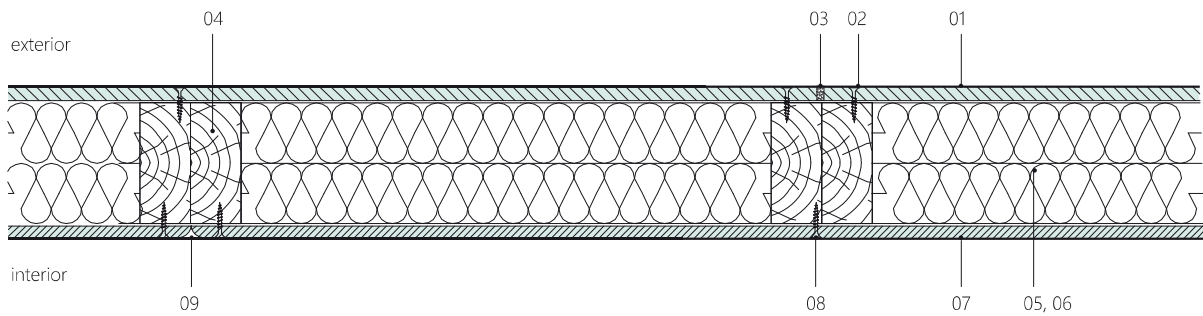


Horizontal cross-section



- 01 CETRIS® board of thickness 14 mm
- 02 screw 4.2 × 35 mm
- 03 fire resistant filler
- 04 vertical wooden pillar (axial spacing max. 625 mm)
- 05 wooden prism
- 06 mineral wool (Orsil Uni) - 2 × thickness 60 mm
- 07 Knauf GKF board - thickness 12.5 mm
- 08 screw TN 3.5 × 35 mm
- 09 joint filler – Knauf Uniflott

8.3 Horizontal Constructions – Suspended Ceilings (Fire from Below)

8.3.1 Scope of Application

Based on the test results provided here, the CETRIS® boards can be applied in the following types of fire resistant horizontal wall constructions:

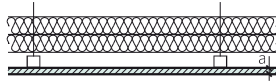


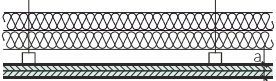
- Separate fire ceiling panel, heat (fire) exposure from underneath. In this case, the fire resistance is specified directly by the result of the fire resistance test.
- horizontal protective membrane (ceiling) sub-floor (roof) constructions, exposure to heat (fire) from below. The fire resistance is for the entire assembled construction.

As stated in the protocols it is also necessary to comply with the technology of the ceiling assembly and all assembly procedures used and tested in the context of preparation of the samples. The ceiling constructions may be of any size on the condition that the spacing between the suspensions will not increase and that the dilatation measures will be adequately implemented. The test results apply to cavities of any height. In the final analysis, this means that the proposed connecting elements, their spacing and layout on the construction and other details are binding and must be complied with for the above attests to be applicable.


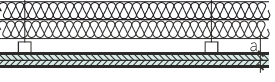
Important notice:

- All the data applies to the conditions and stress of horizontal constructions during fire pursuant to the valid text of ČSN EN 1364-2 and ČSN 13 381-1. The results of fire resistance tests and implementation principles from them only assess the issue of the technical properties of the constructions in relation to their resistance to actual fire. For this reason, the axial distances and types of CD profiles and other elements, which comply with the tests are stated. These, however, must be considered the minimum limits that must not be exceeded. It is necessary to note that when dimensioning fire ceiling panels, it is also necessary to consider the structural requirements for the construction and modify it according to real stress in relation to the weight of the CETRIS® boards.
- Assembly of fire constructions may only be carried out by trained staff – see Chap. 8.8. Training of assembly companies in applications with CTD CETRIS® boards.

Overview of horizontal constructions - separate ceilings (tested according to ČSN EN 1364 - 2)

Type / Marking	Diagram	Cladding of the ceiling	Weight (kg/m ²)	Mineral wool						Fire Resistance	Thermal resistance (m ² K/W ¹)	Weighted sound transmission loss (dB)
				Thickness (mm)	Density (kg/m ³)	Description	Assembly support spacing (mm)	Load-bearing support spacing (mm)	Hanger spacing (mm)			
C 01		1x12	21,60	2x40	60	CD profiles	420	1000	420	EI 15	2,06	43
C 02		2x12	36,5	-	-	CD profiles				EI 30	0,10	-
C 03		2x12	37,5	-	-	Wooden laths 60x40				EI 30	0,10	-
C 04		2x12	41,60	2x40	100	CD profiles				EI 45	2,12	

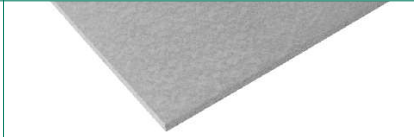
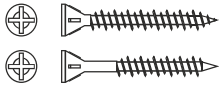
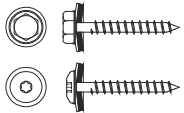
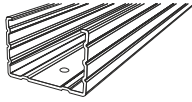
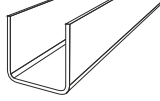









Overview of horizontal protective membranes (tested according to ČSN EN 13 381 -1)

Diagram	Cladding of the ceiling	Weight (kg/m ²)	Mineral wool						Classification of protected horizontal element (ceiling/roof)
			Thickness (mm)	Density (kg/m ³)	Description	Assembly support spacing (mm)	Load-bearing support spacing (mm)	Hanger spacing (mm)	
	1x12	17,5			CD profiles	420	1000	420	R 20
	2x12	37,6	2x40	50	CD profiles				R 45

Note: other instances of application of compositions of protective membranes are given on pages 163 - 166.



Materials for assembly of horizontal constructions – specifications

Description	Visualisation	Note
CETRIS® BASIC board Cement bonded particleboard, smooth surface, cement grey. Basic format 1,250x3,350 mm, density 1320±70 kgm ⁻³		Thickness according to the fire resistance requirements
Screw 4.2x25, 35, 45, 55 mm Counter-sunk, self-tapping screws		Screw type according to the thickness of the lining and type of load-bearing construction. Anchoring in the interior, or exterior under the thermal insulation system (ETICS)
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 according to the thickness of the cladding and type of load-bearing construction. Anchoring in the exterior – it is necessary to pre-drill the board (hole diameter 8(10) mm)
CW profile 75, 100 (vertical) Galvanised sheet metal profile 75x50x0.6 mm 100x50x0.6 mm		Creation of load-bearing grid for installation of the ceilings. They are fixed using a straight or Nonius hanger on the floor (roof) construction.
UD profile Galvanised open sheet-metal profile of dimensions 28 x 27 x 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 cavity heights the ceiling and load-bearing construction.
Cross-coupling		Used for mechanical mutual connection of crossing CD profiles lying one above the other.
Wooden lath Section 60 x 40 mm.		It forms a wooden base construction (assembly and load-bearing profile). Dry impregnated timber class S10 (strength class C24)
NIVEAU plane cross-coupling		Used for mechanical mutual connection of crossing CD profiles lying in one plane.
DEXAFLAMM-R filler White tixotropic filler for joints and sealing of screw caps.		Alternatively, it is possible to use a fire resistant single-component (acrylic, silicone) permanently elastic filler (Sika firesil, Den Braven Pyrocyll)
FIBERFRAX DURAFELT paper Aluminium-silicon fibre mats of thickness 13 mm.		For profile lining on the bottom side, interruption of thermal bridges, as insulation for temperatures up to 1,260° C
ISOVER Mineral board of thickness 60 mm, density 60, or 100 kg/m ³ . Max. density 100 kgm ³ .		Alternatively, it is possible to use a mineral board with the same density, combustibility max. B according to ČSN 730862, the assumed reaction to fire class is A2 (according to EN 13501)



Apart from the compositions of separately hanged products, it is possible to achieve a fire resistance of the horizontal ceiling and roof constructions by using membranes – ceiling with CETRIS® cement bonded particleboard cladding. These ceilings were tested pursuant to ČSN EN 13381-1 Test methods for determining the contribution to the fire resistance of structural members - Part 1: Horizontal protective membranes in compositions, see the table on page 161 - Overview of horizontal protective membranes.

Basic conditions:

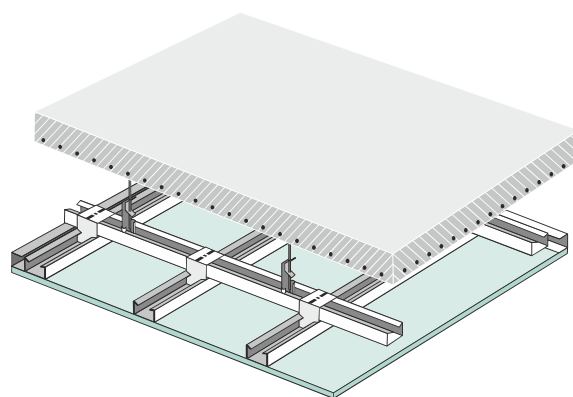
- The height of the cavity between the face of the ceiling board and the upper face of the membrane (ceiling) is min. 300 mm (composition CETRIS® Basic board 12 mm), or 420 mm (composition CETRIS® Basic 2x12 mm + 2x40 mm mineral wool)

- No flammable material may be inserted into the cavity
- The incline of the ceiling or roof construction is 0 - 25° from the horizontal plane

In this case, the ceiling including the ceiling construction is exposed to the effects of a standard fire. A standard composition of the ceiling construction was used - steel beams covered with reinforced lightweight concrete slabs. Within the scope of broader classification based on Euro code calculations, the test results can subsequently be used also under other types of ceiling constructions, see information below.

Suspended reinforced concrete floor slab protected on the underside by a horizontal membrane (with soffit)

Protected concrete floor slab Total thickness of suspended floor slab / reinforcement cover of at least	Ceiling CETRIS® BASIC 12 mm resistance to fire class	Ceiling CETRIS® BASIC 2 x 12 mm 2x40 mm mineral wool insulation resistance to fire class
60/15 mm	REI 45	REI 60
80/20 mm	REI 60	REI 90
100/30 mm	REI 90	REI 120

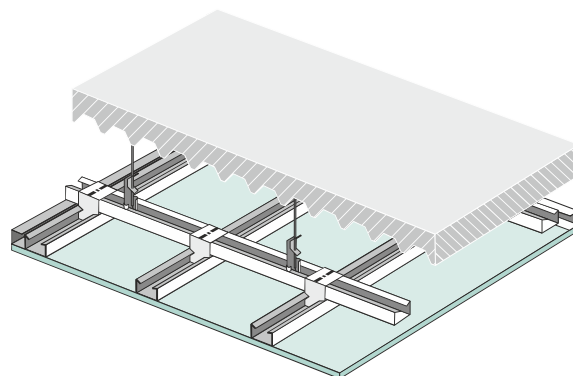


Usage conditions:

Type of suspended floor slab	Applies to suspended floor slabs made of concrete with steel reinforcements designed according to EN 1992 on the basis of the critical temperature of the steel reinforcements; the maximum temperature for the steel reinforcements is 500°C.
Concrete density	The classification applies to concrete with a minimum density of 2,300 kg/m ³ at 20 °C

Composite suspended reinforced concrete floor slab (trapezoidal sheet metal + concrete) protected on the underside by a horizontal membrane (soffit)

Composite suspended floor slab protected by a horizontal membrane – ceiling CETRIS® BASIC 12 mm	Composite suspended floor slab protected by a horizontal membrane – ceiling CETRIS® BASIC 2 x 12 mm + 2x40 mm, mineral wool insulation
REI 30 (R30, I45)	REI 60 (R60, I60)



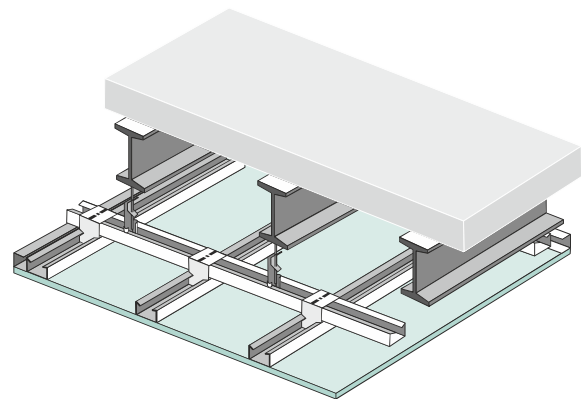
Usage conditions:

Type of corrugated sheet metal	Classification applies to steel corrugated sheet with cavity (not filled with concrete), which broadens from top downwards, for steel corrugated sheeting with cavity (not filled with concrete), which narrows from top downwards (herringbone shaped cavity). The minimum height of the corrugated sheet wave is 50 mm and the minimum thickness of the sheeting is 0.75 mm; steel class S according to EN 10025-1 excluding class S185
Concrete density	The classification applies to concrete with a minimum density of 2,300 kg/m ³ at 20 °C
Thickness of the suspended floor slab concrete	Minimum thickness of composite suspended floor slab at the thinnest point (above the corrugated sheeting wave) is 40 mm;

Ceiling construction of steel beams protected on the underside by a horizontal membrane (with soffit)

Usage conditions:

Types of profiles	Classification applies to steel beams made of open profiles type I, H, U, T, L and closed square cross-section profiles;
Steel class	All construction class steels in class S according to EN 10025-1 excluding class S185



Fire resistance of the ceiling construction protected by a horizontal membrane – hanging ceiling of composition CETRIS® BASIC 12 mm:

Cross-section coefficient of the steel beam A_r/V [m ⁻¹]	Resistance to fire class depending on design temperature							
	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C	700 °C
≤ 160	R 20	R 20	R 20	R 20	R 20	R 20	R 30	R 30
≤ 250	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20
≤ 300	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20
≤ 390	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20

Fire resistance of the ceiling construction protected by a horizontal membrane – hanging ceiling of composition CETRIS® BASIC 2x12 mm + 2x40 mm, mineral wool insulation

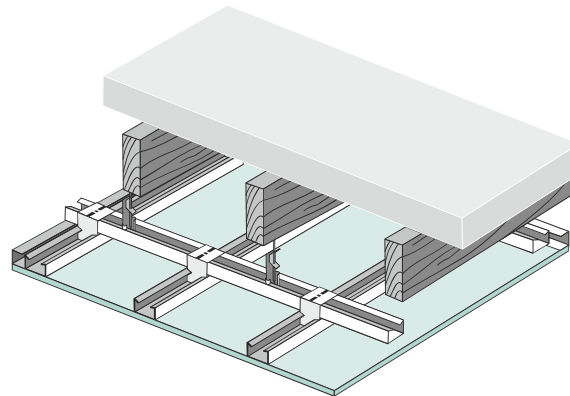
Cross-section coefficient of the steel beam A_r/V [m ⁻¹]	Resistance to fire class depending on design temperature							
	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C	700 °C
≤ 160	R 45	R 45	R 45	R 45	R 45	R 60	R 60	R 60
≤ 250	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 60
≤ 300	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45
≤ 390	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45

A - steel profile perimeter exposed to fire

V - Cross-section area of steel profile



Ceiling construction of wooden ceiling beams protected on the underside by a horizontal membrane (hanging ceiling)



Fire resistance of the ceiling construction protected by a horizontal membrane – ceiling of composition CETRIS® BASIC 12 mm, thermal stress on 3 sides, degree of utilisation of the cross-section 100%:

Stress on 3 sides, usage level 100%		Cross-section height of the wooden beam (mm)											
		80	100	120	140	160	180	200	220	240	260	280	300
Cross-section width of the wooden beam (mm)	60	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20
	80	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30
	100	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30
	120	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30
	140	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 45	R 45	R 45	R 45
	160	R 30	R 30	R 30	R 30	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45
	180	R 30	R 30	R 30	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 60
	200	R 30	R 30	R 30	R 45	R 45	R 45	R 45	R 45	R 45	R 60	R 60	R 60

Fire resistance of the ceiling construction protected by a horizontal membrane – ceiling of composition CETRIS® BASIC 12 mm, thermal stress on 4 sides, degree of utilisation of the cross-section 100%:

Stress on 4 sides, usage level 100%		Cross-section height of the wooden beam (mm)											
		80	100	120	140	160	180	200	220	240	260	280	300
Cross-section width of the wooden beam (mm)	60	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20
	80	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 30	R 30	R 30	R 30
	100	R 20	R 20	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30
	120	R 20	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30
	140	R 20	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30
	160	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30
	180	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 45
	200	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 45	R 45

**Fire resistance of the ceiling construction protected by a horizontal membrane – hanging ceiling of composition CETRIS® BASIC
2x12 mm + 2x40 mm mineral wool, thermal stress on 3 sides, degree of utilisation of the cross-section 100%:**

Stress on 3 sides, usage level 100%		Cross-section height of the wooden beam (mm)											
		80	100	120	140	160	180	200	220	240	260	280	300
Cross-section width of the wooden beam (mm)	60	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 60
	80	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	100	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	120	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	140	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	160	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	180	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 90	R 90
	200	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 90	R 90	R 90	R 90	R 90

**Fire resistance of the ceiling construction protected by a horizontal membrane – hanging ceiling of composition CETRIS® BASIC
2x12 mm + 2x40 mm mineral wool, thermal stress on 4 sides, degree of utilisation of the cross-section 100%:**

Stress on 4 sides, usage level 100%		Cross-section height of the wooden beam (mm)											
		80	100	120	140	160	180	200	220	240	260	280	300
Cross-section width of the wooden beam (mm)	60	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45	R 45
	80	R 45	R 45	R 45	R 45	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	100	R 45	R 45	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	120	R 45	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	140	R 45	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	160	R 45	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	180	R 45	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60
	200	R 45	R 45	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60	R 60

Usage conditions:

Cross-section, number of stressed sides	Classification applies to beams with a four-square section of minimum 60 x 80 mm, maximally 200 x 300 mm. The beam is exposed to thermal stress from three sides in a case where the ceiling construction (cladding) provides protection during the fire resistance of the wooden beam itself. In the rest of the cases, the beam is considered as thermally protected from 4 sides;
Fire resistance of ceiling construction	Fire resistance of ceiling construction on wooden beams must be proved separately;
Degree of utilisation of the cross-section	Degree of utilisation of the cross-section must be determined during design of the wooden beams according to EN 1995-1-1 and related standards. If the degree of utilisation is not defined, the table for 100% utilisation level shall be applied. The table for a certain level of cross-section utilisation automatically also covers all the lower cross-section utilisation levels. The dimensioning table containing the utilisation levels of 70 – 80 -90 % should be requested from the manufacturer.
Wood type	Beams from solid wood or glued beams with density ≥ 290 kg/m ³ , wood carbonisation rate ≤ 0.8 mm/min, without specification of the type of wood.



8.3.2 Principles of Design and Assembly

8.3.2.1 Load-bearing Construction – CD Profiles

The load-bearing construction consists of a grid of steel zinc-coated profiles CD 60 × 27 × 0.6 mm in lengthwise and crosswise directions. The lengthwise and the crosswise profiles may be assembled to a single plane (connected with flat cross joints) or to two planes (the crosswise grid is placed above the lengthwise grid and the two grids are connected with multilevel joints). The grid is fixed to the suspended floor (roof) construction by a system of hangers. The crosswise and lengthwise spacing of the profiles, the spacing and the type of suspensions depend on the cladding type (weight of the ceiling panel).

The grid can hold the heat insulation according to the soffit composition. The bearing grid can be complemented by UD profile in case of wall structures, it is used for anchoring of the soffit to the vertical structures. Anchoring is done by means of steel dowels.

8.3.2.2 Load-bearing Construction – Wooden Laths

The supporting structure consists of unidirectionally oriented wooden laths of cross-section 60 × 40 mm, with a maximum axial distance of 420 mm. The wooden laths can be attached to the ceiling beams or to roof beams (max. length 1,000 mm) or to the supporting structure by hinges.

8.3.2.3 Construction Composition

The composition of ceiling is clad on the bottom side with one or two layers of CETRIS® th. 12 mm. The boards mutually overlap – by at least 400 mm to prevent the creation of a cross-joint. For multi-layer cladding, the gaps between the boards mutually overlap – always by the profile (420 mm).

For anchoring of CETRIS® boards on CD profiles are used self-drilling self-tapping screws 4.2 × 25 mm with countersunk head, and with milling for recessing into the board. The screw length must be at least 10 mm longer than the thickness of the anchored board. In case of multi-layer cladding is necessary to use a screw at least 35 mm long for anchoring of the second CETRIS® layer.

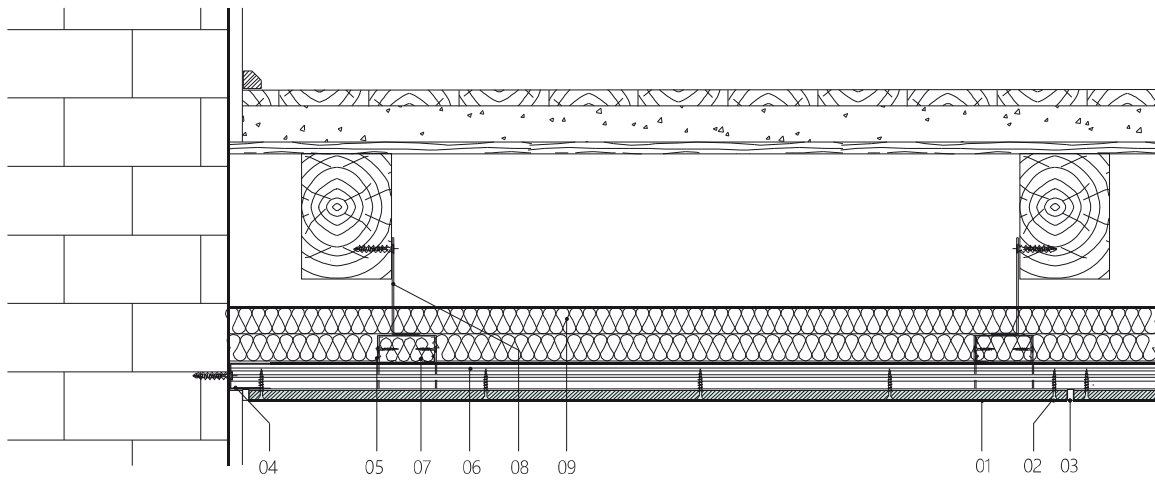
For anchoring of CETRIS® boards on wooden laths are used self-drilling, self-tapping screws 4.2 × 35 mm with countersunk head, and with milling for recessing into the board. For anchoring into the second layer of CETRIS® boards it is necessary to use a screw of minimum length 55 mm. When applied in the exterior, where the CETRIS® board is visible, the last layer of the CETRIS® boards must be anchored as applies to the façade cladding – i.e. using screws inserted into the pre-drilled holes with visible heads and sealing washers.

Joints of minimum width 5 mm are left between the boards. The joint fill, the wall perimeter filling is done using fire-resistant filler.



8.3.2.4 Sample Design Solutions - DETAILS

Longitudinal and transverse cross-section

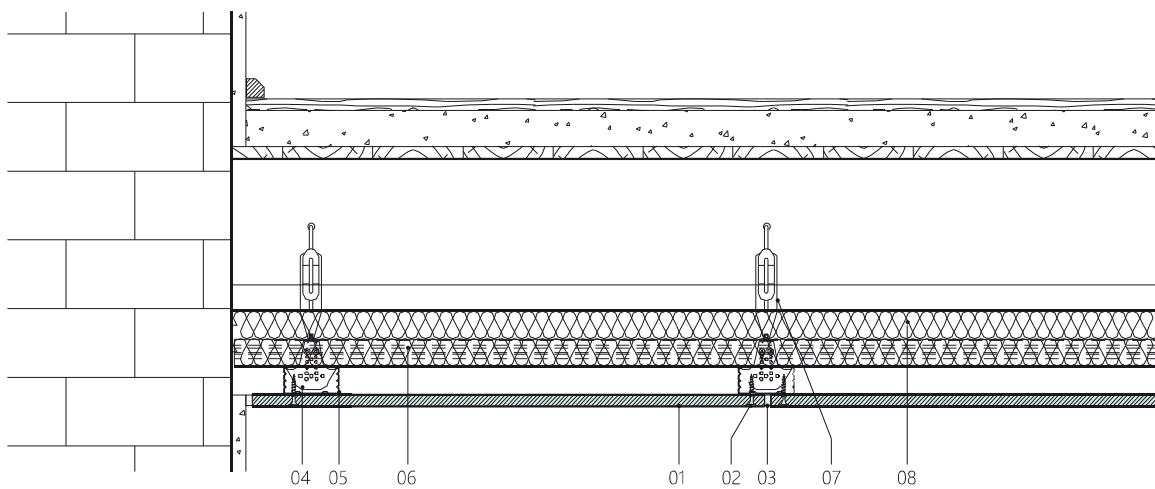


- | | |
|-------------------------------|----------------------------|
| 01 CETRIS® board | 06 CD installation profile |
| 02 screw 4.2 × 25 (35, 45) mm | 07 CD support profile |
| 03 fire resistant filler | 08 hanger |
| 04 UD profile | 09 mineral wool |
| 05 cross-connector | |

UD profile 

Cross-connector 

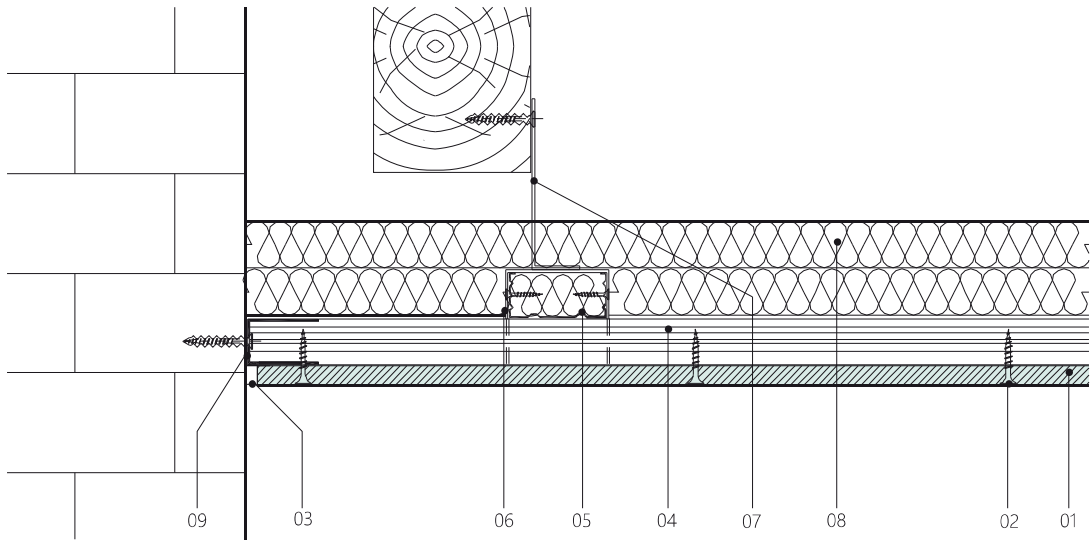
CD profile 



- | | |
|-------------------------------|----------------------------|
| 01 CETRIS® board | 05 CD installation profile |
| 02 screw 4.2 × 25 (35, 45) mm | 06 CD support profile |
| 03 fire resistant filler | 07 hanger |
| 04 cross-connector | 08 mineral wool |

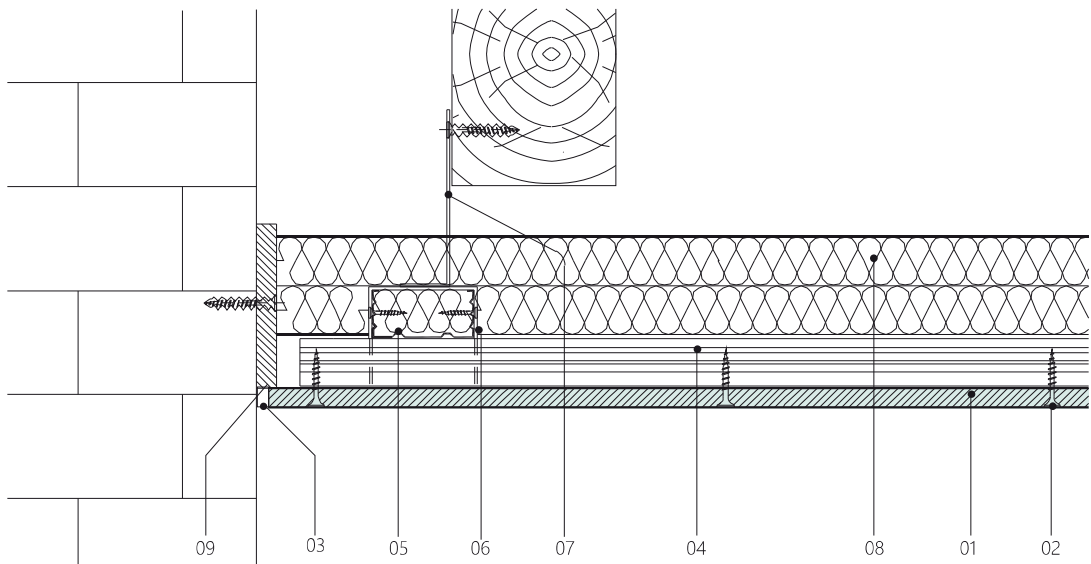


Connection with joint filled with filler (supported with a profile)



- | | |
|-------------------------------|---------------------|
| 01 CETRIS® board | 06 cross-connector |
| 02 screw 4.2 × 25 (35, 45) mm | 07 hanger |
| 03 fire resistant filler | 08 cut mineral felt |
| 04 CD installation profile | 09 UD profile |
| 05 CD support profile | |

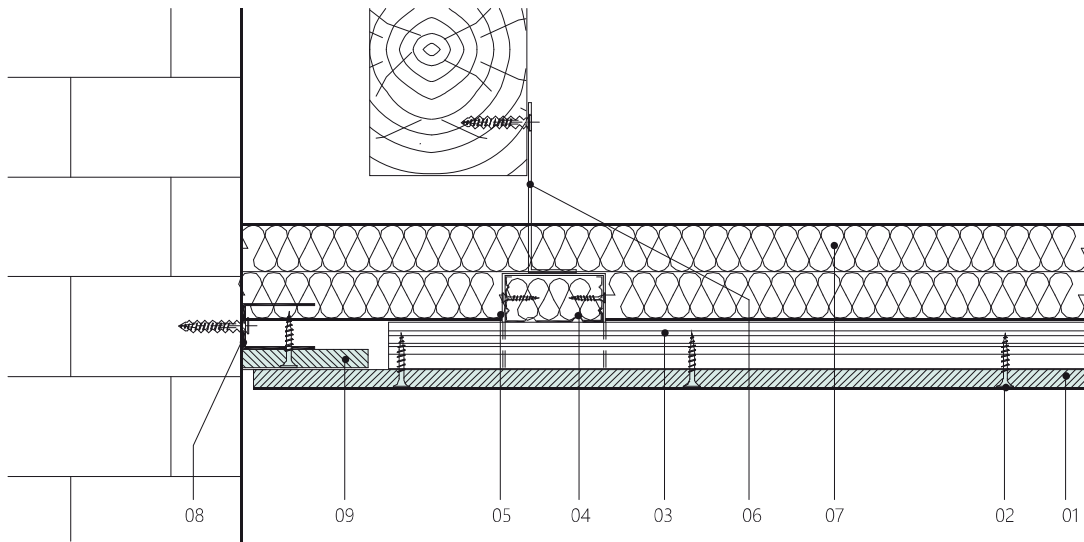
Connection with joint filled with filler (supported with a strip)



- | | |
|-------------------------------|---------------------|
| 01 CETRIS® board | 06 cross-connector |
| 02 screw 4.2 × 25 (35, 45) mm | 07 hanger |
| 03 fire resistant filler | 08 cut mineral felt |
| 04 CD installation profile | 09 CETRIS® tape |
| 05 CD support profile | |

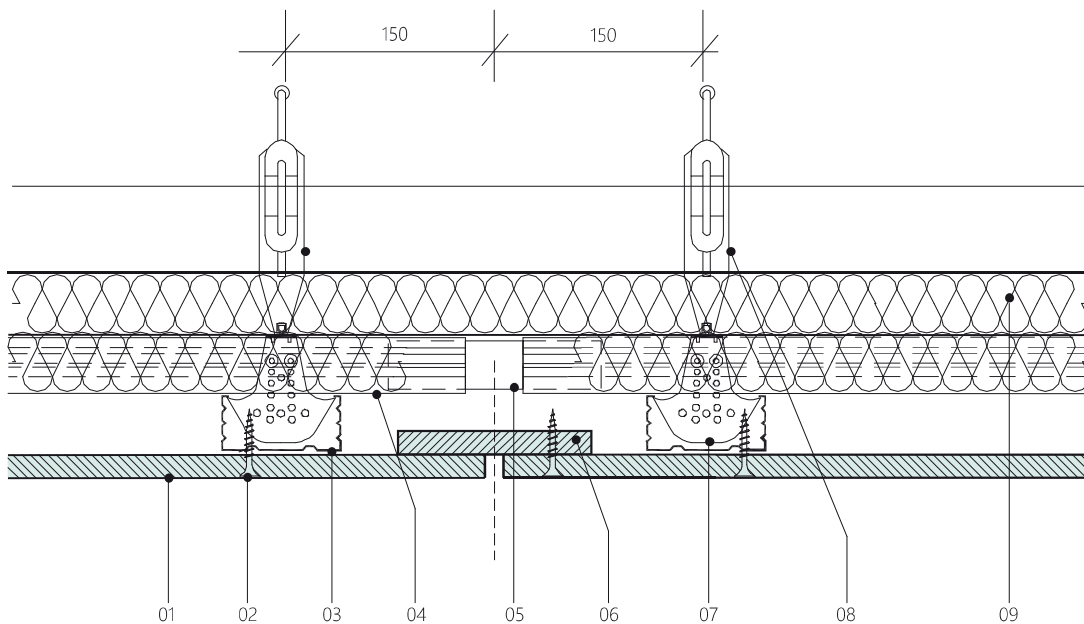


Connection with supported joint (supported with a strip and profile)



- | | |
|-------------------------------|---------------------|
| 01 CETRIS® board | 06 hanger |
| 02 screw 4.2 × 25 (35, 45) mm | 07 cut mineral felt |
| 03 CD installation profile | 08 UD profile |
| 04 CD support profile | 09 CETRIS® tape |
| 05 cross-connector | |

Dilatation joint in the ceiling

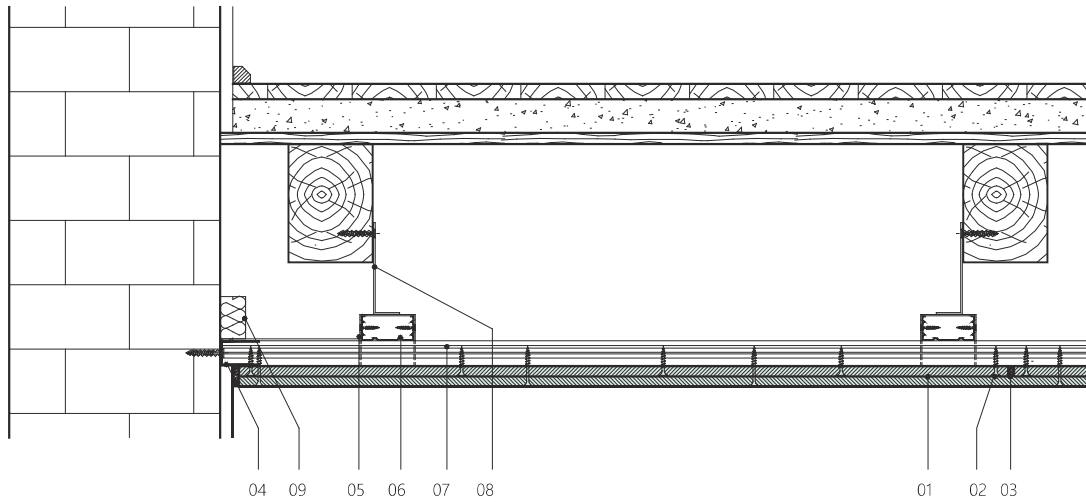


- | | |
|-------------------------------|---------------------|
| 01 CETRIS® board | 06 CETRIS® tape |
| 02 screw 4.2 × 25 (35, 45) mm | 07 cross-connector |
| 03 CD installation profile | 08 hanger |
| 04 CD support profile | 09 cut mineral felt |
| 05 CD connection | |



Fire-resistant ceiling

Longitudinal section



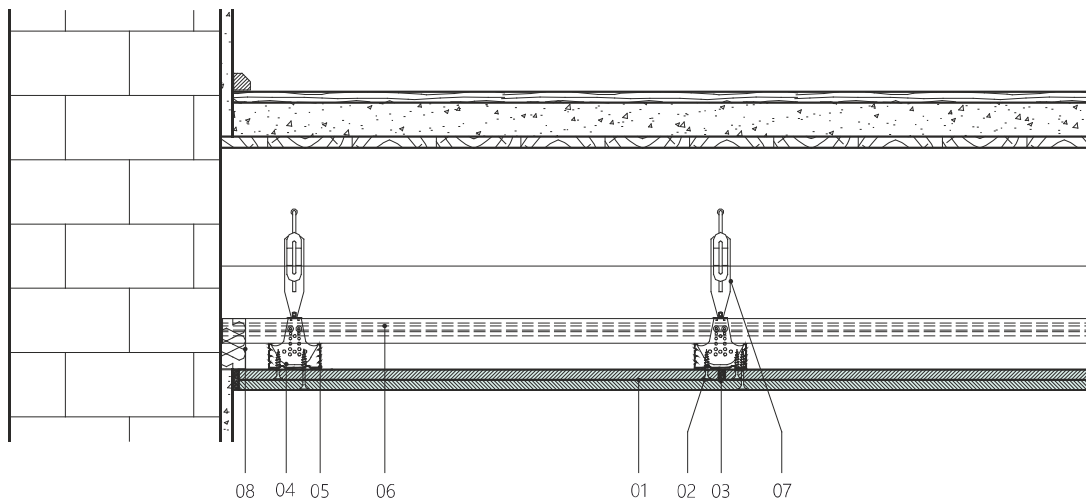
- | | |
|---------------------------|---|
| 01 CETRIS® board | 06 CD installation profile |
| 02 screw 4.2 × 25 (45) mm | 07 CD support profile |
| 03 fire resistant filler | 08 hanger |
| 04 UD profile | 09 mineral insulation – sealing along the walls
(min. thickness 30 mm, height 50 mm) |
| 05 cross-connector | |

UD profile 

Cross-connector 

CD profile 

Transverse section

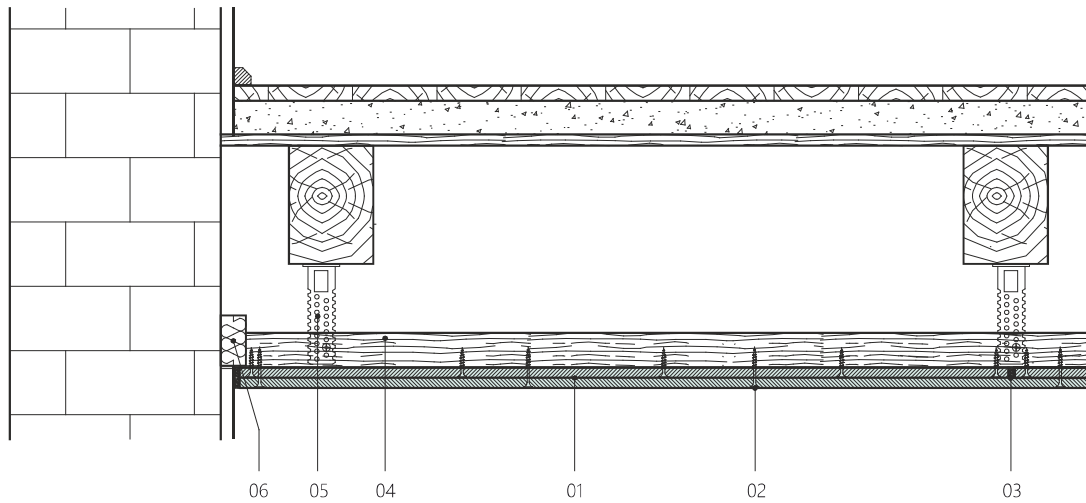


- | | |
|---------------------------|---|
| 01 CETRIS® board | 06 CD support profile |
| 02 screw 4.2 × 25 (45) mm | 07 hanger |
| 03 fire resistant filler | 08 mineral insulation – sealing along the walls
(min. thickness 30 mm, height 50 mm) |
| 04 UD profile | |
| 05 cross-connector | |



Fire-resistant ceiling

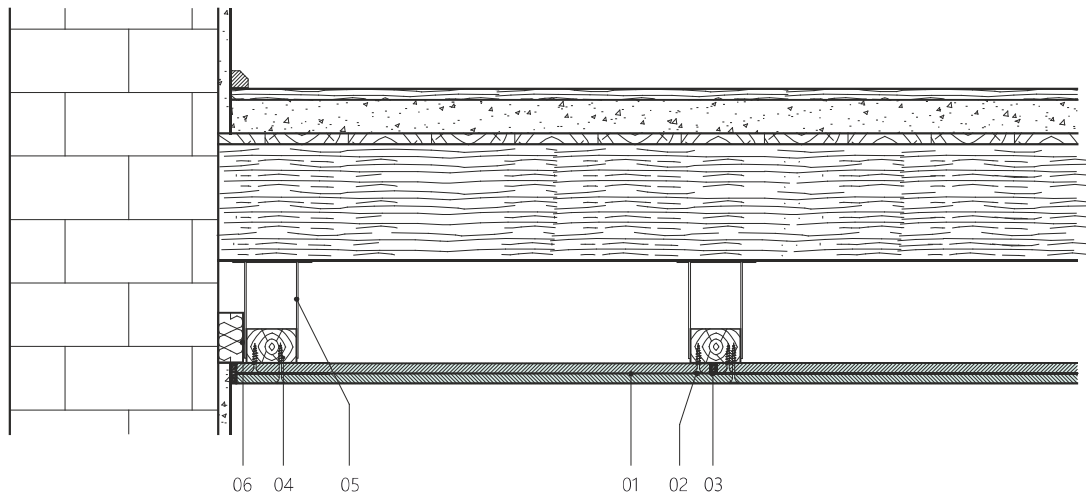
Longitudinal section



01 CETRIS® board
02 screw 4.2 × 35 (55) mm
03 fire resistant filler

04 wooden lath
05 direct hanger
06 mineral insulation – sealing along the walls 60 × 40 mm
(min. thickness 30 mm, height 50 mm)

Transverse section



01 CETRIS® board
02 screw 4.2 × 35 (55) mm
03 fire resistant filler

04 wooden lath
05 direct hanger
06 mineral insulation – sealing along the walls 60 × 40 mm
(min. thickness 30 mm, height 50 mm)



8.3.2.5 General Principles of Assembly of Fire Ceiling Panels

- All structurally independent load-bearing building constructions, to which CETRIS® ceiling panels are fixed in any manner or related as boundaries of fire compartments which might threaten their stability if failing, must have at least the same fire resistance as the CETRIS® ceiling and panels themselves. If these constructions are structurally stressed then their potential deformations must not interfere with the integrity of the ceiling or panels of CETRIS® boards. This requirement does not apply if the supporting and load-bearing construction is not exposed to thermal stress by fire even under the least favourable conditions for the period of the prescribed fire resistance.
- Maximum spacing of the screws anchoring the CETRIS® boards to the CD profiles (the spacing of the laths for fire ceilings must not exceed 200 mm - screws at the edges), or 400 mm (across the surface) and the distance from the board edges must not be less than 25 mm.
- Screws used for anchoring the boards to CD and UD profiles must be at least 10 mm longer than the thickness of the anchored board. For installation of the boards on a wooden lath, the screw must be 30 mm longer than the thickness of the fixed board.
- If the CETRIS® board is used as visible cladding of an exterior fire construction it must be anchored as façade cladding – i.e. with pre-drilled holes (8 or 10 mm) and screws with visible heads and sealing washers (see chapter 7.1.6.2).
- CETRIS® assembly inserts or strips must always have a minimum thickness of 12 mm.
- Maximum spacing of dowels for anchoring the UD profiles must not exceed 625 mm.
- The CETRIS® strip to cover the joints between the CETRIS® boards must overlap on both sides by at least 10 mm, unless otherwise specified in the detail drawing.
- The bottom layer of insulation boards is laid over assembly CW profiles and fills the load-bearing CW profile.
- Dilation joints and all contacts with the wall and the corner joints must be filled with fire resistant filler (DEXAFLAMM-R, Den Braven acrylic fire resistant filler). The filler must be driven in to a minimum depth of 5 mm.
- The surface of CD or UD profiles, adjacent to the wall, should be sealed with fire resistant sealant as necessary and underlaid with FIBREFRAX DURAFELT paper.
- NIVEAU connectors from KNAUF for CD profiles 60 × 27 will be applied for types of suspended ceilings with two layers of CETRIS® boards. The shims of such connectors must be bent and screwed into the supporting profile with LN 3.5 × 9 mm screws.

Axial distance of assembly CD profiles, load-bearing CD profiles and suspensions

Ceiling panel composition	Spacing of assembly profiles a (mm)	Spacing of loadbearing profiles b (mm)	Spacing of suspensions c (mm)	Note
1 × 12 mm	< 420	< 1 000	< 420	picture 1
2 × 12 mm	< 420	< 900	< 420	picture 2

The values apply to ceiling panels and constructions without additional loading (lighting, air conditioning etc.).

The visible ceiling constructions in rooms where negative or excess pressure may be created by ventilation and air conditioning technology must be assessed individually.

Fig. 1) Schematic drawing of the load-bearing construction of the ceiling for cladding with CETRIS® cement bonded particleboard (thickness 12 mm)

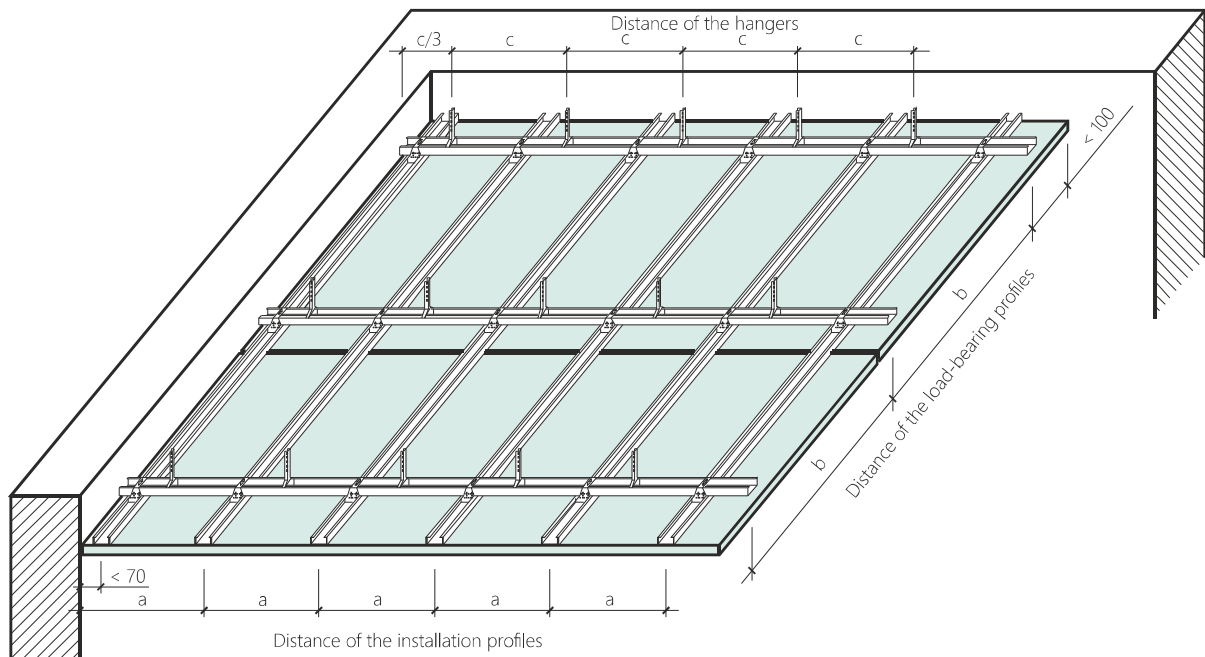
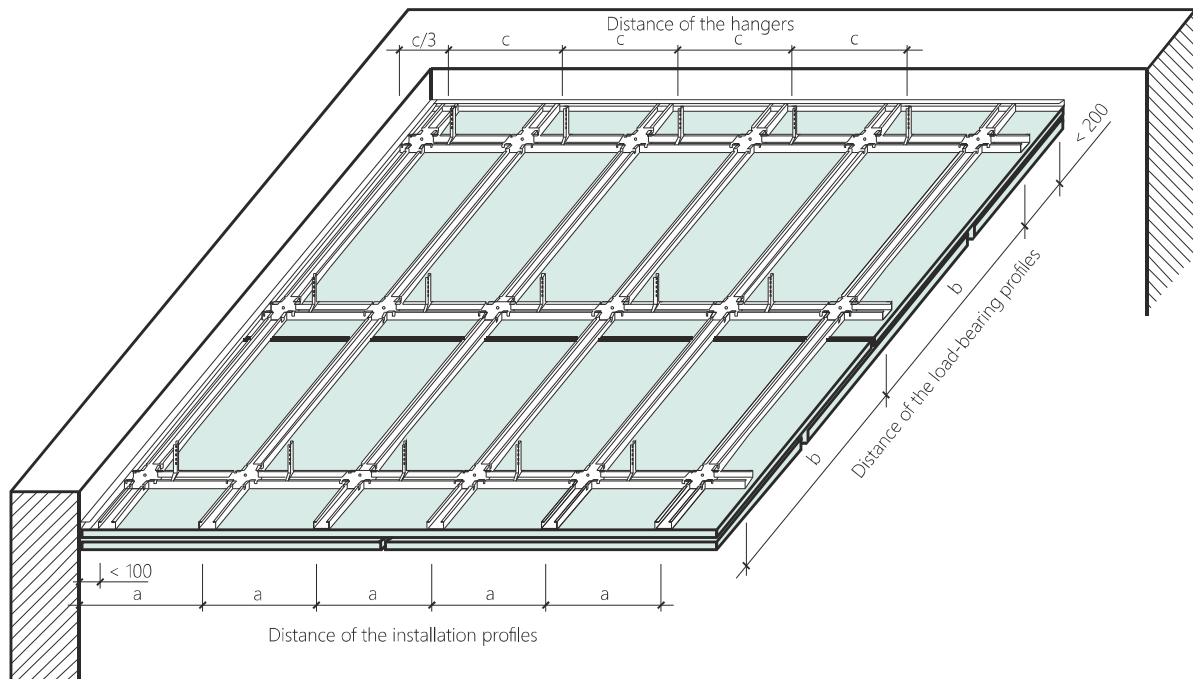


Fig. 2) Schematic drawing of the load-bearing construction of the ceiling for cladding with CETRIS® cement bonded particleboard (thickness 2 × 12 mm)



- NIVEAU cross-connectors from KNAUF for CD profiles 60 × 27 will be applied for types of suspended ceilings with one layer of CETRIS® boards. It is recommended to secure the cross connectors with screws of minimum size M6 × 40 with nuts and washers.
- Joints of multilayer coating must alternate with mutual overlaps of at least 100 mm and without any cross joint whatsoever
- Joints of single-layer coats must always be supported with a CD profile, or (where impossible for construction reasons) with CETRIS® tapes. In exposed cases – in the case of higher demand for fire

resistance of both ways, all joints must be filled with filler. In the case of multilayer coating even the inside joints of the bottom layers must be filled with filler.

- In the case of suspended ceiling composition without inserted mineral wool, it is necessary to insert a strip of mineral wool with a minimum thickness of 30 mm and a height of at least 50 mm over the circumference (along the walls) of the CETRIS® board cladding.

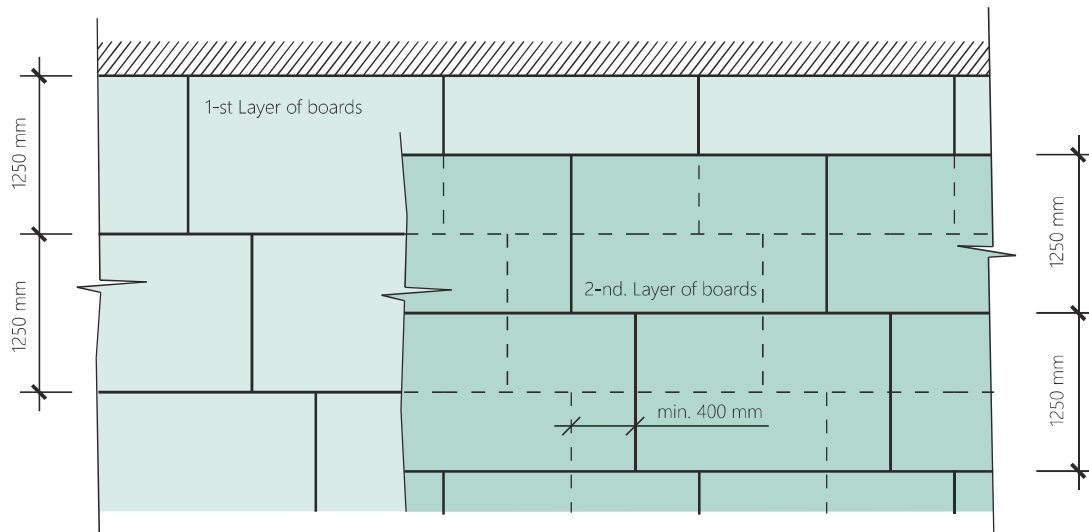
8.3.2.6 Notes to Assembly

The CETRIS® ceiling system is fixed to a metal grid of CD profiles or to wooden laths. CETRIS® boards are then fixed to these profiles with screws in one or two layers. No additional load (such as lighting) may be fixed to the CETRIS® board ceiling panels themselves and no other holes may be drilled in them without further treatment (for ventilation grids etc.). All these adaptations may only be performed by procedures proposed by the project. Lighting must be suspended under the ceiling panels on a separate load-bearing construction; the passages must be sealed with FIBERFRAX DURAFELT paper or mineral wool and fire resistant filler. Locations and types of lamps, potentially sunk in the panels, must be discussed with the fire protection designer in advance and the openings must be treated with fire protection means depending on the lamp and construction type. Ventilation grids for air conditioners must be provided with fire resistance identical with the fire resistance of the through passage.

The following assembly rules must be observed:

- CETRIS® boards must always be assembled with the longer edge perpendicular to the load-bearing profiles.
- All crosswise joints must be supported with a profile lath or an assembly insert with an overlap of at least 400 mm.
- Fixation must always start from the centre or corner of the board (for elimination of potential tensions).
- When screwing the board, it must always be pressed tightly to the load-bearing CD profiles, pre-drilling of the board is recommended
- In the case of cladding of large ceiling constructions (longer or higher than 6 m) dilations in the load-bearing construction must be designed and made visible in the cladding of CETRIS® boards as well.

When applying a two-layer ceiling panel construction the second (external) layer must always be overlapped pursuant to the following schematic drawing:



8.4 Horizontal Constructions - Ceilings and Floors (Fire from Above)

8.4.1 Introduction

Horizontal constructions (ceiling, roof, floor constructions) are most often afflicted by fire stress from below. The required fire resistance is most often achieved in these cases by use of ceilings (solution described in Chapter 7.3 Horizontal constructions – ceilings).

Using CETRIS® cement bonded particleboards it is also possible to achieve the fire resistance of horizontal constructions to fire stress from above. This fire load is characteristic especially for ceiling and floor constructions that form horizontal divisions between storeys.

The ceiling/floor construction (steel load-bearing construction) – with fire stress from above

Schematic drawing of the construction	Cladding thickness CETRIS® d (mm)	Axial distance of load-bearing profiles ¹ (mm)	Mineral wool		Ceiling type	Fire resistance ²
			Thickness (mm)	Density (kg/m ³)		
	22	625	80	25	Galvanised sheet metal 0,55 mm	REI 45 / RE 60
	22	625	80	25	Particleboard 10 mm	
	22	625	80	25	Cardboard 12,5 mm	
	18	420	80	25	Galvanised sheet metal 0,55 mm	

Notes to the table

1) The test was performed with steel I profiles 140 with the span of 4 m.

2) Classification of limit fire resistance pursuant to EN 13 501-2, constructions tested pursuant to EN 1365-1 and EN 1364-2 with reduced vertical load with the intensity of 100 kg/m².