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10.1 SIMEK System – LON (light steel consoles)

The structural system of company SIMEK SYSTEM – LON spol. s r.o. (Ltd.), Bratislava – Slovakia is a modern, low energy consumption system for high quality habitation. The system is composed from a bearing skeleton of the building (walls, ceiling, roof) from light truss girders. The other necessary functions fulfil the auxiliary materials – board type lining materials, especially CETRIS® cement-bonded particleboards. The whole system, in combination with this material, achieves the requested building – physical parameters, including the fire endurance. The CETRIS® board is in the SIMEK SYSTEM used for creation of floor structure and for lining of peripheral structure.

The economic effectiveness of the system is determined namely with steel consoles. The structure has – at a very low total volume weight – a very high strength. The whole system is environmentally friendly – the consoles are made from cold rolling profiles and by welding. All used materials have the necessary at-tests on environmental and hygienic suitability.



10.1.1 The floor structure of SIMEK SYSTEM

The bearing structure of the floor (ceiling) is composed from steel truss girders of type A 50/8-230 (250) of 230 (250) mm in height, in 400 – 500 m spacing, according to the span and the effective load. A self-adhesive sound-insulating tape of type POLIFOAM 50/5 mm is stuck to the console upper flange. The CETRIS® boards are put on the consoles in two layers; 14-mm thick boards are used. A thermal insulation from mineral felt is laid down between the consoles and the whole is covered with moisture-stop foil. The lower CETRIS® board is screwed to the consoles with help of self-drilling screws. The second layer is laid down with overlapping and it is riveted to the lower layer with explosive rivets for to achieve the perfect composite action. The spacing of connecting elements should observe the technologic instructions (see the article 5.1). The boards are laid down tightly without joints; the dilatation joints are created around the walls in a width of 15 mm. On such way prepared flooring structure the all achievable floor cover materials can be used:

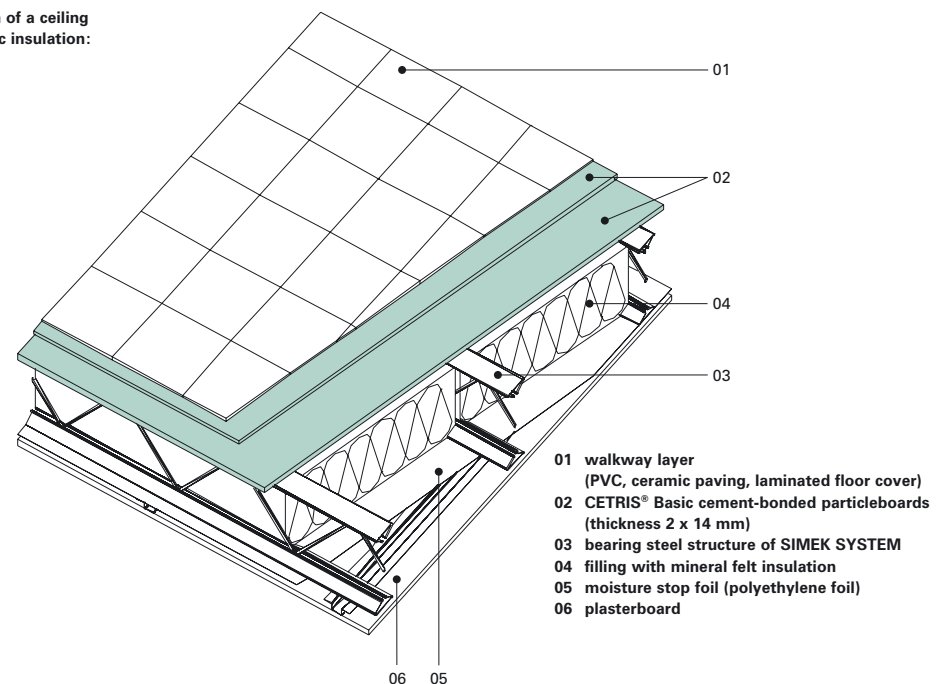
- PVC with sub-layer
- laminated floor cover with sub-layer
- ceramic paving
- cork, rubber floor cover, etc.

The total ceiling thickness is 296 – 326 mm
 The coefficient of heat conductivity is $U = 0.28 \text{ Wm}^{-2}\text{K}^{-1}$
 The index for footfall sound is $Ln'w = 63 \text{ dB}$
 The index of sound transmission loss R_w' is 50 dB
 Fire endurance value is greater as 45 minutes.

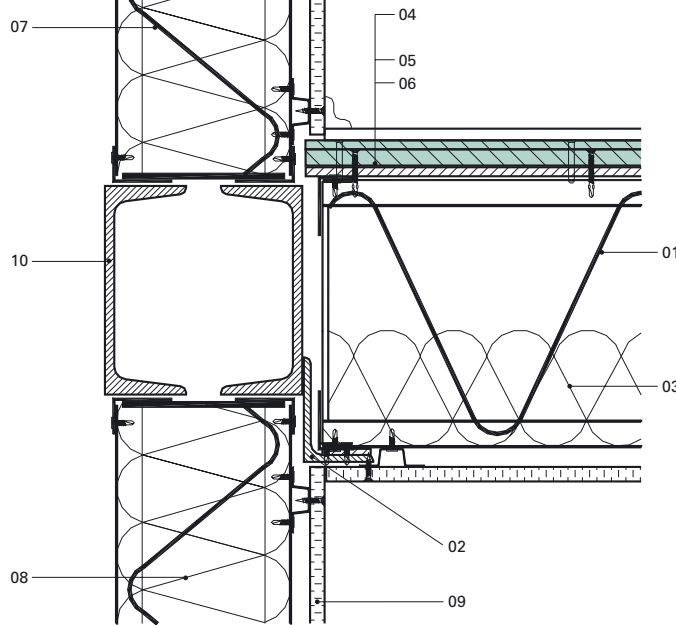
It is important always keep the instructions of floor cover producer, so the floor cover damaging can be prevented. The floor from CETRIS® boards should be aligned on the whole surface with mastic (cement), when thin-layer floor cover should be used (PVC, carpet, and other). The not used pre-bored holes or

the individual connecting elements should be filled up. Always use insulation mat of type Schlüter® – DITRA when ceramic paving is used in the floor composition – the composition is detailed described in the article 7.9.5 Ceramic paving with water insulating foil Schlüter® DITRA.

Composition of a ceiling with acoustic insulation:

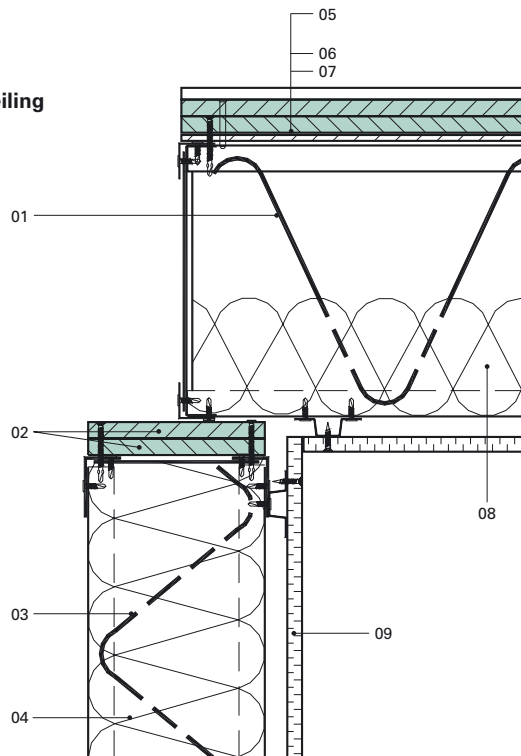


Details of anchoring of ceiling and wall consoles
vertical cross-section



- 01 walkway layer
- 02 steel angle element
- 03 acoustic insulation
- 04 walkway layer with footfall insulation
- 05 CETRIS® Basic cement-bonded particleboards (thickness 2 x 14 mm)
- 06 self-adhesive PE tape
- 07 wall console
- 08 acoustic insulation
- 09 plasterboard
- 10 steel structure

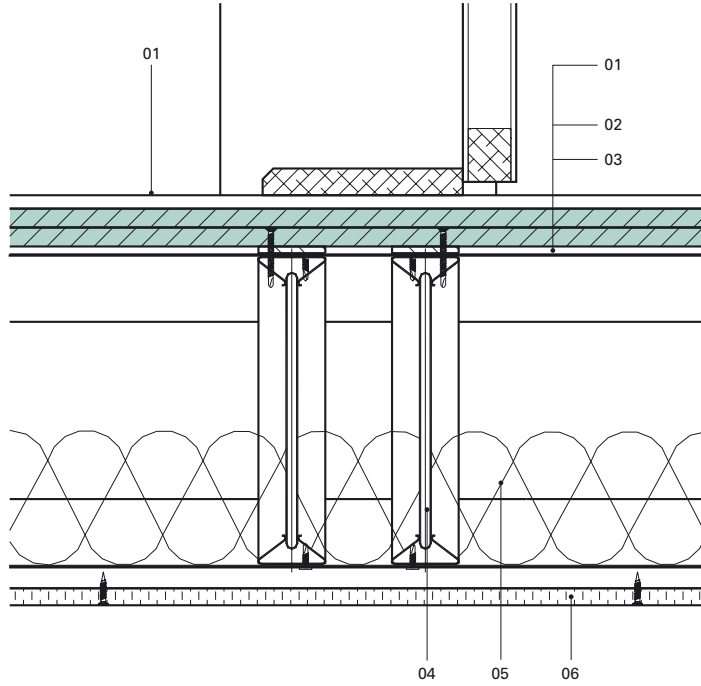
Details of laying of ceiling consoles on the wall
vertical cross-section



- 01 ceiling console
- 02 CETRIS® Basic cement-bonded particleboard
- 03 wall console
- 04 acoustic insulation
- 05 walkway layer with footfall insulation
- 06 CETRIS® Basic cement-bonded particleboards (thickness 2 x 14 mm)
- 07 self-adhesive PE tape
- 08 acoustic insulation
- 09 plasterboard

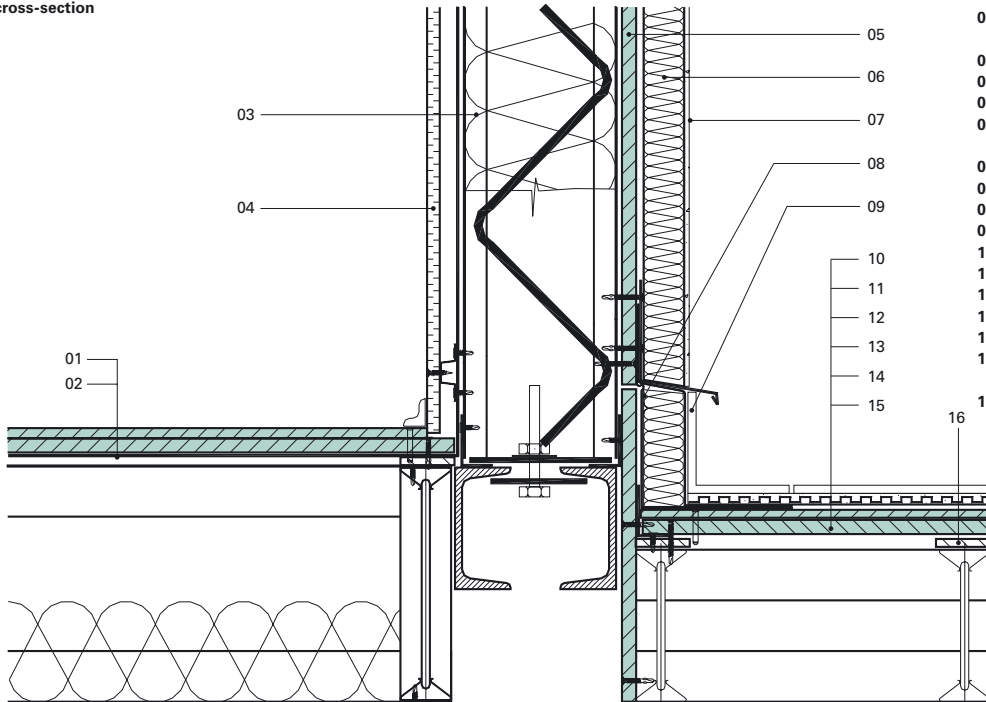
The other application of CETRIS® boards

Details of door – doorsill
vertical cross-section



- 01 walkway layer with footfall insulation
- 02 CETRIS® Basic cement-bonded particleboards (thickness 2 x 14 mm)
- 03 self-adhesive PE tape
- 04 console
- 05 acoustic insulation
- 06 plasterboard

Details of balcony
vertical cross-section



- 01 CETRIS® Basic cement-bonded particleboards (thickness 2 x 14 mm)
- 02 self-adhesive PE foil
- 03 thermal insulation
- 04 plasterboard
- 05 CETRIS® Basic cement-bonded particleboards (thickness 14 mm)
- 06 Nobasil TFL
- 07 plaster
- 08 waterproof foil
- 09 pedestal paving
- 10 ceramic paving
- 11 elastic sticking mastic (cement)
- 12 mat of type Schlüter® – DITRA
- 13 permanently elastic mastic
- 14 penetration
- 15 CETRIS® Basic cement-bonded particleboards (thickness 2 x 14 mm)
- 16 self-adhesive PE tape

10.1.2 Wall structure in the SIMEK SYSTEM

The CETRIS® cement-bonded particleboards (thickness 14 mm) are used for lining of peripheral walls. The wall bearing structure is created from steel truss girders N 30/5-150, with height of 150 mm, in a spacing of 400 – 500 mm according to the static calculation. A mineral felt filling of 150 mm thickness is between the consoles. The consoles are provided with polyethylene foil (moisture-stop) from their internal side, further with articulated profile and they are covered with plasterboards. CETRIS® boards of 14 mm thickness are fastened from outer side to the vertical consoles. Self-drilling screws or explosive rivets are used for anchoring.

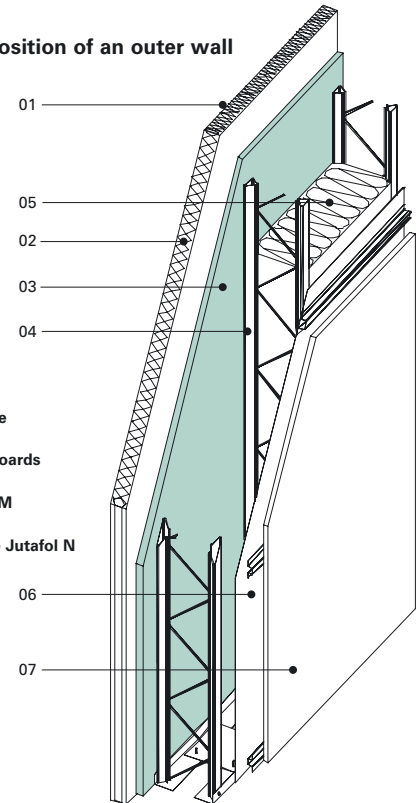
The total wall thickness is 243 mm

- The coefficient of heat conductivity is $U = 0.30 \text{ Wm}^{-2}\text{K}^{-1}$
- The index of sound transmission loss R_w is 44 dB
- The internal surface temperatures are principally over the temperature of condensation point $t_r = +12^\circ \text{C}$ in all measured points
- Fire endurance value is at least 90 minutes – D1 90 minutes (at fire from exterior)

The CETRIS® cement-bonded particleboard is suitable for outer lining not only for its endurance against weathering influences, but also for its mechanical properties – it fulfils in the composition a reinforcing and also a ventilating role in the same time.

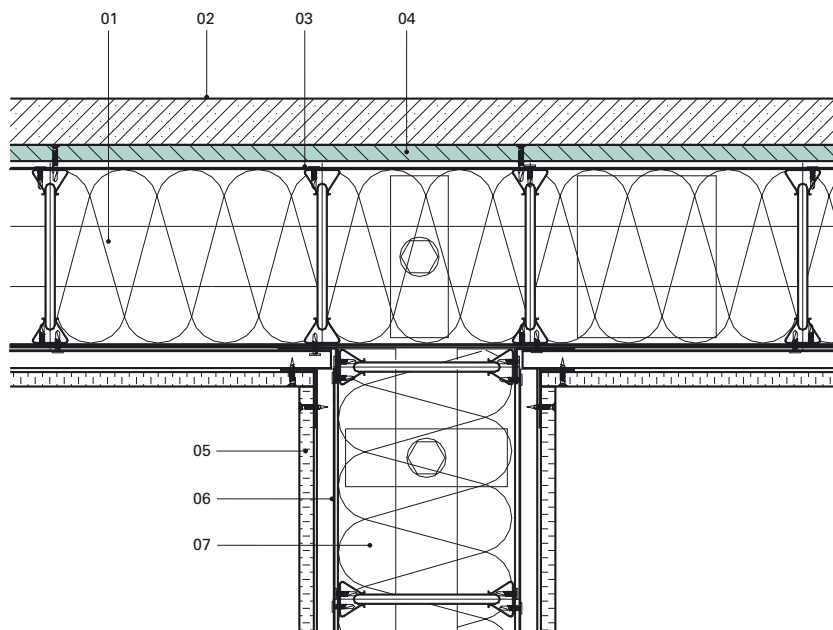
When surface treatment is required, the CETRIS® board is penetrated first, then the insulation boards from mineral wool of 40 mm thickness are stuck on, which are further covered with reinforcing tissue and covered with aligning mastic (cement). After a ground coat the silicate colored plaster is put on.

Composition of an outer wall



- 01 ground paint, reinforcing mastic + tissue
- 02 outer insulation of type Nobasil TFL
- 03 CETRIS® Basic cement-bonded particleboards (thickness 14 mm)
- 04 bearing steel structure of SIMEK SYSTEM
- 05 filling from mineral wool Nobasil M
- 06 moisture stop (polyethylene foil) of type Jutafo N
- 07 plasterboard

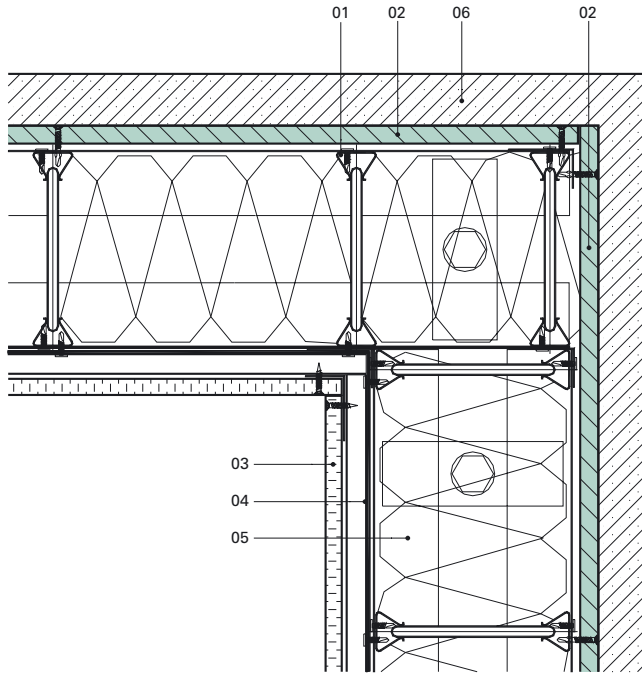
Connection of two walls – detail
horizontal cross-section



- 01 thermal insulation
- 02 surface treatment of CETRIS® cement-bonded particleboard
- 03 wall console
- 04 CETRIS® Basic cement-bonded particleboard
- 05 plasterboard
- 06 moisture stop
- 07 acoustic insulation

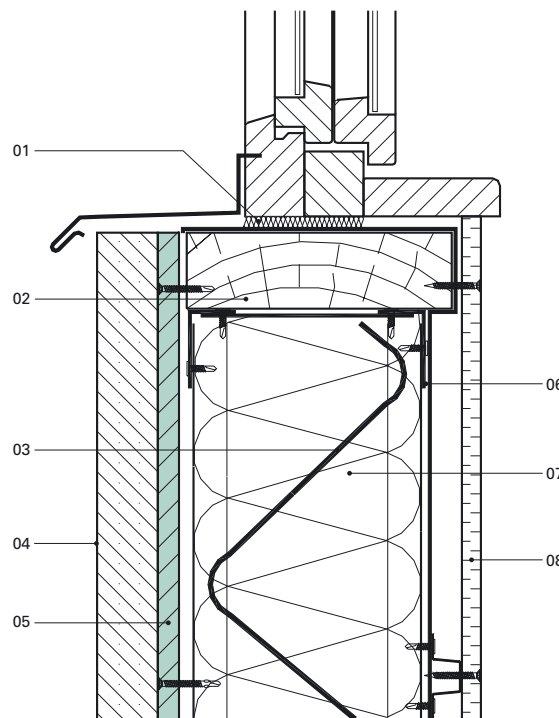
The other application of CETRIS® boards

Corner – detail
horizontal cross-section



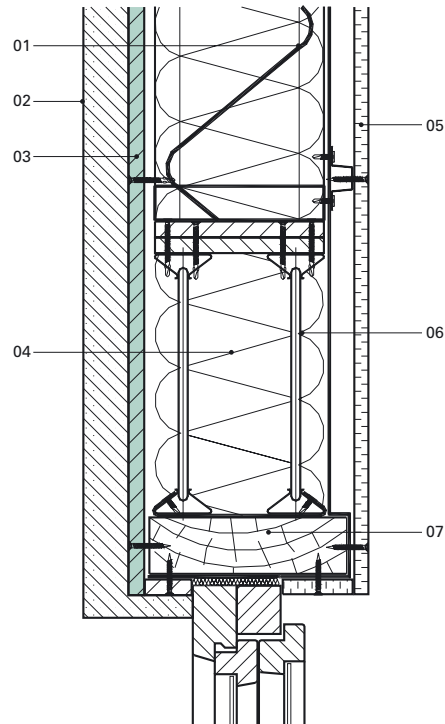
- 01 wall console
- 02 CETRIS® Basic cement-bonded particleboard
- 03 plasterboard
- 04 moisture stop
- 05 thermal insulation
- 06 surface treatment of CETRIS® cement-bonded particleboard

Window-sill – detail
vertical cross-section



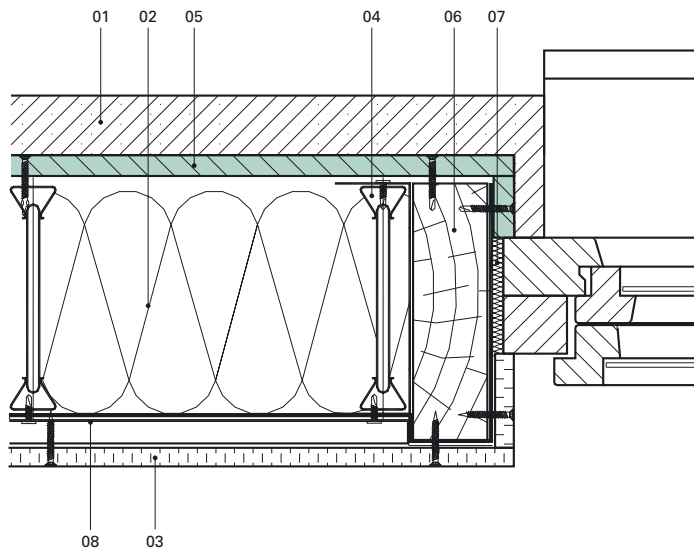
- 01 polyurethane foam
- 02 wooden filling frame
- 03 wall console
- 04 surface treatment of CETRIS® cement-bonded particleboard
- 05 CETRIS® Basic cement-bonded particleboard
- 06 moisture stop
- 07 thermal insulation
- 08 plasterboard

Window header – detail
vertical cross-section



- 01 console
- 02 surface treatment of CETRIS® cement-bonded particleboard
- 03 CETRIS® Basic cement-bonded particleboard
- 04 thermal insulation
- 05 plasterboard
- 06 header
- 07 wooden filling frame

Window case – detail
horizontal cross-section



- 01 surface treatment of CETRIS® cement-bonded particleboard
- 02 thermal insulation
- 03 plasterboard
- 04 wall console
- 05 CETRIS® Basic cement-bonded particleboard
- 06 wooden filling frame
- 07 polyurethane foam
- 08 moisture stop

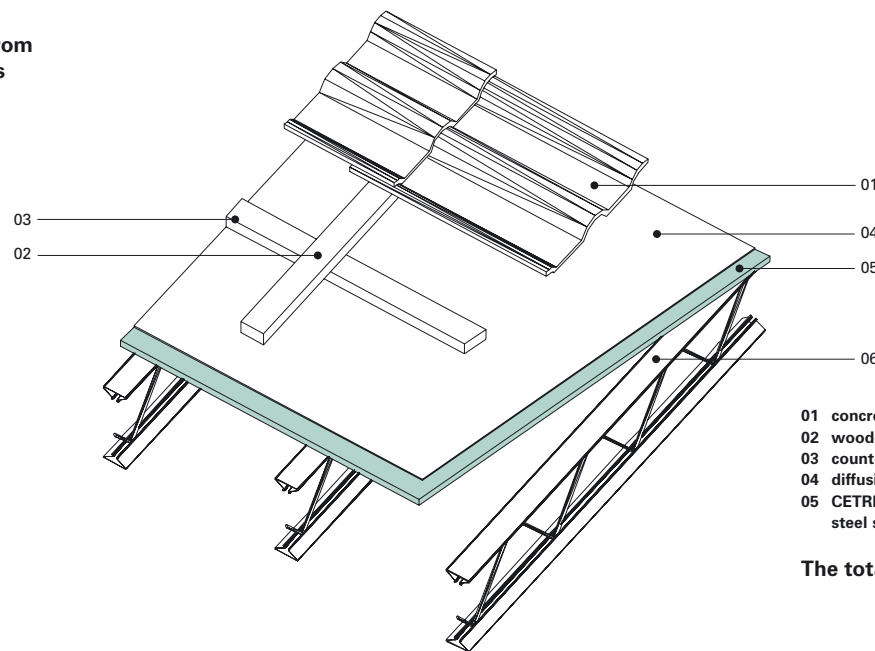
10.1.3 Roof structures of SIMEK SYSTEM

The roofs in SIMEK SYSTEM are solved with slope, and they are covered mostly with asphalt shingles or with roof cover from ceramic or concrete tiles. The roof cover is laid down over an underlaid hydro-insulation (or over roof lathes and counter-lathes,

eventually) and on load distribution layer – CETRIS® cement-bonded particleboards of 14 mm thickness. The boards are anchored to the roof bearing structure – e.g. to steel truss girders A 50/8-230 (250) with height of 230 (250) mm.

The roof can be completed with mineral wool of 200 mm thickness (inserted between the consoles) and with bottom lining from plasterboards, when the roof is provided with thermal insulation.

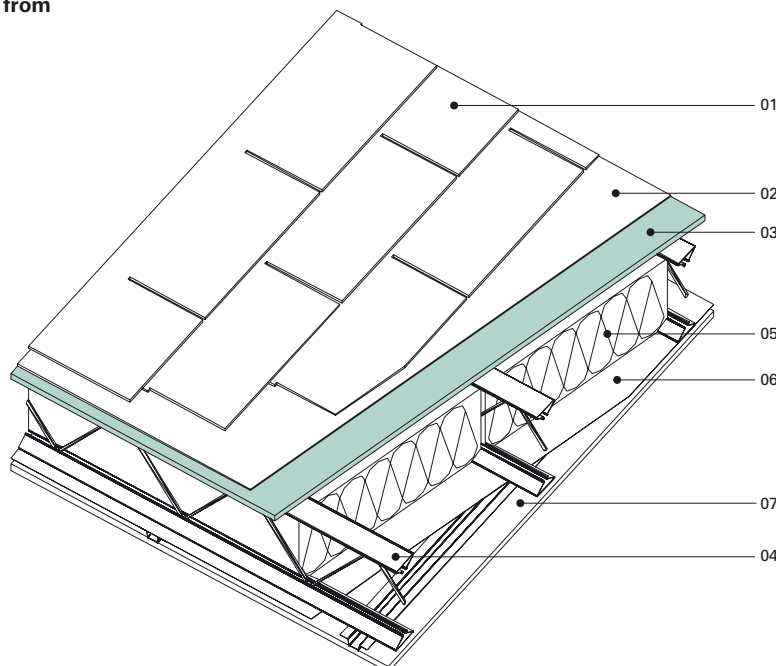
Composition of a roof from concrete or ceramic tiles



- 01 concrete or ceramic tile
- 02 wooden lathes 50 x 30 mm
- 03 counter-lathes 30 x 50 mm
- 04 diffusion membrane of type Jutafoł D
- 05 CETRIS® Basic cement-bonded particleboard the bearing steel structure of SIMEK SYSTEM

The total roof thickness is ca. 374 – 394 mm

Composition of a roof from asphalt shingles

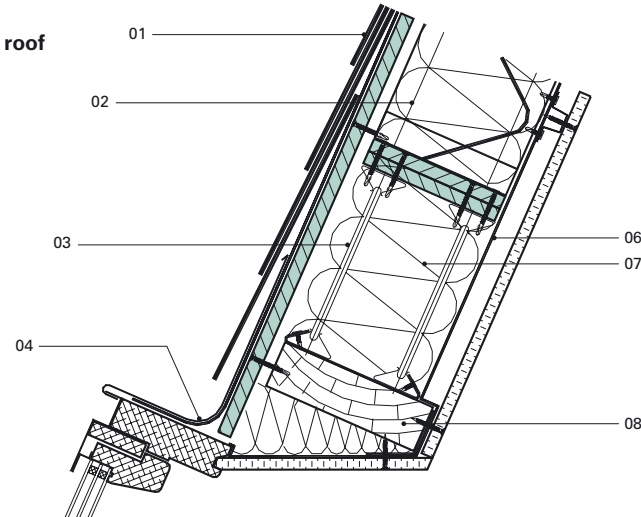


- 01 asphalt shingles
- 02 underlying hydro-insulation
- 03 CETRIS® Basic cement-bonded particleboard
- 04 the bearing steel structure of SIMEK SYSTEM
- 05 filling with mineral wool insulation
- 06 moisture stop (polyethylene foil) – Jutafol N plasterboard

The total roof thickness is ca. 280 – 300 mm

The coefficient of heat conductivity is $U = 0.20 \text{ Wm}^2\text{K}^{-1}$

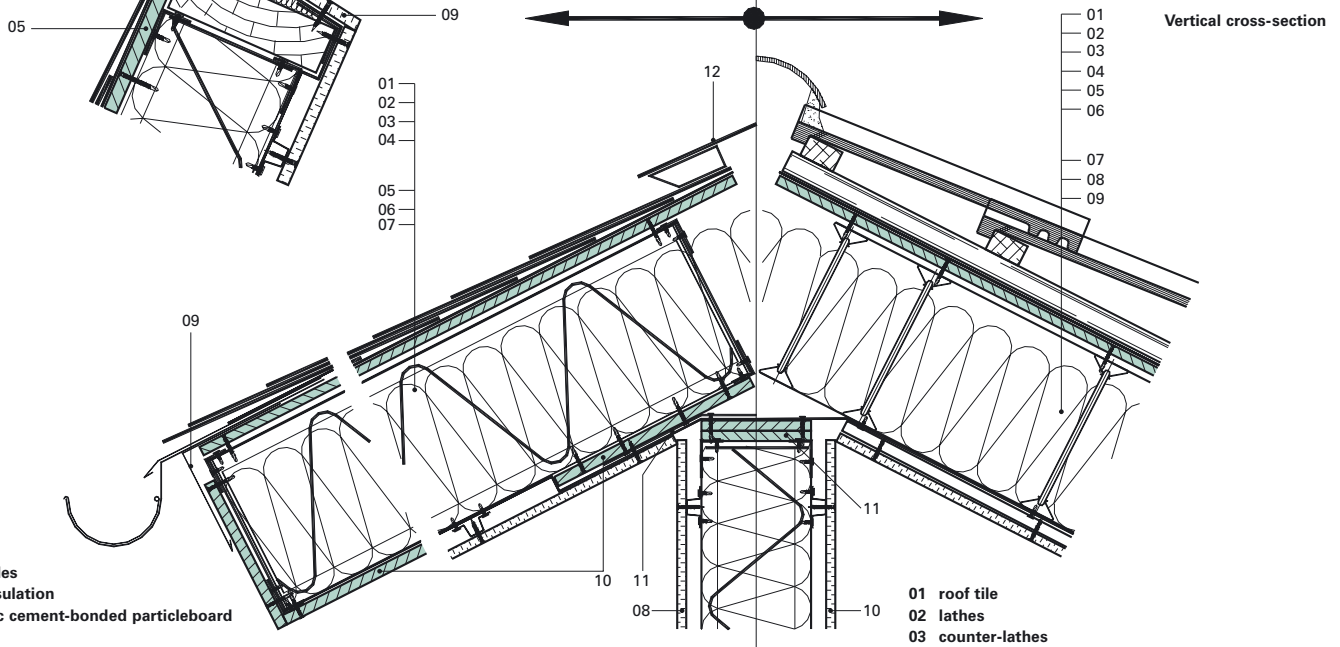
Window in declined roof – detail
Vertical cross-section



- 01 shingle
- 02 wall console (not bearing wall)
- 03 lintel
- 04 metal sheeting
- 05 CETRIS® Basic cement-bonded particleboard
- 06 moisture stop
- 07 thermal insulation
- 08 wooden fastening frame
- 09 plasterboard

Version with consoles roof slope – downward with lying on the wall plate and in the roof ridge

Version with consoles crosswise to roof slope with lying on sandwich walls from the SIMEK SYSTEM or on the stretchers



- 01 asphalt shingles
- 02 watertight insulation
- 03 CETRIS® Basic cement-bonded particleboard
- 04 console
- 05 air gap
- 06 thermal insulation
- 07 moisture stop
- 08 plasterboard
- 09 venting element under the drip
- 10 CETRIS® Basic cement-bonded particleboard (length 300 mm)
- 11 zinc-coated sheet venting element for the roof ridge
- 12 venting element for the roof ridge

- 01 roof tile
- 02 lathes
- 03 counter-lathes
- 04 watertight insulation
- 05 CETRIS® Basic cement-bonded particleboard
- 06 console
- 07 air gap
- 08 thermal insulation
- 09 moisture stop
- 10 plasterboard
- 11 CETRIS® Basic cement-bonded particleboard

10.2 System of permanent shuttering

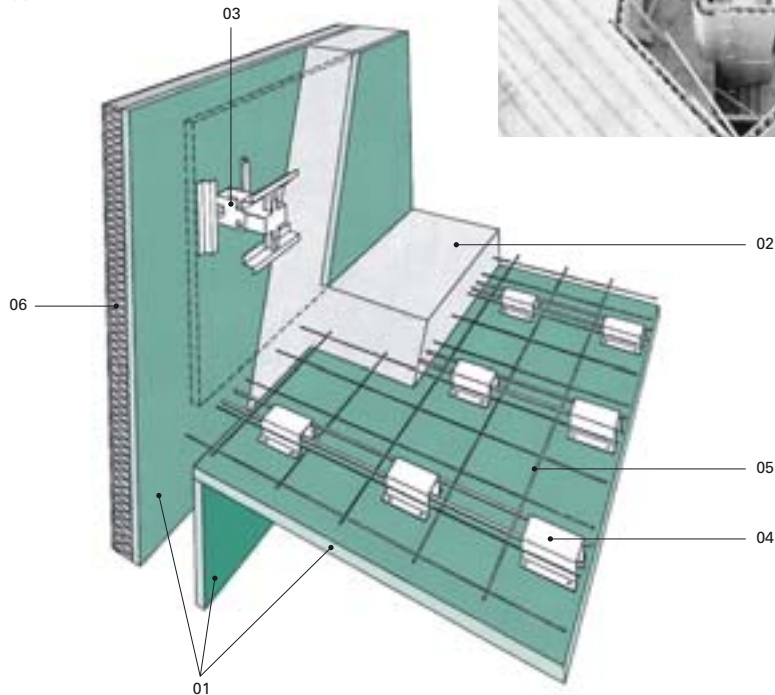
The CETRIS® cement-bonded particleboards create – in the system of permanent shuttering – the pre-fab shuttering elements. The possibilities for use of permanent shuttering are practically unlimited. The system of permanent shuttering is ideally suitable for all bearing structures, as walls, ceilings, consoles, columns, stairs, but also sloping walls, sloping ceilings and also non bearing partition walls and partitions.

The individual elements of the system (wall elements, ceiling panels) are prepared in the producer plant – they are modified to the requested size, they are mutually connected with help of a system of profiles and sheet elements. On the building site is then the element fastened in the requested location and concreted. The high costs for production of the shuttering and its removal are spared in comparison with the traditional methods of concreting with use of large-scale shuttering elements.

The principal parts of permanent shuttering:

- CETRIS® Basic cement-bonded particleboard
 - Structural bearing part – mixture of concrete
- The concrete is composed from Portland cement, silica gravel of different granularity, water and admixtures – flow (viscosity) regulators. These admixtures modify the mixture for sparing water (the minimum necessary water quantity for integration of the mixture).

Wall and ceiling structure in the system of permanent shuttering of type VS-GRUBER



- 01 CETRIS® Basic cement-bonded particleboard (24 mm thickness)
- 02 concrete mixture
- 03 spacer steel wall element
- 04 steel profile of type HT
- 05 armature of the ceiling thermal insulation of the wall



10.2.1 Advantages of permanent shuttering

Bearing capacity

The bearing capacity of a 25 cm thick wall, created with method of permanent shuttering and with use of concrete of type B25 is almost 10 times greater, in comparison to a wall created from hollow bricks of class 6 and with mortar of class I (at comparative room height 2.6 m).

Flammability class

The CETRIS® cement-bonded particleboards, creating the lining for the element of permanent shuttering are – according to Czech standard ČSN 73 08 62 – into the class “A” – not flammable.

Adhesive strength (compactness)

The peripheral elements of permanent shuttering are from the outer side completed with thermal insulation. The following values for failure of compactness were ascertained at testing of compactness of individual layers of the system: ▼

Connection between the sound insulation board and the glue	0.15 – 0.19 Nmm ⁻²
Connection between the CETRIS® cement-bonded particleboard and the glue	0.60 – 0.80 Nmm ⁻²
Connection between the CETRIS® cement-bonded particleboard and the concrete kernel	0.72 Nmm ⁻²

Fire-fighting properties

At fire the CETRIS® cement-bonded particleboard protects the concrete kernel. At comparison tests (fire test with 30 minutes fire exposition) a light partial unsticking of the CETRIS® cement-bonded particleboard layer (in 7 mm depth) appeared.

Heat accumulation

Heat accumulation capacity of a 25 cm thick wall, erected with the permanent shuttering system is by 82 percent higher as for 25 cm thick wall from hollow bricks. Both walls have been covered from the outer side with 70 mm thick layer of mineral wool.

Balancing of moisture content

The internal layer of permanent shuttering, e.g. the CETRIS® cement-bonded particleboard is resistant against moulds and fungi and it has a positive influence to healthy conditions in the room. The structurally important concrete kernel creates the

moisture stop layer. The CETRIS® cement-bonded particleboard shows warm surface at touching.

Damping of by air conducted acoustic noise

The transmission loss R_{wr} of a 25 cm thick wall, erected with the permanent shuttering system is by 20 percent higher as for 25 cm thick plastered wall from hollow bricks.

Extraordinarily short erection time

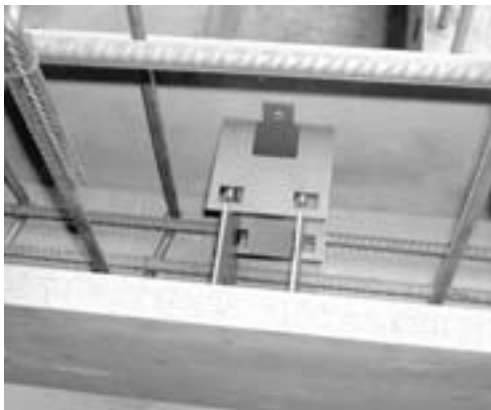
The walls created with the permanent shuttering system enable an extraordinarily short erection time.

10.2.2 Wall elements

The system of permanent shuttering is an erection method with help of elements, which are composed from CETRIS® cement-bonded particleboards, mutually connected with spacer sheet elements. ▼

The designed wall elements are customized in the producer plant and they are easily and namely in very short time mounted together on the building site with help of “tooth technology”. ▼

The electric wiring is inserted in the next step (without additional cutting out of grooves and their plastering). **The walls such way create the designed ground plane and with concreting they achieve their final stability.** ▼



Finished structure built using the CETRIS® permanent shuttering system. ▶

10.2.3 Ceiling elements

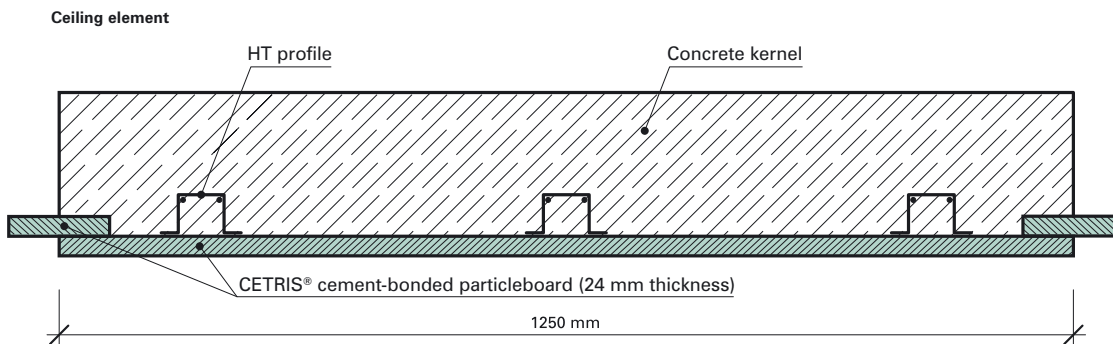
With method of permanent shuttering also horizontal elements – ceiling elements – can be created. The CETRIS® cement-bonded particleboard is used on one side in this case – at lower face; the element is further completed with a “HT” profile and with a covering (border) profile in this case.

The ceiling element has a standard width of 1250 mm, and a length of up to 6000 mm. At reali-

zation bearing consoles with 1.25 m spacing under the ceiling element are sufficient. No spacing inserts are necessary at lying of armoring; the armoring is laid down directly on “HT” profiles. The thickness of additional concrete layer (on the upper side) is dependent from the span of ceiling element and from the effective load and it moves in the period 100 – 300 mm.

Advantages of ceiling elements of permanent shuttering system

- Enables the delivery of up to 520 m² of ceiling elements on one camion.
- The usual manipulation devices can be used for even with the greatest ceiling element (weight about 285 kg)
- Easy mounting, lying and armoring – the consoles can be in a 1.25 m spacing, the armoring is laid down directly on HT profiles, the middle armoring consumption is about 3 kgm⁻².



10.3 Paneling railings, patios, loggie, balconies and stairs with CETRIS® boards

CETRIS® cement-bonded particleboards are used as exterior facing materials, due to their high resistance to the weather, fire, and mechanical failure. As well as being used as jacketing for buildings, CETRIS® boards can also be used as paneling for railings on stairways, balconies, patios, loggie, etc.

To prevent these constructions from breaking and causing injury or material damage, these thin and light structures must be tested in a stress frame.

The CETRIS® board has successfully undergone this testing procedure. In June at the Plzeň branch of the Technical and Testing Institute of Construction, tests were carried out on paneling made from 16-mm-thick CETRIS® boards in a test frame in accordance with ČSN 73 0035 and ČSN 73 2035. The supporting frame was made of steel sections 40 × 40 × 4 mm, maximum support distance was 625 mm. Loads were selected in accordance with the requirements of art. 234 ČSN 73 0035 – nature of a rigid element weighing 1 kg travelling horizontally at a speed of 17 m/s nature of a rigid element weighing 40 kg travelling horizontally at a speed of 2.5 m/s.

After the benchmark test (load applied three times) the paneling was not broken, there was no damage where it met the frame, its usefulness was not affected.

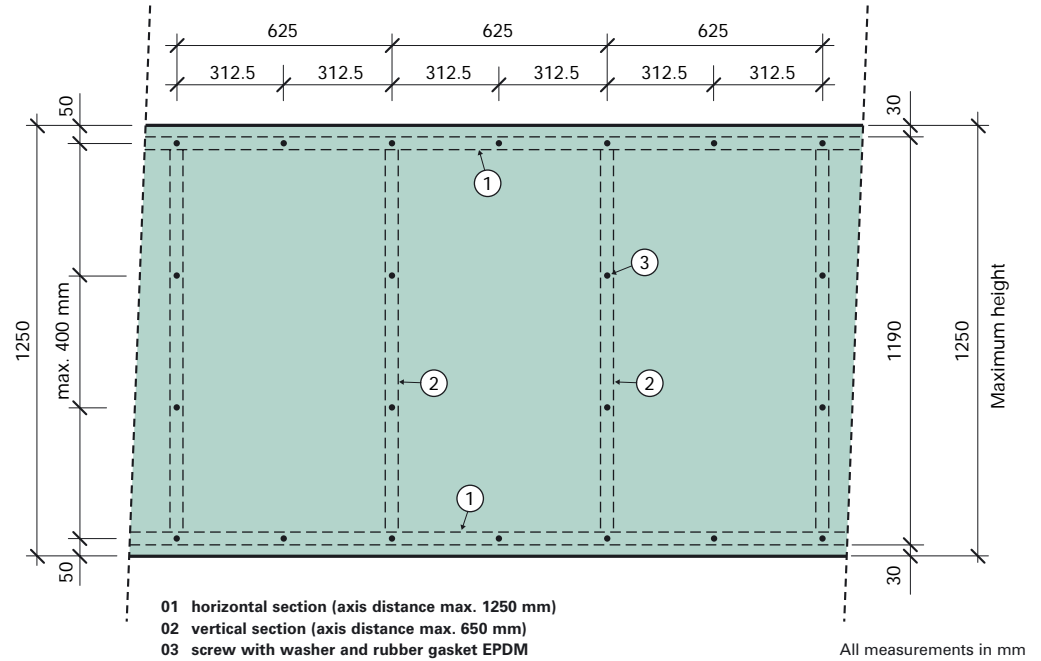
When designing and constructing panels using 16-mm CETRIS® boards, the same principles as for facade applications apply:

- boards are fitted with a joint min. 5 mm wide
- screws with washers and rubber gaskets are used to anchor it; the board has holes already drilled (hole diameter 8 mm for boards up to 1600 mm in size, hole diameter 10 mm for boards over 1600 mm)
- edge screw is 25 mm from vertical edge, 50 mm from horizontal edge
- maximum screw distance is 400 mm.





Supporting construction and anchoring of railing panels CETRIS® board 16 mm thick



10.4 Roof overhang boarding

CETRIS® cement-bonded particleboard is widely used for fitting horizontal or diagonal roof overhang boards. The principles given in chapters 3, 4, and 5 apply when selecting the type of CETRIS® board, the board thickness, support distance, type of anchorage, and surface finish. These recommendations are summarised in this text:

Choice of board type

For jacketing, CETRIS® BASIC boards can be used, which will then be covered either with paint or with a CETRIS® board which already has a surface finish – Finish, Finish Section, Dolomit, Lasur.

Choice of board thickness, support distance

These two factors are interrelated; the same principles apply for jacketing as for the facade, except that with regard to the horizontal position, the maximum screw distance is reduced, to 1/2 of the support interval. For reasons of facing tile weight, CETRIS® boards 8-10-12 mm thick are used.

Support type

CETRIS® are usually anchored using a single-direction grille made of wooden strips (min. width 50 mm, min. 80 mm if the strip meets the join of two boards), or from CD galvanised metal sections. If a fire-resistant soffit is required, the CETRIS® board must be mounted on CD sections; this includes the other principles given in chapter 9.3.2 (page 123).

Anchoring boards

For anchoring CETRIS® boards, screws with a visible/protruding head are used (hexagonal or convex head – see chapter 8.7.6 – pg. 74); the CETRIS® board is pre-drilled, the drill-hole diameter is 8 mm (board length up to 1600 mm) or 10 mm. Screws with flush heads are only used when the board is to have a seamless surface finish (plastered).

BOARD THICKNESS (mm)	SUPPORT DISTANCE a (mm)	SCREW DISTANCE b (mm)	DISTANCE c (mm)
8	400	200	
10	500	250	>25 <50
12	625	300	

If a fire-resistant soffit is required, the CETRIS® 12-mm-thick board must be used; this includes other principles given in chapter 9.3.2 (page 123).

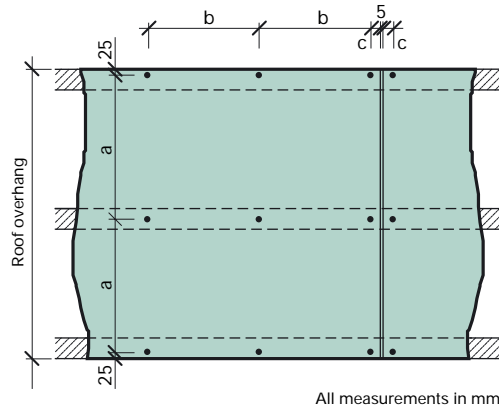
The other application of CETRIS® boards

Surface finish, joints

The surface finish of CETRIS® s boards (Finish, Finish Section, Dolomit, Lasur) does not need to be modified once mounted; only when anchoring to the support structure.

CETRIS® BASIC or PLUS may be modified in a number of ways:

- paint. Joints between the boards are left free or are filled with long-lasting flexible cement (e.g. Den Braven ST-5, Soudaflex LM 14, Botact A4, etc.) and painted with a base (penetrating) primer and final facade coat (acrylic or silicon paint).
- lay the plaster. In this case it is necessary to proceed in accordance with the principles given in chapter 6.4. Exterior plastering, i.e.:
 - CETRIS® BASIC board must be penetrated, stuck down and mechanically anchored using dowelled plates
 - spread the cement on with a spatula, insert the reinforcing fabric, adjust fabric
 - penetrate the base, spread the plaster



All measurements in mm

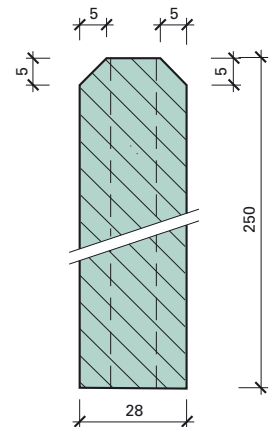
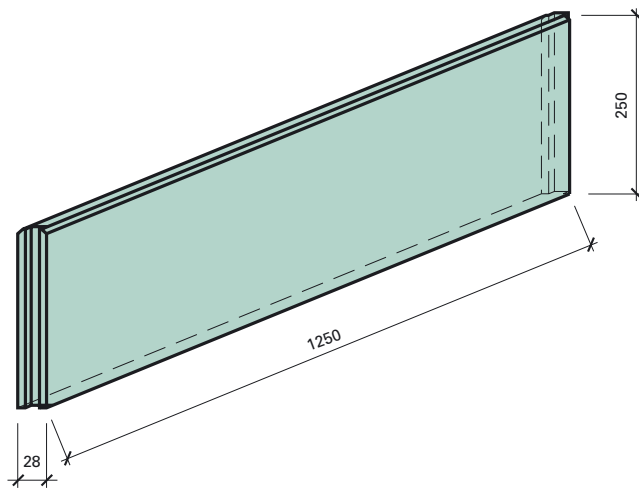


10.5 Flowerbed curbstone

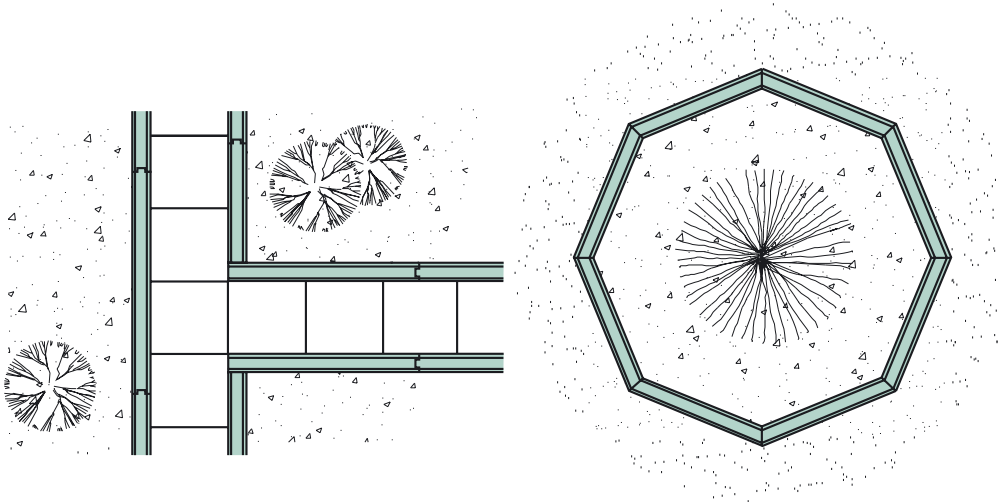
The flowerbed curbstone CETRIS® HOBBY is a rectangular board of dimensions 1250 x 250 x 28 mm, which arises from cutting of CETRIS® board. The upper edge is from both sides beveled, the side edges are with milling prepared for mutual connection (tongue and groove joint). The curbstones can be cut, bored and milled, eventually.

Use:

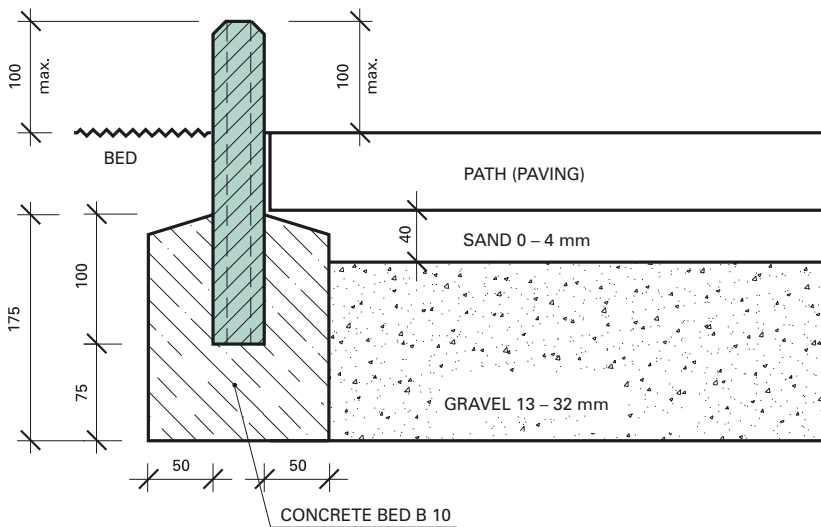
The flowerbed curbstone CETRIS® HOBBY is designed for demarcation of beds' and paths' shape in gardens. The curbstone can be laid down in a concrete bed or directly to a groove in the ground and landed up, eventually. The curbstones are laid down tightly; it is recommended the use of a wooden lath or extended cord, for to achieve a direct row. At demarcation of broken lines the curbstone could be shortened and the side edges are cut askance for the necessary angle.



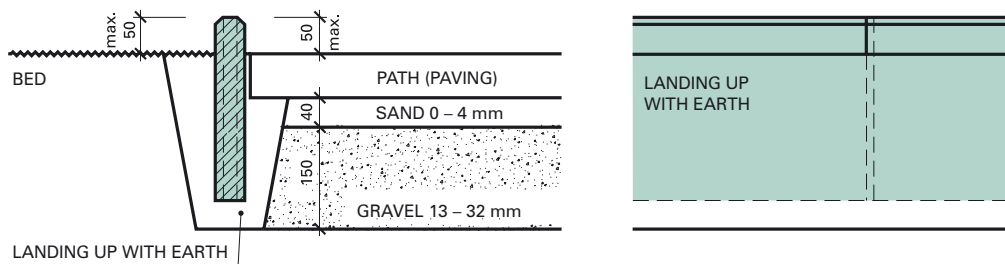
All dimensions in mm.



At putting of curbstone into concrete bed the minimal 100 mm embedding should be observed. The curbstone can lap over maximally 100 mm the flowerbed (or path, eventually). The bearing concrete bed should be at of B10 class quality.



When the curbstone is put into a groove in the ground, it can lap over – after landing up – the bed (or path, eventually) max. 50 mm. At putting the curbstones should be secured against swinging out from the plane with help of additional connection, for example with metal belt, attached to the curbstones and anchored with screws or bolts.



All dimensions in mm.

Machining:

The flowerbed curbstone CETRIS® HOBBY can be machined with same tools as the CETRIS® BASIC cement-bonded particleboard. The curbstone can be bored, cut or milled, eventually. For curbstone machining carbide tipped tools are recommended; for cutting use circular handsaw with possibility of saw adjusting for creation of chamfered cuts. Even if the at machining created dust is not dangerous, its exhaustion is recommended.



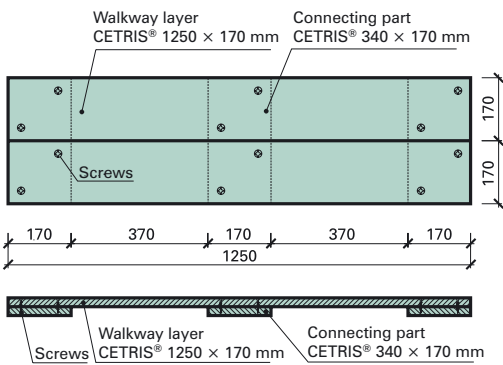
10.6 CETRIS® HOBBY

Movable garden path

Use and description: The movable garden path is created from CETRIS® HOBBY boards of 24 mm thickness. For a walkway layer we need 170 wide cut pieces in a length of 1250 mm. A CETRIS® board in 340 mm length will be used as connecting part.

Consumption of CETRIS® boards and other material:

- For one module of movable garden path we need:
- CETRIS® HOBBY boards of 24 mm thickness – 1250 x 170 mm – 2 pieces
 - CETRIS® HOBBY boards of 24 mm thickness – 340 x 170 mm – 3 pieces
 - Screws, 40 mm length, 12 pieces



Tile-like garden path with curbstone

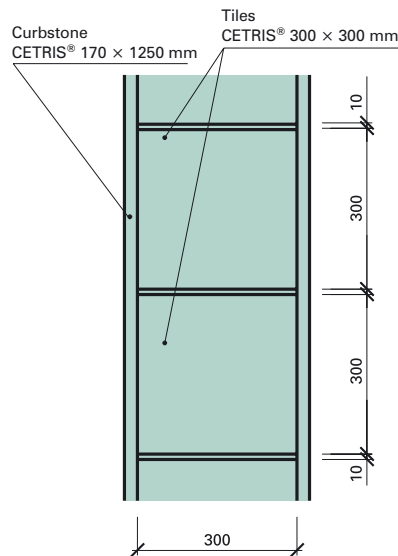
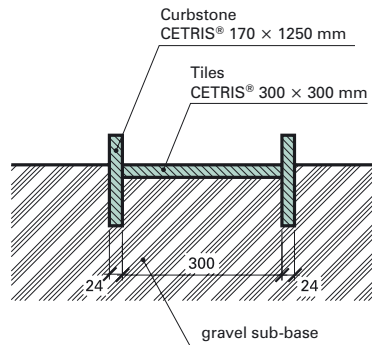


Tile-like garden path with curbstone

Use and description: The tile-like garden path with curbstone is created from CETRIS® HOBBY boards of 24 mm thickness. The boards are cut to the necessary lengths. The CETRIS® HOBBY boards in full length will be used for the curbstone.

Consumption of CETRIS® boards and other material:

- For one meter of tile-like garden path with curbstone we need:
- CETRIS® HOBBY board of 24 mm thickness – 1250 x 170 mm – 2 curbstones
 - CETRIS® HOBBY boards of 24 mm thickness – 300 x 300 mm – 3 pieces/1 meter of path
 - gravel filling for sub-base

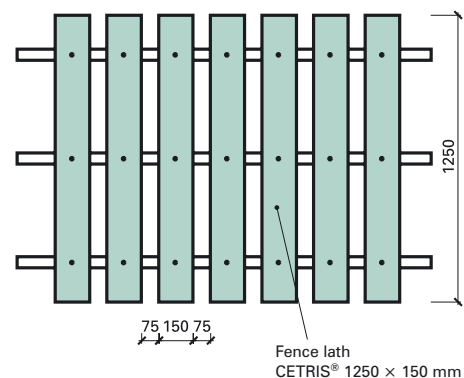


Fence lath

Use and description: The fence laths from CETRIS® HOBBY boards can be in thickness from 18 to 28 mm. The CETRIS® HOBBY boards for the fence laths are 1250 mm long with possibility of shortening to shorter length, in 150 mm width. The laths can be arranged to bows or other shapes according to the design of the fence. The laths can be fastened with screws to wooden or metal skeleton.

Consumption of CETRIS® boards and other material:

- For one meter fence we need:
- CETRIS® HOBBY board of 18 to 28 mm thickness – 1250 x 150 mm – 5 pieces
 - 15 screws, 40 to 80 mm long



All dimensions in mm.

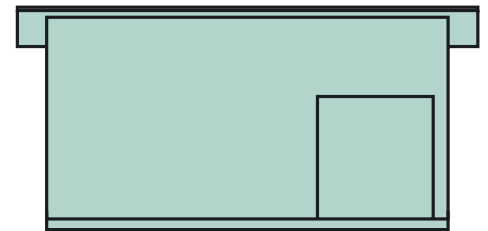
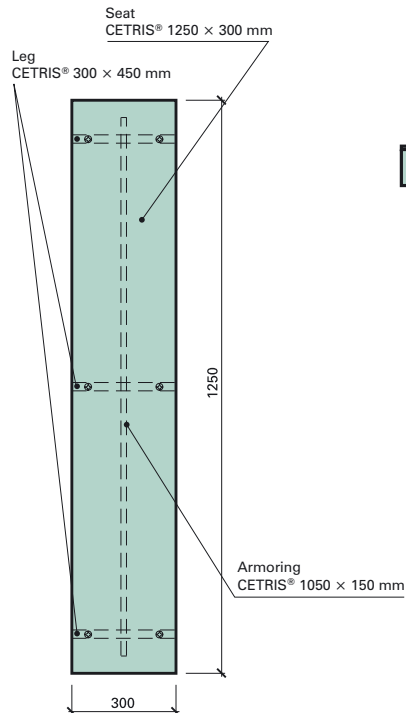
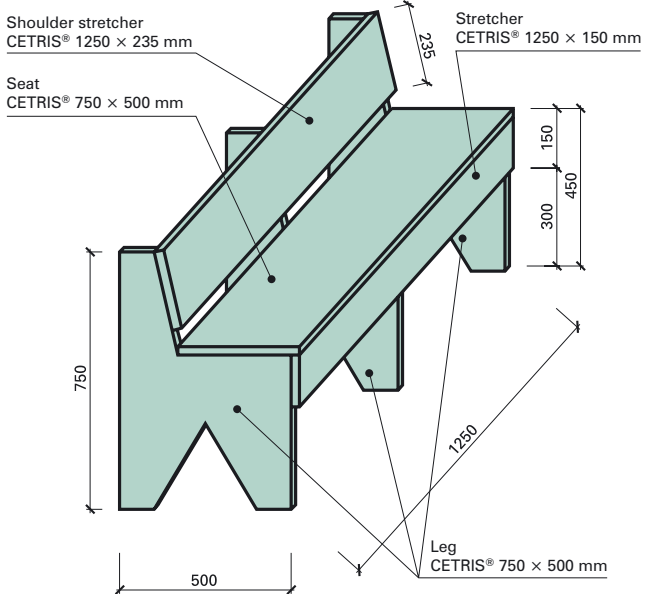
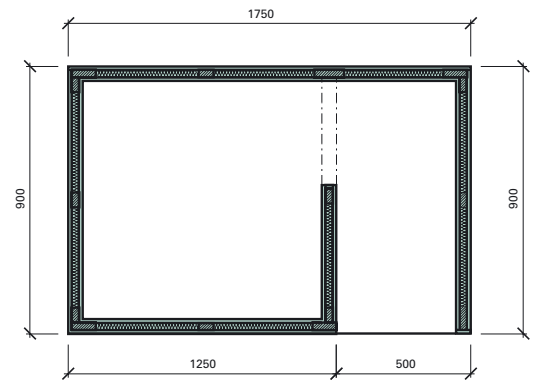
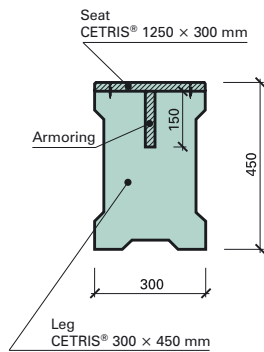
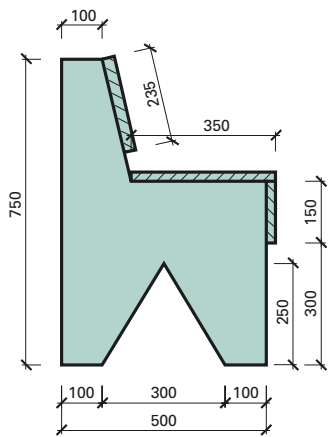
Garden seat



Seat



Dog house



All dimensions in mm.

The other application of CETRIS® boards

Outer stairs



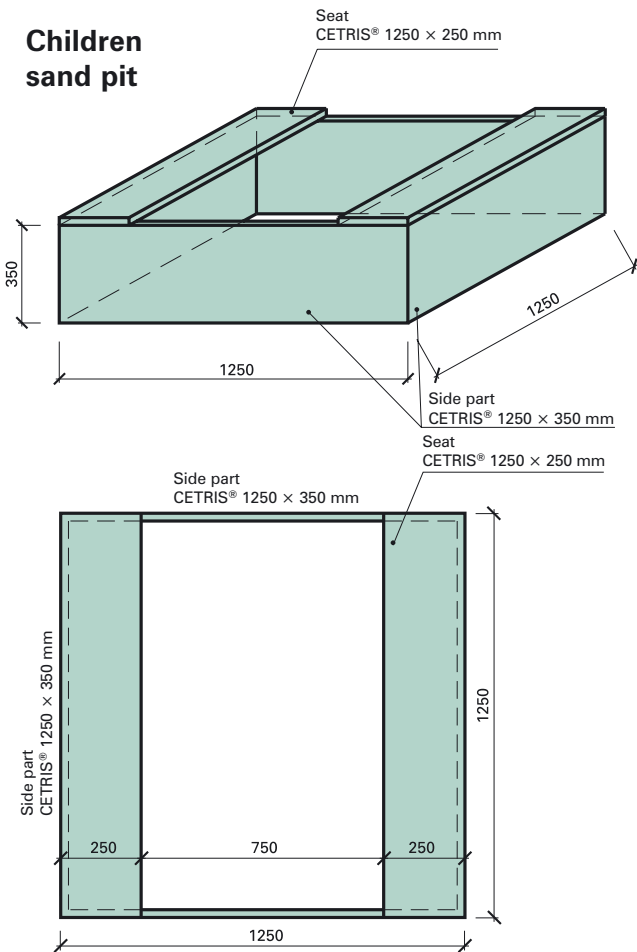
Strawberry garden



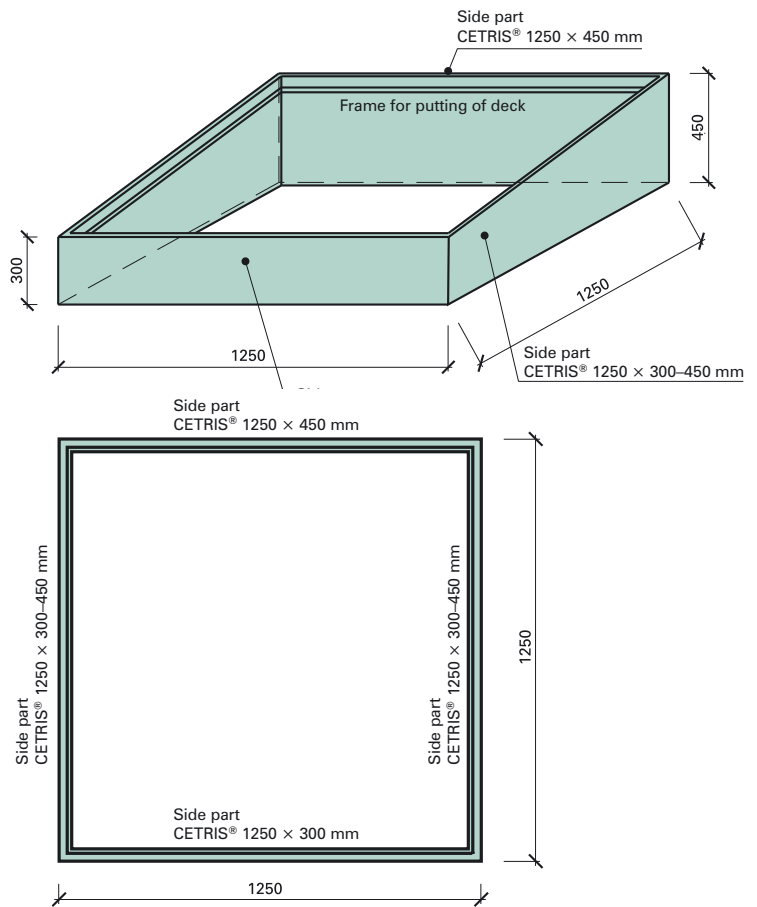
Switch board



Children sand pit



Hot-bed frame



All dimensions in mm.