not earlier than in 24 hours after installation of slabs, i.e. after complete hardening of adhesive compound.


STEP 2

Use plastic anchors. Number of anchors should meet the requirements of the design, but use not less than 5 pcs per slab.


STEP 3

Insert an anchor into the hole and drive it with a hammer. After installation of anchors drive (thread) expansion tips.

# EXTRUDED POLYSTYRENE INSTALLATION

## SURFACE REINFORCEMENT

STEP 1

A grid to be installed in small sections (not more than 1 $m^2$). Bulges on the grid are not admissible.

STEP 2

Adjacent sections of the grid to be joined by overlapping of their ends. The grid has to be sunk into the plaster layer.

# EXTRUDED POLYSTYRENE INSTALLATION

## FINISHING

STEP 1

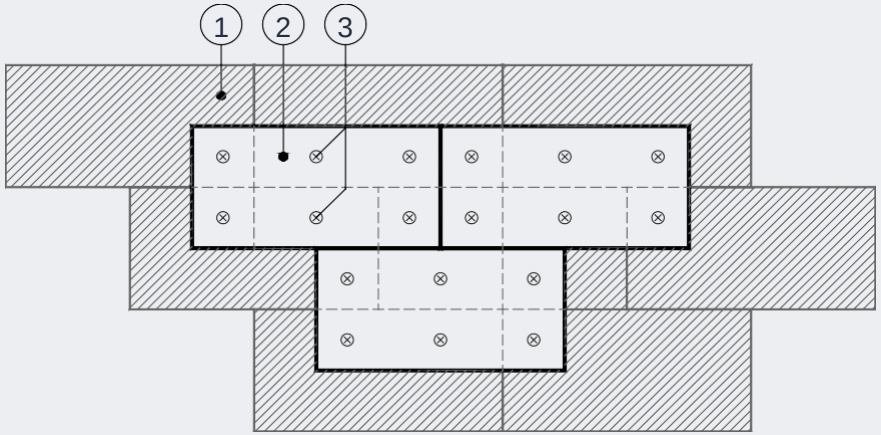
Application of exterior decorative layer is only admissible when the reinforced protective layer is completely dry, but not earlier than in 72 hours. Before application of a decorative layer, treat the surface with primer.

STEP 2

Decorative plaster to be applied in one movement determined by desired texture. When needed, one can apply paint on the plaster layer with a roller.


# CONSTRUCTION SOLUTIONS

TECHNONICOL

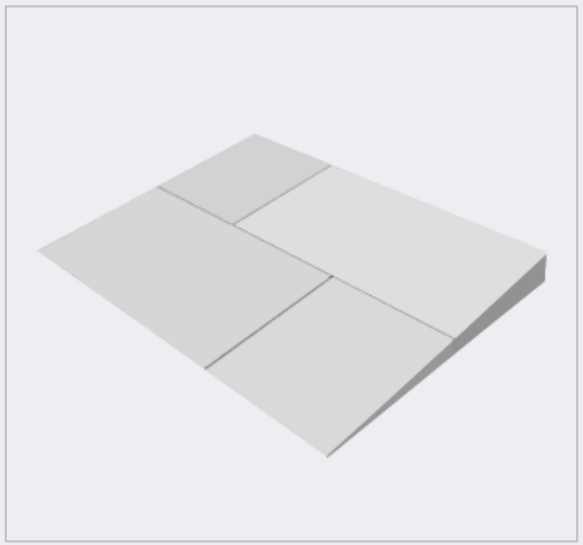



# INSTALLATION OF THERMAL INSULATION

Thermal insulation slabs of one layer are recommended to be installed with a half-length displacement in relation to junctions in adjacent rows.

Junctions of the upper row of insulation slabs to be arranged with an at least 200 mm displacement relatively to the lower row.

Seams between thermal insulation slabs should not be larger than 5 mm.



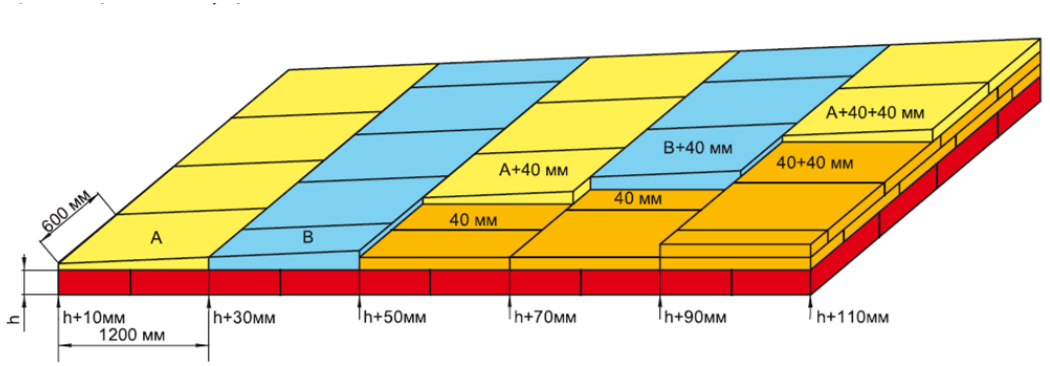
# ARRANGEMENT OF A ROOF SLOPE

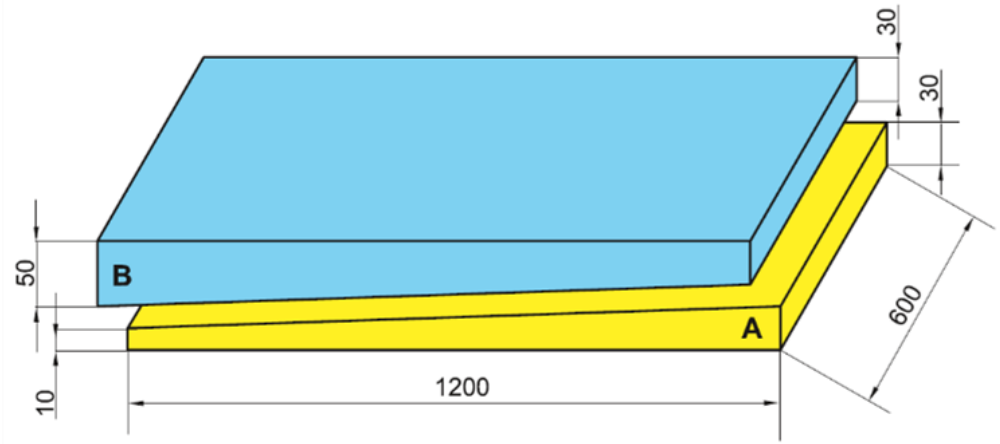
XPS TECHNONICOL CARBON PROF SLOPE – is a set of slabs for arrangement of roofing slopes. CARBON PROF SLOPE slabs help to solve the problem of stagnant zones associated with:

- Arrangement of a slope on the roof, expansion of slope, or change of water runoff direction
- Arrangement of valley sloping in direction of water funnels, gutters near airshafts and roof-lights
- Arrangement of an additional slope for water runoff from the apron (counter slope)

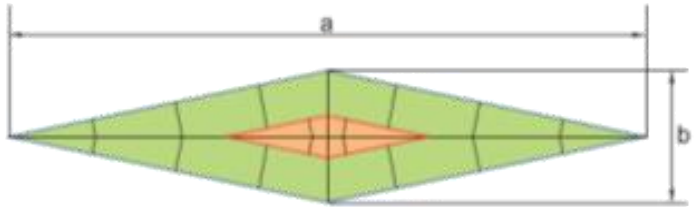
For valley slopes, water runoff from the aprons, roof lights, elevator shafts, roof vents, and expansion of the slope near the apron, XPS TECHNONICOL CARBON PROF SLOPE 2.1% or 4.2% slabs are used.

# CONSTRUCTION SOLUTIONS

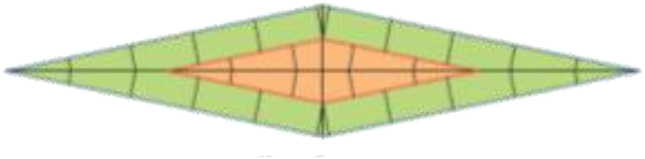


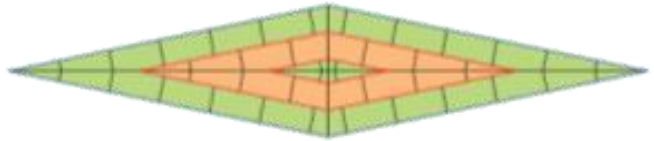

## ARRANGEMENT OF SLOPES BETWEEN FUNNELS



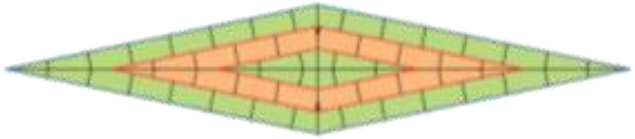

9 m distance between the funnels



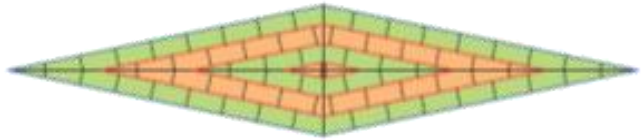
12 m distance between the funnels



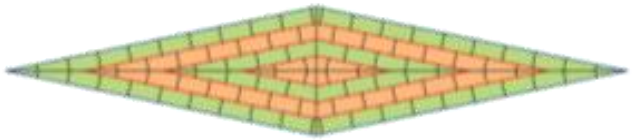
15 m distance between the funnels



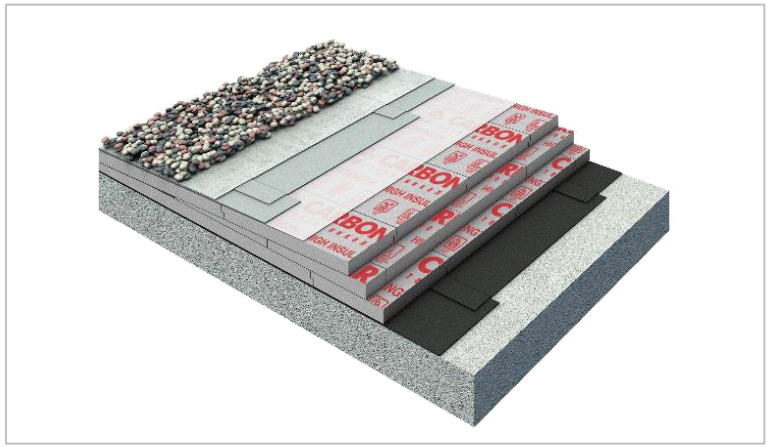
18 m distance between the funnels

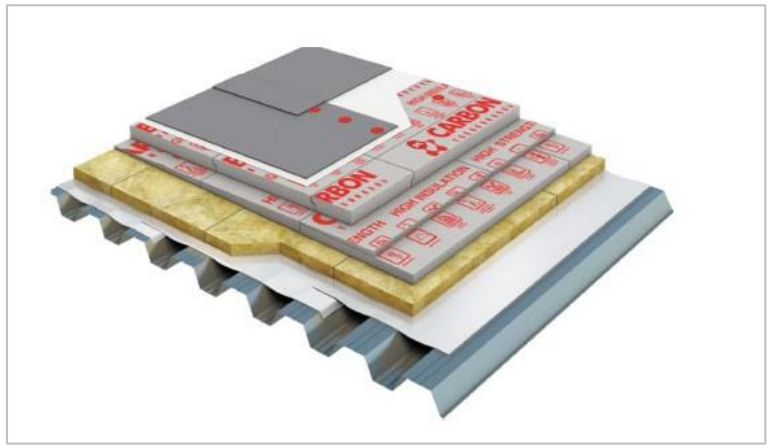


21 m distance between the funnels



# CONSTRUCTION SOLUTIONS



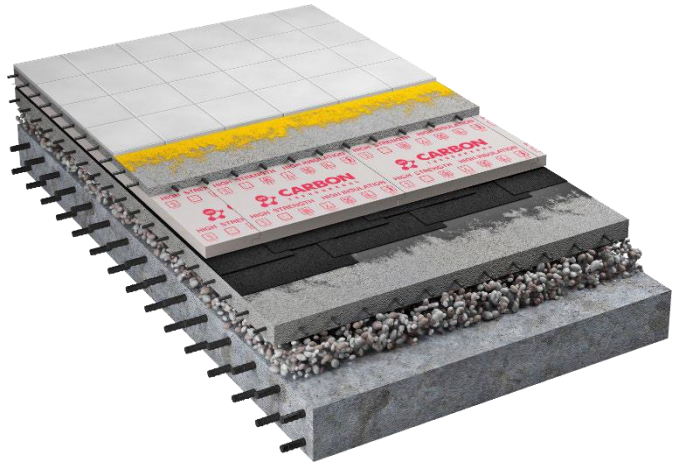



**NOTE!**

It is necessary to use a separation layer between PVC membrane and XPS (for instance, fiberglass, ≥100 g/m$^2$).

# CONSTRUCTION SOLUTIONS






NOTE!

XPS thermal insulation should not be exposed to the UV radiation. Finishing layer to be installed directly after installation of XPS (for instance, ballast layer).

# CONSTRUCTION SOLUTIONS

NOTE!

Thermal insulation slabs are recommended to be installed after complete cooling of torch-on applied polymer-bitumen waterproofing membrane.

TECHNONICOL

# THANK YOU FOR YOUR ATTENTION!