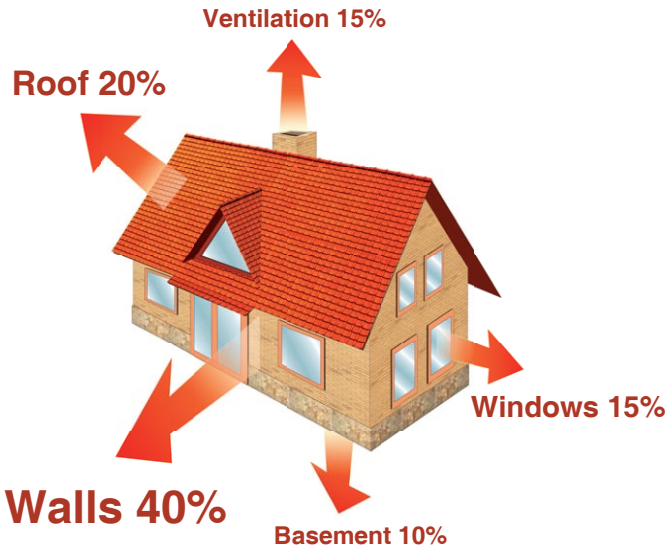

School
of Insulation
ATLAS

School of Insulation

Each building loses a certain amount of heat. One way to minimize the one is the proper implementation of a building thermal insulation.

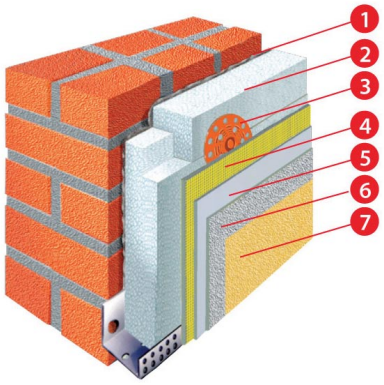
Its primary purpose is to provide adequate thermal insulation of the external walls of the building in order to reduce heat loss from the heated indoors to the environment and to prevent the development of mould on the interior walls.

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



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 but you can also do it yourself by using special programs placed on www.atlas.com.pl/en.

The most commonly used way of (the building) insulation is light-wet method, also known as external wall insulation (EWIS) system or external thermal insulation composite system (ETICS). It is used for new buildings as well as for the thermo-modernization of the old ones. It involves fixing the insulating material (polystyrene or mineral wool) of suitable thickness to the outer surface of the wall, covering it with mortar and then embedding in the mortar a protective reinforcing mesh of fiberglass and, last but not least, finishing the surface with enhanced thin-layer render.



1. Adhesive (basic fixing), 2. Thermal insulation, 3. Mechanical fixing (additional fixing), 4. Reinforced layer (base coat with fibreglass mesh embedded), 5. Primer under renders, 6. Renders (finishing coat), 7. Primers and painting coats (optional finishing)

IN PREPARATION FOR BUILDING INSULATION WE SHOULD BE AWARE OF SEVERAL IMPORTANT ELEMENTS:

You need to prepare yourself with all the necessary tools and equipment. During work/insulating, you cannot afford to break, because the assembly of individual insulation components must keep maintain 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 strong sunlight, at a time of strong winds or whether a drop in temperature below 0°C in 24h time is announced.

ON THE NEXT PAGES WE DESCRIBE DIFFERENT STAGES OF EXTERNAL WALL INSULATION, LEADING YOU STEP BY STEP THROUGH EACH OF THEM.

School of Insulation

Lesson 1

SUBSTRATE PREPARATION FOR INSULATION INSTALLATION

The work starts with checking and preparation of the substrate, to which we attach the polystyrene or mineral wool. There are two types of substrates, on which we can make insulation:
- NEW - new buildings
- OLD - buildings already existing, sometimes with an existing layer of insulation to be modernized.

ANY SUBSTRATE THAT IS TO BE INSULATED SHOULD BE:

STABLE	and hence sufficiently long sound, properly seasoned.	
CAPACITY	OLD SUBSTRATE	we assume that is structurally sound enough as it is made in most cases of new ceramic materials, aerated concrete or concrete.
	NEW SUBSTRATE	if you're not sure about the stability and quality of the substrate, do a simple adhesion test described below.
SEASONING	OLD SUBSTRATE	we assume that they are already fully cured
	NEW SUBSTRATE	new ready-made cement rendering mortars aged for a min. 1 week for each cm thick while the concrete walls - at least 28 days
DRY		
EVEN		
	OLD SUBSTRATE	on their surfaces a variety of damages, cracks and cavities may have formed. They must be filled using, for example: ATLAS LEVELING MORTAR, ATLAS ZW 330, ATLAS PLASTERING MIX or adhesive mortars used for basecoat of insulation systems.
	NEW SUBSTRATE	the substrates are newly built, so do not require alignment
CLEAN	remove any layers that may weaken adhesion, such as dust, dirt, lime, oil, grease, etc.	
	OLD SUBSTRATE	on their 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 (photo 1). Any algae and lichens remove with fungicides such as ATLAS MYKOS.
	NEW SUBSTRATE	remove any dirt when dry. Very absorbent substrates should be primed.

Careless preparation of the substrate and above all not cleaning of dirt or grease and not removing old coatings, results, in most cases, in disruption of the thermal insulation of the entire wall surface. In the pictures are shown errors and their consequences.

ADHESION TEST

It involves fixing with the use of an adhesive (ATLAS HOTER S/AVAL KT 53) to the substrate a number of 8 to 10 polystyrene cubes measuring 10 x 10cm in various places of façade. After 3 days you should try to break the polystyrene cube.



1

If you **break off the whole cube with a layer of the substrate**, such as render, it will indicate a lack of capacity of that layer. In this case, the entire wall must be examined, and all the weak parts of its surface removed down up to sound section of the substrate. Deleted sections should be replaced with new mortar, for example, ATLAS LEVELING MORTAR, ATLAS ZW 330, ATLAS PLASTERING MIX or adhesive used for the insulation. After preparing new substrate, re-check 4 required parameters.

2

If the **cube breaks off with all the adhesive** and the substrate, such as render, remains intact, it will mean that it is improperly prepared. Or it is too absorbent and requires priming using ATLAS UNI-GRUNT/AVAL KT 17, or it is too smooth, non-absorbent or coated with non-adherent layers and needs to be cleaned or covered with the - ATLAS CERPLAST/AVAL KT 16. Cleaning can be done using a pressure washer, by washing the surface of the render, next remove the load bearing parts and then reduce its absorption, e.g. by using ATLAS UNI-GRUNT/ AVAL KT 17.

3

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

DICTIONARY:

- U- external wall heat transfer coefficient, calculated according to PN- EN ISO 6946; 2008 (7)

- The EP ratio, calculated in kWh / (m²year), determining the annual computational demand for primary irreversible heating energy, ventilation and hot water.

IN THE NEXT **Lesson** WE WILL SHOW HOW TO PROPERLY ATTACH THE INSULATING LAYER

School of Insulation

Lesson 2 INSULATION FIXING

In the first lesson we have shown how to prepare the building for insulation, and we discussed the first step which is to check and prepare the substrate under External Wall Insulation, i.e. thermo-insulation * - for new houses or thermo-modernization* - for existing houses.

In today's lesson we will deal with fixing the most commonly used external wall insulation, and show how to fix polystyrene and wool. 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 persons of appropriate experience such as the Technical Advisors of insulation system manufacturers. Each case of thermal insulation or thermo-modernization must be considered individually, taking into account the state of the facade, type of building, its location, purpose, etc. This subject is so complex that to accurately explain the choice of insulating material, to show the properties and the construction of polystyrene and wool, explain where and on what substrates to use, this issue should be given to the full article, which we plan to present in one of the following lessons. So today we will focus on the technology of insulation fixing.

START OF WORK

Before installing the insulation all the elements in 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 (il.1) . We start the installation of thermal insulation layer by determining the level of attachment of 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 dirt carried by drops of rain bouncing of the ground.

Install the starting strip to the wall at a designated altitude using mechanical fixings to form a band around the building which supports the insulation (il.2). Starting strip is not an obligatory system element, but it greatly facilitates the installation of the first insulation layer.

THE NEXT STEP IS TO ATTACH LAYERS OF INSULATING MATERIAL.

1 DRAIN GUTTER REMOVAL

INSTALLATION OF STARTER TRACK 2

POLYSTYRENE BOARDS FIXING

Polystyrene boards are attached to the substrate mainly by using a mineral adhesive. For this purpose, we can use the adhesives designed for this purpose only, e.g. Atlas STOPTER K-10, Atlas HOTER S/Aval KT 53 or the adhesives of universal use, such as Atlas STOPTER K-20/Aval KT 85, Atlas HOTER U/Aval KT 55, used both for fixing polystyrene and for basecoat.

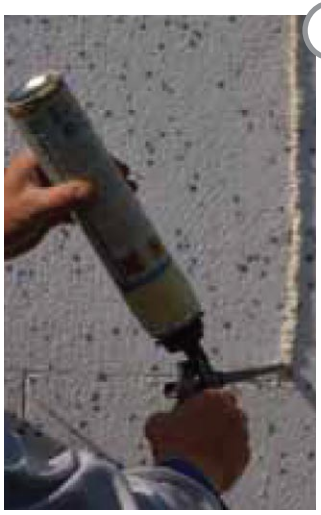
Selection of a suitable adhesive is related to the type of building and its height, the quality of the substrate, etc.

For instance Atlas STOPTER K-20/Aval KT 85 are used for insulation of difficult substrates, in low temperatures and increased humidity, Atlas HOTER S/Aval KT 53 and Atlas HOTER U/Aval KT 55 - for large projects such as multi-storey buildings.

The mortar is prepared by pouring it into the appropriate amount of cold water (the exact proportions are given on the packaging and product Technical Data Sheets) and stir until homogenous. 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 (il. 3). The circumferential 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.

3 ADHESIVE APPLYING WITH A 'STRIP-POINT' METHOD



4 FILLING THE GAPS WITH AN EXPANDING FOAM FILLER

AVAL KT 190/ ATLAS ROKER W-20

ATLAS STOPTER K-10

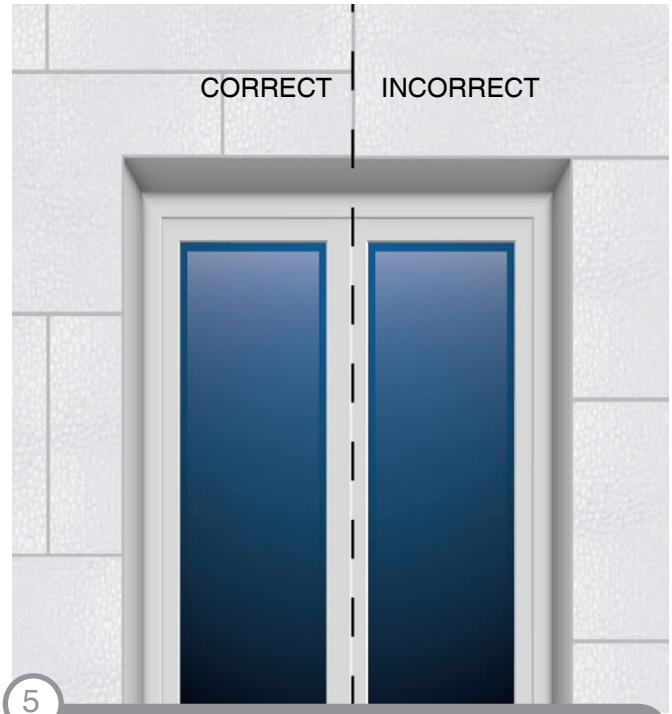
AVAL KT 85 / ATLAS STOPTER K-20

AVAL KT 53 / ATLAS HOTER S

AVAL KT 55 / ATLAS HOTER U

Lesson 2

FIXING THE INSULATION



5 CORRECT AND INCORRECT ARRANGEMENT OF POLYSTYRENE BOARDS IN WINDOW REVEALS

After applying the mortar on the board, place it on the substrate and press. The next board should be placed tightly next to so as to form a single plane. In order to avoid the thermal bridging *, large gaps between the boards should be filled with strips of insulation material, and small ones (up to 5 mm) with expanding foam (il. 4). Boards are arranged from the bottom to the top of an elevation, staggered in the so called brick' on the wall surface and in the corners of the building. During the process of thermo-insulation works use the complete boards and their halves keeping their dressing. Do not use chipped, dented or broken boards. The key element is also a suitable arrangement of insulation boards in window reveals. Correct and incorrect solution is shown in the figure (il. 5)

The next boards should be carefully pressed to avoid faults and inequalities on the surface of insulation material, as they will be visible on the basecoat and the render surface. The resulting inequality should be carefully leveled with a sandpaper or rasps (il. 6 and 6a).

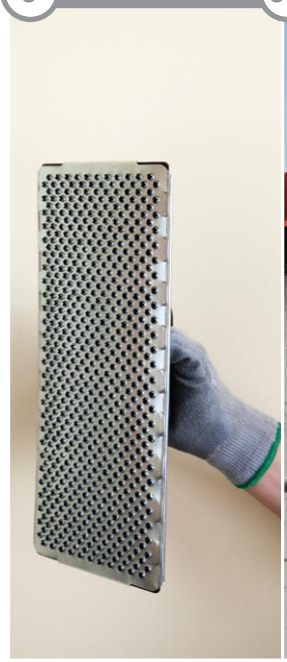
MINERAL WOOL PANELS FIXING

When using mineral wool use mortars dedicated to the wool such as Atlas ROKER W-20/Aval KT 190, however the technology of preparing is exactly the same as in case of mortar for polystyrene. Wool application technology is different to some extent from bonding polystyrene. The main difference is the method of applying adhesive on the wool. Due to the hydrophobicity of the mineral wool it requires pre-filling (priming with adhesive) to form, so-called bonding layer. Then wool panels are applied same as polystyrene boards with the use of „strip-point" method. The exception is the lamella wool which may be additionally factory pre-impregnated. This wool should be fully fixed by coating the entire surface with adhesive using a 10 mm notched trowel. Due to the reduced hardness of mineral wool compared to polystyrene, it should be applied on relatively flat substrates.

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, exposing to rain and strong winds. Apply the layer of adhesive just before the board application.

RASP

6



PLANNING THE SURFACE WITH A RASP

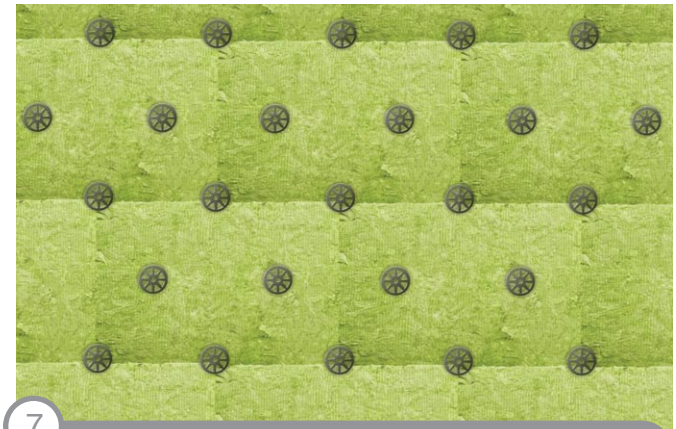
6a

ANCHOR FIXING

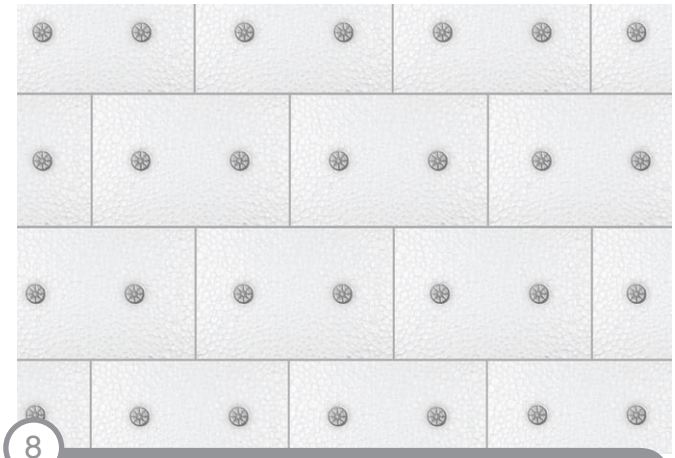
The next phase of the insulation installation is fixing the insulation panels with the use of mechanical fasteners. And here comes the next question: pin it or not? To this question, as in the case of insulating material choice, answers can be found in the project documentation, which should specify in details the quantity, location, type and length of mechanical fasteners. 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 4-5 fasteners per 1m². 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.

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 are placed centrally and in the corners of the neighbouring panels (il. 7). In contrast to a system based on the mineral wool, in a system based on polystyrene anchoring can commence only 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. Anchors are placed centrally on the surface of the board (il. 8). 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 people of knowledge and experience as the proper adhesion of the insulation layer is a key contributor to the insulation effect.



7 MINERAL WOOL – ANCHORS ARE PLACED CENTRALLY AND IN THE CORNERS OF THE NEIGHBOURING PANELS



8 POLYSTYRENE – ANCHORS ARE PLACED IN THE CENTRE OF THE BOARD

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

DICTIONARY:

* **thermo-modernization** versus **thermo-insulation**
The main difference between thermo-modernization and thermo-insulation results from the age and type of building. In the case of buildings designed and constructed with no insulation and modernized with additional insulation of external walls, we are talking about THERMO-MODERNIZATION. On the other hand, on the newly-constructed buildings a layer of thermal insulation is carried at once - then we are talking about INSULATION (thermo-insulation). Their main task is to eliminate the phenomenon of freezing of external walls by insulating them.
* thermal bridging - a place of reduced insulation properties.

School of Insulation

Lesson 3 REINFORCING LAYER EXECUTION

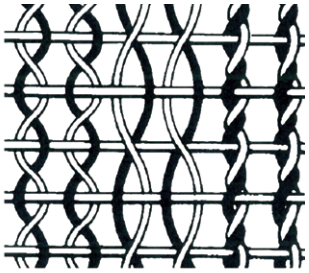
In previous lessons, we have shown how to properly prepare the substrate for insulation and how to install insulation layer (wool or polystyrene). Today we want to show how to properly execute the next phase of insulation - installation of the reinforcing layer (basecoat). It consists of application of proper adhesive and embedding mesh on the insulation already installed. 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?

REINFORCING MESH FOR INSULATION SYSTEMS

LENO MESH



The best is to accept the assumptions set out in the project documentation, where either specific adhesives and type of mesh are given or parameters of different materials listed. But what if we do not have such documentation? A good solution is to contact the Atlas Technical Advisor who will help you in selecting appropriate materials for a particular project. To carry out the reinforcing layer all kinds of reinforcing mesh listed in the technical specifications or recommended by the manufacturer of adhesives can be used. Remember that each product of good quality must keep proper price and avoid buying non-system 'suspiciously' cheap meshes. In most cases it brings more problems than benefits.

When choosing the adhesive on your own, first consider what type of insulation has been used and what kind of project you have (newly built house - insulation of an old one, large building - small building, location of the building, etc.). It is recommended to use products of one manufacturer, as they are usually tested in different combinations and work well together. What adhesive to choose we show on the example of ATLAS/AVAL products:

Lesson 3

REINFORCING LAYER EXECUTION

Adhesives for mesh on the polystyrene substrate:

ATLAS HOTER U / AVAL KT 55 –

general use adhesive for the execution of the reinforcing layer (basecoat) on polystyrene and for polystyrene application. Recommended for insulation and thermomodernization of all types of buildings of height up to 12 m. Reinforced with microfibres.

ATLAS STOPTER K-20 / AVAL KT 85 –

another adhesive of type 2-in-1, which can be freely used for all types of buildings, both to perform the reinforcing layer (basecoat) and polystyrene application. Enriched with microfibres, allows work in high humidity and ambient temperature from 0 °C up to 25 °C.

Adhesives for mesh on the mineral wool substrate:

ATLAS ROKER W-20 / AVAL KT 190 –

adhesive for application of wool panels and execution of the reinforcing layer (basecoat); designed for all types of buildings insulated with mineral wool.

When the proper adhesive and mesh were bought, you can start the basecoat execution. The work should begin 24 – 48 hours after the insulation application. This time can vary due to weather conditions during the insulating works and the type and quality of the substrate. The basecoat execution is divided into two stages.

SECURING THE EDGES AND CORNERS OF WINDOW AND DOOR REVEALS

Before the application of main reinforcing layer of the entire wall we need to protect of the places most vulnerable to mechanical damage, such as the edges of the building and the edges and corners of window and door reveals. Edges are protected with special corner profiles additionally strengthened with mesh, which reinforce the corners of polystyrene or wool. In corner profiles selection, as well as the choice of mesh or adhesive, you should follow the system manufacturer's recommendations or consult with the manufacturer's Technical Advisor.

Before the corner profile application, make sure that the edges are vertical. If so, apply the adhesive to the edge of the wall with a continuous strip with the use of a notched trowel and paste the corner. If not, apply the adhesive in points with a spatula, and, after adding a corner , adjust the vertical deflection resulting from uneven insulation layer. When a vertical edge is achieved, apply the adhesive on the entire surface of the corner and float it smoothly.

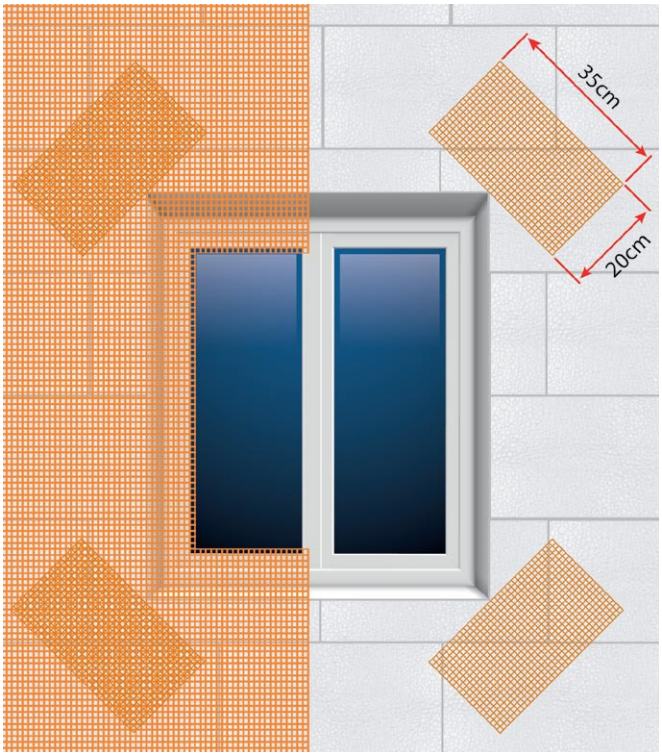
CORNER INSTALLATION

School of Insulation

Lesson 3

REINFORCING LAYER EXECUTION

When you have secured all the edges, strengthen additionally the corners of window and door reveals. This phase consists of application of additional 20x35 cm strips of reinforcing mesh at each reveal corner. Strips are applied diagonally at a 45° angle.



PROPER STRENGHTHENING
OF THE REVEAL CORNERS

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.

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

ERRORS:
EFFECTS OF LACK OF DIAGONAL
STRENGHTHENING
OF WINDOW REVEALS

Lesson 3

REINFORCING LAYER EXECUTION

REINFORCING 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. Then, a layer of adhesive (in the amount of 2/3 of the total quantity) is applied and spread evenly on the board/panel surface with a notched trowel (tooth 10-12 mm). The adhesive layer area should be slightly greater than the cut strip of the reinforcing mesh.

The reinforcing mesh should be immediately laid on such prepared layer, then embedded in the adhesive and floated smoothly with the use of steel trowel. The mesh should be completely immersed in the adhesive and invisible. If the layer of adhesive pressed form under the mesh does not allow full alignment and mesh embedding, apply another layer of adhesive in order to achieve an even surface, which will be a substrate for the next layer, which will be a render. The key issue is to apply an additional layer of adhesive before setting and drying of the first layer, using the 'wet-on-wet' method. Application of a new adhesive layer on a dry and set basecoat is not allowed.

Then, repeat all the steps for the next 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. We proceed this way until the entire wall surface is completed.

APPLICATION OF ADHESIVE ON POLYSTYRENE

LEVELLING OF ADHESIVE WITH USE OF NOTCHED TROWEL

MESH EMBEDDING

The quality of workmanship of the thermal insulation basecoat is an important element influencing the final façade appearance. It determines the appearance of a render applied in the final phase of insulating.

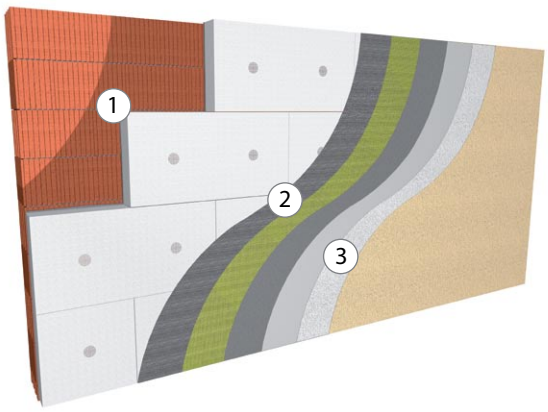
School of Insulation Lesson 4

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?

Why cannot we finish the elevation 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, that is made up of:

1. adhesive for application of thermal insulation material;
2. reinforcing layer, that is the adhesive with the mesh;
3. thin-layer render or tile cladding.



THE ROLE OF RENDERS

Therefore, what function a thin-layer render performs in the thermal insulation systems?

First 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 façade is necessary.**

A BIT OF HISTORY

Since the dawn of time the homeowners have tried to add charm to elevations. 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-layer'). 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. It became a pattern to the currently most popular solution, which is a thin-layer spotted render and its variation commonly called 'rustic'.

Manual machine and broom - devices once used for spotted render application.

In the past, one way of the outer walls finishing was decorating the render with glass or stones.

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	Styrene-acrylic resin	Silicone resin	Styrene-acrylic and silicone resin	Styrene-acrylic 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	***	*	****	***	****

In order to choose the render for a house, you must answer a few questions:

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: internal plaster, external render, thermal insulation, etc). Before deciding it is advised to check the project documentation. You can also use the calculation program available on the web-site www.atlas.com.pl. It will help you to design the partition properly. If the renders are applied on the walls made of high vapour permeability materials, 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 or silicone-silicate 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. Another ally in the fight with the biological corrosion is low water absorption, making the spores difficult to settle.

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 400 pastel and intensive colours available in all types of dispersion renders and paints SAH. An important element is the choice of an appropriate combination of colours as well accurate joining of colours. Special programs available on the website www.atlas.com.pl can assist you in this regard.

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 types of renders: spotted ones marked with letter “N” and rustic ones marked with letter “R”. You should choose the aggregate thickness - from 1 mm to 3 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. However, if it is not possible, and there are doubts as to the choice of a suitable render and place of application, you should consult the manufacturer‘s Technical Advisor.

RENDERS APPLICATION

As we have acquired the knowledge about renders and we know from the previous lessons, how to prepare the 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 right primer for the render. Thus, for example, Atlas/Aval products need following primers:

- ATLAS CERPLAST (AVAL KT 16) - a primer under mineral, acrylic, mosaic renders;
- ATLAS SILKON ANX (AVAL KT 76) - a primer under silicone renders;

ATLAS CERPLAST/ AVAL KT 16

ATLAS SILKON ANX/ AVAL KT 76

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


Spray gun


Brush

The most common application mistakes

One of the most common mistakes is the excessive dilution of the primer. It results in much more difficult render application, reduced substrate adhesion and unequal absorption. Following, it can result in uneven render drying (render dries faster locally). In case of colourful (dyed) renders it might cause stains and local render discolouration.

RENDER APPLICATION

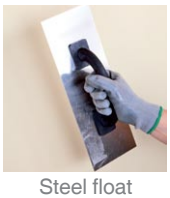
After the application of a priming mass, you can start the rendering. Depending on the render type and application method, this process is divided into several phases.

The manual application of ready-to-use renders (acrylic, silicone, acrylic-silicone, silicone-silicate).

When applying this type of renders 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 blocks 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 characteristic design, so if you know that one whole wall cannot be done in one cycle, you should list down not only the time, but also a place of a technological break. To sum up: the laying of the dyed renders must be carefully planned.

How to apply the render?

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.


Steel float

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 persons involved in the application, you are able to connect it vertically and horizontally with the following render areas.


Ribbon mixer

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 collect the excessive amount at the same time.

Spotted texture

Rustic texture

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 way we move the render aggregate and thus we obtain the final visual effect.

The technique of texture forming depends on the type of the render. '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 elevation. Rustic render, commonly called 'the bark beetle', as its name suggests, imitates the marks left by beetles. To get this effect, you should rub the render with a plastic float with vertical (gives vertical marking) or horizontal (gives horizontal marking) moves.

The application and texture forming of ready-to-use renders seems trivial process. However, as usually, the simplest things make the biggest problems. Therefore, to conduct the render texture forming correctly, we should engage a qualified brigade, preferably with vast experience. 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.

Spray application of the renders

This technology is very different from the one described above. 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. That's right: sprayed.

Lesson 4

Applying renders using steel trowel

Spray application of the renders

In this method, it's just so much or that much as spraying is not that easy. You have to – as builders would say - "form your hand" or to gain experience and intuition in order to reach the correct render proportions and to get the expected effect. Apply it in one place long enough and keep the right distance from the gun nozzle to the façade. It's almost all. Sprayed render is left to dry after application without any other additional work.

Spraying method has also other advantages over the manual one, namely:

- 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;

There are also two disadvantages of this technology, which must be mentioned here. First, the spraying unit cost ranges from 3.5 up to 6.5 thousand EUR. The second is the need to protect all elements of the building, such as windows, gutters, window sills, against contamination.

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.

School of Insulation

Lesson 5 GARAGE SYSTEMS

In the previous lessons we discussed the last stages of the thermal insulation - we focused on priming the substrate under the render, application of the thin-layer renders and painting. 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.

WHY SHOULD WE INSULATE THE BASEMENTS AND GARAGES?

In this lesson we will 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 area of ceiling. They must meet the following conditions:

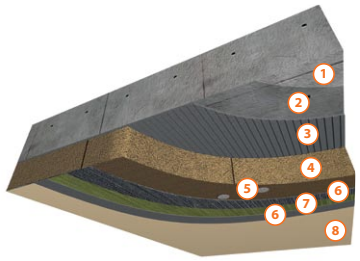
a) construction safety*
b) fire safety*
c) operational safety,
d) adequate hygiene, health and environmental protection conditions*
e) protection against noise and vibration*
f) adequate energetic performance and efficiency of the energy use*

**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.*

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 Roker G system.

Lesson 5

GARAGE SYSTEMS



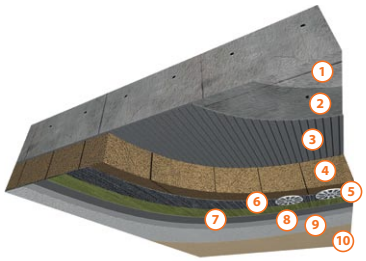
ROKER G INSULATION SYSTEM
Option I

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

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

- Adhesive: Atlas ROKER W-20 / Aval KT 190,
- Primers for paints: Atlas ARKOL SX and Atlas ARKOL NX
- Paints: silicate Atlas ARKOL S, silicone Aval KT 46/Atlas SALTA/Atlas FASTEL NOVA.

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.



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-layer render
9. Thin-layer render
10. Paint coat (optionally)

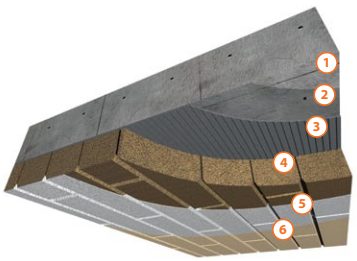
In Option II of the system the following ATLAS products are used:

- Adhesive: Atlas ROKER W-20 / Aval KT 190,
- Priming masses for renders: Atlas CERPLAST / Aval KT 16, Atlas SILKON ANX / AVAL KT 76.
- Renders: mineral Atlas CERMIT SN / DR / Aval KT 137/35, ATLAS Cermit SN-MAL, ATLAS Cermit ND; silicone-silicate ATLAS; silicone ATLAS / AVAL
- Primers for paints: Atlas ARKOL SX; Atlas ARKOL NX
- Paints: silicate Atlas ARKOL S; silicone Atlas SALTA / Atlas FASTEL NOVA / Aval KT 46.

Option II 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) which is covered (manually or with a spray unit) with a thin-layer render that can be optionally painted.

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

- Adhesives: Atlas ROKER W-10, Atlas ROKER W-20 / Aval K I 190,
- Mineral Wool Paroc CGL20 CY,
- Render: mineral CERMIT SN or SN-MAL (up to 2.0 mm),
- Paints: acrylic Atlas SALTA E; silicate Atlas ARKOL S; silicone Aval KT 46/Atlas SALTA/Atlas FASTEL NOVA.



ROKER G INSULATION SYSTEM
Option III

1. Concrete ceiling
2. Priming (optionally)
3. Adhesive for MW panels application
4. Lamella Mineral Wool (MW)
5. Render for spray application Cermit MN
6. Paint coat (optionally)

As the **Option III** is the most popular solution we focus in details on it. This option is technologically different from the options I and II, which - apart from the application site (ceiling) - do not differ significantly from the traditional insulation. A key element differing the options I and II from Option III is the number of layers in the system and the number of phases. An important element of the Option III 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 III)

1. Substrate Preparation

In most cases, the substrates in the 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

/ AVAL KT 17. Substrates of low absorption or extremely smooth should be covered with ATLAS CERPLAST / AVAL KT 16. 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 third Option of the 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-20 / AVAL KT 190 or ATLAS ROKER W-10. 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. 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. Make sure the adhesive does not covers 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.

3. Priming

For the garage ROKER G system (Option III) 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 render spraying. Thanks to this solution, we apply the spray render in one phase only. 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/ AVAL KT 16 with the use

MAI 2 multipump

Wagner PC-15

of the same aggregates as for renders applications. What is important, both solutions are consistent with the system Approval.

4. The render application

The render application in the ROKER G system (Option III) is carried out with the use of the specially selected machines. We recommend the multi-pump MAI 2 and Wagner PC 15 aggregates. They differ in dimensions and the pumping system. MAI 2 is based on a membrane rotoflex pump and Wagner PC 15 is based on a spiral pump system.

5. Stages of Rendering

ATLAS mineral renders of aggregate size 1.5 mm and 2.0 mm can be used with this system.

The first and the crucial step is to prepare the render properly. Mix the dry mixture with a suitable amount of water (listed on the packaging) with the use of a ribbon mixer. It ensures that no lumps will occur in the render. After proper render preparation we launch the aggregate unit.

Ribbon mixer

Lesson 5

GARAGE SYSTEMS

Since the render, due to its designation and composition, does not have good sliding properties, prior to the application of the render prepare the unit, so as to achieve the necessary properties. There are several ways to do that:

1. Mix the wallpaper paste with plenty of water, pour the mix into the unit and pump at a low speed through a hose without the lance attached at the end.
2. Pour Atlas CERPLAST /Aval KT 16 and, as in the case of wallpaper paste, pump it.
3. Mix the render (e.g. mineral) with large amount of water to reach the consistency of Atlas CERPLAST /Aval KT 16 and thus we give the proper slide in the hose.

Avoid priming of air of the aggregate system. When the lubricant disappears from the tank, you should immediately add proper render. Only when at the end of the hose the right consistency render appears, you can install the lance and proceed with the application. The render applied on the wool should be evenly spread, so that the entire wool surface is uniformly coated.

ERRORS IN EXECUTION:

While working with the ROKER G system (Option III), errors may occur that could prevent proper execution of insulation. The most common errors include:

Improperly applied layer of adhesive on wool (for example, due to too thin layer caused e.g. by a poor angle of notched trowel keeping or unevenly spread adhesive).

Uneven and too thin render layer - particularly in joints of wool panels.

Damage in the lamella wool caused by improper application and pressing to the ceiling without using a trowel - a place of damage covered with render.

Poorly made rendering on the wool.

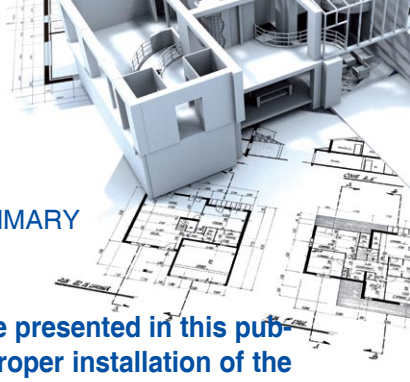
We have tried to give a detailed description of the garage thermal insulation system. And, although it is not a complicated procedure, we advise to read in advance the detailed instructions. One wrongly executed element may impact the whole work. We hope that this lesson will be helpful to you. It should 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.

School of Insulation

Lesson 6

ERRORS IN THE EXECUTION – SUMMARY



This lesson of thermal insulation is a kind of summary of the lessons which we have presented in this publication. 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 committed errors 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 nor the E - coefficient,
- 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 or E – coefficient 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 plaster, dirt, algae, lichens, coating.

1

Errors:

- wrong assessment of the geometry of the walls – their equality and the vertical deviation,
- cursory check of the substrate, leaving coatings (photo 1),
- 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.

Lesson 6

ERRORS IN THE EXECUTION – SUMMARY

Consequences:
Loosening of the entire insulation system.

Advices:
- 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,
- test of adhesion with polystyrene cube in order to assess the quality of the substrate prior to insulation (Photo 2),
- 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/AVAL KT 17,
- surface protection with fungicide agents, such as ATLAS MYKOS


2

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.

Errors:
- inappropriate selection of adhesive
- installation of boards with points of adhesive only,
- leaving unfilled gaps between the boards or filling them with mortar (Photo 3),
- carrying out work in unfavourable thermal conditions,
- uneven application of boards/panels,
- the vertical board joints are not staggered and, additionally, not overlapped at the building corners.


3

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. (Photo 4),


4

- application with 'points' only does not provide adequate adhesion and may lead to loosening. 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,


5

- lack of staggering and overlapping of boards (as in bricklaying) does not allow the insulation to work properly. It may even lead to a construction disaster (Photo 5).

Advices:
- use only recommended products,
- application (e.g. polystyrene) with the use of 'ribbon' stripe together with „points" method is a guarantee that the insulation will bond to the surface properly and meet all the requirements (Photo 6),
- 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. In other cases, to ensure proper temperature and humidity, use a protective net or a tarpaulin fastened to the scaffolding,
- strict adherence to the principles of staggering and overlapping, adequate distribution of boards.

Lesson 6

ERRORS IN THE EXECUTION – SUMMARY


6


7

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.

Errors:

- poor choice of the type of anchors to the type of substrate and insulation,
- inadequate number and spacing of anchors,
- poorly fixed anchors (Photo 7)

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.

Advices:

- 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.

4. REINFORCING LAYER INSTALLATION

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

Errors:

- 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.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- 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 (photo 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 (photo 9),
- negligent execution of the reinforcing layer prevents the even application of thin-layer render and forces the surface leveling with render, which means larger and more expensive use of it.

Advices:

The use of authorized materials (adhesives, mesh) and following the detailed instructions during the installation of the reinforcing layer. Irregularities at this stage will be clearly visible on the surface of the render.

5. RENDERING

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

Errors:

- inappropriate selection of render to the type of insulation,
- savings thanks to excessive 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 loosening of the render,
- excessive dilution of the primer reduces the adhesion of the render. Another consequence is uneven absorption of the surface (photo 10),
- in the case of large façade surface, the effect is often spoiled by visible render joints,
- drying of thin-layer render instead of setting in a natural process, especially in the summer months (photo 11).

Advices:

- detailed checking of the project documentation. In its absence, contact the manufacturer's representative,
- appropriately diluted primer results in lighter work with the render and provides uniform substrate absorption,


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- 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, use a protective nets and tarpaulins. In the case of low temperatures we recommend the construction of the so-called 'heat-zone', using heat blowers.

Due to limited article space we have described the errors only briefly and in a fairly simple form. Although for some they 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.

At the end of this book, 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.


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  ETA-06/0187
- **with mineral wool**
  ETA-06/0173
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EXPORT DEPARTMENT
95-100 Zgierz (Poland), ul. Szczawińska 52A
Tel. (+48 42) 714 08 02
Fax (+48 42) 714 08 07
Mob. (+48) 607 781 018
e-mail: mgoslawski@atlas.com.pl

CONTACT TO ATLAS/AVAL ETICS (EWI) DISTRIBUTOR

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