TECHNICAL CATALOGUE

VENTILATED FAÇADE SYSTEMS FOR CLADDING MATERIALS

ETEM

E97 VFS
VENTILATED FAÇADE SYSTEMS

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ETEM HISTORY

ETEM is a leading aluminium extrusion company. It was founded in 1971 as a part of the largest metal manufacturing holding in the Balkans. With over 40 years of experience ETEM is a fully integrated designer and producer of architectural systems and aluminium profiles for industrial applications.

Our mission is to listen and promptly respond to our customers' requests and design and manufacture aluminium products and systems, taking into consideration technical and aesthetic requirements.

ETEM focuses on sustainable development and has proven its concern about the protection of the natural environment by making considerable investments in anti-pollution measures and by optimizing production processes following the applicable standards of the European Union.

SERVICES WE PROVIDE

ETEM supports you with the following:

▷ design of conventional and bespoke architectural system solutions

▷ innovative engineering in the field of curtain walls, ventilated facades, doors, windows

▷ professional consultation and adequate technical advices ensured by our engineering team with wide experience in the field of profile extrusion as well as architectural systems' engineering

▷ reliable customer care constant support trainings, technical support and audits on site

▷ high quality engineering which guarantees offering the best solution according to the specific features of every single project

▷ managing the process of certification in accordance with the applicable European standards in Notified Bodies

▷ production of non-standard length profiles and non-standard processing high quality powder coating

ETEM PRODUCTS AND SUSTAINABLE DEVELOPMENT

SUSTAINABLE DEVELOPMENT IS DEVELOPMENT THAT MEETS THE NEEDS OF THE PRESENT WITHOUT COMPROMISING THE ABILITY OF FUTURE GENERATIONS TO MEET THEIR OWN NEEDS.*

For many, sustainable development is about environmental conservation. This is true but it also includes two other aspects: a social aspect and an economic aspect.

Sustainable development means striking the right balance between economic development, social equity and environmental protection.

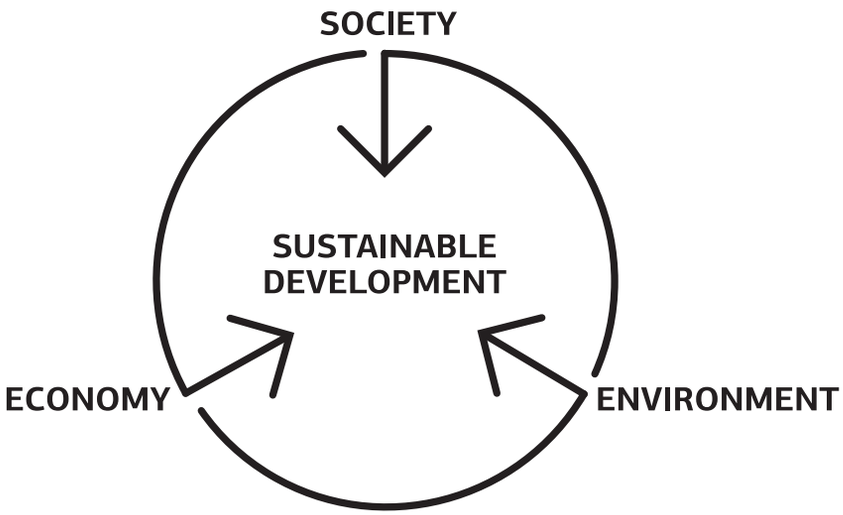
For us meeting this objective translates into the challenge of satisfying market demands at the lowest economic, social and environmental cost possible.

ETEM has always designed architectural systems which are in compliance with all requirements for achieving high energy efficiency.

In order to assure the comfort of the building inhabitants, ETEM systems adapt their functions to the changing environment.

As a moderator between outside and inside our systems provide:

› ENERGY EFFICIENCY
› DAYLIGHT
› SUN-SHADING
› VENTILATION AND GOOD AIR QUALITY
› SAFETY AND SECURITY



* Extract from Brundtland Report, from the United Nations World Commission on Environment and Development WCED

GENERAL INFORMATION

CONCEPT / ADVANTAGES / CERTIFICATES

E97 CONCEPT

VENTILATED FAÇADE SYSTEM (VFS) IS AN ELEMENT OF THE BUILDING ENVELOPE WHICH INCLUDES ALL WINDOWS, DOORS AND FLASHINGS, PARAPETS, LOUVERS, ETC.

VFS IS CONSTRUCTED FROM FULLY FINISHED COMPONENTS AND ASSEMBLIES.

VFS IS A WALL COMPRISING AN OUTER SKIN PANELS AND AN AIRTIGHT INSULATED BACKING WALL SEPARATED BY A VENTILATED CAVITY.

The Ventilated façade ensures protection of the backing walls by integrating the following fundamental aspects:

- **Weatherproofing**

The VFS shields the backing wall from direct rain

- **Wall's ventilation**

The characteristic that has always distinguished the VFS from other façade systems is that it creates an **air cavity** which ensures the wall's ventilation and protection.

- **Drainage**

Further penetration of water passing the rainscreen is prevented by the air gap and water is removed from the air gap by drainage and ventilation.

- **Features of the VFS**

Outer skin of panels, the rainscreen;
Air cavity, at least 30 mm deep;
Insulated backing wall that controls air leakage.

Clamps for fast and secure fixing and clearance compensation

Variety of wall brackets

Fixing bracket with special design reducing the stress in the angle

Oval hole allowing precise positioning of the wall brackets on the backing wall

Hanger made from extruded aluminum profile with special click design

Circular and oval shaped holes allowing fixed and flexible supports

Fastener for final hanger fixation

Specially designed T-slot for fast and easy mounting

Oval and circular holes allowing elongation and for final adjustment of the cassettes

ENF-aluminium metal sheet
Non-combustiable material

Specially designed aluminum extruded main supporting profile

Increased stability of the cassettes ensured by bendings

ADVANTAGES OF VENTILATED FAÇADE SYSTEMS

Energy saving and Energy efficiency

The theme of Energy Efficiency is one of the most widely discussed during the last few years. The climate changes are already a fact. The severe exploitation of natural resources is the main reason for that. The depletion of conventional energy resources forces reconsideration of the national energy strategies and make them part of one common World Strategy. The main advantage of ETEM ventilated systems is energy saving. The correct design and implementation of the systems reduce energy losses and energy expenses, increases the comfort of the premises, ensure healthy surroundings and help the environmental protection.

Excellent outer appearance

Besides the excellent vision, which is due to the diversity of materials and the combinations between them, the façade materials protect the building's external surface from the environment and keeps its integrity. A new aspect of the ventilated systems – the cladding of photovoltaic panels is possible. This is a non-conventional, "green" energy source.

Natural ventilation and Vapor permeability

Besides the thermal insulation, the natural ventilation and the vapour permeability are also very important for the inner microclimate.

The recommended width of the air gap, necessary for the existence of convection, is between 40 and 80 mm. This air gap protects the building from overheating during the summer and cooling down during the winter.

The ventilated façades allow the building to breathe and eliminate the condensation inside the premises. The vapor permeability of the enclosing walls and the thermal insulation let the construction moisture evaporate (this is valid for new buildings), and in premises with higher humidity – to be released outside. The absence of culture for airing the inhabited premises is also a reason for the existence of moisture and microorganisms. Devices with or without sensors are being developed in order to maintain ventilation in frames and suspended façades. This process is natural for the ventilated façades.

Sound insulation

The presence of air gap between the cladding material and the thermal insulation provides high level of noise insulation, a parameter which is very important for life in a big, urbanized city.

Fire Resistance

This is one of the most important advantages of ETEM ventilated systems. Some of the cladding materials are fire resistant. The others have non-burning cores or are mounted on certain height, according to the European regulations for fire safety. The combination between fire resistant façade materials and specially designed system, additionally increases the fire resistance of the building.

Fast mounting and Easy maintenance

An important parameter of Etem systems is the speed of mounting and maintenance. Specially designed to decrease the time for designing and mounting, ETEM ventilated systems are the only solution for large façades, short deadlines, safety and excellent vision. A big advantage in the polluted urban environment is the self – cleaning feature of some of the cladding materials and the easy cleaning of the others.

Sustainability

Made of aluminium, material which is fully recyclable, ETEM VFS systems make a contribution to the creation of building envelope which is sustainable throughout the whole building lifecycle – from cradle to cradle.

COMPLIANCE WITH APPLICABLE REGULATIONS

Production management

Quality management system is certified in accordance with EN ISO 9001:2008.
Environmental management system is certified in accordance with EN ISO 14001.
Factory production control system is certified according to the requirements of EN 15088.
ETEM is authorized to use the QUALICOAT quality sign for paint, lacquer and powder coating on aluminium for architectural applications.
Occupational health & safety Management system is certified in accordance with OHSAS 18001.

Performance characteristics of ETEM VFS systems

Ventilated façade systems ETEM were certified by notified laboratories all over the world according to the requirements of different standards:

- loadbearing capacity of the structure;
- loadbearing capacity of every single fixing bracket when loaded from different directions;
- resistance to wind load;
- impact resistance;
- weather tightness according to CWCT standard.

Tests were performed and reports were issued by the following notified bodies: Wintech Engineering, UK; Istituto Giordano, Italy; Building Research Institute, Bulgaria.

TEST REPORTS ETEM VENTILATED FAÇADE SYSTEMS

TEST SAMPLE	PERFORMANCE CHARACTERISTIC	STANDARDS
VARIO Clips	Resistance to wind load	EN 1991-1-4
	Impact resistance	EN 14019
VARIO Undercut (FORTE Light)	Water penetration (dynamic aero engine)	CWCT
	Wind Resistance (serviceability)	
	Wind Resistance (safety)	
	Impact (safety - hard & soft body)	BS 8200
VARIO G&H (VARIO GH)	Resistance to wind load	EN 13830 / 12179
	Frontal deflection at positive/ negative pressure 1000Pa	
	Residual deformation at positive/ negative pressure 1000Pa	
VARIO Rivets (VARIO Fixings)	Resistance to wind load	EN 13830 / EN 12179
	Frontal deflection at positive/ negative pressure 1000Pa	
	Residual deformation at positive/ negative pressure 1000Pa	
VARIO Glue	Resistance to wind load	EN 13830 / EN 12179
	Frontal deflection at positive/ negative pressure 1000Pa	
	Residual deformation at positive/ negative pressure 1000Pa	
BRAVO etalbond® (BRAVO W)	Resistance to wind load	EN 1991-1-4
	Impact resistance	EN 14019
FORTE Undercut (FORTE)	Water penetration (dynamic aero engine)	CWCT
	Wind Resistance (serviceability)	
	Wind Resistance (safety)	
	Impact (safety - hard & soft body)	BS 8200

ETEM System/ Cladding materials	Ceramic Tiles	Cement Board	Glass	Aluminium Composite Material (etalbond®)	Metal Sheet Products	High Pressure Laminates (HPL)	Fibre cement	Stone	Technical Stone	Composite Mineral Material	Glass Fiber Reinforced Concrete GFRC, GFRP	Light transmitting Concrete	ETEM Aluminium Lamellas
BRAVO W	x	x	x	v	v	x	x	x	x	x	x	x	x
BRAVO U	x	x	x	v	v	x	x	x	x	x	x	x	x
BRAVO Y	x	x	x	v	v	x	x	x	x	x	x	x	x
BRAVO H	x	x	x	v	v	x	x	x	x	x	x	x	x
VARIO Lamella	x	x	x	x	x	x	x	x	x	x	x	x	v
VARIO GH	v	x	v	x	x	v	v	v	v	x	v	v	x
VARIO Glue	x	x	v	x	x	v	v	x	x	v	v	x	x
VARIO Fixings	x	v	x	x	x	v	v	x	x	v	v	v	x
VARIO Clips	v	x	v	x	x	v	v	v	v	v	v	v	x
FORTE Light	v	x	v	x	x	v	v	v	v	v	v	v	x
FORTE	v	x	x	x	x	x	x	v	v	x	x	v	x
FORTE Pins	x	x	x	x	x	x	x	v	v	x	x	v	x

BUILDING PHYSICS

DIMENSIONING / FORMULAS / EXAMPLES

ALUMINIUM AS MATERIAL

ALUMINIUM IS A VERY YOUNG METAL, EXTRACTED FOR THE FIRST TIME IN 1854. COMMERCIALLY PRODUCED AS A PRECIOUS METAL FROM 1886, ITS INDUSTRIAL PRODUCTION FOR CIVIL APPLICATIONS ONLY ACHIEVED WIDE USE IN THE 1950'S.

NOW ALUMINIUM PLAYS A KEY ROLE FOR THE SUSTAINABILITY OF NEW BUILDINGS AND THE RENOVATION OF EXISTING ONES. THANKS TO ITS PERFORMANCE PROPERTIES ALUMINIUM CONTRIBUTES TO THE ENERGY PERFORMANCE, SAFETY AND COMFORT OF NEW BUILDINGS.

ADVANTAGES

DESIGN FLEXIBILITY

The extrusion process offers an almost infinite range of forms and sections, allowing designers to integrate numerous functions into one profile

LONG SERVICE LIFE

Aluminium building products are made from alloys that are weatherproof, corrosion-resistant and immune to the harmful effects of UV rays, ensuring optimal performance over a very long period of time

HIGH STRENGTH-TO-WEIGHT RATIO

Thanks to the metal's inherent strength and stiffness, aluminium window and curtain wall frames can be very narrow. Material's light weight makes it easier to transport and handle on-site, reducing the risk of work-related injury

HIGH-REFLECTIVITY

This characteristic feature makes aluminium a very efficient material for light management. Aluminium shading devices can be used to reduce the need for air conditioning in summer

FIRE SAFETY

Aluminium does not burn and therefore is classified as a non-combustible construction material (European Fire Class A1). Aluminium alloys will nevertheless melt at around 6500 C, but without releasing harmful gases

NO RELEASE OF DANGEROUS SUBSTANCES

Several studies have proved that aluminium building products do not present a hazard to occupants or the surrounding environment. Aluminium building products have no negative impact, either on indoor air quality or on soil, surface and groundwater

OPTIMAL SECURITY

Where high security is required, specially designed, strengthened aluminium frames can be used. While the glass for such applications may well be heavy, the overall weight of the structure remains manageable thanks to the light weight of the aluminium frames.

ALLOYS

Aluminium in its pure form is a very soft metal. Thanks to the addition of alloying elements such as copper, manganese, magnesium, zinc, etc. and thanks to suitable production processes, the physical and mechanical properties can be varied in a wide range to satisfy the requirements of a large number of different applications.

ETEM profiles are extruded from the following alloys:
EN AW-1050 [Al 99.5]
EN AW-6060 [Al Mg Si]
EN AW-6063 [Al Mg0,7 Si]
EN AW-6061 [Al Mg1 Si Cu]
EN AW-6005 [Al Si Mg]
EN AW-6082 [Al Si1 Mg Mn]

The most common aluminium alloys used by ETEM are EN AW 6063 and EN AW 6060.
Here are the properties of these alloys according to EN 755-2 and Eurocode 9

MATERIAL PROPERTIES

Aluminium alloy	EN AW 6063 T6	EN AW 6060 T66
Ultimate tensile strength	R_m = 215 MPa (wall thickness ≤ 10 mm) R_m = 195 MPa (10 mm < wall thickness ≤ 25 mm)	R_m = 215 MPa (wall thickness ≤ 3mm) R_m = 195 MPa (3 mm < wall thickness ≤ 25 mm)
Tensile yield strength	$R_{p0,2}$ = 170 MPa (wall thickness ≤ 10 mm) $R_{p0,2}$ = 160 Mpa (10 mm < wall thickness ≤ 25 mm)	$R_{p0,2}$ = 160 MPa (wall thickness ≤ 3 mm) $R_{p0,2}$ = 150 Mpa (3 mm < wall thickness ≤ 25 mm)
Modulus of elasticity	E_{al} = 70 000 N/mm^2 = 7.109 kg/m^2	
Coefficient of thermal expansion	α = 0.023 mm/m. K (up to 1.2 mm/m for difference up to 50°C)	

EXTRUSION PROCESS

ETEM profiles are obtained through extrusion process, which consists of pushing a hot cylindrical bullet of aluminium through a shaped die. The extrusion process offers almost infinite range of forms and sections, allowing our designers to integrate numerous functions into one single profile.

FINISHING

POWDER COATING
It is a type of paint that is applied as a dry powder. Coating is applied on ETEM profiles electrostatically and then is cured under heat to allow it to flow and form a ''skin''.
ETEM is authorized to use the quality sign QUALICOAT for powder coatings on aluminium for architectural applications. A wide range of colors and gloss levels can be achieved.
ETEM also offers timber imitations painting, in addition to all RAL colors. The technology EZY provides the following colors: Golden Oak, Acero, Betulla, Mogano, Verde Scuro, Wenge, Noce Fiammato, Noce Chiaro, Ciliegio Rosso, Acacia Scuro, Ciliegio Antico, Noce Reale, Ciliegio Reale.

ANODIZING
It is an electrochemical process whereby to reinforce the natural oxide film on the aluminium surface, increasing hardness, corrosion and abrasion resistance. Anodizing gives a very decorative silver matt surface finish, and colored can also be obtained by sealing metallic dyes into the anodized layer.

MAINTENANCE

Apart from routine cleaning for aesthetic reasons, ETEM aluminium profiles do not require any maintenance which translates into a major cost and ecological advantage over lifetime of the product.

RECYCLING

Aluminium scrap can be repeatedly recycled without any loss of value or properties.
In many instances, aluminium is combined with other materials such as steel or plastics, which are most frequently mechanically separated from aluminium before being molten.

WIND LOAD

Wind actions

The main influence over the façade is wind action, which depends mainly on the height of the curtain wall and location.

As a guideline, the wind pressure values with respect to the structure height are given in the table below:

h	v	q		wind pressure	suction in middle zone		suction in edge zone
(m)	(m/s)	(kg/m^2)	(kN/m^2)	c_p = 0,8	c_p = 0,5 h/b ≤ 0,25	c_p = 0,7 h/b ≥ 0,5	c_p = 2,0 b/8 ≤ 2 m
				w_p* = 1,25 x 0,8 x q	w_s = 0,5 x q kN/m^2	w_s = 0,7 x q kN/m^2	w_s = 2,0 x q kN/m^2
0 - 8	28,3	50	0,5	kN/m^2	0,25	0,35	1,0
8 - 20	35,8	80	0,8		0,4	0,56	1,6
20 - 100	42,0	110	1,1		0,55	0,77	2,2
> 100	45,6	130	1,3		0,65	0,91	2,6

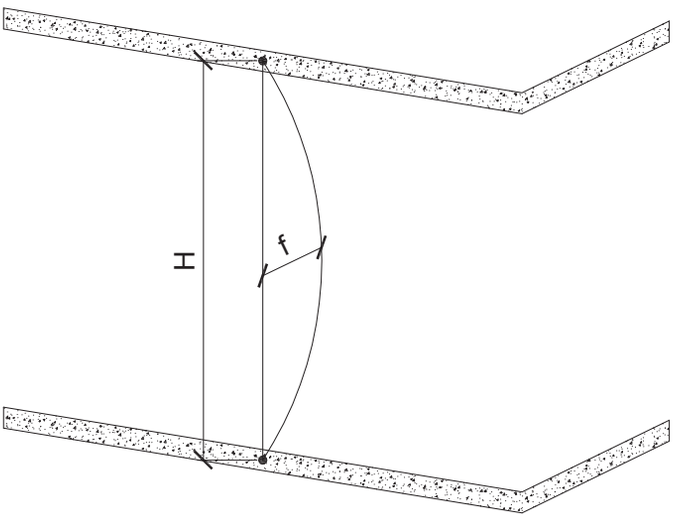
where:

h – building height, m
b – building width, m
v - wind velocity, m/s
q – wind load, kg/m^2 / kN/m^2
$w_{p/s}$ – wind pressure / suction, kN/m^2
c_p – correction factor

*Note: when calculating wind pressure w_p the load is increased with 25%.

ALLOWABLE DEFLECTION

Allowable deflection of substructure
According the requirements of the CWCT Standard for systemized building envelopes, at both positive and negative applications of the peak test pressure, the maximum deflection of the substructure generally shall not exceed:



Length	Allowable deflection
H ≤ 3000 mm	f ≤ H/200 mm
3000 mm < H < 7500 mm	f ≤ 5 + H/300 mm
7500 mm ≤ H	f ≤ H/250 mm

Allowable deflection of some cladding materials

- Allowable deflection of **brittle materials** (e.g. plasterboard):
1/360 of the extent of the board, or 10 mm whichever is the lesser;

- Allowable deflection of **natural stone units**:
1/360 of their length measured along the stone edge, or 3 mm, whichever is the lesser (smaller) deflections may be appropriate depending on the size of stone and method of fixing;

- Allowable deflection of **rainscreen panel**:
At both positive and negative applications of the peak test pressure, the maximum deflection shall not exceed:

  - 1/90 of the span measured between the points of attachement of the panel for aluminium, glass and steel, or
  - 1/360 of the span measured between the points of attachment, or 3 mm whichever is the lesser, for stone and similar brittle materials, or
  - More restrictive limits set by the panel manufacturer.

Greater deflections may also be allowable.

N.B! The deflection limits should be agreed with the material supplier.

COMPARTMENTS

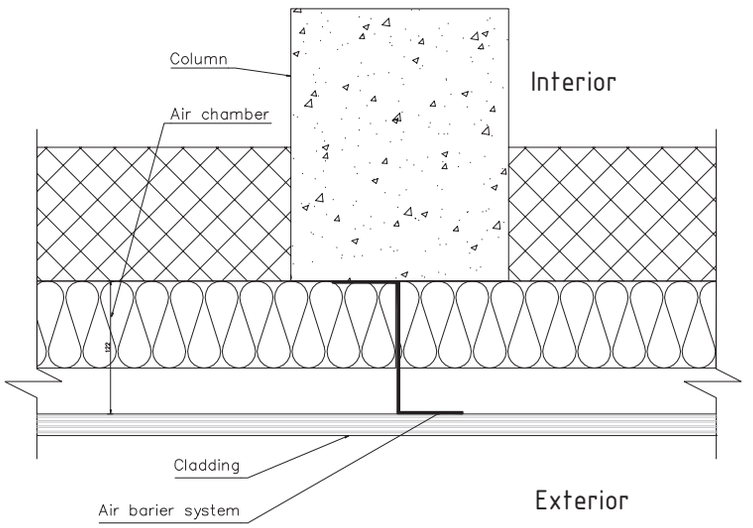
Some water may penetrate into the cavity but the rainscreen/VFS is intended to provide protection from direct rain.

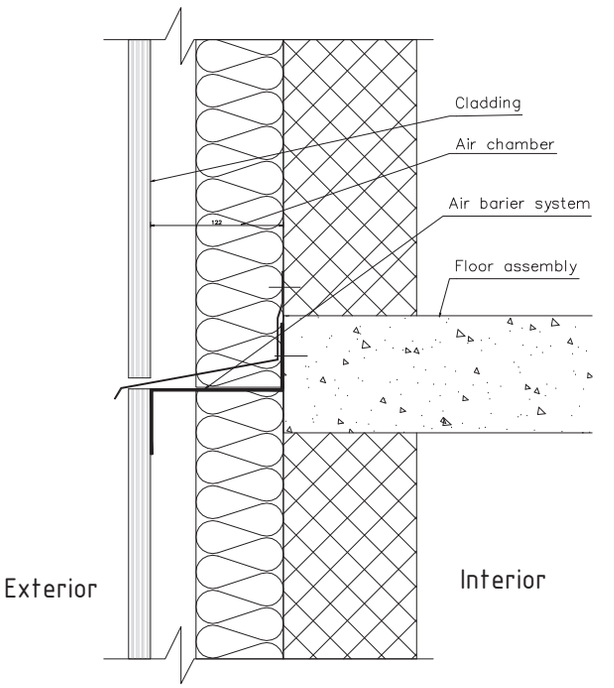
The cavity normally contains the insulation and rainscreen/VFS substructure. The volume of cavity is bounded by horizontal and vertical cavity closers, which form compartments within the cavity.

Compartmentation is necessary to:

a) Control the airflow through cavities at corners, parapets where wind pressure varies across the surface
b) Achieve dynamic and static pressure equalization
c) Build an effective air barrier system, which prevent spread of fire

Compartments focus on the control of air pressure difference across the rainscreen, and the particular elements of wall assemblies instrumental in obtaining such control.





In practice, the wall assembly must comprise of three components:

- a rainscreen (i.e., vented cladding)
- a compartmented air chamber
- an air barrier system.

In practice, the wall assembly must be designed to tolerate the entry of a small amount of water without damage. Preliminary studies indicate that for practical purposes, "adequate pressure equalization" for rain penetration control may be defined as not more than 25 Pa pressure differential across the rainscreen.

THERMAL PERFORMANCE

Thermal properties shall be selected in order to reduce the total in-service energy consumption of the building. These limit the levels of carbon emissions resulting from operation of the building.

Carbon emissions will be lower if the following are reduced:

- Heat transfer through the building envelope.
- Air leakage through the building envelope.
- Cooling loads arising from solar gain.

Heat transfer within an aluminum cladding system mainly affected by three highly correlated factors:

- The external cladding surface material (thermal resistance, solar and heat absorption, etc.)
- The characteristics of the air cavity between the external cladding and the main wall element (air movement, air temperature, dimensions)
- The material and characteristics of the brackets that thermally connects the exterior cladding (geometry, material, anchors) with the façade.

Breather membrane

A breather membrane may be placed on the outer face of insulation that should not be wetted. If it is acceptable for the insulation to be wetted a breather membrane may be placed behind the insulation to protect the backing wall.
A breather membrane may need to withstand the full positive and negative wind loads without tearing and without joints opening up.

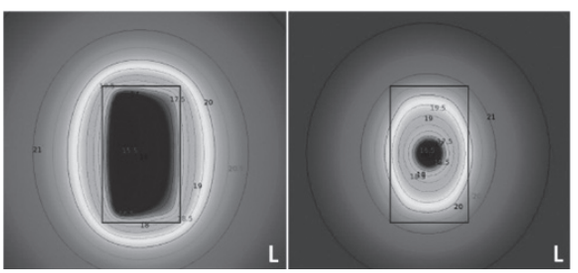
Thermal bridging

The thermal bridges caused by subframe mechanical fixing devices and air spaces shall be taken into account using the appropriate calculation method defined in EN ISO 6946 and EN ISO 10211 standards.
Particular attention shall be given to limiting thermal bridges. Thermal breaks can be used to reduce both U-value and condensation risk. To reduce risk of condensation thermal breaks should be placed so as to form warm fingers and not cold fingers.
Thermostop elements serve only thermal spacers between consoles and structure.
The use of these elements in the two constructions of metal convincingly reduced heat losses and thus are suitable from the viewpoint of building physics.

Such elements (consisting of plastic or wood) are particularly effective when you want to achieve thermal resistance. $R = (\frac{d}{\lambda})$
Where:
d is the thickness of the material layer in the component;
λ is the design thermal conductivity of the material in accordance with ISO 10456

ETEM proposes designed Thermoinsulation pads to separate fixing brackets from the structure. As heat losses are reduced, but no ignored because of installed fasteners that penetrate the solid wall element.

The characteristics of the bracket are of great importance, since the bracket penetrates the insulation protection and creates a three-dimensional thermal bridge. The contact area between the bracket and the solid wall is a significant factor in thermal losses due to point thermal bridges.



without thermal brake with thermal brake

THERMAL RESISTANCE OF HOMOGENEOUS LAYER

The principle of the calculation method is as follows:
- To obtain the thermal resistance of thermally homogenous part of the component;
- To combine these individual resistances so as to obtain the total thermal resistance of the component, including the effect of surface resistances.

The total thermal resistance, R_T of a plane building component consisting of thermally homogeneous layers, perpendicular to the heat flow shall be calculated by the following expression:

$$R_T = R_i + R_1 + R_2 + ... R_n + R_e$$

where

R_i is the internal surface resistance;

R_1, R_2, ... R_n are the design thermal resistances of each layer;

R_e is the external surface resistance.

Thermal transmittance (U-values)

Calculation of U-value of a zone of the building envelope shall be calculated using the weighted U-value method.
The thermal transmittance is given by

$$U = \frac{1}{R_T}$$

The calculation shall be carried out as described below.

a) Calculate R_e as the total thermal resistance of the component excluding the tapered layer, using above equation if all layers are thermally homogenous.
b) Subdivide the area with tapered layers into individual parts, as necessary.
c) Calculate R_1 and R_2 for each tapered layer, using

$$R_1 = \frac{d_1}{\lambda_1}$$

$$R_2 = \frac{d_2}{\lambda_2}$$

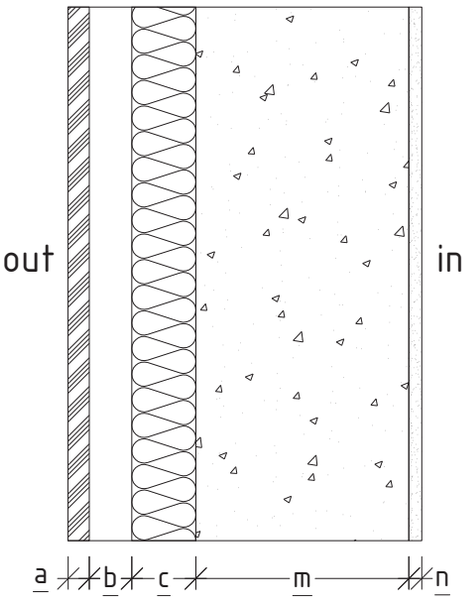
d) Calculate the thermal transmittance of each individual part U_i in accordance with the relevant equation
e) Calculate the overall thermal transmittance for the whole area using

$$U = \frac{\Sigma U_i A_i}{\Sigma A_i}$$

If total thermal resistance of a component with tapered layers is required, then

$$R_T = \frac{1}{U}$$

Example: U-value calculation of thermally homogeneous VFS layers



a façade material thickness
b air gap thickness
c insulation thickness
m wall thickness
n inner layer thickness

If	a	ceramic tile thickness is	0,015	m
	b	air gap thickness is	0,05	m
	c	insulation thickness is	0,08	m
	m	brick wall thickness is	0,25	m
	n	plaster thickness is	0,02	m

then $1/U = 1/Re + \Sigma d/\lambda + 1/Ri$

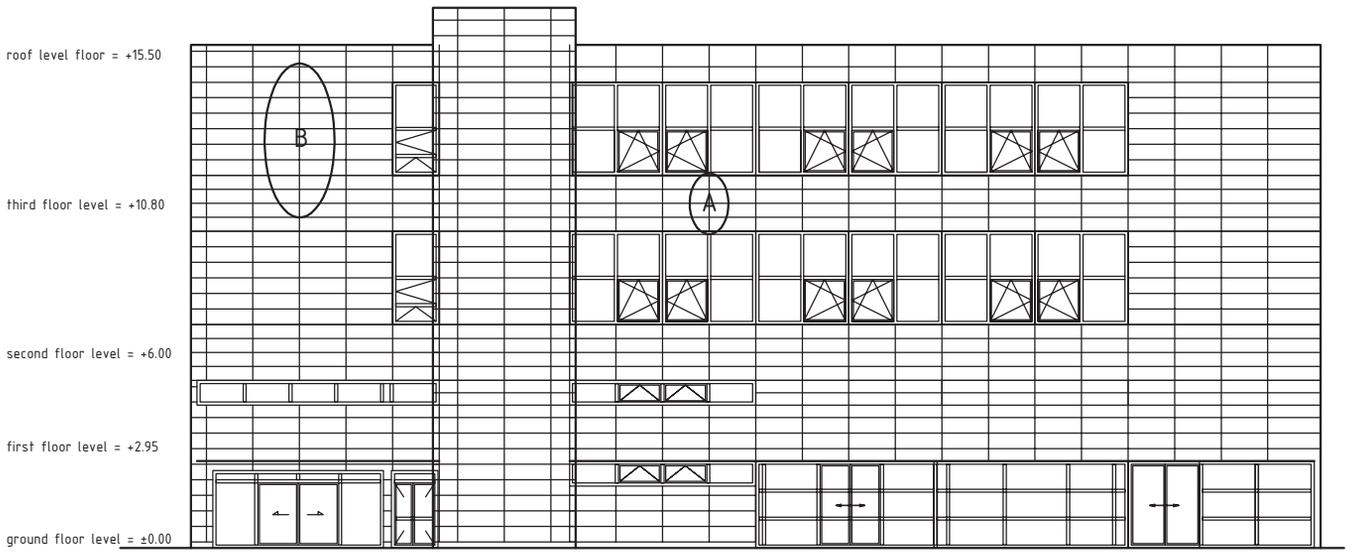
$1/U = 0,05 + 0,015/0,064 + 0,05/0,025 + 0,08/0,05 + 0,25/0,44 + 0,02/0,9 + 0,13 = 4,605$

$U = 0,217\ W/m^2K$

where
- U thermal transmittance (W/m^2K)
- 1/ Reexternal surface transmittance (W/m^2K)
- d layer thickness (m)
- λ design thermal conductivity (W/mK)
- 1/Ri internal surface transmittance (W/m^2K)
- R design thermal resistance (m^2K/W)

Note: This is a simplified method. For a more comprehensive calculation method, see EN ISO 6946:2007 *Building components and building elements – Thermal resistance and thermal transmittance – Calculation method* (ISO 6946:2007).

DIMENSIONING OF MAIN SUPPORTING PROFILE



Initial data:

Project = Office building
Building location = Plovdiv, Bulgaria
Structure base = concrete/brick
Type of façade material = etalbond®
Cladding system = BRAVO W

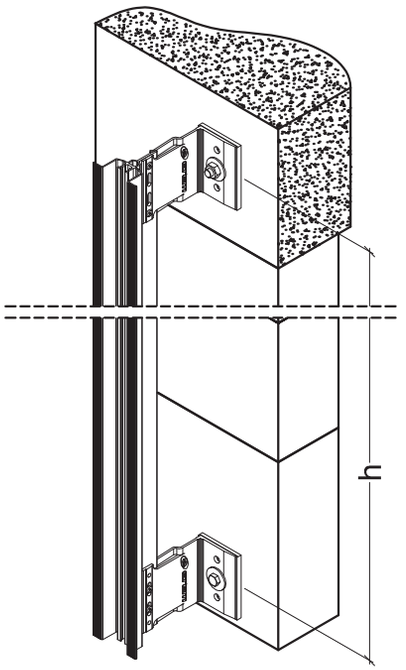
Façade height = 15.5 m
Store height = 4.85 m
Length of the main = 4.85 m
Thermal insulation: mineral wadding = 80 mm

Façade raster = 1500x500 mm
Distance between main profiles = 1500 mm
Distance between fixing brackets = 1616 mm
Fixing brackets = ET0710011.00 – 100 mm

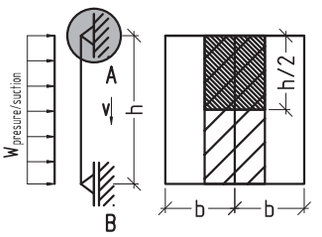
Loads:
Façade material weight = 5.5 kg/m^2
Wind load (normative) = 0.41 kN/m^2

CHOOSING THE APPROPRIATE FIXING BRACKET

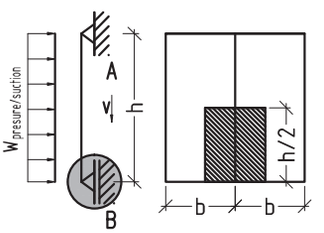
Simply supported beam with one fixed and one movable support – area A



wind load
dead load
Ⓐ fixed support
Ⓑ movable support



Fixed support



Movable support

Fixed support

- Own weight – dead load

V = g.3h.b

- Wind load–presure

For determining the maximum permissible wind load the following formulae apply:

Wp = f1 . q . cp . h/2 . b

- Wind load–suction

Ws = q . cp . h/2 .b

where:

V – load, kN

g – weight main vertical profiles and façade material, kN/m^2

Wp – wind pressure, kN

Ws – wind suction, kN

κz – correction factor (height)

q – dynamic load, kN/m^2

cp – correction factor (wind pressure)

h – distance between fixing brackets, m

b – distance between main vertical profiles, m

H – building height, m

Movable support

- Wind load–presure

For determining the maximum permissible wind load the following formulae apply:

Wp = f1 . q . cp . h/2 . b

- Wind load–suction

Ws = q . cp . h/2 . b

Example

Initial data:

H = 0–15 m (middle zone)

g = 0,41 kN/m^2

f1 = 1,25

q = 0,5 kN/ m^2

cp = 0,8 (wind pressure)

cp = – 0,5 (wind suction)

h = 1,828 m

b = 1,5 m

- Own weight – dead load

V = g.h.b = 0,065. 1,828 . 1,5 =

= 0.178 kN

- Wind load

Wp = f1 . q . cp . h/2 . b =

1,25 . 0,41 . 0,8 . 0.914 . 1,5=

= 0,562 kN

Ws = q . cp . h/2 . b =

0,41 . (–0,6) . 0,914 . 1,5 =

= (–0,337) = 0,337 kN

- Wind load

Wp = f1 . q . cp . h/2 . b =

= 1,25 . 0,41 . 0,8 . 0,914 . 1,5 =

= 0,562 kN

Ws = q . cp . h/2 . b =

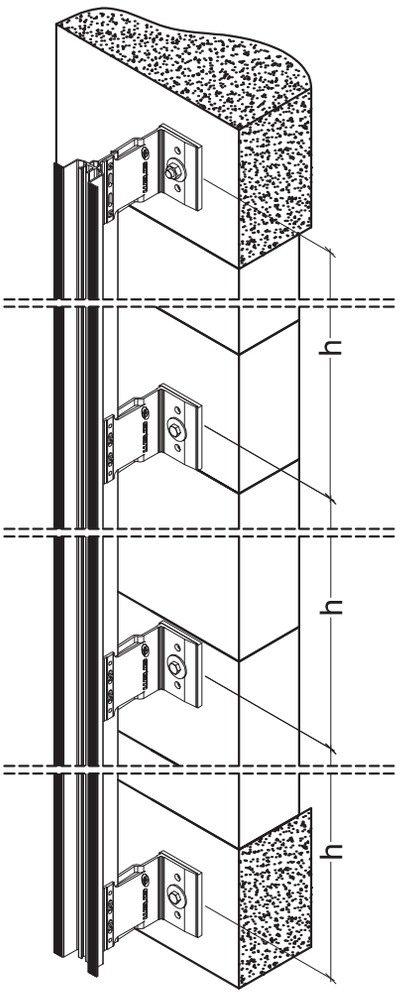
= 0,41 . (–0,6) . 0,914 .1,5 = =

(–0,337) = 0,337 kN

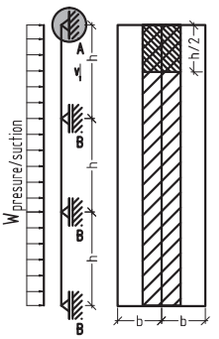
Finally we choose the appropriated fixing bracket with bigger bearing capacity than the calculated value.
Fixing bracket for fixed support must bear both calculated values for dead load and wind load.
Fixing bracket for movable support must bear just wind load.
All static calculations must be verified by responsible structural/façade engineer on site.

CHOOSING THE APPROPRIATE FIXING BRACKET

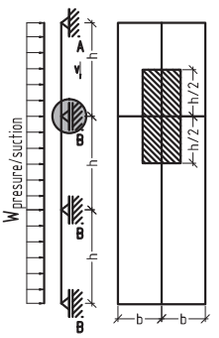
Continuous supported beam with one fixed and three movable supports – area B



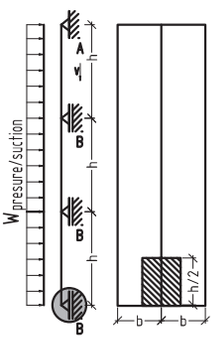
wind load
dead load
Ⓐ fixed support
Ⓑ movable support



Fixed support



Movable support (middle)



Movable support (end)

Fixed support

● Own weight – dead load
V = g.3h.b

● Wind load–presure
For determining the maximum permissible wind load the following formulae apply:
Wp = f1 . q . cp . h/2 . b

● Wind load–suction
Ws= q . cp . h/2 .b

where:
V – load, kN
g – weight main vertical profiles and façade material, kN/m²
Wp – wind pressure, kN
Ws – wind suction, kN
κz – correction factor (height)
q – dynamic load, kN/m²
cp – correction factor (wind pressure)
h – distance between fixing brackets, m
b – distance between main vertical profiles, m
H – building height, m

Movable support (middle)

● Wind load–presure
For determining the maximum permissible wind load the following formulae apply:
Wp = f1 . q . cp . h . b

● Wind load–suction
W s= q . cp . h .b

Example

Initial data:
H = 0–15 m (middle zone)
g = 0.065 kN/m²
f1 = 1,25
q = 0,41 kN/m²
cp = 0,8 (wind pressure)
cp= – 0,6 (wind suction)
h = 1,616 m
h/2 = 0,808 m
b = 1,5 m

● Own weight – dead load

V = g.3h.b = 0,065. 4,85 . 1,5 =
= 0.472 kN

● Wind load

Wp = f1 . q . cp . h/2 . b =
=1 ,25 . 0,41 . 0,8 . 0,808 . 1.5 =
= 0,496 kN

Ws = q . cp . h/2 . b =
= 0,41 . (–0,6) . 0,808 . 1,5 =
= 0,298 kN

● Wind load

Wp = f1 . q . cp . h . b =
= 1,25 . 0,41 . 0,8 . 1,616 . 1,5 =
= 0,994 kN

Ws = q . cp . h . b =
= 0,41 . (–0,6) . 1,616 . 1,5=
= (–0,596) = 0,596 kN

Movable support (end)

● Wind load–presure
For determining the maximum permissible wind load the following formulae apply:
W p= f1 . q . cp . h/2 . b

● Wind load–suction
Ws = q . cp . h/2 .b

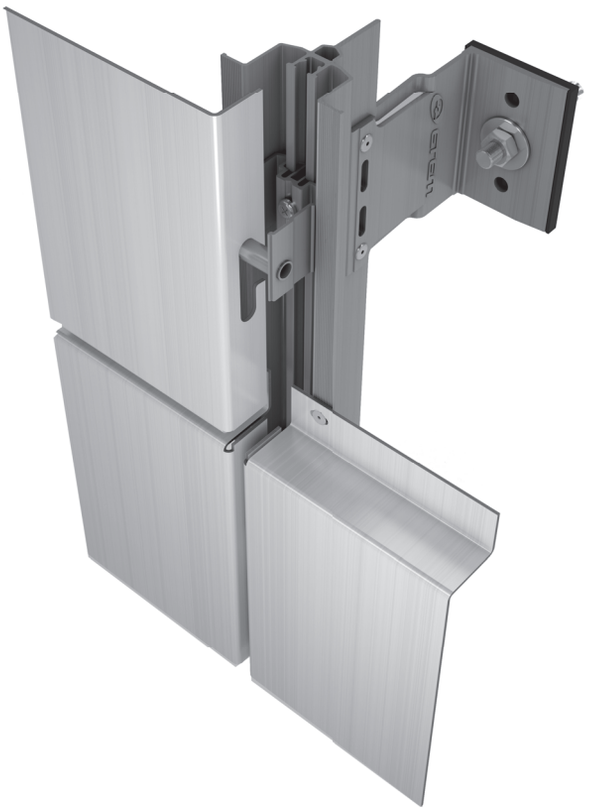
● Wind load

Wp = f1 . q . cp . h/2 . b =
= 1 ,25 . 0,41 . 0,8 . 0,808 . 1,5 =
= 0,497 kN

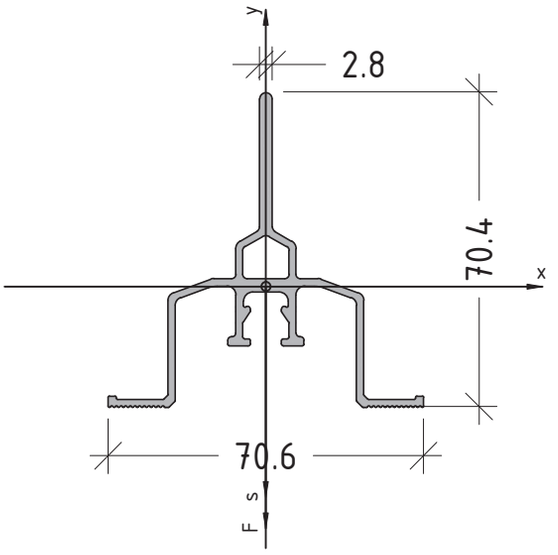
Ws = q . cp . h/2 . b =
= 0,41 . (–0,6) . 0,808 . 1,5 =
= (–0,298) = 0,298 kN

Finally we choose the appropriated fixing bracket with bigger be
Fixing bracket for fixed support must bear both calculated values
Fixing bracket for movable support must bear just wind load.
All static calculations must be verified by responsible structural/façade engineer on site.

DIMENSIONING OF MAIN SUPPORTING PROFILE



BRAVO W – ventilated façade system for hanging etalbond®:



Profile characteristics:

profile code – E97101
standard length – 6,01 m
weight of the profile – 1103g/m
material – aluminum EN AW 6063 T6
Yield point – 160N/mm^2
E-Modulus – 70000N/mm^2

Geometrical characteristics:

moment of inertia
Ix = 13.249cm^4
Iy = 8.896cm^4

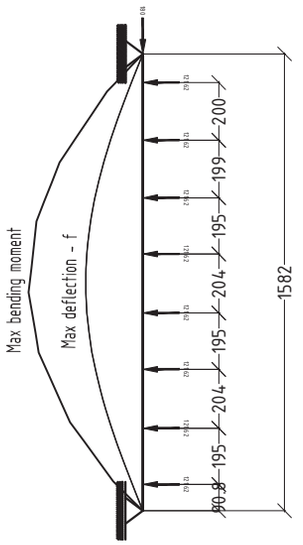
moment of resistance
Wx =3.039cm^3
Wy =2.250cm^3

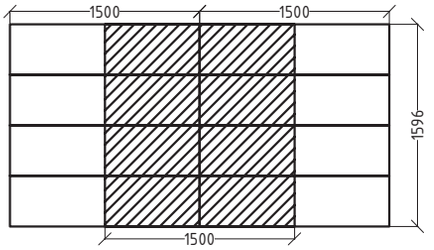
area
A = 4.069cm^2

All static calculations must be verified by responsible structural/façade engineer on site.

DIMENSIONING OF MAIN SUPPORTING PROFILE

Simply supproted beam with one fixed and one movable supports – area A





Dimensioning of profile E97101

Initial data:
H = 0–15 m (middle zone)
g = 0.065 kN/m^2
f1 = 1,25
q = 0,41 kN/m^2
cp = 0,8 (wind pressure)
cp = – 0,6 (wind suction)
h = 1.828 m
b = 1,5 m
s = 1.828 m

Defining the loads:

- Own weight – dead load

V = g.3h.b = 0,066. 1.828 . 1,5 = 0.180 kN

- Wind load of the profile area

Wp = f1 . q . cp . h . b =
= 1,25 . 0,41 . 0,8 . 1,582 . 1,5 = 0,973 kN
Ws = q . cp . h . b =
= 0,41 . (–0,6) . 1,582 . 1,5 = (–0,584) = 0,584 kN

F = Wp/quantity of the hangers
F= 0,973/8 = 0.08438 kN = 140,5 N

Permissible deflection:
[f] = s/200
[f]= 1582/200 = [7,91 mm]

- Own weight – dead load
V=g.3h.b

- Wind load–presure
For determining the maximum permissible wind load the following formulae apply:
Wp = f1 . q . cp . h/2 . b

- Wind load–suction
Ws = q . cp . h/2 .b

where:
V – load, kN
g – weight main vertical profiles and façade material, kN/m2
Wp – wind pressure, kN
Ws – wind suction, kN
f1 – correction factor
q – dynamic load, kN/m^2
cp – correction factor (wind pressure)
h – distance between fixing brackets, m
b – distance between main vertical profiles, m
H – building height, m
s – distance between fixing brackets

Results of the calculation

Max deflection = 5,41 mm < [7,91 mm]
Max Stress = 62,949N/mm^2 < [160N/mm^2]
Max bending momnet = 191,29 Nm
Safety Factor = 2,5417> [2]

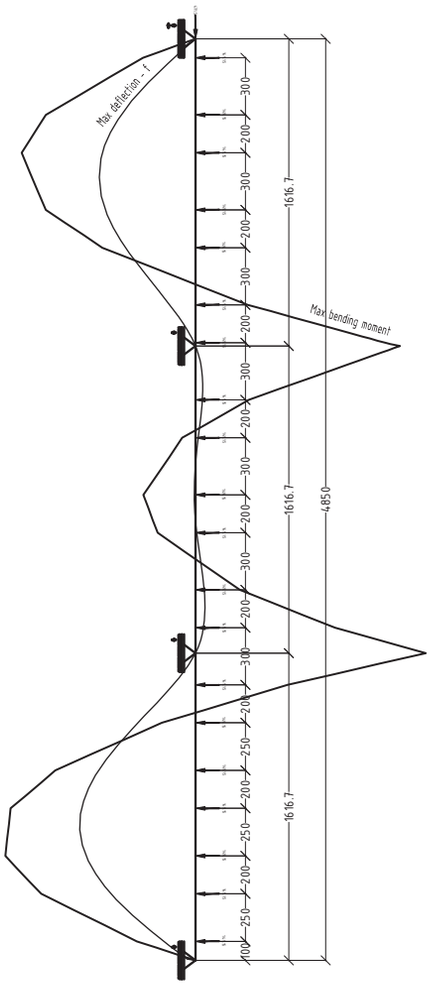
Conclusion:
Based on the conditions above, profile E97101 has the needful bearing capacity.

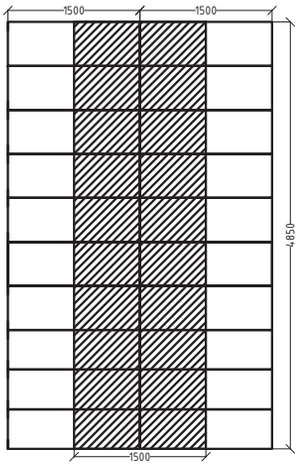
The calculation was made using Autocad Mechanical static module.

Application point of the force F rfom the wind load on the profile is physically the hanger.
All static calculations must be verified by responsible structural/façade engineer on site.

DIMENSIONING OF MAIN SUPPORTING PROFILE

Continuous beam with one fixed and three movable supports – area B





Dimensioning of profile E97101

Initial data:
H = 0–15 m (middle zone)
g = 0.065 kN/m^2
f1 = 1,25
q = 0,41 kN/m^2
cp = 0,8 (wind pressure)
cp= – 0,6 (wind suction)
h = 4.85 m
b = 1,5 m
s = 1.616 m

Defining the loads:

- Own weight – dead load

V = g.3h.b = 0,065. 4,85 . 1,5 = 0.472 kN

- Wind load of the profile area

Wp = f1 . q . cp . h . b =
= 1,25 . 0,41 . 0,8 . 4.85 . 1.5 = 2,983 kN
Ws = κz . q . cp . h . b =
= 0,41 . (–0,6) . 4.85 . 1.5 = (–1,342) = 1,789 kN

F = Wp/quantity of the hangers
F= 2,983/20 = 0.08945kN = 149,15N

Permissible deflection:
[f] = s/200
[f]= 1616/200 = [8.08mm]

- Own weight – dead load
V = g.3h.b

- Wind load–presure
For determining the maximum permissible wind load the following formulae apply:
Wp = f1 . q . cp . h/2 . b

- Wind load–suction
Ws = q . cp . h/2 .b

where:
V – load, kN
g – weight main vertical profiles and façade material, kN/m^2
Wp – wind pressure, kN
Ws – wind suction, kN
f1 – correction factor
q – dynamic load, kN/m^2
cp – correction factor (wind pressure)
h – distance between fixing brackets, m
b – distance between main vertical profiles, m
H – building height, m
s – distance between fixing brackets

Results of the calculation

Max deflection = 3,45 mm < [8.08 mm]
Max Stress = 55,924N/mm^2 < [160N/mm^2]
Max bending momnet = 169,94 Nm
Safety Factor = 2,8610 > [2]

Conclusion:
Based on the conditions above, profile E97101 has the needful bearing capacity.

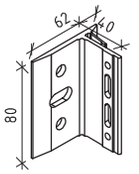
The calculation was made using AutoCad Mechanical deflection line module.

Application point of the force F from the wind load on the profile is physically the hanger.
All static calculations must be verified by responsible structural/façade engineer on site.

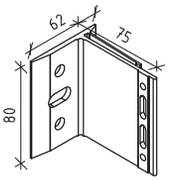
FIXING BRACKETS AND ACCESSORIES

ETEM FIXING BRACKETS

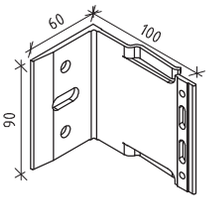
ET710008.00



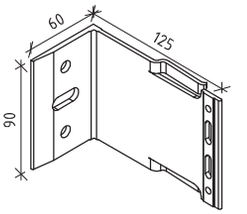
ET710010.00



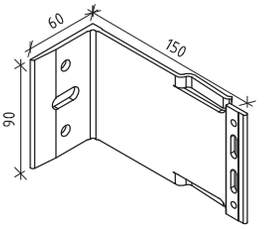
ET710011.00



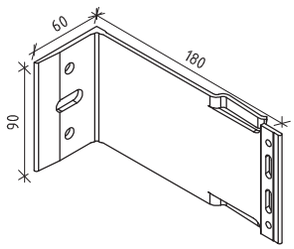
ET710013.00



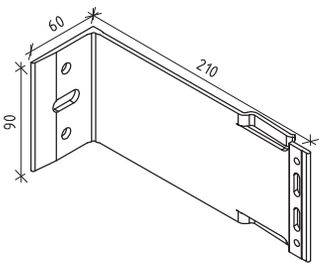
ET710012.00



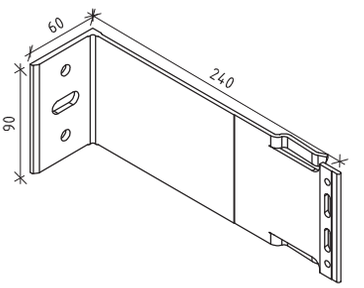
ET710014.00



ET710015.00



ET710016.00



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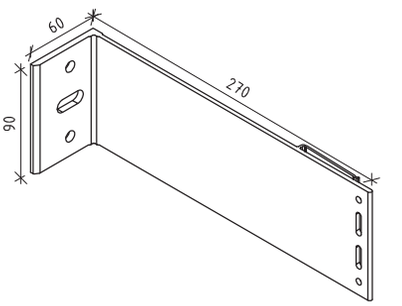
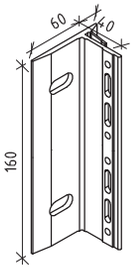
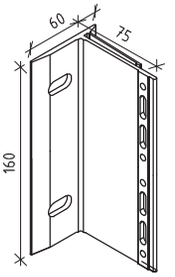


ET710001.00



ET710002.00



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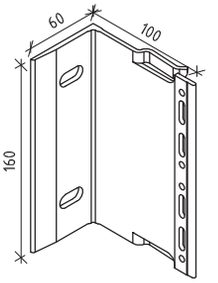

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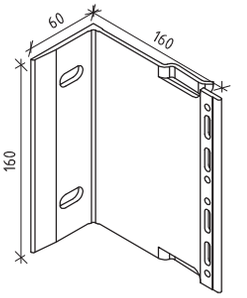

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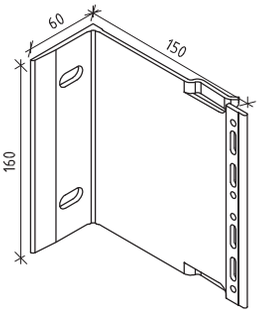
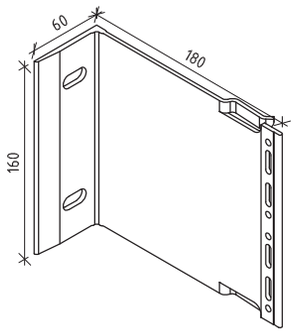


ET710006.00



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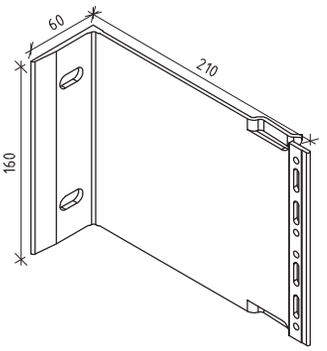
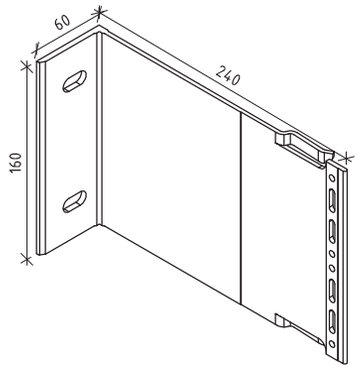
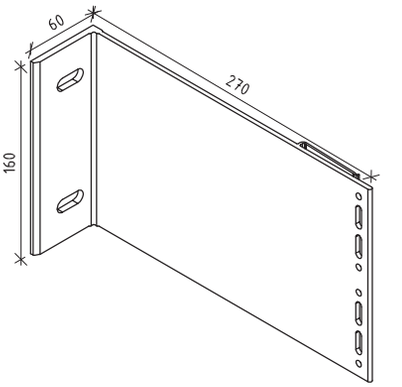


ET710017.00



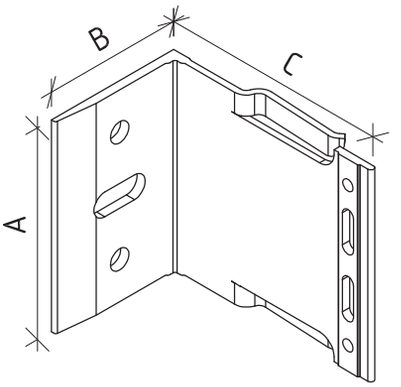
ET710039.00



ETEM FIXING BRACKETS

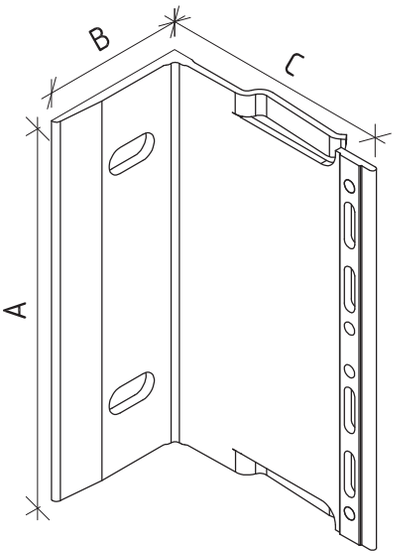
Code	Type	A (mm)	B (mm)	C (mm)
ET0710008.00	single	80	60	40
ET0710010.00	single	80	60	75
ET0710011.00	single	90	60	100
ET0710013.00	single	90	60	125
ET0710012.00	single	90	60	150
ET0710014.00	single	90	60	180
ET0710015.00	single	90	60	210
ET0710016.00	single	90	60	240
ET0710038.00	single	90	60	270

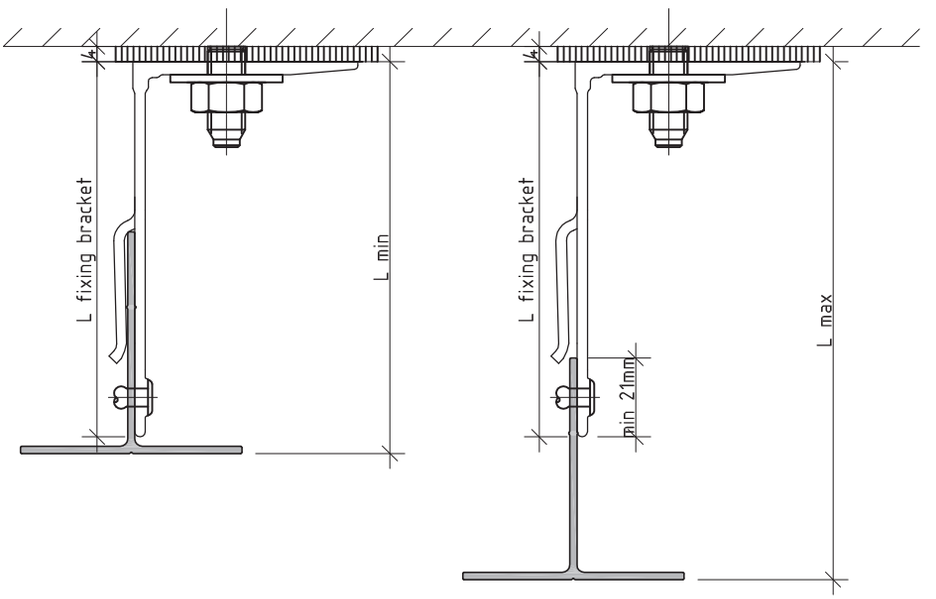
Single fixing bracket



Code	Type	A (mm)	B (mm)	C (mm)
ET0710001.00	double	160	60	40
ET0710002.00	double	160	60	75
ET0710003.00	double	160	60	100
ET0710004.00	double	160	60	125
ET0710005.00	double	160	60	150
ET0710006.00	double	160	60	180
ET0710007.00	double	160	60	210
ET0710017.00	double	160	60	240
ET0710039.00	double	160	60	270

Double fixing bracket





ETEM's fixing brackets allow to distance the cladding material from the backing wall from min 68 mm up to max 312 mm with 60 mm T profile
It's possible to adjust the profile up to 33 mm (Lmin to Lmax).

FIXING BRACKETS AND ACCESSORIES

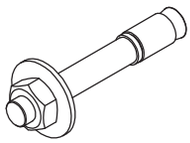
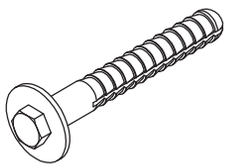
The performance characteristics of all ETEM fixing brackets is tested in laboratory conditions for the worst case scenario.

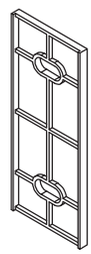
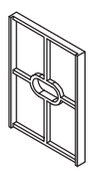
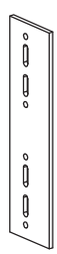
The aim of the test is to determine the load bearing capacity and wind resistance of the brackets and their fixings to the subframe under tension and shear loads.

Summary of results from testing of brackets for ETEM VFS systems

Code	Type	Size(mm)	Support	Loading direction	Loadbearing capacity	
					At elastic behavior of material (without residual displacement)	At displacement 2 mm
ET710001.00 (07vario072)	double	62/40/160	fixed	vertical	6,40 kN	14,45 kN
ET710002.00 (07vario082)	double	62/75/160	fixed	horizontal	6,07 kN	10,86 kN
ET710002.00 (07vario082)	double	62/75/160	movable	horizontal	5,04 kN	10,95 kN
ET710002.00 (07vario082)	double	62/75/160	fixed	vertical	6,04 kN	10,33 kN
ET710003.00 (07varioQ102)	double	60/100/160	fixed	vertical	4,65 kN	7,03 kN
ET710003.00 (07varioQ102)	double	60/100/160	fixed	horizontal	1,45 kN	6, 38 kN
ET710005.00 (07varioQ152)	double	60/150/160	fixed	vertical	3,67 kN	5,03 kN
ET710004.00 (07varioQ172)	double	60/125/160	fixed	vertical	3,42 kN	6,67 kN
ET710004.00 (07varioQ172)	double	60/125/160	fixed	horizontal	5,17 kN	10,93 kN
ET710004.00 (07varioQ172)	double	60/125/160	movable	horizontal	7,15 kN	10,15 kN
ET710014.00 (07varioQ18)	single	60/180/90	fixed	vertical	0,38 kN	0,46 kN
ET710006.00 (07varioQ182)	double	60/180/160	fixed	vertical	2,40 kN	3,32 kN
ET710015.00 (07varioQ21)	single	60/210/90	fixed	vertical	0,36 kN	0,41 kN
ET710015.00 (07varioQ21)	single	60/210/90	fixed	horizontal	1,37 kN	3,11 kN
ET710015.00 (07varioQ21)	single	60/210/90	movable	horizontal	1,65 kN	3,04 kN
ET710007.00 (07varioQ212)	double	60/210/160	fixed	vertical	2,15 kN	2,67 kN
ET710007.00 (07varioQ212)	double	60/210/160	fixed	horizontal	7,23 kN	10,21 kN
ET710007.00 (07varioQ212)	double	60/210/160	movable	horizontal	8,30 kN	11,45 kN

NOTE: All codes in brackets are the old ones!

code description		package/pcs
ET740002.00 ET740003.00 anchor		100
ET740004.00 ET740005.00 dubel		100
ET740019.00 bolt		1000
ET740028.00 nut		1000
ET740001.00 washer		1000

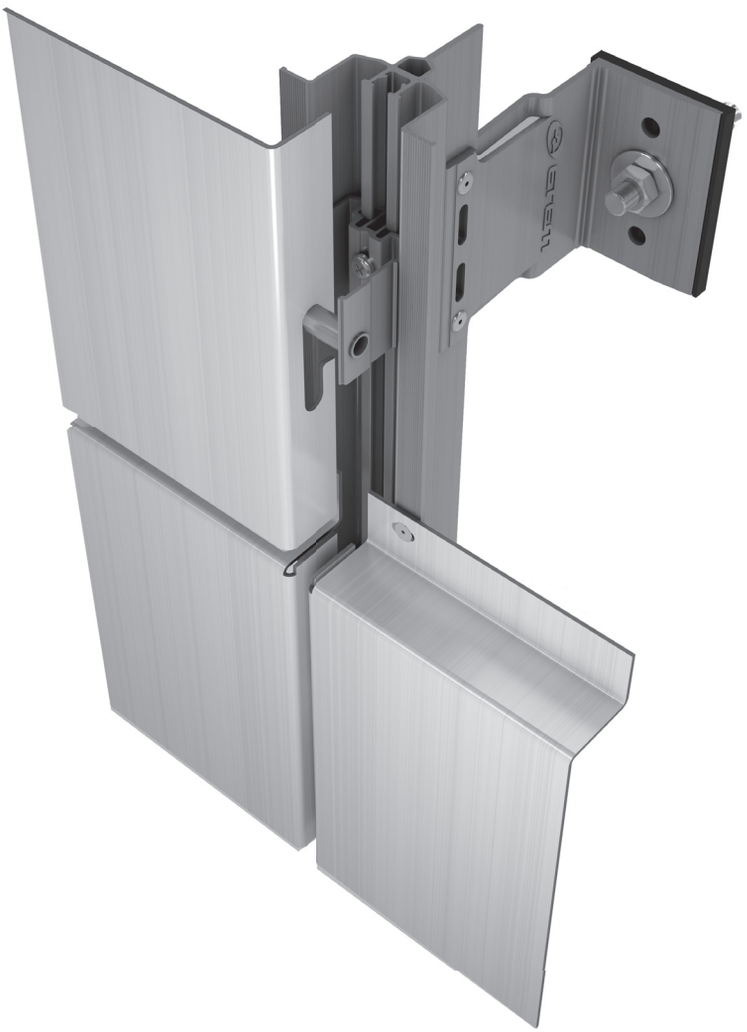
code description		package/pcs
ET740022.00 ET740023.00 ET740024.00 rivet		1000
ET740041.00 screw		250
ET730032.00 ET730034.00 thermo insulation pad		280 700
ET730031.00 ET730033.00 thermo insulation pad		500 1000
ET710022.00 joint profile		200

SYSTEMS

BRAVO / VARIO / FORTE

BRAVO

BRAVO W / BRAVO U / BRAVO Y / BRAVO H



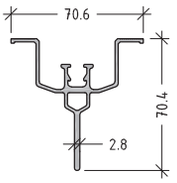
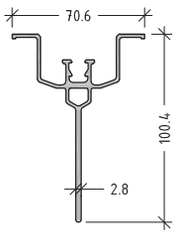
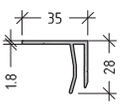
BRAVO W

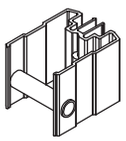
BRAVO W IS THE OPTIMAL SOLUTION FOR LARGE AND FLAT FAÇADES, ENSURING FAST AND SECURE INSTALLATION OF CASSETTES FROM ALUMINIUM COMPOSITE MATERIALS (etalbond®) AND METAL SHEETS. THE SYSTEM ALLOWS THE MOVEMENT OF THE FAÇADE MATERIAL DUE TO VARIOUS THERMAL EXPANSIONS WITHOUT COMPROMISING THE SECURE ATTACHMENT OF THE CASSETTES.

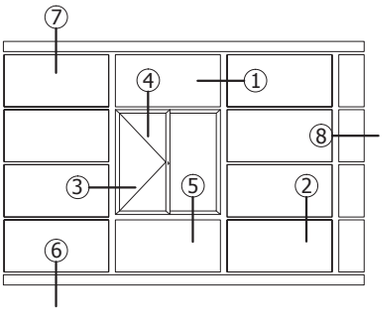
MAIN ADVANTAGES:

- fast and secure installation
- hangers, allowing adjustment in three directions to facilitate the installation of the cassettes

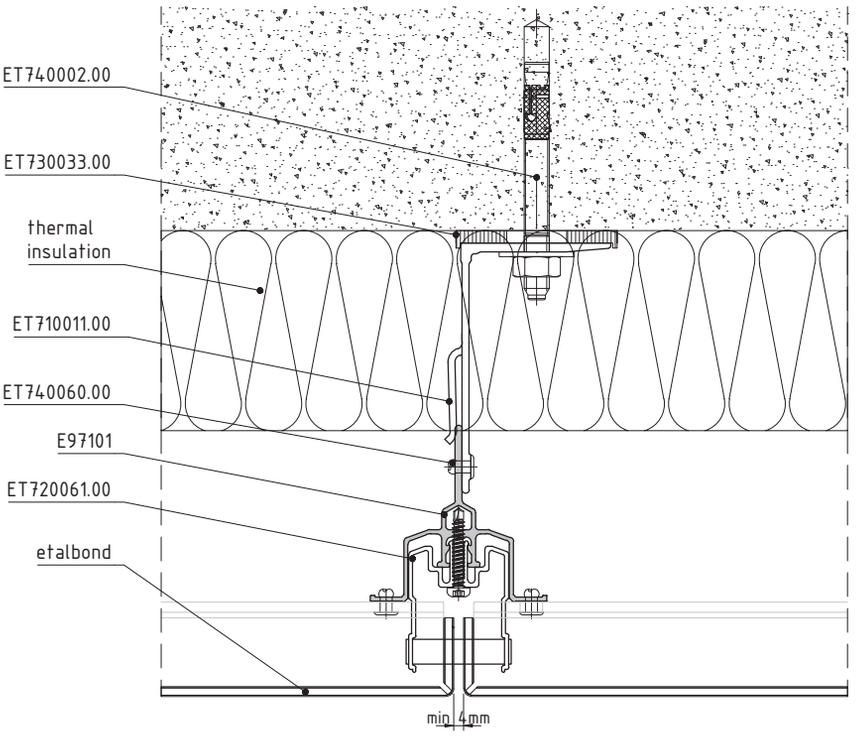
CLADDING MATERIALS: Aluminium Composite Material, Metal sheet products.

code	profile	weight length moment of inertia
E 97101 main profile kg		1103 g/m L=6.01 m Ix=13.25 cm^4 Iy=8.90 cm^4
E 97102 main profile		1329 g/m L=6.01 m Ix=37.52 cm^4 Iy=8.90 cm^4
E 97104 F profile		394 g/m L=6.01 m

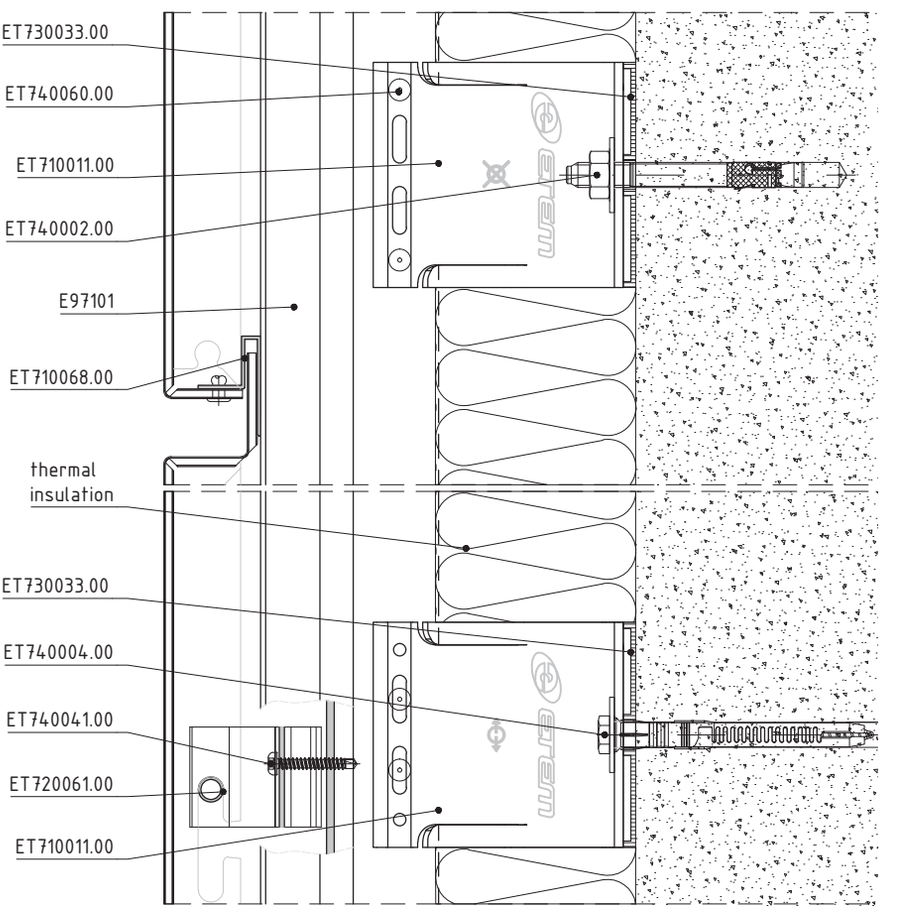
code	profile	weight length moment of inertia
E 97105 U profile		248 g/m L=6.01 m
ET720061.00 hanger		pcs 1


7
4
1
8
3
5
2
6

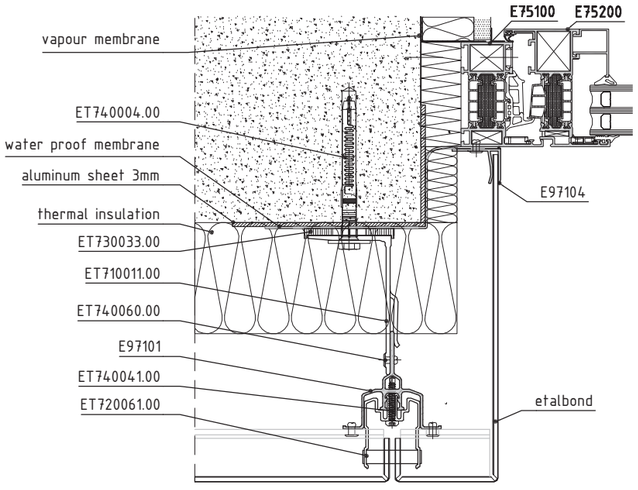
1


ET740002.00
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97101
ET720061.00
etalbond
min. 4mm

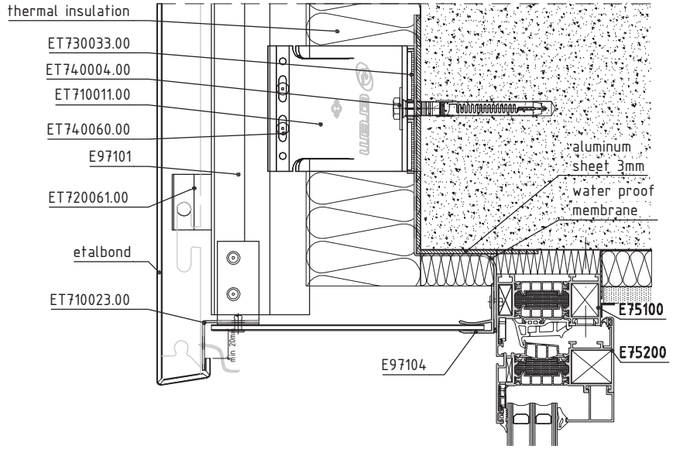
2


ET730033.00
ET740060.00
ET710011.00
ET740002.00
E97101
ET710068.00
thermal insulation
ET730033.00
ET740004.00
ET740041.00
ET720061.00
ET710011.00

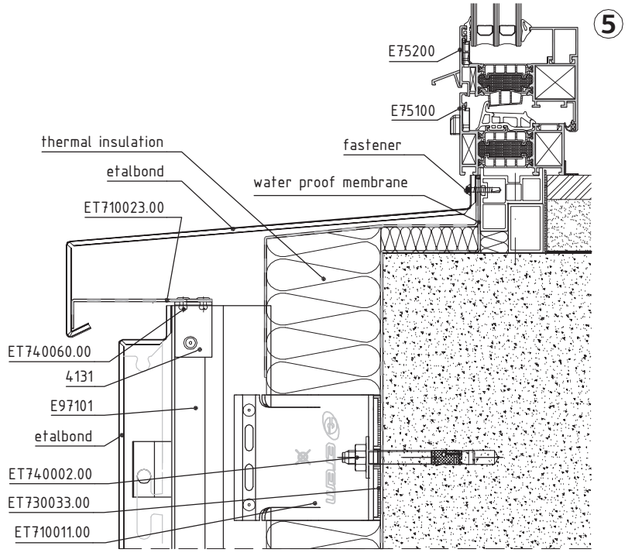
③


E75100
E75200
vapour membrane
ET740004.00
water proof membrane
aluminum sheet 3mm
thermal insulation
ET730033.00
ET710011.00
ET740060.00
E97101
ET740041.00
ET720061.00
E97104
etalbond

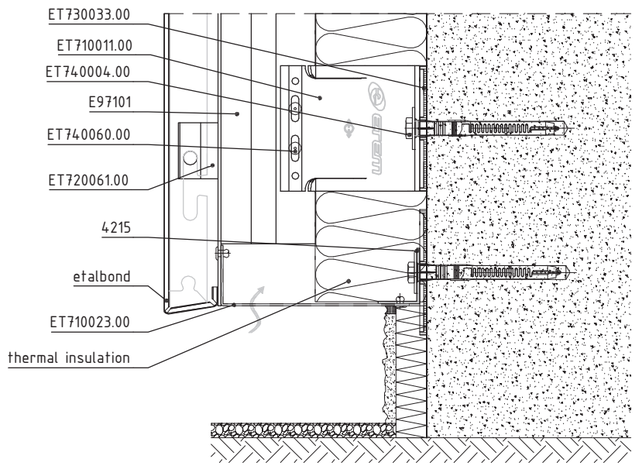
④


thermal insulation
ET730033.00
ET740004.00
ET710011.00
ET740060.00
E97101
ET720061.00
etalbond
ET710023.00
aluminum sheet 3mm
water proof membrane
E75100
E75200
E97104

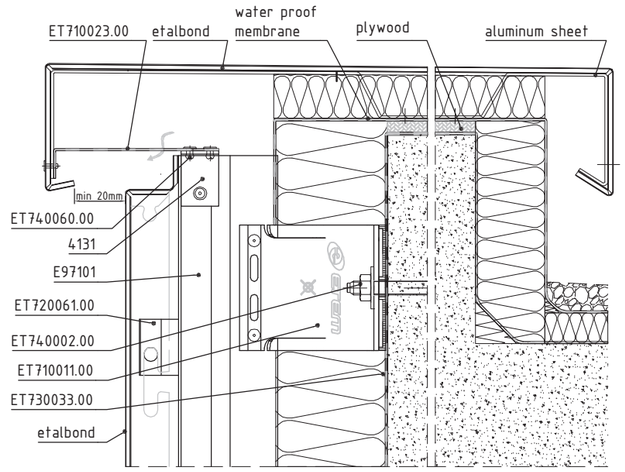
⑤


E75200
E75100
thermal insulation
etalbond
fastener
water proof membrane
ET710023.00
ET740060.00
4131
E97101
etalbond
ET740002.00
ET730033.00
ET710011.00

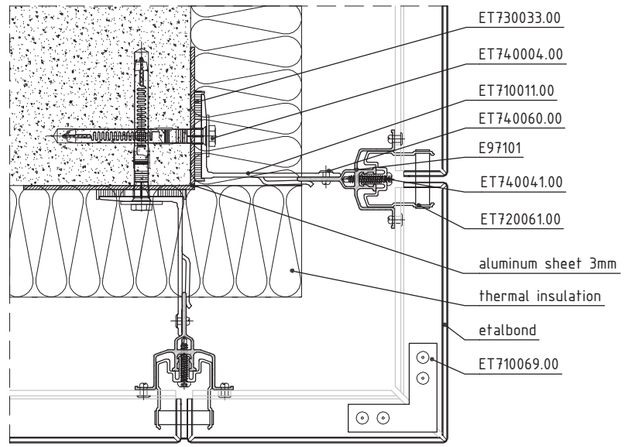
⑥

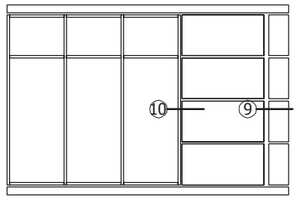

ET730033.00
ET710011.00
ET740004.00
E97101
ET740060.00
ET720061.00
4215
etalbond
ET710023.00
thermal insulation

⑦

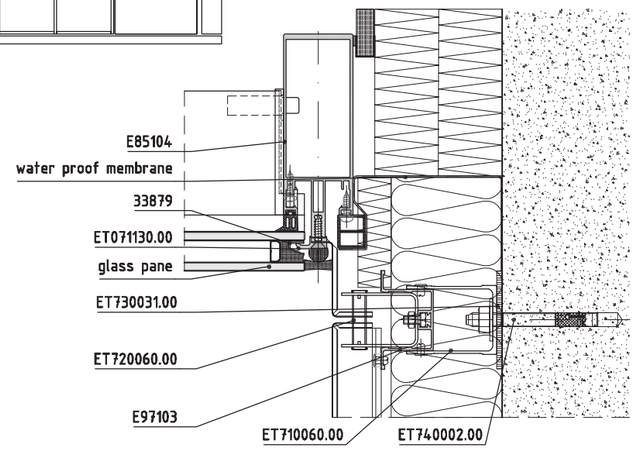

ET710023.00
etalbond
water proof membrane
plywood
aluminum sheet
min 20mm
ET740060.00
4131
E97101
ET720061.00
ET740002.00
ET710011.00
ET730033.00
etalbond

⑧

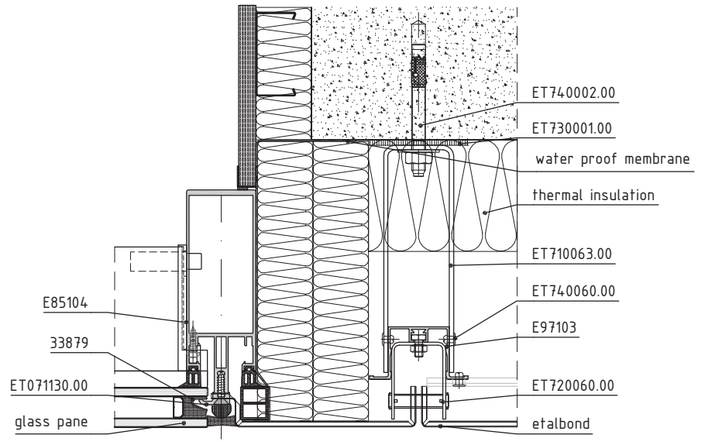

ET730033.00
ET740004.00
ET710011.00
ET740060.00
E97101
ET740041.00
ET720061.00
aluminum sheet 3mm
thermal insulation
etalbond
ET710069.00



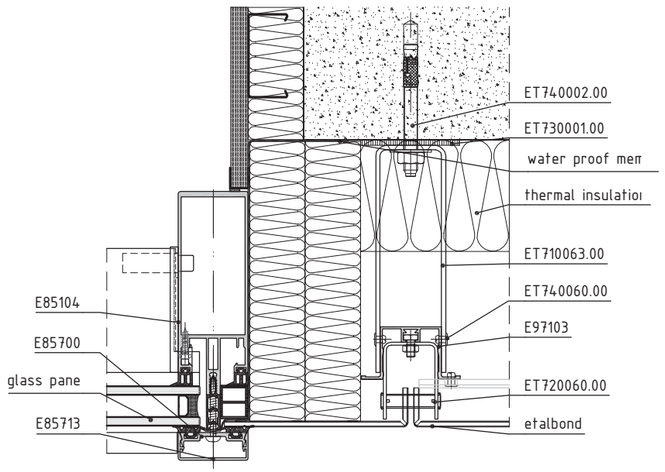
9


E85104
water proof membrane
33879
ET071130.00
glass pane
ET730031.00
ET720060.00
E97103
ET710060.00
ET740002.00

10


ET740002.00
ET730001.00
water proof membrane
thermal insulation
ET710063.00
ET740060.00
E97103
ET720060.00
etalbond
E85104
33879
ET071130.00
glass pane

10


ET740002.00
ET730001.00
water proof mem
thermal insulatio
ET710063.00
ET740060.00
E97103
ET720060.00
etalbond
E85104
E85700
glass pane
E85713

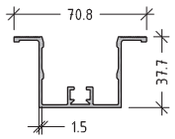
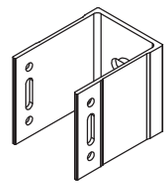
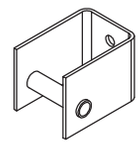
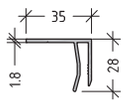
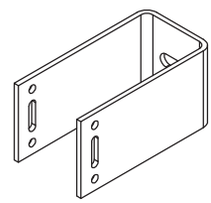
BRAVO U

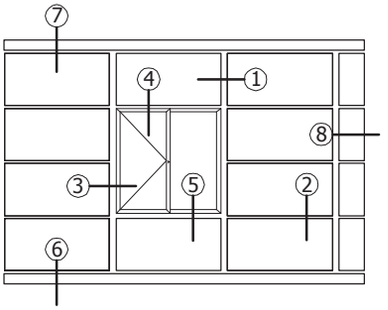
BRAVO U IS A SYSTEM FOR INSTALLATION OF COMPOSITE MATERIALS AND METAL SHEETS, USING THE MOST SUCCESSFUL PRINCIPLE OF PANEL HANGING. THE SYSTEM IS AN OPTIMAL SOLUTION FOR LARGE AND FLAT FAÇADES. IT ENSURES FAST AND SECURE INSTALLATION OF THE COMPOSITE PANELS AND IT IS AN OPTIMAL RESPONSE TO THE THERMAL EXPANSION OF THE MATERIAL.

MAIN ADVANTAGES:

- U- shaped brackets
- profiles, allowing the implementation of curved ventilated façades
- hangers, allowing adjustment in three projections to facilitate the installation of the composite material panels

CLADDING MATERIALS: Aluminium Composite Material, Metal sheet products.

code	profile	weight length moment of inertia	code	profile	weight length moment of inertia
E 97103 main profile kg		761 g/m L=6.01 m Ix=10.94 Iy=5.67	ET710060.00 wall bracket		pcs 1
E 97105 U profile		248 g/m L=6.01 m	ET720060.00 hanger		pcs 1
E 97104 F profile		394 g/m L=6.01 m	ET710061.00 ET710062.00 ET710063.00 ET710064.00 ET710065.00 ET710066.00 wall bracket		pcs 1


7
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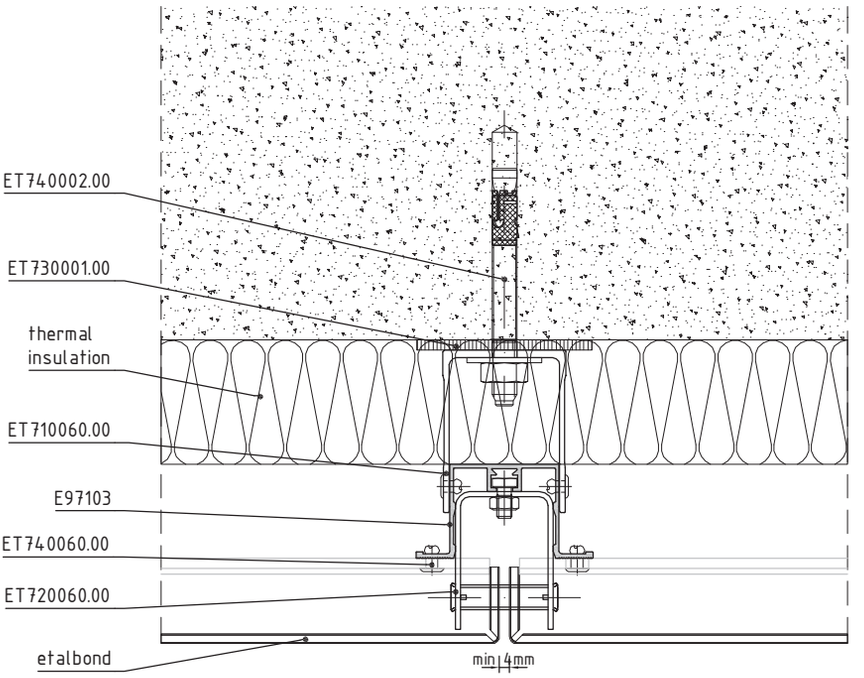
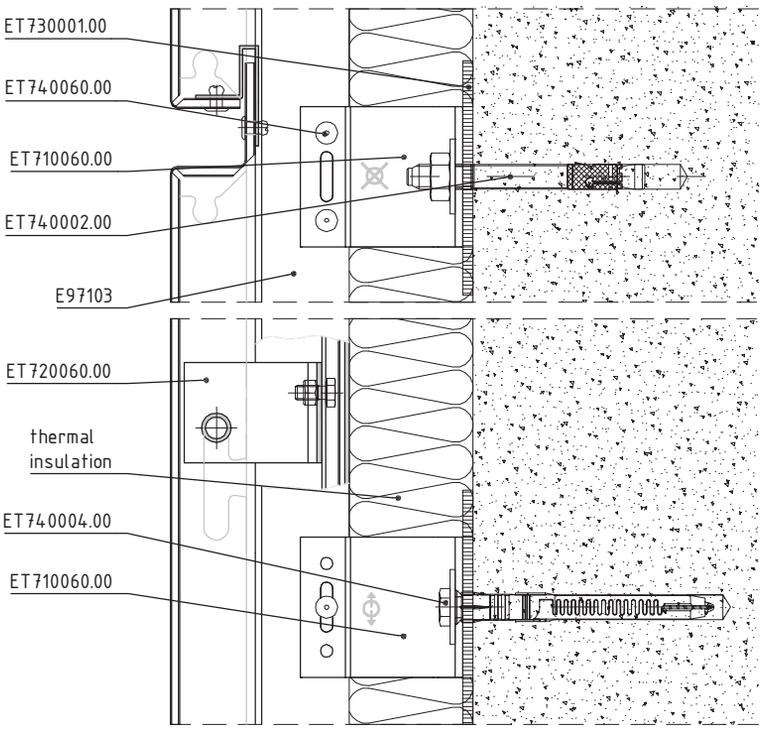
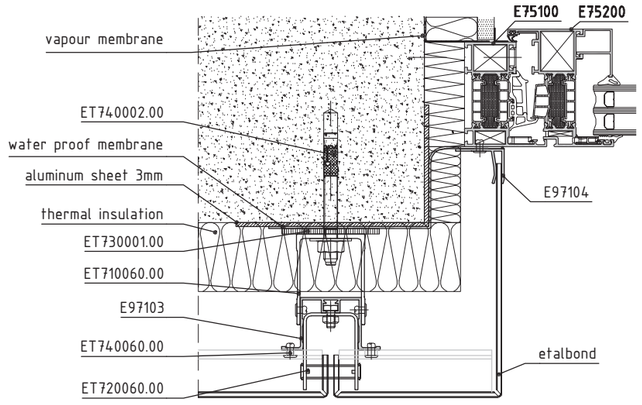
1


ET740002.00
ET730001.00
thermal
insulation
ET710060.00
E97103
ET740060.00
ET720060.00
etalbond
min 4mm

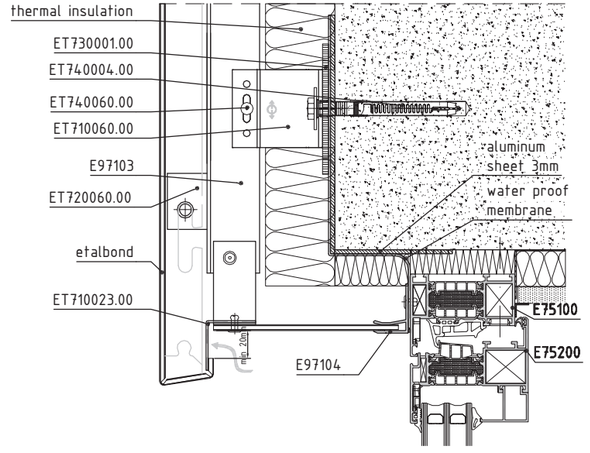
2


ET730001.00
ET740060.00
ET710060.00
ET740002.00
E97103
ET720060.00
thermal
insulation
ET740004.00
ET710060.00

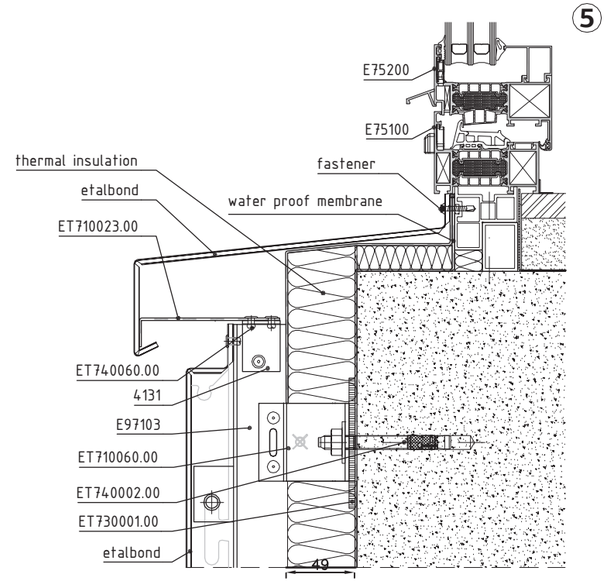
③


E75100
E75200
vapour membrane
ET740002.00
water proof membrane
aluminum sheet 3mm
thermal insulation
ET730001.00
ET710060.00
E97103
ET740060.00
ET720060.00
E97104
etalbond

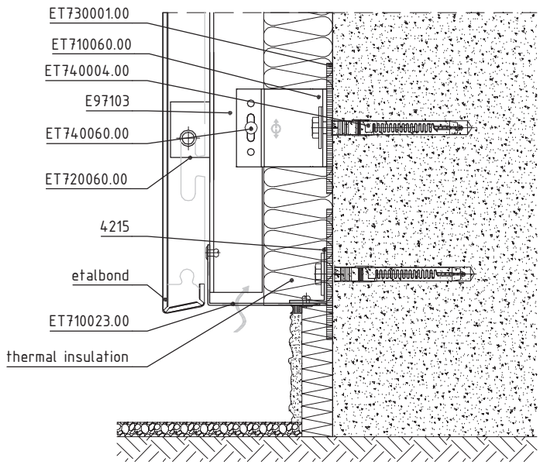
④


thermal insulation
ET730001.00
ET740004.00
ET740060.00
ET710060.00
E97103
ET720060.00
etalbond
ET710023.00
aluminum sheet 3mm
water proof membrane
E75100
E75200
E97104
min 20m

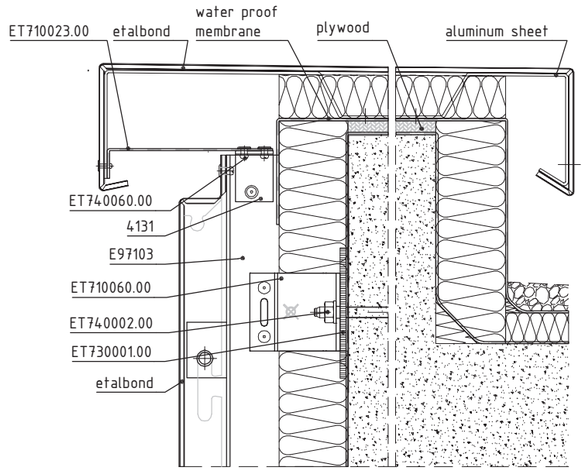
⑤


E75200
E75100
thermal insulation
fastener
etalbond
water proof membrane
ET710023.00
ET740060.00
4131
E97103
ET710060.00
ET740002.00
ET730001.00
etalbond
49

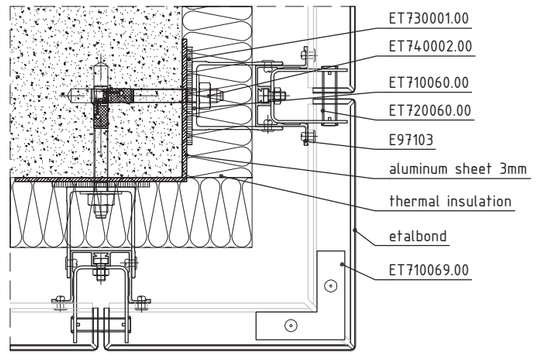
⑥

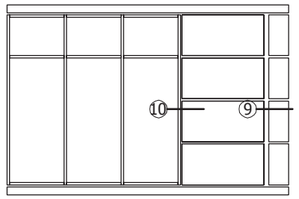

ET730001.00
ET710060.00
ET740004.00
E97103
ET740060.00
ET720060.00
4215
etalbond
ET710023.00
thermal insulation

⑦

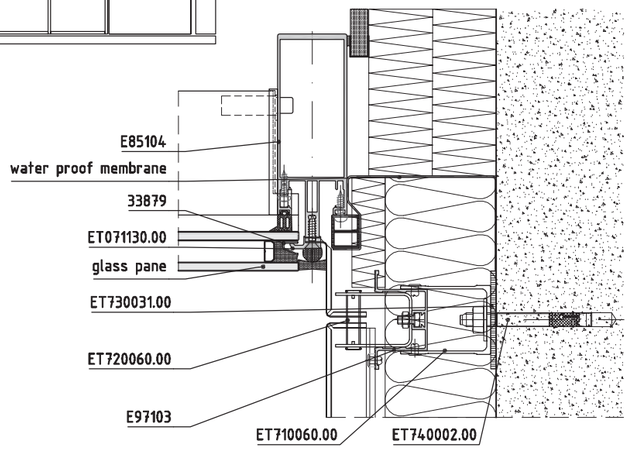

ET710023.00
etalbond
water proof membrane
plywood
aluminum sheet
ET740060.00
4131
E97103
ET710060.00
ET740002.00
ET730001.00
etalbond

⑧

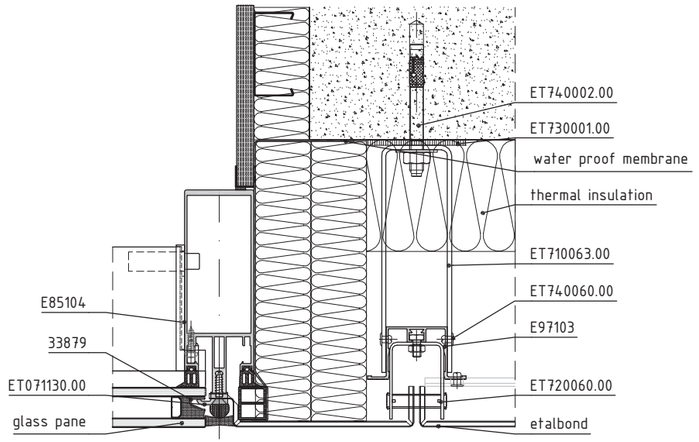

ET730001.00
ET740002.00
ET710060.00
ET720060.00
E97103
aluminum sheet 3mm
thermal insulation
etalbond
ET710069.00


10
9

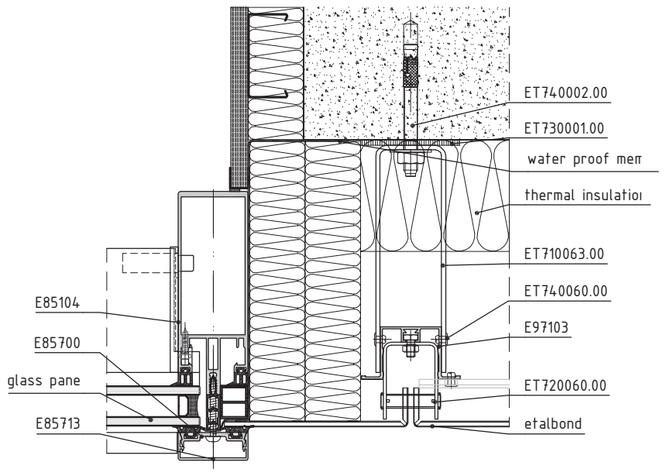
9


E85104
water proof membrane
33879
ET071130.00
glass pane
ET730031.00
ET720060.00
E97103
ET710060.00
ET740002.00

10


ET740002.00
ET730001.00
water proof membrane
thermal insulation
ET710063.00
ET740060.00
E97103
ET720060.00
etalbond
E85104
33879
ET071130.00
glass pane

10


ET740002.00
ET730001.00
water proof mem
thermal insulatio
ET710063.00
ET740060.00
E97103
ET720060.00
etalbond
E85104
E85700
glass pane
E85713

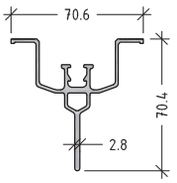
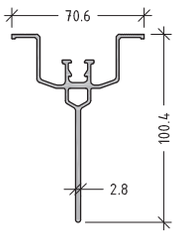
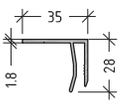
BRAVO Y

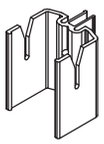
SYSTEM IS DESIGNED FOR INSTALLATION OF COMPOSITE MATERIALS AND METAL SHEETS BY USING THE MOST SUCCESSFUL PRINCIPLE OF CLADDING. THE SYSTEM IS AN OPTIMAL SOLUTION FOR LARGE AND FLAT FAÇADES.

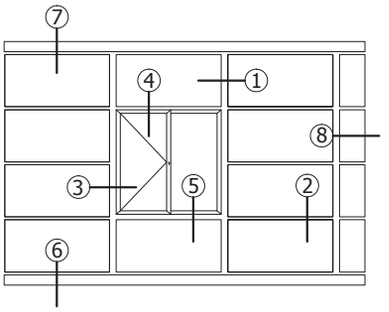
MAIN ADVANTAGES:

- fast and secure installation
- hangers, allowing adjustment in three projections to facilitate the installation of the panels
- specially designed hangers which do not require machining of holes for hanging the panels
- precision engineered "Y" slot on each hanger

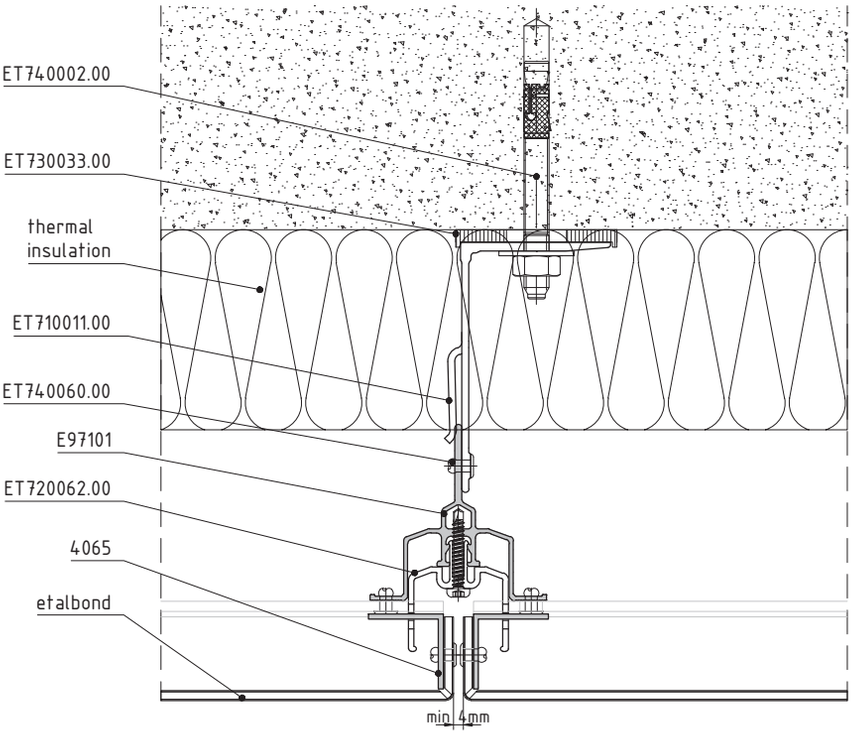
CLADDING MATERIALS: Aluminium Composite Material, Metal sheet products.

code	profile	weight length moment of inertia
E 97101 main profile kg		1329 g/m L=6.01 m Iy=37.52 cm^4 Iy=8.90 cm^4
E 97102 main profile		1329 g/m L=6.01 m Iy=37.52 Iy=8.90
E 97104 F profile		394 g/m L=6.01 m

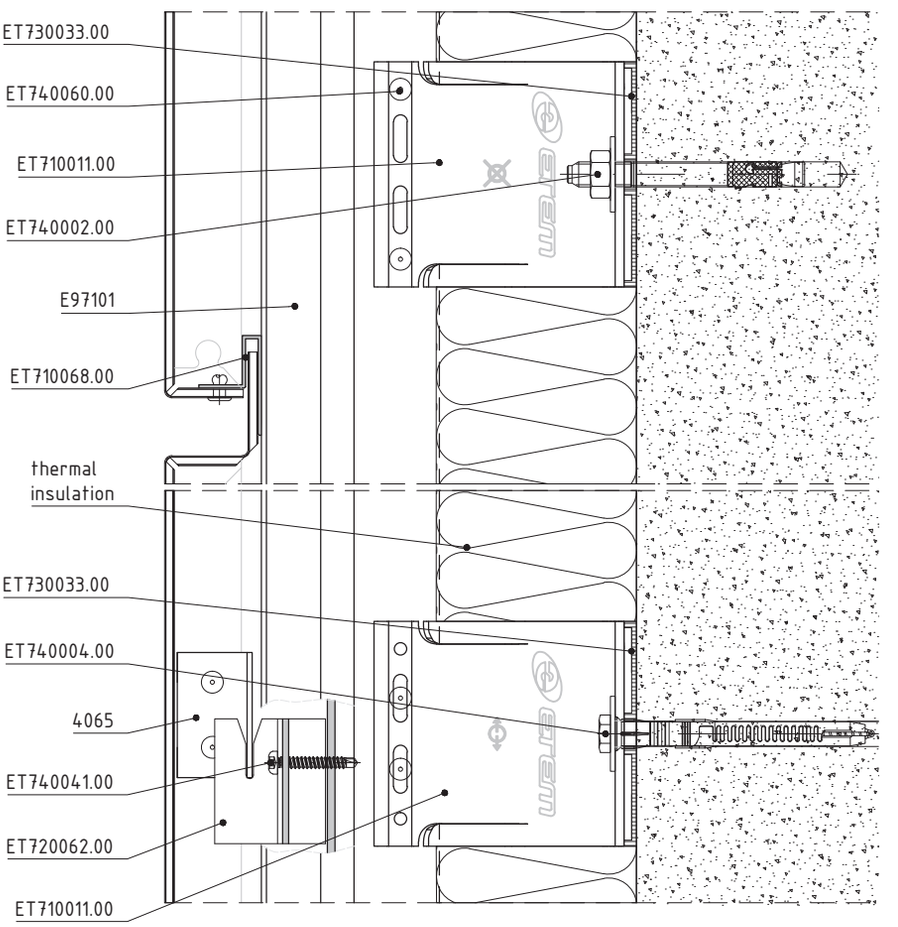
code	profile	weight length moment of inertia
E 97105 U profile		248 g/m L=6.01 m
ET720062.00 hanger		pcs 1


7
4
1
8
3
5
2
6

1


ET740002.00
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97101
ET720062.00
4065
etalbond
min 4mm

2


ET730033.00
ET740060.00
ET710011.00
ET740002.00
E97101
ET710068.00
thermal insulation
ET730033.00
ET740004.00
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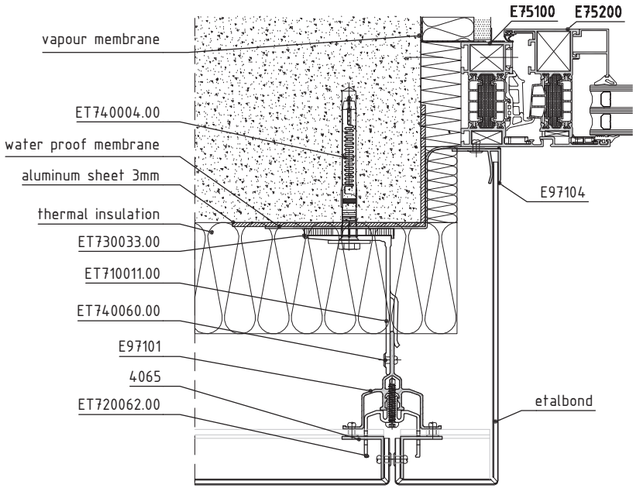
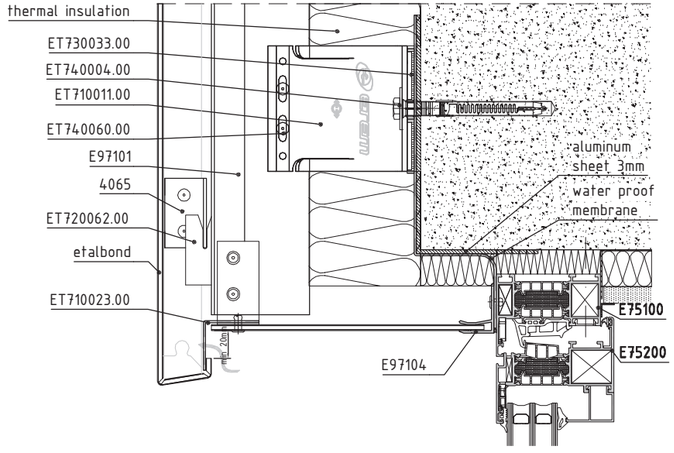
ET740041.00
ET720062.00
ET710011.00

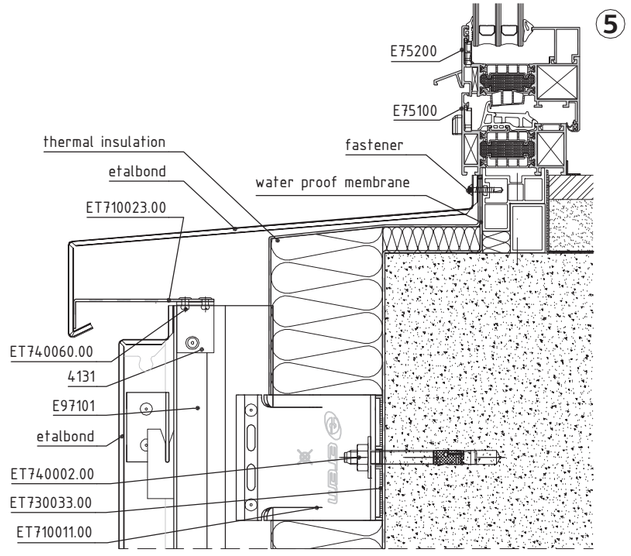
③


E75100
E75200
vapour membrane
ET740004.00
water proof membrane
aluminum sheet 3mm
thermal insulation
ET730033.00
ET710011.00
ET740060.00
E97101
4065
ET720062.00
E97104
etalbond

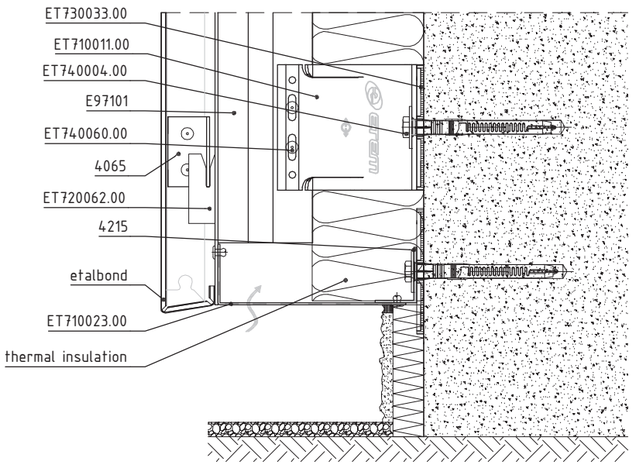
④


thermal insulation
ET730033.00
ET740004.00
ET710011.00
ET740060.00
E97101
4065
ET720062.00
etalbond
ET710023.00
aluminum sheet 3mm
water proof membrane
E75100
E75200
E97104

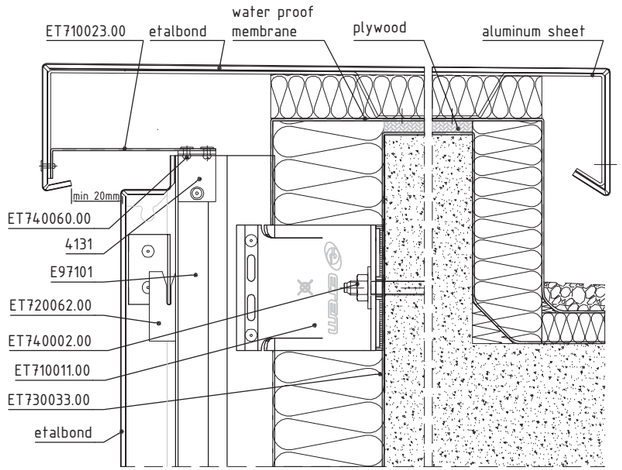
⑤


E75200
E75100
thermal insulation
etalbond
fastener
water proof membrane
ET710023.00
ET740060.00
4131
E97101
etalbond
ET740002.00
ET730033.00
ET710011.00

⑥


ET730033.00
ET710011.00
ET740004.00
E97101
ET740060.00
4065
ET720062.00
4215
etalbond
ET710023.00
thermal insulation

⑦


ET710023.00
etalbond
water proof membrane
plywood
aluminum sheet
min 20mm
ET740060.00
4131
E97101
ET720062.00
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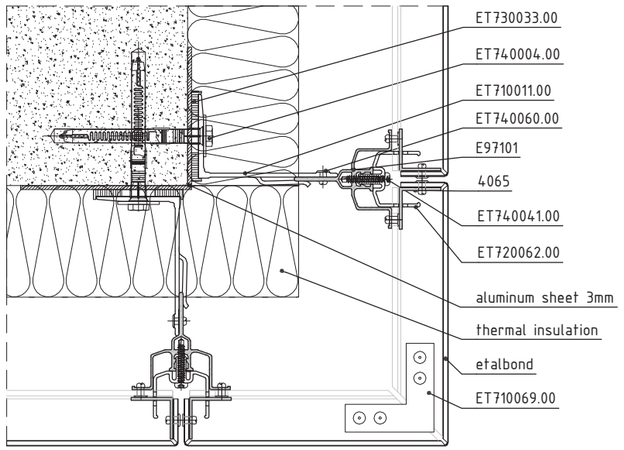
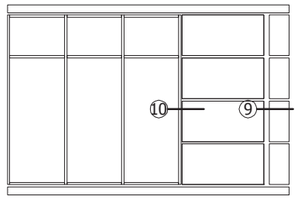
ET710011.00
ET730033.00
etalbond

⑧


ET730033.00
ET740004.00
ET710011.00
ET740060.00
E97101
4065
ET740041.00
ET720062.00
aluminum sheet 3mm
thermal insulation
etalbond
ET710069.00



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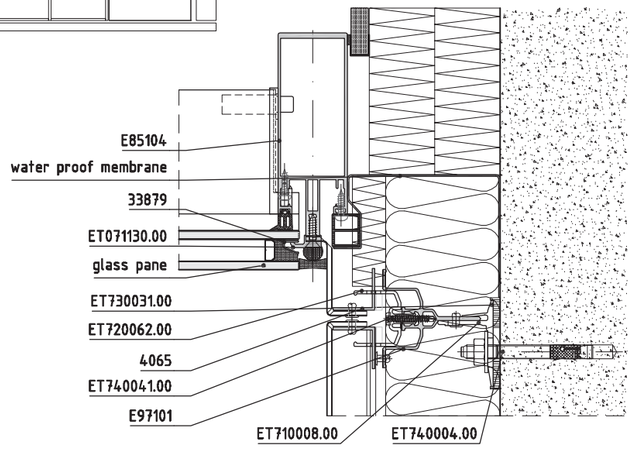
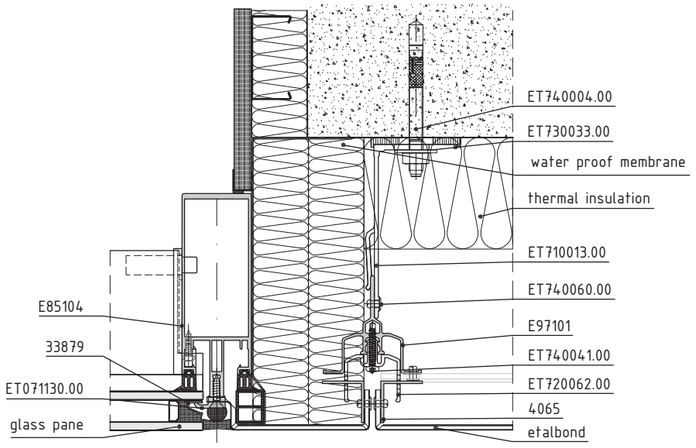
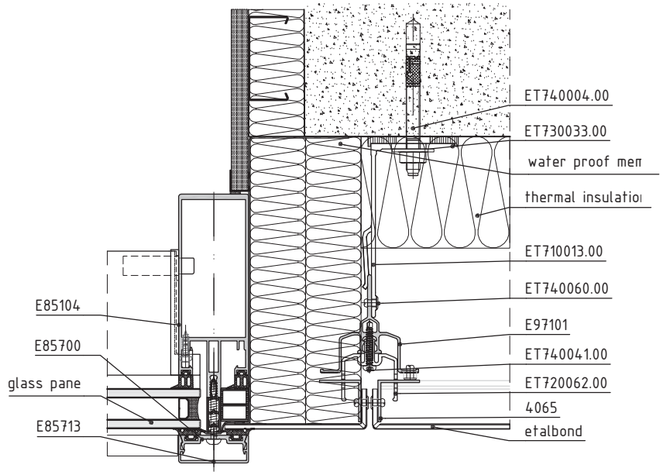

E85104
water proof membrane
33879
ET071130.00
glass pane
ET730031.00
ET720062.00
4065
ET740041.00
E97101
ET710008.00
ET740004.00

10


ET740004.00
ET730033.00
water proof membrane
thermal insulation
ET710013.00
ET740060.00
E97101
ET740041.00
ET720062.00
4065
etalbond
E85104
33879
ET071130.00
glass pane

10


ET740004.00
ET730033.00
water proof mem
thermal insulatio
ET710013.00
ET740060.00
E97101
ET740041.00
ET720062.00
4065
etalbond
E85104
E85700
glass pane
E85713

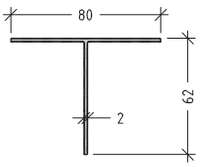
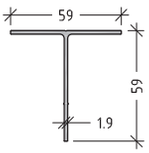
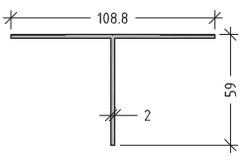
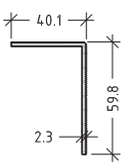
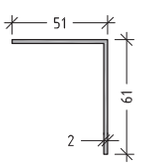
BRAVO H

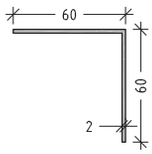
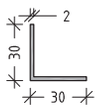
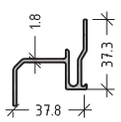
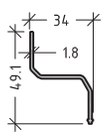
BRAVO H SYSTEM IS DESIGNED FOR INSTALLATION OF COMPOSITE MATERIALS AND METAL SHEETS BY USING THE EASIEST AND SIMPLE CLADDING PRINCIPLE (TONGUE AND GROOVE). THE SYSTEM IS AN OPTIMAL SOLUTION FOR LARGE AND FLAT FAÇADES.

MAIN ADVANTAGES:

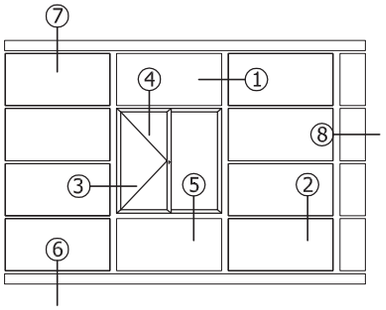
- fast and secure installation
- widescreen raster on the façades can be manufactured
- special accessories to avoid the clatter noise between the horizontal profile
- possibility for large span of the panels depending on the applied loads
- variable horizontal and vertical gap (min 4 – max 21 mm)

CLADDING MATERIALS: Aluminium Composite Material, Metal sheet products.

code	profile	weight length moment of inertia
E 97004 main profile		646 g/m L=6.01 m Ix=8.67 cm^4 Iy=7.26 cm^4
E 97003 main profile		603 g/m L=6.01 m Ix=7.78 cm^4 Iy=3.25 cm^4
E 97217 main profile kg		875 g/m L=6.01 m Ix=9.51 cm^4 Iy=20.03 cm^4
E 97218 main profile kg		567 g/m L=6.01 m Ix=2.96 cm^4 Iy=7.92 cm^4
4049 main profile kg		596 g/m L=6.01 m Ix=27.70 cm^4 Iy=19.39 cm^4

code	profile	weight length moment of inertia
4218 main profile		640 g/m L=6.01 m Ix=8.56 cm^4 Iy=8.56 cm^4
E 97004 supporting profile		314 g/m L=6.01 m Ix=1.02 cm^4 Iy=1.02 cm^4
E 97107 horizontal profile		568 g/m L=6.01 m Ix=1.834 cm^4 Iy=2.317 cm^4
E 97106 horizontal profile		365 g/m L=6.01 m Ix=1.988 cm^4 Iy=4.188 cm^4
ET130439.00 silicone gasket		1000mm length

note: 50 mm gasket - 2 gaskets per each 1 m length


7
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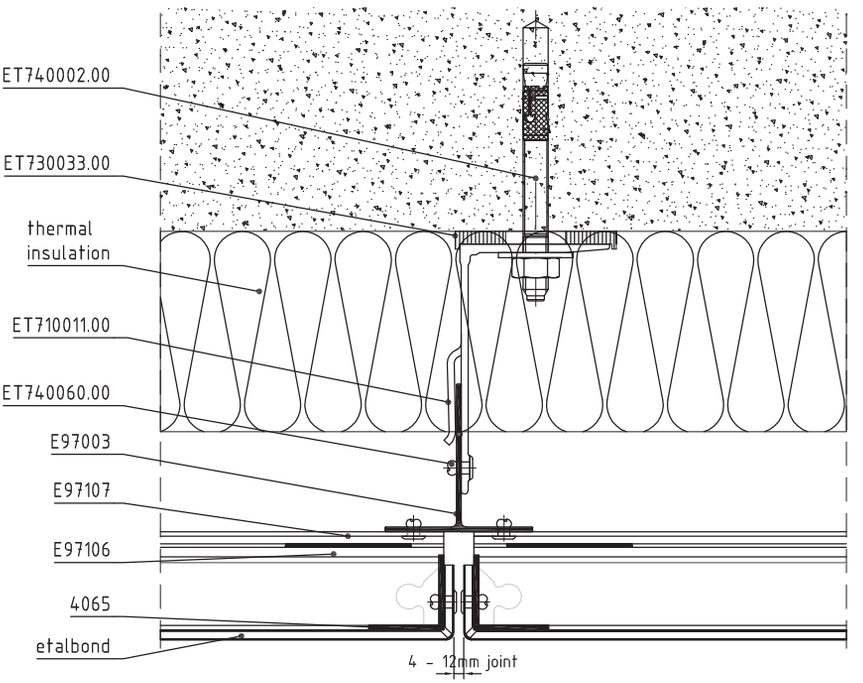
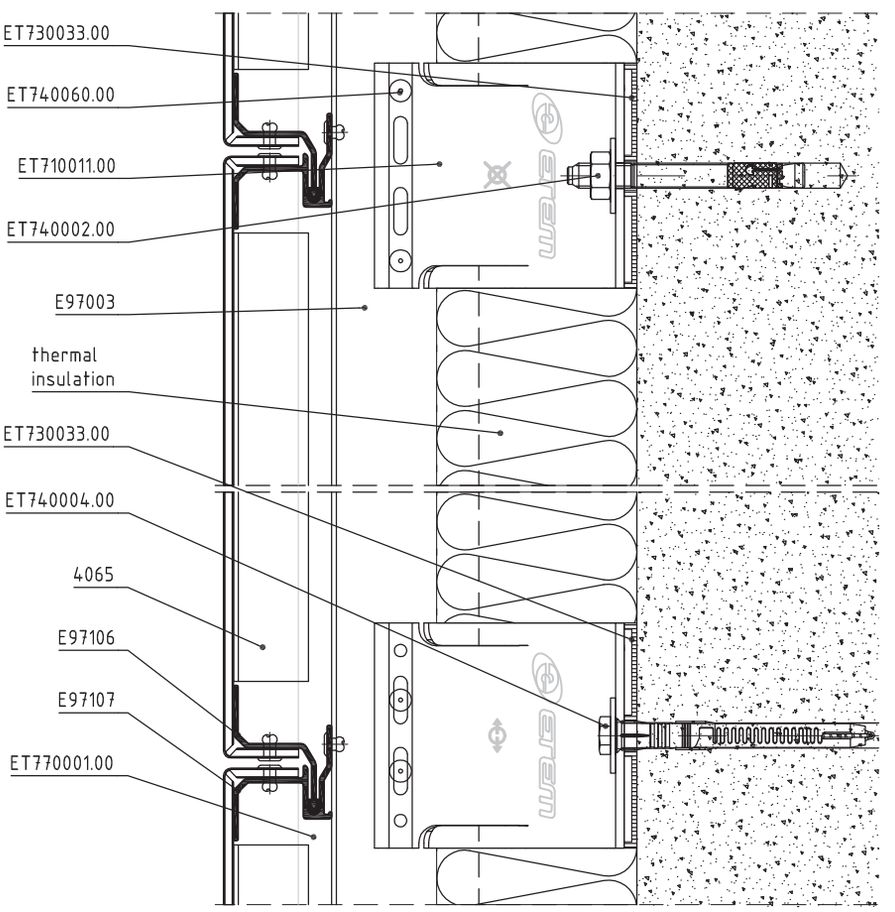
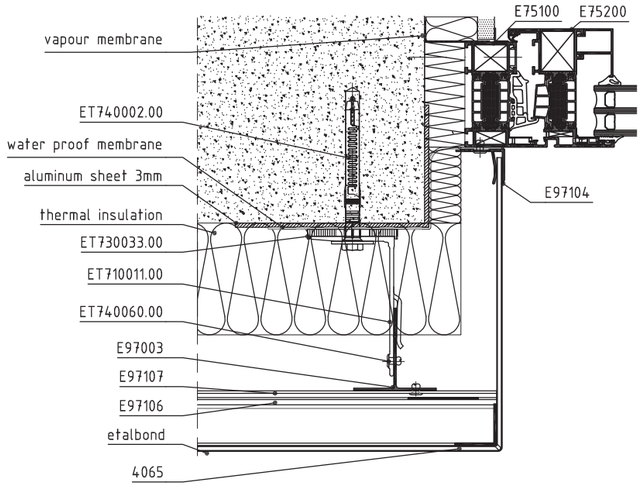
①


ET740002.00
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97003
E97107
E97106
4065
etalbond
4 - 12mm joint

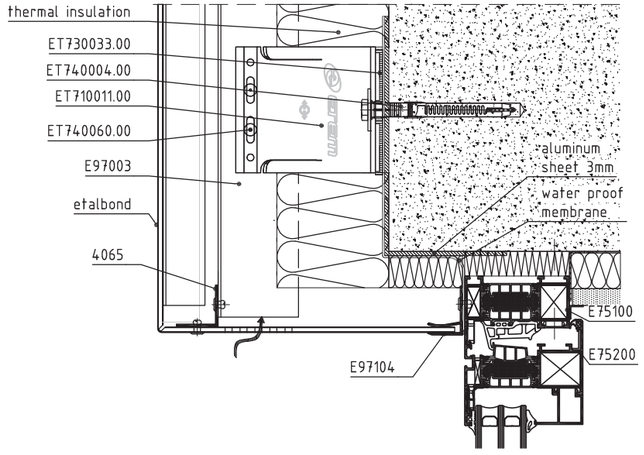
②


ET730033.00
ET740060.00
ET710011.00
ET740002.00
E97003
thermal insulation
ET730033.00
ET740004.00
4065
E97106
E97107
ET770001.00

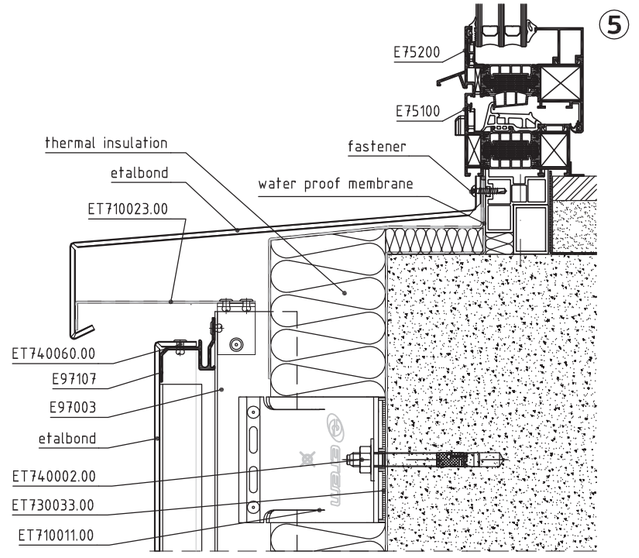
③


E75100
E75200
vapour membrane
ET740002.00
water proof membrane
aluminum sheet 3mm
thermal insulation
ET730033.00
ET710011.00
ET740060.00
E97003
E97107
E97106
etalbond
4065
E97104

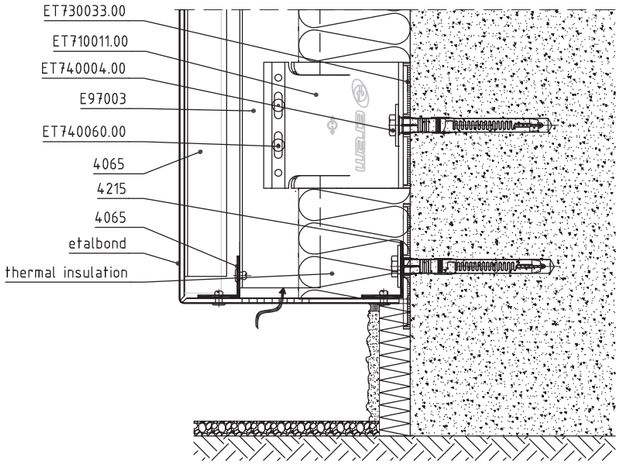
④


thermal insulation
ET730033.00
ET740004.00
ET710011.00
ET740060.00
E97003
etalbond
4065
aluminum sheet 3mm
water proof membrane
E75100
E75200
E97104

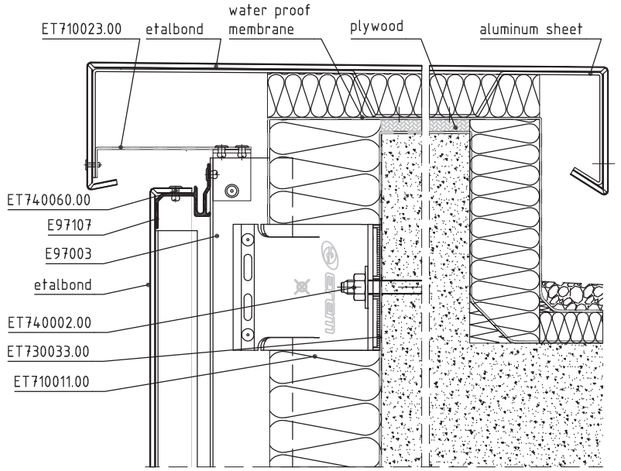
⑤


E75200
E75100
thermal insulation
fastener
etalbond
water proof membrane
ET710023.00
ET740060.00
E97107
E97003
etalbond
ET740002.00
ET730033.00
ET710011.00

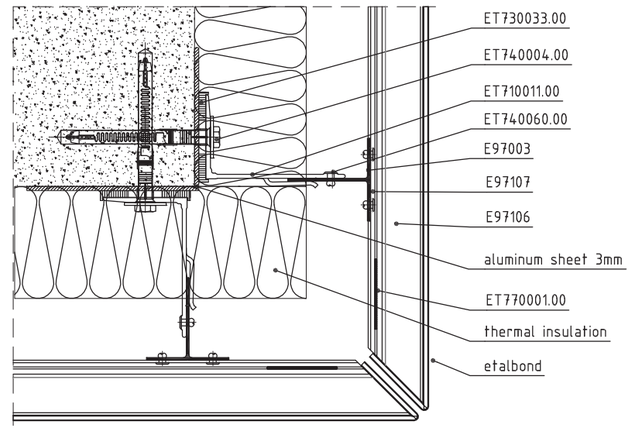
⑥

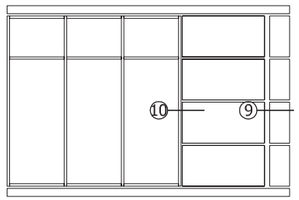

ET730033.00
ET710011.00
ET740004.00
E97003
ET740060.00
4065
4215
4065
etalbond
thermal insulation

⑦


ET710023.00
etalbond
water proof membrane
plywood
aluminum sheet
ET740060.00
E97107
E97003
etalbond
ET740002.00
ET730033.00
ET710011.00

⑧


ET730033.00
ET740004.00
ET710011.00
ET740060.00
E97003
E97107
E97106
aluminum sheet 3mm
ET770001.00
thermal insulation
etalbond



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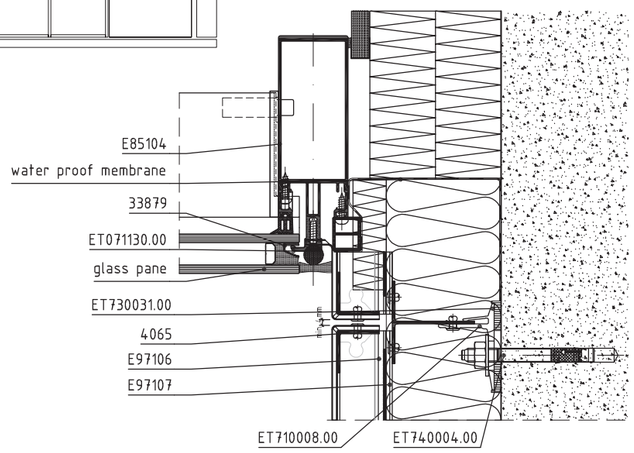
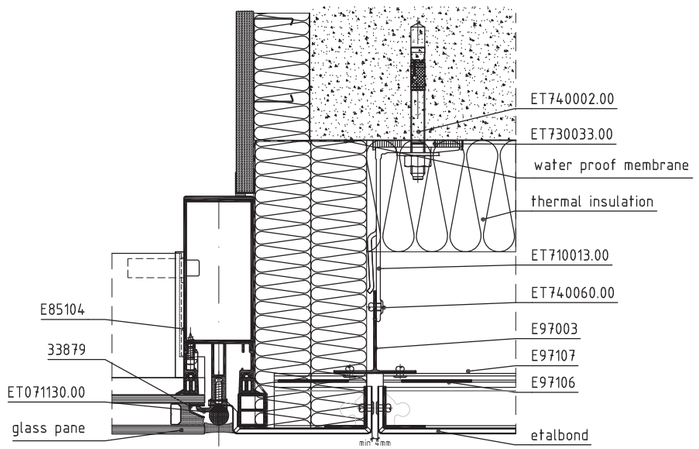
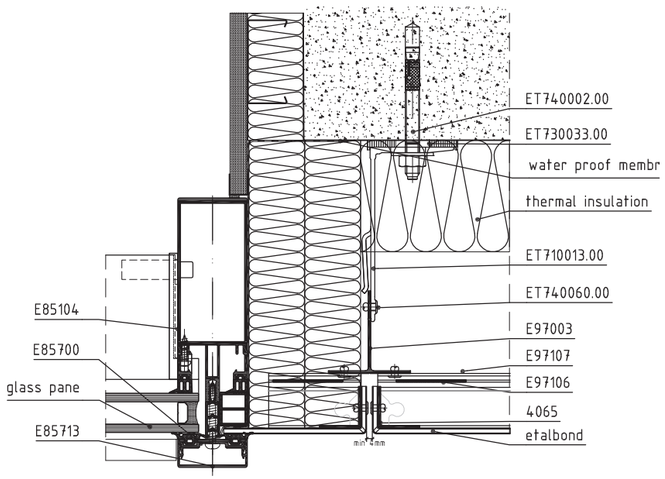

E85104
water proof membrane
33879
ET071130.00
glass pane
ET730031.00
4065
E97106
E97107
ET710008.00
ET740004.00

10


ET740002.00
ET730033.00
water proof membrane
thermal insulation
ET710013.00
ET740060.00
E97003
E97107
E97106
etalbond
E85104
33879
ET071130.00
glass pane

10


ET740002.00
ET730033.00
water proof membr
thermal insulation
ET710013.00
ET740060.00
E97003
E97107
E97106
4065
etalbond
E85104
E85700
glass pane
E85713

VARIO

VARIO Lamella / VARIO GH / VARIO Glue / VARIO Fixings / VARIO Clips

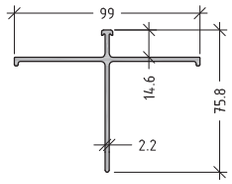
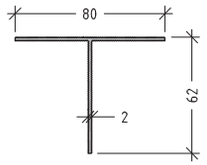
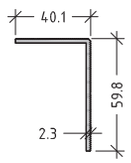
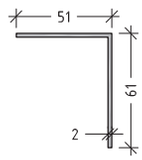
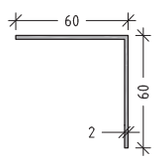
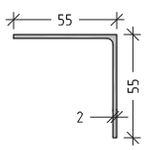
VARIO Lamella

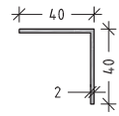
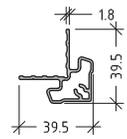
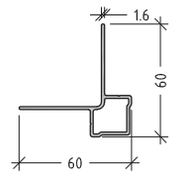
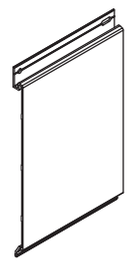
SYSTEM FOR VENTILATED CURTAIN WALL CONSISTED ENTIRELY OF EXTRUDED ALUMINIUM ELEMENTS. VARIO LAMELLA DIFFERS FROM THE EXISTING SOLUTIONS WITH THE UNIQUE CLADDING MATERIAL– ETEM ALUMINIUM LAMELLA. THE PRODUCT ENSURES ACCURATE FIXED 8 MM VERTICAL GAP BY SPECIALLY SELECTED MAIN VERTICAL PROFILE AND 8 MM HORIZONTAL NEGATIVE GAP DEFINED BY THE LAMELLAS.

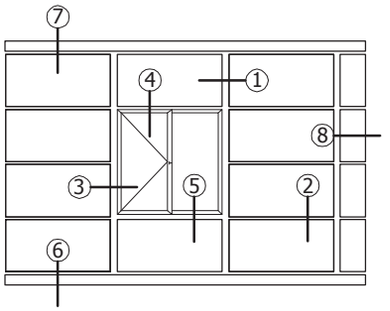
MAIN ADVANTAGES:

- quick and easy installation due to only one main façade material without additional accessories
- custom made sizes of lamellas
- wide range of finishes and colors
- low weight of just 6 kg/m^2, facilitating the transportation, loading, unloading and installation
- allows the use of very long lamella, in the case of severe loading and provides excellent performance in terms of statics

CLADDING MATERIAL: ETEM Aluminium Lamella.

code	profile	weight length moment of inertia
E97208 main profile kg		1087 g/m L=6.01 m Ix=13.08 cm^4 Iy=19.98 cm^4
E97004 main profile		646 g/m L=6.01 m Ix=8.67 cm^4 Iy=7.26 cm^4
E97218 main profile kg		567 g/m L=6.01 m Ix=2.96 cm^4 Iy=7.92 cm^4
4049 main profile kg		596 g/m L=6.01 m Ix=27.70 cm^4 Iy=19.39 cm^4
4218 main profile		640 g/m L=6.01 m Ix=8.56 cm^4 Iy=8.56 cm^4
LP055501 main profile kg		591 g/m L=6.01 m Ix=6.6 cm^4 Iy=6.6 cm^4

code	profile	weight length moment of inertia
4131 main profile kg		423 g/m L=6.01 m Ix=2.47 cm^4 Iy=2.47 cm^4
E97229 corner horizontal profile		541 g/m L=6.01 m
E97230 corner vertical profile		655 g/m L=6.01 m
E97924 TR lamella		1241 g/m L=6.01 m
ET130439.00 silicone gasket note: 50 mm gasket - 2 gaskets per each 1 m length		1000mm length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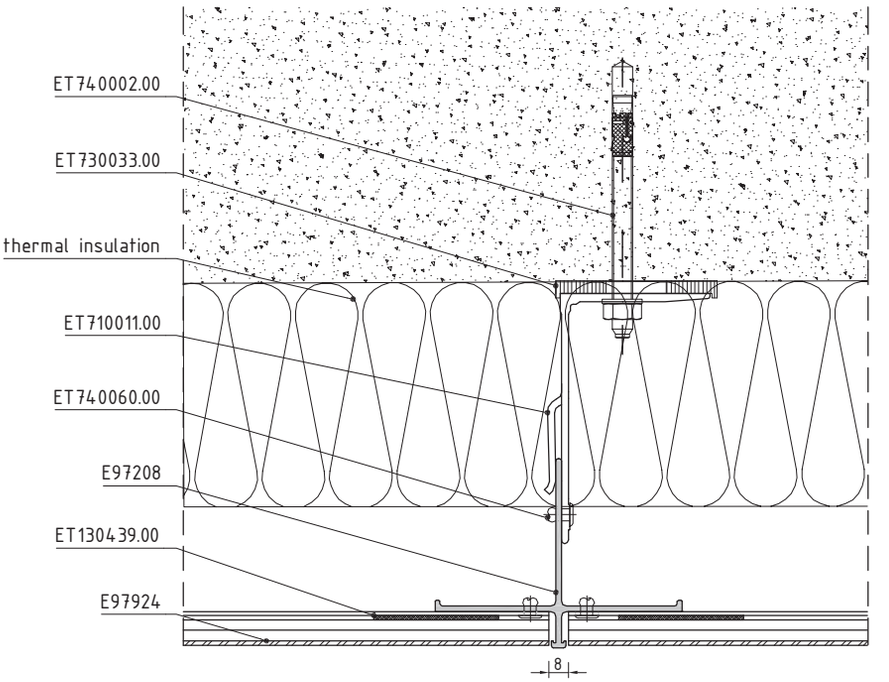
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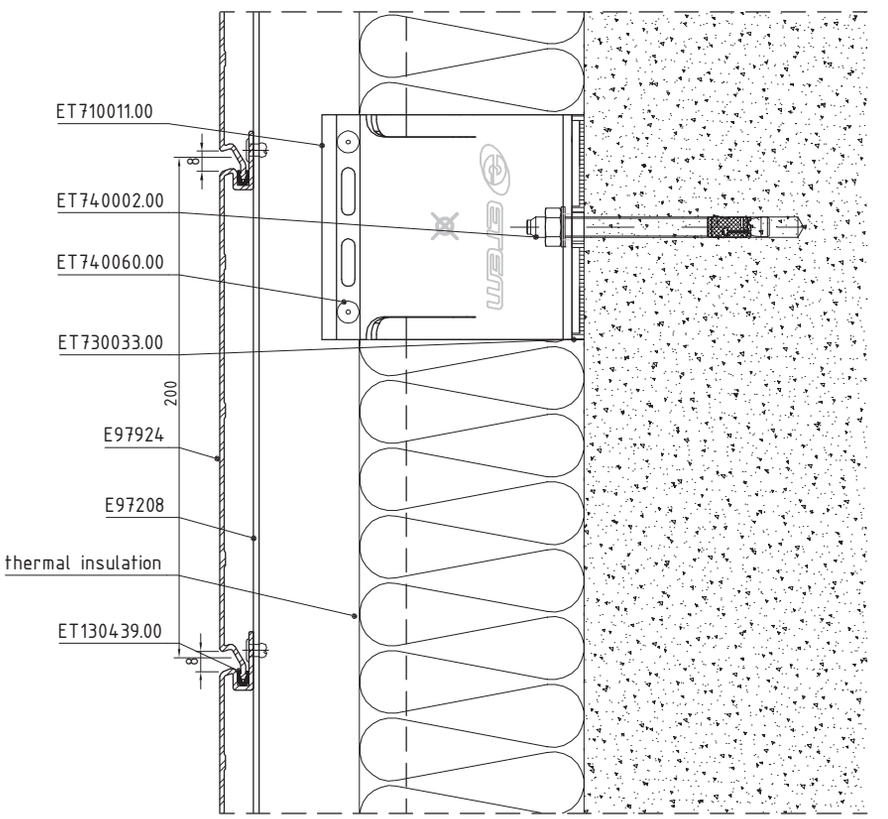
8

2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thermal insulation
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8

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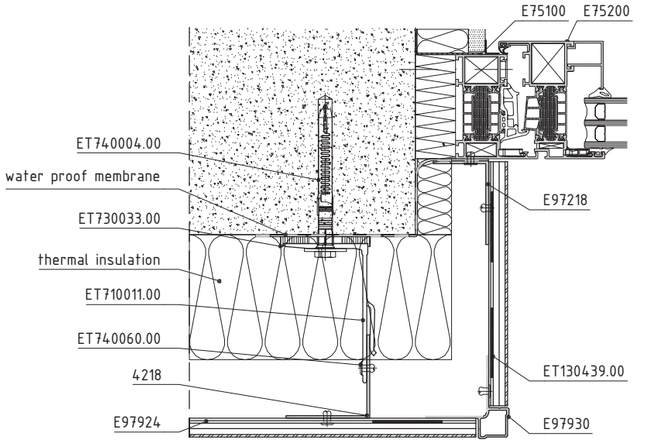
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water proof membrane
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thermal insulation
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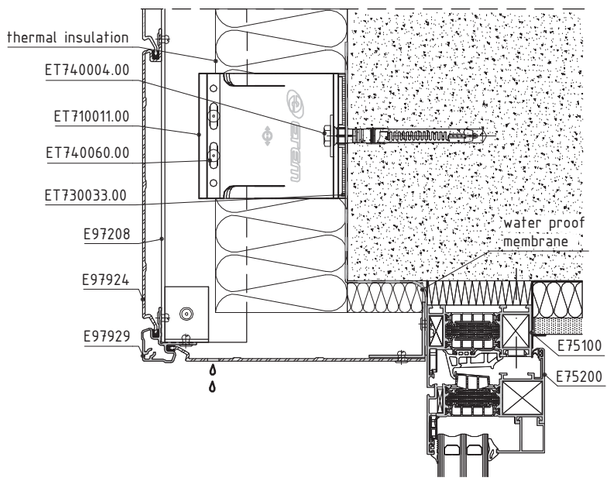
4218
E97924
E97930

④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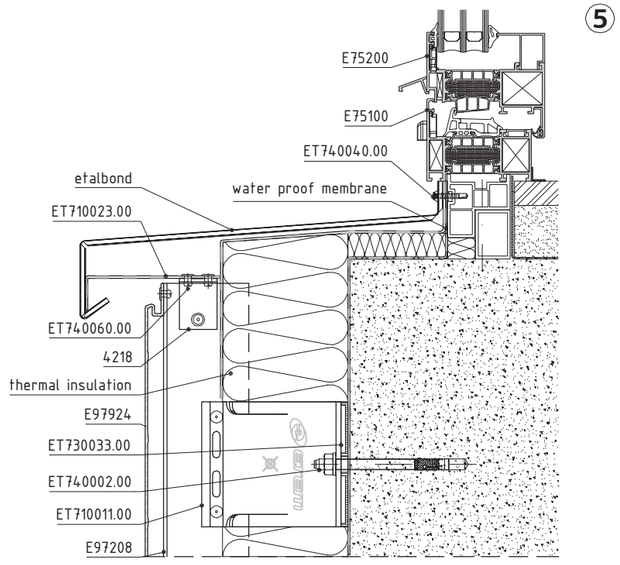
E75200

⑤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etalbond
water proof membrane
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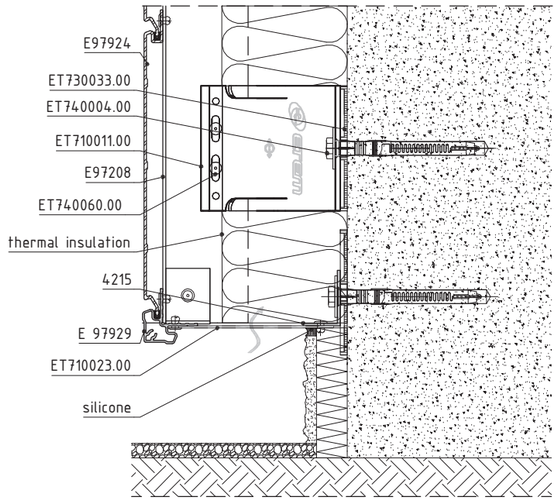
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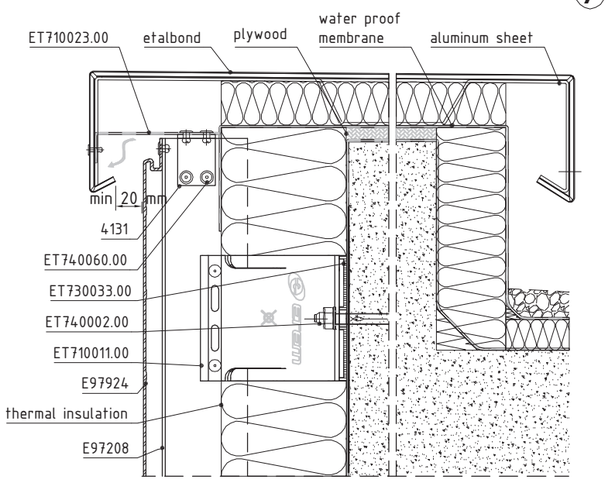
silicone

⑦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plywood
water proof membrane
aluminum sheet
min 20 mm
4131
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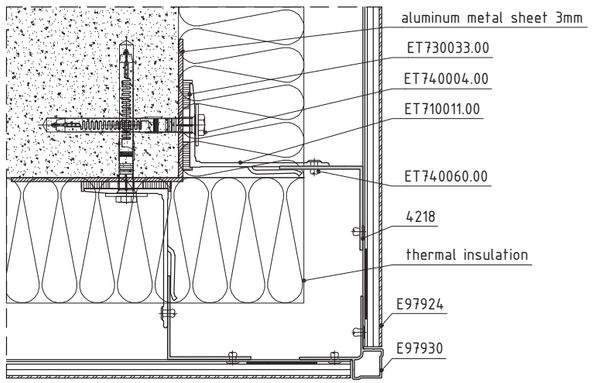
E97924
thermal insulation
E97208

⑧


aluminum metal sheet 3mm
ET730033.00
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ET740060.00
4218
thermal insulation
E97924
E97930

VARIO GH

VARIO GH IS SUPERIOR TO THE EXISTING SOLUTIONS ON THE MARKET INTENDED FOR MATERIAL GLUING. THE ADVANTAGE OF THE SYSTEM IS THE POSSIBILITY TO PERFORM ALL THE PREPARATORY OPERATIONS SUCH AS CUTTING, GLUING, ACCURATE POSITIONING BEFORE GOING ONSITE WHILE STILL STAYING AT THE CONTROLLED WORKSHOP ENVIRONMENT.

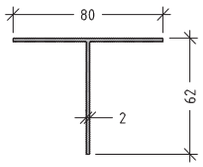
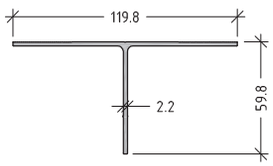
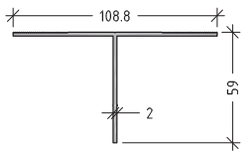
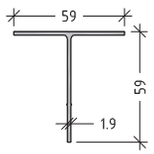
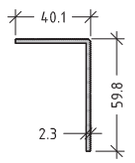
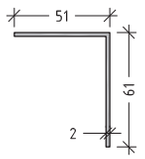
MAIN ADVANTAGES:

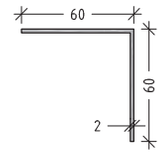
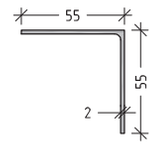
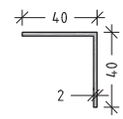
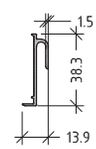
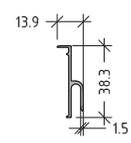
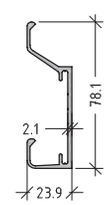
- solution for widescreen flat materials
- assembling in a workshop
- preparation for installation of the system does not depend on weather conditions
- increasing of the inertial characteristics of the façade material
- semi- concealed suspension
- ensure mechanical reinforcement of the material
- provides a rigid support (guarantee symmetrical joints)
- higher performance for assembly work

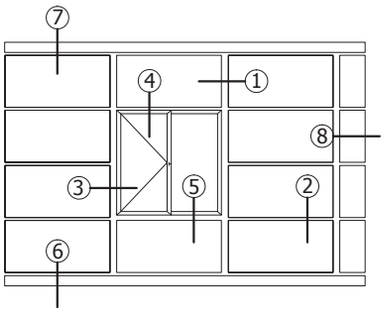
Installation method:

- gluing and hanging

CLADDING MATERIALS: Ceramic Tiles, Glass, High Pressure Laminates (HPL), Fibre Cement, Stone, Technical Stone, Glass Fiber Reinforced Concrete GFRC, GREP, Light Transmitting Concrete.

code	profile	weight length moment of inertia
E97004 main profile		646 g/m L=6.01 m Ix=8.67 cm^4 Iy=7.26 cm^4
E97216 main profile		1043 g/m L=6.01 m Ix=11.10 cm^4 Iy=29.62 cm^4
E97217 main profile kg		875 g/m L=6.01 m Ix=9.51 cm^4 Iy=20.03 cm^4
E97003 main profile		603 g/m L=6.01 m Ix=7.78 cm^4 Iy=3.25 cm^4
E97218 main profile kg		567 g/m L=6.01 m Ix=2.96 cm^4 Iy=7.92 cm^4
4049 main profile kg		596 g/m L=6.01 m Ix=27.70 cm^4 Iy=19.39 cm^4

code	profile	weight length moment of inertia
4218 main profile		640 g/m L=6.01 m Ix=8.56 cm^4 Iy=8.56 cm^4
LP055501 main profile kg		591 g/m L=6.01 m Ix=6.6 cm^4 Iy=6.6 cm^4
4131 main profile kg		423 g/m L=6.01 m Ix=2.47 cm^4 Iy=2.47 cm^4
E97925 bottom horizontal profile		242 g/m L=6.01 m Ix=1.23 cm^4 Iy=0.08 cm^4
E97926 top horizontal profile		240 g/m L=6.01 m Ix=1.04 cm^4 Iy=0.08 cm^4
E97927 hanging profile		742 g/m L=6.01 m Ix=16.50 cm^4 Iy=2.14 cm^4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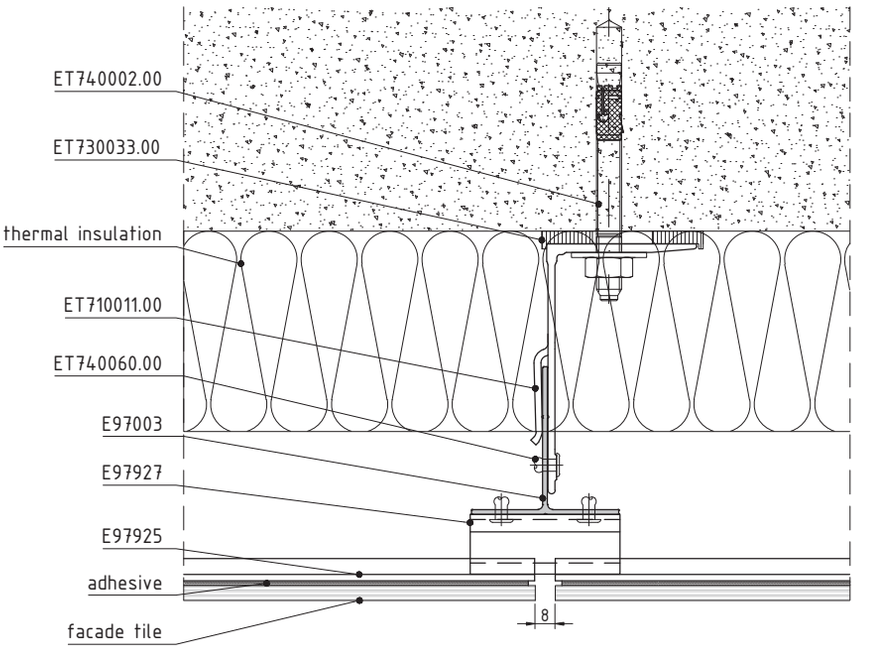
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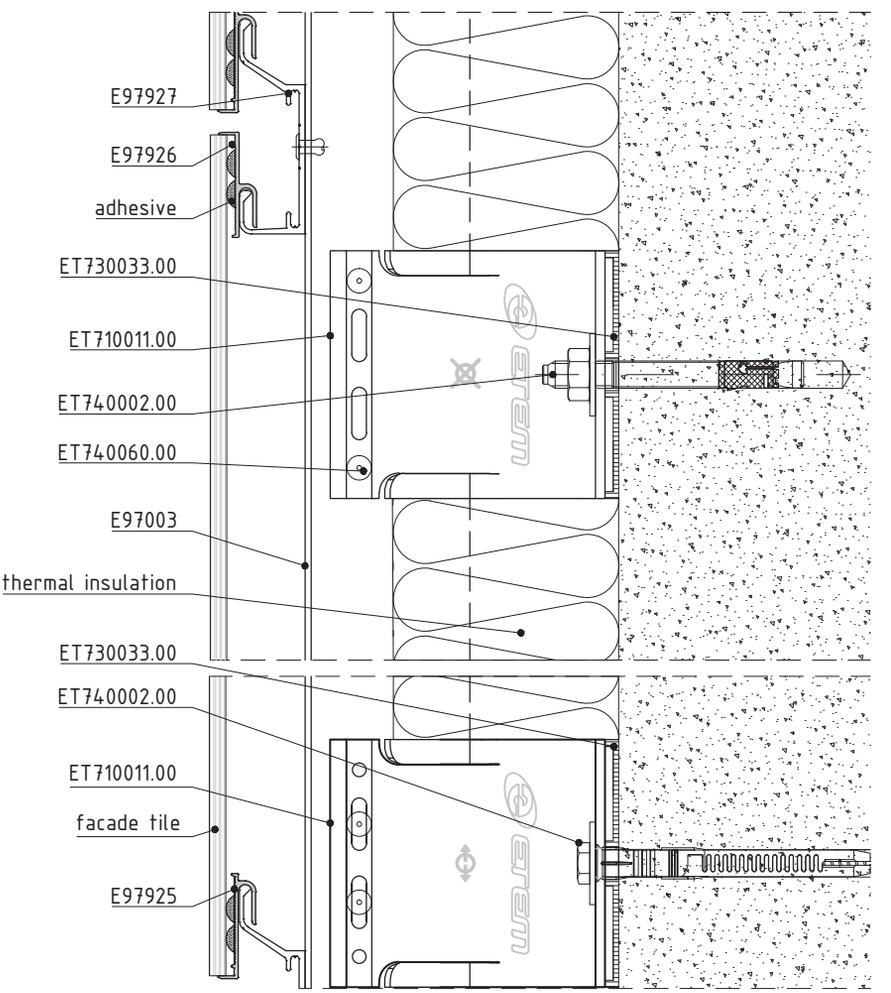
adhesive
facade tile
8

2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facade tile
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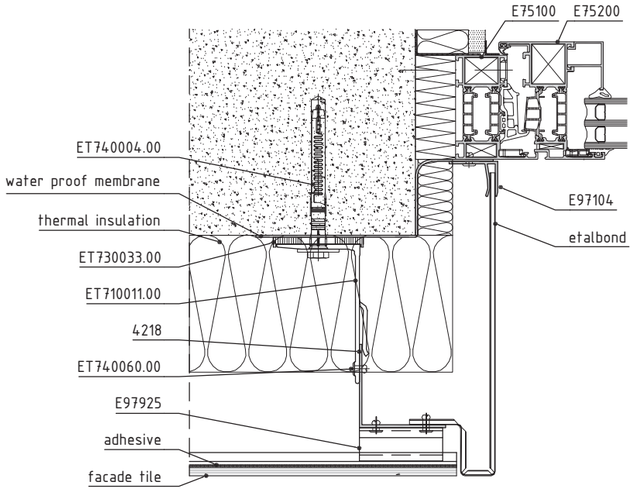
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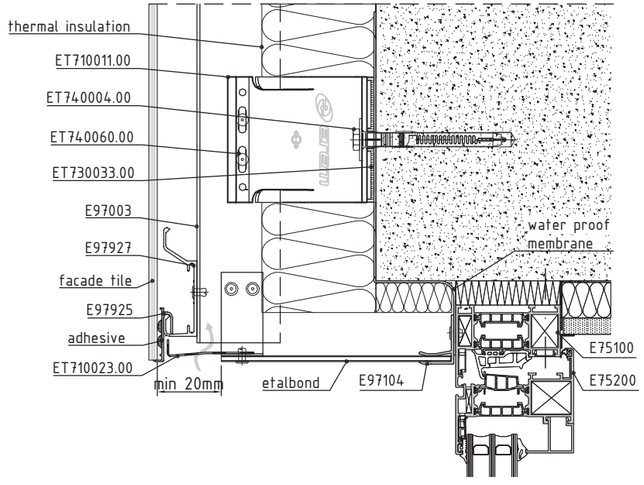
facade tile
E97104
etalbond

④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min 20mm
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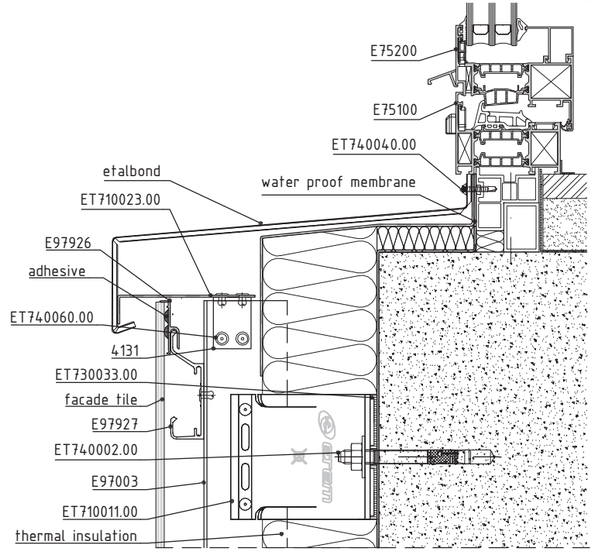
E75200

⑤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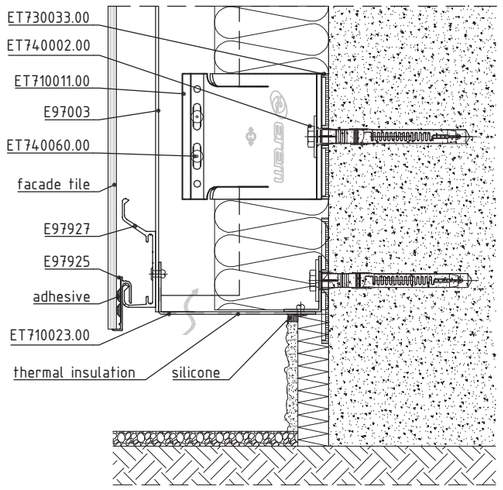
thermal insulation

⑥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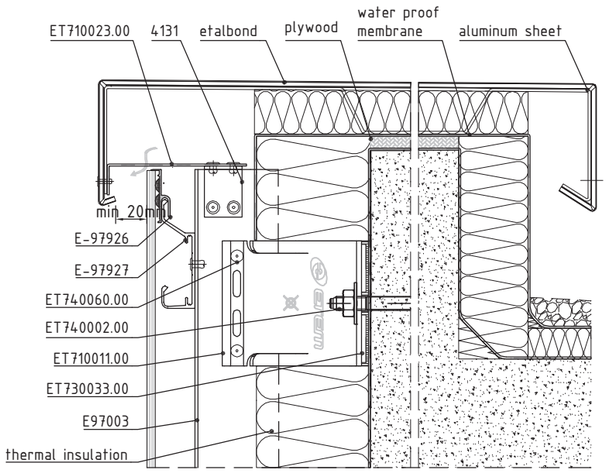
thermal insulation
silicone

⑦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min 20mm
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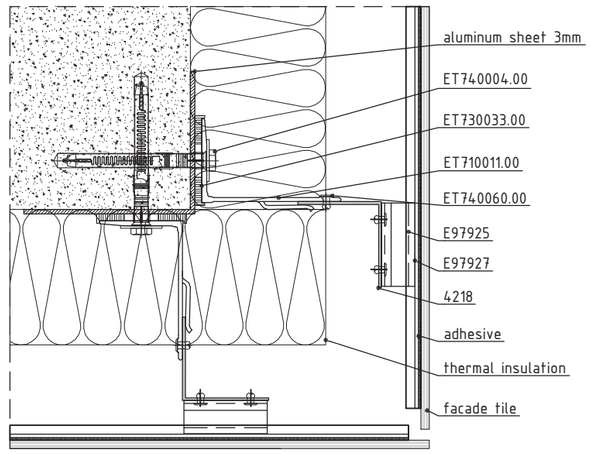
thermal insulation

⑧


aluminum sheet 3mm
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ET730033.00
ET710011.00
ET740060.00
E97925
E97927
4218
adhesive
thermal insulation
facade tile

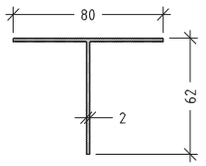
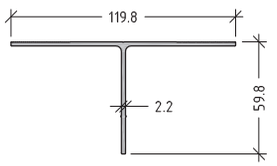
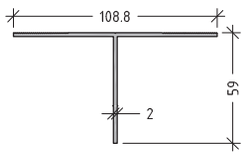
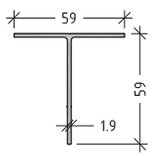
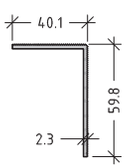
VARIO Glue

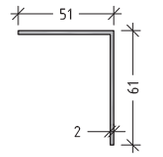
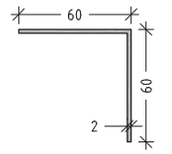
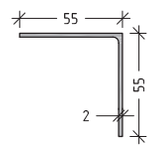
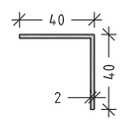
THE SYSTEM IS INTENDED FOR STICKING SHEET MATERIALS ON THE FAÇADE CONSTRUCTION, REPLACING THE USE OF MECHANICAL ELEMENTS (RIVETS, ETC.). THE DESIGN OFFERS A WIDE RANGE OF PROFILES AND BRACKETS FOR INSTALLATION OF CERAMIC, METAL, COMPOSITES, GLASS AND OTHER FAÇADE CLADDING.

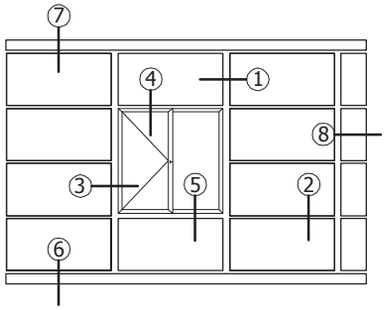
MAIN ADVANTAGES:

- resistance to all temperatures
- strength of the adhesive bond
- high resistance to external environment conditions
- excellent performance when subjected to high wind pressure
- adhesive lasting elasticity, guaranteed by the manufacturer

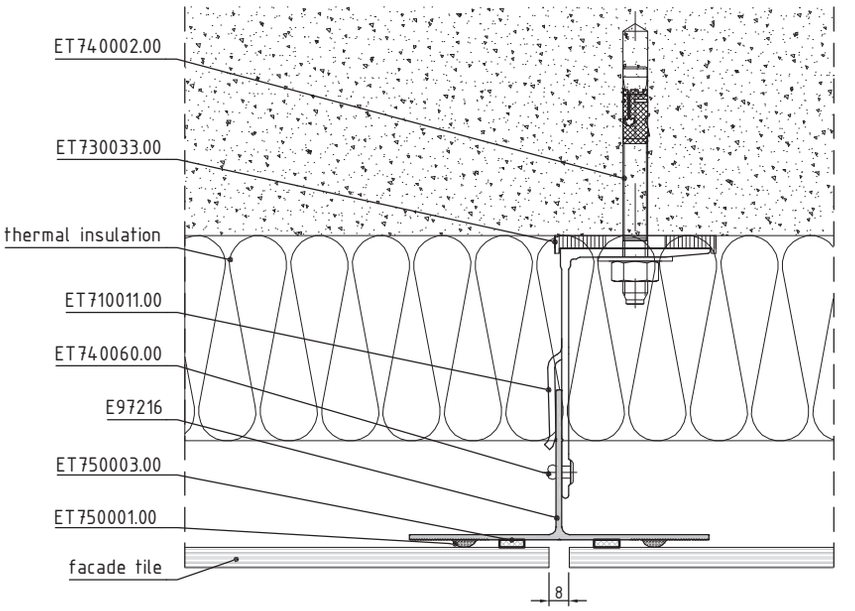
CLADDING MATERIALS: Glass, High Pressure Laminates (HPL), Fibre Cement, Composite Mineral Material, Glass Fiber Reinforced Concrete GFRC, GREP

code	profile	weight length moment of inertia
E97004 main profile		646 g/m L=6.01 m Ix=8.67 cm^4 Iy=7.26 cm^4
E97216 main profile		1043 g/m L=6.01 m Ix=11.10 cm^4 Iy=29.62 cm^4
E97217 main profile kg		875 g/m L=6.01 m Ix=9.51 cm^4 Iy=20.03 cm^4
E97003 main profile		603 g/m L=6.01 m Ix=7.78 cm^4 Iy=3.25 cm^4
E97218 main profile kg		567 g/m L=6.01 m Ix=2.96 cm^4 Iy=7.92 cm^4

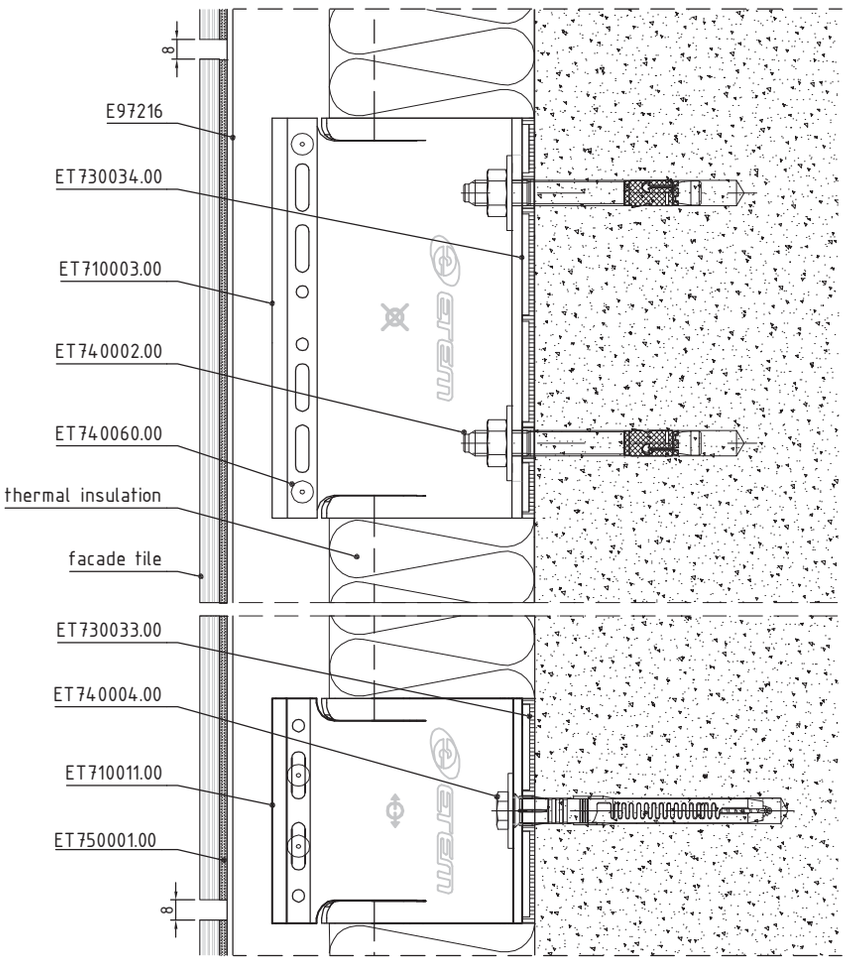
code	profile	weight length moment of inertia
4049 main profile kg		596 g/m L=6.01 m Ix=27.70 cm^4 Iy=19.39 cm^4
4218 main profile		640 g/m L=6.01 m Ix=8.56 cm^4 Iy=8.56 cm^4
LP055501 main profile kg		591 g/m L=6.01 m Ix=6.6 cm^4 Iy=6.6 cm^4
4131 main profile kg		423 g/m L=6.01 m Ix=2.47 cm^4 Iy=2.47 cm^4


7
4
1
8
3
5
2
6

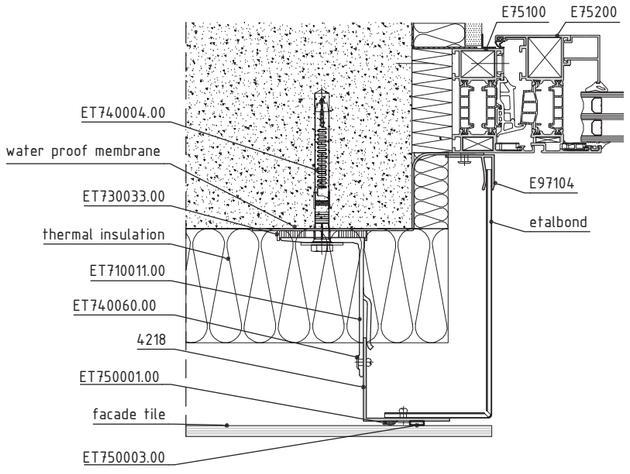
1


ET740002.00
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97216
ET750003.00
ET750001.00
facade tile
8

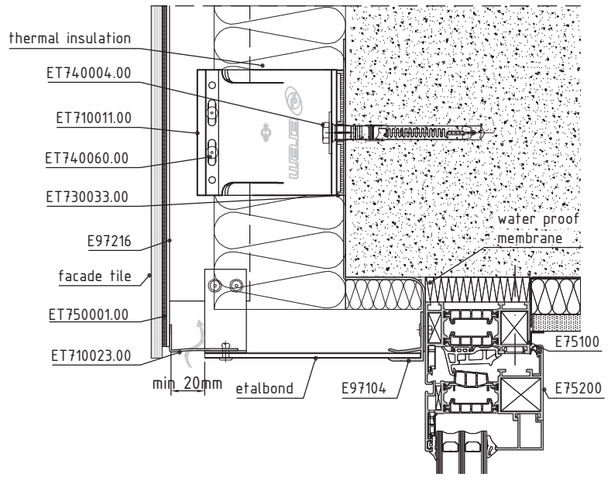
2


8
E97216
ET730034.00
ET710003.00
ET740002.00
ET740060.00
thermal insulation
facade tile
ET730033.00
ET740004.00
ET710011.00
ET750001.00
8

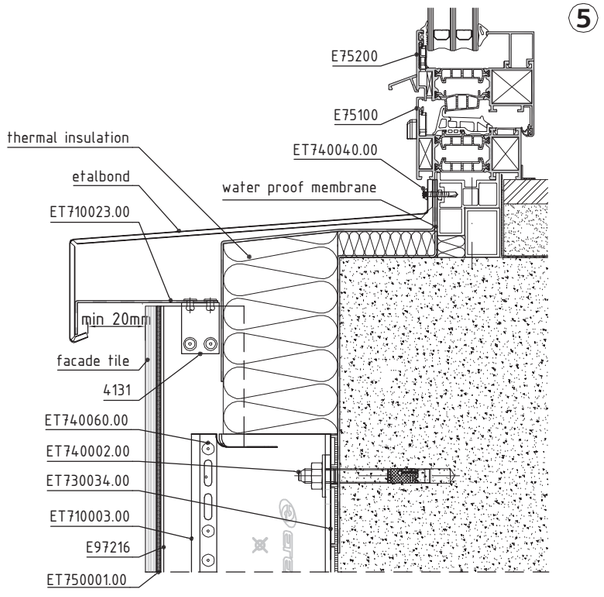
③


E75100
E75200
ET740004.00
water proof membrane
ET730033.00
thermal insulation
ET710011.00
ET740060.00
4218
ET750001.00
facade tile
ET750003.00
E97104
etalbond

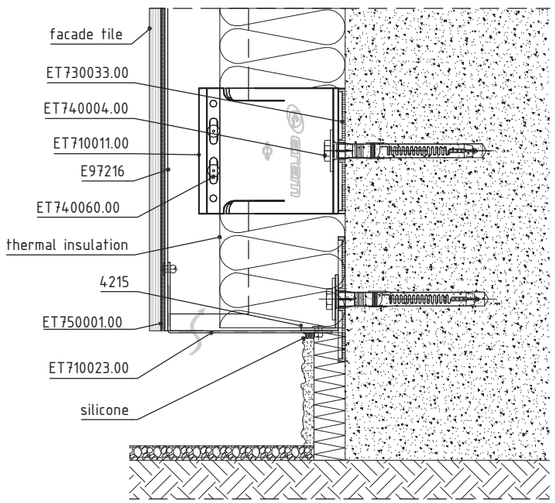
④


thermal insulation
ET740004.00
ET710011.00
ET740060.00
ET730033.00
E97216
facade tile
ET750001.00
ET710023.00
min. 20mm
etalbond
E97104
water proof membrane
E75100
E75200

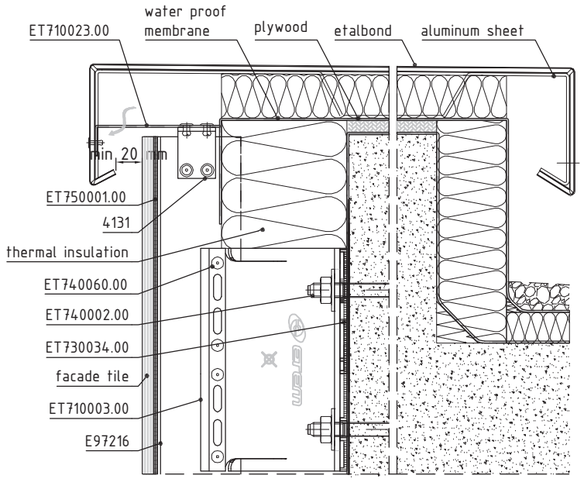
⑤


E75200
E75100
ET740040.00
thermal insulation
etalbond
water proof membrane
ET710023.00
min. 20mm
facade tile
4131
ET740060.00
ET740002.00
ET730034.00
ET710003.00
E97216
ET750001.00

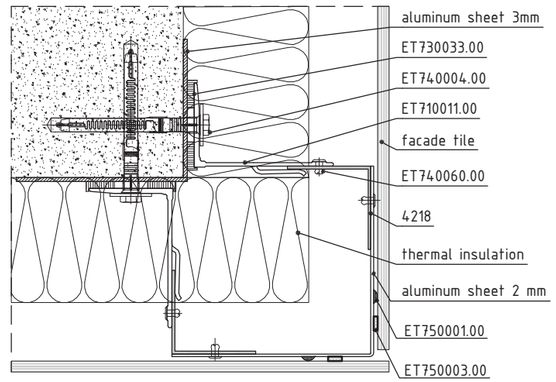
⑥


facade tile
ET730033.00
ET740004.00
ET710011.00
E97216
ET740060.00
thermal insulation
4215
ET750001.00
ET710023.00
silicone

⑦


ET710023.00
water proof membrane
plywood
etalbond
aluminum sheet
min. 20 mm
ET750001.00
4131
thermal insulation
ET740060.00
ET740002.00
ET730034.00
facade tile
ET710003.00
E97216

⑧


aluminum sheet 3mm
ET730033.00
ET740004.00
ET710011.00
facade tile
ET740060.00
4218
thermal insulation
aluminum sheet 2 mm
ET750001.00
ET750003.00

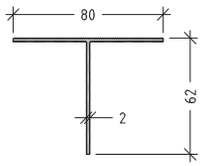
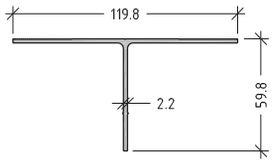
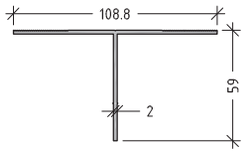
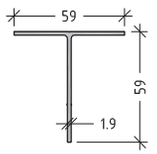
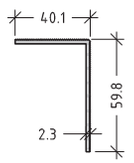
VARIO Fixings

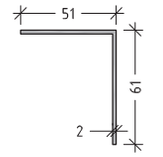
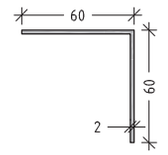
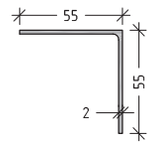
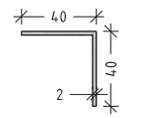
THE SYSTEM IS SUITABLE FOR VISIBLE MOUNTING OF THIN AND SMOOTH FAÇADE MATERIALS BY USING RIVETS/SCREWS.

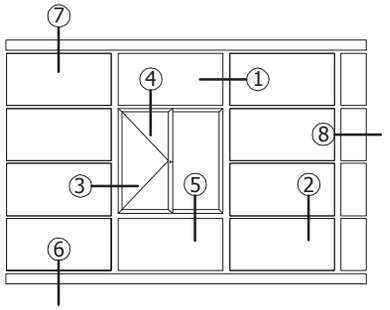
MAIN ADVANTAGES:

- quick installation of façade material with different sizes
- possibility to paint the visible fastening elements in a wide range of colours to match the façade material
- possible use of cladding materials with a thickness ranging from 4 mm to 12 mm

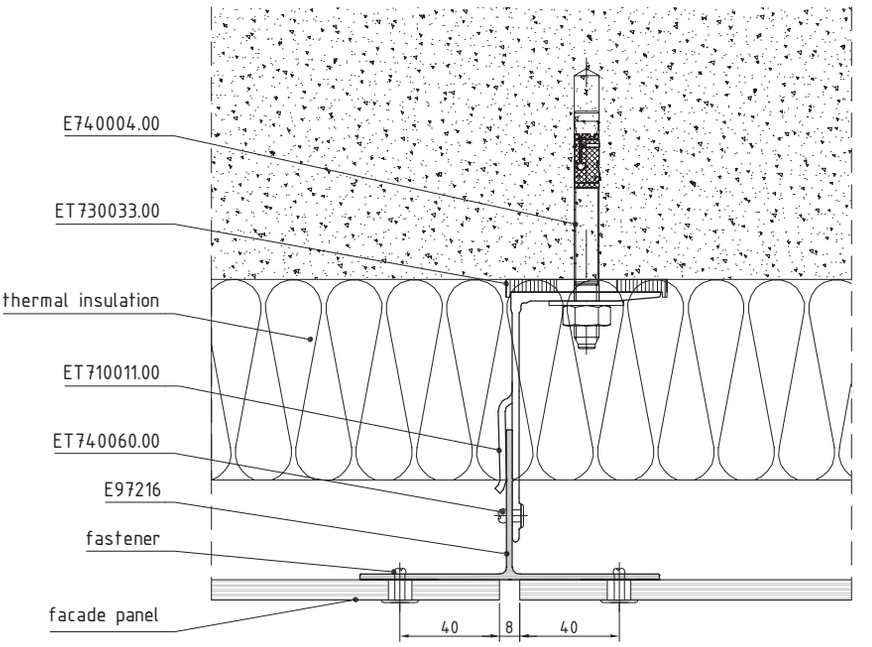
CLADDING MATERIALS: Cement Board, High Pressure Laminates (HPL), Fibre Cement, Composite Mineral Material, Glass Fiber Reinforced Concrete GFRC, GREP, Light Transmitting Concrete

code	profile	weight length moment of inertia
E97004 main profile		646 g/m L=6.01 m Ix=8.67 cm^4 Iy=7.26 cm^4
E97216 main profile		1043 g/m L=6.01 m Ix=11.10 cm^4 Iy=29.62 cm^4
E97217 main profile kg		875 g/m L=6.01 m Ix=9.51 cm^4 Iy=20.03 cm^4
E97003 main profile		603 g/m L=6.01 m Ix=7.78 cm^4 Iy=3.25 cm^4
E97218 main profile kg		567 g/m L=6.01 m Ix=2.96 cm^4 Iy=7.92 cm^4

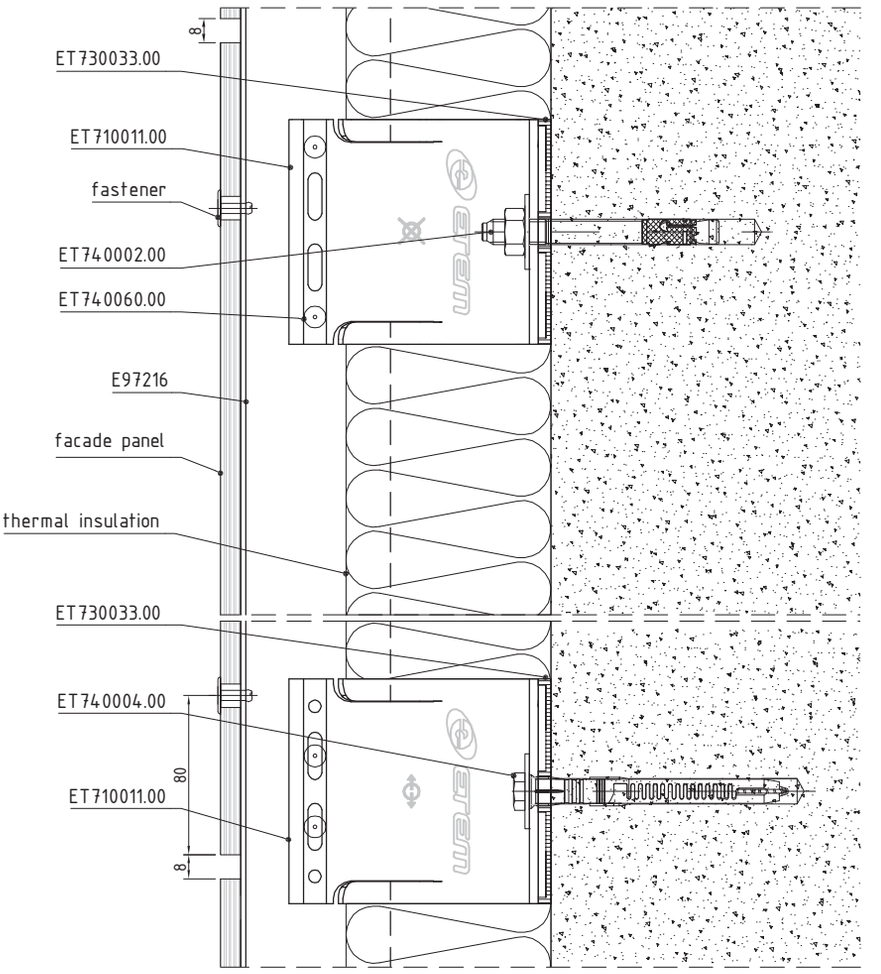
code	profile	weight length moment of inertia
4049 main profile kg		596 g/m L=6.01 m Ix=27.70 cm^4 Iy=19.39 cm^4
4218 main profile		640 g/m L=6.01 m Ix=8.56 cm^4 Iy=8.56 cm^4
LP055501 main profile kg		591 g/m L=6.01 m Ix=6.6 cm^4 Iy=6.6 cm^4
4131 main profile kg		423 g/m L=6.01 m Ix=2.47 cm^4 Iy=2.47 cm^4


7
4
1
8
3
5
2
6

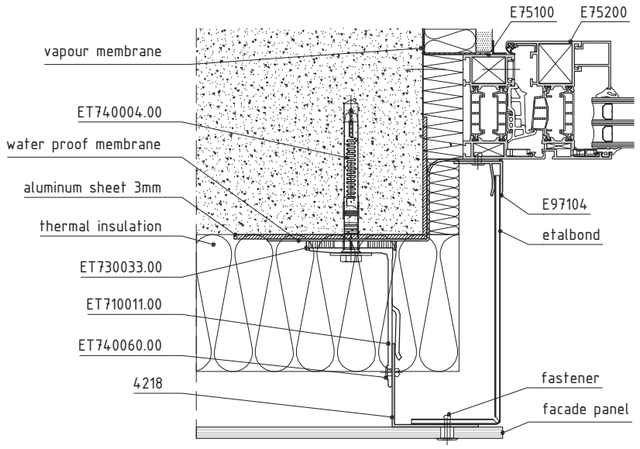
1


E740004.00
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97216
fastener
facade panel
40
8
40

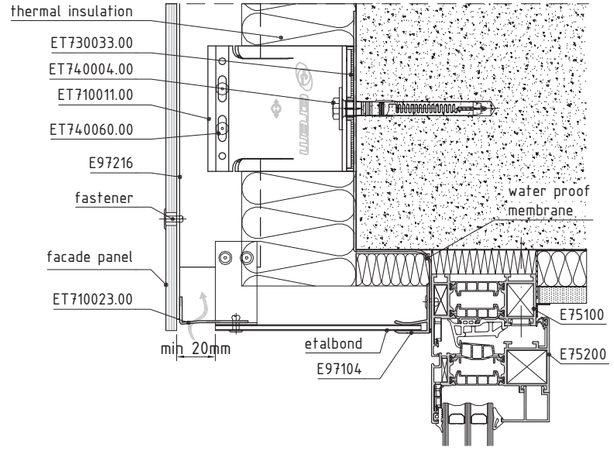
2


8
ET730033.00
ET710011.00
fastener
ET740002.00
ET740060.00
E97216
facade panel
thermal insulation
ET730033.00
ET740004.00
80
ET710011.00
8

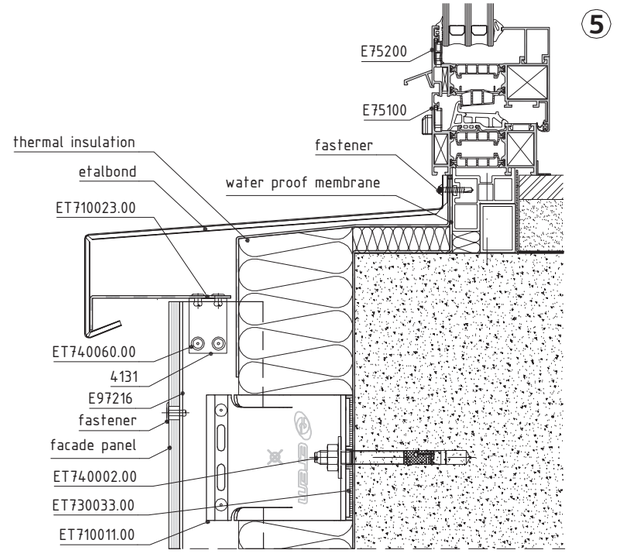
③


E75100
E75200
vapour membrane
ET740004.00
water proof membrane
aluminum sheet 3mm
thermal insulation
ET730033.00
ET710011.00
ET740060.00
4218
E97104
etalbond
fastener
facade panel

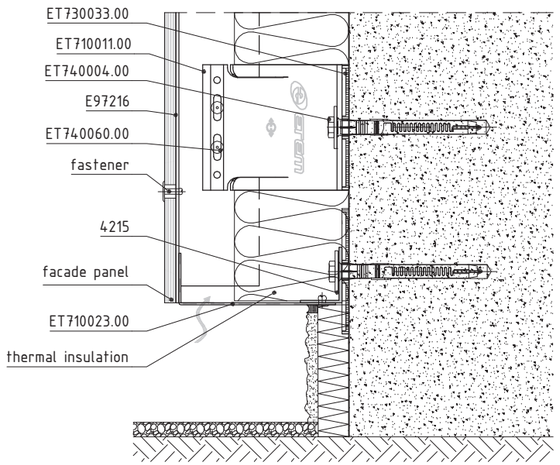
④


thermal insulation
ET730033.00
ET740004.00
ET710011.00
ET740060.00
E97216
fastener
facade panel
ET710023.00
min. 20mm
water proof membrane
E75100
E75200
etalbond
E97104

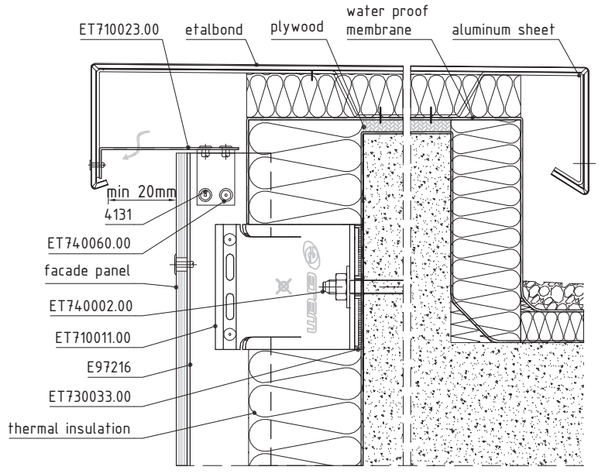
⑤


E75200
E75100
fastener
thermal insulation
etalbond
water proof membrane
ET710023.00
ET740060.00
4131
E97216
fastener
facade panel
ET740002.00
ET730033.00
ET710011.00

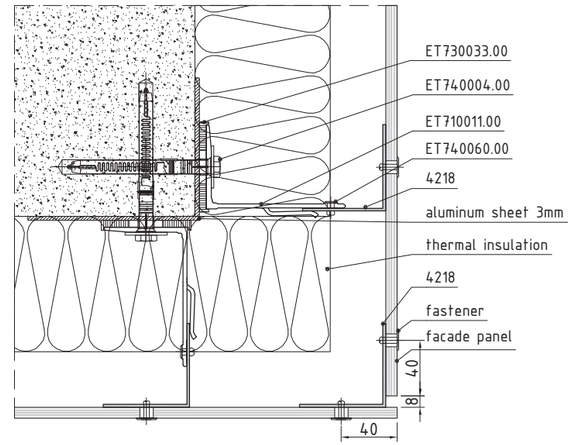
⑥

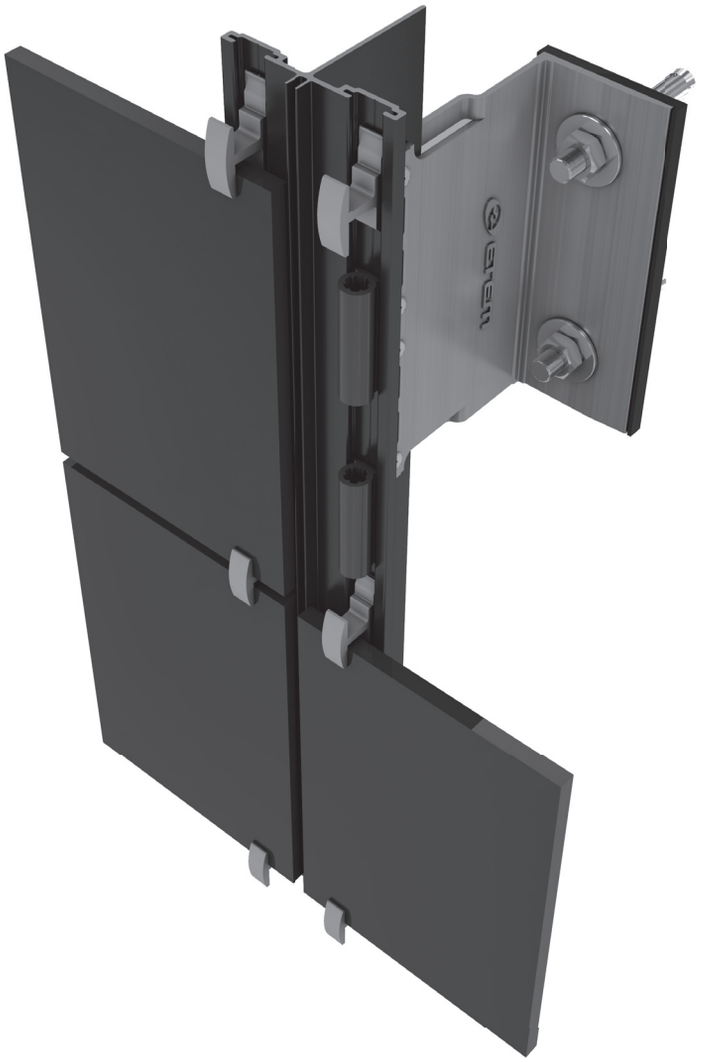

ET730033.00
ET710011.00
ET740004.00
E97216
ET740060.00
fastener
4215
facade panel
ET710023.00
thermal insulation

⑦


ET710023.00
etalbond
plywood
water proof membrane
aluminum sheet
min. 20mm
4131
ET740060.00
facade panel
ET740002.00
ET710011.00
E97216
ET730033.00
thermal insulation

⑧


ET730033.00
ET740004.00
ET710011.00
ET740060.00
4218
aluminum sheet 3mm
thermal insulation
4218
fastener
facade panel
40
8
40



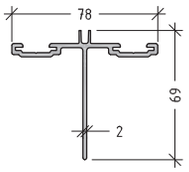
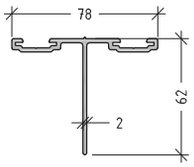
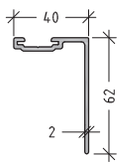
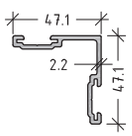
VARIO Clips

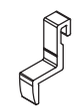
VARIO CLIPS IS USED FOR MOUNTING OF THIN AND SMOOTH FAÇADE MATERIALS BY USING CLIPS. SPECIALLY DESIGNED PROFILES AND ACCESSORIES ALLOW SECURE INSTALLATION OF FLAT FAÇADE MATERIALS SUCH AS: HPL PANELS, GLASS, LIGHT STONES AND CERAMIC WITH THICKNESS LESS THAN 12 MM.

MAIN ADVANTAGES:

- fast and accurate installation without using of special equipment
- easier alignment of vertical joints between the tiles through the main vertical profile
- possibility of coatings in different colours of the visible part of the profile that match the façade material
- the possibility for the production of profiles, which allows mounting of materials with different heights
- possibility for production of basic profiles of different lengths
- clips coated in wide range of colours

CLADDING MATERIALS: Ceramic Tiles, Glass, High Pressure Laminates (HPL), Fibre Cement, Stone, Technical Stone, Composite Mineral Material, Glass Fiber Reinforced Concrete GFRC, GREP, Light Transmitting Concrete

code	profile	weight length moment of inertia
E 97209 TR kg	 	1015 g/m L=6.01 m Ix=10.55 cm^4 Iy=13.79 cm^4
E 97210 TR kg	 	973 g/m L=6.01 m Ix=10.15 cm^4 Iy=13.78 cm^4
E 97211 TR kg	 	653 g/m L=6.01 m Ix=8.52 cm^4 Iy=4.25 cm^4
E 97212 TR kg	 	653 g/m L=6.01 m Ix=6.11 cm^4 Iy=6.11 cm^4
ET770001.00 EPDM gasket		1000mm length
ET720045.00 middle clips		pcs 1

code	profile	weight length moment of inertia
ET720046.00 bottom clips		pcs 1
ET720044.00 upper clips		pcs 1
ET720047.00 end clips		pcs 1

gaskets for 6 mm glass thickness

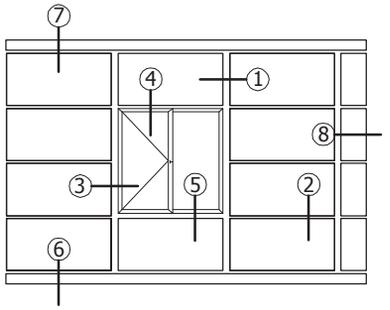
for end clip	for middle up and bottom clip	for middle down and upper clip	
			1 m
ET130765.00	ET130766.00	ET130767.00	

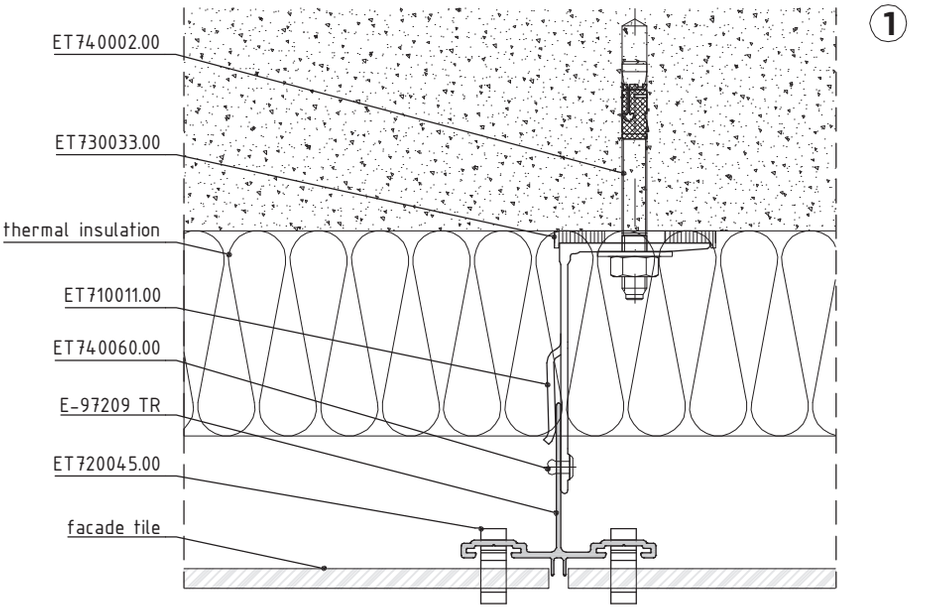
gaskets for 8 mm glass thickness

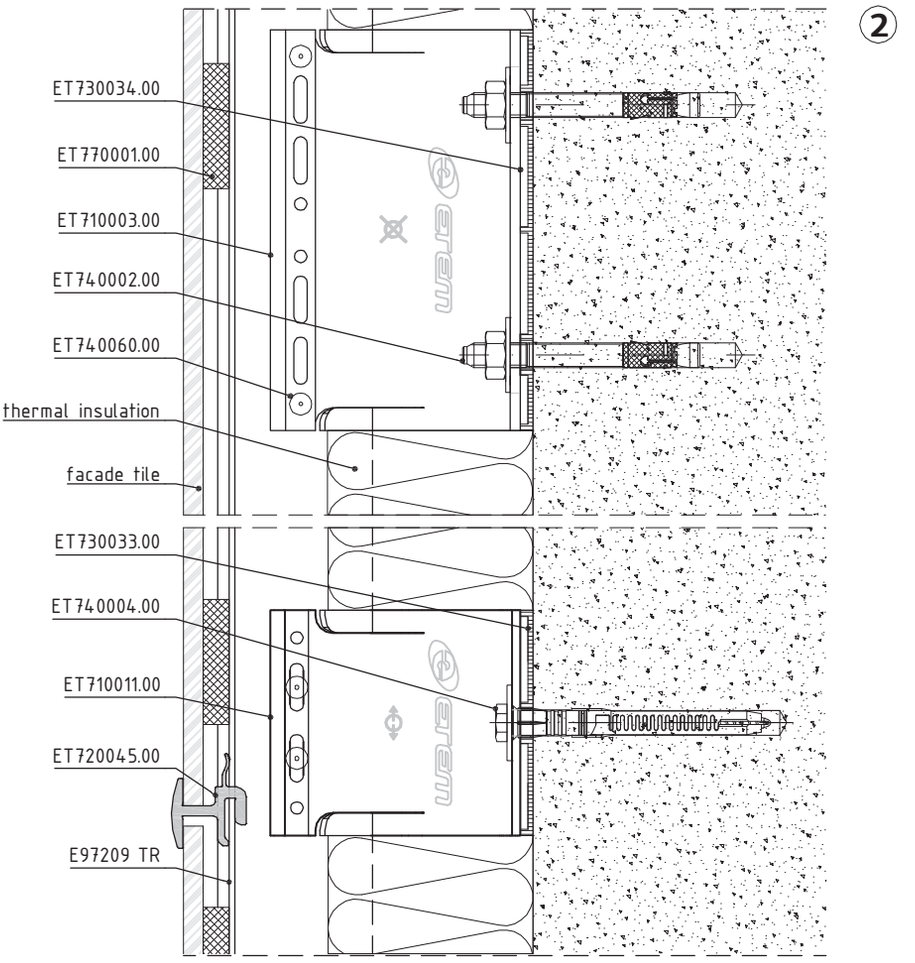
for end clip	for middle up and bottom clip	for middle down and upper clip	
			1 m
ET130781.00	ET130782.00	ET130783.00	

gaskets for 10 mm glass thickness

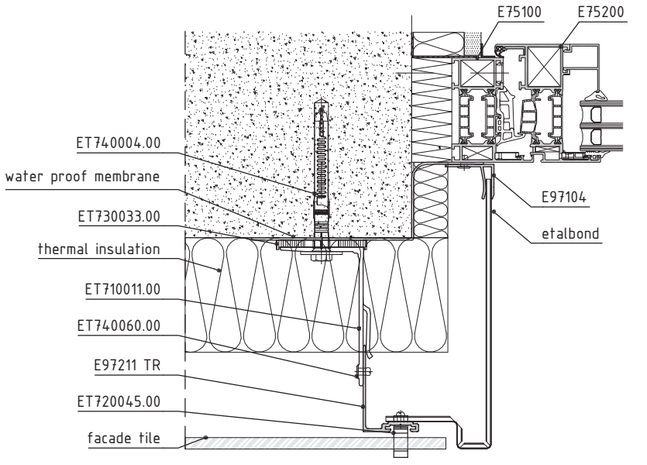
for end clip	for middle up and bottom clip	for middle down and upper clip	
			1 m
ET130759.00	ET130760.00	ET130761.00	


7
4
1
8
3
5
2
6

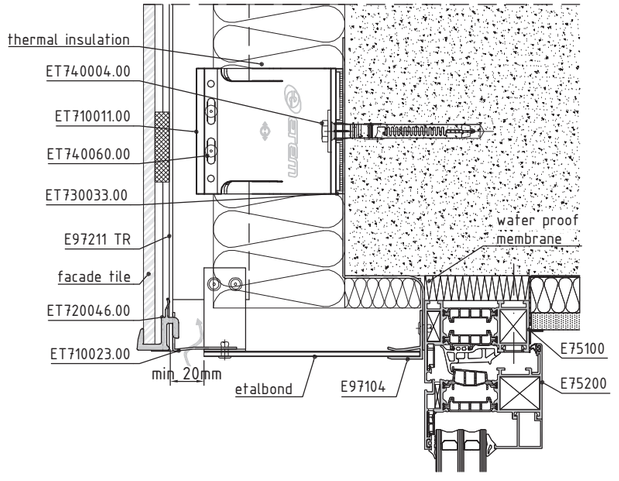

1
ET740002.00
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E-97209 TR
ET720045.00
facade tile


2
ET730034.00
ET770001.00
ET710003.00
ET740002.00
ET740060.00
thermal insulation
facade tile
ET730033.00
ET740004.00
ET710011.00
ET720045.00
E97209 TR

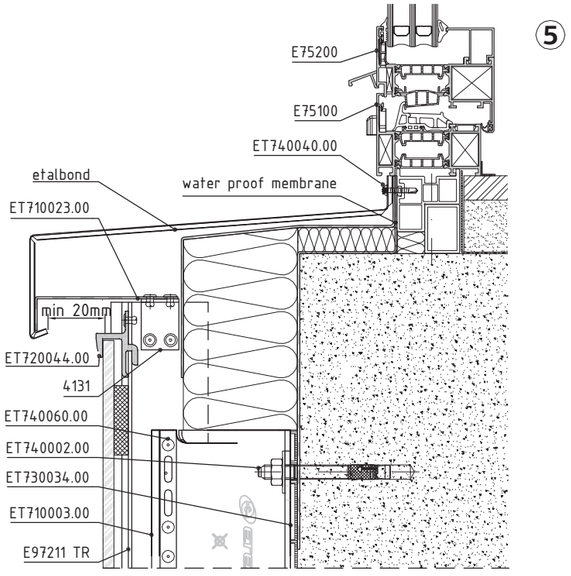
③


E75100
E75200
ET740004.00
water proof membrane
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97211 TR
ET720045.00
facade tile
E97104
etalbond

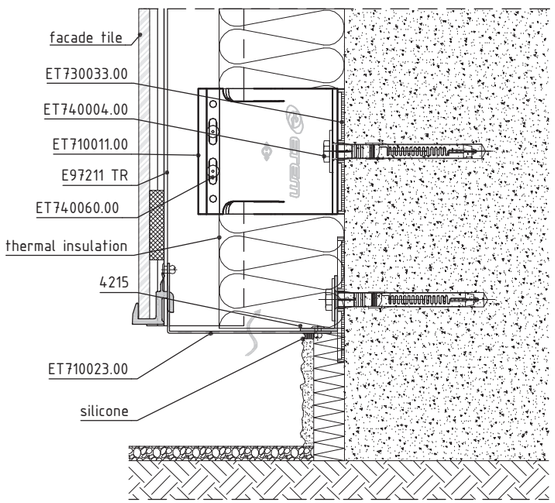
④


thermal insulation
ET740004.00
ET710011.00
ET740060.00
ET730033.00
E97211 TR
facade tile
ET720046.00
ET710023.00
min. 20mm
etalbond
E97104
wafer proof membrane
E75100
E75200

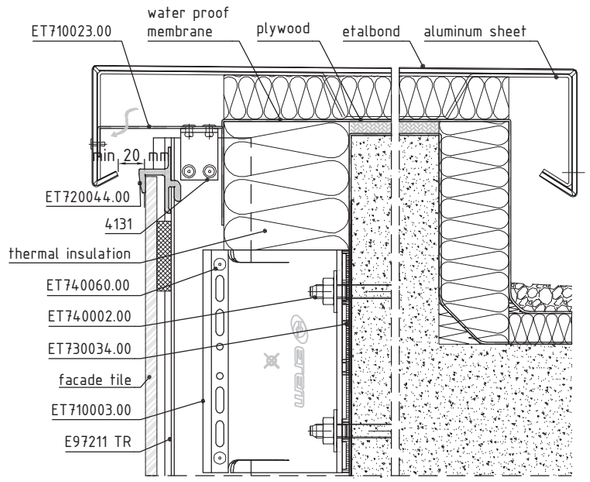
⑤


E75200
E75100
ET740040.00
etalbond
water proof membrane
ET710023.00
min. 20mm
ET720044.00
4131
ET740060.00
ET740002.00
ET730034.00
ET710003.00
E97211 TR

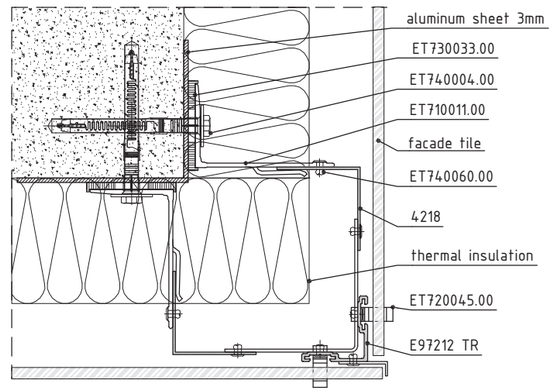
⑥


facade tile
ET730033.00
ET740004.00
ET710011.00
E97211 TR
ET740060.00
thermal insulation
4215
ET710023.00
silicone

⑦

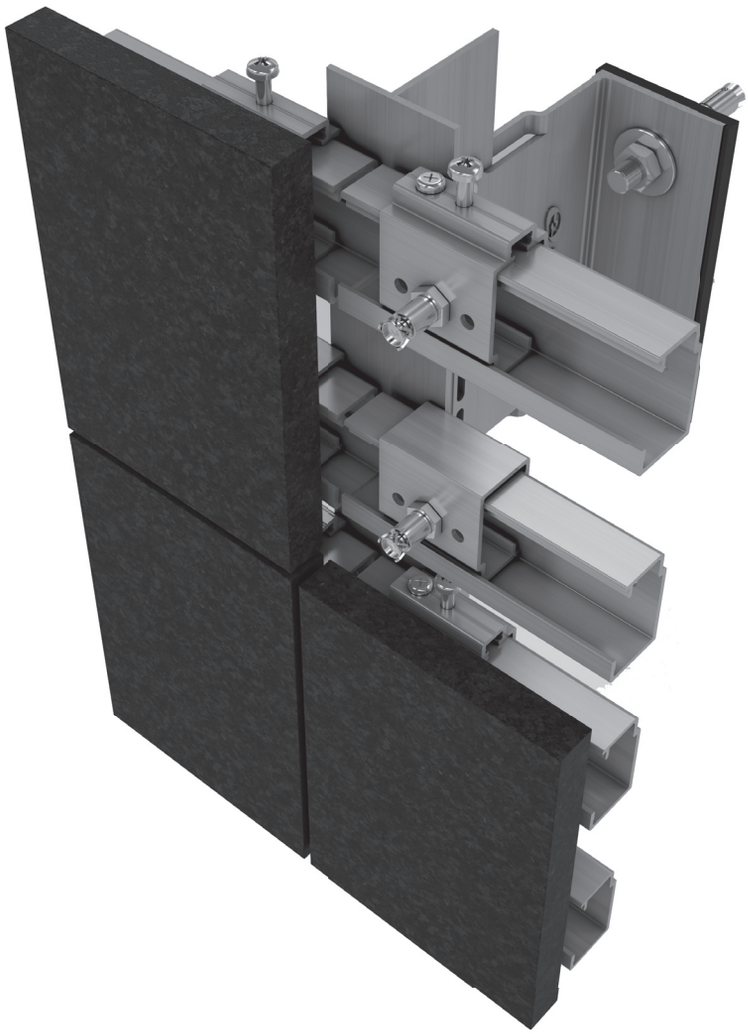

ET710023.00
water proof membrane
plywood
etalbond
aluminum sheet
min. 20 mm
ET720044.00
4131
thermal insulation
ET740060.00
ET740002.00
ET730034.00
facade tile
ET710003.00
E97211 TR

⑧


aluminum sheet 3mm
ET730033.00
ET740004.00
ET710011.00
facade tile
ET740060.00
4218
thermal insulation
ET720045.00
E97212 TR

FORTE

FORTE Light / FORTE / FORTE Pins



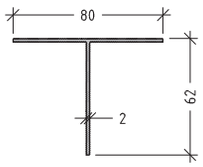
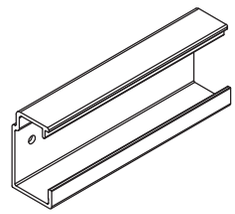
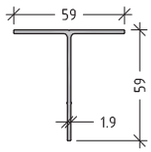
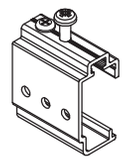
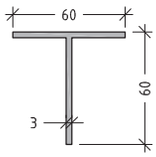
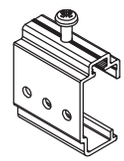
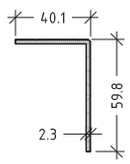
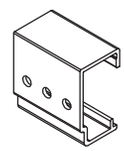
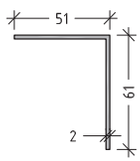
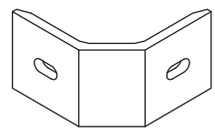
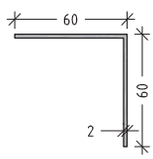
FORTE Light

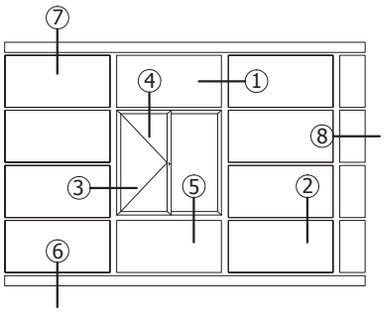
FORTE LIGHT IS DESIGNED FOR INVISIBLE MOUNTING OF THIN AND SMOOTH FAÇADE MATERIALS THROUGH fischer® UNDERCUT ANCHORS. THE UNDERCUT ANCHORS, SYSTEM ACCESSORIES, AND DESIGNED PROFILES ALLOW SECURE MOUNTING OF HPL, FIBRE CEMENT, CERAMICS, AND STONE WITH LESS THAN 25 MM. FORTE LIGHT VENTILATED SYSTEM USES fischer® FIXING ANCHORS TO GUARANTEE THE CONNECTIONS BETWEEN THE FAÇADE MATERIAL AND THE MAIN PROFILES OF THE SYSTEM.

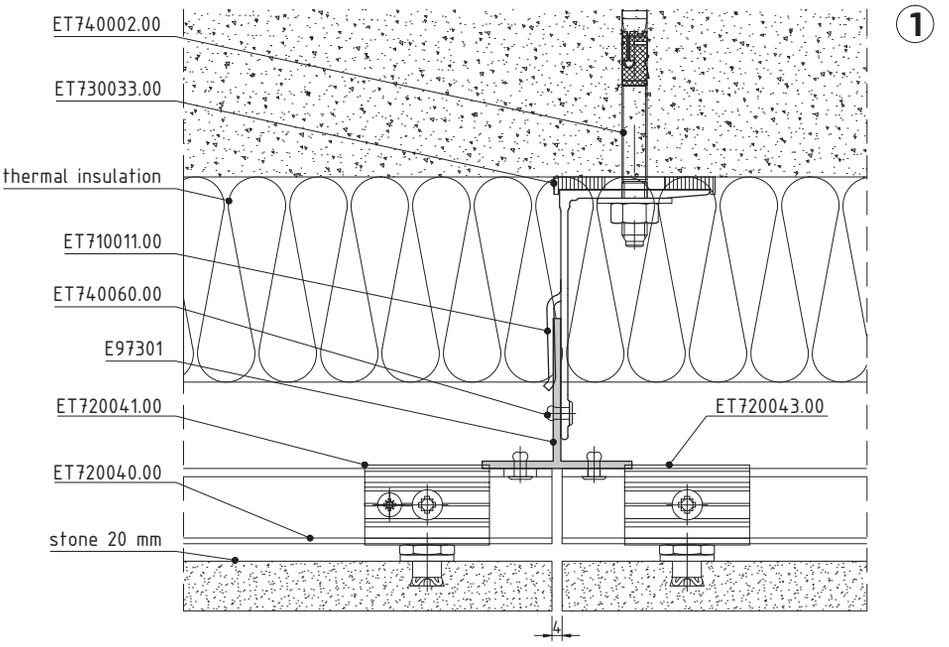
MAIN ADVANTAGES:

- perfect vision of the façade with no visible holding elements; large variety of sizes and designs of the façade materials
- highest level of security when fixing the tiles due to the fischer® and KEIL® undercut anchors
- possibility to use façade materials with thickness ranging from 10 mm to 25 mm
- fast and easy installation – 1.5 sq.m. per person per hour
- secure and fully engineered work which covers the entire project, and guarantees a complete system solution

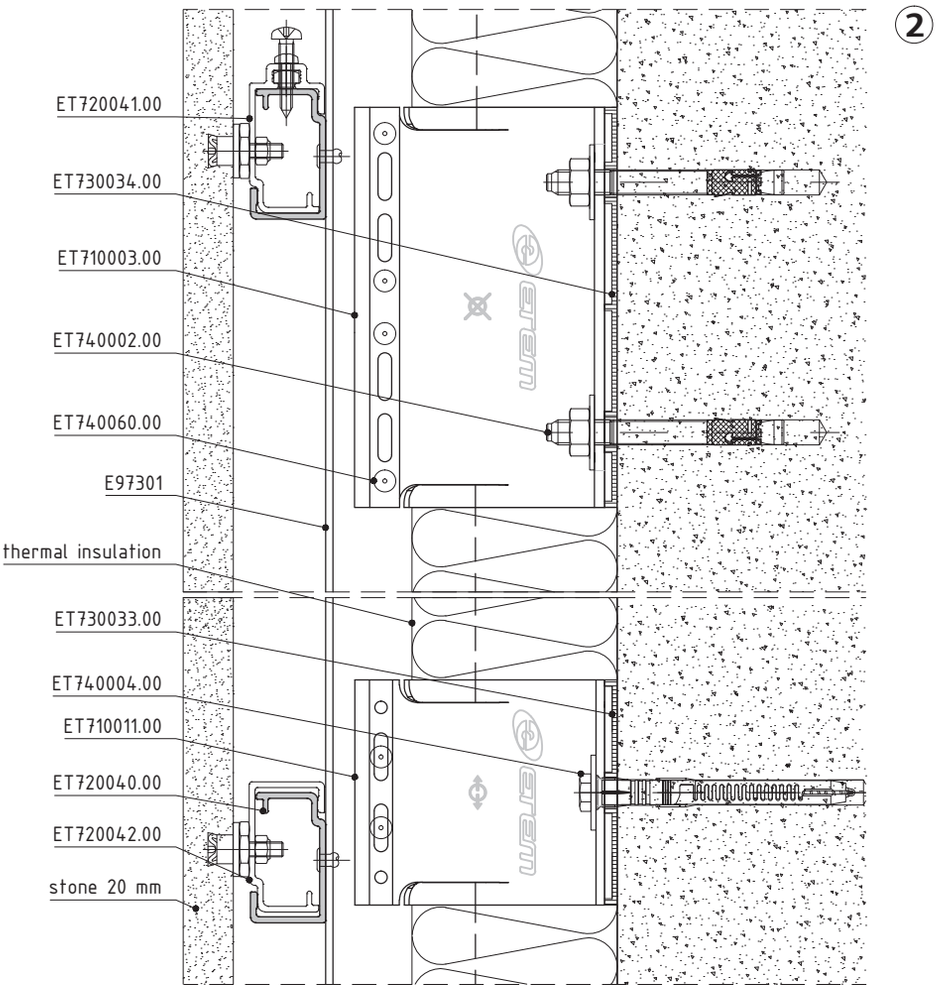
CLADDING MATERIALS: Ceramic Tiles, Glass, High Pressure Laminates (HPL), Fibre Cement, Stone, Technical Stone, Composite Mineral Material, Glass Fiber Reinforced Concrete GFRC, GREP, Light Transmitting Concrete

code	profile	weight length moment of inertia	code	profile	weight length moment of inertia
E97004 main profile		646 g/m L=6.01 m Ix=8.67 cm^4 Iy=7.26 cm^4	ET720040.00 horizontal profile		1000mm length
E97003 main profile		603 g/m L=6.01 m Ix=7.78 cm^4 Iy=3.25 cm^4	ET720041.00 adjustable hanger for fixed support		pcs 1 Note: set includeing fastening elemetns
E97301 main profile		951 g/m L=6.01 m Ix=12.54 cm^4 Iy=5.41 cm^4	ET720043.00 adjustable hanger for flexible support		pcs 1 Note: set includeing fastening elemetns
E97218 main profile kg		567 g/m L=6.01 m Ix=2.96 cm^4 Iy=7.92 cm^4	ET720042.00 hanger for flexible support		pcs 1
4049 main profile kg		596 g/m L=6.01 m Ix=27.70 cm^4 Iy=19.39 cm^4	ET710040.00 corner joint profile		pcs 1
4218 main profile		640 g/m L=6.01 m Ix=8.56 cm^4 Iy=8.56 cm^4	ET740012.00 undercut anchor		pcs 1


7
4
1
8
3
5
2
6

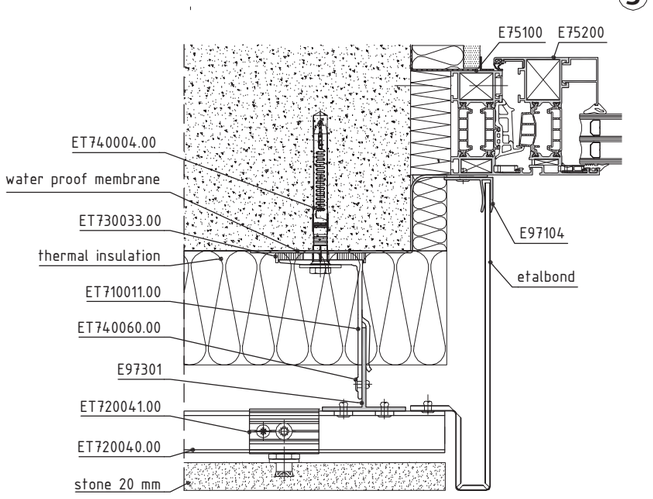

ET740002.00
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97301
ET720041.00
ET720043.00
ET720040.00
stone 20 mm
4

1

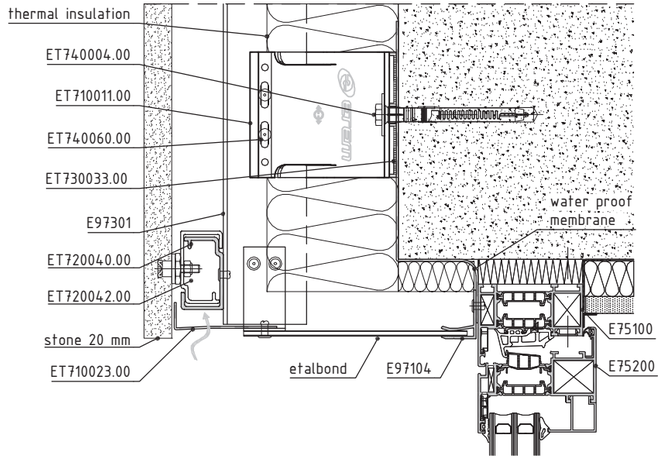

ET720041.00
ET730034.00
ET710003.00
ET740002.00
ET740060.00
E97301
thermal insulation
ET730033.00
ET740004.00
ET710011.00
ET720040.00
ET720042.00
stone 20 mm

2

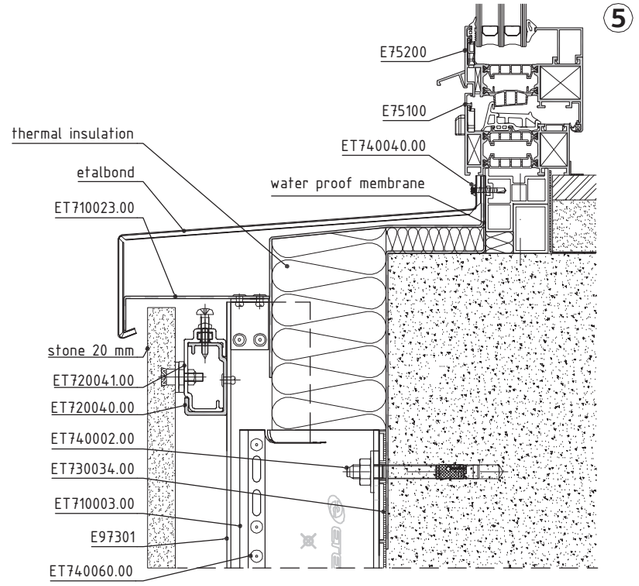
③


E75100
E75200
ET740004.00
water proof membrane
ET730033.00
thermal insulation
ET710011.00
ET740060.00
E97301
ET720041.00
ET720040.00
stone 20 mm
E97104
etalbond

④


thermal insulation
ET740004.00
ET710011.00
ET740060.00
ET730033.00
E97301
ET720040.00
ET720042.00
stone 20 mm
ET710023.00
water proof membrane
E75100
E75200
etalbond
E97104

⑤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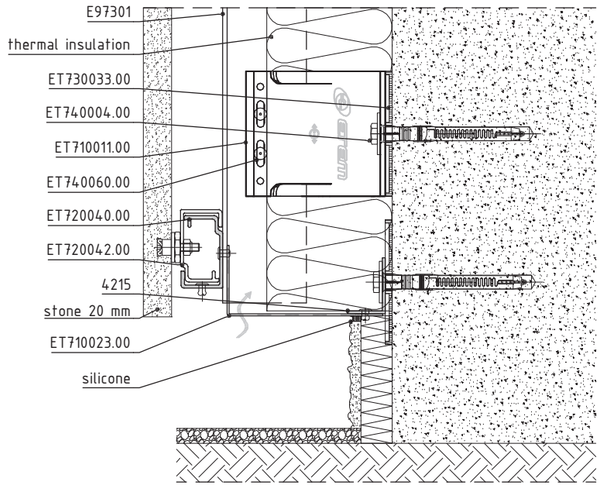
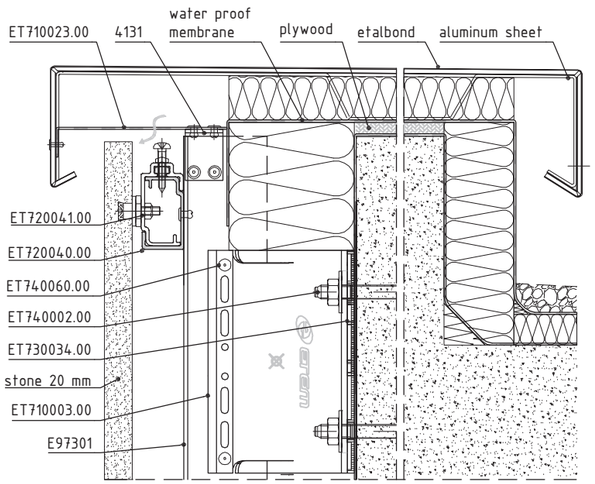
E75100
ET740040.00
thermal insulation
etalbond
water proof membrane
ET710023.00
stone 20 mm
ET720041.00
ET720040.00
ET740002.00
ET730034.00
ET710003.00
E97301
ET740060.00

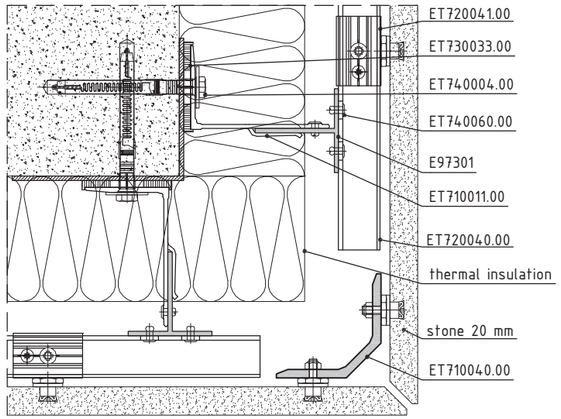
⑥


E97301
thermal insulation
ET730033.00
ET740004.00
ET710011.00
ET740060.00
ET720040.00
ET720042.00
4215
stone 20 mm
ET710023.00
silicone

⑦


ET710023.00
4131
water proof membrane
plywood
etalbond
aluminum sheet
ET720041.00
ET720040.00
ET740060.00
ET740002.00
ET730034.00
stone 20 mm
ET710003.00
E97301

⑧


ET720041.00
ET730033.00
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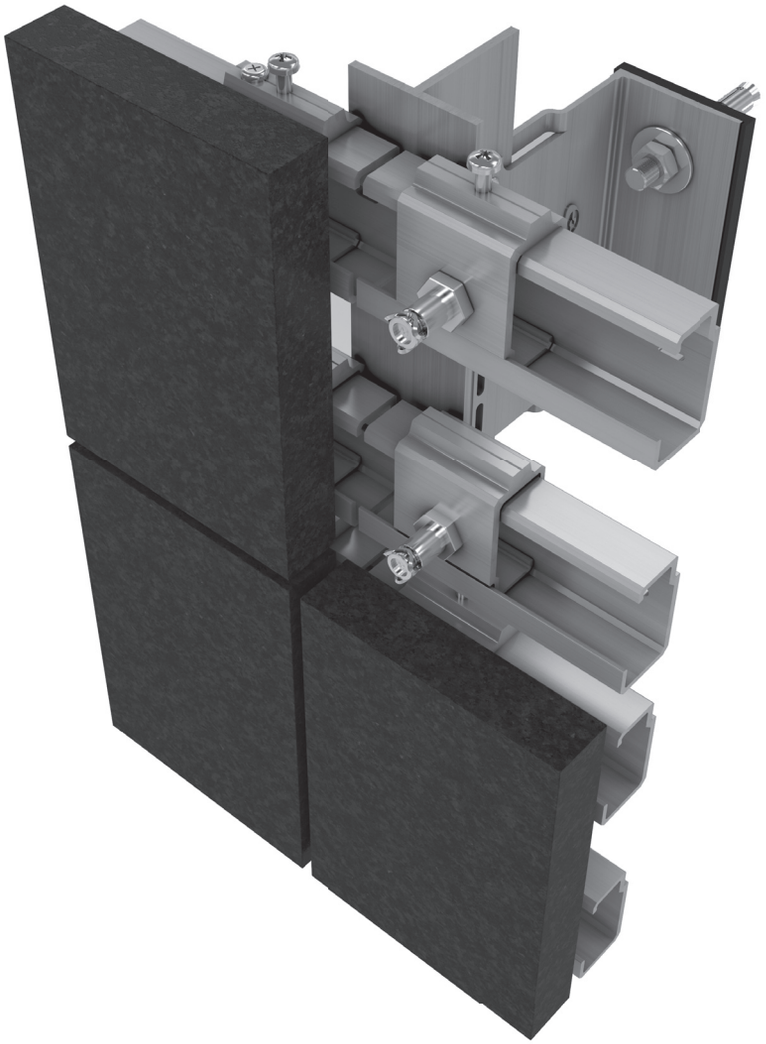
E97301
ET710011.00
ET720040.00
thermal insulation
stone 20 mm
ET710040.00



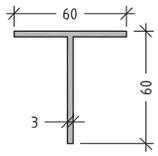
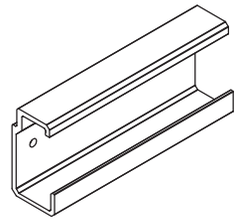
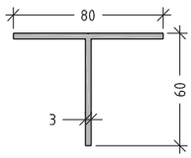
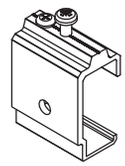
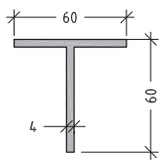
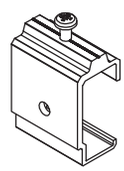
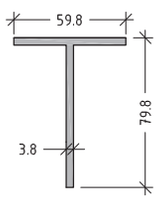
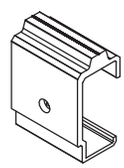
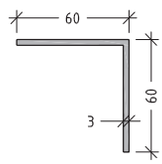
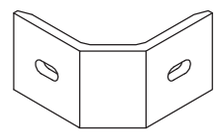
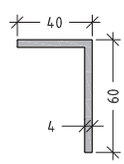
FORTE

THE SYSTEM IS DESIGNED FOR MOUNTING HEAVY FAÇADE MATERIALS WITH THICKNESS MORE THAN 25 MM. THE PROFILES AND ACCESSORIES ARE CONSTRUCTED TO BEAR EXTREME PRESSURES CAUSED BY FAÇADE MATERIALS WITH WEIGHTS UP TO 90 KG PER SQ.M. FORTE VENTILATED SYSTEM USES fischer® FIXING ANCHORS TO GUARANTEE THE CONNECTIONS BETWEEN THE FAÇADE MATERIAL AND THE MAIN BEARING STRUCTURE OF THE SYSTEM. IT IS UNIQUE UNDERCUT TECHNOLOGY FOR DRILLING AND MOUNTING OF THE ANCHOR ON THE BACK (INVISIBLE) SECTION OF THE FAÇADE MATERIAL.

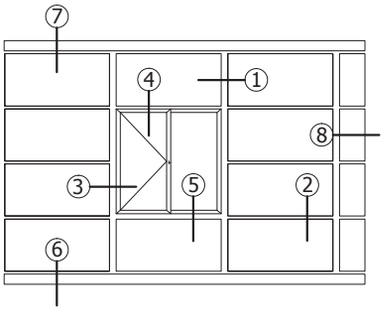
MAIN ADVANTAGES:

- perfect vision of the façade with no visible holding elements
- large variety of sizes and designs of the façade materials
- highest level of security when fixing the plates due to the fischer® undercut anchors
- possibility to use façade materials with thickness ranging from 25 mm to more than 35 mm
- fast and easy installation

CLADDING MATERIALS: Ceramic Tiles, Stone, Technical Stone, Light Transmitting Concrete

code	profile	weight length moment of inertia	code	profile	weight length moment of inertia
E97301 main profile		951 g/m L=6.01 m Ix=12.54 cm^4 Iy=5.41 cm^4	ET720080.00 horizontal profile		1000mm length
E97302 main profile		1113 g/m L=6.01 m Ix=13.63 cm^4 Iy=12.80 cm^4	ET720081.00 adjustable hanger for fixed support		pcs 1 Note: set includeing fastening elemens
17160 main profile kg		1257 g/m L=6.01 m Ix=16.31 cm^4 Iy=7.23 cm^4	ET720083.00 adjustable hanger for flexible support		pcs 1 Note: set includeing fastening elemens
TP060001 main profile kg		1404 g/m L=6.01 m Ix=34.17 cm^4 Iy=6.81 cm^4	ET720082.00 hanger for flexible support		pcs 1
4163 main profile kg		1404 g/m L=6.01 m Ix=12.53 cm^4 Iy=12.53 cm^4	ET710080.00 corner joint profile		pcs 1
4128 main profile kg		1040 g/m L=6.01 m Ix=14.27 cm^4 Iy=5.18 cm^4	ET740027.00 undercut anchor		pcs 1

kg SPECIAL CONDITION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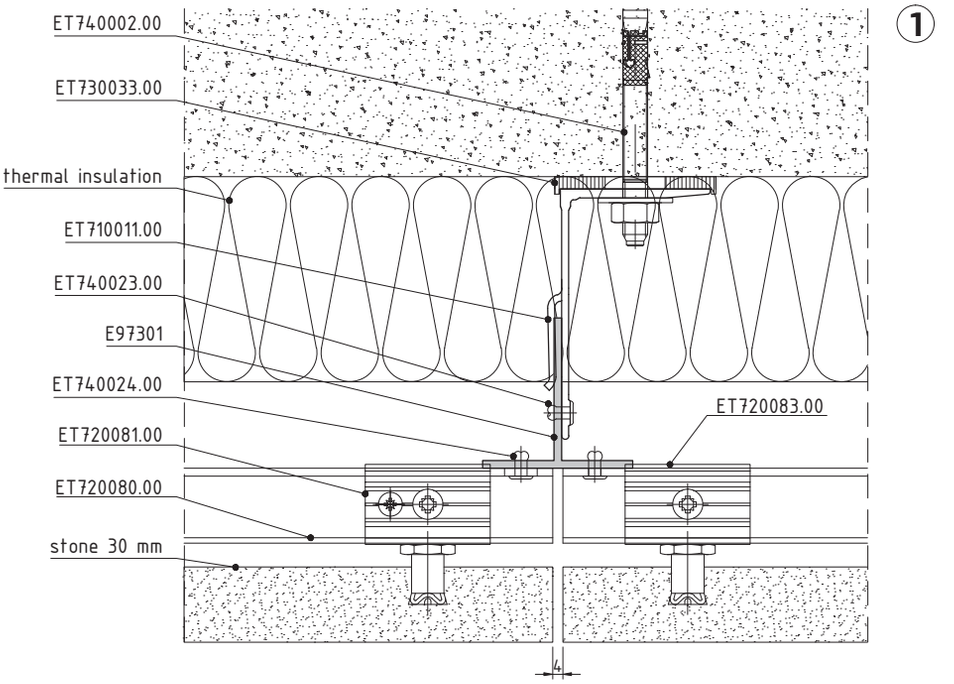
4
1
8
3
5
2
6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ET730033.00
thermal insulation
ET710011.00
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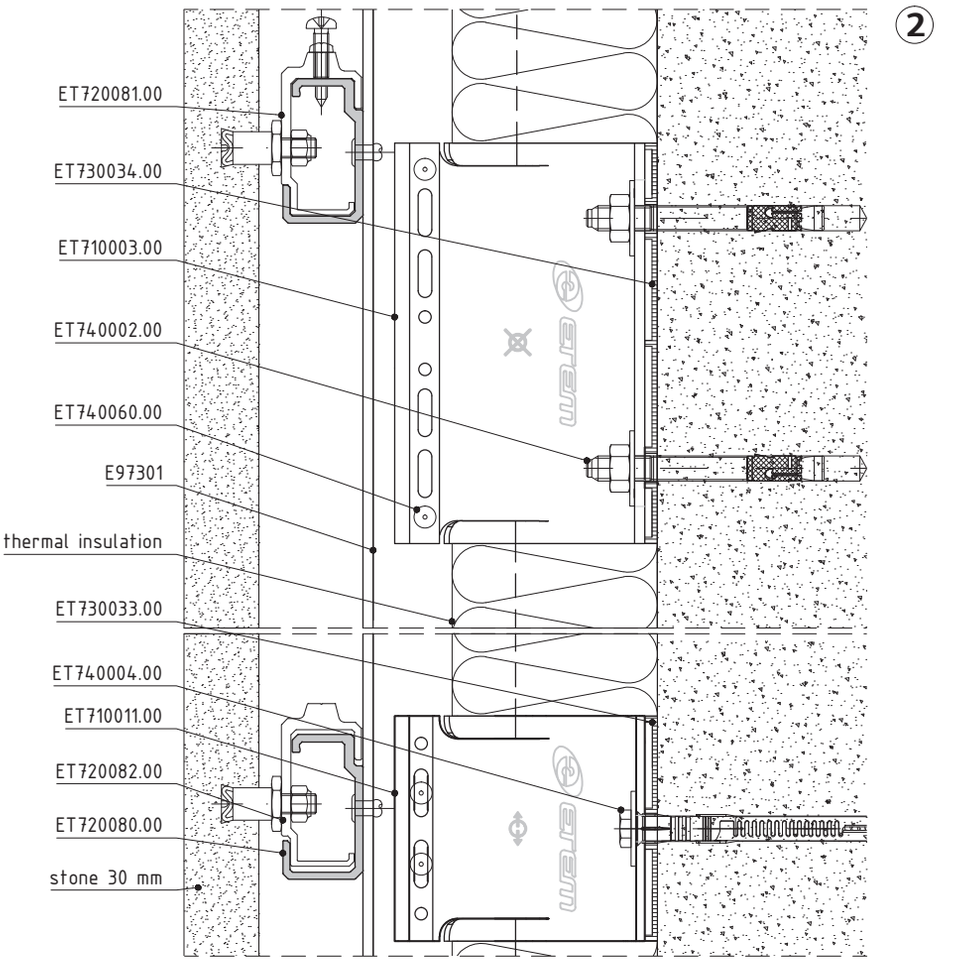
E97301
ET740024.00
ET720081.00
ET720080.00
stone 30 mm
ET720083.00
4

1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ET740002.00
ET740060.00
E97301
thermal insulation
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ET740004.00
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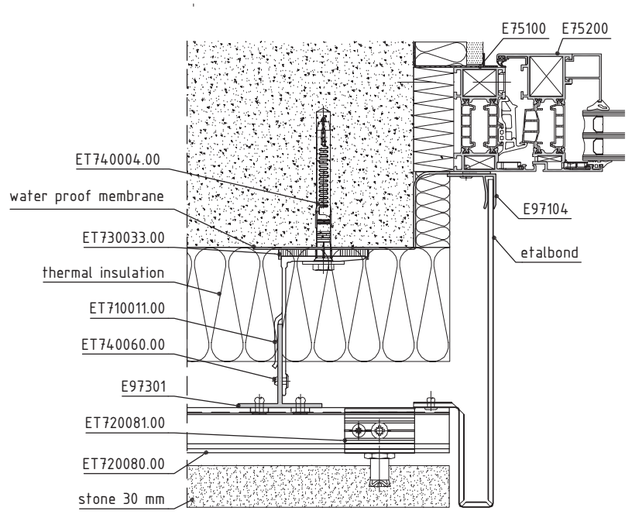
ET720082.00
ET720080.00
stone 30 mm

2

③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E75200
ET740004.00
water proof membrane
ET730033.00
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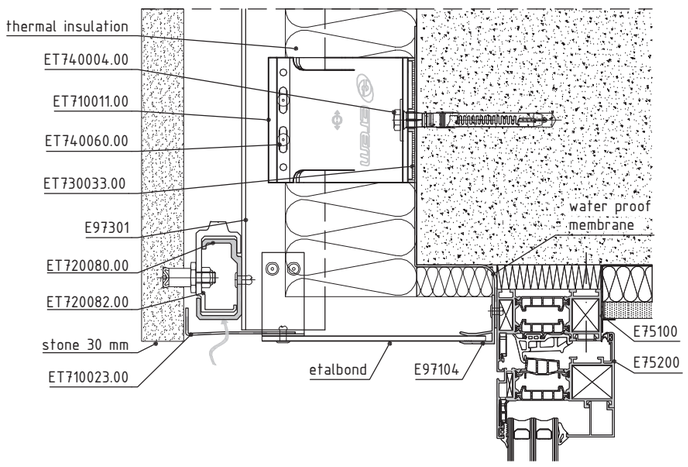
ET720080.00
stone 30 mm
E97104
etalbond

④


thermal insulation
ET740004.00
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E97301
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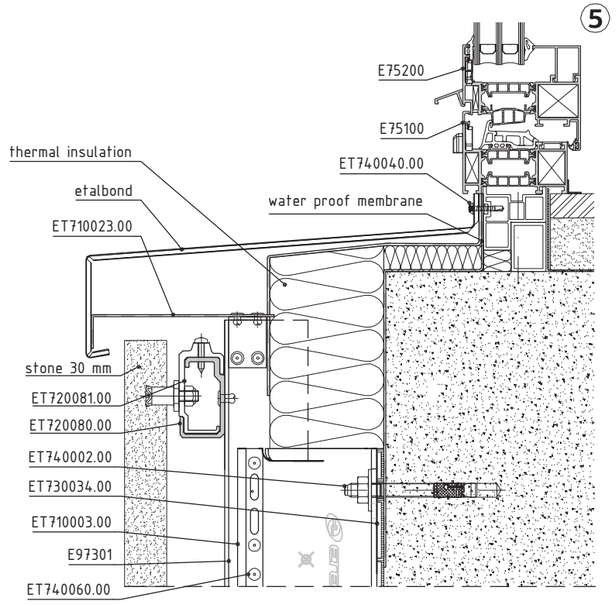
stone 30 mm
ET710023.00
water proof membrane
E75100
E75200
etalbond
E97104

⑤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thermal insulation
etalbond
water proof membrane
ET710023.00
stone 30 mm
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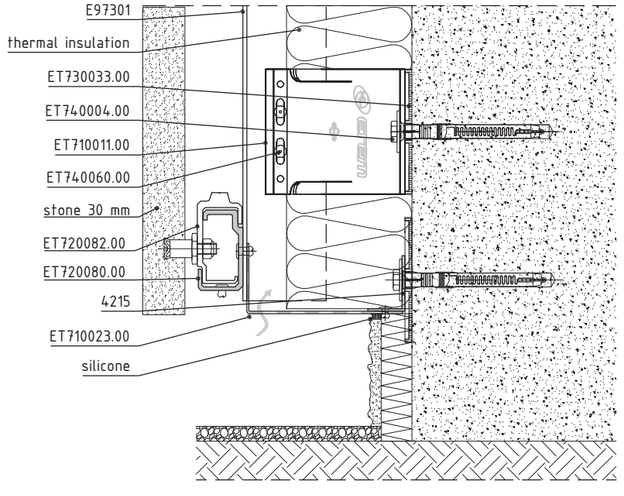
E97301
ET740060.00

⑥


E97301
thermal insulation
ET730033.00
ET740004.00
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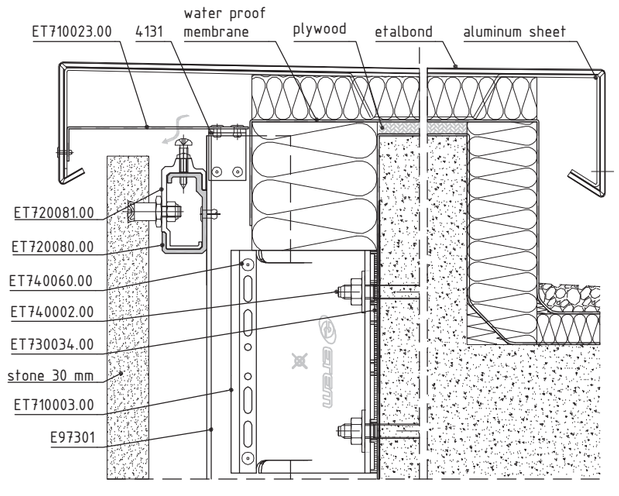
stone 30 mm
ET720082.00
ET720080.00
4215
ET710023.00
silicone

⑦


ET710023.00
4131
water proof membrane
plywood
etalbond
aluminum sheet
ET720081.00
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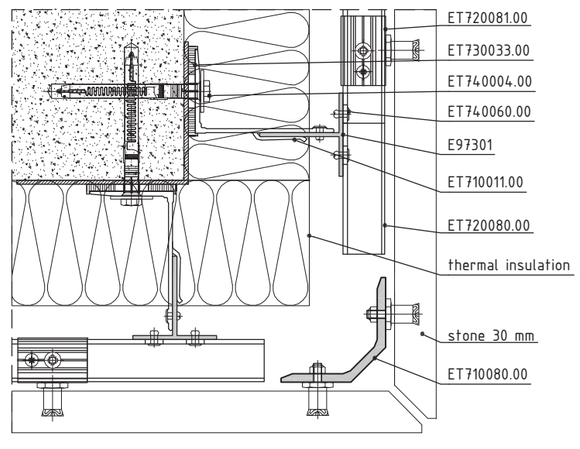
ET730034.00
stone 30 mm
ET710003.00
E97301

⑧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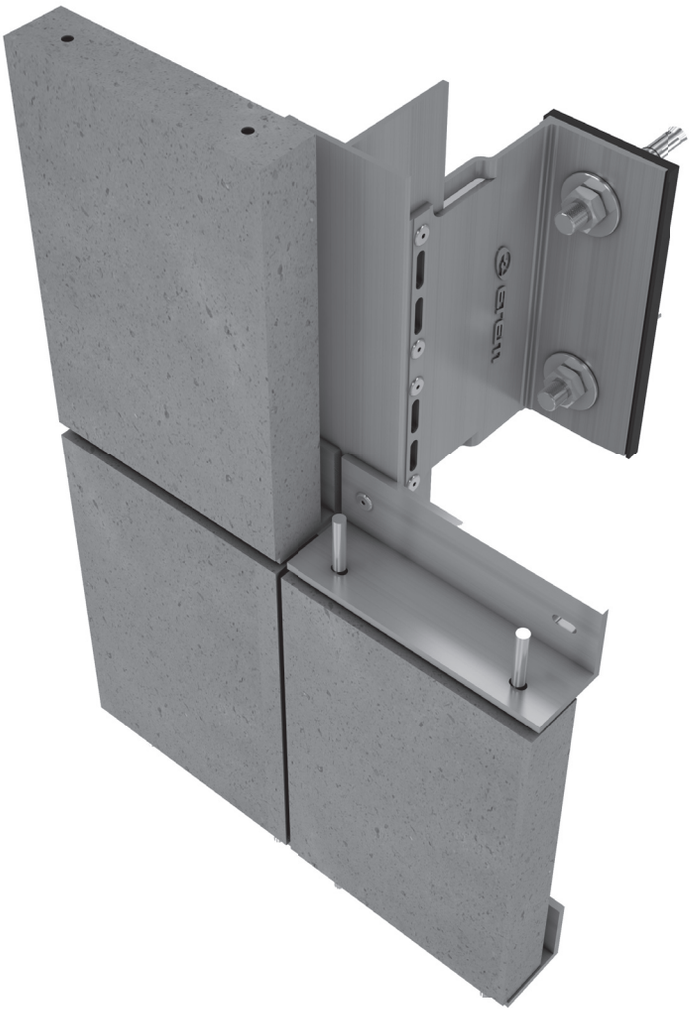
ET720080.00
thermal insulation
stone 30 mm
ET710080.00



FORTE Pins

THE SYSTEM IS DESIGNED FOR MOUNTING OF HEAVY FAÇADE MATERIALS WITH THICKNESS MORE THAN 30 MM. THE PROFILES AND ACCESSORIES ARE DESIGNED TO HANDLE EXTREME LOADS CAUSED BY THE WEIGHT OF FAÇADE MATERIALS UP TO 90 KG/SQ.M.

MAIN ADVANTAGES:

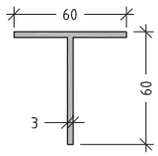
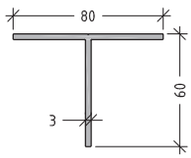
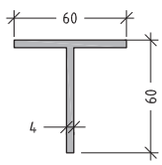
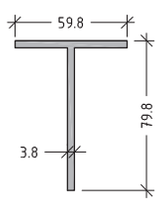
- fast, easy and secure mounting of heavy stones
- optimization of the substructure by optimal load distribution to vertical supporting pillars

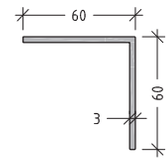
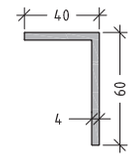
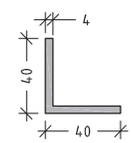
Materials suitable for hanging:

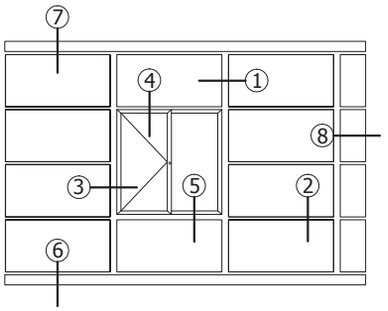
- stone
- marble

Mounting method: stainless steel pins

CLADDING MATERIALS: Stone, Technical Stone, Light Transmitting Concrete

code	profile	weight length moment of inertia
E 97301 main profile		951 g/m L=6.01 m Ix=12.54 cm^4 Iy=5.41 cm^4
E 97302 main profile		1113 g/m L=6.01 m Ix=13.63 cm^4 Iy=12.80 cm^4
17160 main profile		1257 g/m L=6.01 m Ix=16.31 cm^4 Iy=7.23 cm^4
TP060001 main profile		1404 g/m L=6.01 m Ix=34.17 cm^4 Iy=6.81 cm^4

code	profile	weight length moment of inertia
4163 main profile		1404 g/m L=6.01 m Ix=12.53 cm^4 Iy=12.53 cm^4
4128 main profile		1040 g/m L=6.01 m Ix=14.27 cm^4 Iy=5.18 cm^4
4138 horizontal profile		824 g/m L=6.01 m Ix=4.61 cm^4 Iy=4.61 cm^4
ET720088.00 stainless steel pin Ø5		pcs 1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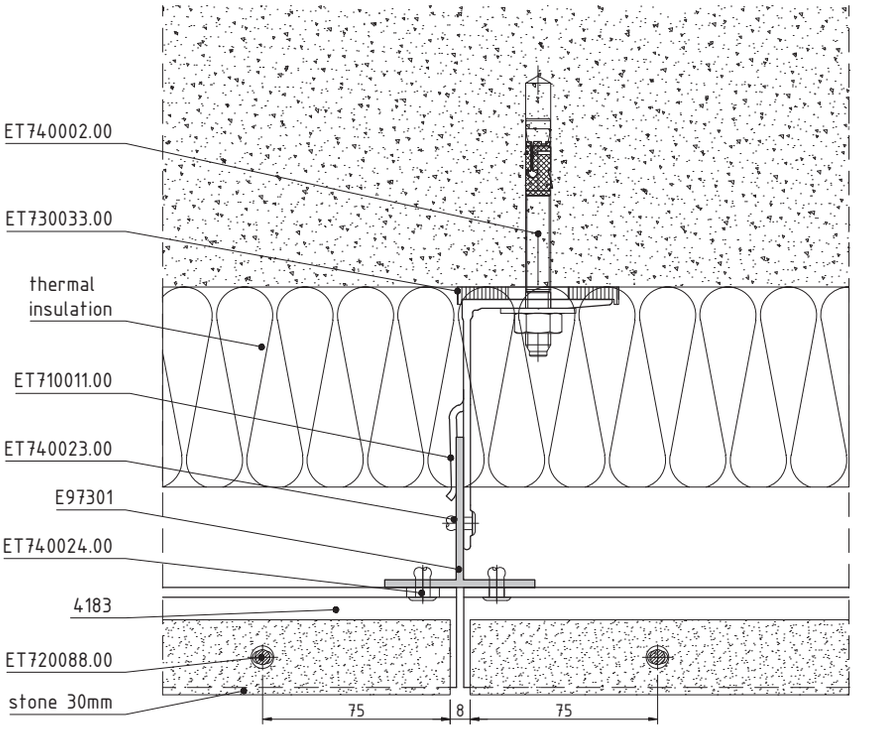
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ET730033.00
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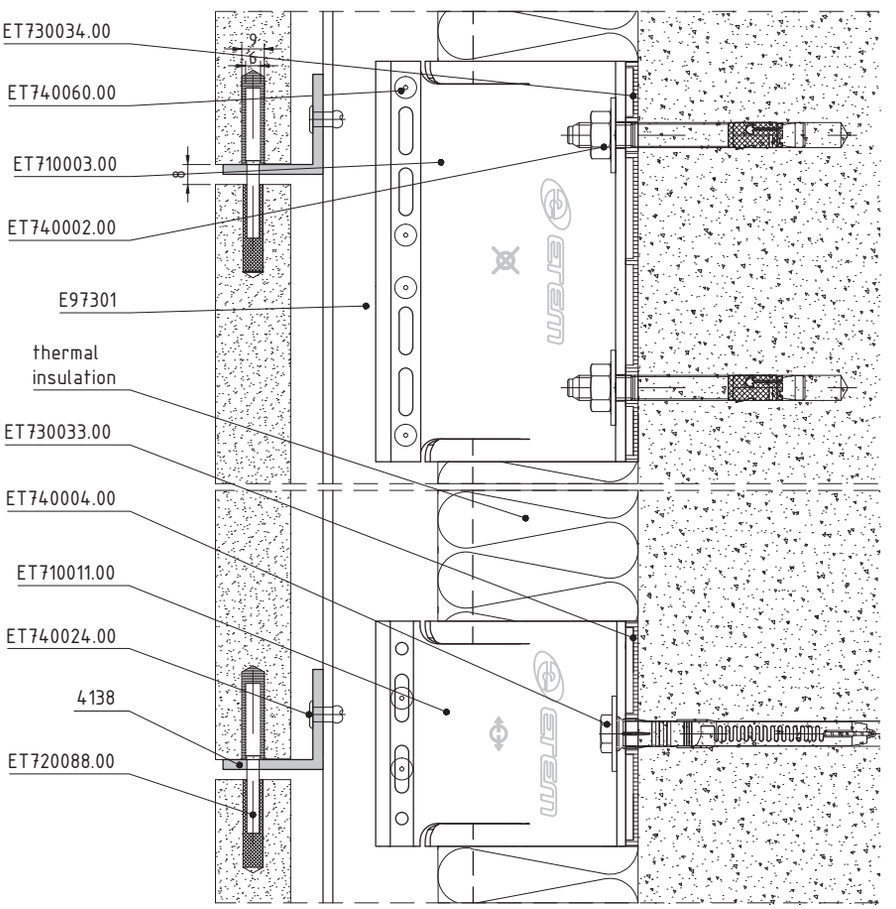
ET740023.00
E97301
ET740024.00
4183
ET720088.00
stone 30mm
75
8
75

2


ET730034.00
9
6
ET740060.00
ET710003.00
8
ET740002.00
E97301
thermal insulation
ET730033.00
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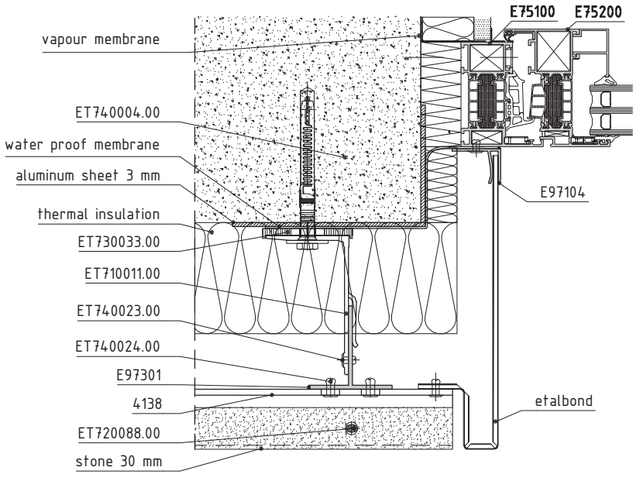
ET740024.00
4138
ET720088.00

③


E75100
E75200
vapour membrane
ET740004.00
water proof membrane
aluminum sheet 3 mm
thermal insulation
ET730033.00
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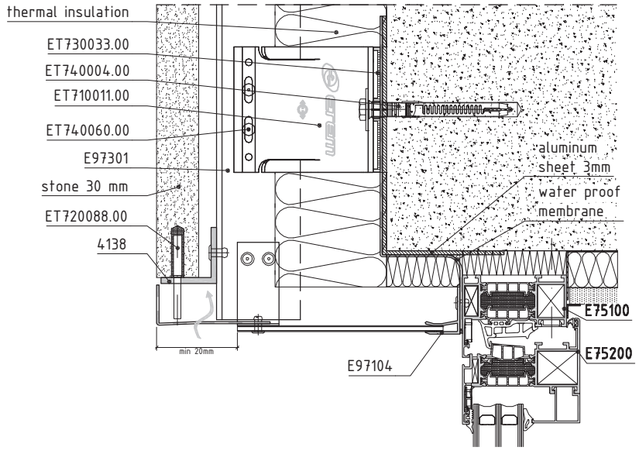
ET740024.00
E97301
4138
ET720088.00
stone 30 mm
E97104
etalbond

④


thermal insulation
ET730033.00
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stone 30 mm
ET720088.00
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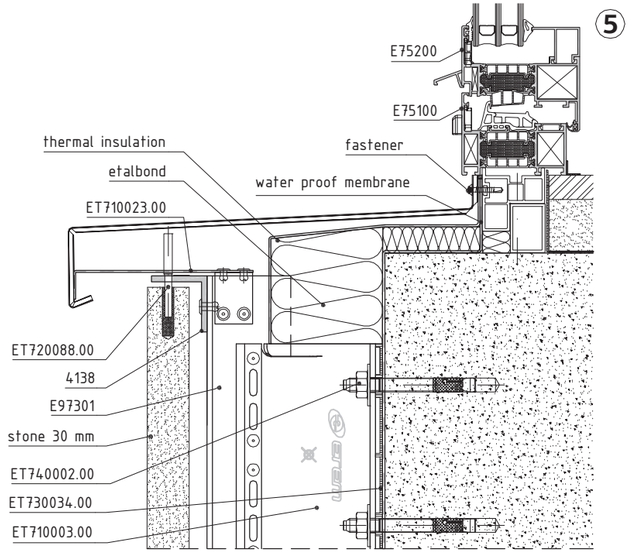
min 20mm
aluminum sheet 3mm
water proof membrane
E75100
E75200
E97104

⑤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E75100
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etalbond
fastener
water proof membrane
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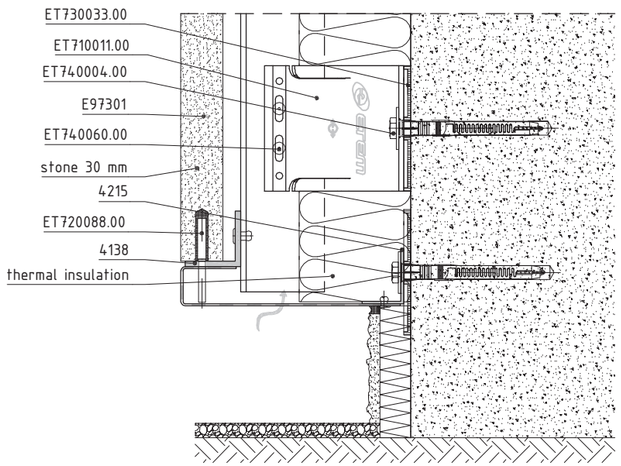
⑥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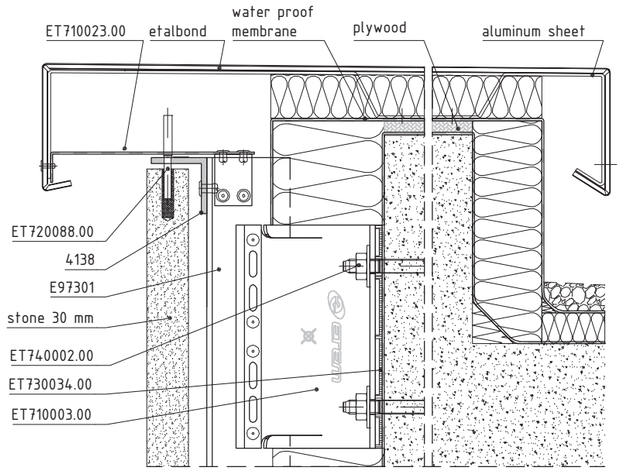
stone 30 mm
4215
ET720088.00
4138
thermal insulation

⑦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etalbond
water proof membrane
plywood
aluminum sheet
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stone 30 mm
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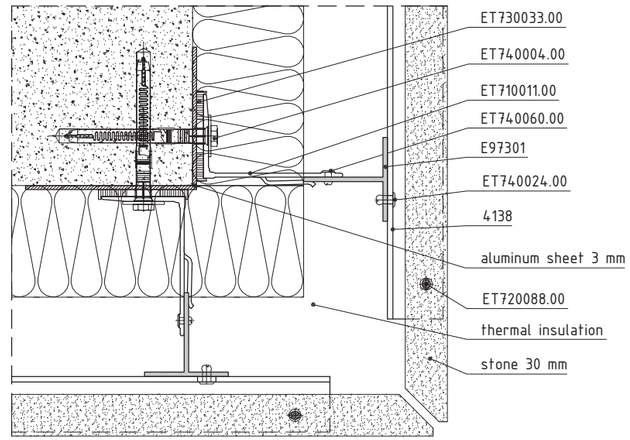
ET710003.00

⑧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ET740004.00
ET710011.00
ET740060.00
E97301
ET740024.00
4138
aluminum sheet 3 mm
ET720088.00
thermal insulation
stone 30 mm

CLADDING MATERIALS

Ceramic tiles

All production procedures, starting with preparation of clays, manufacturing, glazing and firing achieve a top-of-the-range product that satisfies the architectural demands.

There are two kinds of ceramic tiles:

Extruded ceramics – specially designed for fixing to a metallic structure without the need for additional cutting or drilling.

- Thickness: 15–45 mm
- Height: 150–500 mm
- Length: max.1800 mm
- Weight: approx. 25–61 kg/m^2

Flat ceramics

- Thickness: 3–10 mm
- Height: 600–1200 mm
- Length: max.1800 mm
- Weight: approx. 18 kg/m^2

Reaction to fire class: A1, non-combustible

Appropriate ETEM VFS depend on thickness, weight and specifics of the material: FORTE, FORTE Light, VARIO Clips, VARIO GH and others.

Cement Board

Technology creates a new generation building material that can be utilized to create long lasting structures offering advantages unobtainable to conventional construction materials. It is made of aggregated Portland cement with coated glass fibre mesh embedded in back and front surfaces.

- Thickness: 12.5 mm
- Height: 900 mm
- Length: 1200–2500 mm
- Weight: approx. 16 kg/m^2

Reaction to fire class: A1, non-combustible

Appropriate ETEM VFS: VARIO Fixings

Glass

In addition to the traditional usages of painted glass for interior applications, glass is also designed for use in cladding façades.

As exterior decorative applications, the product is designed to be heat strengthened or toughened.

- Thicknesses: 4, 6, 8 and 10 mm.
- Dimensions: 225÷321 cm.

Appropriate ETEM VFS: FORTE Light, VARIO Clips, VARIO GH, VARIO Glue

Aluminium Composite Material

etalbond® is a composite panel consisting of two aluminium cover sheets and a plastic core.

The composite structure of etalbond® results in an impressive strength-to-weight ratio, even when comparing large panel sizes.

- Thickness: 3, 4, 6 mm
- Standard sheet sizes: 1250/3200, 1500/3200 mm

Appropriate ETEM VFS: BRAVO W, BRAVO U, BRAVO Y, BRAVO H

Metal sheet products

Aluminum Coated Sheets and Coils are designed for: Façades, Roofing, Suspended Ceilings, Shading systems. Solid pre-painted PVDF aluminum in Alloy 5754 provides higher anticorrosive properties, UV protecting, extremely weather resistant, dirt repellent.

The Aluminum Coated Sheets and Coils are non-combustible and completely in line with international fire protection regulations.

- Thickness: 0.7-3 mm
- Standard height: 1250, 1500 mm
- Standard length: 2-6 m

ELVAL offers a choice of other materials: Galvanized, Prepainted Steel and AluZinc; Copper; Titanum Zinc natural and pre-weathered.

Appropriate ETEM VFS: BRAVO W, BRAVO U, BRAVO Y, BRAVO H

HPL (High Pressure Laminates)

HPL panels are duromer high-pressure laminates with additional weather protection consists of acrylic resins. They are produced in lamination presses under great pressure and high temperature.

- Thickness: 4-15 mm
- Standard height: 1060-1850 mm
- Standard length: 2140-4100 mm

Reaction to fire class: Euroclass B-s2, d0 for 6-10 mm
Density: 1.45 g/m^3

Appropriate ETEM VFS: FORTE Light, VARIO Clips, VARIO Fixings, VARIO Glue, VARIO GH

Fibre cement

Fibre cement sheets are made from natural materials: cement (i.e. a mixture of chalk and clay), sand, and water, supplemented by non-toxic organic fibres.
The surface treatment makes the material highly resistant to humidity and dirt, ensuring that regardless of what the weather throws at your façade.
Density: 1700 kg/m^3

- Thickness for external façades: 6-10 mm
- Standard height: 1000-1250 mm
- Standard length: 2500-3050 mm

Appropriate ETEM VFS: FORTE Light, VARIO Clips, VARIO Fixings, VARIO Glue, VARIO GH

Stone and Technical Stone

Truly green building materials and most environmentally sound construction materials are natural stones like granite, marble, limestone, sandstone, travertine, slate. All stones should be considered individually for their merits in whatever use they are being considered for.
Technical Stone is a composite product made of 95% natural material (quartz, granite, marble) and 5% polyester resin with very good physical and mechanical characteristics. Technical stone has better technical characteristics than natural stone (granite, marble, etc.) like strength, heat resistance, acid resistance, antibacterial characteristic etc.

Appropriate ETEM VFS: FORTE Light, FORTE, FORTE Pins, VARIO Clips, VARIO GH

Textile membranes

Excellent alternative to the use of traditional materials are textile membranes. The façade system is based on the union of a textile membrane (of different compositions) to an elastomer.
One of the main system applications is the possibility of wrapping the building with a second skin, which, apart from improving its aesthetics, permits obtaining an excellent thermal insulation level. The membrane system places no limits on creativity with different possibilities, evaluating different changes in color, material, silkscreen printing and shapes and modulations. Combined with an LED technology lighting system, permits the creation of a unique sculpture with a changing aspect.
Fire resistance varies, according to the materials chosen for the membrane.
Customized panels are possible with this system, where the size limits are only determined by the ability to transport (up to 12x2.5 m).

Composite Mineral Material

The material is solid, non-porous, homogeneous surfacing material composed of acrylic resin and natural minerals.
Cladding is typically done with CNC routers to create desired shapes, and with sanding or polishing tools for different finishes. It can be fabricated to achieve different levels of light
transmission by reducing the thickness of the material.

- Standard dimensions of DuPont™ Corian® sheets are:
- 4 mm sheet 930 x 2490 mm
- 6 mm sheet 760 x 2490 mm 930 x 2490 mm
- 12.3 mm sheet 760 x 3658 mm 930 x 3658 mm
- 19 mm sheet 760 x 3658 mm

Density: 1.68 – 1.76 g/cm^3
Reaction to fire class: Class B1

Appropriate ETEM VFS: FORTE Light, VARIO Clips, VARIO Fixings, VARIO Glue

Glass Fiber Reinforced Concrete GFRC, GFRP

The composite material formula consists of basic cement material, fine aggregate, water, dispersed resistant glass fiber and other chemical additives. It is possible to easily achieve various visual surfaces and there are no size limitations.
The panels are 8, 10, 12, 13, 15 mm thin and available in different colors.
Density: 1900-2100 kg/m^3
Reaction to fire class: A1, non-combustible

Appropriate ETEM VFS: FORTE Light, VARIO Clips, VARIO Fixings, VARIO GH, VARIO Glue

Light transmitting concrete

Water, sand and cement form concrete and transmitting optical fibers embedded in the concrete.

- The light panels are 4-10 mm thin and available in different colors.
- Standard size: 1,2m x 0,60 m

Density: about 2400 kg/m^3
Reaction to fire class: A1/A2, non-combustible

Appropriate ETEM VFS: FORTE, FORTE Light, FORTE Pins, VARIO Clips, VARIO Fixings, VARIO GH

ETEM Project checklist

For each calculation of new projects by the ETEM R&D department, it is necessary project checklist form to be filled. It includes detailed information, which helps customers to receive most accurate and precise offer. The offers may vary depending on cladding/façade material, the dimensions and weight of the material, wind load, height between floors, thickness of the thermal insulation. Also structural base, raster of the façades, fixing methods and different ventilated facade systems. In order to achieve qualitative calculation, it is necessary the drawings to be submitted via email/courier in CAD format. If there are any specific features of the project, these are also taken into consideration.

Incoming # _____ Date: _____

Designers: _____

PROJECT CHECKLIST: VENTILATED FAÇADE SYSTEMS

1. Project name and location: _____

2. Contractor/sales manager/architect: _____

3.Technical contact person:

Name: _____

Tel.: _____ e-mail: _____

4. Façade material:

☐ ceramics ☐ composite material

☐ stone ☐ aluminium sheet

☐ HPL ☐ other

☐ fibrocement

Size (mm):_____

Weight (kg/m^2): _____

Colour:_____

Specific info: _____

_____

5. Additional data:

Regional wind load (kN/m^2): _____

Structural base: _____

Insulation thickness (mm): _____

Raster, joints: _____

6. Fixing method:

ETEM Ventilated System *(Bravo/Vario/Forte):* _____

Visible *(rivets, clamps, clips):* _____

Invisible *(adhesive, pins, undercut anchors, adaptors):* _____

7. Type of offer:

☐ technical consultation ☐ static analysis

☐ valuable calculation ☐ specific details

Remarks and object specifics: _____

_____

Sales manager */name, last name/:* _____

Date: _____

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STANDARDS

STANDARDS

General

EN 12020 (1÷2) – Aluminium and aluminium alloys – Extruded precision profiles in alloys EN AW-6060 and EN AW-6063
EN 755 (1÷9)– Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles
EN 573 (1÷3) – Aluminium and aluminium alloys – Chemical composition and form of wrought products
EN 15088 – Aluminium and aluminium alloys – Structural products for construction works – Technical conditions for inspection and delivery
EN 1990 Eurocode – Basis of structural design
EN 1991 Eurocode 1 – Actions on structures
EN 1998 Eurocode 8 – Design of structures for earthquake resistance
EN 1999 Eurocode 9 – Design of aluminium structures

Ventilated façade systems

ETAG 034, part 1 – Kits for external wall claddings, Part I: Ventilated cladding kits comprising cladding components and associated fixings
ETAG 034, part 2 – Kits for external wall claddings, Part II: Cladding kits comprising cladding components, associated fixings, subframe and possible insulation layer
CWCT Standard for Systemized Building Envelopes
EN 13830 – Curtain walling – Product standard
EN ISO 6946 – Building components and building elements – Thermal resistance and thermal transmittance – Calculation method
EN ISO 10211 – Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations
EN ISO 14683 – Thermal bridges in building construction – Linear thermal transmittance – Simplified methods and default values
EN 13116 – Curtain walling – Resistance to wind load – Performance requirements
EN 12179 – Curtain walling – Resistance to wind load – Test method
EN 14019 – Curtain Walling – Impact resistance – Performance requirements
EN ISO 10140 – Acoustics – Laboratory measurement of sound insulation of building elements
EN 20140 – Acoustics – Measurement of sound insulation in buildings and of building elements
EN ISO 717-1 – Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation

LIABILITY

The stated data and calculating methods are provided by ETEM as a guideline only.
The information given in this catalogue does not substitute of all applicable regulations – Eurocodes, harmonized European standards, national or regional building codes.

The specific conditions and technical details of every particular project have to be taken into consideration.

The right choice of all elements as well as any special requirements regarding stability of the structure must always be considered by the structural/façade engineer, responsible for the project.

The solutions presented in these pages are indicative and can not cover all possible project cases. Because of that every single project has to be evaluated by the structural/facade engineer in charge taking into consideration the specific features, such as climate conditions, location, orientation, etc.

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