TECHNONICOL

LOGICPIR THERMAL INSULATION BOARD

A NEW GENERATION OF CONSTRUCTION MATERIALS

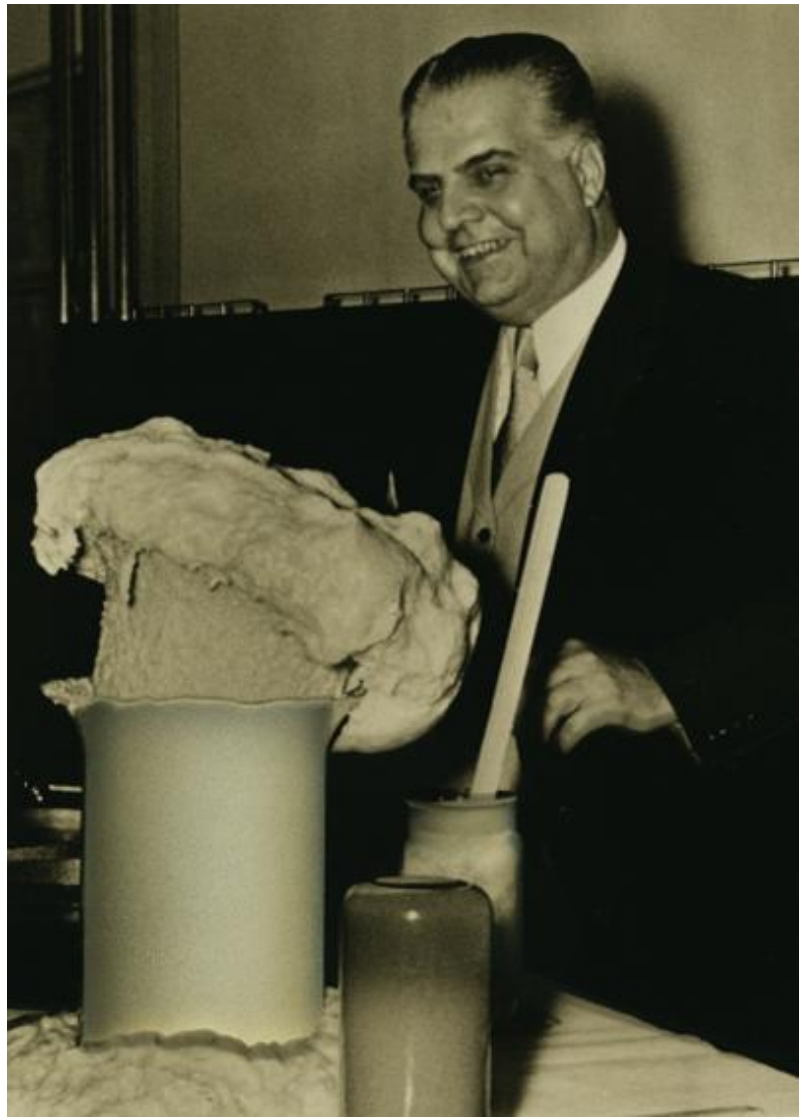
KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.

WWW.TECHNONICOL.IN

HISTORICAL REFERENCE

The discovery of Polyurethane Foam is attributed to Otto Bayer (founder of the group BAYER), who invented this new material for the first time in 1937, while he was trying to obtain a new polymer in the Bayer laboratories in Germany. That was a true revolution in the sphere of materials!

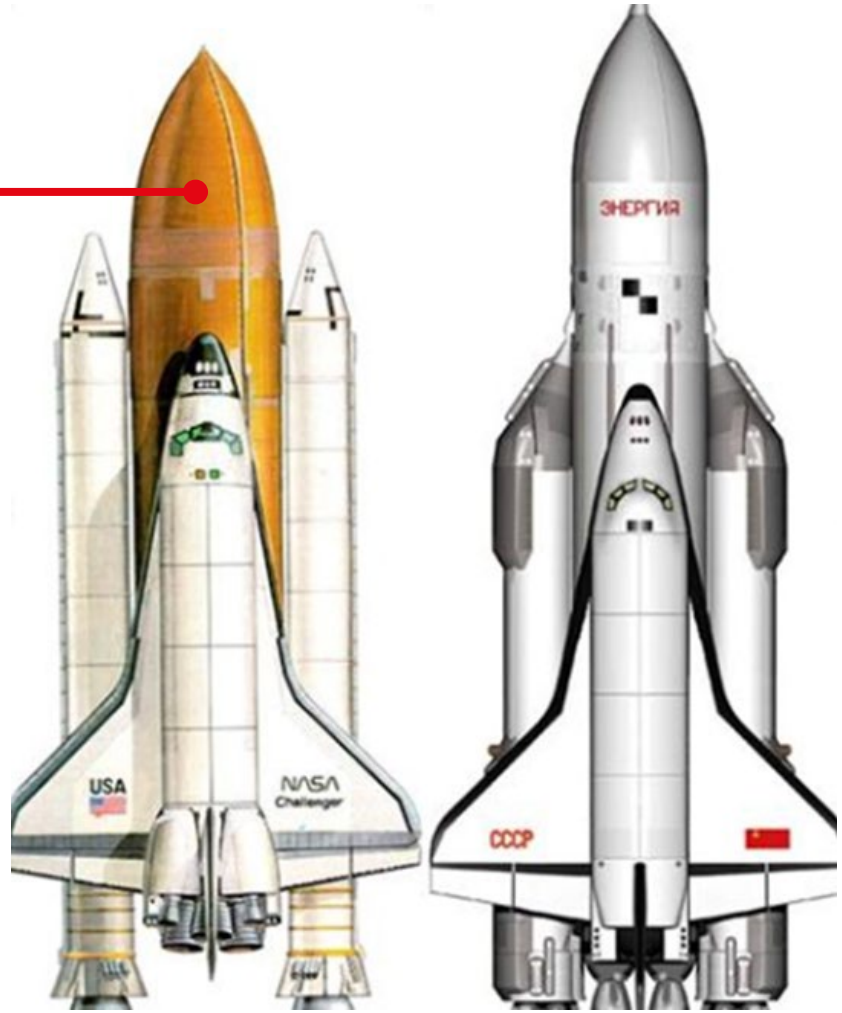
Thanks to its extraordinary mix of lightness, softness, elasticity, pleasantness at touch and resistance to strain, the flexible polyurethane foam soon became the material that finds a great purpose in several productive sectors, from furniture upholstery and sporting goods to the construction industry.



HISTORICAL REFERENCE

Polyurethane insulation was already used in Space Shuttles, USA (1971) and the spacecraft Buran, USSR (1976).

Protective coating for external fuel tank



PIR – WORLD'S INSULATION TREND

Polyisocyanurate, or simply PIR, is a modified and improved polyurethane foam, which is known in the world since 1968. Nowadays, in the context of constantly rising energy prices, energy-saving materials like PIR are becoming extremely popular in various industries.

PIR – WORLD'S INSULATION TREND

According to the research of National Roofing Contractors Association (NRCA) and IAL Consultants, PIR insulation is the market leader in roofing segment in the USA:

75% **of all new flat roofs are being constructed using PIR**

70% **of all renovation projects are carried out with PIR**

NRCA
National Roofing Contractors Association

TECHNONICOL

LOGIPIR BOARD BY TECHNONICOL

KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.

PRODUCTION FACILITY

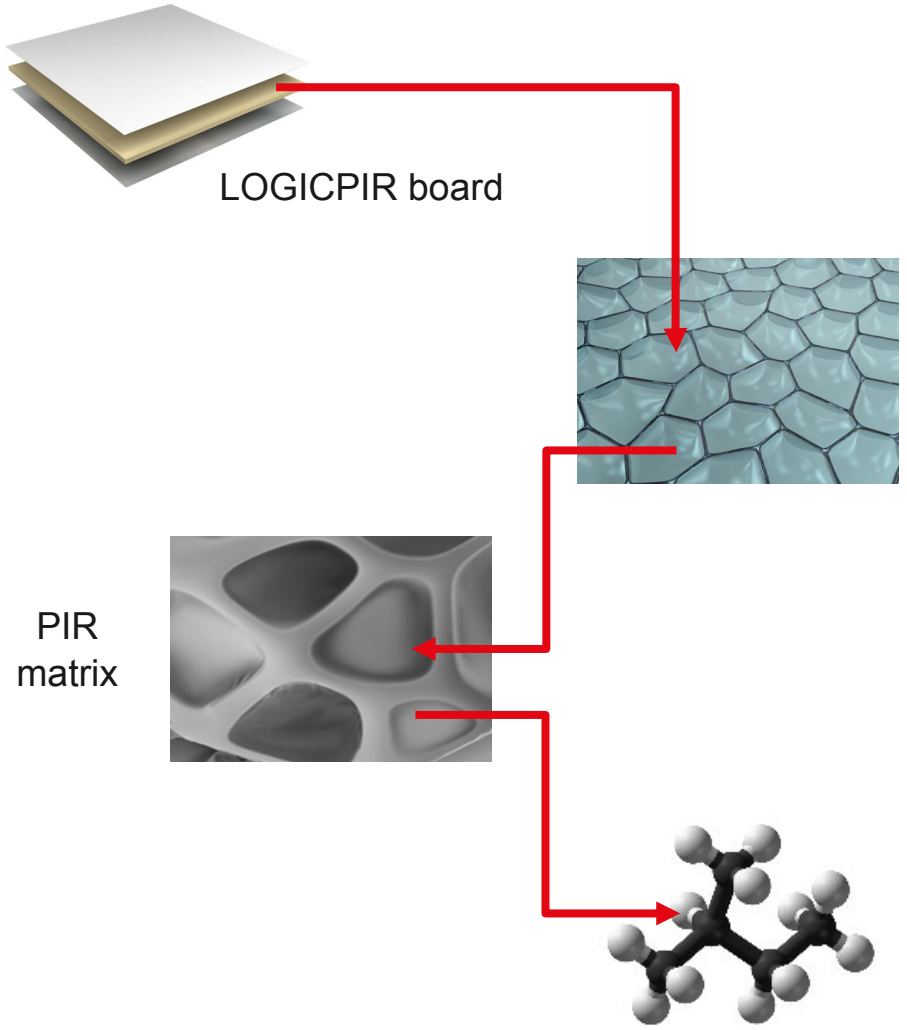
In 2016, TECHNONICOL launched a PIR factory in Ryazan. The production capacity of the line is **30 million m²** per year!

ABOUT MATERIAL

Thermal insulation LOGICPIR by TECHNONICOL is a polymer framework of many closed and gas-filled cells, which form a rigid homogeneous structure with high strength. The molecular ring structure of the polymer with strong chemical bonds and the high density of these bonds between the elements makes their destruction difficult. Closed rigid cells make up more than 95% of the volume of the material and provide it with:

- Record-low thermal conductivity
- Mechanical strength
- Minimal water absorption
- High fire resistance

Thus, thanks to its' chemical continuity, PIR boards by TECHNONICOL retain all the positive properties of polyurethane.



ADVANTAGES OF LOGICPIR

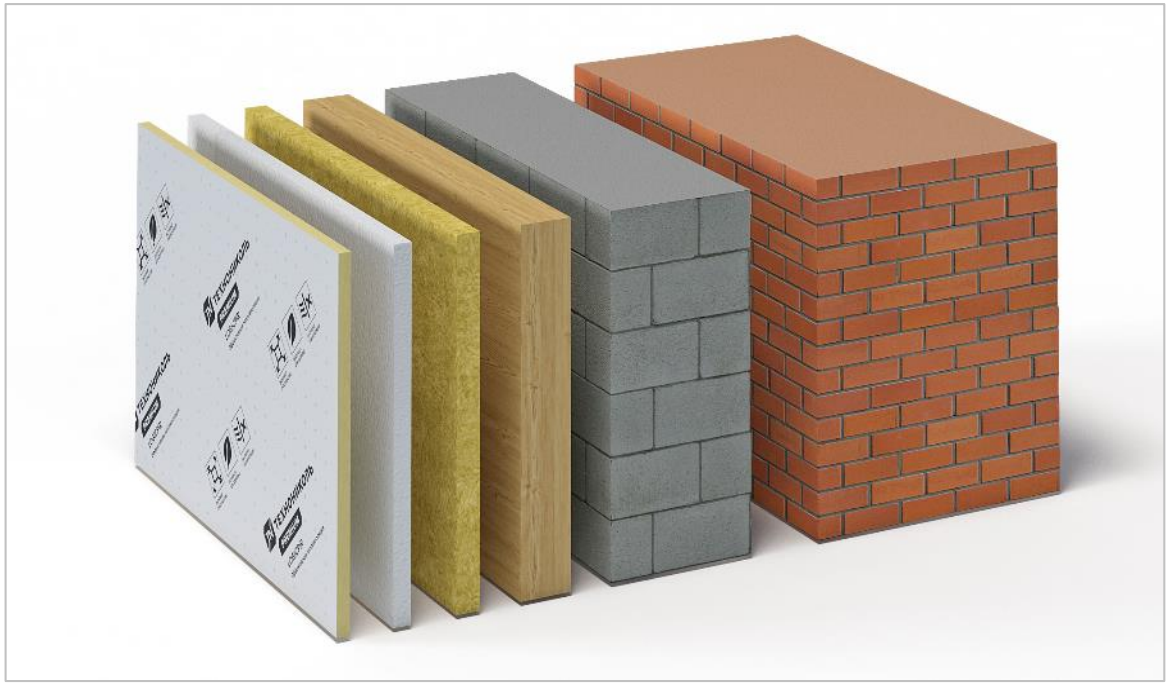
TECHNONICOL

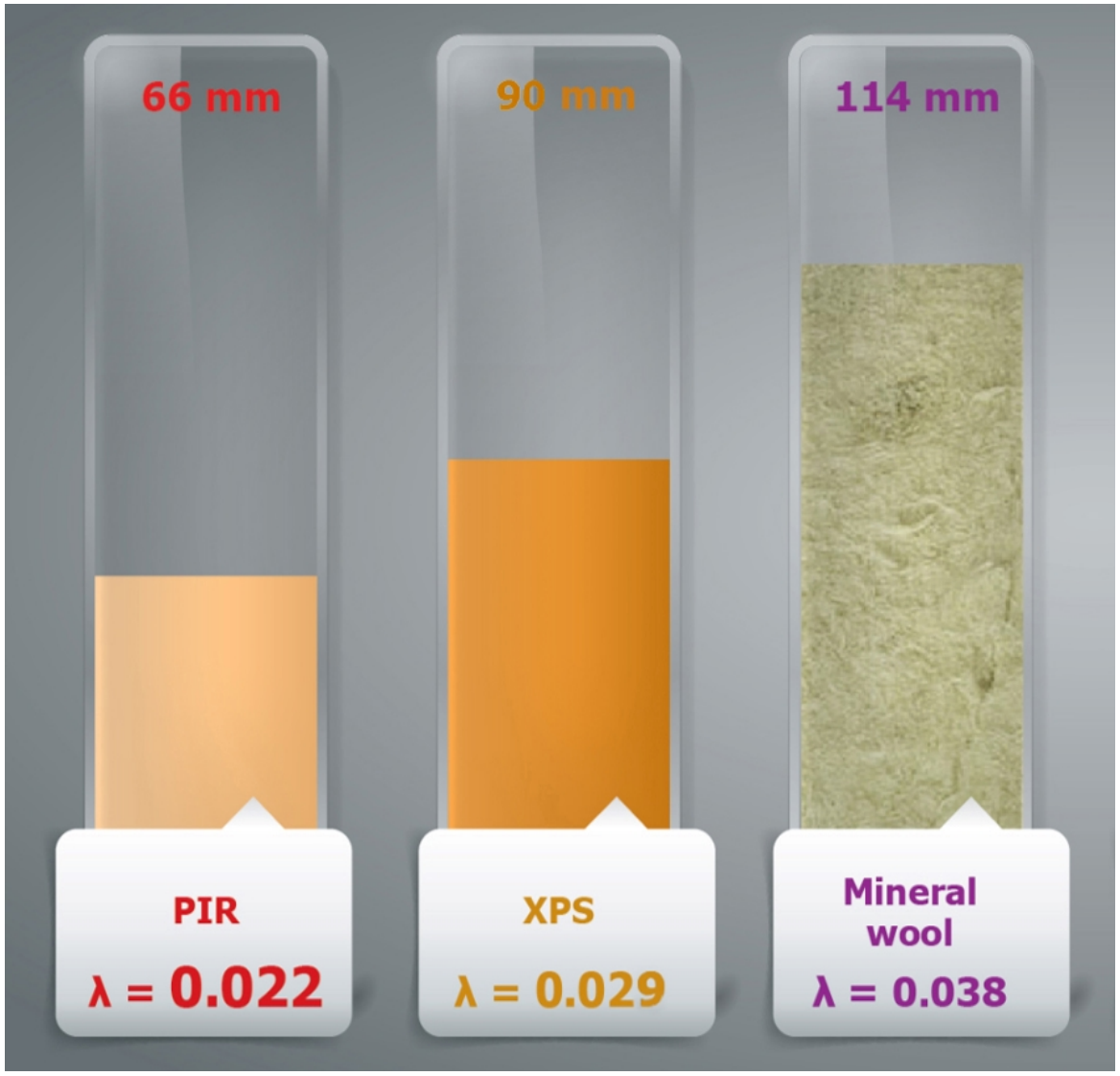
- RECORD-LOW THERMAL CONDUCTIVITY
- RELIABILITY AND DURABILITY
- HIGH FIRE RESISTANCE
- DYNAMIC LOAD RESISTANCE
- MINIMAL WATER ABSORPTION
- LIGHTWEIGHT
- SMALL THICKNESS
- EASY TO INSTALL
- ECOLOGICAL COMPATIBILITY

RECORD-LOW THERMAL CONDUCTIVITY

Being an energy-saving material with closed cellular structure, LOGICPIR boards by TECHNONICOL have a record-low thermal conductivity starting from 0.022 W/m*K. That allows less thickness of the thermal insulation layer to achieve the required level of thermal resistance.

Boards are available with L-shaped edges, so they fit tightly together and thus prevent thermal bridges.





RELIABILITY AND DURABILITY

LOGICPIR insulation boards:

- Are resistant to temperature changes
- Retain their shape without deformation over time
- Do not contain fibers capable to eroding
- Are resistant to microorganisms, fungus, insects and rodents

The stability of the material provides a service life of more than 50 years. Over the lifetime material does not change the thermal characteristics and dimensions.

HIGH FIRE RESISTANCE

PIR boards by TECHNONICOL are a non-flammable material. When in contact with an open flame, polymer burns on the surface only. This creates a charcoal skin, which is an effective defence against further polymer damaging.

VS

DYNAMIC LOAD RESISTANCE

The durable and rigid frame of each cell grants an excellent strength to the material. Due to the high compressive strength, it is possible to walk on boards during the construction of the building or at regular service of the equipment installed on the roof. Unlike other insulation materials, LOGICPIR boards are not sensitive to foot traffic and loads provided during operation.

During the walkability test in Europe, special equipment creates, an imitation of a walking person weighing 75 kg. LOGICPIR boards with the compressive strength of 150 kPa provide high resistance against deformation due to operation loads and comply with class 2 for the dynamic load (EN 826).

MINIMAL WATER ABSORPTION

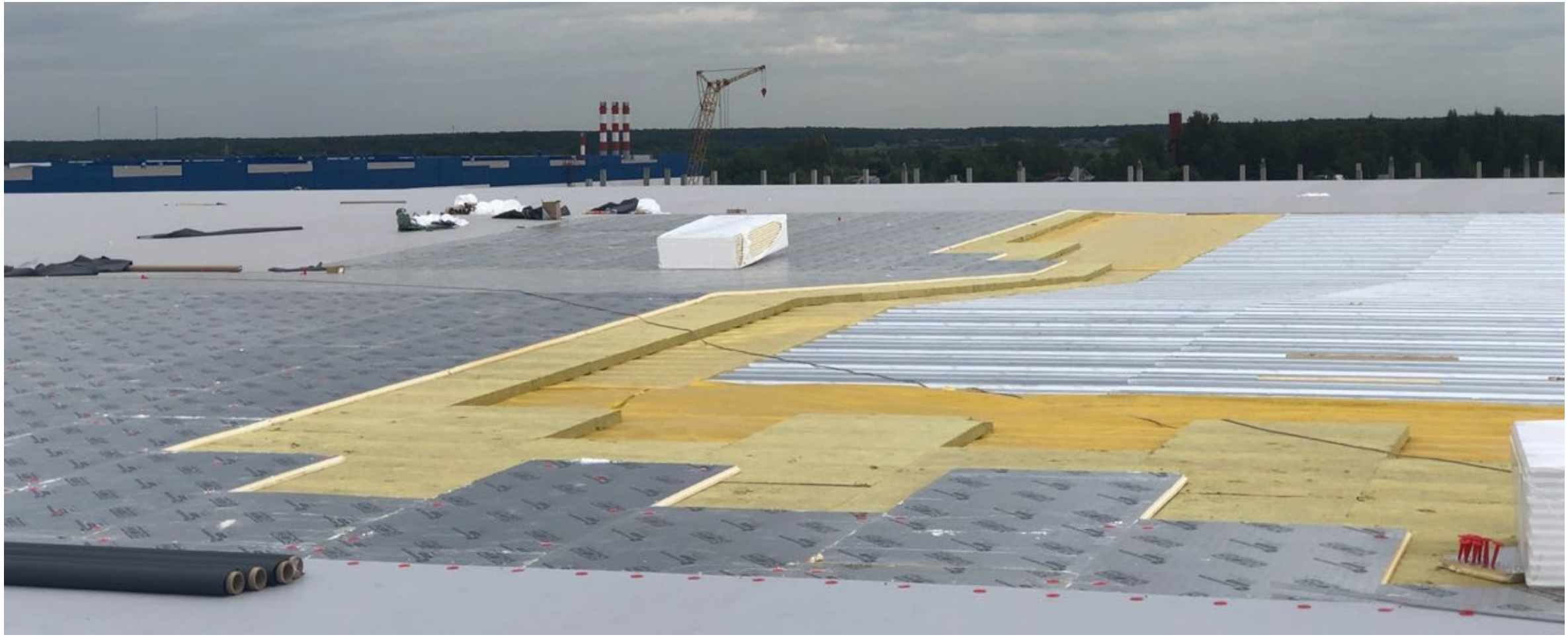
Small cells practically do not absorb water and do not pass it through: water absorption is less than 1%! That grants high bio-stability and the possibility of material installation in severe weather conditions.

LIGHTWEIGHT

The use of PIR boards by TECHNONICOL minimizes an additional load on the supporting base and allows the installation of thermal insulation without reinforcing the supporting structures, which is especially important for roofs renovation. Transportation costs are substantially reduced as well.

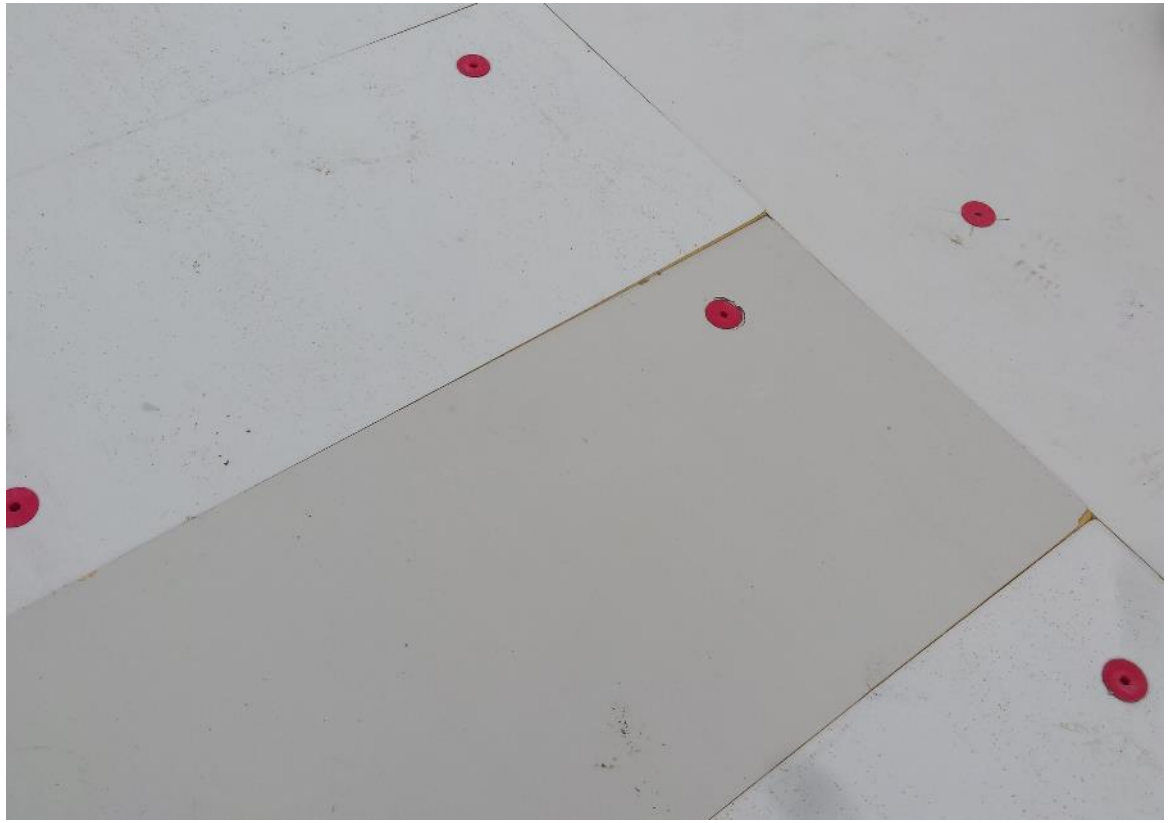
SMALL THICKNESS

Due to the record-low thermal conductivity of LOGICPIR boards by TECHNONICOL, a smaller thickness of the insulation layer is used to achieve the required level of thermal resistance. The minimum thickness allows saving the maximum space.



EASY TO INSTALL

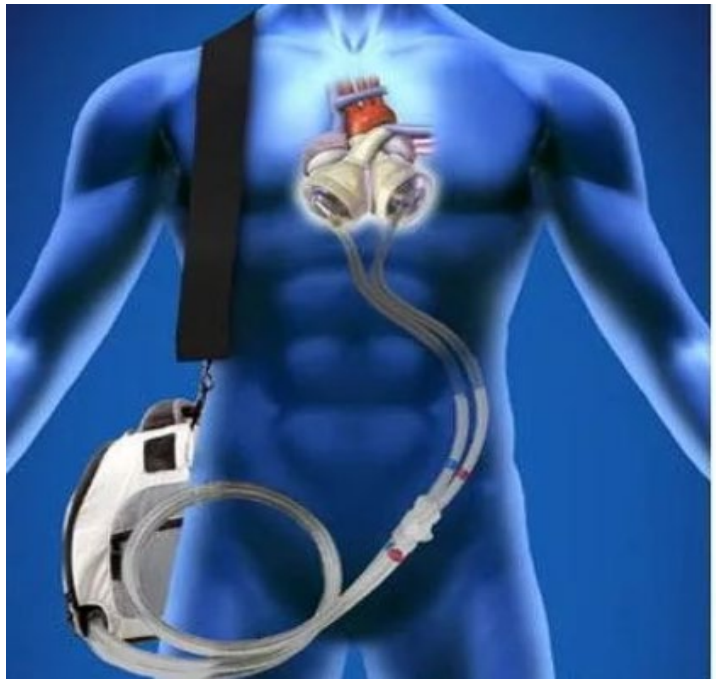
Thanks to the light weight and minimum thickness of LOGICPIR boards, even one person can easily perform the installation of the insulation layer. In addition, the availability of special prefabricated slope shaped boards significantly reduces the time of installation of the whole roofing system as well.

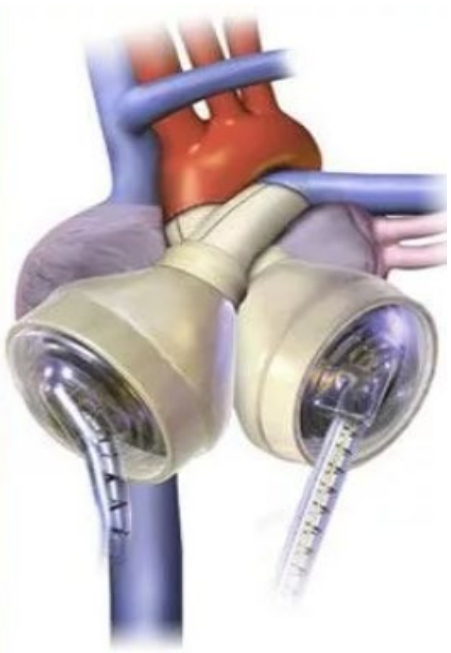


ECOLOGICAL COMPATIBILITY

Polyurethanes are widely used in the manufacture of heart valves, car parts, sports equipment, furniture, children toys, mattresses and pillows, shoes and clothes, adhesives and sealants, as well as many other usual things around us.

The material does not emit any dangerous substances, therefore it is considered one of the safest for the health of people, animals and the environment.





ECOLOGICAL COMPATIBILITY

Thermal insulation LOGICPIR by TECHNONICOL is a new generation of polyurethanes that is absolutely environmentally friendly and safe for human health and approved for use in children and medical institutions.

LOGICPIR does not emit volatile organic compounds (VOC), ammonia, formaldehyde, carcinogenic and other harmful substances, as evidenced by the certificate for M1 emission class issued by the prestigious laboratory of Eurofins Expert Services (Finland).

RAKENNUSTIETO

The Building Information Foundation RTS sr
28.4.2020, no. 3272

EMISSION CLASS FOR BUILDING MATERIAL · RTS · M1

EMISSION CLASSIFICATION OF BUILDING MATERIALS

Zavod Logicroof PIR LLC

The classification working group set up by the Building Information Foundation RTS sr has approved the following product:

PIR Boards F/F

as belonging to emission class M1 for building materials.

The classification is valid until 28.04.2023.

Zavod Logicroof PIR LLC has the right to equip its classified products with the classification mark and to use this classification mark when marketing these products.

The decision is in line with the requirements laid down in the Classification of Indoor Climate 2018 and the Classification of Building Materials: General Rules.

THE BUILDING INFORMATION FOUNDATION RTS sr

Markku Hedman
Director General

Arja Valtanen
Secretary of the Classification Working Group

The Building Information Foundation RTS sr, P.O.B 1004, FI-00101 Helsinki, Finland
Tel. +358 207 476 400, cer.rts.fi

Class E, EN 13501-1 (test method EN ISO 11925-2), ITC, the Czech Republic

Reference No. 75 35 01742
Page 1 of 8

INSTITUTE FOR TESTING AND CERTIFICATION, INC.
třída Tomáše Bati 299, Louky, 763 02 Zlín, Czech Republic

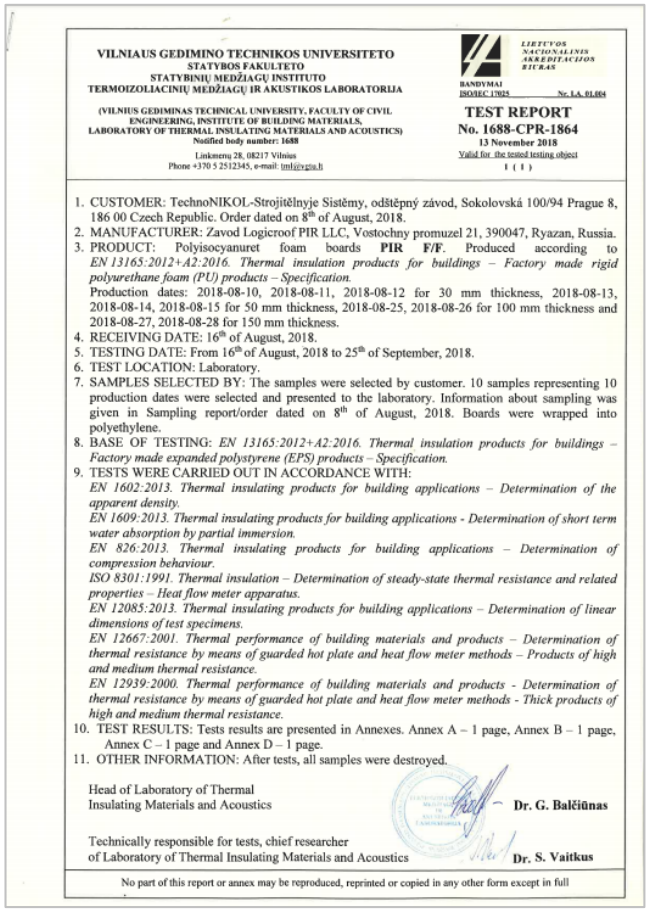
TEST REPORT
Reference No. 75 35 01742/ 2019

Applicant: :	**Zavod Logicroof PIR LLC** **Vostochny promuzel 21** **390 047 Ryazan** **Russia**
Product	**PIR boards GTM/GTM,** **brand name: TechnoNICOL**
Manufacturer :	Zavod Logicroof PIR LLC Vostochny promuzel 21 390 047 Ryazan Russia
Elaborated by :	Milan Kovář
Issued on :	18th November 2019

Jiří Heš
Representative of Notified Body No. 1023

Tax & VAT Id No.: CZ47910381 Company Id No.: 47910381 Phone: +420 577 601 238 +420 577 601 623 Fax: +420 577 104 855 +420 577 601 702 e-mail: itc@itczlin.cz www.itczlin.cz

Basic properties, EN 13165, VGTU, Lithuania



VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO
STATYBOS FAKULTETO
STATYBINIŲ MEDŽIAGŲ INSTITUTO
TERMOIZOLIACINIŲ MEDŽIAGŲ IR AKUSTIKOS LABORATORIJA

(VILNIUS GEDIMINAS TECHNICAL UNIVERSITY, FACULTY OF CIVIL ENGINEERING, INSTITUTE OF BUILDING MATERIALS, LABORATORY OF THERMAL INSULATING MATERIALS AND ACOUSTICS)
Notified body number: 1688
Linkmenų 28, 08217 Vilnius
Phone +370 5 2512345, e-mail: tml@vgtu.lt

LIETUVOS NACIONALINIS AKREDITACIJOS BIURAS
BANDYMAI
ISO/IEC 17025 No. LA 01.004

TEST REPORT
No. 1688-CPR-1864
13 November 2018
Valid for the tested testing object

1. CUSTOMER: TechnoNIKOL-Strojitělnyje Sistěmy, odštěpný závod, Sokolovská 100/94 Prague 8, 186 00 Czech Republic. Order dated on 8th of August, 2018.
2. MANUFACTURER: Zavod Logicroof PIR LLC, Vostochny promuzel 21, 390047, Ryazan, Russia.
3. PRODUCT: Polyisocyanuret foam boards **PIR F/F**. Produced according to *EN 13165:2012+A2:2016. Thermal insulation products for buildings – Factory made rigid polyurethane foam (PU) products – Specification.*
   Production dates: 2018-08-10, 2018-08-11, 2018-08-12 for 30 mm thickness, 2018-08-13, 2018-08-14, 2018-08-15 for 50 mm thickness, 2018-08-25, 2018-08-26 for 100 mm thickness and 2018-08-27, 2018-08-28 for 150 mm thickness.
4. RECEIVING DATE: 16th of August, 2018.
5. TESTING DATE: From 16th of August, 2018 to 25th of September, 2018.
6. TEST LOCATION: Laboratory.
7. SAMPLES SELECTED BY: The samples were selected by customer. 10 samples representing 10 production dates were selected and presented to the laboratory. Information about sampling was given in Sampling report/order dated on 8th of August, 2018. Boards were wrapped into polyethylene.
8. BASE OF TESTING: *EN 13165:2012+A2:2016. Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products – Specification.*
9. TESTS WERE CARRIED OUT IN ACCORDANCE WITH:
   EN 1602:2013. Thermal insulating products for building applications – Determination of the apparent density.
   EN 1609:2013. Thermal insulating products for building applications - Determination of short term water absorption by partial immersion.
   EN 826:2013. Thermal insulating products for building applications – Determination of compression behaviour.
   ISO 8301:1991. Thermal insulation – Determination of steady-state thermal resistance and related properties – Heat flow meter apparatus.
   EN 12085:2013. Thermal insulating products for building applications – Determination of linear dimensions of test specimens.
   EN 12667:2001. Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Products of high and medium thermal resistance.
   EN 12939:2000. Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Thick products of high and medium thermal resistance.
10. TEST RESULTS: Tests results are presented in Annexes. Annex A – 1 page, Annex B – 1 page, Annex C – 1 page and Annex D – 1 page.
11. OTHER INFORMATION: After tests, all samples were destroyed.

Head of Laboratory of Thermal Insulating Materials and Acoustics — **Dr. G. Balčiūnas**

Technically responsible for tests, chief researcher of Laboratory of Thermal Insulating Materials and Acoustics — **Dr. S. Vaitkus**

CERTIFICATES AND TEST REPORTS

**BDA testing, EN 13165,
Kiwa, the Netherlands**

0143-L-18/1
25 July 2018

Test report

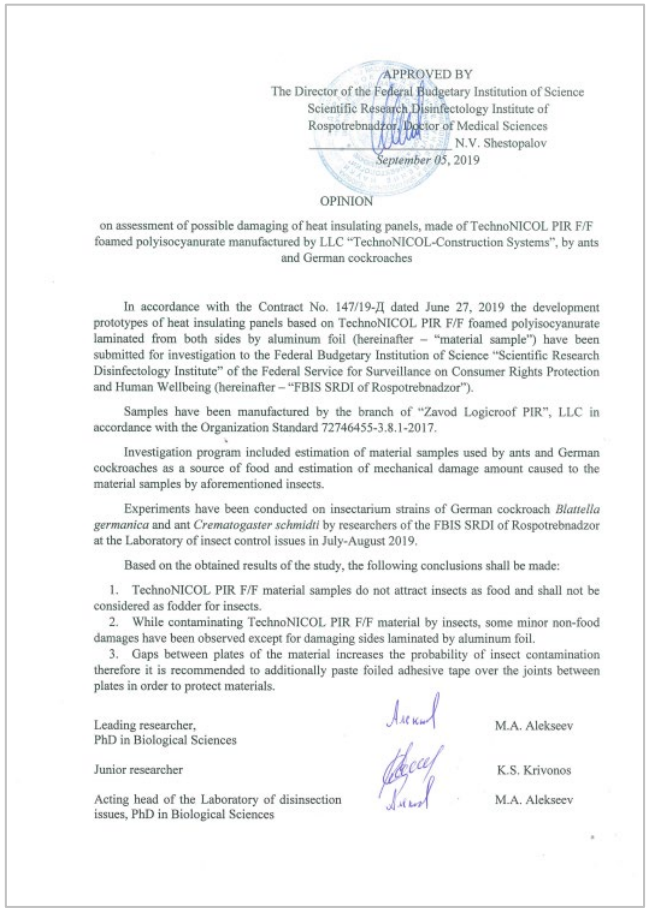
PIR TechnoNICOL – sample 1
PIR TechnoNICOL – sample 2

kiwa

Trust
Quality
Progress

BDA TESTING
Testing institute for the building envelope
expertise in façades and roofs

**Resistance to insects,
FBIS SRDI of Rospotrebnadzor, Russia**



APPROVED BY
The Director of the Federal Budgetary Institution of Science
Scientific Research Disinfectology Institute of
Rospotrebnadzor, Doctor of Medical Sciences
_____ N.V. Shestopalov
September 05, 2019

OPINION

on assessment of possible damaging of heat insulating panels, made of TechnoNICOL PIR F/F foamed polyisocyanurate manufactured by LLC "TechnoNICOL-Construction Systems", by ants and German cockroaches

In accordance with the Contract No. 147/19-Д dated June 27, 2019 the development prototypes of heat insulating panels based on TechnoNICOL PIR F/F foamed polyisocyanurate laminated from both sides by aluminum foil (hereinafter – "material sample") have been submitted for investigation to the Federal Budgetary Institution of Science "Scientific Research Disinfectology Institute" of the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (hereinafter – "FBIS SRDI of Rospotrebnadzor").

Samples have been manufactured by the branch of "Zavod Logicroof PIR", LLC in accordance with the Organization Standard 72746455-3.8.1-2017.

Investigation program included estimation of material samples used by ants and German cockroaches as a source of food and estimation of mechanical damage amount caused to the material samples by aforementioned insects.

Experiments have been conducted on insectarium strains of German cockroach *Blattella germanica* and ant *Crematogaster schmidti* by researchers of the FBIS SRDI of Rospotrebnadzor at the Laboratory of insect control issues in July-August 2019.

Based on the obtained results of the study, the following conclusions shall be made:

1. TechnoNICOL PIR F/F material samples do not attract insects as food and shall not be considered as fodder for insects.
2. While contaminating TechnoNICOL PIR F/F material by insects, some minor non-food damages have been observed except for damaging sides laminated by aluminum foil.
3. Gaps between plates of the material increases the probability of insect contamination therefore it is recommended to additionally paste foiled adhesive tape over the joints between plates in order to protect materials.

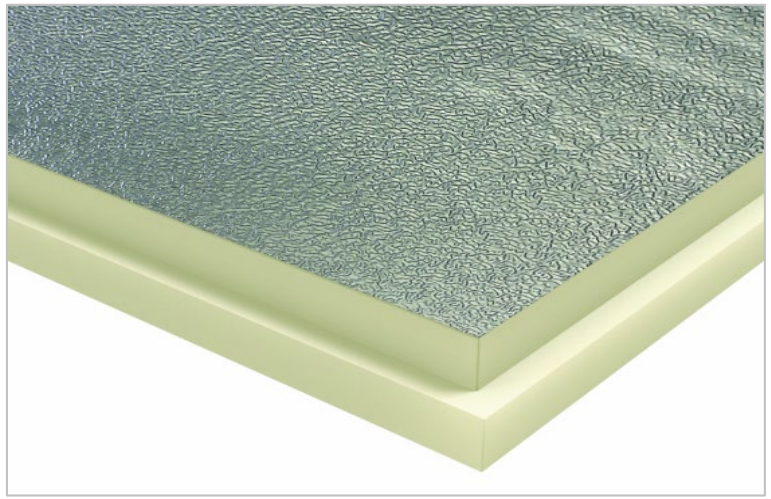
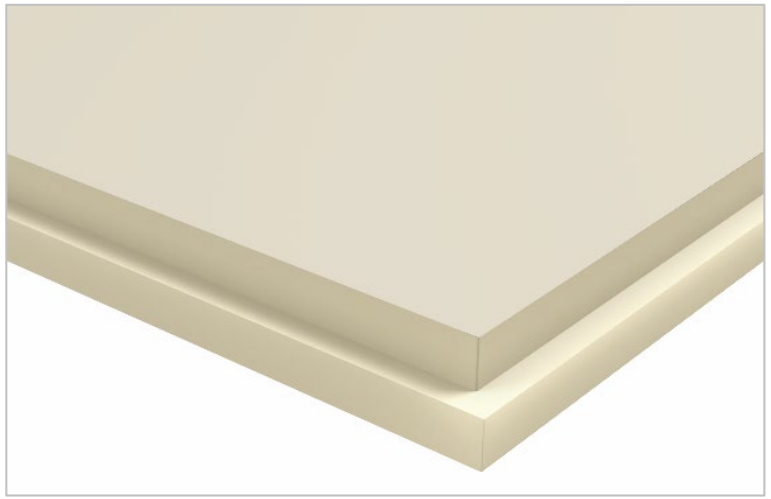
Leading researcher, PhD in Biological Sciences — M.A. Alekseev
Junior researcher — K.S. Krivonos
Acting head of the Laboratory of disinsection issues, PhD in Biological Sciences — M.A. Alekseev

TECHNONICOL

PRODUCT RANGE

KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.

LOGICPIR is available with 2 types of the surface: aluminium foil or glass fiber mat. Can be supplied with flat or L-shaped edges. A variation with the slope shape is available for the creation of the slope of 1.7 or 3.4% in order to drain water on the roof to funnels.

Aluminium foil (F)	Glass tissue with mineral coating (GTM)	Slope-shaped elements (1.7 or 3.4%)
		
Mechanically fixed and ballasted roofing systems	**Adhered roofing systems (including self-adhesive single-ply waterproofing layer)**	**Slope arrangement in any roofing systems**

PRODUCT RANGE

PROPERTIES	LOGICPIR
Thermal conductivity, λ_D, W/m*K	0.022 (aluminium foil covering), 0.026 (glass fiber covering)
Compressive stress at 10 % deformation, kPa	≥150
Long term water absorption by immersion, %	≤1
Reaction to fire – ignitability, Euroclass	E
Board sizes, mm	1200x600, 2400x1200
Thickness (increments 10 mm), mm	30-150
Surface type	aluminium foil or glass fiber mat

TECHNONICOL

AREAS OF APPLICATION

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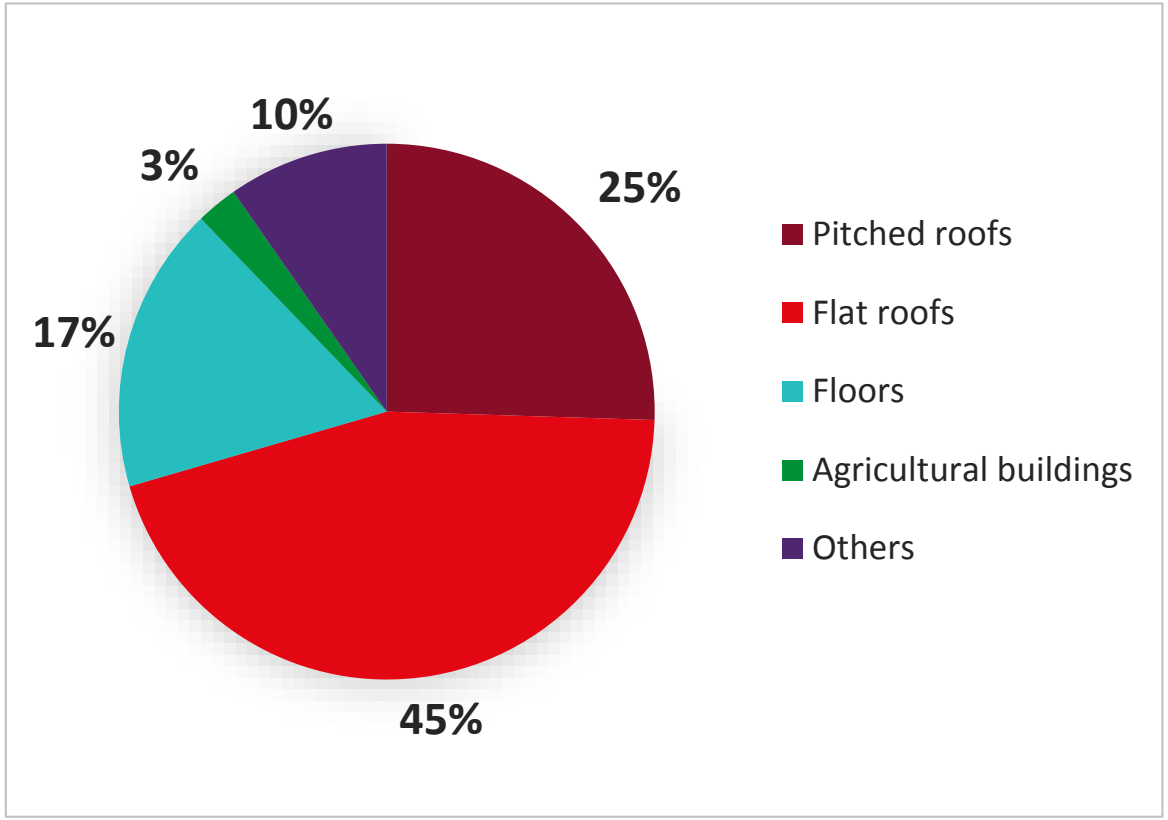
MAIN AREAS OF APPLICATION IN EUROPE

In Europe, the biggest part of the PIR market is occupied by flat roofs (45%). This number includes insulation on concrete flat roofs (residential and non-residential buildings) as well as on large scale steel deck roofs (commercial, infrastructure and production facilities). Pitched roofs come second and account to 25% of sales – the material is used for the new construction and reconstructions (improving the insulation of existing roofs from the outside by installing PIR thermal insulation boards on rafters). Then other areas of application follow: floor insulation, agricultural buildings and others (including wall insulation).



MAIN AREAS OF APPLICATION IN EUROPE

TECHNONICOL

ROOFING SYSTEMS WITH LOGICPIR

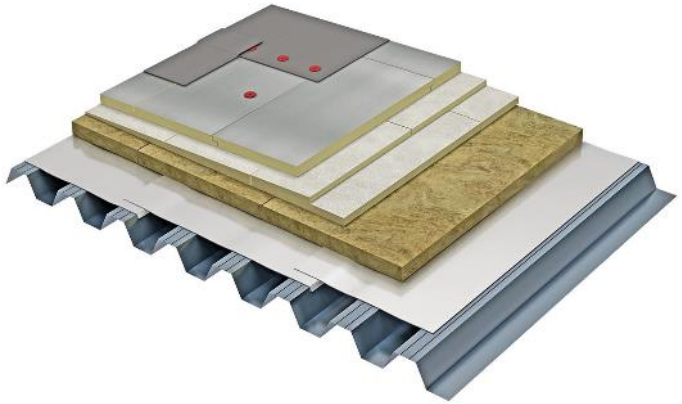
KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.

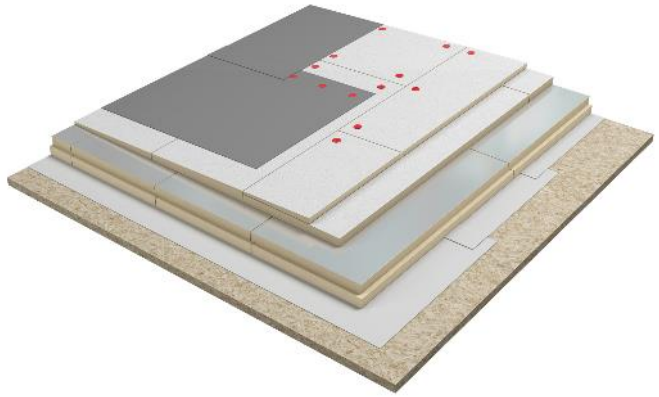
ROOFING SYSTEMS WITH LOGICPIR

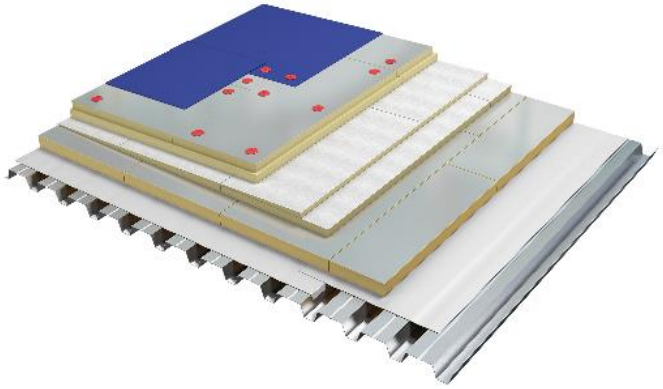
LOGICPIR thermal insulation boards are the great solution for use in different constructions of roofs: pitched and flat, exposed and ballasted (including green roof), operated and non-operated. They are also recommended for use on roofs intended for frequent attendance of personnel, for example, for adjustment of the equipment installed on the roof.

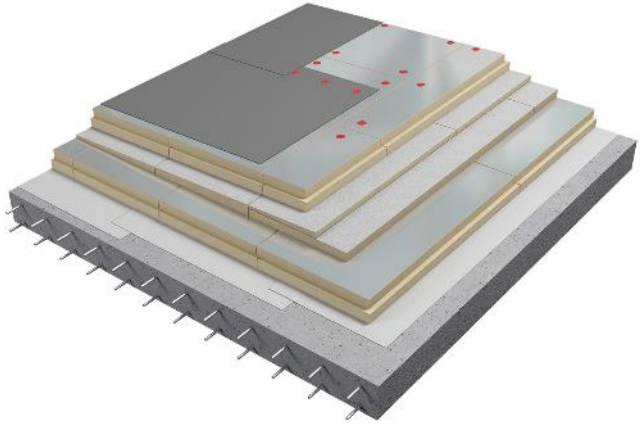
The material can be used with various types of the substrate, e.g. profiled metal deck, reinforced concrete, wood, OSB-3 boards, old roof covering, etc. The application of prefabricated slope shaped boards allows creating the slope for water draining fast and convenient.

MECHANICALLY FIXED ROOFING SYSTEMS

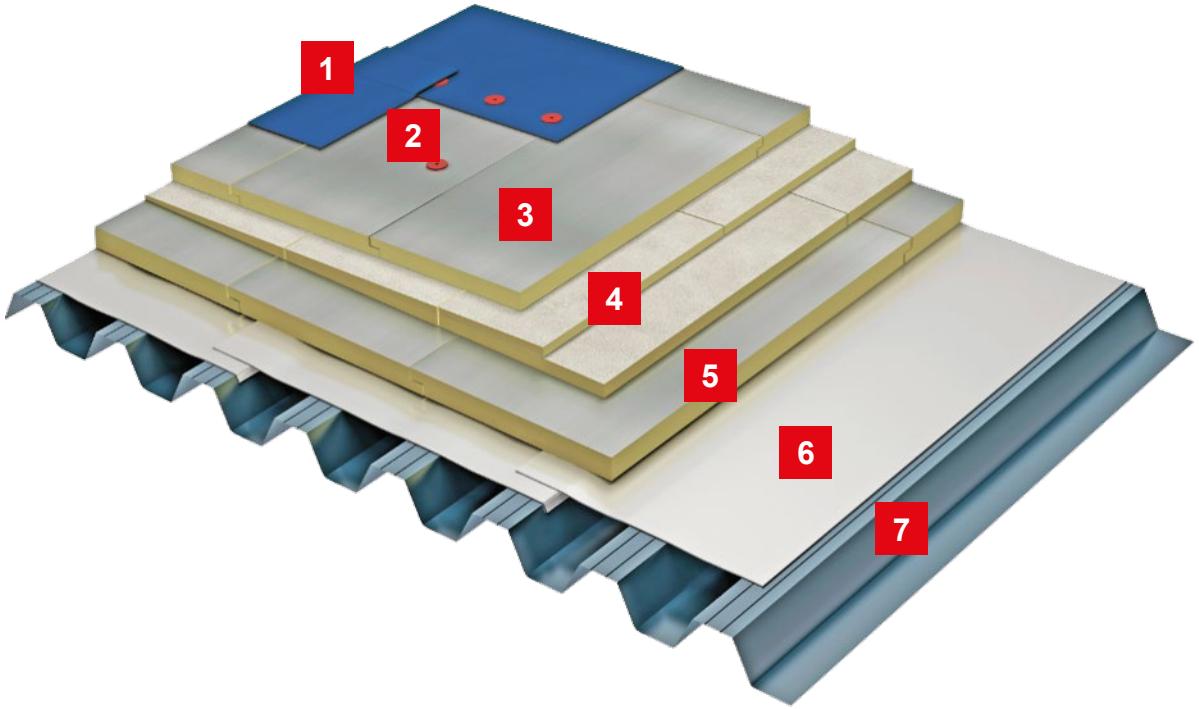






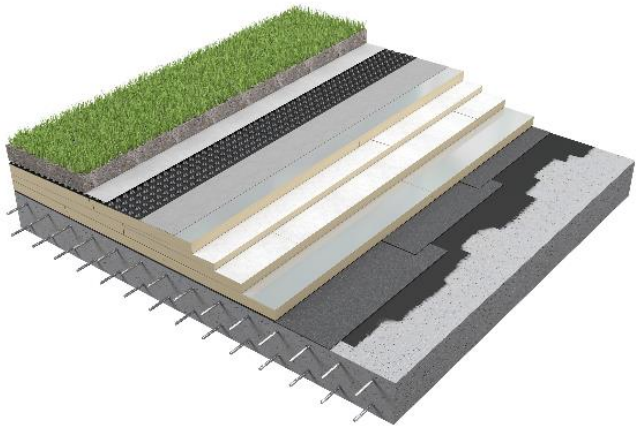


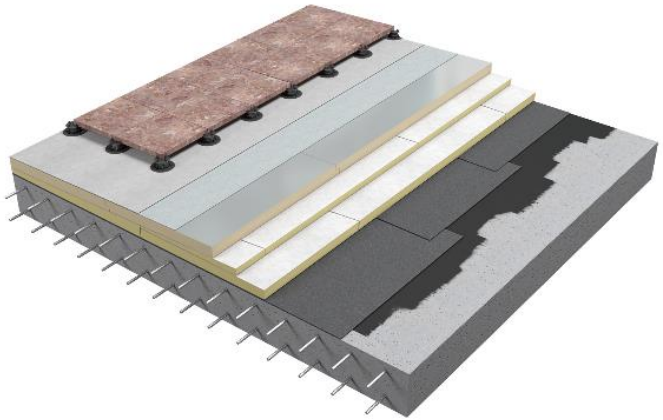
Mechanically fixed roofing system:

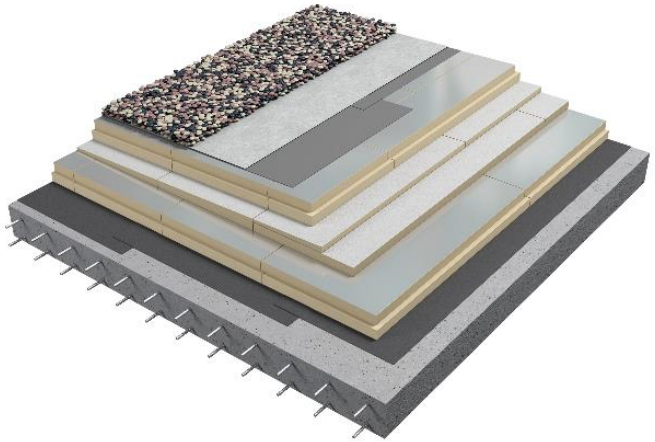


1. PVC membrane LOGICROOF V-RP
2. Telescopic fastener (anchor)
3. Thermal insulation board LOGICPIR
4. Thermal insulation board LOGICPIR Slope
5. Thermal insulation board LOGICPIR
6. Vapor barrier VAPORSTOP CA 500
7. Corrugated steel sheet

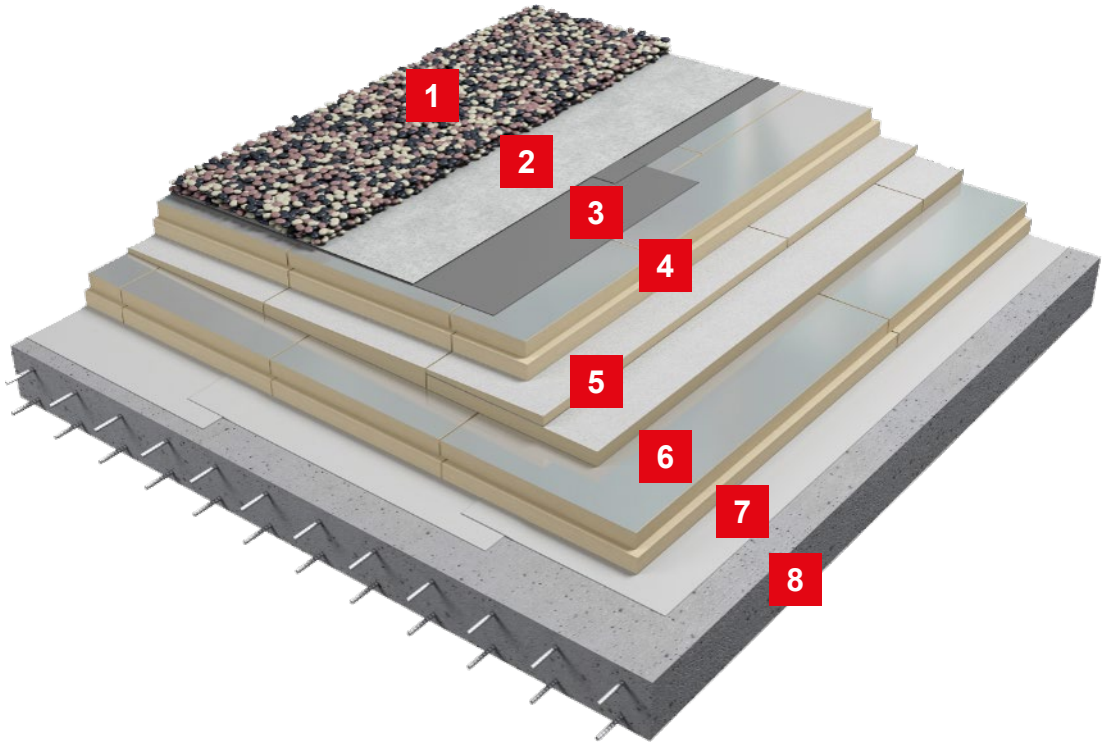
BALLASTED ROOFING SYSTEMS





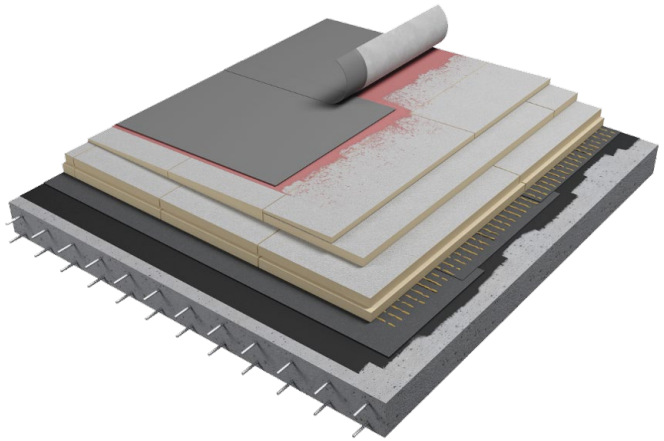


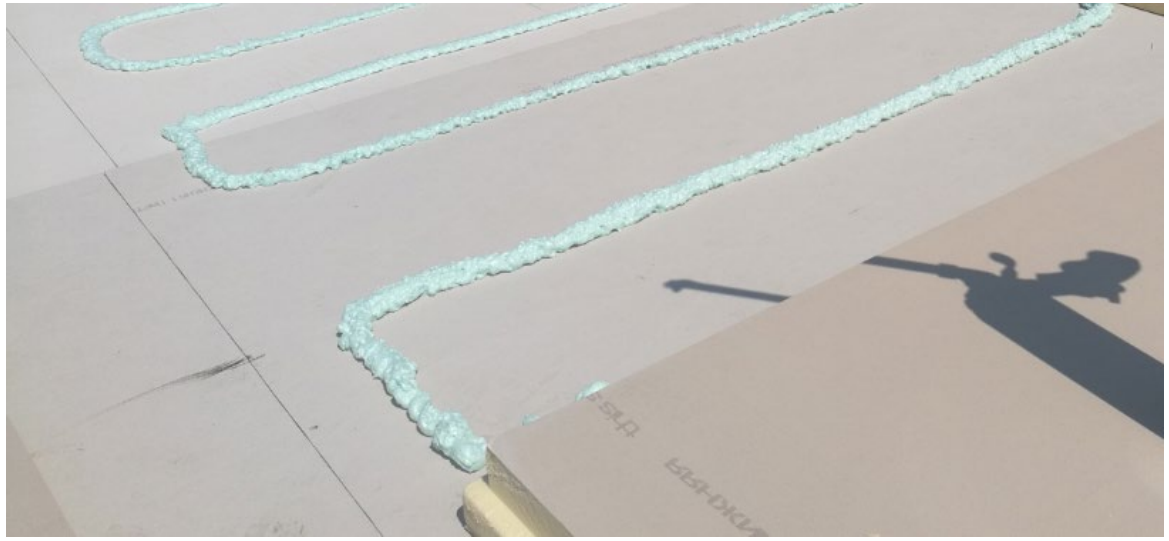
Ballasted roofing system:



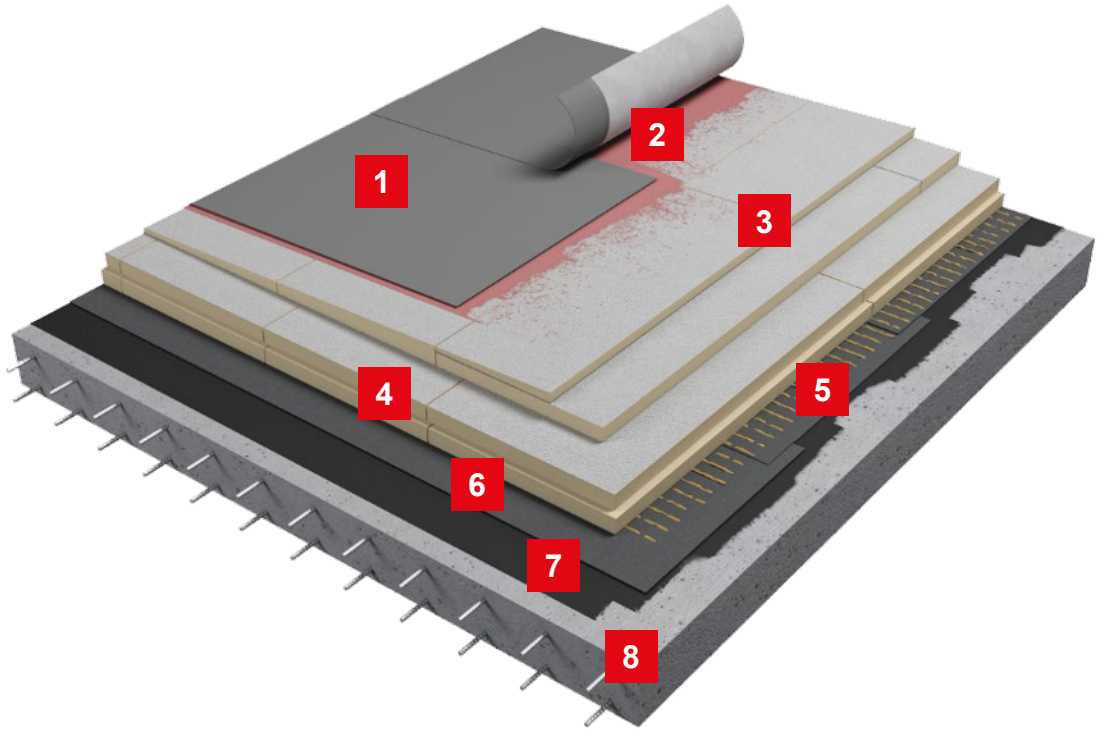
1. Ballast
2. Geotextile 300 g/m^2
3. PVC membrane LOGICROOF V-GR
4. Thermal insulation board LOGICPIR
5. Thermal insulation board LOGICPIR Slope
6. Thermal insulation board LOGICPIR
7. Vapor barrier VAPORSTOP CA 500
8. Reinforced concrete base

ADHERED ROOFING SYSTEM



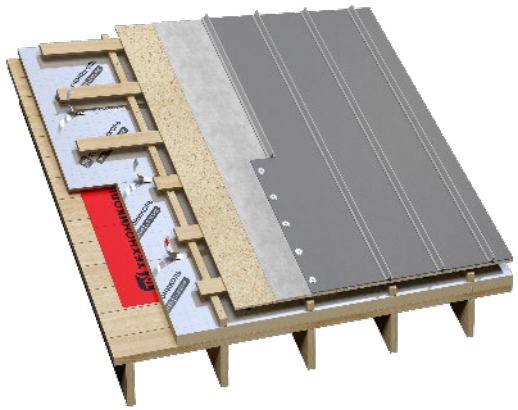


Adhered roofing system:

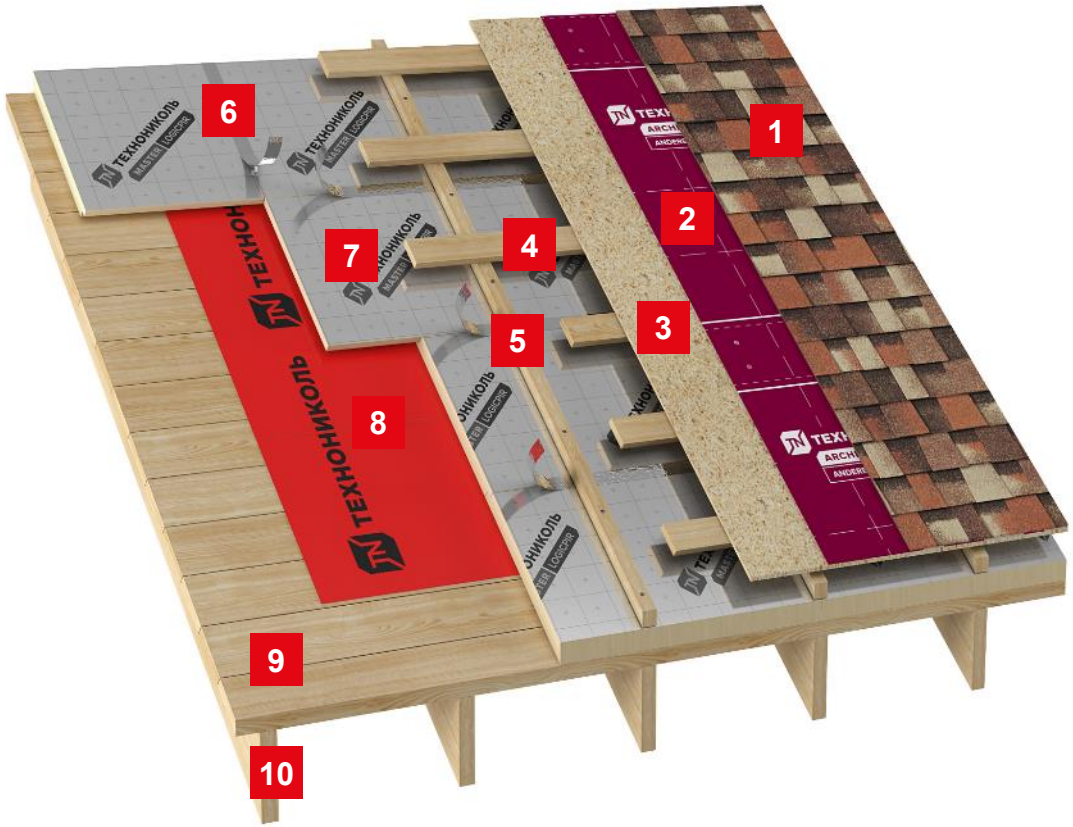


1. PVC membrane LOGICROOF V-GR FB
2. LOGICROOF adhesive compound
3. Thermal insulation board LOGICPIR Slope with glass fiber mat surface
4. Thermal insulation board LOGICPIR with glass fiber mat surface
5. Adhesive foam TECHNONICOL 500 PROFESSIONAL
6. Bitumen vapor barrier VAPORSTOP CA 500 / ULTRAFLEX SA
7. Bitumen prime coating
8. Reinforced concrete base

PITCHED ROOFING SYSTEMS



Pitched roofing system:



1. Roofing shingles by TECHNONICOL
2. Underlay bitumen membrane
3. Wood decking (OSB-3, plywood, tongue or groove planks)
4. Counter battens
5. Ventilation space battens
6. NICOBAND self-adhesive sealant tape
7. LOGICPIR thermal insulation boards
8. TECHNONICOL vapor barrier film
9. Wooden boarding
10. Rafter system

TECHNONICOL

REFERENCES

KNOWLEDGE. EXPERIENCE. CRAFTSMANSHIP.

IKEA, NAVI MUMBAI, INDIA

IKEA, RUSSIA – MORE THAN 1,000,000 M² OF LOGICPIR SUPPLIED!

PLANT NEXEN TIRE, ŽATEC, THE CZECH REPUBLIC

SKI-CENTER, KOLOMNA, RUSSIA

THANK YOU FOR ATTENTION!

TECHNONICOL India Private Limited
+91 22 2872 8691
+91 11 4372 1455
info@technonicol.in