termPIR®
insulation boards

TECHNICAL CATALOG

termPIR® Insulation boards
Residential Buildings

CERTIFIED ISO 9001/14001 COMPANY

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CONTENS

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INTRODUCTION

This publication is intended to present an assortment and technical properties of **termPIR®** boards to our customers. With several years of experience and extensive knowledge, we perfectly know the needs of the market. Thanks to this, we create products and solutions that give our customers real benefits.

ABOUT THE COMPANY

Gór-Stal is a Polish company founded in 2003. It had originally produced and sold finished steel construction elements. The increase in demand for building materials for light industrial facilities forced co-owners to buy the line for the production of sandwich panels with a polyurethane core. It is one of the most modern and technologically advanced production lines in Europe. Gór-Stal manufactures **sandwich panels** and **termPIR® insulating boards**. Sandwich panels are commonly used building materials for light cladding of industrial halls, warehouses, production halls and commercial buildings, offices, administrative buildings, freezers and cold storages. Since the beginning of the company's operation it has rapidly developed and extensively expanded its operations both geographically and in terms of product offerings. Gór-Stal is recognized by customers in Poland, Czech Republic, Austria, Romania, Belgium, the Netherlands, Luxembourg, Great Britain, France, Germany, Estonia and the Nordic countries, Slovakia, Hungary, Ukraine, Lithuania and Latvia. We currently have two factories, one in Gorlice and the other in Bochnia, where we manufacture **termPIR®** insulation boards.

PRODUCTS

termPIR® is a thermal insulation boardwith the core from **polyisocyanurate foam. P**IR is chemically modified polyurethane, which features durability and increased resistance to high temperatures. The isocyanurate structures in foams decompose in temperature over 300˚C and they char partially.The charred layer prevents the penetration of high temperature through the board, which constitutes more effective protection against fire. This product, which is very popular in Europe and globally, successfully substitutes thermal insulation systems based on rock wool and styrofoam. This is due to the best thermal insulation properties in this group of construction materials, durability, easiness and quickness of installation, fulfilling of fire-fighting properties, with the material weight of about **30 kg** per cubic meter. **termPIR®** thermal insulation boards complements the system of light cladding from sandwich panels and allows for complete thermal insulation of industrial and residential buildings, from the floor to the roof using polyurethane – a modern, durable material resistant to rodents and chemical substances.

APPLICATION

Thermal insulation boards **termPIR®** can be applied for thermal insulation of **almost any element** in different types of buildings.Durability,hardnessandverysmallabsorbabilitycausethattheycanbeusedforthermalinsulationofceilings,floors and foundations. They are also useful as a very durable insulation material for walls, roofs and thermal insulation of lofts in residential buildings.

Depending on its application, the **termPIR®** boards is made in different linings, so:

- **termPIR® AL** with gastight multilayer lining containing aluminium is a board with the best thermal parameters recommended for the general use
- **termPIR® WS** with fibreglass lining, which is dedicated for bonded thermal insulation systems
- **termPIR® ETX** with fibreglass lining, which is dedicated for thermal insulation of buildings with a light wet method (so called BSO or ETICS)
- **termPIR® AGRO AL** with aluminum claddings, which are dedicated as a washable roof lining for inventory buildings,

In the further part of this document, details and technical drawings of typical elements of residentialbuildings insulated thermally with **termPIR®** boards are presented.

CERTIFICATES

termPIR® boards possess the following certificates and attestations:

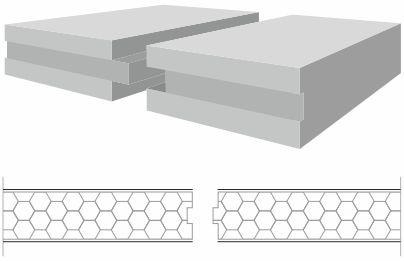
- Quality Management System Certificates,
- CE Declaration of Performance acc. to EN 13165,
- Fireproofing, reaction-to-fire performance, and fire non-proliferation classifications,
- Hygienic Certificate - approving for use in service, commercial, industrial, food sector, cooling, residential, and public use buildings, including healthcare buildings.

Current versions are available on the website.

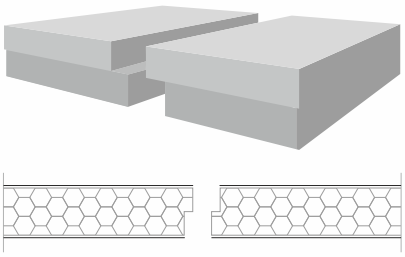
PRODUCTION PROGRAM

The **termPIR®** board is produced in a thickness from **20 to 250 mm.** Typical dimensionsof a single board are **600x1200 mm** and **1200x2400 mm**. It is possible to manufacture boards with the following dimensions: **1200x1200 mm**, **1200x1800 mm** and **1200x3000 mm**. In case of panels milled longitudinally only, also: **1200 x 3000 – 6200 mm**.

Precisely milled edges improve the thermal insulation and facilitate the assembly of insulation. There is a possibility to make mills: **FIT-** flat mill, **LAP-** corrugated mill, and **TAG-** tongue-and-groove mill. The surface of covering the slab with the LAP or TAG mill is smaller by approximately 2% when compared with slab with the FIT mill.The LAP mill is available for slab from 30 mm of thickness, and the TAG mill - for slab from 40 mm of thickness.

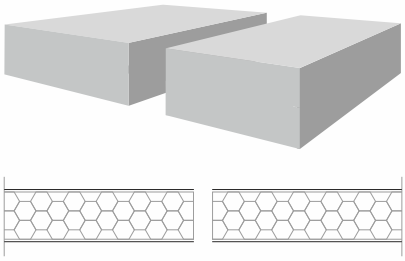


TAG - tongue and groove



LAP - stepwise milling

(for orders for an area above 2000m^2)



FIT - flat milling

TRANSPORT RECOMMENDATIONS

termPIR® thermal insulation boards are packed in packages enabling their handling. The typical package height is **500 mm**. The number of boards in a package depends on its thickness. The table below shows how to pack boards with dimensions of 1200x2400 mm.

Board thickness [mm]	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Number of boards in a package	24	16	12	10	10	7	6	6
Number of packages in a stack	5	5	5	5	4	5	5	4
Board thickness [mm]	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**
Number of boards in a package	5	5	5	4	4	4	3	3
Number of packages in a stack	5	4	4	5	4	4	5	4
Board thickness [mm]	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**
Number of boards in a package	3	3	3	2	2	2	2	2
Number of packages in a stack	4	4	4	5	5	5	5	5

Loading and unloading is carried out manually by single packages or using a fork lift provided with a grab for some packages. In case of longer, not typical boards, the relevant equipment or more persons should be provided for unloading. In this way, board breaking or damage can be prevented.

Note!

Boards are prone to damage, also when they are in the packaging. It is not allowed to throw or roll the packages. The transport of thermal insulation boards should be executed by trucks intended for this purpose. Upon the reception of insulation boards, the number and quality of the delivered commodities should be checked. Discrepancies should be described in the shipping list and reported to the manufacturer immediately. Possible damage to boards on the truck should be documented with photographs.

STORAGE RECOMMENDATION

- packages should be stored in a dry place; they should not be put directly on the ground, but supports should be used
- do not place heavy objects on the boards, this can cause serious damage
- protect from weather conditions
- single boards should be transported vertically so as to avoid their breaking.

PARAMETERS OF termPIR® BOARDS WITH GAS - TIGHT FACINGS

Kind of core		Rigid polyisocyanurate foam (PIR)						
Core density		ρ = 30 kg/m³						
Declared heat transfer coefficient for gas-tight boards (aging lambda)		λ_D = **0,022 W/m·K**						
Boards with gas-tight facings		**AL.** - multi-layer cladding containing aluminum **AGRO AL** - cladding made of 50 micron aluminum **AGRO P REV** - facing of an aluminum laminate and polyethylene, directed with an aluminum layer towards the PIR core. **AL. GK** - multi-layer cladding containing aluminum / plasterboard						
Standard board dimensions [mm]		600 x 1200 / 1200 x 2400						
Dimensions of boards on request [mm]		1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000						
Joint types		**FIT** - flat milling, **LAP** - stepwise milling*, **TAG** - tongue and groove*						
	Coef. U [W/m²·K], wg U = 1 / (Re + R_D + Ri)							
Nominal thickness [mm]:	for the wall	**20**	0,93	**30**	0,66	**40**	0,50	**50**	0,40
	for the roof		0,96		0,67		0,50		0,41
Thermal resistance: R_D [m²·K/W]	for the floor	0.90	0,93	1,35	0,66	1,85	0,50	2,30	0,40
		60	0,34	**70**	0,29	**80**	0,26	**90**	0,23
			0,35		0,29		0,26		0,23
		2,75	0,34	3,25	0,29	3,70	0,26	4,15	0,23
		100	0,21	**110**	0,19	**120**	0,17	**130**	0,16
			0,21		0,19		0,18		0,16
		4,65	0,21	5,10	0,19	5,55	0,17	6,05	0,16
		140	0,15	**150**	0,14	**160**	0,13	**170**	0,12
			0,15		0,14		0,13		0,12
		6,50	0,15	6,95	0,14	7,45	0,13	7,90	0,12
		180	0,12	**190**	0,11	**200**	0,11	**210**	0,10
			0,12		0,11		0,11		0,10
		8,35	0,12	8,85	0,11	9,30	0,11	9,75	0,10
		220	0,10	**230**	0,09	**240**	0,09	**250**	0,08
			0,10		0,09		0,09		0,08
		10,25	0,10	10,70	0,09	11,15	0,09	11,65	0,08
Compressive strength at 10% deformation		$\sigma \geq 120$ kPa - $20 \leq d_N < 30$ mm $\sigma \geq 140$ kPa - $140 \leq d_N \leq 250$ mm $\sigma \geq 150$ kPa - $30 \leq d_N \leq 250$ mm						
Classification according to reaction to fire (single board)		D - termPIR® AGRO AL, E - termPIR® AL (20-49: class F, 50-250: class E) F – termPIR® AGRO P REV, AL GK						
Water absorption [kg /kg]		≤ 2,0 % (for termPIR® AL)						

* dimensions of boards with joint types are 2 to 4 % smaller. **Milling:** LAP available for boards from 30 mm, TAG for boards from 40 mm
** not applicable: termPIR® AL GK, termPIR® AGRO P REV

PARAMETERS OF termPIR® BOARDS WITH GAS PERMEABLE FACINGS

Kind of core	Rigid polyisocyanurate foam (PIR)
Core density	ρ = 30 kg/m³
Declared heat transfer coefficient for gas permeable boards (aging lambda)	λ_D = **0,027** W/m•K for thickness d < 80 mm* λ_D = **0,026** W/m•K for thickness 80 ≤ d < 120 mm* λ_D = **0,025** W/m•K for thickness d ≥ 120 mm*
Boards with gas permeable facings	**WS,**- fiberglass **ETX** - lining dedicated for double-layered walls with a thickened glass veil structure. **BWS** - fiberglass impregnated with bitumen emulsion **BT** - bitumen facing
Standard board dimensions [mm]	600 x 1200 / 1200 x 2400
Dimensions of boards on request [mm]	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000
Joint types	**FIT** - flat milling, **LAP** - stepwise milling*, **TAG** - tongue and groove*

	Coef. U [W/m²·K], wg U = 1 / (Re + R_D + Ri)							
Nominal thickness [mm]:	for the wall	**20**	1,10	**30**	0,78	**40**	0,61	**50**	0,49
	for the roof		1,14		0,80		0,62		0,50
Opór cieplny: R_D [m²·K/W]	for the floor	0.70	1,10	1,10	0,78	1,45	0,61	1,85	0,49
		60	0,42	**70**	0,36	**80**	0,31	**90**	0,28
			0,42		0,37		0,31		0,28
		2,20	0,42	2,55	0,36	3,05	0,31	3,45	0,28
		100	0,25	**110**	0,23	**120**	0,20	**130**	0,19
			0,25		0,23		0,20		0,19
		3,80	0,25	4,20	0,23	4,80	0,20	5,20	0,19
		140	0,17	**150**	0,16	**160**	0,15	**170**	0,14
			0,17		0,16		0,15		0,14
		5,60	0,17	6,00	0,16	6,40	0,15	6,80	0,14
		180	0,14	**190**	0,13	**200**	0,12	**210**	0,12
			0,14		0,13		0,12		0,12
		7,20	0,14	7,60	0,13	8,00	0,12	8,40	0,12
		220	0,11	**230**	0,11	**240**	0,10	**250**	0,10
			0,11		0,11		0,10		0,10
		8,80	0,11	9,20	0,11	9,60	0,10	10,00	0,10

Compressive strength at 10% deformation	σ ≥120 kPa - 20 ≤ d_N < 30 mm σ ≥140 kPa - 140 ≤ d_N ≤ 250 mm σ ≥150 kPa - 30 ≤ d_N ≤ 250 mm
Classification according to reaction to fire (single board)	E - termPIR® WS (20-49: class F, 50-250: class E), termPIR® ETX (20-49: class F, 50-250: class E) F – termPIR® BT, termPIR® BWS (20-49: class F, 50-250: class E (from WS side) / class F (from BT side))
Water absorption [kg /kg]	≤ 2,0 % (for termPIR® WS)

* dimensions of boards with joint types are 2 to 4 % smaller. **Milling:** LAP available for boards from 30 mm, TAG for boards from 40 mm
** termPIR® ETX board available only in dimension 600 x 1200 mm

COMPARISON OF THERMAL INSULATION MATERIALS

In the table, the parameters of thermal insulation made from **termPIR®** boards, mineral wool and Styrofoam are compared. The summary includes the minimum values of the U heat transfer coefficient for selected partitions according to the Regulation of the Minister of Infrastructure of 01/01/2021

Requirements for 2021

The scope of application of the insulation, maximal permissible value of the coecient $U_{(MAX)}$ of the partition		Required thickness, coecient U and weight of termPIR® boards						Required thickness, coecient U and weight of hard rock wool board (λ=0,040 W/m·K)		equired thickness, coecient U and weight of Styrofoam boards (λ=0,038 W/m·K)	
	[W/m²·K]	[mm]			[kg/m²]			[mm]	[kg/m²]	[mm]	[kg/m²]
Roofs, flat roofs and ceilings under unheated attics or over passages											
at t_i≥16˚C	0,15	150[1]	170[2]	130[3]	5,20[1]	6,13[2]	-[3]	280	33,6	260	6,50
at 8˚C≤t_i<16˚C	0,30	80[1]	90[2]	70[3]	2,91[1]	3,52[2]	-[3]	130	15,6	130	3,25
at t_i≥8˚C	0,70	40		30[3]	1,61[1]	1,90[2]	-[3]	60	7,2	50	1,25
External walls											
at t_i≥16˚C	0,20	110[1]	130[2]	100[3]	3,89[1]	4,83[2]	-[3]	210	25,2	200	5,00
at 8˚C≤t_i<16˚C	0,45	50[1]	60[2]	40[3]	1,94[1]	2,55[2]	-[3]	90	10,8	80	2,0
at t_i≥8˚C	0,90	30[1]	30[2]	20[3]	1,29[1]	1,58[2]	-[3]	40	4,8	40	1,0
Floors on the ground											
at t_i≥16˚C	0,30	70[1]	90[2]	60[3]	2,59[1]	3,52[2]	-[3]	Not applied		130	3,25
at 8˚C≤t_i<16˚C	1,20	according to mechanical requirements								according to mechanical requirements	
at t_i≥8˚C	1,50										
Internal walls and ceilings between storeys											
at Δt_i ≥ 8˚C	1,00	20[1]	30[2]	20[3]	0,96[1]	1,58[2]	???[3]	40	4,8	40	1,0
Ceilings separating a heated room from non-heated one											
	0,25	90[1]	110[2]	80[3]	3,24[1]	3,85[2]	???[3]	160	19,2	150	3,75
Walls separating a heated room from non-heated one											
	0,30	80[1]	90[2]	70[3]	2,91[1]	3,52[2]	???[3]	130	15,6	130	3,25

KEY:

1 - the value of heat transfer coefficient for lining of termPIR® AL.amounts to **0,022** W/m·K

2 - the value of heat transfer coefficient for lining of termPIR® WS, BWS, BT, PK, ETX amounts to **0,025 – 0,027** W/m·K depending on board thickness

3 - the value of heat transfer coefficient for lining of termPIR® MAX 19 AL. amounts to **0,019** W/m·K

Types of rooms: **t_i≥16˚C** - apartments, production halls, sports halls, offices, meeting rooms, etc.; **8˚C≤ t_i<16˚C** - stores and warehouses with permanent service iipersonnel, staircases of residential buildings, market halls, etc.**;** **t_i≤8˚C** - stores and warehouses without permanent service personnel, garages, machine rooms, battery irooms, etc.

SELECTION OF termPIR® INSULATION BOARDS IN RESIDENTIAL BUILDINGS

Building element	Facing type of termPIR® boards		Thickness [mm]	
	gas-tight	gas permeable	according to WT 2021	
Roofs on the rafter or under the rafter	termPIR® AL	-	150	-
Roofs under the rafter	termPIR® AL, AL GK	-	150	50
Flat roofs mechanically mounted	termPIR® AL	termPIR® BT	150	170
Flat roofs in the bonded system	termPIR® AL	termPIR® BT, BWS	150	170
Triple layer external wall	termPIR® AL	-	110	-
Double layer external wall in the dry system	termPIR® AL	-	110	-
Double layer external wall in the ETICS system	termPIR® ETX	-	130	-
Interior walls	termPIR® AL GK	-	-	-
Skeleton partition walls	termPIR® AL	termPIR® WS	-	-
Cellar and foundation walls	termPIR® AL	termPIR® BWS	30	40
Ceilings between storeys	termPIR® AL, AGRO P REV*	termPIR® WS	-	-
Ceilings over unheated spaces	termPIR® AL, AGRO P REV*	-	90	-
Floor on the ground	termPIR® AL, AGRO P REV*	-	80	-
Washable suspended ceilings	termPIR® AGRO AL,	-	-	-
Prefabricated walls	termPIR® AGRO P REV	-	110	-

* - recommended for underfloor heating and anhydrite screed

ADVANTAGES OF termPIR® BOARDS

- **low thermal conductivity index (λ=0,022 W/m·K)*** - the lower the index, the better insulation is provided by the material,
- **high resistance to fire** - in direct contact with fire, charred coating appears on the material surface, which efficiently protects the structures located deeper against fire penetration, increasing the level of resistance to fire,
- **minimisation of thermal insulation thickness** - the termPIR® board features almost twice as good thermal insulation properties as those of the currently used thermal insulation materials
- **minimisation of insulation load** - square metre of 100 mm thick termPIR® AL boards (U = 0,22 W/m·K) weighs approximately 3 kg,
- **high compression strength** makes the panel an ideal choice for flooring or terraces. termPIR® is a material which preserves its form, will not break or shrink even after many years of use,
- **water resistance** - high resistance to permeation of humidity and water (absorbability <2% for termPIR AL and WS),
- **resistance** to chemical factors, as well as rodents, insects, fungi, and moulds.

termPIR® boards allow for thermal insulation cost reduction by:

- attractive price of m3 of the product
- smaller thickness of thermal insulation required, reduction of purchase costs
- a few times lighter, which makes transport and installation substantially less labour costly and less expensive
- assumed at the stage of designing they allow for making the building construction leaner as compared with heavier thermal insulation material, which can reduce the costs of the whole investment.

* for termPIR® AL

TECHNICAL ASSISTANCE

We strive to deliver friendly and professional customer service. Our technical department and sales representatives assist designers, engineers and contractors in designing, ordering and selecting our products as well as installation thereof. Our customers are thus provided with active support from the design stage to the installation stage as well as prompt technical advisory service and cost calculation. The ordering and delivery process is coordinated by the Customer Service Department (DOK).

For more information visit our websites: **www.termPIR.eu** i **www.gor-stal.pl**

BOARDS WITH INCREASED THERMAL INSULATION PROPERTIES: termPIR® MAX19

We are pleased to present the outcome of our research and development efforts.
They are the products for the most demanding customers: the board featuring the record-breaking low lambda coefficient:
termPIR® MAX19: λ_D=0,019 W/m·K.
PRODUCT MADE FOR SPECIAL REQUEST WITH INDIVIDUAL PRICING AND DETERMINATION OF EXECUTION DATE!

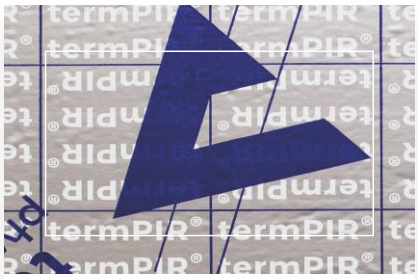
Kind of core	Rigid polyisocyanurate foam (PIR)
Apparent core density	ρ = 30 kg/m³
Declared heat transfer coefficient (aging lambda)	λ_D = 0,019 W/m·K
Board facings	• **AL** - multi-layer facing containing aluminum
Standard board dimensions [mm]	600 x 1200 / 1200 x 2400
Dimensions of boards on request [mm]	1000 x1200 / 1200 x 1200 / 1200 x 1800 / 1200 x 3000
Joint types	FIT - flat milling, LAP - stepwise milling**(for orders above 2000m²), TAG - tongue and groove**

Nominal thickness [mm]:	Coef. U [W/m²·K], wg U = 1 / (Re + R_D + Ri)							
	for the wall	**80**	0,22	**90**	0,20	**100**	0,18	**110**	0,16
	for the roof		0,22		0,20		0,18		0,16
Opór cieplny: R_D [m²·K/W]	for the floor	4,35	0,22	4,90	0,20	5,45	0,18	5,95	0,16
		120	0,15	**130**	0,14	**140**	0,13	**150**	0,12
			0,15		0,14		0,13		0,12
		6,50	0,15	7,05	0,14	7,60	0,13	8,15	0,12
		160	0,11	**170**	0,11	**180**	0,10	**190**	0,10
			0,11		0,11		0,10		0,10
		8,70	0,11	9,25	0,11	9,80	0,10	10,35	0,09
		200	0,09	**210**	0,09	**220**	0,08	**-**	-
			0,09		0,09		0,08		-
		10,90	0,09	11,45	0,09	11,95	0,08	-	-

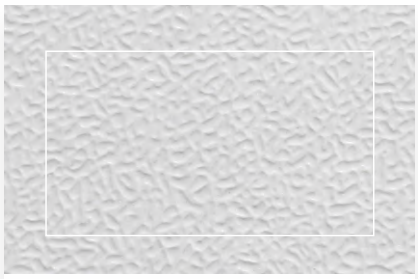
Compressive strength at 10% deformation	σ ≥100 kPa
Classification according to reaction to fire (single board)	E - termPIR® MAX19 AL
Water absorption [kg /kg]	-

* dimensions of boards with joint types are 2 to 4 % smaller. **Milling:** LAP available for boards from 30 mm, TAG for boards from 40 mm

FACINGS OF INSULATION BOARDS

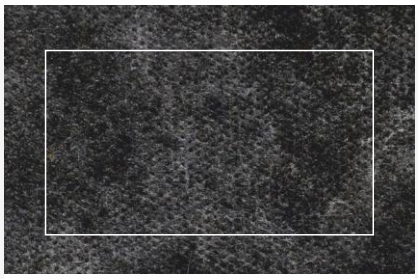


termPIR® AL / termPIR® MAX 19 AL

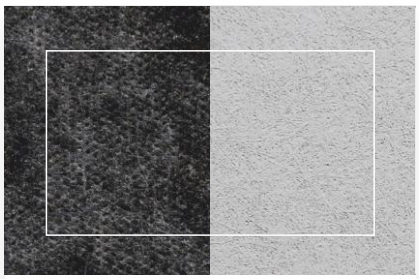


termPIR® AGRO AL

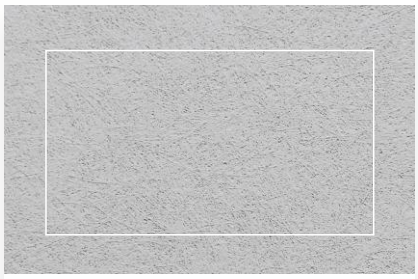
termPIR® AL GK



termPIR® BT



termPIR® BWS



termPIR® WS

termPIR® AGRO P REV

termPIR® ETX

WHY IT IS WORTH USING termPIR® boards?

Property	termPIR® board	rock wool	EPS styrofoam
Thermal insulation	the best λ = 0,019 - 0,027 W/m·K	λ = 0,033 - 0,040 W/m·K	λ = 0,031 - 0,038 W/m·K
Hardness	top hardness strength to 15tons/m²	soft, not bearing	strength up to 10 tons/m²
Absorbability	small absorbability < 2%	high absorbability	small absorbability < 2%
Biological resistance	fully resistant	frequent rodent habitat	rodent habitat
Chemical resistance	fully resistant	resistant	not resistant
Fire resistance	self-extinguishing	non-flammable	self-extinguishing
Application	all-purpose for roofs, ceilings, walls, foundations	limited by absorbability and strength	all-purpose
Product life-span	very long	can change the shape and parameters over time	

INSULATION OF PITCHED ROOFS

termPIR® boards can be installed on sloping roofs in several ways:
1. **Single layer:** under rafters, on rafters and on rafters with planking,
2. Double layer: under rafters and between rafters

Due to the effectiveness of insulation, single layer installation is recommended. It is caused by the fact that a rafter appearing in one of the layers of the **double layer** insulation diminishes its properties substantially. That is why the under-rafter insulation must have a minimum thickness of 40 mm, in order to diminish the thermal bridge and joint thickness of the panels must be larger than in the case of the single layer installation. The double layer installation corresponds to the most popular method of the thermal insulation of lofts using soft rock wool. The installation is similar, but due to the fact that the polyurethane panels are hard:

-the panels must be installed in a staggered way, mounted to the construction with screws, possible gaps in insulation should be sealed with installation foam and in order to seal the joints they must be additionally bonded with an aluminium tape.

-hangers of the construction profiles under the panels g-k should be mounted to the rafters through the insulation under the rafter. The **single layer** installation under rafters is connected with making only one, relevantly thicker insulation layer below the roof purlins, without insulation between the rafters (the layer between the rafters can also be made from rock wool). Below is listed a detailed description of over-rafter assembly method. In case of the on-rafter system with planking, the installation is analogous, it differs only in the making of the complete (or openwork) planking before the installation of **termPIR®** boards.

INSTALLATION GUIDELINES for a roof with on-rafter insulation

Tools necessary for assembly:
- a screw gun with a torx and PH head
- a manual or mechanical wood saw
- a wallpaper knife
- a stapler

Accessories necessary for assembly:
- aluminium tape for sealing panel joints
  - consumption: 1,25-1,5 m. per each 1 m^2 of the **termPIR®** board (one side use), available in 45 m long reels.
- vapour-permeable membrane
  - consumption: 1,1 m^2 per each 1 m^2 **termPIR®** board
- dedicated fixing screws
  On the following pages there is a table of screw selection for **termPIR®** boards.
- other screws and accessories used with traditional covering
  (screws for fixing battens, covers, staples, etc.)

Stages of assembly of a sloping roof in the on-rafter system

1. Eaves assembly.

The assembly begins with the assembly of the eaves or overhang, which will also form a sort of support for the first row of the **termPIR®** insulation boards. The eaves should be installed in such a way that they protrude above the rafter for the length equal to the thickness of the installed boards. In order for the eaves to avoid looking unnaturally wide, the bottom of the rafter can be cut and the wedge obtained in this way can be used as a support for the board from the top of the rafter.

You should remember though about taking the preliminary measurement of the rafters, you should also calculate the foreseen length of the roofline with insulation.

2. Assembly of the first row of termPIR® insulation boards.

Boards are assembled with the longer side (2400 mm) in parallel with eaves. The direction and the side of the board assembly do not matter; however, for the comfort of assembly of the following rows you should consider the panel milling direction (especially in case of the board with LAP stepwise milling).

3. Arranging windproofing.

A vapor-permeable membrane (in accordance with the manufacturer's markings) should be placed on the boards, which will act as a windproof layer. A reserve should be left at the bottom, which will allow the water to drain into the gutter from any leaks and condensate from the cover.

4. Assembly of counter battens.

The correct assembly of the **termPIR®** thermal insulation to the roof structure is carried out through screwing of counter battens to rafters. Because counter battens become a load bearing elements of the covering, their thickness must have at least 40 mm. They are mounted to rafters using screws for timber structures. Recommended screw spacing according to the table on page 013.

5. Assembly of subsequent row of the termPIR® insulation boards.

Assembly of the boards should be carried out in accordance with steps 3 and 4, remembering at the same time to shift the next layer in relation to the previous one. Remember to shift the board joints relative to the previous row (arrange them staggeringly).

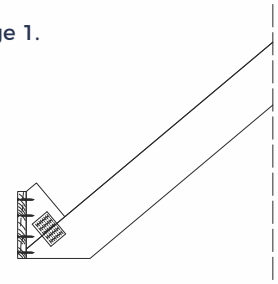
6. Connection of stretches on the ridge.

Insulation boards should be cut on the ridge in such a way that there will be a 5-15 mm gap between the slabs. The gap should be filled out with assembly foam and the connection should be covered with sealing tape. Next, the remaining elements are mounted according to guidelines from points 3 and 4.

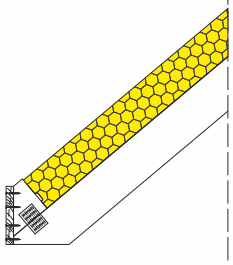
7. Assembly of battens and roof covering.

The battens should be mounted directly on load-bearing battens using screws with length not exceeding the total thickness of battens, distance counter battens, and load-bearing counter battens. In case of heavy covering please also attach the battens directly to the two outermost rafters

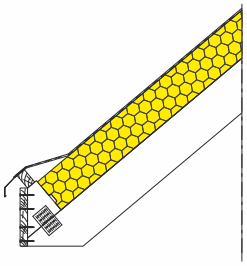
Stage 1.



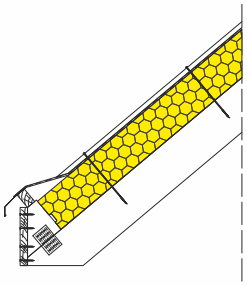
Stage 2.



Stage 3.



Stage 4.



Final detail.

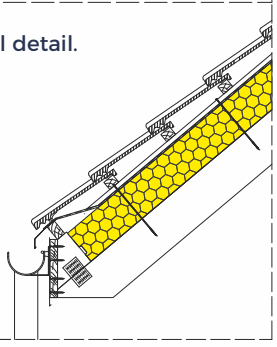


Diagram of one possible assembly method

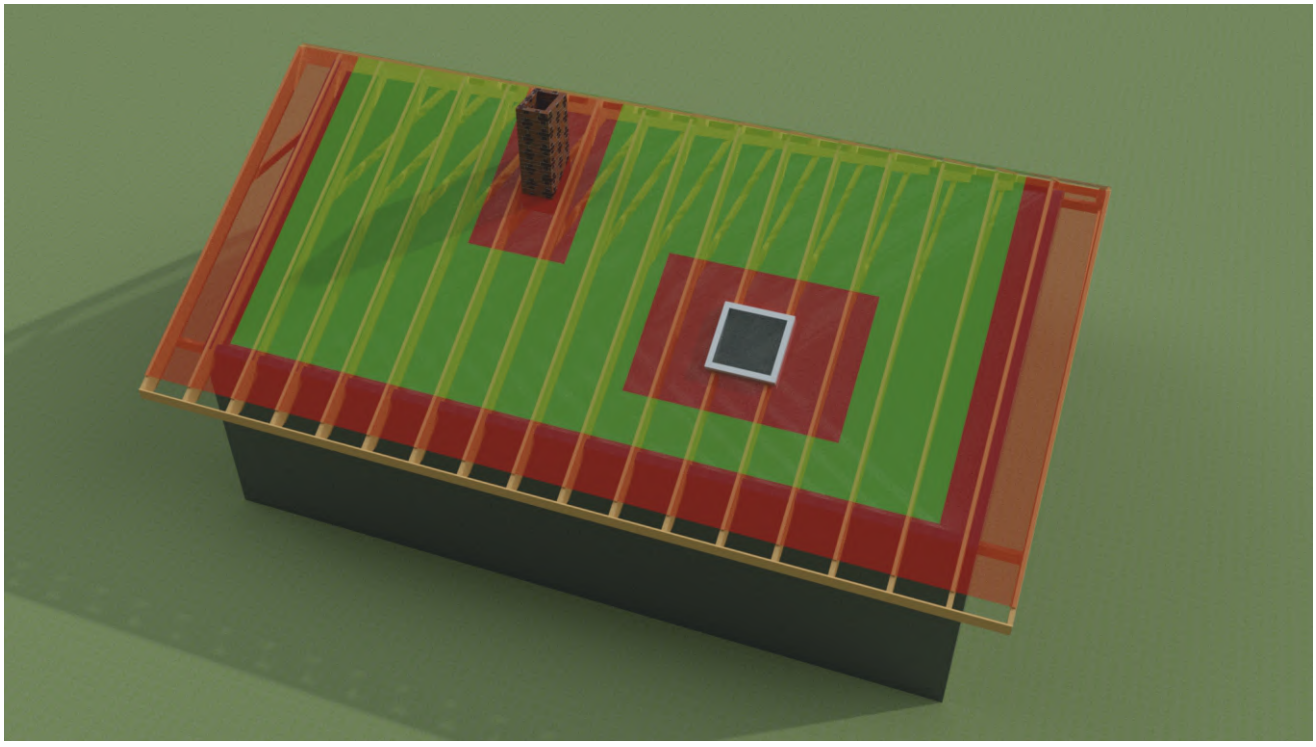
Selection of screws for assembly of the termPIR® boards

Table of selection of screws

termPIR® board thickness	Recommended screw length	The recommended number of screws per running meter of the counter-batten	
		in the inner zone (green)	in the extreme zone (red)
120 mm	260 mm	3 pcs (approx. every 35-40 cm) *	+ 1 pc to the quantity from the column after left
130 mm	280 mm		
140 mm			
150 mm	300 mm		
160 mm			
170 mm	320 mm		
180 mm			
190 mm	340 mm		
200 mm			
210 mm	360 mm		
220 mm			

* quantities assuming installation at an angle of 90 degrees only

The graphic below shows the location of the zones on the roof

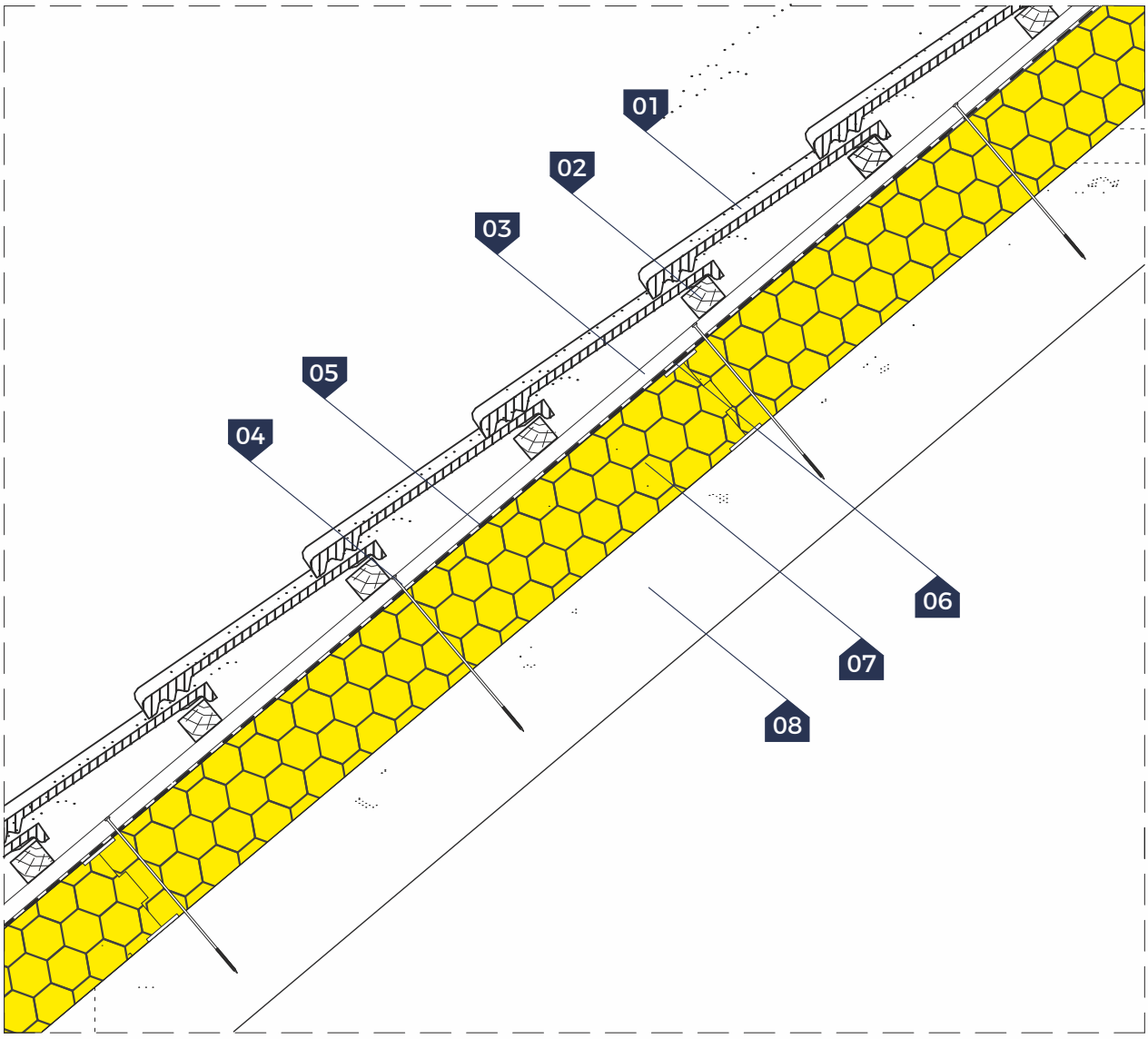


Examples of pitched roof details insulated thermally with termPIR® boards

PITCHED ROOF - On-rafter system (without planking)

Cross section through roof

termPIR®
insulation boards



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Screw fixing a counter-batten to a rafter
05. Wind insulation - vapour permeable membrane
06. Aluminum tape sealing the connections
07. On rafter thermal insulation - termPIR® AL. board
08. Wooden rafter

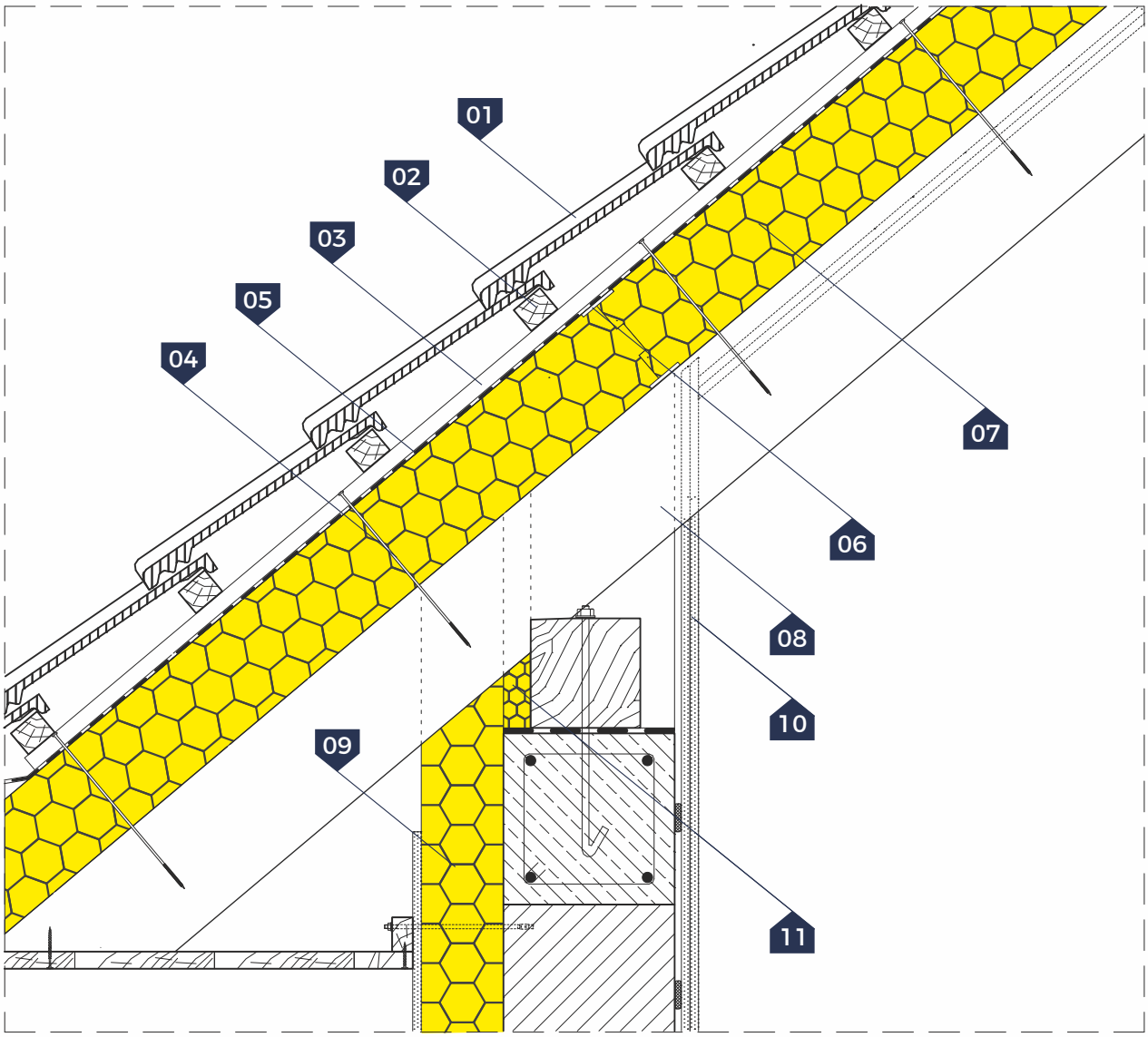
NOTE:

a. A counter-batten is fixed to a rafter through a thermal insulation panel with self-tapping screws every 40 cm, when every second screw in installed at 67 ° degrees
b. In case of high humidity rooms, it is recommended to install the vapour permeable membrane under the termPIR® boards

PITCHED ROOF - On-rafter system (without planking)

Detail of connection between the knee wall and roof

termPIR®
insulation boards



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Screw fixing a counter-batten to a rafter
05. Wind insulation - vapour permeable membrane
06. Aluminum tape sealing the connections
07. On rafter thermal insulation - termPIR® AL. board
08. Wooden rafter
09. Wall thermal insulation - termPIR® ETX board
10. Loft finishing - e.g. g-k panel on battens
11. Bottom chord thermal insulation - termPIR® AL. board

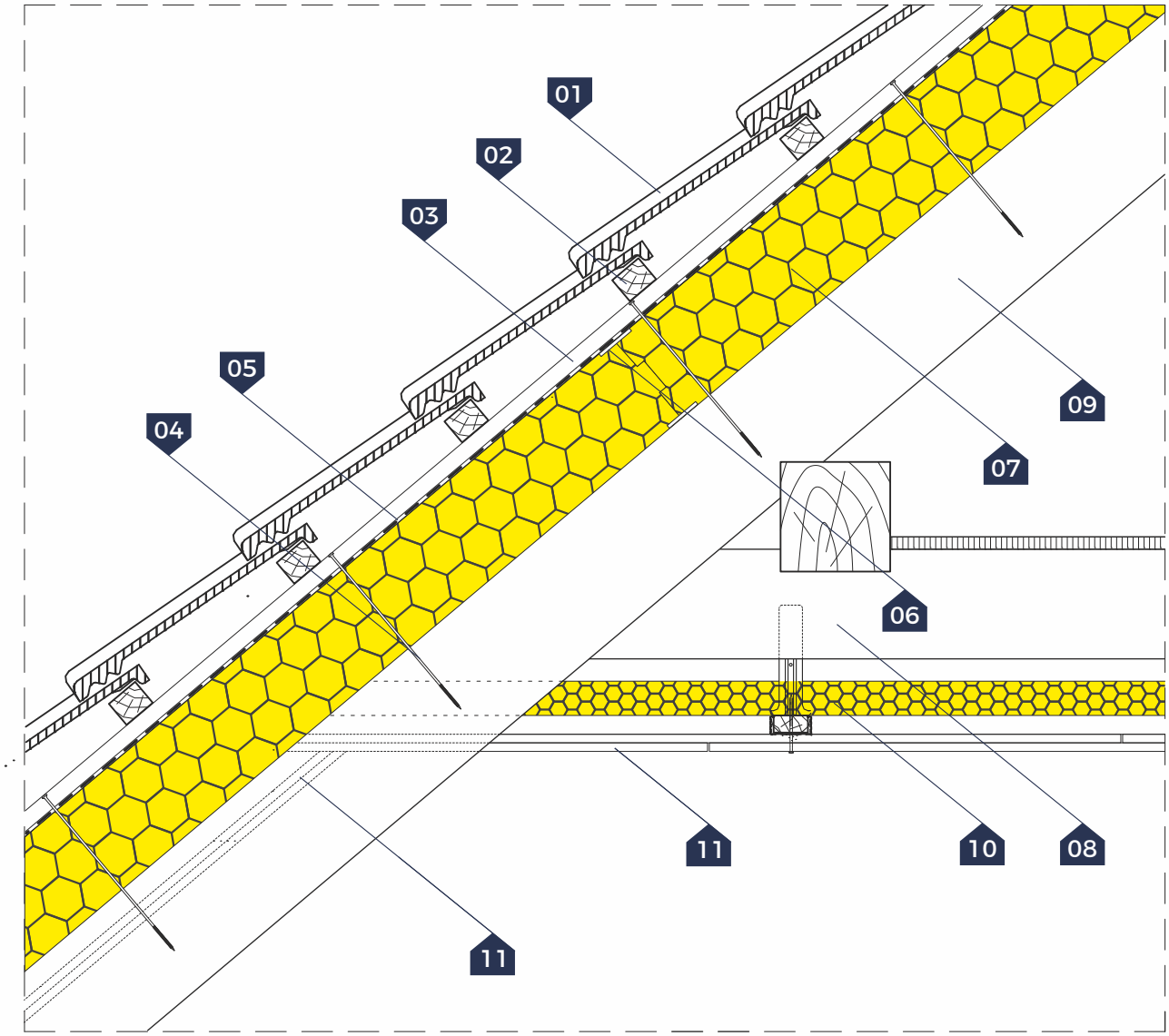
NOTE:

a. A counter-batten is fixed to a rafter through a thermal insulation panel with self-tapping screws every 40 cm, when every second screw in installed at 67 ° degrees
b. The cut boards are to be sealed with assembly foam
c. In case of high humidity rooms, it is recommended to install the vapour permeable membrane under the termPIR® boards

PITCHED ROOF - On-rafter system (without planking)

Detail of connection between the roof and ceiling

termPIR®
insulation boards



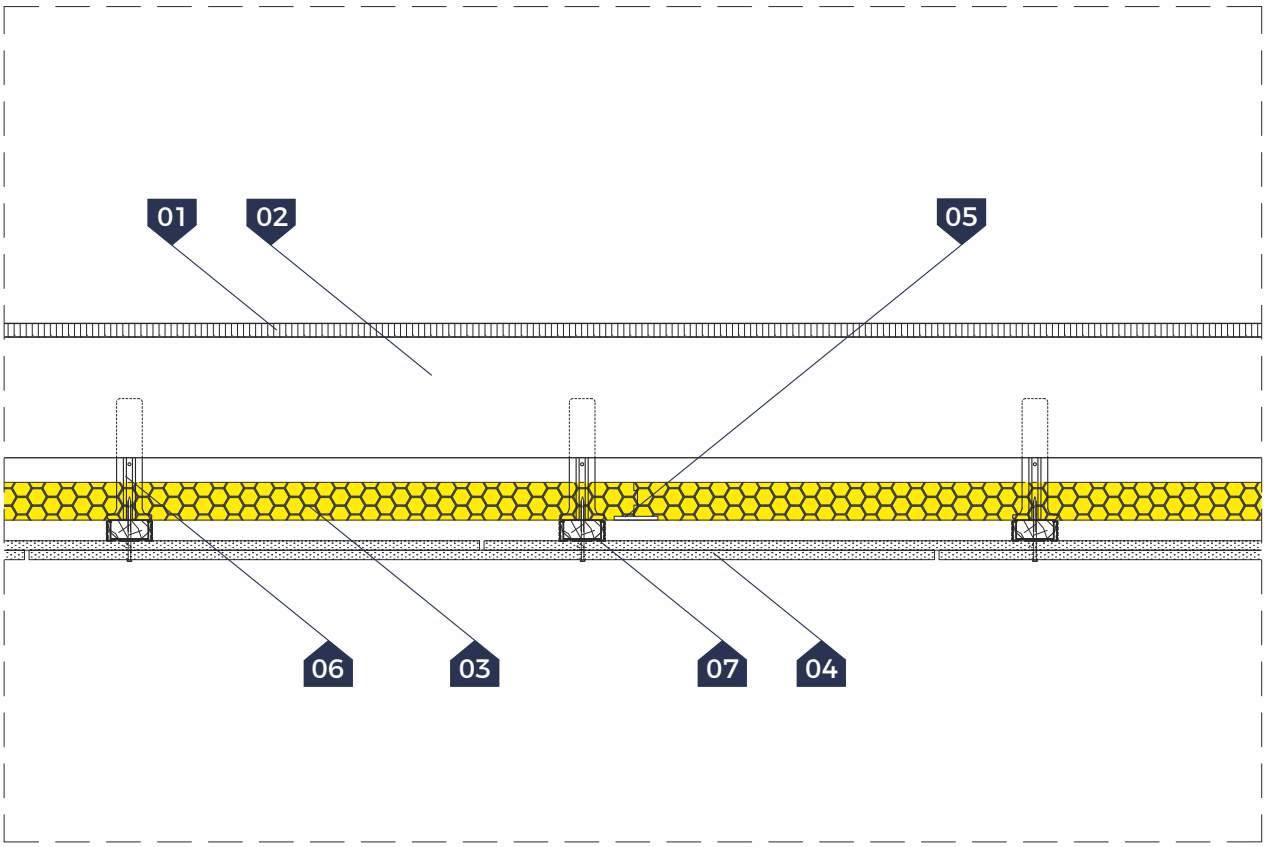
KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Screw fixing a counter-batten to a rafter
05. Wind insulation - vapour permeable membrane
06. Aluminum tape sealing the connections
07. On rafter thermal insulation - termPIR® AL. board
08. Collar beam
09. Wooden rafter
10. Ceiling thermal insulation - termPIR® AL. board
11. Loft finishing - e.g. g-k panel on battens

NOTE:

a. A counter-batten is fixed to a rafter through a thermal insulation panel with self-tapping screws every 40 cm, when every second screw in installed at 67 ° degrees
b. The cut boards are to be sealed with assembly foam
c. In case of high humidity rooms, it is recommended to install the vapour permeable membrane under the termPIR® boards

termPIR®
insulation boards

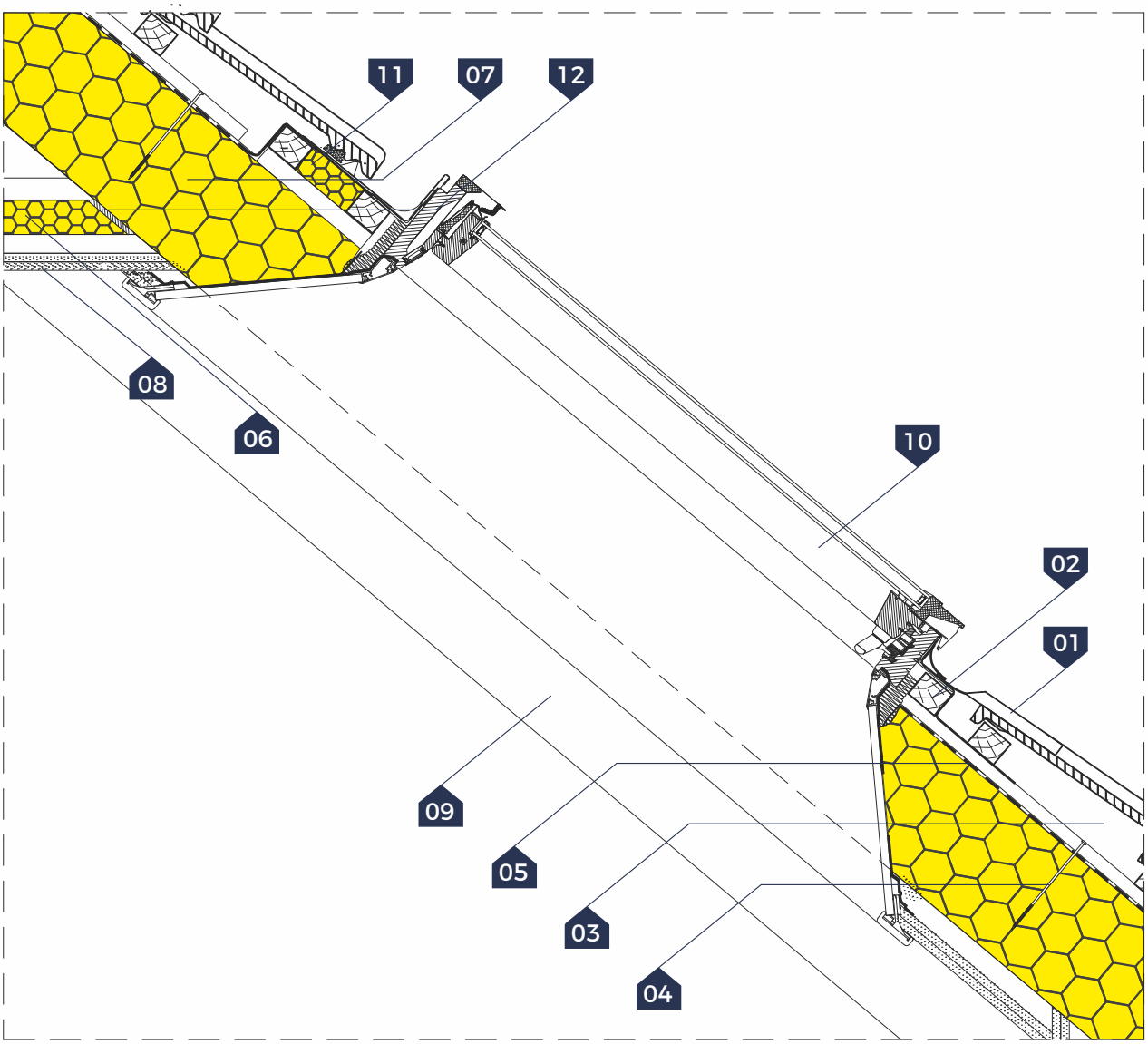


KEY:

01. OSB board
02. Collar beam
03. Ceiling thermal insulation - termPIR® AL. board
04. Finish - e.g. gypsum board on battens
05. Aluminium tape for sealing joints
06. Ceiling fixing hanger
07. Substructure under the gypsum board

NOTE:

a. In case of high humidity rooms, it is recommended to install the vapour permeable membrane under the termPIR® boards
b. The cut boards are to be sealed with assembly foam



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Screw fixing a counter-batten to a rafter
05. Wind insulation - vapour permeable membrane
06. Ceiling thermal insulation- termPIR® AL. board
07. On-rafter thermal insulation - termPIR® AL. board
08. Loft finishing - e.g. g-k panel on battens
09. Wooden rafter
10. Roof window
11. Window edge thermal insulation - termPIR® AL. board
12. The slot is filled with low-pressure PIR foam

NOTE:

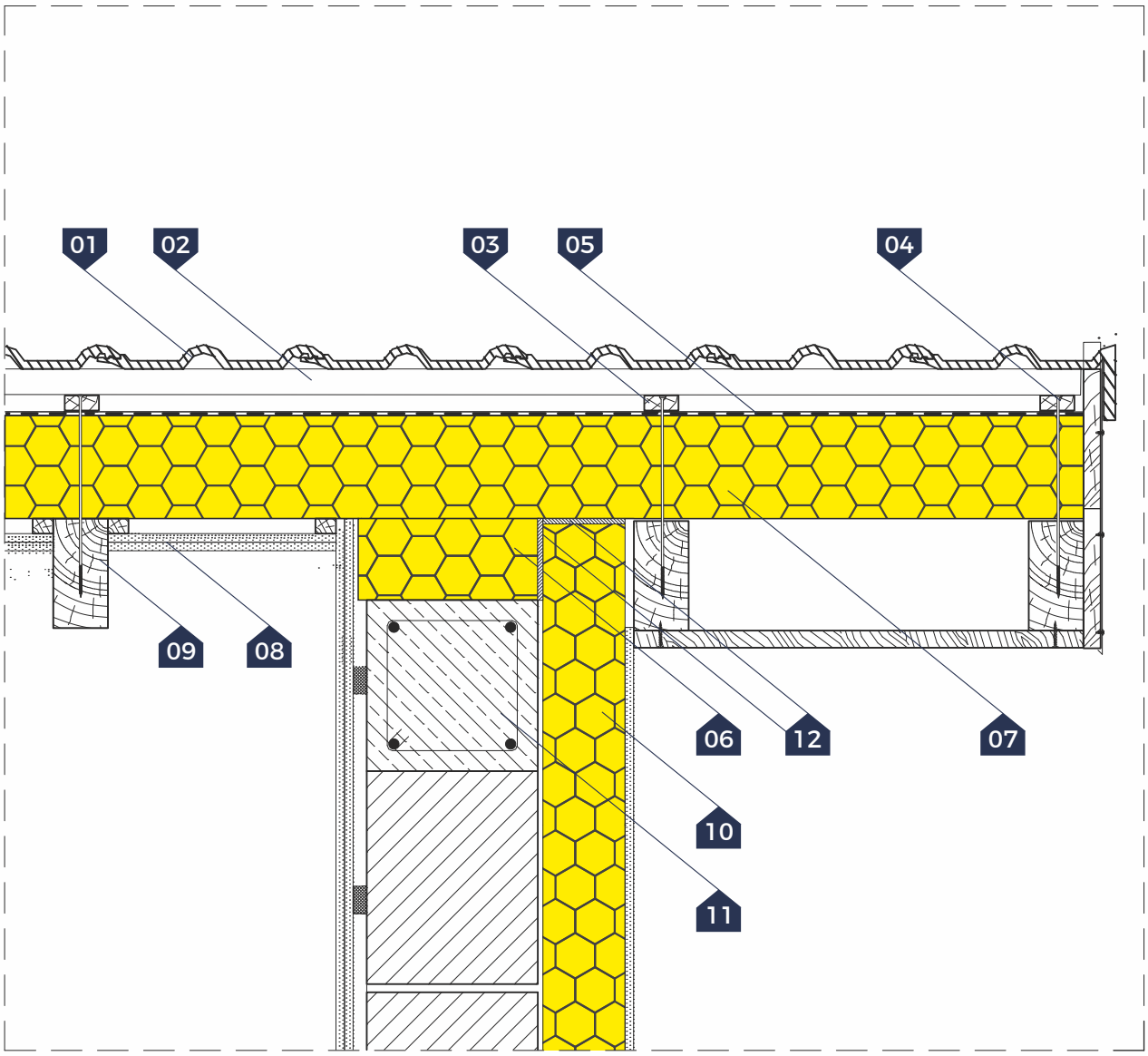
a. A counter-batten is fixed to a rafter through a thermal insulation panel with self-tapping screws every 40 cm, when every second screw in installed at 67 ° degrees
b. The cut boards are to be sealed with assembly foam
c. In case of high humidity rooms, it is recommended to install the vapour permeable membrane under the termPIR® boards

PITCHED ROOF - On-rafter system (without planking)

Detail at the gable wall

- Cross section perpendicular to the roof surface

termPIR®
insulation boards

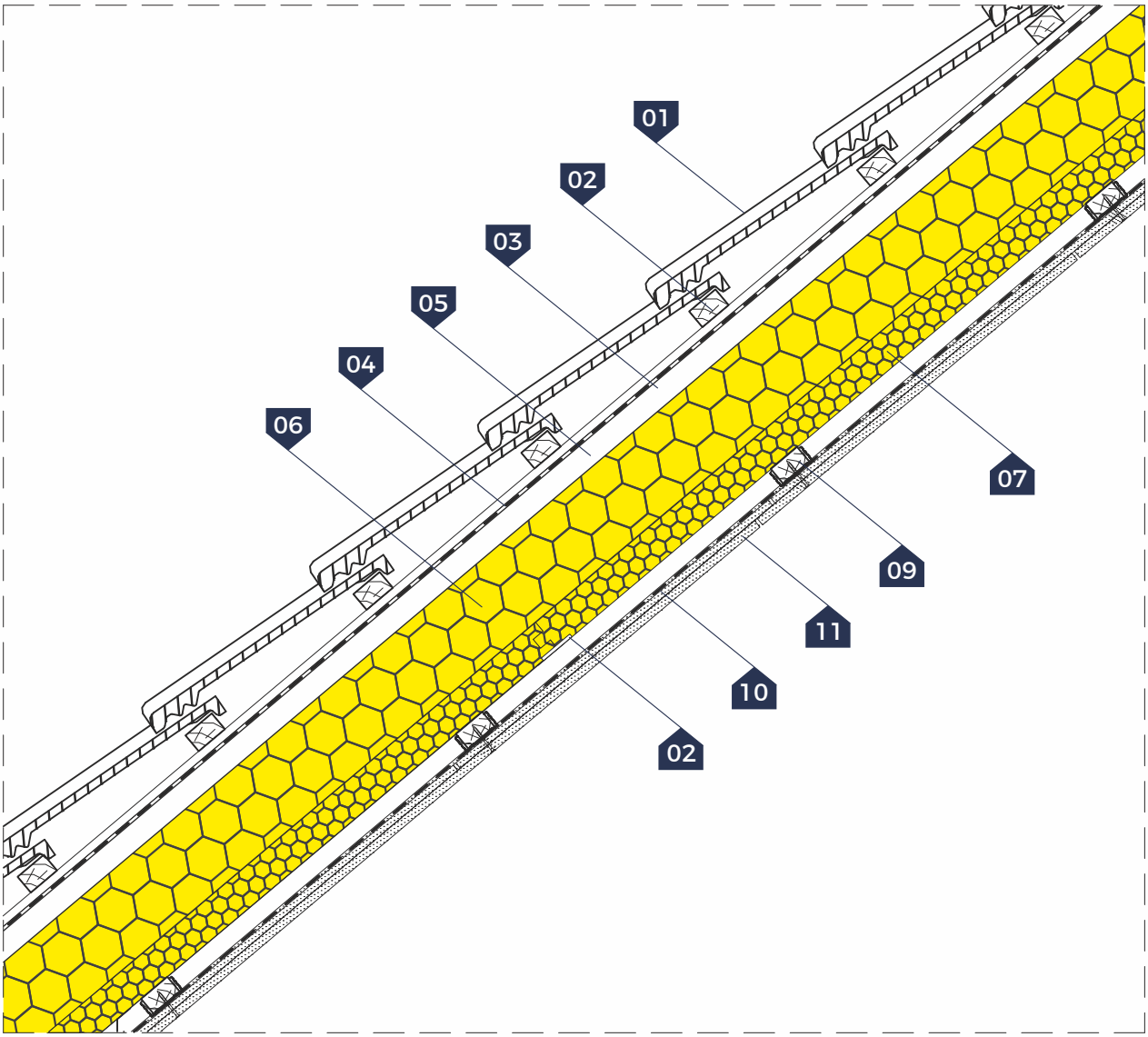


KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Screw fixing a counter-batten to a rafter
05. Wind insulation - vapour permeable membrane
06. Tie beam thermal insulation- termPIR® AL. board
07. On-rafter thermal insulation - termPIR® AL. board
08. Loft finishing - e.g. g-k panel on battens
09. Wooden rafter
10. Wall thermal insulation- termPIR® ETX board
11. Tie beam locking the gable wall
12. The slot is filled with low-pressure PIR foam

NOTE:

a. A counter-batten is fixed to a rafter through a thermal insulation panel with self-tapping screws every 40 cm, when every second screw in installed at 67 ° degrees
b. The cut boards are to be sealed with assembly foam
c. In case of high humidity rooms, it is recommended to install the vapour permeable membrane under the termPIR® boards

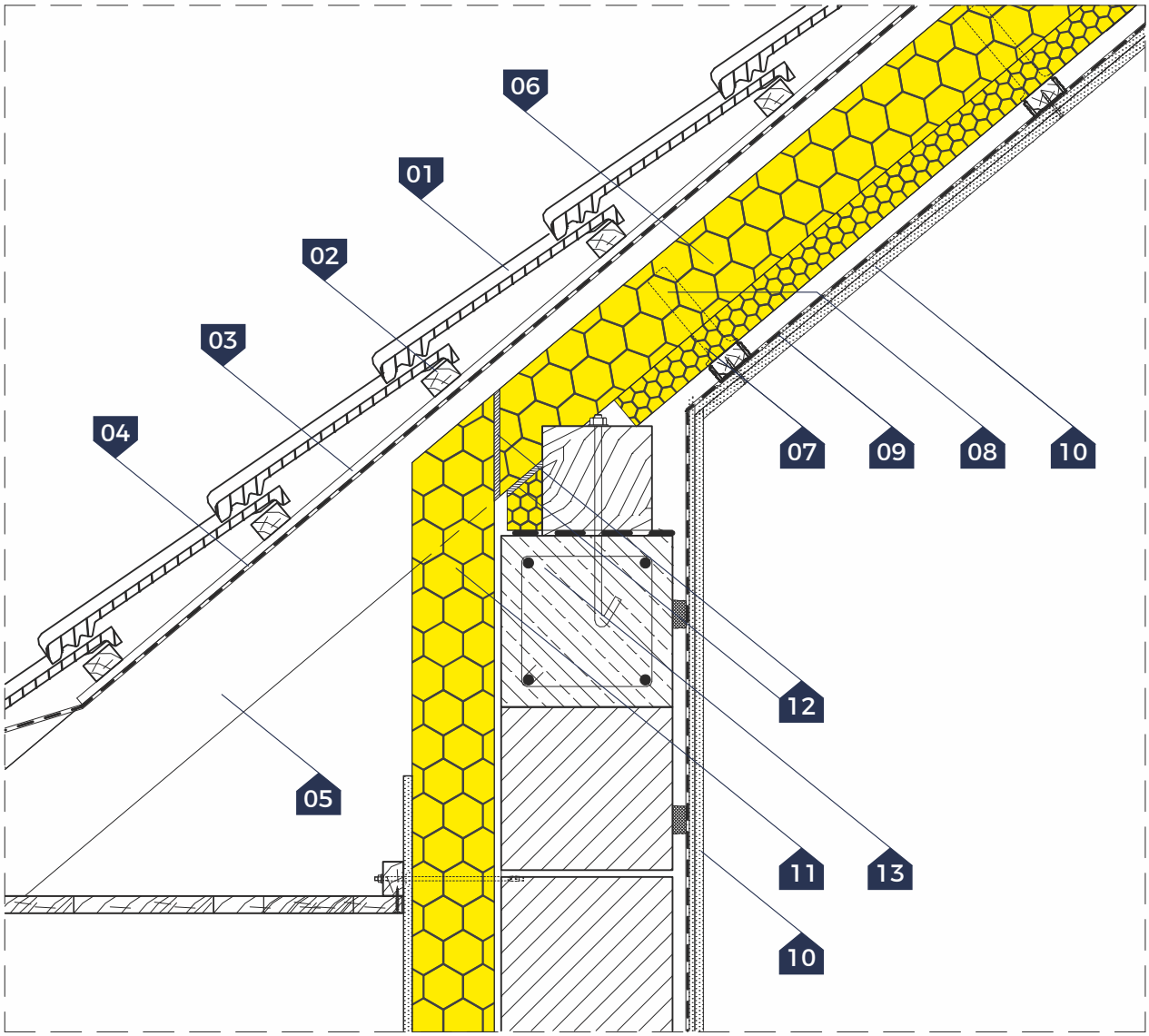


KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. board
08. Aluminum sealing tape
09. Substructure under the gypsum board
10. Vapour permeable membrane - PE foil (for rooms with high humidity)
11. Loft finishing - e.g. g-k panel on battens

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Substructure under the gypsum board
08. Ceiling fixing hanger
09. Vapour permeable membrane - PE foil (for rooms with high humidity)
10. Loft finishing - e.g. g-k panel on battens
11. Walls insulation - termPIR® ETX board
12. The slot is filled with low-pressure PIR foam
13. Wall plate

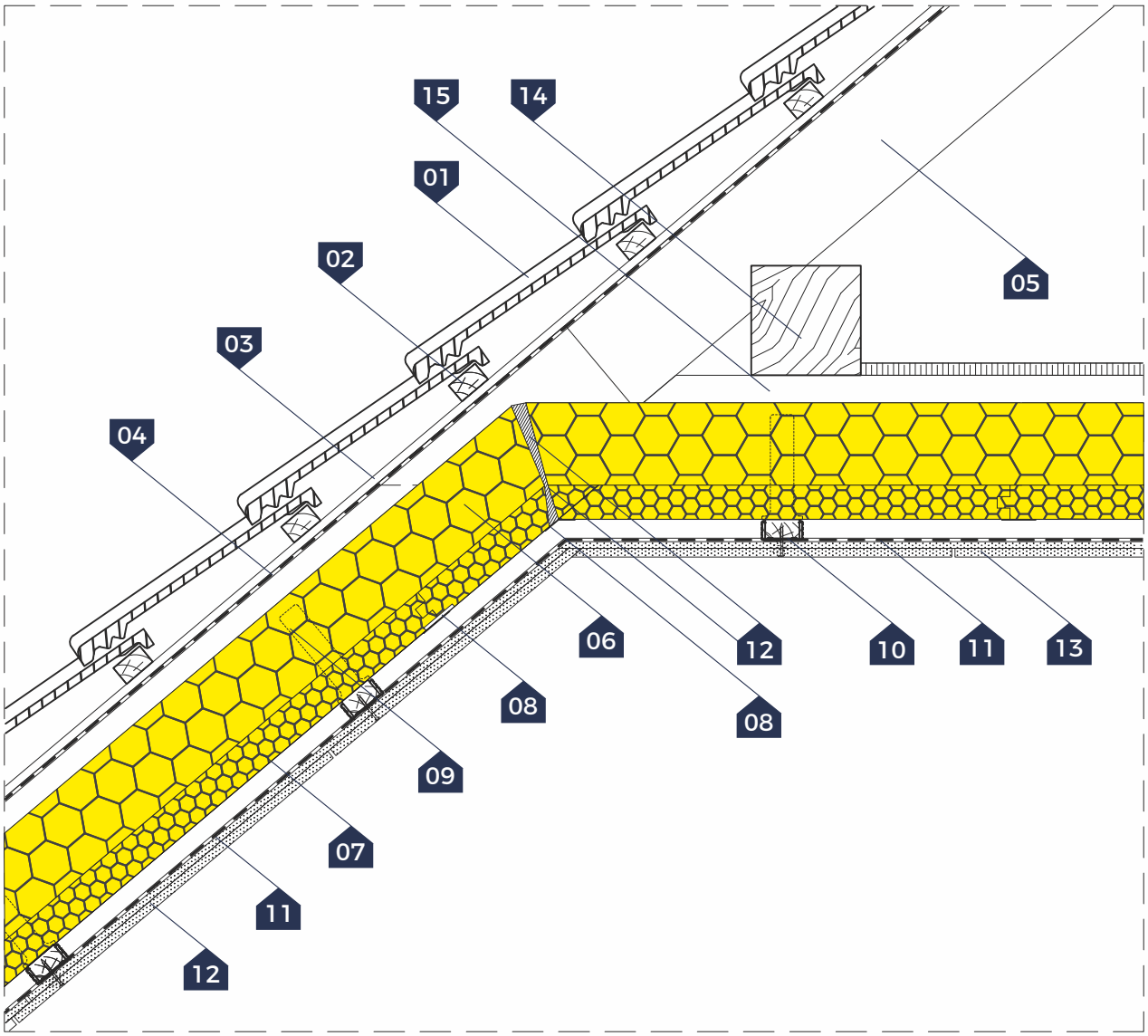
NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam

PITCHED ROOF - Under and between rafter system - W I

Detail of connection between the roof and ceiling

termPIR®
insulation boards



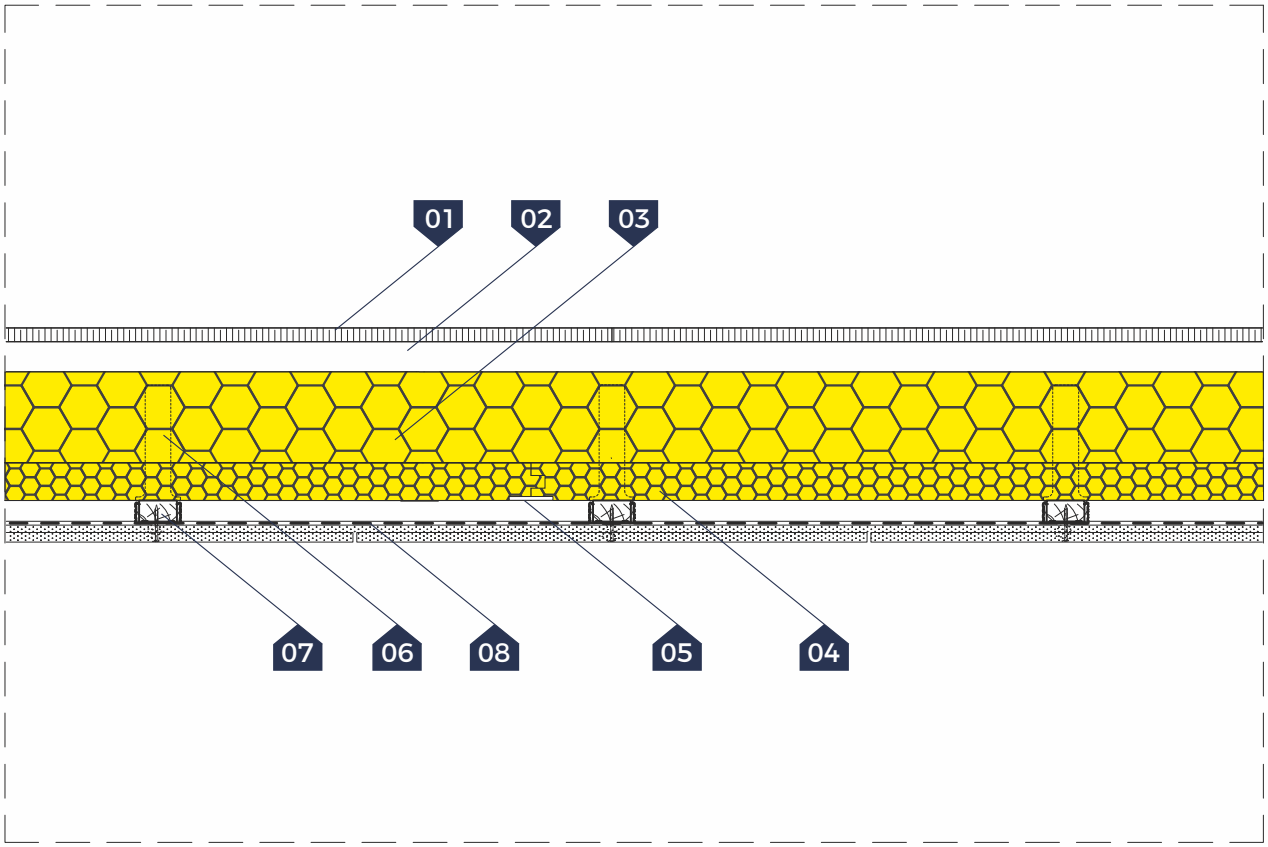
KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. board
08. Aluminium sealing tape
09. Ceiling fixing hanger
10. Substructure under the gypsum board
11. Vapour permeable membrane - PE foil (for rooms with high humidity)
12. The slot is filled with low-pressure PIR foam
13. Loft finishing - e.g. g-k panel on battens
14. Roof purlin
15. Collar beam

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam

termPIR®
insulation boards

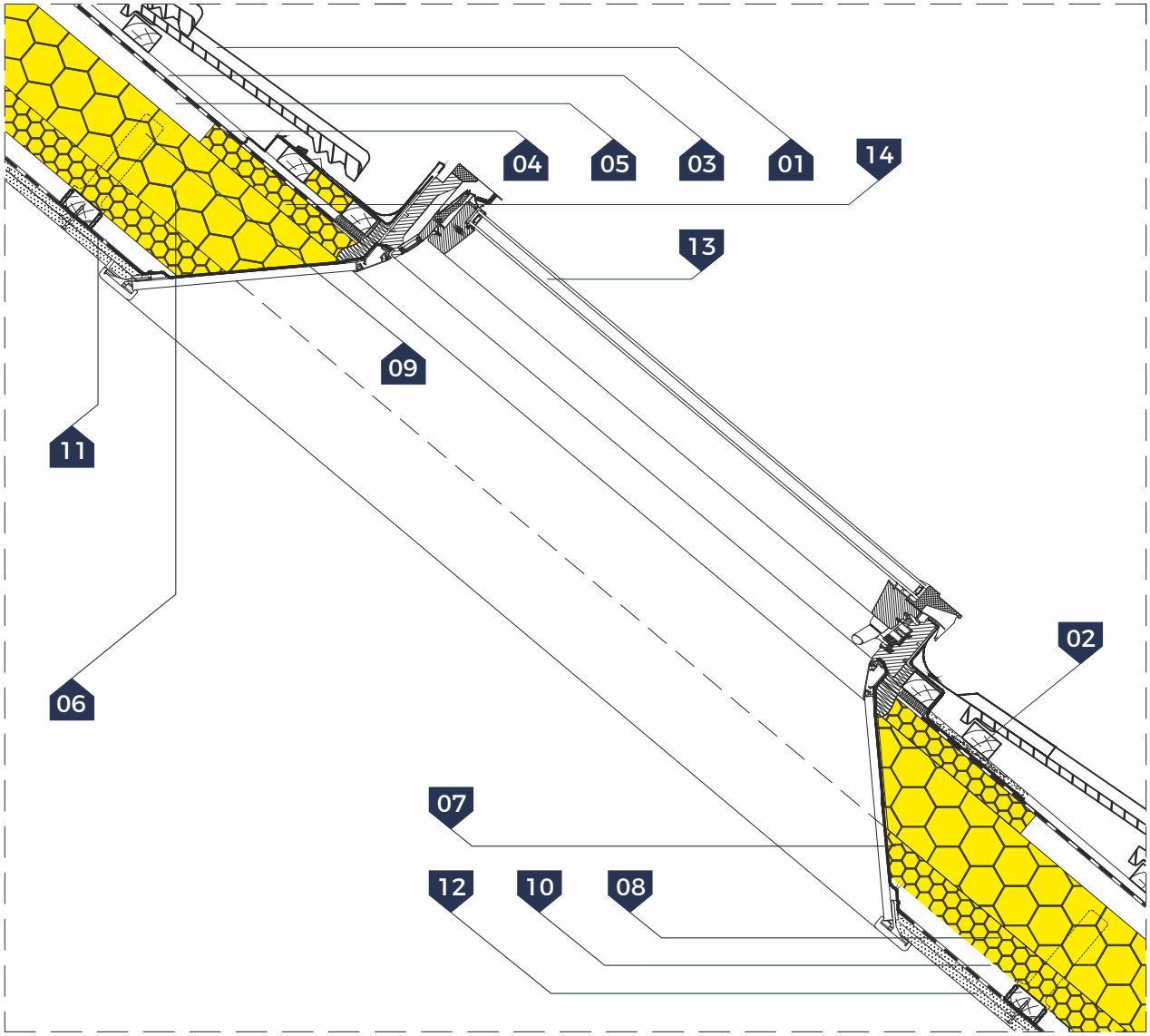


KEY:

01. OSB board
02. Collar beam
03. etween rafter thermal insulation - termPIR® AL. board
04. Under rafter thermal insulation - termPIR® AL. board
05. Aluminium sealing tape
06. Ceiling fixing hanger
07. Substructure under the gypsum board
08. Vapour permeable membrane - PE foil (for rooms with high humidity)

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. board
08. Aluminium sealing tape
09. Ceiling fixing hanger
10. Substructure under the gypsum board
11. Vapour permeable membrane - PE foil (for rooms with high humidity)
12. Loft finishing - e.g. g-k panel on battens
13. Roof window
14. Window edge thermal insulation - termPIR® AL

NOTE:

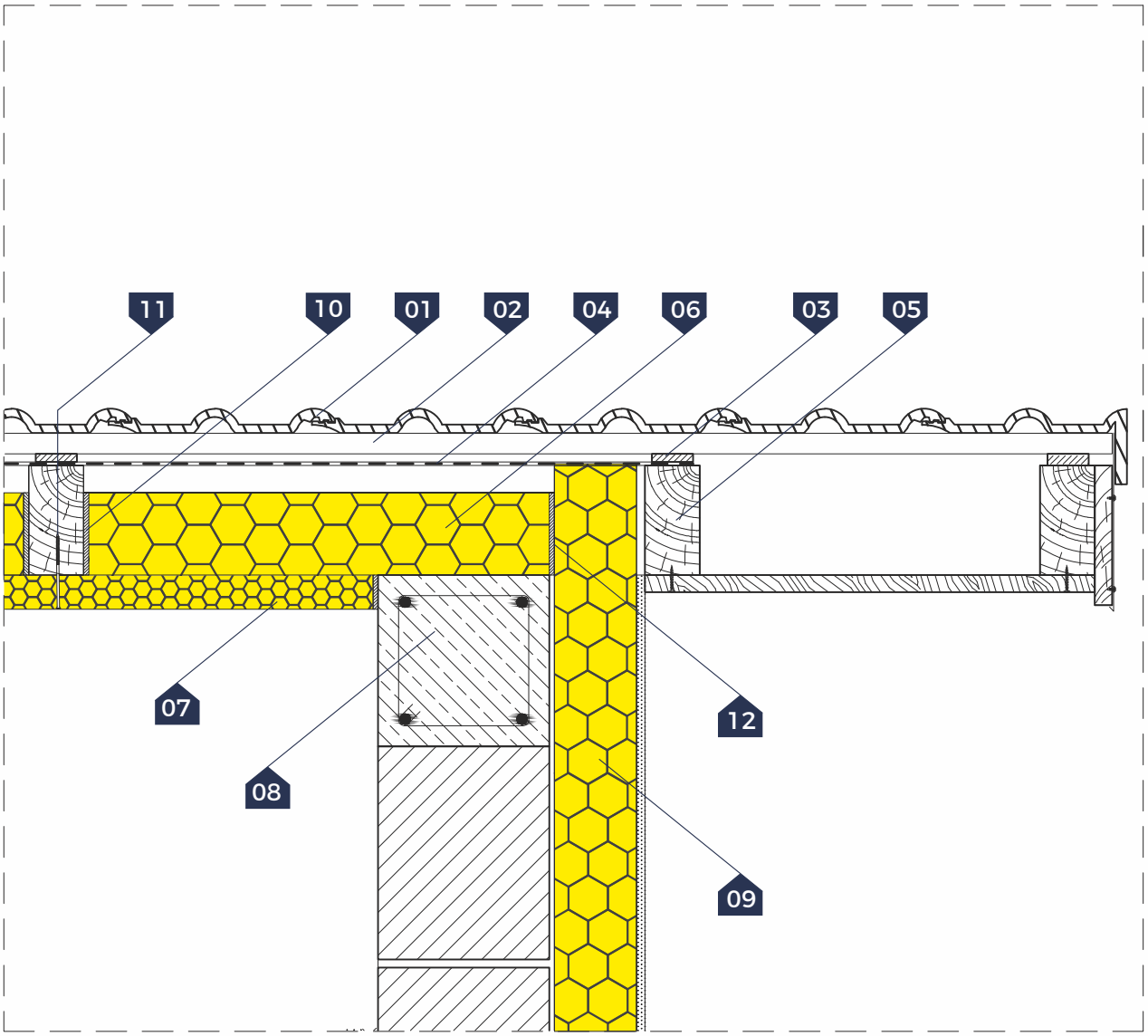
a. Cut boards and inter-rafter boards should be sealed with assembly foam

PITCHED ROOF - Under and between rafter system - W I

Detail at the gable wall

- cross-section perpendicular to the surface of roof

termPIR®
insulation boards

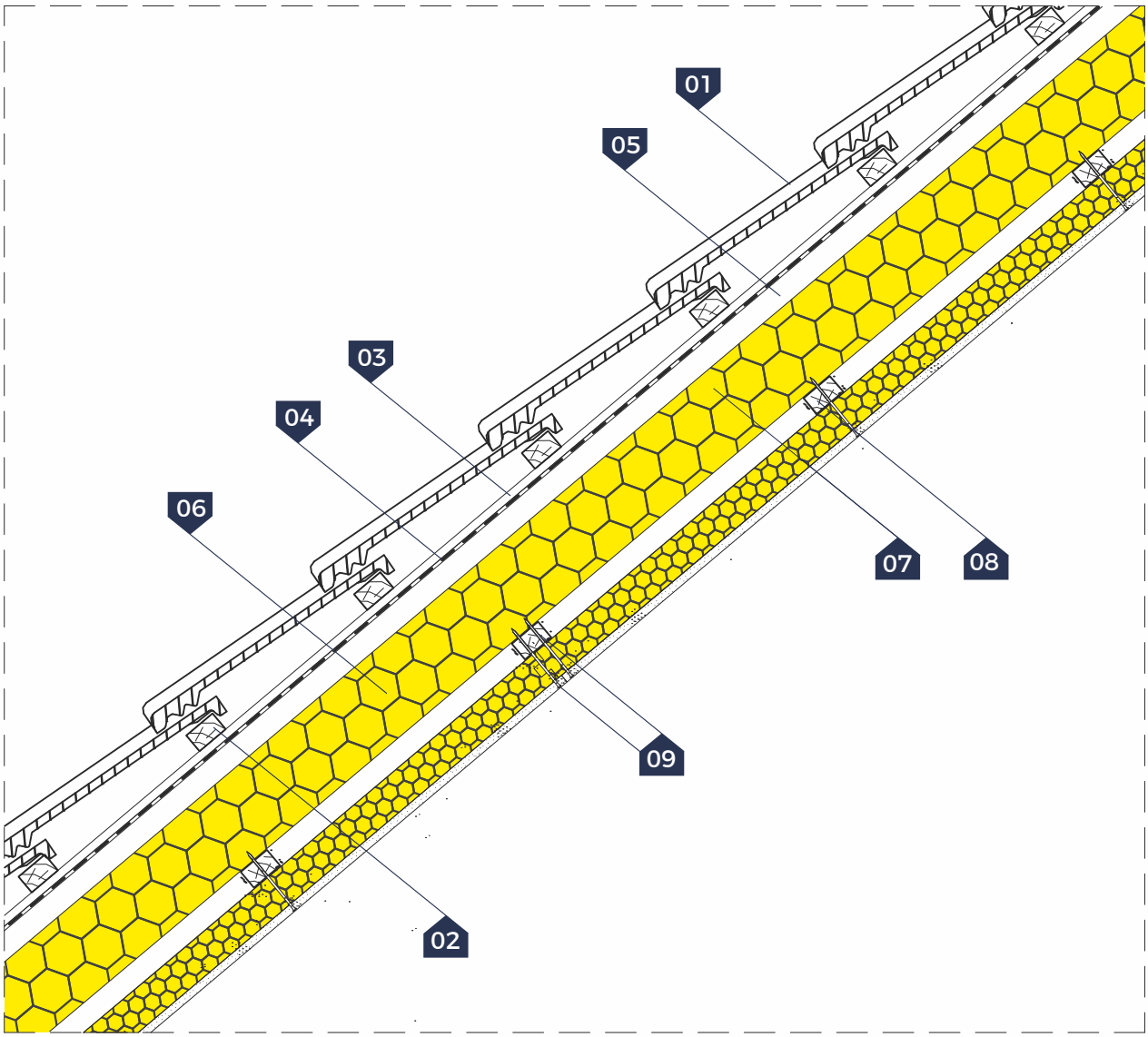


KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. board
08. Tie beam locking the fire wall
09. Wall thermal insulation - termPIR® ETX board
10. Low expandable polyurethane assembly foam
11. Self-tapping wood screw
12, Slot filled with low-pressure PIR foam

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. GK board
08. Substructure under the termPIR® AL. GK(requirements are correspondents to the requirements for gypsum board)
09. Self-tapping wood screw

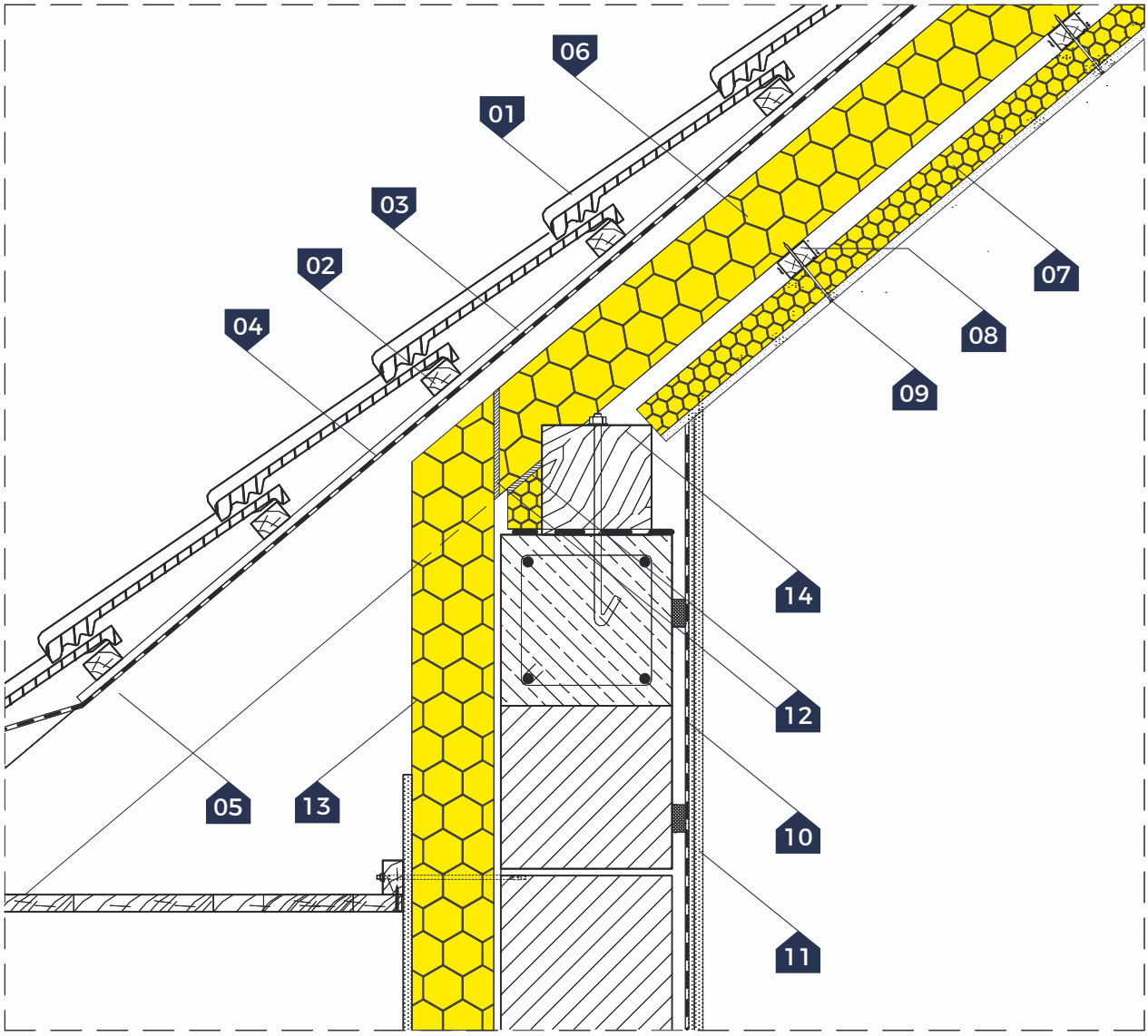
NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam

PITCHED ROOF - Under and between rafter system - W II

Detail of connection between the knee wall and roof

termPIR®
insulation boards

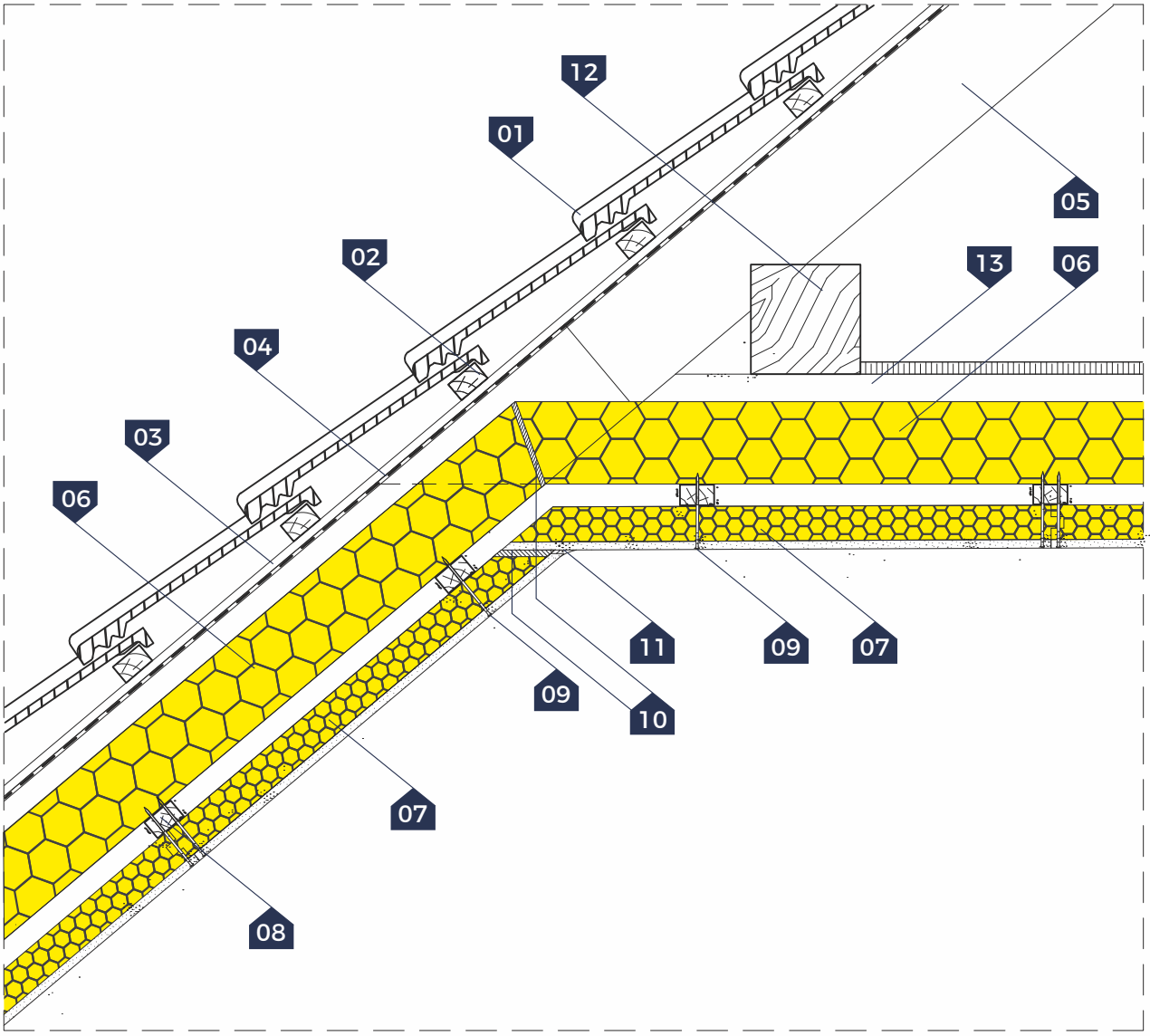


KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. GK board
08. Substructure under the termPIR® AL. GK(requirements are correspondents to the requirements for gypsum board)
09. Self-tapping wood screw
10. Vapour permeable membrane - PE foil (for rooms with high humidity)
11. Gypsum board
12. Slot filled with low-pressure PIR foam
13. Wall insulation - termPIR® ETX board
14. Wall plate

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam

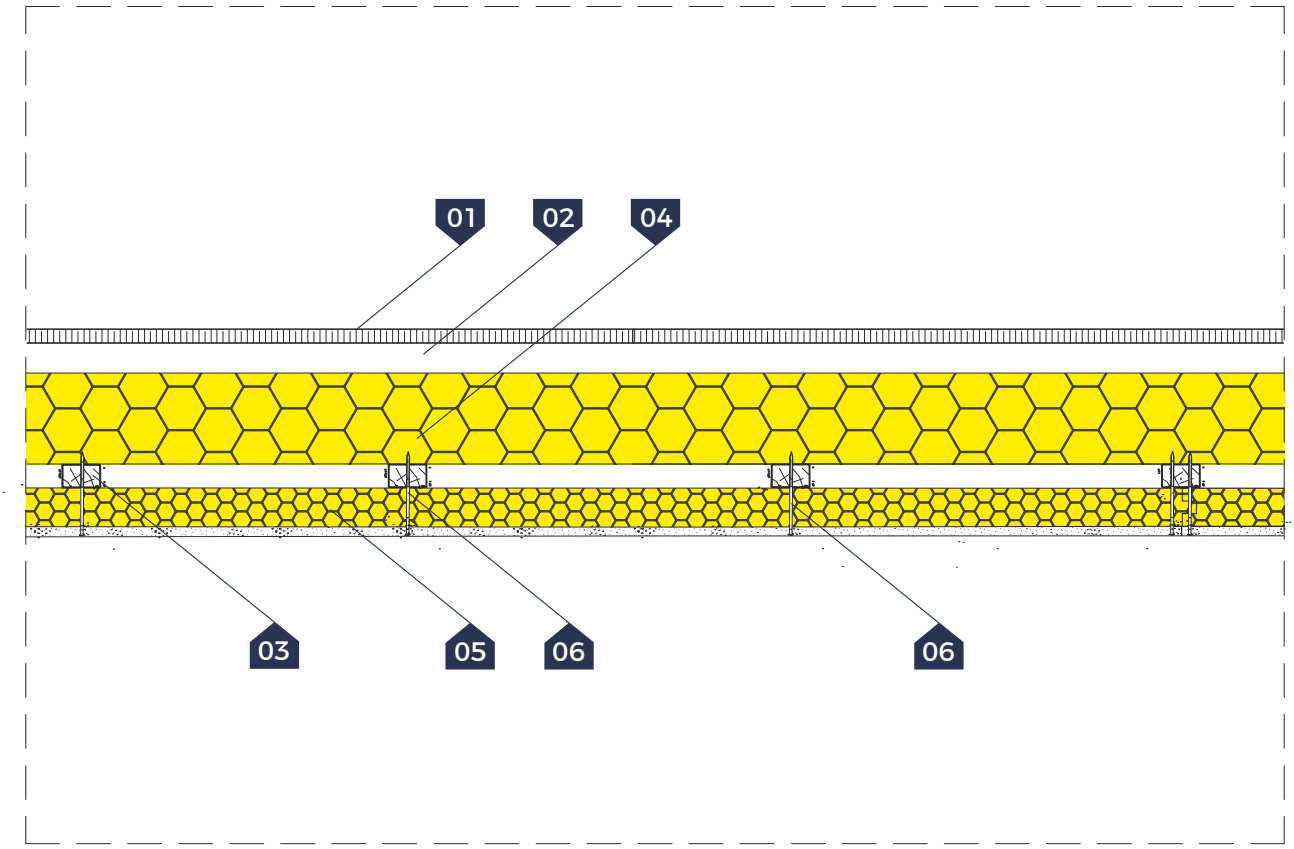


KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. GK board
08. Substructure under the termPIR® AL. GK(requirements are correspondents to the requirements for gypsum board)
09. Self-tapping wood screw
10. Slot filled with low-pressure PIR foam
11. Acrylic finish
12. Roof purlin
13. Collar beam

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam

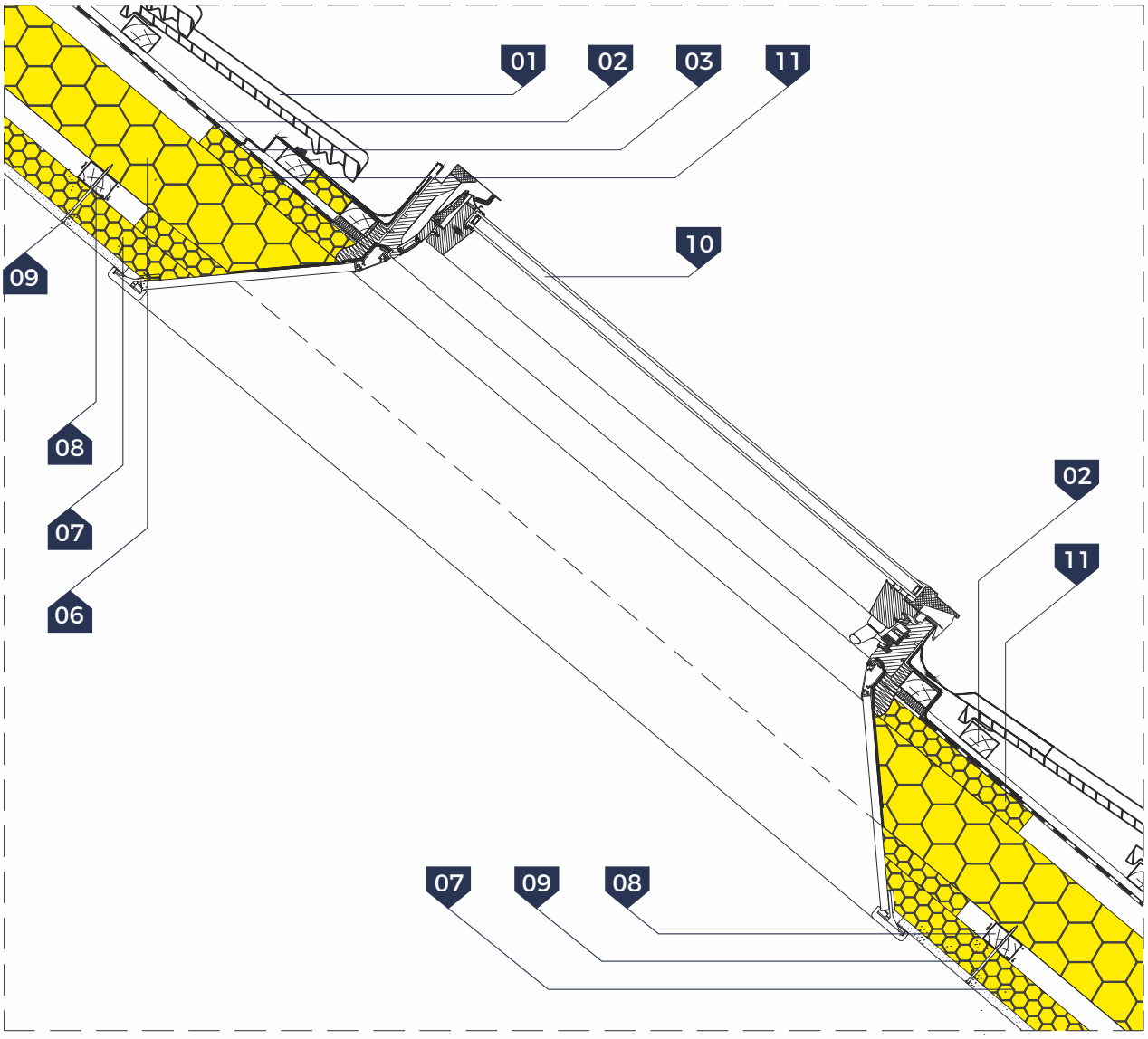


KEY:

01. OSB board
02. Collar beam
03. Substructure under the termPIR® AL GK board (requirements are correspondents to the requirements for gypsum board)
04. Between rafter thermal insulation - termPIR® AL. board
05. Under rafter thermal insulation - termPIR® AL. GK board
06. Self-tapping wood screw

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between-rafter thermal insulation
    - termPIR® AL. board thickness of 150 mm
07. Under rafter thermal insulation
    - termPIR® AL GK board thickness 50 mm + 12,5 mm
08. Substructure under the termPIR® AL. GK board (requirements are correspondents to the requirements for gypsum board)
09. Self-tapping wood screw (screw length = board thickness from indication + 12.5 mm + substructure thickness + 10 mm; round up to the dimension of a commercial screw)
10. Roof window
11. Window edge thermal insulation- termPIR® AL. board

NOTE:

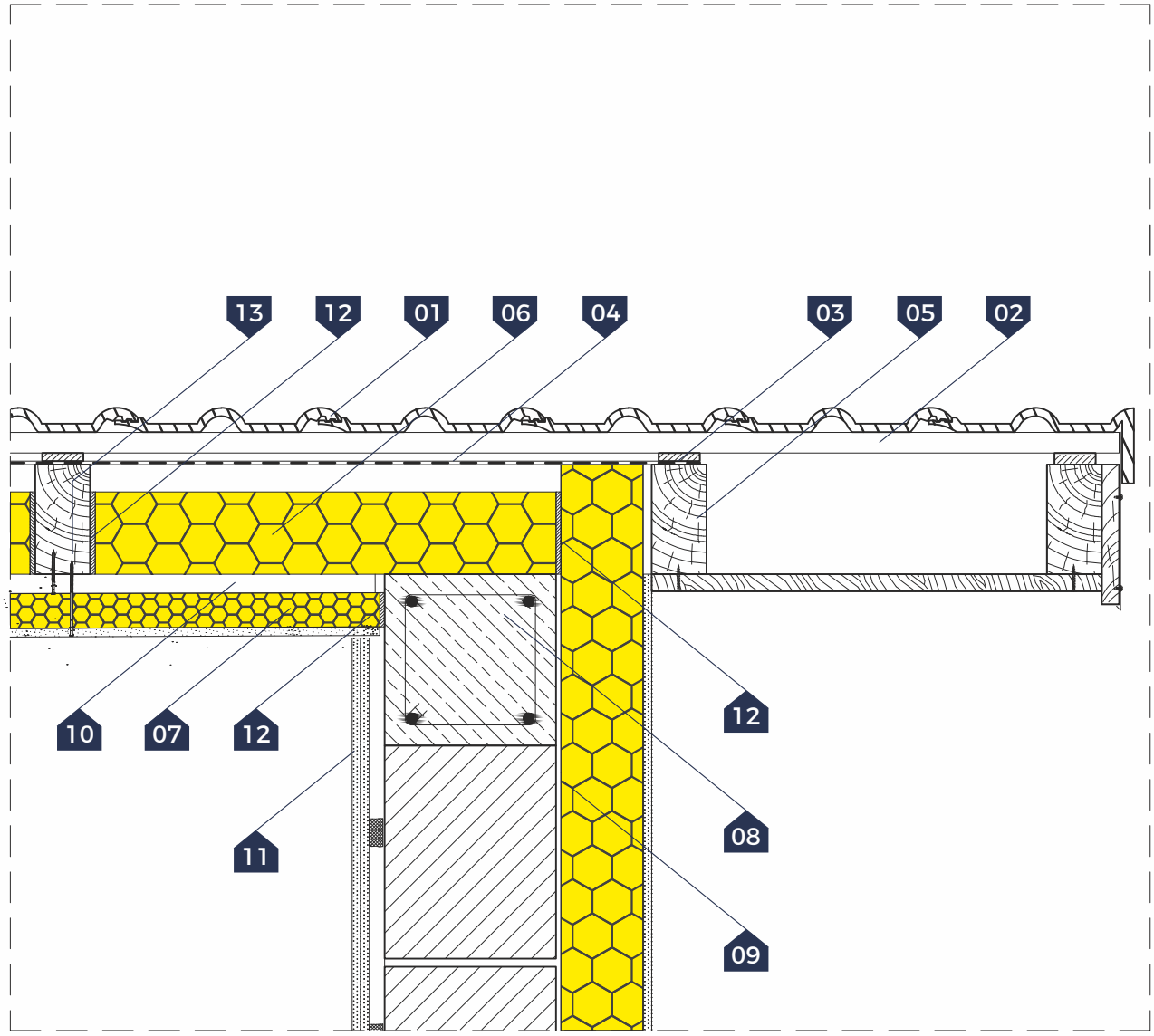
a. Cut boards and inter-rafter boards should be sealed with assembly foam

PITCHED ROOF - Under and between rafter system - W II

Detail at the gable wall

- cross-section perpendicular to the surface of roof

termPIR®
insulation boards



KEY:

01. Roof cover - roof tile or steel sheet
02. Batten
03. Counter batten (thickness min. 40 mm)
04. Wind insulation - vapour permeable membrane
05. Wooden rafter
06. Between rafter thermal insulation - termPIR® AL. board
07. Under rafter thermal insulation - termPIR® AL. GK board
08. Tie beam locking the fire wall
09. Wall thermal insulation - termPIR® ETX board
10. Substructure under the termPIR® AL GK board

(requirements are correspondents to the requirements for gypsum board)

11. Gypsum board
12. Low expandable polyurethane assembly foam
13. Self-tapping wood screw (screw length = board thickness from indication + 12.5 mm + substructure thickness + 10 mm; round up to the dimension of a commercial screw)

NOTE:

a. Cut boards and inter-rafter boards should be sealed with assembly foam

WALL THERMAL INSULATION IN LIGHT WET SYSTEM (ETICS)

termPIR® thermal insulation system allows for taking advantage of PIR insulation in the currently most popular building thermal insulation system: light-wet method, also called the seamless thermal insulation system (BSO) or External Thermal Insulation Composite System (ETICS). It depends on fixing to the external walls of the building of termPIR® ETX insulation panels and then protecting them with a fibreglass net sunk in bonding-sealing mortar. The whole system is finished with masonry mortar in different methods, grain sizes and structures. The t**ermPIR®** insulation system holds the European Technical Assessment No. 17/0066 "External Thermal Insulation Composite System (ETICS)".

GUIDELINES FOR CORRECT EXECUTION OF termPIR® ETX THERMAL INSULATION SYSTEM

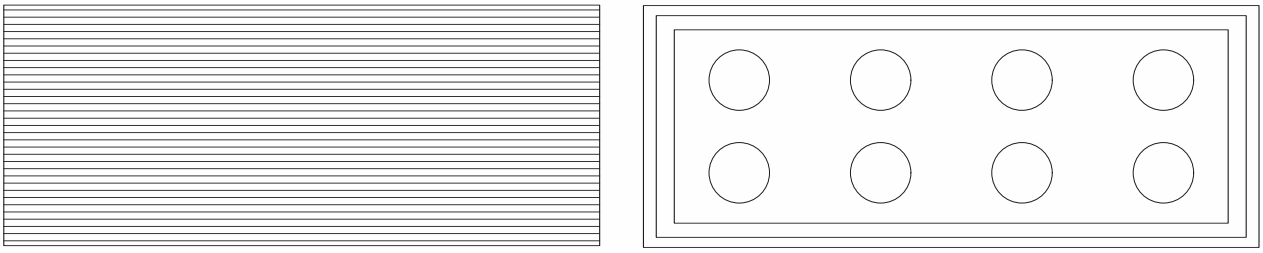
Below is provided an excerpt from the "Guidelines for making an ETICS insulation - the termPIR® insulation system" elaboration [1] available on the websites: **www.termpir.eu.** i **www.gor-stal.pl**
The system includes termPIR® ETX insulation slabs with lining made from glass fibre, with dimensions of 600x1200 mm and thickness between 50 and 250 mm, universal styrofoam adhesives and covering of Termo-Organika® mesh, mechanical connectors with stoppers, glass fibre meshes, silicon, acrylic and polysilicate plasterwork, paints, and primers.

Stages of thermal insulation execution:

1. Preparation of the base surface:
Before commencing the bonding of thermal insulation boards, the base surface to which they will be bonded must be prepared in a proper way. Each base surface must be compact, even, bearing, dry, clean and without the strata diminishing adhesion (grease, dust, etc.). Old "loose" plasters, peeling off paint and other contamination must be removed. Small uneven surfaces and cavities can be repaired a day before the bonding of the insulation board at the latest; ithe thicker the layer of mortar, the longer the time to stick the boards (according to the rule: about 1 day for every 1 mm of mortar thickness). Absorbing base surfaces (e.g. autoclaved aerated concrete) should be covered with a universal clearcole, smooth and/or not absorbing surfaces (e.g. concrete, reinforced concrete) should be covered with bonding clearcole. In the study [1], the principles of selecting the clearcole are presented with consideration of the kind of the base surface and the basic properties of the clearcole preparations.

2. Bonding of termPIR® insulation boards
If the base surface is even, the universal bond should be applied in a thin, even layer on the whole surface of the termPIR® board with a toothed plastering trowel with teeth 10-12 mm (fig. 1a). In the remaining instances, the mortar must be applied circumferentially in the distance of approx. 5 cm from the board edge, in such a way that the bond does not protrude outside the board lining and in addition apply 3 - 6 "cakes" evenly on its surface (fig. 1b).
As a result, the mortar should cover at least
80% of the board.

diagram1. Adhesive application method



a) On the whole board

b) Point and on edges

Then the **termPIR®** boards should be bonded to the wall by pressing it slightly and levelling it, so that it would adhere tightly to the neighbouring boards. Possible excessive amounts of the bond protruding outside the board lining should be removed immediately. The following rows of boards should be moved in respect of the previously applied ones so that the vertical joints of the boards would preserve the staggered way of installation. Bond the boards starting from the bottom of the facade.
Application of the start stripes, even though it is not requested, facilitates the correct levelling of the first row of the bonded boards. However, the start stripes should always be used in case when there is no thermal insulation of the foundation walls. In case when the foundation walls are thermal insulated, the consecutive rows of the thermal insulation of the walls above the ground level are fixed without the start stripe, preserving the continuity of the insulation

Note: termPIR® insulation boards should be installed no sooner than 1 month after the date of their manufacture (the date of manufacture is shown on each package of **termPIR®** boards).

3. Pinning

Pinning and bonding of the reinforcement net should start no sooner than after two days from the bonding of **termPIR®** board. Mechanical connectors applied must be selected relevantly to the kind of the base and compliant with the technical design of the thermal insulation.

The depth of pin anchorage in a base should amount to at least:

- 5-6 cm in concrete, concrete blocks, full ceramic bricks, and silicate bricks,
- 8-9 cm in aerated concrete, expanded clay concrete, hollow bricks.

The connectors with a metal pin with a plastic head or with a strengthened plastic pin should be used. The pin disc should have a diameter of at least 60 mm and its surface should be porous with holes providing adherence of the bonding mortar. In order to avoid the formation of thermal bridges and the "ladybird" effect, the discs should be sunk relevantly in the **termPIR®** board and covered with plugs cut out from grey Styrofoam of a diameter of 62 mm (sold as a product) or cut out from the **termPIR®** board.

Minimal number of the connectors (up to 12 m. height) is 4 pcs/m^2, iin the edge areas 6 pcs/m^2

4. Execution of reinforced layer

After fixing the boards with pins, dilatational shapes and corner strips should be installed and the corners should be strengthened around doors and windows (bonding additional net stripes at the angle of 45° to the line of vertical holes) (fig. 2). Possible gaps between the bonded **termPIR®** boards should be filled with polyurethane foam (it is not allowed to fill them up neither with the bond nor with the mortar). Starting from the top of the wall apply universal bond on the bonded **termPIR®** boards using a plastering trowel (it can be the toothed or straight trowel), evenly spreading it on the surface in the layer of approx. 3 mm and sink in it the reinforcement net keeping an overlap of approx. 10 cm. The installed net should be tense and completely covered with approx. 1 mm of the bond layer. After the reinforced layer is completely dried (at least 3 days) the surface can be clearcoled with bonding or polysilicate clearcole, depending on the kind of the installed plaster.

5. Application of plaster

The application of plaster can commence after the clearcole is completely dried, however no sooner than after 24 hours since finishing the application of clearcole. In case of each kind of plaster, the temperature of the base, plaster and ambient temperature must be above +5°C in the course of installation and during a few following days. The selection of relevant system elements depending on the kind of the plaster is presented in table No. 5 of the study [1].

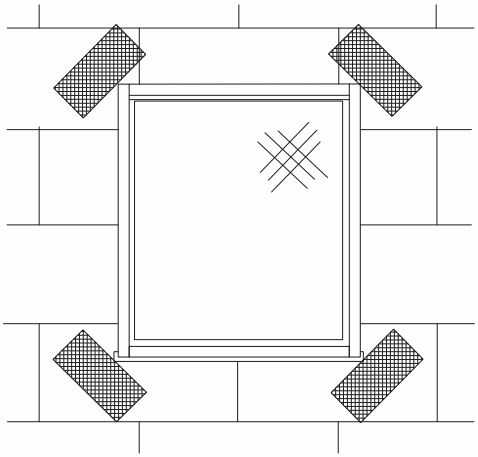


diagram 2. Reinforcement of corners of openings

6. Painting

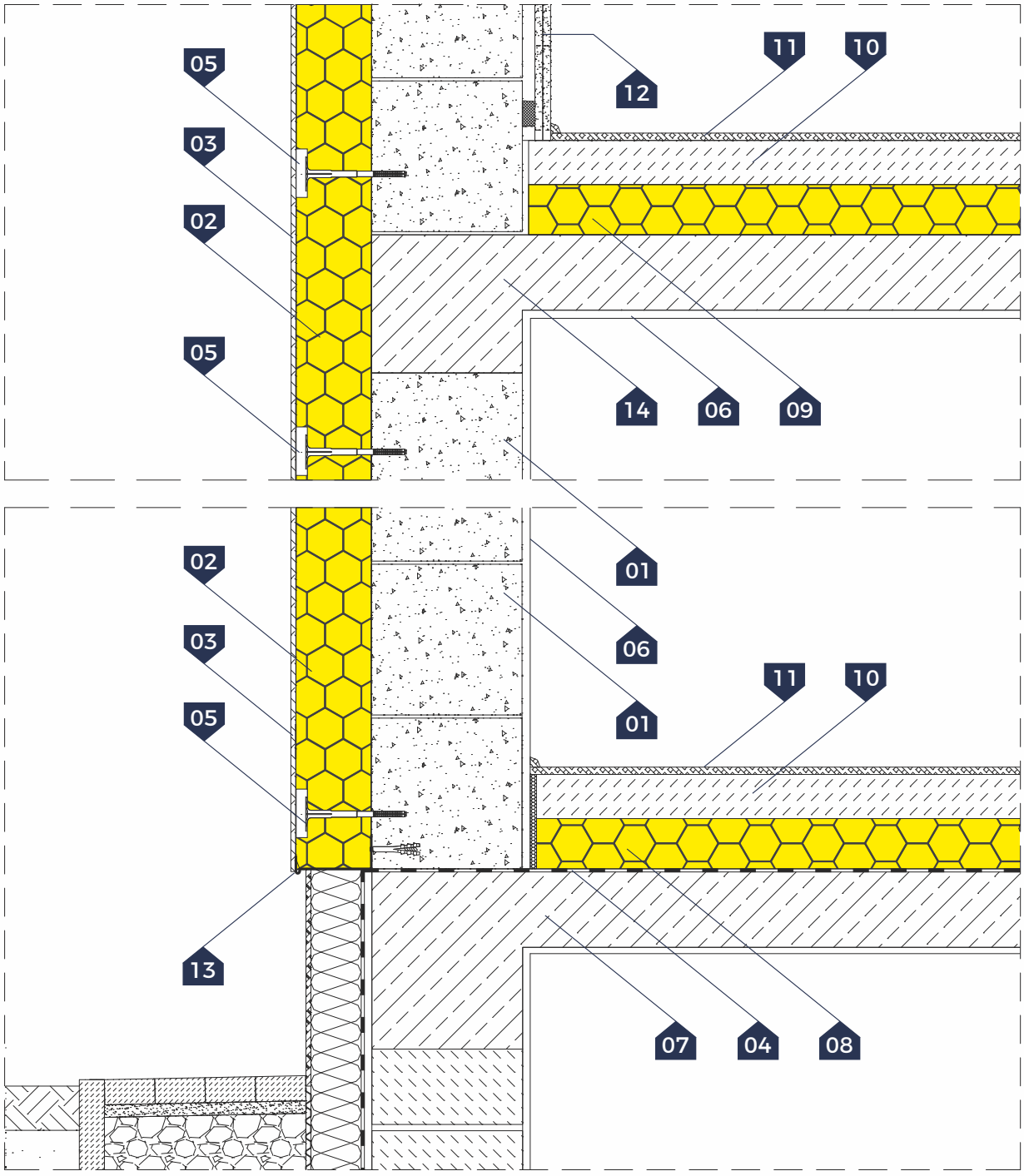
Painting of the facade in the **termPIR®** thermal insulation system is not obligatory. Painting is recommended especially in order to renovate a dirty surface. A frequent solution is also to make the external layer of the facade using mineral-polymer plaster and to paint it with one of the paints. The relevant colour of the facade can be obtained both by making thin plaster layer tinted in the requested colour as well as by painting the white plaster with paint in the required colour.

7. Control and works acceptance

In order to ensure the proper quality of the particular stages of thermal insulation works and the whole system, it is necessar to apply: - acceptance of disappearing and covered works, - partial acceptance, final (end) acceptance. The objective of controls at particular stages of works is to avoid the accumulation of possible mistakes. Failing to perform this control may lead to poor quality of the performed thermal insulation. In the course of acceptance, the following is controlled:

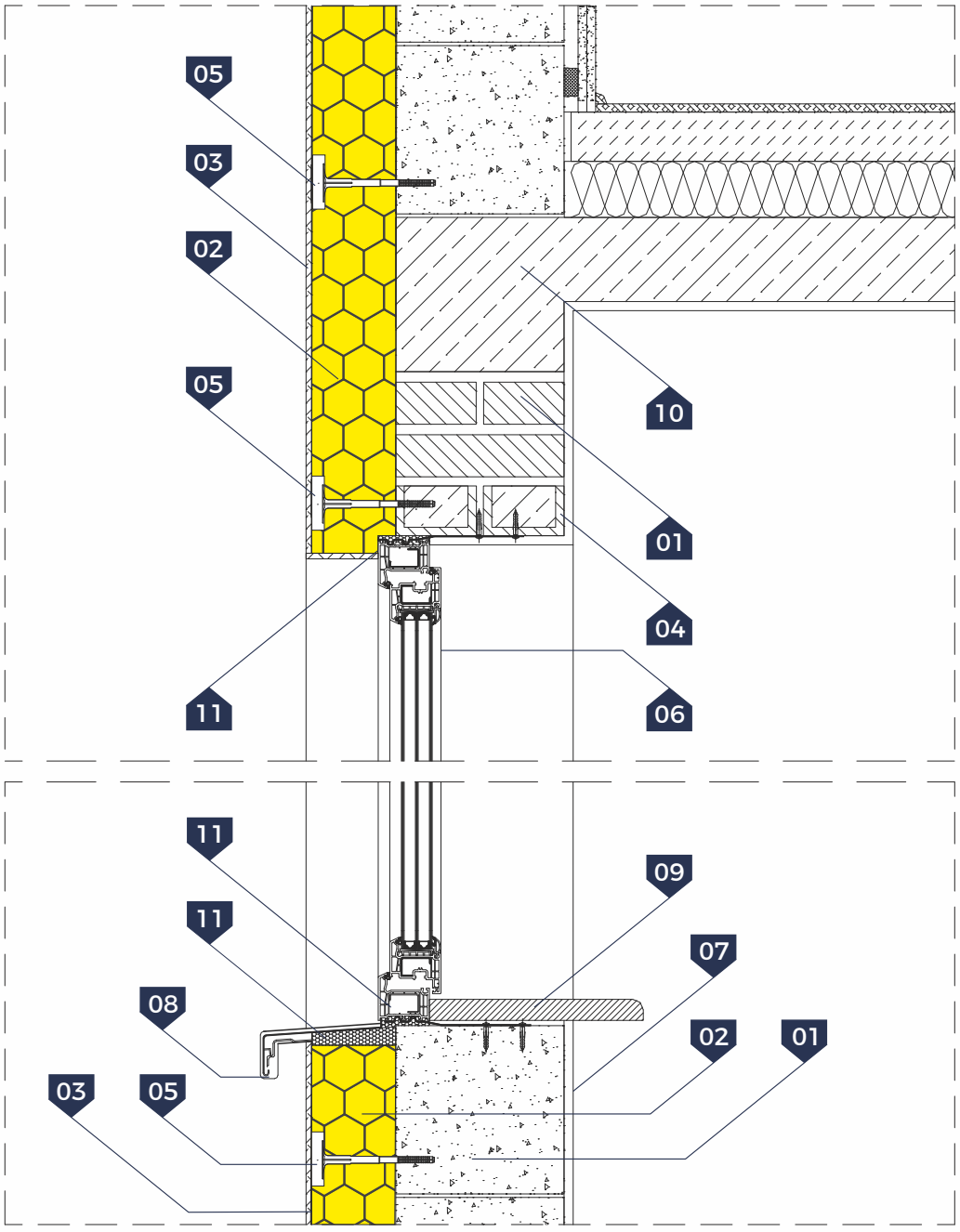
- base condition and geometry, the way of base preparation,
- bonding of the **termPIR®** thermal insulation board, application of mechanical connectors,
- reinforced layer,
- metal sheet flashing,
- plaster layers and painting,
- compliance between the used insulation system components and the project,
- visual assessment of the elevation.

Examples of details of external walls insulated with termPIR® boards



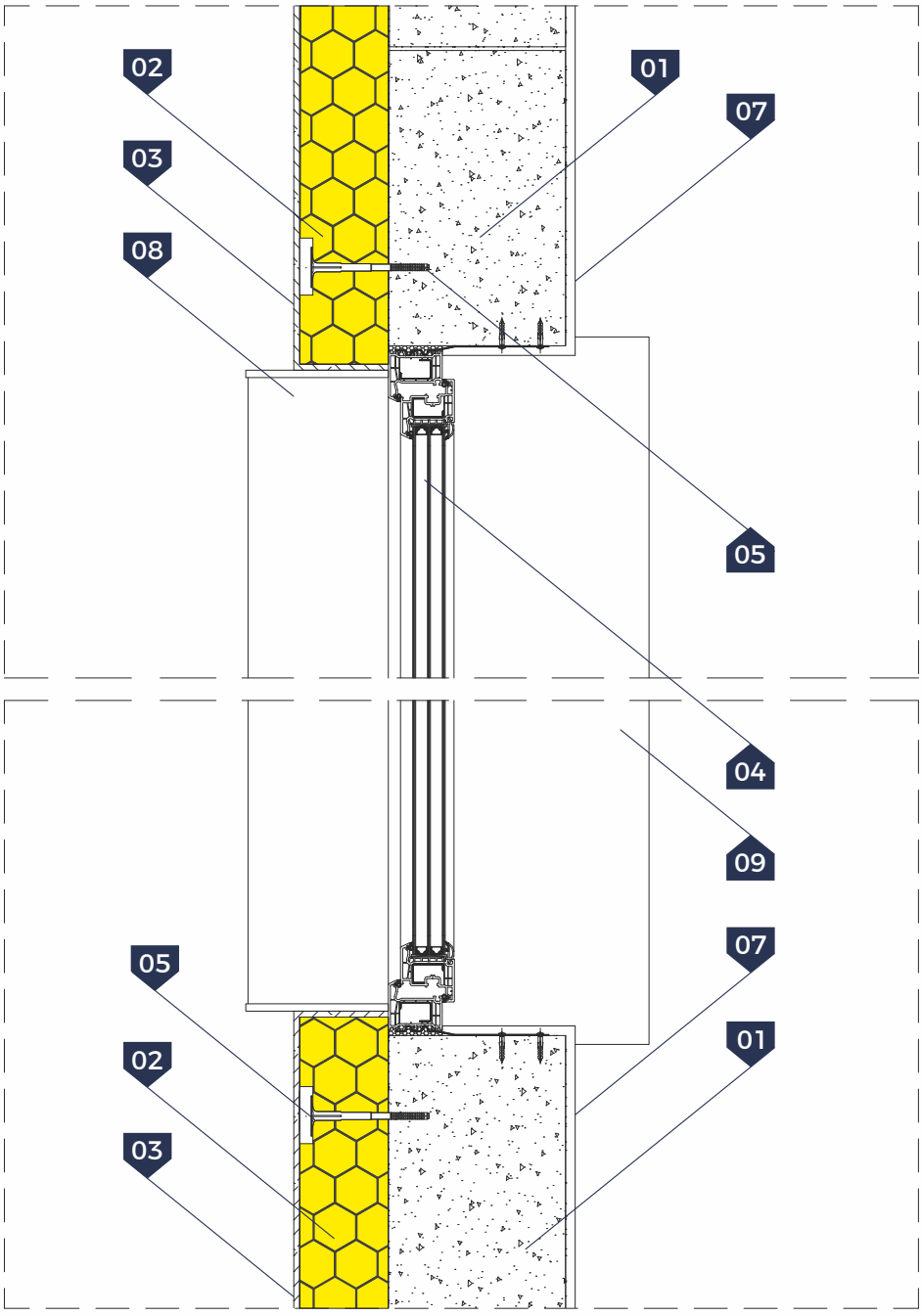
KEY:

01. Ground floor wall
02. Wall thermal insulation - termPIR® ETX board
03. Mineral plaster on net
04. Horizontal damp insulation
05. Connector for fixing insulation with a cap
06. Cement-lime plaster
07. Tie beam and ceiling over the cellar
08. Floor thermal insulation - termPIR® AL/AGRO P REV board
09. Floor thermal insulation - termPIR® AL/AGRO P REV board
10. Cement floor screed
11. Flooring
12. Wall finish - e.g. gypsum board on battens
13. tart strip (recommended)
14. Crib and ceiling above the ground floor



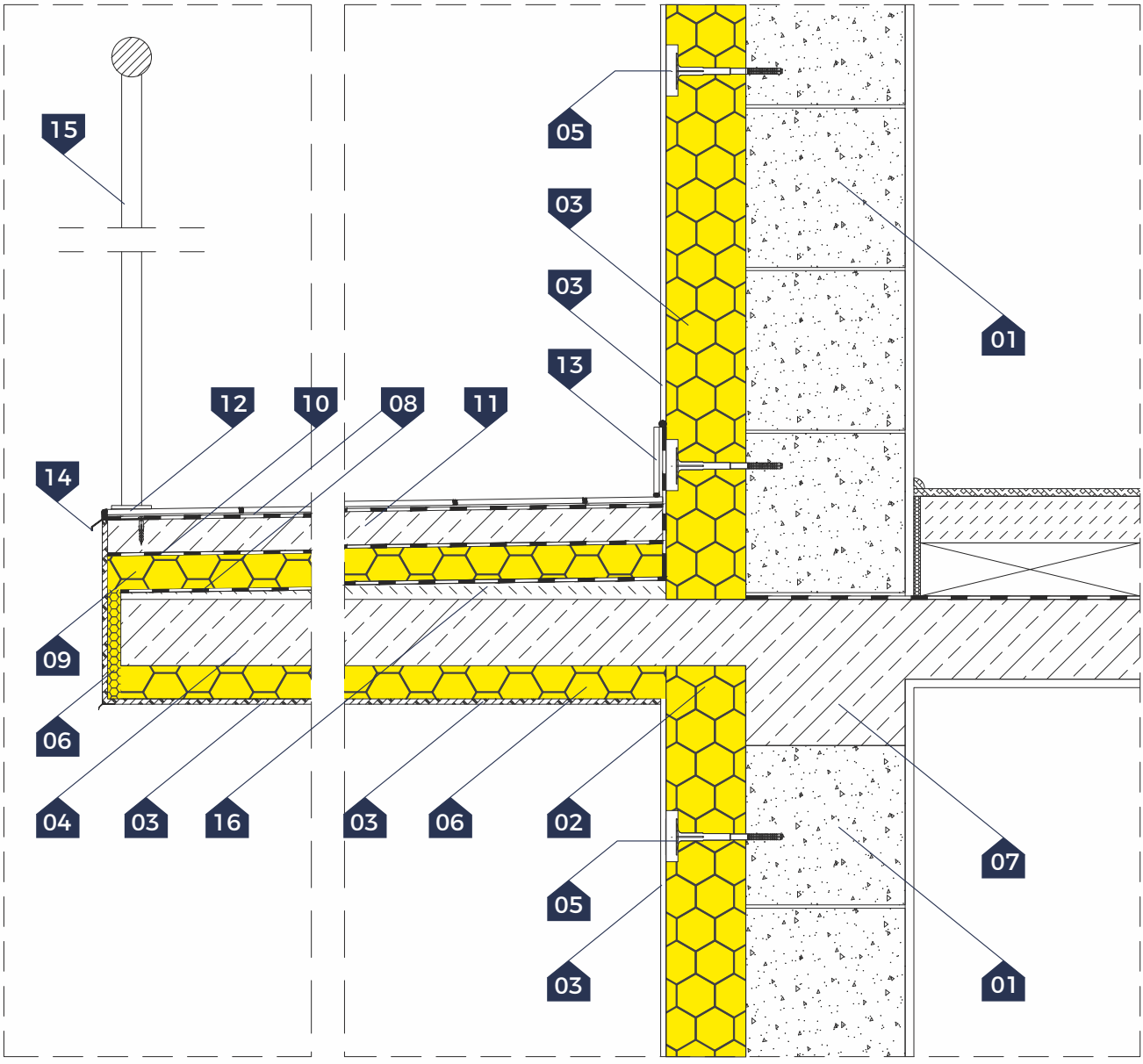
KEY:

01. Ground floor wall
02. Wall thermal insulation - termPIR® ETX board
03. Mineral plaster on net
04. Lintel
05. Connector for fixing insulation with a cap
06. Window
07. Cement-lime plaster
08. External window sill
09. Internal window sill
10. Tie beam and ceiling
11. Assembly foam



KEY:

01. Ground floor wall
02. Wall thermal insulation - termPIR® ETX board
03. Mineral plaster on net
04. Window
05. Connector for fixing insulation with a cap
06. Assembly foam
07. Cement-lime plaster
08. External window sill
09. Internal window sill



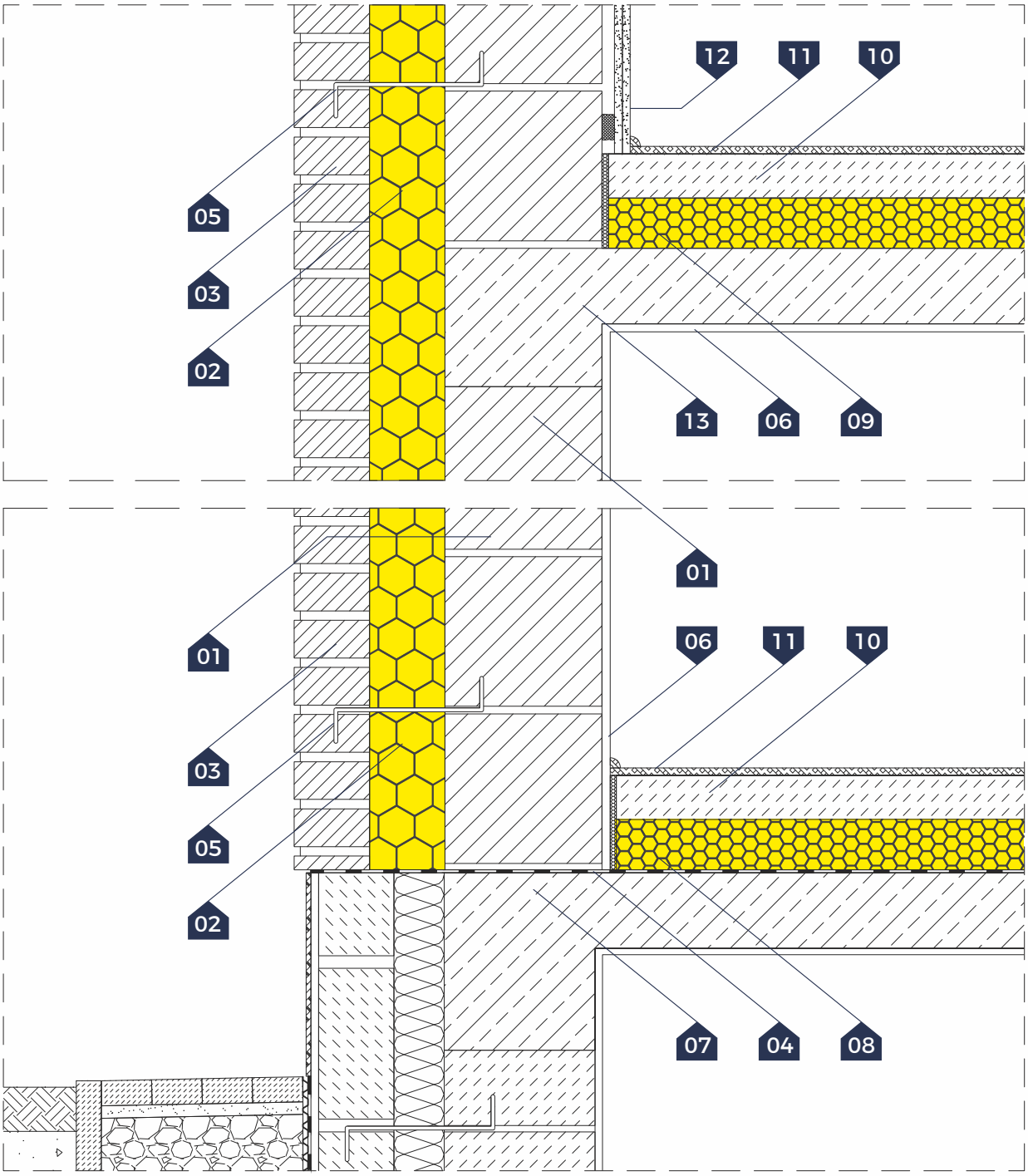
KEY:

01. External bearing wall
02. Wall thermal insulation - termPIR® ETX board
03. Mineral plaster on net
04. Balcony slab
05. Connector for fixing insulation with a cap
06. Balcony underside thermal insulation - termPIR® ETX board
07. Tie beam and ceiling
08. Hydro-insulation
09. Balcony flooring thermal insulation - termPIR® WS/BWS board
10. PE foil
11. Cement floor screed
12. Balcony surface
13. Plinth
14. Drip cap
15. Railing
16. Inclined layer

EXTERNAL WALLS - thermal insulation of triple layer walls

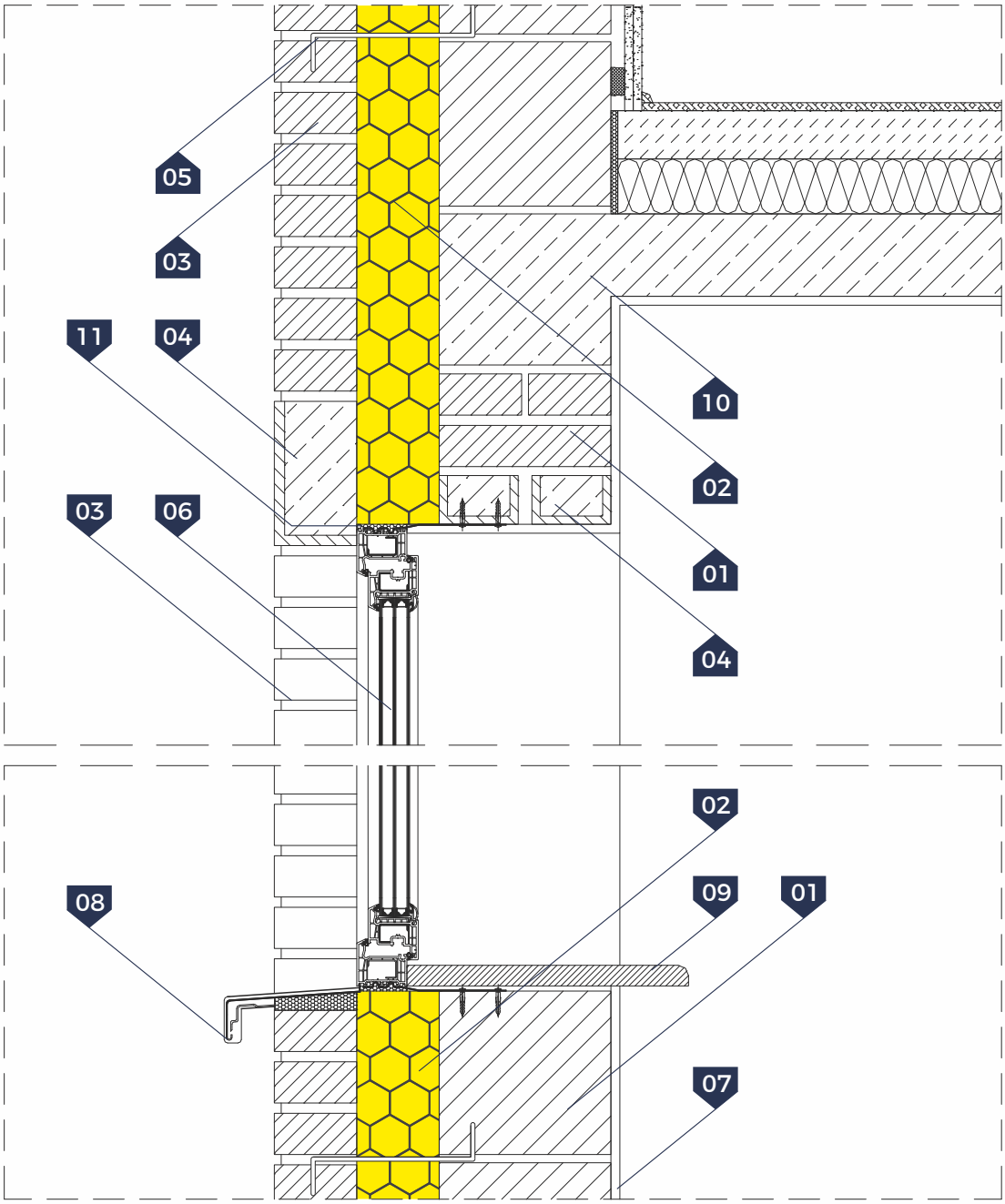
Typical cross-section

termPIR®
insulation boards



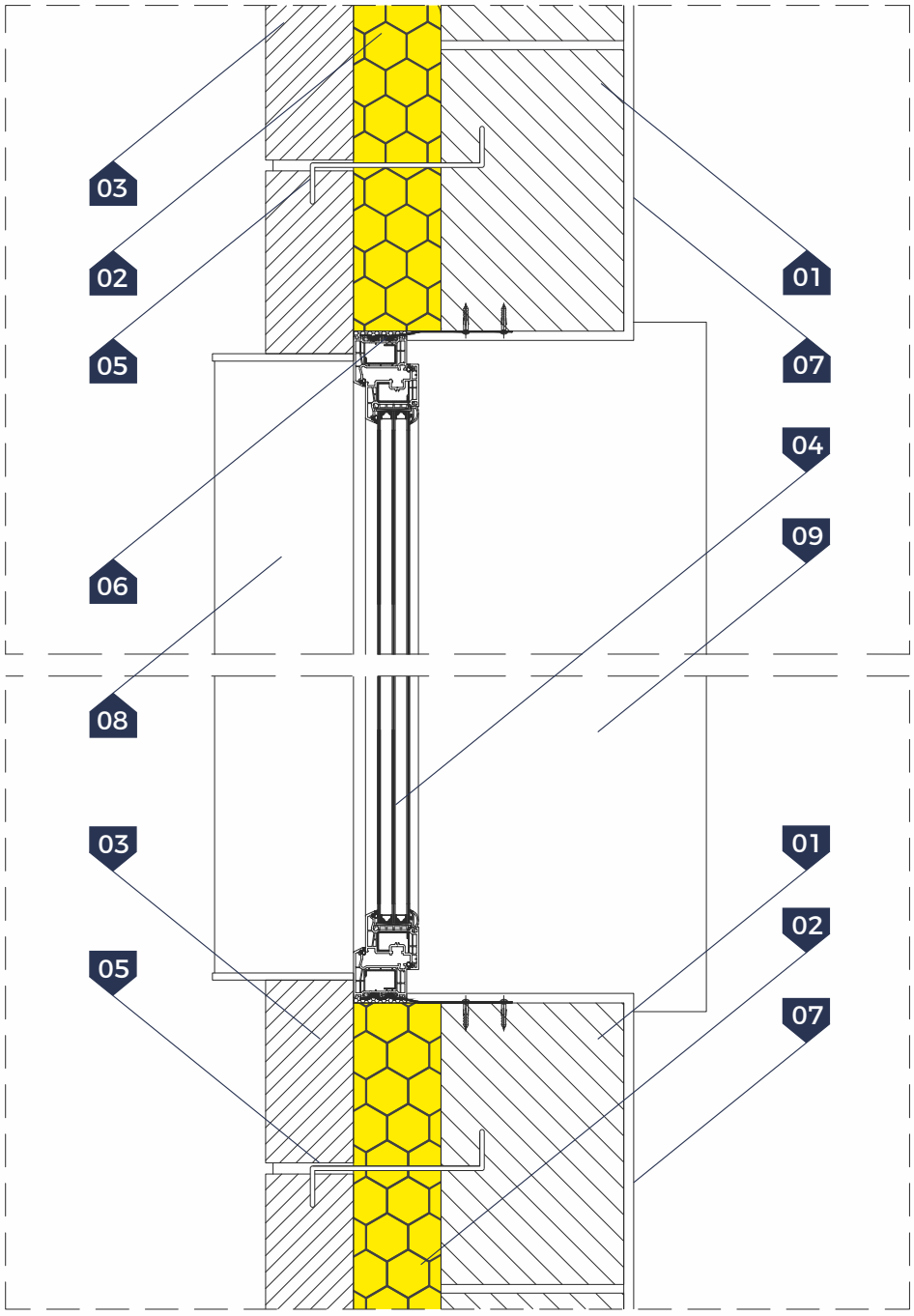
KEY:

01. Ground floor wall - bearing section
02. Wall thermal insulation - termPIR® AL. board
03. Ground floor wall - protecting section
04. Horizontal damp insulation
05. Anchor connecting walls
06. Cement-lime plaster
07. Tie beam and ceiling over the cellar
08. Floor thermal insulation - termPIR® AL/AGRO P REV board
09. Floor thermal insulation - termPIR® AL/AGRO P. REV board
10. Cement floor screed
11. Flooring
12. Wall finish - e.g. gypsum board on battens
12. Tie beam and ceiling over the ground floor



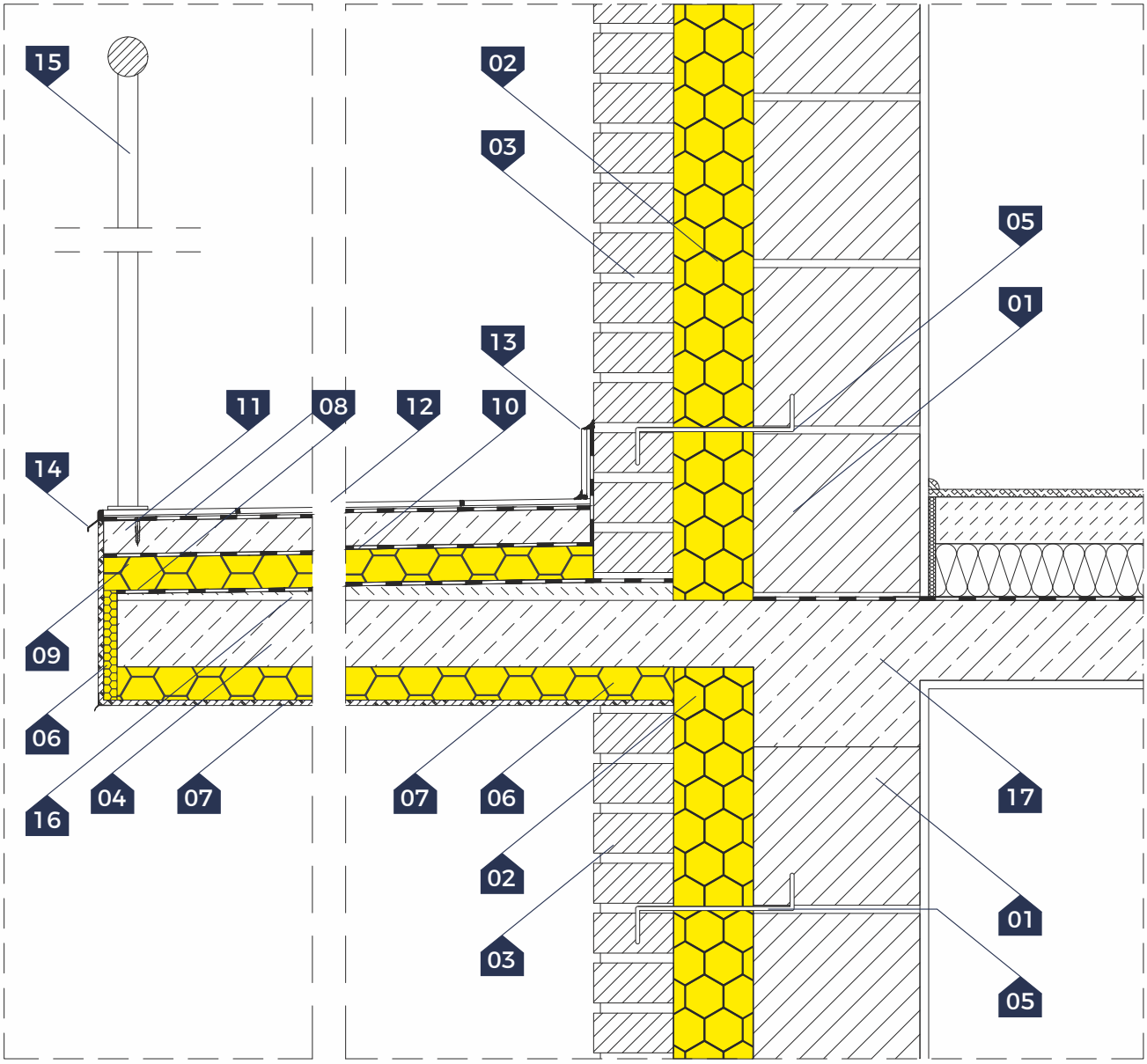
KEY:

01. Ground floor wall - bearing section
02. Wall thermal insulation- termPIR® AL. board
03. Ground floor wall - protecting section
04. Lintel of the bearing and protecting wall
05. Anchor connecting walls
06. Window
07. Cement-lime plaster
08. External window sill
09. Internal window sill
10. Tie beam and ceiling
11. Assembly foam



KEY:

01. Ground floor wall - bearing section
02. Wall thermal insulation - termPIR® AL. board
03. Ground floor wall - protecting section
04. Window
05. Anchor connecting walls
06. Assembly foam
07. Cement-lime plaster
08. External window sill
09. Internal window sill



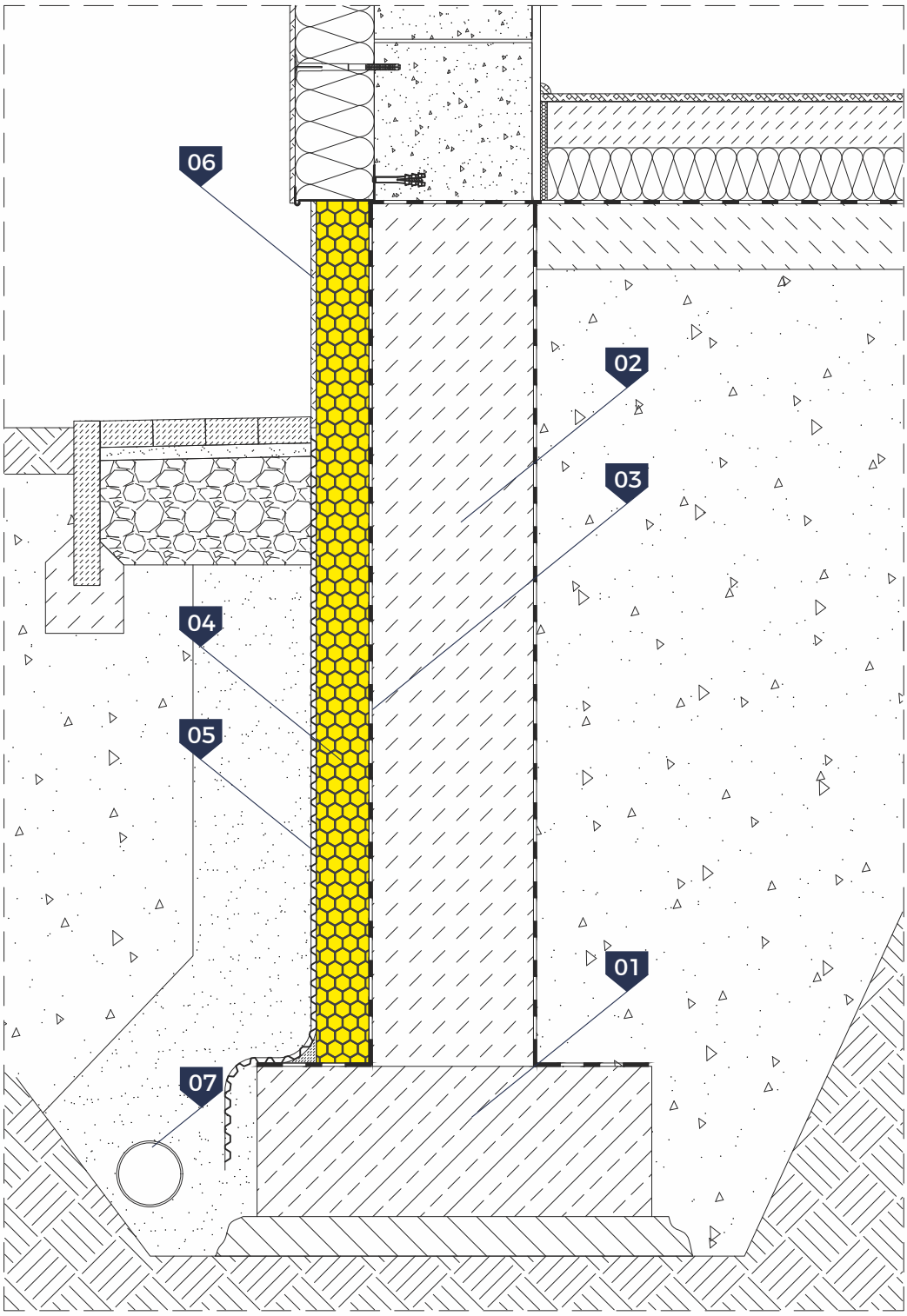
KEY:

01. External wall - bearing section
02. Wall thermal insulation - termPIR® AL. board
03. External wall - bearing section
04. Balcony slab
05. Anchor connecting walls
06. Balcony underside thermal insulation - termPIR® ETX board
07. Mineral plaster on net
08. Hydro-insulation
09. Balcony flooring thermal insulation - termPIR® WS/BWS board
10. PE foil
11. Cement floor screed
12. Balcony surface
13. Plinth
14. Drip cap
15. Railing
16. Fall layer
17. Tie beam and ceiling

FOUNDATION WALLS

Double layer foundation wall
(light type hydro-insulation)

termPIR®
insulation boards



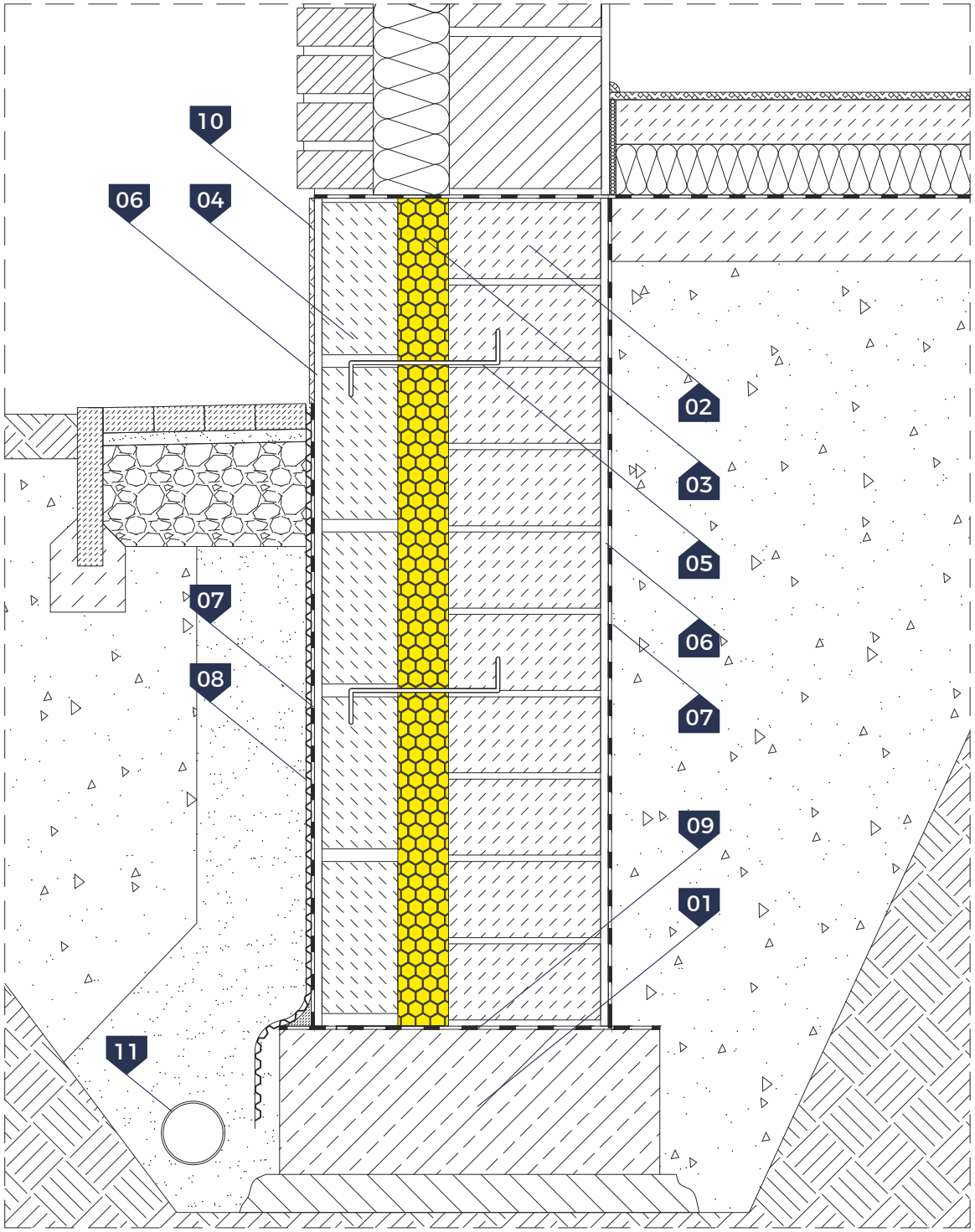
KEY:

01. Strip foundation
02. Foundation wall
03. Bituminous insulation mass
04. Foundation thermal insulation - termPIR® WS/ BWS board bonded directly to the insulation mass
05. Foundation foil
06. Finishing layer bonded to the plinth on net
07. Perimeter drain

FOUNDATION WALLS

Triple layer foundation wall
(light type hydro-insulation)

termPIR®
insulation boards



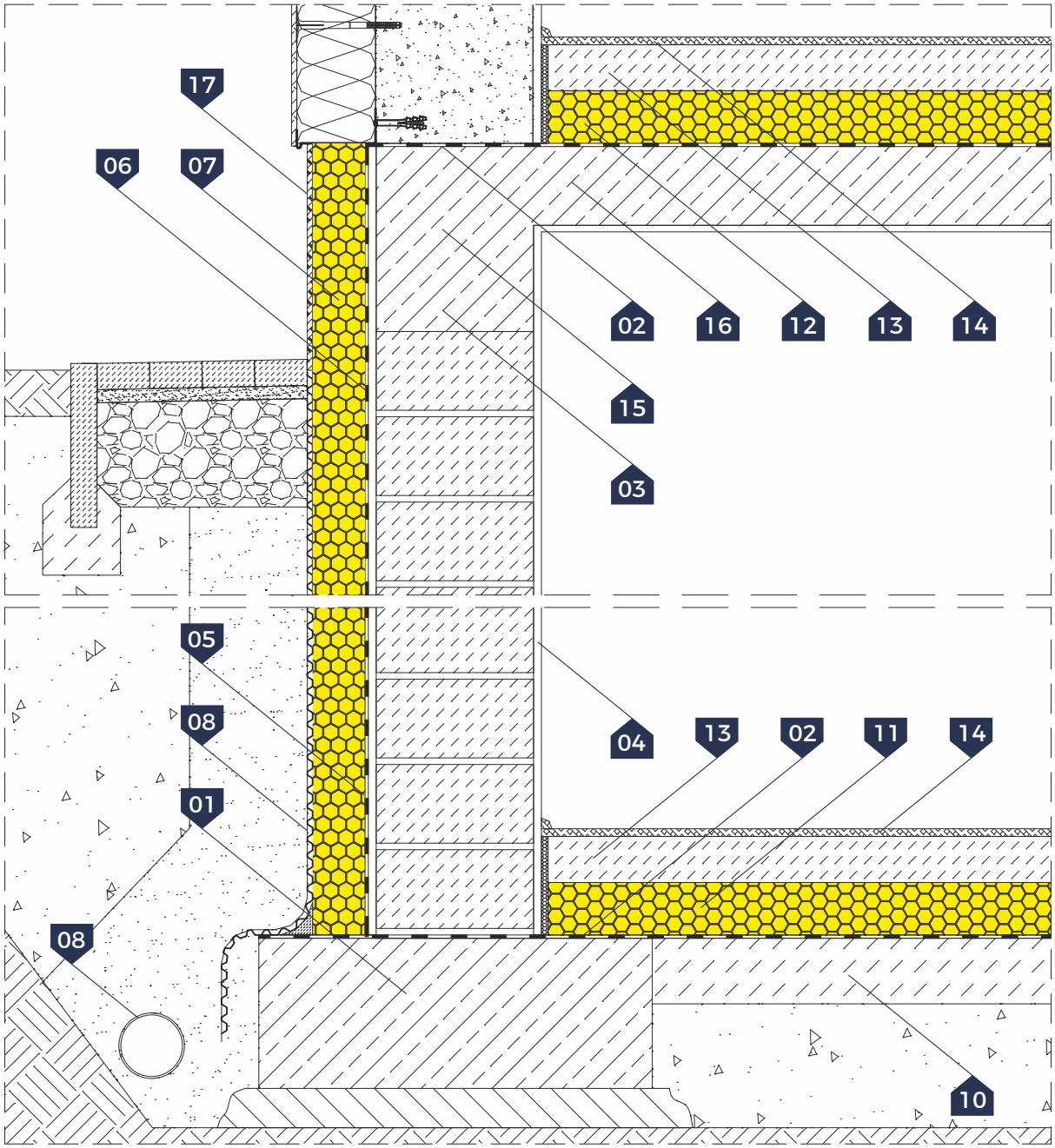
KEY:

01. Strip foundation
02. Foundation wall - bearing section
03. Foundation thermal insulation - termPIR® AL board
04. Foundation wall - protecting section
05. Wall connector
06. Cement plaster
07. Bituminous insulation mass
08. Foundation foil
09. Horizontal insulation
10. Finishing layer bonded to the plinth on net
11. Perimeter drain

CELLAR WALLS

Double layer cellar wall
(light type hydro-insulation)

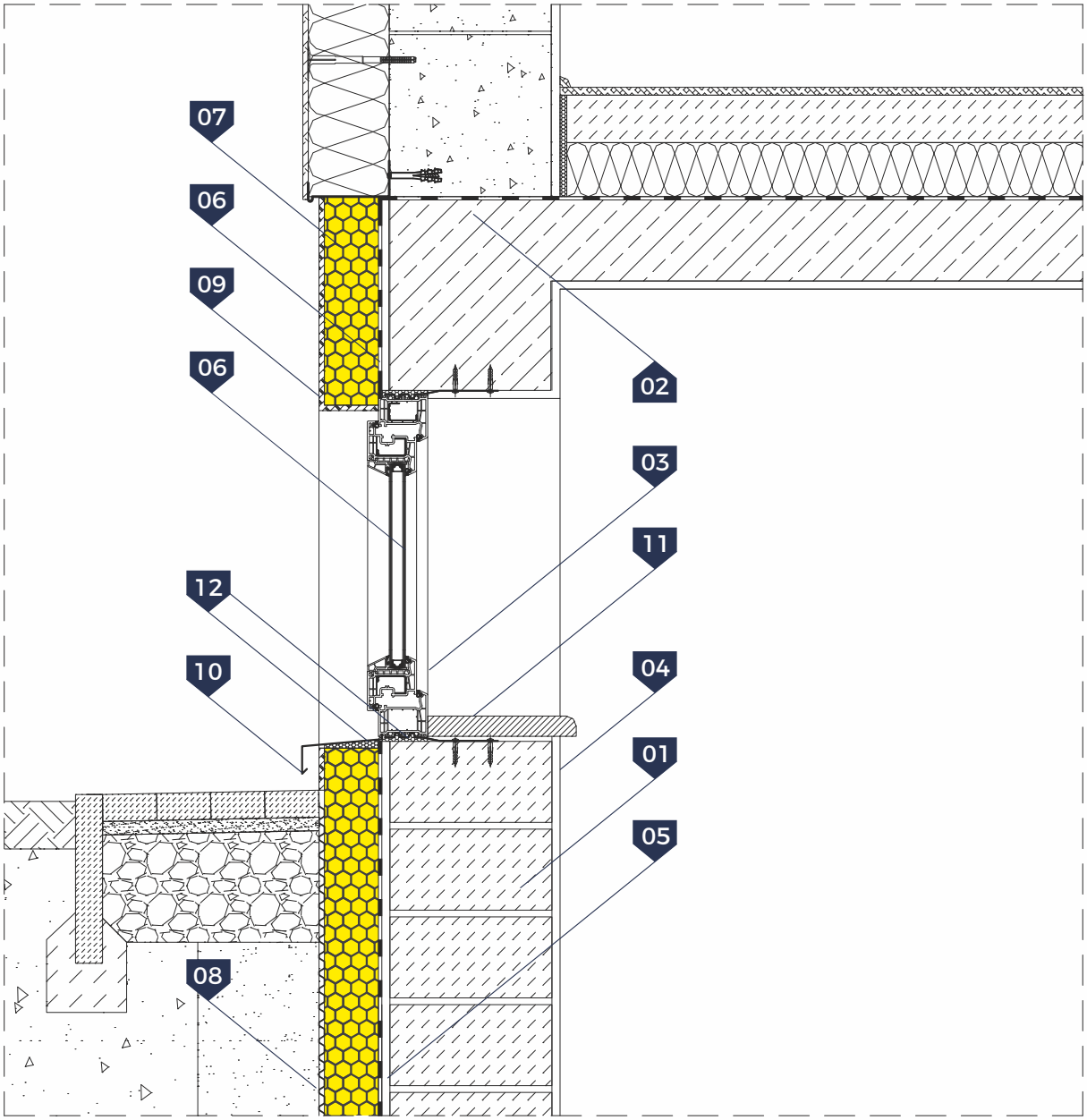
termPIR®
insulation boards



KEY:

01. Strip foundation
02. Horizontal damp insulation
03. Cellar wall
04. Cement-lime plaster
05. Cement plaster
06. Bituminous insulation mass
07. Wall thermal insulation - termPIR® /WS/ BWS board bonded directly to the insulation mass
08. Foundation foil
09. Perimeter drain
10. Lean concrete
11. Floor thermal insulation - termPIR® AL/AGRO P REV board
12. Floor thermal insulation - termPIR® AL/AGRO P. REV board
13. Cement floor screed
13. Flooring
14. Reinforced concrete tie beam
15. Ceiling over the ground floor
16. Finishing layer bonded to the plinth on net

termPIR®
insulation boards



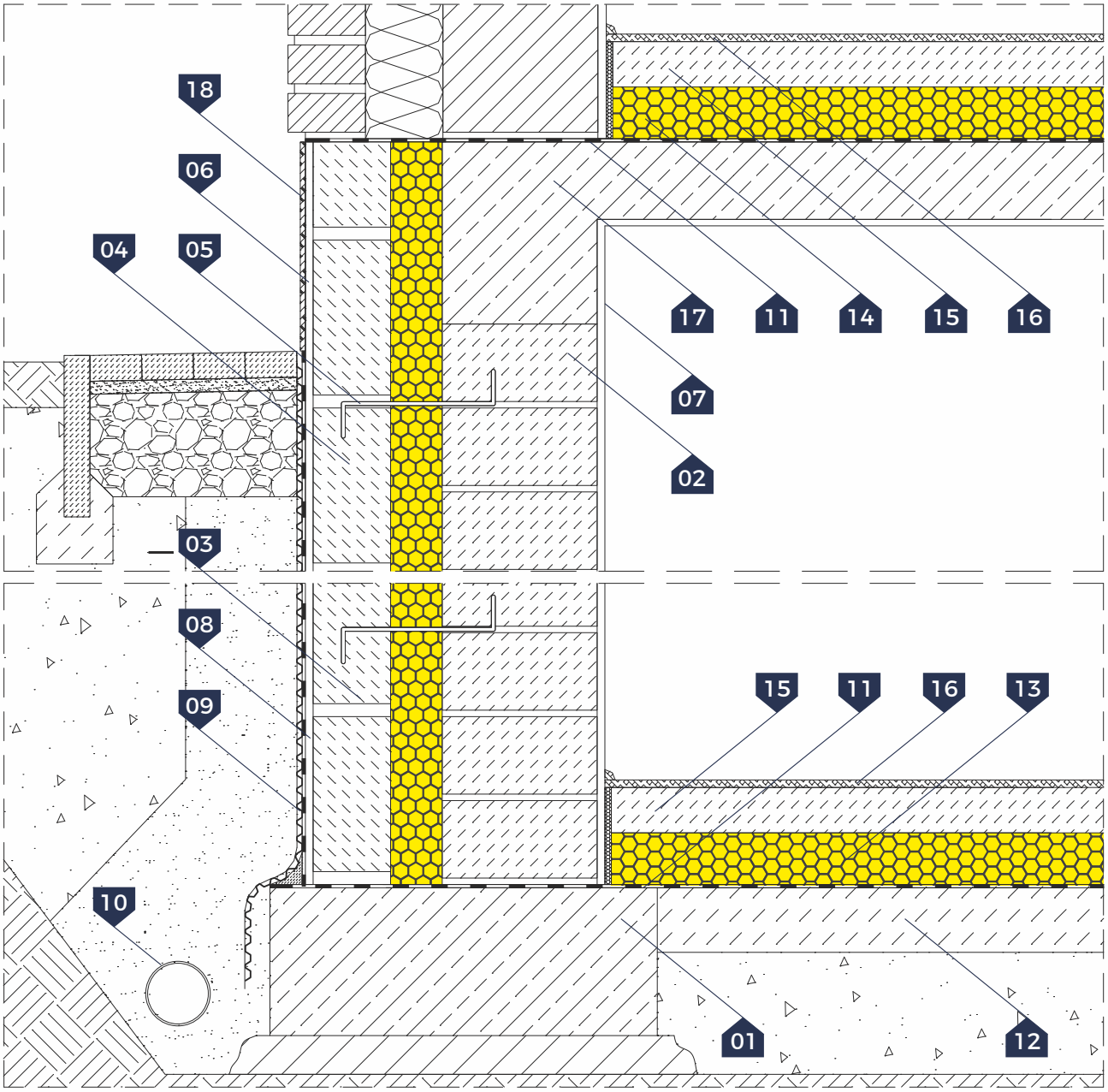
KEY:

01. Cellar wall
02. Lintel
03. Window
04. Cement-lime plaster
05. Cement plaster
06. Bituminous insulation mass
07. Wall thermal insulation - termPIR® WS/BWS board bonded directly to the insulation mass
08. Foundation foil
09. Finishing layer bonded to the plinth on net
10. External window sill
11. Internal window sill
12. Assembly foam

CELLAR WALLS

Triple layer cellar wall
(light type hydro-insulation)

termPIR®
insulation boards



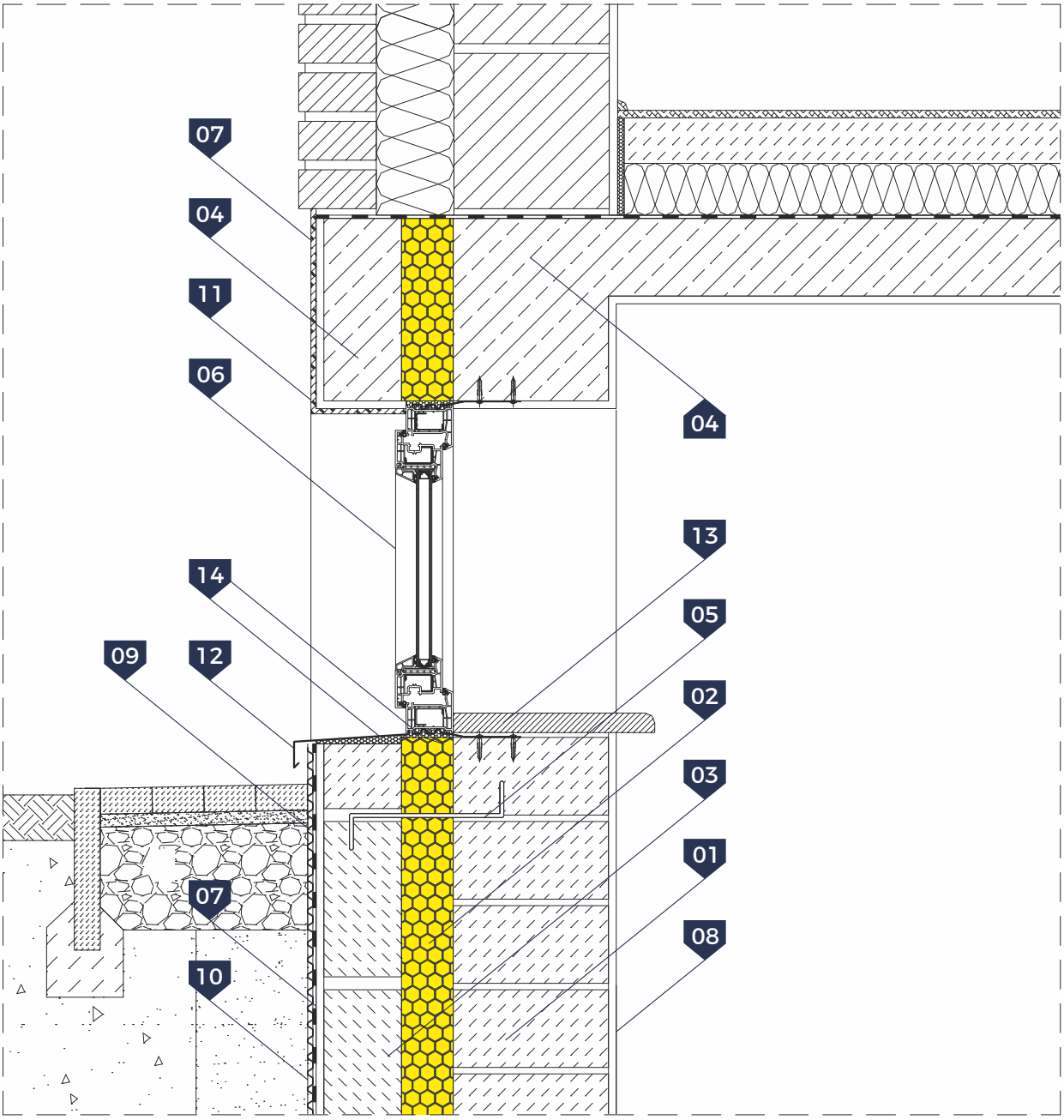
KEY:

01. Foundation batten
02. Cellar wall - bearing section
03. Wall thermal insulation - termPIR® AL. board
04. Cellar wall - protecting section
05. Wall connector
06. Cement plaster
07. Cement-lime plaster
08. Bituminous insulation mass
09. Foundation foil
10. Perimeter drain
11. Horizontal damp-proof insulation
12. Lean concrete
13. Floor thermal insulation
    - termPIR® AL/AGRO P REV board
14. Floor thermal insulation
    - płyta termPIR® AL/AGRO P REV
15. Cement floor screed
15. Flooring
17. Tie beam and ceiling above the cellar
18. Finishing layer bonded to the plinth on net

CELLAR WALLS

Triple layer cellar wall (light type hydro-insulation)
Cellar window detail

termPIR®
insulation boards

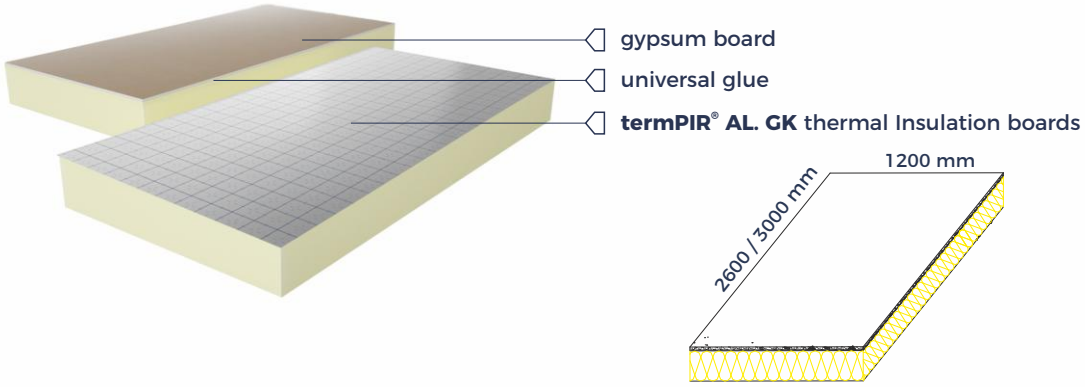


KEY:

01. Cellar wall - bearing section
02. Wall thermal insulation- termPIR® AL. board
03. Cellar wall - protecting section
04. Lintel of the bearing and protecting section
05. Wall connector
06. Window
07. Cement plaster
08. Cement-lime plaster
09. Bituminous insulation mass
10. Foundation foil
11. Finishing layer bonded to the plinth on net
12. External window sill
13. Internal window sill
14. Assembly foam

DIMENSIONS AND CONSTRUCTION OF termPIR® AL GK COMPOSITE THERMAL INSULATION BOARDS

COMPOSITE THERMAL INSULATION BOARDS termPIR® AL GK



INTENDED USE FOR termPIR® AL GK COMPOSITE THERMAL INSULATION BOARDS

termPIR® AL GK tcomposite thermal insulation boards are a product designed with a view to insulate walls of buildings under the protection of the Conservator Officer, the elevations of which are a rich architectural value, thus there is no possibility to change their appearance. This product allows to make a thermal insulation layer of partition located inside the building, which is finished in a way corresponding to the one that we use to make the so-called "pre-walls" using gypsum boards. Due to their dimensions, the termPIR® WS GK slabs will also be applicable in each place that requires the insulation of big surfaces in a relatively short period of time, i.e. on stairwells or other communication routes. The structure and applied production technology enables the Gór-Stal sp. z o.o. Company to offer a product, which in the reaction-to-fire performance classification in the final use is classified as **non-inflammatory** and **non-dripping.**

GUIDELINES FOR THE ASSEMBLY OF termPIR® AL GK COMPOSITE THERMAL INSULATION BOARDS

1. Preparation of base
The basis of a correctly performed assembly of slabs is the execution of base evaluation and, if necessary, application of series of procedures aimed at leading it to appropriate condition. The mentioned evaluation should be carried out according to the guidelines of the manufacturer of used adhesive. In extreme cases, e.g. during the assembly of boards on significantly uneven base, a change of assembly method from gluing to mechanical assembly may be necessary. It should be carried out according to the rules adopted for the assembly of gypsum boards.

2. Assembly of boards
In order to provide the appropriate load-bearing capacity of connection between the boards and base, at least 40% of the surface of one board must be covered in glue. This is guaranteed by applying on it 14 "pancakes" with diameter of approximately 15 cm and 10 cm wide circumferential strip. Board prepared in such way should be pressed to a load-bearing base. Any board location corrections are carried out using a rubber hammer through a wooden washer. Please ensure that the surface of washer from the side placed next to the board is smooth and free of dirt that might destroy the gypsum board. The finish layer of the termPIR® AL GK board must be secured against the possibility of rising dampness from the base. We recommend the application of a10 mm wide gap between the bottom of a board and the base (alternatively you can use damp insulation at the connection point). In case of using the gap, the boards should be supported with dividers for the adhesive binding time determined by the manufacturer. If the location of a board prevents the application of dividers, then it should be also mechanically mounted to the base using styrofoam assembly pins.

3. Wall surface finish
After 7-14 days pass from the assembly, you can start the finish of connections between the boards and connections between boards and other partitions. 5 mm and greater gaps should be first filled out with low pressure PIR foam. The final finish of board connections should be carried out according to the guidelines from the assembly of gypsum board pre-walls and the connections between boards and other partitions should be made using a painted acrylic mass.

Example details of walls of historical buildings insulated with the termPIR® AL GK composite thermal insulation boards.

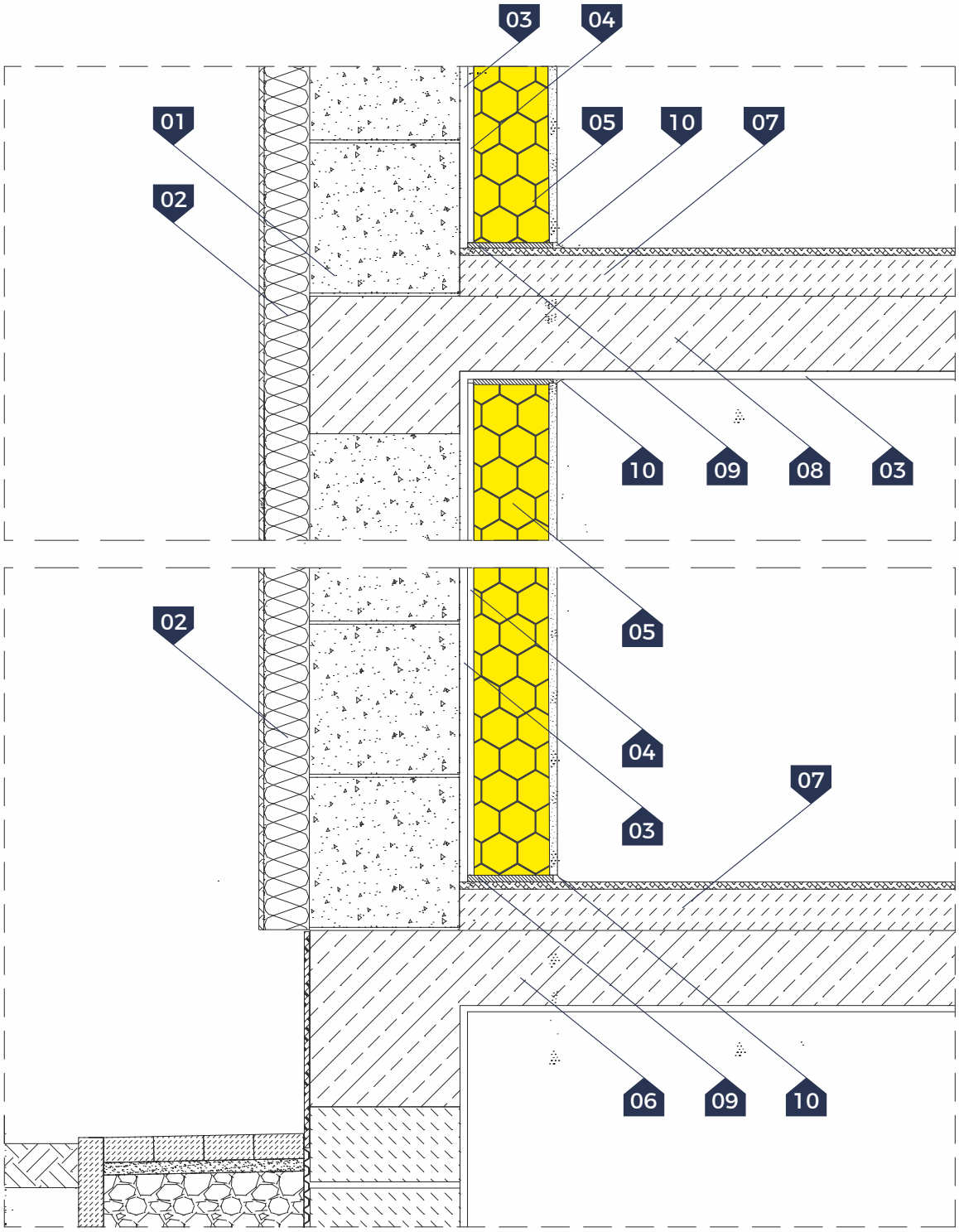
WALLS OF HISTORICAL BUILDINGS - termPIR® AL GK composite thermal insulation boards

WALLS OF HISTORICAL BUILDINGS

termPIR® AL GK composite thermal insulation boards

External wall - vertical section.
Assembly by gluing

termPIR®
insulation boards



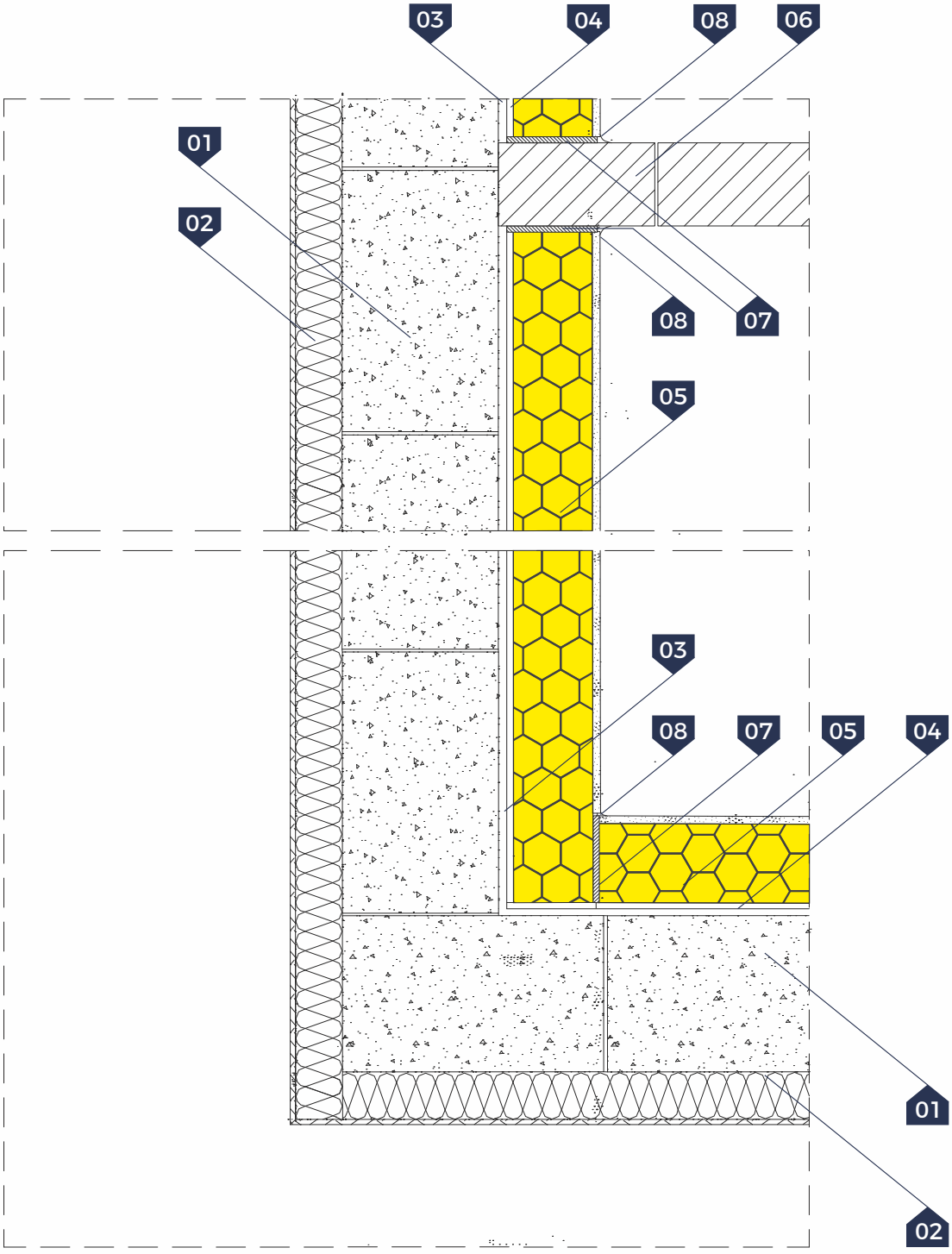
KEY:

01. Structural part of the wall
02. Existing external finish of the wall
03. Cement- calciferous plaster
04. Universal adhesive
05. Thermal insulation of wall - termPIR® AL. GK boards thick. according to thermal and moisture analysis of the wall
06. Tie beam and ceiling above the cellar
07. Floor finish
08. Tie beam and ceiling above the ground floor
09. Gap filled out with low pressure PIR foam
10. Cover strip or acrylic finish

termPIR® AL GK composite thermal insulation boards

External wall - the horizontal plan view.
Mounting by gluing

termPIR®
insulation boards



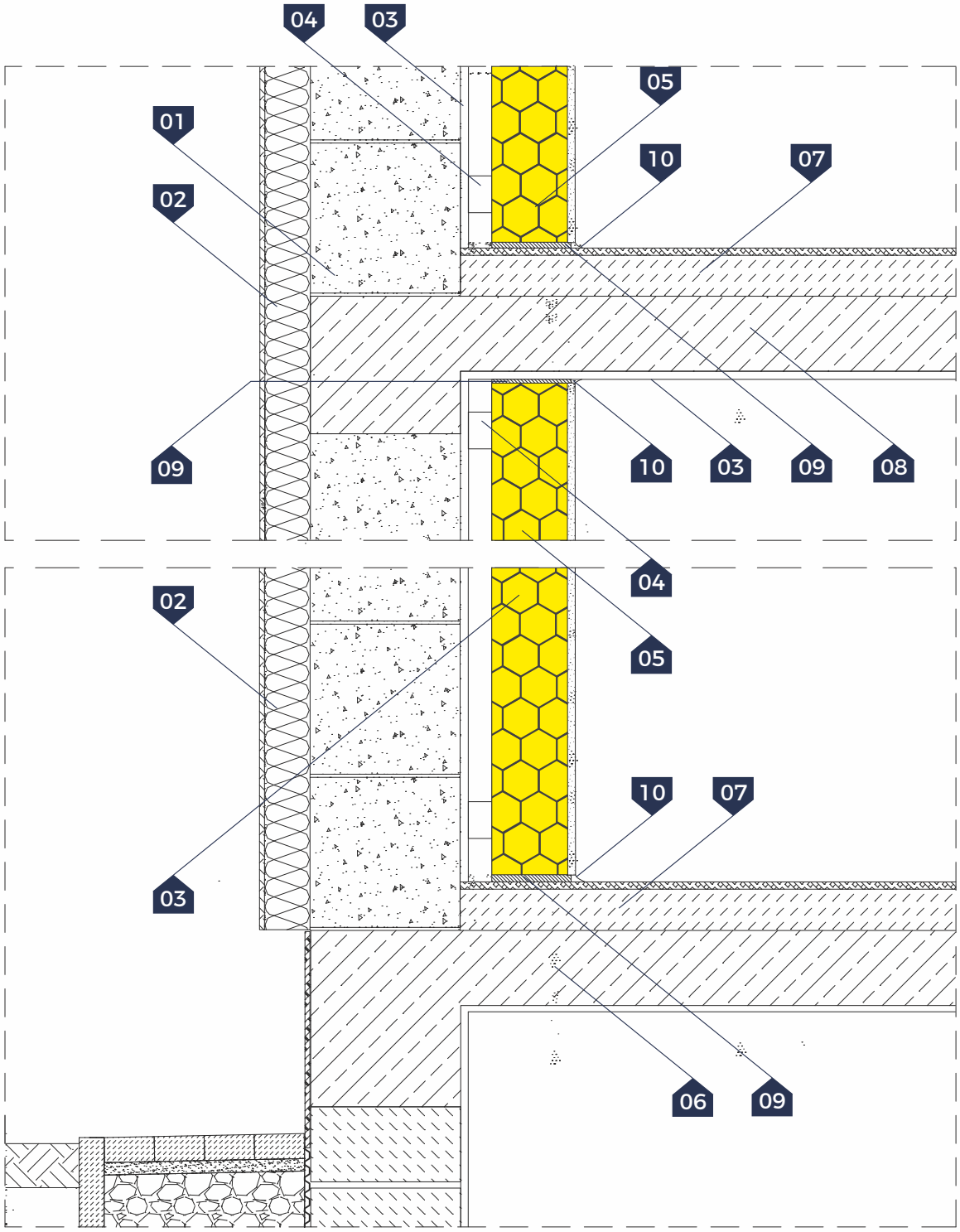
KEY:

01. Structural part of the wall
02. Existing external finish of the wall
03. Cement- calciferous plaster
04. Universal adhesive
05. Thermal insulation of wall - termPIR® AL GK boards thick. according to thermal and moisture analysis of the wall
06. Wall perpendicular to the insulated wall
07. Gap filled out with low pressure PIR foam
08. Cover strip or acrylic finish

termPIR® AL GK composite thermal insulation boards

External wall - vertical section.
Mounting on a rack

termPIR®
insulation boards



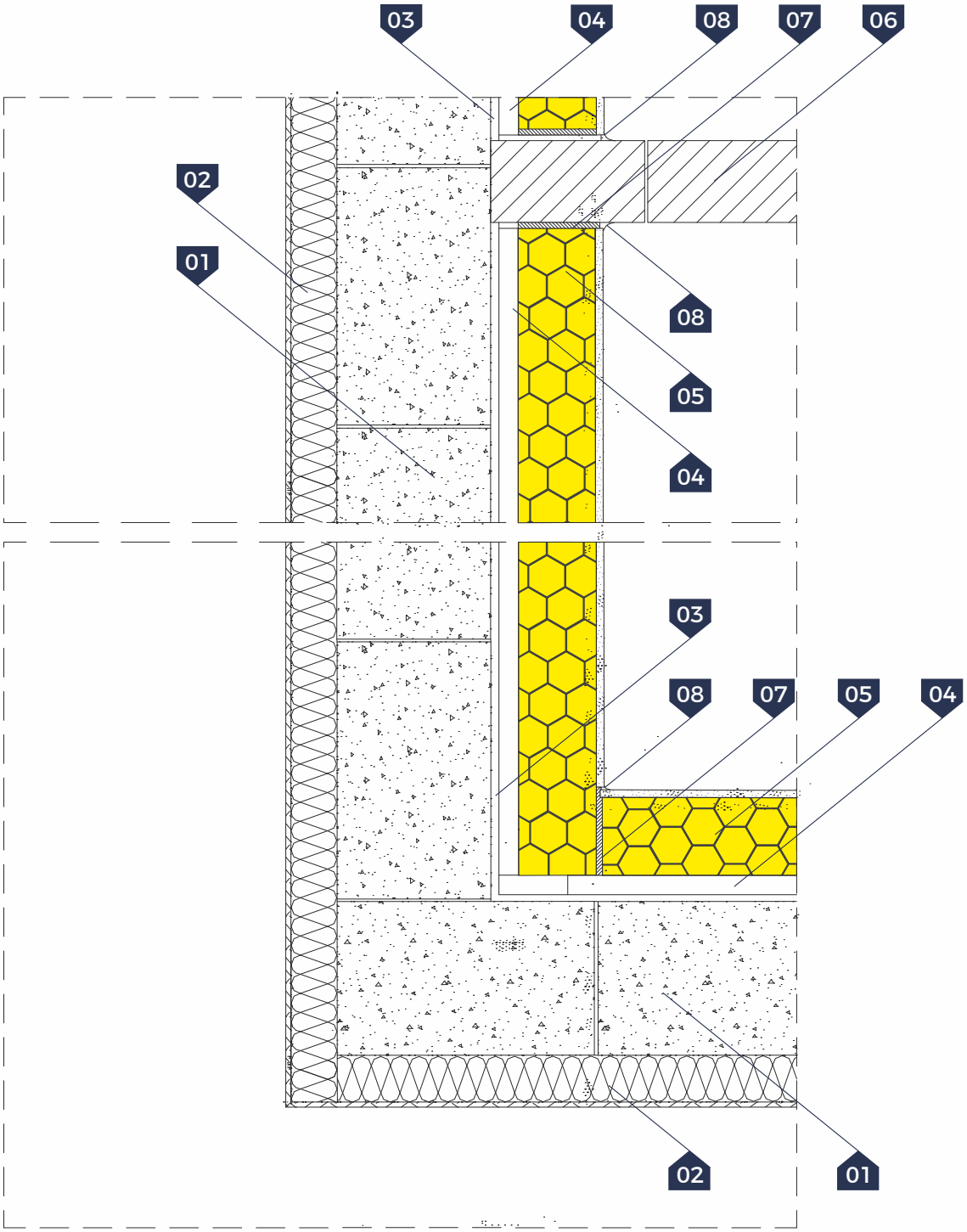
KEY:

01. Structural part of the wall
02. Existing external finish of the wall
03. Cement- calciferous plaster
04. Wooden / steel frame (spacing as for plasterboards)
05. Thermal insulation of wall - termPIR® AL. GK boards thick. according to thermal and moisture analysis of the wall
06. Tie beam and ceiling above the cellar
07. Floor finish
08. Tie beam and ceiling above the ground floor
09. Gap filled out with low pressure PIR foam
10. Cover strip or acrylic finish

termPIR® AL GK composite thermal insulation boards

External wall - the horizontal plan view. Mounting on a rack

termPIR®
insulation boards



KEY:

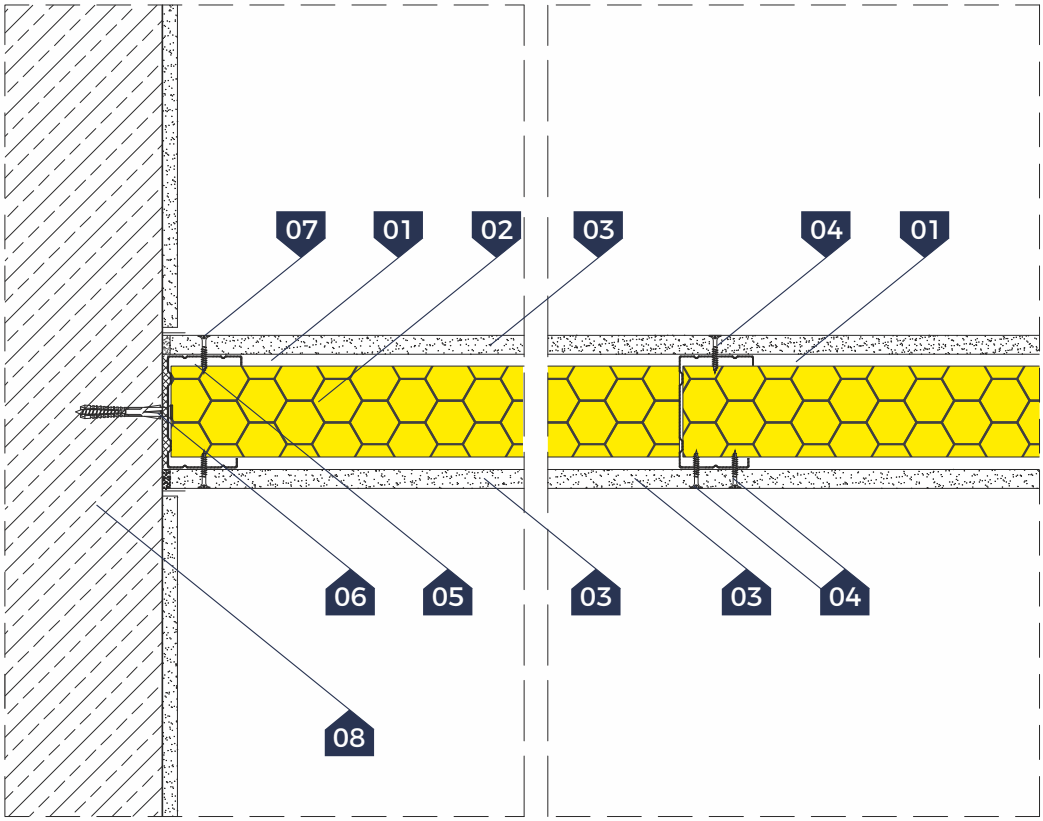
01. Structural part of the wall
02. Existing external finish of the wall
03. Cement- calciferous plaster
04. Wooden / steel frame (spacing as for plasterboards)
05. Thermal insulation of wall - termPIR® AL. GK boards thick. according to thermal and moisture analysis of the wall (assembly similar to plasterboards)
06. Wall perpendicular to the insulated wall
07. Gap filled out with low pressure PIR foam
10. Cover strip or acrylic finish

Examples of details of partition walls insulated thermally with termPIR® boards

PARTITION WALLS - ON STEEL STRUCTURE

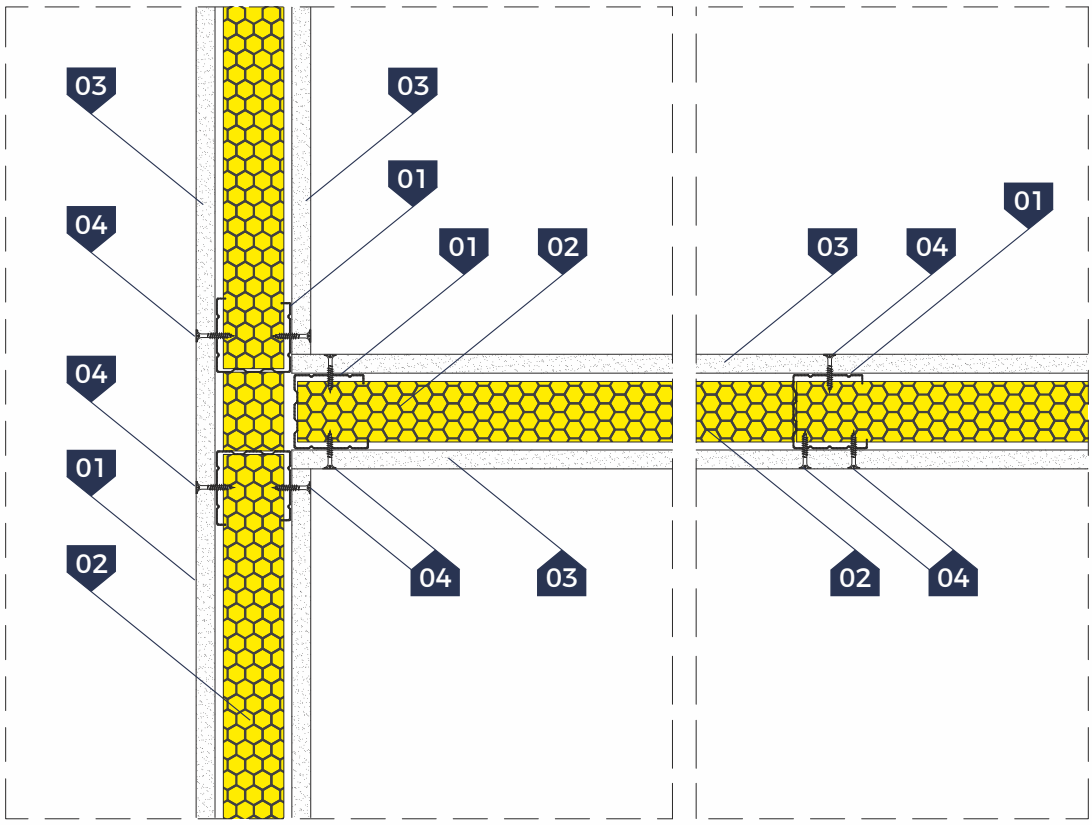
PARTITION WALLS - ON STEEL STRUCTURE

Detail of connection with the bearing wall



KEY:

01. Partition wall construction - CW 100, CW 75, or CW 50 profile
02. Wall thermal insulation - termPIR® WS / AL board
04. Self-tapping screw for steel
05. Sealing tape
06. Wall plug
07. Sliding tape
08. Bearing wall

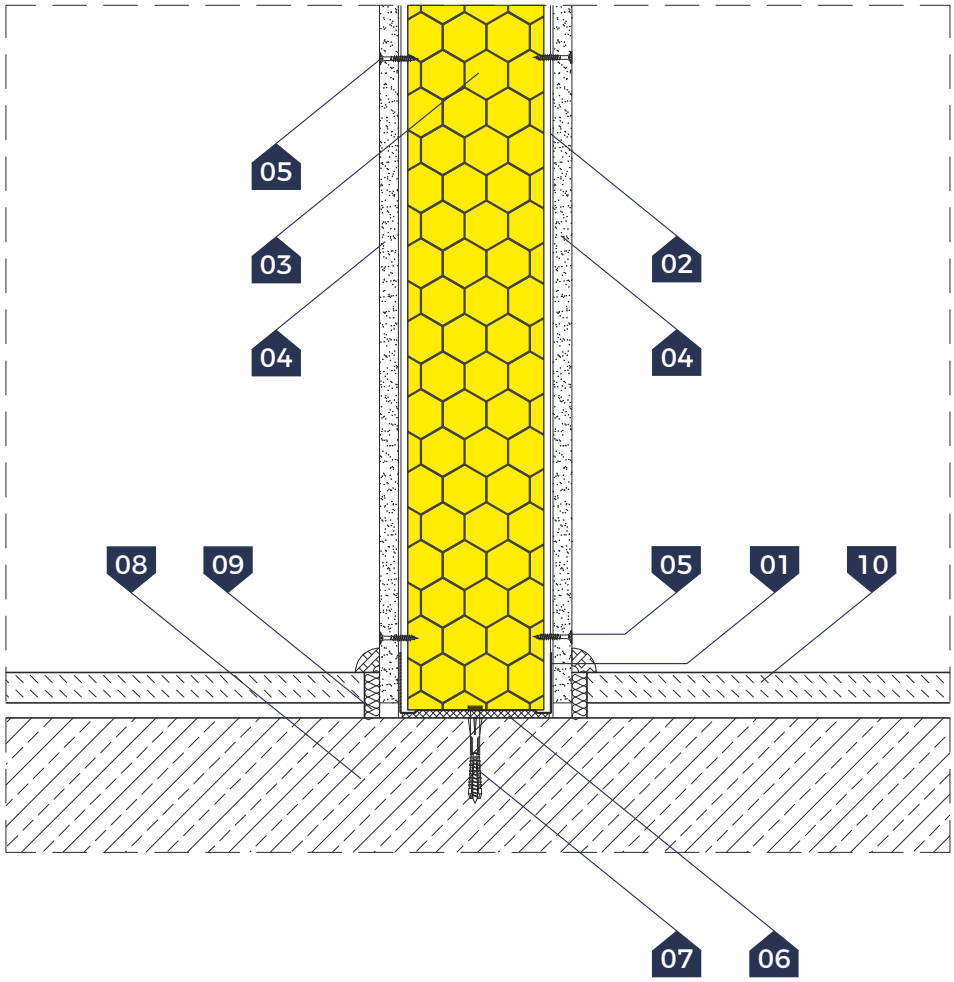


KEY:

01. Partition wall construction - CW 100, CW 75 or CW 50 profile
02. Wall thermal insulation - termPIR® WS / AL board
03. Finish - e.g. gypsum board on battens
04. Self-tapping screw for steel

PARTITION WALLS - ON STEEL STRUCTURE

Detail of the wall assembly near the flooring

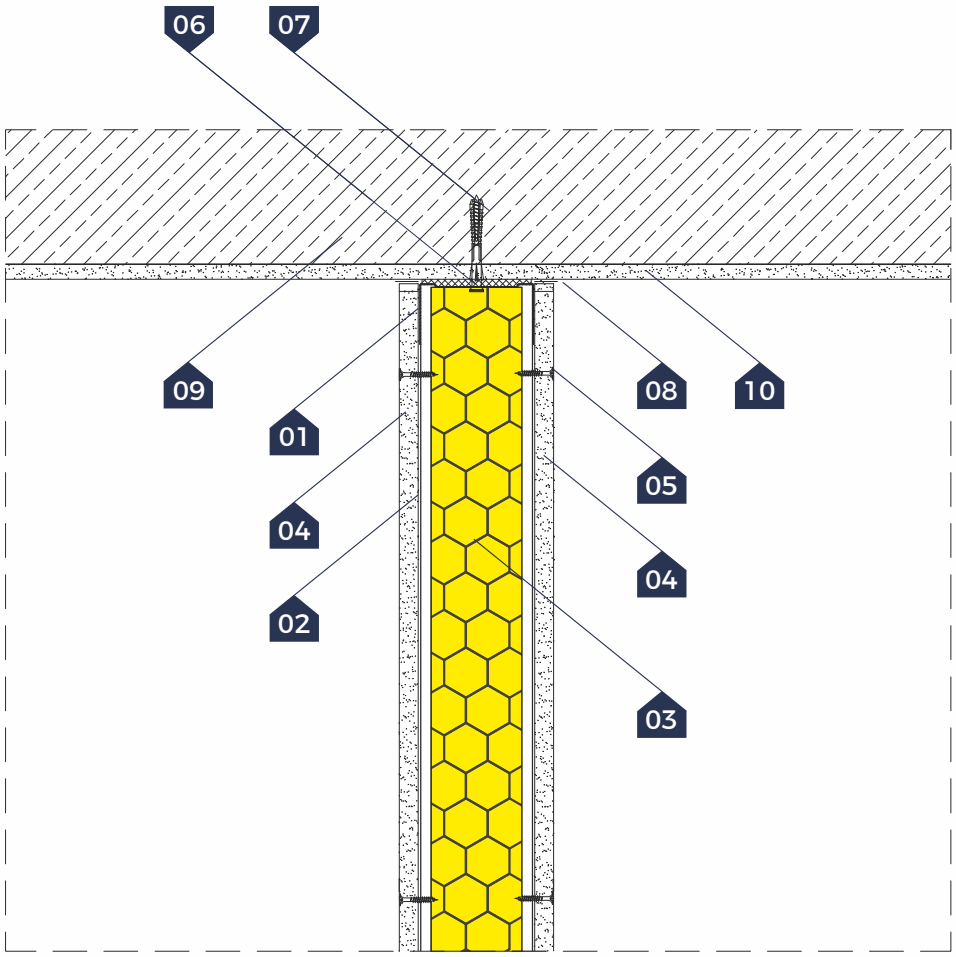


KEY:

01. Partition wall construction - UW 100, UW 75, or UW 50 horizontal profile
02. Partition wall construction - CW 100, CW 75, or CW 50 vertical profile
03. Wall thermal insulation - termPIR® WS/ AL board
04. Finish - e.g. gypsum board on battens
05. Self-tapping screw for steel
06. Sealing tape
07. Wall plug
08. Cement floor screed
09. Circumferential dilatation
10. Flooring finishing

PARTITION WALLS - ON STEEL STRUCTURE

Detail of the wall assembly near the ceiling

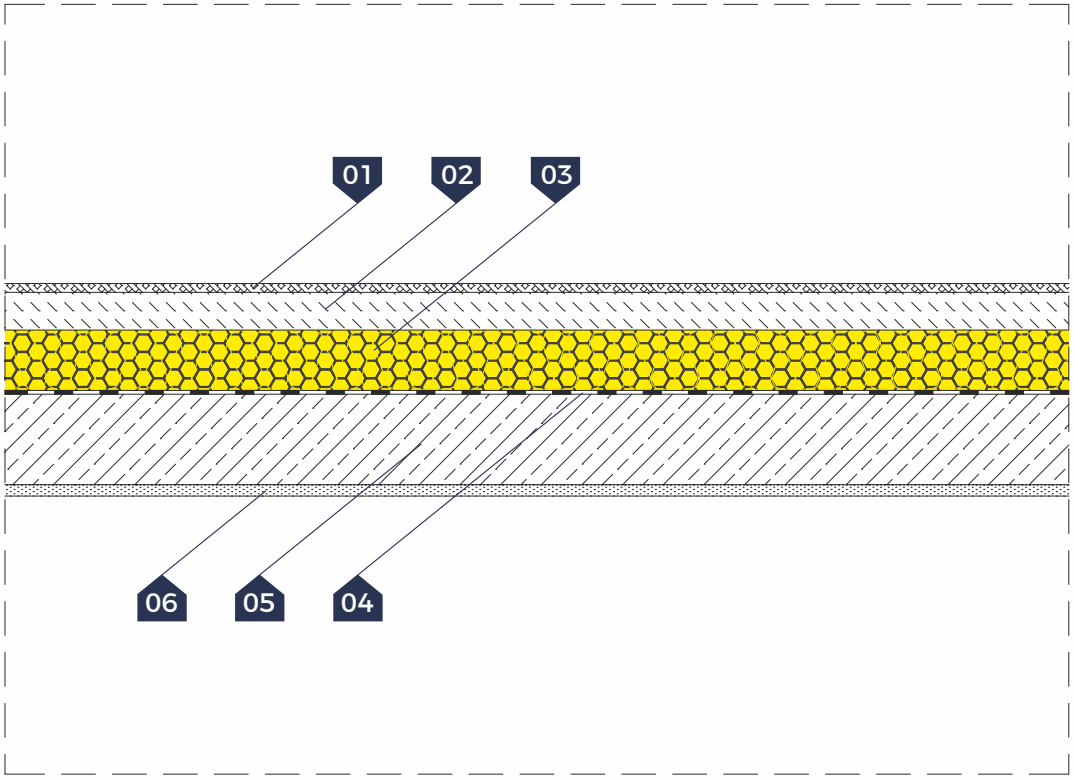


KEY:

01. Partition wall construction - UW 100, UW 75 or UW 50 horizontal profiles
02. Partition wall construction - CW 100, CW 75 or CW 50 vertical profiles
03. Wall thermal insulation - termPIR® WS / AL board
04. Finish - e.g. gypsum board on battens
05. Self-tapping screw for steel
06. Sealing tape
07. Wall plug
08. Sliding tape
09. Ceiling
10. Plaster

Examples of floor and ceiling details insulated thermally with termPIR® boards

CEILINGS AND FLOORS

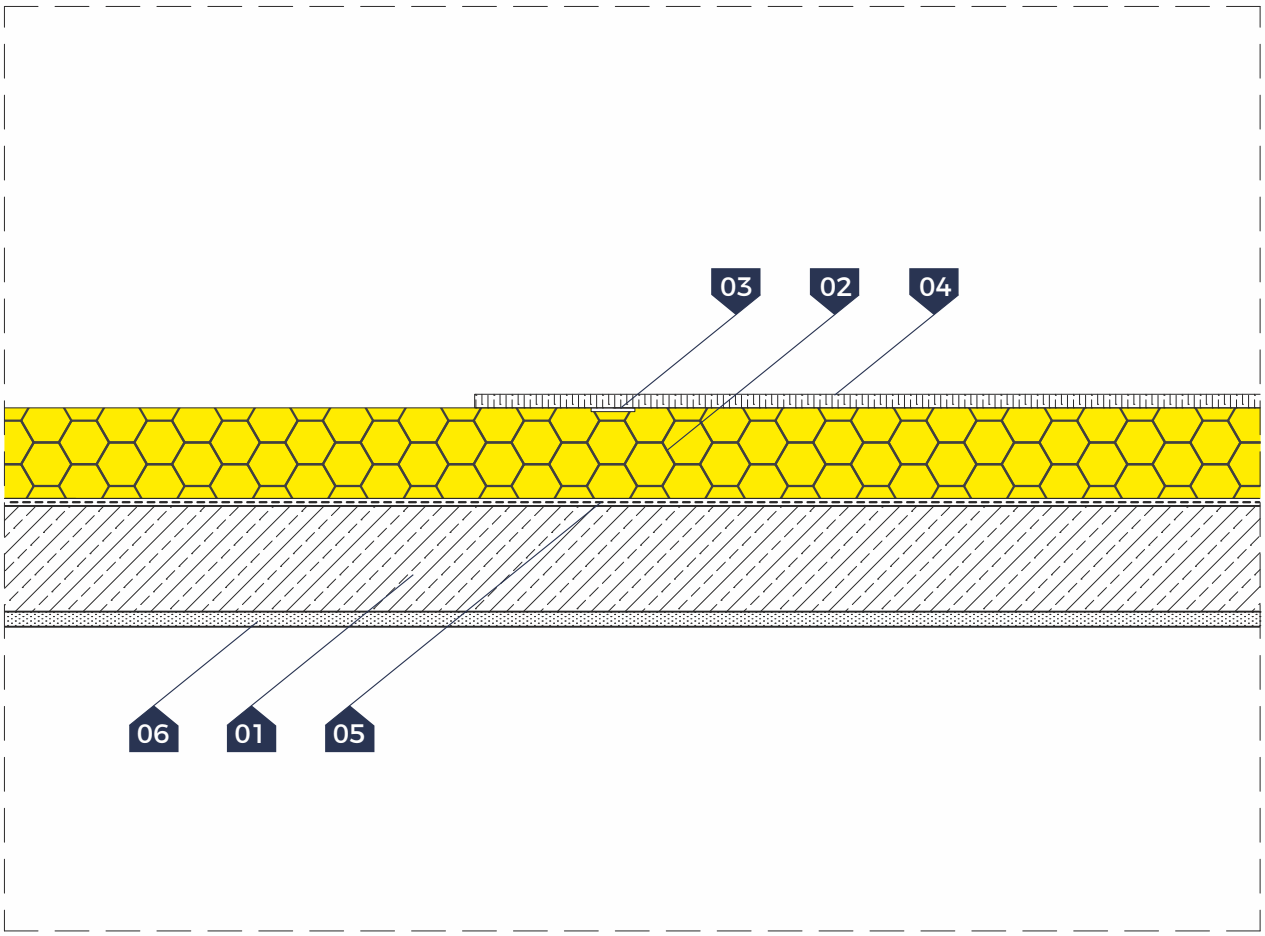


KEY:

01. Flooring - finishing layer
02. Concrete screed - levelling layer
03. PE foil (option)
04. Floor thermal insulation - termPIR® AL/AGRO P. REV board
05. Ceiling - reinforced concrete slab with screed for skim coat
06. Cement-lime plaster

Thermal insulation of the ceiling of the last storey - cross section of the ceiling

termPIR®
insulation boards



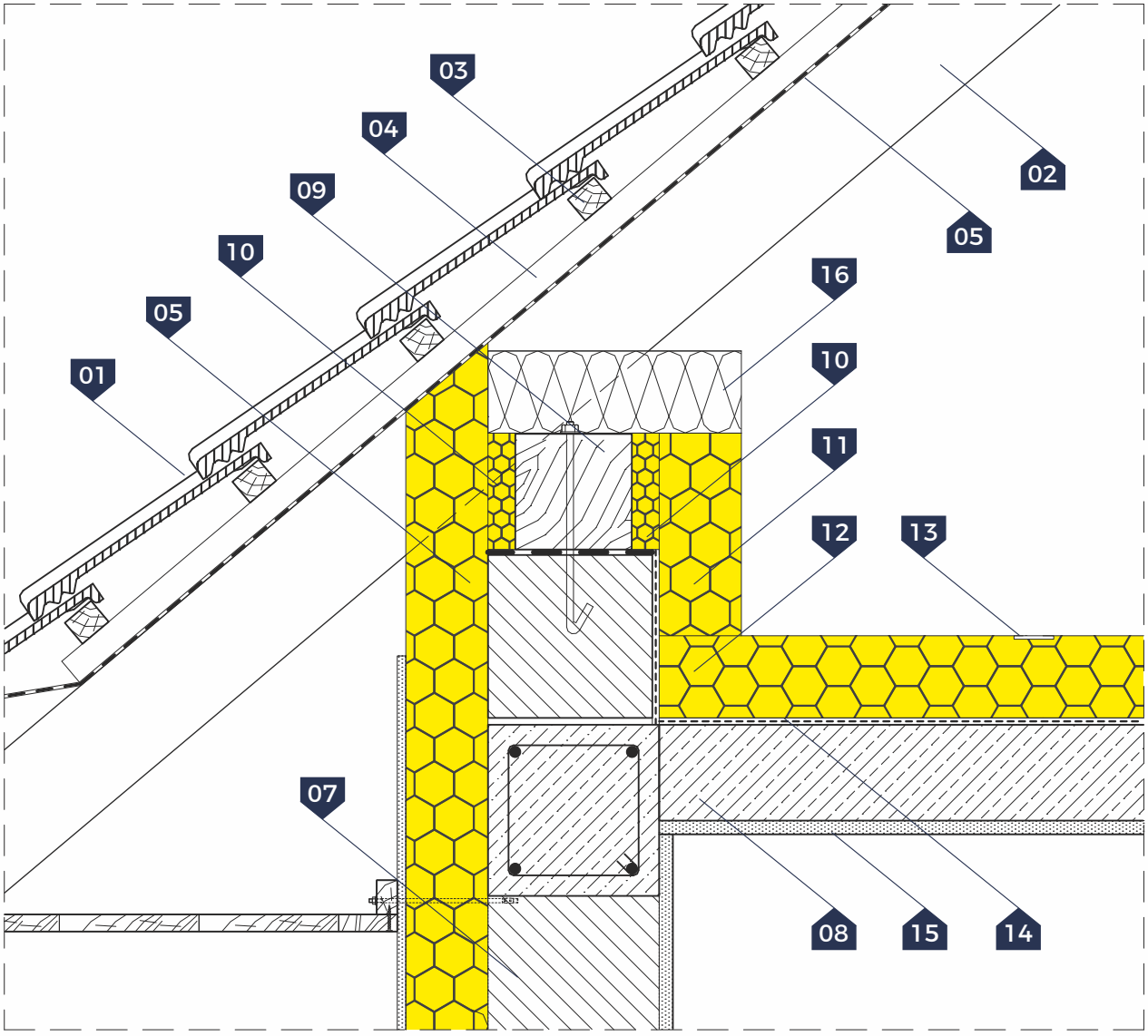
KEY:

01. SReinforced concrete ceiling
02. Ceiling thermal insulation - termPIR® AL. board
03. Aluminium sealing tape
04. OSB board - communication
05. Polyurethane adhesive
06. Plaster

NOTE:

a. The cut boards are to be sealed with assembly foam

b. The aluminium sealing tape to be installed after installation of the boards (only for AL lining)

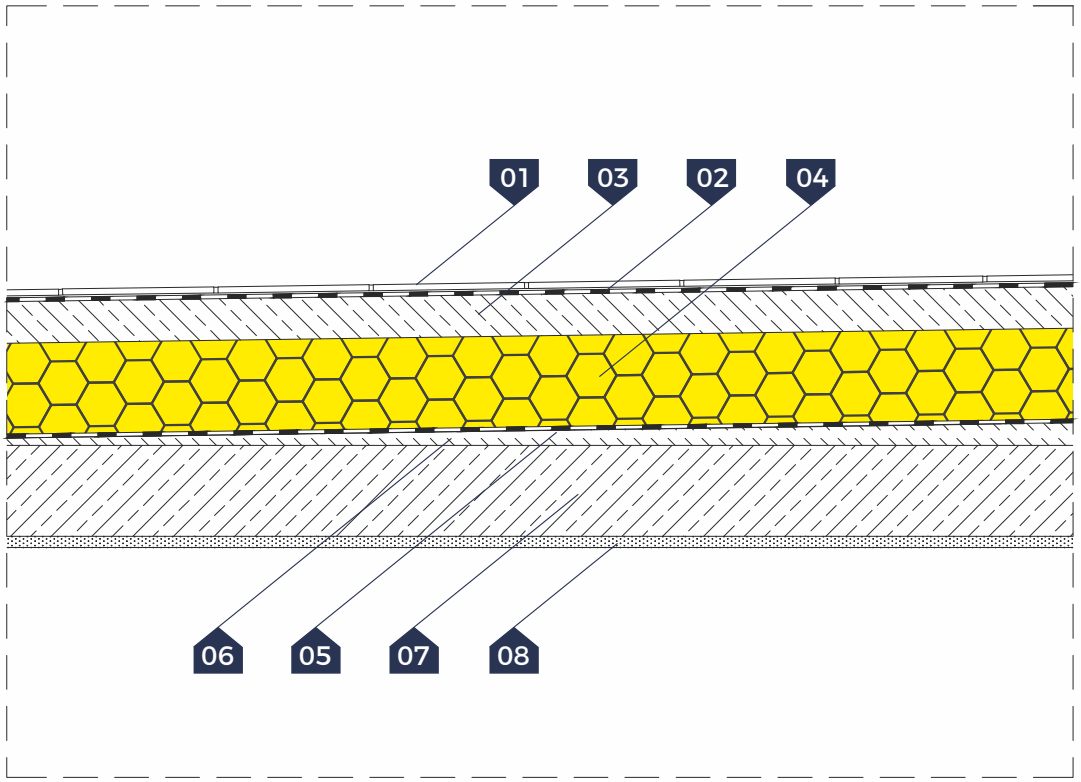


KEY:

01. Roof cover - roof tile or steel sheet
02. Wooden rafter
03. Batten
04. Counter-batten
05. Wind insulation - vapour permeable membrane
06. Wall thermal insulation - termPIR® ETX board
07. External wall
08. Tie beam and reinforced ceiling
09. Wall plate
10. Additional insulation wall plate
11. Additional insulation wall plate- termPIR® AL/WS board
12. Ceiling thermal insulation - termPIR® AL/WS board
13. Aluminium sealing tape
14. Polyurethane adhesive
15. Plaster
16 Additional insulating material

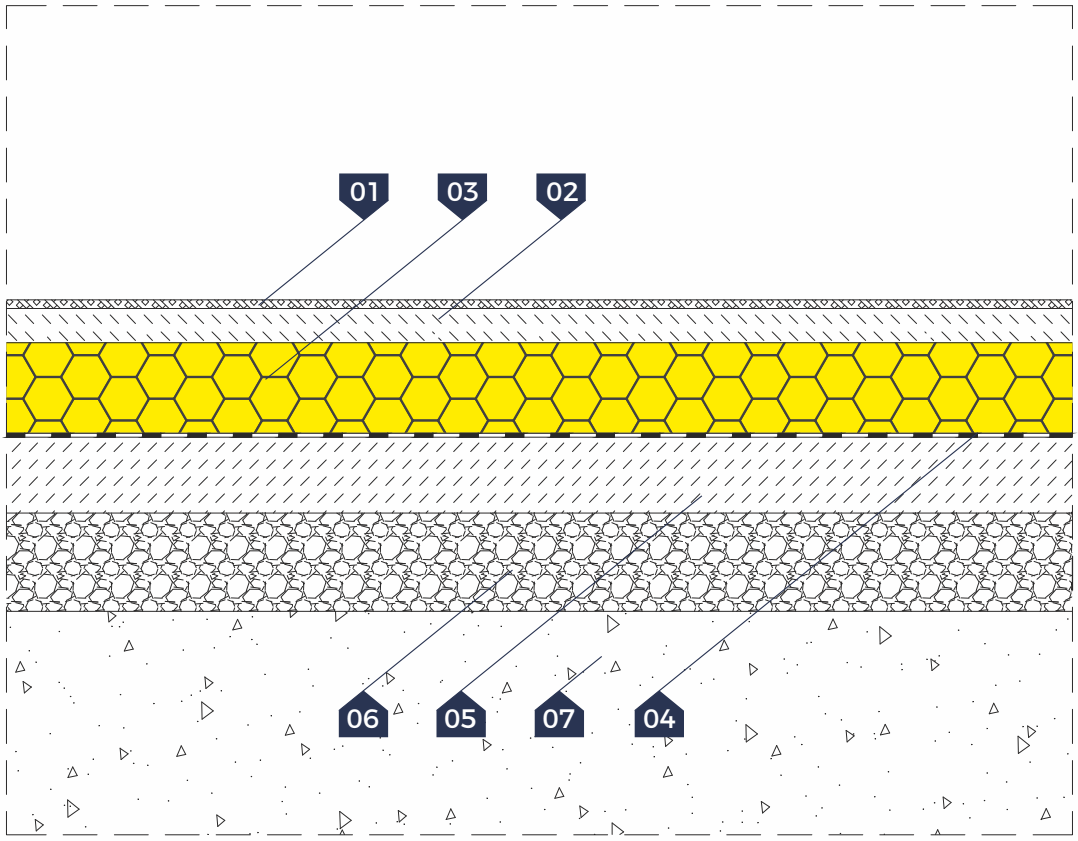
NOTE:

a. The cut boards are to be sealed with assembly foam
b. The aluminium sealing tape to be installed after installation of the boards (only for AL lining)



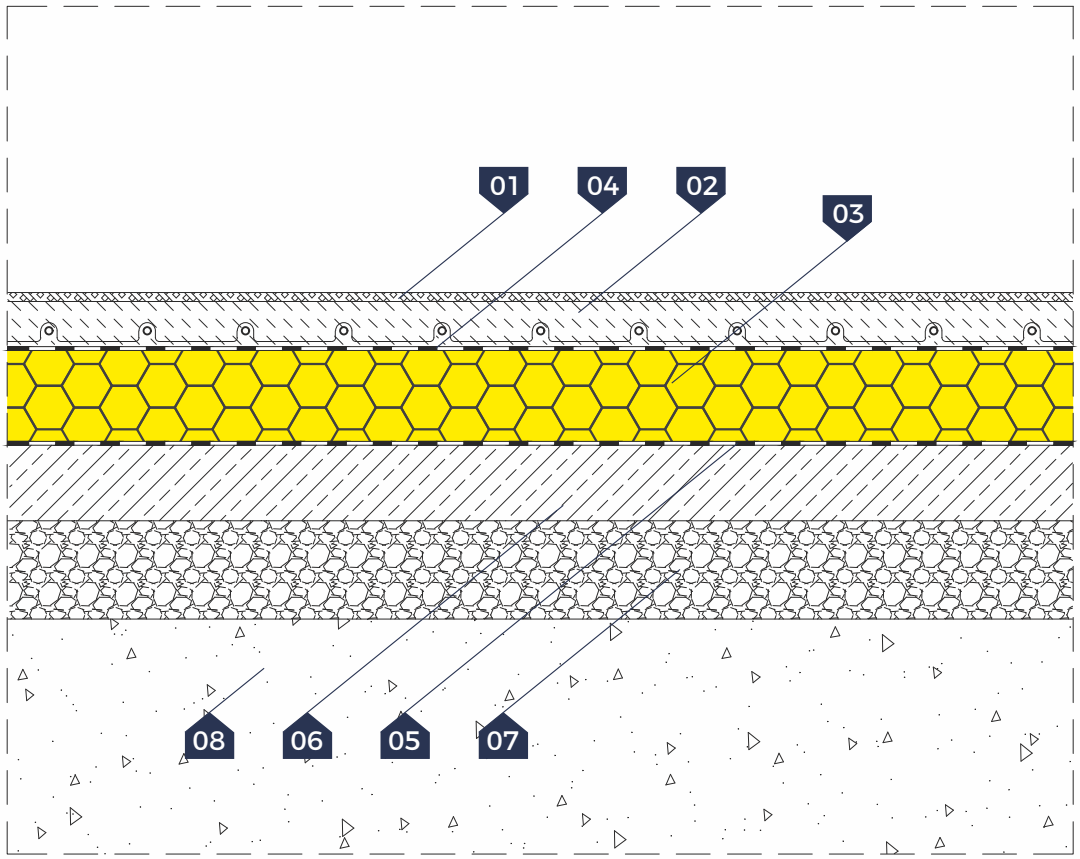
KEY:

01. Terrace surface - finishing layer
02. Hydro-insulation
03. Cement floor screed
04. Terrace thermal insulation- termPIR® AL/AGRO P. REV board
05. PE foil (option)
06. Concrete screed - inclined layer
07. Ceiling - reinforced concrete
08. Cement-lime plaster



KEY:

01. Flooring - finishing layer
02. Concrete screed
03. Floor thermal insulation - termPIR® AL/AGRO P REV board
04. PE foil (option)
05. Concrete slab
06. Gravel bed (or lean concrete)
07. Native ground



KEY:

01. Flooring - finishing layer
02. Concrete screed (or screed) - heating layer
03. Floor thermal insulation - termPIR® AL/AGRO P. REV board
04. Foil - aluminium screen (option)
05. PE foil or hydro-insulation
06. Concrete slab reinforced with net
07. Gravel bed (or lean concrete)
08. Native ground

Order form of

termPIR® INSULATION BOARDS

termPIR® insulation boards

Order

no _____ **of** _____

Agent

_____

Supplier: (name, company address, phone/fax, TIN)

Gór-Stal sp. z o.o.
No. 11 Przemysłowa st.
38-300 Gorlice
Tel./Fax: + 48 18 353 98 00
Account No: 79 1140 1081 0000 5859 5500 1001

Commercial Terms	
Payment method:	
Advance (%): _____	payable until:_____
Maturity:	
Credit limit:	
Remarks:	

Buyer: (name, company address, phone/fax, TIN)

Agent:

Remarks:

Delivery place: (recipient, address, city, post code, phone/fax)

L.P.	**Boards type:** termPIR® AL termPIR® AGRO AL termPIR® AGRO P REV termPIR® WS termPIR® AL GK termPIR® BT termPIR® BWS termPIR® ETX termPIR® MAX19	**Boards thickness [mm]:** 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150 160, 170, 180, 190, 200, 210, 220, 230, 240, 250	**Quantity**		**Net price: Unit/value**	
			dimensions [cm]	pcs.	EUR/m²	EUR
01						
02						
03						
04						
05						
06						
07						
08						
09						
10						
11						
		In total:	**[m²]:**		**[EUR]:**	

Party's Signature Ordering:

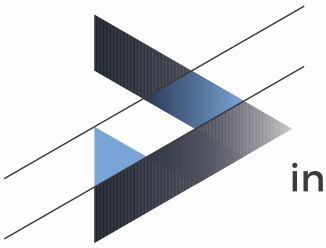
The author and Gór-Stal sp. z o.o reserve the right to amend or correct the content of the catalogue without notice.

The study should be treated as guidelines of the manufacturer concerning the correct application of the products manufactured by the Gór-Stal Company.

The document does not substitute technical and construction know-how and cannot constitute the basis to file any claims against Gór-Stal.

Prepared by: mgr inż. arch. Krzysztof Dudziński, M.Sc. Szymon Jamro, Maciej Kluba, Edition I, Gorlice, 11.2017 r.

Update: mgr inż. Szymon Jamro 26.04.2022 r.



termPIR®
insulation boards

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www.termpir.eu

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