ATLAS

school of insulation

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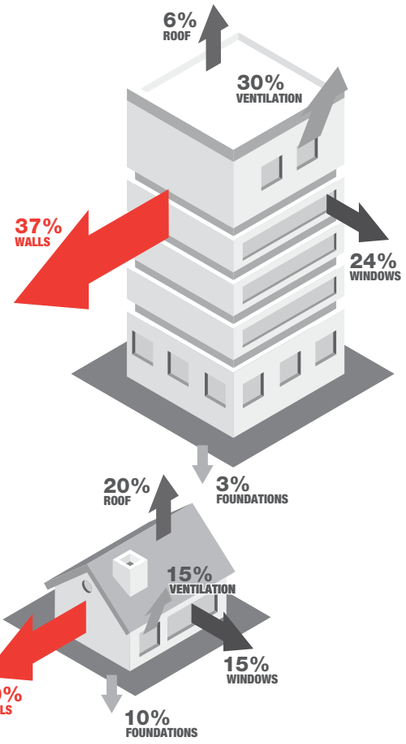
INTRODUCTION

Our project in Poland - effect of concrete

Each building loses a certain amount of heat. One way to minimize it is the proper implementation of a building thermal insulation. Its primary purpose is to provide adequate thermal insulation of the external walls of the building in order to reduce heat loss from the heated indoors to the environment and to prevent the development of mould on the interior walls.

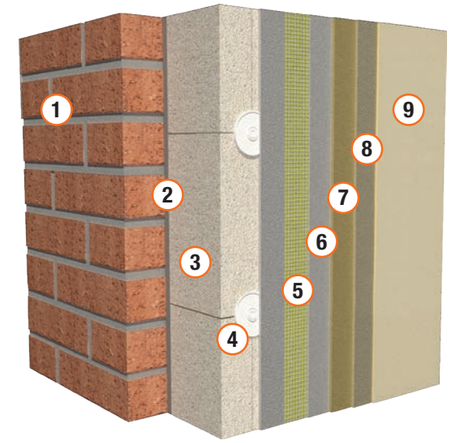
At the same time insulation should not lead to rising dampness of walls caused by the concentration of water vapour in its interior.



LOSS OF HEAT IN RESIDENTIAL BUILDINGS

The fulfillment of these objectives is achieved by selection of an appropriate layer thickness and type of insulating material. In order to choose the insulation material and its thickness you should calculate U* value and the Ep** coefficient. The calculations should be made by a designer.

The most frequently used method of building insulation is external thermal insulation composite system (ETICS), also referred to as external wall insulation (EWI) system. It is used for new buildings as well as for the thermo-modernization of the old ones. It involves fixing insulation boards of expanded (EPS) polystyrene or mineral wool (MW) to the substrate with adhesive mortar and mehanical fixings, application of reinforcing layer with fibre-glass mesh embedded and finishing the surface with a thin-coat render.



ATLAS EXTERNAL WALL INSULATION SYSTEM
1. WALL
2. ADHESIVE FOR THERMAL INSULATION
3. THERMAL INSULATION
4. SUPPLEMENTARY MECHANICAL FIXINGS
6. ADHESIVE FOR MESH EMBEDDING
7. PRIMER UNDER RENDERS (IF NEEDED)
8. RENDER (FINISHING COAT)
9. PRIMERS AND PAINTING COATS (OPTIONAL FINISHING)

WE SHOULD BE AWARE OF SEVERAL IMPORTANT ELEMENTS:

You need to prepare all the necessary tools and equipment. During work, you cannot make breaks because the application of insulation components requires maintaining an appropriate regime of the time.

Materials used in external wall insulation (priming mass, reinforcing mesh, adhesive and render) should be matched to each other in terms of mechanical and chemical parameters as well have building approvals to prove their properties. The most secure solution is to apply comprehensive solutions recommended by manufacturers.

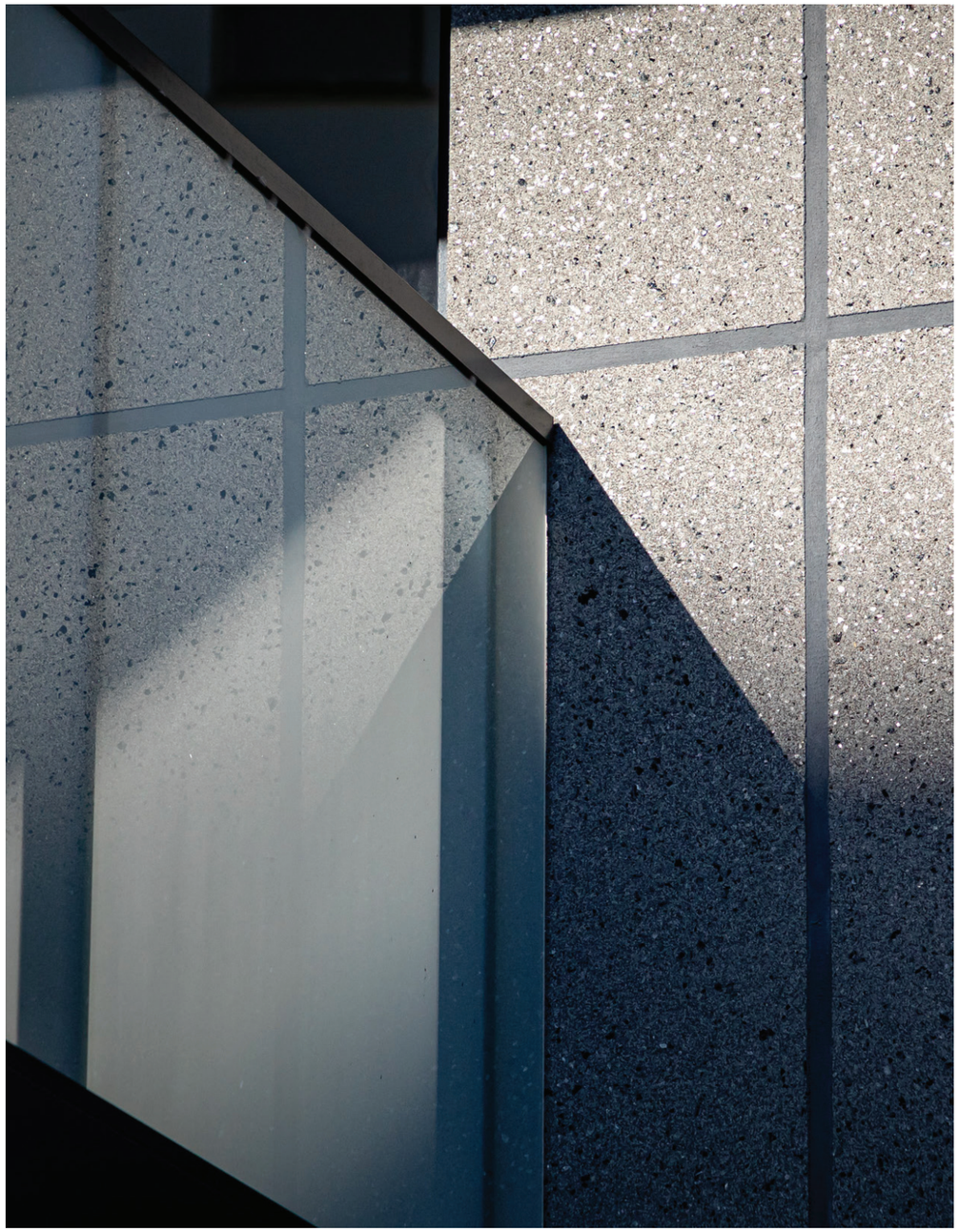
Keep in mind that the work is carried out in temperatures not lower than +5 °C and not higher than +25 °C. It is unacceptable to carry out the works at the time of precipitation, on the facades exposed to direct sunlight, at a time of strong winds or whether a drop in temperature below 0 °C in 24h time is announced.

In this brochure we describe particular stages of external wall insulation, leading you step by step through each of them.

* U – external wall heat transfer coefficient calculated according to domestic regulations.
** Ep – ratio, calculated in kWh / (m^2 / year), calculated annual demand for primary irreversible heating energy, ventilation and hot water.

Lesson 1

SUBSTRATE PREPARATION



Our project in Poland - effect of stone

The work starts with checking and preparation of the substrate, to which we adhere the polystyrene or mineral wool slabs. There are two types of substrates, on which we can apply insulation:

- OLD — buildings already existing, sometimes with an existing layer of insulation to be modernized;
- NEW — newly constructed buildings.

ANY SUBSTRATE THAT IS TO BE INSULATED SHOULD BE:

1. STABLE
and therefore sufficiently sound and properly seasoned.

LOAD BEARING CAPACITY

- OLD SUBSTRATE — if you are not sure about the stability and quality of the substrate, do a simple pull-off test described on the next page.
- NEW SUBSTRATE — we assume that it is structurally sound enough as it is made in most cases of new ceramic materials, cellular concrete or concrete.

SEASONING

- OLD SUBSTRATE — we assume that it is already fully cured.
- NEW SUBSTRATE — new concrete walls — at least 28 days.

2. DRY

- OLD SUBSTRATE — free of moisture from precipitation.
- NEW SUBSTRATE — properly seasoned.

3. EVEN

- OLD SUBSTRATE — on the surfaces a variety of damages, cracks and cavities may have formed. They must be levelled using, for example: ATLAS ZW 330 or adhesive mortars used for basecoat of insulation systems*.
- NEW SUBSTRATE — newly built, so do not require alignment.

4. CLEAN

remove any layers that may weaken adhesion, such as dust, dirt, lime, oil, grease, etc.

- OLD SUBSTRATE — on the surfaces may occur various fouling, damage or even algae and lichens. In case of dirt and debris it is enough to wash surfaces, e.g. with a pressure washer. Algae and lichens remove with fungicides such as ATLAS MYKOS PLUS.
- NEW SUBSTRATE — remove any dirt when dry. Very absorbent substrates should be primed.

FIG 1.1 UNCLEANED SUBSTRATE

Careless preparation of the substrate most importantly not cleaning of dirt or grease and not removing old coatings, results, in most cases, in detachment of the thermal insulation on the entire wall surface. The photo above show errors and their consequences (fig. 1.1).

*in case the uneveness is greater than 20 mm, it should be reduced by apprperiately selecting insulation panels thickness.

PULL-OFF TEST

Pull-off test involves fixing with the use of an adhesive (eg. ATLAS HOTER U) to the substrate a number of 8 to 10 polystyrene cubes measuring 10 x 10 cm in various places of façade. After 3 days you should try to pull off the polystyrene cube.

1. If you pull off the whole cube with a layer of the substrate, such as old render, it will indicate a lack of load-bearing of that layer. In this case, the entire wall must be examined, and all the weak parts of substrate layers removed down up to sound section of the substrate. Removed sections should be replaced with new mortar, for example, ATLAS ZW 330 or adhesive mortar used for the insulation (up to 1 cm thick). After preparing new substrate, re-check 4 required parameters: stable, dry, even, clean.

2. If the cube pulls off with the adhesive and the substrate, such as render, remains intact, it will mean that it is improperly prepared. It is either too absorbent and requires priming using ATLAS UNI-GRUNT, or it is too smooth, non-absorbent or coated with non-adherent layers and needs to be cleaned or covered with ATLAS CERPLAST. Cleaning of the render surface can be done using a preassure washer. It removes dirt, debris and unstable parts of the surface layers. After drying reduce surface's absorption eg. by using ATLAS UNI-GRUNT.

3. If the polystyrene cube tears and one part of it is solidly attached to the wall, it shows that the surface is stable and suitable for insulation fixing.

NOTES

Lesson 2

INSULATION APPLICATION

Our project in Poland - line of intensive tones

In the first lesson we show how to prepare the building for insulation, and we discuss the first step which is to check and prepare the substrate under External Wall Insulation (EWI), i.e. thermo-insulation* — for new houses or thermo-modernization** — for existing houses.

In this lesson we deal with fixing the most commonly used external wall insulation, and show how to bond polystyrene and mineral wool panels.

At the beginning we must ask ourselves what insulation to use, and thus which system to choose?
It is one of the key questions, because improper use of insulation material on a particular investment may bring more problems than benefits.
The easiest solution is to proceed as stipulated in the project documentation, which clearly indicates a particular type of insulation.

But what if we do not have such information?
Then the best solution is to contact with the people of appropriate experience such as the Technical Advisors of insulation system manufacturers. Each case of thermal insulation or thermo-modernization must be considered individually by the designer, taking into account the condition of the facade, type of building, its location, purpose, etc.

In this section, we will focus on the technology of insulation fixing.

* Thermo-insulation - in case of the buildings it referes to actions aiming at obtaining expected thermal isolation parameters of external building partitions or improving them by changing or adding system insulation layers to partitions in order to minimize heat loss and its consequences.
** Thermo-modernization - all works aimed at reduction of thermal energy consumption during building exploatation. Usually it referes to earlier build buildings and includes actions connected with increasing the insulation of external building partitions (walls, roof), as well as exchanging the windows, heating appliances, power sources, etc.

START OF WORK

Before applying the insulation all the elements on the wall which hinder the substrate preparation and execution of insulation, such as: signs, advertisements, gutters and downspouts, shutters, lamps and window sills should be removed.

We start the installation of thermal insulation layer by determining height from which we apply the first layer of insulation according to the design documentation or if you do not have such information, defining the so-called base, that is generally placed about 30 cm above the ground. This height eliminates the influence of the capillary moisture, which affects the stability of the system and protects the external render from mud and dirt carried by drops of rain bouncing of the ground.

Install the starter track to the wall at a designated altitude using mechanical fixings to form a band around the building which supports the insulation (fig. 2.1). Starter track is not an obligatory system element, but it greatly facilitates the installation of the first insulation layer.

FIG. 2.1 INSTALLATION OF STARTER TRACK

POLYSTYRENE BOARDS FIXING

Polystyrene boards are attached to the substrate mainly by using a mineral adhesive mortar. We can use the adhesives designed for this purpose only, e.g, ATLAS HOTER S or the adhesives of universal use, such as ATLAS STOPTER K-50, ATLAS ROKER U used both for fixing polystyrene and for basecoat.

Selection of a suitable adhesive is related to the type of building and its height, the quality of the substrate, etc. For instance ATLAS STOPTER K-20 is used for insulation of difficult substrates, in low temperatures and increased humidity, ATLAS HOTER U for large projects such as multi-storey buildings.

The mortar is prepared by pouring it into the appropriate amount of cold water and stir until homogenous (the exact proportions are given on the packaging and in product's Technical Data Sheets). After about 5-10 minutes (depending on the manufacturer's recommendation) mix the mortar again so that it acquires the corresponding properties and is suitable for use.

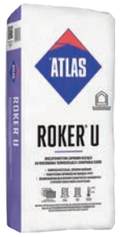
The ready-to-use mortar adhesive is applied on the surface of the board with the **'strip-point' method** (fig. 2.2). The peripheral ribbon of adhesive should be at least 3 cm wide. For the rest of the surface the mass should be spread in the form of patches of a diameter of 8 to 12 cm. The total area of adhesive applied should cover at least 40% of the board surface. The exact amount and the thickness of the adhesive layer depends on the state of the substrate and must be selected to provide the required adhesion. After adhering, the thickness of the adhesive mortar should not exceed 1 cm.

FIG. 2.2 ADHESIVE APPLICATION WITH A 'STRIP-POINT' METHOD

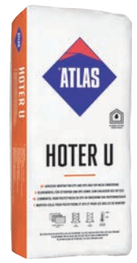
RECOMMENDED ADHESIVES FOR POLYSTYRENE BOARDS

ATLAS
HOTER S
adhesive mortar for EPS and XPS

ATLAS
STOPTER K-20
specialized adhesive mortar for thermal insulation and for mesh embedding



ATLAS
ROKER U
general-purpose adhesive mortar for thermal insulation fixing and mesh embedding



ATLAS
HOTER U
adhesive mortar for EPS and XPS and for mesh embedding

ATLAS
STOPTER K-50
white general use adhesives mortar for external wall insulation

More deatils under QR codes.

INSULATION FIXING

After applying the adhesive mortar on the insulation panel, place it on the substrate and press. The next board should be placed tightly to form flat surface. In order to avoid thermal bridging*, large gaps between the boards should be filled with strips of insulation material, and small ones (up to 5 mm) with low-expanding foam (fig. 2.3). Boards are arranged from the bottom to the top of an facade, staggered in the so called 'brick' on the wall surface and in the building corners.

During the process of thermo-insulation works use the complete boards and their halves. Do not use chipped, dented or broken boards. A key element is also the correct positioning arrangement of insulation boards in window reveals. Correct and incorrect solution is shown in the figure 2.4. The subsequent boards should be carefully pressed to avoid faults and unevenness of the on the surface of insulation material, as they will be visible on the basecoat and the render surface. The resulting uneveness should be carefully leveled with a sandpaper or rasps (fig. 2.5 and fig. 2.5a).

No unevenness should be allowed, especially in the case of graphite EPS boards, because subsequent grinding with a rasp may damage the granulated structure.

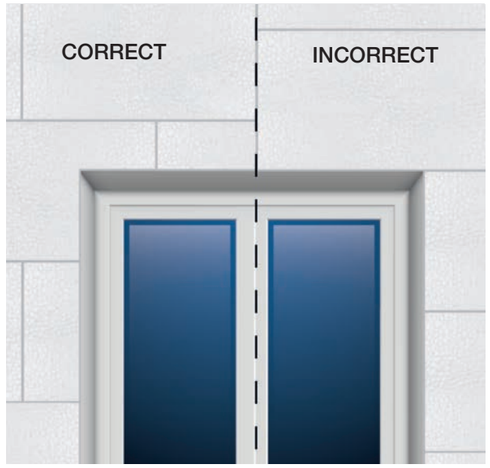


FIG. 2.4 CORRECT AND INCORRECT ARRANGEMENT OF POLYSTYRENE BOARDS IN WINDOW REVEALS

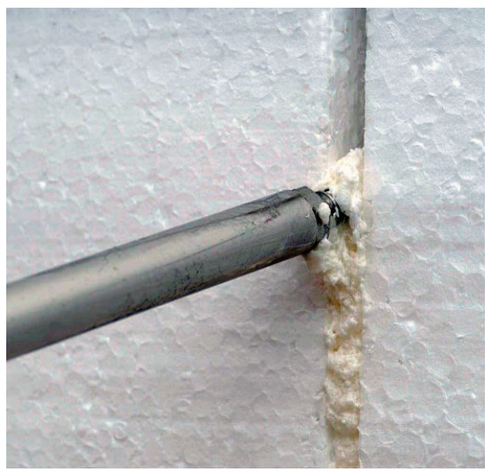


FIG. 2.3 LOW-EXPANDING FOAM

FIG. 2.5 RASP

FIG. 2.5A PLANING THE SURFACE WITH A RASP

* thermal bridging - a place of reduced insulation properties.

MINERAL WOOL PANELS FIXING

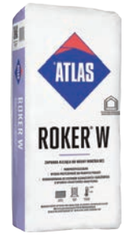
When using mineral wool use mortars dedicated to the wool such as ATLAS ROKER W, however the technolgy of preparing is exactly the same as in case of mortar for polystyrene. Mineral wool panels application technology is different to some extent from adhering polystyrene boards.

Due to the hydrophobicity of the mineral wool it requires prefilling (priming with adhesive) to form, so-called bonding layer. A thin layer of the adhesive mortar should be spread evenly over the entire surface of the MW board with a smooth trowel. Then wool panels are applied same as polystyrene boards with the use of 'strip-point' method. Due to the reduced hardness of mineral wool slabs compared to polystyrene boards, they should be laid on carefully levelled substrates.

If the surface of the substrate is even, the full-surface bonding method is recommended. In this case adhesive mortar has to be spread with a notched trowel over the entire board covered preliminary by a bonding layer. The notches of the trowel should be 10-12 mm. This fixing method applies to lamella boards as well.

Accuracy of execution of this stage determines the aesthetics of the insulation. To limit the risk of excessive drying of the adhesive layer, avoid working in direct sunlight, exposure to rain and strong winds. Apply the layer of adhesive just before the board application.

RECOMMENDED ADHESIVES FOR MINERAL WOOL PANELS

		
ATLAS **ROKER W** adhesive mortar for mineral wool boards fixing	ATLAS **ROKER U** general-purpose adhesive mortar for thermal insulation fixing and mesh embedding	ATLAS **STOPTER K-50** white general use adhesives mortar for external wall insulation

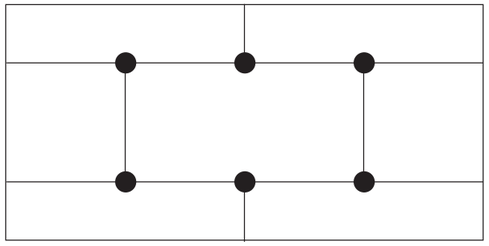
More deatils under QR codes.

ANCHOR FIXING

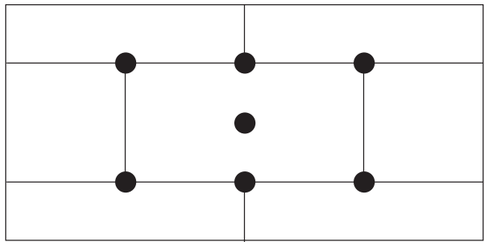
The next phase of the insulation installation is fixing the insulation panels with the use of mechanical fasteners.

And here comes the next question: pin it or not?
To this question, as in the case of insulating material choice, answers can be found in the project documentation, which should specify in details the quantity, location, type and length of mechanical fixings. Type of fasteners depends on the type of substrate, the height and type of building, insulation material used as well as the location (if it is exposed to wind).

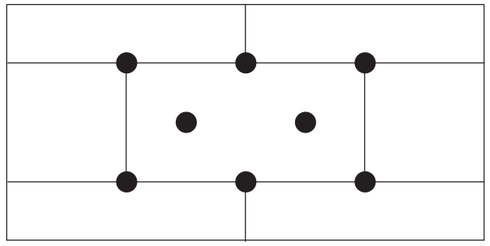
It is generally recommended to use at least 4 fasteners per 1 m^2. The number of fasteners should be increased in the zones of buildings' corners (fig, 2.6). Fasteners length should result from the type of the substrate and the thickness of the insulation material. The depth of anchoring in various substrates should be consistent with the manufacturer's instructions and reference documents. When installing panels on the existing thermal insulation, the use of fasteners is certainly obligatory. It is also recommended to use fasteners when the thickness of EPS extends 15 cm.



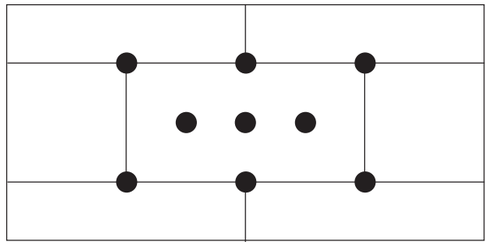
1.00 x 0.50 m	slab size	**1.20 x 0.60 m**
4.00 pcs/m²	no. of mechnical fasteners	**2.78 pcs/m²**



1.00 x 0.50 m	slab size	**1.20 x 0.60 m**
6.00 pcs/m²	no. of mechnical fasteners	**4.17 pcs/m²**



1.00 x 0.50 m	slab size	**1.20 x 0.60 m**
8.00 pcs/m²	no. of mechnical fasteners	**5.56 pcs/m²**



1.00 x 0.50 m	slab size	**1.20 x 0.60 m**
10.00 pcs/m²	no. of mechnical fasteners	**6.94 pcs/m²**

FIG. 2.6 CORRECT ARRANGEMENT OF MECHANICAL FASTENERS FIXING POLYSTYRENE OR MINERAL WOOL PANELS, ENSURING THEIR APPROPRIATE NUMBER PER UNIT AREA FOR BOARDS WITH DIMENSIONS OF 1.00 m x 0.50 m AND FOR BOARDS OF 1.20 m x 0.60 m. THE MIXED ARRANGEMENT OF ANY TWO SUCCESSIVE SCHEMES PROVIDES INTERMEDIATE AMOUNTS.

Due to the considerable weight of the mineral wool panels, in systems based on this material the anchors are fixed immediately after the installation of the thermal insulation. They should be placed basically in the corners of the neighbouring panels and centrally.

In a system based on polystyrene anchoring can be commenced after 2-3 days (this period may extend due to weather conditions, e.g. high humidity). Adhesive must harden enough to prevent polystyrene boards from shifting during drilling holes for fasteners.

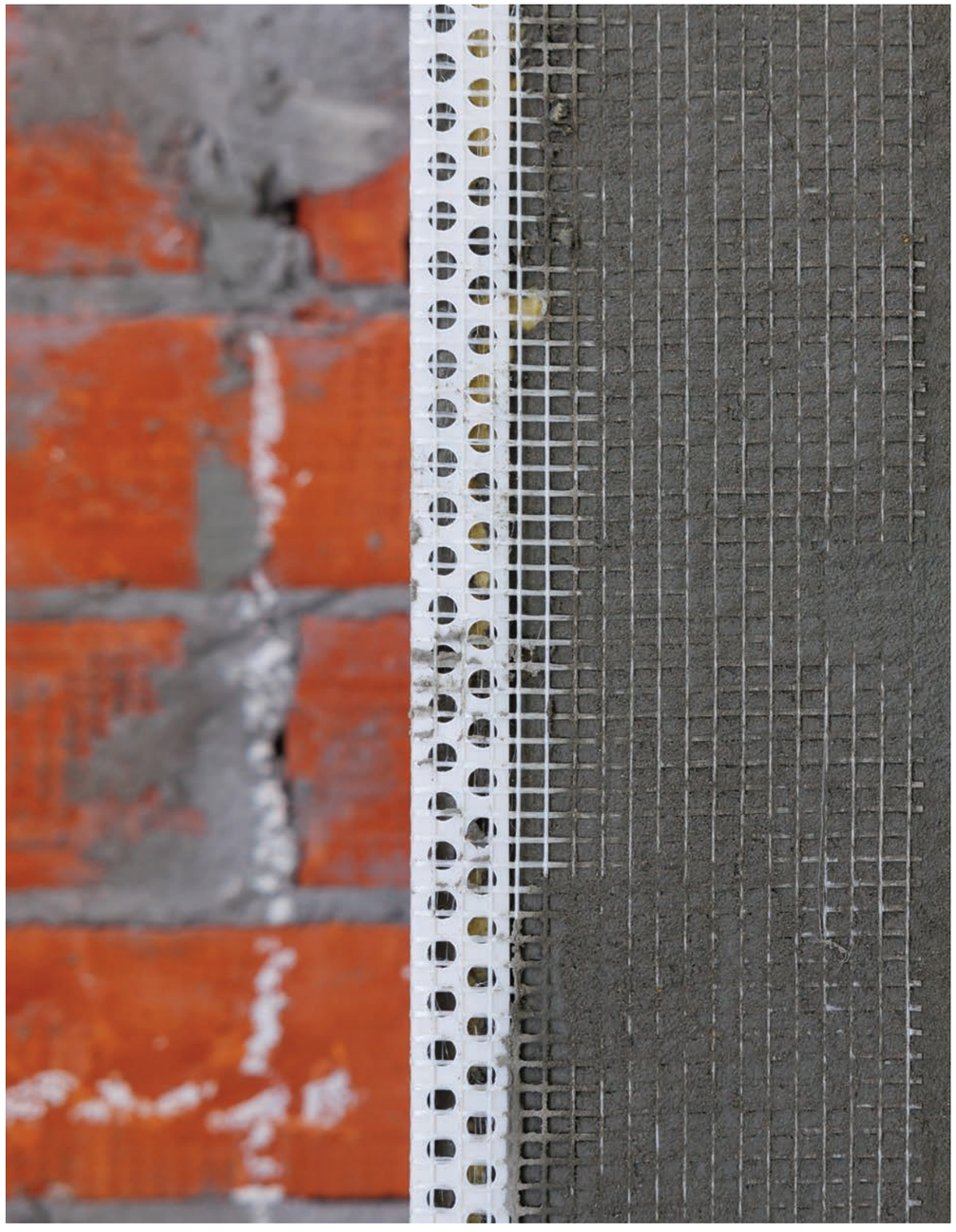
In any untypical project (e.g. high buildings corners, exposed to strong wind, facades of buildings standing in the areas of mining damage) the number and location of fasteners should be determined by the designer of the insulation.

Please note that any insulation or thermal modernization should be considered individually and in case of doubt, consulted with individual that has proper knowledge and experience as the proper adhesion of the insulation layer is a key contributor to the insulation effect.

At this point, we completed the process of installation of the insulation layer. The next step will be execution of reinforcement layer (basecoat).

Lesson 3

REINFORCED LAYER EXECUTION



PVC profile with fibreglass mesh

In previous lessons, we show how to properly prepare the substrate for insulation and how to install insulation layer (wool or polystyrene slabs).

In this one we want to show how to properly execute the next phase of insulation — installation of the reinforcing layer (base coat).

It consists of application of proper adhesive and embedding mesh on the already installed insulation. Proper execution of reinforcing layer and the correct choice of materials for its installation is very important because it determines the durability of the entire thermal insulation system and its aesthetic appearance.

The role of mesh can be compared to the role of steel in reinforced concrete ceiling and the proper adhesive to the appropriate class of concrete.

HOW TO CHOOSE PROPER ADHESIVE AND MESH?

It is best to make assumptions as set out in the design documentation, which specifies either the specific adhesives and type of mesh or the parameters that the individual materials should have. All types of reinforcing mesh listed in the technical specifications or recommended by the adhesive manufacturer can be used for the reinforced layer.

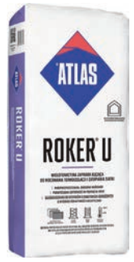
A good mesh is made of fiberglass, making it flame resistant. High-quality mesh is immersed in an acrylic bath at the production stage, which makes it immune to the highly alkaline environment of the adhesive mortar (fig 3.1). Another distinguishing feature is the construction of the mesh itself, specifically the joining of the meshes into what is known as a *Gazean weave*. This has a major impact on their strength and behaviour during the application process. Such a mesh is stiffer, easily unrolled from the roll and does not deform. It does not stretch during bonding, does not form so-called bubbles and, above all, does not tear when cut.

When choosing an adhesive, you should first of all take into account the insulation material used and the type of construction. You should use products that are part of a system from one manufacturer, as only such products are properly tested and work well together. Using ATLAS products as an example, we show where and under what conditions to use the right adhesive mortar.

FIG. 3.1 REINFORCING MESH FOR INSULATION SYSTEMS

FOR MAKING A REINFORCED LAYER ON POLYSTYRENE AND MINERAL WOOL PANELS

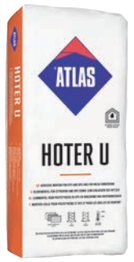
ATLAS
STOPTER K-50
- White colour
- No priming required before application of thin-coat render
- Application temp. +5 °C - +30 °C



ATLAS
ROKER U
- Application temp. +5 °C - +30 °C

FOR MAKING A REINFORCED LAYER ON POLYSTYRENE PANELS

ATLAS
STOPTER K-20
- Application temp. +0 °C - +25 °C



ATLAS
HOTER U
- Application temp. +5 °C - +25 °C

More deatils under QR codes.

Once the appropriate adhesive and mesh have been purchased, you can proceed with the reinforced layer of the insulation. It is recommended to start work 3 days after the thermal insulation has been adhered. The time may vary due to atmospheric conditions during the insulation process and the type and quality of the substrate. This time is needed to ensure that the mortar used to bond the insulation achieves the required durability parameters. Depending on the mortar used, the time may also be reduced, but only if the mortar manufacturer allows for this in the technical data sheets for the respective products.

We divide the work into two stages:

STAGE 1
Securing weak areas by installing suitable profiles with reinforcing mesh.

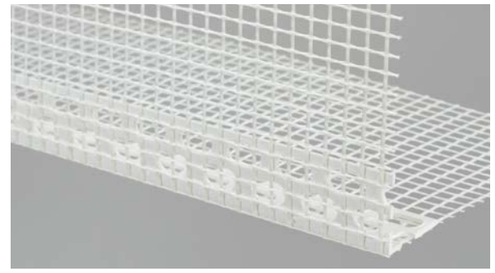
STAGE 2
Reinforced layer installation.

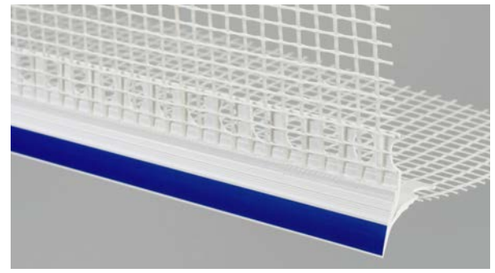
STAGE 1

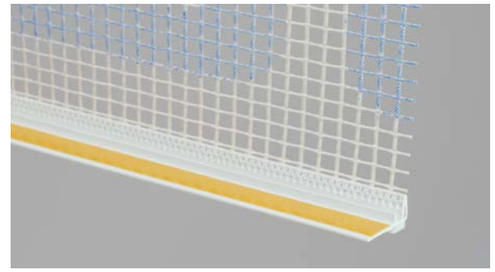
SECURING WEAK AREAS BY INSTALLING SUITABLE PROFILES WITH REINFORCING MESH

Before the main reinforced layer is applied to the entire walls, it is necessary to protect the areas most vulnerable to mechanical damage, such as the edges of the building and the edges and corners of window and door openings.

The edges are secured using special profiles (ALU or PVC) bonded with fibreglass mesh (fig. 3.1A) to reinforce the corners of the polystyrene or mineral wool insulation boards (fig. 3.2 - see page 22). To choose the right profiles, as with the choice of mesh or adhesive, it is best to follow what the system provider proposes, so that it will be the most suitable solution for your needs.







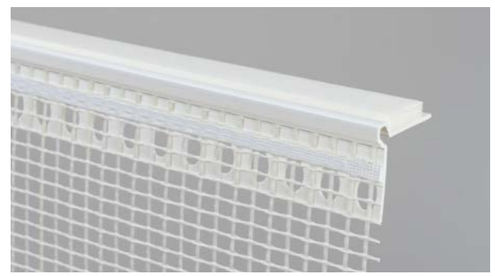


FIG. 3.1A BEADS EXAMPLES

Before installing a particular profile, make sure that the edges are vertical. In the place where you intend to adhere the profile, the wall edge should first be covered with a thin contact layer of adhesive mortar using a smooth trowel. Then apply a layer of adhesive mortar on it, spreading it evenly with a notched trowel. The profile with a mesh is embedded into this layer. Gently press it down to correct its alignment.

Smoothing the surface with a smoothing trowel, gently squeeze out excess adhesive through the mesh, which is then removed to even out the surface. At this stage, the grid pattern should remain visible on the roughened surface. The above steps describe a single operation that must be carried out as quickly as possible without allowing the mortar to dry.

When you have secured all the edges, strengthen additionally the corners of window and door reveals. This phase consists of application of additional 20 x 35 cm strips of reinforcing mesh at each reveal corner (fig. 3.3). Strips are applied diagonally at a 45° angle (fig. 3.4).

This procedure is intended to avoid cracks that can appear even after a long time and can be seen directly on the finishing coat (render) layer.

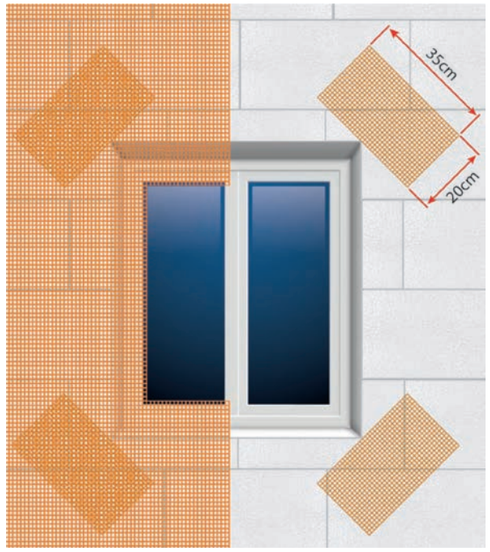


FIG. 3.3 PROPER STRENGHTHENING OF THE REVEAL CORNERS

FIG. 3.2 CORNER INSTALLATION

FIG. 3.4 PREPARATION OF THE WINDOW REVEAL WITH THE USE OF CORNERS AND DIAGONALLY APPLIED MESH STRIPS

STAGE 2

REINFORCED LAYER INSTALLATION

After securing sensitive elements of the façade you can proceed to the reinforcing layer installation over the entire facade.

Note! Various stages of reinforcing layer execution should be done in one operation.

The first step is to prepare reinforcing mesh strips which, if necessary, should be cut to appropriate length and width. Starting from the corner of the building, a thin layer of adhesive mortar is spread evenly on the surface of the panels using a smooth float. The adhesive is spread to a width corresponding to the width of the mesh band with a slight overlap (fig. 3.5). The mortar is added on the thus prepared contact layer with a notched trowel and 'combed' (profiled) to a thickness determined by the size of the notches of the trowel (fig. 3.6). The size of the trowel notches should be selected so that the layer obtains the thickness necessary for the proper embedding of the reinforcing mesh (a trowel with 10-12 mm notches would be suitable for proper application).

The prepared reinforcing mesh strips are then spread over this layer, embedding them with a trowel and filling them in smoothly. The mesh should be spread from top to bottom. The embedded mesh should not be visible on the surface of the adhesive (fig. 3.7). The thickness of the reinforced layer once completed should be in accordance with the guidelines indicated in the product technical data sheet.

Then, repeat all the steps for the next reinforcing mesh strip. Reinforcing mesh should overlap at joint by a minimum coverage of 10 cm (the exact width of the overlaps is given by the system manufacturer in the technical specifications), or move out beyond the edges of window and door reveals. If you cut the mesh (e.g. in the treatment of protruding elements) reinforce this part with an additional mesh strip embedded in adhesive. Reinforcing mesh should extend beyond the corners and the starting track and cut evenly on edges. Proceed this way until the entire wall surface is completed.

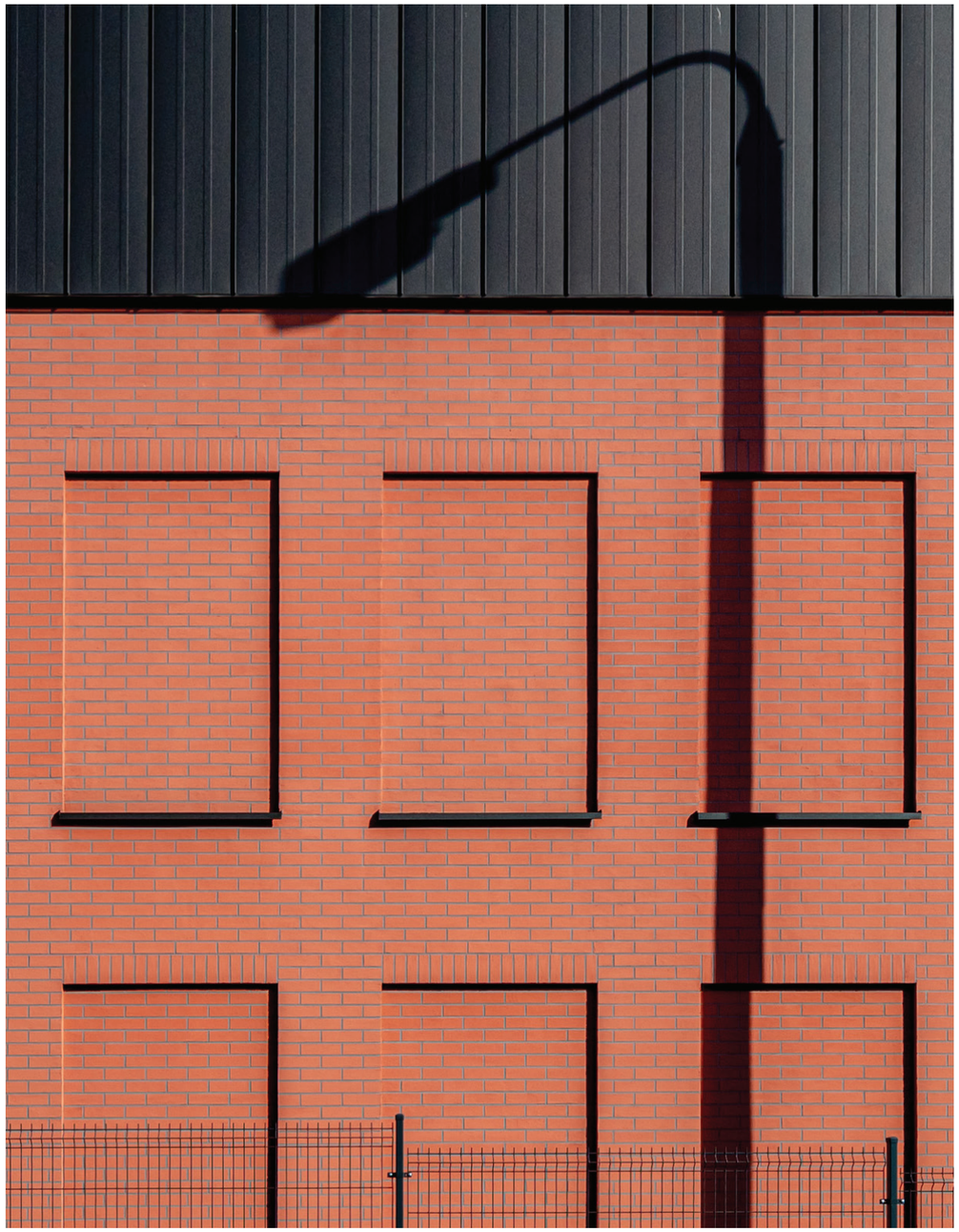
FIG. 3.5 APPLICATION OF ADHESIVE ON POLYSTYRENE

FIG. 3.6 LEVELLING OF ADHESIVE WITH USE OF NOTCHED TROWEL

FIG. 3.7 MESH EMBEDDING

Lesson 4

RENDERING



Our project in Poland - effect of brick

In this lesson we focus on an insulation element that gives the final character of the building — the rendering. Why render plays such an important role in the insulation system?

A BIT OF HISTORY

Since the dawn of time the homeowners have tried to add charm to facades. Therefore, they have used different types of cladding, plasters, colors and other embellishing elements. Apart from wooden houses — where the wall construction is also a decorative element — the most popular façade finishes are renders. In the past, cement and cement-lime plasters were popular. They used to be prepared directly on-site, mixed in a cement-mixer with different proportions of cement, lime, sand and water. Those plasters gave an opportunity to hide any deficiencies, as they were applied with thick layers (today they could be safely called 'thick-coat'). They were painted with combinations of lime and emulsion paints and decorated with broken plates and bottles or sea oval stones pressed into the plaster. Then the fashion for the use of the decorative layer, the so called 'spotted render', came. That thin layer of render was applied with a broom or a special manual machine (fig. 4.1). It became a pattern to the currently most popular solution, which is a thin-coat spotted render.

FIG. 4.1 MANUAL MACHINE AND BROOM - DEVICES ONCE USED FOR SPOTTED RENDER APPLICATION.

RENDERING NOW

Why cannot we finish the facade just with a painted reinforcing layer (discussed in the previous lesson)? The answer is simple. To meet all the insulation system functions which are assigned to it, and to meet them in 100%, the system must be complete.

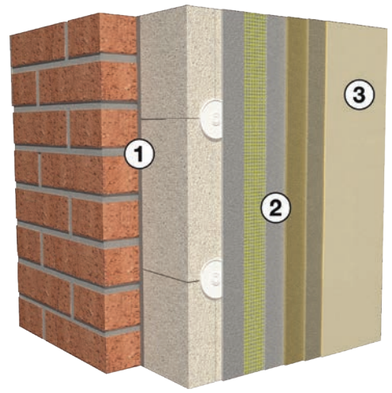


FIG. 4.2 ATLAS EXTERNAL WALL INSULATION SYSTEM
1. ADHESIVE FOR APPLICATION OF THERMAL INSULATION MATERIAL
2. REINFORCED LAYER, THAT IS THE ADHESIVE WITH THE MESH
3. THIN COAT RENDER OR TILE CLADDING.

THE ROLE OF THIN-COAT RENDERS IN THERMAL INSULATION SYSTEMS

Therefore, what function a thin-coat render performs in the thermal insulation systems?
Above of all:

- protects layers beneath — the reinforcing layer, the insulating material as well as the facade of the building — both from the harmful effects of weather conditions and against mechanical damages caused by various factors;
- regulates 'breathing of building', i.e. transports in and out molecules of water vapour;
- gives a unique, attractive appearance, final character of the buildings.

That is why only the full thermal insulation provides adequate protection for the building as well fulfills all the functions of the system. **Therefore, render on the facade is necessary.**

TYPES OF RENDERS

Types of renders and, hence, their suitability to a particular project, are determined mainly by the binder used for the production and the type of insulating material used for thermal insulation. The most popular types of renders are:

- **MINERAL**
- **ACRYLIC**
- **SILICONE**
- **SILICATE**
- **HYBRID**

The main parameters of the renders are presented in the table below.

TYPE OF RENDER	MINERAL	ACRYLIC	SILICONE	ACRYLIC SILICONE	SILICONE -SILICATE
Type of main binder	Cement	Acrylic resin	Silicone resin	Acrylic and silicone resin	Silicone resin, water glass
	PROPERTIES				
Water vapour permeability	***	*	**	*	****
Impact resistance	**	****	***	****	*
Surface absorption resistance	**	****	****	****	*
Ageing resistance	****	*	**	**	***
Dirt resistance	**	**	****	***	****
Biological factors resistance	***	**	****	***	****
	AREA OF APPLICATION				
Urban zone	***	**	****	***	****
Suburban unwooded zone	***	**	****	***	****
Proximity of green areas and water tanks	***	*	****	***	****

* — low

**** — very good

WHAT IS THE DIFFUSION RESISTANCE OF THE WALLS?

The render should not significantly restrict the flow of water vapour through the partition (the wall with all of its elements: external render, thermal insulation, etc). Before deciding it is advised to check the project documentation. If the renders are applied on the walls made of materials with high vapour permeability, such as aerated concrete, then they should have similar characteristics. Then, use the renders based on the silicate or mineral binder. Similarly, when the wall is insulated with the mineral wool.

WHAT IS THE AGE OF THE BUILDING?

For rendering decades-old buildings, which have very high vapour permeability, you should definitely use the renders of similar characteristics (e.g., those that should not significantly restrict the flow of water vapour through the partition), especially silicate ones.

IS A GREEN AREA LOCATED IN THE NEIGHBOURHOOD?

If so, there is always a risk of organic dirt, algae and fungi. In this case, the façade should be coated with mineral renders which have strong alkaline reaction (pH~12) and practically prevent the growth of microorganisms.

Also the silicone dispersion renders, which contain the biocide additives that reduce the growth of microorganisms, can be used. Additionally, low water absorption makes it difficult.

IS THE HOUSE LOCATED BY A BUSY ROAD OR ANOTHER 'SOURCE' OF PERMANENT SOILING?

If the answer is yes, then we have to deal with two problems. First, building close to such roads get dirty quickly, so it is recommended in this situation to use silicone renders, which can be easily kept clean. This render is called 'self-cleaning' as the smaller dirt is being removed itself during the rainfall. Secondly, due to high traffic, the render may be subject to cracking under vibration. To prevent this, we recommend acrylic render which is highly flexible and can make up for tension. The render can be easily cleaned with a pressure washer.

WHAT COLOURS WILL BE USED ON THE FAÇADE?

The new palette of colours offers 486 pastel and intensive colours available in all types of dispersion renders and paints SAH colour collection. An important element is the choice of an appropriate combination of colours as well accurate joining of colours.

WHAT KIND OF RENDER WE CHOOSE IN TERMS OF TYPE AND AGGREGATE THICKNESS?

In this case, the decision mainly depends on aesthetics. We have a choice of two aggregate grain sizes: for a spotted texture up to 1.5 mm and up to 2 mm. The coarser the grain, the visual effect is more clear. It also allows you to hide any shortcomings.

The best way is to leave the render choice to the system designer and put it in the project documentation.

As we have acquired the knowledge about renders and we know from the previous lessons, how to prepare the reinforced basecoat, we can safely go to the renders application.

SUBSTRATE PRIMING

The process of renders application must be preceded by the preparation of the substrate on which they will be applied. To do it we should use a primer professionally known as a priming mass.

Its purpose is to enhance the adhesion of the render to the façade surface and to unify the absorption of the whole substrate. These elements are very important and have significant impact on the render application and its future appearance.

TYPES OF PRIMING MASSES

It is very important to choose the approperiate primer for the render. Thus, for example, ATLAS products need following primers:

ATLAS **CERPLAST**

a primer under mineral, acrylic, mosaic and hybrid renders

ATLAS **SILIKON ANX**

a primer under silicone and hybrid renders

More deatils under QR codes.

PRIMING

Priming mass is usually applied one day before the render, depending on weather conditions. It can be applied in three ways: manually with a brush or a roller, or mechanically with the use of a spray gun or an aggregate.

ROLLER | BRUSH | SPRAY GUN

FIG.4.3 TOOLS

RENDER APPLICATION

After the application of a priming mass, you can start the rendering. Depending on the render type and application method, this process is divided into several phases.

READY-TO-USE RENDERS

When applying ready-to-use renders (acrylic, silicone, acrylic-silicone, silicone-silicate) you should take into account the type and size of the façade and the weather factor. Why? Thin-coat dyed renders should be unconditionally applied 'wet on wet', without any interruption over the entire façade surface, i.e. from a corner to a corner. In the case of detached houses, where wall surfaces are rather small, this type of work should not be a problem. The problem may appear on larger surfaces, e.g. on block of flats. How to deal with it? The best solution is to plan appropriate technological gaps. You should choose a place where the render joints — vertical or horizontal line that will not be conspicuous. These places, e.g. where the render colours are changed, are often planned by the designer. Generally the lines of windows, staircases vertical separations, or other places are used for that purpose. Each project has its design characteristic, so if you know that one whole wall cannot be done in one cycle, you should predict the time and place of technological break.

MANUAL APPLICATION OF READY-TO-USE RENDERS

Ready-to-use renders are supplied in buckets. They should be opened and thoroughly mixed with a ribbon mixer to unify their texture and colour. It is recommended to mix a number of buckets of render in order to avoid colour differences between the buckets (it sometimes may happen, especially when buckets are of different batches). After proper mixing, we proceed to the render application.

It is applied 'wet on wet' with a stainless steel float by pressing to the surface so that, depending on weather conditions and the number of people involved in the application, you are able to connect it vertically and horizontally with the following render areas.

The render is applied with the thickness equal to its aggregate size. If we apply too much, we will not be able to form the proper structure. When we put the render we remember to remove the excessive amount at the same time.

The next step is the texture forming, which gives the render its final appearance. It depends on the conditions in which the render is applied, the render type, and above all the size of the surface which it is applied on. We form the texture with a plastic float by rubbing the render surface. This moves the render aggregate and thus we obtain the final visual effect.

The technique of texture forming depends on the type of the render. For example: ‘spotted’ render can be formed with circular or ‘figure eight’ moves. It is important to texture the render in the same way over the entire surface of the façade.

The application and texture forming of ready-to-use renders seems to be a simple process. However, as usually, the simplest things make the biggest problems. Therefore, to conduct the render texture forming correctly, we should engage a qualified and experienced brigade. At the construction site execution problems, which the brigade will have to deal with, may occur crooked and uneven walls, window reveals treatment, often decorative trims, rustication and other surprises.

When applying manually you should also remember that all kinds of items placed perpendicularly to the façade, such as window reveals or rustication, are generally not covered in the same technological process as the rest of the building (often done the next day).

MANUAL APPLICATION OF DRY MINERAL RENDERS

Application of this type of renders slightly differs from the application of ready-to-use renders (dispersion ones). The product is supplied to the site as a dry mix in a bag. A key element in this case is the proper mixing. Each manufacturer provides adequate guidance as to the amount of water in order to obtain proper consistency that will provide both application and render parameters.

Guidelines are given in the so-called range due to climatic conditions. For example, in the case of dry and hot air the consistency of the applied render may be thinner.

You pour the dry mixture into the appropriate amount of water and mix to reach a proper consistency. Then — as in the case of adhesives — after the time indicated by the manufacturer (usually 5 minutes), re-mix the mass. Manual application process itself is the same as in the case of ready-to-use renders. So where is the difference? Mineral renders are 'dry', and therefore have large colour limitations (due to differences in the composition of raw materials used for the mineral renders and dispersion ones). They are produced only in several pastel colors. A common solution is to use a mineral render and coat it with a paint.

FIG. 4.4 MANUAL RENDER APPLICATION USING STEEL TROWEL

SPRAY APPLICATION OF THE RENDERS

This technology is very different from the one described previously. First, for the mechanical application only the renders designed to this can be used. Although both technologies by hand or with a machine are completely different, sometimes the producer informs that the render can be applied either manually or by spraying. However, due to different types of application, both the parameters of the mixture, its composition, type of raw materials used for manufacturing and the render parameters after drying differ significantly. Concerning the primer, the difference lies in the fact that beside the application with the use of a roller or a brush (as in the manual technology) you can apply it by spraying, which gives less consumption of the product and uniform covering of the façade.

Renders for spray application are prepared in the same way as the manually applied ones: whether wet or dry, they should be mixed. This step is crucial here. Why? In the manual technology, we are able to locate even a small lump and remove it or rub with the float. When this lump occurs while spraying, it blocks the nozzle, creates a blockage, and thus forces a break for the machine cleaning. Only the thoroughly mixed render can be put in the aggregate tank and sprayed.

As easy as the method seems, it requires experience and intuition in order to reach the correct render proportions and to get the expected effect. It is reccomended to each time perform a trial application of the render on a separate part of the facade. Apply it in one place long enough and keep the right distance from the gun nozzle to the façade. Sprayed render is left to dry after application without any other additional work.

FIG. 4.5 SPRAY APPLICATION OF THE RENDERS

Spraying method has also other advantages over the manual one:

- Application, regardless the surface of the façade, requires only three persons, one of them is responsible for a continuous supply of the product to the aggregate tank, the second one, due to the length and size of the hose, helps to maneuver, and the third one is spraying the render on the façade:
- Can be sprayed on all surfaces — horizontal and vertical, window reveals and not available in the manual technology oval spaces and the rustication — in the same technological process.
- You can stop the spraying of a white render whenever you want and the connection will not be visible.
- The time of the application is up to 3 times faster than of the manual one.
- Gives fully repeatable and more clear render structure on the entire façade.

Disadvantages of spraying method:

- First, additional initial cost of the spraying unit
- The second is the need to protect all elements of the building, such as windows, gutters, window sills, against staining.

In addition to the issues listed and described in this lesson and related to the render application, there are still many other elements or technological problems. We will deal with them in the next lessons. We hope that we have been able to explain to all thermal insulation installers from where certain actions and steps of render application arise and enrich the knowledge of those who just start their adventure with thermal insulation.

Lesson 5

GARAGE SYSTEMS

Our project in Poland - effect of brick

In the previous lesson we discussed the last stages of the thermal insulation. We focused on priming the substrate under the render, application of the thin-coat renders. And, although we have already traced all the phases of the insulation, there is still a lot ahead and we continue the education. Now it's time for the details of the garage systems.

FIG. 5.1 HEATED BASEMENT

FIG. 5.2 GARAGE

WHY SHOULD WE INSULATE THE BASEMENTS AND GARAGES?

In this lesson we focus on the available systems and technologies for thermal insulation of garages. Before we go deeply into the topic, we should answer the question: why should we insulate the garages and basements?

The purpose of the basements and garages increasingly deviates from the standard way of thinking. Basements can be adapted as a commercial property or a place to store wine. The features of the garages have changed — especially if you think of the multi-car underground parks, multi-storey car parks at galleries and garages replacing basements under the newly built multiple dwelling units.

Although our bikes and cars do not freeze, the family members living directly above the garage or the basement do. So the current garage insulation system is primarily associated with the floor, and its task is to create an extra layer protecting the rooms on the upper floors from the cold. Of course, aesthetic values of the finished ceilings in garages and basements are also of significant importance, since the insulation improves the appearance and gives a uniform nature of the surface.

IN THE GARAGE

The purpose of the garage insulation system is the protection against heat loss, noise and fire spread. All these cases are regulated by the local building regulations. The following types of buildings should hold the insulated ceilings: residential buildings, public access buildings, permanently or temporarily inhabited with basements, garages as well as the rooms separating the heated section from the unheated one, all new and retrofitted buildings in the ceiling area. They must meet the following conditions:

a) construction safety*,

b) fire safety*,

c) operational safety,

d) adequate hygiene, health and environmental protection conditions*,

e) protection against noise and vibration*,

f) adequate energetic performance and efficiency of the energy use*.

Thanks to the legal regulations we live in warmer, quieter and safer way. They also contributed to the creation of parameterized garage systems, such as the ATLAS ROKER G SYSTEM of thermal insulation of ceilings available in three types. Let‘s take a look at the characteristics of each variant proposed by the ATLAS ROKER G SYSTEM.

**By choosing the right combination of materials based on thoroughly selected building chemicals combined with lamella wool ATLAS ROKER G SYSTEM protects the structure with an additional layer, which increases its durability and safety of use. It constitutes an additional fire barrier that prevents the spread of fire, at the same time suppresses the vibration and noise and improves the energy performance of the ceiling. Shortly speaking: safer, quieter and warmer.*

ATLAS ROKER G SYSTEM OPTIONS

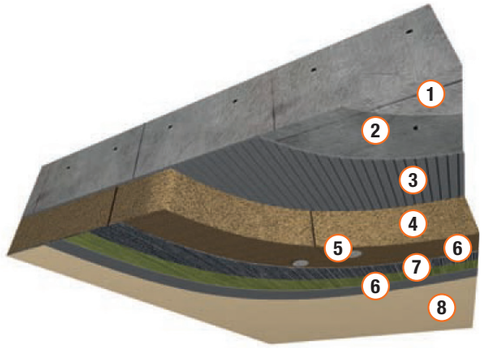


FIG. 5.3 ATLAS ROKER G INSULATION SYSTEM OPTION I

1. CONCRETE CEILING
2. PRIMING (OPTIONALLY)
3. ADHESIVE FOR MW PANELS APPLICATION
4. MINERAL WOOL (MW)
5. MECHANICAL FIXING WITH STEEL PIN
6. ADHESIVE FOR REINFORCING LAYER (BASECOAT)
7. REINFORCING MESH
8. PAINT COAT

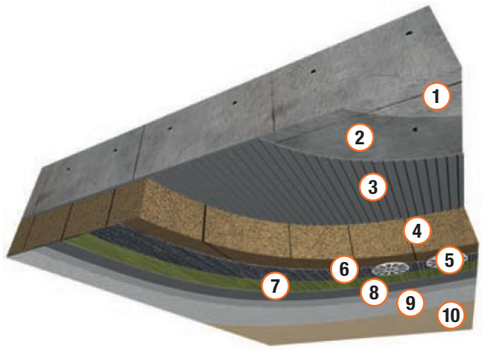


FIG. 5.4 ATLAS ROKER G INSULATION SYSTEM OPTION II

1. CONCRETE CEILING
2. PRIMING (OPTIONALLY)
3. ADHESIVE FOR MW PANELS APPLICATION
4. LAMELLA MINERAL WOOL (MW)
5. MECHANICAL FIXING WITH STEEL PIN
6. ADHESIVE FOR REINFORCING LAYER (BASECOAT)
7. REINFORCING MESH
8. PRIMING MASS UNDER THIN-COAT RENDER
9. THIN-COAT RENDER
10. PAINT COAT (OPTIONALLY)

In Option I of the system the following ATLAS products are used:

- Adhesives: ATLAS ROKER W, ATLAS ROKER U,
- Paints: ATLAS SALTA N, ATLAS SALTA S, ATLAS SALTA

The task of Option I is to cover the internal wall surfaces or ceilings (from the inside) with the mineral wool insulation panels and then execution of a reinforcing layer (basecoat) coated with the façade paint.

In Option II of the system the following ATLAS products are used:

- Adhesives: ATLAS ROKER W, ATLAS ROKER U,
- Priming masses for renders: ATLAS CERPLAST, ATLAS SILKON ANX
- Renders: ATLAS CERMIT ND, ATLAS SILKON BA, ATLAS SILICONE RENDER, ATLAS SILICONE-SILICATE RENDER
- Paints: ATLAS SALTA, ATLAS SALTA S, ATLAS SALTA N

Option II covers the internal wall surfaces or ceilings (from the inside) with the mineral wool insulation panels and then execution of a reinforcing layer (basecoat) which is covered (manually or with a spray unit) with a thin-coat render that can be optionally painted.

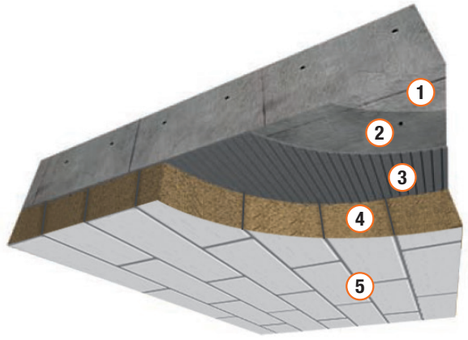


FIG 5.5 ATLAS ROKER G INSULATION SYSTEM OPTION IV

1. CONCRETE CEILING
2. PRIMING (OPTIONALLY)
3. ADHESIVE FOR MW PANELS APPLICATION
4. LAMELLA MINERAL WOOL (MW)
5. PAINT COAT

In Option IV of the system the following ATLAS products are used:

- Adhesives: ATLAS ROKER W, ATLAS ROKER U,
- Lamella mineral wool, eg. PAROC CGL 20 CY,
- Paint: ATLAS SALTA S, ATLAS SALTA

Option IV is used for insulation of ceilings and walls (from the inside) in unheated rooms — closed and open, for which — as in the previous variants — there are heated rooms above or next to them. The main difference is that no reinforced layer or rendering is used. An important element of the Option IV is also the form of render application — spraying with the use of a unit.

In Options I and II, the methods of attaching the product to the thermal insulation may be:

a. bonded system,

b. bonded system with additional mechanical fixing,

c. mechanically fixed system with additional bonding.

Option IV, the thermal insulation layer — lamella mineral wool boards — can be installed in a:

a. bonded system,

b. bonded system with additional mechanical fixing.

As Option IV in an bonded system without additional mechanical fixing is the most popular, we will focus on its details. Mineral wool lamella boards can be fixed to the substrate with adhesive mortar (without mechanical fasteners) provided that the tensile strength of the substrate is not less than 0.08 MPa. The insulation layer in this system is best made of lamella boards specially bevelled and factory primed. An important element of the Option IV is also the form of render application — spraying with the use of a unit.

STEP BY STEP INSTALLATION OF THE INSULATION IN THE ATLAS ROKER G SYSTEM (OPTION IV)

1. SUBSTRATE PREPARATION

In most cases, the substrates in the ATLAS ROKER G system are ceilings made of prefabricated or monolithic materials.

A key element in the preparation of this type of substrate is to determine its moisture content. In common words the surface should be dry. Maturing (setting) time of the concrete floor is 28 days and after this period, it should be kept in air-dry conditions.

The surface must be cleaned of all kinds of inequalities, overhangs, dirt and other elements that reduce the insulation adhesion. If there is a need to reduce the substrate absorption, it should be primed with ATLAS UNI-GRUNT. Substrates of low absorption or extremely smooth should be covered with ATLAS CERPLAST. The most efficient application method is spraying which reduces consumption, accelerates the work and enables uniform distribution in the places out of reach of a roller or a brush.

2. LAMELLA WOOL APPLICATION

In the Option IV of the ATLAS ROKER G system, we use milled lamella wool. It differs from traditional lamella — it has one-sided cut edges, the so-called cutters. The wool application technology is the same as in the lamella wool application on a façade (the difference lies in the fact that the panel is lighter and does not require mechanical fixing).

On the surface of the wool, which is directly fixed to the substrate, we need to make the so-called bonding layer made of spread adhesive ATLAS ROKER W (fig. 5.6). On the surface prepared in this way we apply the adhesive and form it with a notched trowel to produce a layer providing adhesion to the substrate. 100% of the board surface should be covered with adhesive. The prepared panels of wool should be applied on the ceiling so as not to leave visible handprints. Use a trowel to avoid leaving any traces and carefully press together the strips of wool (fig. 5.6A). Make sure the adhesive does not cover the panel side edges. The panels should not be pressed with a hand or a fist, because there is a risk of the wool crumpling, which will be visible on the final render layer and will reduce the aesthetics. The panels must fit tightly together. There must be no gaps between them. The mineral wool lamella panels should be adhered in a staggered pattern ('brick' pattern).

FIG. 5.6 PREPARATION OF BONDING LAYER
FIG. 5.6A LAMELLA WOOL PANELS APPLICATION

3. PRIMING

For the garage ATLAS ROKER G system (Option IV) the Paroc factory primed milled wool marked CGL20 CY is designed. One of the main advantages of this wool is pre-impregnated surface allowing direct paint spraying. The advantage of this type of wool is the possibility of ceiling insulation execution when the time is important and we reckon with the substrate drying.

The second solution is to use the standard lamella wool (not factory-primed). In this case, it should be primed by spraying with ATLAS CERPLAST with the use of the same aggregates as for renders applications. What is important, both solutions are consistent with the system approval.

4. THE PAINT APPLICATION

The paint application in the ATLAS ROKER G system (Option IV) is carried out with the use of roller or the specially selected machines. For example, the Wagner HC 950 unit (fig. 5.7) can be used, recommended nozzles: 517 — pressure 150-170 bar, or the HEA 517 nozzle — pressure 100-120 bar.

FIG. 5.7 SPRAY UNIT

5. STAGES OF PAINTING

The first and the most crucial step is to prepare the paint properly.

PAINT PREPARATION

The paint is supplied ready for use. The paint should be mixed thoroughly to an even consistency immediately before use. This is best carried out mechanically using a slow speed mixer with a ribbon mixer.

DILUTING THE PAINT

For the first application, add a suitable amount of water

- according to the information in the technical data sheet
- depending on selected paint

The dilution ratio should be maintained over the entire painted surface. For final painting and when painting by spraying, use paint undiluted.

PAINTING

Apply the paint in a thin and even layer using spraying unit. Planned breaks in the painting process should be made in advance, e.g. in corners and folds of the building, under drain pipes, at colour interfaces, etc. Paint application should be carried out continuously, avoiding interruptions. The drying time of the paint depending on the substrate, temperature and relative humidity of the air is 2-6 hours. After this time you can apply subsequent layer of paint. The paint applied on the wool should be evenly spread, so that entire wool surface is uniformly coated.

We have tried to give a detailed description of the garage thermal insulation system. And, although it is not a complicated procedure, we advise to read in advance the detailed instructions. One wrongly executed element may impact the whole work. We hope that this lesson will be helpful to you. It should help the experienced installers to supplement their knowledge but also explain the beginners how to proceed with the thermal insulation of the garage or basement ceilings. We also invite you to attend trainings conducted by ATLAS technical advisors.

NOTES

Lesson 6

MISTAKES IN THE EXECUTION – SUMMARY

Our validation in Poland

At the end of this handbook, we would like to specifically raise awareness of the fact that some of the errors committed in the execution of thermal insulation are not always immediately apparent. Due to the thermal insulation system nature they can occur even after a long time, often counted in years — so it's important to avoid any possible shortcomings and save yourself and the customers the troubles. We hope that we have given tips that can be helpful to you and make your work a little bit easier.

This lesson of thermal insulation is a kind of summary of the lessons which we have presented in this brochure. With this book we wanted to provide information about the technology of proper installation of the thermal insulation: in each lesson we were discussing the key aspects and problems associated with them.

We decided that it is worth to take a look and discuss the various stages of the most frequently made mistakes once more.

People say: only those who do nothing, do not make mistakes. It is important to learn from mistakes and try not to duplicate them in the future. This is particularly true in the construction industry, where technologies are tightly linked and one small mistake at the beginning can impact the whole work, destroying the final result. There is a big responsibility in this branch, that is why it's good to get vast knowledge of theory and practice.

THE TRAPS OF THE DESIGN RECORDS

An important aspect of the insulation is to install it in accordance with the design documentation. If you find inaccuracies there, it is best to address them immediately by asking for clarification. We briefly introduce a few items that should raise doubts of installers:

- indication of the general name of the material (tar, polyethylene, polystyrene, wool, cellular concrete) without specifying the type, variety and the necessary parameters,
- providing of alternative materials with different properties (e.g., full ceramic brick or sand-lime brick),
- lack of confirmation of thickness of one or more partition layers (layers are specified without giving their exact thickness),
- no detailed description of the types of layers (in the description of partitions is only general 'partition'),
- no specified U-values for external walls,
- providing of U-value for external walls only (lack of data on other partitions), or information that U-value meets the requirements of U standard without specifying its value,
- lack of U-value calculations,
- lack of solution for local thermal bridging,
- lack of information about appropriate technical solutions for places of reduced vapour and thermal insulation,
- no construction details drawings nor technical drawings concerning the places vulnerable to increased heat and water vapour flow (rims, eaves, balconies, window sills, lintels, etc.),
- careless and illegible drawings, brief technical description without taking account of all the data about the object,
- working on outdated standards and regulations,
- duplication of solutions (drawings, details) without consideration of the object particularities (the same drawings attached to different documents).

INSTALLATION PROBLEMS

If we are sure that the documentation is impeccable, let‘s look at the executive errors during the various stages of work, step by step.

1. SUBSTRATE PREPARATION

Evaluation of the substrate is essential. The easiest way is to divide the substrates to new ones, i.e. designed for thermal insulation already during the construction process, and the old ones — for various reasons not designed for insulation. The first ones are not a problem. Just make sure that they are sufficiently dry, cleaned of any dirt and have a well-regulated absorption. The problem occurs when the old substrates are covered with e.g. a weakened render, dirt, algae, lichens, coating.

FIG. 6.1 UNPREPARED SUBSTRATE

MISTAKES:

- wrong assessment of the geometry of the walls — their evenness and the vertical deviation (fig. 6.1),
- cursory check of the substrate, leaving soiling (fig. 6.2),
- inaccurate removal of surface contaminants and biologically contaminated items,
- no priming of absorbent plaster surface, e.g. of cement-lime one,
- leaving the surface covered with algae and lichens.

FIG. 6.2 SUBSTRATE SOILING

CONSEQUENCES:

Detachment of the entire insulation system.

ADVICE:

- leveling the wall surface with leveling mortars in order to avoid application of adhesive in thick patches. In extreme cases — installation of additional polystyrene layer under the main one,
- perform pull-off test in order to assess the quality of the substrate prior to insulation (fig. 6.3),
- wash off the old surface, e.g. with high-pressure washer,
- in case of doubt about the substrate quality — prime the surface with ATLAS UNI-GRUNT,
- surface protection with fungicide agents, such as ATLAS MYKOS PLUS.

FIG. 6.3 PULL-OFF TEST

ATLAS
UNI-GRUNT
fast drying priming emuslion

ATLAS
MYKOS PLUS
concentrated agent for elimination of algae, fungi and lichen

More deatils under QR codes.

2. INSTALLATION OF INSULATION

Polystyrene insulation boards or mineral wool panels are the key elements of the building‘s thermal protection. This phase of work is particularly important mistakes made here can hardly be repaired and have impact on the next layers of the system.

MISTAKES:

- inappropriate selection of adhesive,
- installation of boards with points of adhesive only,
- leaving unfilled gaps between the boards or filling them with mortar (fig. 6.4),
- carrying out work in unfavourable thermal conditions,
- uneven application of boards,
- the vertical board joints are not staggered and, additionally, not overlapped at the building corners. (fig. 6.5).

CONSEQUENCES:

- mismatched adhesive — despite initial installation of the insulation, the whole system can loosen with successive layers of the system. It leads to the necessity of the system dismounting,
- application with 'points' only does not provide adequate adhesion and may lead to detachment. Between the insulation and the wall surface there is a vertical gap formed, the so-called 'chimney', which is a fire hazard and significantly reduces the thermal insulation of the system,
- a gaping of insulation creates thermal bridging, which, in addition to the insulation effectiveness decreasing, can cause biological corrosion, resulting in loosening of the insulation,
- installation of thermal insulation at high temperatures can cause too rapid drying of the adhesive between the substrate and the insulation and ineffective system bonding. Too low temperature or high humidity extends the process of binding or even causes its stoppage,
- lack of staggering and overlapping of boards (as in bricklaying) does not allow the insulation to work properly.

ADVICE:

- use only recommended products,
- application (e.g. polystyrene) with the use of strip-point method is a guarantee that the insulation will bond to the surface properly and meet all the requirements,
- use of mechanical fixings in the case of the 'old' substrates,
- carrying out works from March to October and in temperatures from +5 up to +25 °C. In other cases, to ensure proper temperature and humidity, use a scaffold safety netting,
- strict adherence to the principles of staggering and overlapping, adequate distribution of insultion boards.

FIG. 6.4 GAPS BETWEEN THE BOARDS

FIG. 6.5 NON-STAGGERED BOARD PATTERN

3. MECHANICAL FIXING

Mechanical fasteners giving additional mechanical fixing of the insulation layers, are particularly important at high buildings exposed to intense forces of nature, especially wind loads, as well the municipal buildings on critical grounds.

MISTAKES:

- poor choice of the type of anchors to the type of substrate and insulation,
- inadequate number and spacing of anchors,
- poorly fixed anchors,
- lack of mechanical fixings (fig 6.6).

CONSEQUENCES:

- not every anchor is suitable for all substrates. Fixing the wrong anchor may cause additional thermal bridging,
- fixing anchors in too small or too large number will not strengthen the system, it may even cause its weakening,
- hammering the anchor too deep, and then sealing it with large amount of an adhesive, will result in so-called 'ladybug' marking on the façade, visible at temperature changes or rain (fig. 6.7).

ADVICE:

- use of project documentation. If this is not possible, seek information from advisors of thermal insulation manufacturers,
- adherence to the instructions of insulation systems manufacturer,
- in the case of hammering the anchor too deep fill the place to the surface of insulation with special caps made of the same insulating material. Alternatively fill it with expanding foam.

FIG. 6.6 LACK OF MECHANICAL FASTENERS

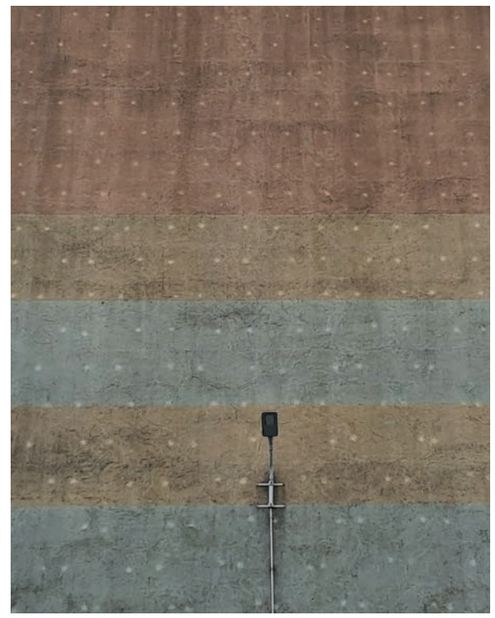


FIG. 6.7 'LADYBUG' EFFECT

4. REINFORCING LAYER INSTALLATION

Reinforcing layer (basecoat) gives strength to the insulation. Full description of its significance is in the lesson number 3.

MISTAKES:

- poorly prepared insulation surface before the execution of the reinforcing layer,
- inadequate protection of the corners of the building,
- no additional diagonal reinforcing strips in the corners of the reveals,
- use of improper reinforcing mesh,
- inadequate embedding of the reinforcing mesh,
- lack of appropriate mesh overlapping,
- leveling the surface with another adhesive layer after complete drying of the previous one,
- negligent installation of the reinforcing layer.

CONSEQUENCES:

- if we do not sand the protruding edges of the boards to even the surface prior to the execution of the reinforcing layer, we can expect higher consumption of adhesive, the inability to achieve an even surface under the reinforcing layer and consequently under the render,
- use of wrong corner profiles, e.g. without a mesh, and installing them contrary to the technology means that even a small mechanical damage may result in loosening of the entire corner,
- lack of diagonal reinforcing strips in the corners of window and door reveals will cause cracking in these areas, which in turn will contribute to blister formation and loosening of the thermal insulation layers (fig. 6.8),
- unauthorized mesh cannot fulfill its function, which may even result in render cracking,
- embedding the mesh in an adhesive that has not been properly distributed with a notched trowel or using nails to attach mesh to polystyrene, and then floating its surface will cause cracking or loosening,
- overlaps on the mesh joints of less than 10 cm may cause the occurrence of cracks,
- leveling the surface of the completely dry reinforcing layer with another adhesive layer is the main cause of loosening of render together with this additional adhesive layer (fig. 6.9),
- negligent execution of the reinforcing layer prevents the even application of thin-coat render and forces the surface leveling with render, which means larger and more expensive use of it.

FIG. 6.8 LACK OF THE DIAGONAL REINFORCING MESH

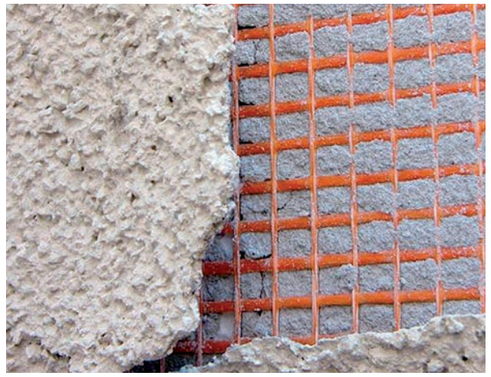


FIG. 6.9 DETACHING RENDER

ADVICE:

Use authorized materials (adhesives, mesh) and follow the detailed instructions during the installation of the reinforcing layer.

5. RENDERING

Errors in application of thin-coat renders are easily and clearly visible. Although the easiest to catch and determining the final result — they are fairly common.

MISTAKES:

- inappropriate selection of render to the type of insulation,
- savings thanks to dilution of the primer,
- in the process of application, too small number of people in relation to the surface,
- lack of planned technological breaks,
- work in unsuitable weather conditions.

CONSEQUENCES :

- wrong choice of render can cause excessive soiling, faster fouling with algae. It can also limit the diffusion of water vapour through the system and lead to the detachment of the render,
- excessive dilution of the primer reduces the adhesion of the render. Another consequence is uneven absorption of the surface (fig. 6.10),
- in the case of large façade surface, the effect is often spoiled by visible render joints,
- drying of thin-coat render instead of setting in a natural process, especially in the summer months.

ADVICE:

- detailed checking of the project documentation. In its absence follow manufacturer's instructions included in technical data sheets,
- appropriately diluted primer results in lighter work with the render and provides uniform substrate absorption,
- ensuring adequate number of workmen, especially during dispersion renders application on large surfaces,
- proper planning of technological breaks,
- the application of render during unfavourable conditions — the surface should be protected not only during application but also until the render fully sets. This approach minimizes the risk of rapid drying and the impact of rain or cold. For this purpose, as in the case of execution of the reinforcing layer, scaffold safety netting should be used. In the case of low temperatures we recommend the construction of the so-called 'heat-zone', using heaters.

FIG. 6.10 UNEVEN SUBSTRATE ABSORPTION

Although for some the mistakes are obvious, sometimes it is worth to confirm your knowledge. For others, however, it can be a valuable indication and the first step to change bad habits.

In case of any further doubts do not hesitate to contact our technical advisors!

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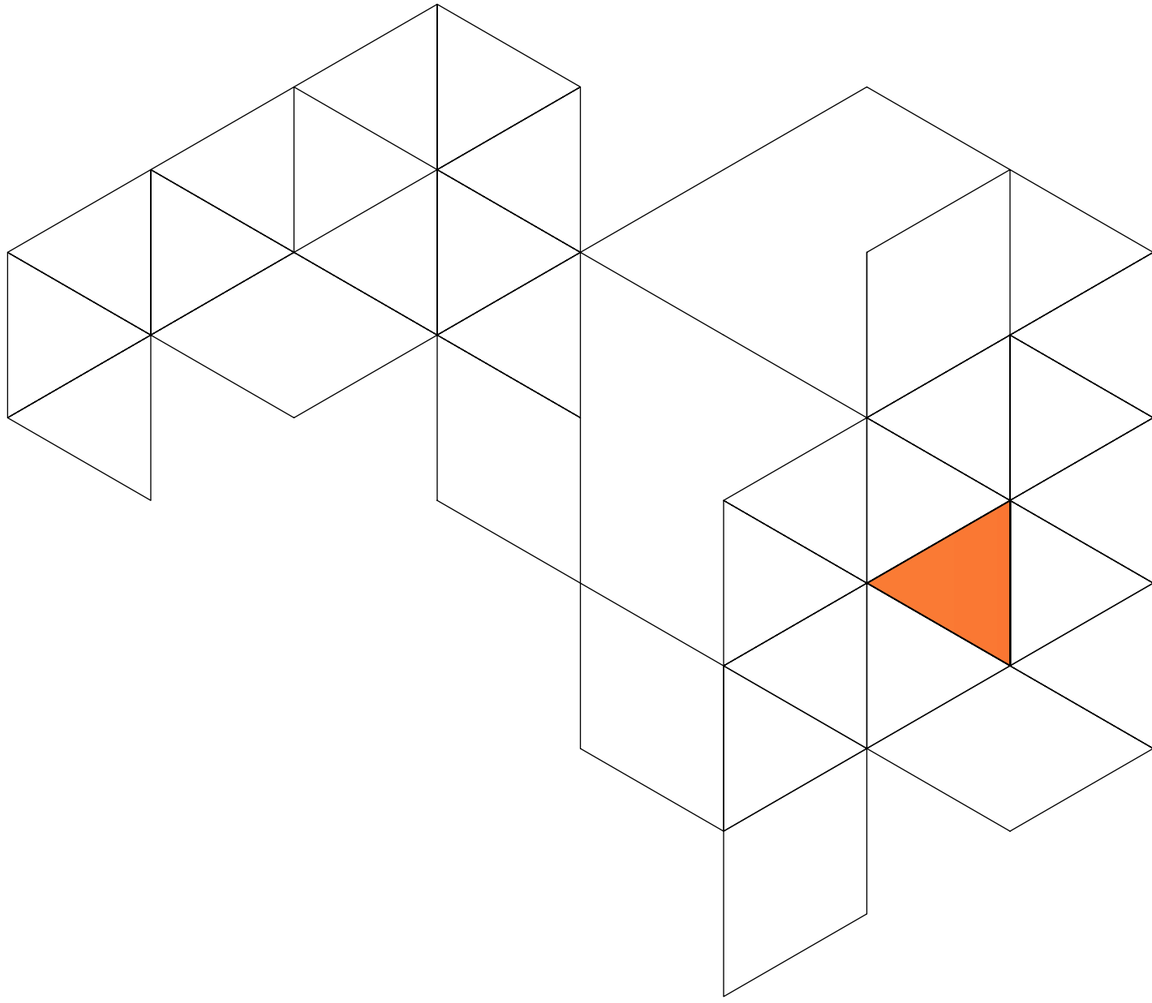

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