

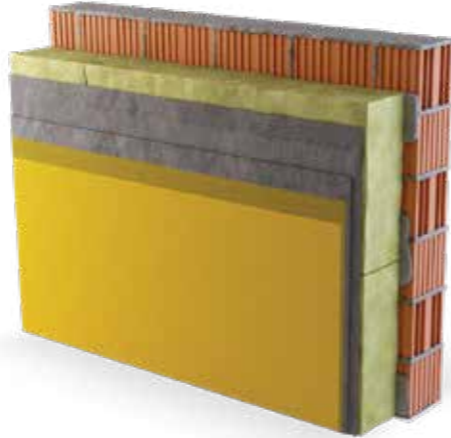
Fasadex®

# THERMAL INSULATION SYSTEMS



MANUAL FOR FAÇADE INSTALLERS





## WELCOME TO CHROMOS!

The first thing that we notice on every house, residential building or office building, regardless of the year of construction, is the façade. The façade is what makes your home recognizable and unique. It gives you a first impression of the tenants, and we know that first impressions are sometimes essential when forming opinions of others. However, the protective function is of greater importance than this aesthetic function. It ensures safe and comfortable living to its users and protects the load-bearing structure from external effects and temperature stresses, regardless of whether it is installed on a family house, apartment building or office building.

Chromos offers complete system solutions for ETICS façade systems - **Fasadex thermal insulation systems** - which meet all requirements with respect to aesthetic and protective functions. Quality and durability of our thermal insulation systems are guaranteed thanks to our experience, technological solutions and expertise in the field of installation of such systems.

This manual contains all information necessary for complete and proper installation of **Fasadex thermal insulation systems**. We will present examples of good practice and recommendations of our experts, describe the most common mistakes and consequences resulting from incorrect installation, as well as graphic details that help identify differences between high-quality executed works and those executed in an average manner.

Your Chromos!

### Important note!

All the guidelines in this catalog for the installation of the Ethics system are in line with the regulations that apply in the territory of the Republic of Croatia. For all other areas, it is necessary to check and adjust the guidelines with the applicable regulations in those areas. Local legal requirements are superior to this document.



Fasadex thermal insulation systems include a European technical approval: ETA-08/0122 for the expanded polystyrene (EPS) system, and ETA-08/0078 for the mineral wool (MW) system. Information in this manual is to be regarded as a general guideline and should not be considered as a guarantee, as specific/actual methods of use are not taken into consideration. Our experts remain at your disposal for any questions you may have.



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## 1. INTRODUCTION AND LEGAL OBLIGATIONS

### 1.1 GENERAL

Buildings make up approximately 40% of the total energy consumption in the European Union, and in the Republic of Croatia. Energy consumption in a building depends on the characteristics of the building (appearance and construction materials), on the energy systems it houses (heating, cooling, ventilation, electrical appliances and lighting used in it), and on the climate conditions present on its location. Due to the aforementioned, the European Parliament and the Council of the European Union are adopting measures, the objective of which is to reduce energy consumption in buildings and encourage the use of energy from renewable sources in order to reduce the European Union's energy dependence and greenhouse gas emissions. Measures to reduce energy consumption, combined with increased energy use from renewable

sources allow the European Union to honour its long-term commitment to sustain global temperature rises and reduce overall greenhouse gas emissions. Reduction in energy consumption and increase in use of energy from renewable sources also play an important role in promoting security of energy supply and technological development.

In addition to reducing total energy consumption, preserving the environment and ensuring sustainable development, energy efficient buildings also affect the comfort of living, their own durability and they increase the quality and standard of the environment in which they are located.

### 1.2 LEGISLATIVE FRAMEWORK

#### Important note!

All the guidelines in this catalog for the installation of the Ethics system are in line with the regulations that apply in the territory of the Republic of Croatia. For all other areas, it is necessary to check and adjust the guidelines with the applicable regulations in those areas. Local legal requirements are superior to this document.

#### LAWS AND REGULATIONS

Guidelines for installation of façade systems are based on currently applicable building regulations (Croatian and European) and FASADEX technical data sheets:

- Fasadex technical instructions and technical information
- Regulation (EU) no. 305/2011
- Labour Act
- Construction Products Act
- Technical Regulation on Energy Economy and Heat Retention in Buildings
- Technical Regulation on Construction Products
- Ordinance on Conformity Assessment, Documents of Conformity and the Marking of Construction Products
- Ordinance on Fire Resistance and Other Requirements for Buildings in Case of Fire
- ETAG 004: External thermal insulation composite systems with rendering (ETICS)
- ETAG 014: Plastic anchors for fixing of external thermal insulation composite systems with rendering
- HRN EN 13499: Thermal insulation products for buildings — External thermal insulation composite systems (ETICS) based on expanded polystyrene — Specification
- HRN EN 13500: Thermal insulation products for buildings —

#### ESSENTIAL REQUIREMENTS FOR CONSTRUCTION WORKS

Each building, depending on its intended use, must be designed and built in such a way that, during its life, it meets the essential requirements for construction works and other requirements or conditions stipulated under this Act and special regulations that affect the observance of basic requirements for construction works or otherwise condition the construction of buildings or affect construction and other products that are installed in the building itself.



External thermal insulation composite systems (ETICS) based on mineral wool — Specification

- HRN EN 13162: Thermal insulation products for buildings — Factory made mineral wool (MW) products — Specification
- HRN EN 13163: Thermal insulation products for buildings. Factory made expanded polystyrene (EPS) products — Specification
- HRN EN 13164: Thermal insulation products for buildings — Factory made extruded polystyrene foam (XPS) products — Specification
- HRN EN 998-1: Specification for mortar for masonry — Part 1: Rendering and plastering mortar
- HRN EN 15824: Specifications for external renders and internal plasters based on organic binders
- HRN EN 13501-1: Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests
- HRN EN 13495: Thermal insulation products for building applications — Determination of the pull-off resistance of external thermal insulation composite systems (ETICS) (foam block test)
- HRN EN 1991-1-4: Eurocode 1: Actions on structures — Part 1-4: General actions – Wind actions and technical instructions of the manufacturer and the members of the Croatian Association of Heat-Façade Systems Manufacturers (HUPFAS)

1. Mechanical resistance and stability
2. Safety in case of fire
3. Hygiene, health and the environment
4. Safety and accessibility in use
5. Protection against noise
6. Energy economy and heat retention
7. Sustainable use of natural resources (Construction Act).

## ENERGY ECONOMY AND HEAT RETENTION

One of the basic requirements for a building is energy economy and heat retention. Buildings and their heating, cooling, lighting and ventilation installations must be designed and installed in such a way that the amount of energy that they require remains low, while taking into account the users and climate conditions at the location of the building. Buildings must also be energy efficient so that they use as little energy as possible during construction and demolition (Construction Act).

## NZEB - NEARLY-ZERO ENERGY BUILDINGS

Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings – EPBD II stipulates the necessity to lay down more concrete actions with a view to achieve the great unrealised potential for energy savings in buildings and to increase the number of buildings which not only fulfil current minimum energy performance requirements, but are also more energy efficient, thereby reducing both energy consumption and carbon dioxide emissions. The aforementioned Directive also includes the term “nearly zero-energy building”, which describes a building that has a very high energy performance.

Member States shall ensure that by 31 December 2020, all new buildings are to be nearly zero-energy buildings; and after 31 December 2018, new buildings occupied and owned by public authorities are to be nearly zero-energy buildings. The provisions of the Directive on Nearly-Zero Energy Buildings (nZEB) have been transposed into our legislation through the Construction Act and the Technical Regulation on Energy Economy and Heat Retention in Buildings.

All new buildings for which an application for issuance of a building permit is submitted as of 31 December 2019 must meet the requirements for nZEB.

## CHARACTERISTICS THAT HELP ACHIEVE HIGH ENERGY PERFORMANCE:

- Architectural design and thermal protection;
- Ventilation;
- Technical systems;
- Energy products;
- Energy concept.

## ENERGY PERFORMANCE IN THE BUILDING SECTOR

In addition to the energy performance of new buildings, which is proven with a building energy certificate, i.e. energy performance certificate, great importance is also given to the increase in energy efficiency of existing buildings, which is stated in an energy performance certificate based on an energy audit of the building. Energy performance in buildings includes a number of different areas that provide the option to save heat and electricity, in addition to the rational use of fossil fuels and the use of renewable energy sources in buildings, wherever it proves to be functionally feasible and economically justified. Thermal protection of buildings is one of the most important topics, because of its great potential with respect to energy savings. Specifically, by improving the thermal insulation characteristics of the building, it is possible to achieve total heat losses of the building by an average of 30 to 60%.

Energy efficiency measures in the building sector:

- Energy audits of buildings and energy performance certificates, which show the energy status of an individual building or a part of it;
- Increasing the building's thermal protection level (installation of thermal insulation and energy efficient joinery);
- Increasing the efficiency of heating, cooling and ventilation systems;

- Increasing the efficiency of lighting systems and electrical appliances;
- Use of renewable energy sources.

Selected measures, of course, depend on the energy status and type of building, its use and location, and it is considered ideal to implement more measures so as to ensure their synergistic effect and to make energy savings as significant as possible. The Environmental Protection and Energy Efficiency Fund implements **energy renovation programmes** adopted by the Government of the Republic of Croatia and co-finances implementation of energy performance measures in buildings, with the aim of reducing energy consumption at a national level and reducing CO2 emissions. Current building renovation programmes have been adopted for buildings with various intended uses:

- Programme of energy renovation of family houses;
- Programme of energy renovation of multi-apartment buildings;
- Energy renovation programme for commercial non-residential buildings;
- Programme of energy renovation of public buildings.

According to the Energy Development Strategy of the Republic of Croatia, measures aimed to achieve energy savings in households are considered one of the important guidelines of European and national energy policies.

The greatest energy savings are achieved by installing high-quality thermal protection on external walls, i.e. by using an external thermal insulation composite system (ETICS).

ETICS façade thermal insulation systems consist of the following components:

- **Fasadex Chromoterm S / Fasadex Chromoterm adhesive mortar;**
- **EPS / MW thermal insulation material;**
- **Fasadex Chromoterm S / Fasadex Chromoterm mortar for the reinforcing layer (1st coat);**
- **FASADEX alkali-resistant glass fibre mesh;**
- **Fasadex Chromoterm S / Fasadex Chromoterm mortar for the reinforcing layer (2st coat);**
- **Fasadex Grund – primer;**
- **Fasadex finishing-decorative layer;**
- **Accessories (anchors, angles (corner profiles), sealing strips...).**



All system components are selected depending on system and substrate specificity. In order to achieve functionality, it is important to ensure perfect coherence of system components, as well as professional planning and execution.

- Substrate inspection and assessment
- Substrate preparation
- Execution

## OBLIGATIONS OF SUPPLIERS, CONTRACTORS AND OTHER PARTIES PARTICIPATING IN CONSTRUCTION\*

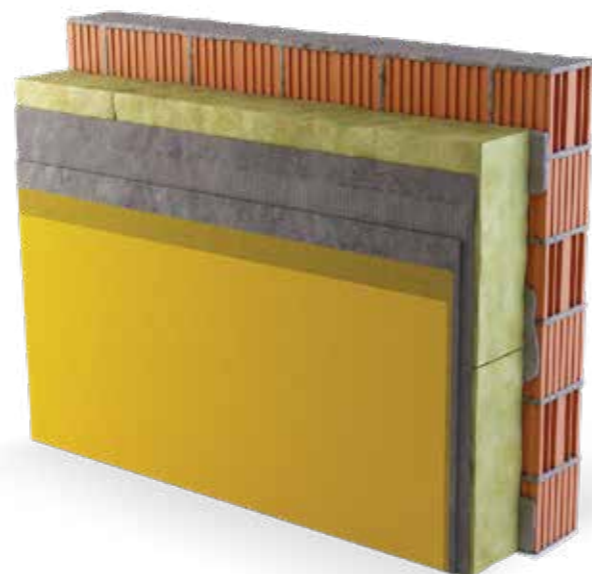
Pursuant to the applicable construction regulation, all suppliers (manufacturers and/or vendors) are obligated to offer complete thermal insulation systems for which an assessment and verification procedure of constancy of performance has been carried out and a declaration of performance has been issued in accordance with the Construction Products Regulation, 305/2011/EU, CPR. Contractors are obligated to install them in accordance with technical instructions of the manufacturer and guidelines of the Croatian Association of Heat-Façade Systems Manufacturers, and to inspect whether the products delivered to the construction site are a part of the system. It is recommended that regulations are followed by all parties participating in construction: design engineers, contractors, supervising engineers and all those involved in the construction product conformity assessment procedure.

The system contractor and the supervising engineer on the construction site are obligated to:

- Inspect whether the elements of the appropriate system have been delivered, i.e. of the system for which the assessment and verification of constancy of performance have been carried out in accordance with applicable laws and regulations;
- Have all the relevant technical documentation kept at the site (technical instructions, declarations of performance, etc.).



EPS façade system



Mineral wool façade system

## ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE OF CONSTRUCTION PRODUCTS\*

Regulation (EU) no. 305/2011, which has been in force in Croatia since 1 July 2013, lays down conditions for the marketing of construction products in accordance with harmonised regulations that are applicable in the entire European Union. Uniform methods for assessment of construction product performance are being introduced through harmonized European standards (hEN), European Technical Approval Guidelines (ETAGs) and the European Assessment Document (EAD). The European Organization for Technical Assessment (EOTA) has approved the guideline ETAG 004 (European Technical Approval Guideline) for purposes of testing and assessments of ETICS systems. It stipulates all reference documents for testing, requirements that thermal systems must meet, test and assessment methods, factory production control methods, marking methods and document validity periods.

This guideline is used as a European Assessment Document based on which the manufacturer will be issued a European Technical Assessment (ETA) following the completion of testing. This document serves as confirmation that its relevant thermal insulation system has met all requirements and that it can be used for its intended use. This is also confirmed by the authorization to affix the CE marking onto products, which confirms the conformity of the product with the declared performances and that it can be placed on the market in Member States. Application of the ETAG 004 guideline in Croatia is mandatory as of 1 July 2015.

Meeting of basic requirements for construction works is a basic condition that each building, depending on its purpose, must meet for the duration of its useful life. These requirements are stipulated under the Construction Act.

## 2. THERMAL INSULATION SYSTEM (TIS)



## 2.1 EUROPEAN TECHNICAL APPROVAL - ETA

Assessment and verification of constancy of performance of the ETICS system is carried out in accordance with the methods stipulated in guideline ETAG 004 and additional requirements laid down in the design. Assessment of constancy of performance of the ETICS system is carried out in accordance with system 2+, with the exception

of reaction to fire performance, which is covered by assessment system 1. Upon completion of required tests, the Notified Body issues a European Technical Assessment (ETA) approved by Member States.

**ZAG** ZAVOD ZA  
ARHITEKTURNO  
INŽENJERSTVO  
IZ OBLASTI  
GRADNENJA

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**European Technical Assessment** **ETA-08/0122**  
of 21.09.2020

English version prepared by ZAG

**General Part**  
Technical Assessment Body issuing the ETA ZAG Ljubljana

**Trade name of the construction product** SPEKTRA toplotno izolativni sistem EPS / FASADEX EPS fasadni sustav / ZVEZDA toplotno izolacijski sistem EPS / COLOR toplotno izolativni sistem EPS / MEGAFAS EPS fasadni sustav / EFFECTA EPS fasadni sustav

**Product family to which the construction product belongs** 04: External Thermal Insulation Composite Systems with rendering (ETICS) for the use as external insulation to walls of buildings

**Manufacturer** HELIOS Tovarna barv, lakov in umetnih smol Količevo, d.o.o.  
Količevo 65  
SI-1230 Domžale, Slovenia  
https://www.helios-group.eu/

**Manufacturing plants** CHROMOS boje i lakovi d.d.  
Radnička cesta 173d  
HR-10000 Zagreb, Croatia

Helios Srbija a.d.  
Radovana Grkovića 24  
RS-32300 Gornji Milanovac, Republic of Serbia

**This European Technical Assessment contains** 24 pages including 2 annexes which forms an integral part of this assessment

**This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of** ETAG 004, edition February 2013, used as European Assessment Document (EAD)

**This version replaces** ETA-08/0122 issued on 06. 11. 2018

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.  
Communication of this European Technical Assessment by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, any reproduction shall be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction is prohibited.

EPS SYSTEM – ETA 08/0122 – façade protection system with expanded polystyrene panels for thermal and sound insulation of old and new buildings.

**ZAG** ZAVOD ZA  
ARHITEKTURNO  
INŽENJERSTVO  
IZ OBLASTI  
GRADNENJA

SI OSEBNO  
PRAVNO PRAVNO  
PRAVNO PRAVNO  
PRAVNO PRAVNO  
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Fax: +386 (0)1-438 74 49  
e-mail: info.ta@zag.si  
http://www.zag.si

**European Technical Assessment** **ETA-08/0078**  
of 26/06/2017

**GENERAL PART**  
Organ za tehnično ocenjevanje, ki je izdal ETA ZAG Ljubljana  
Technical Assessment Body issuing the ETA

**Komercialno ime gradbenega proizvoda** SPEKTRA toplotno izolativni sistem – MW / FASADEX MW fasadni sustav  
Trade name of the construction product

**Družina proizvoda, ki ji gradbeni proizvod pripada** 04: Zunanji toplotnoizolacijski sestavljeni sistemi z ometom (ETICS) namenjeni za izolacijo zunanjih zidov zgradb  
Product family to which the construction product belongs

**Proizvajalec:** HELIOS Tovarna barv, lakov in umetnih smol Količevo, d.o.o.  
Manufacturer Količevo 65  
1230 Domžale  
Slovenija

**Proizvodni obrat:** CHROMOS boje i lakovi d.d.,  
Manufacturing plant Radnička cesta 173d,  
10000 Zagreb, Hrvatska

**Ta Evropska tehnična ocena vsebuje** 20 strani vključno z 1 prilogo, ki je sestavni del te tehnične ocene.  
This European Technical Assessment contains 20 pages including 1 Annex which form an integral part of this assessment.

**Ta ocena zamenjuje** ETAG 004, izdaja 2013, ki se uporablja kot podlagi Uredbe (EU) št. 305/2011 na osnovi  
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of ETAG 004, edition 2013, used as European Assessment Document (EAD)

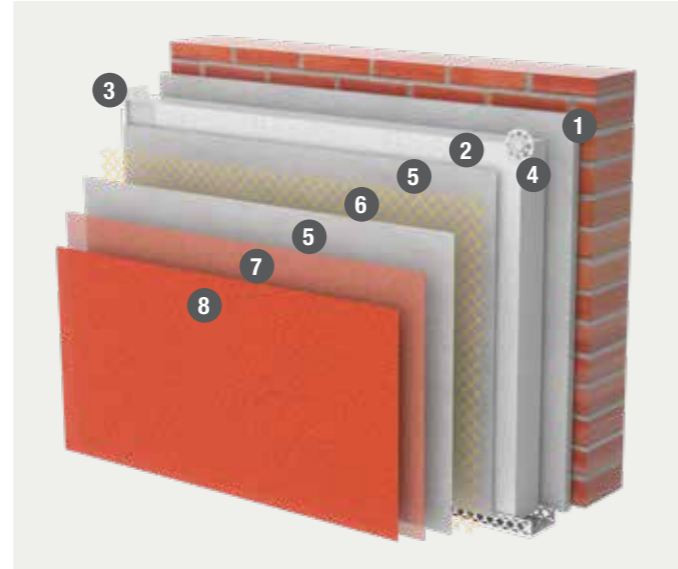
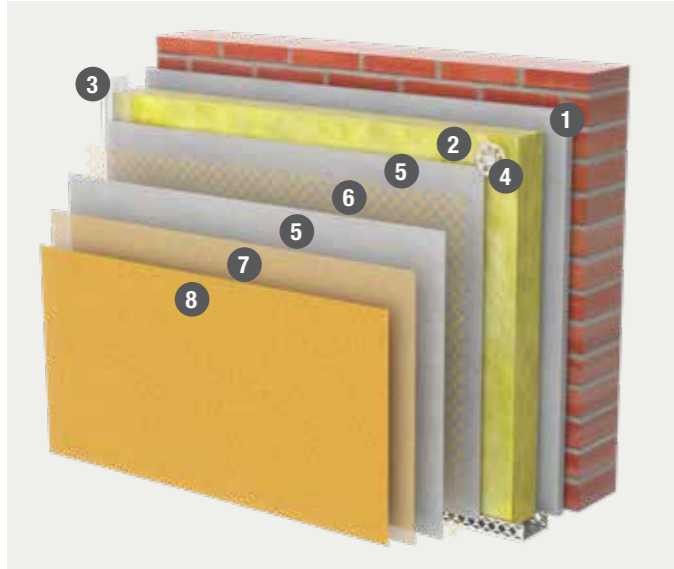
**Ta Evropska tehnična ocena je izdana na podlagi Uredbe (EU) št. 305/2011 na osnovi** ETAG 004, izdaja 2013, ki se uporablja kot Evropski ocenitveni dokument (EAD)  
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of ETAG 004, edition 2013, used as European Assessment Document (EAD)

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MW SYSTEM –ETA 08/0078 – façade insulation system with mineral wool lamellas and panels intended to increase sound and fire protection quality of old and new buildings.

## 2.2 FASADEX FAÇADE SYSTEMS

### STRUCTURE



1. ADHESIVE – FASADEX ADHESIVE (CHROMOTERM/ CHROMOTERM S)
2. INSULATION COATING - FASADEX INSULATION PANELS (MW/EPS)
3. CORNER PROFILES
4. ANCHORS

5. BASE COAT– FASADEX BASE COAT (CHROMOTERM / CHROMOTERM S)
6. REINFORCEMENT – FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING LAYER – FASADEX FINISHING-DECORATIVE PLASTER

### THERMAL INSULATION MATERIALS

The function of thermal insulation material is to provide thermal insulation of walls so as to prevent heat loss during the winter and prevent excessive heating of the building and the building's interior during the summer. Thermal insulation materials most commonly used for purposes of installing ETICS systems are:

**Expanded polystyrene (EPS)** in accordance with requirements of HRN EN 13163

Expanded polystyrene (EPS), better known as Styrofoam, is a thermal insulation material with characteristic physical and chemical properties, outstanding thermal insulation and mechanical properties, of affordable cost and easy to install.

**Mineral wool (MW)** in accordance with requirements of HRN EN 13162

Exceptional properties of mineral wool products ensure an excellent combination of thermal and sound insulation, combined with excellent fire resistance properties. It is resistant to aging and decay, as well as to microorganisms and insects.

**Extruded polystyrene (XPS)** in accordance with requirements of HRN EN 13164

High mechanical resistance level. It is most often used in the base area exposed to water splashes and greater impact loads.

### FASADEX EPS PANELS

Manufactured in accordance with HRN EN 13163:2012+A1:2015, HRN EN 13172:2012 and technical guideline ETAG 004:2013. Façade protection system with expanded polystyrene (EPS) panels for thermal and sound insulation of old and new buildings.

- Optimal thermal protection
- Affordable price
- Simple installation



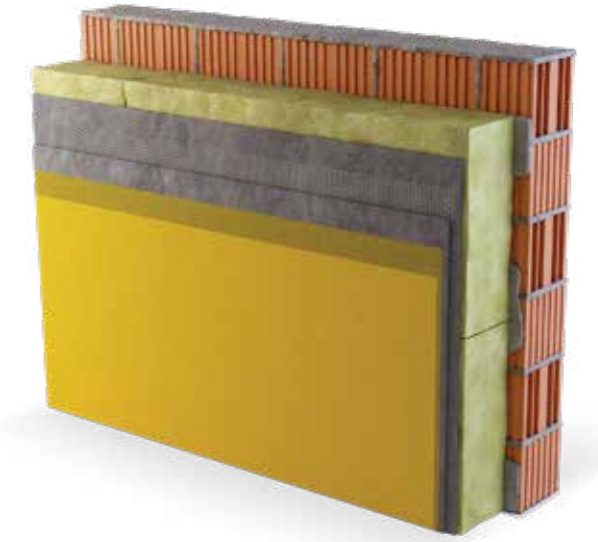
#### FASADEX POLYSTYRENE (EPS) FAÇADE SYSTEMS

- FASADEX EPS STANDARD
- FASADEX EPS PREMIUM
- FASADEX EPS STANDARD STRONG
- FASADEX EPS PREMIUM STRONG

### FASADEX MW

Façade protection system with mineral wool panels or lamellas intended to increase sound, thermal and fire protection quality of old and new buildings.

- Environmentally friendly system
- High vapour permeability
- Fire resistance



#### FASADEX MINERAL WOOL FACADE SYSTEMS (MW)\*\*

- FASADEX MW STANDARD
- FASADEX MW EXTRA
- FASADEX MW PREMIUM

\*\*available in the "STRONG" version (double-reinforcement).

## FASADEX FINISHING-DECORATIVE LAYER

Depending on the specific nature of the substrate and the type of system, you may choose amongst the following:

- Silicone plaster;
- Silicate plaster;
- Si-Si plaster;
- Acrylic plaster.

The finishing colour can be determined according to the CHROMOMIX Exterior Colour Collection tone chart with



over 450 colour shades or from the Chromomix tone chart with a selection of over 700 colour shades. By selecting the grain size and the aforementioned binder, it is possible to obtain different types of plaster textures and structures. The performance and functionality of the entire ETICS system depend on the thickness and type of the finishing-decorative layer.

## SELECTION OF FINISHING PLASTER SHADES

### AESTHETIC FUNCTION

The façade colour should highlight the architecture of the building and help it blend harmoniously with the environment. External factors also play an important role in terms of façade colour perception:

- Outdoor light - one and the same shade can appear different in daylight, in the shade, and on a surface directly illuminated with sunlight. The same is applicable to artificial lighting and moonlight. We recommend that prior to the final selection of shades, you order a smaller sample of the paint coating or plaster in that particular shade and test it on the building. This is best done during daytime and on the side of the building that is not directly exposed to sunlight.

- Distance from the building. The shade intensity depends on the distance from which we observe the building.
- Façade surface: on a textured coating (plaster/ rendering), the shade may look darker, but the achieved tone purity cannot be the same as that of façade paint coatings. The reason lies in natural marble granules that provide the plaster with structure, and which contain a smaller percentage of grey and yellowish grains.
- The colours of the buildings in the vicinity of the observed façade also affect the overall perception of shades.



### PROTECTIVE FUNCTION

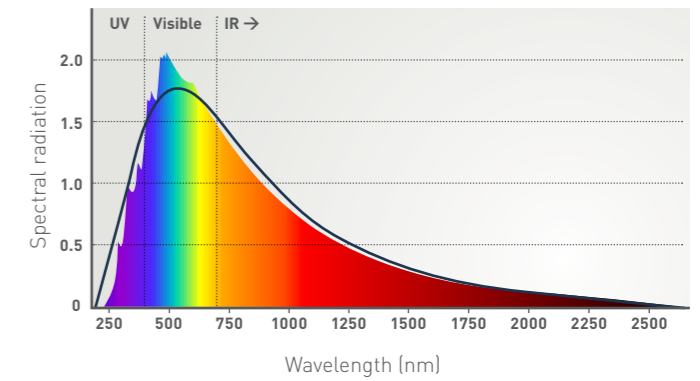
The correct selection of shades largely depends on the type of coating, protection system and climate in the area in which the building is located.

- For all façade paints and plasters, we recommend selecting shades with a high lightfastness. Exterior Colour Collection tone chart consists of shades designed exclusively based on pigments with a high lightfastness rating (UV-resistant), while in the Chromomix tone chart such shades are marked with ☼ (white sun). Namely, strong UV radiation substantially accelerates fading of surfaces coated in tones with a low lightfastness rating, such as intense red, orange and yellow tones.

- For buildings exposed to extreme weather conditions, e.g. rain and strong winds or large temperature fluctuations, we recommend our selection of pastel shades with high UV resistance and acrylic binder-based finishes.
- Silicate binder-based finishes are offered exclusively in pastel tones based on inorganic pigments.
- In order to avoid excessive heating of coated façade surfaces, it is recommended to select shades with Y (H) values exceeding 25, or 30 in the case of silicate plasters.



Chromomix tone charts also include dark shades with Y (H) values of < 25. As an additional benefit, Exterior Colour Collection tone charts include IR reflective shades that do not absorb the thermal (IR) part of the sunlight's spectrum, which in turn reduces overheating of the façade.



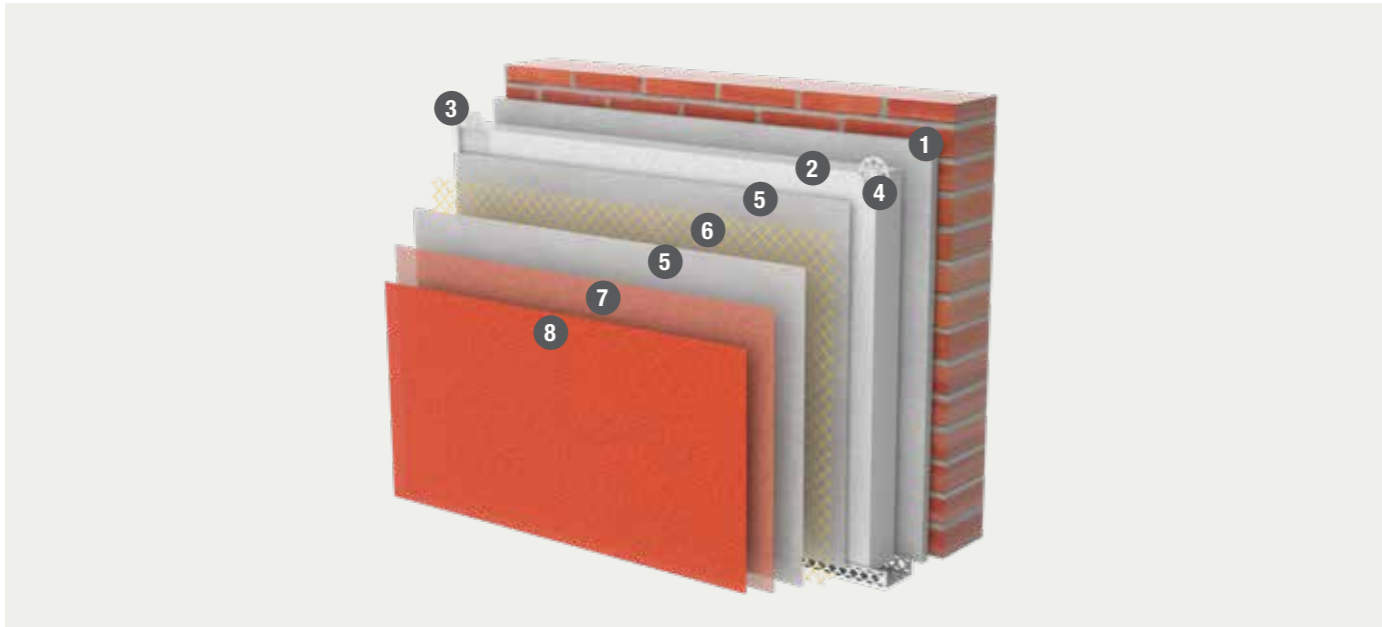
## IR REFLECTIVE SHADES

Heating of façade surfaces depends on total solar radiation, consisting of ultraviolet (UV), visible and infrared part of the spectrum.

Y (H) indicates reflection or absorption in the visible part of the spectrum. A completely white shade will have a Y value of 100% and a black shade will have a Y value of 0%. TSR (Total Solar Reflectance) is the value of total solar reflectance, which is characterized by the façade's ability to reflect all solar radiation components. The darker the shade, the lower the TSR value, and the higher the radiation absorption, i.e., shade heating.

As indicated on the spectrum, a large part of total radiation (approximately 60%) consists of the infrared part of the radiation spectrum, which most significantly affects overheating of dark shade façade surfaces. When the daily temperature is approximately 25 °C, the dark shade façade surface, which is based on conventional pigments, can heat up to a temperature of up to 80 °C. Such heating increases the thermal stress within the finishing-decorative layer, which in turn results in the formation of micro-cracks.

Dark shades of façade surfaces, which are based on IR pigments, reflect the infrared part of the radiation, which in turn significantly reduces heat absorption. The Y (H) value of such shades is still low, while the TSR value is higher. Shades based on IR colourants significantly reduce overheating of façades and, consequently, prolong the life of the façade system.



### 2.2.1 FASADEX EPS STANDARD

#### SYSTEM COMPONENTS:

1. ADHESIVE – FASADEX CHROMOTERM S
2. INSULATION COATING – FASADEX EPS panels
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT – FASADEX CHROMOTERM S
6. REINFORCEMENT – FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING COAT – FASADEX ACRYLIC PLASTER

#### CHARACTERISTICS:

- Cost-effective system for excellent thermal insulation of walls
- Easy installation
- For new and old buildings in various climatic conditions
- Water-repellent system, resistant to abrasion and impacts.

### 2.2.2 FASADEX EPS PREMIUM

#### SYSTEM COMPONENTS:

1. ADHESIVE – FASADEX CHROMOTERM S
2. INSULATION COATING – FASADEX EPS panels
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT – FASADEX CHROMOTERM S
6. REINFORCEMENT – FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING COAT – FASADEX SILICONE PLASTER

#### CHARACTERISTICS:

- Cost-effective system for excellent thermal insulation of walls
- Easy installation
- For new and old buildings in climatic conditions that include frequent rainfall
- Extremely water-repellent system, resistant to fouling and resistant to abrasion and impacts.
- Resistant to algae and mould.

### 2.2.3 FASADEX EPS STANDARD STRONG

#### SYSTEM COMPONENTS:

1. ADHESIVE – FASADEX CHROMOTERM S
2. INSULATION COATING – FASADEX EPS panels
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT – FASADEX CHROMOTERM S
6. REINFORCEMENT – 2 × FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING COAT – FASADEX ACRYLIC PLASTER

#### CHARACTERISTICS:

- Cost-effective system for excellent thermal insulation of walls
- Easy installation
- For new and old buildings in various climatic conditions
- Greater resistance of the façade system to impacts and indentations thanks to double reinforcement
- For buildings exposed to extreme weather conditions (hail, wind-driven rain), various mechanical forces and thermal stresses
- Broader selection of shades of the finishing layer (it is possible to select shades with HBW < 25).
- Water-repellent system, resistant to abrasion and impacts.
- Resistant to mould and algae.

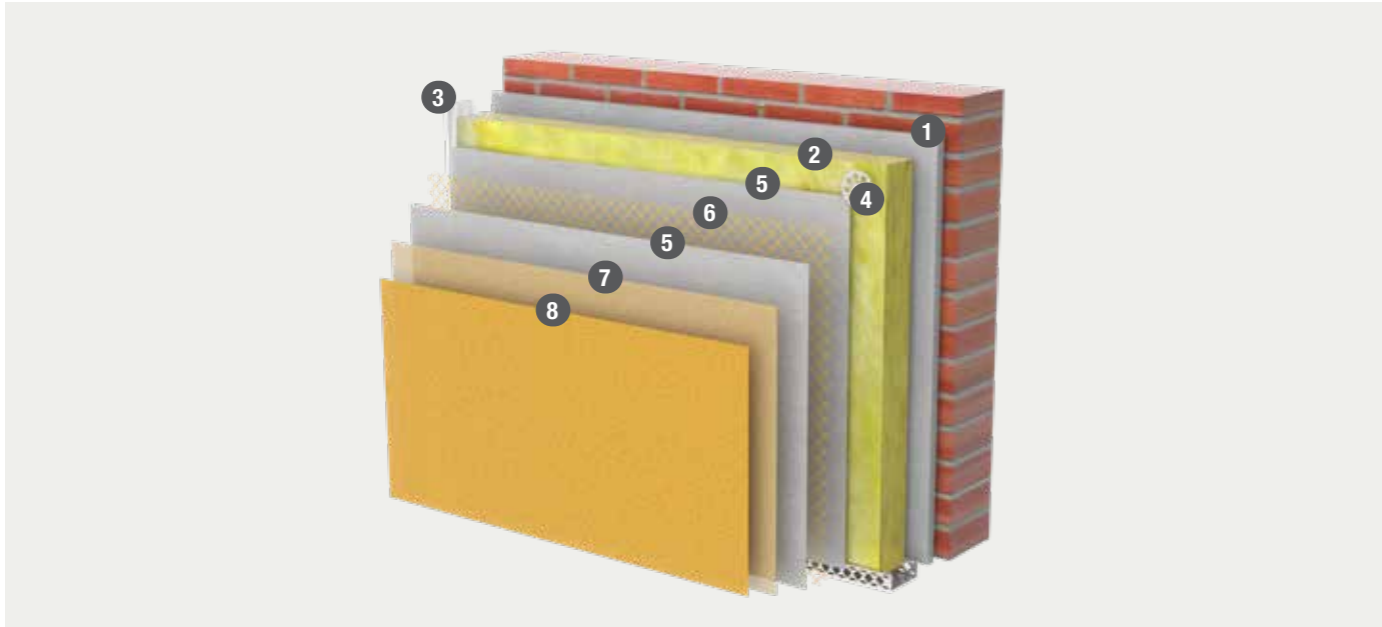
### 2.2.4 FASADEX EPS PREMIUM STRONG

#### SYSTEM COMPONENTS:

1. ADHESIVE – FASADEX CHROMOTERM S
2. INSULATION COATING – FASADEX EPS panels
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT – FASADEX CHROMOTERM S
6. REINFORCEMENT – 2 × FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING COAT – FASADEX SILICONE PLASTER

#### CHARACTERISTICS:

- Cost-effective system for excellent thermal insulation of walls
- Easy installation
- Greater resistance of the façade system to impacts and indentations thanks to double reinforcement
- For buildings exposed to extreme weather conditions (hail, wind-driven rain), various mechanical forces and thermal stresses
- Broader selection of shades of the finishing layer (it is possible to select shades with HBW < 25).
- For new and old buildings in climatic conditions that include frequent rainfall
- Extremely water-repellent system, resistant to fouling and resistant to abrasion and impacts.
- Resistant to mould and algae.



### 2.2.5 FASADEX MW STANDARD

#### SYSTEM COMPONENTS:

1. ADHESIVE – FASADEX CHROMOTERM
2. INSULATION COATING – FASADEX MW lamellas/panels
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT – FASADEX CHROMOTERM
6. REINFORCEMENT – FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING COAT – FASADEX SILICATE PLASTER

#### CHARACTERISTICS:

- High fire resistance. Possibility of installation on public buildings and high-rise buildings.
- Optimal thermal insulation.
- Good sound insulation.
- High vapour permeability of the system.
- Resistant to fouling in buildings exposed to dirt and smoke (mineral character of the surface).
- Excellent system surface strength: the finishing layer chemically binds to the substrate.

### 2.2.6 FASADEX MW EXTRA

#### SYSTEM COMPONENTS:

1. ADHESIVE – FASADEX CHROMOTERM
2. INSULATION COATING – FASADEX MW lamellas/panels
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT – FASADEX CHROMOTERM
6. REINFORCEMENT – FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING COAT – FASADEX Si-Si PLASTER

#### CHARACTERISTICS:

- High fire resistance. Possibility of installation on public buildings and high-rise buildings.
- Optimal thermal insulation.
- Good sound insulation.
- High vapour permeability of the system.
- Water-repellent system with a finishing plaster resistant to fouling.
- Excellent system surface strength.
- Resistant to micro-organism growth.

### 2.2.7 FASADEX MW PREMIUM

#### SYSTEM COMPONENTS:

1. ADHESIVE – FASADEX CHROMOTERM
2. INSULATION COATING – FASADEX MW lamellas/panels
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT – FASADEX CHROMOTERM
6. REINFORCEMENT – FASADEX reinforcing mesh
7. PRIMER – FASADEX GRUND
8. FINISHING COAT – FASADEX SILICONE PLASTER

#### CHARACTERISTICS:

- High fire resistance. Possibility of installation on public buildings and high-rise buildings.
- Optimal thermal insulation.
- Good sound insulation.
- High vapour permeability of the system.
- Excellent water-repellent properties of the system, in addition to the finishing plaster that prevents humidity accumulation in the substrate.
- For buildings in climatic conditions that include frequent rainfall.
- Low fouling tendency.
- Excellent system surface strength.
- Resistant to micro-organism growth.

## 2.3 GENERAL INSTRUCTIONS

The job of installing a composite thermal insulation system includes far more than the execution of construction works on the building. In order to complete the job properly, it is necessary to have a well-organized construction site. Great importance should be given to all activities that precede the installation of thermal insulation systems, which include transport and storage, inspection of delivered products, execution of preliminary works and preparation of the substrate for TIS (thermal insulation system) installation.

Proper organization of the construction site includes storage of all components in accordance with technical regulations applicable to the ETICS system. It is not permitted to mix any other additive (e.g. accelerated curing or antifreeze additives) in any system component. Any tinting of **Fasadex finishing-decorative plasters** at the construction site or in the shop is allowed only in cooperation with the manufacturer and with his approval.

Weather conditions strongly affect the quality of executed works, and, consequently, the following instructions should be followed:

- During the entire construction, drying and curing stage, the ambient, substrate and material temperatures must be no less than +5 °C (for silicate plasters no less than +8 °C). At a temperature lower than +5 °C, all material bonding and drying processes cease, unless explicitly stated otherwise by the manufacturer, i.e. in cases where the materials can be used at temperatures not lower than 0 °C. Adverse weather conditions, such as temperatures exceeding +30 °C, high relative air humidity, wind and direct exposure to sunlight, can alter the properties of the material during processing thereof.
- Every organised construction site implies the use of scaffolding covers for protection against atmospheric effects, for occupational health and safety purposes and for protection of the environment.
- Only clean water of a normal temperature should be used during the execution of works.
- Along with the uneven substrate and human factors that affect the final appearance and quality of the executed works, it is also necessary to take into account the time required for the material to dry and bond, as well as adverse weather conditions that significantly prolong the drying time.

When selecting the finishing paint coating for the façade, be sure to take into account that the selected paint also affects the complete protection system. The selection of paint also entails construction-related and physical consequences. Dark colours absorb significantly more heat than lighter ones, which is why the wall heats up more and why the thermal load of decorative plasters is higher. The amount of reflected light, i.e. the reflection coefficient (HBW value), expresses the part of the light that will reflect off the substrate (100% = white, 0% = black). The requirements for individual façade systems vary. However, when selecting the colour of the finishing coat, it is a general rule that the reflection coefficient (HBW) of façades with an installed thermal insulation system must not be lower than 25% (Y value). You can determine the colour according to the **CHROMOMIX Exterior Colour Collection** tone chart, which offers a wide range of colours.

## 2.4 PRELIMINARY WORKS

The thermal insulation system can be installed after the following works have been executed:

- The roof is finalized and the gutters are installed (stormwater drainage);
- Concrete walls are no less than 3 months old and brick walls no less than 1 month;
- Formwork release agents and any remaining grease must be removed from concrete surfaces;
- Doors, windows and other builder's joinery have been mounted;
- All surfaces that could be damaged (glass, wood, aluminium, window handles, etc.) have been covered and protected;
- Internal plastering, screed installation, etc., have been completed, and installed materials have dried according to the manufacturer's instructions;
- The substrate has been inspected and its condition tested. Basic parameters: substrate temperature: +10 - +30 °C, surface flatness +/- 1 cm at 4 m
- All horizontal surfaces, profiles, wall cornices, etc., have been covered and protected;
- Precise details on how various connections and terminations will be executed, in order to prevent the occurrence of thermal bridges, have been drawn up;
- Causes of salting on old buildings have been eliminated and rise of capillary moisture has been prevented;
- Rail brackets have been installed on balconies and terraces;
- All joints have been filled.

## 2.5 THERMAL INSULATION – SYSTEM SUBSTRATE

The installation of thermal insulation is preceded by the preparation of the substrate. The contractor is obligated to inspect the substrate and, based on his expertise, determine whether it is suitable for the installation of a thermal insulation system.

If working with new substrates or newly constructed buildings (made from brick, concrete, siporex, etc.), the contractor can quickly determine whether all surfaces are suitable for installation of insulation panels by performing a visual inspection. If working with older buildings with various substrates, the contractors should carefully inspect them and, if necessary, seek the help of experts.

### UNPLASTERED NEW SUBSTRATES\*

The following substrates are suitable for installation of ETICS systems:

- Solid and hollow bricks in accordance with HRN EN 771-1 and HRN EN 771-3;
- Hollow and solid blocks (fly ash and aggregate blocks) in accordance with HRN EN 771-3;
- Concrete in accordance with HRN EN 206-1;
- Aerated concrete in accordance with HRN EN 771-4;
- Cement-bonded wood-chip shuttering blocks, with a concrete core, and with or without integrated additional insulation in accordance with HRN EN 15498.

### EXISTING PLASTERED SUBSTRATES

It is necessary to perform a detailed inspection of the substrate. The substrate is examined by performing blind tests, at one's own discretion and in several points:

- A visual inspection of the substrate is used to assess the following:
  - o Substrate moisture (risk of moisture penetration into the ETICS system) (Figure 1);
  - o Presence of cracks on the substrate (Figure 2);
  - o Type of substrate (Figure 3);
- Dark cloth wipe test or palm wipe test, which are used to assess the presence of dust, chalky old coatings, harmful white discoloration, or "blooming" of the surface (Figure 4);
- Notching with a hard sharp object or scratching to check the strength and load capacity (e.g., cross-cut test, adhesive tape test);
- A brush wetting test or a spray test used to inspect water absorption and moisture of the substrate;
- Inspection of wall flatness with a flat lathe or plummet - appropriate levelling measures must be implemented (plastering, etc.) if the deviation of substrate flatness is not within permissible tolerance limits according to HRN DIN 18202;



Distance between measurement points (m)	0.1	1	4	10	≥15
Permitted values for imperfect walls and the underside of the panels (mm)	5	10	15	25	30

- Adhesion test on coated substrates: lay a glass mesh with dimensions of no less than 30 × 30 cm in mortar intended for the installation of the intended system's 3 to 5 mm-thick reinforcing layer and make sure that a part of the mesh remains free - after no less than three days of drying, the mortar must not separate from the substrate;
- In cases where the substrate does not correspond to any category listed in ETAG 014, a pull off test must be performed.



Moisture in the substrate



Presence of cracks



Type of substrate



Dust presence and "blooming" testing

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### 3. INSTALLATION OF FASADEx – THERMAL INSULATION SYSTEMS



Prior to the commencement of works, it is necessary to inspect the flatness of the substrate. If deviations regarding substrate flatness are not within the permissible tolerance limits stipulated under HRN DIN 18202, the façade surface on which the insulation panels are to be installed will have to be levelled. It is necessary to tighten a rope horizontally and determine the direction vertically.

The ETICS system is usually installed through three or four stages of execution:

- Bonding of thermal insulation material;
- Additional mechanical fixing/fastening (if required);
- Installation of reinforcement layers;
- Installation of finishing-decorative plasters with a primer,

where the installation of each component plays an important role in defining the final quality of the installed ETICS system.

#### 3.1 FAÇADE BASE

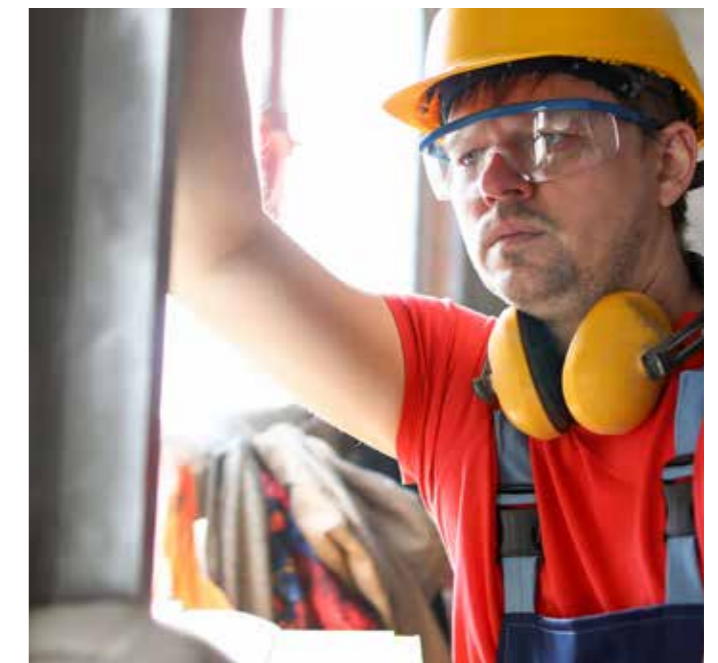
The part of the façade exposed to water spraying is considered to be the base, i.e. the plinth of the façade. It is the area from the top of the ground or lining along the cladding and it is between 30 cm and 100 cm high. The façade base is made by using **Fasadex XPS panels** due to the higher mechanical requirements. The façade base can be:

- Recessed with respect to the rest of the cladding;
- Flush with the cladding.

Due to its higher mechanical requirements and humidity in comparison to the other parts of the façade, this part of the façade requires implementation of special measures, during which great care must be taken. **Fasadex mozaik**, a protective-decorative plaster based on an acrylic dispersion and coloured quartz grains (sand) is most often used as a finishing layer.

#### 3.1.1 RECESSED FAÇADE BASE

After determining the height of the base, the base edge profile is placed on the upper edge of the plinth (Figures 5 and 6) in a straight line (with a spirit level) and mechanically fixed. The base profile is fastened at a distance of approximately 30 cm, as well as at its ends. The dimensions of the final profile depend on the thickness of the thermal insulation material. They protect the lower edge of the insulation system from damage and ensure fastening of the lower row of insulation panels. A sealing tape, adhesive, etc. is applied to the contact edge between the base and the base edge profile in order to ensure airtightness, prevent penetration of insects into the façade system, etc. (Figure 6).



**NOTE:** The installation of the base and the transition to perimeter insulation is executed in accordance with design-defined details.

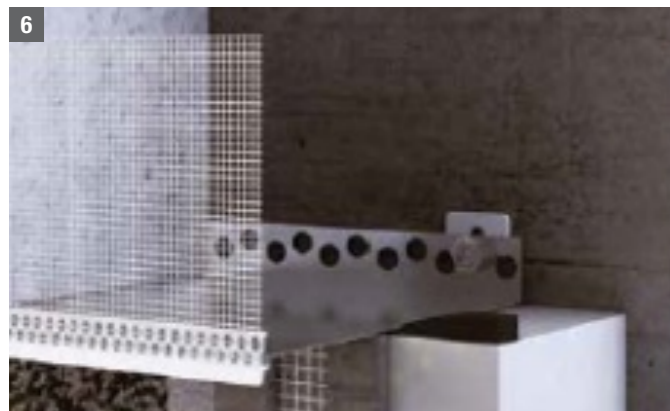
Stormwater should be drained from the façade by applying appropriate methods. It is recommended to install a drainage layer in order to prevent capillary rise of water. Pavements, as well as slab or paver coverings, should be installed at an appropriate technically prescribed incline and structurally separated from the building.

### 3.1.2 BASE FLUSH WITH THE CLADDING

Bases flush with the cladding may be installed with the same or different finishing layer. When installing bases flush with the cladding of a different finish, the thermal insulation material of the base and that of the rest of the façade is connected on the same plane, without using the basic profile (Figure 9).

**Fasadex reinforcement layer** is applied over both types of material, and the base Fasadex **finishing-decorative layer** is separated from the finishing-decorative layer of wall surfaces.

If the finishing-decorative layer is also applied in the base area, it is important to ensure as little water spraying as possible.



## 3.2 GROUND CONNECTION

### 3.2.1 WITH PERIMETER INSULATION

Perimeter insulation is the thermal insulation installed on the external side of basement outer walls. Thermal insulation material installed in the base area enters the area below the ground level by no less than 20-30 cm. If thickness of the base thermal insulation material and that of the perimeter insulation are different, it is necessary to level them with an inclined cut in order to ensure contact edge tightness. Base panels cut into the underside at an inclined angle, at the connection point with the perimeter insulation (Figure 10). **Fasadex reinforcement layer** should be applied onto the perimeter insulation. **Fasadex finishing-decorative layer** should be applied at no less than 15 cm below ground level.



### 3.2.2 WITHOUT PERIMETER INSULATION

Thermal insulation material of the base should be cut at an inclined angle from its underside. This is followed by the installation of the **Fasadex reinforcement layer** and formation of a transition to the wall. **Fasadex finishing-decorative layer** should be installed 15 cm below ground level (Figure 11).





### 3.3 BONDING OF THERMAL INSULATION PANELS (EPS, MW)

#### 3.3.1 FASADEx EPS PANELS

**Fasadex Chromoterm S** adhesive is used for this type of thermal insulation material. The manufacturer's instructions must be observed when mixing the adhesive. The adhesive can be applied manually or by machine, while taking care of the following:

- That air cannot circulate between the insulation panels and the substrate (otherwise a chimney effect can occur);
- That the panel's surface adheres evenly to the substrate.

#### MANUAL APPLICATION

The used method includes application of the adhesive in strips along the edges of the panel and in dots in the centre of the panel. The other method includes application of the adhesive over the entire panel surface. In case of well-prepared substrates (surface unevenness of up to +/- 1 cm), Fasadex Chromoterm S adhesive should be applied in strips along the edges, and in dots in the centre of the panel. A strip with a width of

approximately 5 cm is applied around the edge of the panel, and 3–6 dots with a diameter of approximately 10–15 cm are applied in the centre of the panel (Figure 12). This prevents the air from circulating and penetrating into the façade system. The required amount of adhesive must conform to substrate-related tolerances and the thickness of the adhesive layer (up to 15 mm), so as to achieve a contact surface of no less than 40%.



In case of flat non-absorbent substrates, the adhesive can be applied over the entire surface of the panel by using a notched trowel with teeth no less than 12 mm-wide. Substrates of lower quality require that the ratio of the surface with applied adhesive (contact) must be as close as possible to 100 % (Figure 13).



#### MACHINE APPLICATION

Using a glue gun, styrofoam boards can be glued with PUR foam for gluing styrofoam. It is applied along the edge of the panel and on its centre in a W-pattern. The strip is 5 cm-wide and 2 cm-high. Adhesive should be applied in a uniform manner and contact surface should take up no less than 40%.

**NOTE:** Regardless of the selected method, the complete surface of each panel must be pressed following its installation in order to achieve uniform distribution of the adhesive and to ensure that the panel properly adheres to the substrate. After the panel is positioned and pressed, it must no longer be touched, so as not to loosen the bond between the panel and the wall.

#### 3.3.2 FASADEx MW (MINERAL WOOL)

**Fasadex Chromoterm** adhesive is used for this type of thermal insulation material. The method of applying adhesive onto mineral wool is the same as with EPS, except that a thin layer of adhesive must first be applied onto the mineral wool in order to bond the fibres and allow better adhesion.

The used method includes application of the adhesive in strips along the edges of the panel and in dots in the centre of the panel, while covering no less than 40% of the panel surface. The other method includes application of the adhesive over the entire untreated side of the panel. When applying adhesive on a surface of poor quality, use only the method in which the adhesive is applied over the entire panel surface.



### 3.3.2.1 FASADEX MW LAMELLA

#### UNTREATED

The method used on the untreated surface of the lamella includes application of the adhesive along its entire surface.

#### TREATED ON ONE OR BOTH SIDES

In case of double-sided lamellas, and regardless of substrate quality, apply the "full-surface covering" method.

Prior to the application of **Fasadex Chromoterm** adhesive on a lamella, the lamellae manufacturer recommends pressing the adhesive into the lamella with a masonry trowel. Only then can the adhesive layer be applied (Figure 14). This helps solidify the fibres and the dust on the surface of the wool, which accumulated during the installation of the lamella. When applied manually, the adhesive must be applied across the entire surface with a special trowel for lamellae, and onto the substrate with a notched trowel.

#### PROCEDURE

- Press the lamellas with the adhesive onto fresh adhesive and straighten them.
- The amount of adhesive applied onto the substrate should be sufficient to allow positioning of the panels before the adhesive starts to dry.
- The use of a damp or damaged panel is prohibited.
- If adhesive is left on the lamella or wall for too long, a



- thin dried layer forms on it. This can make it difficult for the lamella to adhere to the surface.
- Thermal insulation lamellas must be pressed onto the substrate and pressed immediately following the application of the adhesive.
- Adhesive between contact surfaces must be removed immediately and completely in order to prevent the formation of thermal bridges.

### 3.3.2.2 FASADEX MW PANELS

When using these panels, the **Fasadex Chromoterm** adhesive application phase must be executed beforehand by injecting loose adhesive into the panel itself. This prevents the insulation panel from delaminating (Figure 15). Mineral wool insulation panels must always be additionally fastened with façade dowels positioned on points containing the adhesive (after drying).

**NOTE:** The thermal insulation material must be evenly pressed over the entire surface of the substrate in order to avoid occurrence of deformations caused by temperature fluctuations between the interior of the building and the outside air ("pillow effect" - Figure 16 or "mattress effect" - Figure 17).



Figure 16 - Low outdoor and high indoor temperature



Figure 17 - High outdoor and low indoor temperature



## 3.4 INSTALLATION OF FASADEX THERMAL INSULATION PANELS

Thermal insulation panels are installed from the bottom up, tightly bonded and joined by a longitudinal alternating connection (Figure 21). They are first installed on the corners of the building, while taking care not to create open grout joints between them. Due to the permitted tolerances of the substrate, the formation of such joints (even those wider than 2 mm) cannot be avoided. Such joints must be closed with strips made from the same thermal insulation material (Figure 18).



Low-expansion polyurethane foam can be used for joints smaller than 4 mm, but only for bonding of EPS panels (Figure 19).



The adhesive must never enter the joints (contact points), i.e. the joints between thermal insulation panels (Figure 20). During installation it is necessary to simultaneously pay attention to the aforementioned and clean the joints before installing thermal insulation panels.



In each subsequent row, the panels are installed alternately, at a distance of half of the panel's width (Figure 21). Excess panel material at the corners is cut after the adhesive has cured (2-3 days), while paying attention to the evenness of the surface. Expansion joints in the substrate must also be transferred to the system. After placing each row of panels, it is necessary to inspect the evenness of the panels by using a lathe. When cutting panel sections, make sure that the cut is made at a right angle and with the use of appropriate tools:

- Use a glow-wire for EPS;
- Use a knife or a handsaw for mineral wool.

In corners of the cladding, the panels overlap alternately. Panels narrower than 50 cm must not be used around the openings or in corners. The installation of panels narrower than 20 cm should be avoided.



Panels that are installed in corners of openings intended for doors and windows are to be cut in an L-shaped form. By doing so, the corner is surrounded by one insulation piece, as shown in Figure 22. This way the insulation does not meet in the corners of an opening. Exposed parts are to be insulated after the base surfaces have bonded. Afterwards, sealing strips or window profiles are placed on the window or door frame of the contact surface.



**NOTE:** Details pertaining to all connections (connections around windows and doors, balconies, connections to the window sills, roof, or to the roller blind housing...) are especially important and are often not given enough attention during execution thereof, which in turn results in the occurrence of moisture, falling-off of system components, etc. Connection details must be defined in the design, and executed in accordance with the details. Windows and doors must be installed according to the manufacturer's instructions and in accordance with the design.

After installation, **Fasadex insulation panels** must be left untouched for a minimum of 72 hours under normal drying conditions, or longer, depending on the conditions, until the load bearing properties of the adhesive can become applicable. Afterwards, make sure that the panels are level by using a 4 m-long flat lath. Possible uneven points are sanded at right angles. Uneven points are sanded perpendicular to panel joints / connection points. After panel sanding, small particles and grains of Styrofoam must be removed. Sanding with smaller pieces of sandpaper or sanding parallel to the joints or circularly will usually result in the formation of "waves" on the panels, which, along with the entry of adhesive into panel joints, is one of the reasons for the occurrence of panel contours on the façade. Due to the exposure to UV rays, the surface of EPS panels turns yellow. The chemically degraded layer (yellowish layer) must be completely sanded.

**NOTE:** In addition to single-layer installation of thermal insulation panels/lamellas described herein, it is also possible to install them in two layers. Such a procedure requires a test of building physics. Insulation panel and lamella thickness must be equal. When installing double-layer insulation, the first layer is bonded in accordance with these guidelines. The second layer of insulation materials is bonded completely to the first layer of insulation panels with alternating overlaps. If additional mechanical fastening is required, EPS panel anchors can be installed in the first layer. In case of any other insulation material, the anchors must pass through both insulation material layers.

### 3.5 FIXING OF FASADEX THERMAL INSULATION PANELS



The primary function of the anchors (dowels) is to press the plate against the wall and take over the wind breaking force. The substrate must be correctly installed. This ensures a permanent connection between the thermal insulation and the substrate - either just by bonding or by bonding with the use of additional mechanical fasteners. EPS thermal insulation panels on load-bearing substrates can be additionally fastened with façade dowels 72 hours after having bonded, i.e. after the adhesive has dried. EPS panels and mineral wool lamellas on new buildings and in TISs with a surface mass of <math><30 \text{ kg/m}^2</math> do not require additional fastening with façade dowels - unless otherwise stipulated due to the location of the building and the average strength of local winds. For buildings taller than 8 m, the use of dowels for fastening of EPS panels is mandatory. When a connection between the adhesive and the substrate, which was executed by bonding panels/lamellas, is of "questionable" quality (e.g. when performing thermal rehabilitation on existing façades or in case old buildings), the system must always be additionally mechanically fastened with anchors. Fastening is also required in case of high wind loads occurring in areas where base wind speeds are  $v_{\text{ref},0} > 30 \text{ m/sec}$  or in case of buildings taller than 22 m. For systems with a surface mass (insulation + reinforcement layer + finishing-decorative plaster) greater than  $30 \text{ kg/m}^2$ , it is necessary to perform a detailed analysis of the load and load-bearing capacity of the system. Selecting the type and number of anchors is often part of a building's static design.



### 3.5.1 FIXING WITH RESPECT TO THERMAL INSULATION MATERIALS AND SUBSTRATE

#### 3.5.1.1 FASADEx THERMAL INSULATION PANELS BASED ON EXPANDED POLYSTYRENE (EPS)\*

These panels require additional mechanical fastening, except when they are installed on following substrates:

- Solid and hollow bricks in accordance with HRN EN 771-1 and HRN EN 771-3;
- Precast concrete from cement-bonded wood-chip shuttering blocks without integrated additional insulation and cement-bonded wood-chip thermal insulation panels in accordance with HRN EN 15498;
- Aerated concrete in accordance with HRN EN 771-4, with a tensile strength perpendicular to the surface of  $\geq 150$  kPa.

#### 3.5.1.2 FASADEx THERMAL INSULATION PANELS BASED ON MINERAL WOOL - FIBRES PARALLEL TO THE PANEL SURFACE\*

These panels always require additional mechanical fastening.

#### 3.5.1.3 FASADEx THERMAL INSULATION LAMELLAS - FIBRES PERPENDICULAR TO THE LAMELLA SURFACE\*

Lamellas require additional mechanical fastening, except when they are installed on following substrates:

- Solid and hollow bricks in accordance with HRN EN 771-1 and HRN EN 771-3;
- Concrete in accordance with HRN EN 206-1;
- shuttering blocks without integrated additional insulation and WS and WSD cement-bonded wood-chip thermal insulation panels in accordance with HRN EN 15498;
- Aerated concrete in accordance with HRN EN 771-4 with a tensile strength perpendicular to the surface of  $\geq 150$  kPa.

#### 3.5.1.4 FASADEx THERMAL INSULATION PANELS BASED ON EXPANDED POLYSTYRENE (EPS)\* INTENDED FOR BASES

In addition to the application of adhesive, **Fasadex XPS panels** installed in the plinth area must always be fastened with anchors. This is carried out before the **Fasadex Chromoterm** adhesive begins to bond (wet condition) and by fixing 4 anchors/m<sup>2</sup> or no less than 2 anchors per panel. During the installation of anchors, care should be taken that the anchors do not pass through the waterproofing layer.

### 3.5.2 SELECTION OF ANCHORS

When selecting dowels, care must be taken to ensure that they are suitable for the substrate, the façade system and that they meet the application-related requirements.

For most insulation panels, the diameter of the dowel head cap must be no less than 60 mm, and in case of lamellas between 100 and 140 mm.

The following should be taken into account when selecting anchors:

- Anchors must meet the requirements of ETAG 014;
- Anchors must correspond to the load category applicable to the existing substrate in accordance with the ETAG 014 guideline;
- If the substrate does not correspond to any category listed in ETAG 014, the load bearing capacity of the anchors must be tested at the construction site via a pull off test;

Substrate categories according to ETAG 014:				
A	B	C	D	E
Concrete	Solid bricks	Hollow bricks	Lightweight concrete	Aerated concrete

- On walls made from precast concrete with cementbonded wood-chip shuttering blocks, the fastening of anchors must be performed in the concrete core;
- When selecting the length of the anchors, one must take into account the thickness of any existing plaster and that of the levelling layer, as well as substrate unevenness. This is done in order to ensure high pull-out resistance of the anchors with respect to the substrate;
- Thermal insulation panels made from expanded polystyrene, extruded polystyrene foam and rock wool require that the rosette diameter be  $\geq 60$  mm;
- Thermal insulation lamellas made of rock wool (fibres perpendicular to the plane) require that the rosette diameter be  $\geq 140$  mm.

### 3.5.3 DRILLING OF HOLES

The following should be considered when drilling holes:

- Drilling may commence only after the Fasadex adhesive has cured sufficiently (usually after three days);
- A drill bit of a specified diameter should be used for drilling (noted on the anchor);
- Electric hammer drills and pneumatic drills should only be used on concrete or solid bricks (Figure 23);
- A vibration-free drill, i.e. a tool provided by the anchor manufacturer, should be used on hollow bricks, hollow brick blocks and aerated concrete;
- Mineral wool panels should be drilled by using a vibrationfree drill;
- Required drilling depth: anchor body length + 10 to 15 mm;
- Drilling depth in load-bearing walls is 50 mm;
- Old façade systems and mortars are not considered to be load-bearing substrates.

Anchors should be placed at the same level as the insulation material or recessed to an appropriate depth required for mounting of insulation plugs (Figures 24 and 25). Depending on the type of anchor, they can be nailed or screwed on. In case of thermal insulation materials, it is recommended that the anchors be covered with insulation plugs (Figure 26). Dowels must be firmly nailed. Insufficiently fastened dowels must be removed and new ones installed. In addition, the resulting hole should be filled with insulation material. Fixing is performed in points that contain adhesive between the panel and the wall. Dowel connections are made under the reinforcement layer.

### 3.5.4 NUMBER OF ANCHORS AND MOUNTING THEREOF

Wind action represents the most significant load to which the ETICS system is exposed. Primary function of anchors is to take over the tensile load applied by the wind that acts perpendicular to the system surface. In accordance with the applicable Croatian standard HRN EN 1991-1-4:2012 - Eurocode 1: Actions on structures – Part 1-4: General wind actions (EN 1991-1-4:2005+AC:2010+A1:2010) and HRN EN 1991-1-4:2012/NA:2012 - Eurocode 1: Actions on structures – Part 1-4: General actions – Wind actions. This load depends on the geographical position, i.e. on nominal wind speed, building height, terrain category and altitude. This standard also stipulates edge zone width with respect to the height and layout of the building. The edge zones are exposed to greater wind loads and are therefore fastened more tightly. The number of anchors depends on the type of substrate and the selected façade system.

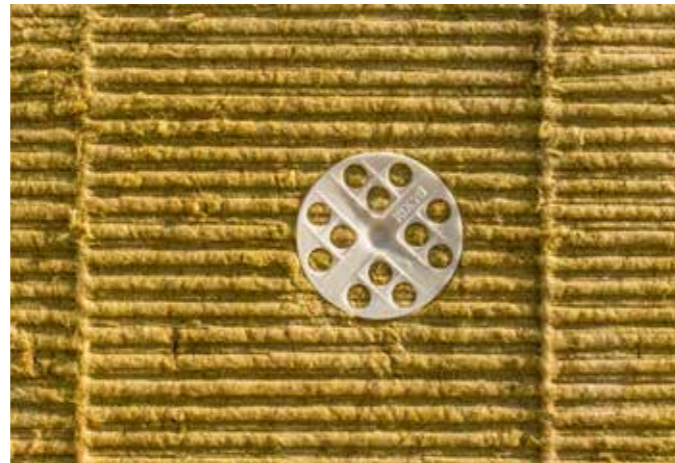


### 3.5.4.1 NUMBER OF ANCHORS

The number of anchors is determined based on wind load and the load capacity of the selected anchor in combination with the relevant substrate. The required number of anchors is min. 6 pcs / m<sup>2</sup>. In case of taller buildings, old substrates and stronger winds, and depending on the requirements, their number can reach up to 12 pcs / m<sup>2</sup>. Depending on wind speed, the shape of the terrain surrounding the building and its height, the number of anchors in edge zones can be increased to 12 anchors per m<sup>2</sup>. The width of the edge zone on both sides must be no less than 1 m. Width of edge zone A is shorter by one fifth of the doubled height value (2 h) or of the adjacent side of the building (b);  $e = \min(2h; b)$ , where b is the width of the adjacent side, and the width of the edge zone is  $A = 1/5 * e$ . The design engineer must specify the number of dowels for the façades in the design documentation, and the contractors must adhere to that number.



Example of an incorrectly installed anchor



Example of a properly installed anchor



Example of a properly installed anchor

### 3.5.4.2 INSTALLATION OF ANCHORS

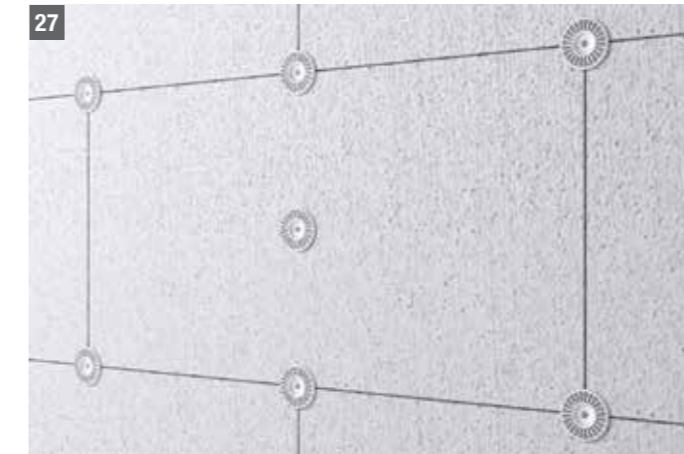
The following should be taken into consideration when selecting anchors:

- Anchors may only be installed when the **Fasadex** adhesive has cured (usually after three days);
- Anchors should be installed so that the top of the rosette is levelled with the surface of the panel/ lamella. Take into consideration that this is not applicable when the rosette is inserted into the thermal insulation material (anchors with rondelles)
- Depending on the type of anchor, the needle can be in the shape of a thorn or screw;
- After installation, make sure that the anchors are firmly fastened to the substrate;
- Anchors that are over-pressed and those that are not firmly fastened must be removed and new ones must be installed. The resulting holes should be filled with the same thermal insulation material.

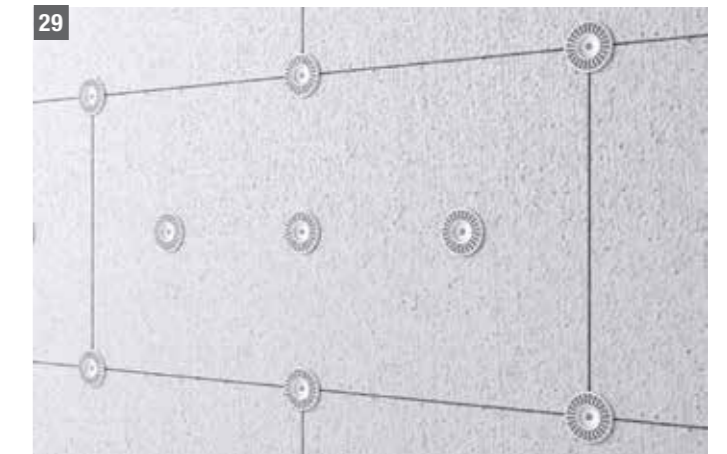
### 3.5.4.3 INSTALLATION SCHEME

The T-installation pattern is used in systems with EPS. Anchors are positioned in the centre of the panel and at the contact points of vertical and horizontal joints (T-joints). See Figures 27 to 30.

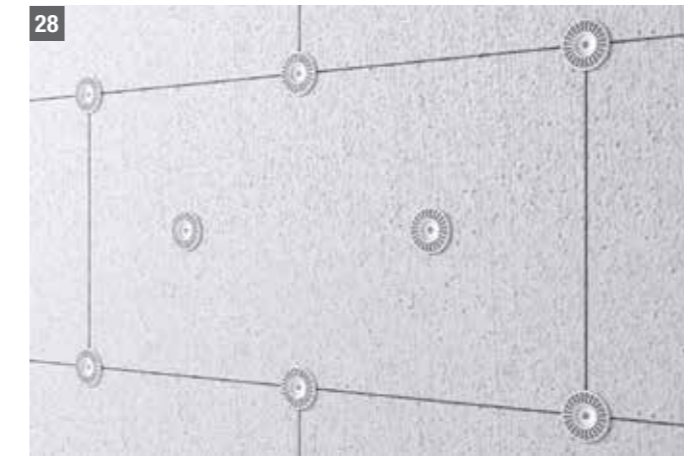
T-installation pattern with 6 anchors and EPS F panels (100 x 50 cm)



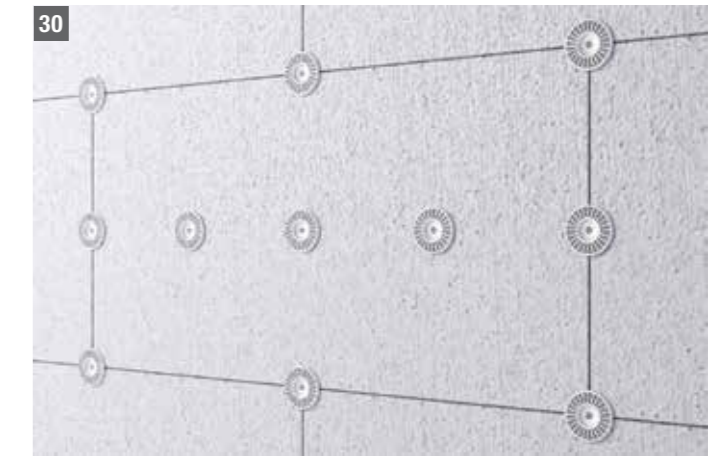
T-installation pattern with 10 anchors and EPS F panels (100 x 50 cm)



T-installation pattern with 8 anchors and EPS F panels (100 x 50 cm)



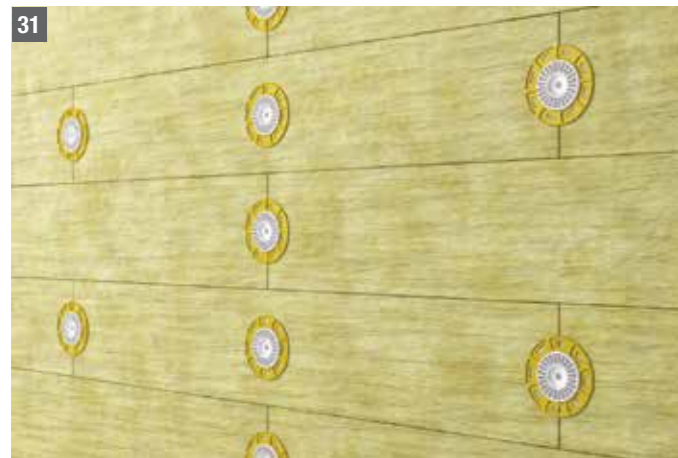
T-installation pattern with 12 anchors and EPS F panels (100 x 50 cm)



In systems made from mineral wool lamellas, the anchors are installed as shown in Figure 31, where one anchor is installed into the centre of the panel of every second row.

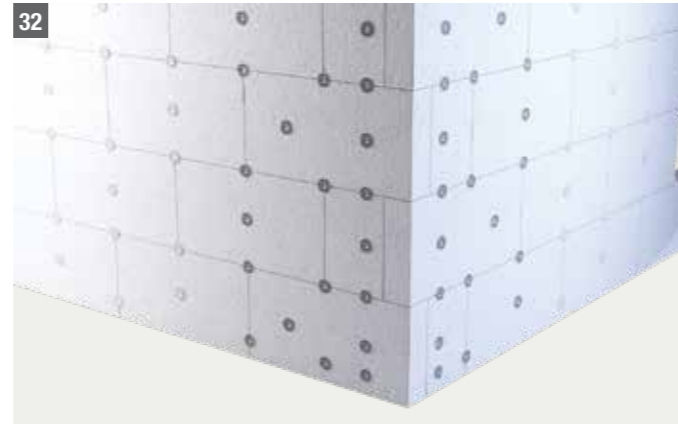
The W-installation pattern is used in systems with mineral wool products. Anchors are installed in W-shaped patterns. It is mandatory that they pass through the adhesive layer. Distance between the rosette and panel edge must be approximately 5 cm.

Anchor installation pattern in MW lamellas (120 x 20 cm)

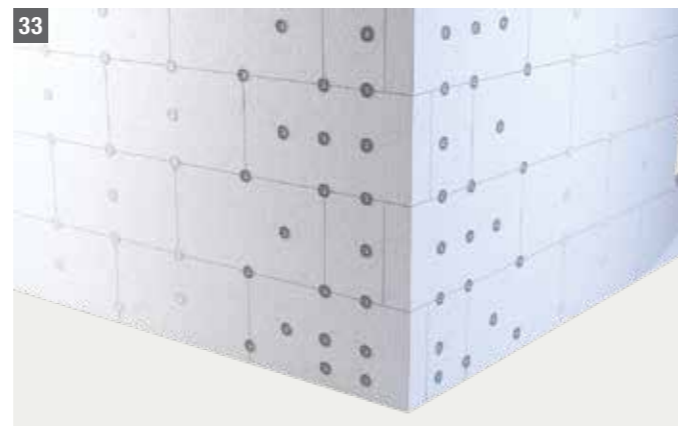


**Additional installation patterns used for fastening of edges of insulation elements with 8, 10 or 12 anchors/m<sup>2</sup>**

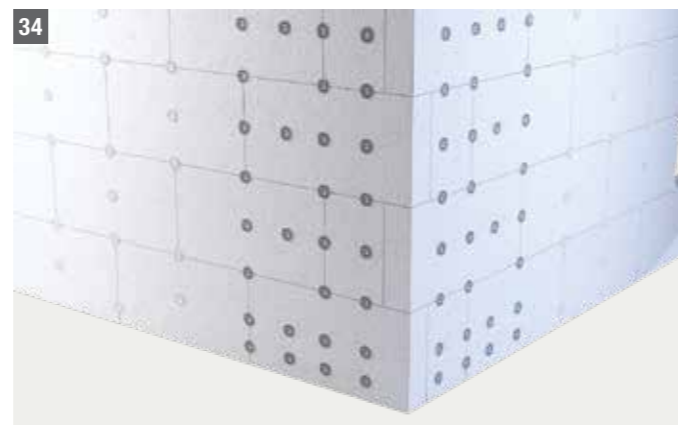
T-installation pattern with 6 dowels on the surface and a peripheral zone with 8 dowels for EPS F panels (100 x 50 cm)



T-installation pattern with 6 dowels on the surface and a peripheral zone with 10 dowels for EPS F panels (100 x 50 cm)



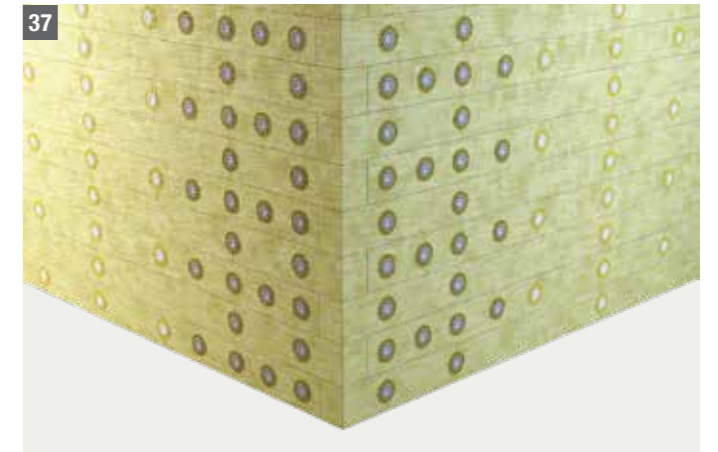
T-installation pattern with 6 dowels on the surface and a peripheral zone with 12 dowels for EPS F panels (100 x 50 cm)



MW lamella installation pattern (120 x 20 cm), 6 anchors on the surface and 8 in the edge zone



MW lamella installation pattern (120 x 20 cm), 6 anchors on the surface and 12 in the boundary zone



MW lamella installation pattern (120 x 20 cm), 6 anchors on the surface and 10 in the edge zone



Wind speed in km/h	Area category								
	Windy area of category I			Area with barriers for winds of cat. II			Area with no wind, location of cat. III		
	Building height			Building height			Building height		
	< 10 m	10-25 m	< 25-50 m	< 10 m	10-25 m	< 25-50 m	< 10 m	10-25 m	< 25-50 m
Up to 85	6	6	6	6	6	6	6	6	6
From 85 to 115	8	8	10	6	6	8	6	6	8
From 115 to 135	10	12	12	8	10	10	6	8	10



## 3.6 PREPARATIONS FOR REINFORCEMENT INSTALLATION AND REINFORCEMENT OF FASADEX THERMAL INSULATION MATERIALS

### 3.6.1 PREPARATION AND REINFORCING

The reinforcing layer represents the most important element of the system because it ensures the system's resistance to external effects. Consequently, it is necessary to apply it with special care and while strictly observing the rules of the profession.

Uneven points on already installed **Fasadex EPS** panels must be levelled by using a sander or a special Styrofoam sanding machine. Dust resulting from sanding must be completely removed. Due to the exposure to UV rays, the surface of the panel turns yellow after prolonged exposure to sunlight. Before commencing reinforcement works, it is necessary to completely remove the yellow material from EPS panel surfaces (sand and clean).

Prior to the installation of the reinforcement layer, **Fasadex mineral wool** panels should be coated with an impregnation layer (diluted **Fasadex Chromoterm** adhesive), protected against moisture and good adhesion of the façade system reinforcement layer must be ensured (Figure 37).

Reinforcement works may commence after the **Fasadex adhesive** has dried for 2 to 3 days (or according to product-related instructions). This is done by reinforcing the **Fasadex base coat** (**Fasadex Chromoterm S** for the EPS system, **Fasadex Chromoterm** for the mineral wool system).



First, a base coat (reinforcing compound) must be applied to a properly prepared substrate made of thermal insulation materials. This can be done by manual or machine application, and with a metal notched trowel approximately 3 mm thick. The alkali-resistant Fasadex mesh is pressed into the freshly applied base coat. This is done from top to bottom, in vertical or horizontal strips and with an overlap of no less than 10 cm (Figure 38). To ensure sufficient coverage, the inserted mesh must be wet-on-wet coated with the base coat.



Smoothing is performed from the centre towards the edge, without wrinkles, to the point in which the mesh becomes barely visible. After the base coat has dried (no less than 1 day for each mm of thickness), apply a second coat with a thickness of approximately 2 mm and smooth it. The second coat should be left to dry for two days (i.e., depending on weather conditions), after which a finishing layer should be applied by using **Fasadex finishing-decorative plasters**. All the aforementioned data refer to an application and drying temperature of 23 °C and a relative humidity of 60%. In other conditions, the drying process may be longer or shorter. The optimum operating temperature is between +5 and +30 °C.



Installation of the reinforcement layer should commence no later than 14 days from the day of thermal insulation installation.

### 3.6.2 FORMING OF CORNERS (EDGES)

When installing building elements such as lightning rods, sockets, rain gutters or similar on insulation layers, it is necessary to ensure permanent protection against penetration of water into the thermal insulation system. Such protection must be installed in accordance with the building design, its location and wind speed at the relevant micro-location. Permanent protection is possible only if technically proper and stipulated façade profiles are used.

### 3.6.3 DIAGONAL REINFORCEMENT

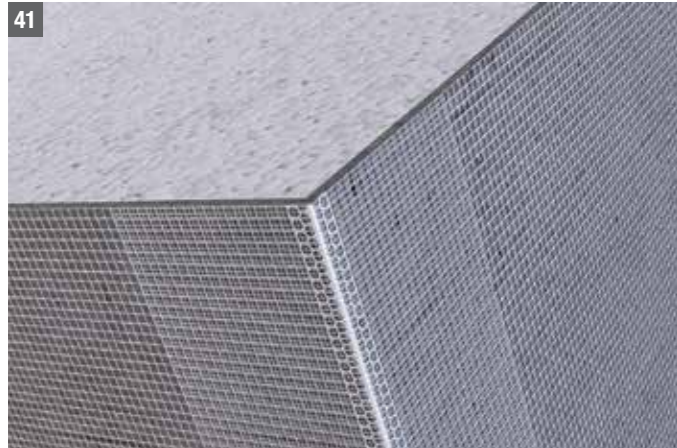
Diagonal reinforcements around window and door openings are mandatory. They are installed prior to surface reinforcement and fastened so that strip edges are placed at an angle of approximately 45°. Strip dimensions are usually 30 × 40 cm. The first fibres are positioned all the way in the corner, i.e. the mesh cuts into the corner (Figure 40).

The shortest reinforcing strips are 20 × 40 cm in size, and they are considered to be technically acceptable for use on smaller and lower buildings.

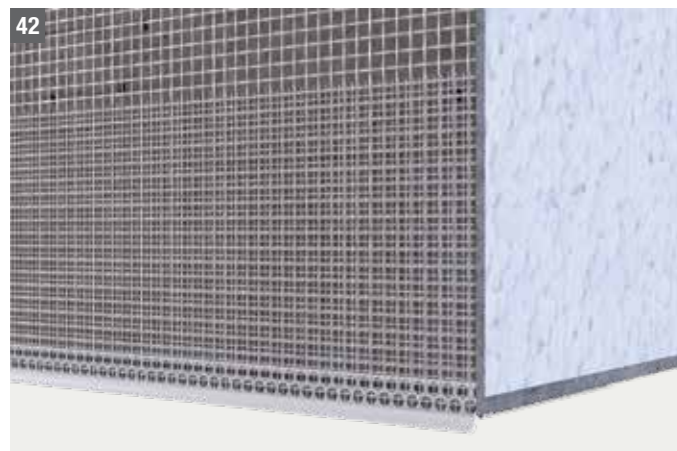


### 3.6.4 FORMING OF EDGES

When using PVC edge and drip edge profiles with a mesh made of textile glass for façades, or PVC corner pieces with meshes, it is necessary to apply a base coat along the entire width of the planned extension. This allows the PVC edge or drip edge profiles and mesh extensions to be installed into the base coat. The connection must be made with an overlap of 10 cm (Figure 41).



Façade meshes made of textile glass can be used to form edges without precast profiles. This is done by pulling the mesh over the edge on one side (approximately 15 to 20 cm) and by inserting it into the base coat with an overlap of no less than 10 cm.

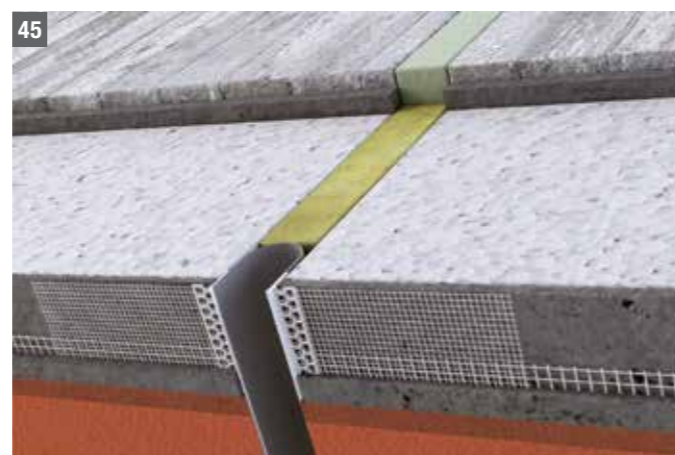
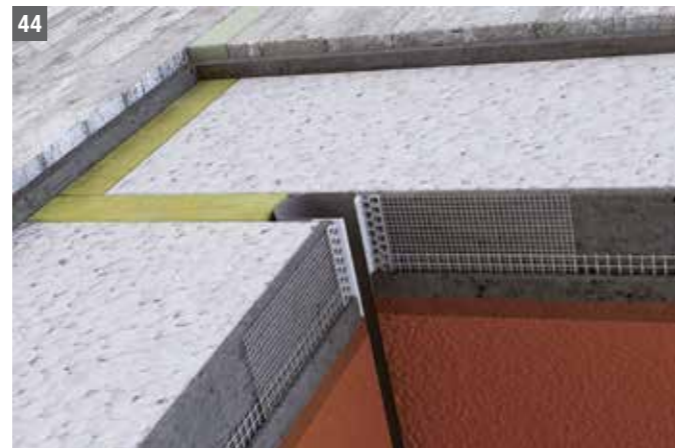


Drip edge profiles for window trims are used on edges in order to ensure proper stormwater drainage, which can moisten the façade surface with the help of the wind (Figure 42).



### 3.6.5 EXPANSION PROFILES

These are used to bridge the stretches of larger surfaces that are statically expanding and shrinking due to the effect of heating and cooling. Such surfaces move more than a façade system without expansion joints can withstand. Surface movements can be caused by static building movements (Figures 44 and 45). Expansion joints in the substrate must also be transferred to the system.



### 3.6.6 SPECIAL FEATURES OF FAÇADE SECTIONS SUBJECTED TO INCREASED MECHANICAL LOADS

These parts of the façade can be installed in two ways:

- By using reinforced glass mesh (so-called "Armor mesh") - prior to the installation of protective corner profiles (angles) and surface reinforcement, the reinforced glass mesh (210-350 g / m<sup>2</sup>) is installed in an approximately 2 mm-thick layer of **Fasadex mortar** intended for the reinforcement layer (no overlaps).
- By installing a reinforcement layer with a double, standard-stipulated glass mesh - the first mesh layer is installed in a freshly applied **Fasadex mortar** layer without overlaps (blunt joint); and, after the first layer of mortar has sufficiently cured, a second mesh layer is inserted into the freshly applied second layer of mortar so that the overlap does not coincide with the blunt joint of the first mesh layer.

Reinforcement layer thickness and glass mesh positioning:

Nominal thickness (mm)	Minimum thickness (mm)	Average thickness (mm)	Mesh position	Applies to ETICS system based on
3	2.5	≥3.0	Middle	EPS
5	4	≥4.5	Upper third	EPS; MW
8	6	≥7.0	Upper third	MW





## 3.7 FINISHING LAYER

### 3.7.1 INSTALLATION OF FASADEx FINISHING-DECORATIVE PLASTERS

After the prescribed drying time of the **Fasadex reinforcement layer** has passed, and 24 hours prior to the application of the **Fasadex finishing-decorative plaster**, a coarse coat of the primer - **Fasadex grund** - should be applied by using a roller or a paintbrush. When applying an intense shade of plaster, it is also necessary to shade the primer in accordance with the tone of the finishing layer. This way, the "sifting" of the substrate is prevented and a uniform surface appearance is achieved.

**Fasadex finishing-decorative plasters** are applied onto a completely dry and solid surface. During the finishing and bonding stages, the temperature of the air, material and substrate must exceed +5 °C (for silicate plasters over +8 °C), but it must not exceed +35 °C. Relative air humidity must not exceed 80%. The plaster must not be applied onto a surface that is directly exposed to sunlight (protect the façade with a screen) or in windy, foggy or rainy weather conditions. In case of premature application of the finishing-decorative plaster, there is a risk of staining, and in extreme cases, a risk of occurrence of bubbles or cracking.

Depending on the installed system, there are different types of Fasadex finishing-decorative plasters that can be applied. The minimum thickness of the finishing-decorative plaster of a grained structure is 1.5 mm, and 2 mm in case of grooved plasters. The required quantity of materials, i.e. of finishing-decorative plasters, must be ordered for the entire building in a single order. In order to avoid the occurrence of visible joints on transitions between individual scaffolding

levels, it is necessary to ensure a sufficient number of workers and to execute works on the transitions in a "wet-on-wet" manner. This will reduce the risk of occurrence of uneven colours and structure. Interruptions in the execution of works on one surface are not permitted. Change of conditions during the plaster bonding or application phase can result in unevenness in terms of shade. Another important function of the finishing-decorative plaster is also the protection of lower system layers against weather effects. The smaller the granulation of the finishing plaster, the more difficult it is to fulfil this task. Consequently, the min. layer thickness values stipulated for different buildings should be strictly observed. Finishing-decorative plasters can be additionally coated with suitable façade paint coatings. In this case, attention should be paid to the reflectance value of the façade paint shade, and the time required for substrate drying should also be observed.

Before using **FASADEx finishing-decorative plasters**, it is necessary to properly mix them by using a slow-rotating mixer while they are in their original packaging. If necessary, plaster consistency can be altered by adding water (max. 1.0 dcl per bucket of plaster). Apply manually and evenly with a stainless steel trowel and make sure that the depth corresponds to the thickness of the largest grain. As an alternative, you may apply it by spraying with a suitable machine.

**FASADEx finishing-decorative plasters** with a Z-structure should immediately be structured by using a plastic trowel until a uniform texture is achieved. After a short drying period, the **FASADEx finishing-decorative plasters with an**

**R structure** should be spread by using a plastic trowel to form the desired structure: circular, vertical or horizontal.

Do this in a uniform and continuous manner. When executing plastering works with a trowel, it is important to repeat the direction of rotation. Otherwise, pebbles from different sides are smoothed, which is later reflected in the final appearance of the façade. One can also rotate the trowel so that its movements form the no. "8".

Under standard drying conditions (t = + 20°C, relative air humidity: 65%), the plaster is dry to the touch after 6–10 h. After 24 hours, the surface no longer needs to be protected against precipitation. Low temperatures and high air humidity can significantly prolong the drying time. In such conditions, the surface must be protected against precipitation for longer periods.

#### NOTES:

**FASADEx finishing-decorative plasters** contain a biocidal agent that prevents the formation of mould and algae in conditions of moderate exposure.

When selecting shades of **FASADEx finishing-decorative plasters**, which are to be used as finishing layers in external thermal insulation composite systems, it is necessary to take into consideration the reflectance value (HBW - value). Reflectance is a numerical value that indicates the amount of reflected sunlight. The lower the value, the darker the shade, and the more heated the façade. This significantly increases thermal stresses in the reinforcing and finishing layers and the risk of crack occurrence. This is especially important in ETICS systems because the heat transfer from the upper layers to the substrate is almost non-existent due to the thermal insulation layer. Consequently, almost all thermal stresses have to be absorbed by the relatively thin reinforcing and finishing-decorative layers. In order to reduce the risk of crack occurrence, reflectance (depending on the type of binder of the finishing-decorative plaster) must be  $\geq 25$  in case of **Fasadex acrylic and silicone plasters**, and  $\geq 30$  in case of **Fasadex silicate plasters**. Due to possible minor deviations in shade between different batches, we recommend that the same batch of **FASADEx finishing-decorative plaster** be used for one surface. When reproducing shades in **FASADEx finishing-decorative plasters**, slight deviations from the étalon (tone chart) are possible due to the differences in plaster structure and granulation and due to different drying conditions.

### 3.7.2 GRANULATION AND PROCESSING OF FINISHING-DECORATIVE ACRYLIC, SILICATE, SILICONE AND SI-SI PLASTERS

**GRANULATION:**  
1.5 / 2.0 / 2.5 mm

**FINISHING:**  
Z (granular)



#### MATERIAL:

**FASADEx ACRYLIC DECORATIVE PLASTER**  
**FASADEx SILICATE DECORATIVE PLASTER**  
**FASADEx SILICONE DECORATIVE PLASTER**  
**FASADEx SI-SI DECORATIVE PLASTER**

**GRANULATION:**  
1.5 / 2.0 / 2.5 mm

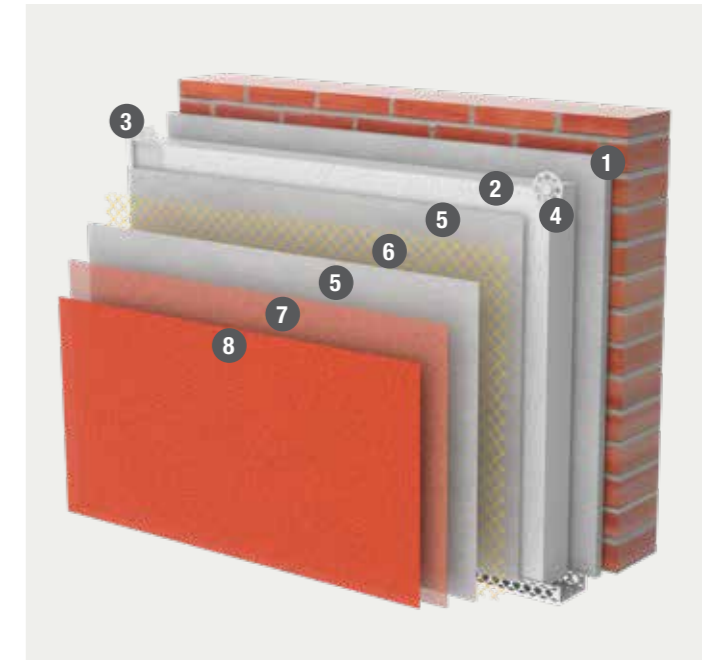
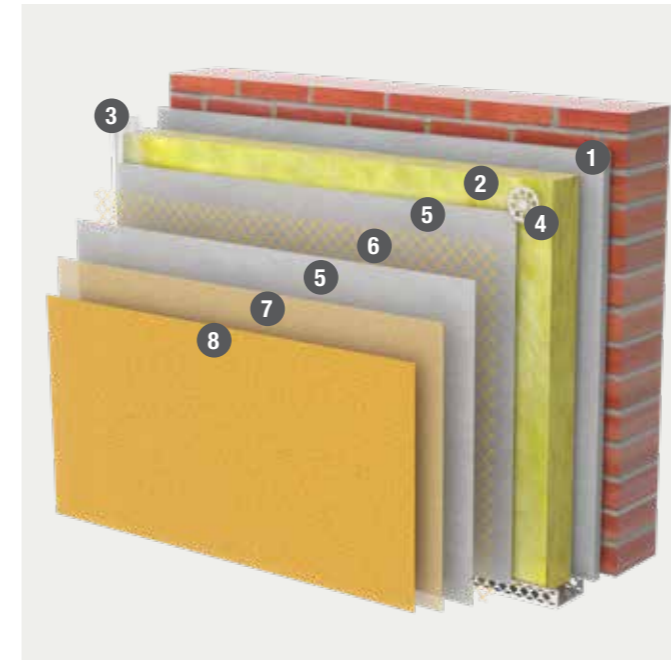
**FINISHING:**  
R (grooved)



#### MATERIAL:

**FASADEx ACRYLIC DECORATIVE PLASTER**  
**FASADEx SILICATE DECORATIVE PLASTER**  
**FASADEx SILICONE DECORATIVE PLASTER**  
**FASADEx SI-SI DECORATIVE PLASTER**

## 4. FASADEx THERMAL INSULATION SYSTEM COMPONENTS



1. ADHESIVE  
- FASADEx CHROMOTERM / FASADEx CHROMOTERM S
2. INSULATION COATING  
- FASADEx INSULATION PANELS (MW/EPS)
3. CORNER PROFILES
4. ANCHORS
5. BASE COAT  
- FASADEx CHROMOTERM / FASADEx CHROMOTERM S
6. REINFORCEMENT  
- FASADEx reinforcing mesh
7. PRIMER  
- FASADEx GRUND
8. FINISHING LAYER  
- FASADEx FINISHING-DECORATIVE PLASTER

## 4.1 ADHESIVE

### FASADEx CHROMOTERM S

Polymer-modified cement mortar for bonding and finishing of EPS panels.

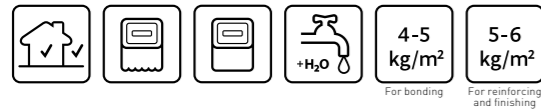
#### INTENDED USE OF THE PRODUCT:

For internal and external application and for manual and machine-based finishing. It is used as an adhesive for bonding Styrofoam panels (EPS) onto mineral substrates. It is also used as a mortar for laying of glass mesh onto Styrofoam panels (reinforcing) and as a finishing compound (smoothing) prior to the application of the finishing-decorative plaster.

- Vapour-permeable;
- Elastic;
- Excellent properties with respect to application.

#### UPUTE ZA UPORABU:

- It is prepared by adding clean water in a 4:1 ratio (powder : water);
- It is applied either manually or by using machines in one (bonding) or two layers (reinforcement and finishing).



#### CONSUMPTION:

Bonding: 4.0–5.0 kg/m<sup>2</sup>  
Reinforcing and finishing: 5–6 kg/m<sup>2</sup>

PACKAGING: 25 kg

### FASADEx CHROMOTERM

Elastic polymer-modified cement mortar with fibres for bonding and finishing of thermal insulation panels (EPS, MW, XPS).

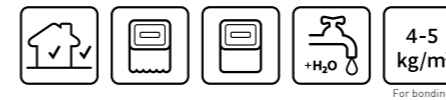
#### INTENDED USE OF THE PRODUCT:

An adhesive for internal and external bonding of thermal insulation panels onto mineral substrates. It is also used as a mortar for laying of glass mesh onto thermal insulation panels (reinforcing) and as a finishing compound (smoothing) prior to the application of the finishing-decorative plaster. It is suitable for Styrofoam panel (XPS) bonding and finishing.

- Vapour-permeable;
- Highly elastic;
- Reinforced with microfibres.

#### INSTRUCTIONS FOR USE:

- It is prepared by adding clean water in a 4:1 ratio (powder : water);
- It is applied either manually or by using machines in one (bonding) or two layers (reinforcement and finishing).



#### CONSUMPTION:

Bonding: 4.0 – 5.0 kg/m<sup>2</sup>  
Reinforcing and finishing: approximately 6 kg/m<sup>2</sup>

PACKAGING: 25 kg

## 4.2 THERMAL INSULATION MATERIALS

### FASADEX EPS PANELS

Manufactured in accordance with HRN EN 13163:2012+A1:2015, HRN EN 13172:2012 and technical guideline ETAG 004:2013.

The panels are of a white colour, odourless, flame retardant (do not support flame spreading); they are not harmful to human health, they do not contain CFC and they are not resistant to organic solvents. Panels are of a rectangular shape, with dimensions of 1000 x 500 mm and a thickness between 10 to 30 mm, with a straight edge, or with a thickness of 40 to 150 mm with an overlap. The panels are dimensionally stabilized (aged). They are stable at temperatures of up to 80 °C, and in case of short-term exposure up to 95 °C.



### FASADEX MW PANELS AND LAMELLAS

- High thermal insulation;
- High delamination resistance;
- Building fire protection;
- Simple and fast installation despite the mandatory anchoring;
- High vapour permeability
- Excellent for renovation and suitable for all types of thin-layer façades;
- For renovation of old buildings and construction of new buildings;
- Hydrophobic;
- Resistant to chemicals and micro-organisms.



Essential characteristics	Designation	Tolerance	Unit
Thermal conductivity	$\lambda$	$\leq 0.035$	[W/mK]T
Reaction to fire class	-	Class A1	-
Tensile strength	omt	$\geq 10$	kPa

## 4.3 FASADEX REINFORCING MESH

### FASADEX REINFORCING MESH

High-quality textile-glass mesh, alkali-resistant, for reinforcement of thermal insulation systems

#### INSTRUCTIONS FOR USE:

A base coat (approximately 3 mm) should be applied onto a prepared substrate made from thermal insulation materials. The alkali-resistant Fasadex mesh is pressed into the freshly applied base coat. This is done from top to bottom, in vertical or horizontal strips and with an overlap of no less than 10 cm. The inserted mesh must be coated with the base coat by applying the "wet-on-wet" method, so that the mesh becomes barely visible. After the base coat has dried (no less than 1 day for each mm of thickness), apply a second coat with a thickness of approximately 2 mm and smooth it.



## 4.4 ANCHORS

Anchors for expanded polystyrene (EPS) and mineral wool (MW) thermal insulation systems.

Anchors significantly increase the load bearing capacity of the ETICS system with respect to wind loads. Calculations for negative pressure values (pullout) that affect the façade surface are made based on the aforementioned standard. The type and number of anchors per m<sup>2</sup> (6 -12 pcs/m<sup>2</sup>) is selected based on the obtained results and depending on the load bearing capacity of the selected anchor when applied on a specific substrate. When mounting anchors, the drilling method (with or without vibrations) and the drill bit type must be conformed to the substrate.



## 4.5 PRIMER/IMPREGNATION

### FASADEx GRUND

Universal course primers based on an acrylic polymer dispersion in water.

#### INTENDED USE OF THE PRODUCT:

Impregnation of external and internal walls prior to the application of FASADEx finishing protective-decorative plasters. It can be applied onto concrete surfaces, all mineral plasters, fibre-cement and drywall panels.

- Bridges small cracks;
- Levels the structure and absorbency of the substrate;
- Improves adhesion and quality of the finishing layer;
- Helps achieve a uniform shade of the finishing layer.

#### INSTRUCTIONS FOR USE:

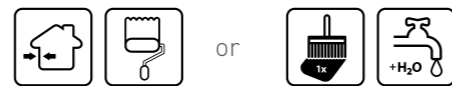
Properly mix FASADEx GRUND in its original packaging by using a mixer and dilute it with approximately 10% water. Apply with a roller or paintbrush (brush). Drying time prior to finishing is 24 hours.

CONSUMPTION: 0.18–0.20 kg/m<sup>2</sup>



**PACKAGING:** 8 and 25 kg

**SHADING:** At retail stores (CHROMOMIX SYSTEM); it is recommended to shade FASADEx grund in the tone of the finishing plaster, especially if it is of a deep tone.



## 4.6 FINISHING PROTECTIVE AND DECORATIVE PLASTERS

### FASADEx SILICONE PLASTER

Mixed structural finishing plaster based on acrylic binder, silicone resin and a siloxane additive.

#### INTENDED USE OF PRODUCT:

Used for protection and decoration of external and internal wall surfaces and as a finishing layer in a thermal insulation system (certified in Fasadex EPS and Fasadex MW external thermal insulation composite systems). It is available in a granular (Z) and grooved (R) structure.

- It is resistant to atmospheric effects;
- It is extremely water-repellent and vapour-permeable;
- It is resistant to fouling;
- It is resistant to abrasion and impacts;
- Universal application.

#### INSTRUCTIONS FOR USE:

Before using FASADEx silicone plasters, it is necessary to properly mix them in their original packaging by using a mixer. If necessary, plaster consistency can be altered by adding water (max. 1.0 dcl per bucket of plaster). Apply manually and evenly with a stainless steel trowel and make sure that the depth corresponds to the thickness of the largest grain. As an alternative, you may apply it by spraying with a suitable machine. FASADEx silicone plasters with a Z-structure should be structured by using a plastic trowel until a uniform texture is achieved. FASADEx silicone plaster with an R-structure should be spread by using a plastic trowel until the desired structure is achieved: circular, vertical or horizontal. Do this in a uniform and continuous manner.



#### CONSUMPTION:

Granulation 1.5 mm: 2.4 kg/m<sup>2</sup>

Granulation 2.0 mm: 3.0 kg/m<sup>2</sup>

Granulation 2.5 mm: 3.2 kg/m<sup>2</sup>

**PACKAGING:** 25 kg

**SHADING:** At retail stores (CHROMOMIX SYSTEM); wide range of pastel and deep tones from the CHROMOMIX tone chart. We recommend selection of shades with a high UV resistance.



## FASADEX ACRYLIC PLASTER

Finishing protective-decorative plaster based on an acrylic polymer dispersion in water. Manufactured with a granular (Z) and grooved (R) structure.

### INTENDED USE OF THE PRODUCT:

As a mixed structural finishing plaster, for façades installed on base plasters (renders), levelling compounds, concrete surfaces and as a finishing layer in FASADEX EPS thermal insulation systems.

- Water-repellent, vapour-permeable;
- Resistant to atmospheric effects;
- Resistant to abrasion and impacts;
- Elastic.

### INSTRUCTIONS FOR USE:

Before using FASADEX acrylic plasters, it is necessary to properly mix them in their original packaging by using a mixer. If necessary, plaster consistency can be altered by adding water (max. 1.0 dcl per bucket of plaster). Apply manually and evenly with a stainless steel trowel and make sure that the depth corresponds to the thickness of the largest grain. As an alternative, you may apply it by spraying with a suitable machine. FASADEX acrylic plasters with a Z-structure should be structured by using a plastic trowel until a uniform texture is achieved. After a short drying period, FASADEX acrylic plasters with an R-structure should be spread by using a plastic trowel to form the desired structure: circular, vertical or horizontal. Do this in a uniform and continuous manner.



### CONSUMPTION:

Granulation 1.5 mm: ~ 2.5 kg/m<sup>2</sup>  
Granulation 2.0 mm: ~ 3.0 kg/m<sup>2</sup>  
Granulation 2.5 mm: ~ 3.2 kg/m<sup>2</sup>

**PACKAGING:** 25 kg

**SHADING:** At retail stores (CHROMOMIX SYSTEM); wide range of pastel and deep tones from the CHROMOMIX tone chart. We recommend selection of shades with a high UV resistance.



## FASADEX SI-SI PLASTER

Finishing protective-decorative plaster based on an acrylic polymer dispersion in water, potassium silicate solution and special hydrophobic modified mineral fillers.

### INTENDED USE OF PRODUCT:

It is used as a mixed structural finishing plaster for protection and decoration of external wall surfaces and on old and new mineral-based plasters, on levelling compounds, and concrete surfaces; and as a finishing layer in FASADEX MW thermal insulation systems.

- Prevents accumulation of moisture in the substrate;
- Mineral surface properties (low fouling tendency);
- Resistant to atmospheric effects;
- Water-repellent and vapour-permeable;
- It is resistant to abrasion and impacts.

### INSTRUCTIONS FOR USE:

Before using FASADEX Si-Si plasters, it is necessary to properly mix them in their original packaging by using a mixer. If necessary, plaster consistency can be altered by adding water (max. 1.0 dcl per bucket of plaster). Apply manually and evenly with a stainless steel trowel and make sure that the depth corresponds to the thickness of the largest grain. As an alternative, you may apply it by spraying with a suitable machine. FASADEX Si-Si plasters with a Z-structure should be structured by using a plastic trowel until a uniform texture is achieved. After a short drying period, FASADEX Si-Si plasters with an R-structure should be spread by using a plastic trowel to form the desired structure: circular, vertical or horizontal. Do this in a uniform and continuous manner.



### CONSUMPTION:

Granulation 1.5 mm: 2.6 kg/m<sup>2</sup>  
Granulation 2.0 mm: 3.0–3.2 kg/m<sup>2</sup>  
Granulation 2.5 mm: 3.2–3.5 kg/m<sup>2</sup>

**PACKAGING:** 25 kg

**SHADING:** At retail stores (CHROMOMIX SYSTEM); in a wide range of pastel tones from the CHROMOMIX tone chart. Deep tones cannot be achieved when using FASADEX Si-Si plaster.

## FASADEx SILICATE PLASTER

Finishing protective-decorative plaster based on an acrylic polymer dispersion in water and a potassium silicate solution. Manufactured with a granular (Z) and grooved (R) structure.

### INTENDED USE OF THE PRODUCT:

As a mixed structural finishing plaster, for façades installed on base plasters (renders), levelling compounds, concrete surfaces and as a finishing layer in FASADEx MW thermal insulation systems.

- Highly vapour-permeable;
- Resistant to atmospheric effects;
- Resistant to abrasion and impacts;
- Resistant to fouling.

### INSTRUCTIONS FOR USE:

Before using FASADEx silicate plasters, it is necessary to properly mix in their original packaging them by using a mixer. If necessary, plaster consistency can be altered by adding water (max. 1.0 dcl per bucket of plaster). Apply manually and evenly with a stainless steel trowel and make sure that the depth corresponds to the thickness of the largest grain. As an alternative, you may apply it by spraying with a suitable machine. FASADEx silicate plasters with a Z-structure should be structured by using a plastic trowel until a uniform texture is achieved. After a short drying period, FASADEx silicate plasters with an R-structure should be spread by using a plastic trowel to form the desired structure: circular, vertical or horizontal. Do this in a uniform and continuous manner.



### CONSUMPTION:

Granulation 1.5 mm: ~ 2.5 kg/m<sup>2</sup>

Granulation 2.0 mm: ~ 3.0 kg/m<sup>2</sup>

**PACKAGING:** 25 kg

**SHADING:** At retail stores (CHROMOMIX SYSTEM); in a wide range of pastel tones from the CHROMOMIX tone chart. Deep tones cannot be achieved when using FASADEx silicate plaster.



## FASADEx MOZAIK

Protective-decorative plaster based on an acrylic dispersion and coloured mineral grains.

### INTENDED USE OF THE PRODUCT:

For forming of façade bases (socles), trimmings or decorations on base plasters, concrete, external and inner walls, columns, staircases, around windows, doors and fireplaces. Manufactured in 10 standard mixes (tones).

- It is resistant to atmospheric effects;
- Water-repellent;
- Resistant to spraying and washing;
- It is resistant to abrasion and impacts.

### CONSUMPTION:

Granulation 1.0 mm: ~2.5 kg/m<sup>2</sup>

Granulation 2.0 mm: ~4.0 kg/m<sup>2</sup>

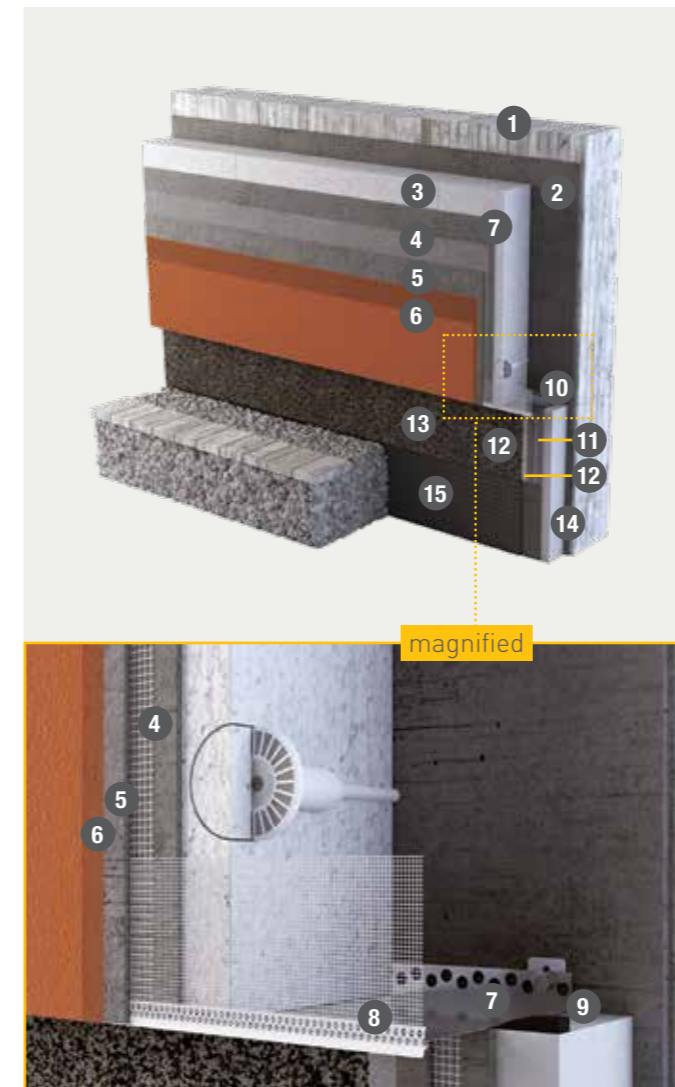
**PACKAGING:** 25 kg



## 5. TECHNICAL DESCRIPTION OF THE INSTALLATION OF FASADEX THERMAL INSULATION SYSTEMS



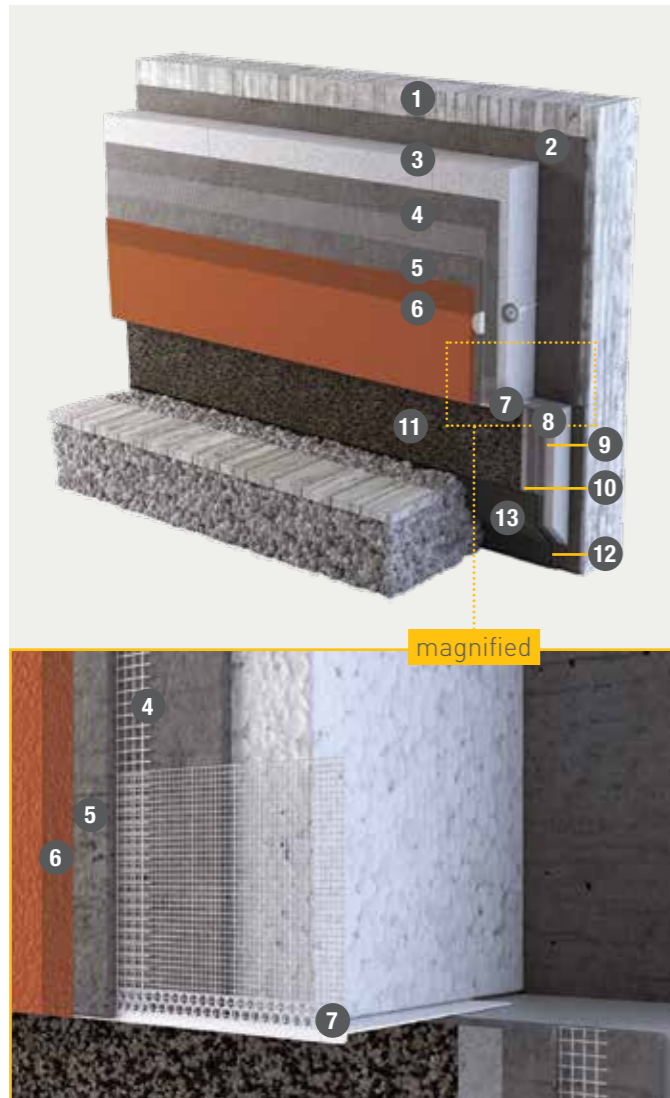
### 5.1 RECESSED FAÇADE BASE - USE OF ALU PROFILES FOR THE BASE



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEX insulation panels
4. FASADEX reinforcing layer with inserted FASADEX reinforcing mesh
5. FASADEX reinforcing layer - second coat
6. FASADEX GRUND with FASADEX finishing - decorative plaster
7. ALU profiles for the base
8. Drip edge profiles for the base
9. Compressed sealing strips BG1
10. FASADEX XPS - insulation panels for bases
11. FASADEX reinforcing layer with inserted FASADEX reinforcing mesh
12. FASADEX reinforcing layer - second coat
13. FASADEX GRUND with FASADEX MOZAIK decorative plaster
14. Waterproofing
15. Protection of the system against damage under terrain elevation

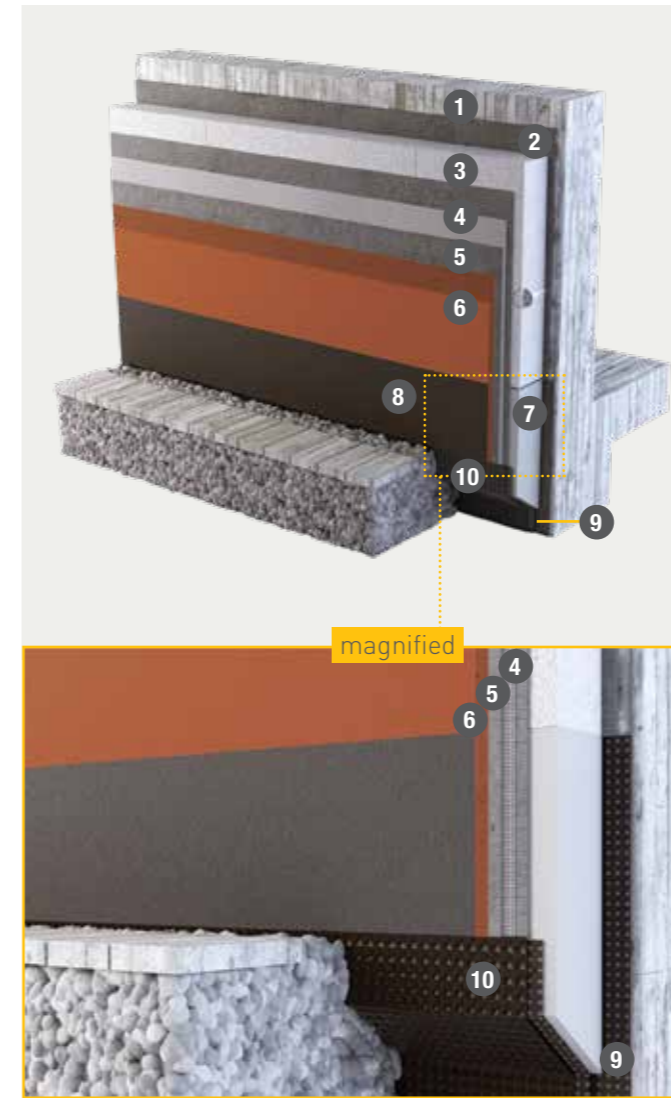
## 5.2 RECESSED FAÇADE BASE - USE OF PVC PROFILES FOR THE BASE



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEX insulation panels
4. FASADEX reinforcing layer with inserted FASADEX reinforcing mesh
5. FASADEX reinforcing layer - second coat
6. FASADEX GRUND with FASADEX finishing -decorative plaster
7. PVC profiles for the base
8. FASADEX XPS – insulation panels for bases
9. FASADEX reinforcing layer with inserted FASADEX reinforcing mesh
10. FASADEX reinforcing layer - second coat
11. FASADEX GRUND with FASADEX MOZAIK decorative plaster
12. Waterproofing
13. Protection of the system against damage under terrain elevation

## 5.3 FAÇADE BASE FLUSH WITH THE FAÇADE SURFACE



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEX insulation panels
4. FASADEX reinforcing layer with inserted FASADEX reinforcing mesh
5. FASADEX reinforcing layer - second coat
6. FASADEX GRUND with FASADEX finishing-decorative plaster
7. FASADEX XPS – insulation panels for bases
8. FASADEX GRUND with FASADEX MOZAIK decorative plaster
9. Waterproofing
10. Protection of the system against damage under terrain elevation

## 5.4 CONNECTING THERMAL INSULATION TO THE INSULATION IN BASEMENT ROOMS/EXECUTION OF FINISHING WORKS ON THE BUILDING'S FOUNDATION



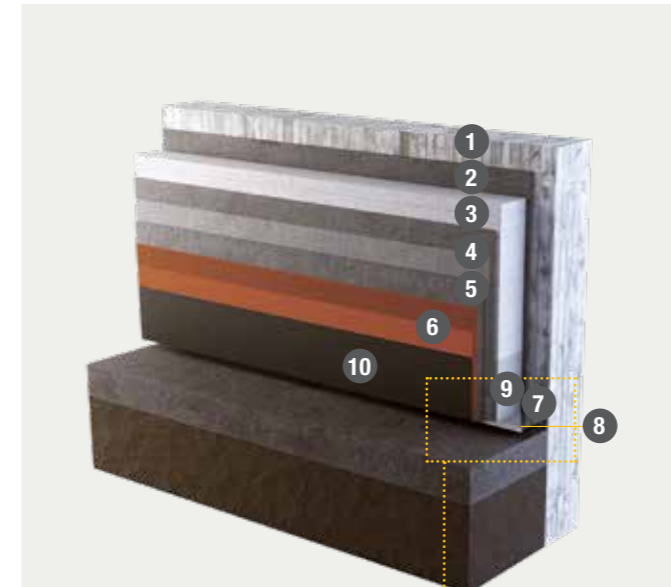
Legend:

1. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
  2. FASADEx reinforcing layer - second coat
  3. Waterproofing
  4. Protection of the system against damage under terrain elevation
  5. Basement area thermal insulation
- A. FASADEx insulation panels  
B. FASADEx XPS – insulation panels for bases  
C. Basement area insulation



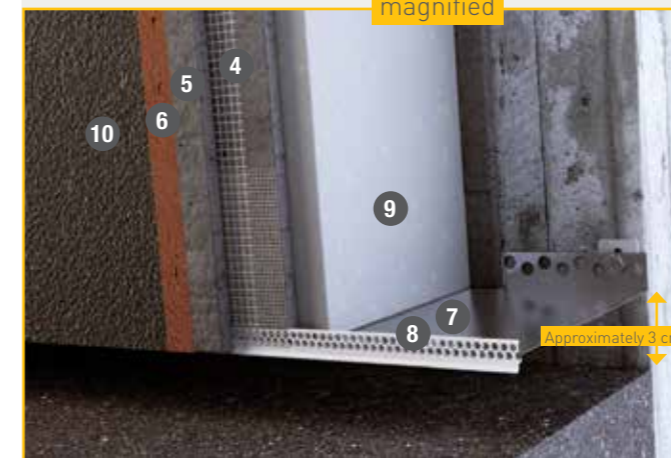
1. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
2. FASADEx reinforcing layer - second coat
3. FASADEx GRUND with FASADEx MOZAIK decorative plaster
4. Waterproofing
5. Protection of the system against damage under terrain elevation

## 5.5 PLINTH AREA, WITH TOP SURFACE AT TERRAIN LEVEL



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
5. FASADEx reinforcing layer - second coat
6. FASADEx GRUND with FASADEx finishing-decorative plaster
7. ALU profiles for the base
8. Profile insert for the base
9. FASADEx insulation panel on the plinth
10. FASADEx GRUND with FASADEx MOZAIK decorative plaster



## 5.6 WORKS PERTAINING TO BUILDER'S JOINERY, EXECUTED BY USING FASADEx WINDOW PROFILES WITH VWS REINFORCING MESH



Legend:

1. Builder's joinery
2. Corner profile
3. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
4. VWS window profile with a reinforcing mesh
5. FASADEx reinforcing layer - second coat
6. FASADEx GRUND with FASADEx finishing -decorative plaster
7. Window profile tongue with a protective PVC foil
8. Sealing strip

## 5.7 INSTALLATION OF WINDOW SILL

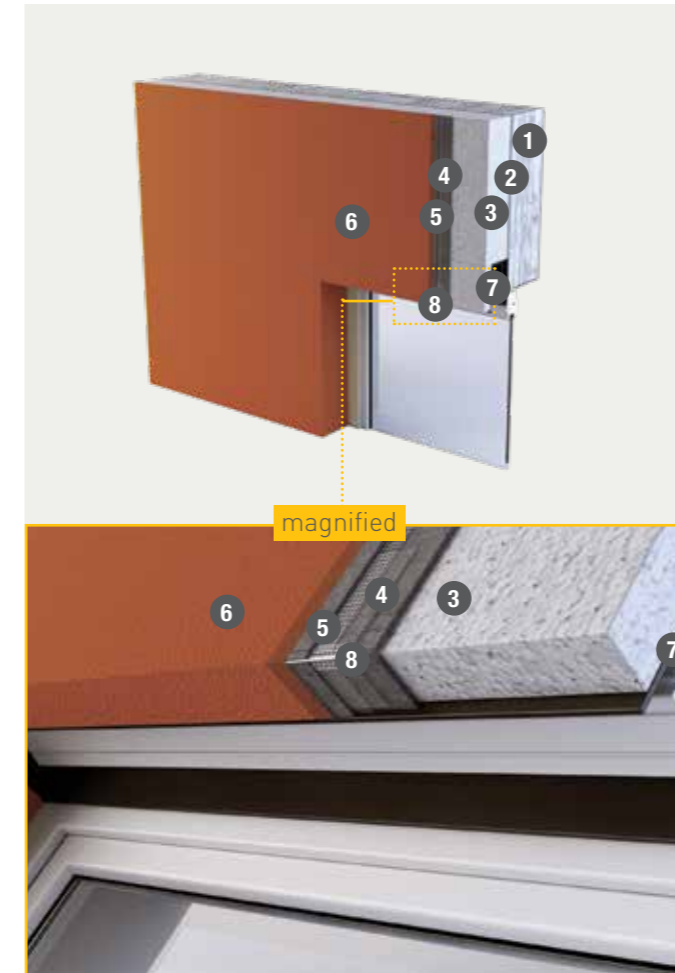


Legend:

1. Builder's joinery
2. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
3. FASADEx reinforcing layer - second coat
4. FASADEx GRUND with FASADEx finishing -decorative plaster
5. Connections for waterproof sealing of window sills are executed by using, e.g., compressed sealing strips for joints BG1.
6. Window sill



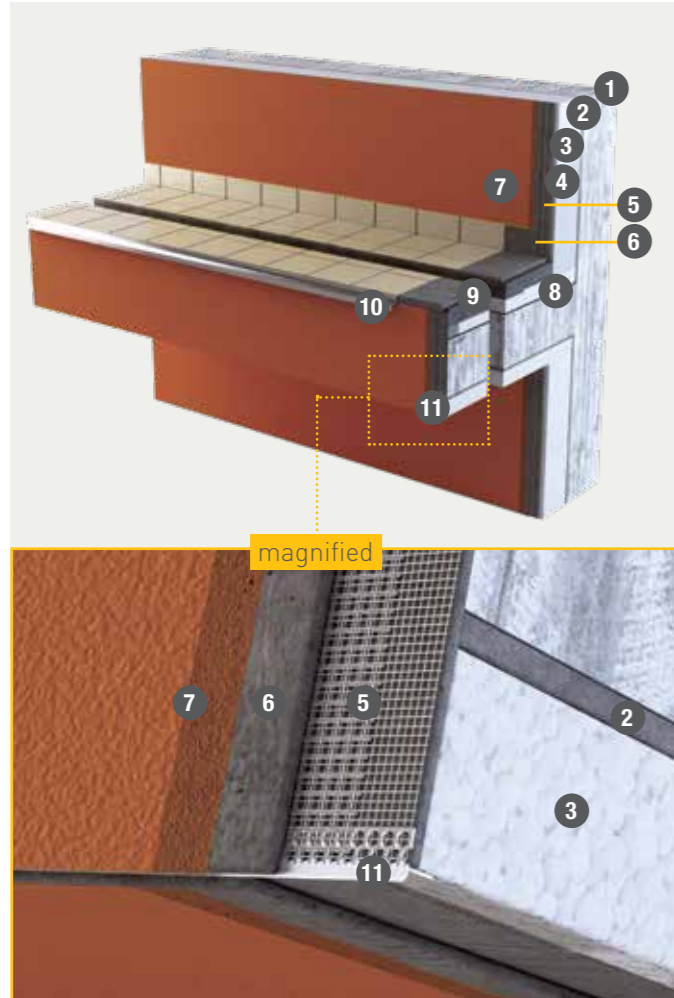
## 5.8 ROLLER BLIND HOUSING INSULATION



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
5. FASADEx reinforcing layer - second coat
6. FASADEx GRUND with FASADEx finishing -decorative plaster
7. Roller blind housing
8. PVC profile with a reinforcing mesh

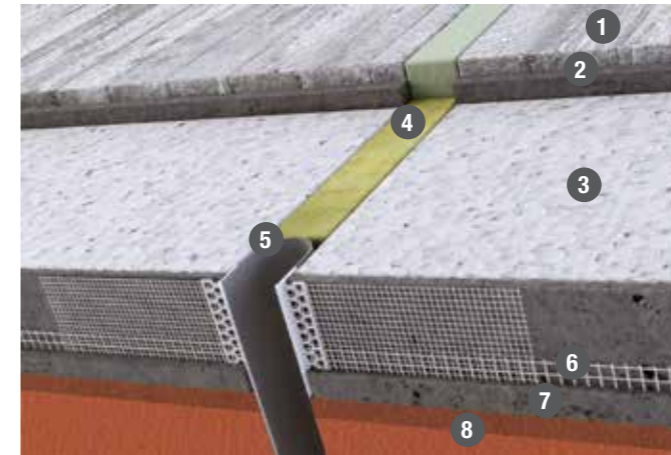
## 5.9 OVERHANGS OF BALCONY ELEMENTS AND USE OF PROFILES WITH WINDOW CASINGS (TRIMS)



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. Insulation panel on the plinth
5. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
6. FASADEx reinforcing layer - second coat
7. FASADEx GRUND with FASADEx finishing decorative plaster
8. Walk-on insulation panels for sidewalks
9. Concrete sidewalk with installed waterproofing and ceramic coating
10. Profiles for window trims - end of ceramic coating
11. Drip edge profile

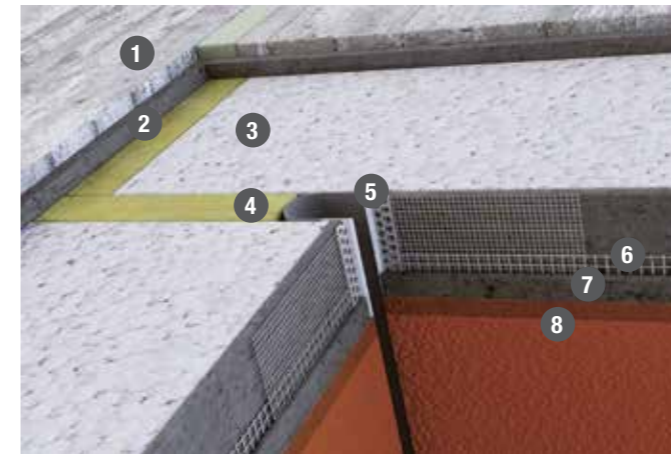
## 5.10 INSTALLATION OF FASADEx TISs ON EXPANSION JOINTS OF BUILDINGS



Expansion profiles, type E

Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. FASADEx insulation panel from mineral wool
5. Expansion profiles
6. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
7. FASADEx reinforcing layer - second coat
8. FASADEx GRUND with FASADEx finishing magnified decorative plaster



Expansion profiles, type V

## 5.11 CONNECTION TO A ROOF STRUCTURE



Legend:

1. Roof structure insulation
2. Fasadex adhesive
3. FASADEx insulation panels
4. Bearing structure
5. Compressed sealing strips BG1
6. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
7. FASADEx reinforcing layer - second coat
8. FASADEx GRUND with FASADEx finishing-decorative plaster

## 5.12 CONNECTION TO A ROOF STRUCTURE WITH A VENTILATED LOFT SPACE



Legend:

1. Roof structure insulation
2. Fasadex adhesive
3. Bearing structure
4. FASADEx insulation panels
5. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
6. FASADEx reinforcing layer - second coat
7. FASADEx GRUND with FASADEx finishing-decorative plaster

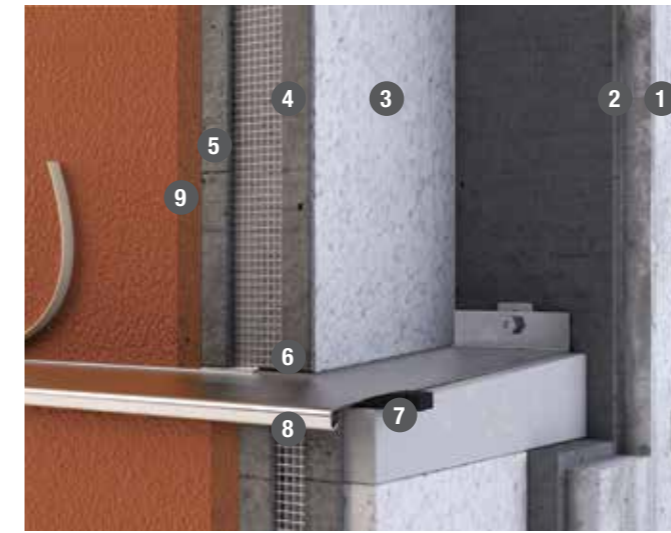
## 5.13 INSTALLATION OF FASADEx TISs ON A FLAT CANOPY AREA



Legend:

1. Bearing structure
2. Fasadex adhesive
3. Compressed sealing strips BG1
4. FASADEx insulation panels
5. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
6. FASADEx reinforcing layer - second coat
7. FASADEx GRUND with FASADEx finishing-decorative plaster

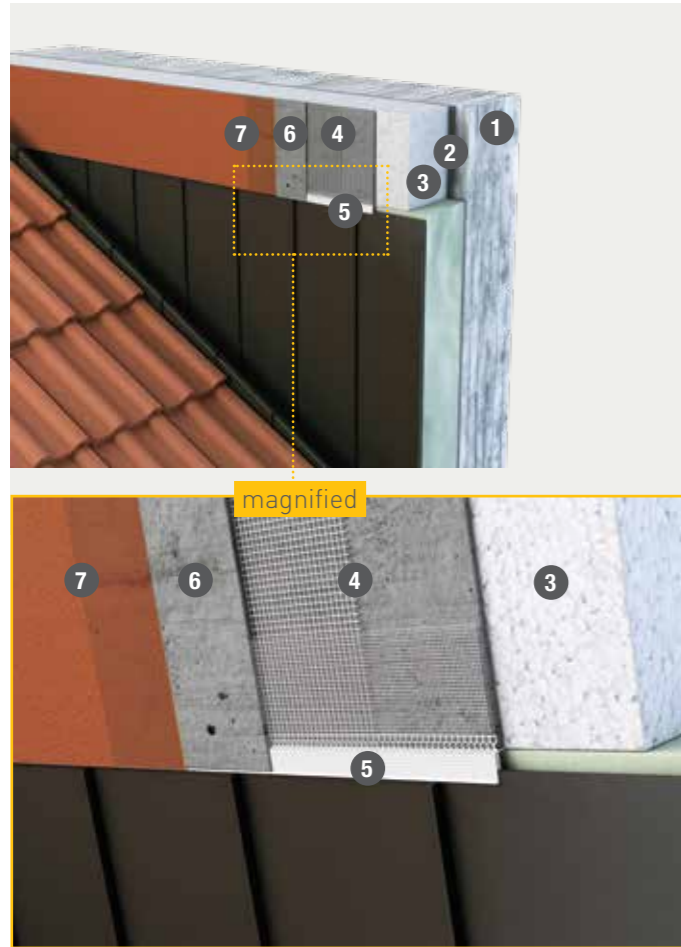
## 5.14 INSTALLATION OF FASADEx TISs ALONG AN INCLINED FAÇADE SURFACE AND ALONG AN INCLINED BEARING STRUCTURE



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
5. FASADEx reinforcing layer - second coat
6. FASADEx window profiles with a reinforcing mesh
7. Compressed sealing strips BG1
8. Façade system protective profiles
9. FASADEx GRUND with FASADEx finishing-decorative plaster

## 5.15 CONNECTION TO THE SHEET METAL ROOF EDGES



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
5. Connecting PVC profiles for sheet metal trims with reinforcing mesh
6. FASADEx reinforcing layer - second coat
7. FASADEx GRUND with FASADEx finishing-decorative plaster

**ROOF  
EXPERT**  
ADVANCED ROOFING SYSTEMS

# INNOVATIVE TECHNOLOGY - LIQUID WATERPROOFING MEMBRANES FOR ROOFS

and pitched roofs made from concrete, bricks, stone, bitumen, roofing tiles or metal. Liquid membranes are installed without joints and they fully adhere to the substrate, which they protect against water and moisture penetration and UV radiation. Elastic coatings reflect 86% of solar energy and ensure lower temperatures on the roof, high-quality housing and energy efficiency. Roof Expert system technology is excellent for application on new roofs and an excellent solution for renovation of old ones.



[www.chromos.eu](http://www.chromos.eu)



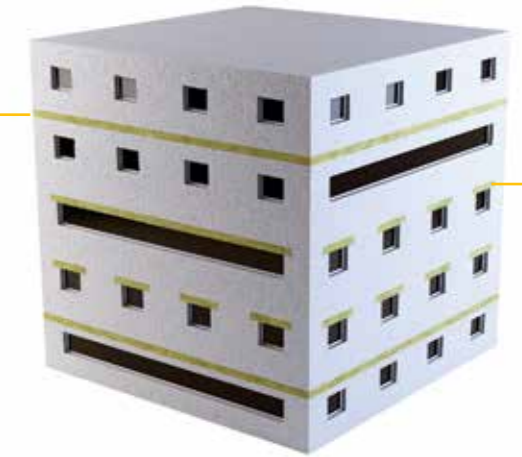
## 6. FIRE PROTECTION OF BUILDINGS AND INSTALLATION DETAIL DRAWINGS

### 6.1 FIRE PROTECTION OF BUILDINGS

In terms of reaction to fire, the construction materials are categorized and classified in accordance with the Croatian standard HRN EN 13501-1. Requirements related to reaction to fire applicable to ETICS systems are defined in the Ordinance on Fire Resistance and Other Requirements for Buildings in Case of Fire (Official Gazette 29/2013 and 87/2015) according to building subgroups, which are also defined in the aforementioned Ordinance. Reaction to fire class indicates how much a construction material contributes to the development of a fire in an early stage due its own degradation arising from exposure of that construction material to certain testing conditions.

Construction parts	Building Subgroup (ZPS)					
	ZPS1	ZPS2	ZPS3	ZPS4	ZPS5	High-rise buildings
Cladding thermal contact system	E	D	D-d1	C-d1	B-d1	A2-d1

In order to prevent the spreading of fire along the building cladding, the Ordinance stipulates that buildings with an installed ETICS system and with combustible thermal insulation must include fire barriers or fire-resistant zones made from materials of fire reaction class A1 or A2-s1, d0, which belong to subgroups ZPS4 and ZPS5. The fire barrier is installed directly around construction openings, both on their side and above them (windows, doors, etc.), in the width of 20 cm. As an alternative, they can be installed horizontally above the openings in the length exceeding 30 cm to the left and right with respect to the outermost edge of the openings, and in the width of no less than 20 cm. Horizontal continuous fire-resistant zones with a width of no less than 30 cm must be installed on every other floor around the entire building, at no more than 50 cm above the upper edge of the opening and at a minimum height of 30 cm. In order to prevent parts of thermal insulation of the non-combustible barrier and zones from falling off in the event of a fire, they are bonded by using the full-surface covering method and they are additionally mechanically fastened with anchors, i.e. with steel mandrels or screws.

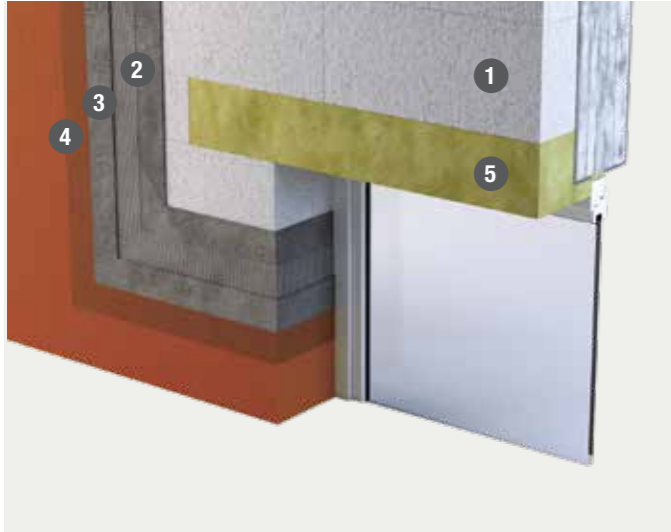


Fire separation between floors.

Fire separation between floors at the height of the window lintel.

## 6.2 INSTALLATION DETAILS

FIRE SEPARATION BETWEEN FLOORS AT THE HEIGHT OF THE WINDOW LINTEL



Legend:

1. FASADEx insulation panels
2. FASADEx reinforcing layer with inserted FASADEx reinforcing mesh
3. FASADEx reinforcing layer - second coat
4. FASADEx GRUND with FASADEx finishing-decorative plaster
5. Insulating mineral wool lamellas (reaction to fire class A1)

INSTALLATION OF FIRE PROTECTION WITH A WINDOW ON THE EDGE OF THE LOAD BEARING STRUCTURE



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. Insulating mineral wool lamellas (reaction to fire class A1)
5. Builder's joinery - window

## 6.3 INSTALLATION DETAILS

INSTALLATION OF FIRE PROTECTION WITH A WINDOW IN THE CENTRE OF THE BEARING STRUCTURE



Legend:

1. Bearing structure
2. Fasadex adhesive
3. FASADEx insulation panels
4. Insulating mineral wool lamellas (reaction to fire class A1)
5. Builder's joinery - window

**NOTE:** The insulation of **FASADEx MW** thermal insulation systems used to form a fire-resistant zone must be fastened with façade anchors.

## 7. RENOVATION OF FASADEX THERMAL INSULATION SYSTEMS



We recommend renovating thermal insulation systems with FASADEX façade paint coatings.

ETICS systems are exposed to various loads:

- The system's own weight;
- Wind;
- Changes in temperature and moisture;
- Mechanical impacts;
- Bearing structure stresses.

ETICS systems are subject to changes and ageing. However, if system installation is carried out in accordance with the rules of the profession, the changes that occur over the years remain largely aesthetic in nature and they do not compromise the system's functionality. Changes that occur on the finishing layer of ETICS systems most often depend on the building structure, the climate area, location of the building and on installation-related details.

Regular maintenance of the façade implies occasional periodic repainting thereof. If installation was performed in a technically correct manner, without compromising functionality and the need for more serious interventions in terms of renovation, the durability of the system will depend on the type of installed system.

### REGULAR MAINTENANCE:

#### PAINTING OF CLADDING

Repainting of cladding is performed as part of ETICS system maintenance. It is carried out every few years (usually 5 - 10 years), depending on the exposure of the façade to external effects. Prior to each repainting, the façade must be washed and a suitable primer must be applied to the dried and clean surface, as required, and in accordance with provided instructions. It is recommended to use a paint that contains an additive against microorganisms (biocidal agent) such as **FASADEX with fibres**, **FASADEX acrylic paint**, **FASADEX silicone paint**, **FASADEX silicate paint** or **FASADEX elastik**.

#### CRACK REHABILITATION

When cracks appear on ETICS systems, an expert must determine the exact cause of their occurrence. While doing so, width, appearance and the moment of crack occurrence should be taken into account. The cause of cracking in ETICS systems is improper installation or due to external mechanical and hygrothermal effects.

Depending on the width of the crack, repairs can be carried out in several ways:

a) Cracks with a width of up to 0.3 mm - it is necessary to repair them by repainting, i.e. by applying special coatings intended for this purpose, such as **FASADEX with FIBRES** or **FASADEX ELASTIK**;

b) Cracks with a width exceeding 0.3 mm - provided the system is stable, the following is required:

- Installation of a new finishing-decorative layer, such as **FASADEX acrylic**, **silicate**, **Si-Si** or **silicone decorative plaster**;
- Installation of a new reinforcing and finishing-decorative layer.

## 7.1 BASIC RENOVATION OF FAÇADE SYSTEMS

### PROCEDURE:

1. Surfaces on which algae and mould have settled are rehabilitated by applying a single or double coating of the biocidal agent - POLIFLOR FUNGISTOP, as required.
2. The façade surface must be thoroughly washed with high pressure water jets in order to remove dust and poorly bonded parts.
3. If necessary, the cleaned surfaces are impregnated with a deep-acting primer by using the FASADDEX SN bonding agent;
4. The façade surface is coated twice with FASADDEX façade paint.



## 7.2 REHABILITATION AND RENOVATION OF ETICS ON ETICS

Prior to the installation of a new ETICS system on an existing ETICS system, it is necessary to inspect the load-bearing capacity and stability of the existing system. If an authorized person does not perform an inspection and provide a positive opinion on the load-bearing capacity and stability of the existing ETICS system, the installation of an additional layer of thermal insulation should not commence.

Cracks, worn-out joints and destroyed or worn-out window sills are just some of the reasons for rehabilitation of existing ETICS systems.

Systems require rehabilitation after years of exposure to various atmospheric effects.

### REHABILITATION OPTIONS FOR THE EXISTING ETICS SYSTEM

A worn-out ETICS system can be rehabilitated in various ways, e.g. by applying a new façade coating, a new primer and finishing plaster, as previously described in previous chapters of this manual, or by removing and installing a new ETICS system or installing a new ETICS system on an existing ETICS system. The rehabilitation procedure suitable for a particular façade depends on the damage and requirements that the new envelope must meet. However, it also depends on the costs of the rehabilitation itself.

PROCEDURE	REHABILITATION REASON						
	Energy efficiency renovation;	Dirt / fungi;	Cracks;	Peeling;	Mechanical damage;	Worn-out joints;	Questionable load capacity.
ETICS on ETICS	++		++		+	++	x
New ETICS system	++						++
New coating	x	++		x	x	x	x
Rehabilitation of cracks with a reinforcing layer	x	+	++	++	+	+	x

Legend:  
 ++ very good                      + good                      x unsuitable

Benefits of installing a new ETICS system on an existing ETICS system are as follows:

- No costs arising from removal of the old system and from waste disposal;
- Improves thermal insulation and increases energy savings;
- Provides additional protection against external noise, while simultaneously solving the problem of fouling, fungi, anchor outlining and occurrence of cracks on the surface; it also integrates the old but functional ETICS system into the new ETICS system and improves thermal properties, i.e. helps save resources.

### PREVIOUS EXPLORATORY WORKS AND INSPECTION OF THE AS-IS STATE (STATE OF THE EXISTING ETICS SYSTEM)

- Carry out a detailed inspection of the condition of the existing façade system, including the collection of all important data pertaining to the existing system such as: types of load-bearing substrates (base building structure) and their position, details on the existing system (used materials, type of finishing plasters, insulation, anchors, and optionally their position and the position of insulation panels of the existing ETICS system).
- Determine the possibility of installing a new system with respect to the possibility of connecting it to the existing equipment and elements on the façade (connections to the joinery, metalwork elements, sheet metal and all other elements on the façade itself). If deemed required, and prior to the process of defining of a new ETICS system layer and installation thereof, it is necessary to define all details regarding the connections to all listed elements and, if necessary, plan the installation of new elements before installing the new ETICS system layer.

- Inspection of possible degradation and damage to the existing system and determination of their causes, if any. Determine whether the degradation occurred only on the façade system or does it also affect the load-bearing structure of the building. Condition and type of the finishing façade layer (peeling, algae, fungi, cracks, dirt, mechanical damage, degradation, capillary moisture ...).

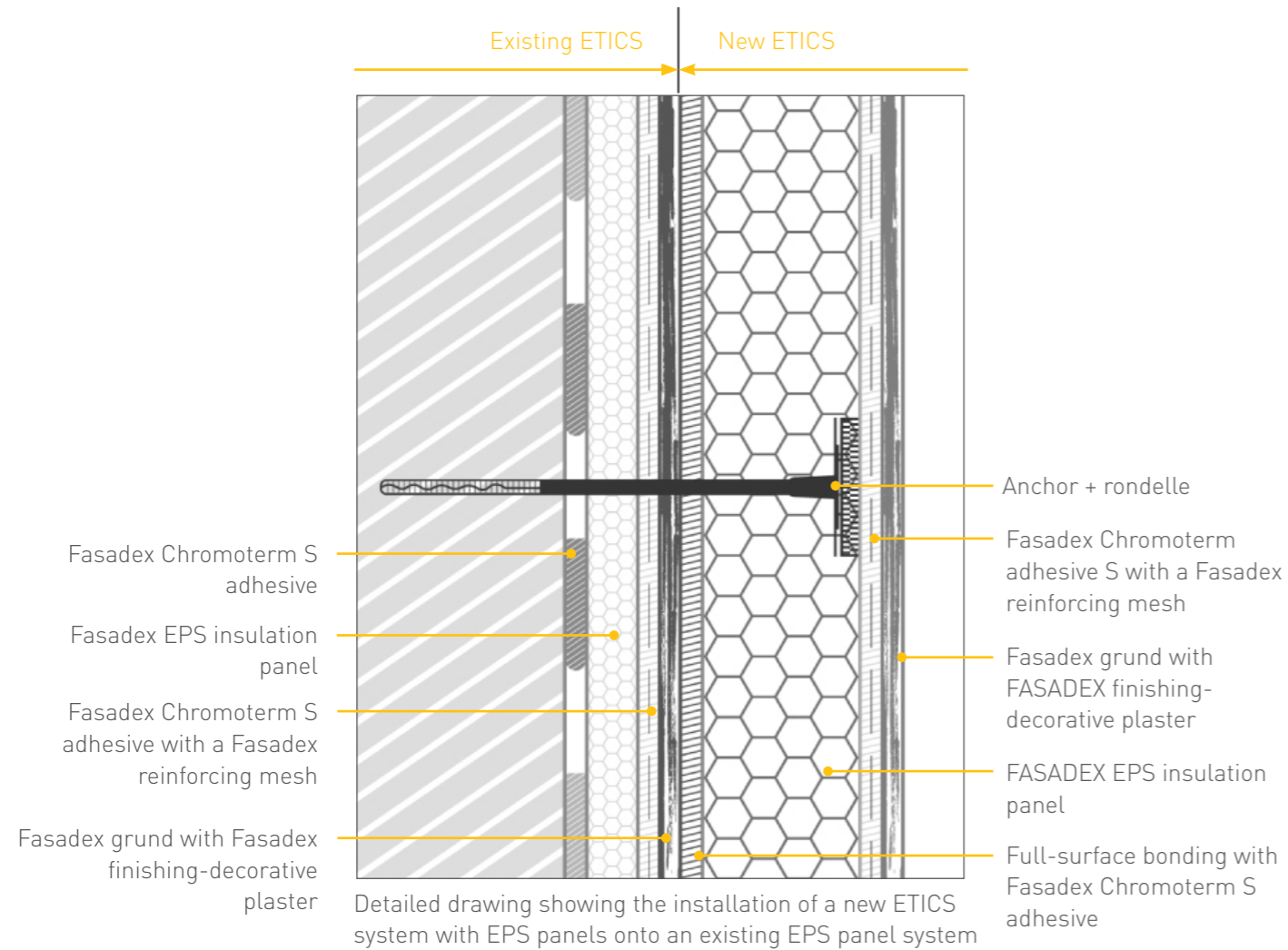
### METHOD OF PLANNING / DESIGNING ETICS ON ETICS

- A design must be drawn-up in accordance with all applicable legal and technical regulations.
- The design must include calculations with respect to "construction physics" and the diffusion of water vapour. This is done in order to prove the system's functionality in terms of its structure and physics (dew point value).
- Defining of positions and solving the problem of thermal bridges, both existing and newly formed.
- Detailed plan or design of connections and joints (e.g. windows, doors, awnings, window sills, various trimmings, etc.).
- As part of the design, it is mandatory to carry out calculations with respect to load-bearing capacity, and to select the type and quantity of anchors suitable according to the as-is state and the type and location of the building. All of this must be carried out in accordance with existing regulations and recommendations.
- The design should confirm and define the conditions for installation of fire barriers, in accordance with all applicable legal and technical regulations.

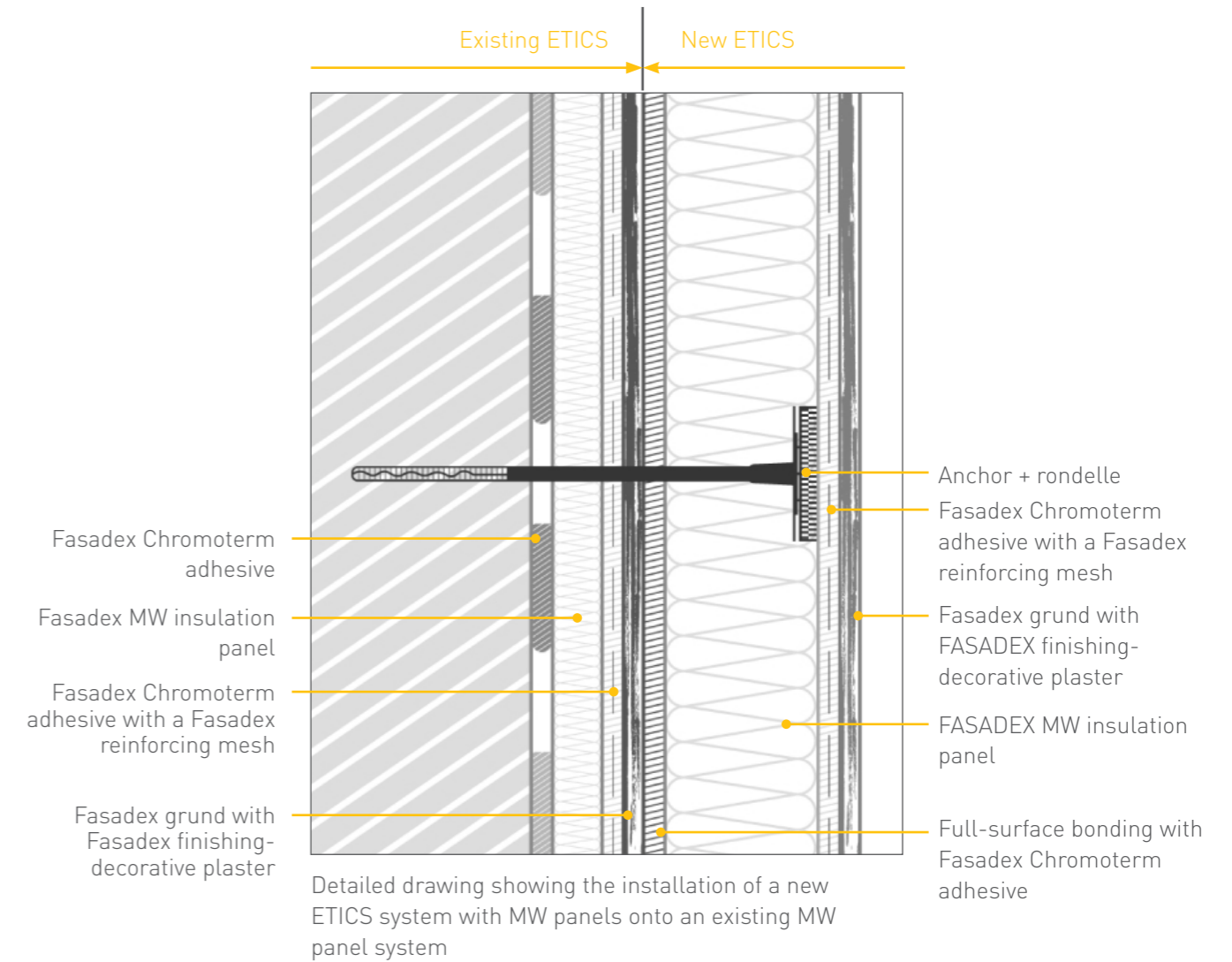
Existing ETICS system	New ETICS system	Max. system thickness (existing + new) (mm)	Max. mortar weight (bonding and reinforcing) of the old and new system (kg/m <sup>2</sup> )
EPS / combined panels	EPS	400	50
EPS / combined panels	Mineral wool panels Mineral wool lamellas	200	50
EPS / combined panels	Mineral wool panels Mineral wool lamellas	200	30
Mineral wool panels Mineral wool lamellas	Mineral wool panels Mineral wool lamellas	200	30
Mineral wool panels Mineral wool lamellas	EPS	200	30

## 7.3 INSTALLATION DETAILS

### 7.3.1 EPS ON EPS (EXPANDED POLYSTYRENE ON EXPANDED POLYSTYRENE)



### 7.3.2 MW ON MW (MINERAL WOOL ON MINERAL WOOL)

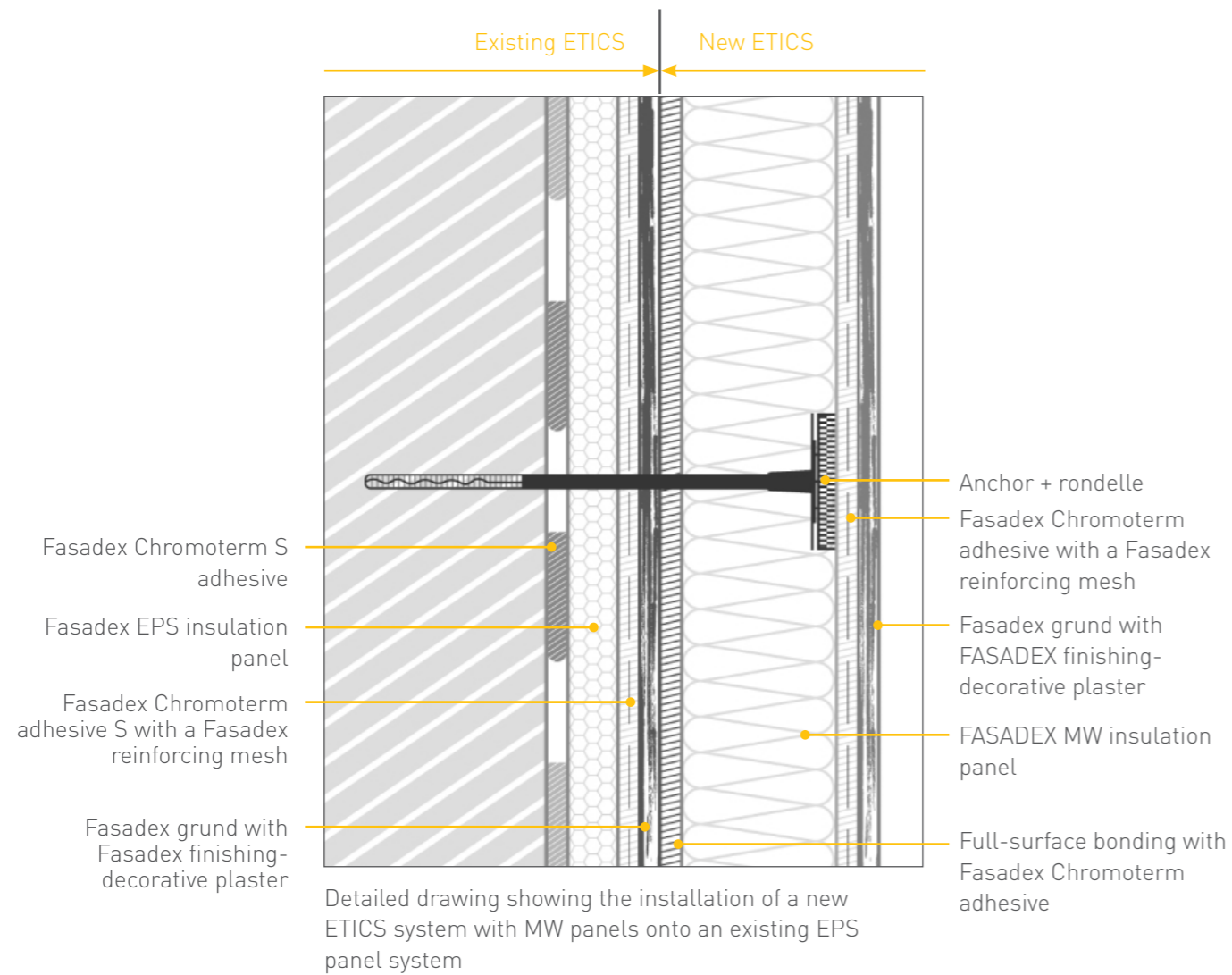


#### RECOMMENDATION FOR APPLICATION OF A NEW COATING AND THE ACCOMPANYING PROCEDURE:

- Preparation of the substrate according to the above provided instructions;
- Depending on the finishing layer, apply an adequate primer for better adhesion;
- Perform full-surface bonding by using a notched trowel (min. 15 mm x 15 mm) and a polymer-modified cement adhesive such as **Fasadex Chromoterm S**;
- Install new insulation panels by shifting the connections with respect to the existing ones;
- Install fire barriers in accordance with the design and applicable technical regulations (removal of the old EPS system at the location of fire barriers);
- Installation of suitable anchors in accordance with the calculations and the fastening pattern (example of calculations for new length is = old system thickness + new system thickness + anchoring to the load-bearing structure);
- Forming of a reinforcing layer;
- Primer (**Fasadex grund**);
- **Fasadex finishing-decorative plaster** (acrylic or silicone).

**NOTE:** Recommendations for the application of a new layer and the accompanying procedure is the same as for EPS on EPS.

### 7.3.3 COMBINATION OF MW ON EPS



**NOTE:** Recommendations for the application of a new layer and the accompanying procedure is the same as for EPS on EPS.

### 7.4 GENERAL GUIDELINES APPLICABLE TO INSTALLATION OF ADDITIONAL INSULATION LAYERS (DOUBLE INSULATION)

- The new layer should be bonded and fastened with appropriate anchors along its entire surface.
- Fasten by using the allowed anchors on both layers of load-bearing walls.
- It is prohibited to install double insulation on the system by using rails.
- Installation of multiple double layers is not allowed.
- Bonding with adhesive foam is prohibited.
- The minimum thickness of the new system is 40 mm.
- Maximum thickness of the complete insulation material layer is  $\leq 200$  mm.

#### WORK PROCEDURES:

- Adequate substrate preparation (washing, cleaning, removal of worn-out and non-load-bearing parts, drying);
- Full-surface bonding of insulation materials (possible bonding of partial surfaces). Take into account the position and overlap of the lower existing insulation layer and install the new layer without overlapping with the panel connections.
- Fastening of the entire system with selected anchors;
- Installation of connections;
- Installing protection for corners;
- Application of a reinforcement layer;
- Priming (optional);
- Application of a finishing-decorative plaster layer;
- Coating (optional).

**NOTE:** All other details and installation instructions are applied in accordance with the instructions provided by the technical service advisor.



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