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Beside improved thermal insulation properties the protection of walling against moisture, the noise damping and the better esthetic aspect of buildings is accentuated these days. The relative moisture content in internal heated housing and office rooms – where we spend more the 90 % of our time – is about 60 %. The moisture is pressed towards the outer wall surface, where the water vapor condenses. When the escape of water vapor is hindered by for instance ceramic coating, the vapor is cumulated in the walling. The thermal conductivity of walling increases and the water in walling freezes in winter and the volume of frozen walling increases and damages the plaster. Also moulds can arise in the interior such way. An optimal solution of such problems is the application of vented facade systems.

## 8.1 Application possibilities for vented CETRIS® facades

The ventilated facade system with use of cement-bonded particleboard of type CETRIS® is one of possible application of CETRIS® boards in civil engineering, used here as protection of peripheral walls of constructions before influence of the weather.

Such system can be used both for new buildings and for reconstruction of family houses, flat buildings, office buildings, civic amenities, industrial and agricultural buildings.

The functional and elegant ventilated facade from

CETRIS® boards fulfils the requirements to high quality, esthetic, functionality and lifetime. The ventilated facade system can be completed with thermal insulation.

### Description of the facade system:

The ventilated facade is an integral part of peripheral structure and therefor the structure has to be checked as an unit from static point of view, and in case of additional thermal insulation also from thermal conductivity point of view.

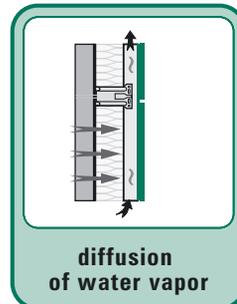
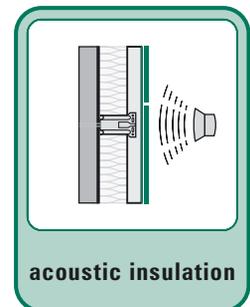
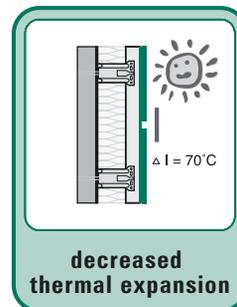
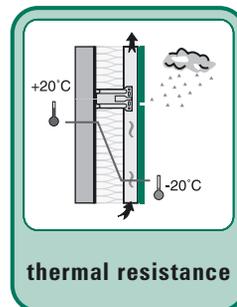
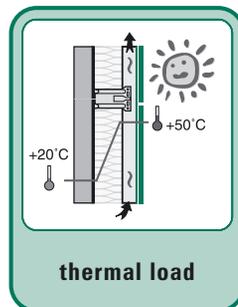
- **The bearing structure** – ensures the insertion of thermal insulation and the fastening of facade lining to the bearing wall of the building

- **Thermal insulation** – a layer of thermal insulating material, fastened to the outer surface of peripheral structure of the building

- **Facade lining** – protects the bearing structure and the thermal insulation against the influence of the weather and creates the esthetic aspect of the building in the same time

### 8.1.1 Advantages of ventilated CETRIS® facades

- **Thermal insulation in winter** – the optimal choice of thermal insulation thickness in connection with the ventilated air ensures the minimal consumption of energy for heating of the house
- **Thermal insulation in summer** – the thermal damping of the facade decreases the overheating of the interior caused by the solar radiation in the summer
- **Hinged facade** – the hinged facade effectively protects before direct influence of the weather and holds the thermal insulation and wall in perfect dry condition
- **Diffusion of water vapor** – the ventilated facade has favorable influence to the diffusion of water vapor in the structure and enables this way the achieving of an optimal moisture regime both in the wall and in the thermal insulation, and enables the drying of wall eventually. The stack effect between the internal cover and the thermal insulation ensures the perpetual removal of water vapor
- **Acoustic insulation** – the thermal insulation from mineral fiber provides also an acoustic insulation and dominantly contributes to the protection against the outer noise
- **Facade lining** – a facade element from CETRIS® boards is an element of many possible combinations of sizes, shapes, surfaces and colors and contributes to perfect realization of the architectural requirements to the facade
- **The system eliminates the eventual unevenness of existing wall**



- **Easy replacement of individual facade elements**
- **The structure is built with "dry" method of mounting**, so the works can be provided over the whole year

The CETRIS® ventilated facade system applied on bearing structure is a system, which together with the existing bearing structure creates a new peripheral structure, fully fulfilling all requirements to function, thermal properties, static, architectonic aspect at achieving a satisfactory lifetime.

## 8.1.2 Division of CETRIS® facade systems

**A) Depending on the location of CETRIS® boards on the facade we divide the CETRIS® facade systems as follows:**

**A<sub>1</sub>) CETRIS® VARIO facade system**  
a facade system with manifested horizontal and vertical joint between the individual facade elements



**A<sub>2</sub>) CETRIS® PLANK facade system**  
a facade system with overlapped horizontal (the vertical joint is manifested only) joints



**B) Three types of bearing grids can be used for anchoring of CETRIS® boards on the facade**

**B<sub>1</sub>) wooden bearing grid**



**B<sub>2</sub>) bearing grid from system profiles from aluminum, zinc coated sheets (the systems EuroFox, SPEEDY, SPIDY, etc.)**



**B<sub>3</sub>) combined grid**  
anchors + UNI connections + wooden lathes



The extent of use of ventilated facade system on a wooden or combined bearing structure is limited with the fire-fighting regulations. The maximal allowed height of the building is for production building 12 m, for the other 9 m. The maximal height measured from the ground is decisive. The hinged ventilated system with CETRIS® boards on system profiles EuroFox is certified under the trademark CETRIS-STYL 2000. The extent of use of a ventilated facade system on Eurofox profiles is not limited with fire-fighting regulations.



The ventilated facade system with CETRIS® boards can be realized also on system profiles of type SPIDI® from the company ISODOM a.s. The extent of use of ventilated facade system on profiles of type SPIDI® is determined with a certificate.

## 8.2 Types of CETRIS® boards for facade systems

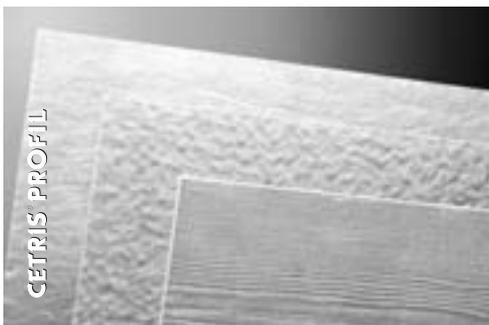
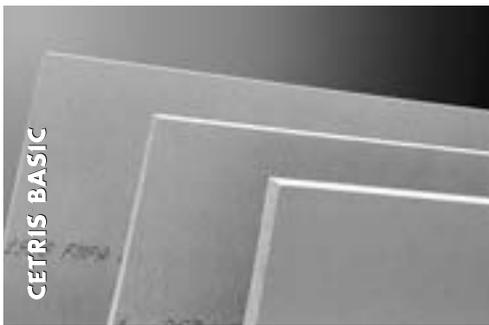
### 8.2.1 CETRIS® BASIC and CETRIS® PROFIL

The CETRIS® BASIC (CETRIS® PROFIL) is a cement-bonded particleboard with smooth surface (with relief) and in basic version in cement gray color. It is suitable to provide this board with final colored or transparent paint (when the original cement aspect is required). The surface treatment increases the protection of board against weather influences and prolongs its lifetime.

The recommended paints and technological methods are described in the article 6 Surface treatment (finishing) of cement-bonded particleboard of type CETRIS®.

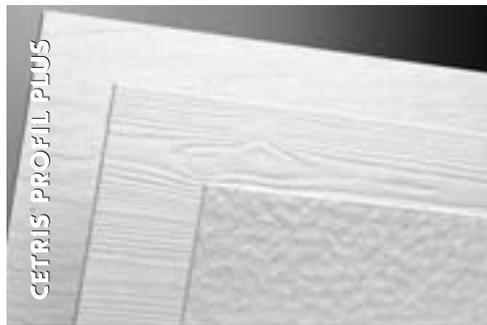
At designing of facade systems from CETRIS® BASIC (CETRIS® PROFIL) boards without surface treatment the composition of the board material – cement ware – has to be taken into account.

The elements of free (not bonded) lime contained in the Portland-cement could penetrate up to the board surface and carbonize on the air and causing such way white “flowers”, which could disturb the uniform aspect of the board surface. Claims from such reasons could therefore not be accepted. This phenomenon could be partly prevented by treatment of the board with deep penetrating paints, which decrease the absorbing capacity and hinder the transport of mineral substances on the board surface.



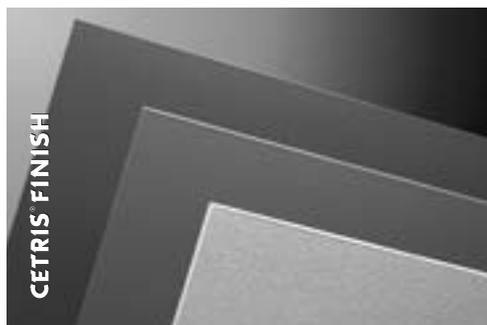
### 8.2.2 CETRIS® PLUS and CETRIS® PROFIL PLUS

The CETRIS® PLUS (CETRIS® PROFIL PLUS) is a cement-bonded particleboard with smooth surface (with plaster, slate, wood relief) and provided with ground penetration coat (white). The ground coat decreases the absorption capacity of the board and improves the adhesion of final coat. This type of board has to be provided with final coat.



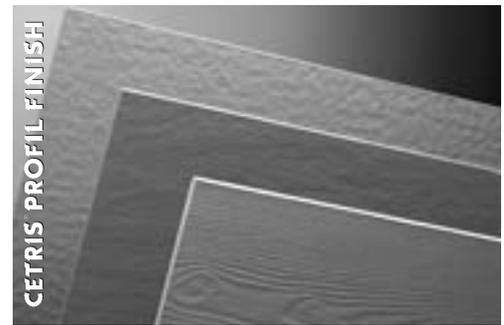
### 8.2.3 CETRIS® FINISH

The CETRIS® FINISH is a cement-bonded particleboard with smooth surface provided with a ground painting and a final painting in color shades of RAL, NCS color charts.



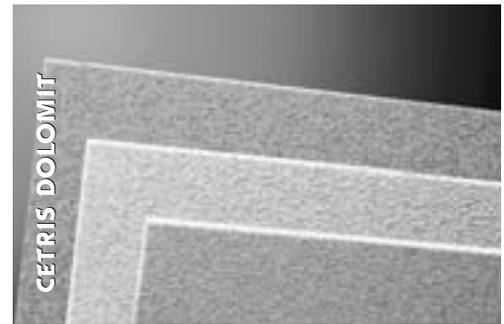
### 8.2.4 CETRIS® PROFIL FINISH

The CETRIS® PROFIL FINISH is a cement-bonded particleboard (of 10 or 12 mm thickness), the surface of which is composed from embossment imitating the structure of wood, plaster or slate. The board surface is provided with a ground painting and a final painting in color shades of RAL, NCS color charts.



### 8.2.5 CETRIS® DOLOMIT

The CETRIS® DOLOMIT is a cement-bonded particleboard, the surface of which is strewn with marble gravel of three different granularity and in colors according to color chart. The board dimension of CETRIS® DOLOMIT board is because of production reasons limited (see the appropriate article 2.3.9 on maximal dimensions of CETRIS® DOLOMIT boards).



### 8.3 CETRIS® VARIO facade system

The recommended thickness for cement-bonded particleboards of type CETRIS® for facade systems is 10 and 12 mm. For coating of pedestals also boards with greater thickness can be delivered.

The CETRIS® boards for facade system with manifested joint of type VARIO can be delivered in maximal dimensions of 1250 x 3350 mm. The boards are provided with pre-bored holes of 10 mm diameter (at maximal dimension up to 1600 mm the boards are pre-bored with holes of 8 mm diameter). The boards can be delivered also in other dimensions, the minimal size for facade board is 300 x 300 mm. The boring of holes and the span of consoles should correspond to the technological prescriptions. The method of fastening to the bearing structure has to enable the displacement caused with volume

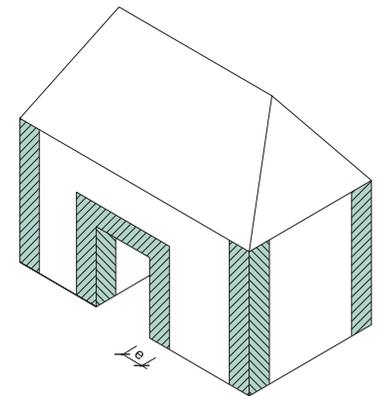
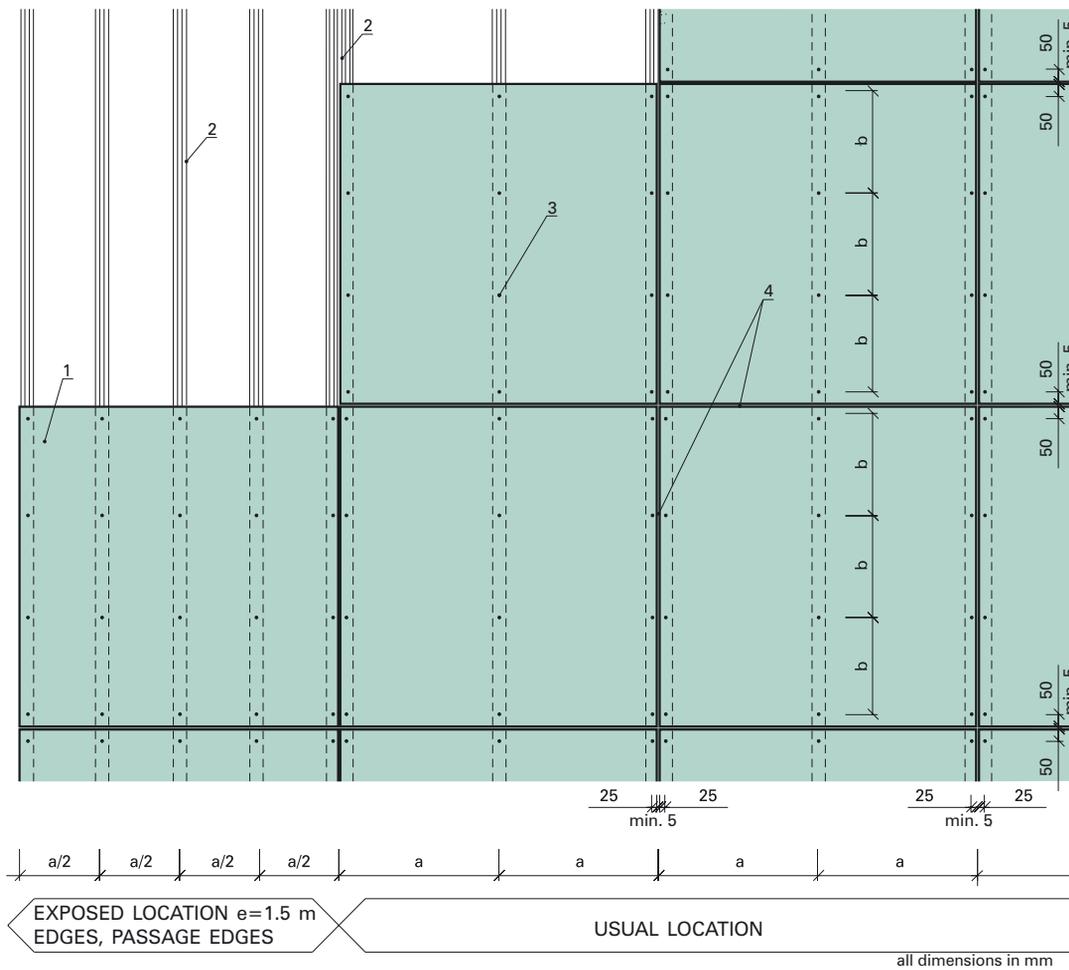
changes of facade boards. The individual facade elements should be fastened with joint min. 5 mm at board maximal side up to 1600 mm and min. 10 mm at the maximal dimension of 3350 mm. When the

holes are bored on site, the hole diameter in the VARIO system has to be 10 mm (at maximal size up to 1600 mm the holes can have 8 mm diameter).

#### Maximal distance of anchoring elements

Console span a (mm)	Maximal axial distance b (mm)				
	th. 10	th. 12	th. 14	th. 16	th. 18
400	600	600	600	600	600
450	600	600	600	600	600
500	600	600	600	600	600
550		550	600	600	600
600		500	600	600	550
650				600	550
700				550	500

#### Scheme of laying of CETRIS® boards in the VARIO system



Exposed location, edges, passage edges

e = 1.5 m

#### LEGEND:

- 1 CETRIS® cement-bonded particleboard
- 2 vertical supports
- 3 screws for fastening of CETRIS® boards
- 4 joints between CETRIS® boards

## 8.4 CETRIS® PLANK facade system

The CETRIS® cement-bonded particleboards for the overlapped facade system PLANK can be delivered in 300 or 200 mm width, in maximal length 3350 mm. The boards are provided with pre-bored holes of 5 mm diameter (minimally 1.2 times the screw diameter). The boring of holes and the span of consoles should correspond to the technological prescriptions.

The method of fastening to the bearing structure has to enable the displacement caused with volume changes of facade boards. The individual facade elements should be fastened with joint min. 5 mm at board maximal side up to 1600 mm and min. 10 mm at the maximal dimension of 3350 mm. When the holes are bored on site, the hole diameter in the PLANK system has to be 1.2 times the screw shaft diameter. The CETRIS® boards for the

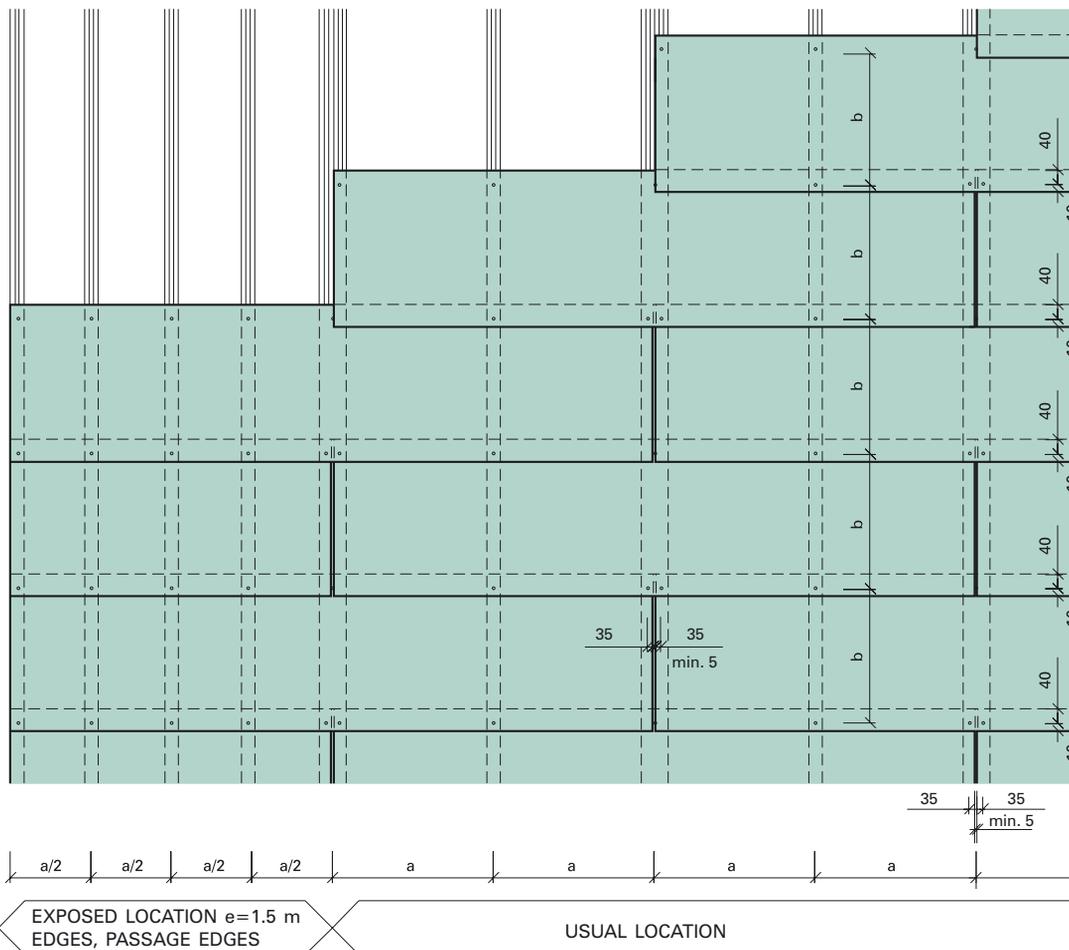
overlapped facade system PLANK are delivered with chamfered lower edges under 45° or phase milled with half-round milling cutter, radius  $r = 3.2$  mm

(this not valid for all modifications of CETRIS® PROFIL boards). This modification is not provided at CETRIS® DOLOMIT boards.

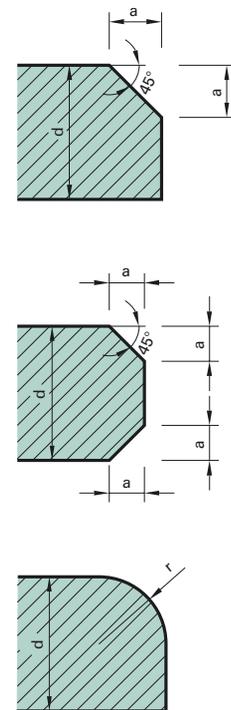
### Maximal distance of anchoring elements

Console span a (mm)	Maximal axial distance b (mm)				
	th. 10	th. 12	th. 14	th. 16	th. 18
400	600	500	600	600	600
450	500	450	600	600	600
500	450	400	600	600	600
550		350	600	600	600
600		350	600	600	600
650				600	550
700				550	500

### Scheme of laying of CETRIS® boards in the PLANK system



### Chamfering of the edges at CETRIS® boards in the PLANK system



$a = \text{min. } 2 \text{ mm, max. } 5 \text{ mm}$

$r = 3.2 \text{ mm}$

$d = \text{thickness of CETRIS® cement-bonded particleboard}$

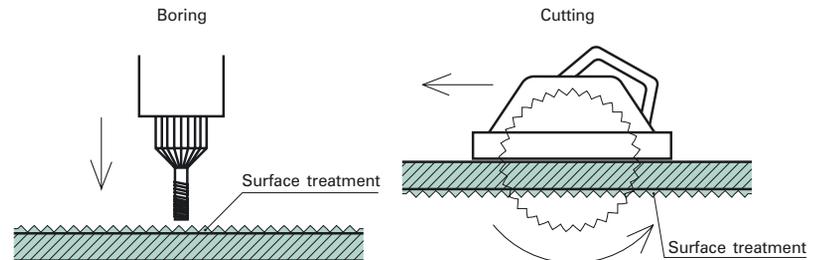
all dimensions in mm

## 8.5 Machining of CETRIS® facade-boards

The CETRIS® cement-bonded particleboard can be easily cut with circular saw with carbide tipped cutting tools. A guiding lath should be used to achieve a clear and direct cut and the cutting should be provided from the backside, so the front side will be not damaged.

The pre-boring of holes should be done with a boring machine without impact, on a solid base. A drill for metal is recommended. The boring should be provided from the front side only.

### Machining of CETRIS® facade-boards with surface treatment



## 8.6 Packaging and storing of CETRIS® facade-boards

The CETRIS® cement-bonded particleboards are delivered on wooden transport pallets, packaged into protective foil. The individual CETRIS® FINISH and

CETRIS® PROFIL FINISH boards are separated by a softened foil, preventing the damaging of boards during transport. The boards have to be stored and

packaged on a solid and stable base in a dry environment, protected against rain and dust.

## 8.7 Composition of CETRIS® facade system

### 8.7.1 Bearing structure

The bearing structure has to fulfill the all requirements of according technical regulations for this type of structure (Czech standard ČSN, building and other technological certificates, technological methods). Namely the homogeneity, compactness, the total and local strength and flatness are important. The strength of the base is determined also by the requirements of individual producers of anchoring elements and their instructions for designing of given anchoring elements.

### 8.7.2 Thermal insulation

We recommend, in cases, when a thermal insulation is required, the use of hydrophobic mineral fiber of type WV according to German standard DIN 18165, certified for the territory of Czech Republic, with flammability class at least "B" according to Czech standard ČSN 73 0862, with minimal board thickness given with the production program of individual producers and with the requirements to thermal resistance of insulation layer (with calculation of thermal losses). The use of boards with flammability class "C1" (hardly flammable) according to Czech standard ČSN 73 0862 is, because of fire-fighting regulations, limited to a maximal facade height 22.5 m (measured from the modified ground).

### The recommended types of mineral fibers:

ORSIL N  
density 100 kgm<sup>-3</sup>  
λ = 0.039 W/mK

Rockwool RFP-040  
density 35 kgm<sup>-3</sup>  
λ = 0.040 W/mK

Rockwool RFP-035  
density 35 kgm<sup>-3</sup>  
λ = 0.035 W/mK

The fastening of insulation boards is provided with plated dowels, in dowel lengths according the instructions of the producer. The minimal quantity of dowels to 1 m<sup>2</sup> is determined with the instructions of the mineral board producers.



### 8.7.3 Air gap

The air gap ensures the removal of atmospheric moisture and the by the rain and snowfall inserted moisture – through joints into the open system, and also the removal of moisture diffused from the bearing structure. This air gap favorably contributes as inhibition of temperature increase in the bearing structure in the summer. The condensation of moisture in the ventilated area depends namely from the intensity of ventilating air stream and from its velocity. The minimal thickness of the air gap is 25 mm, the maximal 50 mm.

## 8.7.4 Bearing grid from wood

### Bearing structure

The bearing structure is composed from a grid from wooden lathes and planks. The lathes and planks are produced from high quality pine timber, dried to a max. 12 % moisture content. Such way dried wood should be impregnated with appropriate fungicide agent.

### The primary – horizontal – grid

This grid is used, when an additional thermal insulation is required. The grid thickness corresponds with the insulation thickness, the recommended width is 100 mm. The dimensions, the method of anchoring and the lath span is determined by the designer according to the provided static and thermal calculation of peripheral walling.

### The secondary – vertical – grid

This grid creates the ventilating gap between the facade lining and it forms the bearing structure for the facade boards in the same time. The lath thickness depends on the span of primary grid and the minimal profile for ventilating gap – minimal cross-section 250 cm<sup>2</sup>/m and the maximal one 500 cm<sup>2</sup>/m – has to be observed in the same time. That means the minimal distance of facade-board internal surface from the thermal insulation or to the bearing wall of the building is 25 mm and the maximal one 50 mm. The lathes are fastened to the primary grid in spans corresponding to the facade lining type. The lath width in connection place of two facade elements is min. 100 mm, the interlacing lathes have a 50 mm width.



## 8.7.5 Bearing grid from aluminum profiles STYL 2000

### Bearing structure

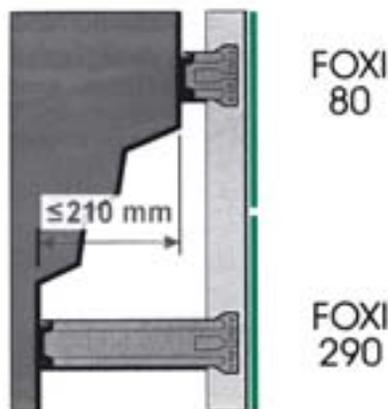
The bearing structure is delivered by the company STYL 2000 Brno, Czech Republic. The EUROFOX system has been developed in Austria by a company of same name, and it is designed for ventilated facade lining. The bearing structure in STYL 2000 system is composed from a system of anchors, profiles and consoles. The structure is – thank to used materials (aluminum, its noble alloy metals (Al+Mg+Si), stainless steel eventually) – resistant against staining and against aggressive environment. The cost-effective, from static point of view

optimized structure of basic system elements enables the composition thickness of the lining from 80 mm to 330 mm. The stability of bearing structure STYL 2000 is – from thermal stress point of view – given with a system of solid points and slide bearing (pre-bored circular and oval holes in the FOXI elements for fastening of bearing profiles). The basic FOXI bearing elements enable – thanks to tongue and groove connection with vertical bearing profiles – the aligning of unevenness of base structures up to 35 mm in the plane upright to the basic reference plane.

### FIXI – the anchoring element

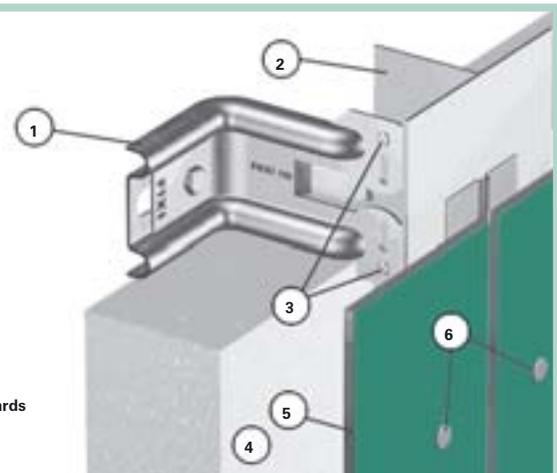
The anchoring element FIXI is produced from aluminum alloy AlMg according to German standard DIN 4113, with dimensions 32/48/3 mm. The contact surface to the FIXI anchor is grooved for increasing the composite action from static point of view. A circular hole of 10.5 or 14.5 mm diameter is pre-bored on the anchoring element for fastening to the base with aid of a dowel and appropriate screw.

### The elements of STYL 2000 system



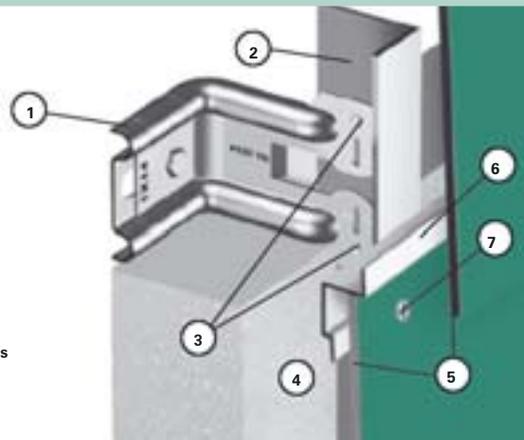
### The elements of STYL 2000 system FTA-v-100

- 1 bearing anchor FOXI with dowel and screw
- 2 vertical T-shaped console
- 3 self-drilling stainless screws
- 4 thermal insulation from mineral hydrophobized boards
- 5 CETRIS® cement-bonded particleboard
- 6 stainless screw



### The elements of STYL 2000 system FLZ-v-500

- 1 bearing anchor FOXI with dowel and screw
- 2 vertical L-shaped console
- 3 self-drilling stainless screws
- 4 thermal insulation from mineral hydrophobized boards
- 5 CETRIS® cement-bonded particleboard
- 6 horizontal console
- 7 stainless screw



### FOXI – the bearing anchoring element

The bearing anchoring element FOXI is produced from aluminum alloy AlMg according to German standard DIN 4113, L-shaped, with dimensions 80/80 – 290 mm, sheet thickness 2 mm. It is provided with two circular holes of 20 mm diameter for fastening with help of FIXI fastening element and of dowel and appropriate screw to the base.

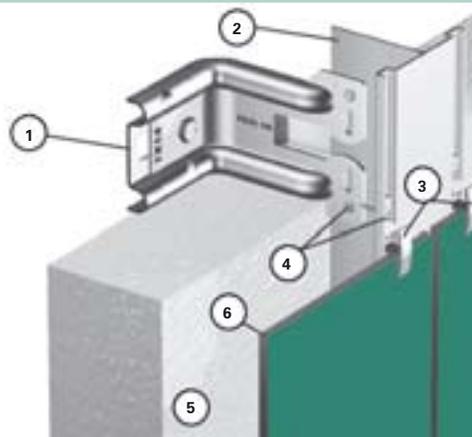
### Vertical T, L-shaped (corner) consoles

The vertical T, L-shaped (also corner) consoles are produced from aluminum alloy AlMgSi 05 F25 according to German standard DIN 4113, in length of 6000 mm, sheet thickness 1.6 mm.

L-shaped profile in dimensions	60/40 mm
T-shaped profile in dimensions	60/80 mm
Corner profile in dimensions	30/30 mm

### The elements of STYL 2000 system FTC-v-200

- 1 bearing anchor FOXI with dowel and screw
- 2 vertical T-shaped console
- 3 aluminum fasteners for fastening of CETRIS® boards
- 4 self-drilling stainless screws
- 5 thermal insulation from mineral hydrophobized boards
- 6 CETRIS® cement-bonded particleboard



### UNI connector

The UNI connector is used for creation of a bearing grid from combined materials (aluminum anchor, wooden vertical console). The connection of individual elements is provided with screws. All wooden elements have to be treated with protective paint (impregnation).

### Self-drilling screws 4.2/16

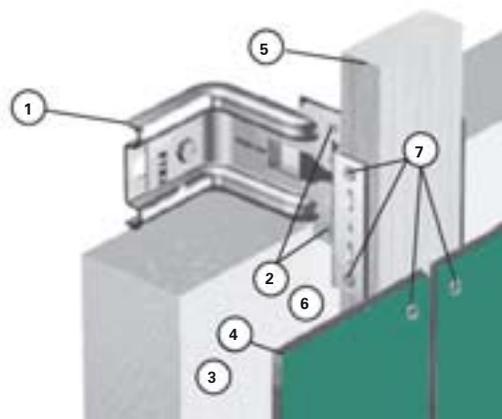
The self-drilling screws 4.2/13 are produced from noble steel of class A4 (resistant against stain, inoxidable) according to German standard DIN 4113. They are used for connection of FOXI elements with vertical consoles and to connection of customer-built profiles with vertical consoles according to the requirements of the design.

### Auxiliary profiles

The auxiliary profiles are produced with Czech producers according to the requirements of the design, from metal sheet of 1 to 2 mm thickness, from aluminum alloy AlMg 3 according to German standard DIN 4113.

### The elements of STYL 2000 system FUH-v-200

- 1 bearing anchor FOXI with dowel and screw
- 2 self-drilling stainless screws
- 3 thermal insulation from mineral hydrophobized boards
- 4 CETRIS® cement-bonded particleboard
- 5 wooden impregnated console
- 6 fastening of wooden console, UNI connector
- 7 stainless screw



## 8.7.6 Auxiliary material

### Screws for fastening of CETRIS® cement-bonded particleboards to the grid

For fastening of CETRIS® boards in the system VARIO (visible joints) stainless screws with cylindrical or hexagon head with pressing watertight washer re used. The lower side of such washer is provided with vulcanized layer of EPDM elastomer, which ensures the watertight and elastic connection of materials. The type of the screw depends also from the type of the base material – the used bearing grid. ▶

For fastening of CETRIS® boards in the system PLANK (overlapped system) galvanized screws with sunk head are used. The recommended screws for boards of 10 (12) mm in thickness, at wooden bearing structure:

- screws of type BÜHNEN, diameter 4.2 mm, length 35 (see the article 5.1 Screwing)

The recommended screws for boards of 10 (12) mm in thickness, at EuroFox bearing structure:

- screws of type EJOT Climadur-Dabo TKR – 4.8 x 35 mm

### System for invisible fastening (gluing) of CETRIS® boards to the grid

The boards can be glued to the grid, when invisible fastening elements (valid for VARIO system only) are required.

The recommended system comes from the company SIKA and is composed from the following components:

- primer paint (de-greasing agent) SikaTack – Panel Primer (for treatment of contact surfaces)
- double-faced adhesive mounting belt SikaTack (ensures the pressing of board to the grid up to the activation of the glue)
- gluing mastic (cement) SikaTack – Panel

At designing of this system a consultation with the producer company SIKA is necessary. The mounting can be provided with a schooled company only.

### Permanently elastic connecting cement (mastic)

At laying of CETRIS® cement-bonded particleboards in the PLANK system is suitable to secure the free ends of facade boards with application of permanently elastic cements. The acrylic type cements with tensile strength min. 0.1 MPa are recommended for this purpose.

### Belts and mats from rubber

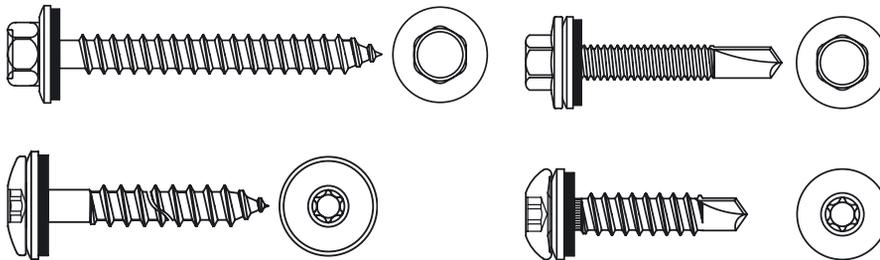
The belts and mats from rubber are used for prevention of contact and slot corrosion in contact places of aluminum alloys with other metals (bearing grid STYL 2000), or for increased lifetime

The recommended screws for CETRIS® boards board thickness 10 (12) mm, wooden bearing structure:

- SFS TW-S-D12-A10  
4.8 x 38 mm (half-eye)
- EJOT SAPHIR JT 2 -2H  
4.9 x 35 mm (hexagonal)
- EJOT SAPHIR JT 3 -FR - 2  
4.9 x 35 mm (half-eye)

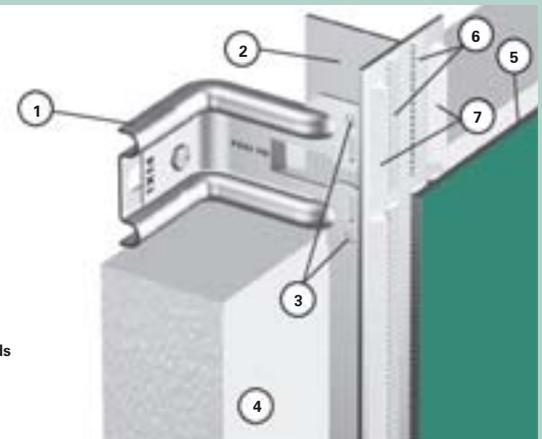
The recommended screws for CETRIS® boards board thickness 10 (12) mm, EuroFox bearing structure (aluminum):

- SFS SX 3/10-S16  
5.5 x 28 mm (hexagonal)
- EJOT SAPHIR JT 2 – 3  
4.8 x 32 mm (hexagonal)
- EJOT SAPHIR JT 3 – FR – 3H  
5.5 x 25 mm (half-eye)



### Gluing of boards in SIKA system

- 1 bearing anchor FOXI with dowel and screw
- 2 vertical T-shaped console
- 3 self-drilling stainless screws
- 4 thermal insulation from mineral hydrophobized boards
- 5 CETRIS® cement-bonded particleboard
- 6 double-faced adhesive belt
- 7 special gluing mastic



of wooden structure eventually (underlay of vertical joints in contact place of two lining boards on wooden grid).

### Anchoring elements

For fastening of the lathes to the bearing wooden grid (dowels) wall plugs of type HILTI HRDU, MUNGO, MEA, EJOT, UPAT, POLYMAT and similar are used. The location and type of plugs have to be determined by the designer.

Stainless or galvanized screws are used for fastening of vertical lathes to the horizontal ones (secondary and primary grid).

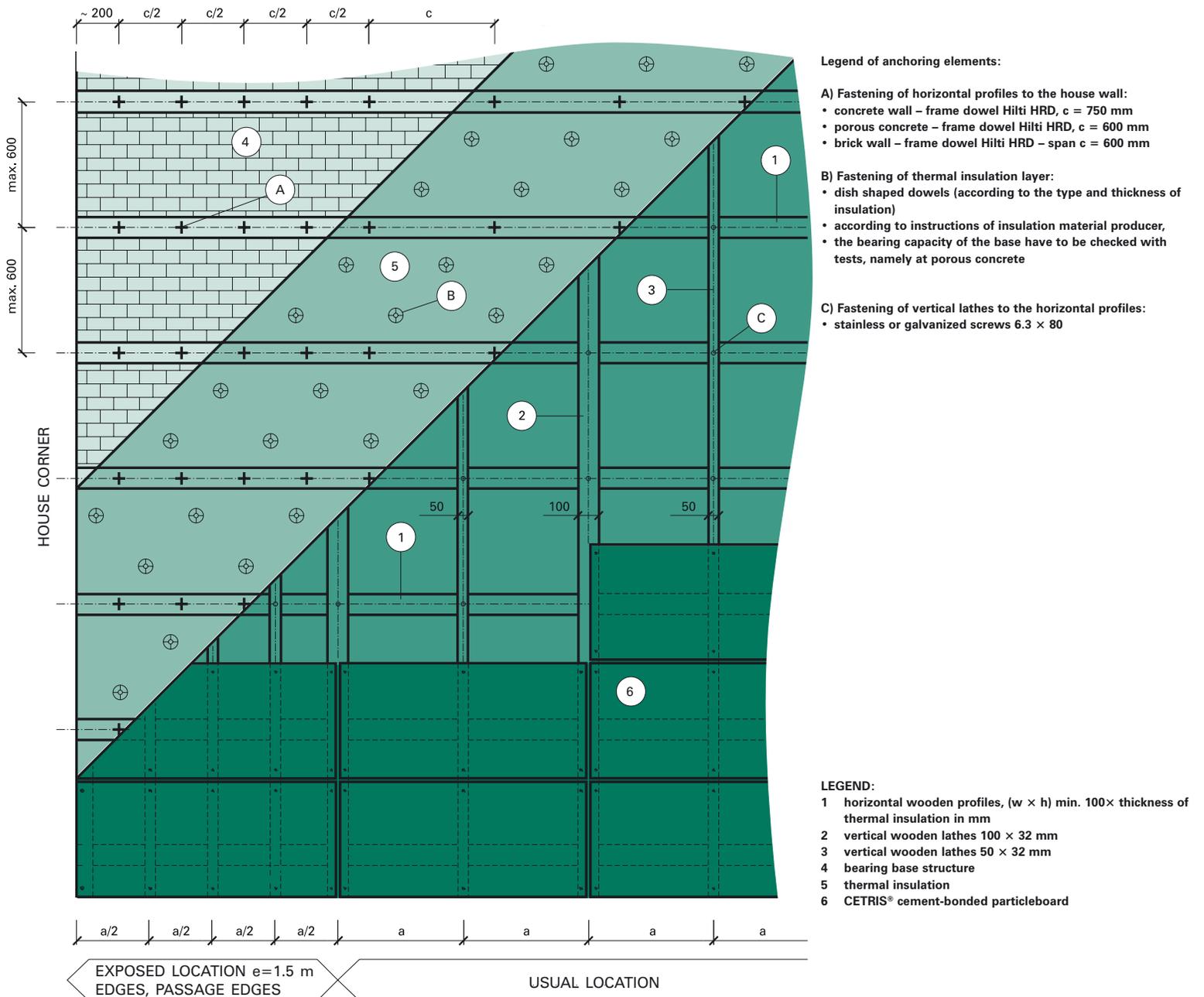
### Auxiliary profiles (lathes) to the facade system

Special shaped profiles (lathes) are used for solution of details of hinged ventilated facade (lower ending – ventilation, upper ending – ventilation, lining of holes, outer corners, inner corners, etc.). Such lathes are from zinc coated sheets (possible colored versions), from aluminum sheets or from PVC (system Protector, Baukulit).



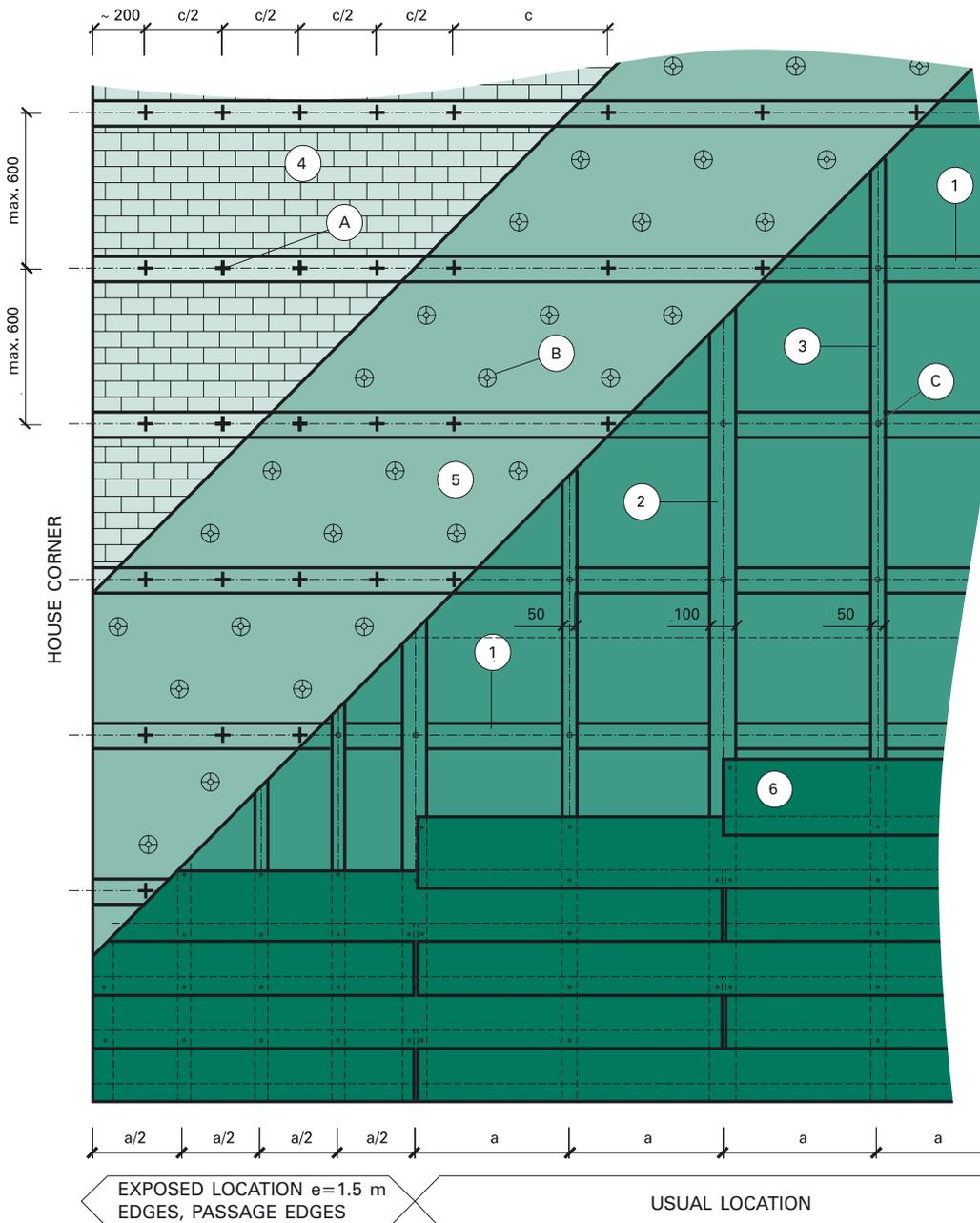
## 8.8 Technological process of mounting in CETRIS® facade system

Cross-section of CETRIS® VARIO facade system with thermal insulation on wooden structure



all dimensions in mm

## Cross-section of CETRIS® PLANK facade system with thermal insulation on wooden structure



### Legend of anchoring elements:

- A) Fastening of horizontal profiles to the house wall:**
- concrete wall - frame dowel Hilti HRD,  $c = 750$  mm
  - porous concrete - frame dowel Hilti HRD,  $c = 600$  mm
  - brick wall - frame dowel Hilti HRD - span  $c = 600$  mm

- B) Fastening of thermal insulation layer:**
- dish shaped dowels (according to the type and thickness of insulation)
  - according to instructions of insulation material producer, the bearing capacity of the base have to be checked with tests, namely at porous concrete

- C) Fastening of vertical lathes to the horizontal profiles:**
- stainless or galvanized screws  $6.3 \times 80$

### LEGEND:

- 1 horizontal wooden profiles, (w × h) min.  $100 \times$  thickness of thermal insulation in mm
- 2 vertical wooden lathes  $100 \times 32$  mm
- 3 vertical wooden lathes  $50 \times 32$  mm
- 4 bearing base structure
- 5 thermal insulation
- 6 CETRIS® cement-bonded particleboard

all dimensions in mm

### 8.8.1 Mounting of wooden bearing structure of the facade

#### Determination of principal axes and reference plane for providing of walls

It is suitable to determinate the principal axes, namely the width of pillars between the windows and the reference planes for compact surfaces of the facade lining, when possible.

#### Wooden bearing structure of ventilated facade:

##### Providing of primary grid – horizontal lathes

The wooden lathes are with help of wall plugs (dowels) fastened to the aligned base for to achieve a bearing structure of corresponding stability. The wall plug type and size is chosen considering the properties of the base. At uneven base the lathes is aligned with help of wooden rests. For aligning of individual surfaces we should fasten the vertical lathes on its sides. In these lathes we drive nails and we extend lines between them. The face plane of wooden grid is determined this way. We adapt also

the other horizontal laths – with help of insertion of wooden rests or locking into the wall – to this plane. Then the lathes will be fastened.

##### Mounting of thermal insulation layer

We fasten the horizontal lathes to the base first, when additional thermal insulation is provided (the lath thickness is the same as for insulation). We insert lengthwise the thermal insulation, fastened with dish-shaped wall plugs to the base. The mounting of thermal insulation layer with dish-shaped wall plugs should be provided according to requirements of the producer of anchoring elements. The quantity of dish-shaped wall plugs is determined by the designer according to recommendation of the producer of thermal insulation. The thermal insulation layer has to be fit tightly to the base, continuously, without open joints (very tightly!). The dish-shaped wall plugs should have a solid bed in the base and they should fit tightly to the insulation layer.

##### Providing of secondary grid – vertical bearing lathes

The vertical lathes (with minimal width 50 mm, in connection of two lathes 100 mm) are fastened with screws to the primary grid. The span of lathes should not be greater as the determined value. After fastening of vertical lathes a air gap will be created in the grid, the minimal width of this air gap is 25 mm, the maximal one 50 mm.

##### Mounting of auxiliary structures

The auxiliary structures are fastened according to requirements of realization documentation. They are namely auxiliary vertical or horizontal lathes determining the openings (window and door case and rabbet), internal ad external corner, lower and upper endings, etc.

### 8.8.2 Mounting of aluminum bearing structure for STYL 2000 facade

The bearing structure can be provided with a company schooled by the producer only.

#### The mounting is composed from the following partial steps:

- determination of principal axis and reference plane
- measurement of the raw building, determination of the axis of vertical consoles
- mounting of FOXI bearing elements
- mounting of vertical bearing lathes
- mounting of auxiliary structures
- mounting of CETRIS® cement-bonded particleboards
- details of opening's case and rabbet, corners, arch dilatations, etc.
- boring and cutting of CETRIS® cement-bonded particleboards contact of facade lining with transient structures

#### Measurement (survey) of principal axis and reference plane for providing of the brickwork

It is suitable to determinate the principal axes, namely the width of pillars between the windows and the reference planes for compact surfaces of the facade lining, when possible.

The keeping of such principal dimensions and the evenness according the reference plane at providing the walls as base for the bearing structure of type STYL 2000 could spare all additional expenditures connected with modification of dimensions and evenness of facade lining base or with modification of the thickness of facade lining and distribution

of joints, eventually.

- We mark – with help of a laser beam, taking into account the segmentation of facade lining – the reference vertical axis, with reference to which we measure the first right or left side axis, or the axis of symmetry for the surface, eventually.
- Form such way determined solid axis we measure out the edges for pillars between the windows, in the highest and lowest level of the surface. The edges of such pillars are determined for prevention of eventual measurement error, with help of a measure tape with integral method of measuring.
- We mark the reference plane – with help of a laser beam in a distance about 100 mm from the assumed wall front.

Such way the net of axis is created, determining the bearing structure for the facade lining (wall), on the whole surface and also in place of openings, and this both in regard of their size and also their location.

#### The survey of finished raw building

We provide this step as in the previous part:

- We determine the vertical axis
- We determine the vertical axis of vertical elements of the cover (lining) from this principal axis. With repeated measurement we check, if the location of window pillows, infillings, or openings for such infillings corresponds to the corresponding documentation for the facade lining. It is necessary to adjust the above mentioned dimensions – with providing of additional building, cutting – with the documentation, in case of deviations. It is prohibited – because of ensuring the corresponding strength

of the base – to provide the mentioned modifications with lime-cast or lime-cement cast, or with "screening".

- We drive nails or rod from concrete reinforcing so they should run out about 150 mm from the base.
- We mark – with help of a laser beam, in a distance about 100 mm from wall front, the reference plane, which we mark further on auxiliary points (nails, rods). We measure the distance between the reference axis and the front of the base, e.g. we ensure the planeness of the walling. We insert – in the place of minimal distance between the front of the base and reference axis – a FOXI anchor and then – with self-drilling screws – we fasten to it the vertical bearing profile such a way, that it will be in a minimal possible distance from the front of the base (up to contact). Such way the maximal distance of the front from the vertical profiles is determined and a rectification of vertical elements – from reason of unevenness of the walling – by up to 35 mm is possible. A – by one step – greater FOXI anchor should be used, when such rectification would not be sufficient. The whole above described method should be repeated in case of unevenness exceeding 35 mm, and this with a – by one step – shorter FOXI anchor (respecting here the relation of thermal insulation layer thickness to the length of FOXI anchor). As to the static optimization of STYL 2000 bearing structure, it is not necessary the repetition of static calculation.

- We check the height of parapets, window cases, the vertical dimension of fillings, or the dimensions of openings for such fillings and we check the evenness in horizontal direction.

### Mounting of FOXI bearing elements

The FOXI bearing elements are mounted in positions according to the documentation. The mounting is provided with help of FOXI element and an appropriate wall plug with corresponding screw, according to the type of the base structure and according to the instructions of the corresponding producers of anchoring elements. The insertion of FOXI anchor should not allow any side movement of the anchor.

### Mounting of thermal insulation layer

The mounting of thermal insulation layer is provided with dish-shaped wall plugs according to requirements of the producer of anchoring elements. The quantity of dish-shaped wall plugs is determined by the designer according to recommendation of the

producer of thermal insulation. The thermal insulation layer has to be fit tightly to the base, continuously, without open joints (very tightly!). The dish-shaped wall plugs should have a solid bed in the base and they should fit tightly to the insulation layer.

### Providing of vertical bearing lathes

The vertical bearing lathes (T-, L-shaped or corners) are fastened with self-drilling screws to the FOXI bearing elements such a way, that one FOXI anchor (the middle one) is screwed through the circular holes (solid assembly) and the other through the oval holes (slide assembly). A gap should remain between the individual vertical lathes (min. 10 mm, max. 15 mm). The sufficient dilatation for movement of the structure, caused by the thermal expansion for

a temperature difference up to 100° C is ensured this way. The plane aligning of vertical bearing elements is provided with a laser beam, with relation to the basic location of the vertical bearing element.

### Mounting of auxiliary structures

The auxiliary structures are fastened according to requirements of realization documentation. They are namely aluminum square bars of different dimensions and length, enabling the mounting of parapets, outer жалousies, of metal plating of attic, connections to the metal plating of flat roofs, or mounting of lathes, the lower ending of facade lining, the connections with other types of hinged peripheral covers, eventually.

## 8.8.3 Mounting of CETRIS® facade boards

### Mounting of CETRIS® boards – system VARIO (visible joints)

The principal horizontal plane should be determined (according to the documentation) before the mounting of boards.

#### The principal horizontal plane is usually determined by:

- the lower edge of second horizontal row of CETRIS® cement-bonded particleboards
- the level of parapets (of windows, doors), when the joints between the boards follow this level
- the lintel level of openings (windows, doors), when the joints between the boards follow this level

This plane will be then decisive for the whole perimeter of the building. When the design have more height levels of the cover (lining), so – according to the documentation – the other guiding horizontal axis (determined always with the lower edge of first horizontal row of CETRIS® cement-bonded particleboards) should be marked (with laser beam as the best) in this stage of the work.

The boards are laid down one side-by-side with visible horizontal and vertical joints of minimal 5 mm width. The CETRIS® cement-bonded particleboards are fastened with visible connecting elements with

help of screws or fasteners, or with invisible connecting elements with Sika Tack glue. The screws near the board edge have to be located always min. 50 mm from the horizontal (upper/lower) row and min. 25 mm from the vertical edge, when the boards are fastened to the grid with screws. The screws should be screwed upright to the board plane and tighten without deformation of the facade element and without preventing the volume changes of the board.

### Mounting of CETRIS® boards – system PLANK (visible joints)

The principal horizontal plane should be determined (according to the documentation) before the mounting of boards.

The principal horizontal plane is – at system with overlapping – determined by the upper edge of first horizontal row of CETRIS® boards. This is then the determining plane for the whole building perimeter. The necessary quantity of cover-boards and the necessary overlapping should be ensured, as the boards are laid down with overlapped horizontal joint.

Number of boards:  $N = 1 + (H - 300) / 250$

Overlapping of boards:  $O = (N \times 300 - H) / (N - 1)$

N – number of boards

H – facade height in mm

O – overlapping of boards in mm, at least 50 mm.

300 = the board width for CETRIS® PLANK boards  
250 = visible board width for CETRIS® PLANK boards

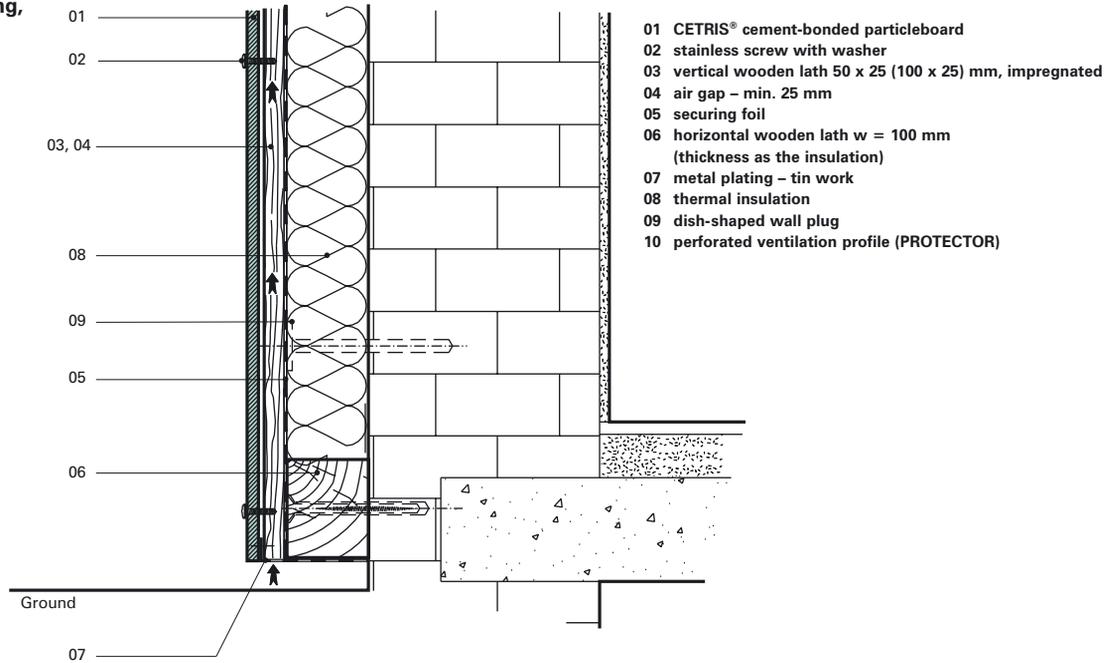
The mounting begins from below, where a belt of same thickness as for CETRIS® boards and of same width as the calculated overlapping is put on the principal horizontal plane. The belt is then covered with the first row of cover boards of 300 (200) mm width. The connecting elements are located always at the upper edge of the board (40 mm from the upper edge, 35 mm from the vertical edge). The screws should be tighten without deformation of the facade element and without preventing the volume changes of the board. The aligning of first row should be perfect for preventing of later troubles. Under the upper edge of already fastened cover board a permanently elastic cement (cake-like, diameter ca. 20 mm, in distances about 300 mm) before laying down of each next row. Each free end of cover board should be underlaid. The vertical joint is at least 5 mm, for boards with 3350 mm length at least 10 mm.

## 8.8.4 Solution of details at CETRIS® facade systems

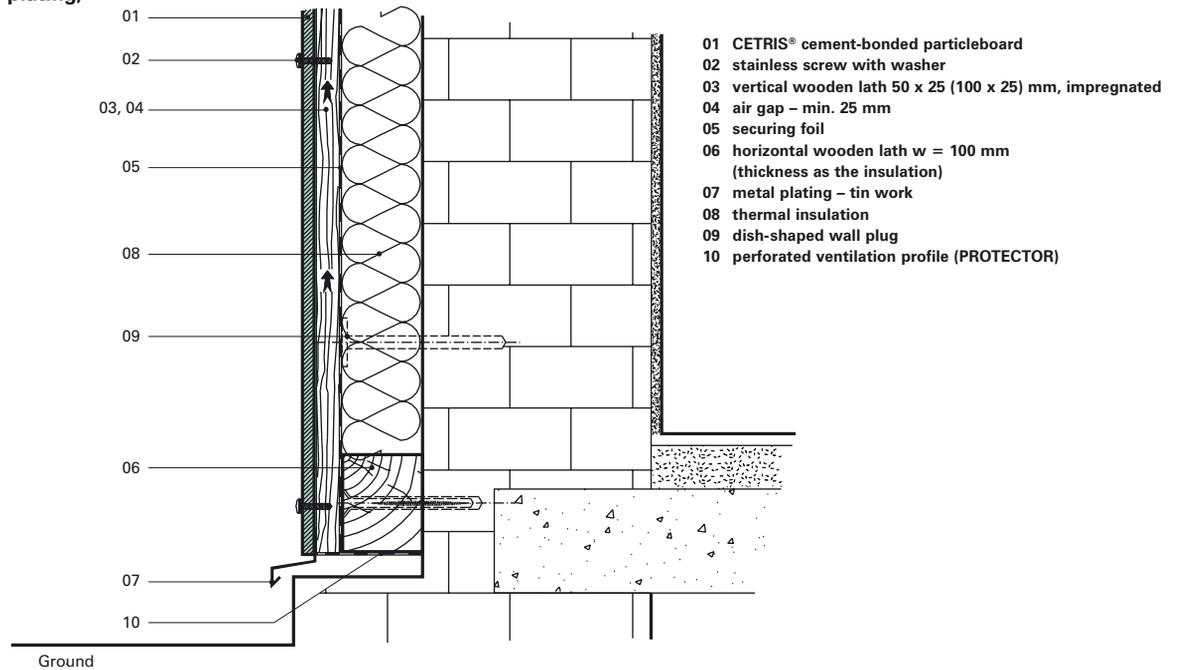
The method of mounting for individual details of hinged facade lining is solved individually according to documentation. The recommended solutions are illustrated on the following pages.

**Remark:** The boring and cutting (milling eventually) of CETRIS® cement-bonded particleboards is possible with carbide tipped cutting tools only and designed for the type of the cut. When some anchoring elements should go through the lining (for instance for external lighting of the building, for mounting of marking or advertising sheets, etc.), a corresponding dilatation gap should be ensured between the lining and the anchoring elements, e.g. the holes for such elements should be at least by 15 mm greater as the greater dimension of the anchoring element. We should use the to his purpose and with all order delivered paint for renewal of surface finish of exposed new edges. The mounting of other structures (for instance advertising sheets, etc.) directly to facade lining is possible after special static calculation only and after considering the composite action of such structures and the lining as from thermal extension of individual materials point of view.

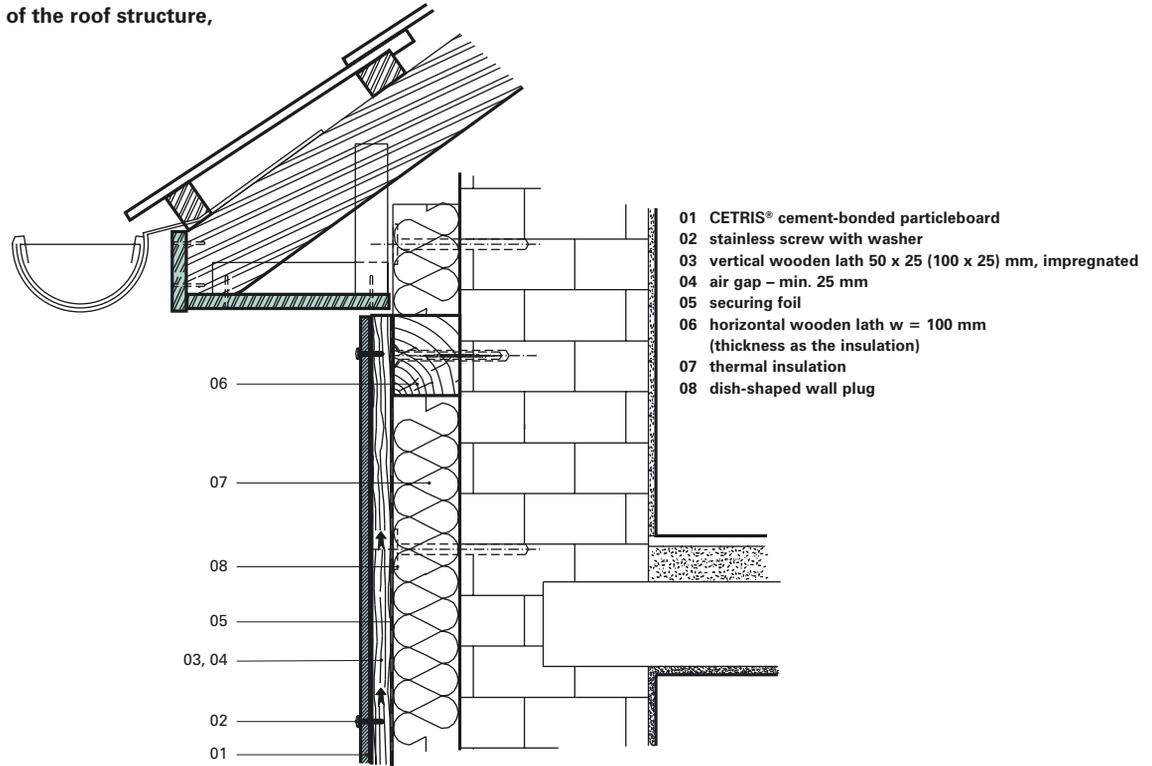
Detail of lower ending with metal plating,  
CETRIS® boards on wooden grid,  
VARIO system  
vertical cross-section



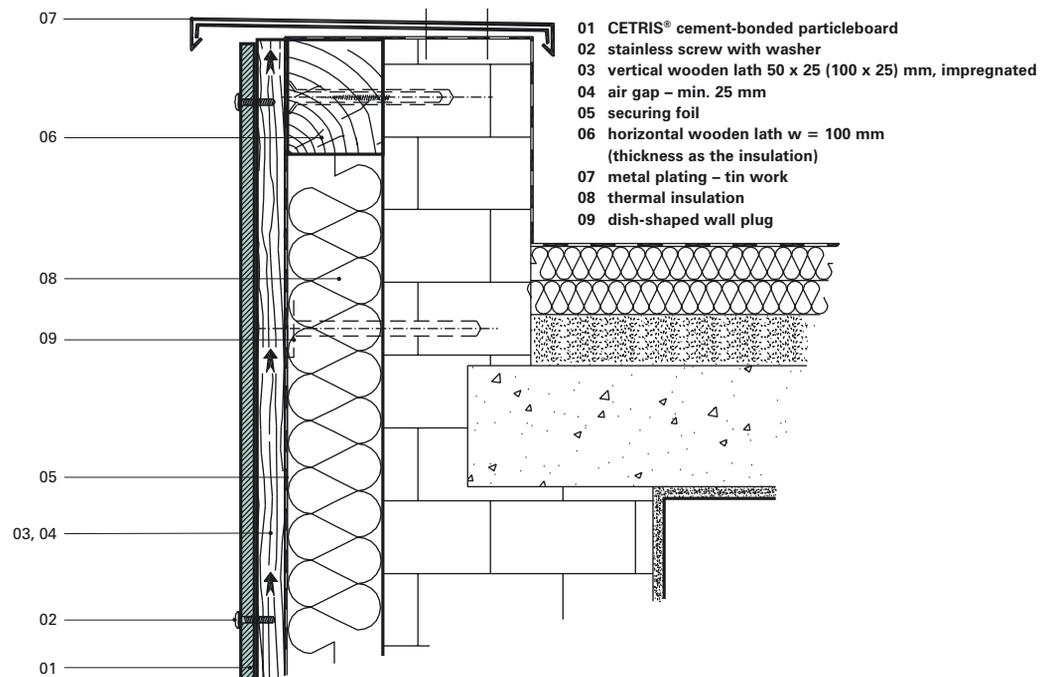
Detail of lower ending with metal plating,  
CETRIS® boards on wooden grid,  
VARIO system  
vertical cross-section



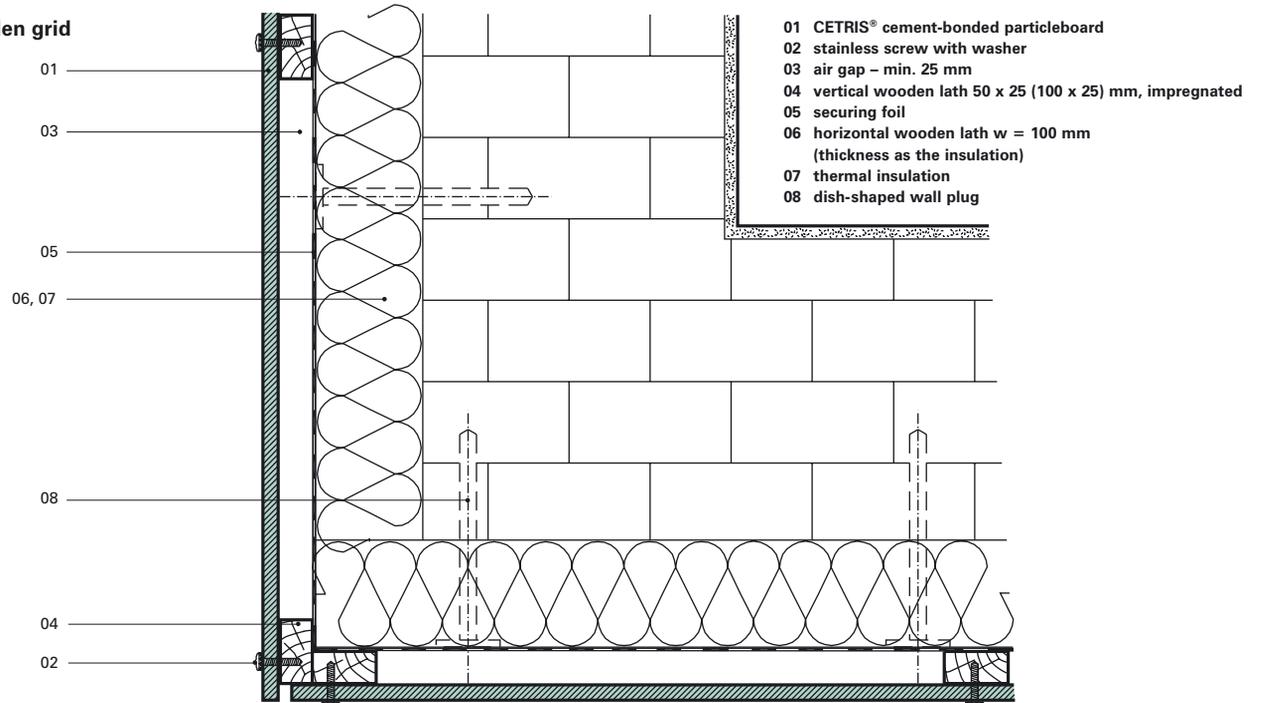
Detail of upper ending with overrun of the roof structure,  
CETRIS® boards on wooden grid,  
VARIO system  
vertical cross-section



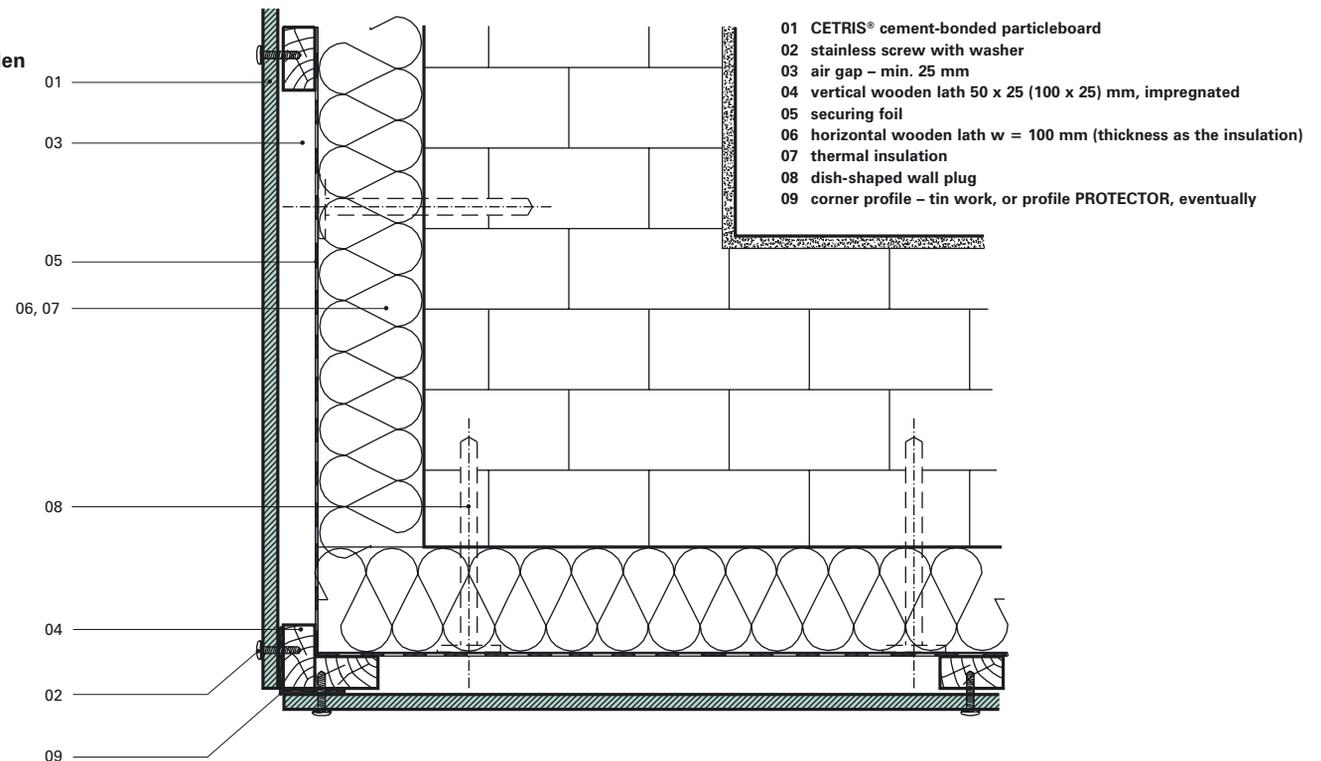
Detail of upper ending with attic,  
CETRIS® boards on wooden grid,  
VARIO system  
vertical cross-section



Detail of outer corner,  
CETRIS® boards on wooden grid  
with corner profile,  
VARIO system  
horizontal cross-section

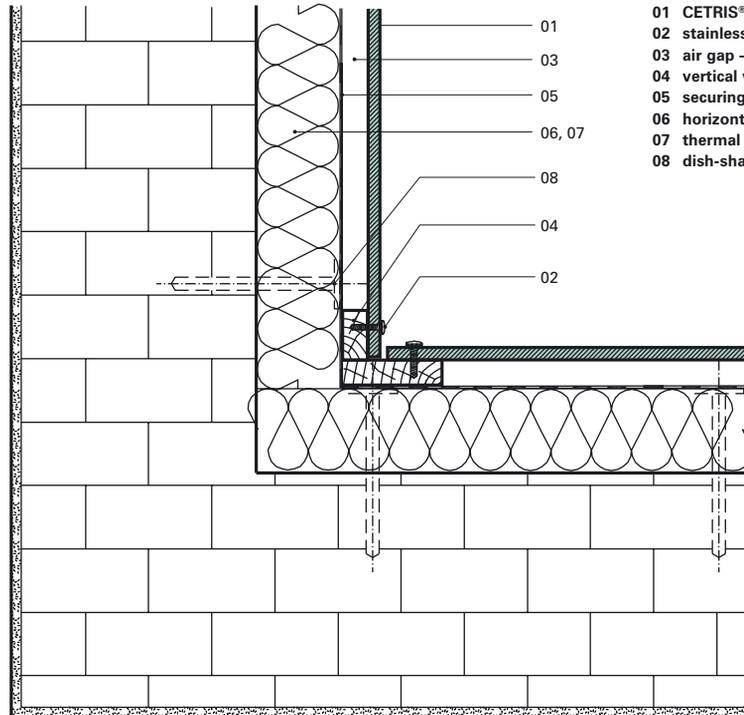


Detail of outer corner,  
CETRIS® boards on wooden  
grid with corner profile,  
VARIO system  
horizontal cross-section



**Detail of internal corner,  
CETRIS® boards on wooden grid  
with overrun,  
VARIO system**

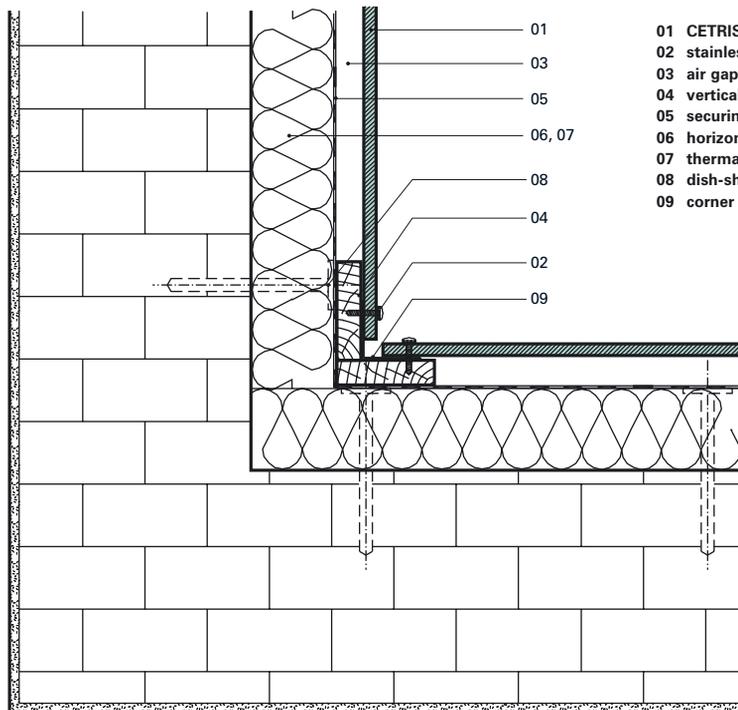
horizontal cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 thermal insulation
- 08 dish-shaped wall plug

**Detail of internal corner,  
CETRIS® boards on wooden grid  
with corner profile,  
VARIO system**

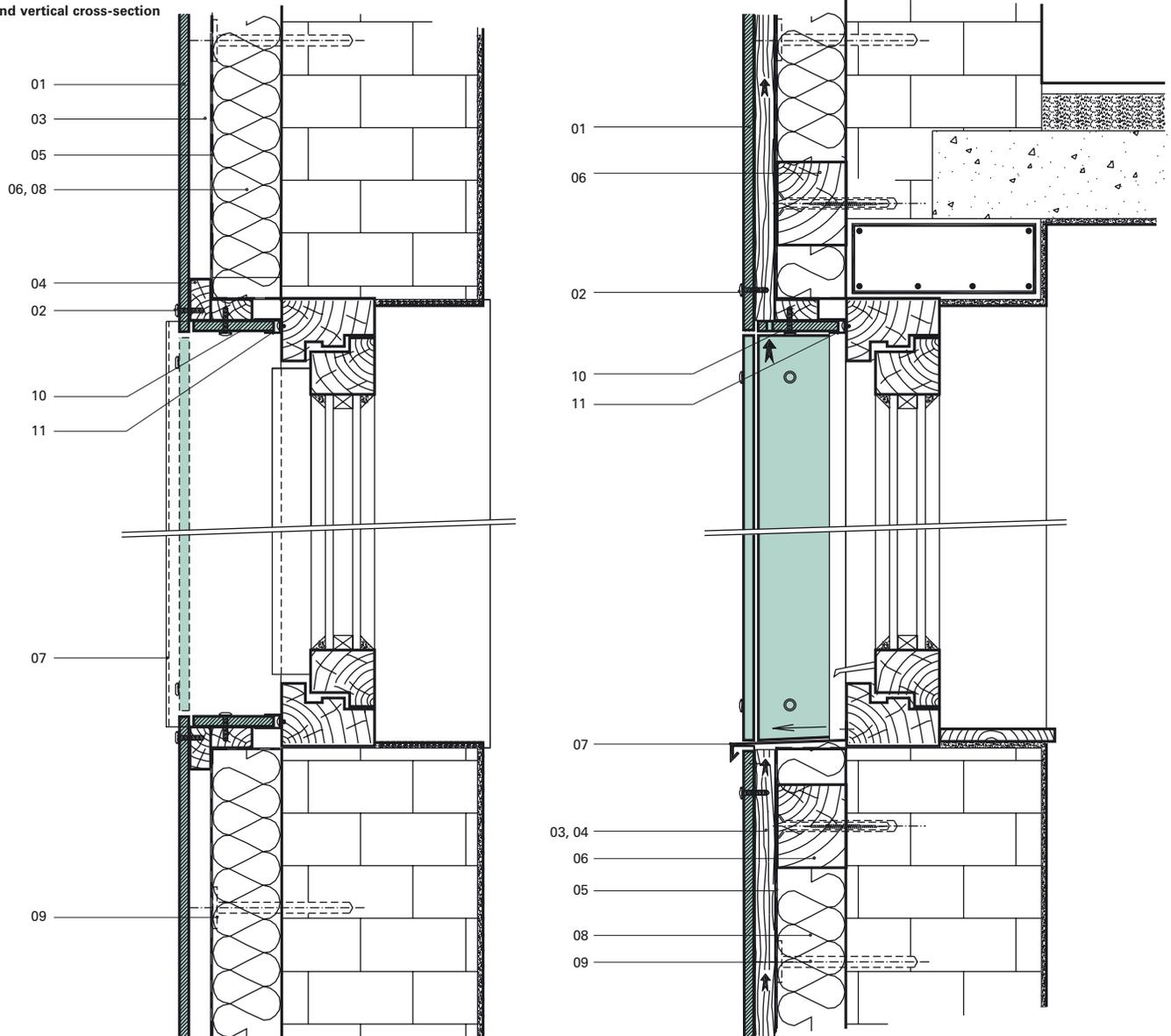
horizontal cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 thermal insulation
- 08 dish-shaped wall plug
- 09 corner profile – tin work, or profile PROTECTOR, eventually

**Detail of opening's case, CETRIS® boards on wooden grid,  
VARIO system**

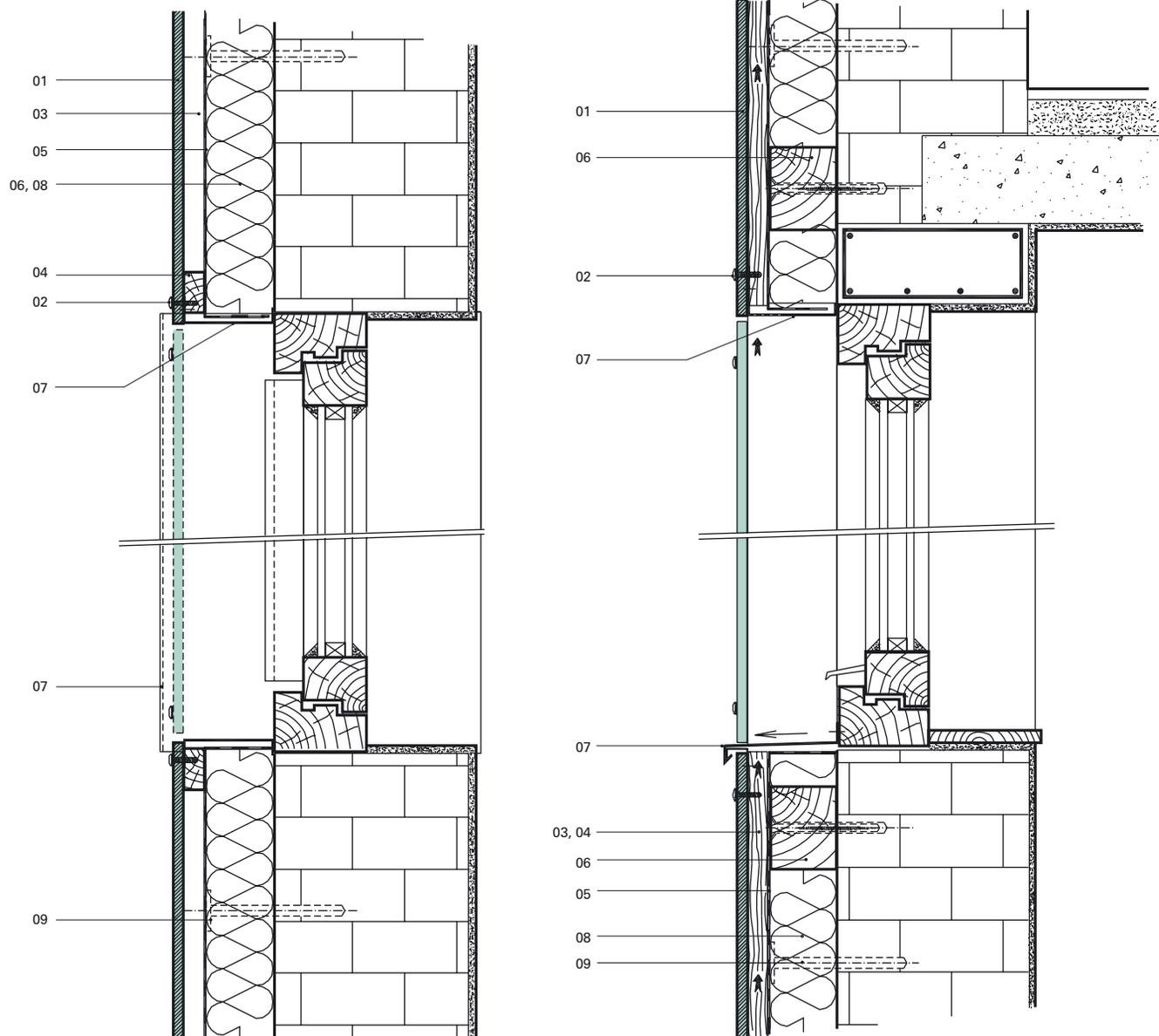
horizontal and vertical cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 metal plating – tin work
- 08 thermal insulation
- 09 dish-shaped wall plug
- 10 case (lining) – perforated CETRIS® board
- 11 ending profile

## Detail of opening's case with metal plating, CETRIS® boards on wooden grid, VARIO system

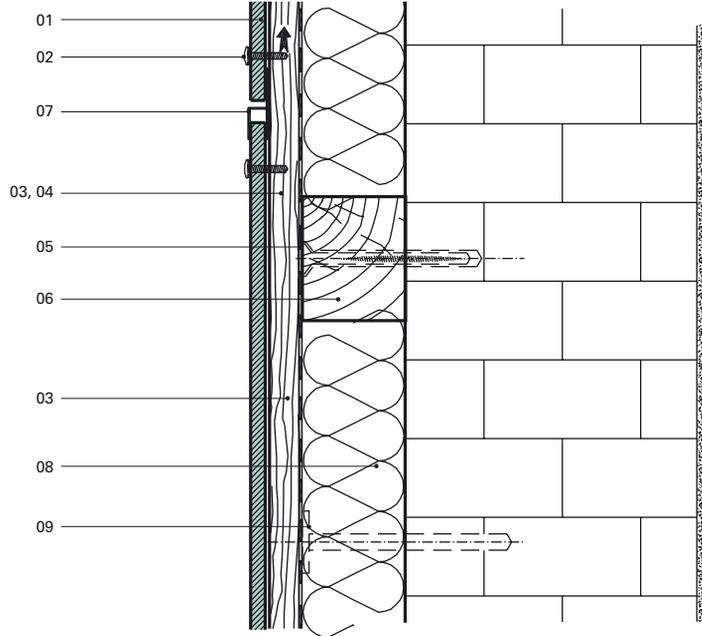
horizontal and vertical cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 metal plating – tin work
- 08 thermal insulation
- 09 dish-shaped wall plug

**Detail of horizontal joint, CETRIS® boards on wooden grid, VARIO system**

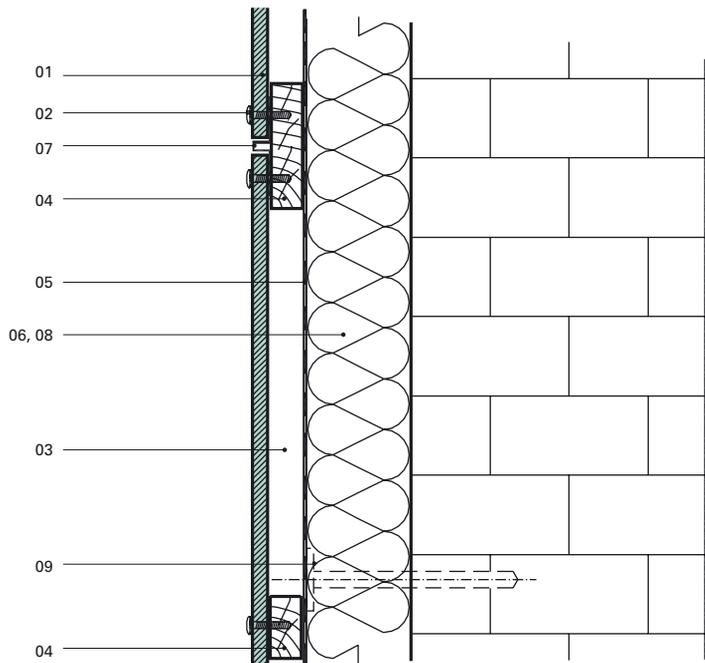
vertical cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 profile in the joint – tin work, or profile PROTECTOR, eventually
- 08 thermal insulation
- 09 dish-shaped wall plug

**Detail of vertical joint, CETRIS® boards on wooden grid, VARIO system**

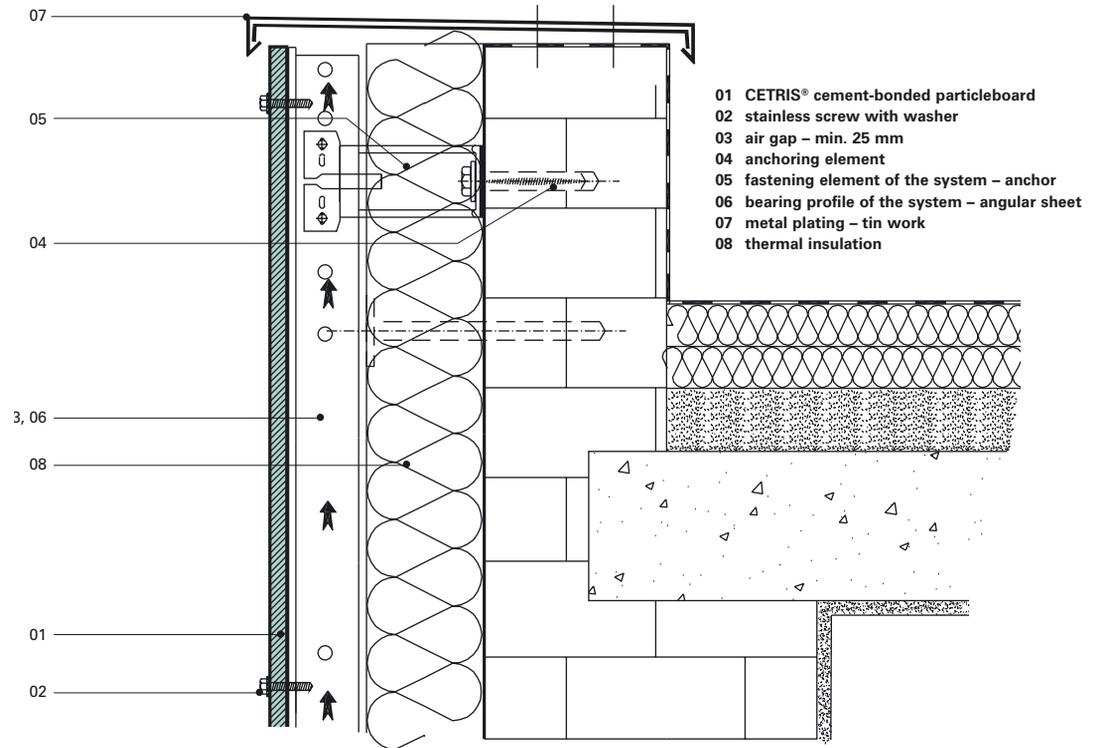
vertical cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 profile in the joint – tin work, or profile PROTECTOR, eventually
- 08 thermal insulation
- 09 dish-shaped wall plug

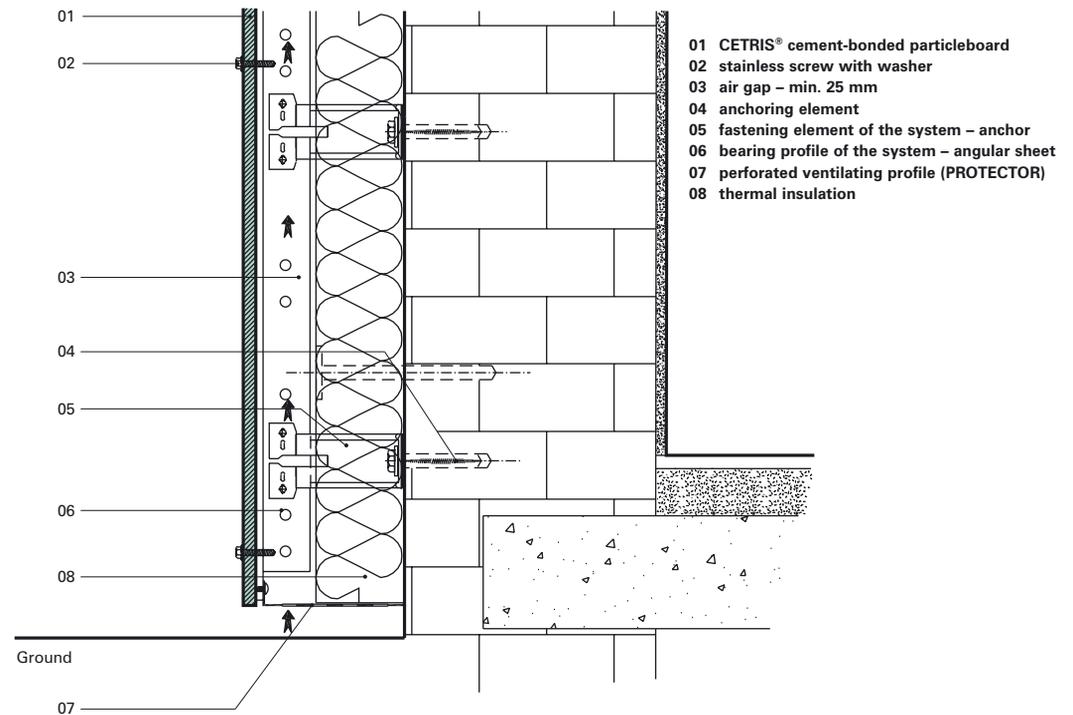
## Detail of upper ending with attic, CETRIS® boards on system profiles, VARIO system

vertical cross-section



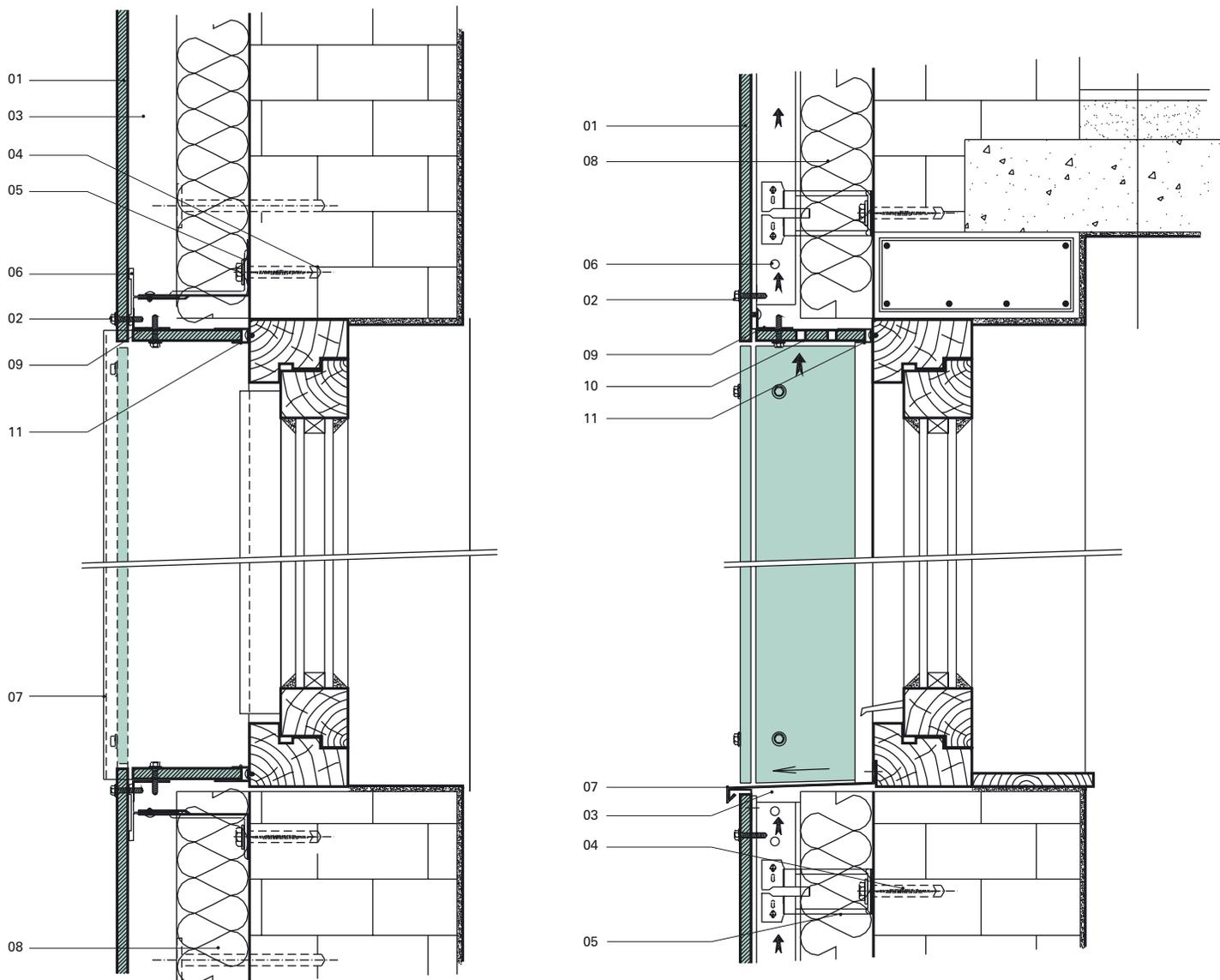
## Detail of lower ending with overrun, CETRIS® boards on system profiles, VARIO system

vertical cross-section



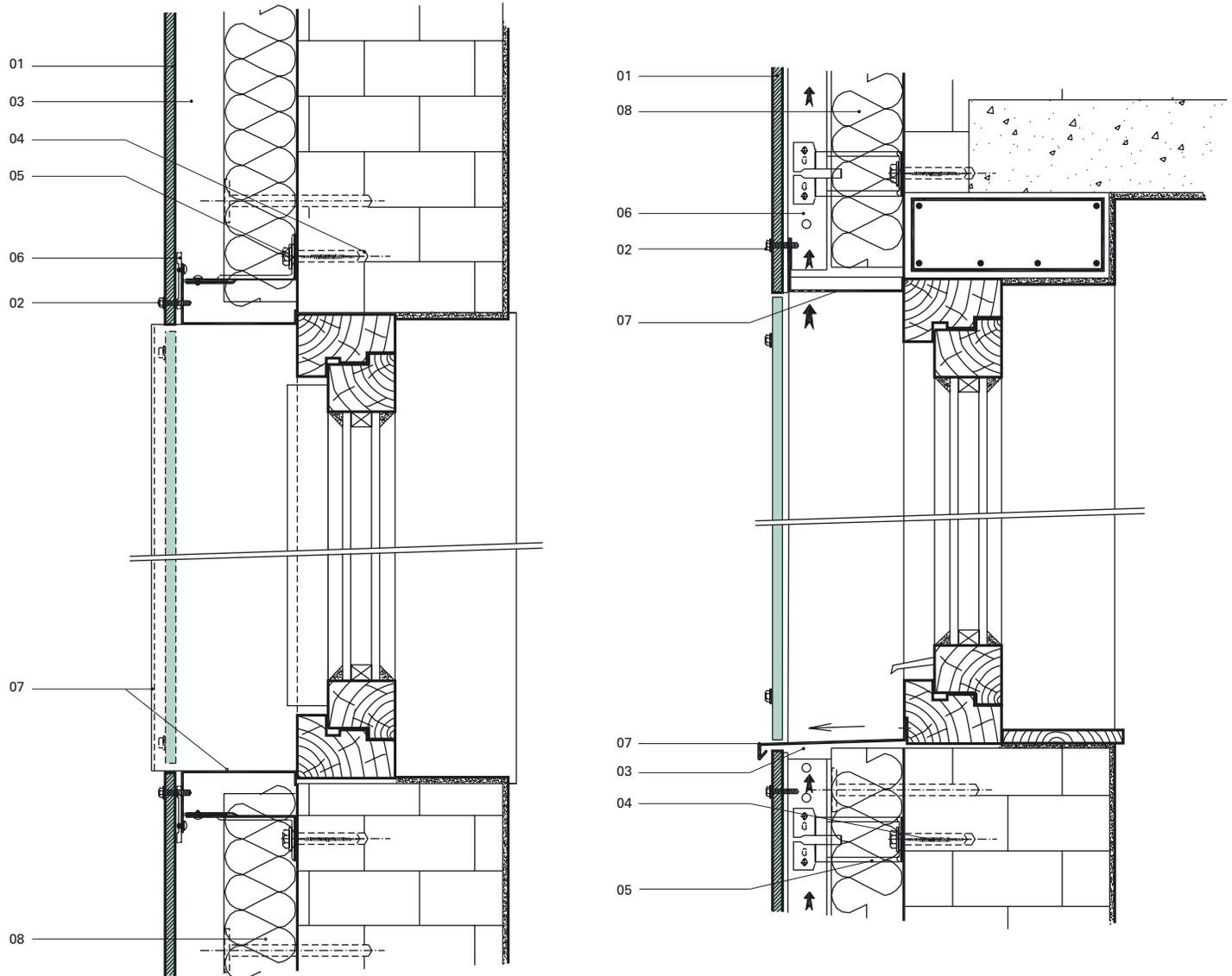


**Detail of opening's case with metal plating, CETRIS® boards on system profiles, VARIO system**  
horizontal and vertical cross-section



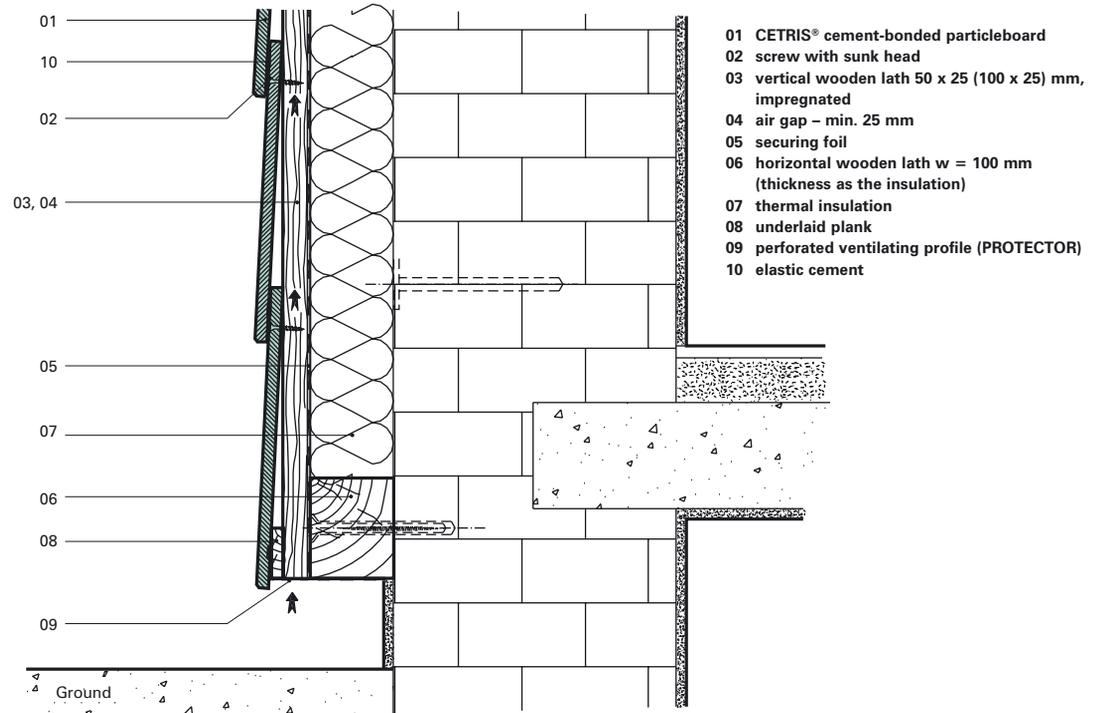
- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 anchoring element
- 05 fastening element of the system – anchor
- 06 bearing profile of the system
- 07 metal plating – tin work
- 08 thermal insulation
- 09 aluminum L-shaped profile
- 10 case (lining) – perforated CETRIS® board
- 11 ending profile

Detail of opening's case with metal plating, CETRIS® boards on system profiles,  
VARIO system  
horizontal and vertical cross-section

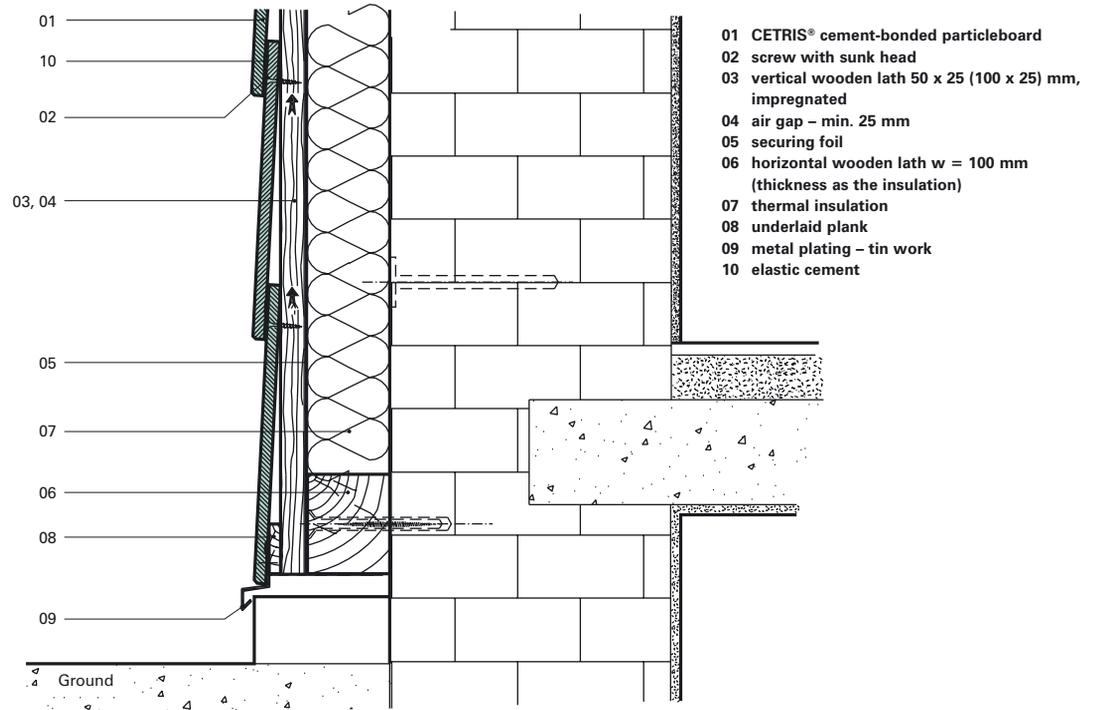


- 01 CETRIS® cement-bonded particleboard
- 02 stainless screw with washer
- 03 air gap – min. 25 mm
- 04 anchoring element
- 05 fastening element of the system – anchor
- 06 bearing profile of the system
- 07 metal plating – tin work
- 08 thermal insulation

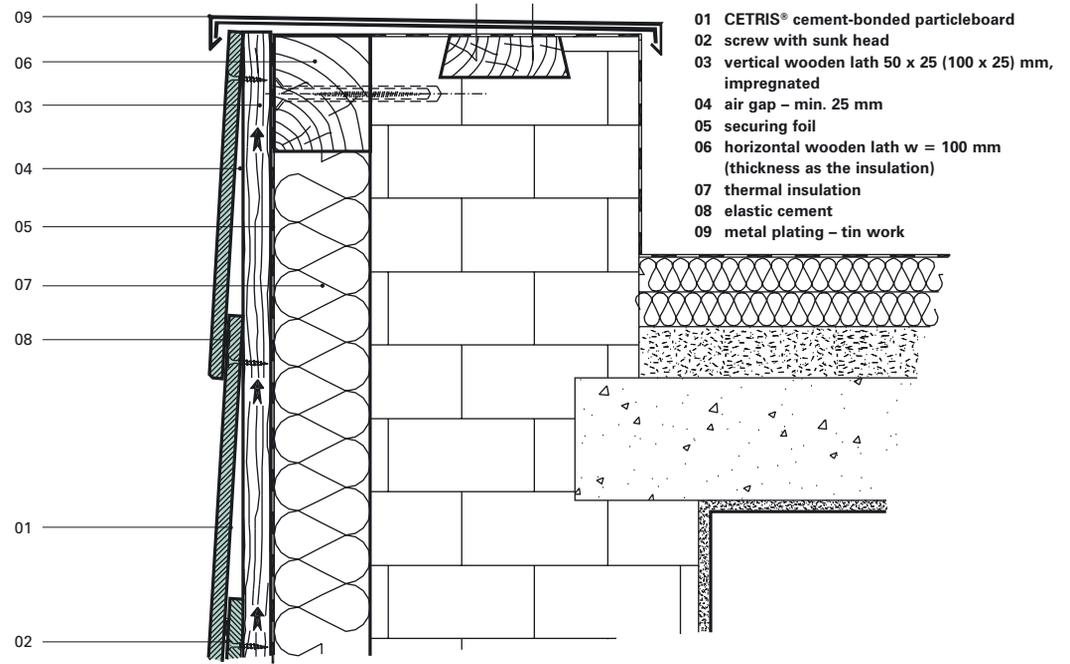
**Detail of lower ending,  
CETRIS® boards on wooden grid,  
PLANK system**  
vertical cross-section



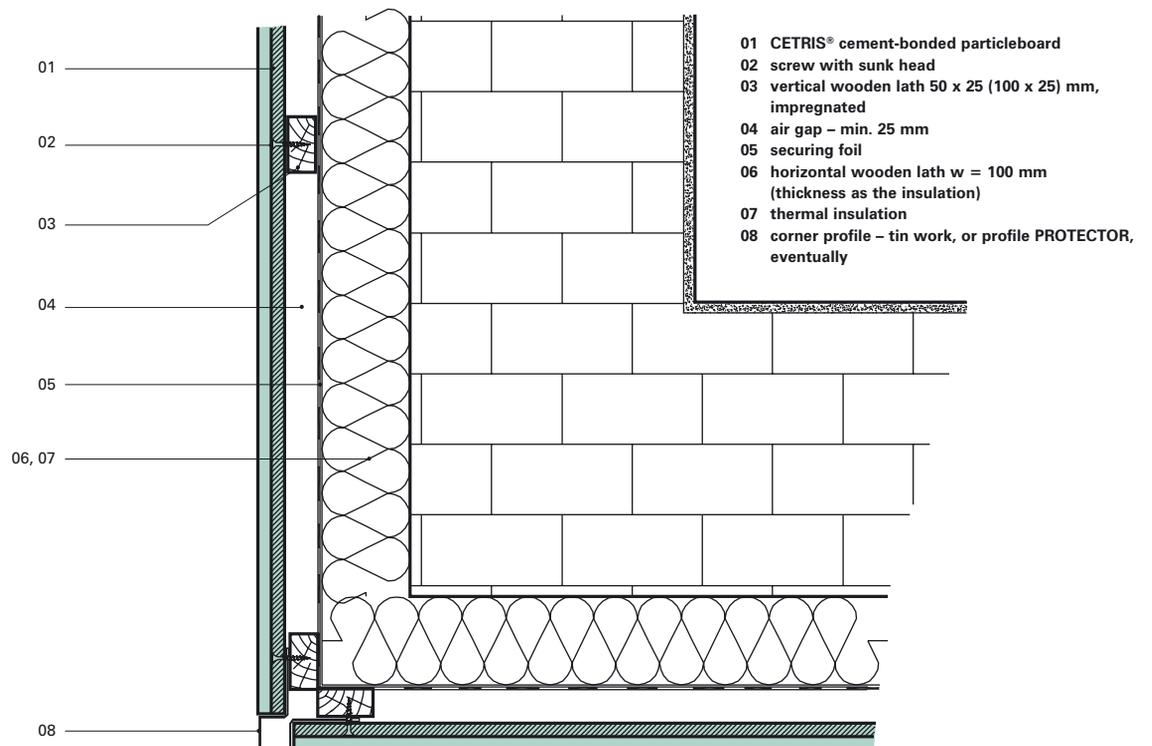
**Detail of lower ending with metal plating,  
CETRIS® boards on wooden grid,  
PLANK system**  
vertical cross-section



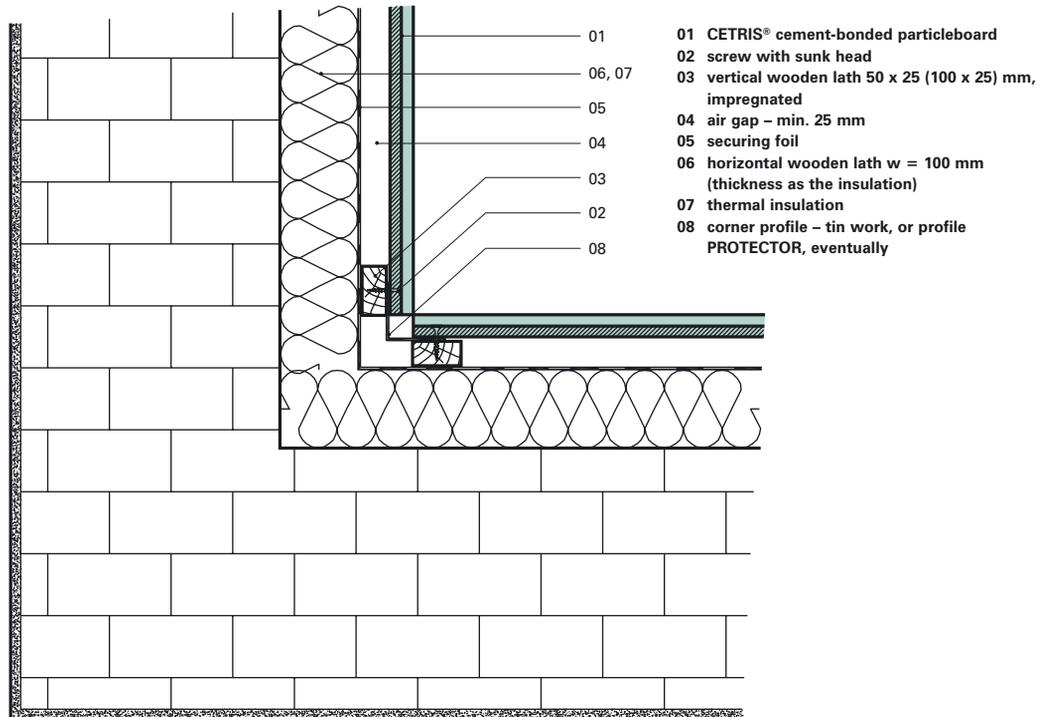
Detail of upper ending,  
CETRIS® boards on wooden grid,  
PLANK system  
vertical cross-section



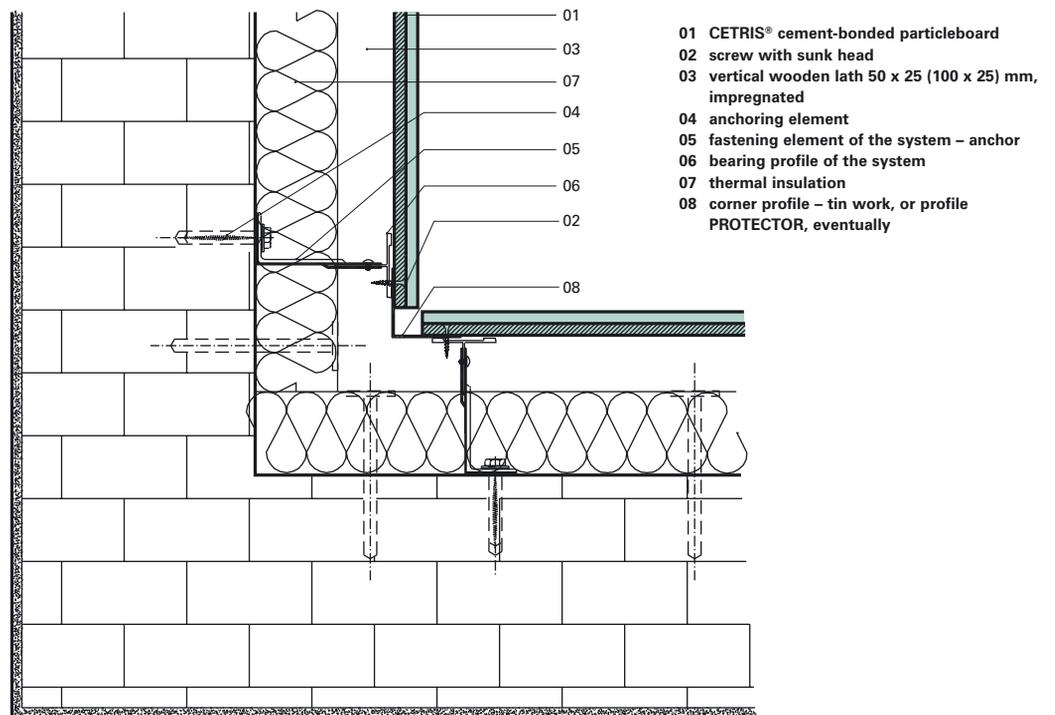
Detail of outer corner,  
CETRIS® boards on wooden grid  
with corner profile,  
PLANK system  
horizontal cross-section



Detail of internal corner,  
CETRIS® boards on wooden grid wi-  
th corner profile,  
PLANK system  
horizontal cross-section

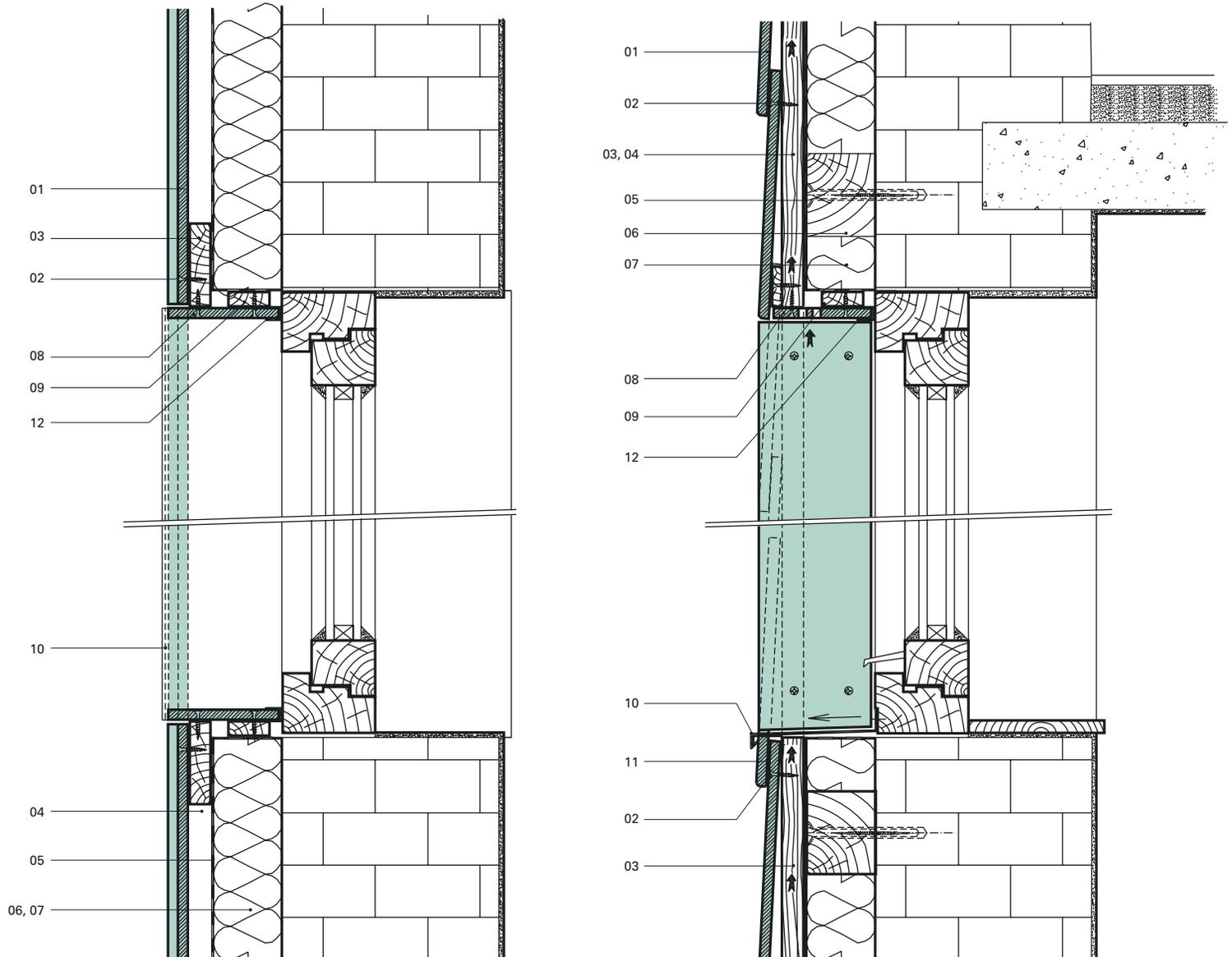


Detail of internal corner,  
CETRIS® boards on system profile wi-  
th corner profile,  
PLANK system  
horizontal cross-section



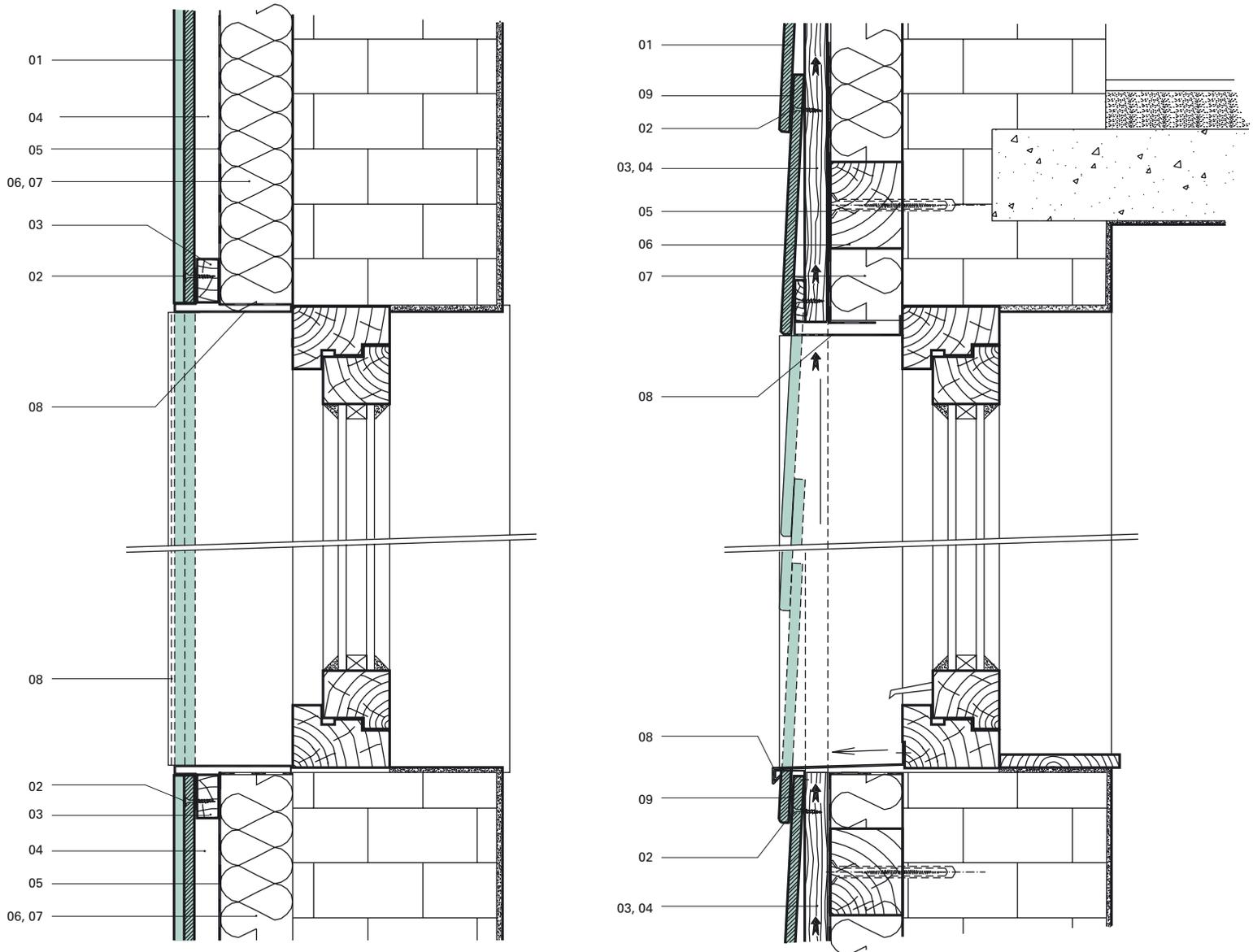
**Detail of opening's case, CETRIS® boards on wooden grid, PLANK system**

horizontal and vertical cross-section



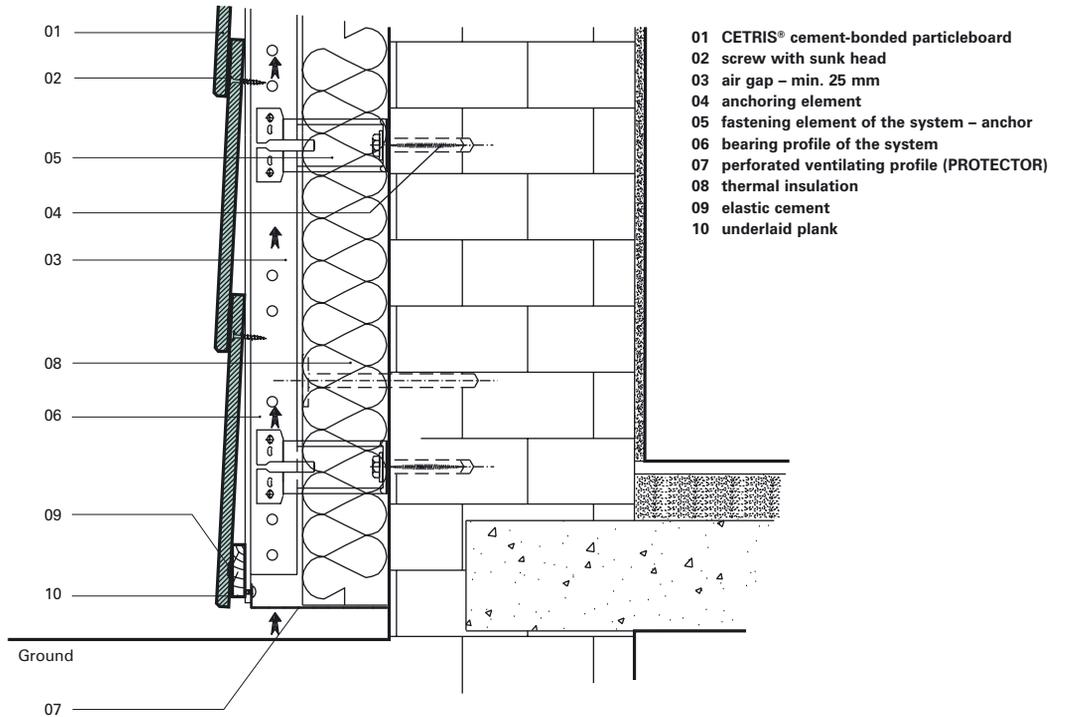
- 01 CETRIS® cement-bonded particleboard
- 02 screw with sunk head
- 03 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 04 air gap – min. 25 mm
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 thermal insulation
- 08 case (lining) – perforated CETRIS® board
- 09 wooden plank, 18 mm thickness
- 10 metal plating – tin work, or profile PROTECTOR, eventually
- 11 elastic cement
- 12 ending profile PROTECTOR

**Detail of opening's case with metal plating, CETRIS® boards on wooden grid,  
PLANK system**  
horizontal and vertical cross-section

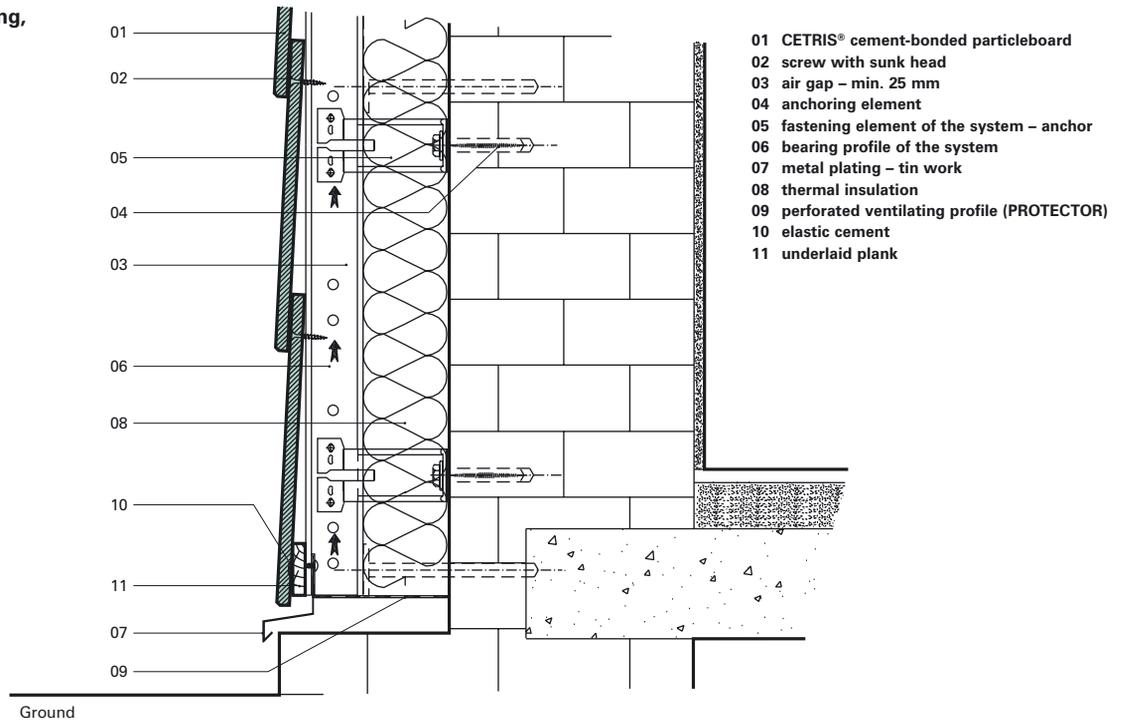


- 01 CETRIS® cement-bonded particleboard
- 02 screw with sunk head
- 03 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
- 04 air gap – min. 25 mm
- 05 securing foil
- 06 horizontal wooden lath w = 100 mm (thickness as the insulation)
- 07 thermal insulation
- 08 metal plating – tin work, or profile PROTECTOR, eventually
- 09 elastic cement

**Detail of lower ending with overrun,  
CETRIS® boards on system profile,  
PLANK system**  
vertical cross-section

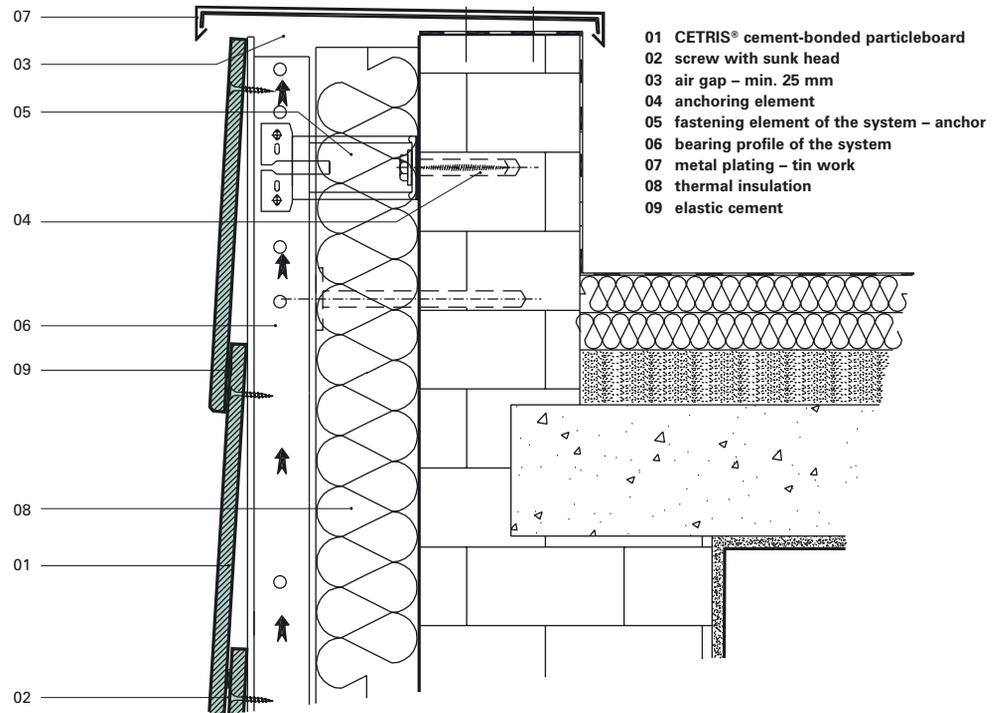


**Detail of lower ending with metal plating,  
CETRIS® boards on system profile,  
PLANK system**  
vertical cross-section



## Detail of upper ending, CETRIS® boards on system profile, PLANK system

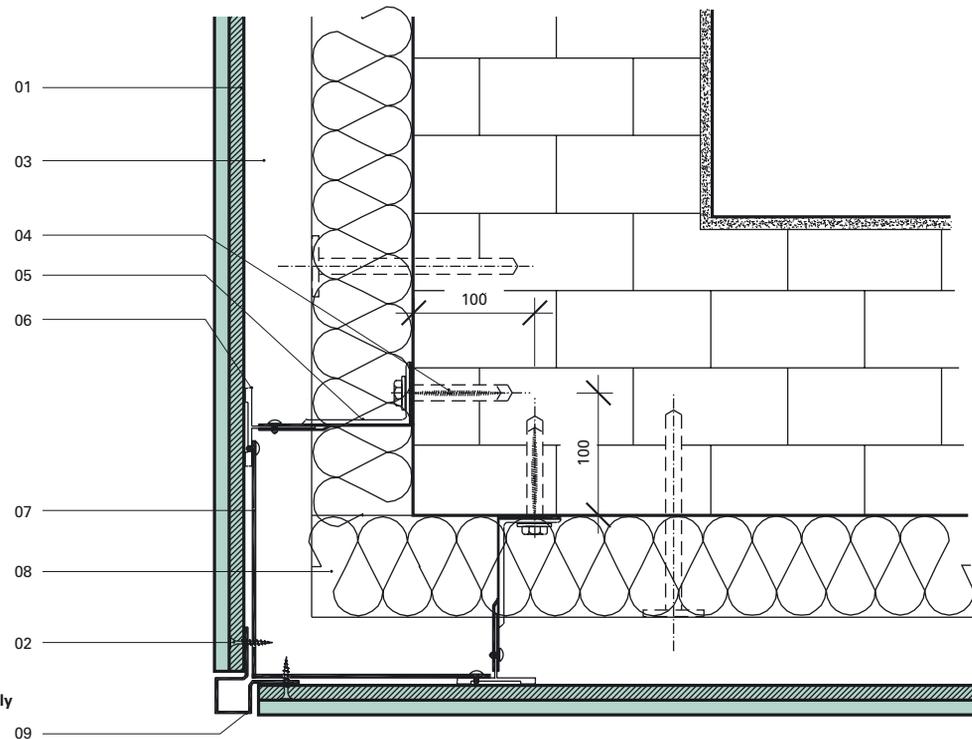
vertical cross-section



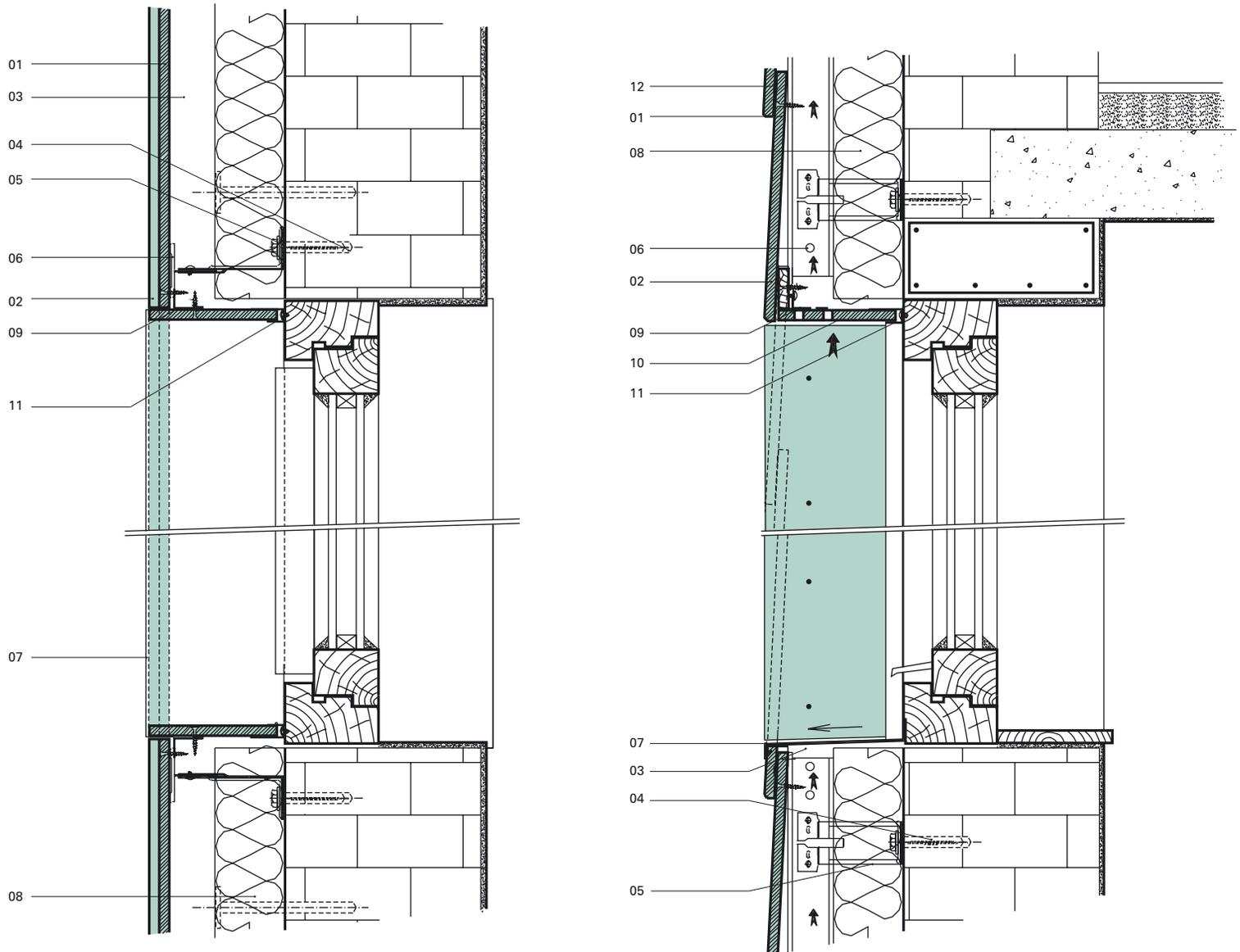
## Detail of outer corner, CETRIS® boards on system profile, PLANK system

horizontal cross-section

- 01 CETRIS® cement-bonded particleboard  
02 screw with sunk head  
03 air gap – min. 25 mm  
04 anchoring element  
05 fastening element of the system – anchor  
06 bearing profile of the system  
07 aluminum L-shaped profile  
08 thermal insulation  
09 corner profile – tin work, or profile PROTECTOR, eventually

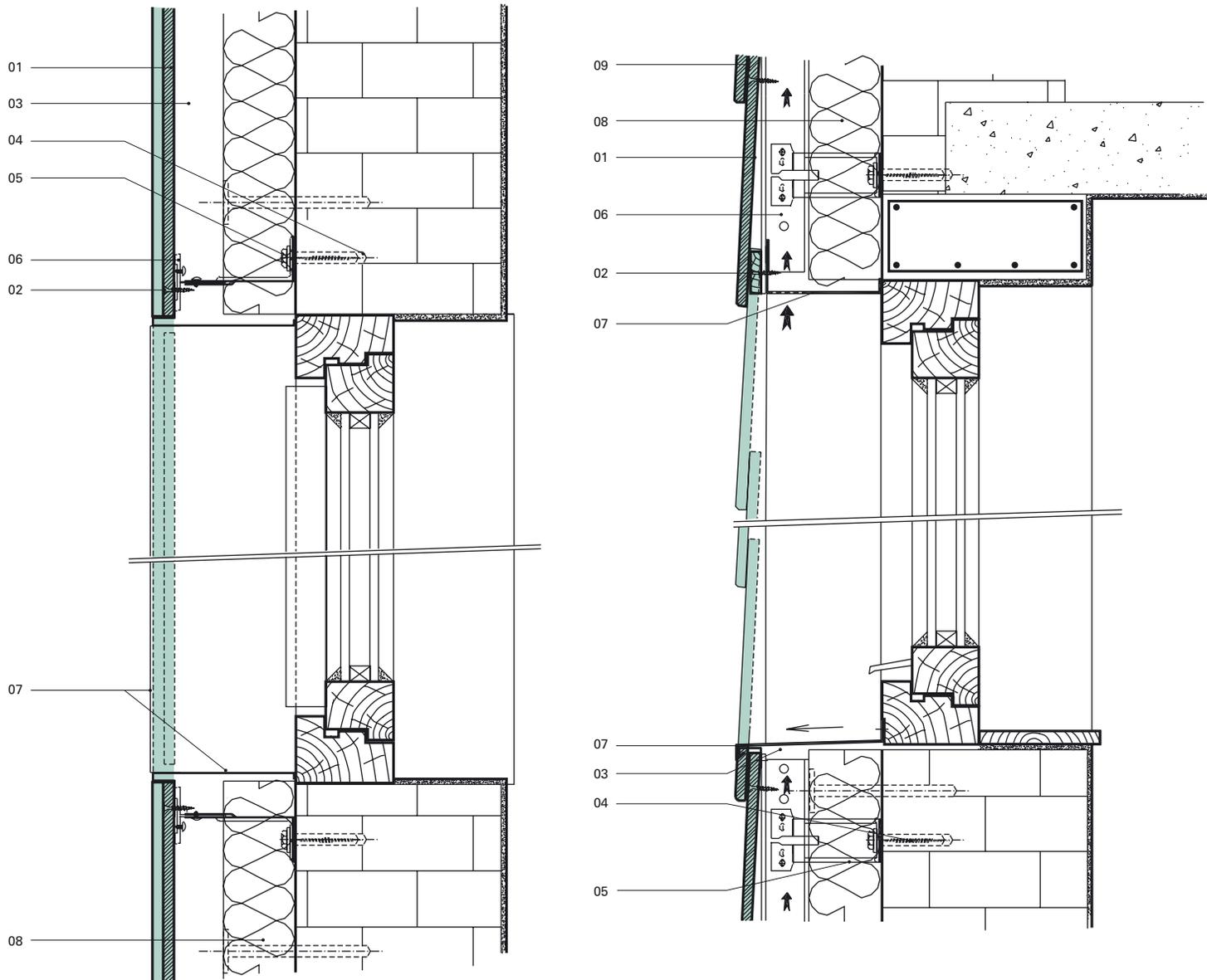


Detail of opening's case, CETRIS® boards on system profiles,  
PLANK system  
horizontal and vertical cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 screw with sunk head
- 03 air gap – min. 25 mm
- 04 anchoring element
- 05 fastening element of the system – anchor
- 06 bearing profile of the system
- 07 metal plating – tin work
- 08 thermal insulation
- 09 aluminum L-shaped profile
- 10 case (lining) – perforated CETRIS® board
- 11 ending profile PROTECTOR
- 12 elastic cement

Detail of opening's case with metal plating, CETRIS® boards on system profiles,  
PLANK system  
horizontal and vertical cross-section



- 01 CETRIS® cement-bonded particleboard
- 02 screw with sunk head
- 03 air gap – min. 25 mm
- 04 anchoring element
- 05 fastening element of the system – anchor
- 06 bearing profile of the system
- 07 metal plating – tin work
- 08 thermal insulation
- 09 elastic cement