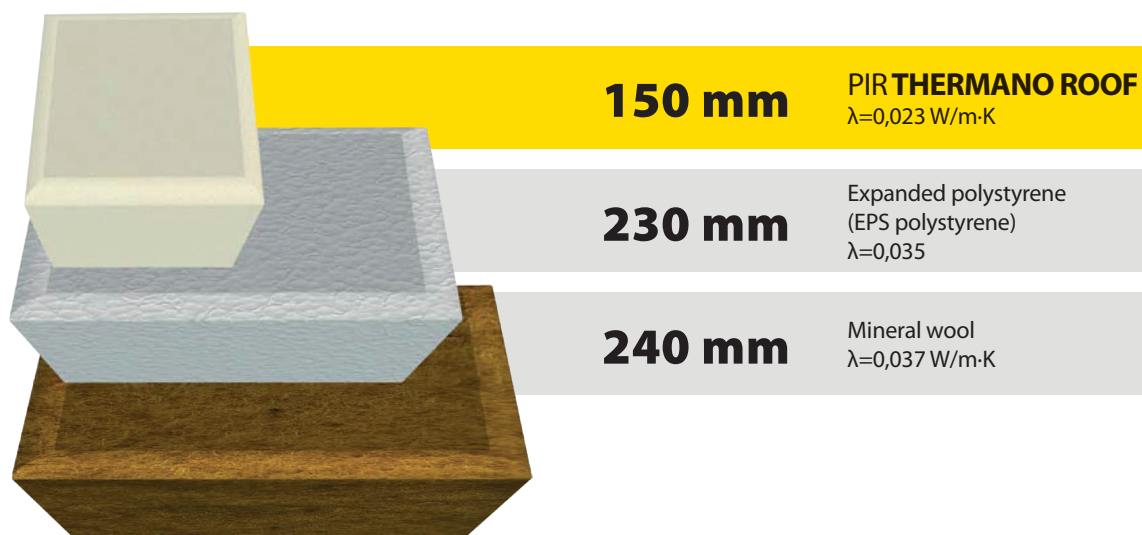


THERMANO
FLAT ROOF
INSTALLATION
MANUAL

ADVANTAGES OF **THERMANO ROOF** IN FLAT ROOF INSULATION

Unrivalled energy efficiency

Energy-saving roof: thickness 150 mm



Roof barrier insulation index $U=0,15 \text{ W/m}^2\cdot\text{K}$ according to the requirements of Ministry of Infrastructure and Development, as of 1 January 2021.

THERMANO ROOF boards have exceptionally high energy efficiency, which brings the following effects:

- It is possible to reduce insulation layer thickness: this is very important for insulating existing roofs that are limited by attics, gutters, etc
- Reduction in insulation thickness and low weight of the boards (low material density: 30 kg/m^3) – lower weight of the whole cladding means lower cost of bearing steel structure by up to 20%!

Compare thermal insulators

Technical requirements for flat roofs

Technical requirements for flat roofs in buildings with interior temperatures > 16°C		PIR THERMANO ROOF ($\lambda=0,023$ W/m·K; density = 30kg/m ³)				Mineral wool ($\lambda=0,037$ W/m·K; density = 130kg/m ³)			
For general purpose buildings, production, warehouse and storage buildings	Required U _{max}	Grubość [mm]	U [W/m ² ·K]	R [m ² K/W]	Weight kg/m ²	Thickness [mm]	U [W/m ² ·K]	R [m ² K/W]	Weight kg/m ²
as of 1 January 2017*	0,18	125	0,18	5,43	3,75	210	0,18	5,68	27,30
as of 1 January 2021*	0,15	150	0,15	6,52	4,50	250	0,15	6,76	32,50

* Required insulation indices for the years 2017, 2021 according to the Ordinance of the Ministry of Infrastructure and Development of 5.07.2013

Technical loads



Taking into account the required heat transfer parameters for flat roofs, the load of thermal insulation in the case of mineral wool is eight times higher than the one of PIR **THERMANO ROOF** meeting the same thermal insulation requirements!

This is because PIR **THERMANO ROOF** not only has much better insulation properties, which influences the quantity of material needed for insulation (thicker PIR material has the same insulation properties as wool), but also differs with regard to material density (30 kg/m³ for PIR **THERMANO ROOF** in comparison to 130 kg/m³ for mineral wool).

Thanks to much lower weight of PIR **THERMANO ROOF** in comparison with competitive mineral wool products, the construction of the whole building requires less in terms of load bearing capacity and hence it is possible to considerably reduce the construction costs – even up to 20%!

Example

For a building with a flat roof (up to 3,5% inclination) located in snow load zone 3 (1,44 kN/m²), the roof structure consisting of:

- TR50.260.1038 structural trapezoidal sheet, 0,75 mm thickness – the computational load is 0,077 kN/m²
- Vapour insulation and roof cladding layers - 0,022 kN/m²
- Thermal insulation with a thickness meeting the applicable heat transfer coefficient for this type of roof (for PIR **THERMANO ROOF** 150 mm = 0,045 kN/m², for mineral wool 240 mm thickness = 0,36 kN/m²); load differences may be up to **85%** in favour of **THERMANO ROOF**.

ECOLOGY

THERMANO PIR is a modern, eco-friendly and safe material with exceptional thermal insulation properties.

Multifactorial, standardised LCA (Life Cycle Assessment) analyses have shown, that PIR foams are a material with the lowest environmental costs counted from production stage through routine use to final liquidation, among building thermal insulators. They have the lowest ADP – Abiotic

They have the lowest ADP – Abiotic Depletion. Potential and the highest modification possibilities by using ecological renewable materials (plants).

They are completely free from ODP (Ozone Depletion Potential) compounds.

They are recyclable and mostly reusable. The material does not contain any elements, additives or fibres that might cause throat, eye or skin irritation.



High stress resistance - 200 kPa (20 tons/m²)

The fact that stress resistance is almost **twice higher** than the one of insulation fibre materials means:

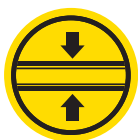
No risk of surface mechanical damage: it is possible to walk on the roof without the risk of damaging it, e.g. to do maintenance works or remove snow.



Low absorbability

- 2% or lower

- resistance to fungi, mould, germs, rodents



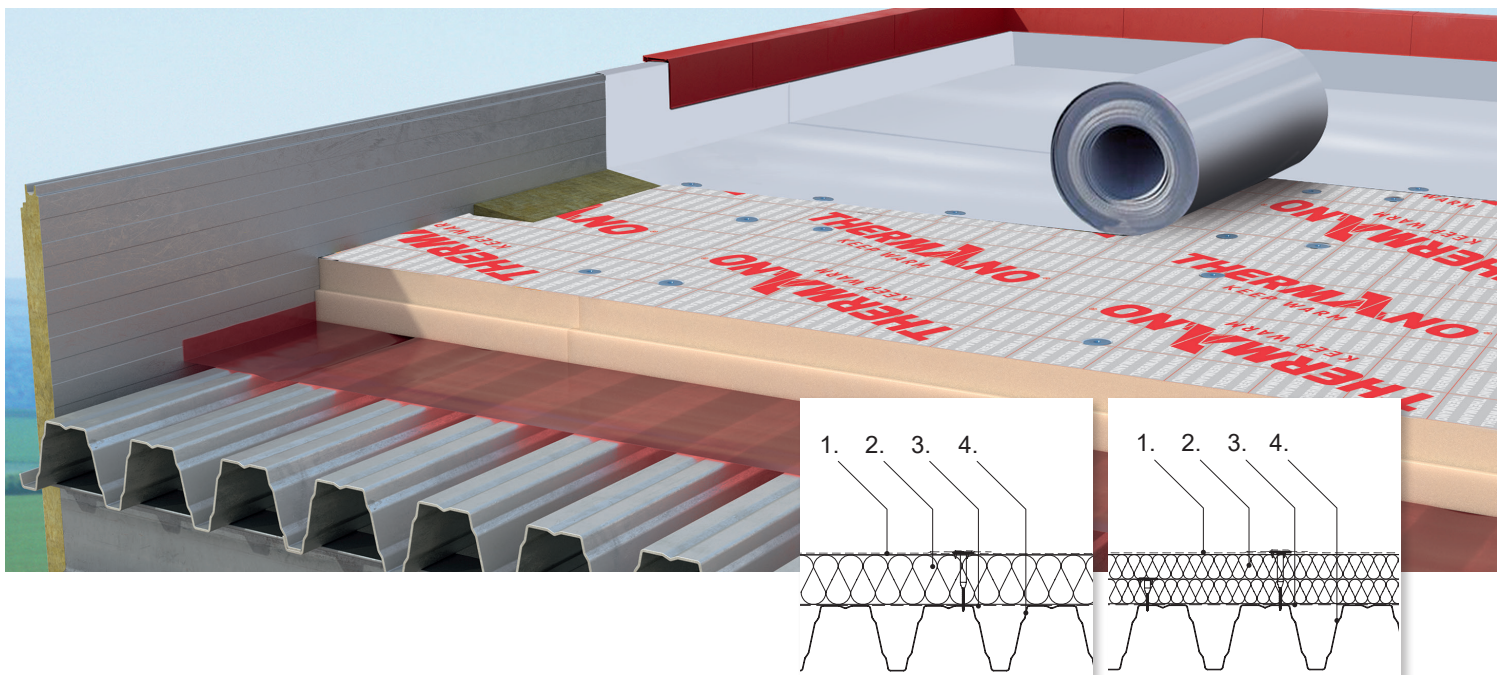
Easy assembly

- easy treatment
- excellent cooperation with various vapour and hydro membranes and other finishing materials

- low risk of the so-called assembly flaws

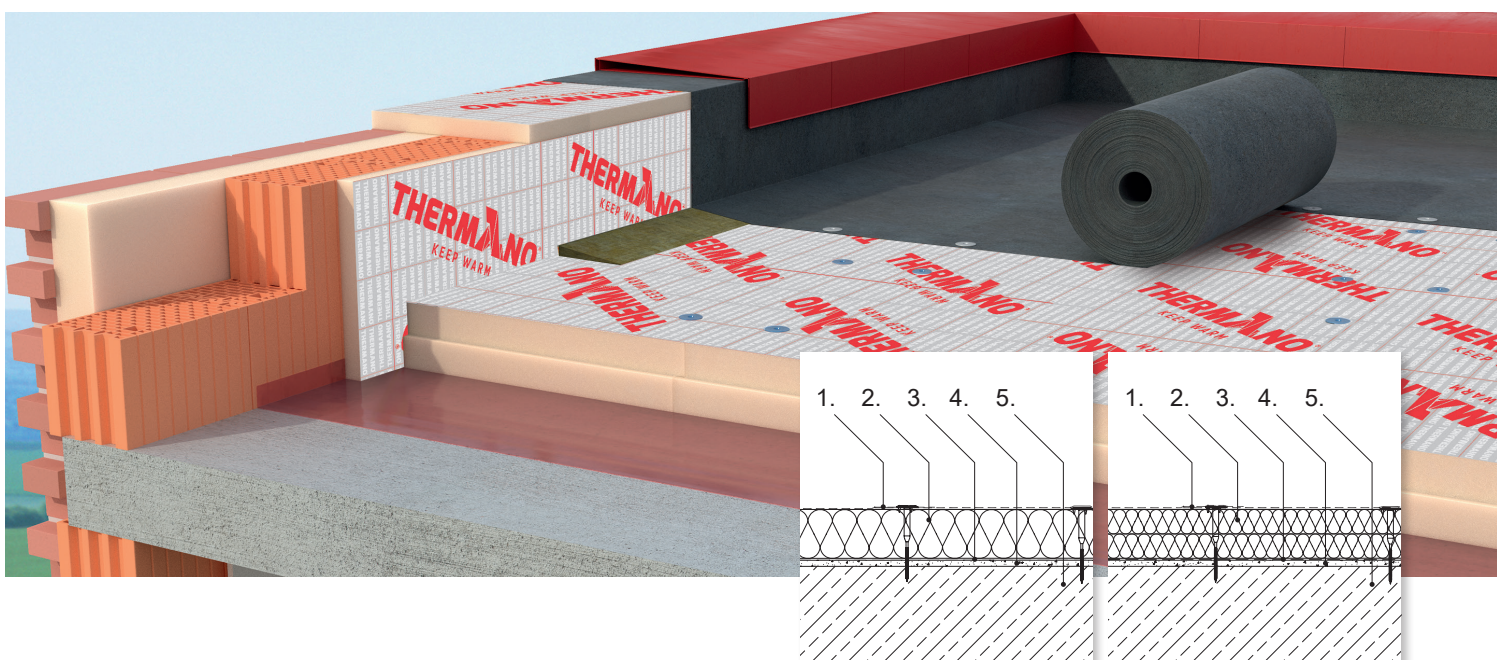
APPLICATION

Modern flat roof thermal insulation on trapezoidal sheet



1. Waterproofing 2. **THERMANO ROOF** insulation board, 3. Vapour insulation, 4. Trapezoidal sheet – supporting substrate

Modern thermal insulation of a flat roof on concrete structural ceiling



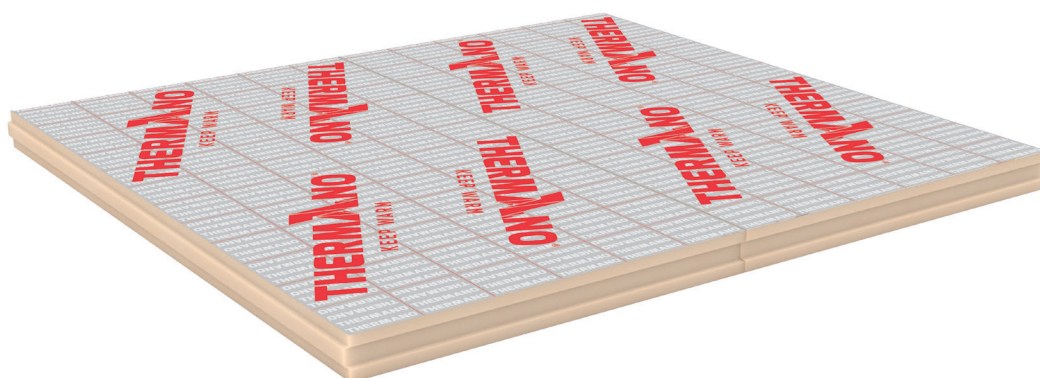
1. Waterproofing, 2. **THERMANO** thermal insulation board, 3. Vapour insulation, 4. Sloping layer, 5. Reinforced concrete supporting substrate

THERMANO ROOF

TECHNICAL INFORMATION

Material

THERMANO ROOF is a hard, polyisocyanurate (PIR) thermal insulation board, 100% freon free (does not contain CFC and HCFC).



PIR is manufactured as a result of liquid ingredient foaming reaction (mainly organic ingredients from polyol and isocyanate groups) with an addition of an active foaming agent. This compound is continuously fed between two linings that limit the foamed volume.

Thermal insulation properties are optimised by the right selection of organic ingredients, indispensable chemical additives and fully ecological foamer.

These processes lead to creation of small cell structure with over 90 % of closed cells filled with gas of very low heat conductivity. Such structure gives very good resistance parameters and exceptional thermal insulation properties of the material – a much better one in comparison with mineral wool and Styrofoam.

Technical parameters

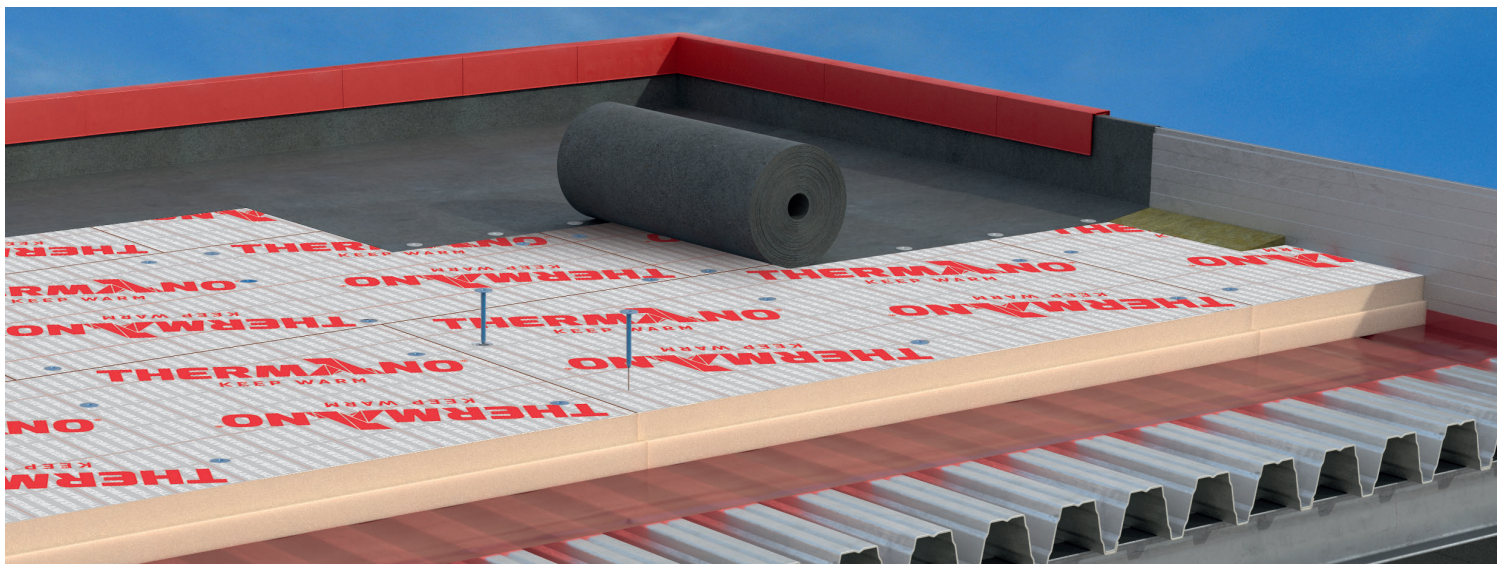
- according to PN-EN 13165 standard*
- Thermal conductivity coefficient $\lambda_p = 0,023$ [W/m·K], taking ageing into account
 - Bulk density: **30 kg/m³**
 - Compressive stress **200 kPa** (at 10% deformation)
 - Absorbability **<= 2%**
 - Tensile strength **TR100**
 - Water vapour resistance: **$\mu = 50-100$**
 - **Euro fire class E**
 - Multilayer, gas-tight cladding with an addition of aluminium

Dimensions

- Total width: **1200 mm**
- Modular (covering) width: **1185 mm** (for TOP lock - overlapping), **1200 mm** (for BASIC lock – straight edge)
- Total length: **2400 mm**
- Modular (covering) length: **2385 mm** (for TOP lock - overlapping), **2400 mm** (for BASIC lock – straight edge)
- Other dimensions:
 - 600 x 1200 mm, 1200 x 1200 mm
 - boards of length up to 5000 mm may be produced at a special request
- Available board thicknesses: **40, 50, 60, 80, 100, 120, 125, 140, 150, 160 mm**

Fire resistance

In the foam polyurethane group, hard polyisocyanurate (PIR) boards in aluminium foil cladding are relatively the most resistant to fire. The special composition of the material significantly increases ignition temperature and usual application temperature range, making these boards more resistant to fire than certain popular thermal insulation materials used in the building industry.



Flat roof thermal insulation on trapezoidal construction sheet

THERMANO ROOF in roof systems covered with PVC membrane or heat-weldable roofing has been tested for fire resistance by FIRES Testing Laboratory and obtained REI30 class, irrespective of whether the supporting layer is trapezoid sheet or reinforced concrete elements.

This test result meets the requirements of "Technical conditions for buildings and their location" for the roof of buildings with even the highest "A" fire resistance class.

In the tested systems, only **THERMANO ROOF** was used as thermal insulation, without additional fire protection layers, e.g. from mineral wool.

THERMANO ROOF has the European fire reaction class - Euroclass E.



A charred layer on PIR isolates and separates the rest of the material from further fire penetration

In direct contact with fire, a charred layer develops on top of the board, preventing further fire access and increasing the system's fire resistance (a barrier against further fire penetration of the material).

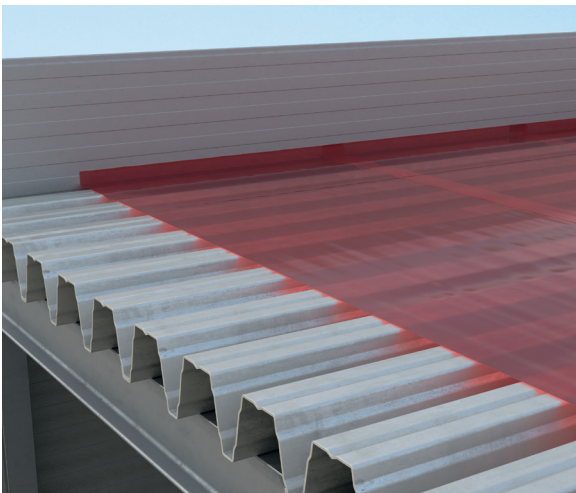
FLAT ROOF THERMAL INSULATION

Thanks to their exceptional energy efficiency, low weight and easiness of application, **THERMANO ROOF** boards are perfect for thermal insulation of flat roofs made of trapezoidal sheet or concrete. They conform to roof thermal insulation requirements at a relatively lower thickness in comparison to other materials.

	d [mm] board thickness	U [W/m ² ·K] insulation coefficient	R [m ² ·K/W] heat resistance
λ = 0,023 W/m·K	40	0,57	1,75
	50	0,45	2,20
	60	0,38	2,60
	80	0,29	3,50
	100	0,23	4,35
	120	0,19	5,25
	125	0,18	5,45
	140	0,16	6,15
	150	0,15	6,55
	160	0,14	7,00

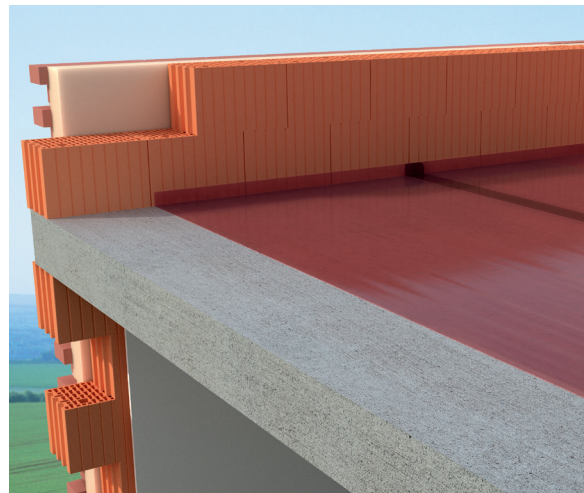
Guidelines for application

1. Preparation of the substrate



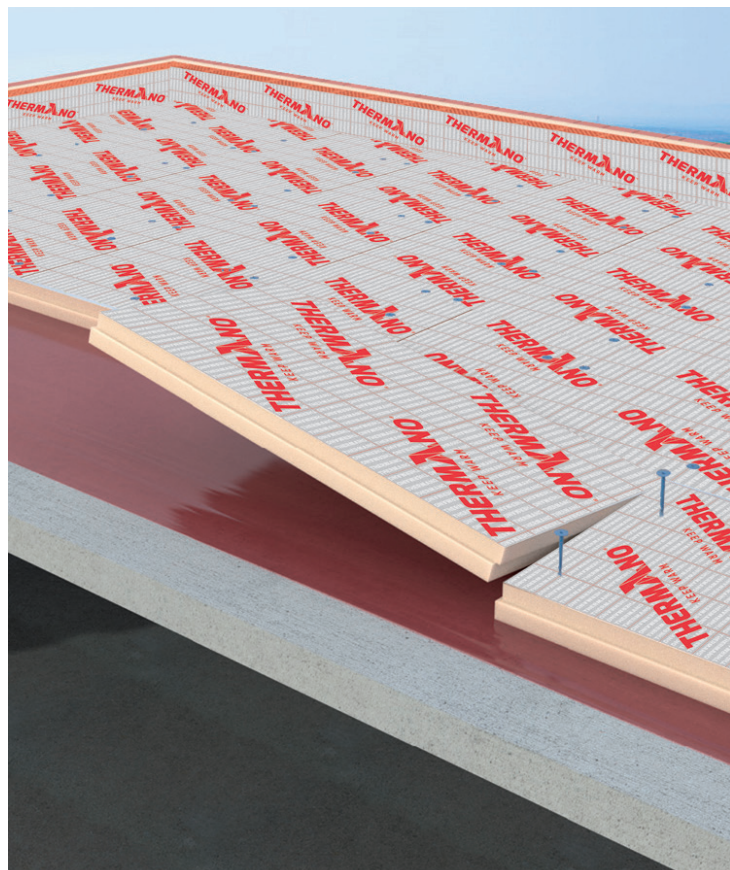
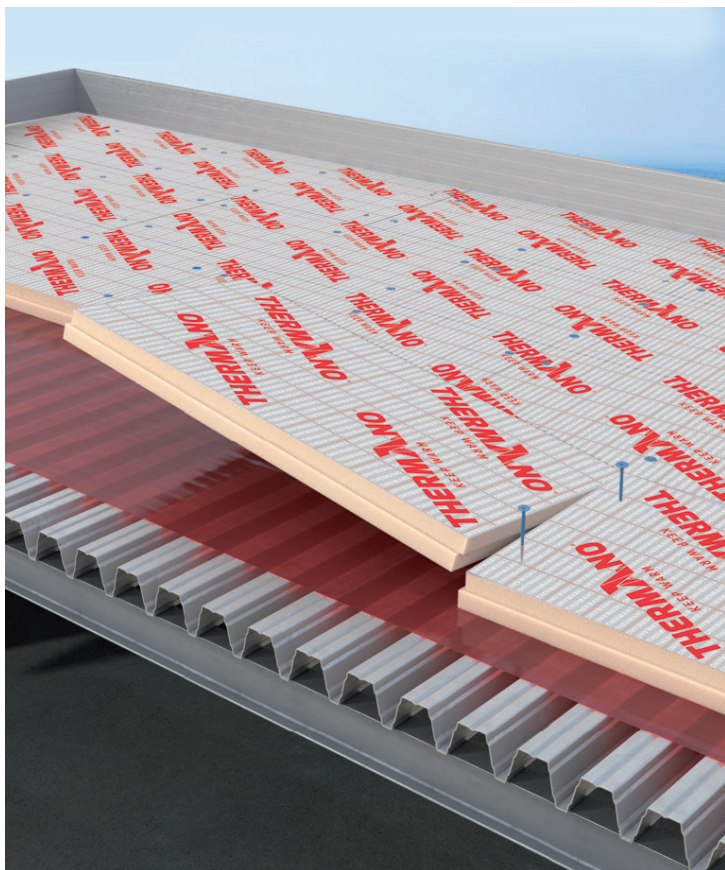
The boards are put on a supporting substrate covered with vapour insulation layers. The substrate should be even and dry, and all debris from building works (e.g. screws, nails, metal chips and fillings) should be removed prior to mounting.

2. Cutting the boards



Depending on the roof shape and how complicated it is, **THERMANO ROOF** boards may be cut by commonly available tools, such as jigsaws, wood and metal saws, sharp knives, etc.

3. Board laying



THERMANO ROOF boards are put on the vapour insulation layer, e.g. PE foil or heat-weldable roofing. For trapezoid sheet substrate, lay them with the longer side perpendicular to the sheet ridges: this will facilitate mounting pins to trapezoid ridges.

Lay the boards very carefully avoiding gaps in the thermal insulation layer. Any possible glitches may be filled with low pressure polyurethane foam.

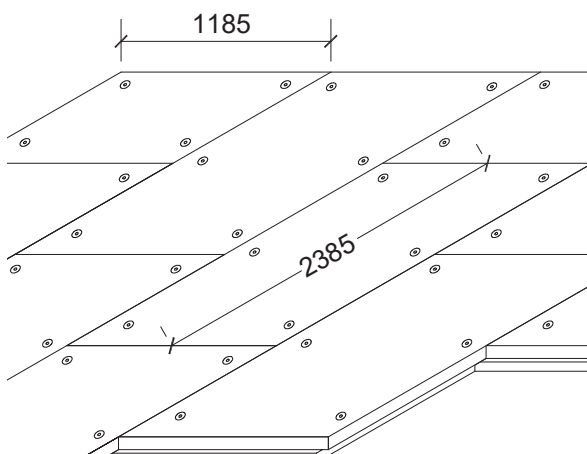


Diagram of staggering of boards for one layer of **THERMANO ROOF** insulation boards, with the location of joints.

THERMANO ROOF boards may be placed in single or double layers. In both cases, stick to the staggering system, to avoid having the edges of boards in the same places in both layers. The boards should be placed as shown in the above diagram and picture.



4. Mounting the boards

The tool kit for mounting the boards consists of: a telescopic joint (sleeve) + an appropriate screw. The minimum number of screws to mount thermal insulation boards to the substrate are 2 pieces per 1 m² (6 pieces per 1200x2400 mm board). The joints are mounted according to the pattern. It is forbidden to mount more than one board with one joint.

THERMANO joints depending on insulation thickness

On a trapezoidal sheet BTR

THERMANO thickness [mm]	Sleeve R45 + self drilling screw x4,8 [mm]
80	60+60
100	80+60
120	100+60
140	120+60
150	120+80
160	120+90

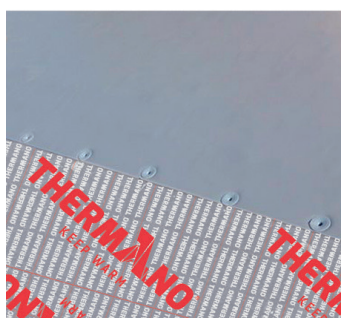
On a reinforced concrete roof

THERMANO thickness [mm]	Sleeve R45 + concrete screw x6,1 [mm]
80	60+80
100	80+80
120	100+80
140	120+80
150	120+90
160	120+100



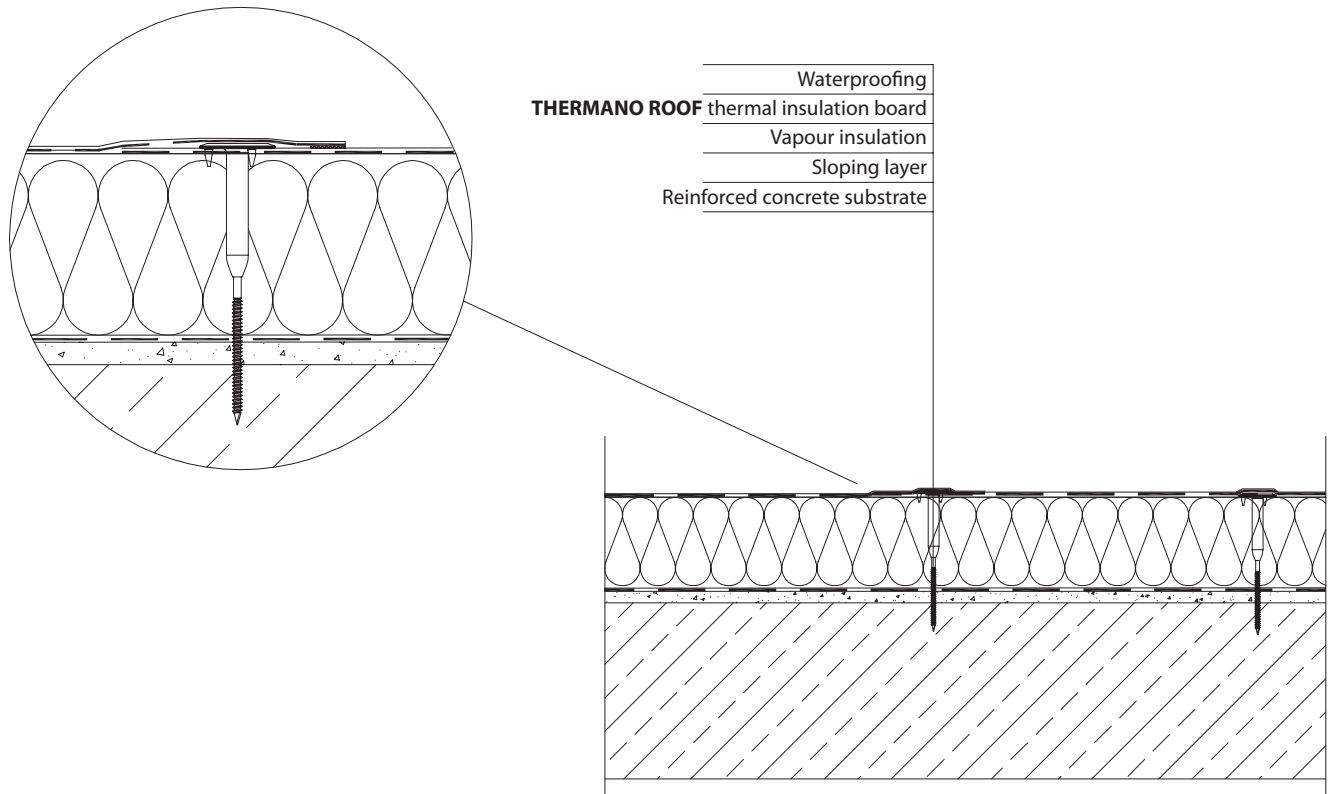
5. Hydro-insulation

Once mounted, THERMANO ROOF thermal insulation is covered with a waterproofing layer. Mount the roof waterproofing, in the form of PVC TPO/FPO, EPDM membranes or bitumic roofing by mechanical joints, according to the manufacturer's instructions.

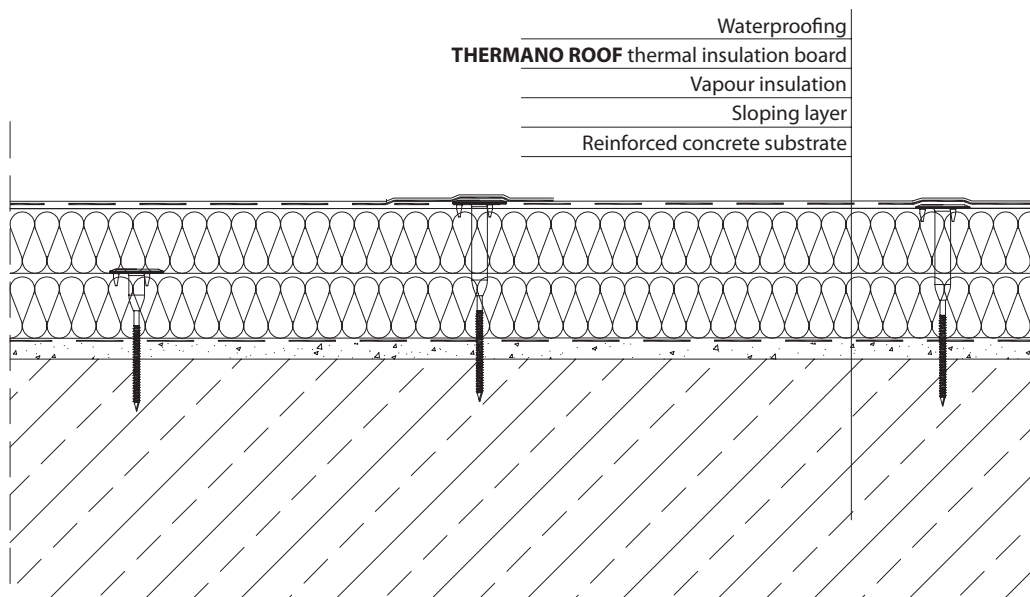


ASSEMBLY DETAILS OF **TERMANO ROOF** THERMAL INSULATION ON FLAT ROOFS

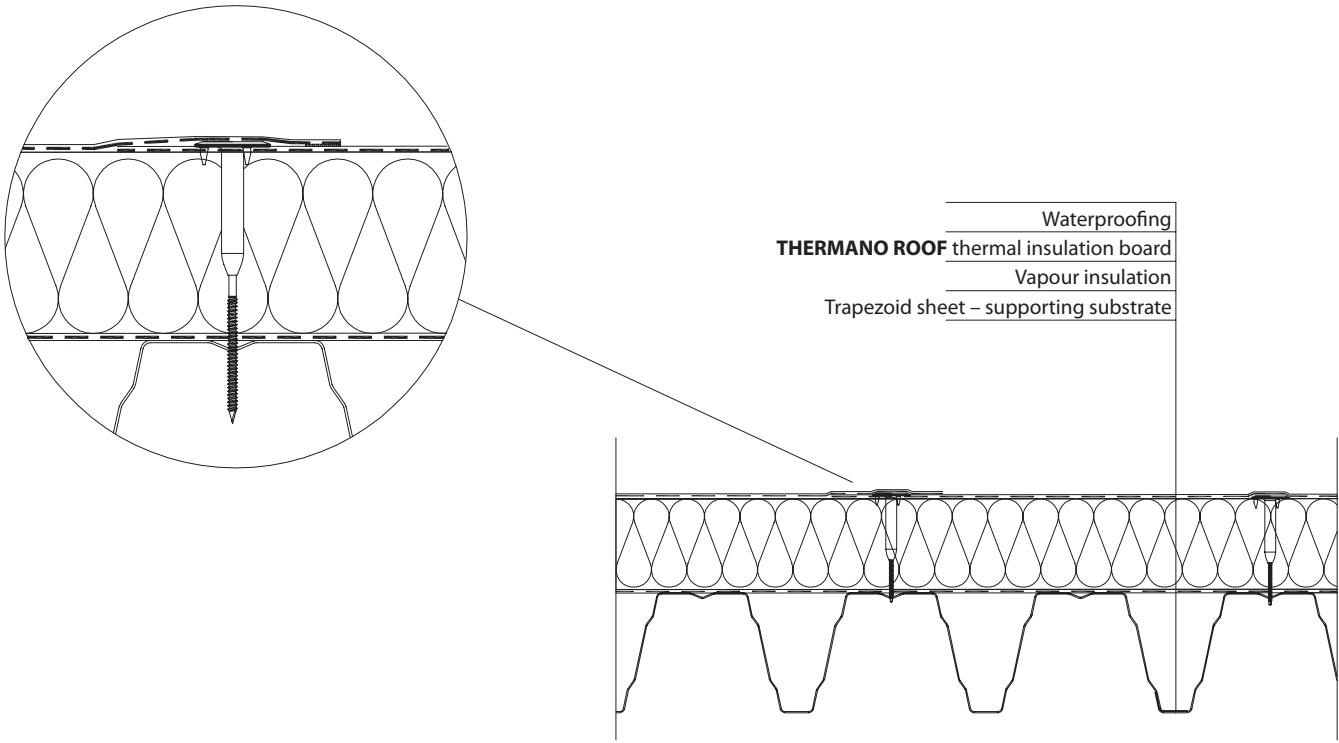
TERMANO ROOF boards on a flat roof, concrete substrate – single layer system



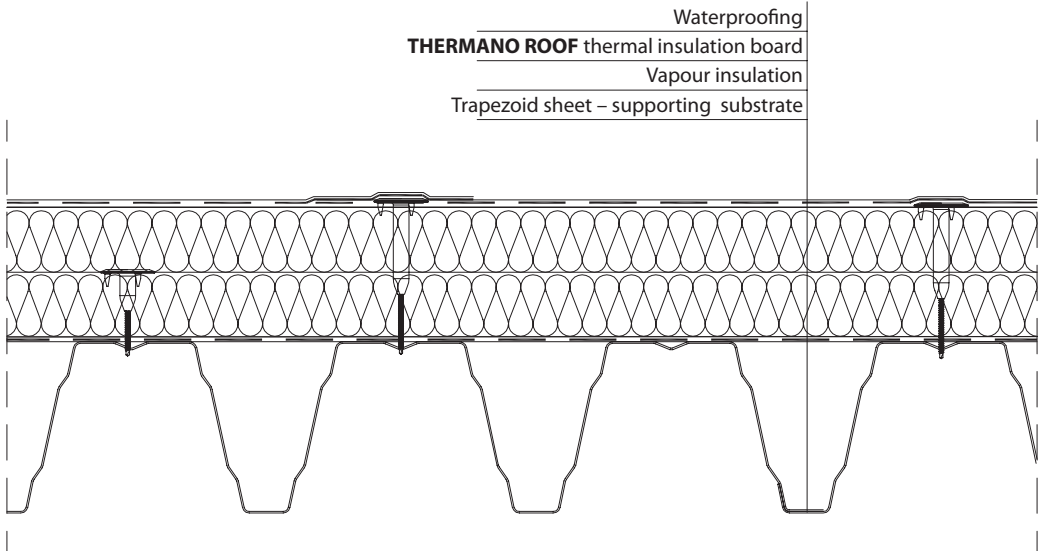
TERMANO ROOF boards on a flat roof, concrete substrate – double layer system



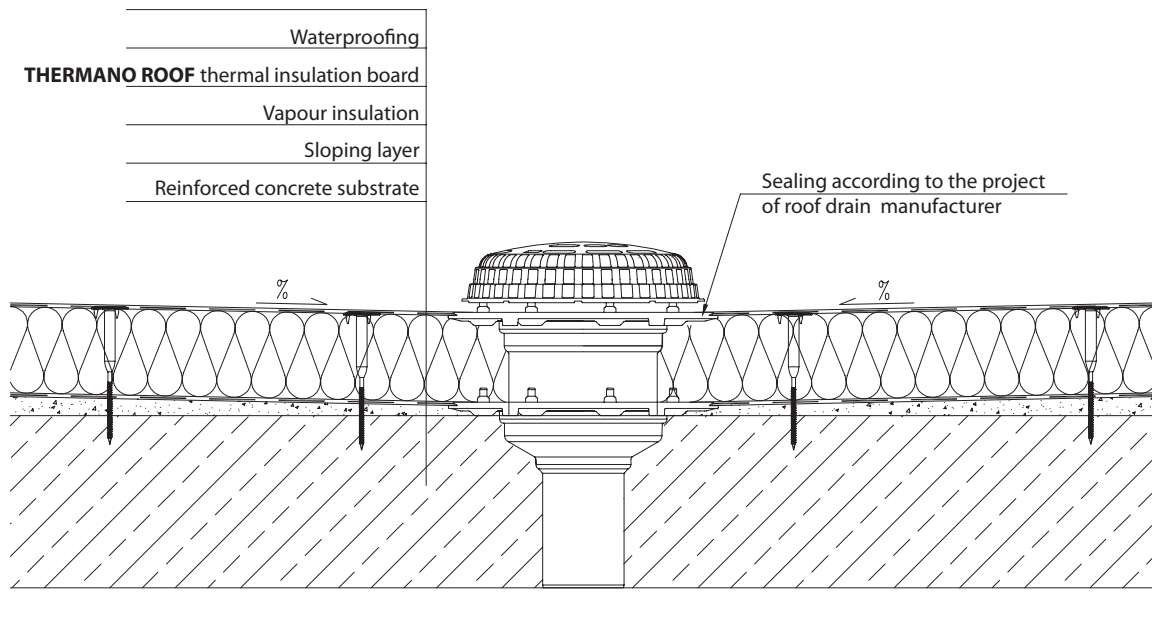
THERMANO ROOF boards on a flat roof, trapezoid sheet substrate – single layer system



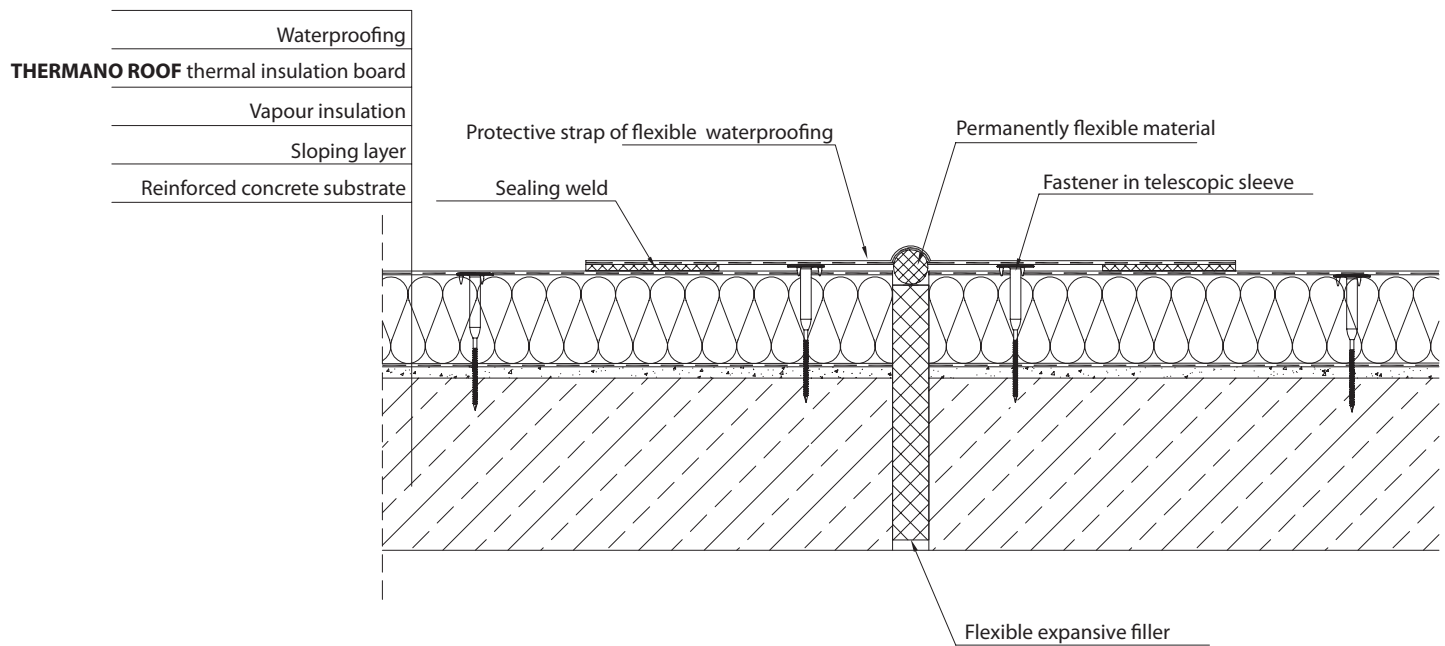
THERMANO ROOF boards on a flat roof, trapezoid sheet substrate – double layer system



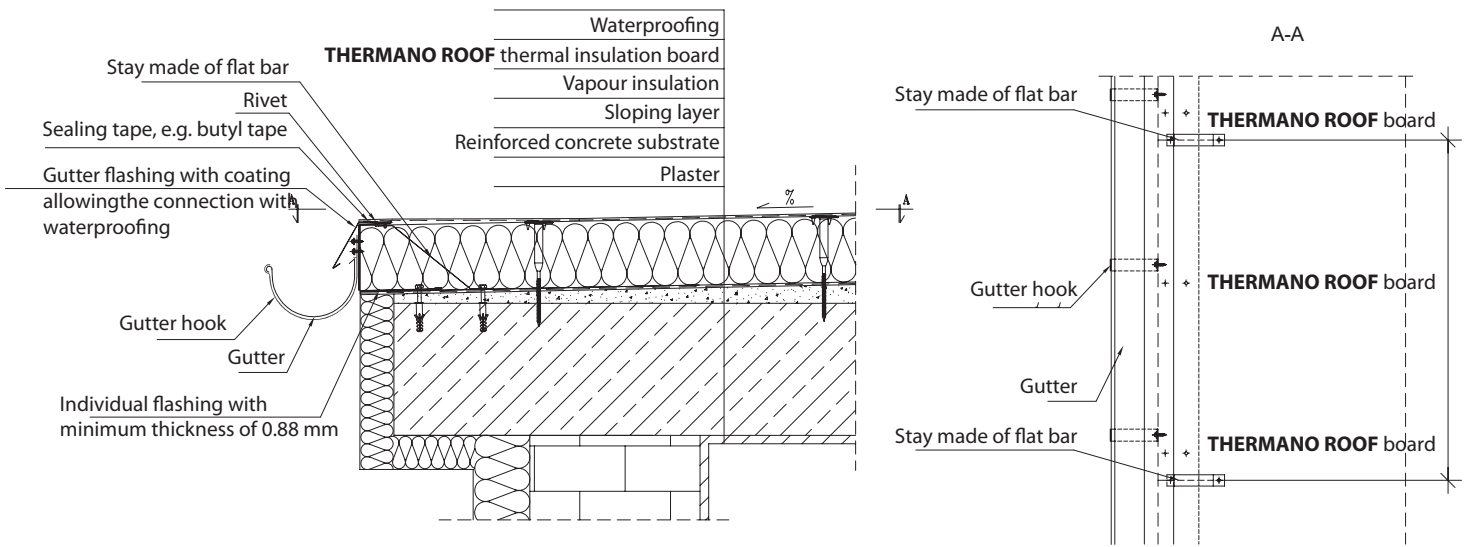
Roof water drainage detail



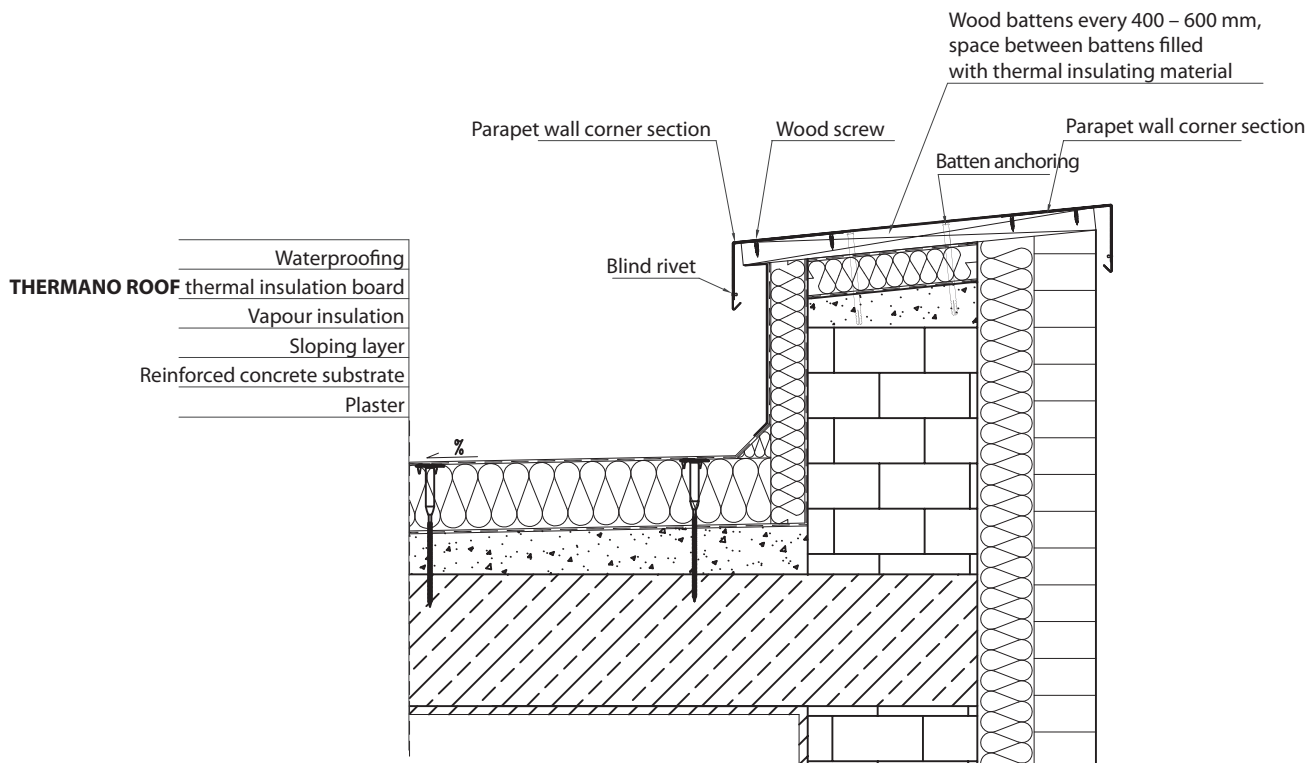
Roof expansion joint detail



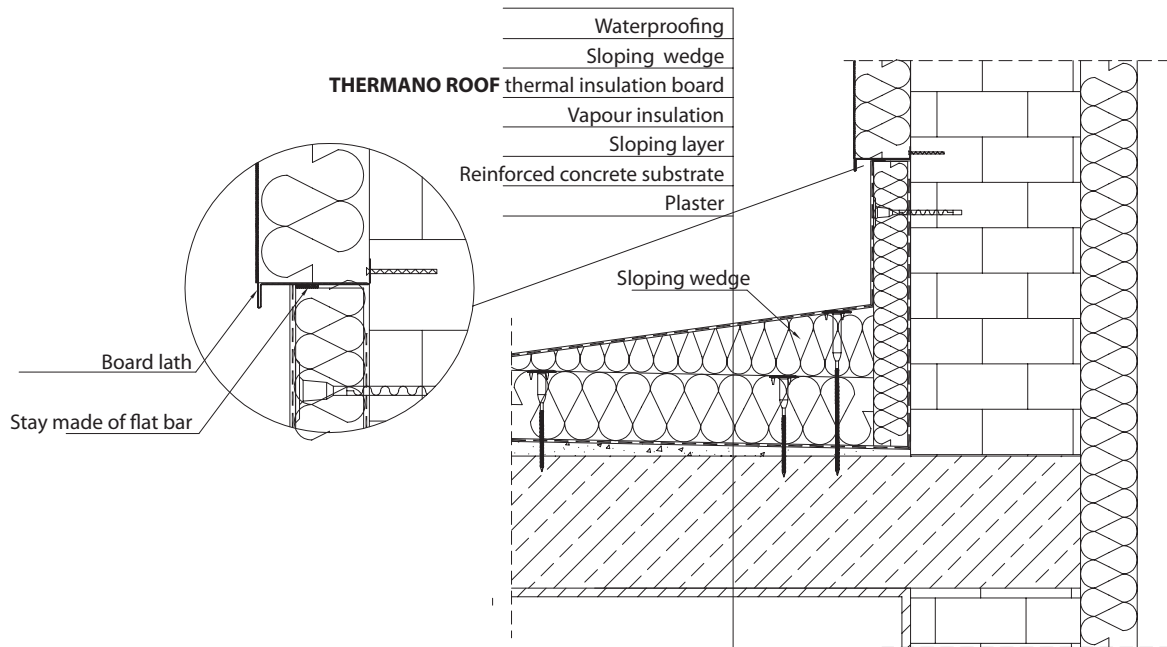
Roof water drainage detail – water drain to the gutter



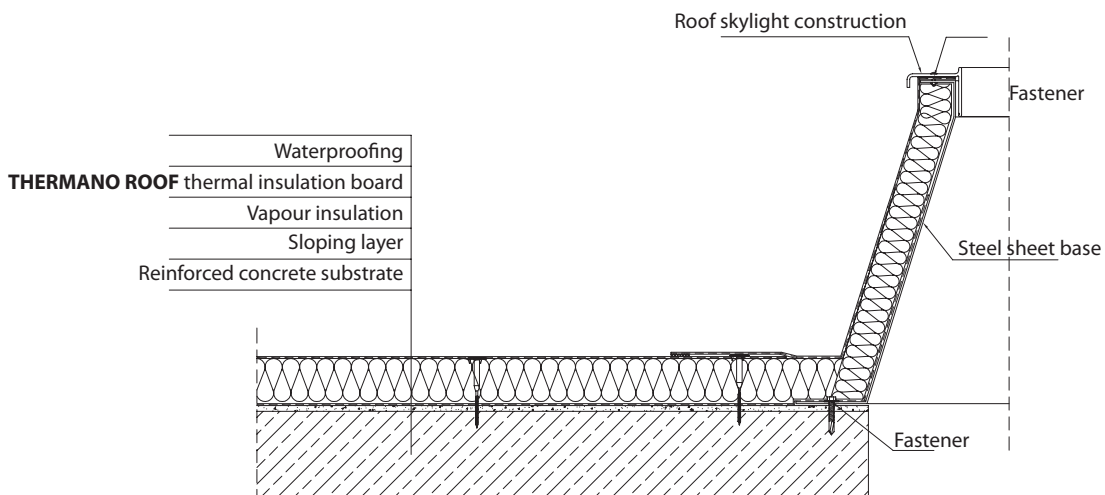
Low parapet wall thermal insulation detail



Detail of low parapet wall or adjacent wall thermal insulation



Roof skylight support detail



Balex Metal Sp. z o. o.

ul. Wejherowska 12C
84-239 Bolszewo
NIP 588-11-30-299
Regon 191112216
KRS 0000176277

kontakt@balex.eu
+48 58 778 44 44 / 801 000 807

balex.eu

EN-2022-10-26

This printing does not constitute an offer within the meaning of the Civil Code. The presented information is valid on the date of issue. Balex Metal follows a policy of continuous improvement; hence the information contained here is not binding in any way and may change without notice. Balex Metal reserves the right to modify the presented product versions.



Online version of instruction