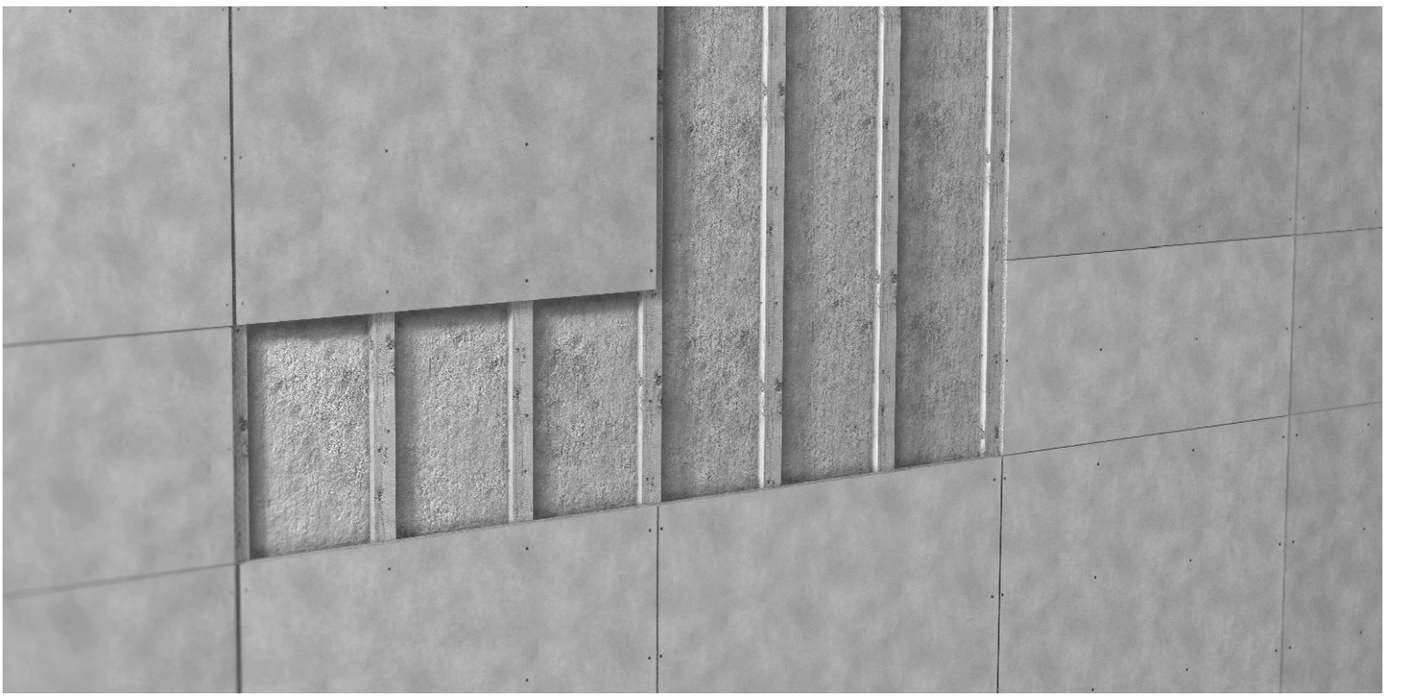
Building Façade Systems

7.1 CETRIS® Ventilated Façades

In modern times, apart from improved thermal insulation properties, attention is increasingly focused on protection of the wall against moisture, suppression of noise and there is a clear effort to improve the aesthetic appearance of the buildings. In residential and office buildings in which we spend up to 90 % of our time, the relative humidity in the interior heated spaces is approximately 60 %. Moisture is pushed toward the outer surface of the wall, where the water vapour condenses. If the wall hinders the escape of water vapour, e.g. the walls are lined with ceramic tiles, the water vapour accumulates in the wall. The thermal conductivity of the wall increases, the water in the wall freezes thus expanding in volume and damaging the plaster. In the interiors, this may result in the occurrence of fungi. An optimal solution to these problems is use of application of ventilated façade systems.



7.1.1 Possible Applications of CETRIS Ventilated Façades

The ventilated façades are one of the options for application of the CETRIS® cement bonded particleboards in civil engineering for protection of the peripheral walls from the effects of weather. This applies to new buildings, reconstruction of family homes, office, commercial, industrial and agricultural buildings. The functional and elegant vented façades with CETRIS® boards meet high quality, aesthetic, functional and longevity requirements. The ventilated façade system may be combined with thermal insulation

Description of façade system:
Ventilated façade is an integral part of peripheral construction and that is why the construction must be assessed as a whole from the static point of view, or from the thermal point of view in the case of heat insulation retrofitting.

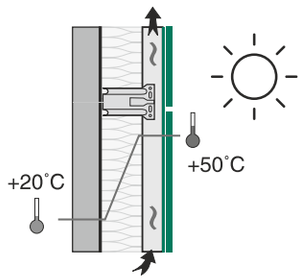
- Load-bearing construction – enables insertion of heat insulation and fixation of the façade cladding to the load-bearing wall of the building
- Thermal insulation – a layer of heat insulating material fixed to the outer face of the peripheral construction of the building
- Façade cladding – protects the load-bearing construction and thermal insulation against the effects of the weather and also creates the aesthetic appearance of the building

7.1.2. Advantages of CETRIS® Ventilated Façades

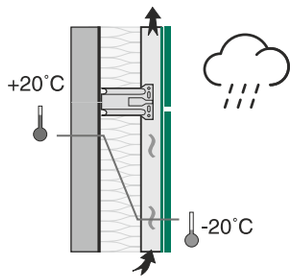
- Thermal insulation in winter – optimum design of the thermal insulation layer thickness in combination with the ventilated air gap ensures minimum energy consumption for heating
- Thermal insulation in summer – heat attenuation reduces interior overheating, which is caused by sunshine in the summer
- Suspended façade – suspended façades effectively protect against direct weather effects and keep thermal insulation and the wall completely dry
- Vapour diffusion – ventilated façades favourably affect vapour diffusion in the construction and thus provide for optimum humidity mode both in the wall and in the thermal insulation, or eventually allow for wall drying. The chimney effect of the air flowing between the interior lining and thermal insulation provides for constant vapour draining
- Noise absorption – thermal insulation of mineral wool also absorbs sound and considerably contributes to protection of the interior against external noise
- Façade cladding – the cladding element of CETRIS® boards allows for countless combinations of sizes, shapes, surfaces and colours for excellent materialisation of all requirements for façade architecture
- The system eliminates the potential unevenness of the existing wall. Easy replacement of individual façade elements is facilitated
- Construction is done by the dry method, which allows performance of works all-year-round

The CETRIS® ventilated façade systems, when used on load-bearing construction, are systems that together with the existing load-bearing construction create a new peripheral coat of the building which is fully compliant with all functional, thermal, static and architectural requirements while at the same time ensuring adequate long life. Moreover, they provide heat and dryness and thus form a basis for living comfort.

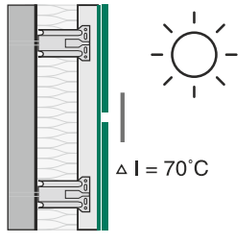
thermal load



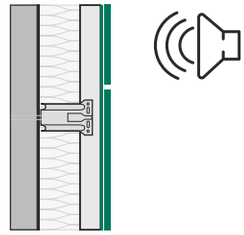
thermal resistance



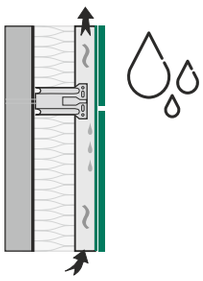
reduced swell



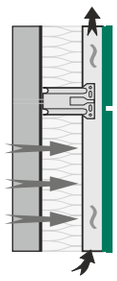
sound insulation



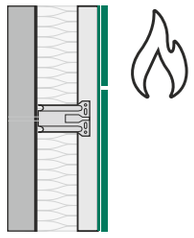
resistance to moisture



diffusion of water vapours



fire resistance



7.1.3 Mounting Options of CETRIS® Ventilated Façades

1) CETRIS® VARIO

boards with visible horizontal and vertical joint between the individual façade elements

2) CETRIS® PLANK

boards with overlapped horizontal joints (only the vertical joint is visible)

7.1.3.1 Mounting of the Boards - CETRIS®VARIO

The recommended thicknesses of the CETRIS® cement bonded particleboards for ventilated façades are 10 and 12 mm. For the cladding of the skirting, it is possible to also supply boards with larger thicknesses. The CETRIS® boards for the VARIO visible joint systems are available in the maximum size of 1,250 by 3,350 mm. The boards may have pre-drilled holes with a diameter of 10 mm (in the case of the maximum size of 1,600 mm the diameter of the pre-drilled holes is 8 mm) when using 5 mm screws. The boards may also be supplied pre-cut to the minimum façade board size of 300 × 300 mm. The hole drilling and span of the load-bearing supports must correspond to the technological regulation. Fixture of the boards to the load-bearing construction must allow the motion caused by the volumetric changes in the façade boards. The individual façade elements must be installed with joints of at least 5 mm for element sizes up to 1,600 mm and min. 10 mm for a maximum size of 3,350 mm. Holes drilled additionally for fixing of the CETRIS®boards in the VARIO system must have a hole diameter of 10 mm (in the case of the maximum size of 1,600 mm, a hole diameter of 8 mm suffices) when using screws with a diameter of 5 mm.

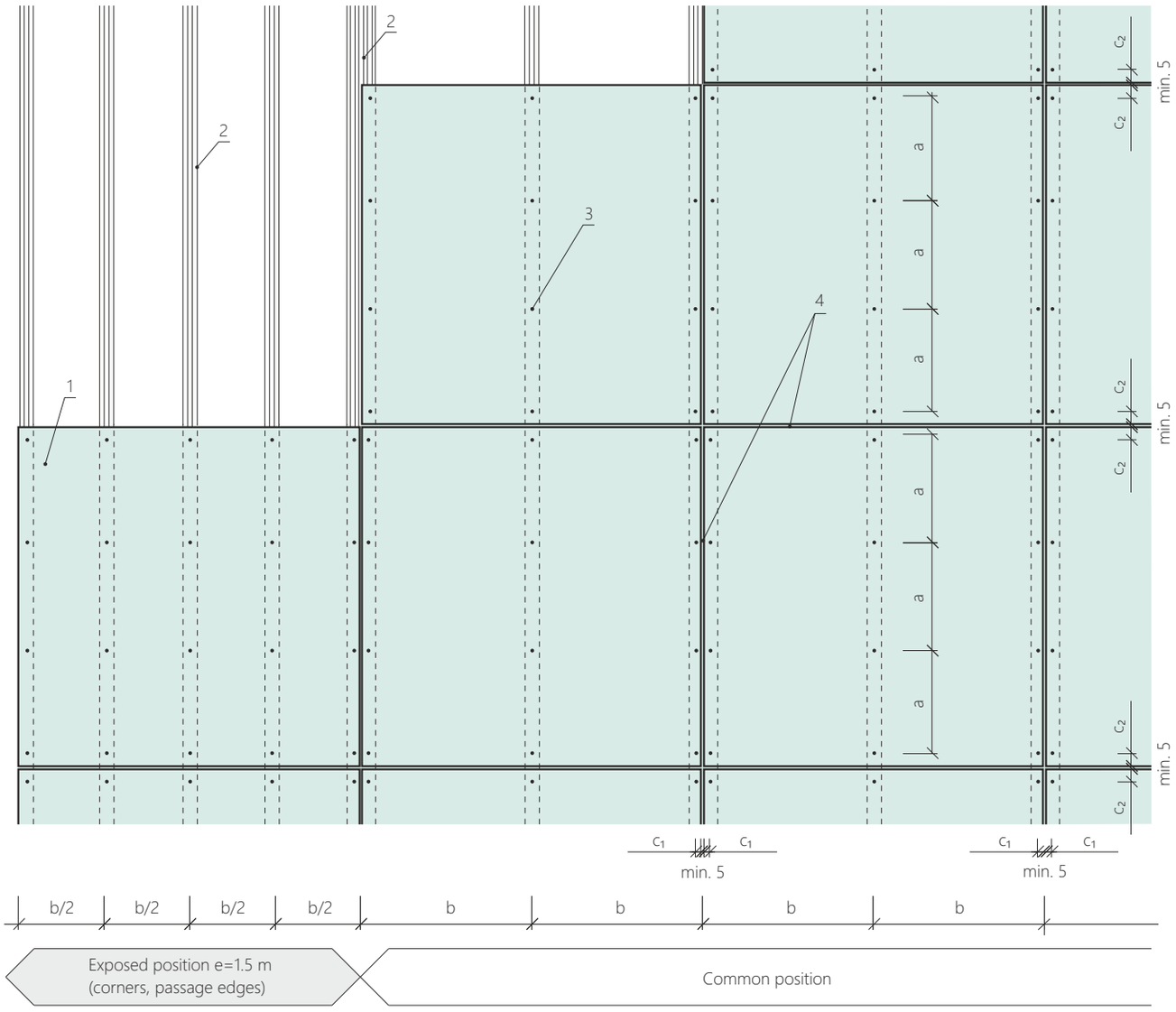
VARIO anchoring table

Board thick-ness (mm)	Screw spacing a (mm)	Support spacing b (mm)	Screw distance from vertical edge c_1 (mm)			Screws distance from horizontal edge c_2 (mm)
			Timber	Zinc coat	Aluminium	
8	< 400	< 420	>25 <50	>30 <50 >50 <70*	>50 <70	>70 <100
10	< 500	< 500				
12	< 500	< 625				
14	< 550	< 625				
16	< 550	< 700				

* Applies to the laying of CETRIS® boards with horizontal dimension >1875 mm

Note: The given values apply to a building height of max. 30 m. In the case of taller building cladding with CETRIS® boards, contact the manufacturer.

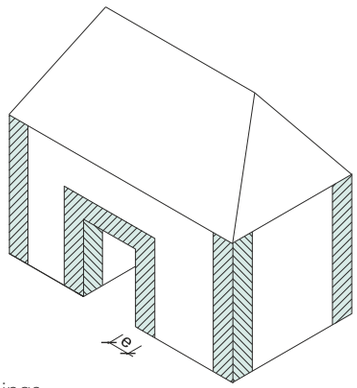
Diagram of CETRIS® board laying in the VARIO system



All values are given in mm.

e = 1,5 m

1 CETRIS® cement bonded particleboard
2 vertical supports – load-bearing construction
3 screws for fixture of CETRIS® boards
4 joints between CETRIS® boards



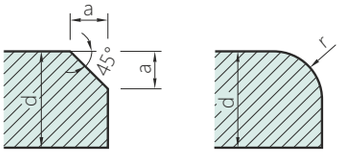
Exposed positions on building edges, openings, passages and thoroughfares in the buildings.

7.1.3.2 Mounting of CETRIS® PLANK Boards

CETRIS® cement bonded particleboards for PLANK system are available in widths of 300 or 200 mm, in a recommended length of maximum 1,875 mm (for a thickness of 12 mm). The boards have pre-drilled holes with a diameter of 8 mm (sliding – edge holes) and at least 1.2 multiple of the screw diameter (inner holes). The hole drilling and span of the load-bearing supports must correspond to the technological regulation, see the following table. Fixture of the boards to the load-bearing construction must allow the motion caused by the volumetric changes in the façade boards.

The individual façade elements must be installed with joints of min. 5 mm. The CETRIS® boards for the PLANK overlapped joint system are supplied with chamfered bottom edge at an angle of 45° or phased with semi-circular mill with r = 3.2 mm (this does not apply to CETRIS® PROFIL boards in all modifications).

Chamfering of the edges, rounding of the edges on CETRIS® boards for the PLANK system



a = min. 2 mm, max. 5 mm
r = 3,2 mm
d = thickness of CETRIS® board

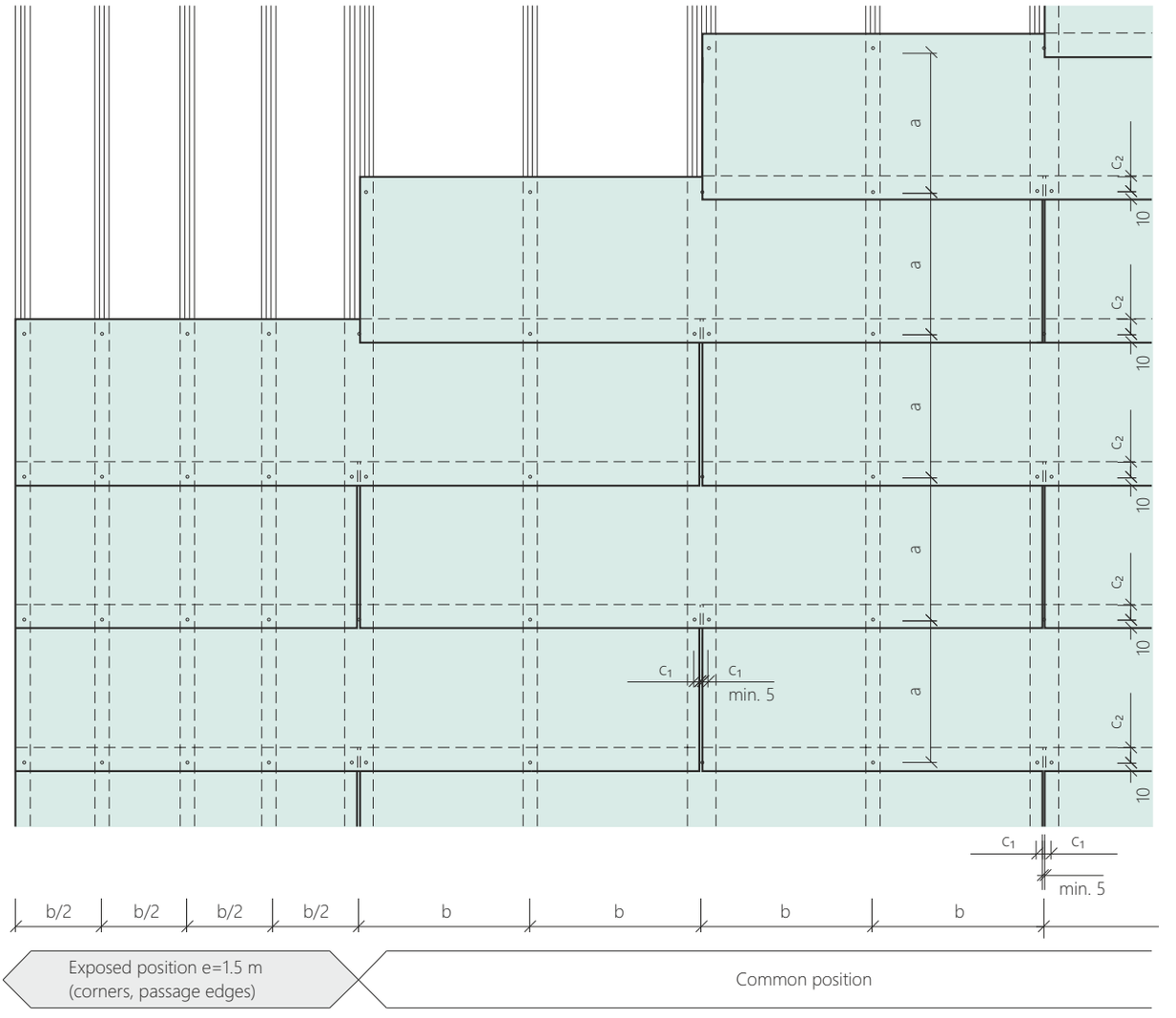
PLANK anchoring table

Board thick-ness (mm)	Screw span a (mm)	Support span b (mm)	Distance of screws from vertical edge c_1 (mm) Wood / Zinc / Aluminium	Distance of screws from horizontal edge c_2 (mm)	Max. board length (mm)
8	< 400	< 420	>35 <50	min. 40	1260
10	< 400	< 500			1500
12	< 400	< 625			1875
14	< 400	< 625			1875
16	< 400	< 700			2100

Note: The given values apply to a building height of max. 30 m. In case of taller building cladding with CETRIS® boards, contact the manufacturer.

Note: The recommended maximum length of CETRIS® board for the PLANK system is equal to triple the span of the auxiliary vertical profiles (laths) – i.e. for a board thickness of 10 mm this is max. 1,500 mm and for a board thickness of 12 mm it is 1,875 mm.

Diagram of the mounting of CETRIS® PLANK boards



All values are given in mm.

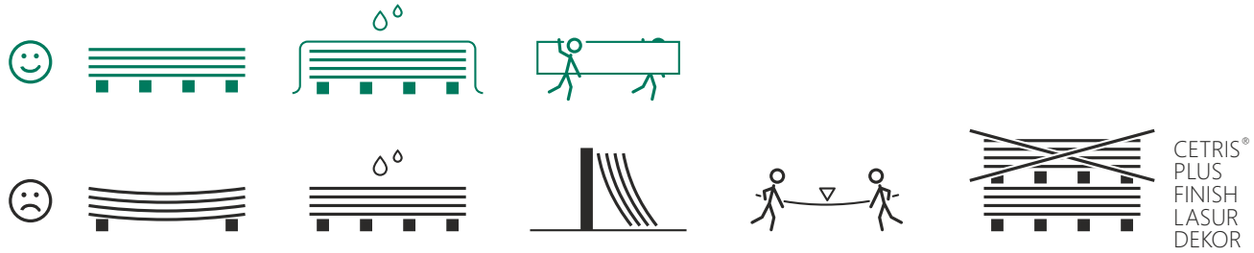
7.1.4 Processing of CETRIS® Façade Boards

CETRIS® cement bonded particleboards can be cut with a circular saw with a hard metal tipped blade. For a clean and straight cut, it is necessary to use a guide bar and cut the boards from the reverse side to protect the face against damage. Immediately after working the boards with surface treatment it is necessary to clean dust from the edge and coat it. Holes are pre-drilled with a no impact drill on a firm surface. It is recommended to use a drill bit for metal drilling. As a rule, the holes are drilled from the front side.

Processing of CETRIS® boards with surface treatment

7.1.5 Packaging and Storage of CETRIS® Façade Boards

The CETRIS® cement bonded particleboards are supplied on wooden transport pallets wrapped in protective foil. The individual CETRIS® FINISH, CETRIS® PROFIL FINISH and LASUR DEKOR boards are separated with softened inlays preventing board damage during transport. The boards must be stored in their original packaging on a stable firm surface in a dry place, which is protected against rain and dust.



7.1.6 Composition of the CETRIS® Board Façade System

1) Base construction

The base construction must meet all requirements of the relevant technical standards prescribed for these constructions (Czech national technical standards – ČSN, construction and technical certificates, and technological procedures). This particularly applies to homogeneity, coherence, strength and straightness requirements, both local and overall. The base strengths are given by the requirements of the individual manufacturers of the anchoring technologies and their regulations for the design of individual anchoring elements.

2) Thermal insulation

If thermal insulation is required, we recommend using hydrophobic boards of mineral fibre of WV type pursuant to DIN 18165. The recommended reaction to fire class pursuant to EN 13 501-1 is A1 or A2 as the case may be. The minimum thickness of the boards is based on the manufacturing programmes of the individual manufacturers and the heat resistance requirements of the insulation layer (thermal technical calculation).

Recommended types of mineral boards

Manufacturer, contact	Product	Diffusion resistance factor μ	Thermal conductivity coefficient λ	Reaction to fire class
Saint-Gobain Insulations, www.isover.cz	ISOVER FASSIL	1,4	0,035 W/mK	A1
	ISOVER MULTIMAX	1,0	0,030 W/mK	
Rockwool International a.s., www.rockwool.cz	AIRROCK ND		0,035 W/mK	
	VENTI MAX		0,034 W/mK	

The insulation boards are fixed with disc dowels in lengths as instructed by the manufacturer. The minimum number of dowels per m^2 is according to the instructions of the mineral board manufacturers.

3) Air gap

The air gap serves for exhaustion of atmospheric humidity and rain and snow moisture penetrated into the open system through joints and for removal of humidity diffusing from the base construction. In the summer the air gap prevents temperature increase in the load-bearing base construction. The humidity condensation in the ventilated space mainly depends on the intensity of the volume flow and speed of the ventilation stream. The minimum size of the air gap is 25 mm, max. 50 mm.

4) Wind-tight safety hydro insulation

The basic function of these membranes is to provide for wind tightness and limit air movement from/to the heat insulation. Another function of these membranes is to prevent water penetration and effectively remove vapours. The most frequent manifestations of air movement inside the vented façade in the gap between the lamellae and the heat insulation include the arising chimney effect and the wind. Thanks to this movement there is heat loss due to the air flow – the heat is drawn from the heat insulation. Similarly, the mechanical particles such as dust may get into the insulation and absorb moisture, thus negatively affecting the heat insulation properties. Water may get into the construction of the suspended façade in different ways (rain, gravitation etc.). A suitable product is DuPont™ Tyvek® Façade – a wind tight and highly vapour permeable membrane. The membrane is laid directly on the surface of the heat insulating materials, anchored with disc dowels. At the points where the anchors and disc dowels penetrate the membrane and where the membrane overlaps, the joints shall be covered with Tyvek® system tape.

5) Wooden load-bearing grid

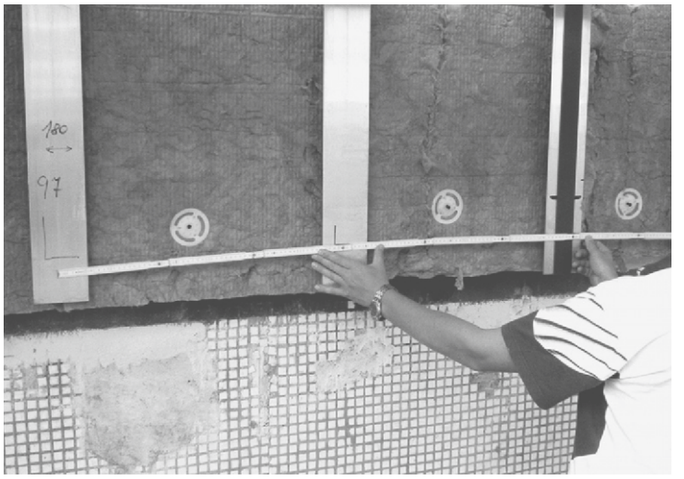
Load-bearing construction
The load-bearing skeleton consists of a grid made of wooden laths and planks. The laths and the planks are made of quality spruce cut timber dried to a max. 12% humidity. Such dried timber is impregnated with a suitable agent against mould and rot.

Primary – horizontal – grid
If additional thermal insulation is to be installed, a grid is also used in the composition. The thickness corresponds to the thickness of the insulation (max. 60 mm); the minimum width is 50 mm. The size, anchoring and spacing are specified by the designer on the basis of static and thermal technical assessment of the peripheral construction.

Secondary – vertical – grid
The grid forms the venting gap between the façade coat and also performs the function of the load-bearing construction for the façade boards. The lath thickness depends on the positioning of the primary grid laths and it is also necessary to keep the gap venting profile – the minimum cross-section should be 250 cm2/m and the max. 500 cm2/m. This means that the distance of the inside face of the façade board from the heat insulation or load-bearing wall of the building is min. 25 and max. 50 mm.

The laths are fixed to the primary grid and spaced according to the type of façade cladding. The lath width at the contact point of two façade elements is min. 80 mm; the width of the intermediate laths is 50 mm.

The scope of application of the ventilated façade on a wooden and combined (wood + galvanised, aluminium) load-bearing construction is limited by the fire regulations. During design of the base construction, it is necessary to act according to ČSN 73 0810, ČSN 73 0804 and ČSN 73 0802.



6) Metallic load-bearing grid

The load-bearing construction for the CETRIS® façade system may be made of anchored aluminium or galvanised profiles. Several types of load-bearing constructions for ventilated façades are available on the market, e.g. SPIDI, LA CENTRUM, DEKMETAL, ETANCO, ILTEGRO, KNAUF INSULATION.

7) CETRIS® boards

- without surface treatment - CETRIS®BASIC, CETRIS®PROFIL, CETRIS®INCOL
- with surface treatment – CETRIS®FINISH, CETRIS®LASUR, CETRIS® PROFIL FINISH, CETRIS® PROFIL LASUR, CETRIS®DEKOR

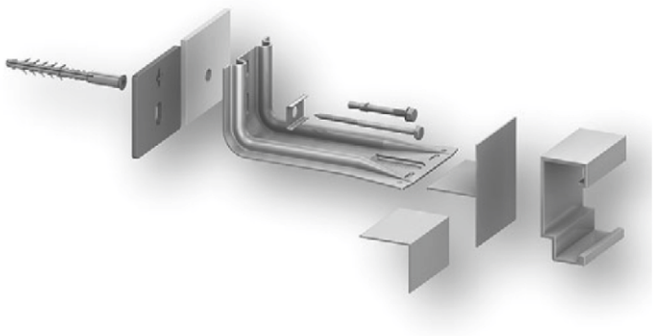
By their technical properties, the façade CETRIS® cement bonded particleboards fulfil the European regulation ETAG 034-1 and European technical approval ETA-14/0196 has been issued for them.

Note: the surface of the boards without surface treatment does not have a uniform colour (lime efflorescence); complaints concerning board appearance cannot be accepted.

7.1.6.1 Load-bearing grids

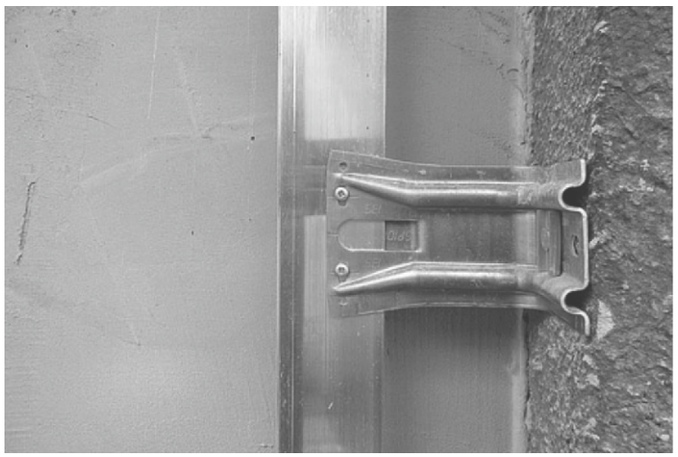
SPIDI load-bearing construction

The certified load-bearing systems for the SPIDI, or SPIDImax ventilated façade systems are made of aluminium or steel with anti-corrosion treatment. Thanks to the composition, the entire construction is resistant to corrosion and an aggressive environment. The stability of the load-bearing construction in terms of the temperature load is based on the system of fixed and sliding fixing points (pre-drilled round and oval holes in the SPIDI elements for fixture of load-bearing profiles). The basic load-bearing elements of the SPIDI system with a construction length of 60 – 300 mm thanks to combination with vertical load-bearing profiles of tongue and groove type allows for levelling of unevenness in the base constructions up to 35 mm in the plane perpendicular to the basic reference plane.



Composition of the SPIDI load-bearing construction

- SPIDI fixing element – anchor
- L or T load-bearing profile, or special profile
- fixing elements (spacing elements, plate fasteners)
- connecting elements (screws, bolts, rivets)
- assembly elements (battens, perforated profiles, rivet caps, base strips)



Technical service in the area of design, delivery and installation of the load-bearing structures is done by ISODOM, a.s. - www.isodom.cz

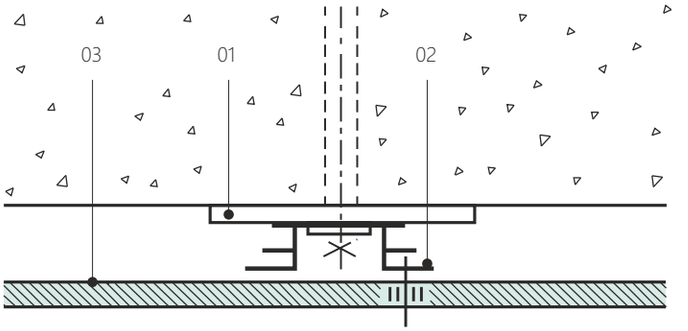
LA centrum load-bearing construction

The LA centrum system offers six different load-bearing construction variants for the façade boards. The load-bearing grids are based on aluminium, alloy and corrosion-resistant steel. Above-standard extension from 30 to 400 mm. Vertical beams – specially shaped aluminium alloy profiles. Fixing elements, small fastening and connecting material made of aluminium, its alloys and corrosion-resistant steel.

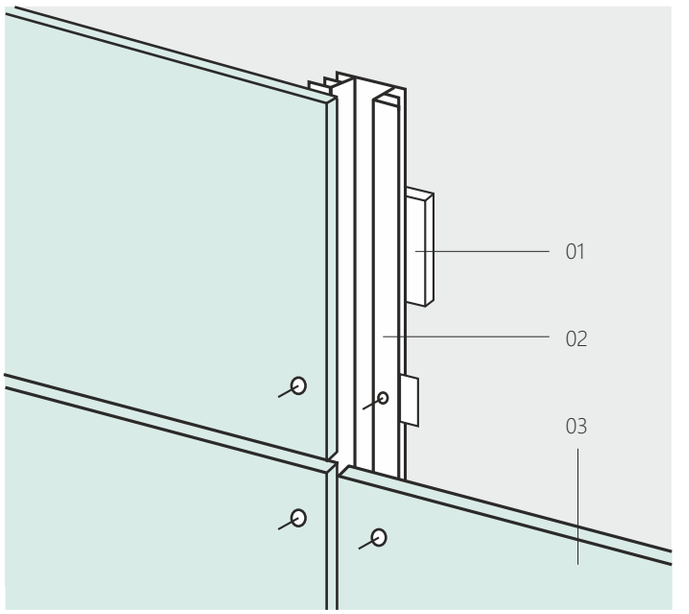
The LA-KV1 and LA-LV1 systems are suitable for fixture of the CETRIS® cement bonded particleboards.

The LA-KV1 load-bearing grid is an exceptionally economical metallic grid variant. The flat beams of special omega cross-section are laid in vertical position approx. 600 mm and are laid over the adjustable washers directly on the base. They are located at the point of the tile joint and as intermediate elements. Fixed and sliding fixing points ensure the dilatation of the beams. The width of vertical beams is uniform. At the point of the vertical joints, the joints may be expanded with firmly fixed wings. The LA-KV1 grid is a thin-layer alternative to the LA-LV1 grid.

The thickness of the ventilated LA-KV1 façades is identical to the thickness of classic glued tiles or plasters. Already from 28 mm including the load-bearing grid. Up to approx. 60 mm. They increase only by the unevenness of the base and thickness of the cladding boards. The vertical continuous ventilation air gap behind the boards are always maintained. It has a thickness of at least 20, normally 30 mm and above.



01 washer
02 KV beam
03 CETRIS® façade board



The LA-LV1_load-bearing grid comprises of vertical beams of special T-section, laid with a spacing of max. 625 mm (applies to a board thickness of 12 mm). They are clamped at the point of the tile joint and as intermediate elements. They are anchored to the base by consoles of various designs, according to the clear span of the tile and assembly requirements. The consoles are made in size series. In this way, it is possible to align a tile of any thickness. The dilatation of the beams is ensured by fixed, sliding or swinging connection to the consoles. The width of the beams is uniform. According to the anchoring of the boards, the wings fixed in the slots in the edges of the beams are expanded.

The fixture of the façade boards is a combination of fixed and sliding joints. It allows the full area dilatation of the boards independent of the dilatation of the load-bearing grid. The boards are fixed by shear rivets to the beam or wings with big heads over the holes pre-drilled in the boards. The holes of the sliding joints have a larger diameter.

The thickness of the ventilated LA-LV1 façades is the total of all their layers. It also includes the necessary space for rectification, and the ventilation air gap behind the boards. This is vertically continuous with a thickness of at least 30 mm. The top and bottom end in ventilation slots. The overall thickness of the LA-LV ventilated façade is 65 to 400 mm and above.

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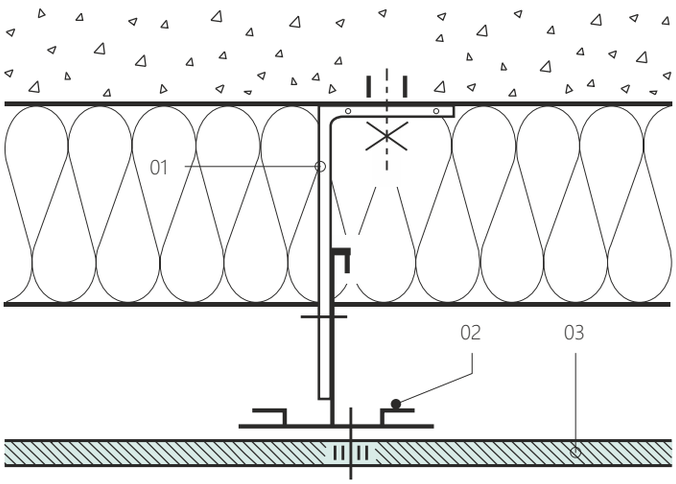
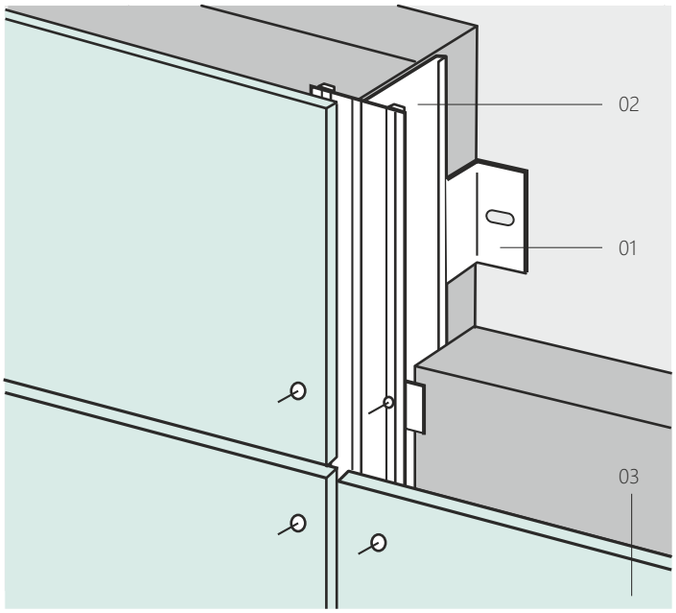
www.thermosolutions.cz



01 console
02 LV beam
03 CETRIS® façade board



DEKMETAL load-bearing construction

Assembly of the façade system from the DEKMETAL load-bearing construction can be divided into several phases as follows:

- creation of the horizontal grid
- installation of the thermal insulation
- fixture of the diffusion foil
- assembly of the vertical profiles
- assembly of the façade cladding including solution of details

The procedure in the first two steps depends on the type of base construction – whether it is a skeleton and C cassettes are used or whether a wall construction is involved and consoles and profiles are used. Further assembly procedure is identical.

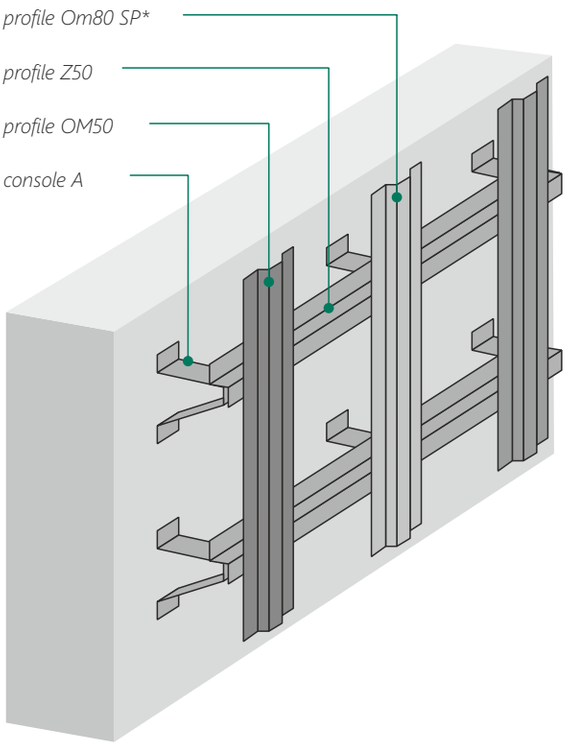
The first assembly phase of the façade system consists of the horizontal part of the grid. If the load-bearing construction comprises a skeleton, C cassettes are used. If the façade board is installed on a load-bearing wall, this grid is composed of a system of Z50 consoles and profiles. In the following text, the assembly variant is described more often – the base is a brick or concrete wall. The procedure of assembly for C cassettes (installed base constructions) is available from the system manufacturer.

When using the DEKMETAL load-bearing construction, the same principles apply to the spacing of vertical profiles and anchoring elements – see the table of the Maximum axial distances of anchoring elements in chapters 7.1.3.1 Application of the CETRIS® VARIO boards and 7.1.3.2 Application of CETRIS® PLANK boards.

Technical service in the area of design, delivery and installation of the load-bearing structures is done by DEKMETAL s.r.o.

www.dekmetal.cz

grid DKM2A

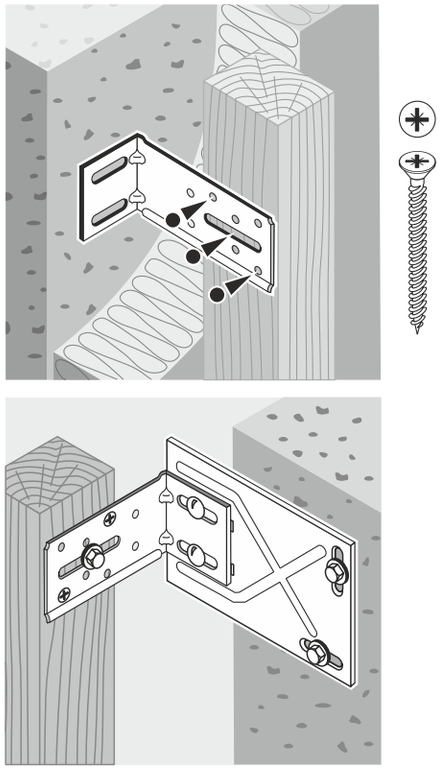


ETANCO load-bearing construction

ETANCO CZ s.r.o. is a supplier of anchoring (fixing) elements and anchoring equipment for the building construction industry, particularly in the specific sectors, such as, the cladding of the façades and roofs, ventilated façades, flat roofs, etc. and also ensures technical service in the area of design, supply and assembly of the load-bearing construction.

Combined load-bearing construction – wooden elements and metallic anchors

It is used for cladding up to a height of 9 m without limit; on higher buildings, it is used according to individual assessment of the entire structure pursuant to the requirements of ISO 5658-4 for vertical propagation of fire. The main advantage is its variability and affordability.



Aluminium construction

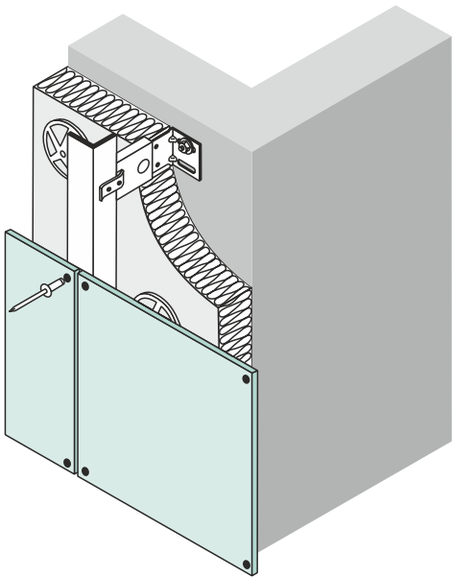
Its advantage is quick and easy assembly. Galvanising or other protective treatment is not necessary and its lower weight (as compared with steel) makes it possible to hang a larger weight on this construction or reduce the span and hence also the number of anchors. During the design and assembly of the façade boards on the construction, it is necessary to ensure adequate dilatation of the boards and the grid profiles (max. 3.35 m). The Façalu LR 110 aluminium construction system consists of ISOLALU wall anchors. These anchors are made in ten different lengths and it is possible to adjust them in the range 68 – 278 mm. The main grid elements are three basic aluminium profiles – T, L and Omega profile. Components of the system are also polypropylene pressed washers, which prevent the creation of a thermal bridge between the load-bearing construction of the building and the square.

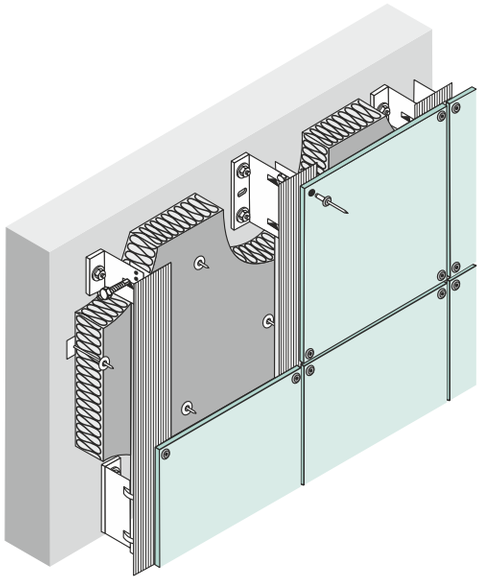
Technical service in the area of design, delivery and installation of the load-bearing structures is done by ETANCO CZ, s.r.o.

www.etanco.cz

Steel construction

It is not limited to a maximum height by safety regulations. The main advantage is affordability. During the design and assembly of the façade boards on the construction, it is necessary to ensure adequate dilatation of the boards and the grid profiles (max. 3.35 m). The basis system element of the combined and steel constructions consists of the pressed, reinforced anchoring consoles made of galvanised Z 350 - ISOLCO 3000P for vertical grids and CONSOLES for horizontal grids combined with L construction profiles.





Load-bearing construction - KNAUF INSULATION DIAGONAL 2H

The DIAGONAL 2H system is the result of efforts at minimising the effect of thermal bridges on the resulting thermal technical properties of the application of thermal insulation. It is possible to ensure the static function of the load-bearing construction and simultaneously reduce its effect on the efficiency of the thermal insulation if the console system is transformed into a more elegant truss system. In order to achieve the functionality of the thermal insulation, an important component of the composition is the outer weather protection and the possibility for its implementation as comprehensively as possible. During consideration of its location, it is however important to also consider how the resulting properties of the load-bearing construction shall influence the massiveness of the profiles that form the base for assembly of the foil and subsequently the base under the elements that form the outer face of the cladding. The more massive these elements will be – the more they will better transfer the heat to the exterior as an effective cooler and thus contribute to heat losses. For this reason, we divided the spar flanges into two elements. One of them is the auxiliary L profile, which is used to create the shape of the façade and also serves as the base for the air-tight foil. Over the foil, the Z and W profiles are added to prevent ventilated air spaces and also serve as the base construction for assembly of the CETRIS® board cladding.

As compared with construction versions for ventilated façades, the thermal bridge of this construction is relatively small. It can be compared with the effect of façade dowels on the efficiency of the contact thermal insulation system.

The DIAGONAL 2H steel construction for creation of a ventilated thermally insulated façade is designed to minimise the effect of thermal bridges on the effectiveness of the thermal insulation. On buildings up to 30 m tall, the construction allows the use of final cladding with a weight of up to 70 kg/m^2

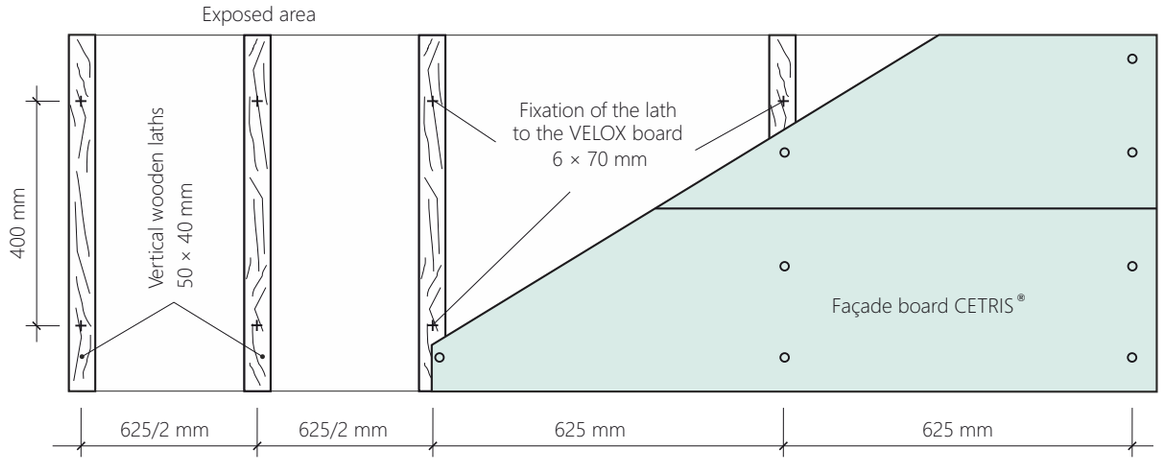
The system is applicable to refurbishment of old buildings or new buildings and also modifiable for use in wooden buildings and on extremely uneven surfaces with a high functional reserve and is undemanding in terms of machine requirements during assembly.

Technical service in the area of design, delivery and installation of the load-bearing structures is provided by KNAUF INSULATION.

www.knaufinsulation.cz

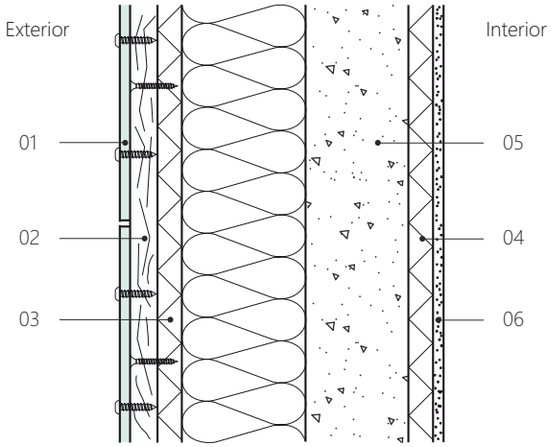
CETRIS® façade boards on a VELOX wall

Fixture of the load-bearing construction (wooden laths 50 × 40 mm) of the façade cladding for VELOX cement bonded chipboard:



- Wood screws, minimum diameter 6 mm, minimum length 70 mm
- Maximum screw spacing 400 mm
- The vertical lath itself may have a spacing of max. 625 mm; in the case of exposed surfaces (exterior corners, interior corners, thoroughfares, etc.) maximally half.

These recommendations apply if:
- the maximum building height is 12 m
- the maximum façade cladding – CETRIS® board thickness is 16 mm



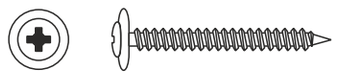
01 CETRIS® façade board
02 Vertical wooden lath 50 × 40 mm
03 VELOX WS-EPS board with thermal insulation
04 VELOX WSD board
05 Concrete
06 Plaster

7.1.6.2 Fixture CETRIS boards - auxiliary materials

Screws for fixture of the CETRIS® cement bonded particleboards to the grid

For fixture of CETRIS® cement bonded particleboards in the PLANK system (assumed) stainless steel or galvanised screws with frame or sunken head.
The recommended screws for the CETRIS® boards when mounted on PLANK thickness 10 (12) mm, wooden load-bearing construction:

- CETRIS PLANK screw 4.2 × 45 mm



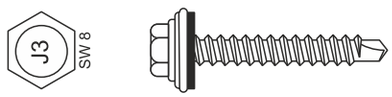
The recommended screws for the CETRIS® boards when mounted on PLANK thickness 10 (12) mm, load-bearing construction EuroFox:

- EJOT screw Climadur-Dabo TKR 4.8×35 mm

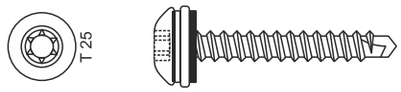
For fixture of CETRIS® boards in the VARIO system (visible joints), stainless steel or galvanized screws with semi-circular or hexagonal heads and compressive water-tight washers are used. The washers are treated on the bottom side with vulcanized elastomer EPDM for water-tight and flexible material connection. The bolt/screw type also depends on the base type – the load-bearing grid applied.

The recommended screws/bolts for anchoring the CETRIS® boards in the VARIO system on a wooden load-bearing construction:

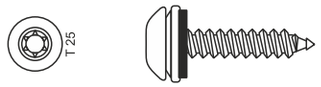
- JT 3 – 2 – 4,9 × 35 – E 14
  (max. thickness of the CETRIS® board 12 mm)



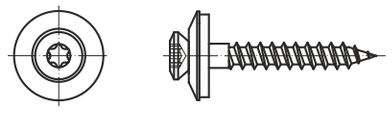
- JT 4 – FR – 2 – 4,9 × 35 – E 14
  (max. thickness of the CETRIS® board 12 mm)



- JA 3 – LT – 4,9 × 38 – E14
  (max. thickness of the CETRIS® board 14 mm)



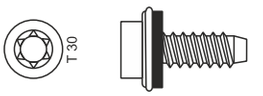
- VISIMPEX plumbing screw + EPDM,
  TX20 4,5 × 35 – 60 mm, stainless steel A2



- SFS TW-S-D12-A14-4,8 × 38, half lens, wood
- Mage 7060 screw Topex 4,8×45 mm, wood, hexagonal (max. board thickness 12 mm)
- Mage 7341 screw Topex Ufo 4.8×45 mm, wood, half lens (max. board thickness 12 mm)
- Visimpex CIBDJ 4,8×35 mm

The recommended screws for anchoring the CETRIS® boards in the VARIO system on an aluminium or galvanised load-bearing construction:

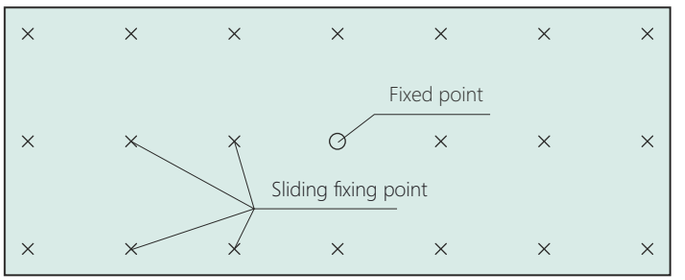
- JT 2 – 3 – 4,8 × 25 (38) – V 14



- SFS SX 3/15-L12-S16 – 5,5 × 38 mm – IRIUS head, (CETRIS board thickness 14 mm)
- SFS SX 3/15-S16 – 5,5 × 38 mm – hex head, clamping length 15 mm
- Mage 7010 – self-tapping screw Topex Ufo 4.8 × 38 mm, for Al, galvanised, half lens (max. board thickness 12 mm)

Anchoring of CETRIS® boards with rivets

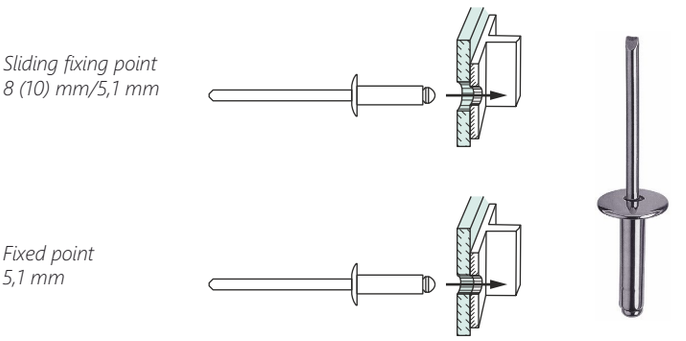
- The CETRIS® board must be pre-drilled, the hole diameter in the case of a sliding point is 8 mm (or 10 mm, if the board length is greater than 1,600 mm), for a fixed point, the pre-drilled hole diameter is 5.1 mm (diameter of the rivet body).
- The position of the pre-drilled holes in the board is identical to the anchoring of the boards with screws, one hole in the board always has a pre-drilled hole diameter of 5.1 mm (so-called fixed point). The position of the fixed point is chosen according to the shape of the board, number of holes, see diagram.
- Stainless steel or galvanised rivets with powder paint finish are suitable for riveting. Due to the pre-drilling the rivet head diameter shall be min. 14 mm, the rivet length depends on the clamping length (CETRIS® board thickness + the façade load-bearing construction profile thickness).
- When riveting, a spacer of max. 1 mm must be used to achieve the sliding joint.



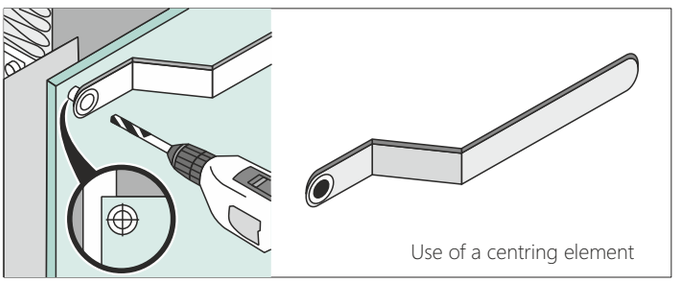
x - Sliding fixing point
o - Fixed point

Recommended rivet types:

- SFS - AP 14 - 50180 - S (dimensions 5.0 × 18.0 mm, head Ø 14 mm, clamping length 10.5 – 15.0 mm)
- SFS - AP 16 - 50180 - S (dimensions 5.0 × 18.0 mm, head Ø 16 mm, clamping length 10.5 – 15.0 mm)
- EJOT - K14 - Al/E 5×18 mm (head Ø 14 mm, clamping length 12 – 14 mm)
- ETANCO open Al/stainless steel rivet 4.8 × 18 mm (head diameter 16 mm, clamping length 12 – 14 mm)
- BS 4.8 × 25 mm Al/stainless steel A2, head diameter 16 mm, clamping length 15 mm



Note:
When anchoring CETRIS® boards with screws or rivets, it is necessary to set the anchoring element precisely at the middle of the pre-drilled hole (pre-drilled hole diameter 10 mm or 8 mm according to the CETRIS® board length). A centring piece can be used for precision setting (for drilling, screwing).



Invisible fixation (gluing) of CETRIS® boards

In the case of a requirement for invisible fixation (only applies to the VARIO system and vertical cladding) the CETRIS® boards may be glued to the grid.

The recommended system is supplied by Sika Company and consists of:

- Sika®Cleaner 205 – cleaner and activator for preparation of the glued surface with short venting time
- SikaTack® Panel Primer – primer for cladding boards, aluminium or wooden load-bearing elements
- SikaTack® Klebeland – assembly tape – two-sided adhesive tape for quick fixation of façade boards
- SikaTack® Panel – gluing filler

Recommended system developed by the AUTO-COLOR company consists of the following components:

- Dinitrol 520 cleaner-activator – cleaning and activating agent for the preparation of the glued surface
- Dinitrol 550 Multiprimer – primer for façade panels, aluminium or wooden supporting elements
- SPADA double sided mounting tape – fixing adhesive tape for quick fixation of façade boards
- Dinitrol F 500 LP – structural adhesive

Gluing by this technology may only be performed by trained companies and employees, strictly following the effective technological procedure issued by the manufacturer of the gluing system. Before actual gluing, it is necessary to hold technical consultation with the manufacturer's technical department.

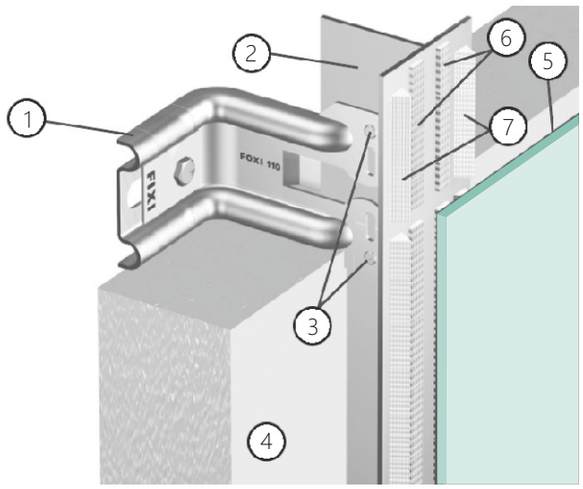
The most important principles for use of the gluing system for fixture of CETRIS® cement bonded particleboards:

- recommended thicknesses of boards are 10 and 12 mm
- suitable base are aluminium profiles and wooden laths (with planed surface on the gluing side), in the case of zinc-coated profiles surface treatment is necessary (pursuant to the instructions of the gluing system supplier)
- maximum spacing of supports 500 mm (for 10 mm thickness), or 625 mm (for 12 mm thickness), maximum length of the CETRIS® board equals to triple the max. support spacing (i.e. 1,500 mm for 10 mm thickness and 1,875 mm for 12 mm thickness)
- profiles must not be oriented horizontally, maximum acceptable profile (lath) length 5 m, dilatations between profiles (laths) is necessary
- assembly is possible only in dry conditions at an ambient temperature in the range +10° C to +30° C that must not drop below the lower for at least 5 hours after assembly.
- board gluing recommended up to max. 12 m height
- assembly may be performed only by trained staff acquainted with all principles and requirements.

Joining Flexible Fillers

For laying of CETRIS® cement bonded particleboards in the PLANK system, flexible fillers are recommended for application under the free ends of the façade boards. The recommended types are acrylic fillers with tensile strength of min. 0.1 MPa

Gluing of boards with the SIKA, DINITROL system



1 load-bearing anchor with dowel and screw
2 vertical T beam
3 self-tapping stainless steel screws
4 thermal insulation made of mineral hydrophobic boards
5 CETRIS® cement bonded particleboards
6 double-sided adhesive tape
7 special gluing filler

Rubber Tapes and Washers

Rubber tapes and washers are used as prevention of contact and fissure corrosion resulting from contact between elements of aluminium alloys and other metals, or for the extended life of wooden constructions (the washers are placed under the vertical joint in the points of contact between two cladding boards on a wooden grid).

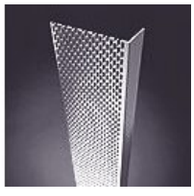
Anchoring Technique

The wooden grids are fixed with HILTI HRDU, MUNGO, MEA, EJOT, UPAT, POLYMAT frame dowels, etc. The layout and types of the dowels is specified by the designer. Stainless or galvanised screws are to be used for fixation of vertical laths to horizontal ones (secondary and primary grid).

Complementary profiles (laths) to the ventilated façade systems

Details of suspended vented façades (bottom end – venting, upper end – venting, cladding of the openings, external/internal corners etc.) are resolved with shaped profiles (laths). These laths are made of zinc-coated metal (with optional colour finish), aluminium sheets or PVC (Protector, Baukulit, DK GIPS systems).





7.1.7 Technological Procedure for Assembly of CETRIS® Ventilated Façades

7.1.7.1 Assembly of Wooden and Metallic Constructions

Assembly of Wooden Load-bearing Façade Construction

Specification of basic axes and reference plane for brick laying.

If possible, the basic axes should be specified, especially the widths of inter-window pillars, together with the reference plane for the full surface of the façade cladding base.

Load-bearing wooden construction of suspended ventilated façade:

Installation of primary grid – horizontal laths
Fix the wooden laths with dowels to a levelled base for corresponding stability of the resulting load-bearing construction. When selecting the type and size of the dowels the suitability of the base must be assessed. If the base is not sufficiently flat put wooden pieces under the laths to achieve local and overall planarity. To level the individual surfaces place vertical wooden laths along their edges first. Hammer nails into the laths and stretch a line between them. In this way, the front plane of the wooden grid is specified. The other horizontal laths must be aligned to this plane with the help of wooden pieces or cutting into the wall. We subsequently tighten the laths.

Assembly of thermal insulation layers
When applying thermal insulation to the façade, we first fix the horizontal laths to the base (the lath thickness must be the same as the insulation thickness, max. 60 mm). We lay longitudinal thermal insulation, which we attach to the base with disc dowels. Assembly of the thermal insulation layers is done using disc dowels according to the requirements of the manufacturers of the anchoring equipment. The number of the disc dowels is to be specified by the designer on the basis of recommendations of the heat insulation material manufacturers. The thermal insulation layer must adhere to the base, must be continuous without open joints (the individual parts must be placed tightly together!) The disc dowels must be firmly fixed to the base and must be fixed firmly to the thermal insulation layer.

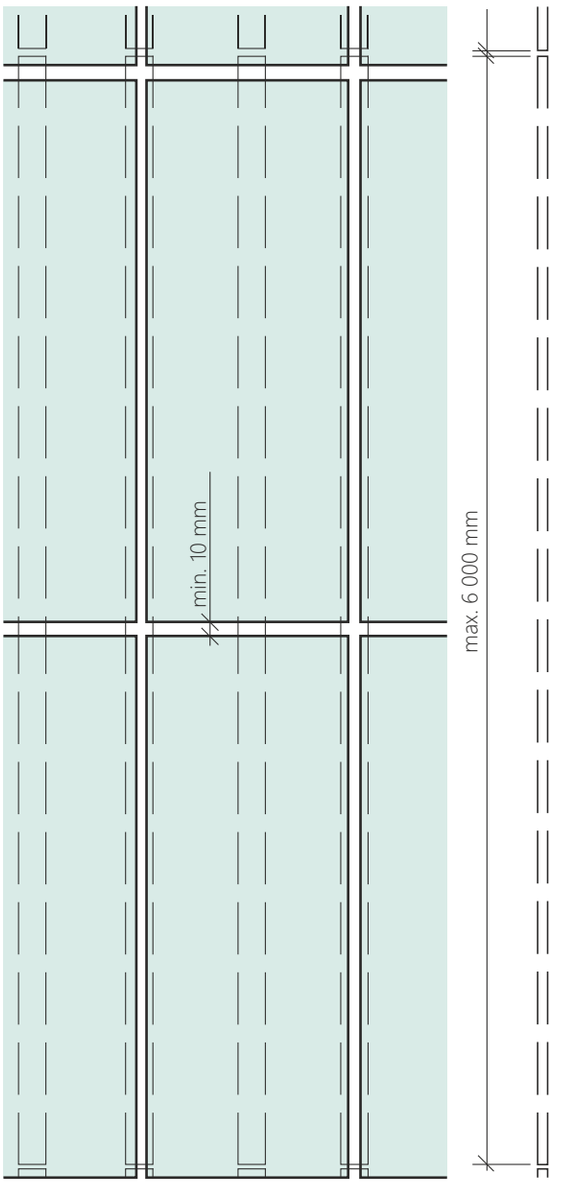
Installation of the secondary grid – vertical load-bearing laths
The vertical load-bearing laths (minimum width 50 mm, at the contact point of two boards minimum 100 mm or use two 50 or 60 mm laths) are fixed with screws to the primary grid. The axial distance of the laths must not exceed the stated values. After fixing the vertical laths, an air gap is created in the grid of minimum width 25 mm and maximum width 50 mm.

Installation of the auxiliary constructions
The auxiliary constructions are installed pursuant to the requirements of the detail drawings included in the manufacturing documentation. They mainly include auxiliary vertical and horizontal laths defining openings (jambs and heads of windows and doors), inner and outer corners, bottom and top lining etc.

The maximum length of the wooden lath grid is 6 m. Wooden elements must be dried and treated against humidity, insects and ligniperdous pests. In the case of a combined grid, anchors must be placed alternately on both sides of the wooden laths (to reduce twisting).

The dilatation between the laths at the point of the horizontal joint must always be at least 10 mm. Stainless anchoring material is recommended for joining.

Dilatation – wooden grid



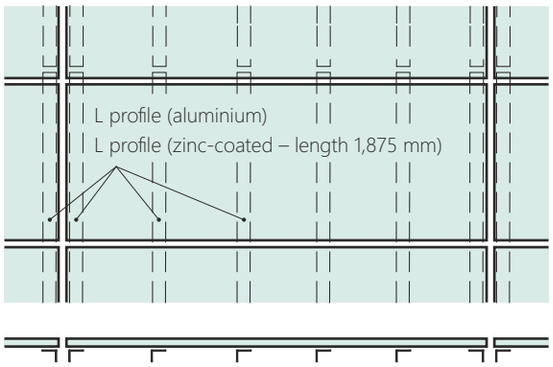
When assembling the grid of zinc-coated or aluminium profiles it is acceptable to use a joint profile for CETRIS® board laying in widths of up to 1,875 mm. For wider boards (laid lengthwise), use two separate L profiles instead of a joint profile.

The maximum length of an aluminium and zinc-coated profile grid is 3.35 m. The dilatation between the profiles at the point of the horizontal joint must always be at least 10 mm. The load-bearing grid (fixation and spacing of anchors, profile anchoring – fixed and slide anchoring points etc.) must be assembled pursuant to the instructions of the grid supplier. All the joining materials for aluminium grids must be stainless.

Fixation of a CETRIS® board to two different grids (different materials or different dilation units) is not permitted!

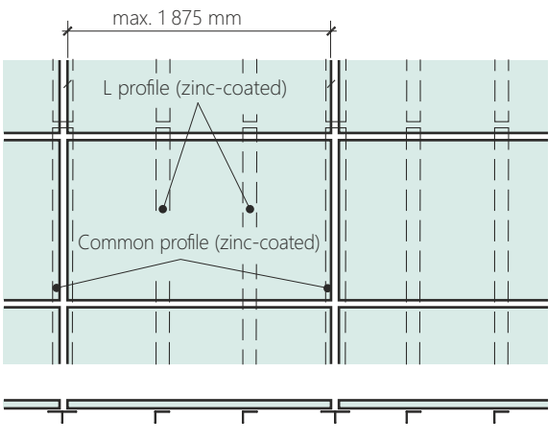
Correct assembly of L profiles at the vertical joint

Diagram of the installation of the galvanised and aluminium profiles for board widths >1,875 mm

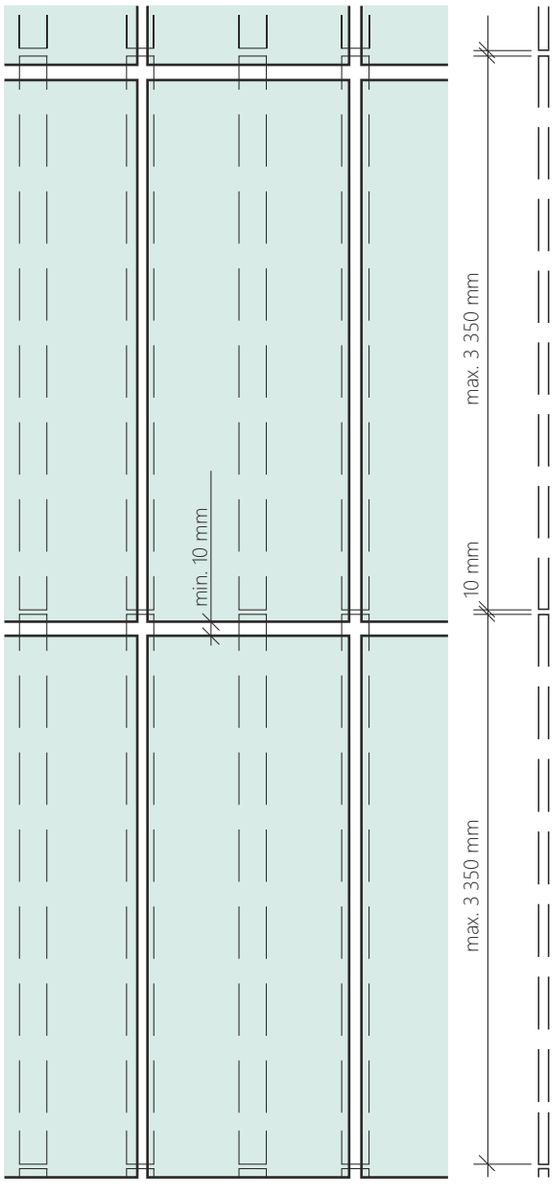


For façades wider than 8 metres, it is necessary to ensure continuous vertical dilatation in the load-bearing construction – i.e. the base construction at the points of the vertical joint must be resolved using two separate profiles.

Diagram of the installation of the galvanised and aluminium profiles for board widths < 1,875 mm



Dilatation – grid of aluminium or zinc-coated profiles



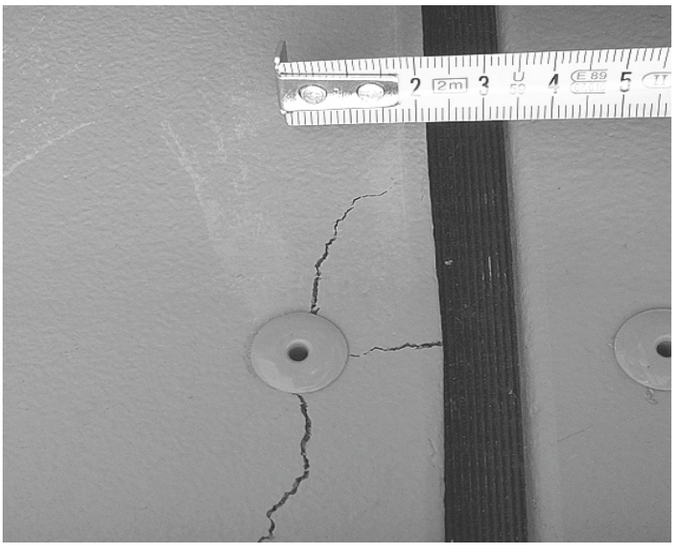
Exceeded support spacing

Insufficient anchoring of CETRIS® boards (exceeded maximum spacing of profiles and screws) causes deformations (bulging or swelling) or board damage (cracking)!

Incorrect grid dilatation

Incorrect profile dilation off the horizontal joint level between the CETRIS® boards.

Inadequate spacing of the rivet from the edge



Correct use of rubber tape

For base levelling and board dilation facilitation, a rubber EPT or EPDM UV stable tape must be placed under the CETRIS® boards. The tape will prevent the immediate transfer of heat, humidity and potential trickling corrosion (zinc-coated grid)

Installation of the CETRIS® boards – VARIO system (visible joints)

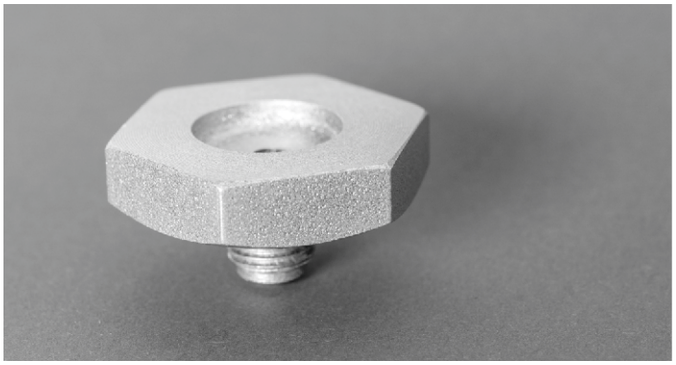
Before the board installation, mark the basic horizontal plane (pursuant to the manufacturing documentation).

The basic horizontal plane is usually delimited by the:

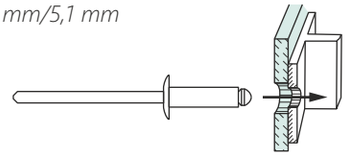
- bottom edge of the second horizontal layer of CETRIS® cement bonded particleboards
- level of the sills/parapets of the openings (windows, doors), if the joints between the boards follow this level
- level of the lintels of the openings (windows, doors), if the joints between the boards follow this level

This level is subsequently decisive for the entire building perimeter. If the project dictates several height levels of the cladding, it is necessary at this stage in line with the manufacturing documentation to project the other controlling horizontal axes (always determined by the bottom edge of the first layer of CETRIS® cement bonded particleboards) of these levels (at beast using a laser). Place the boards side by side with the visible horizontal and vertical joints with a minimum width of 5 mm. The CETRIS® cement bonded particleboards are fixed visibly using screws or invisibly using SikaTack, Dinitrol glues. The pre-drilled holes and connecting elements must be located at the prescribed distances in the board. When fixing the board, we first fix the fixed point (according to the size and shape of the board - one or two points - as close as possible to the board centre). Afterwards, we anchor all the sliding points, at best clockwise.

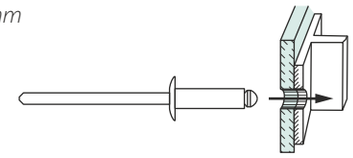
The screw tightening torque must be set to prevent deformation of the screw washers or CETRIS® board. The screw (rivet) must be placed in the middle of the pre-drilled hole perpendicularly to the board plane. When riveting, the slide joint must be achieved with a distance extension of about 1 mm.



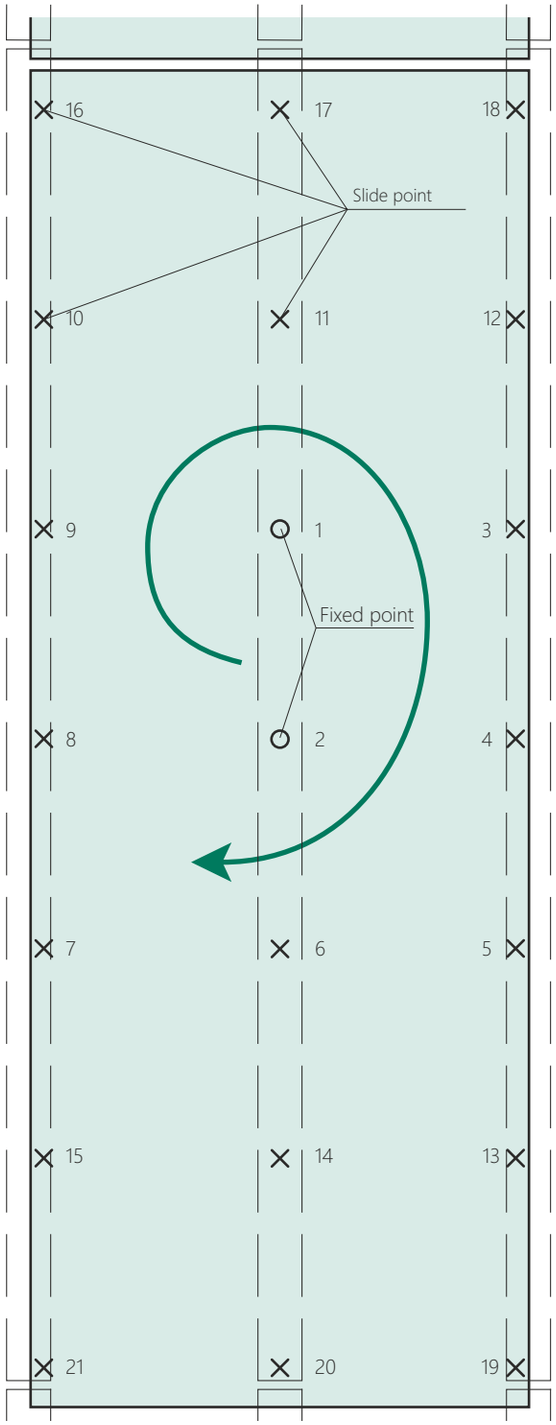
slide point 8 (10) mm/5,1 mm

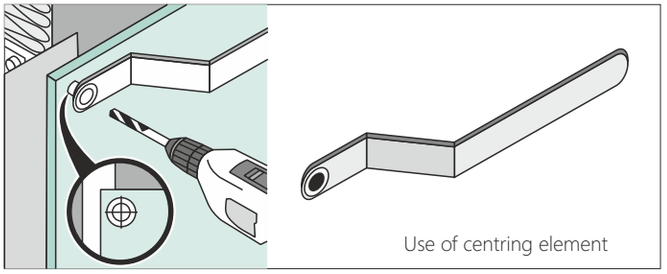


fixed point 5,1 mm



Anchoring procedure





Installation of the CETRIS® boards – PLANK system (overlapped horizontal joints)

Before the board installation, mark the basic horizontal plane (pursuant to the manufacturing documentation). The basic horizontal plane in the overlapped system is defined by the upper edge of the first horizontal row of the CETRIS® boards. This plane subsequently defines the whole perimeter of the building.

As the boards are laid with overlapped horizontal joints the needed number of boards and their overlaps must be determined.

Number of boards: $N = 1+(H-300)/250$
Board overlap: $O = (N\times300-H)/(N-1)$

Where:

N	number of boards in pieces
H	façade height in mm
O	board overlap in mm, at least 50 mm
300	CETRIS® board width in mm
250	visible width of CETRIS® board in mm

Begin the board assembly from the bottom by placement of a strip on the basic horizontal plane with the same thickness as the CETRIS® board and the width corresponding to the calculated overlap. Cover the strip with the first row of the cladding boards, width 300 (200) mm.

Place the joining elements to the upper edge of the boards (40 mm from the upper edge, 35 mm from the vertical edge). The screws may only be tightened to an extent where they do not deform the façade element and do not hinder dilatation of the board. The first row of the cladding boards must be properly levelled to prevent later complications.

Before placement of every row of the cladding boards apply the flexible sealant under the upper edge of the already fixed boards (cakes with the diameter of about 20 mm with a spacing of approx. 300 mm).

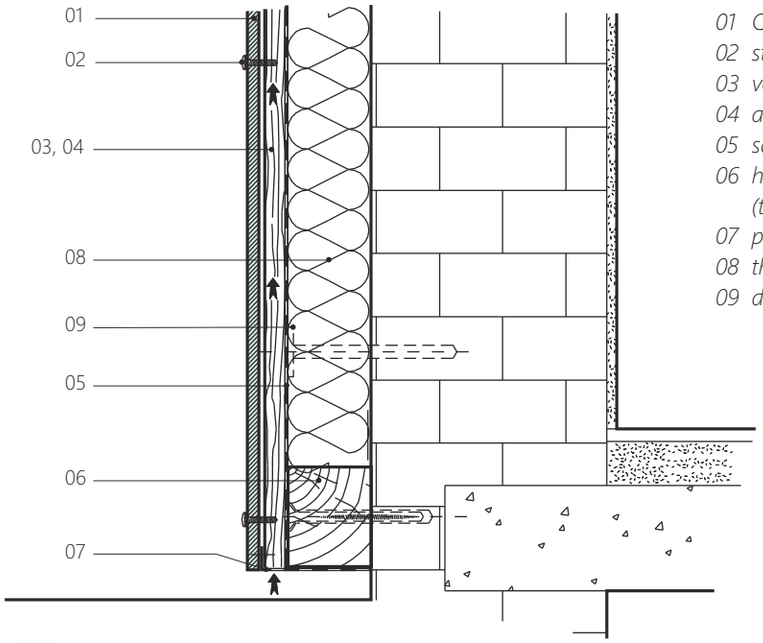
The vertical joints of the boards must be supported and their width must be at least 5 mm.

7.1.7.3 Dealing with Details of CETRIS® Ventilated Facade Systems

The process of assembly of details of the suspended facade coat is designed individually on the basis of the design of the details in the relevant manufacturing documentation drawings. The recommended solutions of these details are shown further down.

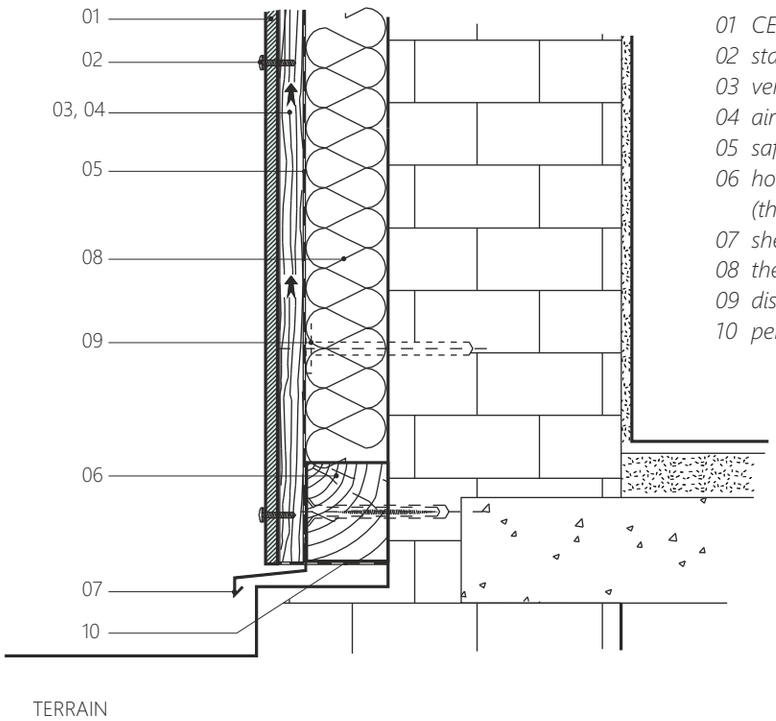
Note: The drilling and cutting (or milling) of CETRIS® cement bonded particleboards is only possible with hard metal tilled tools designed for this type of cutting operation. Where anchoring element penetration is required (for example for exterior lighting of the building, for installation of signs and advertising panels etc.) sufficient dilation of the coat and these anchoring elements must be provided for, i.e. the holes for these elements must be at least 15 mm larger than the largest size of the anchoring element. To restore the surface tratment of the visible edges use the paint supplied for this purpose with every order. Assembly of other constructions (such as advertising signs) directly to the suspended façade coat is only possible as an exception on condition of static assessment and solution of joint forces from these constructions and from the coat with regard to thermal expansions of the individual materials.

Detail of bottom lining with overlap - CETRIS® board on wooden grid, VARIO system
Vertical section



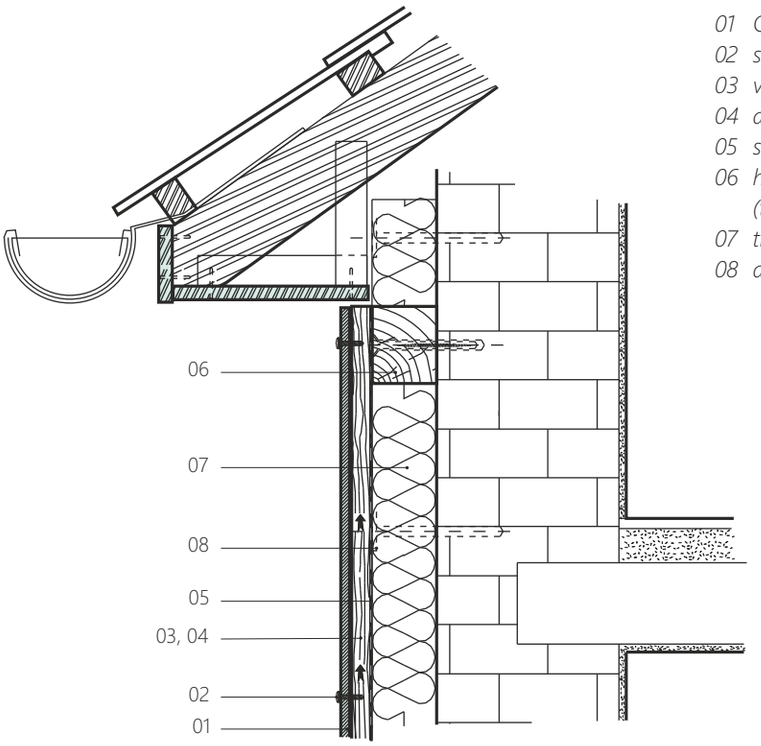
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 perforated ventilation profile (PROTECTOR)
08 thermal insulation
09 disc dowel

Detail of bottom lining with sheet metal lining - CETRIS® board on wooden grid, VARIO system
Vertical section



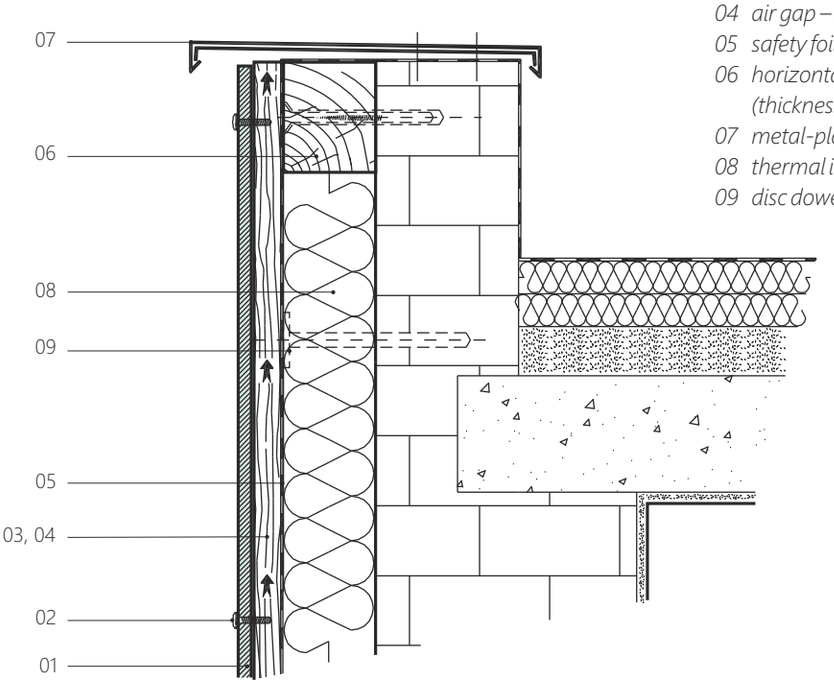
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 sheet metal plating – tinsmithing product
08 thermal insulation
09 disc dowel
10 perforated ventilation profile (PROTECTOR)

Detail of upper lining with roof construction overlap. CETRIS® board on wooden grid, VARIO system
Vertical section



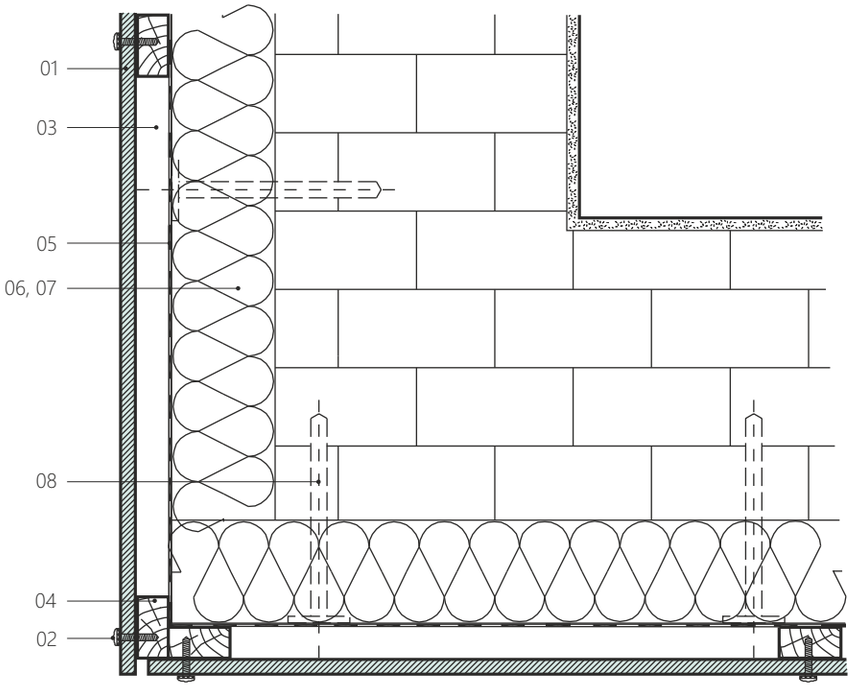
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap – min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel

Detail of upper ending with attic. CETRIS® board on wooden grid, VARIO system
Vertical section



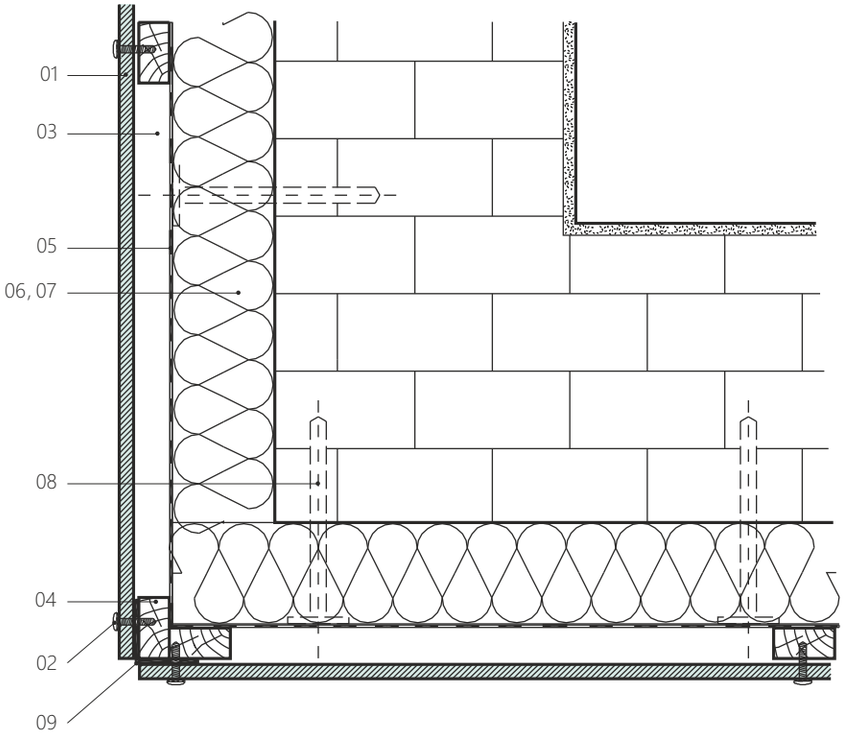
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap – min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 metal-plating – tinsmithing product
08 thermal insulation
09 disc dowel

Detail of exterior corner. CETRIS® board on wooden grid with overlap, VARIO system
Horizontal section



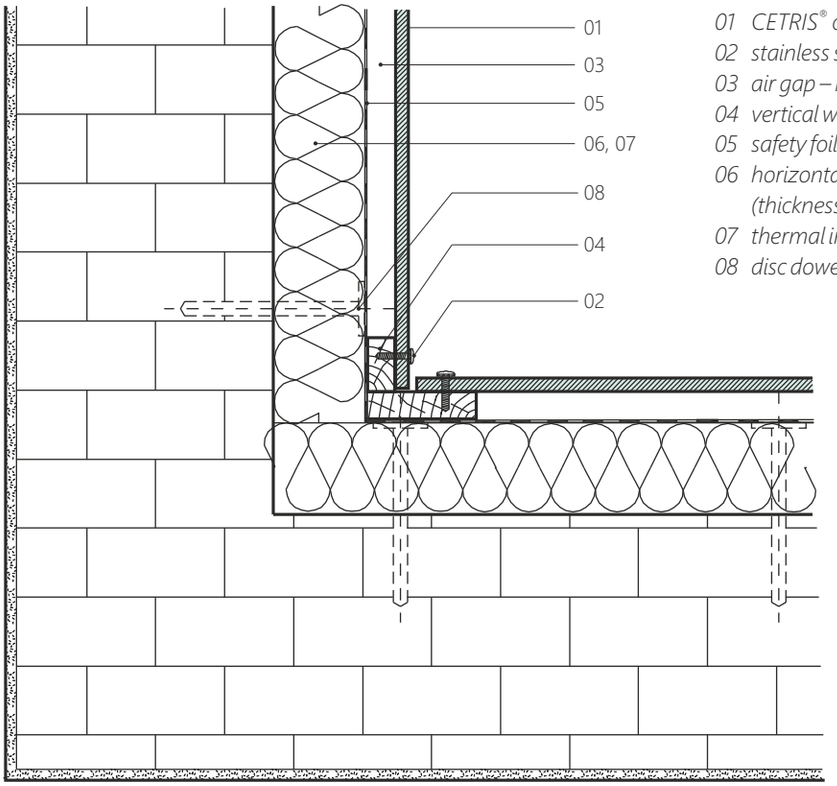
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel

Detail of exterior corner. CETRIS® board on wooden grid with corner profile, VARIO system
Horizontal section



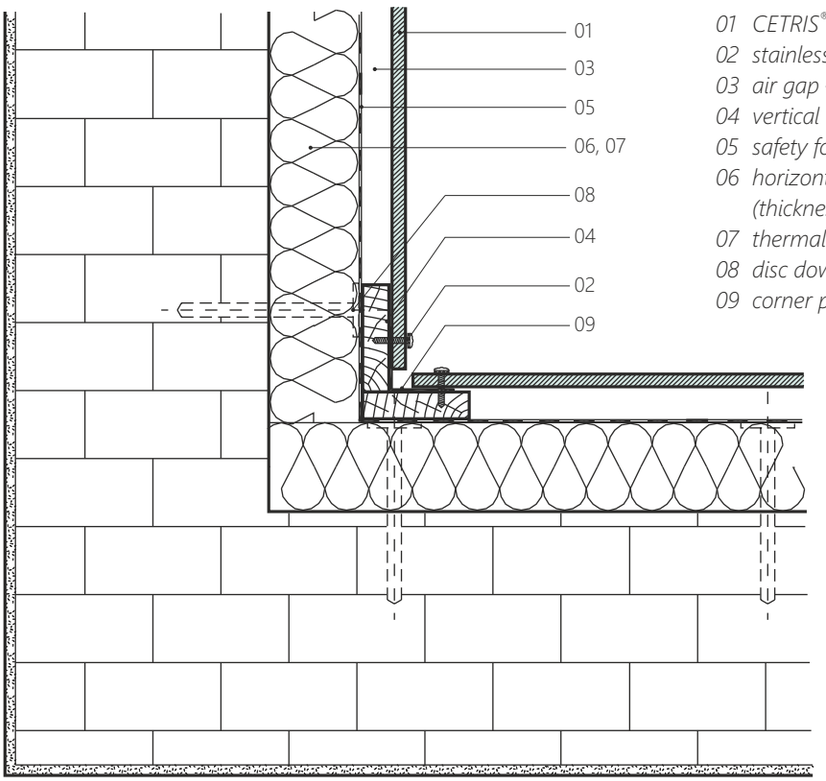
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel
09 corner profile – tinsmithing product, or PROTECTOR profile

Detail of interior corner. CETRIS® board on wooden grid with overlap, VARIO system
Horizontal section



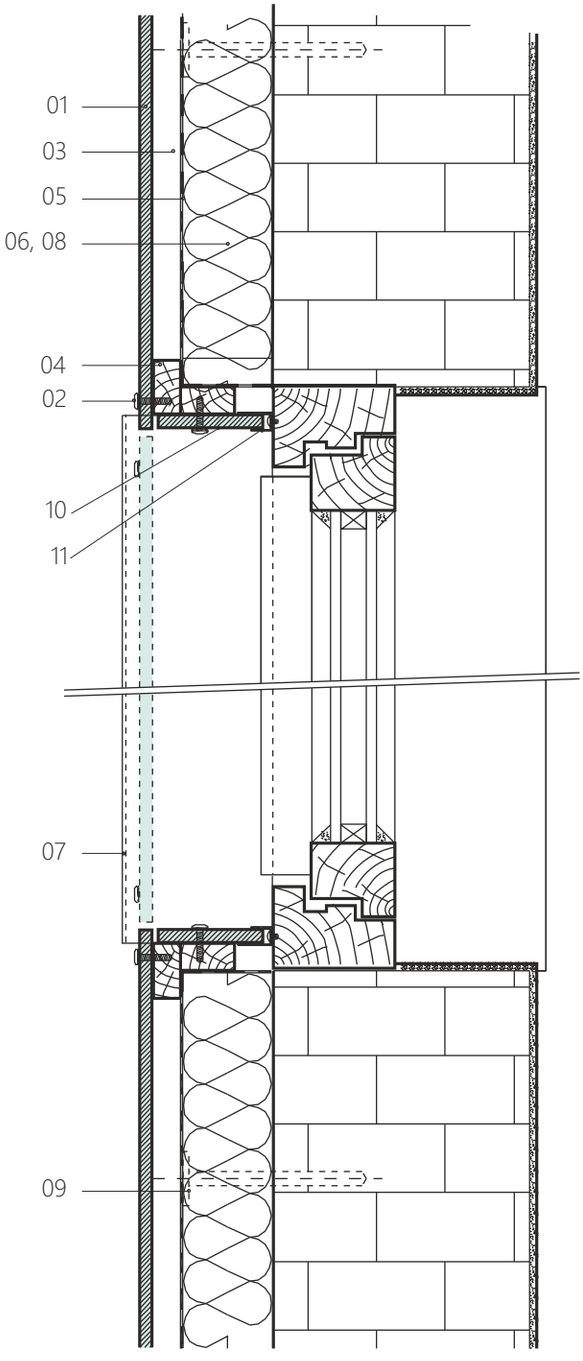
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel

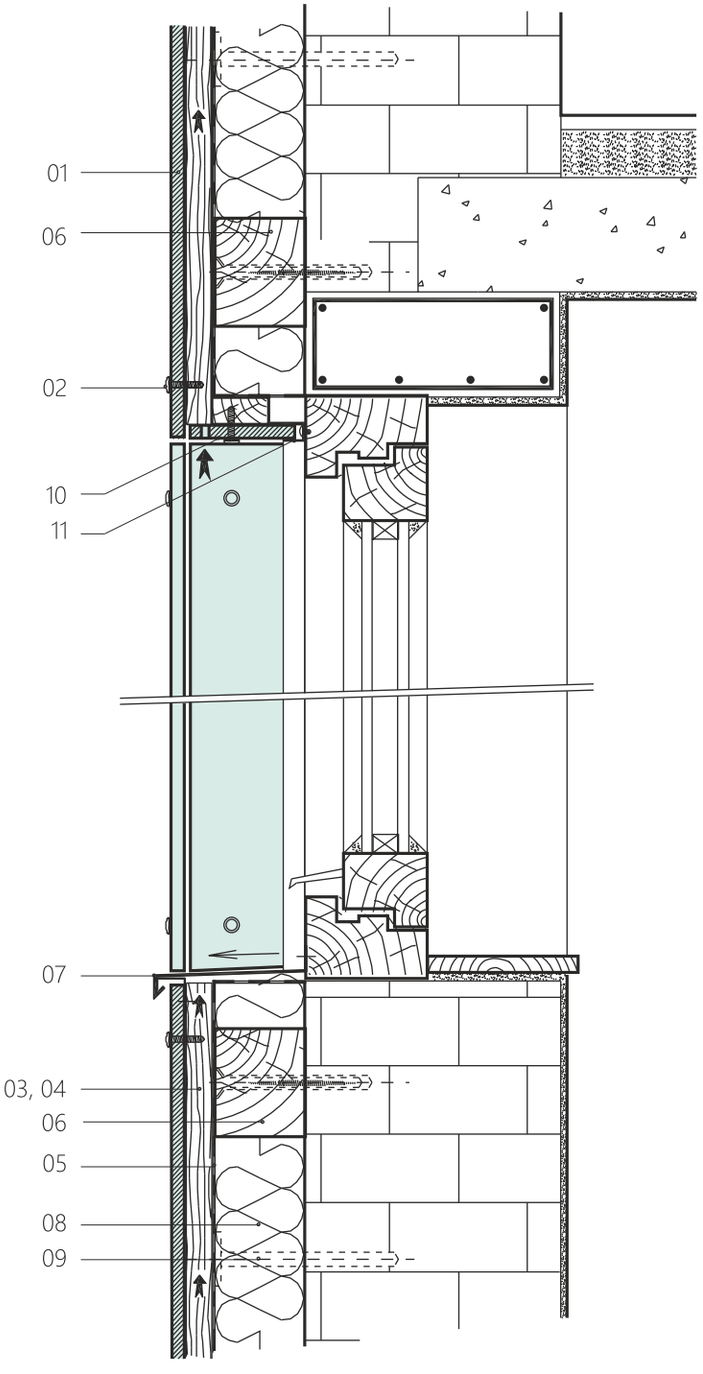
Detail of interior corner. CETRIS® board on wooden grid with corner profile, VARIO system
Horizontal section



01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel
09 corner profile – tinsmithing product, or PROTECTOR profile

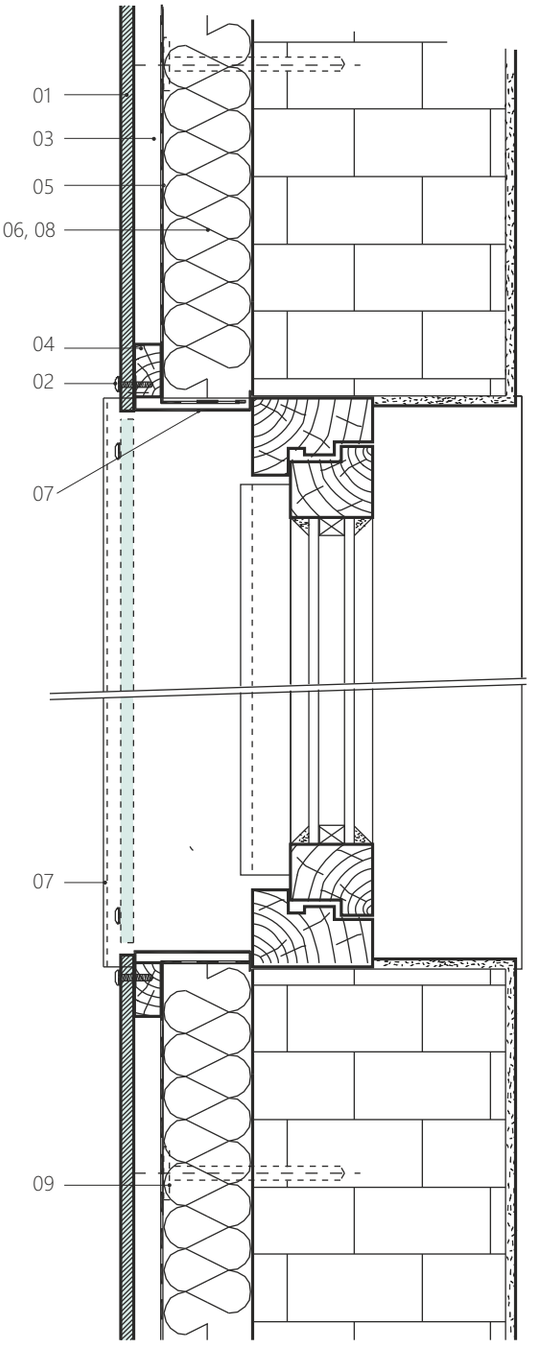
Detail of jamb and window head of opening, CETRIS® boards on wooden grid, VARIO system
Horizontal and vertical section

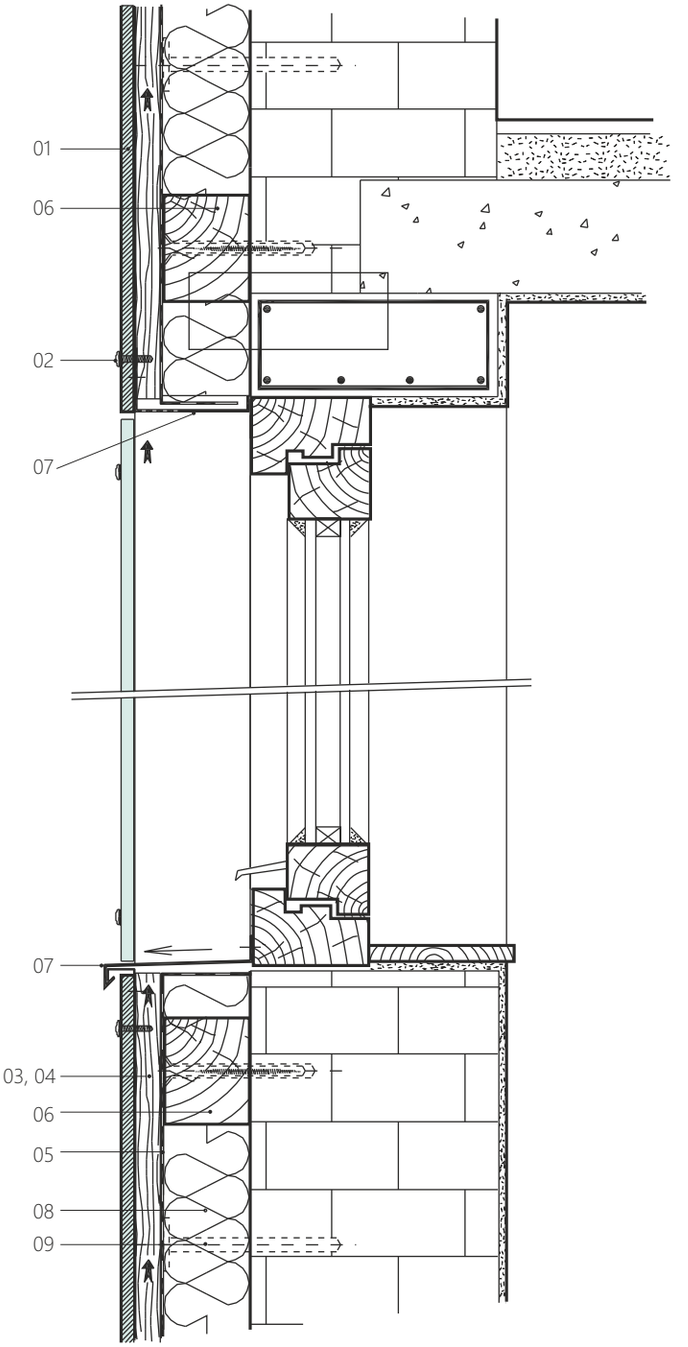




01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 metal-plating – tinsmithing product
08 thermal insulation
09 disc dowel
10 head jamb – perforated CETRIS® board
11 edge profile

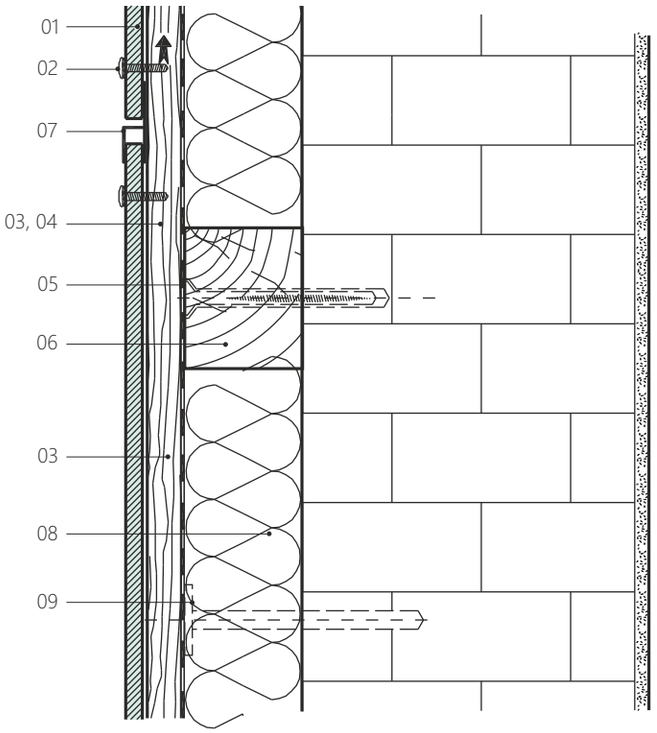
Detail of jamb and window head with sheet metal cladding of opening, CETRIS® boards on wooden grid, VARIO system
Horizontal and vertical section





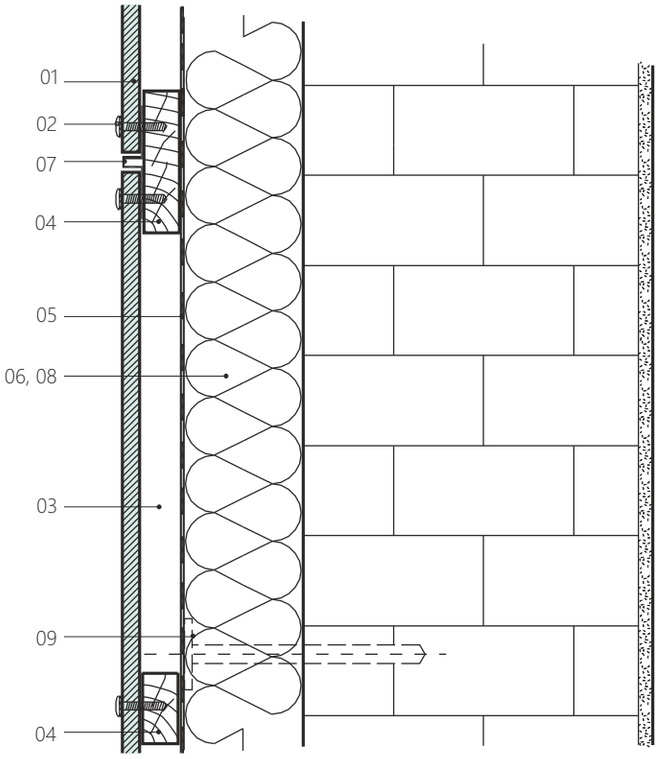
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 metal-plating – tinsmithing product
08 thermal insulation
09 disc dowel

Detail of horizontal joint. CETRIS® board on wooden grid, VARIO system
Vertical section



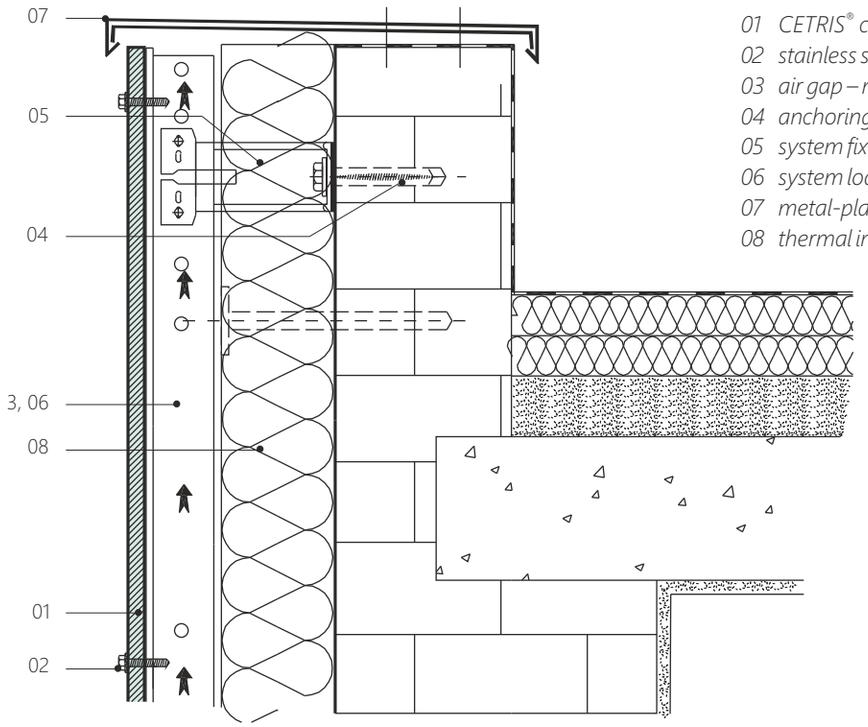
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 profile in joint – metal product, or profile protector
08 thermal insulation
09 disc dowel

Detail of vertical joint. CETRIS® board on wooden grid, VARIO system
Horizontal section



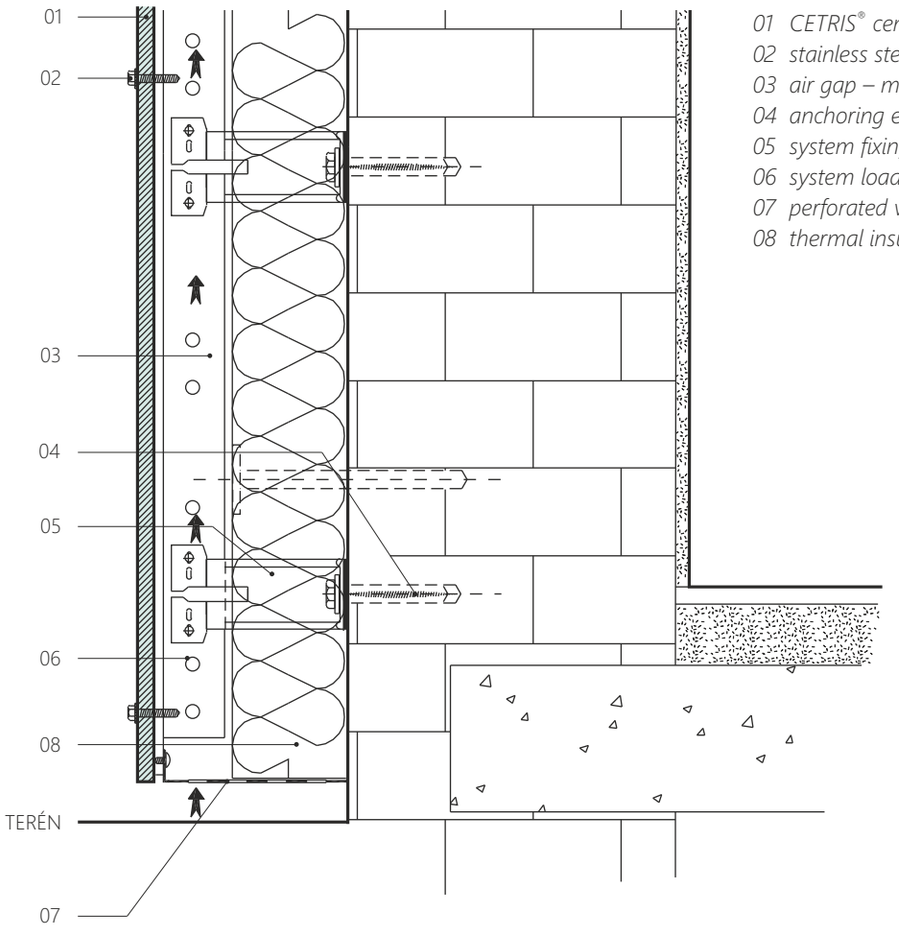
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 profile in joint – metal product, or profile protector
08 thermal insulation
09 disc dowel

Detail of upper ending with attic. CETRIS® board on system profiles, VARIO system
Vertical section



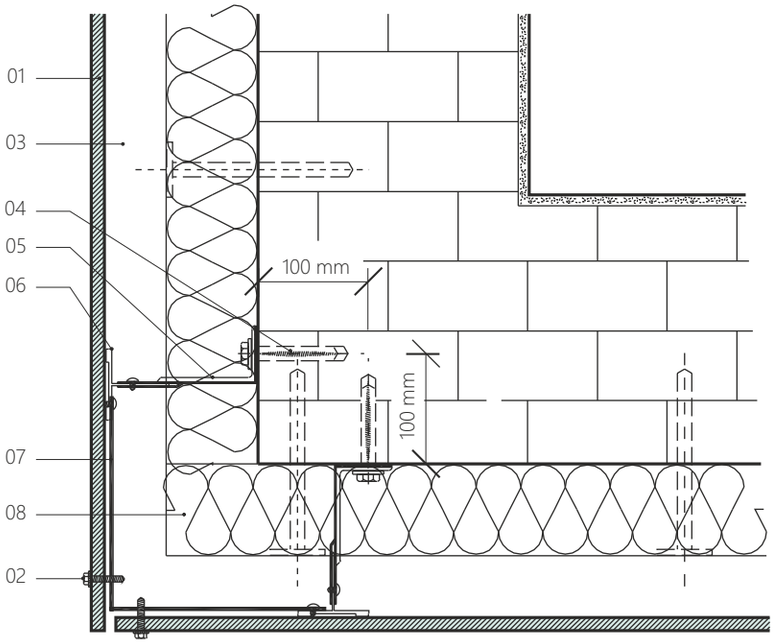
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile – angle
07 metal-plating – tinsmithing product
08 thermal insulation

Detail of bottom ending with overlap. CETRIS® board on system profiles, VARIO system
Vertical section



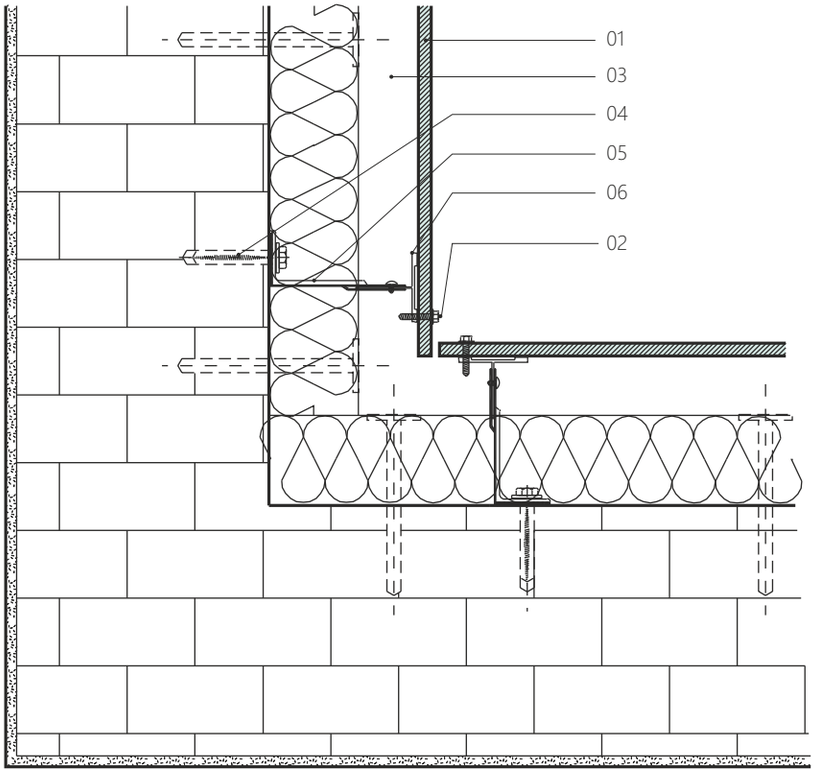
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile – angle
07 perforated ventilation profile (PROTECTOR)
08 thermal insulation

Detail of exterior corner. CETRIS® board on system profiles, VARIO system
Horizontal section



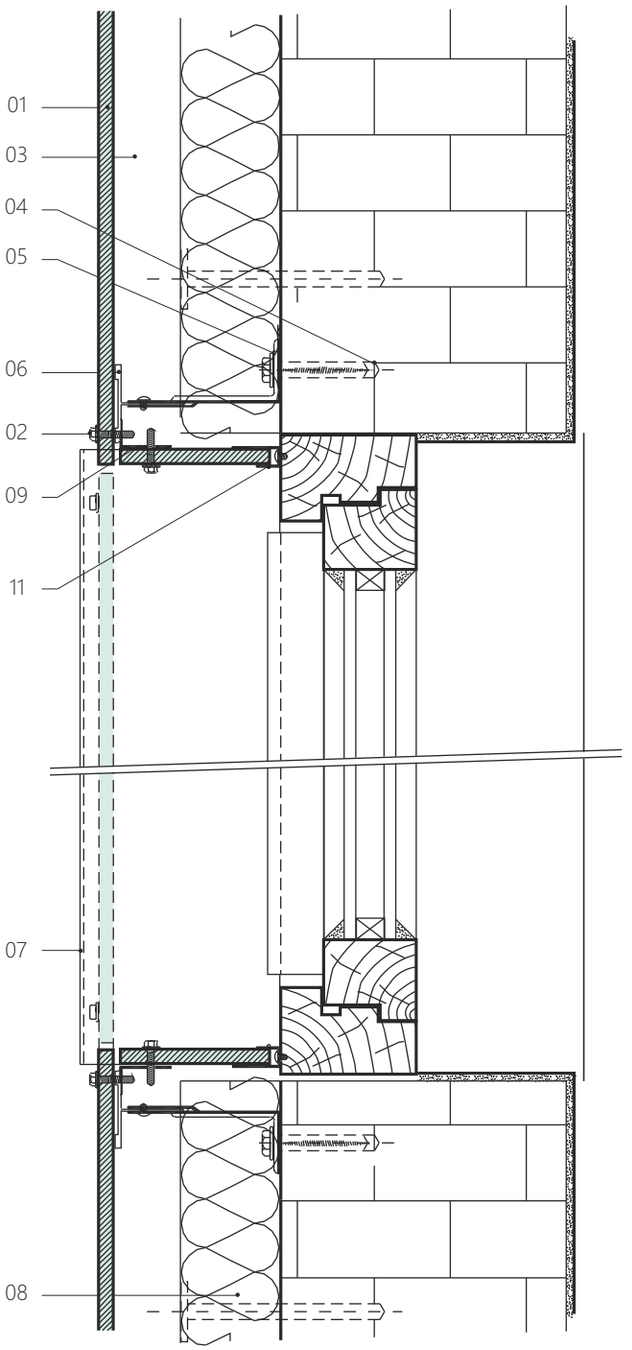
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 aluminium L profile (500 mm)
08 thermal insulation

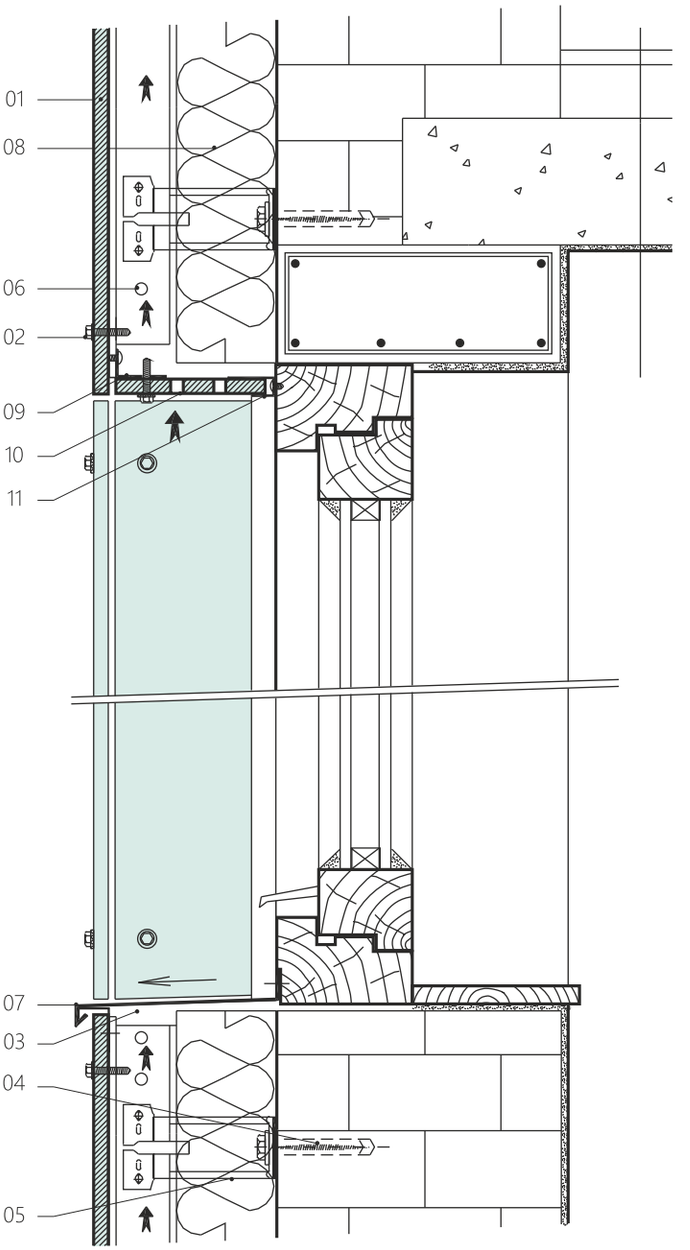
Detail of interior corner. CETRIS® board on system profiles, VARIO system
Horizontal section



01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile

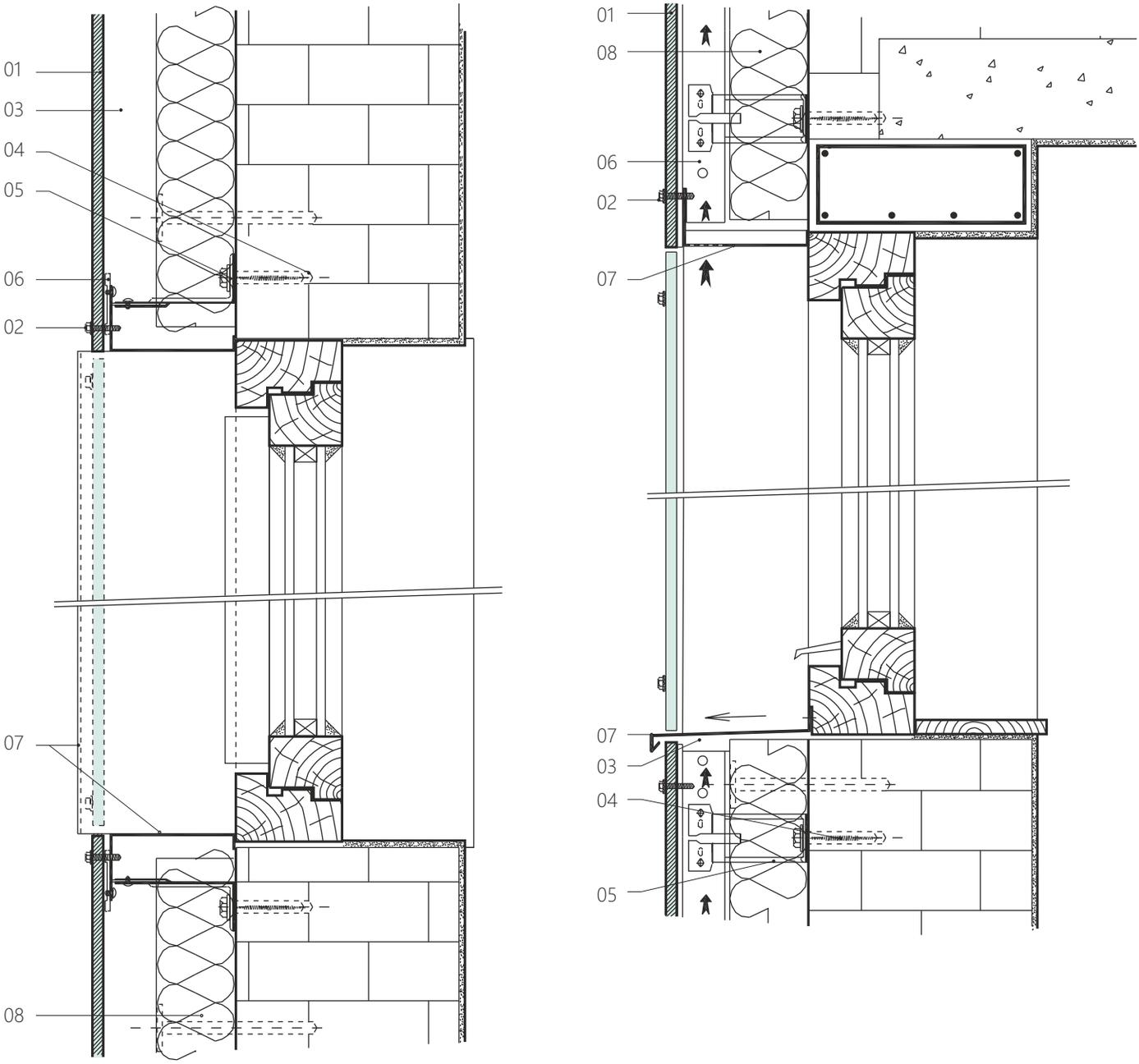
Detail of jamb and window head with opening sheet metal cladding of the opening, CETRIS® boards on system profiles, VARIO system
Horizontal and vertical section





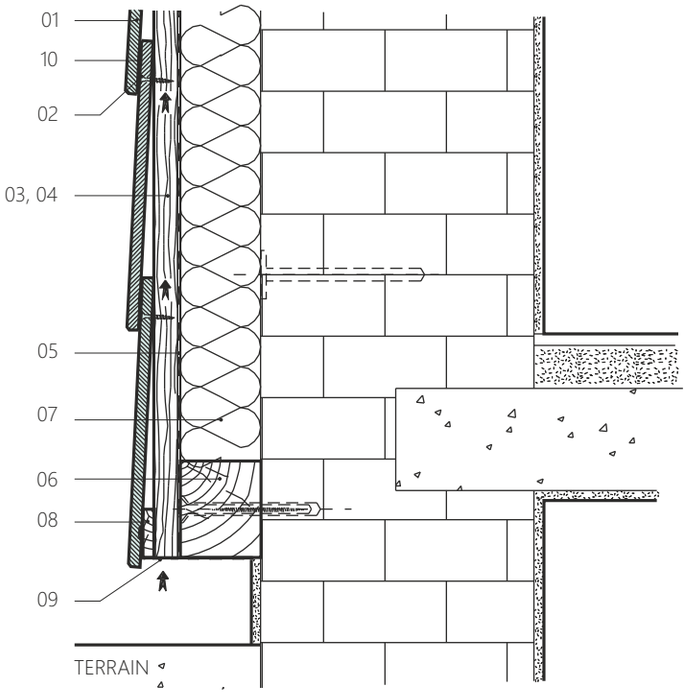
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 aluminium L profile
10 head jamb – perforated CETRIS® board
11 edge profile

Detail of jamb and window head with opening sheet metal cladding of the opening, CETRIS® boards on system profiles, VARIO system
Horizontal and vertical section



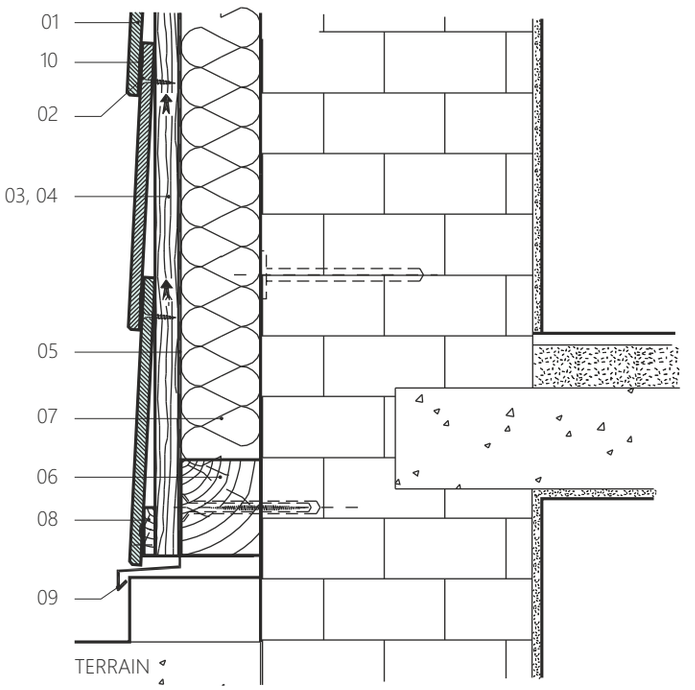
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation

Detail of bottom ending. CETRIS® board on wooden grid, PLANK system
Vertical section



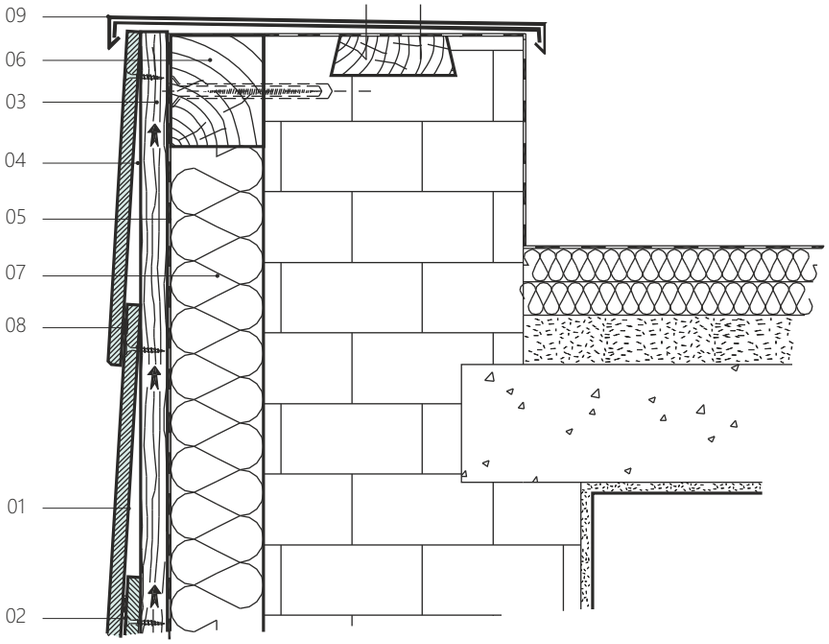
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath with a width of 100 mm (thickness according to the insulation)
07 thermal insulation
08 base plate
09 perforated ventilation profile (PROTECTOR)
10 elastic sealant

Detail of bottom ending with sheet metal cladding. CETRIS® board on wooden grid, PLANK system
Vertical section



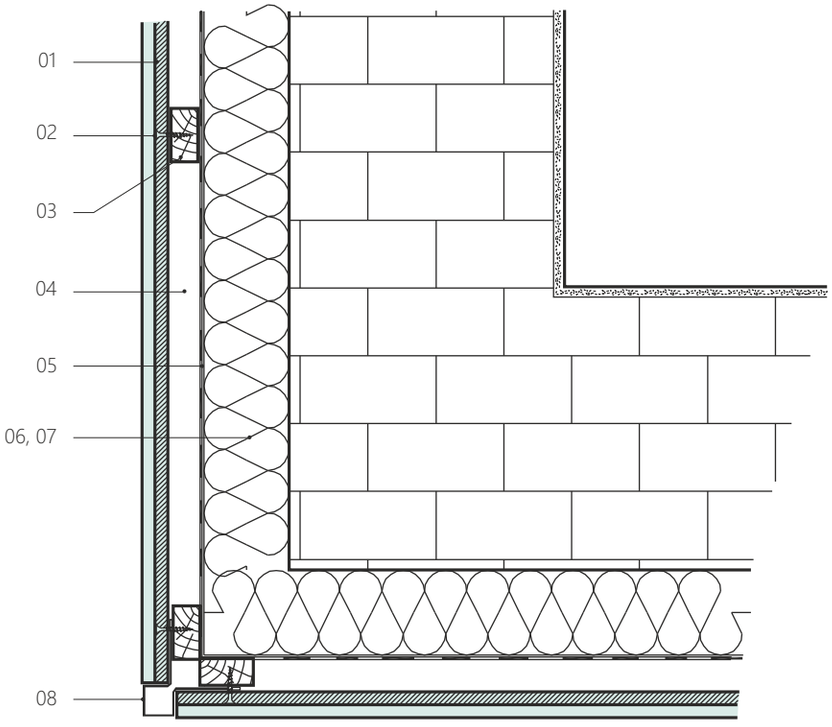
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath with a width of 100 mm (thickness according to the insulation)
07 thermal insulation
08 base plate
09 perforated ventilation profile (PROTECTOR)
10 elastic sealant

Detail of upper ending of the CETRIS® board on a wooden grid, PLANK system
Vertical section



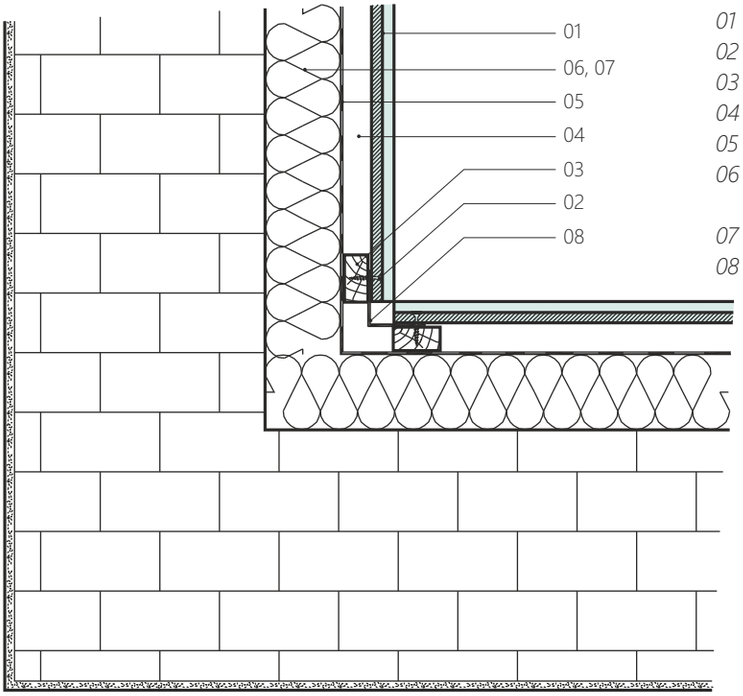
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width 100 mm (thickness according to the insulation)
07 thermal insulation
08 elastic sealant
09 metal-plating – tinsmithing product

Detail of exterior corner. CETRIS® board on wooden grid with corner profile, PLANK system
Horizontal section



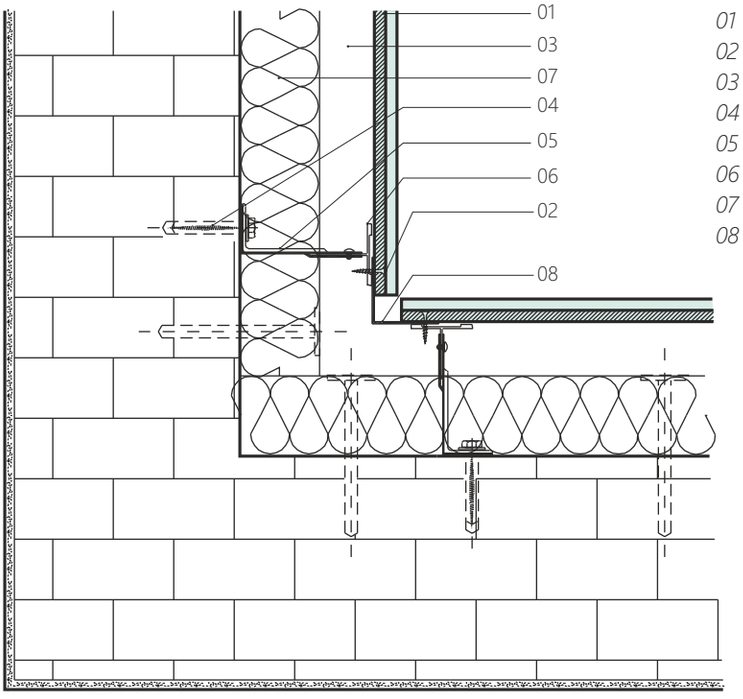
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width 100 mm (thickness according to the insulation)
07 thermal insulation
08 corner profile – tinsmithing products, or PROTECTOR profile

Detail of interior corner. CETRIS® board on wooden grid with corner profile, PLANK system
Horizontal section



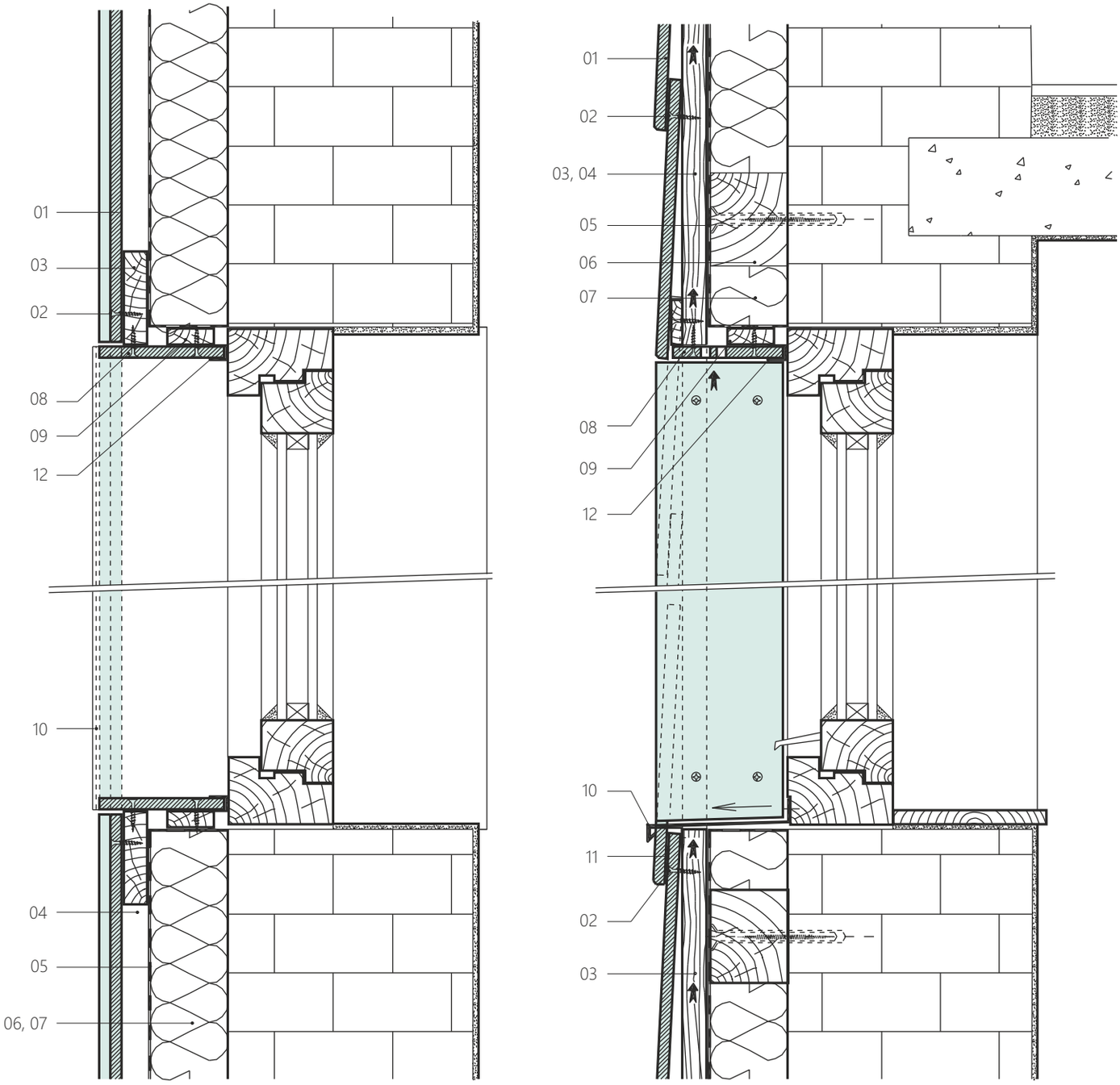
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath with a width of 100 mm (thickness according to the insulation)
07 thermal insulation
08 corner profile – tinsmithing product, or PROTECTOR profile

Detail of interior corner. CETRIS® board on system profiles with corner profile, PLANK system
Horizontal section



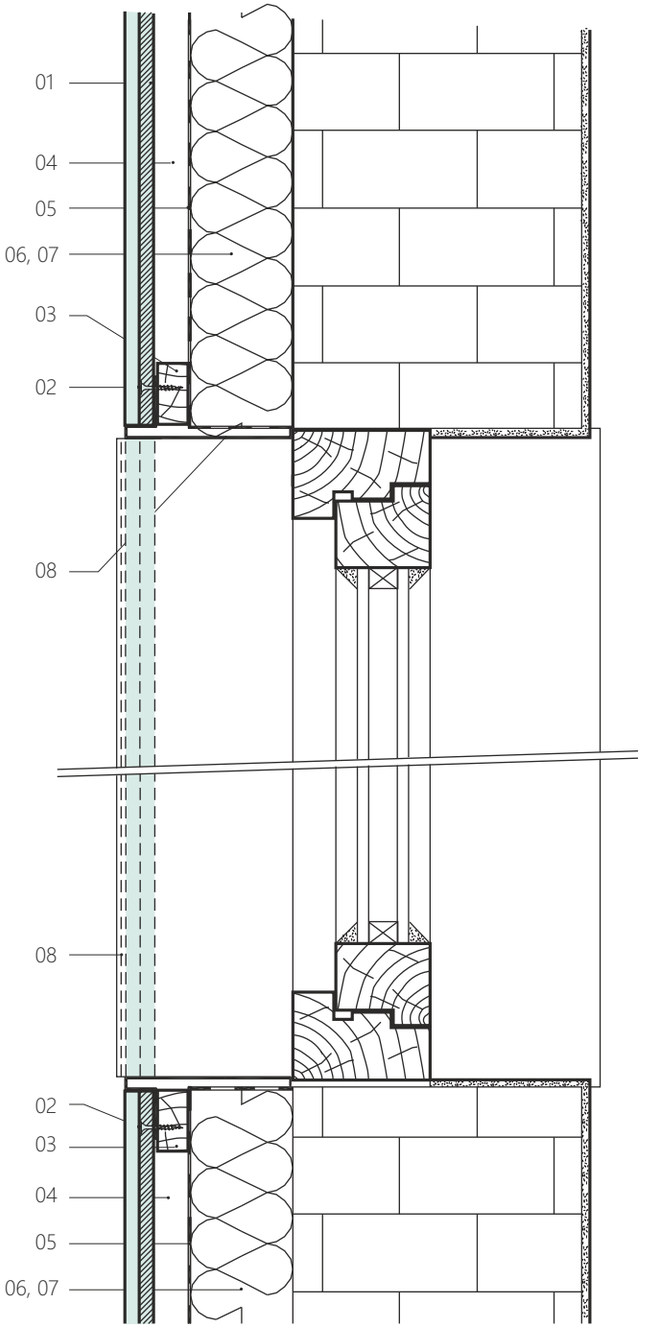
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 thermal insulation
08 corner profile – tinsmithing product, or PROTECTOR profile

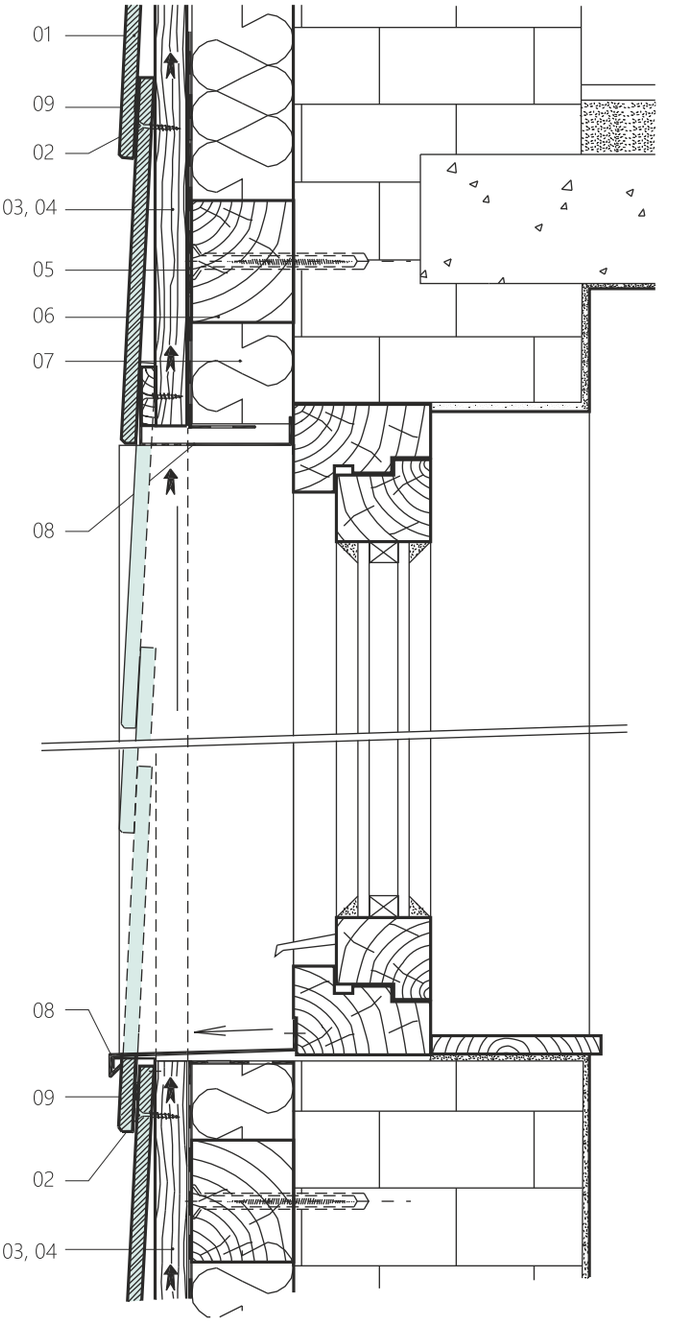
Detail of jamb and window head of opening, CETRIS® boards on wooden grid, PLANK system
Horizontal and vertical section



01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap – min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 jamb (window head) cladding – perforated CETRIS® board
09 wooden board thickness 18 mm
10 metal plating – tinsmithing product, or PROTECTOR profile
11 elastic sealant
12 end profile (PROTECTOR)

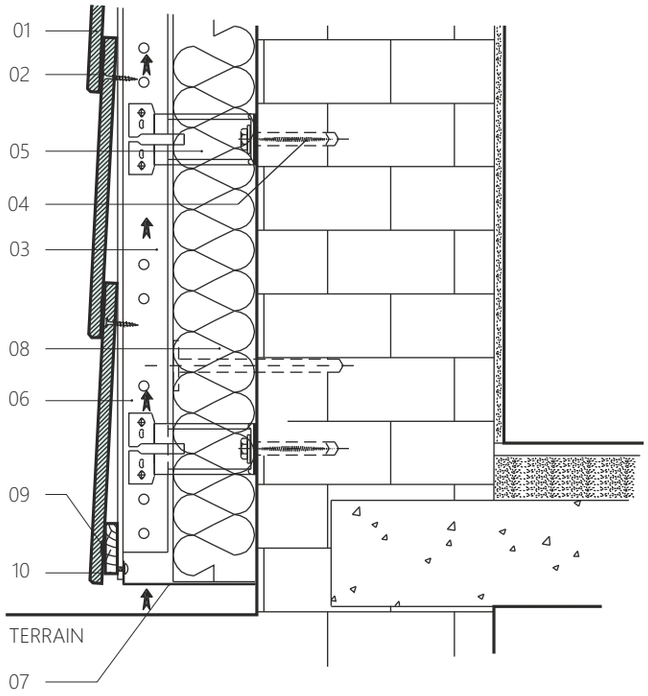
Detail of jamb and window head of opening with sheet metal cladding, CETRIS® boards on wooden grid, PLANK system
Horizontal and vertical section





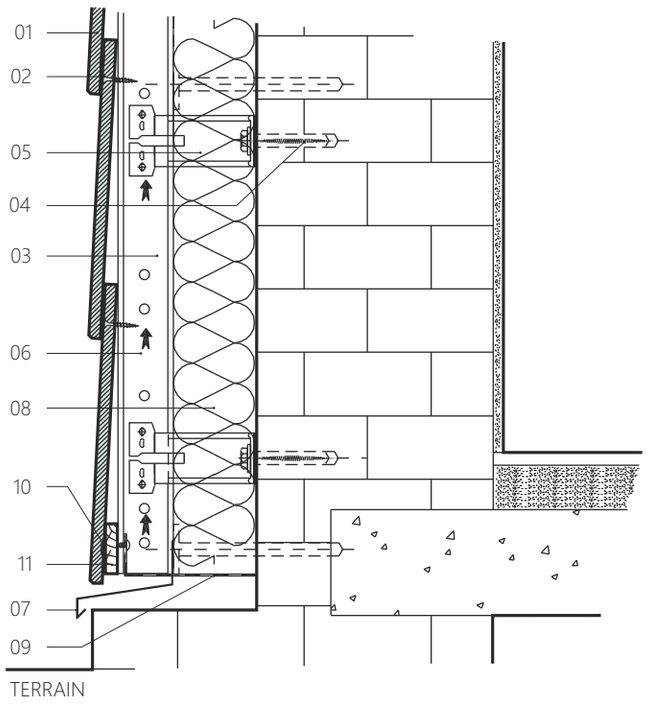
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 metal plating – tinsmithing product, or PROTECTOR profile
09 elastic sealant

Detail of bottom end with overlap. CETRIS® board on system profiles, PLANK system
Vertical section



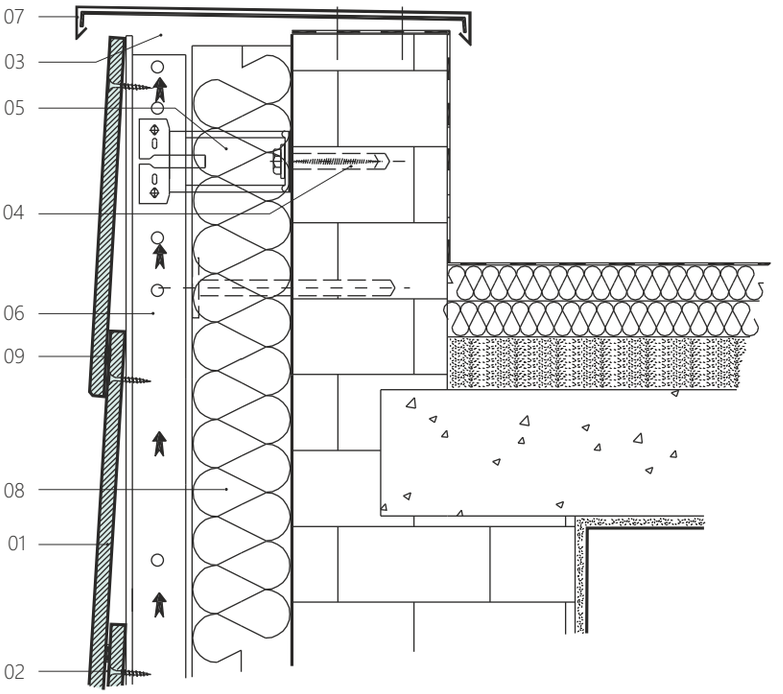
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 perforated ventilation profile (PROTECTOR)
08 thermal insulation
09 elastic sealant
10 base plate

Detail of bottom end with sheet metal cladding. CETRIS® board on system profiles, PLANK system
Vertical section



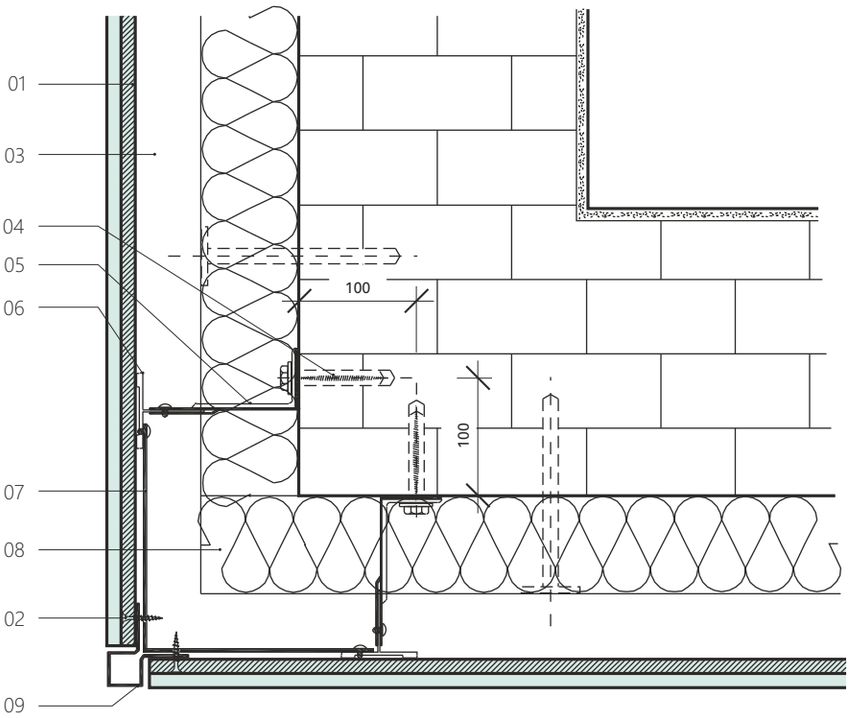
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 perforated ventilation profile (PROTECTOR)
10 elastic sealant
11 base plate

Detail of upper end. CETRIS® board on system profiles, PLANK system
Vertical section



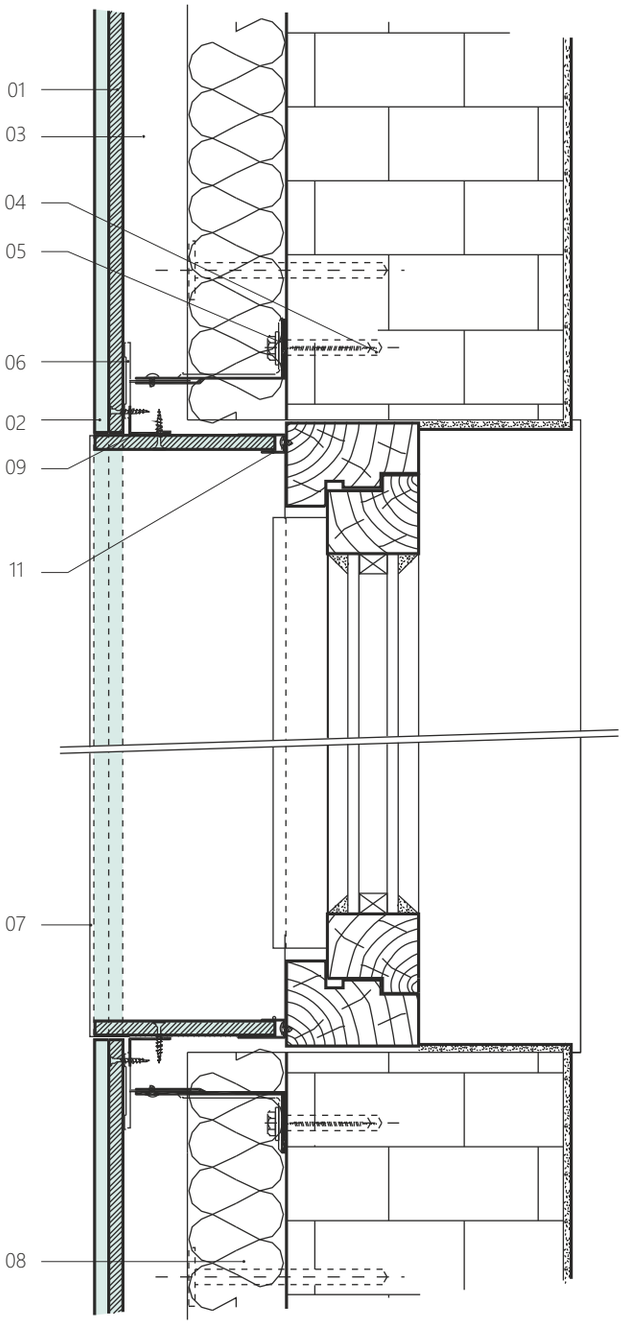
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 elastic sealant

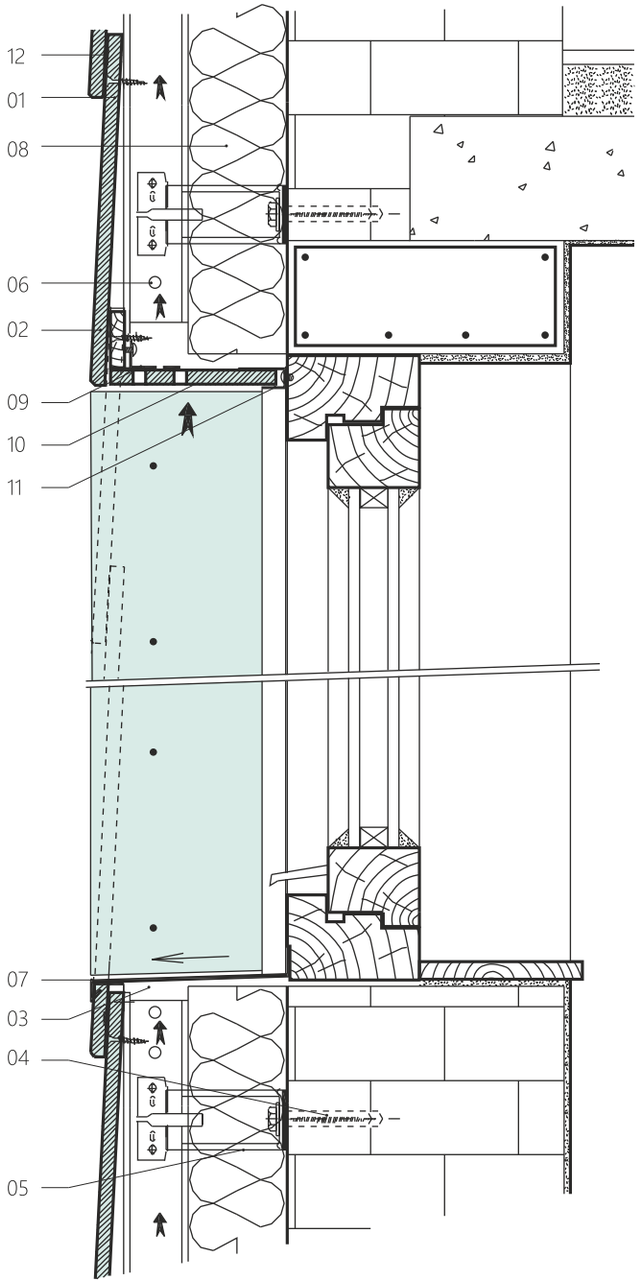
Detail of exterior corner. CETRIS® board on system profiles, PLANK system
Horizontal section



01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 aluminium "L"-profile
08 thermal insulation
09 corner profile – metal product, or PROTECTOR profile

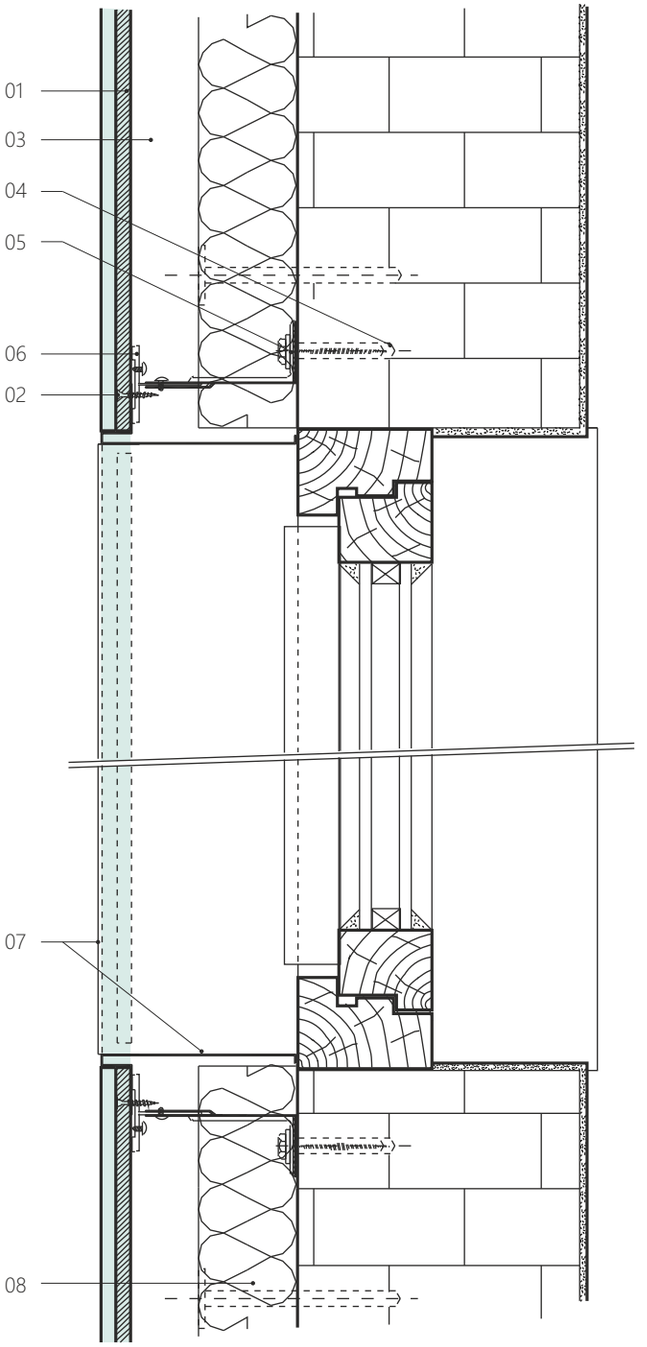
Detail of jamb and window head of opening, CETRIS® boards on system profiles, PLANK system
Horizontal and vertical section

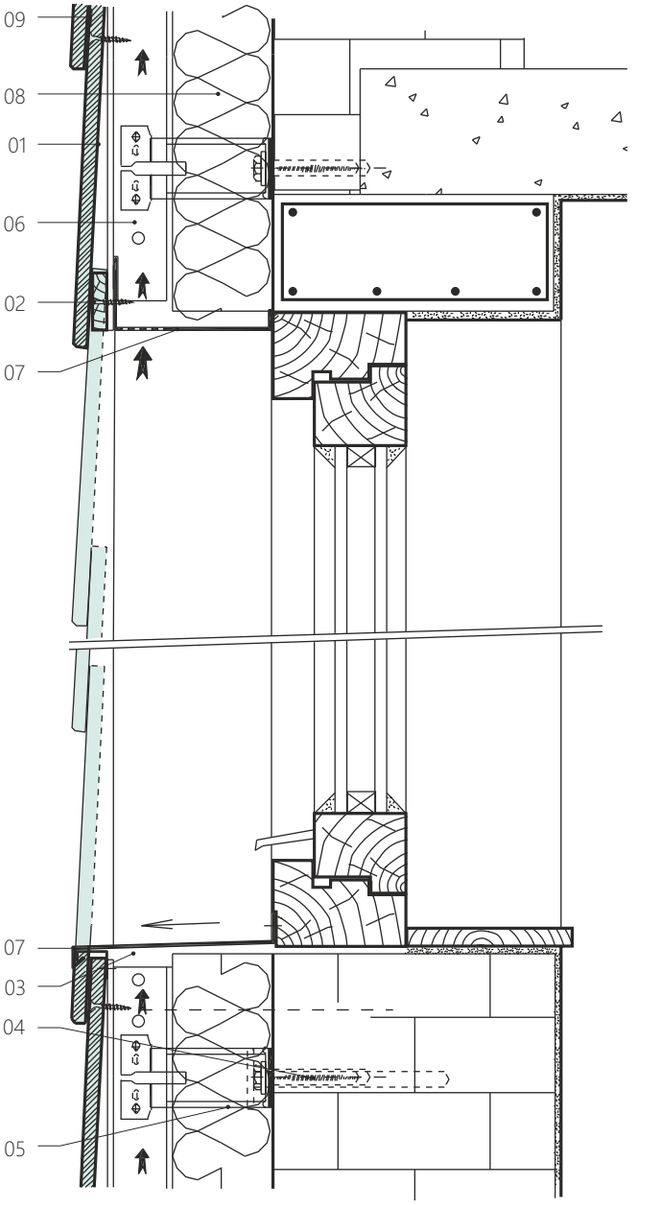




01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 aluminium "L"-profile
10 jamb (door head) cladding – perforated CETRIS® board
11 end profile
12 elastic sealant

Detail of jamb and window head of opening with sheet metal cladding. CETRIS® boards on system profiles, PLANK system
Horizontal and vertical section





01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 elastic sealant

7.2 CETRIS® Board Guardrail Panels, Terraces,Loggia, Balconies

For its high resistance to weather, fire and mechanical damage, the CETRIS® cement bonded particleboard is used as a cladding element for exterior applications. Apart from building cladding, the CETRIS® board can also be used as a panels of railings, staircases, balconies, terraces, loggias, etc.

To prevent injuries or material damage in the case of disintegration of these constructions, these thin walled and light constructions must be impact tested.

Security and usability of infill railings on balconies, terraces, and loggias is assessed according to the standard ČSN 74 3305 Guardrails. A critical examination verifies the reliability of the railings on the effects of impact load. In this test, the railing must resist the soft impact with energy impact according to the table.

This impact test is used to demonstrate the safety of railings against impact of a person. The test sample, which corresponds to the real execution of the railing, is exposed to the impact of the specimen with the desired incident energy, perpendicularly to the surface of the railing. The soft impact represents a bag filled with small glass balls of 3 mm diameter and the total weight of 50 kg.

The point of impact is directed to the places with the least resistance of the railing – mostly in the middle of the railing. After the impact the state of panel is assessed – among others, the impact must not create a hole through which a ball with a diameter of 76 mm can pass, or create a crack up to the edges of the panel.

Utilisation category of the area according to EN1991-1-1	Determination of use	Impact energy value (J)
A	Residential areas and areas for domestic activities	Min. 150
B, C, D, E	Office areas Areas where people may gather Business areas	Min. 250

Recommended and tested variants of solutions of CETRIS® board railing panels

1) CETRIS® board panel of thickness 14 mm fixed mechanically to the frame with screws or rivets.

In this variant, the panel – CETRIS® board of minimum thickness 14 mm – is fixed to the load-bearing construction with screws or rivets. The load-bearing frame is made of steel profiles 40 × 40 × 4 mm, maximum distance of vertical supports is 625 mm.

This mode of installation is subject to the same principles as apply to façade cladding. Due to thermal expansion of metal and contraction of CETRIS® boards caused by changes in humidity, we distinguish two principles for installation of CETRIS® boards according to the maximum length of the size used.

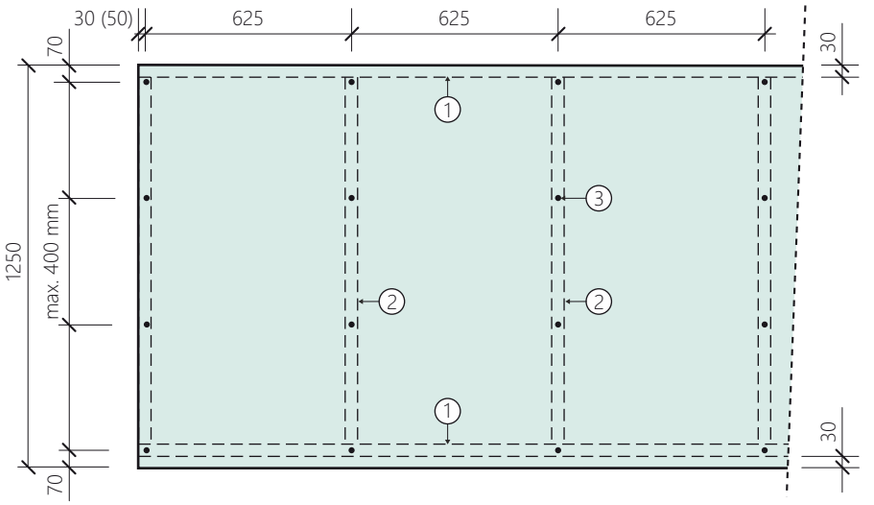
Length up to 1,670 mm:

- the boards are installed with a minimum gap of 5 mm
- the CETRIS® board has pre-drilled holes that are 5 mm larger than the diameter of the screw/bolt/rivet used whereby one of the pre-drilled holes (mostly at centre) always has the same diameter as the screw/bolt/rivet used and this is the, so-called, fixed point. Its position is chosen according to the size and orientation of the board
- screws with washers and sealing rubbers are used for anchoring – the recommended type is SFS SX 3/20 - 5.5 × 50 mm (clamping thickness 20 mm) or rivets – recommended types: ETANCO open Al/stainless steel rivet 4.8 × 24 mm (clamping length 20 mm), SFS AP 16-50210-S 5 × 21 mm (clamping thickness 18 mm)
- the position of the edge screw / rivet from the vertical edge is in the range 30 - 50 mm, and from the horizontal edge 70 - 100 mm, the maximum distance of the screws in the vertical direction of the supports is 400 mm.

Length over 1,670 mm:

- the boards are installed with a minimum gap of 10 mm
- the CETRIS® board has pre-drilled holes that are 7 mm larger than the diameter of the screw/bolt/rivet used whereby one of the pre-drilled holes (mostly at centre) always has the same diameter as the screw/bolt/rivet used and this is the, so-called, fixed point. Its position is chosen according to the size and orientation of the board
- screws with washers and sealing rubbers are used for anchoring – the recommended type is SFS SX 3/20 - 5.5 × 50 mm (clamping thickness 20 mm) or rivets – recommended types: ETANCO open Al/stainless steel rivet 4.8 × 24 mm (clamping length 20 mm), SFS AP 16-50210-S 5 × 21 mm (clamping thickness 18 mm)
- the position of the edge screw / rivet from the vertical edge is in the range 50 - 70 mm, and from the horizontal edge 70 - 100 mm, the maximum distance of the screws in the vertical direction of the supports is 400 mm. In cases where there is no possibility to comply with the required minimal edge distance, it is possible to glue the entire vertical edge of CETRIS® board to a vertical support (e.g. DenBraven Mamut Glue High Tack).

Load-bearing construction and mechanical anchoring of railing fill – CETRIS® board 14 mm



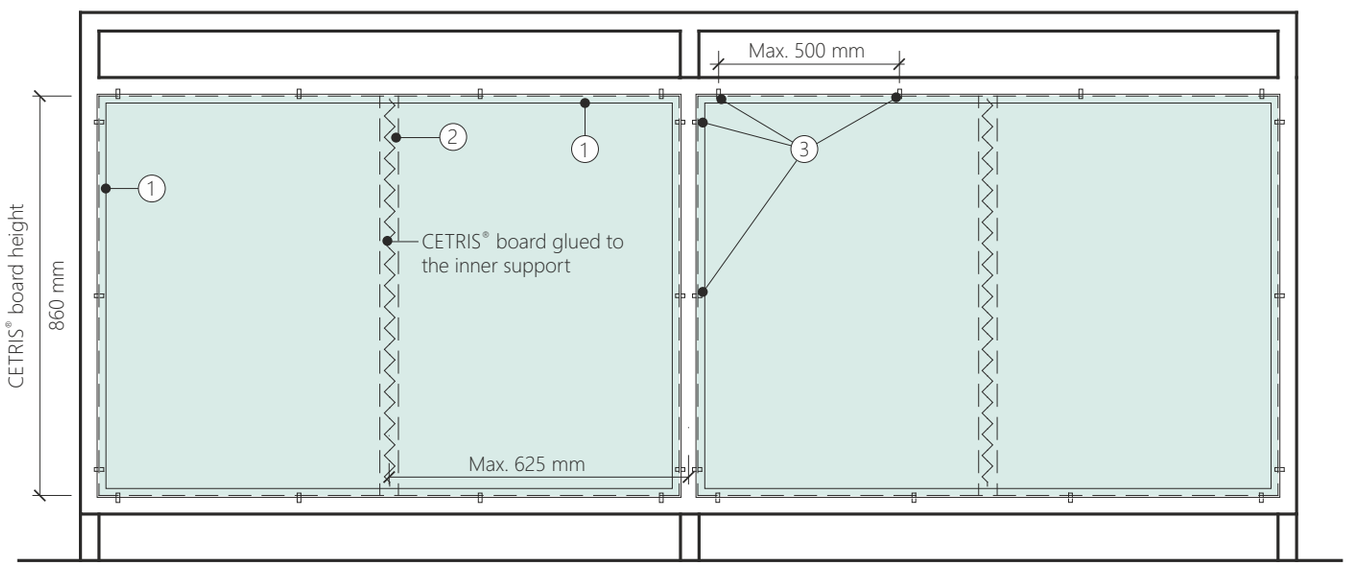
1 Horizontal profile (axial distance max 1250 mm)
2 Vertical profile (axial distance max 625 mm)
3 Screw with washer and sealing rubber

2) CETRIS® board panel of thickness 16 mm (or 10 mm) – fixed in the peripheral lath and glued to the inner braces

CETRIS® board, used for railing panel, is inserted in a F-shaped lath with edge dilation 3 – 5 mm. The adjusted board is installed in the peripheral frame with vertical braces. The F lath is riveted to the frame along the perimeter (maximum spacing 500 mm); it is fixed to the inner vertical brace of the CETRIS® board with DenBraven Mamut Glue High Tack glue. No anchoring element is visible from the visible side.

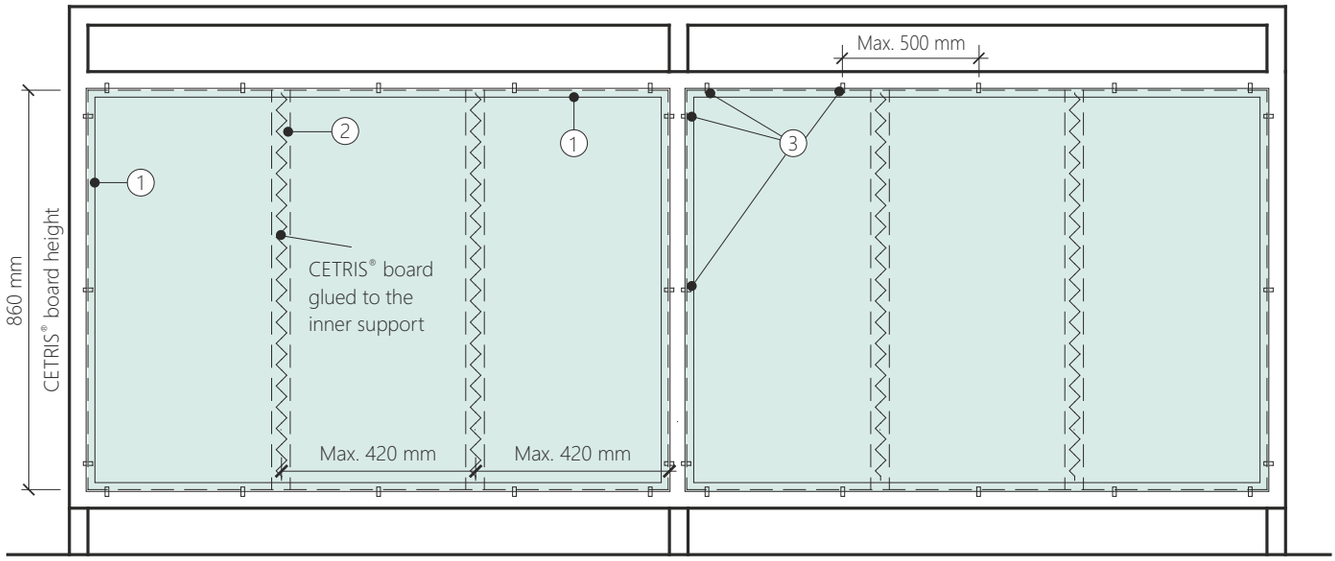
When using a CETRIS® board of thickness 16 mm, the maximum available spacing of the inner vertical reinforcements is 625 mm. A suitable type of the peripheral lath is the F profile PROAL 74009.

1 Aluminium F-profile PROAL 74009 – for board thickness 16 mm)
2 Vertical brace 40×25×4 mm
3 Rivets – joining of the F-profile to the frame



When using a CETRIS® board of thickness 10 mm, the maximum possible spacing of the inner vertical reinforcements is 420 mm. A suitable type of the peripheral lath is the F profile PROAL 74008.

1 Aluminium F-profile PROAL 74008 – for board thickness 10 mm
2 Vertical brace 40×25×4 mm
3 Rivets – joining of the F-profile with the frame



250 J All these variants have been successfully certified for higher impact energy – i.e. 250 J, they are therefore suitable for all application classes.

7.3 Suspended Ceilings - Cladding of Roof Overhangs using CETRIS® Boards

CETRIS® cement bonded particleboards are also widely used for horizontal or oblique cladding of roof construction overlaps. The conditions for anchoring of the boards and their types differ for various environments and appearances.

Board type selection

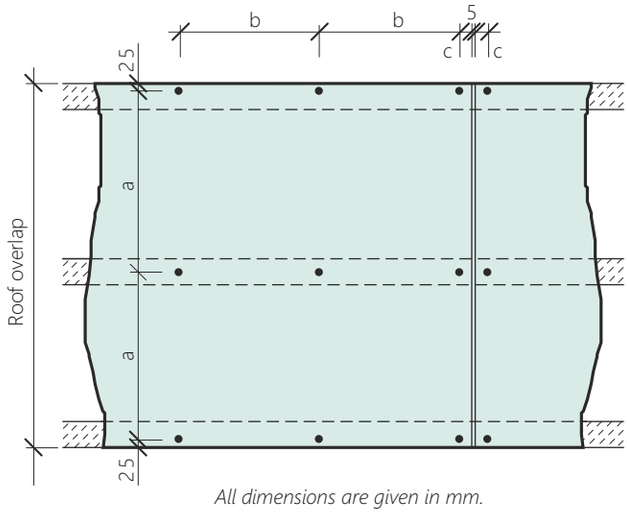
Cladding of the exterior of constructions may be done using basic CETRIS® BASIC, PROFIL, INCOL boards without surface treatment whose surfaces can be treated prior to installation, or some CETRIS® boards with surface treatment– FINISH, PROFIL FINISH, LASUR, PROFIL LASUR, DEKOR boards. The basic CETRIS® BASIC board or the CETRIS® PLUS board with acrylic primer is used for cladding constructions in the interior and exterior under the contact thermal insulation system.

Type of support

- Single-direction wooden lath grid with a minimum width of 50 mm. If the lath lies at the joint of two boards, its minimum width must be at least 80 mm, or two laths of width 50 mm must be used side by side)
- CD galvanised profiles. If the profile lies at the joint of two boards, then two profiles must be used side by side

Choice of board thickness, distance of the supports

These two parameters are mutually related, the same principles apply to the cladding and the façade system, only the maximum distance of the screws is reduced to 1/2 the support span due to the horizontal position. Due to the weight of the cladding boards, CETRIS® boards with thicknesses of 8-10-12 mm may be used.

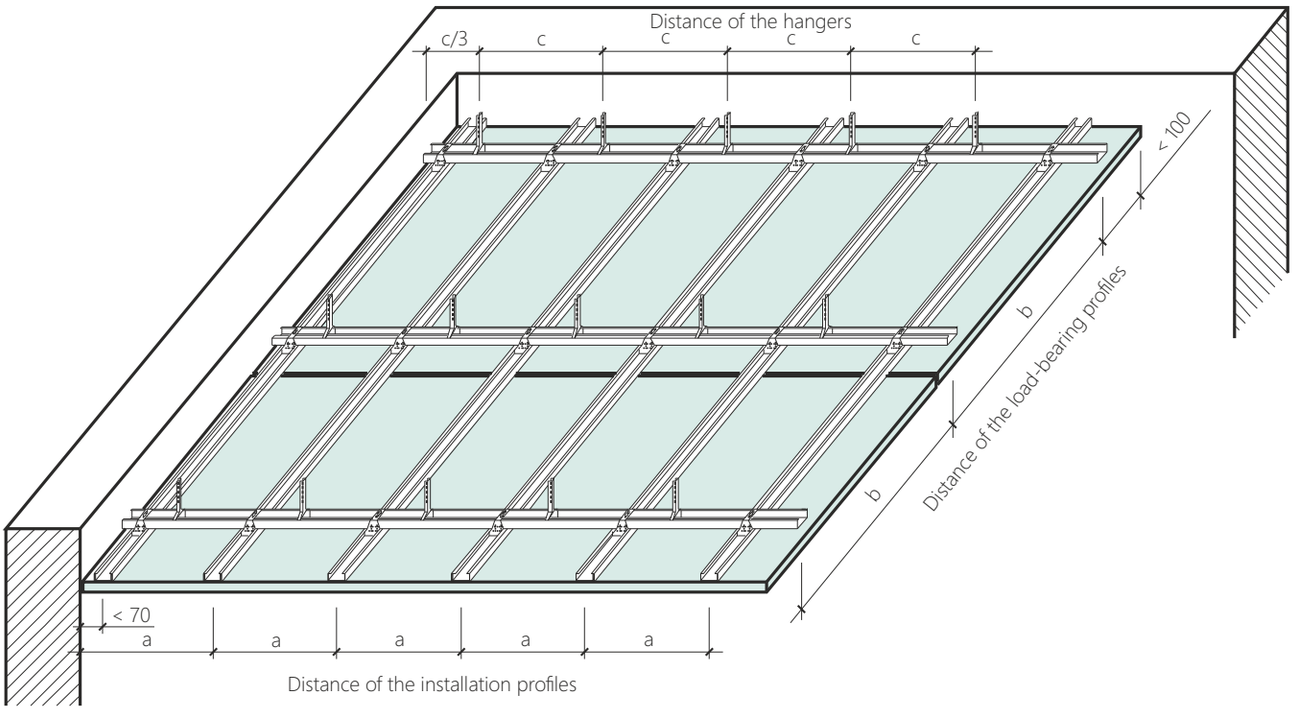


All dimensions are given in mm.

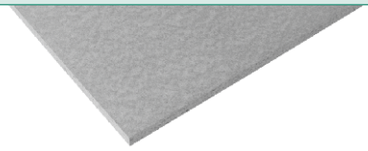
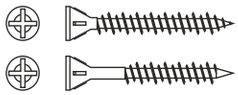
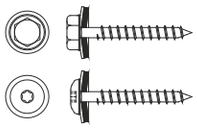
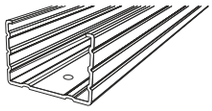
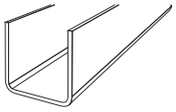
Load-bearing construction – wooden laths			
Board thickness (mm)	Support distance a (mm)	Screw distance b (mm)	Distance of screw from board edge c (mm)
8	400	200	>25 <70
10	500	250	
12	625	300	

Load-bearing construction – galvanised CD profiles					
Board thick-ness (mm)	Hanger spacing c (mm)	Distance of the load-bearing profiles b (mm)	Distance of the assembly profiles a (mm)	Screw distance (mm)	Distance of the screws from the board edge (mm)
8	420	1000	420	200	>30 <100
10			500	250	
12			625	300	

Diagram of the load-bearing construction of the ceiling for cladding with CETRIS® cement bonded particleboard (thickness 12 mm)



Materials for assembly of the suspended ceilings

Description	Visualisation	Note
CETRIS® BASIC board Cement bonded particleboard, smooth surface, cement grey. Basic format 1,250x3,350 mm Density1320±70 kgm-3		Board thicknesses 8, 10, 12 mm
Screw 4.2x25, 35, 45, 55 mm Self-tapping screws with counter-sunk heads		For anchoring of the boards in the interior or exterior under the contact thermal insulation system
Screw 4.2 – 4.8 x 38, 45, 55 mm Stainless steel or galvanised screws with half-round or hex head with thrust water-tight washer		Screw type (length) according to the thickness of the cladding. The screw is intended for anchoring the top layer of CETRIS® boards in the exterior where the board remains visible. The board must have pre-drilled holes of minimum diameter 8 (10) mm!
CW profile 75, 100 (vertical) Galvanised sheet metal profile 75x50x0.6 mm 100 x 50 x 0.6 mm		It forms a load-bearing grid for installation of the ceilings. They are fixed using a straight or Nonius hanger on the suspended floor (roof) construction.
UD profile Galvanised open sheet-metal profile of dimensions 28 × 27 × 0.6 mm, length 3.00 m.		It is used to anchor the ceiling to the walls, masonry with steel dowels
Connection for CD profile		For mechanical connection of CD profiles.
Direct hanger of thickness 1 mm, length 125 mm, load capacity 40 kg		Used to hang the metallic CD profile grid on the wooden beams of the roof ceiling constructions.
Nonius hanger of load capacity 40 kg Three-part system used for fixing the CD profile grating to the load-bearing construction of the suspended floor		It allows setting of various gap heights in the ceiling and load-bearing construction.
Cross-coupling		Used for mechanical mutual connection of crossing CD profiles lying one above the other.
Wooden lath with a cross-section of 60 × 40 mm.		It forms a wooden base construction (assembly and load-bearing profile). It is dry impregnated timber class S10 (strength class C24).

7.4 Cladding of the Building Substructure (Skirting) - Using CETRIS® Boards

The CETRIS® cement bonded particleboard is used as cladding of the hanging ventilated façade; it is also suitable for cladding of the building substructure – skirting.

Board type selection
Cladding of the skirting may be done using basic CETRIS® BASIC boards to which surface finish shall subsequently be applied or any of the CETRIS® boards with surface treatment - FINISH, FINISH PROFIL, LASUR or DEKOR boards.

Choice of board thickness, distance of the supports
These two parameters are mutually related, the same principles apply to the cladding and the façade system. The minimum recommended thickness of the CETRIS® board is 10 mm and for higher mechanical load (exposed areas – roads), we recommend a CETRIS® board of thickness 14 or 16 mm.

Type of support
Most often the CETRIS® board is anchored on an auxiliary single direction wooden lath grid (minimum width 50 mm, if the lath is positioned at the joint, of two boards - minimum width is 80 mm).

A recommended solution for anchoring of impregnated wooden elements with simultaneous levelling of the surface is the use of STEN distance screws. It is also possible to use galvanised L profiles (or J profiles) installed on anchors (brackets) – e.g. the DEKMETAL DKM1A system.

Skirting			
Board thickness (mm)	Support distance (mm)	Screw distance (mm)	Distance of the screws from the board edge (mm)
10	<500	<400	>25 <70
12	<625	<500	
14			
16			

The general principles of anchoring, solution of the joints and surface treatment of the ceilings, underlining of the roofs and skirting

Board anchoring
CETRIS® boards are anchored with visible head screws (hexagonal or semi-lens + rubber lined washer, the CETRIS® board is pre-drilled, the pre-drilled hole diameter is 8 mm (board length up to 1,600 mm) or 10 mm., all using screws of diameter 4 – 5 mm. Sunken head screws are used for anchoring of the CETRIS® boards in the interior under the contact thermal insulation system. The screw type must be adapted to the type of support (wood - galvanising), optimally with a conical head and self-tapping blades. The CETRIS® boards are pre-drilled to 1.2 multiple the diameter of the screw used.

Solution of the joints dilatation
Exterior – the joint between the individual board formats is left open in most cases and its size depends on the CETRIS® board size (up to 1,670 mm – minimum joint width of 5 mm, above 1,670 mm – minimum joint width of 10 mm).

Interior – CETRIS® boards cannot be laid flush, a minimum joint of 4 – 6 mm must be created according to the board size.
Dilatation spaces are usually in the direction of the assembly profiles with a maximum spacing of 6 m because in the opposite direction, the profiles/laths are doubled at the contact point of the two boards. The dilatation space must be ensured at the dilatation point of the CETRIS® boards. In the interior, it is necessary to let the CETRIS® boards to acclimatize in the given environment for a period of at least 48 hours.

Surface treatment
Exterior – CETRIS® boards with surface treatment (FINISH, PROFIL FINISH, LASUR, PROFIL LASUR, DEKOR) need not be processed further on site, it suffices to install them with visible joint and anchor them to the load-bearing construction: The CETRIS® BASIC or PROFIL can be coated prior to assembly.

Interior – for an appearance without joints and visible screw heads, the only solution is application of a full area plaster system.

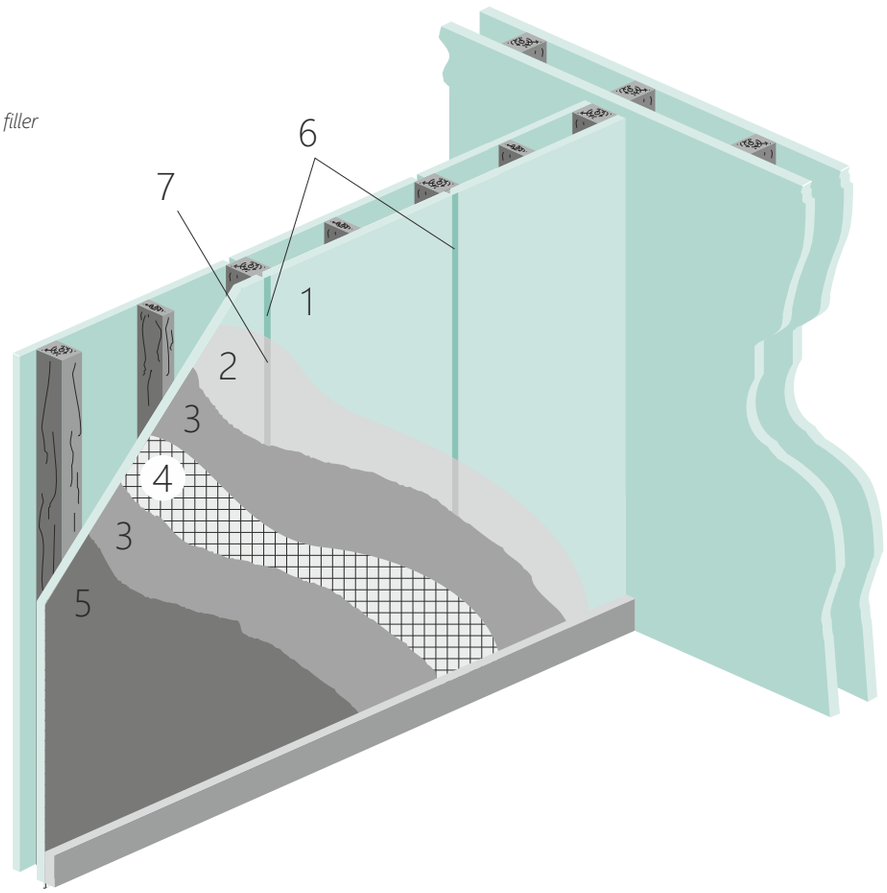
Exterior without joints – for an appearance without joints and visible screw heads, the only solution is application of a full area plaster system including full area gluing of 30 mm insulation (polystyrene, mineral wool).

Plasters in the interiors

Plastering creates a surface finish with an invisible joint.

The CETRIS® boards must first be primed, the joints must be filled with permanently elastic filler. Subsequently a trowel-on coating is applied on the full surface and the glass-fibre bandaging material is embedded in it. After the smoothing layer, the levelling plaster is re-applied and then the final finish is applied. We recommend use of the complete system of one surface finish manufacturer and observation of the technological procedures of the given manufacturer. The back side of the CETRIS® board must be treated with at least one coating layer (for instance, primer – base coat or coat with higher diffusion resistance) to prevent bending of the board during surface finishing work on the face of the board.

1 CETRIS® cement bonded particleboard
2 primer
3 filling compound
4 bandage fabric
5 plaster
6 dilatation joint
7 permanently elastic joint filler



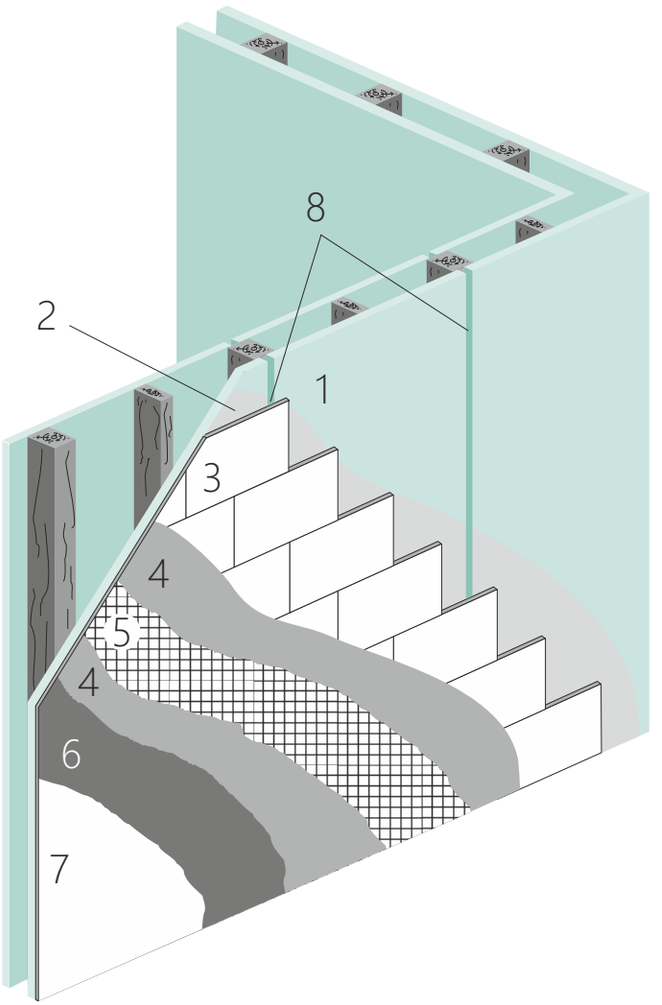
Exterior Plasters

Application of plasters is surface finishing with an invisible joint. The CETRIS® boards continuously expand and shrink as a result of humidity dilatation movements. To prevent damage of the façade plaster by hair-thin cracks caused by these movements, it is necessary to cover the CETRIS® board with an insulation board (polystyrene, mineral wool) with the minimum thickness of 30 mm or mechanicaly anchor it. When using a CETRIS® cement bonded particleboard of max. format 1,250 x 1,250 mm, an insulation board thickness of 20 mm suffices. The insulation will create a separation layer to which other layers are applied, like in the case of the contact thermal insulating systems – filling compound, bandage, noble plaster.

The CETRIS® boards must be treated with a penetration agent, the joints need not be filled in this case. Polystyrene and mineral wool are glued with cement glue or low-expansion foam to cover the joints between the CETRIS® cement bonded particleboards. Subsequently a trowel-on coating is applied on the full surface and the glass-fibre bandaging material is embedded in it. After the smoothing layer, the filling compound is re-applied and is followed by the final finish.

1 CETRIS® cement bonded particleboard
2 primer
3 insulation board
4 filling compound
5 bandage fabric
6 priming
7 plaster
8 dilatation joint

Mechanical anchoring of insulation boards to CETRIS® boards is implemented with disc dowels (self-tapping screw with disc head of high-quality polyethylene). The number of anchoring elements are specified by the manufacturers of the insulation boards, or the manufacturer of the discs shall be minimum 4 pieces/m^2.



Recommended products:
EJOT SBH-T 65/25, screw diameter 4.8 mm, anchoring length 20 – 40 mm. Used in combination with the self-tapping screws EJOT® Climadur-Dabo SW 8 R.