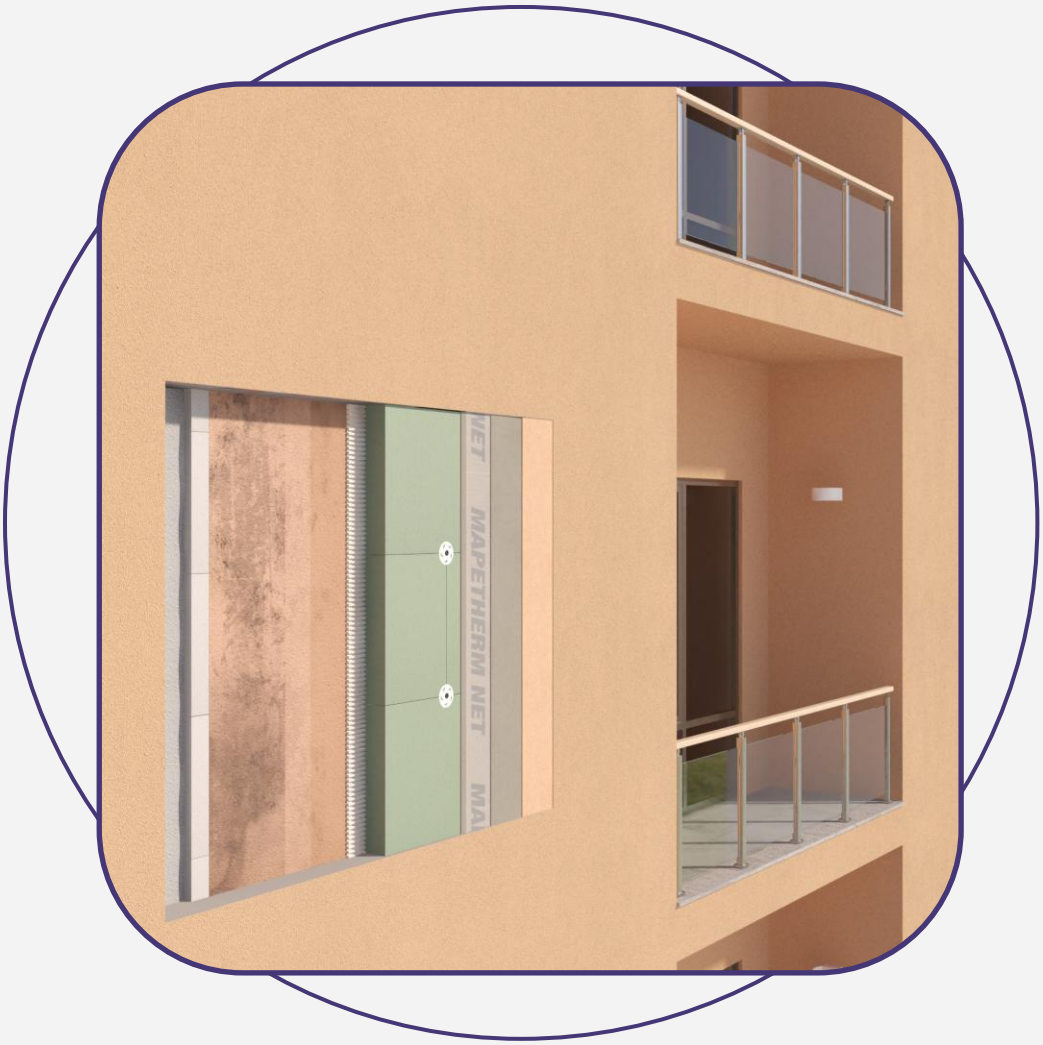
2 November 2026

ANIT
HANDBOOKS

ETICS OVER ETICS

English version

Solutions for Installing an Exterior Thermal Insulation System on an Existing System



ANIT

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ANIT HANDBOOKS

ANIT, the Italian National Association for Thermal and acoustic Insulation, periodically publishes documents on topics related to energy efficiency and acoustic insulation of buildings.
The subjects covered include legislation, relevant technical standards, construction technologies, installation guidelines and more.
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INTRODUCTION

The new EPBD IV Directive, published in May 2024, sets an ambitious goal: to achieve a zero-emission building stock in Europe by 2050.
To meet this deadline, it will be necessary to take action on a large portion of the building stock, not only on older, completely inefficient buildings, but also on recently constructed ones, whose thermal insulation, while present, is no longer sufficient to meet current requirements.
Furthermore, the large number of exterior wall insulation systems installed in recent years may require not only maintenance but also an upgrade to their thermal resistance in order to comply with future, more stringent requirements. In this context, enhancing insulation by adding a second layer to existing systems will become a priority, one far more significant than it has been to date.
This handbook aims to explore this topic in depth.

1 TOWARD MORE EFFICIENT BUILDINGS

1.1 EPBD - Energy Performance of Buildings Directives

The European Union has established a framework for Member States in the field of energy efficiency through a series of directives known as the EPBD, or Energy Performance of Buildings Directive:

- EPBD1 – Directive 2002/91/EC "Energy Performance of Buildings";
- EPBD2 – Directive 2010/31/EU;
- EPBD3 – Directive 2018/844/EU;
- EPBD4 – Directive 2024/1275/EU.

The last Directive, EPBD 4, was published in the Official Journal of the European Union on May 8, 2024, and sets the challenging goal of decarbonizing the entire European building stock by 2050.
The key change from previous documents is that it calls for an energy efficiency plan for the entire building stock of each Member State (and not just for buildings undergoing renovation).
Member States will therefore be required to develop a national building renovation plan, outlining measures for the national residential and non-residential building stock, both public and private, with the aim of making it net-zero emissions.
In addition, as was already the case with previous Directives, new and more ambitious energy efficiency targets are established for new buildings and those undergoing renovation.

Of particular importance is the definition of a **zero-emission building**, which is described as:

> *"zero-emission building means a building with a very high energy performance, …, requiring zero or a very low amount of energy, producing zero on-site carbon emissions from fossil fuels and producing zero or a very low amount of operational greenhouse gas emissions…"*

This definition clearly states that a net-zero energy building must have an extremely efficient building envelope with zero or very low energy demand and be powered exclusively by non-fossil fuel sources.

1.2 The goals of renovating existing buildings

Each Member State must prepare a draft **National Building Renovation Plan**, which includes a roadmap (with interim targets), an overview of planned policies, and an estimate of the necessary investments and submit it to the European Commission by December 31, 2025.
The European Commission will review the proposal and provide feedback; subsequently, by December 31, 2026, the **final National Plan**, which will incorporate the Commission's recommendations, must be submitted.

1.2.1 Goals for the residential building stock

By May 29, 2026, **each Member State shall establish a national roadmap** for the progressive renovation of the residential building stock, expressed as a reduction in the average primary energy consumption in kWh/(m²year) of the entire residential building stock over the period 2020–2050, and shall specify:

- **the number of residential buildings** and residential units, or the floor area, **to be retrofitted each year**;
- **the number or floor area of the 43% of residential buildings with the worst energy performance**.

Member States shall ensure that the average primary energy consumption expressed in kWh/(m²year) of the entire residential building stock:

- decreases by at least **16% compared to 2020 by 2030**;
- decreases by at least **20–22% compared to 2020 by 2035**;

- by 2040, and every five years thereafter, is equal to or lower than a nationally established threshold that is equal to or lower than the value determined at the national level, derived from a gradual decline in average primary energy consumption from 2030 to 2050 in line with the transition of the residential building stock to a zero-emission building stock.

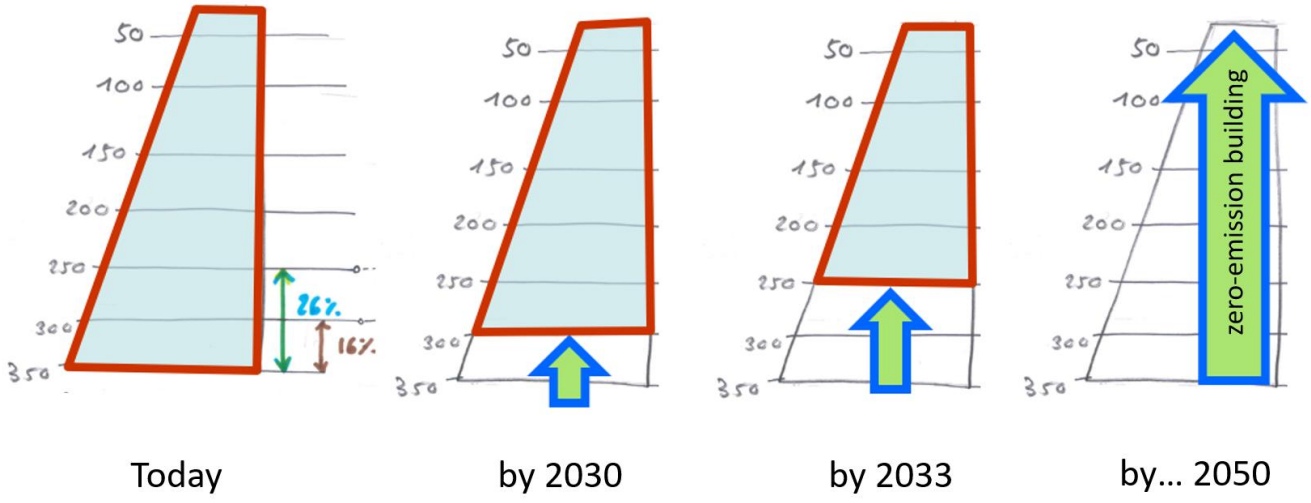
Member States shall ensure that at least **55% of the reduction in average primary energy consumption** referred to in the third subparagraph is achieved through the r**enovation of 43% of the residential buildings with the worst energy performance**.

1.2.2 Goals for the non-residential building stock

For the non-residential building stock, the following must be retrofitted:

- **16% of the buildings with the worst energy performance by 2030**
- **26% of the buildings with the worst energy performance by 2033**

Member States may establish and publish criteria for exempting individual non-residential buildings from the requirements set forth in this paragraph, taking into account the intended future use of such buildings, in light of significant difficulties, or in the event of an unfavorable cost-benefit assessment.
Where the comprehensive renovation necessary to achieve the energy performance thresholds referred to in this paragraph results in an unfavorable cost-benefit assessment for a specific non-residential building, Member States shall require that, for that non-residential building, at least those individual renovation measures with a favorable cost-benefit assessment be implemented.



Energy-efficiency improvements to non-residential buildings.

2 ITALIAN NORMATIVE FRAMEWORK

In Italy, there are several key standards that are essential to understand when designing or renovating an exterior insulation and finish system (ETICS) project. These standards cover every aspect of the ETICS installation, from design to installation, through maintenance and restoration, and also define the professional qualifications required of installers. The addition of a second ETICS layer is also addressed in detail (ETICS over ETICS).

2.1 UNI TR 11715

The UNI TR 11715 standard, "Thermal Insulation for Buildings - Design and Installation of External Thermal Insulation Composite Systems (ETICS)," was published in 2018.
This standard represents the state of the art in the design and installation of external thermal insulation composite systems (ETICS) and serves as a reference for the proper installation of an ETICS system.
It is a comprehensive document that examines in detail every phase of the design and installation of an ETICS system, from substrate preparation to the design of details.
The main chapters are:

- System Components
- Substrate Preparation
- Insulation Requirements
- On-Site Installation of the System
- Design and Execution of Joints
- Maintenance and Restoration of ETICS Systems

It is therefore an essential reference for all professionals involved in ETICS: designers, contractors and inspectors checking for installation errors or overseeing restoration work on deteriorated systems. It is important that all these professionals understand and study the standard thoroughly, in part to ensure they speak a "common language" that enables the highest quality in the installation of these systems.

2.1.1 UNI TR 11715 and the installation of a second layer of insulation

The technical regulations on ETICS also specifically address the issue of doubling the insulation, providing a few but precise guidelines:

- They specify the need for careful planning of the work.
- They indicate the need for both anchoring and bonding in all cases, specifying the method of anchoring based on whether the finish layer of the old insulation system is removed or retained.
- The standard requires a thorough assessment of the condition of the existing ETICS. The purpose of this assessment is to commission an expert report, prepared by a third-party technician, to evaluate the feasibility of adding a second layer.
- It specifies the information to be gathered for the design of the additional ETICS system, namely:
    - physical characteristics of the building (layer thicknesses, dew point, thermal bridges)
    - sound insulation
    - fire protection (in accordance with national standards)
    - thermal break mounting elements for external loads
    - type of the new ETICS system
    - fastening of the new ETICS system

2.2 UNI 11716

The UNI 11716:2018 standard, "Unregulated Professional Activities—Professional Roles Involved in the Installation of External Thermal Insulation Composite Systems (ETICS)—Requirements for Knowledge, Skills, and Competence," was published in June 2018.

The standard sets out the procedure for certifying the competence of ETICS installers.
The defined competencies differ between entry-level installers and foremen. Certification of installers is not currently mandatory, but the use of certified labor certainly guarantees the high quality of the work performed and, consequently, the durability and effectiveness of the installed system.

2.3 CE Marking of the Insulation System

For the CE marking of construction products, reference is made to EU Regulation 305/2011, which was transposed into Italian national law by Legislative Decree 106/2017. Products for which a harmonized European standard exists are subject to mandatory CE marking. Products for which no such standard exists may obtain CE marking through a voluntary procedure, the ETA (European Technical Assessment), issued on the basis of an EAD (European Assessment Document), a guidance document that specifies which performance characteristics to evaluate for that product and the methodology to be used.

According to Regulation 305, a construction product is defined as a single product or a "kit." The term "kit" refers to a product placed on the market by a single manufacturer as a set of at least two distinct components that must be assembled for installation in completed structures. External thermal insulation is an example of a kit.

To date, there is no harmonized product standard for external thermal insulation composite systems (ETICS).
In order to develop external thermal insulation composite systems that can be CE-marked on a voluntary basis and that meet the minimum requirements of the Construction Products Directive, reference is made to EAD 040083-00-0404, which is the document required to obtain the ETA (European Technical Assessment) for external thermal insulation composite systems. Currently in Italy, the majority of external thermal insulation composite systems still hold an ETA obtained under ETAG 004 (the document that preceded the EAD). Since these systems hold an ETA, they are fully compliant and may be used. However, starting in 2021, new ETAs will be issued based on EAD 040083-00-0404.

The CE marking on an exterior insulation and finish system provides greater assurance regarding the system's performance and durability. This is verified through laboratory testing, ensuring that the products included in the kit are compatible.
When using CE-marked systems, it is the manufacturer (i.e. the system owner) guarantees the performance of the individual components of the ETICS and, consequently, the ETICS as a whole.
It is therefore strongly recommended to choose a CE-marked system. This recommendation is also echoed in the ENEA note on insulation materials (December 2020), which explains how to declare the thermal performance of materials used in projects eligible for tax incentives.

It should be noted that the doubling of the insulation system does not fall within the scope of EAD 040083-00-0404; therefore, such projects cannot bear the CE marking, even if they are carried out in accordance with best practices and the guidelines set forth in that document.

3 ADDING A SECOND ETICS LAYER

The technique of doubling the existing insulation system allows the old, now obsolete insulation to be used as a base for a new, higher-performance insulation system. This is achieved, following an inspection and proper preparation of the existing insulation, by bonding new insulation panels, carefully anchoring them with anchors, applying a reinforced base coat incorporating glass-fibre mesh, and finally applying a protective decorative finish.
This system optimizes a building's performance and characteristics: living comfort, protection of building structures, compliance with current regulations, energy savings, reduced heating and cooling costs, and a reduction in pollutant emissions.
Doubling the insulation layer is an extremely sustainable solution because it capitalizes on the existing insulation, saves on disposal costs for the existing material, avoids the production of polluting waste, and allows for a more rational purchase of new materials.

This handbook provides guidance on common scenarios and the corresponding intervention methods. Each case must nevertheless be assessed individually by the designer responsible for the project.

3.1 Analysis of the Existing Insulation System

It is essential to conduct preliminary inspections and assessments of the existing system in order to determine its condition and identify any preparatory work that needs to be carried out.
To this end, carry out tests or take core samples to assess the condition of the existing system and the cohesion and adhesion between its components:

- The substrate beneath the insulation system must be cohesive and "load-bearing."
- The insulation panel must be in good condition and free from deterioration and/or damage.
- The adhesive must be firmly bonded to both the substrate and the insulation panel.
- The presence of anchors and their secure hold must be verified by mapping any existing installation pattern (in order to correctly plan the placement of any reinforcement anchors for the old system and the safety anchors for the new system).
- The reinforced skim coat must adhere to the insulation panels, be cohesive, and be mechanically strong.
- The finish coat must be properly adhered to the underlying skim coat, cohesive, and mechanically strong.

Note: all these operations must be coordinated by the designer responsible for the project.

3.2 Design of the New Exterior Insulation System

Proceed as follows:

1. Perform the thermal calculation.
2. Conduct physical assessments: dew point, thermal bridges, etc.
3. Select the system for restoring the existing exterior insulation system based on the findings of the preliminary inspections: see section 3.1.
4. Select the type of exterior insulation system based on the performance requirements and desired outcomes, including acoustic performance and fire resistance.
5. Evaluate all connections to existing elements and their seals (e.g., cornices, overhangs, window sills, etc.).
6. Evaluate thermal break fasteners for light external loads (lights, shutter stops, etc.) and plan for medium (downspouts, etc.) and heavy (awnings, canopies, shutters, parapets, etc.) loads.
7. Design and select the materials to be used and their installation system:
    - Insulation:

type, thickness, specific performance characteristics, etc.

- Adhesive/smoothing compound:
  performance characteristics, impact resistance, etc.
- Anchors:
  type, length, placement pattern, etc.
- Accessories:
  corner profiles, drip edges, expansion joints, etc.
- Thermal break fastening systems:
  light-duty, medium-duty, heavy-duty.
- Finish:
  type, performance, water absorption class, mold and algae resistance (tested according to European standards), color, etc.

Note: All these specifications must be defined by the designer responsible for the project.

4 ETICS OVER ETICS TECHNOLOGIES AND INSTALLATION METHODS

4.1 Substrate Preparation

The following sections provide specific preparation guidelines based on the various conditions identified during the analysis of the existing system.

4.1.1 Existing ETICS in perfect condition - "Load-Bearing" Insulation System

Preliminary inspections have confirmed that all the relevant requirements are met (see section 3.1) and rule out the need for specific preparatory measures.

Download the specification for preparation 4.1.1

a) On surfaces affected by mold and algae, supply and application of a broad-spectrum sanitizing cleaner, based on active anti-algae and anti-mold compounds in an aqueous solution, for cleaning wall surfaces, let it sit for at least 24 hours (so that it has time to perform its function); repeat the operation several times to achieve the greatest possible penetration.
b) Thorough cleaning of the surfaces by pressure washing, using pressures and flow rates appropriate to the characteristics of the substrate, in order to remove traces of dirt, dust, or any substance that could compromise the adhesion of the products to be applied subsequently.
c) Upon completion of the preparations, the substrate must be mechanically sound, flat, clean, and dry.

4.1.2 Existing exterior insulation in good condition - Preliminary reinforcement requested

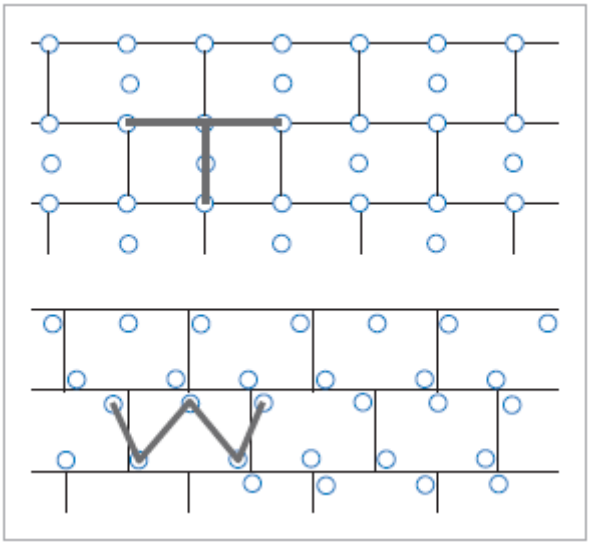
Preliminary inspections have shown that the substrate is generally in good condition and load-bearing (see section 3.1), but indicate the need for some preventive restoration and preparation work.

Download the specification for preparation 4.1.2

a) On surfaces affected by mold and algae, supply and application of a broad-spectrum sanitizing cleaner, based on active anti-algae and anti-mold compounds in an aqueous solution, for cleaning wall surfaces, allowing it to act for at least 24 hours (so that it has time to take effect); repeat the operation several times to ensure the greatest possible penetration.
b) Thorough cleaning of the surfaces by pressure washing, using pressures and flow rates appropriate to the characteristics of the substrate, in order to remove traces of dirt, dust, or any substance that could compromise the adhesion of the products to be applied subsequently.
c) Depending on its condition, remove all or part of any finish coat that is poorly bonded or lacks cohesion.
d) Remove, either completely or partially depending on the conditions, any reinforced skim coat that is not properly adhered and/or cohesive.
e) Removal of any deteriorated and/or damaged insulation panels, followed by the supply and installation of new panels of the same size, type, and performance as the existing ones, using a single-component cementitious adhesive/skim coat*, with a Class A1 fire reaction rating, for bonding and skimming thermal insulation panels and for "external insulation" systems.

f) If the adhesive layer proves inadequate, in order to increase the adhesion of the panels to the substrate, supply and installation of a single-component, ultra-low-expansion polyurethane adhesive foam for bonding insulation panels. Drill holes approximately 40 cm apart through the insulation and inject the adhesive using a dispensing tube whose length is equal to the sum of the thicknesses of all layers in the existing system: insulation panel + reinforced skim coat + finish coat.

g) If the anchoring is missing or inadequate and the adhesive is insufficient, supply and installation of specific anchors for securing exterior insulation and finish systems, with an ETA assessment based on EAD 330196-01-0604, to be screwed in until they reach the load-bearing portion of the substrate:
   - The length of the anchor must be determined by adding the thickness of the outer layer (finish coat + reinforced skim coat), the insulation panel, the adhesive, the plaster (if present), and the anchoring depth of the specific anchor in the specific masonry (refer to the relevant technical data sheet).
   - Holes for the anchors must be drilled with a drill bit of the same diameter as the anchor shank, using the drill's rotary-hammer mode only when working on concrete or solid brick substrates.
   - Install the anchors in a suitable pattern, based on the existing conditions, generally using a "T"-pattern layout for synthetic panels to help the adhesive and skim coat counteract the panels' thermal expansion, or a "W"-pattern layout for fibrous panels to prevent pull-through.



   - Review and adjust the anchor placement pattern if old anchors are already present.
   - Each installed anchor must be securely fastened; otherwise, it must be removed, the hole filled with appropriate insulating foam, and a new anchor installed nearby.

h) If the old skim coat/finish layer has been removed, either completely or partially, restore the proper flatness using a single-component cementitious adhesive/skim coat*, with a reaction-to-fire class of A1, intended for bonding and skimming thermal insulation panels and for "external insulation" systems.

i) Once preparations are complete, the substrate must be mechanically sound, level, clean, and dry.

* See the table at the end of this section (Table 2) for possible alternatives

4.1.3 Existing ETICS in very poor condition

The inspections (see section 3.1) revealed defects that cannot be repaired (e.g., old, degraded underlying plaster and/or finish that is powdery and lacks cohesion; insulation panels that are generally deteriorated or widely detached from the substrate, etc.).

Download the specification for preparation 4.1.3

a) Complete removal of the old exterior insulation and finish system and disposal in accordance with applicable regulations.
b) Proper preparation of the substrate to accommodate the new exterior insulation and finish system.

4.2 Installation of the New Insulation System

Download the complete technical specifications for solution 4.2

4.2.1 Preliminary Preparations

On a mechanically sound, properly prepared, flat, clean, and dry substrate, supply and apply a highly penetrating and consolidating primer based on micronized acrylic resins in an aqueous solution, appropriately diluted with water, with the aim of reducing the substrate's absorbency and eliminating residual surface "dust."
If the project involves adding a second layer of high-density insulation (e.g., mineral wool, wood fiber, …), provide for preliminary anchoring of the old system even in the case of an old "load-bearing" exterior insulation system (Section 4.1.1) by supplying and installing screw-in anchors, to be placed strategically based on the insulation's positioning, using the appropriate installation pattern for the planned panels (as described in Section 4.1.2).

4.2.2 Installation of Retaining and Protective Profiles

Supply and installation of retaining and protective profiles: side closures, sill plates, cover plates, sheet metal work, etc.

4.2.3 Installation of Insulation Panels

Proceed as follows:

a) On facade surfaces, supply and install thermal insulation panels of a type and thickness consistent with the design specifications and calculations, compliant with the minimum environmental criteria (CAM), suitable for external thermal insulation composite systems (ETICS), with square edges and no rebates.
   - The panels must be protected from rain and direct sunlight both during installation and while in storage.
   - The new thermal insulation panels must be installed from the bottom up, staggered both horizontally and vertically with respect to the existing insulation system, as shown in Figure 1.
   - Only undamaged panels may be used for installation.

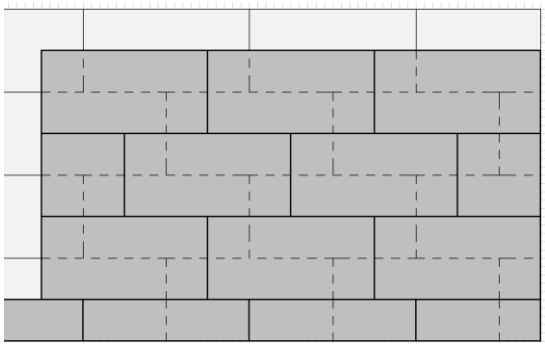
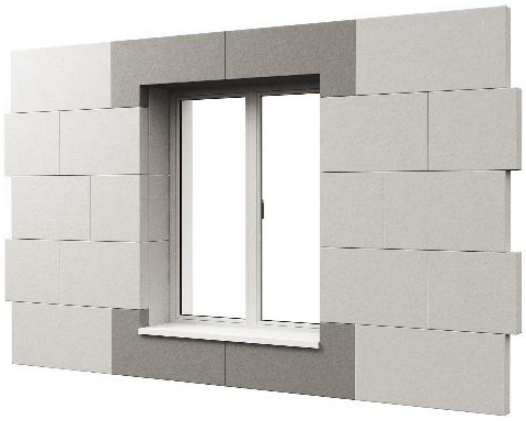
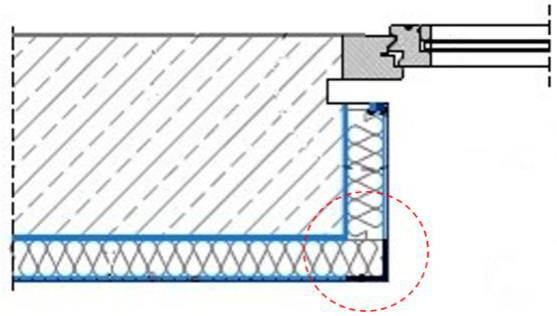


Fig. 1: New panels over old ones of the same dimensions

b) Bonding the panels to the surfaces by supplying and applying an adhesive/skim coat consisting of a single-component cementitious mortar*, Class A1 fire reaction rating, for bonding and skimming thermal insulation panels and for “external insulation” systems, with uniform application of the adhesive to the back of the panel (full-surface method).
   - Ensure that the adhesive application method does not allow air to enter the system.
   - Position the panels on the substrate, taking care to arrange them in horizontal rows, stagger them by 50% of their length (but never less than 25 cm), align them closely without leaving gaps, and press them firmly against the substrate to ensure even distribution of the adhesive.
   - For door and window openings, use full-size panels with the corner cut out, extending at least 10 cm beyond the edge in every direction.



   - To insulate the jambs of windows and doors, position the panels on the facade surface so that they extend beyond the rough edge of the opening. Then apply the transition insulation to the window or door frame.



- Near the corners of the building, install the panels alternately in overlapping, staggered rows, allowing the entire panel to extend beyond the corner. This installation method is essential for proper stress distribution and to ensure the system's strength and durability over time.



c) During installation, respect any existing or planned "structural" joints, which must be protected with specific joint profiles either flat or angled.
d) To achieve a high-quality final aesthetic result, during installation, while the adhesive is still fresh, check and, if necessary, adjust the flatness of the insulation panels using an aluminum straightedge.
e) Once the adhesive is dry, if necessary, further refine the flatness of the surfaces by performing power sanding (with the exception of panels with a glass fiber mesh surface, for which, if applicable, a preliminary leveling coat must be applied using a single-component cementitious skim coat*, class A1 fire reaction rating, intended for bonding and skimming thermal insulation panels and for "external insulation" systems).
f) Carefully fill any gaps between the insulation panels to their full depth using a portion of the same insulation material; special polyurethane foam may be used for gaps no wider than 5 mm; strictly avoid "filling" these gaps by inserting skim coat mortar.

* See the table at the end of this section (Table 2) for possible alternatives

4.2.4 Mechanical Fastening (anchoring)

Approximately 48 hours after the panels have been glued and in any case once the adhesive has dried, mechanically secure the insulation panels by supplying and installing high-performance expansion anchors specifically designed for fixing exterior insulation systems, with an ETA assessment based on EAD 330196-01-0604, and screwed into place until they reach the load-bearing portion of the substrate:

- The length of the anchor should be determined by adding the thickness of the new insulation panel, the new adhesive layer, the outer layer (finish coat + reinforced skim coat) of the old system, the old insulation panel, the old adhesive, the plaster (if present), and the anchoring depth of the specific anchor in the specific masonry (refer to the relevant technical data sheet).
- Drill the holes for the anchors after the adhesive has cured to avoid compromising the flatness of the installed panels, using a drill bit with the same diameter as the anchor shank; use the hammer drill mode only when working on concrete or solid brick substrates.
- Install the anchors strategically, based on the existing conditions, using, as a general rule, the "T"-shaped installation pattern for synthetic panels (EPS, XPS, polyurethane, phenolic resin, etc.), to help the adhesive and skim coat counteract the thermal expansion of the panels; or a "W" pattern, adding an anchor at the center of the insulation panel, for fibrous panels (rock wool, glass wool, etc.), to prevent pull-through (see Figures 2A and 2B).

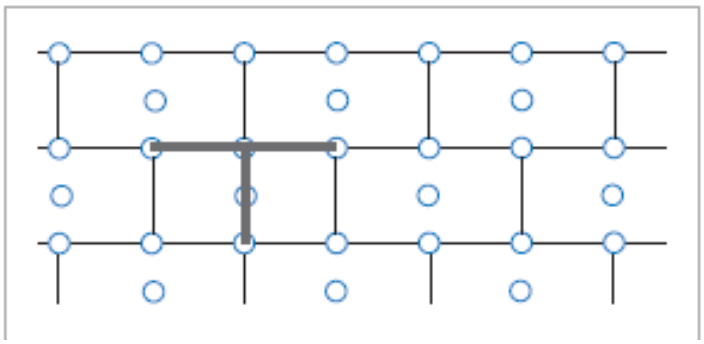


Fig. 2A: Standard anchoring layout for synthetic panels

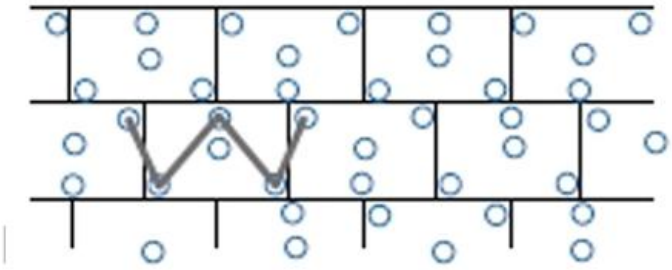


Fig. 2B: Standard anchoring layout for fiber-based panels

- Review and adapt the anchoring pattern if old anchors are already present and/or if prior consolidation anchoring has been performed and/or if a specific system has been designed, depending on the existing conditions. Figures 3A and 3B show two examples of double anchoring (old and new systems) with new panels of the same dimensions as the old ones (Figure 3A) and with new panels of different dimensions from the old ones (Figure 3B: example of new 120x60 cm panels and old 100x50 cm panels).

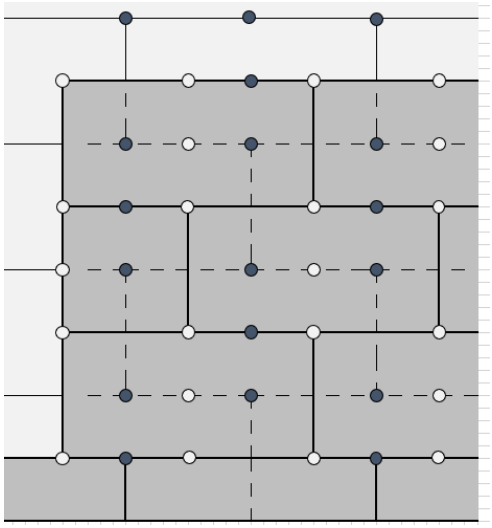


Fig. 3A: Double anchoring with old and new panels of the same dimensions. Anchors shown in black for the old system and in white for the new.

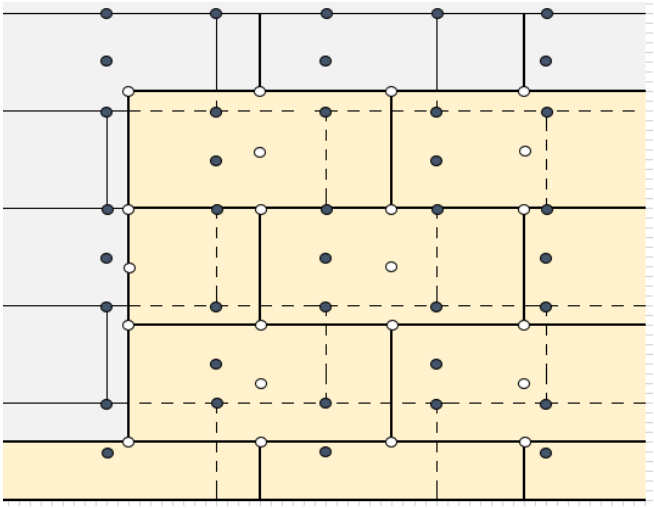


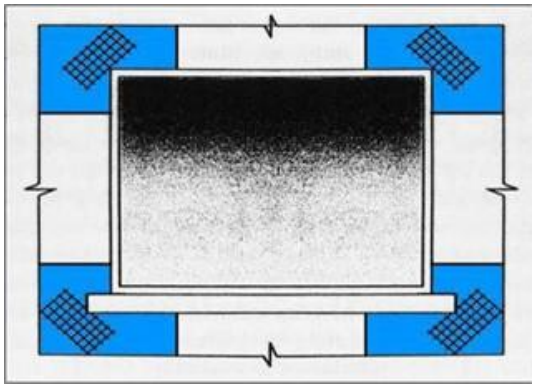
Fig. 3B: Double anchoring with old panels (50x100 cm) and new panels (60x120 cm). Anchors are shown in black for the old system and in white for the new one.

- Each anchor must be securely seated; otherwise, it must be removed, the hole filled with appropriate insulating foam, and a new anchor installed nearby.

4.2.5 Fastening, Reinforcement, and Protection Elements

The following steps must be performed:

a) Supply and installation of all protective and containment accessories (base profiles, corner guards, cover profiles, etc.); use aluminum alloy or PVC accessories, strictly avoiding the use of galvanized or painted steel profiles.
b) At the corners of the openings, supply and install additional reinforcement by placing pieces of fiberglass mesh treated with a special alkali-resistant coating, tested according to test method EAD 040083-00-0404, measuring approximately 30x40 cm, at an angle to the openings and carefully aligned with the corners themselves. Attach these “patches” using a single-component cementitious mortar*, with reaction-to-fire class A1, intended for bonding and skimming thermal insulation panels and for “external insulation” systems.



- For all corners of the building and openings, supply and installation of PVC corner profiles with pre-mounted alkali-resistant fiberglass mesh; apply using a single-component cementitious mortar, reaction-to-fire class A1, for bonding and skimming thermal insulation panels and for “external insulation” systems.

- For the edges of window sills, window lintels, balcony facings, etc., supply and installation of PVC drip edge profiles to ensure proper drainage of rainwater; apply a single-component cementitious mortar*, with a reaction-to-fire class of A1, for bonding and skimming thermal insulation panels and for exterior insulation systems.
- At the joints where the exterior insulation system meets other parts of the building (window sills, window jambs, roofing, etc.), to compensate for the expansion and contraction movements of the different materials in contact with one another, supply and installation of self-expanding sealing tape.
- For the thermally broken mounting of heavy loads (shutters, curtains, railings, parapets, etc.), medium loads (downspouts, etc.), or light loads (shutter fasteners, light fixtures, etc.), supply and installation of suitable, specific mounting elements (See Table 1).

* See the table at the bottom of this section (Table 2) for possible alternatives.

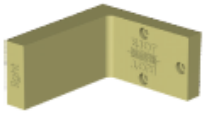
Load-Securing Fasteners		
Products	**Image and Description**	
Mapetherm-Ejot ISO Spirale		Mounting elements for securing light loads
Mapetherm-Ejot Iso-Dart		Mounting elements for securing light or medium loads
Mapetherm-Set Ejot Iso-Bar		Mounting elements for securing medium or heavy loads (non-prepositioned)
Mapetherm-Ejot Iso-Bloc		Mounting components for prepositioned light-load securing or as a compression element
Mapetherm Iso-Corner		Mounting components for prepositioned medium- or heavy-load securing
Mapetherm Iso-Corner Light		Mounting components for prepositioned medium-load securing

Table 1: Load-securing devices

Download the specifications for load-bearing fasteners

4.2.6 General warning

It is necessary to:

- Set up adequate protective measures on the job site to prevent possible water infiltration if it rains during installation.
- Store all components, including those delivered to the site, in their original packaging, in a dry place, protected from direct sunlight and other heat sources.
- Protect the insulation panels from rain during both installation and storage.
- Do not use damaged or dirty panels.
- For proper adhesion, do not apply the product when the ambient or substrate temperature is below 5 °C or above 35 °C.
- All safety and handling instructions for the products are provided in the safety data sheets for the individual products that make up the system.

Note: For details on all connections and joints, refer to the technical drawings included in the relevant documentation (e.g., UNI TR 11715 standard, Cortexa Manual, Mapetherm Technical Manual).

4.3 Application of Reinforced Skim Coat and Finishing

When a design decision is made to retain an old exterior insulation system and double its thickness, it is essential to use high-performance materials that protect the new work and ensure long-term performance. This is because, even if carefully evaluated in advance through a significant number of tests, the existing ETICS may still present unknown or unverified conditions. The use of materials with specific performance characteristics, such as highly elastic skim coats and finishes, allows work to be carried out with an adequate margin of safety, often compensating for any inconsistencies in the old system that were either not assessed or could not be assessed. Furthermore, the technologies used to add a second layer to an old insulation system can significantly improve performance not only in terms of thermal efficiency and sustainability but also, for example, in terms of high impact resistance.

Download the specification for Solution 4.3.1

4.3.1 Hail-Resistant System: A System Resistant to Extreme Impacts

This is an ETICS finishing system using a highly elastic reinforced base coat and finish coat, featuring a double-layered reinforced structure, capable of maximizing resistance to any form of cracking in the outer layer, even on the most challenging substrates. This configuration also provides certified impact resistance of more than 100 J (roughly equivalent to the impact of a tennis ball-sized hailstone, based on the international classification defined by the Torro scale, see the focus section at the bottom of this paragraph).

- **The hail resistance test will ensure the highest impact resistance rating Category (I) for impacts of 100 J**.
- First, verify and select the insulation panels based on test reports conducted by third-party organizations, ensuring they achieve a certified impact resistance performance of at least 100 J.
- For the insulation panels selected and installed according to the instructions in section 4.2, proceed with the supply and installation of the following system:
    - Apply a first coat of skim coat, approximately 2 mm thick, using a single-component, cement-free, paintable paste that is extremely elastic and resistant to biological attack by algae and mold (effectiveness tested in accordance with European standards EN 15457 and EN 15458), also ideal for the restoration of external thermal insulation systems, particle size 1.5 mm.

- On the still-fresh skim coat, install the fiberglass mesh treated with a special alkali-resistant coating, tested according to test method EAD 040083-00-0404, working from top to bottom, taking care to place the strips side by side (without overlapping).
- After at least 48 hours, and in any case once the previously applied layer has dried, apply a second coat, approximately 1.5–2 mm thick, of a single-component, cement-free, paintable skim coat that is extremely elastic and resistant to biological attack by algae and mold (effectiveness tested in accordance with European standards EN 15457 and EN 15458), which is also ideal for restoring external thermal insulation systems, with a particle size of 1.5 mm.
- While the skim coat is still fresh, apply a second layer of fiberglass mesh treated with a special alkali-resistant coating, tested according to the specific test method EAD 040083-00-0404, working from top to bottom and staggered relative to the previous layer, taking care to overlap the strips by at least 10 cm.
- After at least 48 hours, and in any case once the previous layer has dried, apply a third, approximately 1.5 mm-thick coat of a single-component, cement-free, paintable, extremely elastic skim coat that is resistant to biological attack by algae and mold (effectiveness tested in accordance with European standards EN 15457 and EN 15458), which is also ideal for restoring external thermal insulation systems, with a particle size of 1.5 mm, forming a homogeneous and uniform layer in which the mesh must be fully embedded and covered by a layer at least 1 mm thick.
- Recommended total thickness of the reinforced layer: approximately 5 mm.
- If required by the certified application sequence based on test reports, apply a pigmented primer for exterior and interior use that acts as a leveling agent, filler, and adhesion promoter.
- Complete the application with an elastomeric paste coating based on silicone resin in aqueous dispersion, with low dirt retention and high elasticity (static crack-bridging class A3 in accordance with EN 1062-7), with mold and algae-inhibiting properties (effectiveness tested in accordance with European standards EN 15457 and EN 15458), low water absorption (Class W3 according to EN 1062-3: W=0.01 kg/(m·h$^{o.5}$)), and a particle size of 1.2 mm. The coating must be CE-certified in accordance with standard EN 15824 (Specifications for exterior and interior plasters based on organic binders) and standard EN 1504-2 (Concrete surface protection systems).
- A finish color with a light reflectance index greater than 20% is recommended.

Traditional exterior insulation systems generally do not deteriorate upon impact with 3 J of energy, but they do sustain surface damage upon impact with 10 J of energy (roughly equivalent to the impact of a hailstone the size of a ping-pong ball).
It is possible to achieve impact resistance of up to 100 J (roughly equivalent to the impact of a tennis ball-sized hailstone) with specifically designed systems, such as the one just described.

Note: Hail is classified, by international convention, using the TORRO Hailstorm Intensity Scale, which is based on the diameter of the hailstones (Table A) or the extent of the damage they cause (Table B). Each class is associated with an intensity category, ranging from H0 (weak hail, causing no damage) to H10 (super hail or exceptional hail). This intensity (last column of Table A) varies depending on various factors: hailstone diameter, hardness, fall velocity, fall inclination, shape of the hailstone, and wind.

Size code	Maximum diameter (mm)	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > soft ball
9	91-100	Grapefruit
10	>100	Melon

Table A: TORRO Scale - Hail size and diameter

Scale	Intensity category	Size code range	Typical damage impact
H0	Hard hail	1	No damage
H1	Potentially damaging	1-3	Slight general damage to plants, crops
H2	Significant	1-4	Significant damage to fruit, crops, vegetation
H3	Severe	2-5	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	3-6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	4-7	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	5-8	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	6-9	Severe roof damage, risk of serious injuries
H8	Destructive	7-10	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	8-10	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	9-10	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Table B: TORRO Scale - Hailstorm Intensity Scale (H0 to H10) in relation to typical damage and hail size codes.

4.3.2 Reinforced Cycle: Impact-Resistant System and/or for Substrates with Greater Challenges

This is an exterior insulation and finish system (ETICS) made with a skim coat and finish of extremely high elasticity, capable of preventing problems even on challenging substrates. This configuration also provides certified impact resistance exceeding 15J.

Download the specification entry for Solution 4.3.2

- **The reinforced cycle will enable the highest impact resistance category (I) to be achieved for impacts of 15J, in accordance with UNI EN ISO 7892.**
- First, verify and select the insulation panels based on test reports issued by third-party organizations, ensuring they achieve a certified impact resistance performance of at least 15J.
- For the insulation panels selected and installed in accordance with the instructions in paragraph 4.2, proceed with the supply and installation of the following cycle:
    - Apply a first coat of skim coat, approximately 2 mm thick, using a single-component, cement-free, paintable paste that is extremely elastic and resistant to biological attack by algae and mold (effectiveness tested in accordance with European standards EN 15457 and EN 15458), also ideal for the restoration of external thermal insulation systems, particle size 1.5 mm.
    - While the skim coat is still fresh, install the fiberglass mesh treated with a special alkali-resistant primer, tested according to the specific test method EAD 040083-00-0404, working from top to bottom, taking care to overlap the strips by at least 10 cm.
    - After approximately 48 hours, and in any case once the first layer has dried, apply a second coat, approximately 1.5 mm thick, of a single-component, cement-free, paintable skim coat that is extremely elastic and resistant to biological attack by algae and mold (effectiveness tested in accordance with European standards EN 15457 and EN 15458), which is also ideal for restoring external thermal insulation systems, with a particle size of 1.5 mm, forming a homogeneous and uniform layer in which the mesh must no longer be visible and must be covered by a layer of at least 1 mm.
    - Recommended total thickness of the reinforced layer: approximately 3.5 mm (but never less than 3 mm).
    - Complete the work with an elastomeric paste coating based on a water-dispersed silicone resin, with low dirt retention and high elasticity (Class A3 crack-bridging according to EN 1062-7 static), with mold and algae-inhibiting properties (effectiveness tested in accordance with European standards EN 15457 and EN 15458), low water absorption (Class W3 according to EN 1062-3: W=0.01 kg/(m·h$^{0.5}$)), and a particle size of 1.2 mm. The coating must be CE-certified in accordance with standard EN 15824 (Specifications for exterior and interior plasters based on organic binders) and standard EN 1504-2 (Concrete surface protection systems).
    - A finish color with a light reflectance index greater than 20% is recommended.

4.3.3 Standard Cycle: Traditional System

This is an exterior insulation and finish system (ETICS) made with a cement-based skim coat and traditional finish, suitable for substrates free of any potential issues.

Download the specification for Solution 4.3.3

- On the insulation panels selected and installed according to the instructions in section 4.2, proceed with the supply and installation of the following system:
  - Apply a first coat of skim coat, approximately 2.5–3 mm thick, using a single-component cementitious adhesive/skim coat*, with a reaction-to-fire class of A1, designed for bonding and skimming thermal insulation panels and for “external insulation” systems.
  - On the still-fresh skim coat, install the fiberglass mesh treated with a special alkali-resistant primer, tested according to test method EAD 040083-00-0404 (formerly ETAG 004), working from top to bottom, taking care to overlap the strips by at least 10 cm.
  - After approximately 24 hours, or once the first layer has dried, apply a second coat of single-component cementitious adhesive/skim coat*, Class A1 fire reaction rating, for bonding and skimming thermal insulation panels and for “external insulation” systems, to a thickness of approximately 1–1.5 mm, forming a homogeneous and uniform layer in which the mesh must no longer be visible and must be covered by a layer of at least 1 mm.
  - Recommended total thickness of the reinforced layer: approximately 4 mm.
  - Apply a pigmented primer* for exterior and interior use that evens out the surface, fills imperfections, and promotes adhesion.
  - Complete the application with a topcoat* that has well-defined performance characteristics: CE certification in accordance with EN 15824 (Specifications for exterior and interior plasters based on organic binders), algae and mold-resistant (effectiveness tested in accordance with European standards EN 15457 and EN 15458), low water absorption (Class W3 according to EN 1062-3).
  - A finish color with a light reflectance index greater than 20% is recommended.

* See the table at the bottom of this paragraph (Table 2) for available alternatives.

Component	Products	Description
Adhesive/Smoothing Compound	Mapetherm AR1	Fine-grained single-component cement mortar
	Mapetherm AR1 GG	Medium-grained single-component cement mortar
	Mapetherm AR1 Maxi	Coarse-grained single-component cement mortar
	Mapetherm AR1 Light	Lightweight single-component cement mortar
Smoothing Compound	Mapetherm Flex RP	Elastic paste filler
Base Coat and Primer	Malech	Transparent acrylic primer
	Quarzolite Base Coat	Pigmented acrylic primer
	Silancolor Base Coat	Pigmented siloxane primer
	Silancolor Base Coat Plus	Pigmented sanitizing siloxane primer
	Silancolor Primer Plus	Transparent sanitizing siloxane primer
Topcoat	Elastocolor Tonachino Plus	Sanitizing elastomeric coating
	Quarzolite Tonachino Plus	Sanitizing acrylic coating
	Quarzolite Tonachino Pro	Compact sanitizing acrylic coating
	Quarzolite Tonachino Pro S	Compact sanitizing acrylosiloxane coating

	Silancolor AC Tonachino Plus Silancolor Tonachino Plus	Sanitizing acrylosiloxane coating for more challenging colors Sanitizing siloxane coating

Table 2: Possible options for bonding, skimming, and finishing layers

Download the complete specifications for all adhesives and skim coats
Download the complete specifications for all base coats and primers
Download the complete specifications for all finish coatings

For applications that differ from the instructions in this handbook, please contact the technical support department of the relevant system manufacturer.

CONTACTS

- ANIT, Associazione Nazionale per l'Isolamento Termico e acustico
  https://www.anit.it
  info@anit.it

- Mapei
  www.mapei.it
  coating.hq@mapei.it

REFERENCES

[1] DIRECTIVE (EU) 2024/1275 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of April 24, 2024, on the energy performance of buildings. Official Journal of the European Union, May 8, 2024

[2] UNI/ TR 11715: Isolanti termici per l'edilizia - Progettazione e messa in opera dei sistemi isolanti termici per l'esterno ETICS. (*Thermal Insulation for Buildings—Design and Installation of External Thermal Insulation Composite Systems ETICS*).

[3] UNI 11716: Attività professionali non regolamentate - Figure professionali che eseguono la posa dei sistemi compositi di isolamento termico per esterno (ETICS) - Requisiti di conoscenza, abilità e competenza. (*Unregulated Professional Activities - Professionals Who Install External Thermal Insulation Composite Systems (ETICS) - Requirements for Knowledge, Skills, and Competence*)

[4] Manuale Cappotto Termico (*ETICS handbook*) by Cortexa

[5] Linee guida - Formazione applicatori: i prodotti vernicianti per edilizia (*Guidelines - Training for Applicators: Coatings for the Construction Industry*) by Avisa-Federchimica

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