

THERMANO PITCHED ROOF INSTALLATION MANUAL

THE COMMON WEAKNESS OF ROOFS: THERMAL BRIDGES

We have gone through the length and breadth of Poland. We have first-hand experience of what Polish roofs are exposed to. Extreme temperature changes during the year make our climate more of a challenge than the weather in Spitzbergen.

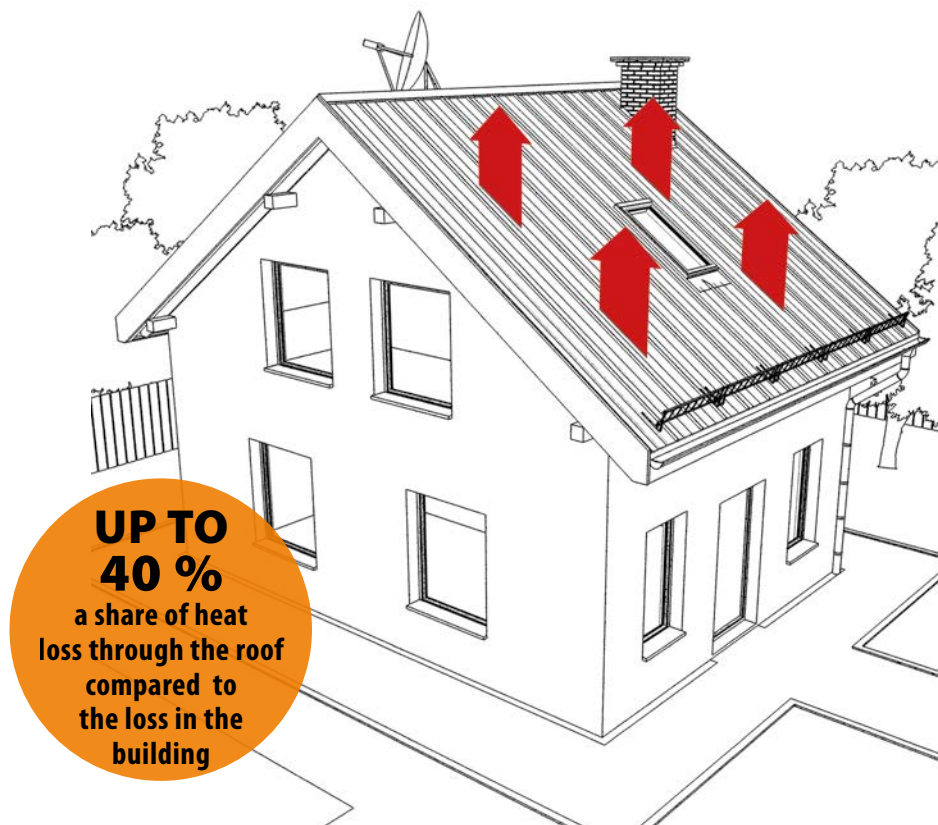
Having analysed the construction of roofs in Polish homes, we have found one fundamental flaw: **thermal bridges**.

Traditionally, roofs are insulated between rafters. This solution is far from perfect. It leads to formulation of thermal bridges, a substantial structural flaw of Polish roofs.

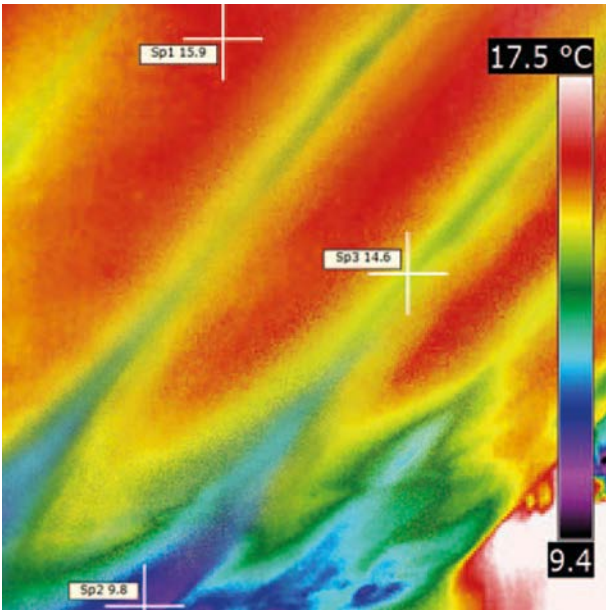
THERMANO ROOF makes it possible to eliminate them effectively.

Thermal bridges are a phenomenon leading to a decrease in temperature of dividing structures. They cause water vapour condensation and damp in structural and insulation materials, which in turn results in fungi and mould growth. In addition, thermal bridges always cause substantial heat losses.

We have made a breakthrough: **THERMANO ROOF** is over-rafter superinsulation. In this way, thermal insulation covers the roof in a uniform, coherent surface, preventing the thermal bridge problem and reducing heating costs by even 40%.



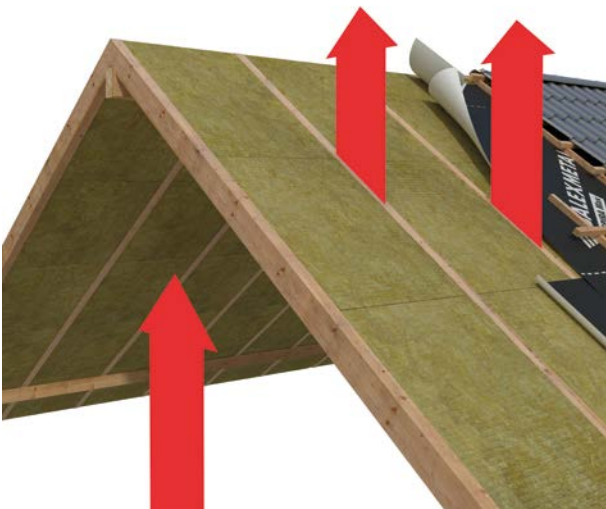
1. 1. Heat loss through the roof: 20-40%



1.2. An image from thermographic camera showing clear thermal bridges where unin-sulated rafters are located



1.3. An example of thermal bridges - melted snow in places where heat gets through rafters on the roof



1.4. Inter-rafter, one layer roof insulation with clearly visible thermal bridges.

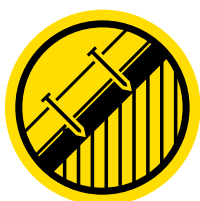


1.5. Over-rafter roof insulation with a **THERMANO ROOF** board, with a clear barrier to thermal conductivity

A BREAKTHROUGH IN ROOF CONSTRUCTION: OVER-RAFTER INSULATION SYSTEM

Thanks to over-rafter **THERMANO ROOF** insulation system, we get a super-roof resistant to the Polish weather conditions. Learn about all the advantages of this construction.

Why is **THERMANO ROOF** a breakthrough?



Super-insulation means no thermal bridges

THERMANO ROOF boards are assembled directly on the roof truss, and not between rafters. This eliminates thermal bridges in uninsulated rafters giving away the heat and making roof insulation worse.



Super-insulation means no damp

Water vapour condenses in the areas of badly insulated elements, and this causes damp in insulation. By eliminating thermal bridges through integrated THERMANO ROOF board roof insulation, we have no problem with damp causing fungi and mould growth.



Super-insulation means the highest energy efficiency

THERMANO ROOF has the lowest thermal conductivity coefficient $\lambda=0,023$ [W/m·K] among all thermal insulating materials, which provides its best insulation parameters with a comparable material thickness. The minimum thermal insulation index requirement, according to the Ministry of Transport, Building Industry and Maritime Management, $U_c = 0,18$ [W/m²·K], can be met when using already 125 mm THERMANO ROOF boards for thermal insulation!

TECHNICAL PARAMETERS

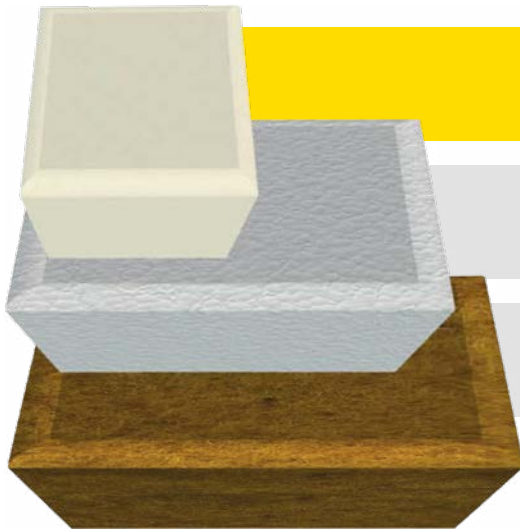
- According To Pn-En 13165 Standard
- Thermal conductivity coefficient $\lambda_p=0,023$ [W/m·K], taking ageing into account
- Bulk density: **30 kg/m³**
- Compressive stress **200 kPa** (at 10% deformation)
- Absorbability **<= 2%**
- Tensile strength **TR70**
- Water vapour resistance: $\mu = 50-100$
- **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**

UNRIVALLED ENERGY EFFICIENCY

Energy-saving roof: 150 mm thickness



150 mm

PIR THERMANO
 $\lambda=0,023 \text{ W/m}\cdot\text{K}$

230 mm

Expanded polystyrene
(EPS polystyrene)
 $\lambda=0,035 \text{ W/m}\cdot\text{K}$

240 mm

Mineral wool
 $\lambda=0,037 \text{ W/m}\cdot\text{K}$

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

COMPARE THERMAL INSULATORS

Technical requirements for pitched roofs

Technical requirements for pitched roof in buildings with interior temperatures $> 16^\circ\text{C}$		PIR THERMANO ($\lambda=0,023 \text{ W/m}\cdot\text{K}$)			Inna termoizolacja ($\lambda=0,037 \text{ W/m}\cdot\text{K}$)		
For general purpose buildings, production, warehouse and storage buildings	Required U_{max}	Thickness [mm]	U [$\text{W/m}^2\cdot\text{K}$]	R [$\text{m}^2\cdot\text{K/W}$]	Thickness [mm]	U [$\text{W/m}^2\cdot\text{K}$]	R [$\text{m}^2\cdot\text{K/W}$]
1 January 2017*	0,18	125	0,18	5,43	210	0,18	5,68
1 January 2021*	0,15	150	0,15	6,52	250	0,15	6,76

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

SUPER-INSULATION MEANS CHEAPER AND FASTER ASSEMBLY

- The assembly may be done by roofer companies. **THERMANO ROOF** is assembled onto a ready roof truss, just prior to its covering (by steel tiles or other materials). This shortens the time of works: the insulation is ready with roof covering, and reduced the cost as no additional builders are needed.



SUPER-INSULATION MEANS SUPER INTERIORS

THERMANO is assembled on rafters, which is why there is more space in the attic. Moreover, the wooden roof structure may be exposed in an attractive way, creating a unique interior atmosphere.

THERE ARE MORE ADVANTAGES TO SUPER-INSULATION:

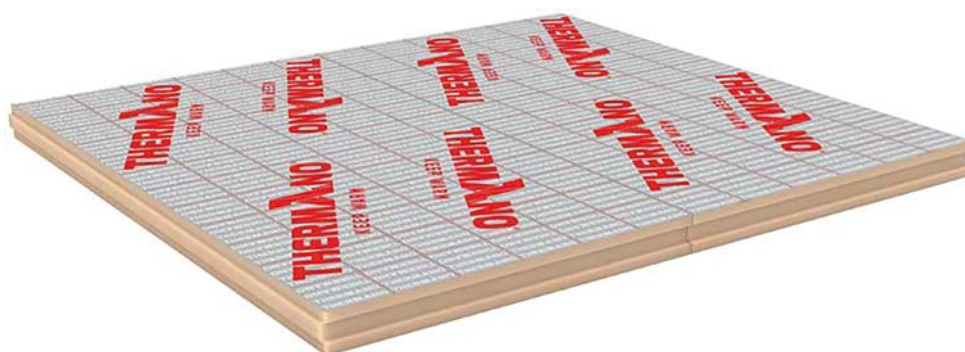
- Does not require complete formwork;
- Most workmanship errors are eliminated;
- All wet works may be done in the building without damaging insulation;
- No skin and respiratory system irritation during assembly;
- More cubic capacity and usable space of the interior;
- Higher knee wall;
- Does not contain troublesome fibers.

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.



REMEMBER!

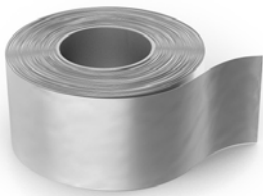
Thermano boards are transported in packaging secured by foil, with an additional Styrofoam base to prevent direct contact with the ground.

Once unpacked, the boards must be stored under cover, without being exposed to excessive sunlight.

BUILD A ROOF RESISTANT TO POLISH WEATHER CONDITIONS

THERMANO ROOF does not give you only its advantages and super-structure creation options. Super-insulation is also easy and convenient to assemble.

What you need to assemble a complete thermal insulation system:



Joints between boards should be sealed with aluminium adhesive tape to increase cover tightness.



Vapour permeable membrane (we recommend ASPIRA membranes). Optionally use polyethylene foam sealing tape under counter-battens, in screw areas

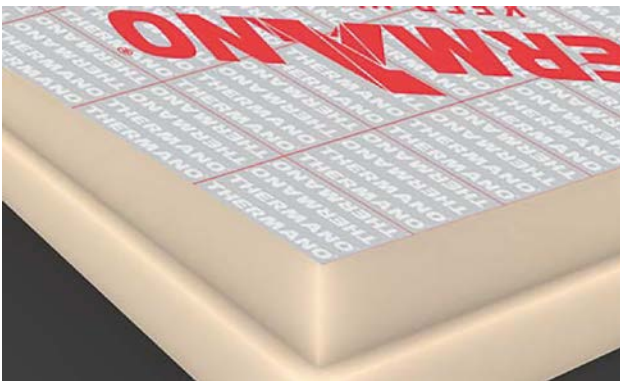


To assemble the boards, use screws for wood with conical head, of the length:

- min. 185 mm for board thickness up to 100 mm
- min. 210 mm for board thickness up to 113 mm
- 250 mm for board thickness up to 160 mm

ASSEMBLY STAGES

- 1 Place the first row of boards at eaves and then stabilise each board with at least two screws.



Join the boards by overlapping lock (TOP). It ensures higher stability and higher insulation rate of connections.



Insulate connections between boards by aluminium adhesive tape. The tape increases covering tightness.

- 2 Place vapour permeable membrane on the first row of boards (we recommend ASPIRA membranes).

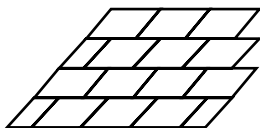
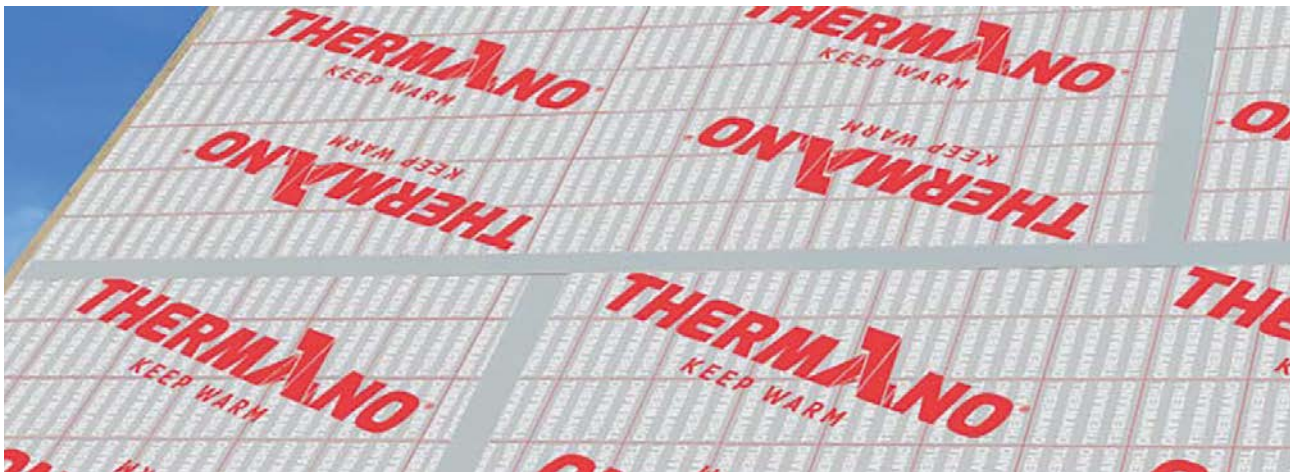


3 Place short counter-battens on the membrane and tighten to the rafters through the thermal insulation board by screws. Use counter-battens with min. 40x60 mm cross-section (for 15 m rafters), and 50x60 mm (for rafters longer than 15 m).

Tighten the screws at approx. 40 cm intervals to each rafter. They need to be assembled alternately at 90 and "67" degrees angles..



4 Place the next rows of boards in a similar way and remember to differ the position of rows against one another. The next rows of boards don't need to be tightened with screws, unless it is required by the conditions.

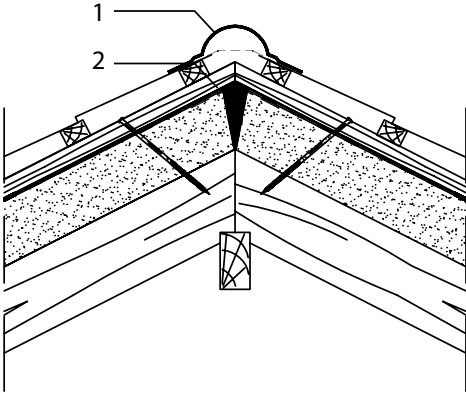


To reduce the amount of cut-offs, start the next row with the fragment of the board you have cut off before.



Boards can be cut very easily and fast. You only need ordinary tools, such as wood or metal saw. Remember to use protective glasses for your safety.

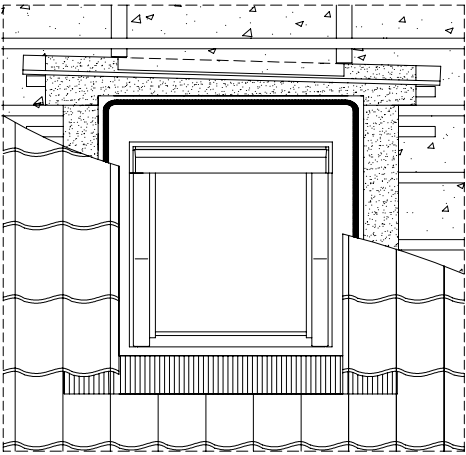
- 5** At the ridge, the last row of boards should be joint in a way that allows the gaps on the connection to be sealed with a special adhesive tape.



How to join the boards at the ridge:

1. Ridge tile
2. Adhesive ridge tape

The gaps should be filled with a piece of thermal insulation board (wedge) or low pressure foam. In addition, cover the board joint at the ridge with vapour permeable membrane (e.g. ASPIRA) with overlapping lock, or cover the whole with a membrane falling on both sides of the roof.

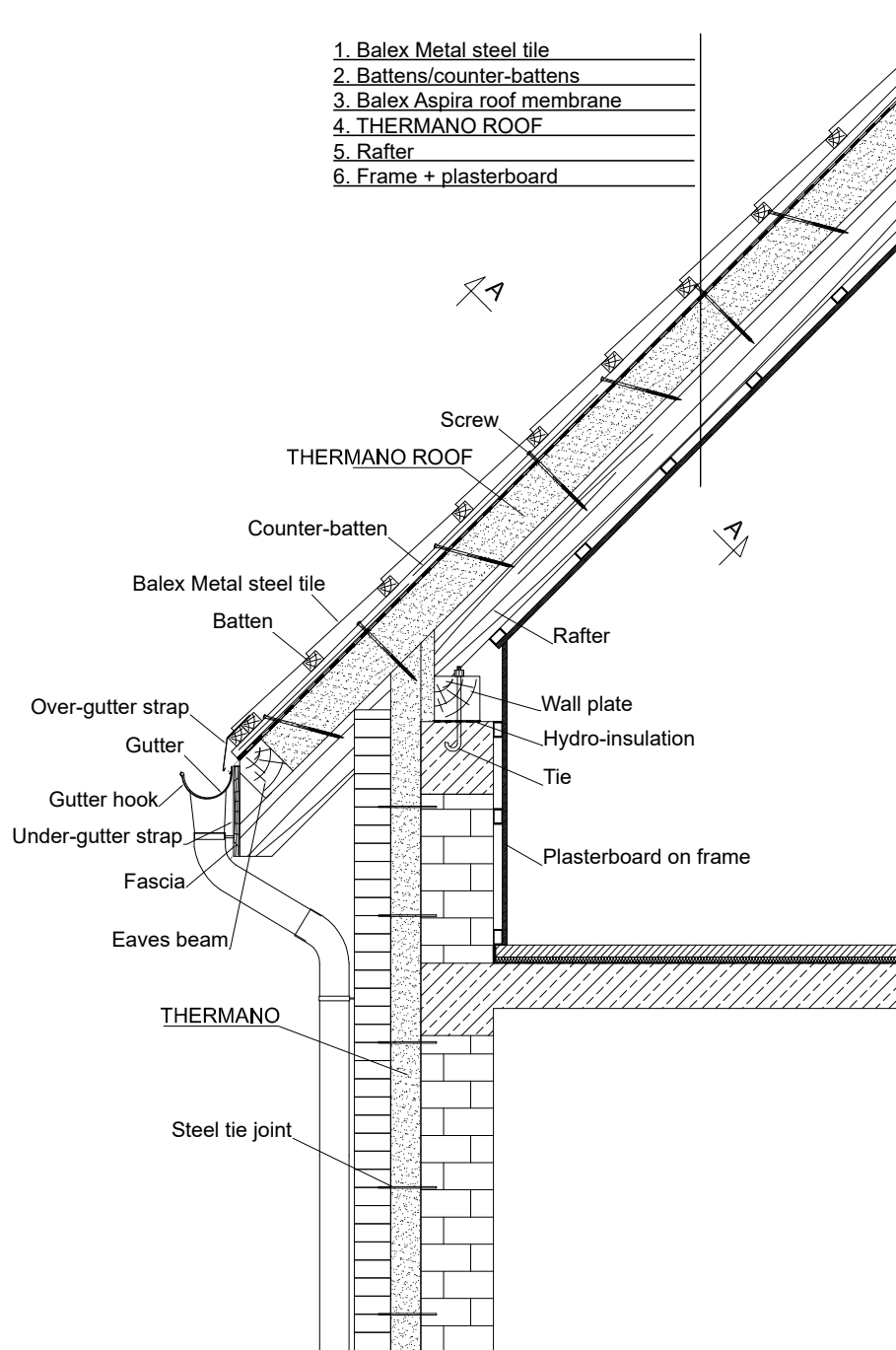


Roof window assembly:

Cut out the opening for a roof window in the already assembled thermal insulation boards, according to the dimensions specified by the window producer

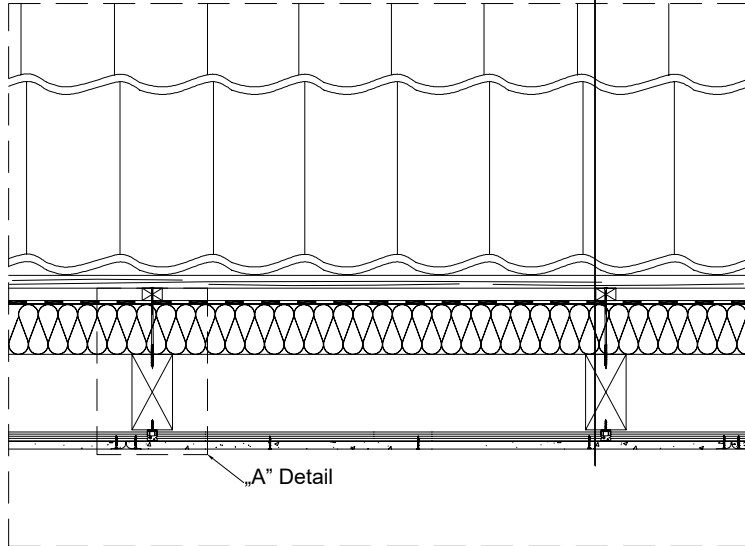
ASSEMBLY DETAILS FOR THERMANO ROOF INSULATION ON PITCHED ROOFS

Over-rafter thermal insulation with plasterboards under rafters in the attic

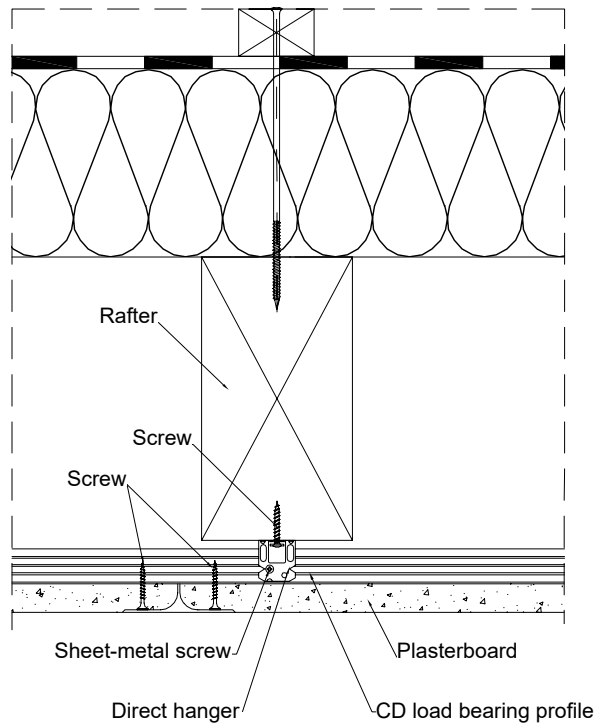


Cross-section A-A
Scale: 1:15

- 1. Balex Metal steel tile
- 2. Battens/counter-battens
- 3. Balex Aspira roof membrane
- 4. THERMANO ROOF
- 5. Rafter
- 6. Frame + plasterboard



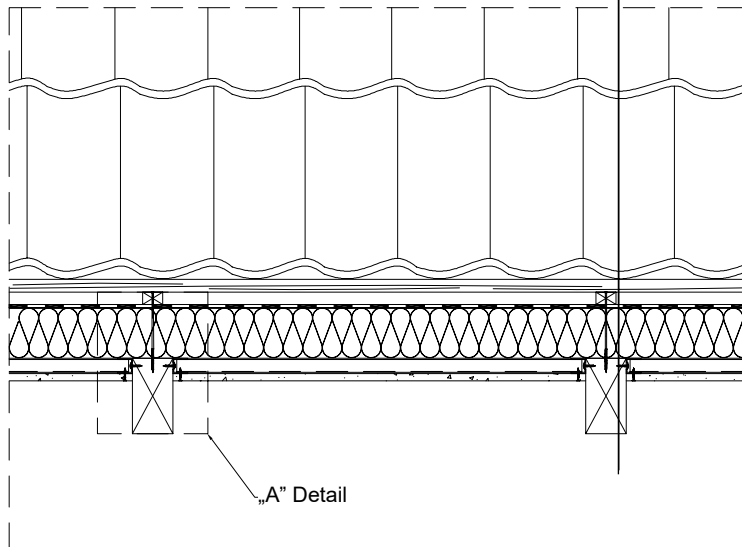
A Detail
Scale 1:4



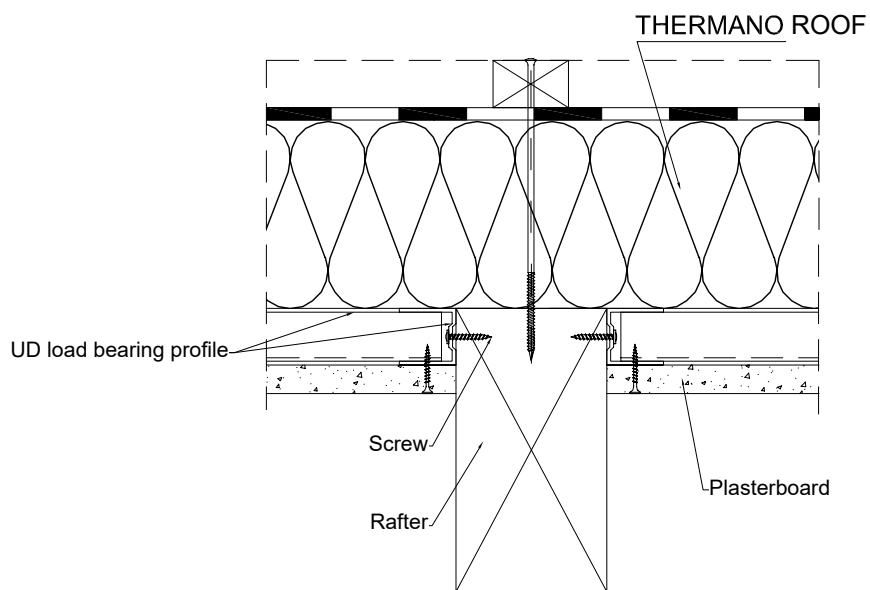
Thermal insulation of an attic with attic finish by plasterboards between rafters

Cross-section A-A
Scale: 1:15

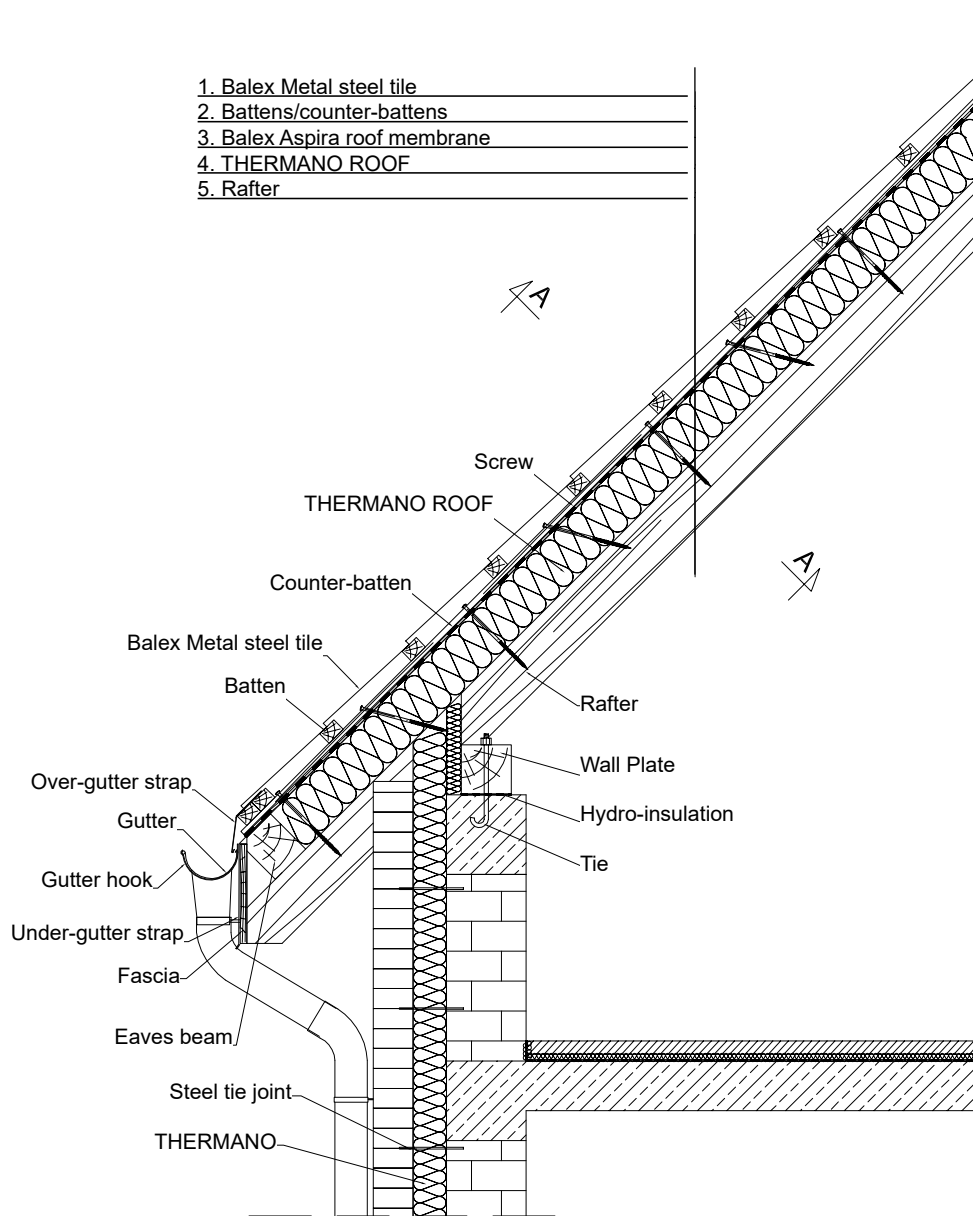
- 1. Balex Metal steel tile
- 2. Battens/counter-battens
- 3. Balex Aspira roof membrane
- 4. THERMANO ROOF
- 5. Rafter/Frame + plasterboard



A Detail
Scale 1:4

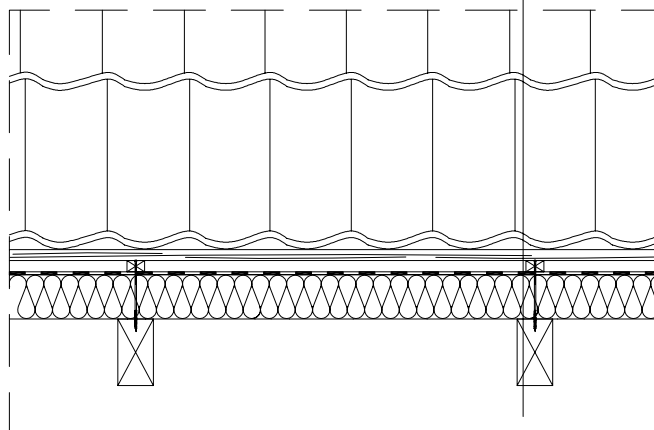


Over-rafter thermal insulation without attic finish



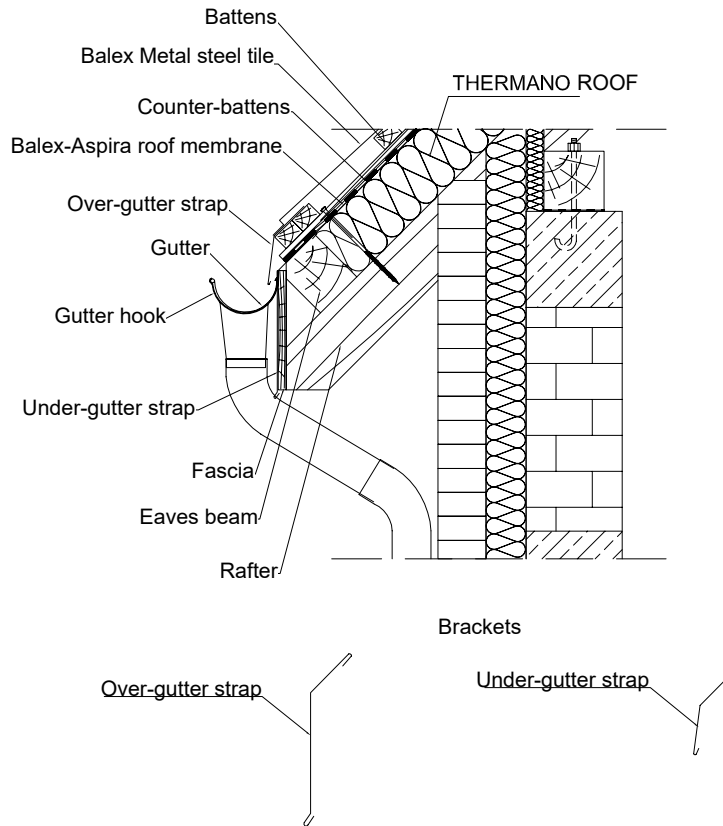
Cross-section A-A
 Scale: 1:15

- 1. Balex Metal steel tile
- 2. Battens/counter-battens
- 3. Balex Aspira roof membrane
- 4. THERMANO ROOF
- 5. Rafter

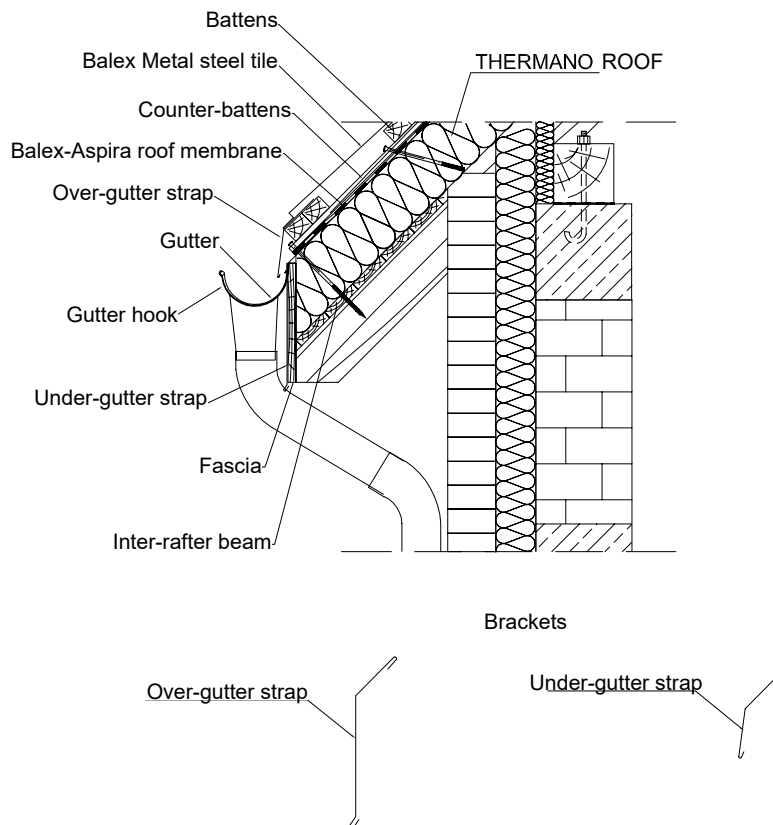


Over-rafter thermal insulation – eaves detail

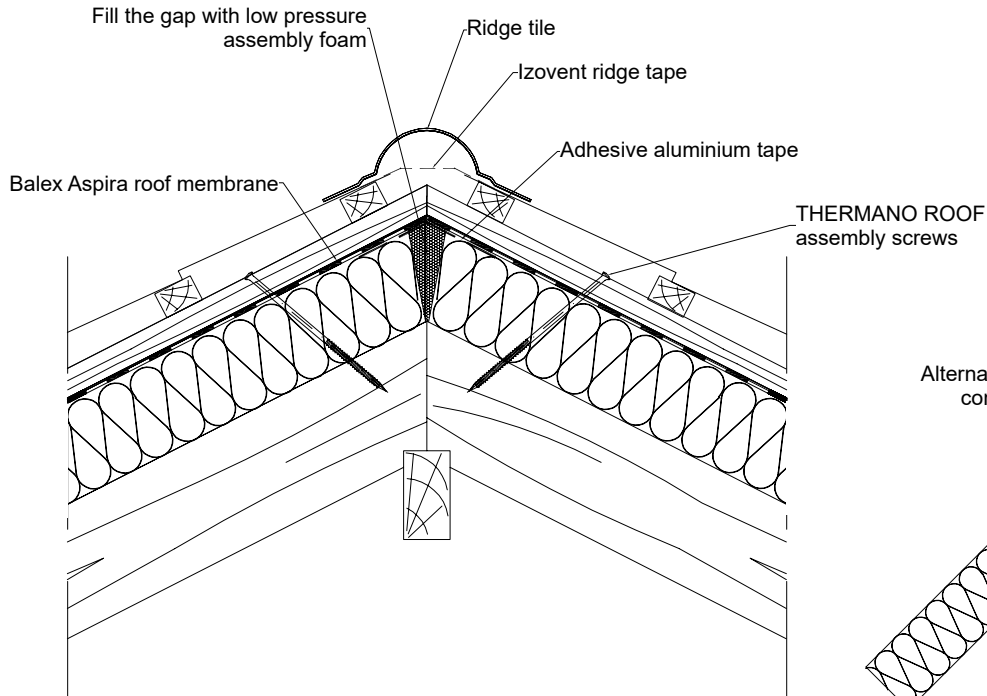
VARIANT I



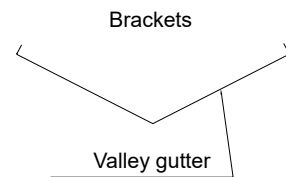
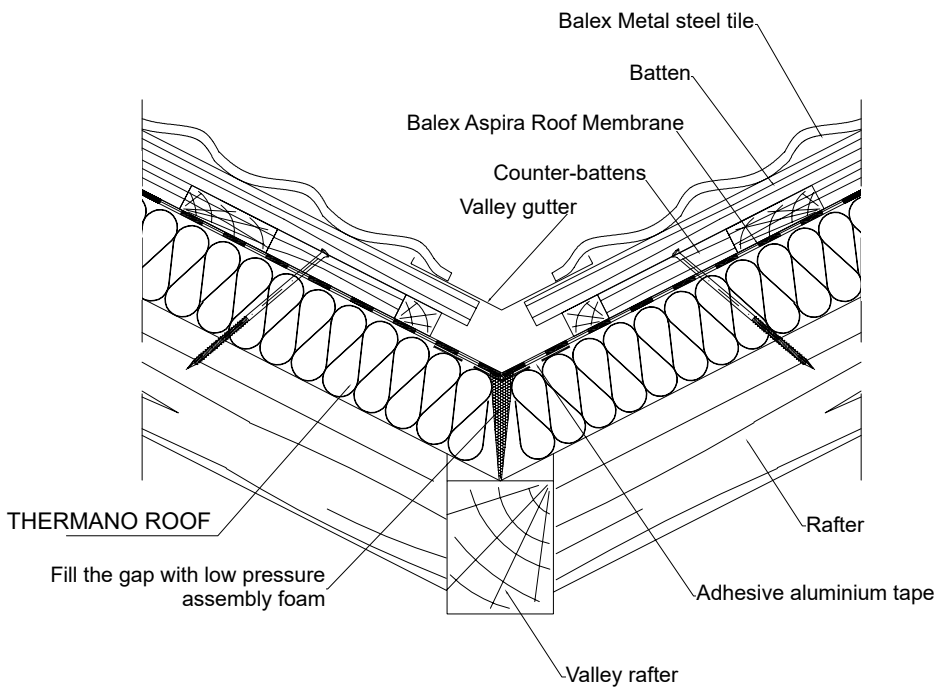
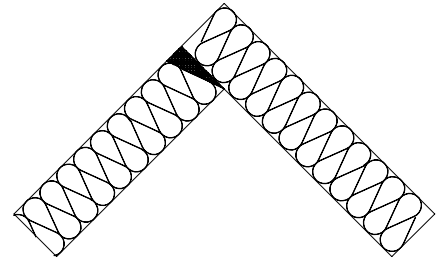
VARIANT II



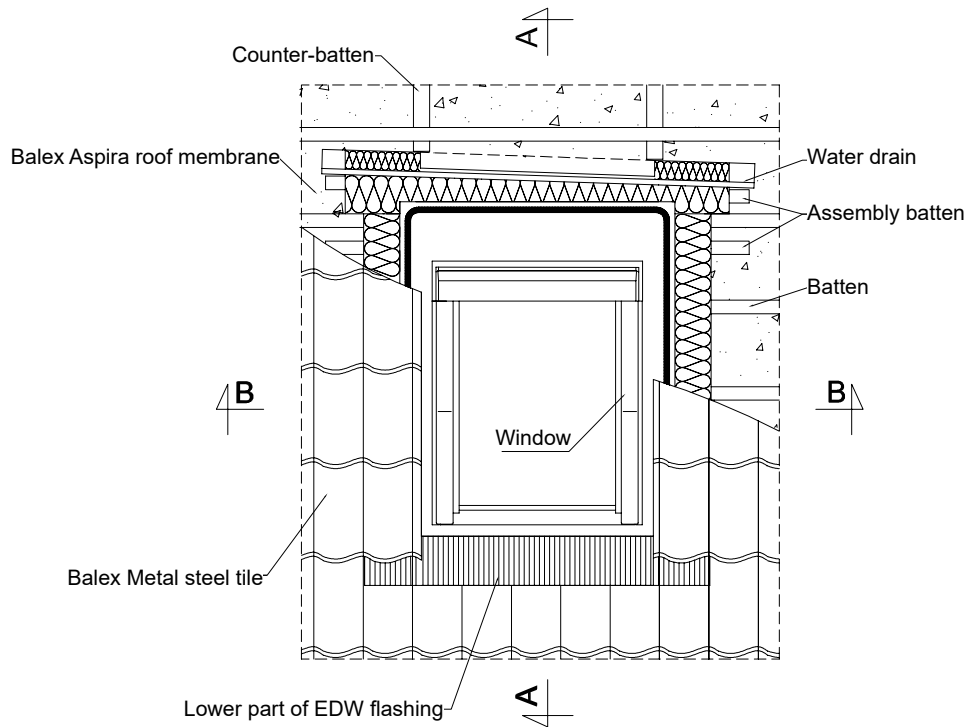
Over-rafter thermal insulation – ridge and valley gutter detail



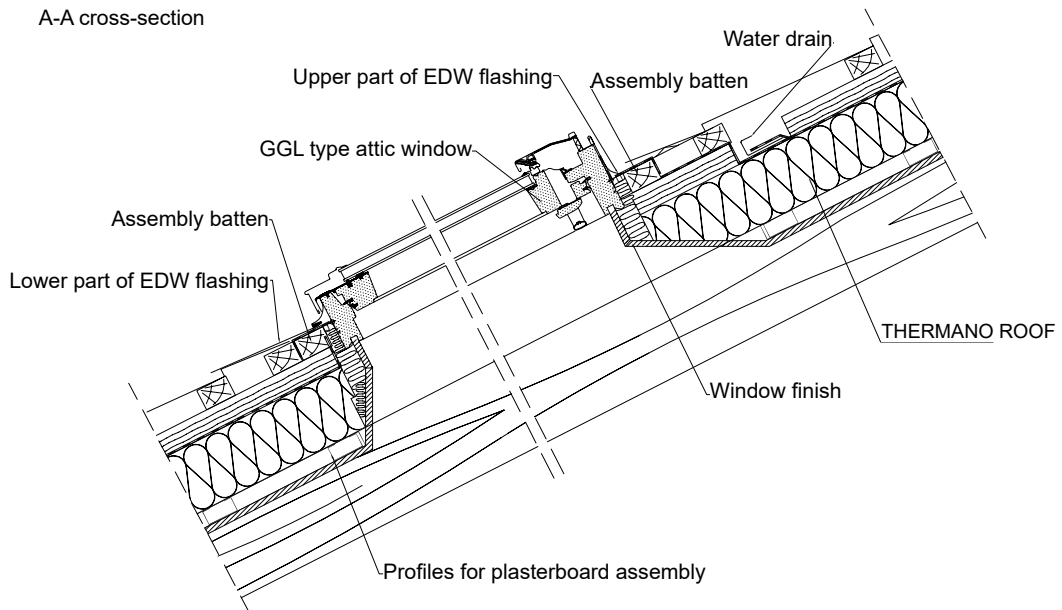
Alternative THERMANO ROOF connection at the ridge



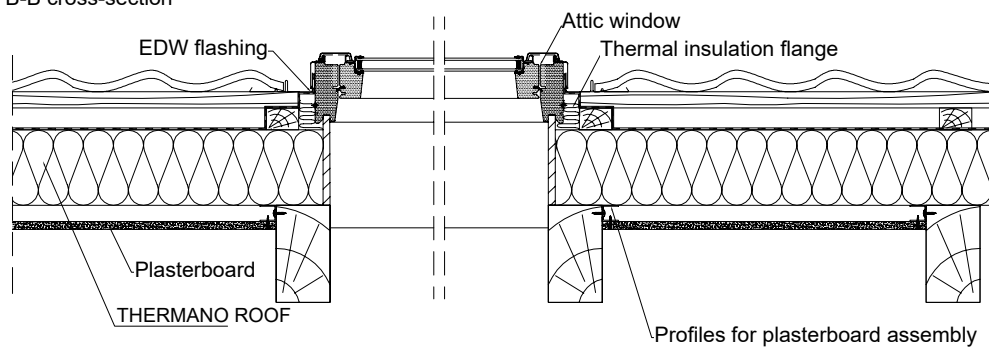
Over-rafter thermal insulation - window detail



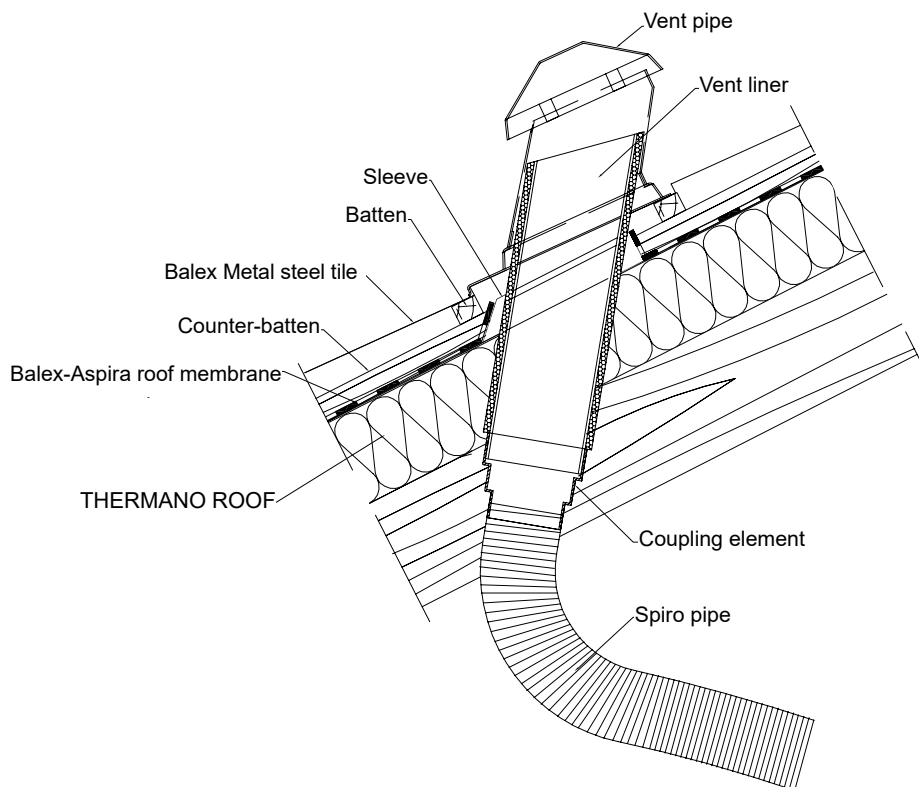
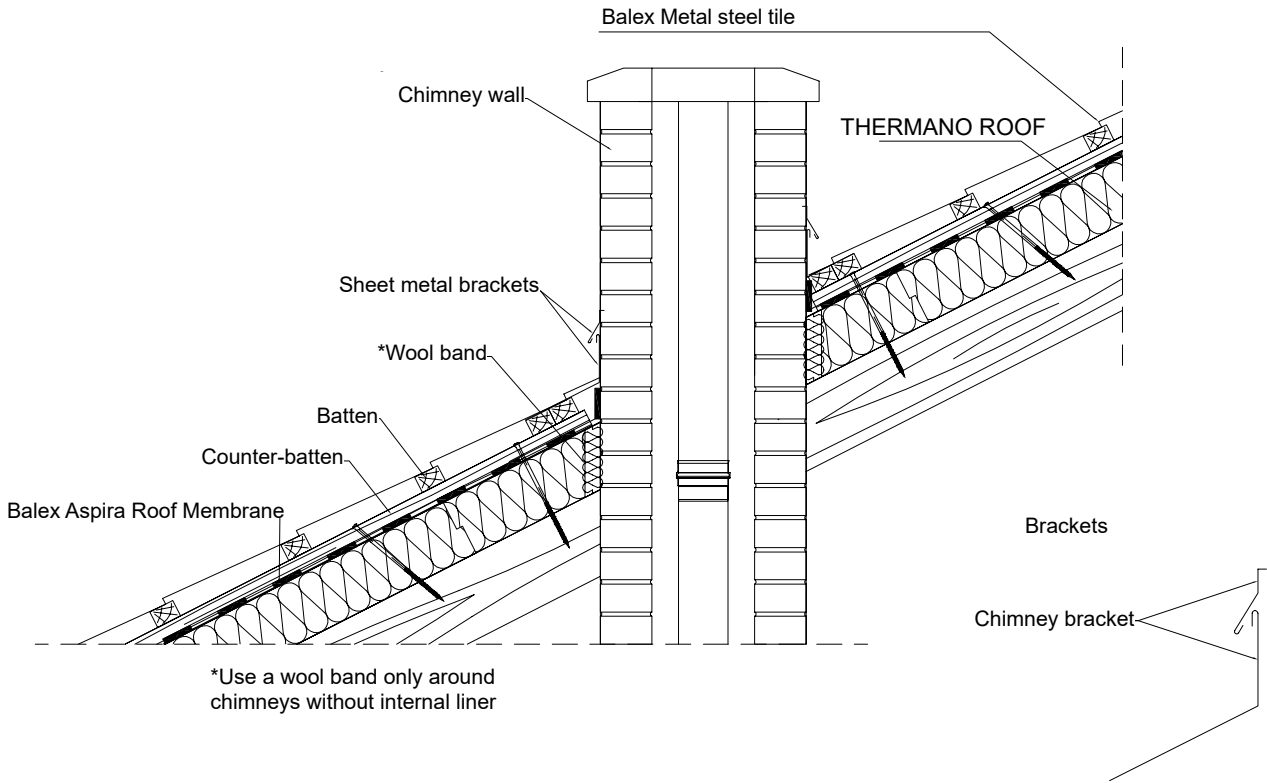
A-A cross-section



B-B cross-section

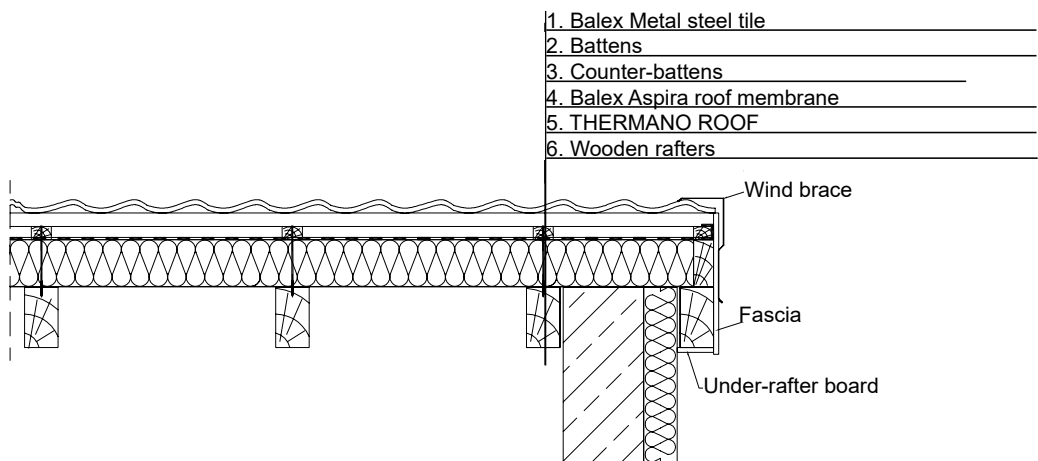
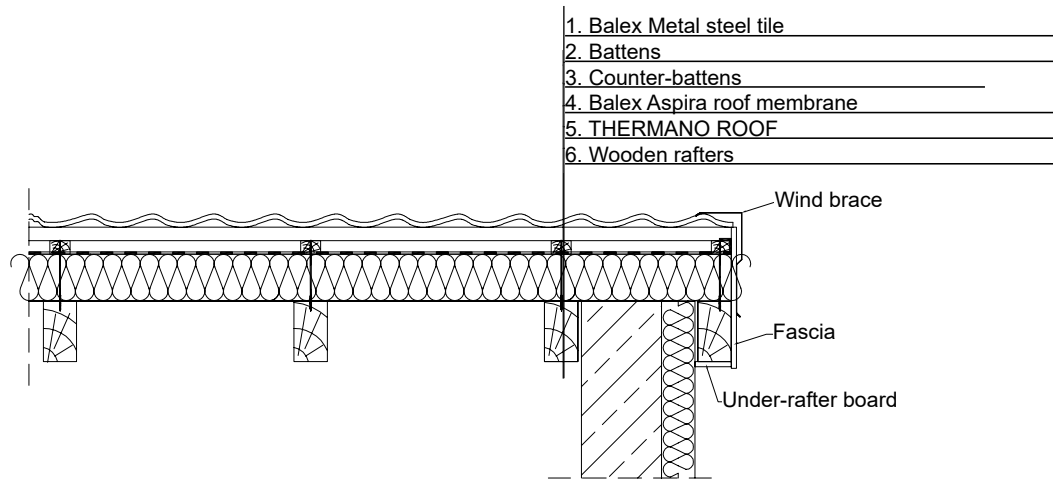


Over-rafter thermal insulation – chimney and vent pipe details

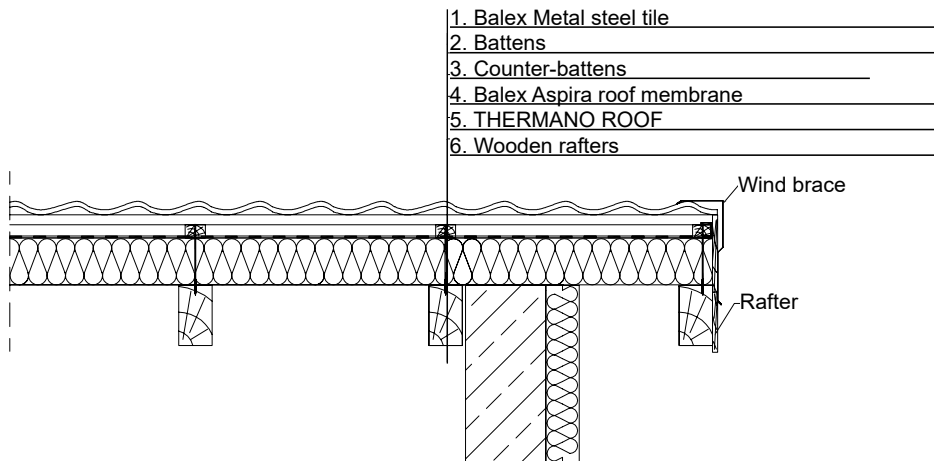
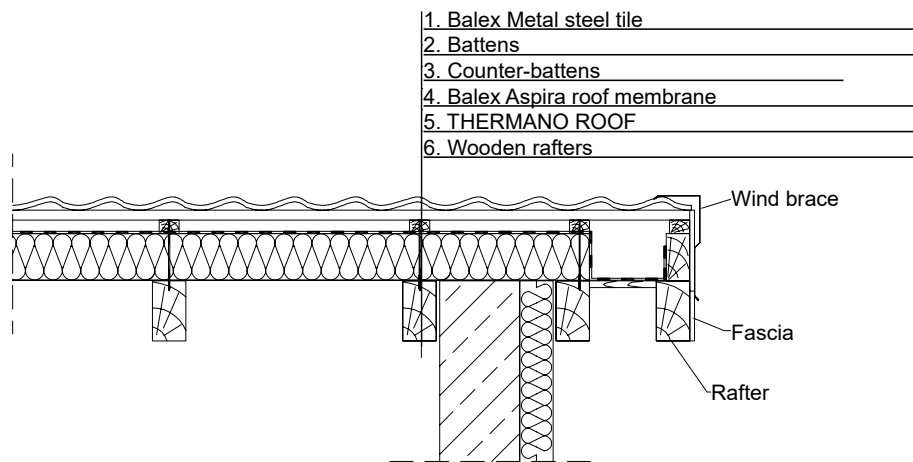


Over-rafter thermal insulation – eaves variants

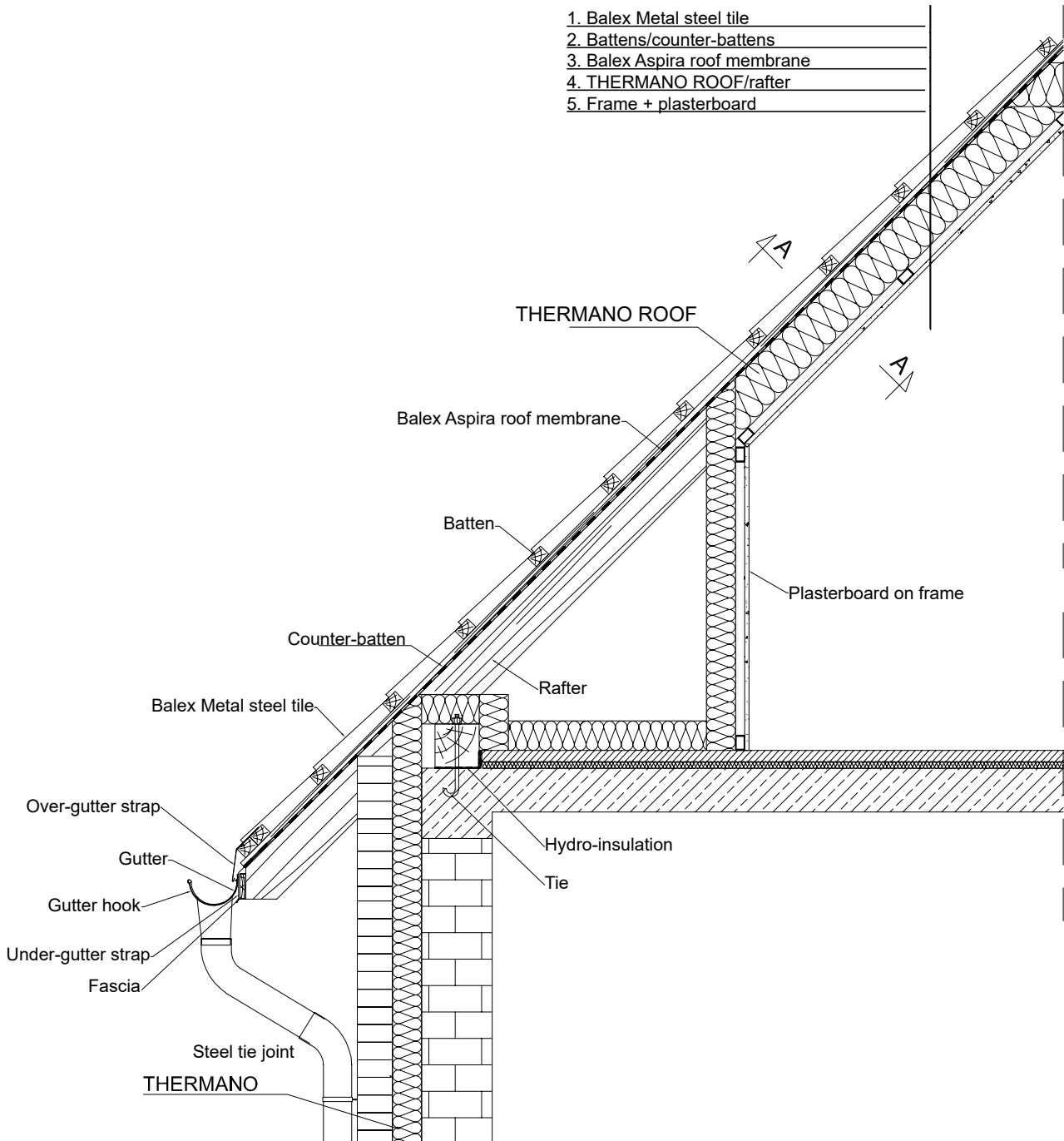
Rafter by the wall – VARIANTS I AND II



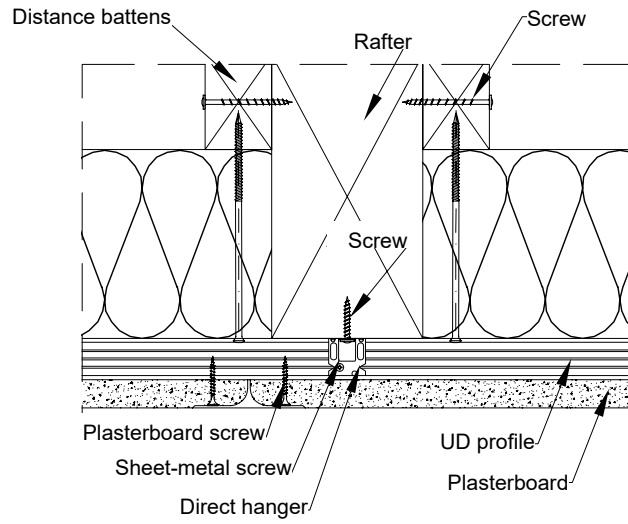
Protruding rafter – VARIANTS I AND II



Inter-rafter thermal insulation with plasterboards under rafters in the attic

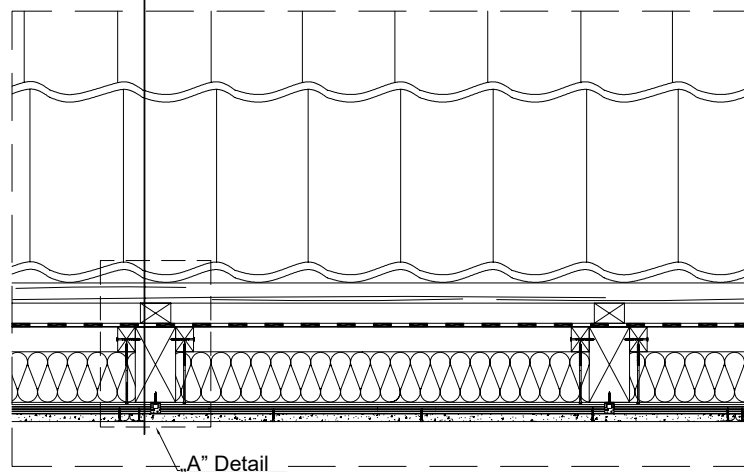


A Detail
Scale: 1:4

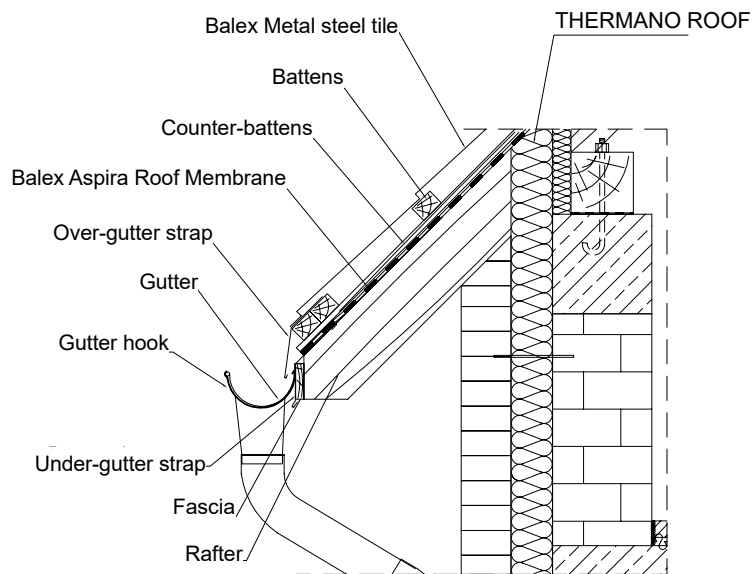


- 1. Balex Metal steel tile
- 2. Battens/counter-battens
- 3. Balex Aspira roof membrane
- 4. THERMANO ROOF/rafter
- 5. Frame + plasterboard

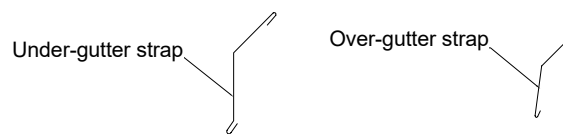
A – A Cross-section
Scale: 1:15



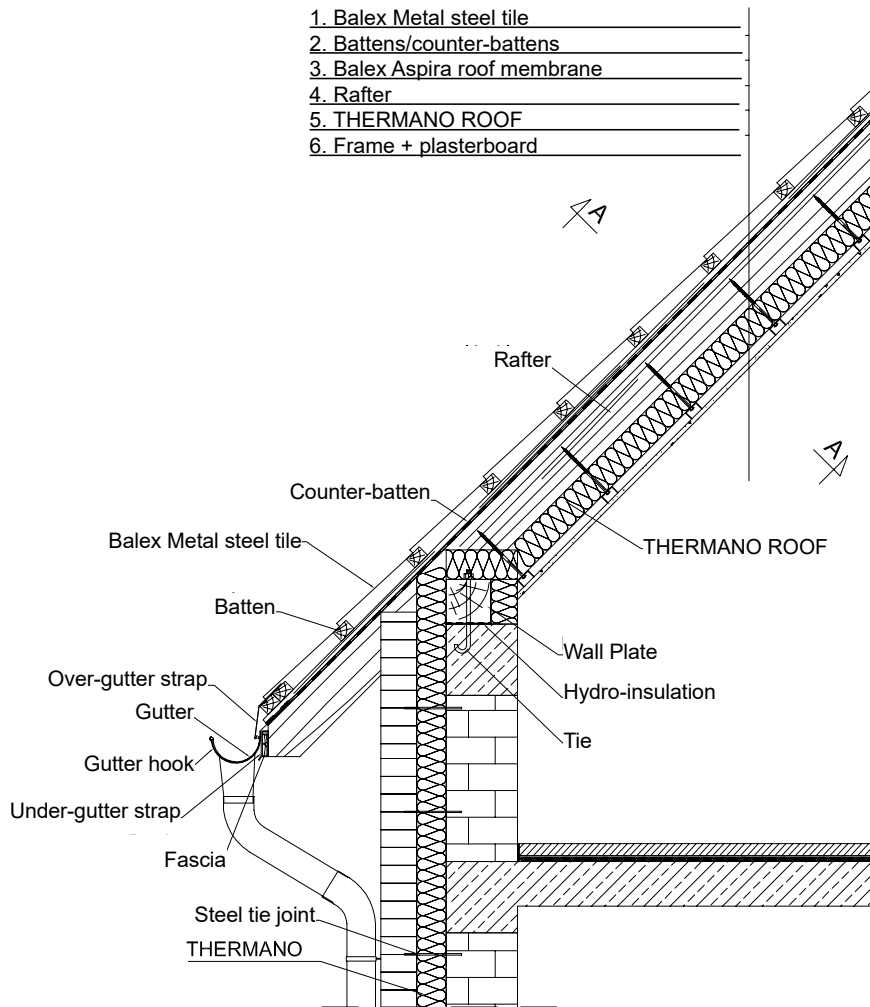
Inter-rafter/ under-rafter thermal insulation - eaves detail



Brackets:

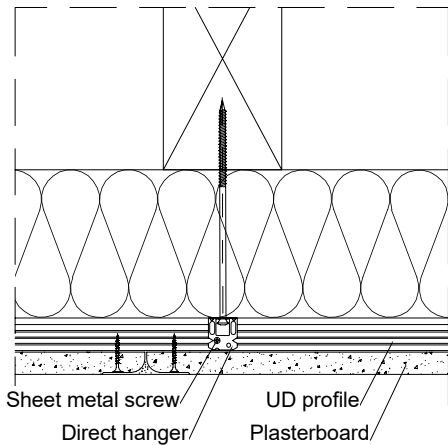


Under-rafter thermal insulation with plasterboards in the attic

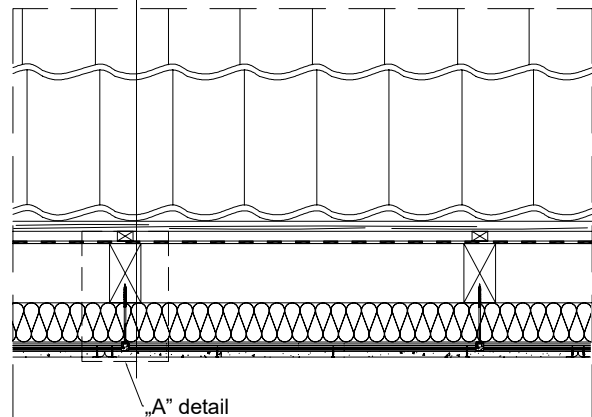


A Detail
 Scale: 1:4

1. Balex Metal steel tile
2. Battens/counter-battens
3. Balex Aspira roof membrane
4. Rafter
5. THERMANO ROOF
6. Frame + plasterboard



A – A Cross-section
 Scale: 1:15



CONTACT

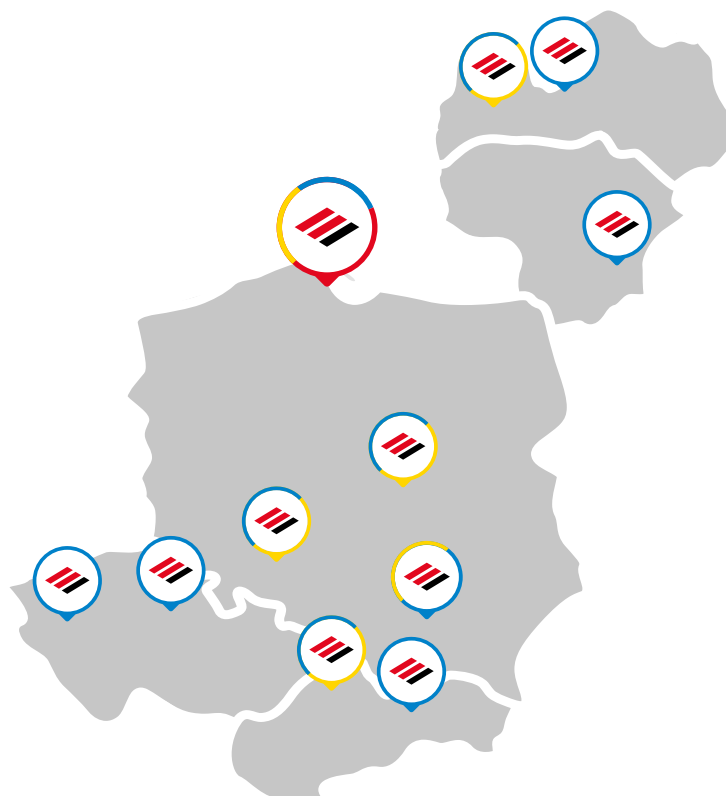
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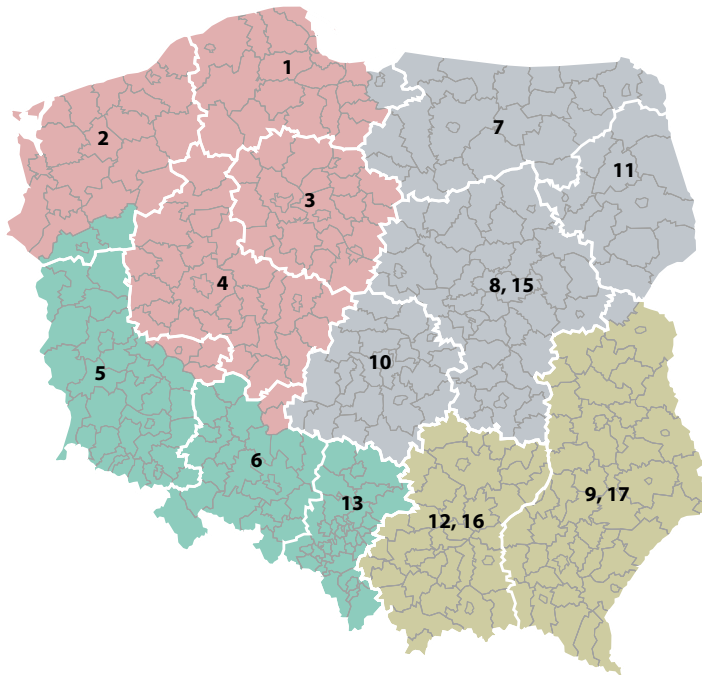
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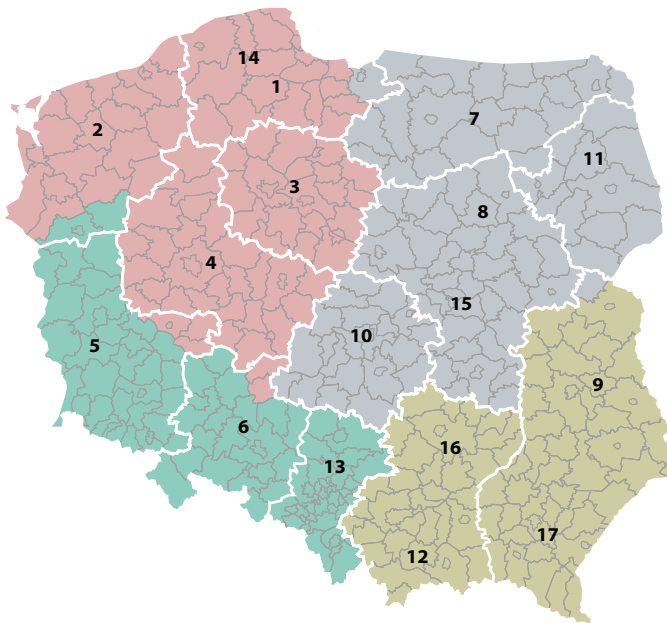
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4	+48 883 350 918	13	+48 605 052 715
5	+48 605 050 992	14	+48 734 494 299
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3	+48 668 124 420	16	+48 600 380 674
4	+48 883 350 919	17	+48 883 350 978
5	+48 665 108 150	18	+48 604 509 014
6	+48 660 740 902	19	+48 605 058 124
7	+48 668 126 122	20	+48 660 740 904
8	+48 784 047 204	21	+48 664 013 968
9	+48 883 350 916	22	+48 608 490 475
10	+48 666 882 995	23	+48 538 637 934
11	+48 660 740 907	24	+48 883 350 811
12	+48 532 623 393		
13	+48 660 740 908		

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