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**Manual for Insulating
Using the Seamless Thermal Insulation System**

Dear Readers

This instruction manual for ETICS FAST SM/SA and ETICS FAST W insulation systems is based on the following materials:

- BUILDING RESEARCH INSTITUTE [ITB] INSTRUCTION No.334/2002 - Seamless thermal insulation for external walls
- BUILDING RESEARCH INSTITUTE [ITB] INSTRUCTION No.418/2007 - Seamless thermal insulation for external walls
- European Technical Approval ETA-09/0379, ETA-09/0378 - Products for the performance of insulation systems on external walls using the ETICS FAST SM and ETICS FAST SA systems.
- European Technical Approval ETA-09/0380 - Products for the performance of insulation systems on external walls using the ETICS FAST W system.
- current Polish standards and regulations

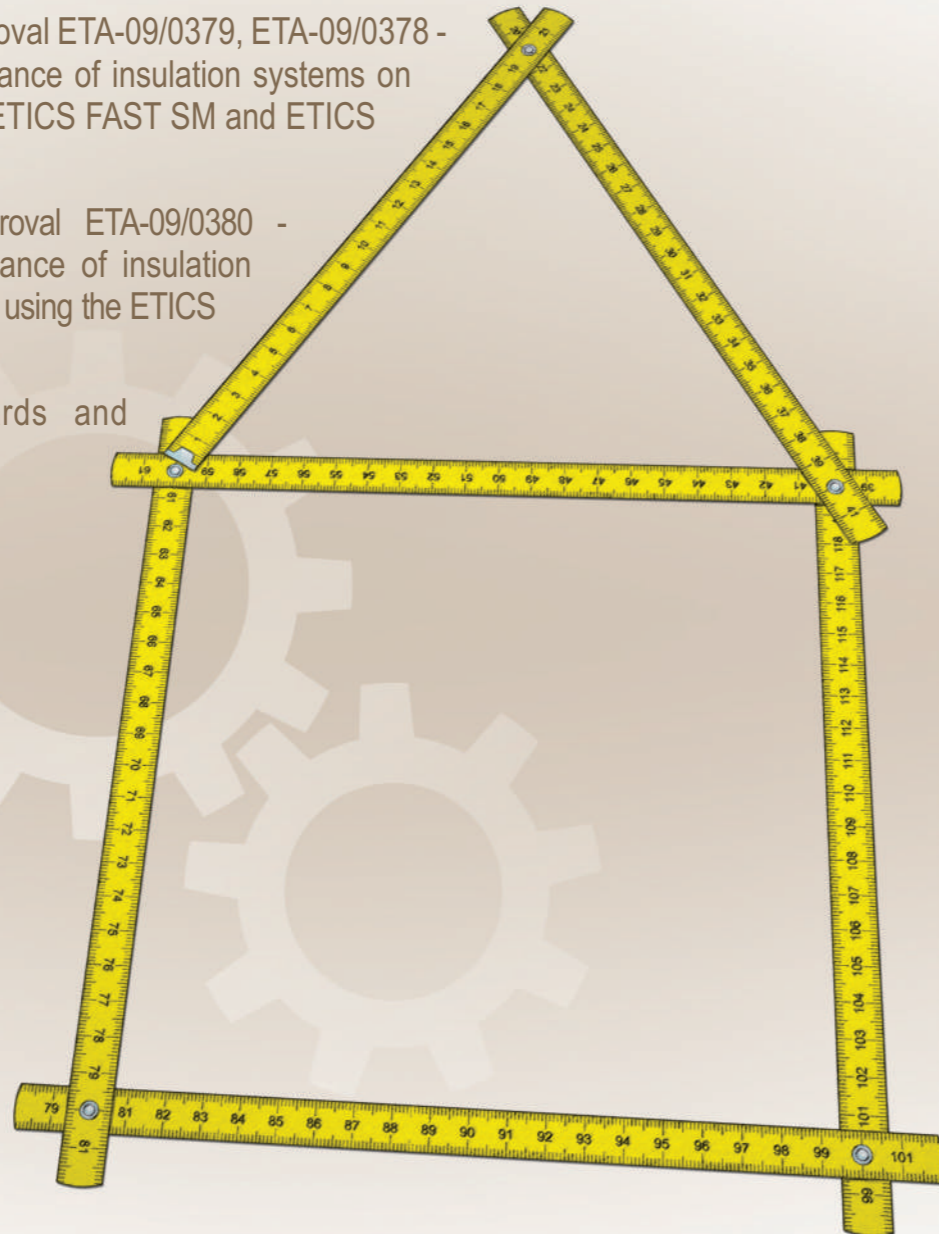


Figure 1 - Washing walls using water under pressure

© FAST 2008



Figure 2 - Checking the surface by tapping

© FAST 2008



Figure 3 - Priming absorbent, weak surfaces

© FAST 2008

1 Clearing the surface

The surface should be thoroughly checked and prepared before commencing insulation work. Walls intended for gluing of insulating material should be stable, dry and free from dirt, dust, old peeling paint and other contaminants that reduce the adhesion of the mortar glue. The ideal method is to wash the entire wall with water under pressure (Fig. 1) or mechanical cleaning (e.g. using a wire brush or grinder). In the case of large clusters of moss and algae, use of biocides is recommended.

2 Evaluation of the surface and leveling

It is very important to check the state of the surface when evaluating it. Checking for loose plaster can be done through tapping with a hammer and listening for a hollow sound (Fig. 2). If such plaster is found, it should be replaced. It is recommended to remove plaster on the outside of window and door frames, allowing 2 to 3 cm of insulation to be used. If present, old paint cover should be checked for its stability through running a sharp tool over it or sticking and removing adhesive tape. If the old paint comes off in whole areas, the surface is unstable and should be thoroughly cleaned.

If there are any uneven areas, indentations of more than 10 mm, they should be leveled using leveling mortar. If the unevenness exceeds 20 mm, it should be leveled through the use of thermal insulation boards of appropriate thickness. Using multiple boards to level a surface is unacceptable.

3 Priming the surface

Surfaces which are powdery and loose should be primed using FAST GRUNT G before insulation material is attached. Walls from strongly absorbent materials must be primed using FAST GRUNT U (Fig. 3). Mechanically cleaned surfaces also require priming.

4 Checking the strength of the surface

An adhesion test should be carried out to if the surface is not sound. For this purpose, between 8 and 10 pieces of 10x10 cm polystyrene should be attached in different places on the prepared surface. They should be attached using a 10 mm thick layer of FAST NORMAL S mortar and firmly pushed down on the selected areas of the surface. After a minimum of 3 days, an attempt to manually remove the polystyrene should be made. If it breaks, the surface and the mortar are strong enough. When samples of polystyrene break away from the wall surface together with the layer of mortar, the surface was not properly prepared or its top layer is not strong enough. In this case, mechanical fixings should be used and the surface prepared once more. The exact quantity and nature of the fixings should be indicated by the insulation designer.

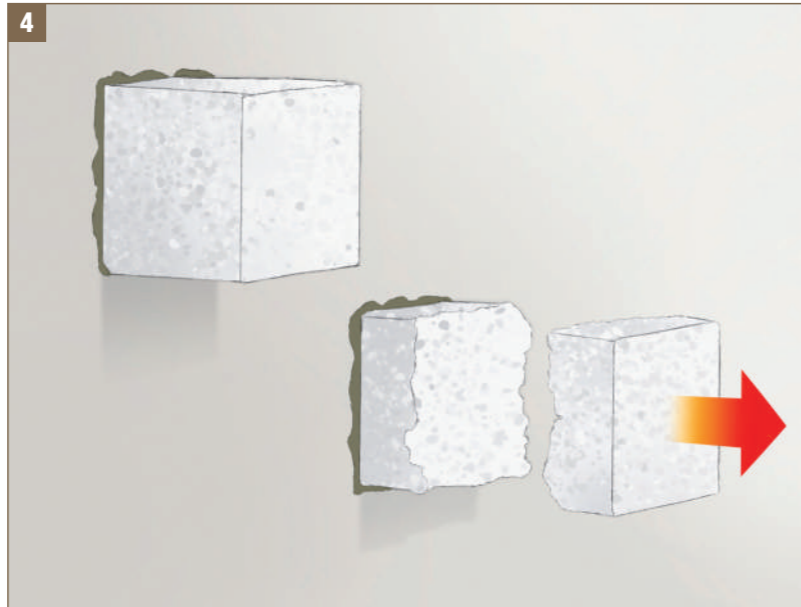


Fig. 4 - Checking bearing capacity of surface © FAST 2008

5 Starter track installation

Starter tracks should be mounted prior to attaching insulation boards (Fig. 5). To this end, the height of the base should be indicated using coloured line. After leveling, the lath should be fastened with anchors - 3 per meter on average. Spacers should be used, if walls are uneven. It is recommended to connect profiles using special mounting clips. Starter tracks, apart from setting the level and facilitating installation of insulating materials, are responsible for protecting the insulation from fire, moisture and damage by insects, birds or rodents.

When installing the starter tracks on inner or outer corners of the building, one should pay special attention that they are tightly spaced (Fig. 6). For the sake of preserving continuity of the board, it is advisable to make special cuts, which will allow boards to be connected without any breaks. This way the lower level of the insulated building is preserved. Special connectors can also be used.

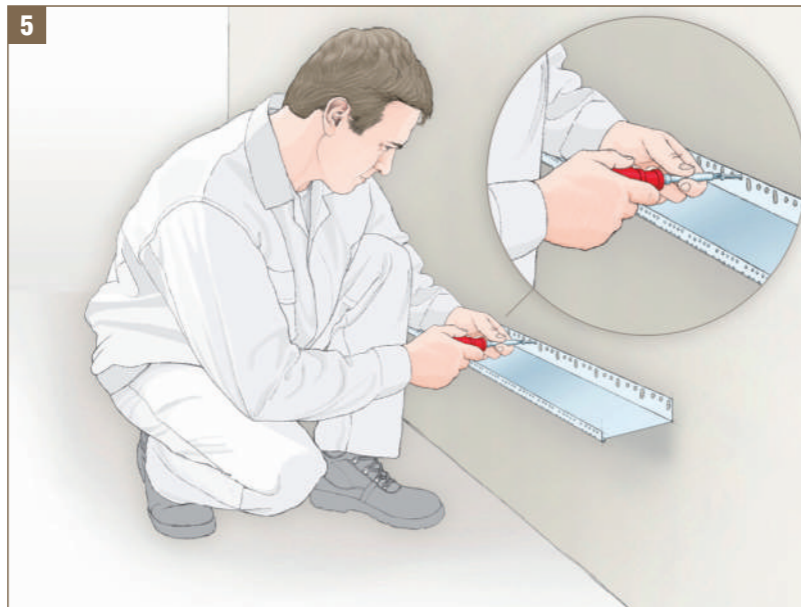


Fig. 5 - Installation of first starter track © FAST 2008

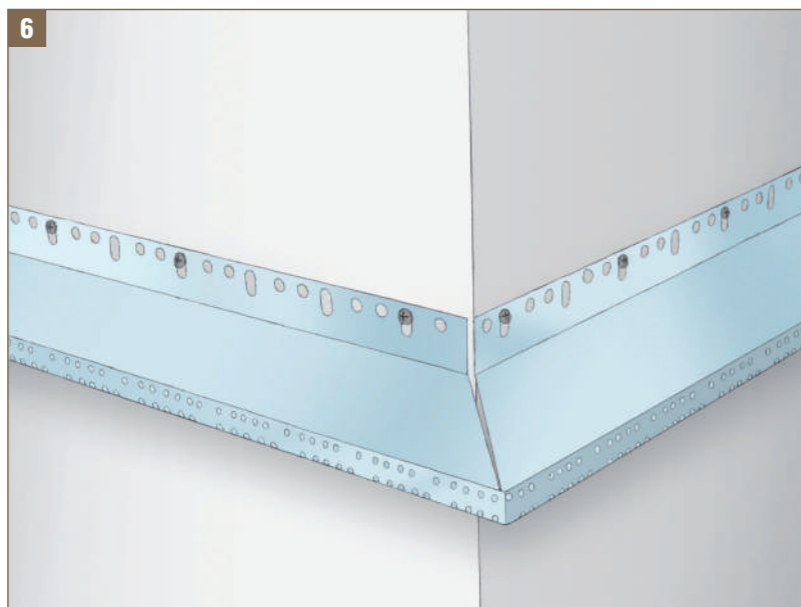


Fig. 6 - Mounting first starter track at the corner of the building © FAST 2008

6 Preparation of mortar glue

Mortar glue should be properly prepared before insulating material is attached.

For polystyrene boards FAST NORMAL S (Fig. 7) (alternatively FAST SPECJAL or FAST SPECJAL M) mortar glue should be used, whereas in the case of mineral wool panels FAST NORMAL W (alternatively FAST SPECJAL W). The contents of the bag must be thoroughly mixed with about 5.5 LIT. of clean, cool water using a slow rotation drill with a suitable mixer. After achieving a homogeneous mixture, free of any lumps, wait about 10 minutes and mix again before use. Mortar prepared in such a way is suitable for use for 2.5 to 3 hours. It should be mixed during work approximately every 30 minutes.

Water must not be added to mortar to "improve" its consistency.



Fig. 7 - Preparation of mortar glue © FAST 2008

7 Applying mortar to insulation boards

Depending on the surface, the mortar glue may be applied to the thermal insulation boards in two ways.

In the case of insulating level, plastered surfaces, the mortar glue should be applied to thin boards using a notched trowel with square 10-12 mm notches. In other cases it should be applied using the "circumference and points" method, which means distributing it with a trowel around the circumference of the board in a 3-4 cm band and in 3-8 additional points. The size of the points is dependant on their number.

Mortar properly distributed along the circumference should be sufficiently far away from the edge, so that it does not extend outside the board when the latter is pushed into place.

The rule that mortar glue must cover at least 40% of the board surface, must be observed

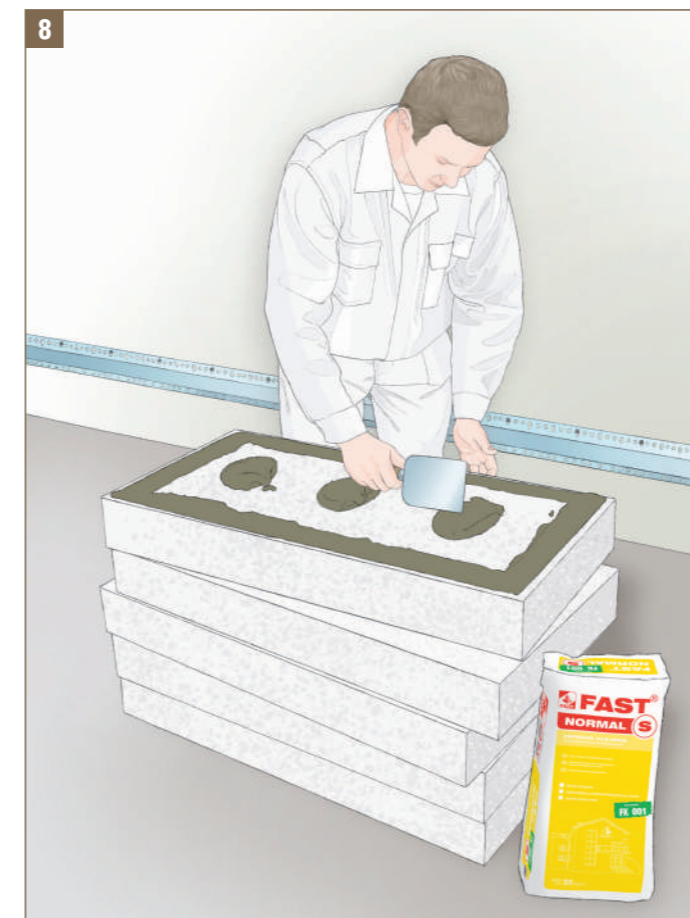


Fig. 8 - Method of applying mortar glue to insulation boards © FAST 2008

8 Applying mortar to mineral wool panels

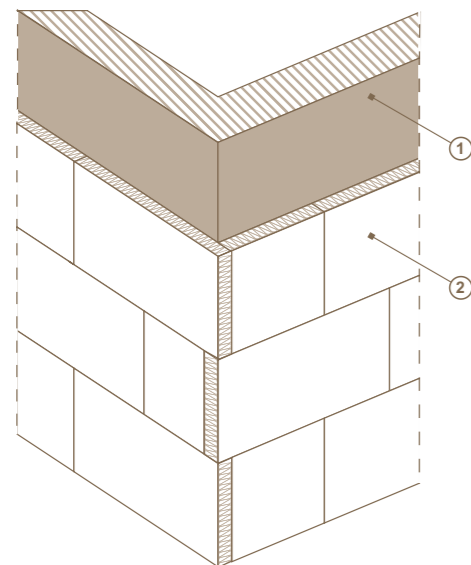
When attaching panels of mineral wool, before the actual application of mortar glue, the surface to be glued should be cleared of dust and loose particles and initially covered with mortar by applying a thin layer of mortar glue using a smooth edge trowel, in order to increase adhesion. On a surface prepared in the above mentioned way, the actual adhesive layer can be applied as a thin layer using a notched trowel or using the "circumference and points" method. As in the case of polystyrene boards, the mortar glue must cover at least 40% of the panel surface. In the case of lamella panels, the mortar glue should always be applied using a notched trowel with square 10-12 mm notches (Fig. 9).

9 Attaching boards to the surface

Once the mortar glue has been applied, the insulation board should be attached to the surface in the chosen spot and slid into place, right next to previously attached boards, and pushed into place through tapping with a trowel, until it is flush with neighbouring boards. Mortar glue squeezed outside the board must be removed, as it could lead to the formation of thermal bridges and cracks in the plastering.

Attempts at correcting the position of boards or moving them after several minutes are unacceptable, as the process of bonding has already begun.

Boards are attached close to one another starting from the starter track and up to the eave of the roof with their vertical joints staggered (Fig. 10). When insulating walls are constructed of large prefabricated elements, the boards should be placed in such a way that the joints between them do not fall in the same places as those of the prefabricated elements. Board arrangement in a corner of a building is shown below.



Board arrangement in a corner of a building.

- 1 - Existing wall
- 2 - Insulation boards



Fig. 9 - Applying mortar glue to lamella mineral wool panels © FAST 2008

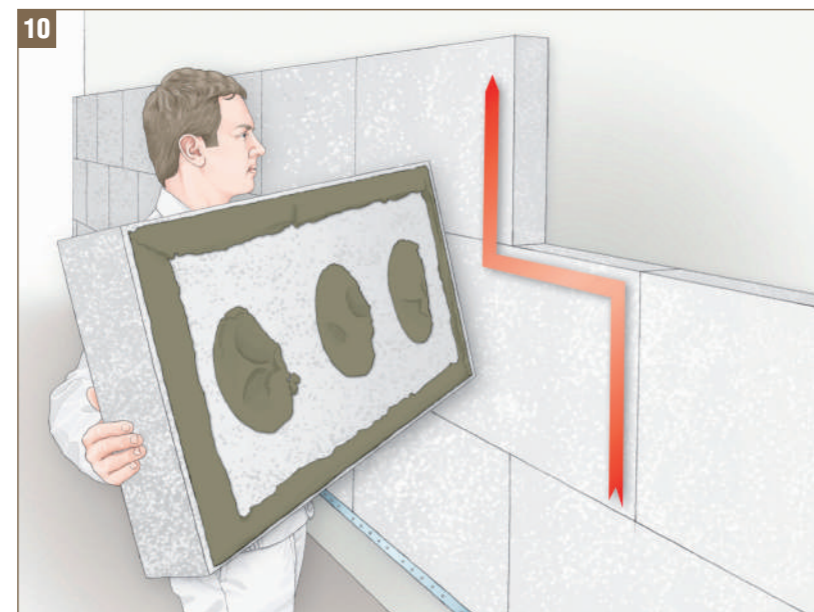


Fig. 10 - Method of fixing boards to the surface © FAST 2008

10 Fixing insulation boards around window and door openings

Boards near window and door openings should be chosen (cut) so that the vertical and horizontal joints are not in the same places as the edges of the openings (Fig. 11). This ensures that the facade will not crack in the future. In addition to this, building expansion lines or roof vents should be properly prepared in order to be later secured in an appropriate manner.



Fig. 11 - Proper arrangement of insulating panels near doors and windows © FAST 2008

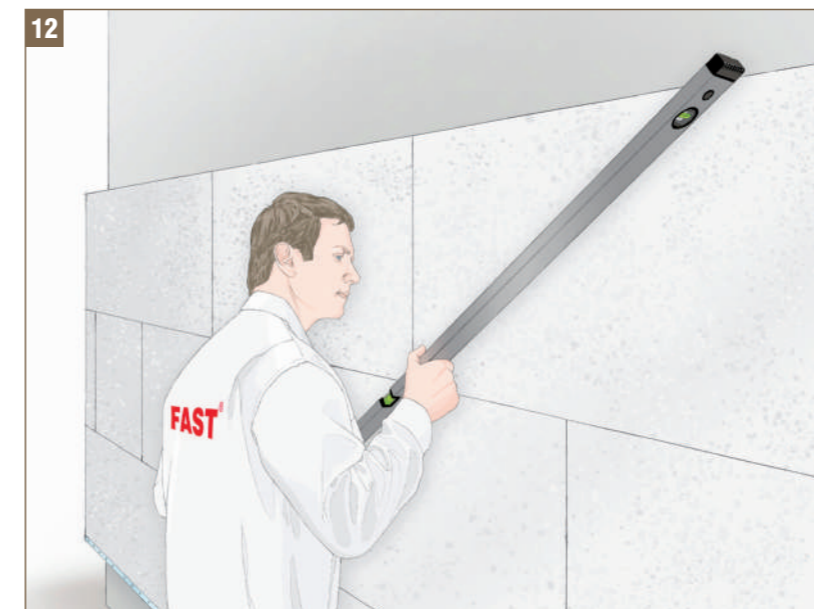
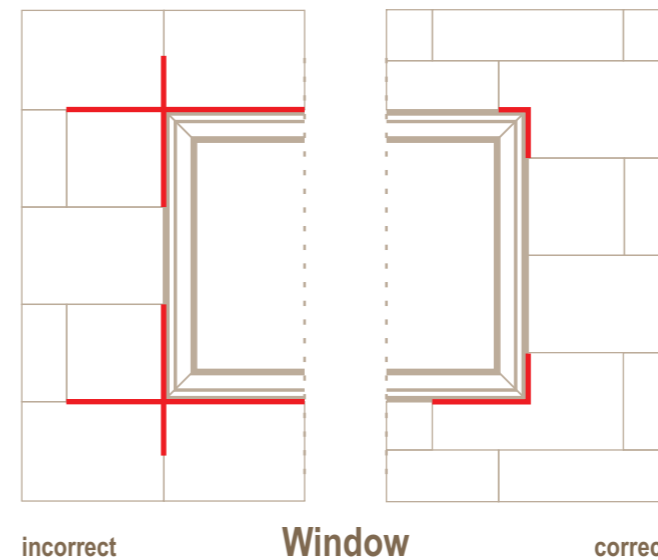


Fig. 12 - Checking board flushness after fixing © FAST 2008

11 Checking level of fixed boards

Please note that during fixing of boards, the plumb, level and flushness of the whole surface should be checked using a floating trowel or a long spirit level (Fig. 12).

12 Filling gaps between insulating material boards

Gaps between boards larger than 2 mm should be filled with strips of insulating material (Fig. 13). In the case of gaps smaller than 4 mm in systems using polystyrene boards, it is also permissible to fill them with low expansion PU foam.

It is unacceptable to fill gaps with mortar used for fixing boards due to the formation of thermal bridges and the risk of the appearance of cracks along board joints.



Fig. 13 - Filling gaps between boards using strips of insulating material © FAST 2008

13 Leveling the surface of boards

Insulation boards must be flush after fixing. Any unevenness (faults) should be grinded down using a special rasp or sandpaper attached to a float (Fig. 14).

Grinding of boards can be done no earlier than after 3 full days from the date of their attachment.



Fig. 14 - Leveling plane through grinding © FAST 2008

14 Fastening boards using mechanical fixings

If there is a need for securing the polystyrene boards from tearing off, i.e. when the resistance of the surface to tearing is less than 0.08 MPa or the building height exceeds 20 m, mechanical fixings with plastic or metal pins should be used (Fig. 15).

In the case of mineral wool panels with unordered fiber structure, mechanical fixings with metal pins should always be used, regardless of the height of the building (Fig. 15). It is permissible to mount mineral wool mortar using only mortar glue in the case of panels with ordered fibers, so called lamellas, when the building height does not exceed 20 m and the tensile strength of the surface is ≥ 0.08 MPa.

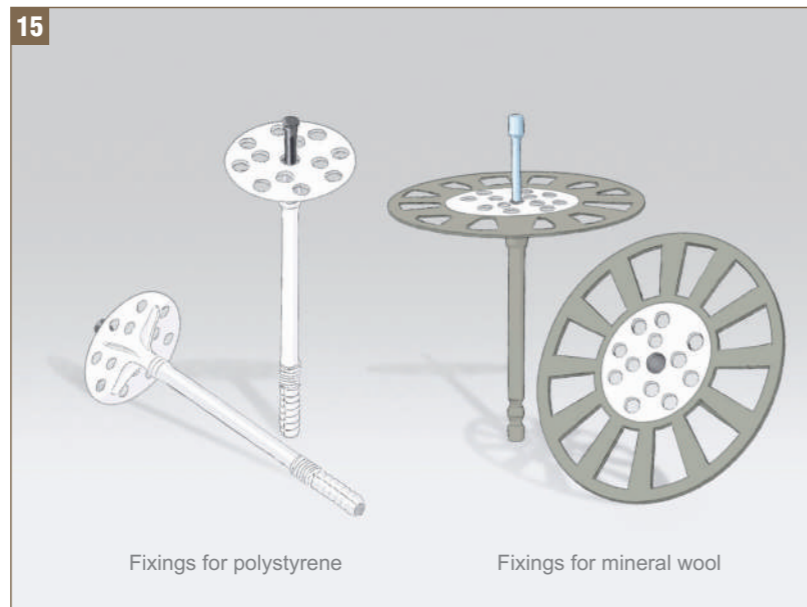


Fig. 15 - Mechanical fixings for polystyrene and mineral wool © FAST 2008



Fig. 16 - Drilling holes for mechanical fixings © FAST 2008

Drilling holes and mechanical fixing can begin no earlier than 3 days from the attachment of boards, which is the proper setting time of mortar glue.

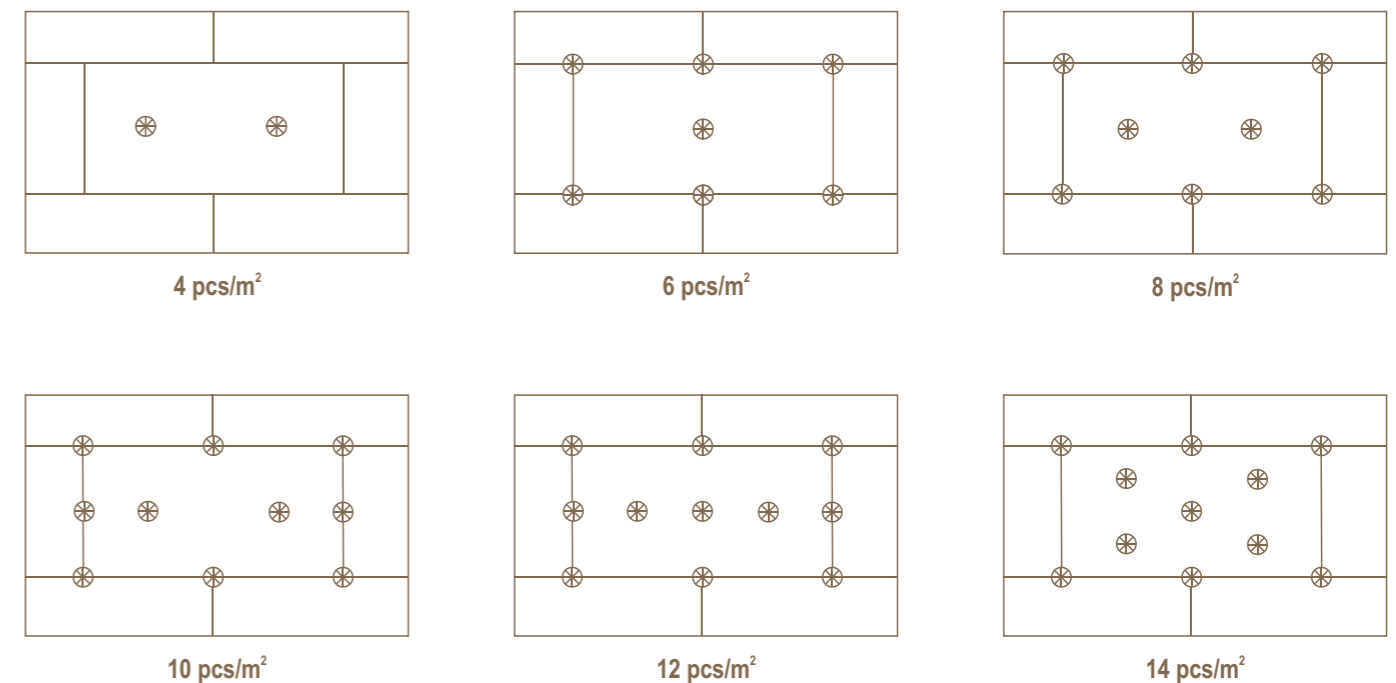
The insertion depth of the pin into the wall should be equal to:

- min. 5-6 cm - dense surface, (concrete, solid brick, silica brick or stone)
- min. 8-9 cm - porous surface (aerated concrete, cavity bricks and block cavity bricks, and cavity breezeblock)

For drilling holes in thin or cavity materials, a drill with an engaged hammering action should not be used. The exact amount, type and method of placing the fixings should be determined by the designer of the insulation. Usually in the case of polystyrene boards this is 4 to 6 per m² and between 6 and 8 per m² for mineral wool.

The embedment depth, the thickness of the old plaster, the mortar glue layer and the thickness of the insulating material should be taken into account when estimating the length of the fixings. Please note that mechanical fixings must be used in the case of buildings higher than 20 m, regardless of the bearing capacity of the surface. In areas of building edges, where major wind-induced forces are present, i.e. 1 to 2 m from the edge, the design of the insulation should include an increased amount of fixings.

Examples of spacing patterns on insulation boards



15 Installation of mechanical fixings

After holes are drilled, mechanical fixings should be carefully fitted, anchored with driven or screwed-in pins (Fig. 17).

The heads of fixings cannot protrude beyond the plane of the boards - they should be exactly flushed. Fixing heads should not be driven into the insulation and wall using a hammer. Excessively deep insertion of fixing heads in the insulation material can cause cracking (rupture) of the boards, which in turn weakens the insulation. Filling indentations in the areas of fixing heads with mortar glue causes thermal bridges and, consequently, may lead to plaster loosening in such areas.

In the case of mineral wool with ordered fibers, so called lamellas, fixings with a metal pin and larger diameter of head (140 mm) are used (Fig. 18).

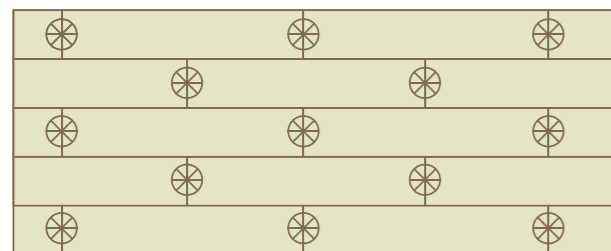


Fig. 17 - Installation of mechanical fixings and driving pins © FAST 2008

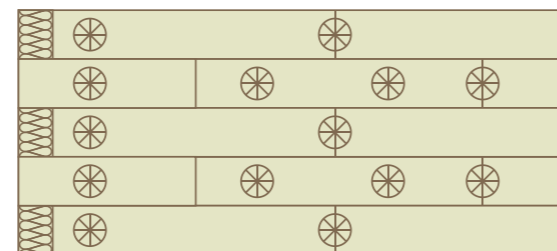


Fig. 18 - Installation of mechanical fixings on wool lamella © FAST 2008

Example diagrams of fixing spacing on mineral wool lamella panels



4 pcs/m²



8 pcs/m²

16 Preparation of mortar glue

For laying the reinforcing layer with fiberglass mesh, FAST SPECJAL or FAST SPECJAL M mortar glue should be used for polystyrene insulation and FAST SPECJAL W for mineral wool insulation. The contents of the bag should be thoroughly mixed with clean, cool water using a slow rotation drill with a suitable mixer. Wait about 10 minutes after initial mixing and mix again. Mortar prepared in such a way is suitable for use for 2.5 to 3 hours.

Water must not be added to mortar to "improve" its consistency.



Fig. 19 - Preparation of FAST SPECJAL mortar glue © FAST 2008

17 Additional safeguards for corners of the building and window and door reveals

The reinforcement should be installed not earlier than 3 days after the attachment of insulation boards, in dry weather and in an ambient temperature between +5°C and +25°C. If a temperature drop below freezing is forecast within 24 hours, the laying of the reinforcing layer should be stopped, even if at the time of laying, the temperature is above 5°C. In order to protect the layer from excessive drying due to wind or sun during bonding, the scaffolding should be protected using nets or shielding mats.

NOTE: If polystyrene boards fixed in the spring and summer were exposed to UV radiation for longer than 3 months, their condition should be carefully verified (danger of polystyrene oxidation - "yellowing"). If necessary, the entire surface should be grinded using a grater or a float with coarse sandpaper.

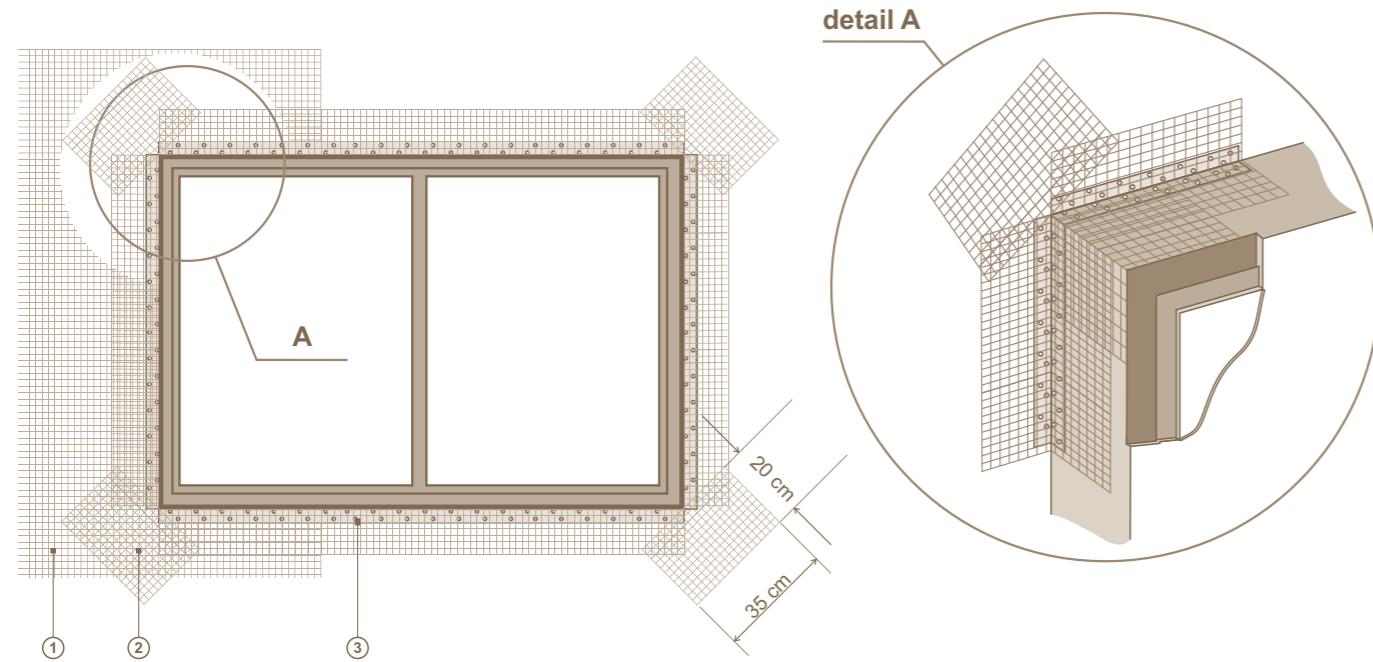
Before putting the reinforcing layer on the walls, it is necessary to:

- embed corner protectors with mesh at the corners of the building walls and corners near doors and windows
- reinforce all corners of openings by attaching mesh with dimensions of 20 cm by 35 cm - placing it at an angle of 45° (Fig. 20)
- perform necessary expansion joints with sealing tape or expansion profiles



Fig. 20 - Reinforcing a corner around window and door openings © FAST 2008

Method for fixing fiberglass mesh around openings for doors and windows



- 1 - fiberglass mesh (cut strip of mesh to the edge of the corner)
- 2 - pieces of reinforcing mesh in opening corners
- 3 - protective corner with fiberglass mesh

18 Application of mortar glue layer on insulation boards

Mortar glue is applied on the board as a continuous layer about 3 mm thick. A notched trowel with 10-12 mm notches is used for applying the mortar glue. In the case of mineral wool insulation, be sure to clean the entire surface of the panels of loose particles and dust. Then, to increase the adhesion of the reinforcing layer, a preliminary application of a thin layer of mortar glue, so called rubbing of mortar glue, onto the surface of the panels is required. Mortar glue is applied in vertical stripes with a width equal to that of the fiberglass mesh (Fig. 21).



Fig. 21 - Applying mortar glue using notched trowel

© FAST 2008



Fig. 22 - Embedding mesh in a layer of mortar glue

© FAST 2008

19 Embedding fiberglass mesh

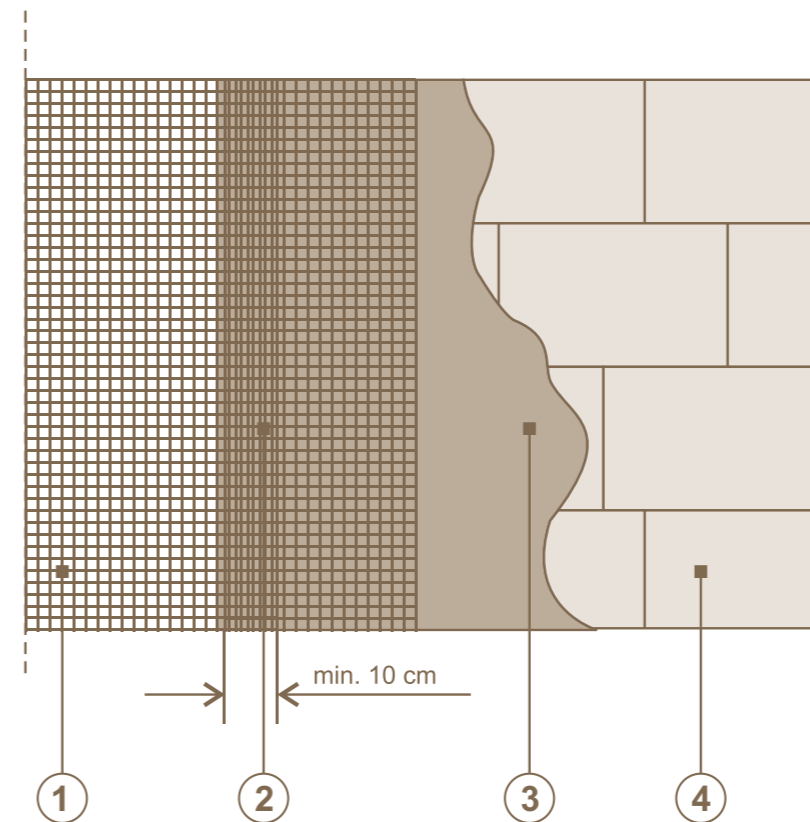
After application of mortar glue, the mesh should be embedded into it, starting from the top by pushing it across its whole width. The mesh should be evenly stretched over the entire surface, without any waves, humps or bumps (Fig. 22).

To ensure proper functioning of the reinforcing layer, the mesh should be embedded in the middle of the mortar layer. It is unacceptable to insert the reinforcing mesh directly onto the boards or to have it protruding from the exterior. Sinking the mesh too deep or too shallow can cause it to exert an eccentric force, which can ultimately lead to cracking and the formation of humps in the reinforcing layer. The layer thickness when a single sheet of mesh is used should be between 3 and 5 mm.

It is unacceptable to add a thin layer, 1mm thick, to the dry reinforcing layer because of its poor adhesive properties (too rapid evaporation of water from the added layer may result in it separating from the surface).

When embedding fiberglass mesh into the mortar glue, it is necessary to maintain a vertical and horizontal overlap of at least 10 cm. The fiberglass mesh must be bent around frames and window sill as well as vertical wall corners - around 15 cm should be on the adjacent wall. If the building's walls are subject to possible impacts or mechanical damage due to their location, e.g. close to sidewalks, crossings, roads or playgrounds etc. they should be protected with a double layer of fiberglass mesh along the whole first floor. Once the mortar glue with fiberglass mesh sunk into it is set, a second layer of mortar glue should be applied and another layer of fiberglass mesh sunk (inserted). The thickness of the reinforcing layer with double fiberglass mesh should be between 6-8 mm.

The reinforcing layer must be thoroughly covered with mortar as inaccurate execution and alignment of the surface affects the final appearance of the facade. If the surface is rough or notches appear, they must be sanded with sandpaper. Otherwise they will be visible in the structure of thin exterior plaster. Surface grinding can be done when the mortar layer is not too hard.



Mesh overlap

- 1 - fiberglass mesh
- 2 - area of overlap of adjacent strips of fiberglass mesh
- 3 - mortar glue layer
- 4 - insulation boards

20 Applying the undercoat layer

After the reinforcing layer is dry, but not earlier than 3 days after it has been done (this period may be extended in case of adverse weather conditions), priming of the surface can be performed in order to ensure optimal adhesion of plaster to the surface using one of FAST plaster undercoats (Fig. 23). In the case of mineral, acrylic and siloxane plaster, use primer FAST GRUNT M, whereas for silicate plasters apply primer FAST GRUNT S-T. Work should be carried out at an ambient temperature of above 5° C and not higher than 25° C, in dry weather. The undercoat should be applied using a brush or roller as a uniform coat on the whole surface.

Undercoats should not be diluted, as this deteriorates their bonding properties.



Fig. 23 - Applying the undercoat

© FAST 2008

21 Preparation of polymer-mineral plasters and ready-mixed plaster

After the undercoat dries, but no earlier than 24 hours after it had been applied, plastering work can begin.

Polymer-mineral plasters in the ETICS FAST SM range are offered in the form of a white powder. In order to prepare them, the entire contents of the package must be thoroughly mixed with about 5.0 liters of clean water until a uniform consistency is achieved (Fig. 24). The prepared mass should be left for 10 minutes and then mixed once more (without adding water). Plaster prepared this way is suitable for use for no longer than 1 hour.

In the case of ready-mixed coloured plaster, i.e. acrylic, silicate and siloxane plasters, each bucket should be thoroughly mixed using a slow-rotating drill prior to application.

Additionally, to ensure uniform color on the whole wall, buckets should be mixed together in a large mortar tub (Fig. 25).

As the plaster is prepared, new plaster should be systematically added and each time mixed using a slow-rotating drill with a suitable mixer. This is especially important for materials from different batches (production dates).



Fig. 24 - Preparation of plaster prior to application (polymer-mineral plasters)

© FAST 2008

22 Application of thin plaster

Plastering should be carried out in suitable weather conditions both during the application and during drying: avoid rain, strong winds and a high exposure to the sun. The optimum temperature should be between 5° C and 25° C and relative humidity should not exceed 75%. If there is a risk of the temperature dropping below 5° C during the drying of plaster (at least 48 hours from its application) plastering work should not be performed.

When applying finishing coloured plaster, the base layer of plaster should have a similar colour.

If these above mentioned conditions are met, plaster can be applied to the primed wall. Plaster should be applied using a steel trowel as a layer equal in thickness to the grain of the plaster. The surface should then be smoothed and the excess material collected (Fig. 26). After a short period of time, depending on the conditions during application, a texture can be applied to the surface using a plastic trowel. In order to avoid any visible lines at the areas of contact between dried and freshly applied plaster, a sufficient number of workers and scaffolding should be available for the works to be carried out continuously. One surface should be done in one work cycle, with no breaks during the application of plaster and using the "wet on wet" rule.

Due to increased heat and ultraviolet absorption, facades facing south or west should not be plastered using dark coloured plaster; such colours should not exceed 10% of the total area.



Fig. 25 - Preparation of plaster prior to application (acrylic, silicate and siloxane plasters)

© FAST 2008



Fig. 26 - Plastering a primed wall

© FAST 2008

23 Texturing plaster

Giving a texture to the plaster can begin when the trowel no longer sticks to the plaster. The time necessary for this depends on air and surface temperature, relative humidity and the thickness of the material. Plastic floats are used for texturing and, depending on the structure of the plaster, to give it an appropriate pattern. Be sure to push on the float with the same force and at a constant angle.

24 Grated structure

Texture can be given to plaster with a grated structure in any way depending on the float movement. Vertical (Fig. 27), horizontal (Fig. 28), diagonal or circular (Fig. 29) scratches can be achieved, depending on the size of the grain.



Fig. 27 - Giving texture to plaster - vertical grated structure © FAST 2008



Fig. 28 - Giving texture to plaster - horizontal grated structure © FAST 2008



Fig. 29 - Giving texture to plaster - swirl grated structure © FAST 2008



Fig. 30 - Texturing plaster - "fleece" structure © FAST 2008



Fig. 31 - Painting plaster © FAST 2008

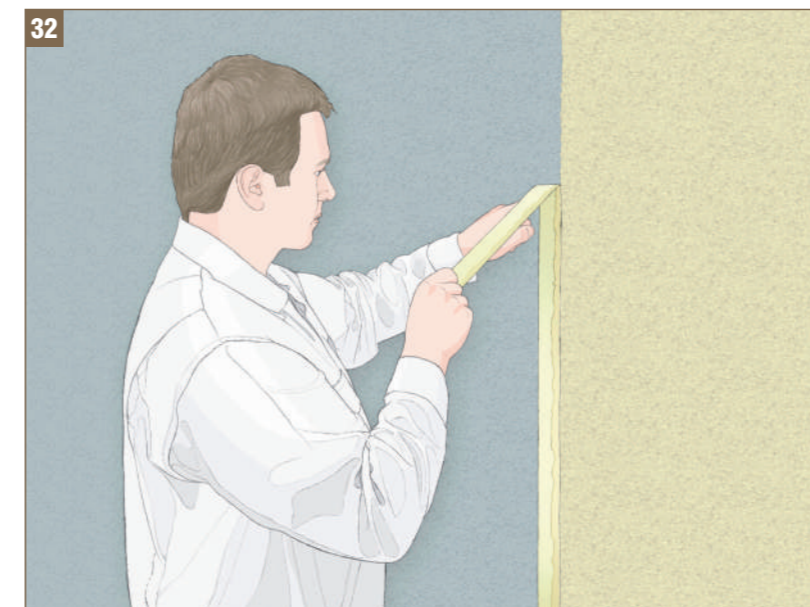


Fig. 32 - Combining different paint colours on one wall © FAST 2008

25 "Fleece" texturing

Texture is given to plaster with a fleece structure through circular motions, avoiding excessive blending (Fig. 30).

26 Painting plaster

Painting of FAST polymer-mineral plaster can begin after drying and seasoning. Depending on the type of paint, the seasoning of plaster after application takes:

- silicate paint - minimum 3 days
- silicone paint - minimum 7 days
- acrylic and siloxane paint - minimum 28 days

Paint can be applied using a brush or roller (Fig. 31) and mechanically by spray painting, always in two layers. The first coat can be diluted, especially if the work is carried out at temperatures close to the maximum permitted (+25°C). To dilute silicate paints, FAST GRUNT S (diluter) should be used in an amount up to 5% of the total volume, while other types of paint can be diluted by up to 10% with clean water.

The second coat of paint should always be applied in undiluted form. Proper weather conditions for painting should be observed, i.e. avoiding intense sun, strong winds and rain. The optimum temperature is between 5°C to 25° C with relative humidity below 75%.

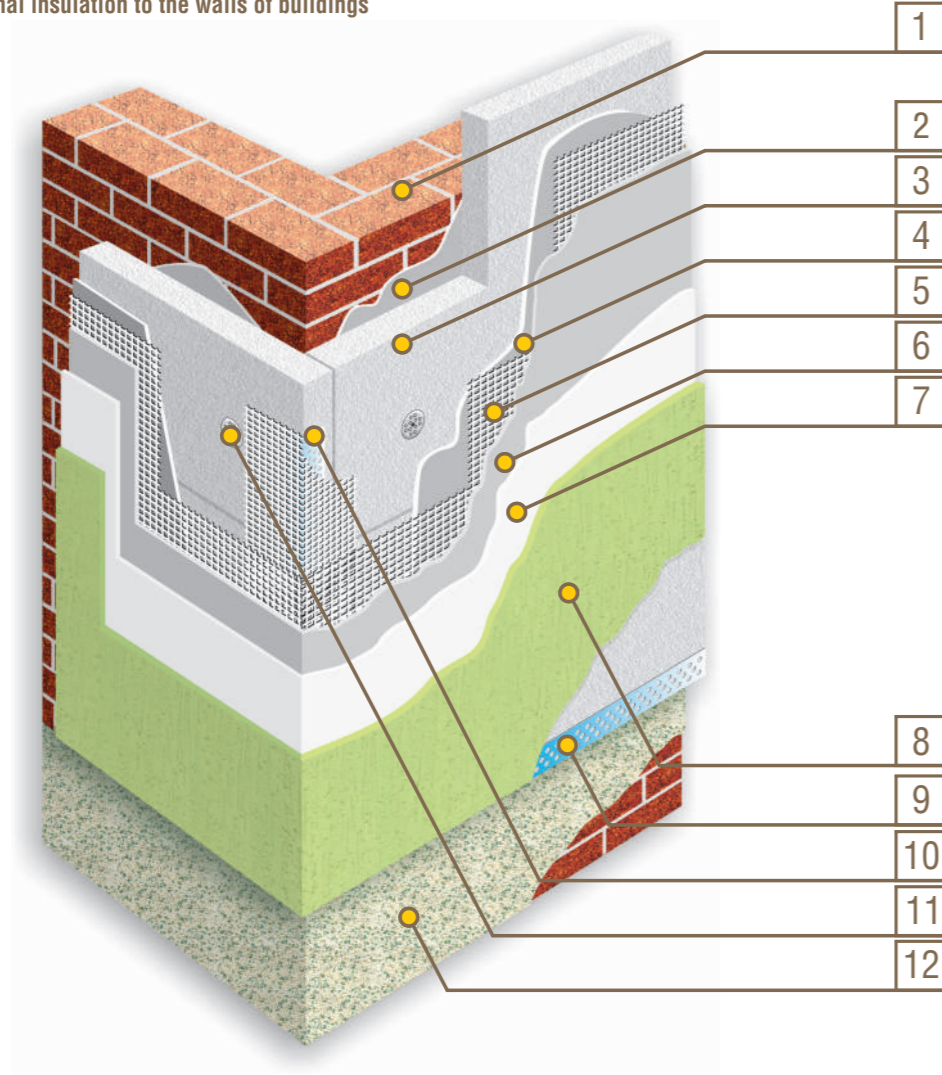
27 Different colours of paint

If two colours of paint are used on one surface, they should always be separated using masking tape (Fig. 32).

All necessary information concerning the application of various types of paints on plaster can be found in the relevant technical data sheets or in the FAST catalogue.

FAST SA / FAST SM

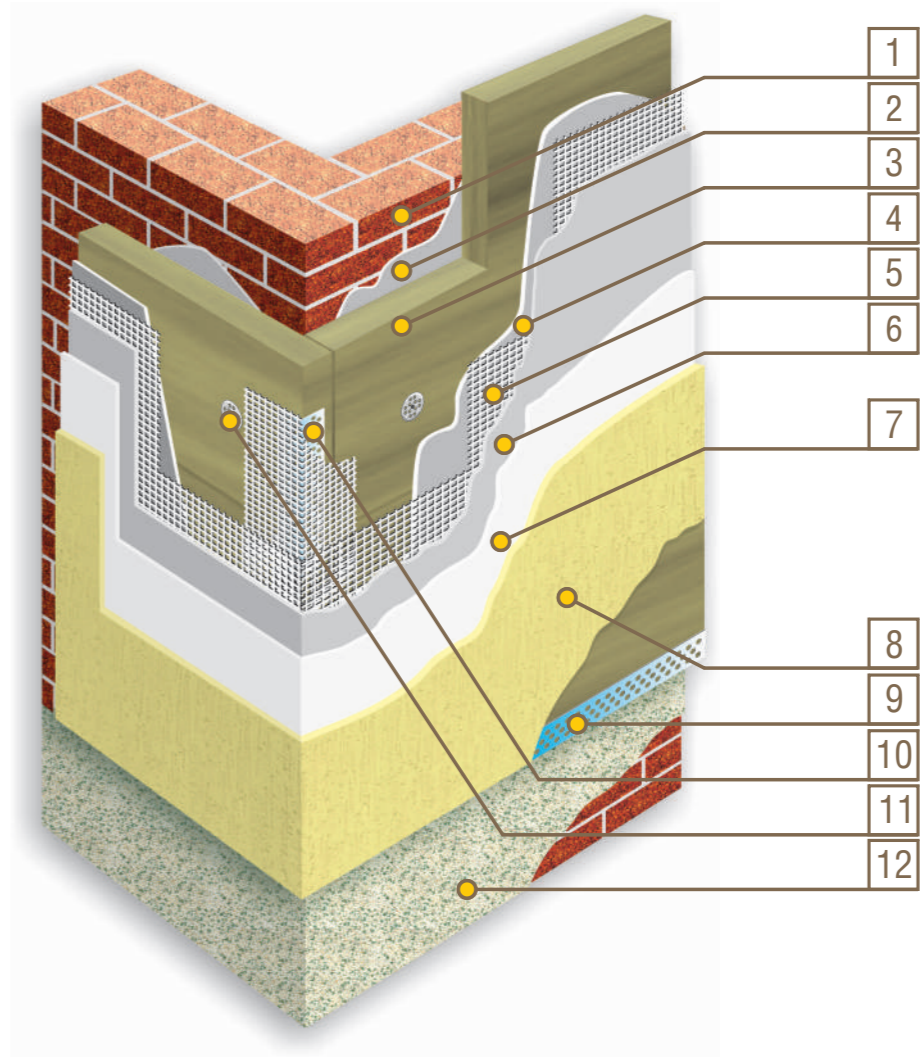
External Thermal Insulation Composite System with rendering on polystyrene for the use as external insulation to the walls of buildings



- 1 insulated wall
- 2 adhesive **FAST NORMAL S**
(interchangeably **FAST SPECJAL** or **FAST SPECJAL M**)
- 3 polystyrene boards
- 4 adhesive **FAST SPECJAL** or **FAST SPECJAL M**
- 5 glass fibre mesh
- 6 adhesive **FAST SPECJAL** or **FAST SPECJAL M**
- 7 primer **FAST GRUNT M**
- 8 polymer-mineral rendering **FAST BARANEK** or **FAST KORNIK** + facade paint:
- acrylic **FAST F-AZ**
- or silicate **FAST F-S**
- or siloxane **FAST SI-SI**
- or silicone **FAST SILIKON**
or acrylic finishing coat **FAST BARANEK A** or **FAST KORNIK A**
or siloxane finishing coat **FAST BARANEK SI** or **FAST KORNIK SI**
or silicone finishing coat **FAST BARANEK SIL** or **FAST KORNIK SIL**
or **Wet Dash / Dry Dash**
- 9 starter track
- 10 glass cloth corner profile with aluminum reinforcement
- 11 mechanical fixing
- 12 mosaic plaster **FAST GRANIT**

ETICS FAST W

External Thermal Insulation Composite System with rendering on mineral wool for the use as external insulation to the walls of buildings



- 1 insulated wall
- 2 adhesive **FAST NORMAL W**
- 3 mineral wool
- 4 adhesive **FAST SPECJAL W**
- 5 glass fibre mesh
- 6 adhesive **FAST SPECJAL W**
- 7 primer **FAST GRUNT M** (used for polymer-mineral plaster)
or **FAST GRUNT S-T** (used for silicate plaster)
- 8 polymer-mineral rendering **FAST BARANEK + FAST F-S** (silicate paint)
polymer-mineral rendering **FAST KORNIK + FAST F-S** (silicate paint)
polymer-mineral rendering **FAST BARANEK + FAST SILIKON** (silicone paint)
polymer-mineral rendering **FAST KORNIK + FAST SILIKON** (silicone paint)
or silicate finishing coat **FAST BARANEK S** or **FAST KORNIK S**
or silicone finishing coat **FAST BARANEK SIL** or **FAST KORNIK SIL**
- 9 starter track
- 10 glass cloth corner profile with aluminum reinforcement
- 11 mechanical fixing
- 12 mosaic plaster **FAST GRANIT**