CETRIS®

CETRIS® LASUR
façade cladding board,
reconstruction of the
Kindergarten
Hranice, 2018

TECHNICAL MANUAL

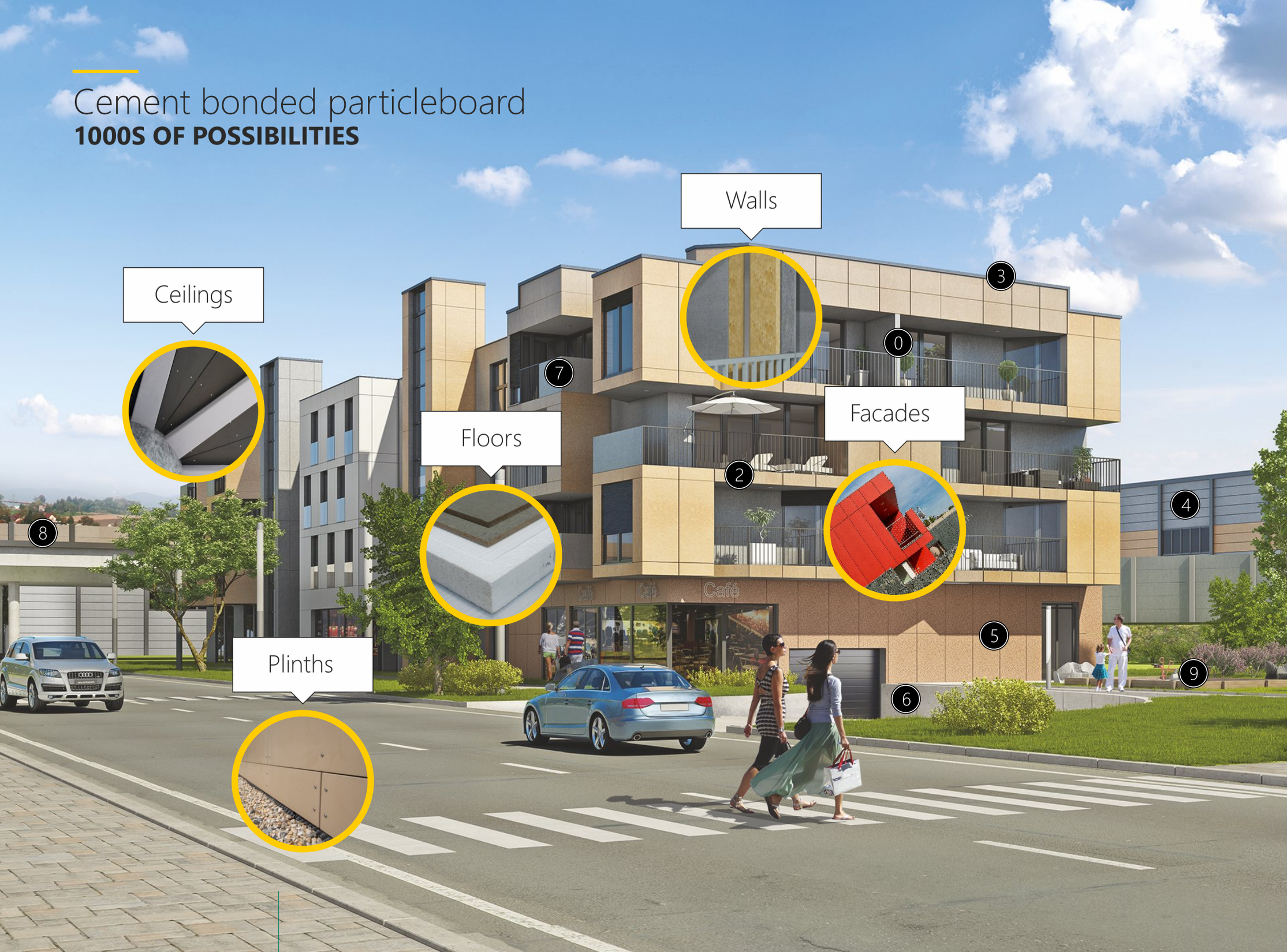
FOR ARCHITECTS, DESIGNERS AND MANUFACTURERS

2018

Fully revised edition

Cement bonded particleboard

1000S OF POSSIBILITIES



CETRIS®

Overview of the products and their usage

Board types	Maximum board dimensions	Supplied board thicknesses	Using the board
CETRIS **BASIC**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 1 2 3 4 5 6 7 8 9
CETRIS **PD**	1250 x 625	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	2 3 4
CETRIS **PDB**	1250 x 625	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	2 3 4
CETRIS **PDI**	1220 x 610	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	2
NEW CETRIS **INCOL**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 1 4 5 7
CETRIS **PLUS**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 1 4 5 7
CETRIS **FINISH**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	1 4 5 7
CETRIS **LASUR**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	1 4 5 7
CETRIS **PROFIL**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	1 4 5
CETRIS **PROFIL PLUS**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	1 4 5
CETRIS **PROFIL FINISH**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 1 4 5
CETRIS **PROFIL LASUR**	3350 x 1250	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 1 4 5
NEW CETRIS **AKUSTIC**	1250 x 625	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 5
NEW CETRIS **AKUSTIC FINISH**	1250 x 625	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 5
NEW CETRIS **AKUSTIC INCOL**	1250 x 625	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	0 5
CETRIS **DEKOR**	1250 x 625	8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40	1 5 7

- 0 Walls
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- 5 Ceilings and plinths
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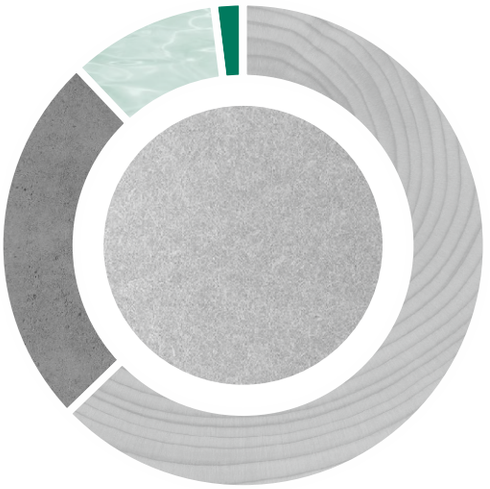
CE A2 15 YEARS GUARANTEE ISO 9001 PEFC PEFC/08-35-0021

CONTENTS

PRODUCTS - Production Program

1.1 Composition of the CETRIS® Cement bonded Particleboards

CETRIS® boards are made of wood, cement, water and hydration additives. The board structure is created by pressing the wooden particles coated with cement. The finer fraction is applied on both sides on a medium coarse layer, which makes the board surface smooth.



63%	wooden particles
25%	cement
10%	water
2%	hydration additives

(volume)

1.2 Benefits of the CETRIS® Boards

The CETRIS® cement bonded particleboards combine the positive properties of cement and wood. They are lighter than traditional cement-fibre boards, their strength and resistance to weather, frost and fungi ranks them among the wood-chip-cement board or plasterboard.

Major advantages of the CETRIS® boards

Ecology
The cement bonded particleboards are ecological and environmental friendly. They do not contain dangerous substances such as asbestos and formaldehyde; they are resistant to benzene and oils.

Resistance to fire
The CETRIS® cement bonded particleboard is fire resistant and its classification according to resistance to fire class as stipulated under European standard EN 13 501-1 is A2-s1,d0 – inflammable.

Perfect sound insulation
CETRIS® boards provide for acoustic insulation (sound transmission loss 30 – 35 dB).

Frost-resistance
CETRIS® cement bonded particleboards are frost resistant, tested successfully by 100 freezing-defrosting cycles pursuant to ČSN EN 1328 standard.

Weather resistance
CETRIS® cement bonded particleboards is the best material for wet rooms and weather-exposed exteriors for its excellent humidity resistance. The thickness swelling of CETRIS® boards when stored in water for 24 hours is only max. 1.5 %.

Hygienic harmless
CETRIS® boards are hygienic harmless, odourless and contain no hazardous substances.

Fungi and mould resistance
Fungi and mould do not form on the board surface thanks to the CETRIS® board resistance to humidity.

Insect resistance
The CETRIS® cement bonded particleboards are absolutely insect resistant thanks to their cement content.

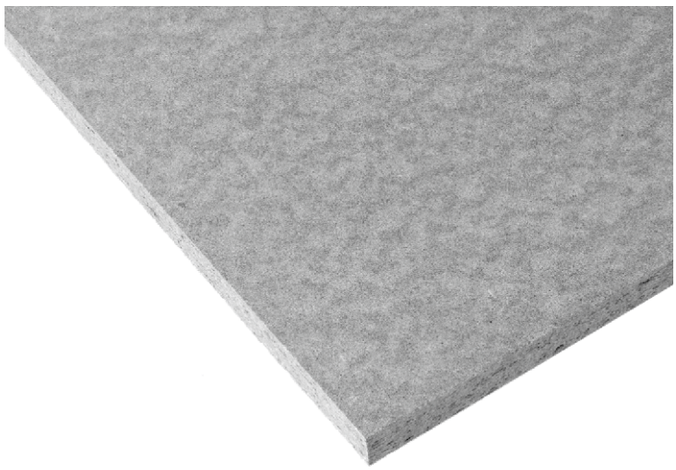
1.3 Types of CETRIS® Cement Bonded Particleboards

Boards without Surface Treatment

The basis of the production programme of the CETRIS® Division is manufacturing of one product, the CETRIS® BASIC boards. All other products are created by mechanical or surface treatment of this basic board.

1.3.1 CETRIS® BASIC

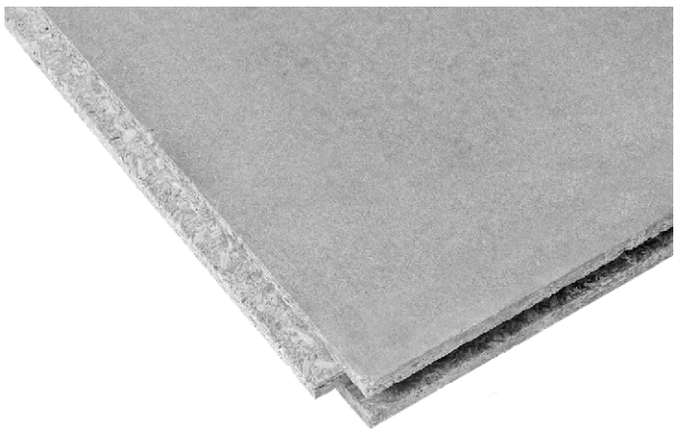
CETRIS® BASIC	Cement bonded particleboard with smooth natural grey cement surface
Board format	3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	8-10-12-14-16-18-20-22-24-26-28-30-32, as per agreement 34-36-38-40 mm
Service	According to the requirements of the customer – cutting, drilling, edge chamfering, milling...



CETRIS® BASIC is a universal structural board, which is suitable, for cladding of walls, suspended ceilings, skirting, floor, fire resistant, roof systems, etc. The boards can be supplied with service - cut to the dimensions required by the customer, rounded or chamfered edges under an angle of 45°, milling from a minimum board thickness of 12 mm with semi-groove, from a board thickness of 16 mm with groove and tongue. Pre-drilled holes may be made in the boards on request.

1.3.2 CETRIS® PD

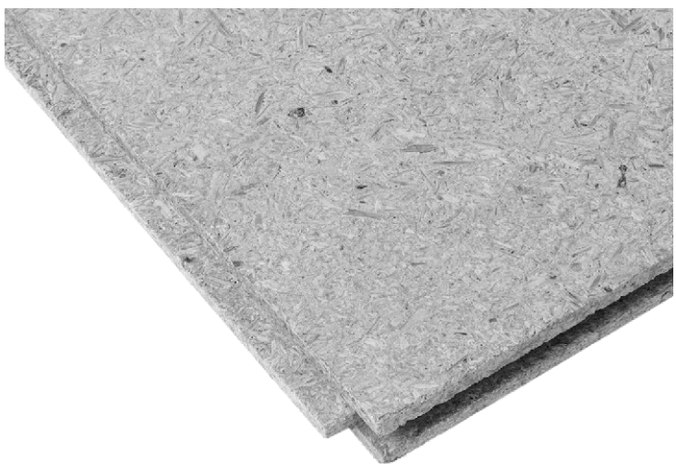
CETRIS® PD	Cement bonded particleboard with smooth grey cement surface with tongue and groove
Board format	1250 x 625 mm (including tongue) after installation 1 242 x 617 mm
Denisity	1150-1450 kg/m^3
Board thicknesses	16-18-20-22-24-26-28 mm
Service	Milling of tongue and groove edges



CETRIS® PD boards are intended for use on floors, i.e. they are laid on beams, or for renovation of old wooden floors.

1.3.3 CETRIS® PDB

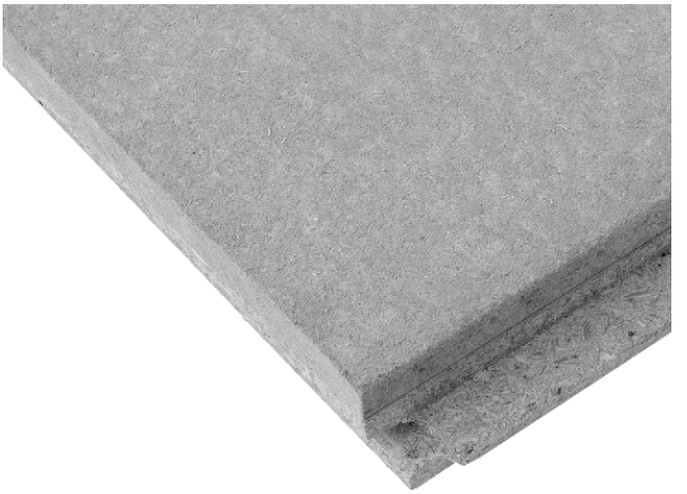
CETRIS® PDB	Tongue-and-grooved cement bonded particleboard has a smooth surface calibrated by sanding
Board format	1250 x 625 mm (including tongue), after installation 1 242 x 617 mm
Density	1150-1450 kg/m^3
Board thicknesses	16-18-20-22-24-26-28 mm (as per agreement 30-32-34-36-38 mm)
Service	Full-size double-sided sanding, milling of tongue and groove edges



The CETRIS® PDB are calibrated by sanding to a thickness tolerance of ±0.3 mm and are intended for use on floors by attachment to beams, or for renovation of old wooden floors mainly under thin floorings.

1.3.4 CETRIS® PDI

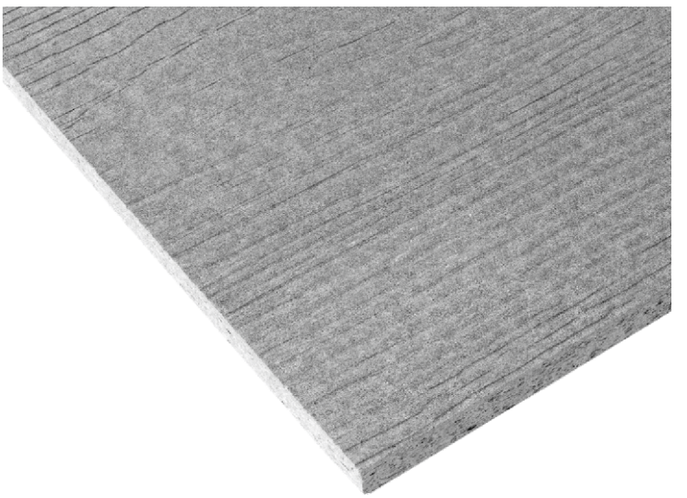
CETRIS® PDI	Two-ply panel consisting of a CETRIS® cement bonded particleboard of thickness 20 mm or 22 mm glued together with a fibreboard insulation of thickness 12 mm. The surface is smooth with milled tongue and groove around the perimeter
Board format	1 220 x 610 mm (including tongue), after installation 1 203 x 593 mm
Panel thickness:	32, 34 mm
Area weight:	approx. 30,4/ 33,5 kg/m^2
Service	Milling of tongue and groove on the edges



The CETRIS® PDI boards are designed for use of dry technology and laying on a flat surface (ceiling structure, decking). More detailed information about use of the floor panels is available in chapter 6.5.

1.3.5 CETRIS® PROFIL

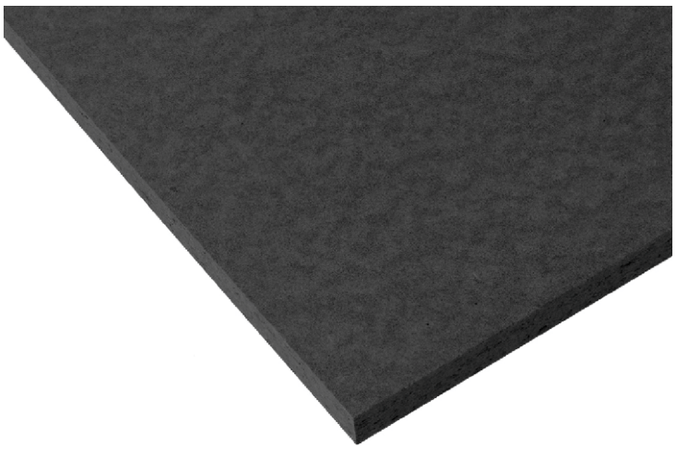
CETRIS® PROFIL	Cement bonded particleboard with relief imitating wood or slate structure with a natural grey cement surface
Board format	3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	10 - 12 mm
Relief type	Wood, Slate
Service	According to the requirements of the customer – cutting, drilling, milling.



CETRIS® PROFIL boards can be supplied with service - cutting according to the dimensions required by the customer, milling from a board thickness of 12 mm with semi-groove. Pre-drilled holes may be made in the boards on request. CETRIS® PROFIL boards are mainly used as exterior and interior façade cladding for their decorative appearance.

1.3.6 CETRIS® INCOL NEW

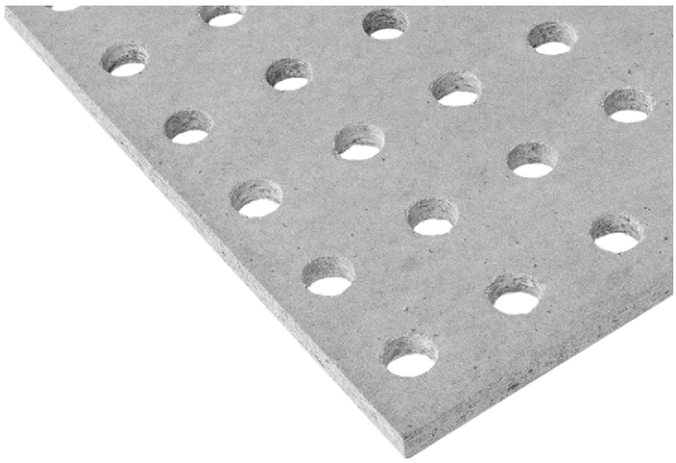
CETRIS® INCOL	Cement-bonded particleboard with smooth surface primed through with black pigment
Board format	3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thickness	12 mm
Service	According to the requirements of the customer – cutting, drilling, edge chamfering, milling...



CETRIS® INCOL boards can be supplied with service - cutting according to the dimensions required by the customer, rounded edge or chamfered edge to 45°, milled with semi-groove. Pre-drilled holes may be made in the boards on request. CETRIS® INCOL boards are mainly used as exterior and interior cladding.

1.3.7 CETRIS® AKUSTIC

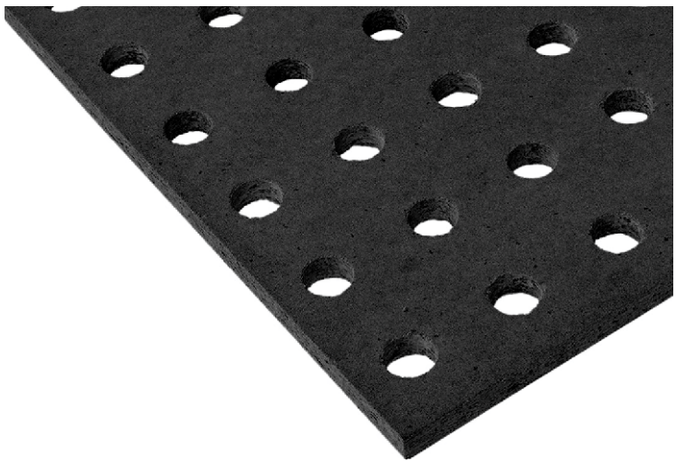
CETRIS® AKUSTIC	Cement bonded particleboard with pre-drilled / milled holes and smooth cement surface
Board format	1250 x 625 mm
Density	1150-1450 kg/m^3
Board thicknesses	8 - 10 mm (as per agreement 12 - 14 mm)
Area weight	8 mm – 10 kg/m^2, 10 mm – 12,5 kg/m^2
Service	Drilled holes of diameter 12 mm, spacing 32 mm + new board milling (drilling) designs.



CETRIS® AKUSTIC boards are used as part of noise-absorbing acoustic insulation structures in connection with load-bearing structures, mineral wool and acoustic textile. By use of these boards, we get not only an aesthetically interesting, but also functional cladding that improves spatial acoustics. Details in chapter 9.3.

1.3.8 CETRIS® AKUSTIC INCOL NEW

CETRIS® AKUSTIC INCOL	Cement bonded particleboard with smooth surface primed through with black pigment with drilled / milled holes
Board format	1250 x 625 mm
Density	1150-1450 kg/m^3
Board thicknesses	12 mm
Area weight	8 mm – 10 kg/m^2, 10 mm – 12,5 kg/m^2
Service	Drilled holes of diameter 12 mm, spacing 32 mm + new board milling (drilling) designs.



CETRIS® AKUSTIC INCOL boards are used as part of noise-absorbing acoustic insulation structures in connection with load-bearing structures, mineral wool and acoustic textile. By use of these boards, we get not only an aesthetically interesting, but also functional cladding that improves spatial acoustics. Details in chapter 9.3.

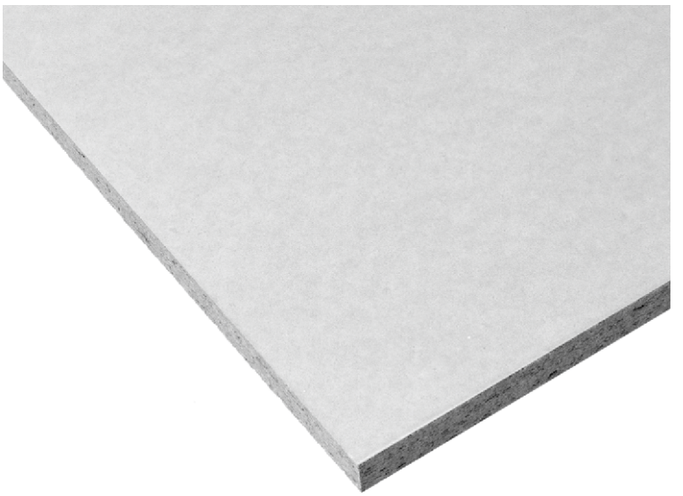
1.3.9 CETRIS® HOBBY FLOWERBED CURB

CETRIS® HOBBY FLOWERBED CURB	
Board format	1250 x 250 x 28 mm
Weight (1 pc)	12.25 kg

CETRIS® HOBBY FLOWERBED CURB is a CETRIS® cement bonded particleboard of rectangular format and a thickness of 28 mm with a size of 1250 x 250 mm, cut from CETRIS® BASIC board. The top edge is chamfered on both sides, the side edges are milled to allow (tongue+groove) joining. The boards may be cut, drilled or milled. The boards may be set in concrete, or directly in a furrow and filled with soil.

1.3.10 CETRIS® PLUS

CETRIS® PLUS	Cement bonded particleboard with a smooth surface treated with primer coat on both sides including the edges
Board format	According to the customer's requirements max. 3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	8-10-12-14-16-18-20-22-24-26-28-30-32 mm
Service	According to the requirements of the customer – cutting, drilling, phasing, milling...
Surface treatment	White base coat



The provided services are identical with those provided for CETRIS® BASIC boards. The base coat improves the adhesion of the final paint on the board, reduces the porosity of the board and consumption of final coating material. The CETRIS® PLUS boards are mainly suitable for use in interiors as a base under a contact heat insulation system. The underside has lower coverage and an irregular structure.

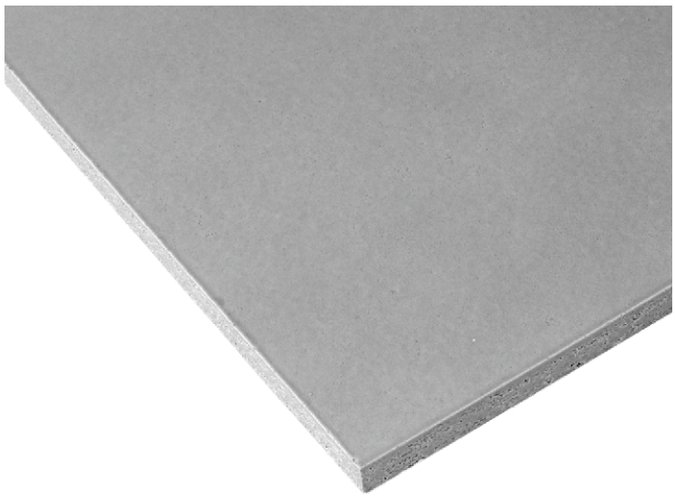
1.3.11 CETRIS® PROFIL PLUS

CETRIS® PROFIL PLUS	Cement bonded particleboard with relief surface imitating wood or slate structure with white primer on both sides including the edges.
Board format	According to the customer's requirements, max. 3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	10 - 12 mm
Relief type	Wood, Slate
Service	According to the requirements of the customer – cutting, milling.
Surface treatment	White base coat

The provided services are identical with those provided for CETRIS® BASIC boards. The base coat improves the adhesion of the final paint on the board, reduces the porosity of the board and consumption of final coating material. The CETRIS® PROFIL PLUS boards are mainly suitable for use in interiors. The underside has lower coverage and an irregular structure.

1.3.12 CETRIS® FINISH

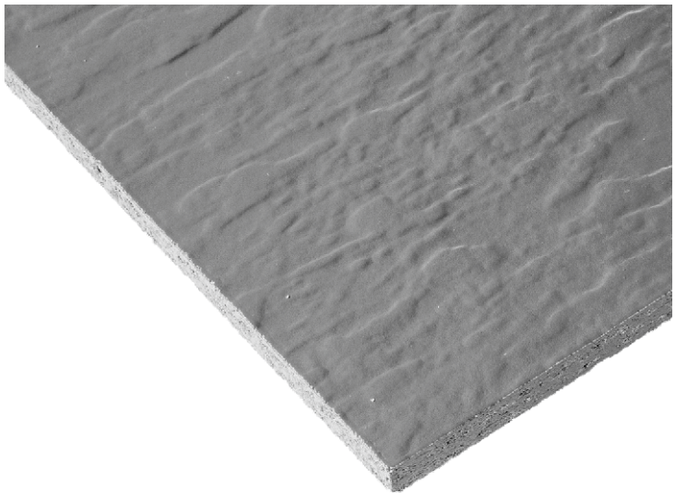
CETRIS® FINISH	Cement bonded particleboard with smooth surface provided with a primer and a final top coat in shades according to the customer's requirements
Board format	According to the customer's requirements, max. 3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	10-12-14-16 mm
Service	According to requirements – cutting, drilling, chamfering of edges
Surface treatment	Pigment primer coat, top coat
Colour shades	According to the RAL, NCS swatches – suitability of the colour shade must be consulted with the manufacturer



The CETRIS® FINISH boards are used mainly as surface cladding boards in exteriors and interiors. The backside of the CETRIS® FINISH boards is provided with a protective primer coat without regular structure, appearance, specific colour shade and adequate covering power. The requirement for the design of the backside in white or transparent shade must be specified in the order in advance.

1.3.13 CETRIS® PROFIL FINISH

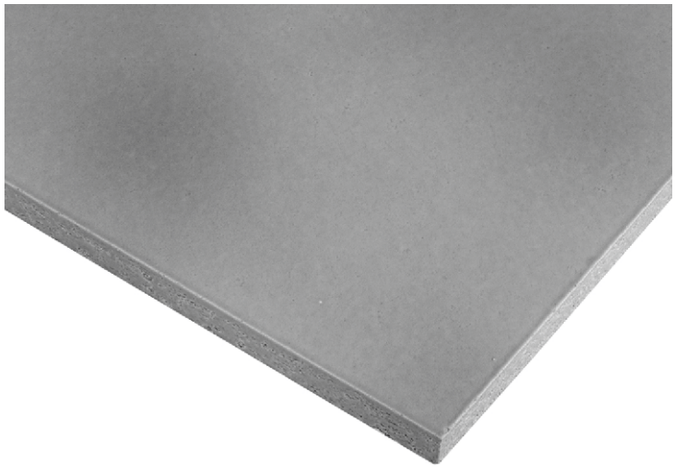
CETRIS® PROFIL FINISH	Cement bonded particleboard with relief imitating wood or slate structure, with a primer and top coat according to the customer's colour shade requirement
Board format	According to the customer's requirements, max 3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	10 - 12 mm
Relief type	Wood, Slate
Service	According to the requirements of the customer – cutting, drilling of holes
Surface treatment	Pigment primer coat, top coat
Colour shades	According to the RAL, NCS swatches – suitability of the colour shade must be consulted with the manufacturer



CETRIS® PROFIL FINISH boards are mainly used as exterior and interior façade cladding for their decorative appearance. The backside of the boards is provided with a protective primer coat without regular structure, appearance, specific colour shade and adequate covering power. The requirement for the design of the backside in white or transparent shade must be specified in the order in advance.

1.3.14 CETRIS® LASUR

CETRIS® LASUR	Cement bonded particleboard with smooth surface provided with a primer coat and a glaze top coat in shades according to the customer's requirements
Board format	According to the customer's requirements, max. 3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	10-12-14-16 mm
Service	According to the requirements of the customer – cutting, drilling of holes, chamfering of edges
Surface treatment	Pigment primer coat, top glaze coat
Shades	According to the CETRIS® LASUR board sampler



The CETRIS® LASUR boards are used mainly as surface cladding boards in exteriors and interiors. The backside of the CETRIS® LASUR boards is provided with a protective primer coat without regular structure, appearance, specific colour shade and adequate covering power.

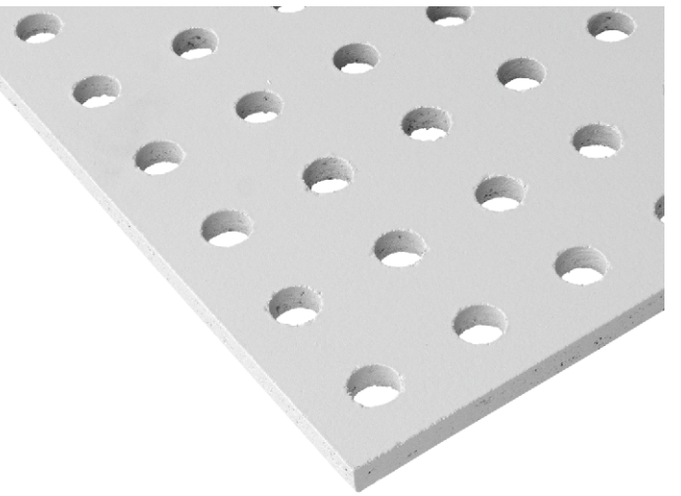
1.3.15 CETRIS® PROFIL LASUR

CETRIS® PROFIL LASUR	Cement bonded particleboard with relief imitating wood or slate structure, with a primer and final glaze top coat made according to the customer's requirement
Board format	According to the customer's requirements, max. 3350 x 1250 mm
Density	1150-1450 kg/m^3
Board thicknesses	10-12 mm
Relief type	Wood, Slate
Service	According to the requirements of the customer – cutting, drilling of holes
Surface treatment	Primer pigment coat, top glaze coat
Shades	According to the CETRIS® LASUR board sampler

CETRIS® PROFIL LASUR boards are mainly used as exterior and interior façade cladding for their decorative appearance. The backrside of the CETRIS® PROFIL LASUR boards is provided with a protective primer coat without regular structure, appearance, specific colour shade and adequate covering power.

1.3.16 CETRIS® AKUSTIC FINISH NEW

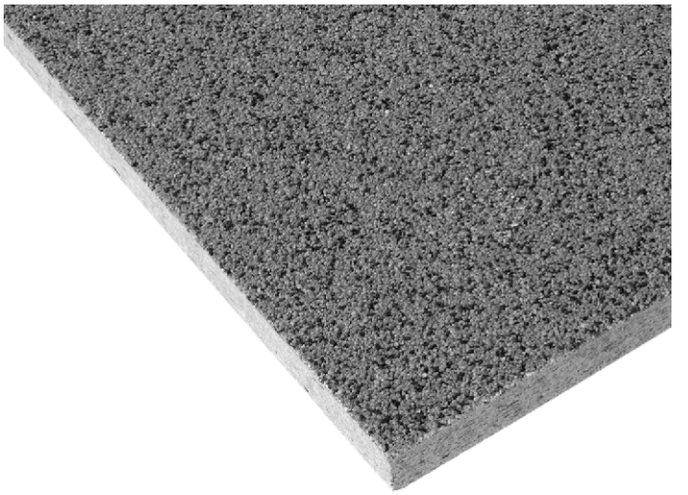
CETRIS® AKUSTIC FINISH	Cement bonded particleboard with regular pre-drilled holes with primer coat and final top coat
Board format	1250 x 625 mm
Density	8 mm – 10 kg/m^2, 10 mm – 12,5 kg/m^2
Board thicknesses	8 - 10 mm (as per agreement 12 - 14 mm)
Relief type	smooth
Service	Drilled holes – diameter 12 mm, hole spacing 32 mm + new board drilling (milling) design
Surface treatment	Pigment primer coat, top coat
Colour shades	According to RAL, NCS - consult with the manufacturer



CETRIS® AKUSTIC FINISH boards are used as part of noise-absorbing acoustic insulation structures in connection with load-bearing structures, mineral wool and acoustic textile. By use of these boards, we get not only an aesthetically interesting, but also functional cladding that improves spatial acoustics. The backside of the CETRIS® AKUSTIC FINISH boards is provided with a protective primer with irregular structure, raw appearance and insufficient coverage. Details in chapter 9.3

1.3.17 CETRIS® DEKOR

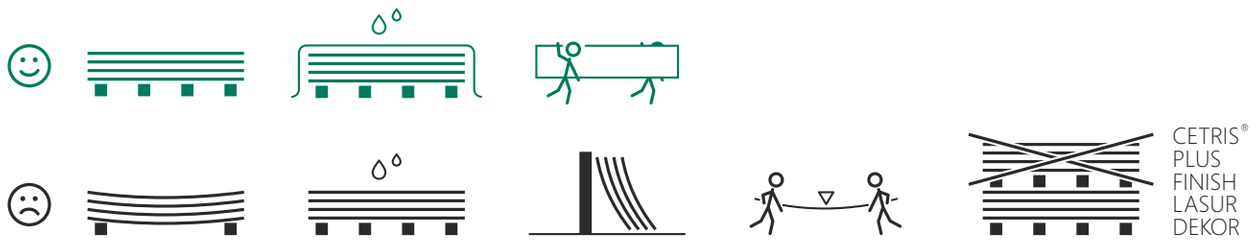
CETRIS® DEKOR	Cement bonded particleboard with base coat and decorative mosaic plaster
Board format	1250 x 625 mm
Area weight	12 mm – cca 20 kg/m^2, 14 mm – cca 23 kg/m^2
Board thicknesses	12, 14 mm
Surface treatment	Pigment primer coat, decorative mosaic plaster
Colour shades	According to the CETRIS® DEKOR board sampler



The CETRIS® DEKOR boards are used mainly as cladding boards in exteriors and interiors. The backside of the CETRIS® DEKOR boards is provided with a protective primer without regular structure, appearance, specific colour shade and adequate covering power.

1.4 Packaging, Storage, Handling

The CETRIS® cement bonded particleboard are stored on wooden transport pallets which allow handling with a forklift. The boards are fixed with straps cross-wise. Longitudinally, fixing is only upon customer request. CETRIS® boards are protected against weather using PE foil. However, packaging of CETRIS® boards in PE foil does not fulfil the conditions for long-term exposure to the effects of weather during storage in an open space. During storage, the top board may bend due to quicker drying of the upper surface. This phenomenon is eliminated by turning the board over. The CETRIS® boards should be stored in roofed dry space to ensure that they do not become moist before instatlation. During storage, it is possible to stack CETRIS® without surface treatment in layers on the same size up to a maximum height of 4 m. The pallets CETRIS® boards on which surface finish are stored cannot be stacked (PLUS, FINISH, LASUR, DEKOR). When handling, the CETRIS® boards should be placed on pallets During storage, the boards are handled in vertical position. Manual transfer is also done in vertical position.



Board thick-ness (mm)	Approx. weight (kg/m²)	Approx. weight of the board (kg)	Number of boards on pallet (pieces)	Area of boards on pallet (m²)	Total approximate weight of the boards including pal. (kg)
CETRIS® BASIC, PROFIL, INCOL cement bonded particleboards in basic format (1,250x3,350 mm)					
8	11,4	47,6	60	254,25	2 894
10	14,2	59,5	45	188,44	2 716
12	17,0	71,4	40	167,50	2 894
14	19,9	83,3	35	146,56	2 954
16	22,7	95,1	30	125,63	2 894
18	25,6	107,0	25	104,69	2 716
20	28,4	118,9	25	104,69	2 013
22	31,5	130,8	20	83,75	2 656
24	34,3	142,7	20	83,75	2 894
26	36,9	154,6	20	83,75	2 132
28	39,8	166,5	15	62,81	2 537
30	42,6	178,4	15	62,81	2 716
32	45,4	190,3	15	62,81	2 894
34	48,3	202,2	15	62,81	2 073
36	51,1	214,1	10	41,88	2 181
38	54,0	226,0	10	41,88	2 300
40	56,8	237,9	10	41,88	2 419

Board thick-ness (mm)	Approx. weight (kg/m²)	Approx. weight of the board (kg)	Number of boards on pallet (pieces)	Area of boards on pallet (m²)	Total approximate weight of the boards including the pallet (kg)
CETRIS® PD, CETRIS® PDB floor boards (dimensions 1,250 x 625 mm)					
16	22,7	17,8	50	39,0	895
18	25,6	20,0	45	35,1	906
20	28,4	22,2	40	31,2	895
22	31,5	24,6	35	27,3	868
24	34,3	26,8	35	27,3	946
26	36,9	28,8	30	23,4	865
28	39,8	31,1	30	23,4	932
CETRIS® BASIC for the POLYCET, IZOCET floor systems (1,250 x 625 mm)					
12 horní	17,0	13,3	70	54,7	950
12 dolní	17,0	13,3	70	54,7	950
CETRIS® AKUSTIC (1250x625 mm) cement bonded particleboards					
8	10,0	7,8	100	78,13	810
10	12,5	9,75	80	62,5	805
Insulating fibreboards for the IZOCET floor system (1,200 x 810 mm)					
19	5,0	5,0	150	145,8	745
CETRIS® PDI (1220x610 mm) floor panel					
34	33,5	24	30	22,32	750
32	30,4	24	30	22,32	700

1.5 Parameters of the Dispatched Boards

1.5.1 Dimensional tolerances

Note: The given tolerances are defined according to ČSN EN 634-1.

Parameter	Board thickness	Requirement
Thickness of a unsanded board	8,10 mm	±0,7 mm
	12,14 mm	±1,0 mm
	16,18 mm	±1,2 mm
	20 – 40 mm	±1,5 mm
Thickness of a sanded board	8 - 38 mm	±0,3 mm
Basic format length and width	8 – 40 mm	±5,0 mm
Sizing precision for length and width	8 – 40 mm	±3,0 mm
Edge straightness tolerance	8 – 40 mm	1,5 mm/m
Rectangularity tolerance	8 – 40 mm	2,0 mm/m

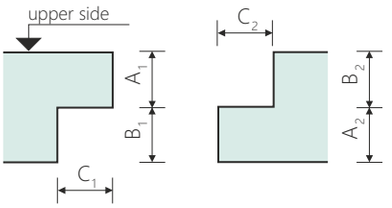
Parameter	1st Class Quality	Lower quality class
Deviation from the right angle	Max. 2 mm / 1 m of length	Max. 4 mm / 1 m of length
Permissible edge damage	Max. to a depth of 3 mm	Max. to a depth of 30 mm
Plane projections	Max. 1 mm, size 10 mm	Max. 2 mm
Depressions	Max. 1 mm, size 10 mm	Max. 2 mm
Miscellaneous		Corrugated surface up to 30 mm, longitudinal wave >30 mm and transverse wave >20 mm, thin edges, pressed cement, peel in the surface, edges peeled, surfaces damaged by the pallets, edges damaged by the disc and cut-out saws.

1.5.2 Services

Deviations in milling, chamfering, creation of tongues and grooves are determined in such a manner that functional correctness is maintained during assembly.

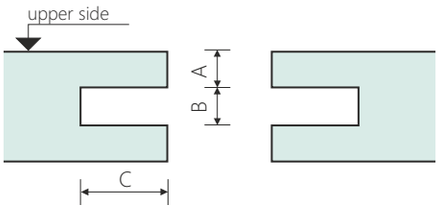
Semi-groove

Dimensions	Deviation	Dimensions	Deviation
A1	–1/0	A2	-1/0
B1	0/+1,5	B2	0/+1,5
C1	0/+2	C2	-2/0



Groove

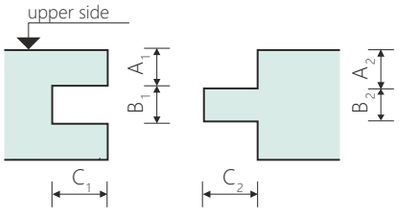
Dimensions	Deviation
A	–0,5/+0,5
B	0/+1,5
C	0/+2



Tongue and groove

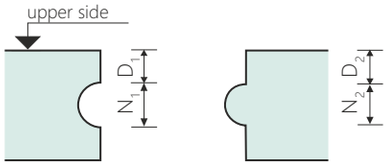
d (mm)	16	18	20	22	24	26	28
A_1 (mm)	5,0	6,0	7,0	8,0	8,0	9,0	10,0
A_2 (mm)	5,25	6,25	7,25	8,25	8,5	9,5	10,5
B_1 (mm)	6,0				8,0		
B_2 (mm)	5,5				7,0		
C_1 (mm)	10,0						
C_2 (mm)	8,5						

Dimensions	Deviation	Dimensions	Deviation
A_1	±0,5 mm	A_2	±0,5 mm
B_1	0/+0,5	B_2	-0,5/0
C_1	0/+2	C_2	-2/0



Half-round tongue and groove

Dimensions	Deviation	Dimensions	Deviation
D1	±0,5 mm	D2	±0,5 mm
N1	0/+0,5	N2	-0,5/0

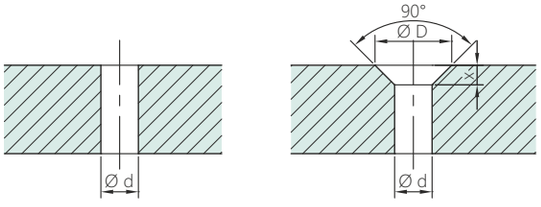


Chamfered and rounded edges

Deviation
Machining accuracy ± 1.0 mm

Drilling

Type of drilling	Hole diameter		Depth x (mm)	Board thickness (mm)
	inner d (mm)	outer D (mm)		
Without recessing	(4,5 - 8,0) ± 0,5	- - -	- - -	8 - 40
Without recessing	(10,0 – 12,0) ± 1,0	- - -	- - -	8 - 40
With recessing	4,5 ± 0,5	9,5± 1,0	2,5± 0,5	12 - 40
With recessing	5,5 ± 0,5	1,0 ± 1,0	2,5± 0,5	12 - 40
With recessing	6,5 ± 0,5	17,0 ± 1,5	5,0 ± 1,0	12 - 40



Deviation of the distance of the individual holes in the board is not more than ± 5 mm.

Surface Treatment

Guarantee on colour stability (according to the manufacturer of the coats) is at least 3 years. Colour shades of CETRIS® FINISH, PROFIL FINISH and AKUSTIC FINISH boards can be chosen according to the RAL or NCS colour sampler. Colour shades of the CETRIS® LASUR and CETRIS® PROFIL LASUR boards can be chosen according to the CETRIS®LASUR colour sampler. We recommend that you consult the suitability of the chosen colour shade with us. The backside of the CETRIS® FINISH, PROFIL FINISH, LASUR, PROFIL LASUR, AKUSTIC FINISH and DEKOR is provided with a protective primer with irregular structure, raw appearance and insufficient coverage.

The backside coat is provided in an unspecified colour shade, the requirement for white or transparent shade must be specified in the order in advance. The backside surface of the boards may be slightly disrupted by handling related to the manufacturing of the CETRIS® boards. If a sample with the required colour shade is made upon customer request, this sample shall only serve as orientation information about the chosen colour shade and coverage level (difference in the manual application of the coat on the sample and machine application during series production).

Basic Properties of CETRIS® Cement Bonded Particleboards

2.1 Basic Parameters and Properties

Table of basic physical mechanical properties	Norm values	Values achieved
Density according to ČSN EN 323	min. 1000 kg/m^3	1350 kg/m^3
Tensile bending strength acc. to ČSN EN 310	min. 9,0 N/mm^2	min. 11,5 N/mm^2
Modulus of elasticity acc. to ČSN EN 310	min. 4500 N/mm^2	min. 6800 N/mm^2
Tensile strength perpendicular to the board plane acc. to ČSN EN 319	min. 0,5 N/mm^2	min. 0,63 N/mm^2
Mass balanced moisture at 20° and relative humidity 50 % according to EN 634-1	9+/-3 %	9,5 %
Linear expansion with changes in humidity from 30% to 85 % at 20°		Max. 0,2 %
Thermal expansion coefficient pursuant to VUPS methodology		0,011 mm/m °C
Water absorption by the board when stored in water for 24 hours		max. 16 %
Thickness swelling when stored in water for 24 hours	max. 1,5 %	max. 0,28 %
Coefficient of thermal conductivity pursuant to ČSN EN 12 664		th. 8 mm – 0,200 W/mK
		th. 22 mm – 0,251 W/mK
		th. 40 mm – 0,287 W/mK
Airborne sound insulation pursuant to ČSN 73 0513		th. 8 mm – 30 dB
		th. 24 mm – 33 dB
		th. 40 mm – 35 dB
Diffusion resistance factor pursuant to ČSN EN ISO 12 572		th. 8 mm – 52,8
		th. 40 mm – 69,2
Weight activity Ra 226	150 Bq/kg	22 Bq/kg
Weight activity index	I = 0,5	I = 0,21
Internal bond after cycling in a humid environment pursuant to ČSN EN 321	min. 0,3 N/mm^2	min. 0,41 N/mm^2
Thickness swelling after cycling in a humid environment pursuant to ČSN EN 321	max. 1,5 %	max. 0,31 %
Resistance to frost at 100 cycles pursuant to ČSN EN 1328	R_L > 0,7	R_L = 0,90
Board surface resistance to water and chemical de-icing agents pursuant to ČSN 73 1326	Waste after 100 cycles max. 800 gr/m^2 (Method A) Waste after 75 cycles max. 800 gr/m^2 (Method C)	Waste after 100 cycles max 20.4 gr/m^2 (Method A) Waste after 100 cycles max 47.8 gr/m^2 (Method C)
Resistance to arc discharge of high voltage at low intensity pursuant to EN 61 621		tl. 10 mm - min. 143 sec
pH of board material		12,5
Shearing friction coefficient		Static μs = 0,73, Dynamický μd = 0,76

Table of basic fire properties	Achieved value
Reaction to fire pursuant to EN 13 501-1	A2 - s1,d0
Surface flame propagation index pursuant to ČSN 73 0863	i = 0 mm/min

2.2 Linear Expansivity

One of the properties of the products, which contain a portion of wood material is linear expansivity and shrinking during changes in air humidity. This applies to the CETRIS® boards and it is necessary to count on this property when using them and allow for the dilatation of the CETRIS® boards. When cladding vertical structures, the dilatation over a length of 1,250 mm is over a width of 4 – 5 mm, for 3,350 mm it is 12 mm. For load-bearing horizontal structures (e.g. floors) the CETRIS® boards are laid end-to-end and the dilatation gaps are created around the walls in a width of min. 15 mm. Dimensional changes to not affect the quality or the durability of the CETRIS® boards.

2.3 Load Tables

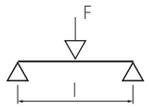
The static calculation of the load-bearing capacity of the CETRIS® boards was done for installation of the boards on beams (the boards act as a continuous beam). The interaction of the individual CETRIS® boards is ensured in the case of beams with two or more fields by bonding of the tongue and groove jointing, for smaller thicknesses by bonding the edges. The calculation was done assuming the elastic behaviour of the material while respecting the following mechanical and physical characteristics:

- bending tensile strength of min. 9 Nmm^{-2}
- modulus of elasticity min. 4500 Nmm^{-2}
- density 1400 kg/m^3

When determining the load capacity, the dead weight of the board was also taken into consideration. The maximum normal stress in the terminal fibres under load did not exceed 3.60 Nmm-2 (a 2.5 multiple of safety is achieved). The maximum elastic deflection from operating load including dead weight shall not exceed 1/300 of the span. The calculation proved that concentrated load is decisive for the load capacity of the CETRIS® boards. The following tables and graphs show the considered load for an area of 50 x 50 mm at the middle of a board of minimum thickness 1 m (according to EN). The static calculation further assumes that the load acts directly on the surface of the board. The given data cannot be used for dimensioning the thickness of the CETRIS® boards for the floor systems. The sample solutions of the CETRIS® board floors and the board load tables are given in chapter 6 CETRIS® Floor Systems.

CETRIS® load tables – concentrated load – 1 field beam

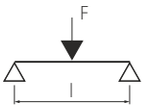
(applies, for instance, to determination of the thickness of a ceiling board – with isolated load)



Beam span l (mm)	Maximum load F (kN)											
	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm	22 mm	24 mm	26 mm	28 mm	30 mm	32 mm
200	0,298	0,431	0,587	0,767	0,972	1,201	1,454	1,731	2,032	2,357	2,707	3,080
250	0,291	0,420	0,573	0,750	0,951	1,175	1,423	1,694	1,990	2,309	2,651	3,018
300	0,250	0,410	0,559	0,732	0,929	1,148	1,391	1,657	1,946	2,259	2,595	2,954
350	0,205	0,361	0,545	0,714	0,906	1,121	1,359	1,619	1,903	2,209	2,538	2,889
400	0,170	0,302	0,489	0,695	0,883	1,093	1,326	1,581	1,858	2,157	2,479	2,824
450	0,141	0,255	0,417	0,632	0,860	1,065	1,292	1,541	1,812	2,105	2,420	2,757
500	0,117	0,216	0,357	0,546	0,789	1,036	1,258	1,501	1,766	2,053	2,360	2,690
550	0,097	0,183	0,307	0,473	0,688	0,958	1,223	1,461	1,719	1,999	2,300	2,622
600	0,078	0,154	0,263	0,410	0,601	0,842	1,137	1,420	1,672	1,945	2,239	2,553
650	0,062	0,128	0,225	0,356	0,526	0,741	1,006	1,325	1,624	1,891	2,177	2,483
700	0,047	0,105	0,191	0,308	0,461	0,654	0,892	1,179	1,520	1,836	2,115	2,414
750	0,033	0,084	0,160	0,265	0,402	0,576	0,790	1,050	1,359	1,720	2,052	2,343
800	0,020	0,065	0,132	0,226	0,349	0,506	0,700	0,935	1,216	1,544	1,925	2,273
850	0,007	0,047	0,106	0,190	0,301	0,443	0,619	0,832	1,087	1,387	1,734	2,132
900		0,030	0,082	0,157	0,257	0,385	0,545	0,739	0,971	1,245	1,562	1,926
950		0,014	0,060	0,127	0,217	0,333	0,478	0,654	0,866	1,116	1,406	1,739
1000			0,039	0,098	0,179	0,284	0,416	0,577	0,770	0,998	1,264	1,570
1050			0,020	0,072	0,144	0,239	0,358	0,505	0,682	0,890	1,134	1,415
1100			0,001	0,047	0,112	0,197	0,306	0,439	0,600	0,791	1,014	1,272
1150				0,024	0,082	0,158	0,256	0,378	0,525	0,700	0,904	1,141
1200					0,003	0,053	0,122	0,211	0,321	0,455	0,615	0,802

CETRIS® load tables – linear load – 1 field beam

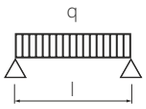
(applies, for instance, to determination of the thickness of a board with linear load)



Beam span l (mm)	Maximum load F (kN)											
	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm	22 mm	24 mm	26 mm	28 mm	30 mm	32 mm
200	1,186	1,711	2,332	3,050	3,863	4,772	5,777	6,878	8,076	9,369	10,758	12,243
250	0,938	1,361	1,857	2,430	3,079	3,805	4,608	5,488	6,444	7,477	8,588	9,774
300	0,640	1,121	1,539	2,014	2,554	3,158	3,826	4,558	5,353	6,213	7,137	8,125
350	0,459	0,810	1,301	1,716	2,178	2,694	3,265	3,891	4,572	5,307	6,098	6,943
400	0,340	0,606	0,980	1,480	1,894	2,344	2,842	3,389	3,983	4,626	5,316	6,054
450	0,257	0,465	0,758	1,151	1,657	2,070	2,512	2,996	3,523	4,093	4,706	5,361
500	0,196	0,362	0,597	0,913	1,321	1,833	2,246	2,681	3,154	3,665	4,215	4,803
550	0,150	0,285	0,477	0,735	1,070	1,491	2,006	2,421	2,850	3,313	3,812	4,345
600	0,114	0,225	0,384	0,599	0,878	1,228	1,659	2,178	2,595	3,018	3,474	3,962
650	0,085	0,177	0,310	0,491	0,726	1,022	1,387	1,827	2,348	2,767	3,187	3,635
700	0,061	0,138	0,250	0,404	0,604	0,857	1,169	1,546	1,993	2,517	2,939	3,354
750	0,041	0,106	0,201	0,332	0,504	0,722	0,991	1,317	1,704	2,158	2,683	3,109
800	0,024	0,078	0,159	0,272	0,421	0,610	0,844	1,128	1,466	1,862	2,321	2,848
850	0,009	0,054	0,124	0,221	0,350	0,516	0,721	0,970	1,266	1,615	2,019	2,483
900		0,034	0,093	0,177	0,290	0,435	0,615	0,835	1,097	1,406	1,764	2,175
950		0,015	0,066	0,139	0,238	0,366	0,525	0,720	0,952	1,227	1,546	1,912
1000			0,042	0,106	0,192	0,305	0,446	0,619	0,827	1,072	1,358	1,686
1050			0,021	0,076	0,152	0,252	0,377	0,532	0,718	0,937	1,194	1,489
1100			0,001	0,049	0,116	0,204	0,316	0,454	0,621	0,819	1,050	1,317
1150				0,025	0,083	0,162	0,262	0,386	0,536	0,714	0,923	1,165
1200				0,003	0,054	0,123	0,213	0,324	0,459	0,621	0,810	1,029

CETRIS® load tables – continuous load – 1 field beam

(applies, for instance, to determination of the thickness of a board used in permanent shuttering)



Beam span l (mm)	Maximum load q (kN/m²)											
	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm	22 mm	24 mm	26 mm	28 mm	30 mm	32 mm
200	11,860	17,112	23,324	30,496	38,628							
250	6,004	10,449	14,857	19,437	24,631	30,440						
300	3,416	5,976	9,560	13,429	17,028	21,053	25,505	30,384				
350	2,099	3,701	5,948	8,947	12,444	15,393	18,657	22,234	26,124	30,328		
400	1,360	2,424	3,920	5,920	8,496	11,720	14,212	16,944	19,916	23,128	26,580	30,272
450	0,913	1,652	2,695	4,091	5,892	8,148	10,910	13,317	15,660	18,192	20,913	23,825
500	0,628	1,159	1,911	2,922	4,227	5,864	7,870	10,281	12,615	14,661	16,860	19,213
550	0,437	0,829	1,387	2,139	3,113	4,336	5,836	7,641	9,778	12,048	13,861	15,801
600	0,304	0,600	1,024	1,596	2,340	3,276	4,424	5,808	7,448	9,364	11,580	13,205
650	0,210	0,436	0,763	1,208	1,787	2,517	3,414	4,496	5,780	7,282	9,018	11,007
700	0,140	0,316	0,572	0,922	1,380	1,959	2,672	3,533	4,555	5,752	7,137	8,723
750	0,088	0,225	0,428	0,708	1,075	1,540	2,115	2,810	3,636	4,603	5,724	7,009
800	0,048	0,156	0,319	0,544	0,842	1,220	1,689	2,256	2,932	3,724	4,643	5,696
850	0,016	0,102	0,233	0,416	0,660	0,971	1,356	1,825	2,383	3,040	3,801	4,674
900		0,060	0,165	0,315	0,516	0,773	1,094	1,484	1,951	2,499	3,136	3,867
950		0,025	0,111	0,235	0,401	0,616	0,884	1,212	1,604	2,066	2,603	3,221
1000			0,067	0,169	0,308	0,488	0,714	0,991	1,323	1,715	2,172	2,698
1050			0,032	0,116	0,232	0,383	0,575	0,810	1,094	1,428	1,819	2,269
1100			0,002	0,071	0,169	0,297	0,460	0,661	0,904	1,191	1,527	1,915
1150				0,035	0,116	0,225	0,364	0,537	0,745	0,994	1,284	1,620
1200				0,004	0,072	0,164	0,284	0,432	0,612	0,828	1,080	1,372

2.4 Thermal Technical Properties

Thermal conductivity or coefficient of thermal conductivity is the most important indicator of the building materials in terms of heat technology. The CETRIS® cement bonded particleboards are thanks to their perfect bonding of wood and cement free of any air bubble pores are thus a very good conductor of heat. For this reason, they can be used in all places with a requirement for material strength and the least possible heat resistance, which could cause heat losses, e.g. floor heating. Floor heating is elaborated separately in chapter 6.10 Floor Heating.

λ = max. 0.287 W/mK (at a mass moisture content of 93 %)

At higher humidity, thermal conductivity rises, but it should not exceed 0.35 W/mK.

Thermal conductivity of the CETRIS® boards in relation to their thickness:

Thickness of CETRIS® board (mm)	Thermal conductivity λ (W/mK)	Heat resistance R (m²K/W)
8	0,200	0,040
24	0,251	0,096
40	0,287	0,139

The given thermal conductivity values are measured in dry state, but the effect on thermal conductivity is not negligible. The thermal conductivity of the material increases with rising humidity, for which reason it is suitable to state the thermal conductivity value in stable humidity of the CETRIS® boards.

2.5 Sound Insulation Properties

According to the evaluation of the acoustic properties tests done by Výzkumný ústav pozemních staveb Praha, CETRIS® boards have excellent acoustic properties and are suitable to cladding partitions, walls and ceilings and can also be used as ceiling sound insulation. The CETRIS® cement bonded particleboard have low sound absorption, they are thus a reflexive element. To increase sound absorption, it is necessary to use CETRIS® boards in combination with absorptive material. For use of the boards from the acoustics viewpoint, the following variables were ascertained:

dynamic modulus of elasticity	5 800 MPa
loss coefficient	0,013
propagation speed of the longitudinal waves	2 128 m/s
material constant	22,7
index Rw tl. 8, 10 mm	30 dB
thickness 12, 14mm	31 dB
thickness 16,20 mm	32 dB
thickness 24 mm	33 dB
thickness 32 mm	34 dB
thickness 40 mm	35 dB

Soundproofing of the wall structures with CETRIS® cement bonded particleboard cladding

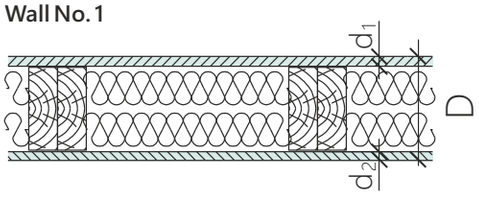
One of the possibilities for reduction of noise transmission from the source to the recipient is effective noise protection. The capability of building construction structures to transmit and weaken airborne noise transmission is provided by acoustics materials (insulation and the like). Airborne sound insulation is a property of the structure to acoustically isolate two neighbouring rooms in terms of airborne sound. Basic rule – the higher the airborne sound insulation the better! The weighted laboratory airborne sound insulation Rw (dB) of selected wall structures with CETRIS® cement bonded particleboard cladding was measured in the laboratory on samples of prescribed size pursuant to EN ISO 140-3 Acoustics - Measurement of sound insulation in buildings and of building elements - Part 3: Laboratory measurement of airborne sound insulation of building elements. For other calculated wall and partition wall compositions, the sound insulation values stated in the table on page 141 (chapter on Application of CETRIS® boards in fire protection, overview of fire walls). Weighted building sound insulation R`w (dB) – measured on a specific building structure on the building construction site. For reason of differences in the measurement conditions (effect of lateral paths) the results on the construction site are always worse than in the laboratory. For building sound insulation R`w (dB), the following relationship applies: R`w = Rw – k (dB) where k is correction dependent on the auxiliary air dispersion paths (normally k = 2-3 dB, for composite structures it is recommended to determine them individually with knowledge of the surroundings and lateral paths).

Orientation compositions – requirements for sound insulation between the rooms in the buildings according to ČSN 73 0532 Acoustics – Protection against noise in buildings and evaluation of acoustic properties of building elements:

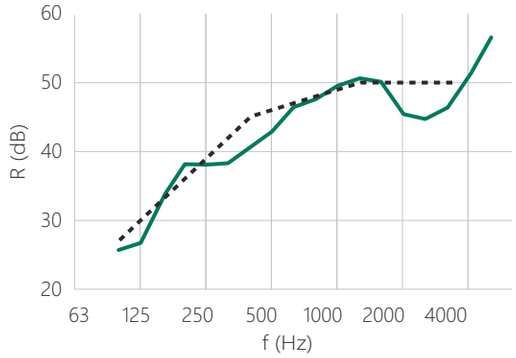
Space	Requirements for sound insulation of partition walls R'_w	Design structure
Residential houses – one living room in a multi-room apartment		
All other rooms of the same apartment unless they are functional parts of the protected space	42 dB	CETRIS®12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Residential houses – appartments		
All the rooms of other appartments	52 dB	CETRIS® 2x12 mm, CW profil 75 + 60 mm mineral wool, CETRIS®2x12 mm
All other areas used (stairways, corridors and the like)	52 dB	CETRIS® 2x12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 2x12 mm
All non-public areas (e.g. attics)	47 dB	CETRIS® 12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Thoroughfares, underpasses	52 dB	CETRIS® 2x12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 2x12 mm
Hotels and accommodation facilities – bedroom space, guest rooms		
Other guest rooms	47 dB	CETRIS® 12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Public areas (corridors, stairways)	47 dB	CETRIS® 12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Hospitals, sanatoria... - hospital bed rooms, physicians' rooms		
Hospital bed rooms, therapy rooms	47 dB	CETRIS®12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Auxiliary and ancillary areas	47 dB	CETRIS® 12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Schools and the like – Teaching space		
Learning areas	47 dB	CETRIS®12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Public areas	42 dB	CETRIS®12 mm, CW profil 75 + 60 mm mineral wool, CETRIS® 12 mm
Noisy spaces (gyms, workshops, canteens)	52 dB	CETRIS®2x12 mm, CW profil 75 + 60 mm mineral wool, CETRIS®2x12 mm
Offices and studies		
Offices and working rooms	37 dB	CETRIS® 12 mm, CW profil 75, CETRIS® 12 mm
Working rooms with higher demands for noise protection	47 dB	CETRIS® 12 mm, CW profil 75 + 60 mm mineral wool, CETRIS®12 mm

Laboratory measurement of airborne sound insulation pursuant to ČSN EN ISO 140-3

Wall No. 1



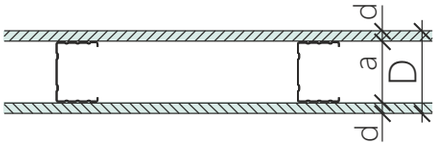
- CETRIS® board, th. 14 mm
- wooden frame, th. 120 mm
- ORSIL Uni 2x60 mm
- KNAUF GKB plasterboard, th. 12.5



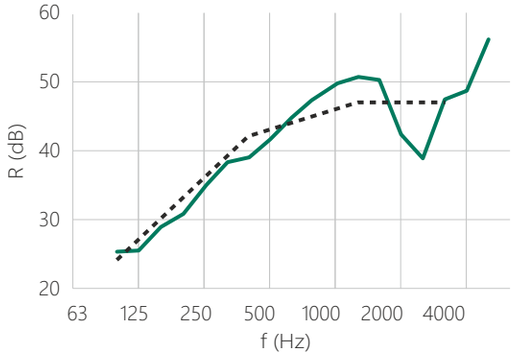
Evaluation pursuant to ČSN EN ISO 717-1
R_w (C;Ctr) = 46 (-2; -6) dB

Frequency Hz	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R 1/3 okt. dB	25,6	26,7	33,2	38,1	38,0	38,2	40,8	42,9	46,5	47,6	49,5	50,6	50,1	45,5	44,7	46,4	51,1	56,6

Wall No. 2



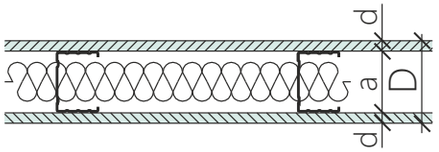
- CETRIS® board of thickness 12 mm
- CW profile 75 mm
- CETRIS® board of thickness 12 mm



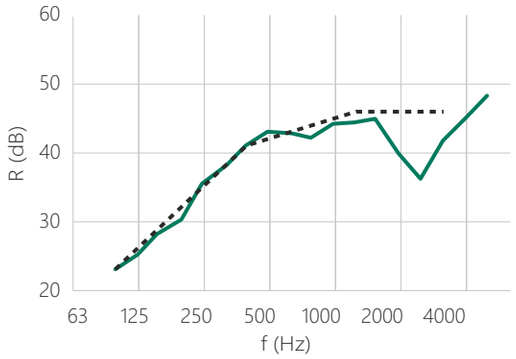
Evaluation pursuant to ČSN EN ISO 717-1
R_w (C;Ctr) = 43 (-2; -5) dB

Frequency Hz	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R 1/3 okt. dB	25,2	25,4	28,8	30,7	34,8	38,3	38,9	41,7	45,0	47,7	49,7	50,7	50,3	42,3	38,7	47,5	48,6	56,2

Wall No. 3



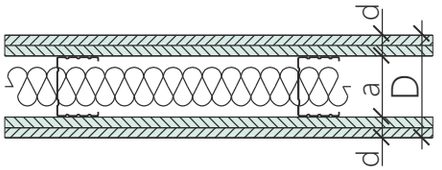
- CETRIS® board of thickness 12 mm
- CW profile 75 mm
- ORSIL Hardsil 60 mm
- CETRIS® board of thickness 12 mm



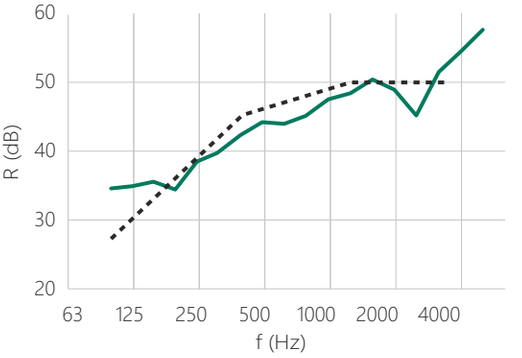
Evaluation pursuant to ČSN EN ISO 717-1
R_w (C;Ctr) = 52 (-2; -5) dB

Frequency Hz	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R 1/3 okt. dB	33,2	35,3	38,5	40,3	45,7	48,0	51,2	53,2	53,0	52,3	54,3	54,5	55,1	50,2	46,2	51,8	55,1	58,4

Wall No. 4



- 2x CETRIS® board of thickness 12 mm
- CW profile 75 mm
- ORSIL Hardsil 60 mm
- 2x CETRIS® board of thickness 12 mm



Evaluation pursuant to ČSN EN ISO 717-1
Rw (C;Ctr) = 56 (-1; -3) dB

Frequency Hz	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R 1/3 okt. dB	44,5	44,8	45,5	44,3	48,4	49,8	52,4	54,2	54,0	55,2	57,5	58,4	60,4	59,0	55,2	61,4	64,4	67,6

Note: Measurement of the boards was done by the Centrum stavebního inženýrství, a. s. Praha, Zlín Branch in October 2006 under the following conditions: Area of test sample 10.3 m^2, volume of broadcasting chamber 90.3 m^3, volume of receiving chamber 70 m^3, temperature 18 – 19 °C, relative humidity 44 – 47 %.

2.6 Vapour Permeability

Diffusion is the ability of molecules of gas, vapour or liquid to permeate the molecules of the porous material. In a case where porous material divides two environments with a difference in the partial pressures of water vapour, diffusion of water vapour occurs. Diffusion occurs in the environment where partial water vapour pressure is higher and in the macro-capillaries with a diameter of d > 10-7 m, because capillary condensation occurs in such capillaries. Diffusion (diffusion resistance factor) is tested according to ČSN EN ISO 12 572 Hygrothermal performance of building materials and products - Determination of water vapour transmission properties. Diffusion is tested on a precisely defined sample, which tightly closes the space of the test cup that contains either the desiccant (Silicagel) or saturated solution (wet cup). The system is placed into a test chamber with a controlled temperature and air humidity. For reason of different partial water vapour pressure between the test cup and the chamber, the water vapour shall flow through the permeable sample. The permeation of the vapour is determined by regular weighing of the system in stable state. The capability of the building materials to release water vapour by diffusion can be expressed by:

- diffusion conductivity coefficient (water vapour diffusion) δ
- diffusion resistance factor μ
- equivalent diffusion thickness s_d. These values include precisely defined relationships.

The diffusion conductivity coefficient (water vapour diffusion) δ (s) is the product of the permeability of water vapours and thickness of the homogeneous sample. The coefficient was determined for the CETRIS® cement bonded particleboard in 1991 (according to ČSN 72 7031, tested th. 12 mm) at 0,00239 * 10^{-9} s, or 8,604 * 10^{-6} $m^{-1}h\text{-}1Pa^{-1}$

More frequently used value is diffusion resistance μ (without dimensions), which is the ratio of the diffusion conductivity factor and the building material. The factor expresses the number of times it is greater than the diffusion resistance of the building material in comparison with the air layer of the same thickness and temperature, it thus applies that the higher the resistance value – the lesser the permeable material (mineral wools reach the value of 1-2, concrete value 17-32, hydro-insulation in tens of thousands). The diffusion resistance factor was set by a test pursuant to ČSN EN ISO 12 572 for CETRIS® boards with this result:

- for thickness 8 mm (thinnest) μ = 52.8
- for thickness 40 mm (thickest) μ = 69.2

The equivalent diffusion thickness s_d (m) – thickness of the equivalent air gap is the thickness of the layer of calm air, which has the same diffusion resistance as the test sample. For the CETRIS® cement bonded particleboard the equivalent diffusion thickness is generally s_d = μ * d, where d is the thickness of the material, i.e.:

- for thickness 8 mm (thinnest) s_d = 52,8 * 0,008 = 0,43 m
- for thickness 40 mm (thickest) s_d = 69,2 * 0,040 = 2,78 m
- for different thicknesses (generally) s_d = μ * d

d ... CETRIS® board thickness in m
μ ... interpolated value from the table (for th. 10-38 mm)

d (mm)	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
μ (-)	52,8	53,7	54,6	55,5	56,4	57,3	58,2	59,1	60	60,9	61,8	62,7	63,6	65	66,4	67,8	69,2
s_d (m)	0,43	0,54	0,66	0,78	0,90	1,03	1,16	1,30	1,44	1,58	1,73	1,88	2,04	2,21	2,39	2,58	2,78

2.7 Fire Protection Properties

Classification of the cement bonded particleboard by reaction to fire class pursuant to European standard

For the uniform classification of building construction materials, a new system was established that was designed and implemented under the standard EN 13 501-1 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests. Classification of CETRIS ® cement bonded particleboard based on its reaction to fire was performed on the basis of results of tests carried out pursuant to the following European standards:

- ČSN EN ISO 1716:2002 – Specification of Burning Heat
- EN 13823:2002 – Test by Single Burning Item (SBI)

Based on these tests, CETRIS® cement bonded particleboards are classified as A2. Its complementary classification of smoke generation is s1, its classification of flaming drops (particles) is d0, which means the resulting classification of A2-s1,d0. This result applies to classification of the board behaviour in fire conditions, except for flooring.

2.8 Board Resistance against Arc Discharge of High Voltage and Low Intensity

CETRIS® cement bonded particleboard is a universal board material for interior and exterior use. It is distinguished from other board materials by its high resistance to weather effects, fire, mechanical damage and demanding technological space conditions. On the basis of requirements coming from electricity distribution companies, cement bonded particleboard CETRIS® has been tested for resistance against arc discharge of high voltage and low intensity pursuant to EN 61 621:1998 (IEC 61621:1997) The testing was performed in May 2003 in the Electro-technical Test Institute in Prague with the testing apparatus MICAFIL ART 68 with the following result for CETRIS® board, thickness 10 mm:

- Minimum time to conductive path 143 s
- Mean time to conductive path 180.25 s

CETRIS® cement bonded particleboard complies with its resistance to electrical arc in spaces with high voltage wiring (collectors). Justification: The mean and the minimum value of the measured times to the conductive path is lower than the protection switch off times of distribution network HV and LV wiring.

2.9 Biological Resistance

Pursuant to European standard ČSN P CEN/TS 15083-1 Durability of wood and wood-based products - Definition of the natural durability of timber and resistance to wood-destroying fungi, testing methods - Part 1: Basidiomycetes was used to test the durability of the CETRIS® cement bonded particleboard against Baisiomycetes fungi. By assessment of the test results pursuant to Annex D to the above-stated standard, CETRIS® cement bonded particleboards are classified as Durability Class 1 – Very Durable.

Testing of resistance to micro-organisms (various stems of mould) was done according to ČSN EN 60068-2-10 : 2006 Environmental testing - Part 2-10: Tests - Test J and guidance: Mould growth.

CETRIS® cement bonded particleboards are fully fungi-resistant – after testing on the samples, there was no mould growth, visible change or damage.

The resistance CETRIS® cement bonded particleboards to termites is verified pursuant to ČSN EN 117 (490698) Wood preservatives - Determination of toxic values against Reticulitermes species (European termites) (Laboratory method). After visual assessment, only mild disruption was confirmed (level 2).

Processing of CETRIS® Cement Bonded Particleboards

A big advantage of the CETRIS® cement bonded particleboards consists in that they can be processed using standard woodworking machines. For professional processing of CETRIS® boards, only hard metal tools must be used. The CETRIS® boards may be cut, drilled, milled and sanded.

3.1 Cutting

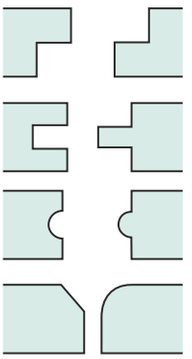
The boards may be cut using special equipment directly at the manufacturing plant according to the customer's requirements. If the customer wants to cut the boards using own equipment, we recommend use of standard hard metal wood-cutting tools (SK laminae). It is also suitable to use special diamond saws to cut the cement bonded particle and cement bonded fibre-glass boards. Due to targeting of an optimal cutting speed of 30 – 60 m/s, it is suitable to use machines with electronic speed regulation. As a rule the boards with surface treatment (CETRIS® FINISH, PROFIL FINISH, LASUR, PROFIL LASUR, DEKOR) must be cut always on the backside (non-treated) side of the board to prevent disruption of the face – finished surface. Immediately after working the boards with surface treatment it is necessary to clean dust from the edge and coat it. When cutting the CETRIS® boards, very fine waste dust is generated. Although the dust does not contain any substances that are harmful to health, we recommend its vacuum-cleaning for reason of environmental protection.

3.2 Drilling

According to the drilling plan submitted by the customer, it is possible to drill the board, including counter-sinking, directly in the manufacturing plant. It is possible to use metal drill-bits (HSS) to drill CETRIS® boards. During manual drilling, it is suitable to use electric drills with electronic speed regulation. As a rule the boards with surface treatment (CETRIS® FINISH, PROFIL FINISH, LASUR, PROFIL LASUR, DEKOR) are drilled from the face (treated) side; drilling from the backside could damage the face - finished surface.

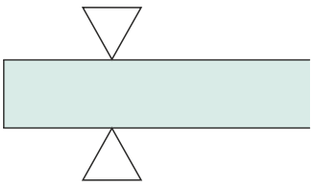
3.3 Milling

CETRIS® cement bonded particleboard can be milled according to customer requirements (e.g. semi-groove, tongue and groove, chamfering of the edges and the like). If the customer wants to machine the board on own equipment, the same principles as apply to the preceding processing methods also apply here. However, when milling, it is necessary to consider the mechanical properties (min. thickness) of the CETRIS® boards.



3.4 Sanding

Full-surface machine sanding of the CETRIS® cement bonded particleboards in the manufacturing plant is done on sanded CETRIS® PDB floor boards in order to reduce the thickness tolerance to ±0.3 mm. Manual sanding can be done on the board contact surfaces if it is necessary to eliminate surface unevenness or roughen the board surface. Hand-held electric grinders with 40 – 80 grain sand paper are used. Also in this case, it is suitable to suck-off the generated dust.



Fastening of CETRIS® Cement Bonded Particleboards

4.1 Interior Anchoring

CETRIS® boards can be fixed to the structures using screws, staples or nails. All types of fastening elements must be treated with an anti-corrosion agent; use of screws to fix plasterboard is not recommended. When using regular screws the screw holes should be pre-drilled to 1.2 multiple of the screw used. It is also recommended to prepare the countersinking for the sunken screw heads. For professional screwing it is recommended to use pneumatic or electrical screwdrivers with regulated revolutions.

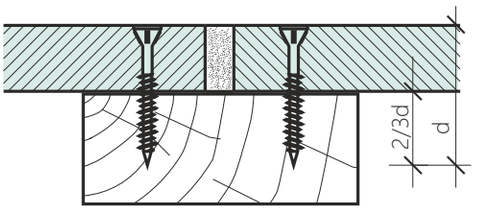
The principles stated in this chapter (screwing to timber, sheet metal, stapling, nailing) also apply to exterior anchoring in cases where the board forms a base for a contact insulating system, or a composite roof system.

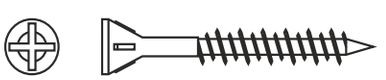
4.1.1 Screwing to Timber

For correct fixation of CETRIS® boards to constructions it is necessary to keep the maximum spacing of the load-bearing construction and the fixation elements. The best fastening element for fixation of CETRIS® boards is a self-tapping screw with double thread, hardened tip and sunken head with blades for countersinking. This type of screw may be supplied as an auxiliary material with CETRIS® label, diameter 4.2 mm, lengths 35, 45, 55 mm for connecting of two CETRIS® boards in the floating floor system or for board fixation to horizontal and vertical timber constructions (floors, partition walls, ceiling panels, etc.). For anchoring purposes the screw should penetrate to the wooden construction with at least 2/3 of its length. For fixation of floor boards, a screw of the length exceeding the board thickness by 20 mm will suffice.

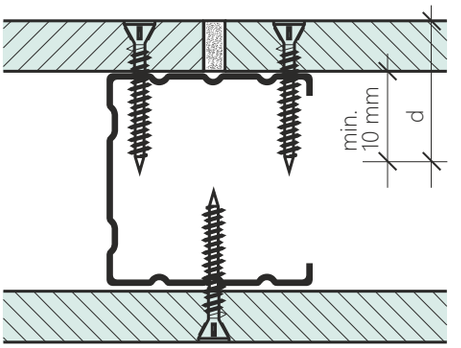
4.1.2 Screwing to Sheet Metal

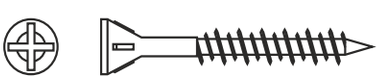
For fixation of CETRIS® boards to sheet metal profiles there is the self-tapping screw, CETRIS® 4.2 × 25 mm (this screw is threaded up to the head), or screws 4.2 × 35, 45, 55 mm (thread up to about 2/3 of the shank length). The most often used load-bearing constructions include zinc-coated CW and UW profiles. Horizontal UW profiles are anchored via sound absorbing inserts to the ceiling (floor) construction. Vertical CW profiles are inserted in the UW profiles, about 15 mm short of the room height. The CETRIS® board for wall cladding is only fixed to the vertical profiles (stands – CW). When anchoring to sheet metal profiles the screw should protrude by at least 10 mm through the thickness of the board. It is recommended to pre-drill the CETRIS® board. At the contact point – of the vertical joint and the vertical CW profile – first anchor the CETRIS® board closer to the stand of the CW profile. In the case of the opposite procedure (anchoring to the soft part of the CW profile) there is the risk of deformation of the profile and subsequently the cladding!





CETRIS self-tapping screw to timber

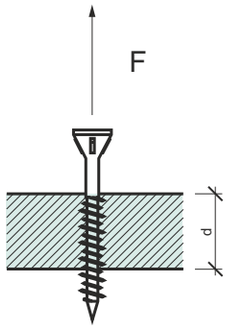




CETRIS self-tapping screw to sheet metal

A) Specification of resistance to the screw pulling out perpendicularly to the board plane:

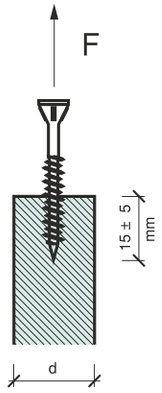
Test method: ČSN EN 320
Screw type: CETRIS 4,2 x 35 mm
(pre-drilled hole in the board with a diameter of 3.5 mm)



Board thickness d	Resistance
8 mm	597 N
10 mm	788 N
12 mm	1305 N

B) Specification of resistance to the screw pulling out parallel to the board plane:

Test method: ČSN EN 320
Screw type: CETRIS 4,2 x 35 mm
(pre-drilled hole in the board with a diameter of 3.5 mm)



Board thickness d	Resistance
22 mm	1039 N

Note: informative values.

Interior wall – no fire resistance requirement (or exterior cladding under contact thermal insulation systems)

Board thickness (mm)	Screw spacing a (mm)	Beam spacing b (mm)	Distance of screws from vertical edge c_1 (mm)	Distance of screws from horizontal edge c_2 (mm)
8	<200	< 420	>25 <50	>50 <100
10	< 250	< 500		
12, 14	< 250	< 625		
16,18,20	< 300	< 670		
22,24,26,28,30	< 350			
32,34,36,38,40	< 400			

Interior ceiling -no fire resistance requirement (or exterior cladding under contact thermal insulation systems)

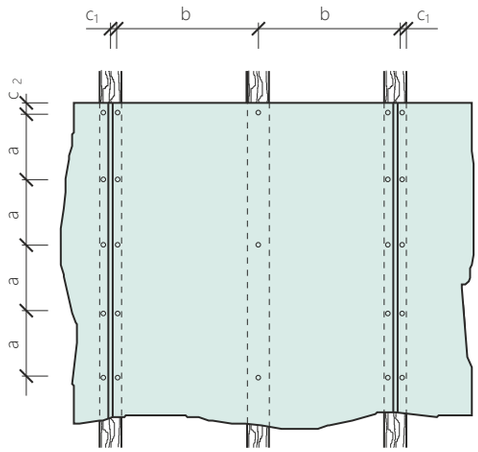
Board thickness (mm)	Screw spacing a (mm)	Beam spacing b (mm)	Distance of screws from vertical edge c_1 (mm)	Distance of screws from horizontal edge c_2 (mm)
8	<200	< 420	>25 <50	>50 <100
10	< 250	< 500		
12	< 300	< 625		

Interior ceiling – with fire resistance requirement (or exterior cladding under thermal insulation systems)

Board thickness (mm)	Screw spacing a (mm)	Beam spacing b (mm)	Distance of screws from vertical edge c_1 (mm)	Distance of screws from horizontal edge c_2 (mm)
12	<200	< 420	>25 <50	>50 <100

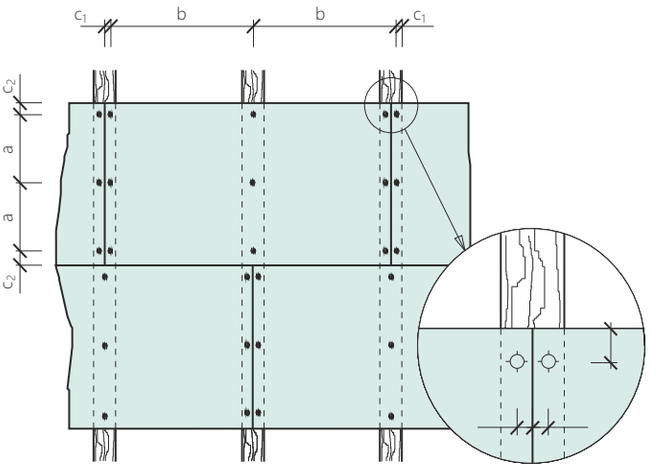
Interior wall – with fire resistance requirement (or exterior cladding under thermal insulation systems)

Board thickness (mm)	Screw spacing a (mm)	Beam spacing b (mm)	Distance of screws from vertical edge c_1 (mm)	Distance of screws from horizontal edge c_2 (mm)
10,12,14,16,18	<200	< 625	>25 <50	>50 <100



Flooring constructions – for details, see Chapters 6.6 and 6.7

Board thickness (mm)	Screw spacing a (mm)	Beam spacing b (mm)	Distance of screws from vertical edge c_1 (mm)	Distance of screws from horizontal edge c_2 (mm)
12 (ZOCET, POLYCET floating floors)	Upper layer pre-drilled, max. 300 mm		>25 <50	50
16,18,20,22,24 CETRIS PD (PDB)	< 300	Pursuant to load tables		
26,28,30,32,34, 36,38 CETRIS PD (PDB)	< 400			



4.1.3 Stapling

Pneumatic staplers are used for fixation of the cement bonded particleboards (static load-bearing and non-load-bearing) to a wooden base (beam, column, KV prism, and the like). Various models are available according to the type and thickness of the board. The models differ in the type of staple used (wire diameter) and size of the body for higher impact force.

Staple types KG 700 CNK geh / DIN 1052 /, wire diameter 1.53 mm
KG 700 CDNK geh, for joint / board on board /
KG 745 CNK geh for board of max. th. 10 mm to wood.
KG 722 CDNK geh for joining of the board to a board of thickness 12x12 mm.
KG 718 CDNK geh for joining of the board to a board of thickness 10x12 mm.
Recommended staplers: PN 755 XI/Kontakt, PN 755 XI/Automat

- staple length up to 55 mm
- the Automat version has a rate of up top 300 staples /min

HD 7900 CNK geh /DIN 1052/, wire diameter 1.83 mm
SD 9100 CNK geh /DIN 1052/, wire diameter 2.00 mm
Stapler PN 9180 XII/ Kontakt

- staple length up to 75(80) mm
- model XII with high impact force

Recommended board stapling principles

- minimum staple distance from board edge 20 mm
- minimum staple spacing 30 mm (36 mm for the HD7900 staples and SD9100), max. 75 mm (around the perimeter), max. 150 mm inside the board area
- staples obliquely to the board edge, at least under an angle of 30°

Recommended staple length (HD 7900 CNK geh, SD 9100 CNK geh)						
Board thickness (mm)	12	14	16	18	20	22
Staple length (mm)	45	50	60	70	70	70

4.1.4 Nailing

Nailing may be used to anchor CETRIS® cement bonded particleboards of thickness 8 - 22 mm. Recommended board nailing principles:

- nail diameter d_n = 2,1-2,5 mm.
- minimum nail length = board thickness + 30 mm (min)
- nails must not be embedded lower than 2 mm.
- nailer types Duo Fast CNP 50.1, CNP 65.1, Haubold RNC 50M, RNC 65 S/WII, recommended working pressure 6 - 8 bar (max. 8 bar).
- minimum nail spacing in boards on a wooden base, the minimum nail spacing from the non-stressed edge of the board is 5. dn, the minimum nail spacing from the stressed edge of the board is 7. dn.
- the mutual spacing of the nails in the boards is minimum 20. dn., maximum 75 mm (edge support), 150 mm (inner reinforcements).

4.2 Exterior Anchoring - Screws (Fasteners)

Façade cladding with visible horizontal and vertical joints – VARIO system – for details see Chapter 7.1.3.1.

CETRIS® boards are fixed in the VARIO system (façades, skirting lining, roof overhangs, suspended ceilings...) with stainless steel or galvanized screws with semi-circular or hexagonal heads and compressive water-tight washers. These washers are treated on the bottom side with vulcanized elastomer EPDM for water-tight and flexible material connection. The screw type also depends on the base type – the load-bearing grid applied. It is also possible to use rivets to fix the boards to galvanized (aluminium) constructions. (See Chapter 7.1.6.2)

Pre-drilling of the boards (applies to a screw / rivet diameter of up to 5 mm). CETRIS® boards must be pre-drilled:

- Diameter 8 mm for board lengths up to 1,600 mm
- Diameter 10 mm for board lengths over 1,600 mm

For position stabilisation at least one fixed point (with the diameter of 5 mm) is needed. Dilations between boards 5 – 10 mm.

Façade cladding with overlapped joints – PLANK system – for details see Chapter 7.1.3.2.

CETRIS® boards in the PLANK system (overlapped) are fixed with galvanized screws or stainless steel screws with sunken heads.

Pre-drilling of the boards (applies to a screw diameter of up to 5 mm):

- outer – diameter of 8 mm
- inner – 1.2 times of the screw diameter

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

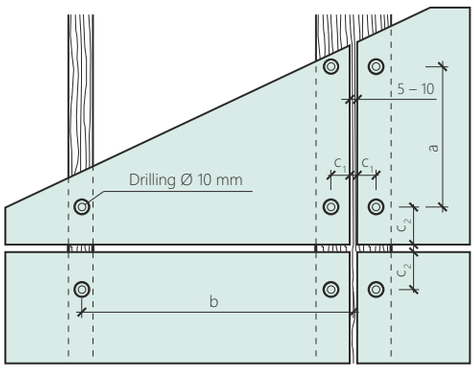
VARIO anchoring table

Board thickness (mm)	Screw spacing a (mm)	Beam spacing b (mm)	Distance of screws from vertical edge c_1 (mm)			Distance of screws from horizontal edge c_2 (mm)
			Timber	Zinc	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				

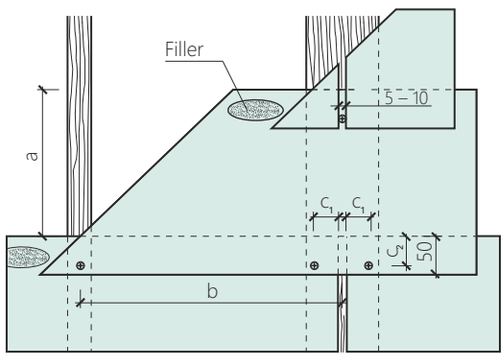
PLANK anchoring table

Board thickness (mm)	Screw spacing a (mm)	Support span b (mm)	Screw distance from vertical edge c_1 (mm)	Screw distance from horizontal edge c_2 (mm)	Maximum length of board (mm)
			Timber / Zinc coat / Aluminium		
8	< 400	< 420	>35 < 50	min. 40	1260
10	< 400	< 500			1500
12	< 350	< 625			1875
14	< 400	< 625			1875
16	< 400	< 700			2100

* Applies to the installation of the CETRIS® boards with horizontal dimension > 1,875 mm



* Applies to the installation of the CETRIS® boards with horizontal dimension > 1,875 mm



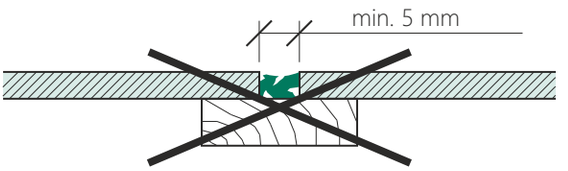
Surface Treatments of CETRIS® Cement Bonded Particleboards

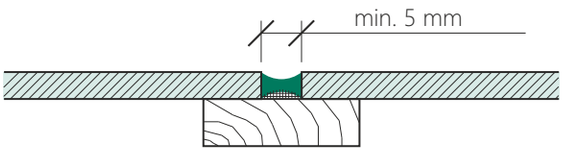
When applying surface treatments to the CETRIS® cement bonded particleboards, it is necessary to observe the following principles:

- All applied materials must be stable in an alkali environment
- Before application of paints, glues or plasters on CETRIS® boards the boards must be covered with a primer for absorptive surfaces
- The materials must be applied on the dry surfaces of the CETRIS® boards in compliance with the technological procedures required by the material manufacturers
- It is recommended to apply not hard materials but rather permanently elastic materials
- Dilation joints between boards may be covered with laths or filled with elastic filler (acrylic, polyurethane)
- Coating and sealing can be done after acclimatization of boards in installed condition

5.1 Joint Filling with Permanently Elastic Fillers

When using CETRIS® boards for walls, partition walls and ceiling cladding, the boards must be dilated – visible joints must be left with the minimum width of 5 mm. The joints may be covered with laths, an inserted wooden, plastic or sheet metal profile, or filled with permanently elastic filler. The recommended fillers are the ones based on acrylic resins or polyurethanes. Silicon fillers may be applied to compact materials with acid pH, which is not the case of CETRIS® board. Where silicon filler must be used, the contact surfaces must be treated with a primer. The main principle for correct function of the dilatation joints is elimination of three-sided adhesion in the joint, which causes uneven stress on the elastic filling and subsequently its tearing off the joint sides. This may be prevented by insertion of a slide insert – a polyethylene tape or string. The result is adhesion of the elastic matter on the opposite sides (edges of CETRIS® boards) only and even stress on the fill – the "chewing gum effect". Ensure that the string is 25 % larger than the width of the joint. Press it in to a depth, which corresponds to the chosen depth of the sealed end. To ensure a constant depth, it is good to use, for instance, a peg with graduation. The surfaces neighbouring the joint can be protected with paper tape. Remove the tape immediately upon completion of the joint-filling process.





Fillers recommended for joint filling

Description	Properties	Application	Procedure	Manufacturer
Acrylic elastic filler S-T 5 Single-component sealing joint filler. Creates a permanent firm elastic joint.	High adhesion, coverable with acrylic and dispersion paints. After hardening resistant to weather effects including UV radiation. Maximum permissible deformation 20 %.	Filling joints in peripheral coats of cement bonded particleboards CETRIS® with joint widths of 5 – 40 mm.	The surface must be clean, dry, firm, without grease and oils. It is recommended to treat the base with a primer – diluted filler S-T 5 (diluted in water in the ratio 1:3).	DEN BRAVEN
Soudaflex 14 LM Single-component elastic low-module filler on polyurethane basis.	Permanently elastic after maturation, maximum permitted deformation 25 %. When covered with regular oxidisation paints the paint drying process may be delayed.	Joint filling with high contact movement. Joint width 5 – 30 mm.	The surface must be clean, dry, firm, free of grease and oil. It is recommended to treat the base with a primer – Primer 100.	SOUDAL

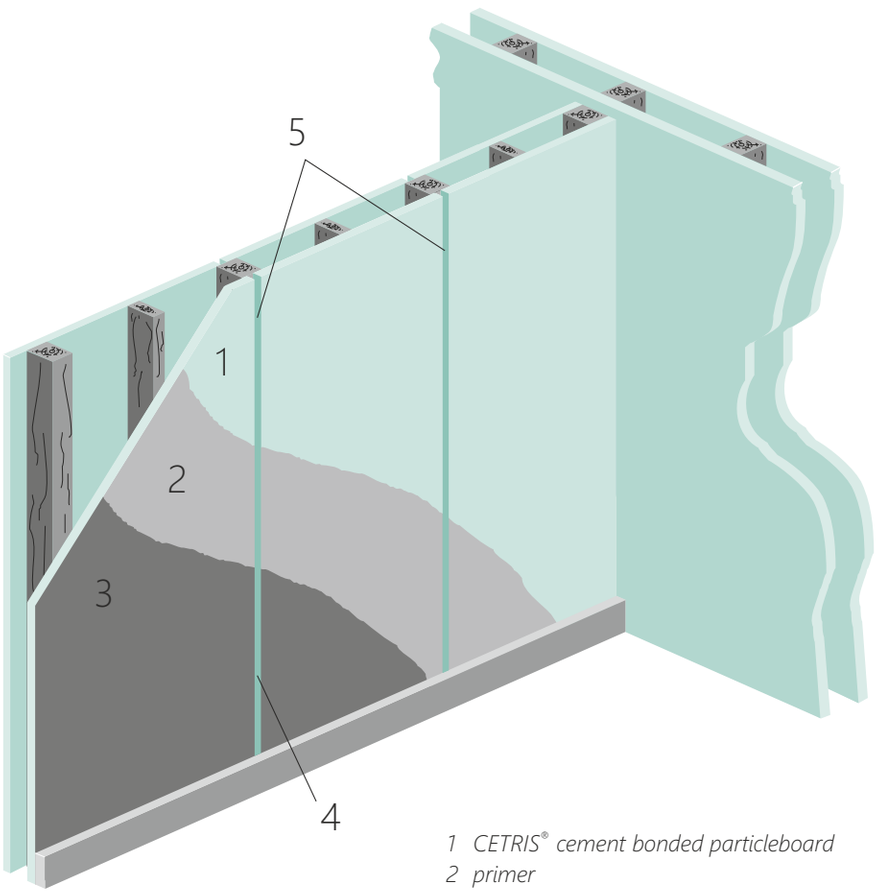
Description	Properties	Application	Procedure	Manufacturer
MAPEFLEX Ac4 - Single-component joint filling materials on acrylic resin basis.	Water- and air-tight permanently elastic joint filler.	Joint fill with maximum movement possible 15 – 20 %. Joint width 5 – 30 mm.	The surface must be clean, dry, firm, free of grease and oil.	MAPEI
BOTACT A4 - Single-component acrylic filler.	Weather resistant, high ductility, can be covered with paint.	For joint sealing and construction board connection.	The surface must be clean, firm, dust-free and without oils and grease.	BOTAMENT
SCHÖNOX S 20 - Permanently elastic single-component joint filler on MS polymer basis.	High adhesion, resistant to water, weather and UV radiation, coverable with acrylic and dispersion paints. Maximum permitted deformation 25 %.	Filling joints in peripheral coats, balconies, dilatation joints between construction slabs and in ceramic paving. For joints of width 5 – 20 mm.	The surface must be firm, dry, without dust, grease and other impurities. It is recommended to treat the base with Casco Primer 12.	SCHÖNOX
Henkel – Building acrylic Dispersion sealing filler	Does not contain solvents, coverable with paint, odourless, resistant to UV radiation.	Sealing of joints with a width of 5 – 30 mm.	The surface must be clean, dry, firm, without dust, grease and oil. It is recommended to moisten the base before application.	HENKEL
Dexaflamm - R - Single-component elastic filler. FIRE PROTECTION APPLICATIONS	Permanently elastic after maturation, maximum permitted deformation 15 %.	Joint filling between boards, fire resistance. Joint width 5 – 20 mm.	The surface must be clean, dry, firm, free of grease and oil. It is recommended to treat the edges with a primer – diluted filler Dexaflamm – R.	TORA
Den Braven - Single-component acrylic fire protection filler.	Single-component sealing filler on acrylic dispersion basis. Slightly foams at temperatures above +120°C and retards propagation of fire. Retards fire, slows down combustion.	Fire protection filler - filling of interior CETRIS® board joints.	The surface must be clean, dry, firm, without free dust particles, grease and oil. For joints of width up to 10 mm the ratio of 1:1 applies with a minimum depth and width of 5 mm.	DEN BRAVEN
Den Braven - Silicone fire protection filler	SIngle-component neutral silicone filler. Hardens by vulcanization at atmospheric humidity and creates a permanent firm elastic joint that prevents the entry of smoke and fire.	Fire protection filler - filling of joints between the CETRIS® boards that is resistant to UV, water, moisture.		DEN BRAVEN
SIKA Firesil - permanently elastic 1-component silicone based filler. FIRE PROTECTION APPLICATIONS	High-adhesion, fire-resistant, water-resistant.	Filling joints between boards, maximum joint width of 15 mm.	The surface must be clean, firm, dust-free and without oil and grease.	SIKA

5.2 Paints

Painting a CETRIS® board is the most frequently used surface finish. When applying surface treatments to the CETRIS® cement bonded particleboards, it is necessary to respect their composition. It mainly necessary to respect the fact that the CETRIS® BASIC cement bonded particleboard is construction material with permissible minor defects in the face and backside. The characteristics of the surface of the 1st Class Quality CETRIS® cement bonded particleboards is given in Chapter 1.5 of this publication. Parameters of the dispatched boards. The back side of the boards (digitally marked by the manufacturer) has more porous surface and may have a larger number of minor defects as compared to the face.

Recommended paint coat application procedure:

- before application of the paint coat, it is necessary to remove all visible wooden particles and bark from the surface (remove them with a palette knife). These areas must be sealed with two-component polyester filler for exterior use. Minor unevenness in the surface is also sealed in the same manner (depressions, grooves). The filler must be sanded. Coating may be done only 18 hours after sanding.
- the CETRIS® board surfaces must be dry, clean, free of grease and oils. Dust and other impurities from the working process may remain on the board, especially on its edges (cutting, milling, etc.). For this reason, the edges must be sanded with sand paper of grain 80 before application of the coat and rid of dust impurities.
- A primer must be applied to the board (stabilization of the surface, reduction of its absorptive power, unification of the base). A primer must be applied to all the surfaces – face, underside and edges!
- The top coats recommended by their manufacturers for a cement base must be used
- The product composition must be unified and the prescribed technological procedure must be followed (especially the application method, technological breaks)
- The paints must contain pigments stable in an alkali environment. Unstable pigments may lead to discolouration. To ensure an even surface finish, the reverse side must also be provided with protective primer. For aesthetic reasons, CETRIS® boards with chamfered edges may be used. For invisible joints, a full-area trowel-on system must be used, see below. Note: For old paint renewals, it is necessary to consider the condition of the existing paint and type of paint used (composition). The surface must be roughened and cleaned before re-painting. The covering paint must have the same composition as the initial paint.



1 CETRIS® cement bonded particleboard
2 primer
3 top coat
4 permanently elastic joint filler
5 dilatation joint

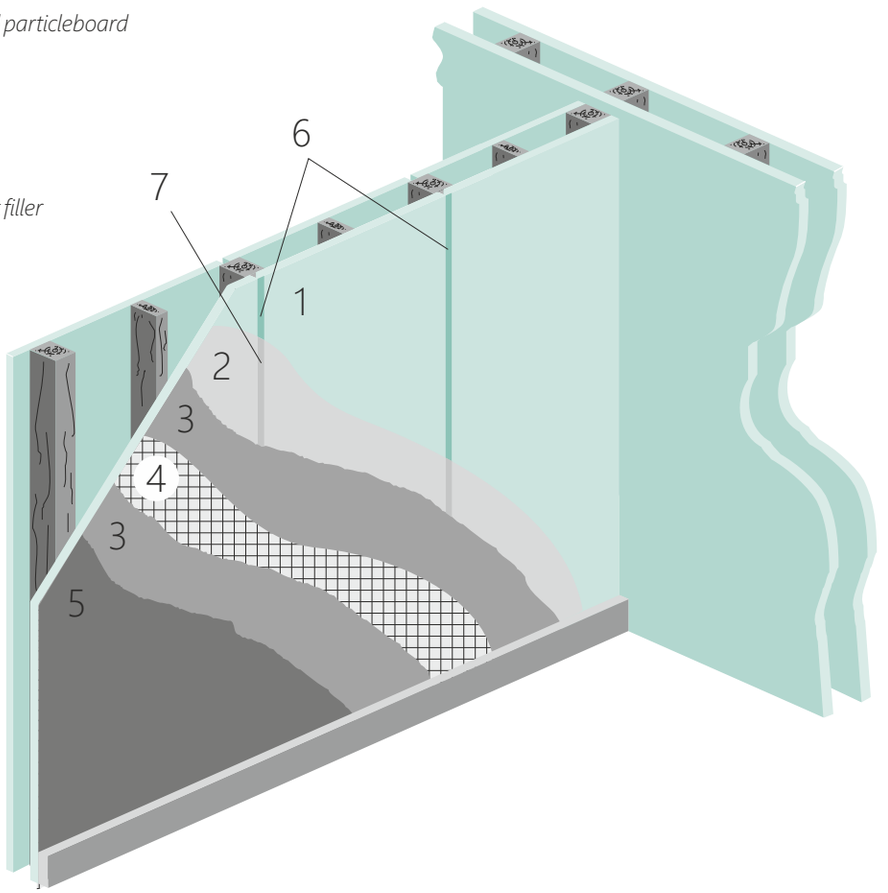
Recommended paints for colour surface finish of CETRIS® boards		
Primer	Top coat	Manufacturer
FORTE Penetral - micro-molecular primer	ETERNAL - universal dispersion coating material	AUSTIS
ACRYL EMULZE - water soluble primer	ACRYL COLOR - water soluble acrylic top coat	JUB
Acrylic-Silicone Primer - water soluble primer	Silicone façade paint or Acrylic façade paint - water soluble façade paint	CEMIX
BTAi top 1000A-CRT - single-component water soluble primer	BTAi top 1000A-CTS - single-component water soluble top coat	BTAindustry
HC-4 - water soluble primer	GAMADEKOR (F, FS, FS1, SIL, SA) - water soluble top coat	STOMIX
EkoPEN - deep primer	koFAS (EkoFAS Extra) - smooth acrylic façade coat	EKOLAK
Quarzgrund - resin-based filled primer	TEX Egalisationsfarbe - water resistant highly permeable façade paint.	TEX COLOR
Sto Prim Concentrat - primer concentrate	Sto Color Royal - matt acrylic based façade paint	STO
Mistral Primer	Mistral Univerzal - water soluble enamel paint	MISTRAL
Ceresit CT 17 - deep primer without solvents	Ceresit CT 44 - acrylate paint	HENKEL
Baumit universal primer - primer for surface absorption levelling	Baumit Nanopor paint - highly resistant vapour resistant paint on silicate basis for exteriors, dirt resistant	BAUMIT
FANO - façade penetration	RENOFAS - fine façade paint	CHEMOLAK
KEIM Silangrund - waterproofing silane-based primer	KEIM Granital - homogenized silicate-based paint	KEIM FARBEN
BILEP P - dispersion acrylic penetration	ETERfiX BI - dispersion acrylic matte top coat	BIOPOL PAINTS
Funcosil Hydro-Tiefengrund - water soluble deep penetration	Funcosil Betonacryl - anti-carbon acrylic paint for concrete surfaces	REMMERS
PEN-fiX - water soluble off-white penetration	ELASTACRYL SATIN - water soluble matt façade paint	TOLLENS
REMCOLOR Imprégnation - primer	REMCOLOR Roof Paint - water soluble dispersion paint for external use	deREM

Recommended paints for transparent surface finish of CETRIS® boards	
Primer	Manufacturer
IMESTA IW 290 water-resistant silicone-based oil product.	IMESTA
TOLLENS Hydrofuge Incolore hydrophobic solution for stone, masonry, concrete and plaster protection.	TOLLENS
SIKAGARD 700S hydrophobic single-component solution on siloxan resin basis.	SIKA
Herbol-Fassaden-Imprägnierung hydrophob Colorless, solvent impregnation agent for water resistant paints on all mineral bases	HERBOL Akzo Nobel Deco

5.3 Interior Plasters

Plastering creates 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 trowel-on material is re-applied and is followed by the final finish. We recommend use of the complete system of one surface finish manufacturer and observation of the technological procedures of the given manufacturer. The underside 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*



5.4 Exterior Plasters

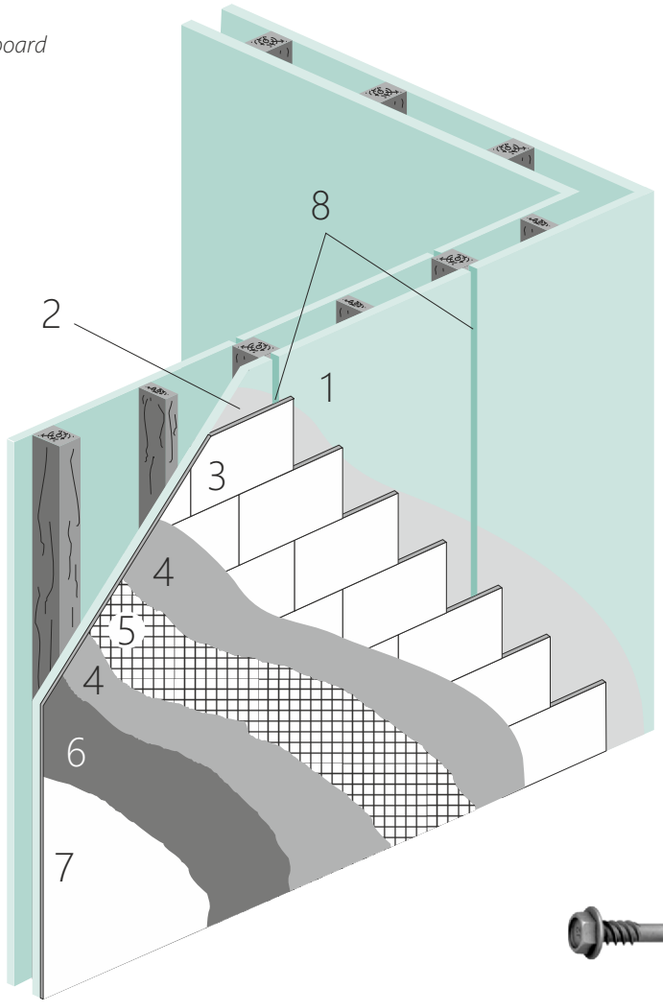
Application of plasters is surface finishing with an invisible joint. The CETRIS® boards continuously expand and shrink as a result of humidity dilatation movements. To prevent damage of the façade plaster by hair-thin cracks caused by these movements, it is necessary to cover the CETRIS® board with an insulation board (polystyrene, mineral wool) with the minimum thickness of 30 mm. 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.

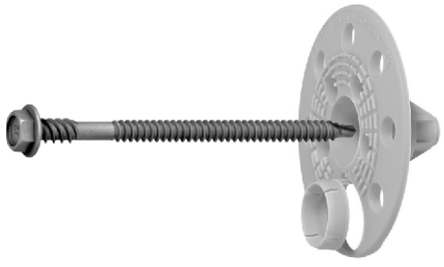
Mechanical anchoring of insulation boards to CETRIS® boards is implemented with disc dowels (self-tapping screw with disc head of high-quality polyethylene). The number of anchoring elements are specified by the manufacturers of the insulation boards, or the manufacturer of the discs shall be minimum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

Recommended products for anchoring the insulation:

- 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.
- 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



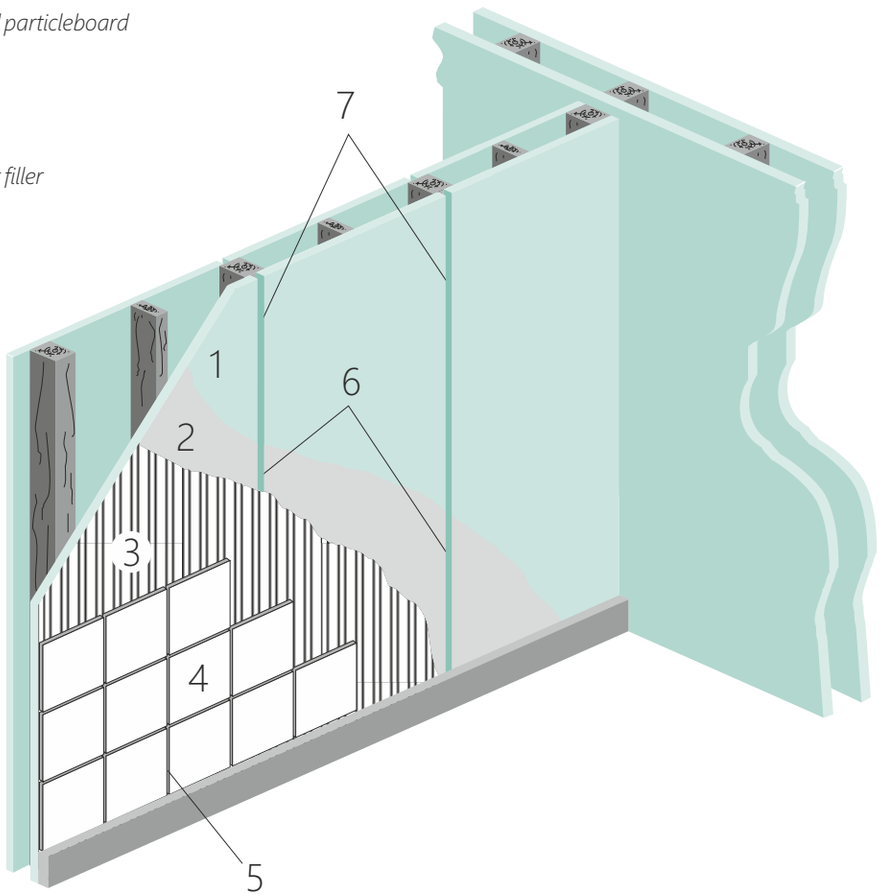


5.5 Interior Ceramic Tiles

Areas under normal stress

When tiling, it is recommended to use permanently elastic fillers for joint filling between CETRIS® cement bonded particleboards, as well as for the tiling itself. The gluing filler must be spread across the whole surface not only in points. The dilatation joints between the boards must be visible either in the tile or glue the tile between the boards only to one CETRIS® board and leave it without gluing filler at the point of overlap of the CETRIS® board joints. This solution is designed for spaces commonly exposed to water. Maximum tile size 200 x 200 mm. The backside 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. Gluing of tiles can be done only after acclimatization of the CETRIS® boards in the given environment.

1 CETRIS® cement bonded particleboard
2 priming
3 bonding cement
4 ceramic wall tiles
5 joint filler
6 permanently elastic joint filler
7 dilatation joint

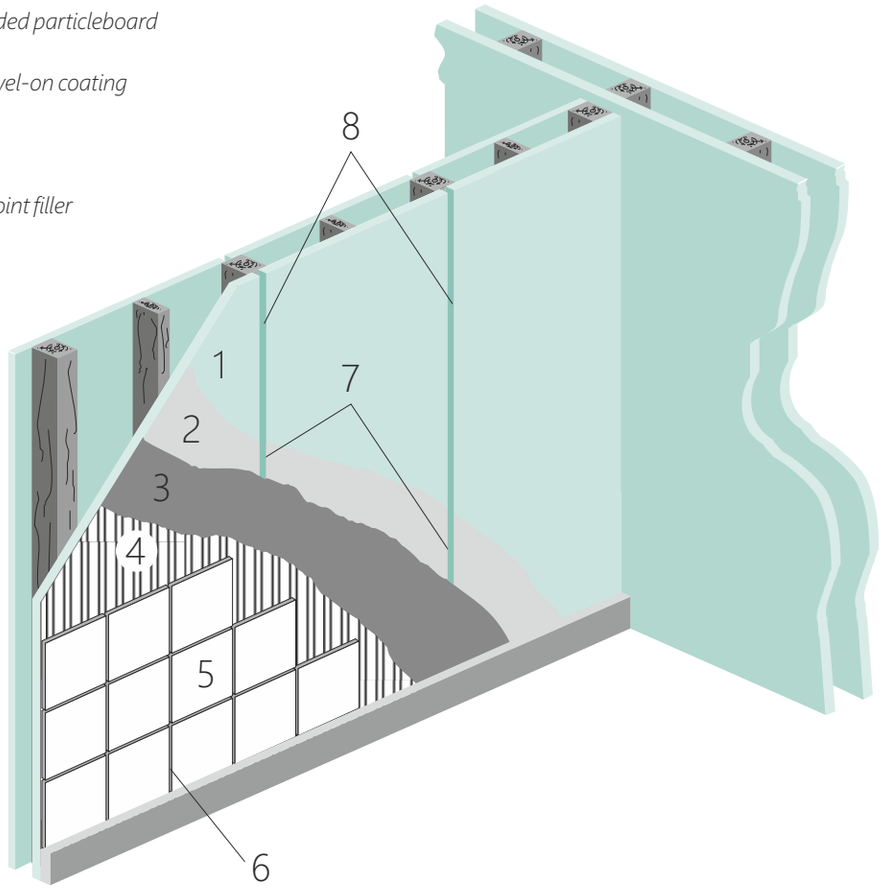


System composition	Primer	Gluing filler	Joint filler (dilatation joint filling)
MAPEI	Not required	Ultramastic III	Ultracolor (Mapesil AC)
SCHÖNOX	Schönox KH, diluted with water in a ratio of 1:3	Schönox PFK, resp. PFK White	Schönox WD Flex (Schönox ES, or Schönox SMP)
BOTAMENT	Botact D11	Botatc M21	Motact M32 (Botact S5)
BASF	PCI-Gisogrund	PCI-Nanolight	PCI-Flexfug
CERESIT	Ceresit CT 17	Ceresit CM 16 – lower load Ceresit CM 17 – higher load	Ceresit CE 40 (Ceresit CS 25)
SIKA	not required	Sika Ceram 203	Sika Fuga
CEMIX	Superkontakt 241	FLEX ETRA 045	FLEX 079 nebo BIOFLEX 179

Areas under moisture stress

In non-ventilated sanitary spaces, showers and spaces with increased humidity exposure, CETRIS® cement bonded particleboards must be treated with hydro insulating paint:

1 *CETRIS® cement bonded particleboard*
2 *priming*
3 *hydro-insulating trowel-on coating*
4 *bonding cement*
5 *ceramic wall tiles*
6 *joint filler*
7 *permanently elastic joint filler*
8 *dilatation joint*



System structure	Primer	Hydro insulation (bandaging of corners, dilatation)	Bonding cement	Joint filler (dilatation filler)
MAPEI	not required	Keralastic tl. 1 mm (MAPEBAND)	Keralastic	Ultracolor (Mapesil AC)
SCHÖNOX	Schönox KH, diluted with water in a ratio of 1:3	Schönox HA (Schönox ST-IC, popř. ST-EA)	Schönox PF, or Schönox Q9	Schönox SU, popř. UF Preminum (Schönox ES, or Schönox SMP)
BOTAMENT	Botact D11	Botatc DF 9 Plus (AB 78)	Botatc M21	Motact M32 (Botact S5)
BASF	PCI-Gisogrund	PCI-Lastogum (PCI-Dichtband Objekt)	PCI-Nanolight	PCI-Flexfug
CERESIT	Ceresit CT 17	Ceresit CL 51 (Ceresit CL 52)	Ceresit CM 16 – lower load Ceresit CM 17 – higher load	Ceresit CE 40 (Ceresit CS 25)
SIKA	not required	Sika Top 109 Elastocem (Sika Tape Seal S)	Sika Ceram 203	Sika Fuga
CEMIX	Superkontakt 241	1K hydro-insulation film (elastic sealing tape 100, inner and outer corner)	FLEX ETRA 045	FLEX 079 nebo BIOFLEX 179

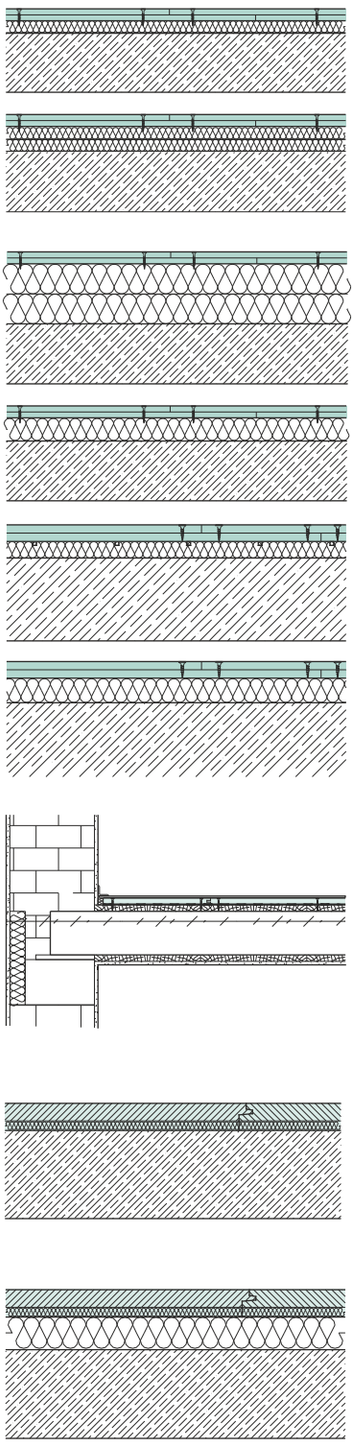
Floors

6.1 Types of CETRIS® Floor Systems

Floor constructions made of CETRIS® cement bonded particleboards can be solved in several basic versions according to the following diagram:

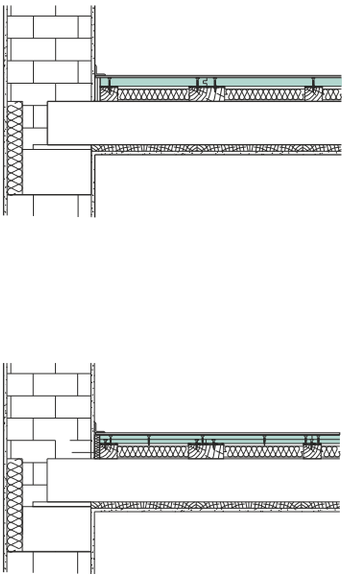
Floors laid on a flat base

- IZOCET
  - SP 65
  - SP 45
- POLYCET
  - Max, Min
  - Heat
  - Aku
  - Therm
- CETRIS® PD, PDB → On a load -bearing flat base
- CETRIS® PDI
  - On a load -bearing flat base
  - On a load -bearing flat base and insulation



Floors laid on grids or beams

- CETRIS® PD, PDB → On beams
- CETRIS® BASIC – two layers → Two layers on beams



Scope and application of CETRIS® board floating floors

CETRIS® cement bonded particleboard are successfully used as floor boards during the refurbishment of old wooden floors, as a load-bearing layers on beams or in a system of light floating floors. Because of their thermal conductivity (λ = 0,35 W/mK), they are applied in various floor heating systems. In combination with the thermal insulation materials, they form a floor construction with the required insulation and fire protection properties.

It is possible to use the CETRIS® boards to quickly and cheaply improve the acoustic and thermal insulation parameters of existing floor constructions or create a new floor construction without using wet processes. To ensure a quality floor construction, it is necessary to keep manufacturer's recommended technological procedures, which respect the properties of the CETRIS® cement bonded particleboards.

6.2 Applications of CETRIS® Floor Boards

Examples of the application of the floor systems of CETRIS® cement bonded particleboards:

- New residential and commercial developments
- Building reconstructions and renovations
- Floors in extensions and inbuilt structures in lofts
- Assembled buildings
- Offices, administration and classrooms
- Special flooring solutions
- Creation of a strong and flexible floor
- Anti-slip protection of the room
- etc.

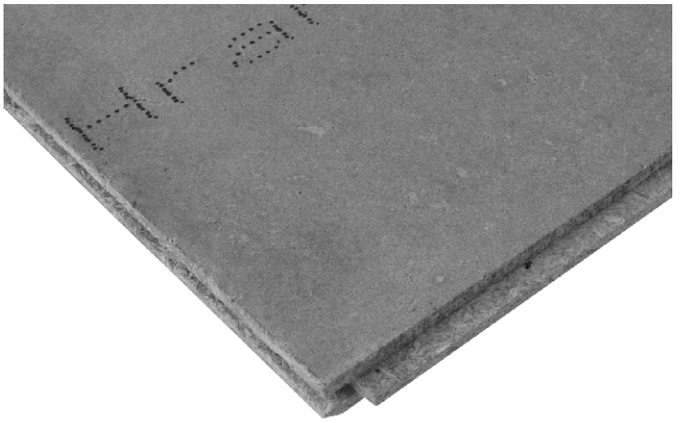
Advantages of CETRIS® cement bonded particleboard floor systems:

- Ability to level different elevations
- Possibility of combinations of different floor systems as needed (with different usable load-bearing capacities)
- Easy and quick assembly without wet processes
- Excellent acoustic and heat insulation properties
- Low area weight of floor construction
- Floor ready for walking immediately after laying
- High level of fire resistance
- High level of noise reduction
- Applicability of a wide range of floorings
- etc.

6.3 Types of CETRIS® Floor Boards

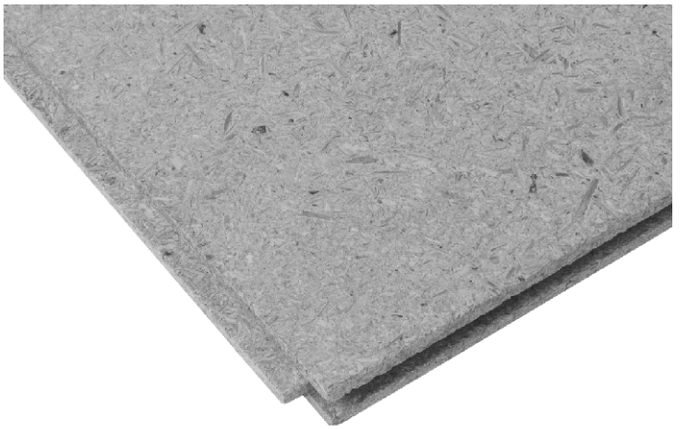
6.3.1 CETRIS® PD Floor Boards

The standard manufacturing dimensions are 625 x 1,250 mm (0.78 m^2) including the tongue. The cover size of the board is 617 x 1,242 mm (0.77 m^2). The standard manufactured thicknesses are 16, 18, 20, 22, 24, 26, 28 mm. The floor boards are provided with a groove and tongue along the perimeter with a groove depth of 10 mm. On request other thicknesses may also be supplied. The bottom side of CETRIS® PD boards are marked with a stamp for laying reasons.



6.3.2 CETRIS® PDB Floor Boards

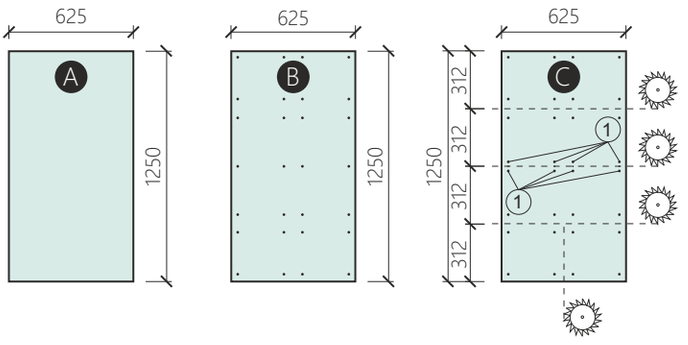
The standard manufacturing dimensions of the CETRIS® PDB floor boards are 625 x 1,250 mm (0.78 m2) inclusive. The cover size of the board is 617 x 1,242 mm (0.77 m2). The standard manufactured thicknesses are 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36 and 38 mm. The floor board is full-area sanded to achieve minimum thickness tolerances (max. ±0.3 mm). The floor boards are provided with a groove and tongue along the perimeter with a groove depth of 10 mm. On request other thicknesses may also be supplied. The bottom side of CETRIS® PDB boards is marked with a stamp for laying reasons. The sanded appearance of the CETRIS® PDB floor boards resembles chipboard, which may tempt the user to use the boards as the wear layer of the floor. However, it is necessary to consider the fact that the CETRIS® PD and CETRIS® PDB boards are manufactured as construction layers of the floor with the relevant permissible tolerances (length, width) and not as decorative floors. Complaints concerning board appearance cannot be accepted.



6.3.3 CETRIS® Floor Boards for Floating (Two-Layer) Floors

The IZOCET and POLYCET floor systems are made of CETRIS® boards of thickness 12 mm, standard size 625 × 1,250 mm (0.78 m2), without edge chamfering. The boards are laid in two layers with an overlap of 312 mm, both layers are connected with self-tapping screws with sunken heads with blades for counter-sinking and double thread 4.2 × 35 mm. For easier assembly the upper layer of the boards is pre-drilled with holes with a diameter of 4.5 mm. The screw spacing is specified by static tests of dry floor constructions. The average number of connecting screws is 30 pcs/m^2.

A – Standard size of CETRIS® floor board for bottom layer
B – Standard size of CETRIS® floor board for top layer with pre-drilled 4 mm holes
C – Adaptation of standard size of CETRIS® floor board for module size
1 – Holes made on site



6.3.4 CETRIS® PDI Two-ply Panel

The CETRIS® PDI is a two-ply panel for dry floor technology. It consists of a 20 (22) mm thick cement bonded CETRIS® particleboard glued to 12 mm insulating fibreboard (hardboard). The size is 1,220 × 610 mm (including the tongue) and it is 32 (34) mm thick; it has a tongue and groove along the perimeter, its surface is smooth. The panels should be laid on a level surface area (ceiling structures, cladding). Their advantage is quick, easy and precise assembly. A further advantage is that they spread spot-load stress over a larger area. The CETRIS® PDI panels can be laid directly on the base – a ceiling structure or decking. The condition is that the base must be level, supporting and dry. In this way, a new load spreading and insulating layer with a thickness of only 32 (34) mm can be made with a high load-capacity and resistance against operational spot stress.

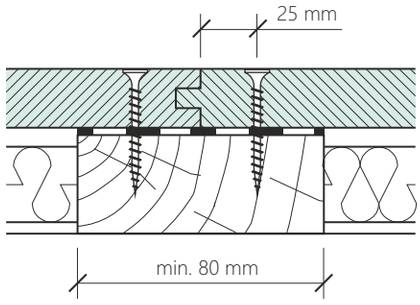
6.4 General Principles of Assembly of CETRIS® Floors

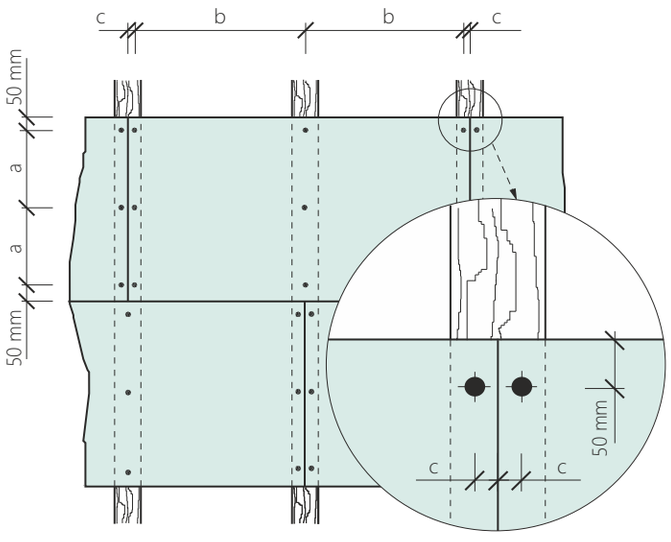
6.4.1 Fixing of CETRIS® Floor Boards

The CETRIS® PD and CETRIS® PBD floor boards are fixed to the base by screwing. This is how the individual layers of the floor can be interconnected (IZOCET, POLYCET system). For screw connections self-tapping screws with sunken heads with blades for countersinking and double thread are recommended (such as VISIMPEX or BÜHNEN). Specification of the screw length is governed by the principle that the screw reach length inside the base (beam) should be at least 20 mm (in the case of solid wood) or 10 mm (in the case of steel profiles). For screwing with other types of screws and in the case of use of screws for anchoring to the steel construction, the holes in the board must be pre-drilled by 1.2 multiple of the diameter of the screw used. The head countersinking must also be prepared in advance. The maximum axial distances of the connecting elements are shown in the table. The axial distances of the holes from the board edges are at least 25 mm and maximum 50 mm. The width of the support (beam) must be at least 50 mm or at least 80 mm under the joint of two CETRIS® boards.

- Self-cutting screws used for plasterboard assembly purposes and nails are not suitable for CETRIS® board connection.
- In the case of floor parts laid over joists, the joints must be supported in at least one direction. In the case of single-direction beams, CETRIS® PD and PDB boards are laid with the longer side perpendicular to the beams (continuous beam).
- In the case of floor parts laid over a plank floor, the boards are laid crosswise to the direction of the original wooden floor.

The CETRIS® floor boards can be stapled or nailed to the grid; the principles for this type of anchoring are given in chapters 4.1.3 and 4.1.4.)





Type of product and board thickness (mm)	a (mm)	b (mm)	c (mm)
CETRIS® boards for floating floor systems, thickness 12 mm	The upper layer of the board is pre-drilled by the manufacturer, max. 300 mm		
CETRIS® PD (PDB) thickness 16, 18, 20, 22, 24 mm	≤ 300	max. 621	25 ≥ c ≥ 50
CETRIS® PD (PDB) thickness 26, 28 mm	≤ 400	max. 621	25 ≥ c ≥ 50

6.4.2 Dilatation Joints when Laying CETRIS® Floor Boards

One of the properties of products containing wood mass is represented by size changes caused by changes in air humidity – expansion and shrinkage. This also applies to CETRIS® boards and must be considered when using them. The floor boards are laid tightly and dilatation is allowed along the walls where a gap of 15 mm is left. The dilatation joints divide the floor area into smaller fields. The dilatation joints run through the floor construction from the surface to the insulation or the load-bearing construction.

The dilatation joints must be implemented:

- In the case of floors larger than 6 by 6 m
- At the points of change of floor thickness and type or a sudden change of the ground plan etc.
- At vertical constructions – walls, pillars
- At the door thresholds

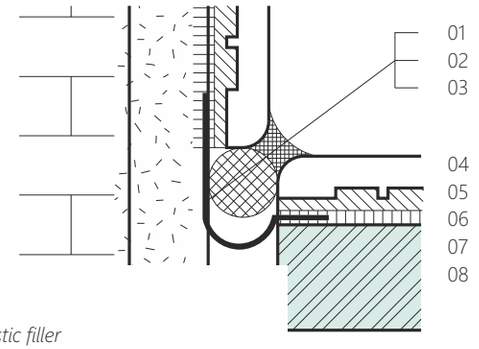
The dilatation joints (wall/floor contact points) when laying the floorings are solved by means of the following:

- PVC corner piece, carpet
- Wooden edge lath (wooden floorings)
- Schlüter® system profiles

When laying the floor around the threshold always, also make the dilatation joint. At the point of transition of a dry floor construction into another floor system (e.g. a traditional floor), where possible, we always recommend application of the transition system dilatation profile from Schlüter® (DILEX-EX, EKE, EDP, BWB, BWS, KS, etc.) at the door threshold.

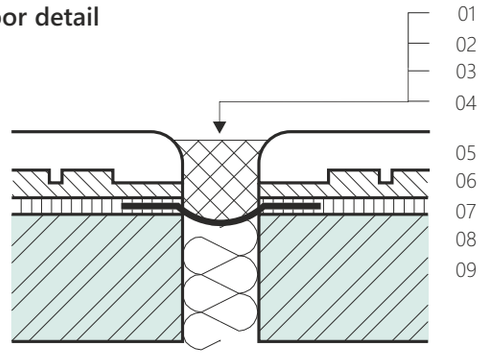
A) Joints filled with elastic mass

A_1 contact of floor and wall



01 elastic filler
02 sealing cord
03 corner insulating tape for use in hydro-insulating plaster
04 paving, flexible water tight joint filler
05 highly flexible adhesive filler
06 corner insulating tape for use in hydro-insulating plaster
07 primer
08 CETRIS® board

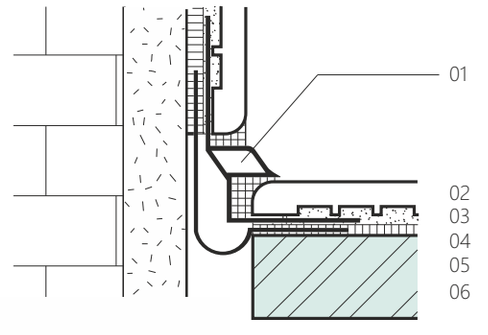
A_2 floor detail



01 elastic filler
02 corner insulating tape
03 sealing cord
04 separating layers (polystyrene, mineral wool)
05 paving, flexible water tight joint filler
06 highly flexible adhesive filler
07 hydro-insulating trowel-on coating
08 primer
09 CETRIS® board

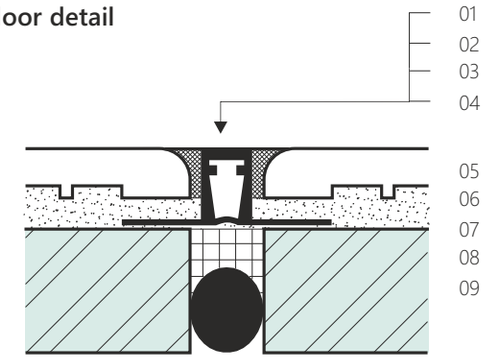
B) Joints filled with special dilatation profiles

B_1 contact of floor and wall



01 Schlüter® corner dilatation profile
02 paving, flexible water tight joint filler
03 highly flexible adhesive filler
04 corner insulating tape for use in hydro-insulating plaster
05 primer
06 CETRIS® board

B_2 floor detail



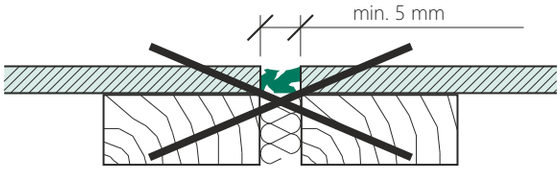
01 joint filler
02 Schluter® dilatation profile
03 elastic filler
04 sealing cord
05 paving, flexible water tight joint filler
06 highly flexible adhesive filler
07 hydro-insulating trowel-on coating
08 primer
09 CETRIS® board

Construction of the dilatation joint

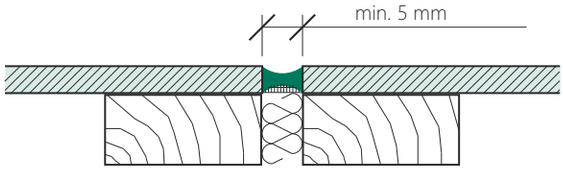
The width to depth ratio of the joint is 1:1, for larger joint widths 2:3. The dilatation joints to be filled must be dry and dust-free. Better adhesion may be achieved by priming the joint sides with the prescribed primer (or diluted filler), after which it is necessary to wait for the coat to dry completely. The main principle for correct function of the dilatation joints is elimination of three-sided adhesion in the joint, which causes uneven stress on the elastic filling and subsequently its tearing off the joint sides. This may be prevented by insertion of a slide insert into the joint bottom – polyethylene tape, or cord in the case of deeper joints. The result is adhesion of the elastic matter on the opposite sides only and hence equal stress on the filler – "chewing gum effect".

Dilation joint filling

1 – Incorrect: Three-sided adhesion of the filler in the dilatation joint



2 – Correct: Separation of the filler form the joint bottom with a slide insert min. 5 mm



6.5 Floating Floors of CETRIS® Boards

A floating floor is a floor separated from the other constructions, the ceiling and the walls with an elastic material – the floor is laid in a basin of this material and, so-called, "floats" in it. The purpose of the dry floor construction is to create a new floor construction very quickly and cheaply without using the wet process while at the same time improving the acoustic and heat insulating properties of the ceiling construction. The floating floors, unlike other floor types, act favourably on the joint mechanism of the human body.

When designing dry floating constructions the increased elasticity must be considered, for which reason, these systems are not recommended for spaces with higher humidity (showers, bathrooms, laundries, saunas, etc.) where the permissible sag of the floor may jeopardize the function of the hydro insulating layer. The insulation boards used must be suitable for use in light floating floors. Use of mineral or rock wool insulation boards for use in heavy floating floors is not permissible.

The IZOCET, POLYCET, CETRIS® PDI dry floor constructions fall under the light floating floor category (floating floor weight up to 75 kg/m^2). The mechanical parameters were verified according to EN 13 810-1 Wood-based panels – Floating floors – Part 1: Performance specifications and requirements.

Composition of the floating floor:

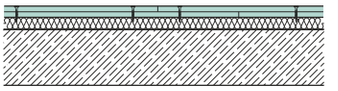
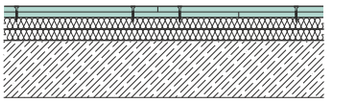
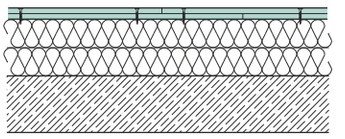
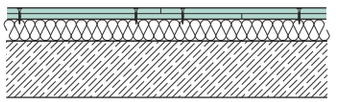
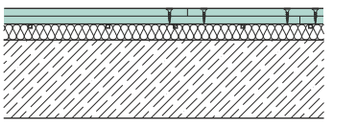
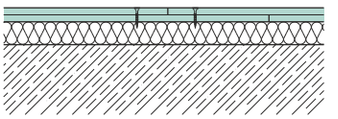
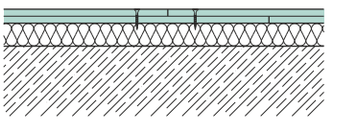
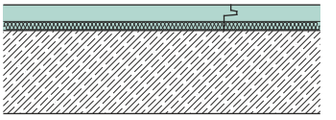
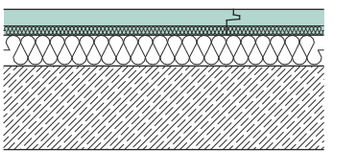
A – wear layers – may consist of a carpet, parquets, PVC, paving

B – load-distribution layers – consists of two CETRIS® boards, thickness 12 mm (thickness 10 mm – POLYCET Min floor system), which are screwed together with self-tapping screws 4.2 × 35 mm with sunken heads. In the case of CETRIS® PDI, the load-distribution layers consist of the CETRIS® cement bonded particleboards of thickness 20 (22) mm.

C – thermal insulation layers – the most important part of the floating floor, assuring increased impact sound transmission loss and airborne sound transmission loss as well as improved heat insulation. This function is fulfilled by pressed fibreboards (IZOCET System), or insulation boards made of elasticated polystyrene foam (hereinafter referred to as EPS) – POLYCET System.

D – edge strips – the CETRIS® cement bonded particleboard must be separated from the walls with a material with similar sound insulation properties as the insulation itself

6.5.1.1 Description of the construction of IZOCET, POLYCET, CETRIS® PDI floating floors

Brand name	Composition – Description	
IZOCET SP 45	CETRIS® cement bonded particleboard, 12 mm, upper drilled / CETRIS® cement bonded particleboard, 12 mm, lower / Insulation fibreboard of thickness 19 mm	
IZOCET SP 65	CETRIS® cement bonded particleboard, 12 mm, upper drilled / CETRIS® cement bonded particleboard, 12 mm, lower / Insulation fibreboard of thickness 19 mm 2 layers	
POLYCET Therm	CETRIS® cement bonded particleboard, 12 mm, upper drilled / CETRIS® cement bonded particleboard, 12 mm, lower / Separation layers – softened foil of maximum thickness 2 mm / Polystyrene foam EPS 100 Z of maximum thickness 60 mm, two layers	
POLYCET Aku	CETRIS® cement bonded particleboard, 12 mm, upper drilled / CETRIS® cement bonded particleboard, 12 mm, lower / Separation layers – softened foil of maximum thickness 2 mm / Polystyrene foam EPS T4000 of maximum thickness 50 mm	
POLYCET Heat	CETRIS® cement bonded particleboard, 12 mm, upper drilled / CETRIS® cement bonded particleboard, 12 mm, lower / Separation layers – softened foil of maximum thickness 2 mm / Polystyrene foam EPS 100 Z of maximum thickness 50 mm with integrated hot-water heating system	
POLYCET Max	CETRIS® cement bonded particleboard, 12 mm, upper drilled / CETRIS® cement bonded particleboard, 12 mm, lower / Separation layers – softened foil of maximum thickness 2 mm / Polystyrene foam EPS 200 S of maximum thickness 30 mm	
POLYCET Min	CETRIS® cement bonded particleboard, 10 mm, upper drilled/ CETRIS® cement bonded particleboard, 10 mm, lower / Separation layers – softened foil of maximum thickness 2 mm / Polystyrene foam EPS T 4000 of maximum thickness 30 mm	
CETRIS® PDI	Two-ply panel consisting of CETRIS® cement bonded particleboard of thickness 20 mm or 22 mm glued together with fibreboard insulation of thickness 12mm	
CETRIS® PDI + insulation	Floor insulation panel consisting of CETRIS® cement bonded particleboard of thickness 20 mm or 22 mm glued together with fibreboard insulation of thickness 12mm. Insulation (polystyrene foam) of maximum thickness 50 mm	

Material specifications:

- CETRIS® boards of thickness 12 (±1.0) mm, with tensile bending strength min. 9 Nm/m^2, size 625 x 1,250 mm, the boards for the upper layer are supplied with pre-drilled holes (diameter 5 mm). In the POLYCET Min floor composition, it is possible to use CETRIS® cement bonded particleboards of thickness 10 (±0.7) mm. Alternatively it is possible to also use the base board format 1,250 x 3,350 mm.
- Self-cutting screws 4.2 × 35 mm with double thread and sunken heads with blades for countersinking. Alternatively, the CETRIS® boards can be stapled together – Haubold KG 700 CNK staples. In the POLYCET Heat floor composition, the maximum length of the screws used is 25 mm
- Insulation boards in the IZOCET System - soft fibreboard (hardboard) of thickness 19 (±1.0) mm, volume mass 250 kg/m3 ±30 kg/m3, supplied in a size of 810 x 1,200 mm.
- Insulation boards in the POLYCET System made of elasticised foam polystyrene. The type and thickness is specified individually for each composition. Insulation layers of lower class or thicker than 60 mm cannot be used. A maximum two layers of insulation boards are permitted.
- UZIN MK 73 Glue for full-surface gluing of CETRIS® boards in the POLYCET Heat variant. A solvent type glue based on artificial resins. For particleboard, cement, magnesium, heated plasters, cast bitumen and UZIN insulation layers. Easy to spread, good filling, very quick adhesion, with hard elasticity and high shear strength. Alternatively, low-expansion polyurethane bonding foam can be used for full surface bonding of the cement bonded particleboards.
- CETRIS® PDI is a floor panel consisting of CETRIS® cement bonded particleboard of thickness 20 mm or 22 mm glued together with fibreboard insulation of thickness 12mm. The entire panel milled with tongue and groove around the perimeter. The panel surface is smooth.

6.5.1.2 Properties of floating floors

Mechanical load-bearing capacity of the floor

The load-bearing capacity of the IZOCET, POLYCET, CETRIS® PDI floating boards (panel thickness 34 mm) was set on the basis of tests for light floor constructions pursuant to EN 13 810-1. The individual tests were performed in the acoustic chamber of the testing laboratory of CSI Praha a.s., Zlín office, on a sample of size 3.6 × 3.0 m. The floor was always laid on a reinforced concrete ceiling construction.

Test loading methods:

- Concentrated load – local action of a load of weight 130 kg (classes A,B) or 260 kg (classes C1-C3, C5 and D1) on a circular area with a diameter of 25 mm. The limit sag under the loading arm is max. 3 mm.
- Impact load – a 40 kg load falls from a height of 350 mm, after 10 falls, the limit sag value is max. 1.0 mm. The load simulated falling objects, people, jumping, dancing.
- Application of an even load with an intensity of 3.0 kN/m^2 (classes A and B), or 5.0 kN/m^2 (classes C1-C3, C5 and D1)

Evaluation of the tests for the utility categories C1-C3, C5 (gathering areas) and D1 (shopping areas)

Parameter (test standard)	Parameter limit value	POLYCET Max	CETRIS® PDI 34 mm
Resistance to concentrated load (ČSN EN 13 810-1)	When F_k=2,6 kN deflection $d_F \leq 3,0$ mm	d_F = 2,96 mm	d_F = 0,96 mm
Resistance to dynamic impact load (ČSN EN 1195)	Increase of deflection $\partial dF \leq 3,0$ mm	∂d_F = - 0,35 mm	∂d_F = -0,04 mm
Resistance to even load (ČSN EN 12 431)	When q_k=5,0 kN/m^2 deflection $d_q \leq 3,0$ mm	d_q = 0,38 mm	d_q = 0,17 mm

Evaluation of tests for category A (residential spaces) and category B (office spaces)

Parameter (test standard)	Parameter limit value	IZOCET SP 45	IZOCET SP 45	POLYCET Therm	POLYCET Aku	POLYCET Heat	POLYCET Min	CETRIS® PDI 34 mm + 50 mm EPS
Resistance to concentrated load (ČSN EN 13 810-1)	When F_k=1,3 kN deflection $d_F \leq 3,0$ mm	d_F = 2,7 mm	d_F = 2,0 mm	d_F = 1,7 mm	d_F = 1,9 mm	d_F = 1,9 mm	d_F = 2,58 mm	d_F = 0,86 mm
Resistance to dynamic impact load (ČSN EN 1195)	Increase of deflection $\partial d_F \leq 1,0$mm	∂d_F = - 0,7 mm	∂d_F = 0 mm	∂d_F = 0,1 mm	∂d_F = 0,0 mm	∂d_F = 0,2 mm	∂d_F = 0,15 mm	∂d_F = -0,10 mm
Resistance to uniform load (ČSN EN 12 431)	When q_k=3,0 kN/m^2 deflection $d_q \leq 2,0$ mm	d_q = 0,26 mm	d_q = 0,43 mm	d_q = 0,9 mm	d_q = 0,8 mm	d_q = 1,0 mm	d_q = 0,48 mm	d_q = 0,23 mm

Range and application of CETRIS® board floating floor systems	
Flooring System	Fields of Application
IZOCET SP 45	A – Residential areas B – Office areas
IZOCET SP 65	
POLYCET Therm	
POLYCET Aku	
POLYCET Heat	
POLYCET Min	
CETRIS® PDI + inserted insulation (max. 50 mm)	
POLYCET Max	A – Residential areas B – Office areas C1 + C2 + C3 + C5 + D1
CETRIS® PDI	
Load categories pursuant to EN 1991-1-1	
A. Residential areas and areas for domestic activities	Rooms of residential buildings and houses, bed rooms and hospital operating theatres, hotel and hostel bedrooms, kitchens and toilets
B. Office areas	
C. Areas, where people may gather (except areas stated in categories A, B, D)	C1: Areas with tables, etc., e.g. areas in schools, cafés, restaurants, dining halls, reading rooms, receptions.
	C2: Areas with built-in seating, e.g. areas in churches, theatres and cinemas, meeting rooms, lecture or conference rooms, railway waiting rooms.
	C3: Areas without obstacles for the movement of persons, e.g. areas in museums, exhibition halls and in the access areas of public and office buildings and hotels.
	C4: Areas designed for physical activities such as dance halls, gymnasiums, stages.
	C5: Areas where there may be a high concentration of people, such as buildings for public events like concert halls, sports halls including stands, terraces or access areas.
D. Shopping areas	D1: Areas in small shops.
	D2: Areas in departmental stores, e.g. areas in warehouses for goods, paper and stationery.

Sound insulation properties

The acoustic properties of the IZOCET, POLYCET and CETRIS® PDI dry floating floors were specified by the laboratory method pursuant to ČSN EN ISO 140-3, ČSN EN ISO 140-6 on a standardised ceiling slab (reinforced concrete overhead construction of thickness 120 mm). The horizontal structures are assessed in terms of the airborne sound propagation (airborne sound insulation) and in terms of impact noise arising from dynamic impact load (impact noise insulation).Airborne sound insulation is the capability of the construction to acoustically isolate two neighbouring rooms in terms of airborne sound. The evaluation criterion is the weighted airborne sound insulation R´w or laboratory airborne sound insulation Rw. The higher the airborne sound insulation the higher the sound insulation capability.

The following applies: R´w = Rw - C (dB)
C ... correction dependent on sound transmission via lateral paths

Impact noise insulation expresses the capability of the construction to dampen sound energy, which arises from mechanical impact on the construction. The evaluation parameter is the weighted impact noise level L´nw, or the laboratory impact noise level Lnw. The higher the value, the higher the impact sound insulation between two spaces.

Reduction of standardised impact sound level – ΔLw – improvement of sound insulation, difference in the impact sound level only for the ceiling construction (without acoustic adjustment) and impact sound level of the ceiling including acoustic adjustment, adjusted by the correction factor (depends on the type of ceiling construction).

In terms of the quality of impact sound loss, the IZOCET, POLYCET and CETRIS® PDI dry floating floors can be used on load-bearing constructions with an area weight of 300 kg/m^2 or on ceiling constructions without acoustic requirements. For these reasons, in order to improve the acoustic properties of floors laid on a wooden beam ceiling, we recommend burdening the decking – e.g. with concrete paving of minimum thickness 40 mm.

Acoustic parameters of light floating floors on a standardised ceiling slab (specified by a test)

Floor structure	Index of airbornesound insulation R_w	Index of normalized contact noise level L_{nw}	Reduction of the level of normalizedcontact noise ΔL_w
IZOCET SP 45	58 dB	54 dB	26 dB
IZOCET SP 65	59 dB	52 dB	28 dB
POLYCET Therm	58 dB	54 dB	25 dB
POLYCET Aku	59 dB	52 dB	22 dB
POLYCET Min	54 dB	57 dB	23 dB
POLYCET Max	55 dB	58 dB	22 dB
CETRIS® PDI	57 dB	60 dB	21 dB
CETRIS® PDI + 50 mm EPS	58 dB	55 dB	26 dB

Required values of sound insulation of ceiling construction pursuant to ČSN 73 0532 and EN ISO 717-1.2

Space	Sound insulation requirements	
	R'_w (dB)	L'_{BW} (dB)
Residential houses – one living room in a multi-room apartments		
All other rooms of the same apartment unless they are functional parts of the protected space	47	63
Residential houses – apartments		
All rooms of other apartments	53 (52)	55 (58)
Common spaces used (stairways, corridors, etc.)	52	55
Common unused spaces (e.g. lofts)	47	63
Passages, underpasses	57	53
Passages, underpasses, garages	57	48
Workplaces with noise LA, MAX ≤85 dB in operation till 10 pm	57	53
Semi-detached and terraced family houses		
Rooms in the neighbouring house	57	48
Hotels and accommodation facilities – bedroom space, guest rooms		
Rooms of other guests	52	58
Common spaces in use (corridors, stairways)	52	58
Restaurants, social spaces and services in operation till 10 pm	57	53
Hospitals, sanatoria - wards, doctors' offices		
Wards, surgeries	52	58
Auxiliary and ancillary spaces	52	58
Schools and the like – teaching space		
Classrooms	52	58
Common spaces in use (corridors, stairways)	52	58
Offices and studies		
Offices and studies with standard administration activities	47	63
Studies with increased demand for noise protection	52	58

Orientation acoustic parameters of light floating floors on a wooden ceiling construction (specified by calculation)

Floor structure	Index of airbornesound insulation Rw	Index of normalized contact noise level L_{nw}	Reduction of the level of normalizedcontact noise ΔL_w
IZOCET SP 45	58 dB	62 dB	8 dB
POLYCET Therm	58 dB	63 dB	7 dB

Thermal insulation properties

The thermal insulation properties of IZOCET, POLYCET and CETRIS® PDI dry floating floors are mainly characterised by the properties of insulation boards.

Thermal technical parameters of the insulation boards

Type of insulation	EPS 100Z	EPS T4000	EPS 100S	EPS 200 S	fibreboard insulation panel
Coefficient of thermal conductivity (W/m.K)	0,038	0,045	0,038	0,034	0,050

Increase of the heat resistance of a ceiling construction with a light floating floor

Floor	Load distribution layers	Insulation		Increase of heat resistance R ($Wm^{-2}KJ^{-1}$)
		Type	Thickness (mm)	
IZOCET SP 45	CETRIS® 2x12 mm	fibreboard insulation panel	1x19	0,49
IZOCET SP 65			2x19	0,89
POLYCET Therm		EPS 100Z	2x60	3,24
POLYCET Aku		EPS T4000	50	1,19
POLYCET Heat		EPS 100S	50	1,4
POLYCET Max		EPS 200S	30	0,97
POLYCET Min	CETRIS® 2x10 mm	EPS T4000	30	0,84
CETRIS® PDI	CETRIS® 20/22mm	fibreboard insulation panel	12	0,33
CETRIS® PDI + 50 mm EPS			12+50 mm EPS	1,65

Required and recommended heat transmittance coefficient values for buildings with dominant design interior temperature θim in the interval 18 °C to 22 °C inclusive

Description of the construction	Heat transmittance coefficient [$W/(m^2 \cdot K)$]		
	Required values $U_{N,20}$	Recommended values $U_{rec,20}$	Recommended values for passive buildings $U_{pas,20}$
Ceiling with floor above an exterior space	0,24	0,16	0,15 až 0,10
Ceiling above a non-heated attic (roof without thermal insulation)	0,30	0,20	0,15 až 0,10
Floor and wall of a heated space on natural ground 1), 2)	0,45	0,30	0,22 až 0,15
Floor and wall of a tempered space n natural ground 6)	0,85	0,60	0,45 až 0,30
Ceiling between spaces with a temperature difference up to 10 °C inclusive	1,05	0,70	-
Ceiling between spaces with a temperature difference of up to 5 °C inclusive	2,20	1,45	-

1) In case of floor and wall heating, the heat transmittance coefficient includes only the layers from the plane where the heating is installed toward the exterior.
2) Corresponds to the calculation of the coefficient of heat transmittance according to ČSN 73 0540-4 (i.e. without the influence of soil), not the resulting action according to ČSN EN ISO 13370.

6.5.1.3 Base Preparation for Floor Laying

Load-bearing base, requirements and preparation

The preparation of the load-bearing base is important for ensuring the final quality of the floating floor surface for the wear layers. The load-bearing base may be a massive ceiling construction (a reinforced concrete slab, HURDIS ceramic ceiling etc.) or a timber ceiling with planks, a wooden log ceiling or a concrete foundation slab.

The load-bearing base is expected to be able to transfer the minimum load equal to the standard (usable) load plus the weight of the floor with the requirement of the maximum sag of the ceiling construction in compliance with the given requirements.

The floating floor requires a dry load-bearing base with a planarity tolerance of 4 mm per 2 m. If the permissible deviations from the planarity of the load-bearing base shall not be observed, it is not possible to subsequently guarantee the permissible deviations of the planarity under the wear layers. The local irregularities may reach up to 5 mm (e.g. individually protruding fillings, concrete burrs or knots in the wooden base) due to the possibility of additional levelling of the insulation layer.

An insufficiently flat surface must be levelled.

Levelling of the load-bearing base

Levelling of the base can be done in two ways:

1. Wet method – using cement mortar and sand or using a layer of self-levelling plaster pursuant to the instructions of the individual manufacturers

2. Using a dry sub-base – it is possible to use dry levelling mixtures based on crushed porous concrete, pearlite. The sub-base height must be minimum 10 mm and maximum 40 mm. It is possible to recommend the sub-base mixtures FERMACELL, BACHL BS Perlit, Siliperl, Cemwood 2000. **The sub-base mixture can not be used to level the surface under the CETRIS PDI floor panel.** When levelling the surface of a wooden log ceiling, it is necessary to first assess the quality of the load-bearing construction, beaten, distorted (unevenness above 5 mm) and replace otherwise damaged planks. Cardboard should be laid over the decking to prevent the dry sub-base mixture from falling through the openings after knots and gaps in the planks. The levelling sub-base is spread according to instructions of the individual manufacturers.

Recommended procedure:
1. Specify the required final height of the constructed floor and mark it on the adjacent walls (1 m above the final floor level)
2. Pour the sub-base mixture along one wall in a strip of approximate width 20 cm up to the height that corresponds to the required sub-base height (it is necessary to respect the construction height of the floor system). Create a parallel sub-base mixture strip at the distance equal to the length of the smoothing lath.
3. Place the smoothing lath on the strip and level with a spirit level. You need a set of smoothing laths for this activity (for instance, wooden prisms). The smoothing lath must have lateral cuts corresponding to the height of the levelling laths.
4. Fill the space between the strips with the sub-base mixture and subsequently use the smoothing lath to level the surface of the sub-base to the required height level.

Base humidity

Maximum permitted mass humidity of the base
- Wooden base - 12%
- Silicate base - 6%

Insulation against moisture

To prevent transfer of the moisture to the thermal and sound insulation layers, it is necessary to separate the layer from the floor construction with hydro-insulation foil. This barrier mainly applies to the load-bearing ceiling construction, which contains residual humidity, or where increased transition of the humidity through the ceiling construction is expected. For this purpose, clean the surface and cover it with a hydro-insulating foil such as PE foil of thickness 0.2 mm with overlaps between the individual strips - at least 200 mm (or glue the foil joints with an adhesive tape) and pull it over the vertical construction above the level of the assumed floor level.

When levelling the surface with the self-levelling plaster the humidity insulation is placed over the plaster; in the case of levelling with the sub-base mixture the humidity insulation is placed between the load-bearing construction and the sub-base. When laying the floor over a wooden load-bearing construction, or the original ceiling construction, use of PE foil is not recommended to ensure "breathing" of the ceiling. If there are rooms under the ceiling where increased humidity is expected (a bathroom, a kitchen) then it is necessary to prevent humidity transport to the construction or ensure its free evaporation.

The humidity insulation must be solved as a component of the entire ceiling and floor construction. For the purpose of potential ventilation of wet constructions, it is possible to use micro-ventilating layer (e.g. OLDROYD, TECHNODREN) or a studded membrane..

6.5.1.4 Laying of IZOCET, POLYCET floating floors

1 – The IZOCET, POLYCET floating floor is laid as the final construction after completion of the "wet" building construction works (after erection of the partition walls, after plastering, etc.).

2 – The IZOCET, POLYCET floating floor is laid on a dry and clean base.

3 – Before laying the floor construction the floor parts should be acclimatised for a minimum period of 48 hours at the minimum temperature of 18° C and a relative air humidity of max. 70 %. The acclimatisation approximates the manufacturing humidity of the board to the balanced humidity of the application and reduces the problem of later changes in the shape.

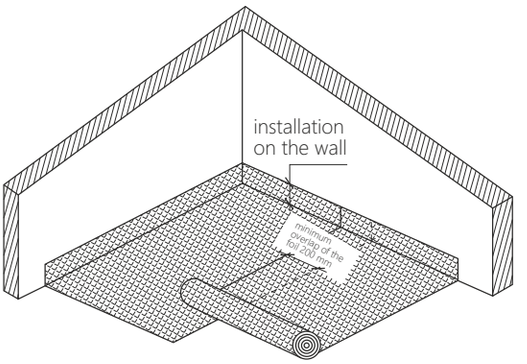
4 – If the sub-base contains high residual humidity, or in the case of risk of increased infiltration of humidity through the ceiling construction, cover the load-bearing ceiling construction with PE foil with 200 mm overlaps between the strips and overlapping the vertical constructions at least to the height of the floor construction.

5 – If necessary, level the base with a dry sub-base, which is always spread on only part of the area.

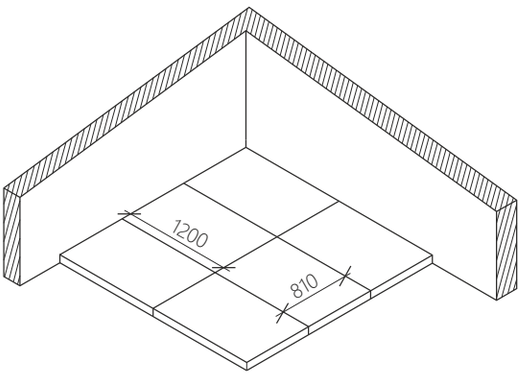
6 – Specify the direction of the upper CETRIS® board layer on which the direction of the bottom boards depends. When laying the layers, it is necessary to observe the principle that the individual layers must cross each other. It is necessary to ensure that the joints of the insulation boards and the CETRIS® floor boards do not lie above each other.

7 – The insulation boards (fibreboard in the IZOCET system, elasticized foam polystyrene in the POLYCET system) are laid flush on the vertical constructions. The insulation boards are laid without dilatation gaps in the surface. Where the dry floor construction passes a door threshold the issue of installation of the door frame must be resolved. The floor must be levelled and padded up to the exact height along the door frame length under the central bottom partition wall. When fixing the door threshold it is necessary to use longer screws to connect the door frame with the base profile. In the case of a door threshold, it is recommended to always install the base laths on both sides of the threshold under the CETRIS® boards. The recommended base board width is 80 mm and the height is 19 mm up to the total height of the insulation supplemented with cut insulation board of adequate thickness (see detail drawing on page 63, 64). The effect of reduction of impact sound absorption is negligible due to local use. The solution with the base lath is also recommended in the case of the floor dilatation across the surface (area larger than 6 x 6 m), floor transition, around the room perimeter – around the walls. To ensure proper contact of the door threshold particularly on the wear layer made of ceramic paving, we recommend application of silicone filler to the threshold before laying it.

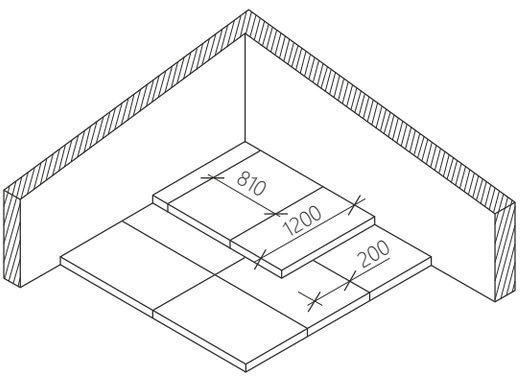
Installation of the foil



Laying of the first layer of insulation boards



Laying of the second layer of insulation boards

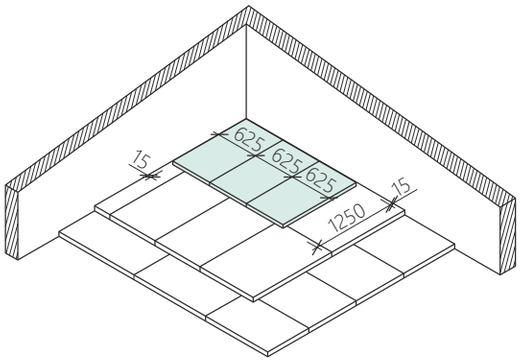


8 – When using two insulation board layers, the second layer is laid on the first layer with a minimum displacement (overlap) of 200 mm. Regarding the height of the insulation, it is recommended to eliminate the effect of the unfavourable deformations by using load-distributing elements as the base. As the best solution in terms of reinforcement of the floor, we recommend 80 x 30 mm planks and the thickness is supplemented with EPS boards up to the total height of the insulation base. These "reinforcements" are placed at the room transition points, transitions between the individual types of floorings, around the room perimeter and where concentrated loads larger than permissible for the given type of floor are assumed. In the case of POLYCET Heat, insulation boards with grooves for installation of floor heating are used. A straight insulation board is used across the floor area – with longitudinal grooves. An end piece is placed along the walls where a change in the heating pipe direction is expected. Thanks to the new technology the end piece is completely covered with aluminium foil to minimise heat loss. The universal groove layout allows for combinations of heating pipe spans – both 125 and 250 mm. Assembly is identical with the standard technological procedures for floor heating. The new technology allows for overlap of lengthwise joints between the shaped pieces with self-adhesive aluminium overlaps. Laying of the insulation boards is followed by the floor heating pipe. Before laying the load-distributing layer, the functionality and tightness of the floor heating pipes must be checked! Before laying the CETRIS® board load distribution layer, it is recommended to lay EPS separation foil on the insulation boards to prevent creaking of the floor – a softened PE foil – e.g. Mirelon of thickness 2 mm. In the case of the POLYCET HEAT floor where insulation boards with aluminium foil are used, the separation is not needed.

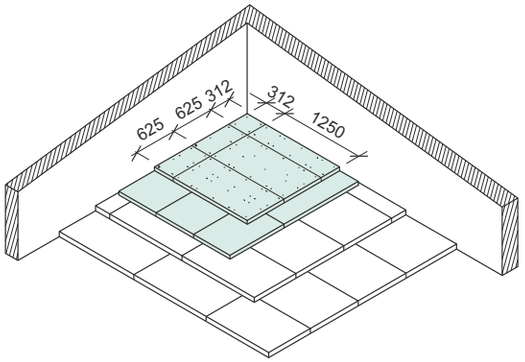
9 – Start CETRIS® board laying with a whole board opposite the door. The boards are laid tightly with a cross joint

10 – A dilatation joints with a width of 15 mm is created around the vertical constructions (walls, pillars etc.). It is recommended to place a 15 mm wide mineral wool or polystyrene strip into the dilatation joints along the vertical constructions to prevent clogging of the dilatation joint during subsequent work. This tape is cut to the desired height upon completion of the final surface finishing of the floating floor before installation of the floorings.

Laying of the first layer of CETRIS® boards



Laying of the second layer of CETRIS® boards



Further floor laying procedure depends on the floating floor variant.

The IZOCET, POLYCET Therm, Aku, Max and Min variants:

11 – The second layer of CETRIS® boards is laid crosswise on the first layer with an overlap of 1/3 of the board, i.e. 312 mm. For easier assembly, the upper layer CETRIS® floor boards are pre-drilled. The diameter of the pre-drilled holes is 4.5 mm.

12 – Immediately after laying, it is necessary to connect the CETRIS® boards with self-tapping screws of diameter 4.2 mm and length 35 mm with countersunk heads. The screws are inserted into the pre-drilled holes. In case of additional cutting of the boards, the screws must be placed 25 – 50 mm from the board edge with a maximum spacing of 300 mm between the individual joints. The screws must not pass through the joints of the bottom layer of CETRIS® boards. The average number of connecting screws is 30 pcs/m^2.

13 – It is recommended to use electric screwdrivers to drive the screws. When joining the CETRIS® boards, it is necessary to locally press the boards down, ideally with the weight of the worker. This prevents the lifting of the upper layer of the boards and potential contamination of the joints with the sawdust from drilling. The screwing of the individual boards is done from the centre outwards.

When laying basic format CETRIS® boards (1,250 x 3,350 mm), it suffices to use approximately 20 screws on 1 m2 if the following conditions are met:

A) The minimum distance of each screw from the board edge is 25 mm
B) The maximum spacing of the screws in the board surface is 300 mm
C) Double-screwing is necessary at the contact points of the lower boards – the upper board must be screwed to both bottom boards
D) The upper boards must be have pre-drilled 4 mm holes.

The mutual connection and interaction of two layers of CETRIS® cement bonded particleboards of thickness 12 mm can be achieved also by stapling. The recommended instructions for stapling of the "CETRIS® board to the board":

- Staple types KG 700 CNK geh /DIN 1052/, wire diameter 1.53 mm 35 mm length
- Stapler type - Stapler PN 755 XI
- Number and positioning of the staples – 28 staples/m2, position according to the drilling template for the upper CETRIS® board of thickness 12 mm. Minimum spacing of the staple from the edge is 25 mm; the staple must be at an angle of 45° to the edge of the board

15 – After joining both layers of CETRIS® boards cut the edge strip and the insulation foil at the required height with a knife.

16 – A screw jointed floor is immediately walkable. It is possible to install the wear layer immediately.

POLYCET Heat Variant (embedded floor heating):

Before laying the second layer of CETRIS® boards apply UZIN MK-73 glue to the upper side of the bottom layer of the CETRIS® boards.

The face of the bottom layer of CETRIS® boards must be dry and clean – without substances that reduce adhesion. The glue must be applied evenly across the layer surface with a notched spatula with the notch height of B3. The recommended glue consumption is 0.8 – 1.0 kg/m2 Alternatively, low-expansion polyurethane bonding foam can be used for full surface bonding of the cement bonded particleboards. The foam is applied in beads with a diameter of 15 mm. The beads must run along the perimeter of the glued board and within the area with a maximum spacing of 150 mm.

11 – The second layer of CETRIS® boards is placed on the glue layer. The board is laid crosswise on the first layer with an overlap of 1/3 of the board, i.e. 312 mm.

12 – Immediately after laying, the upper board layer must be locally screwed together with the bottom layer of CETRIS® boards. In the case of the CETRIS® board size 1,250 × 625 mm it is necessary to place the screws in the corners and in the middle of the longer edge – i.e. 6 screws per board. It is recommended to pre-drill the upper boards with a drilled hole diameter of 4 mm and use self-tapping screws with the diameter of 4.2 mm and length 25 mm with countersunk heads. The screws are inserted into the pre-drilled holes. The screws must be positioned 25 – 50 mm from the board edge and must not pass through the joints of the bottom layer of CETRIS® boards. Laying of basic format CETRIS® boards is not recommended in the case of the POLYCET Heat variant because of the short curing time of the glue.

13 – It is recommended to use electric screwdrivers to drive the screws. When joining the CETRIS® boards, it is necessary to locally press the boards down, ideally with the weight of the worker. This prevents the lifting of the upper layer of the boards and potential contamination of the joints with the sawdust from drilling.

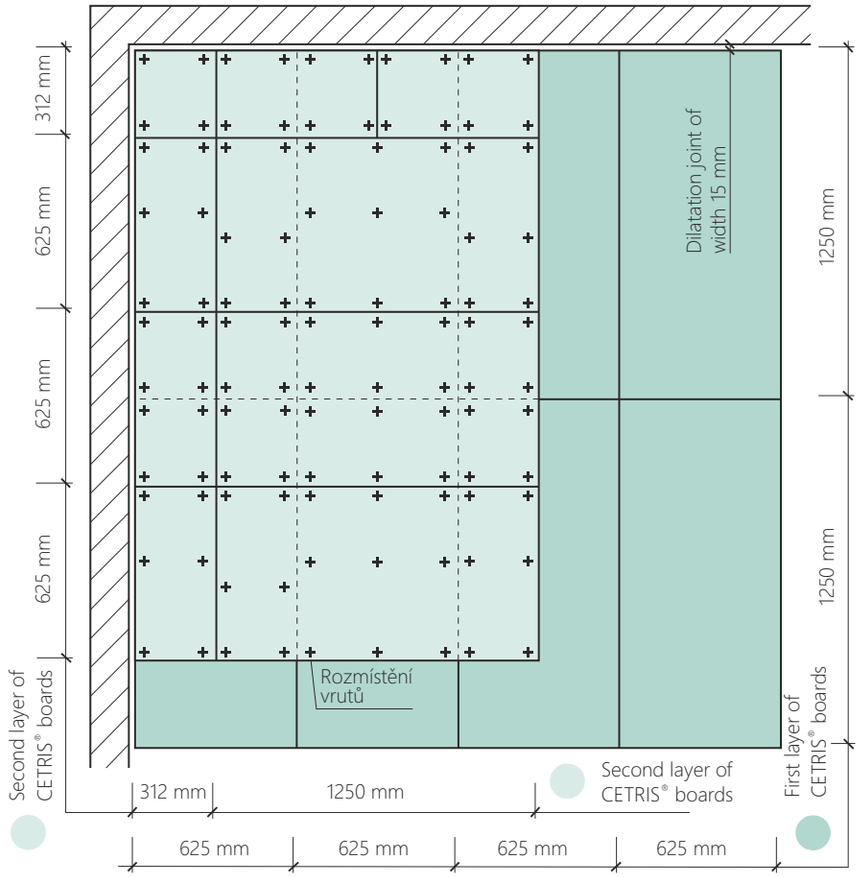
15 – After joining both layers of CETRIS® boards, cut the edge strip and the insulation foil at the required height with a knife.

16 – As the CETRIS® board layers are glued together, the POLYCET Heat floor is not ready for walking traffic immediately after laying. Walking and application of the wear layer on the laid floor is possible no sooner than 48 hours after assembly.

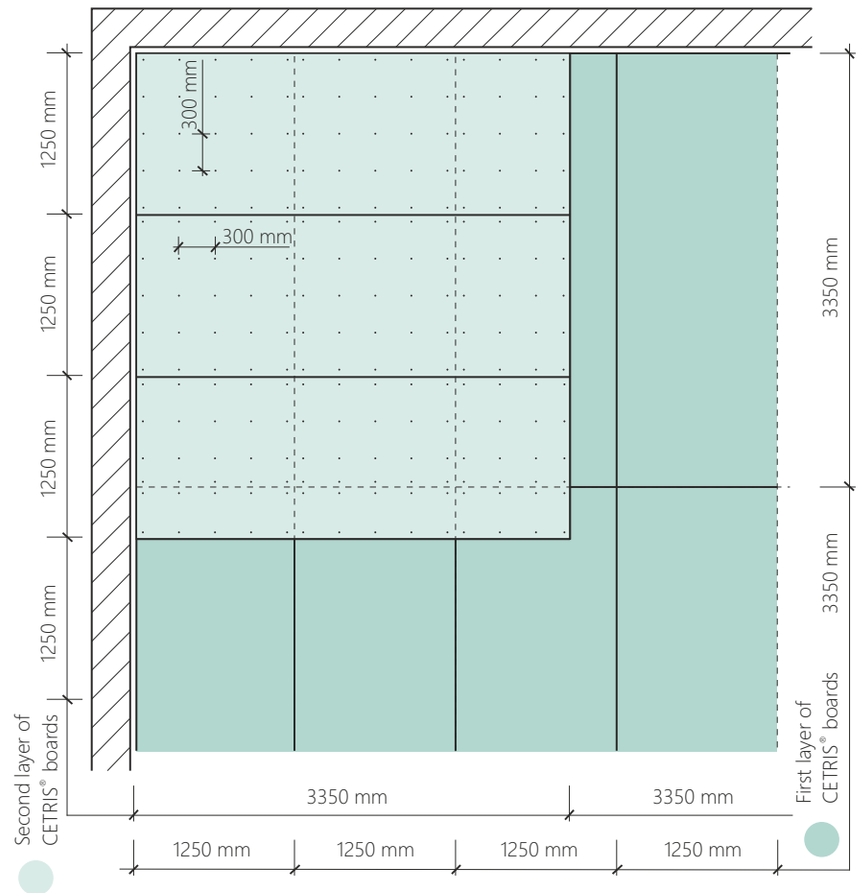
17 – When laying a large floor area, we recommend sequential installation of the insulation and panels in the individual areas of the dilatation zone. This reduces the risk of damage to the insulation boards from the movement of the workers.

Note: Due to drying and gradual acclimatisation of the CETRIS® boards after laying of the floor, especially in winter months, moderate lifting of the free edges (by the walls, in the corners) may occur. This effect may be eliminated by local anchoring of the CETRIS® boards to the base (sub-floor, ceiling).

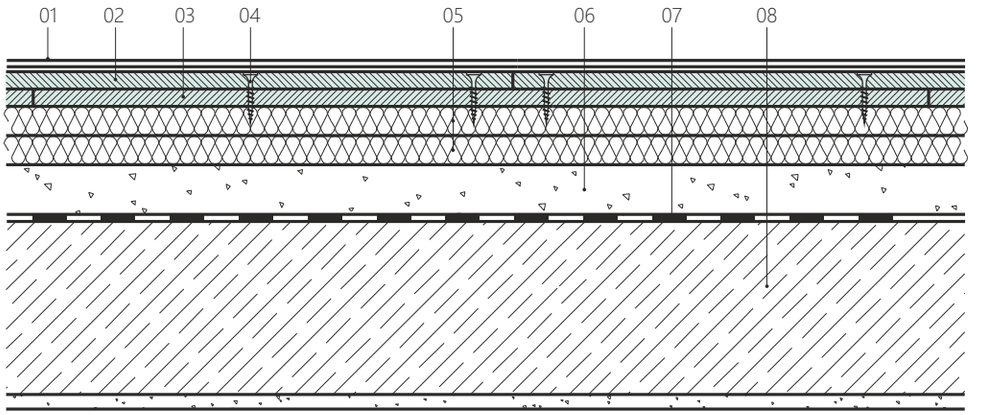
Installation of CETRIS® boards of format 1,250 x 625 mm - IZOCET, POLYCET floating floorsFirst layer of CETRIS® boards



Installation of CETRIS® boards of format 1,250 x 3,350 mm - IZOCET, POLYCET floating floors

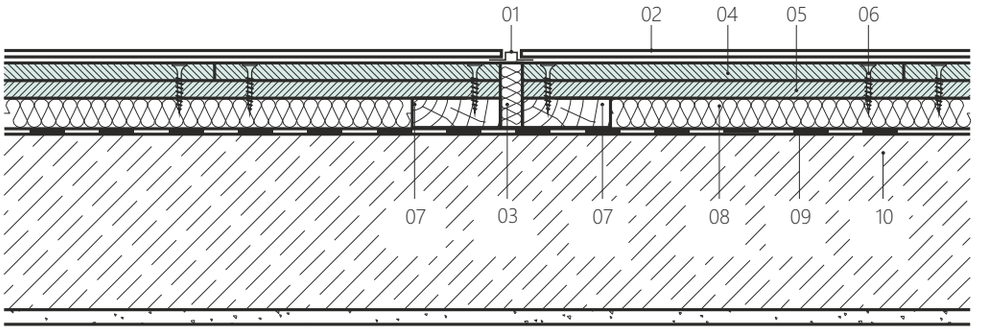


Levelling of the base, increase of the construction height of the IZOCET system - vertical section



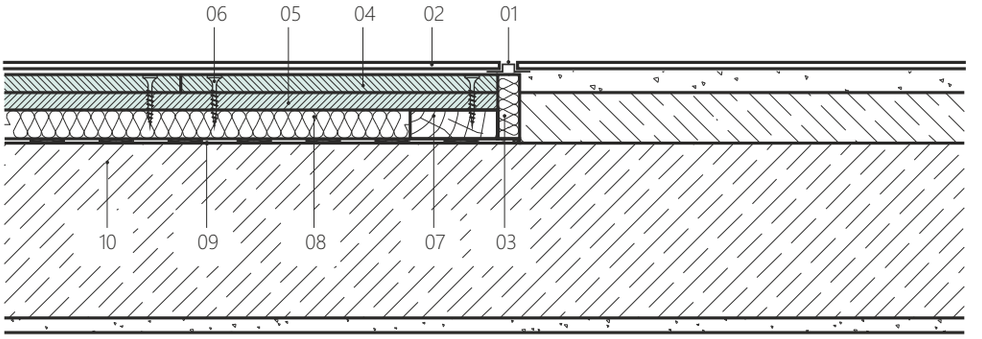
01 wear layer
02 CETRIS® board of thickness 12 mm, upper
03 CETRIS® board of thickness 12 mm, lower
04 screw 4.2 × 35 mm
05 insulation wood-fibre board of thickness 19 mm
06 sub-base mixtures (Fermacell, BACHL, Perlit, Cemwood 2000, Silipert) – max. thickness 40 mm
07 vapour barrier
08 ceiling construction

Dilatation joint in the IZOCET area - vertical section



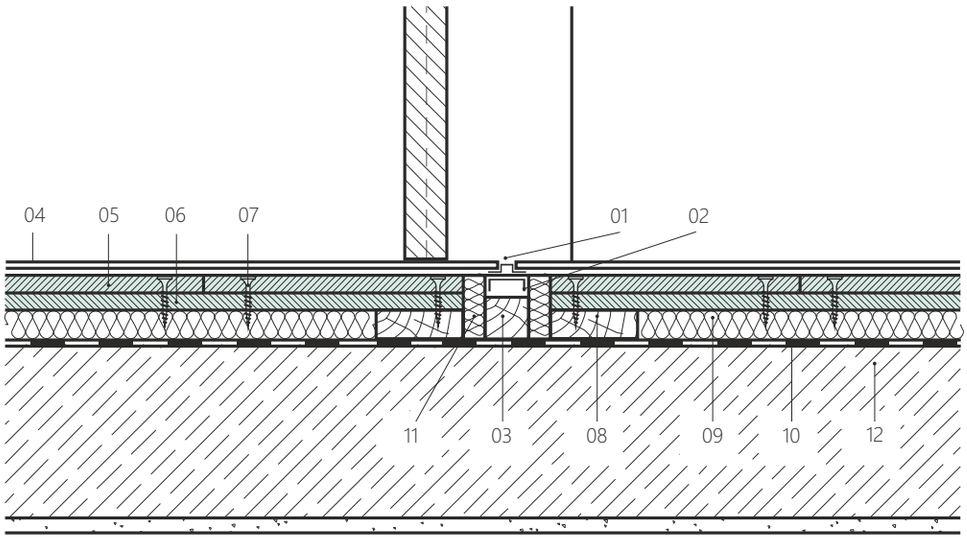
01 Schlűter DILEX dilatation profile
02 wear layer
03 dilatation (15 mm)
04 CETRIS® board of thickness 12 mm, upper
05 CETRIS® board of thickness 12 mm, lower
06 screw 4.2 × 35 mm
07 base wooden lath
08 insulation wood-fibre board of thickness 19 mm
09 vapour barrier
10 ceiling construction

Transition to another IZOCET floor - vertical section



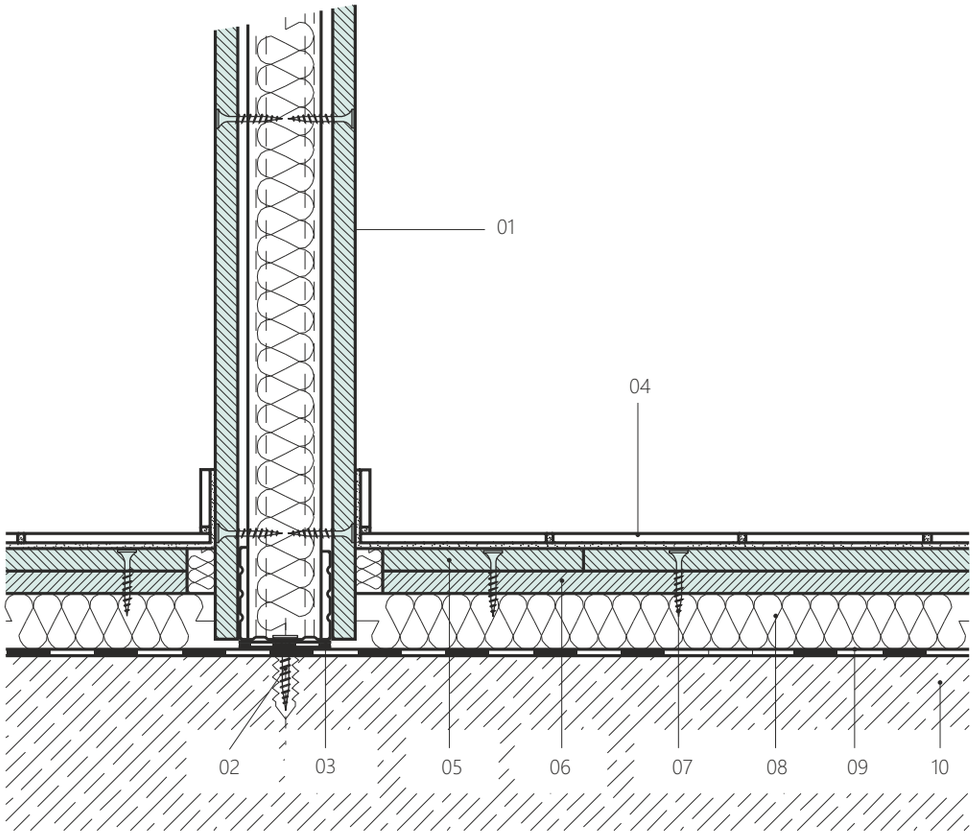
01 Schlűter DILEX dilatation profile
02 wear layer
03 dilatation (15 mm)
04 CETRIS® board of thickness 12 mm, upper
05 CETRIS® board of thickness 12 mm, lower
06 screw 4.2 × 35 mm
07 base wooden lath
08 insulation wood-fibre board of thickness 19 mm
09 vapour barrier
10 ceiling construction

Threshold free transition for the IZOCET floor - vertical section



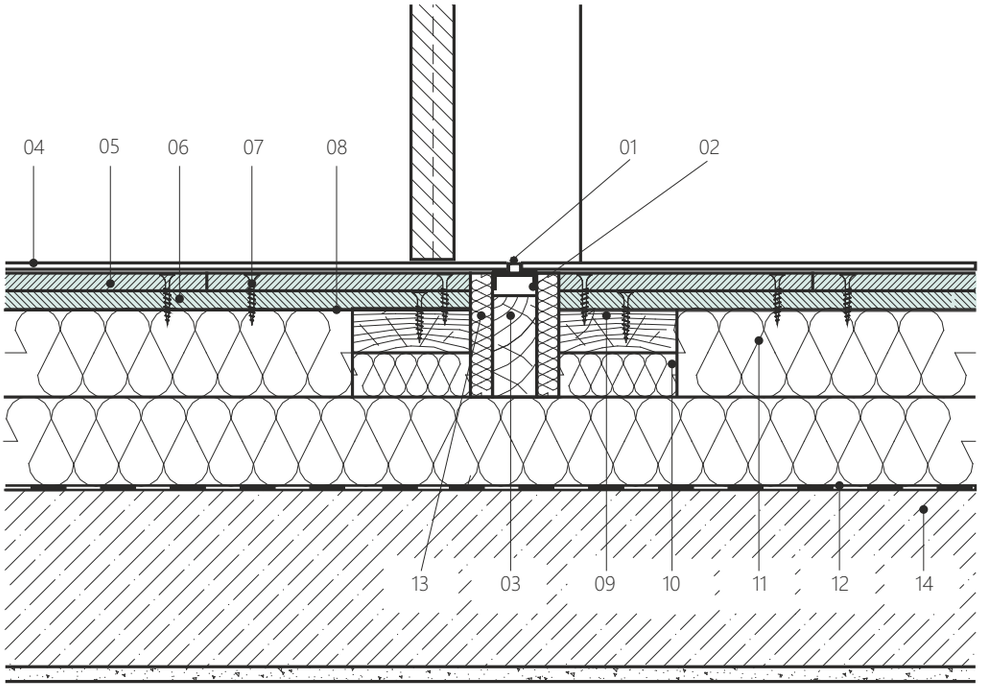
01 Schlűter DILEX dilatation profile
02 threshold connection
03 wooden threshold base profile
04 wear layer
05 CETRIS® board of thickness 12 mm, upper
06 CETRIS® board of thickness 12 mm, lower
07 screw 4.2 × 35 mm
08 base wooden lath
09 insulation wood-fibre board of thickness 19 mm
10 vapour barrier
11 dilatation (15 mm)
12 ceiling construction

Connection of IZOCET floor to a partition wall - vertical section



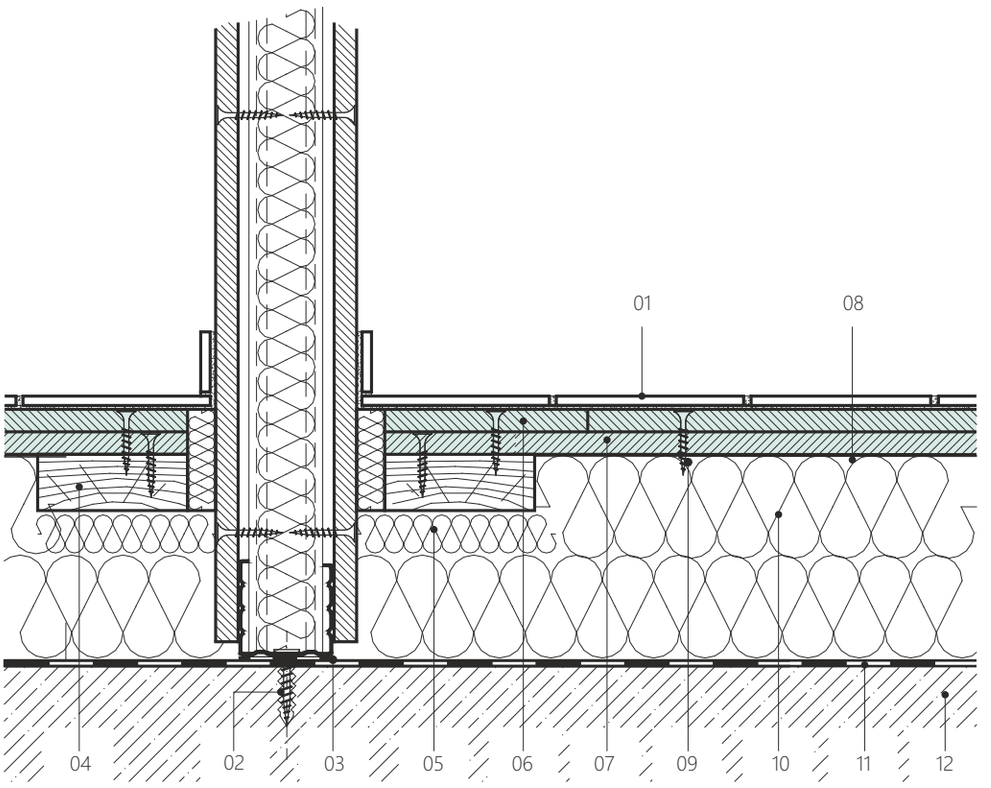
01 partition wall
02 dowel
03 sealing washer
04 base wooden lath
05 CETRIS® board of thickness 12 mm, upper
06 CETRIS® board of thickness 12 mm, lower
07 screw 4.2 × 35 mm
08 insulation wood-fibre board of thickness 19 mm
09 vapour barrier
10 ceiling construction

Threshold free transition for the POLYCET floor - vertical section



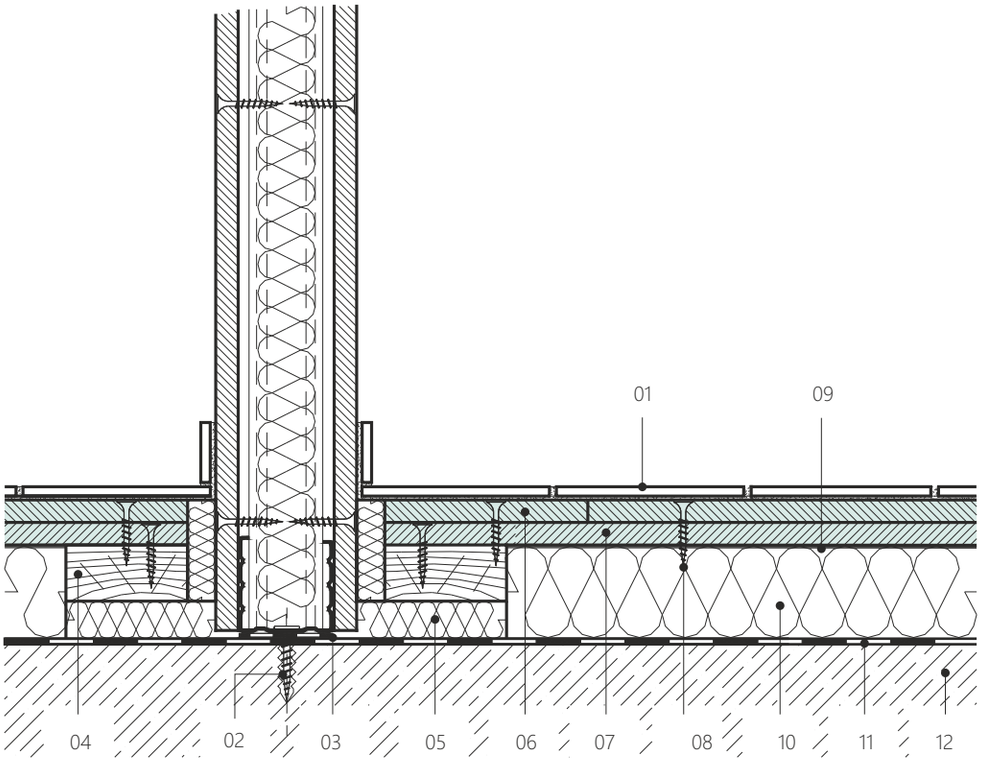
01 Schlűter DILEX dilatation profile
02 threshold connection
03 wooden threshold base profile
04 wear layer
05 CETRIS® board of thickness 12 mm, upper
06 CETRIS® board of thickness 12 mm, lower
07 screw 4.2 × 35 mm
08 separation layers – foam foil of thickness 2 mm
09 wooden base lath 80 × 30 mm
10 EPS insulation
11 EPS insulation board, type 100Z or 100S (two layers)
12 vapour barrier
13 dilatation (15 mm)
14 ceiling construction

Connection of POLYCET Therm floor to a partition wall - vertical section



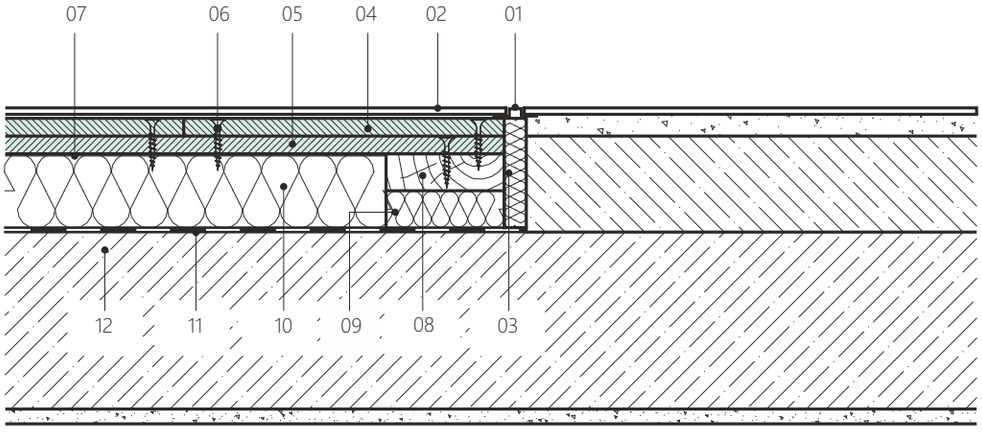
01 wear layer
02 dowel
03 sealing washer
04 wooden base lath 80 × 30 mm
05 EPS insulation
06 CETRIS® board of thickness 12 mm, upper
07 CETRIS® board of thickness 12 mm, lower
08 separation layers – foam foil 2 mm
09 screw 4.2 × 35 mm
10 EPS insulation board EPS 100Z (two layers)
11 vapour barrier
12 ceiling construction

Connection of POLYCET Aku floor to a partition wall - vertical section



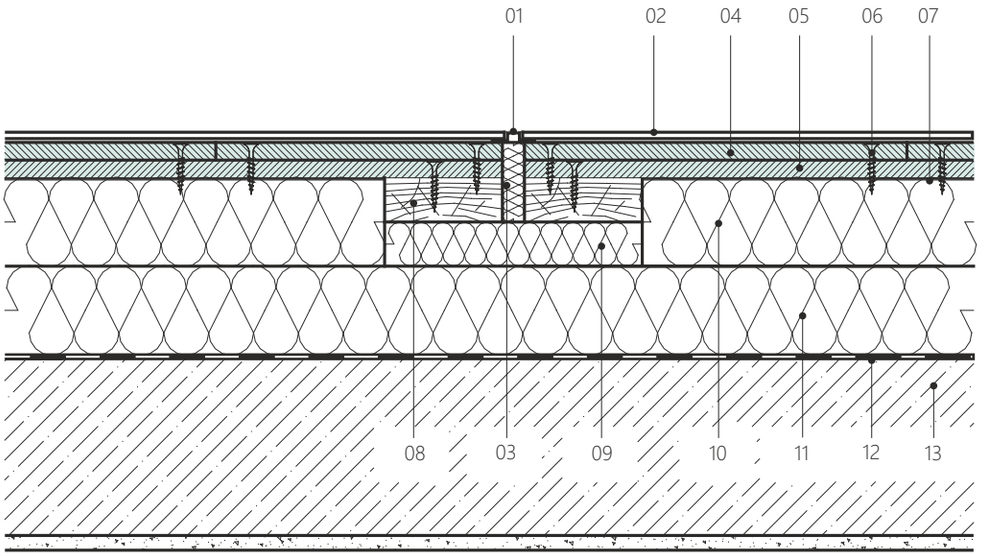
01 wear layer
02 dowel
03 sealing washer
04 wooden base lath 80 × 30 mm
05 EPS insulation
06 CETRIS® board of thickness 12 mm, upper
07 CETRIS® board of thickness 12 mm, lower
08 screw 4.2 × 35 mm
09 separation layers – foam foil 2 mm
10 EPS insulation
11 vapour barrier
12 ceiling construction

Transition to another floor - vertical cross-section



01 dilatation profile
02 wear layer
03 dilatation (15 mm)
04 CETRIS® board of thickness 12 mm, upper
05 CETRIS® board of thickness 12 mm, lower
06 screw 4.2 × 35 mm
07 separation layer – foam foil th. 2 mm
08 wooden base lath 80 × 30 mm
09 EPS insulation
10 EPS 100Z insulation board
11 vapour barrier
12 ceiling construction

Dilatation joint in the surface - vertical cross-section



01 Schlűter DILEX dilatation profile
02 wear layer
03 dilatation (15 mm)
04 CETRIS® board of thickness 12 mm, upper
05 CETRIS® board of thickness 12 mm, lower
06 screw 4.2 × 35 mm
07 separation layers – foam foil th. 2 mm
08 wooden base lath 80 × 30 mm
09 EPS insulation
10 EPS insulation board, type 100Z
11 EPS insulation board, type 100Z
12 vapour barrier
13 ceiling construction

6.5.1.5 Laying of the CETRIS® PDI floor

1 – The CETRIS®PDI floating floor is laid as the final construction after completion of the "wet" building construction work (after erection of the partition walls, after plastering, etc.).

2 – The CETRIS®PDI floating floor is laid on a dry and clean base.

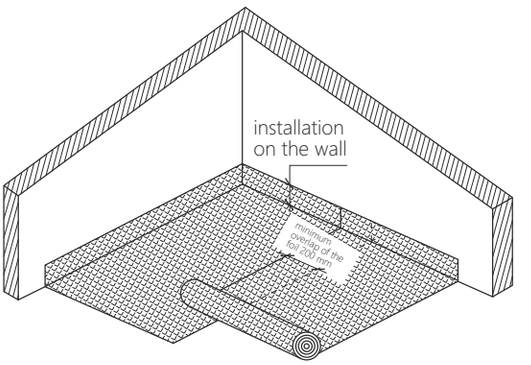
3 – Before laying the floor construction the floor parts should be acclimatised for a minimum period of 48 hours at the minimum temperature of 18° C and a relative air humidity of max. 70%. The acclimatisation approximates the manufacturing humidity of the board to the balanced humidity of the application and reduces the problem of later changes in the shape.

4 – If the base contains a high level or residual moisture or if penetration of moisture through the ceiling structure is anticipated, a PE foil should be laid on the base with a 200 mm overlap of the strips and pulled up along vertical structures to the anticipated level of the floor.

5 – If an insulation board is inserted between the CETRIS®PDI floor board panels, it is necessary prior to laying to specify the laying direction of the insulation boards. When laying the layers, it is necessary to observe the principle that the individual layers must be crosswise. It is necessary to ensure that the joints of the insulation boards and the CETRIS® PDI floor boards do not lie above each other.

6 – The insulation boards are laid flush on the vertical constructions. The insulation boards are laid without dilatation gaps in the surface. Where the dry floor construction passes a door threshold the issue of installation of the door frame must be resolved. The floor must be levelled and padded up to the exact height along the door frame length under the central bottom partition wall. When fixing the door threshold it is necessary to use longer screws to connect the door frame with the base profile.

Installation of the foil



If the composition includes insulation boards, it is recommended in the case of a door threshold to always install the base laths on both sides of the threshold under the CETRIS® PDI boards. The recommended base board dimensions are 80 x 30 mm, which may be supplemented to the total height of the insulation with cut EPS insulation board of adequate thickness (see detail). The effect of reduction of impact sound absorption is negligible due to local use. The solution with the base lath is also recommended in the case of the floor dilatation across the surface (area larger than 6 x 6 m), floor transition, etc.

7 – A dilatation joints with a width of 15 mm is created around the vertical constructions (walls, pillars etc.). It is recommended to place a 15 mm wide mineral wool or polystyrene strip into the dilatation joints along the vertical constructions to prevent clogging of the dilatation joint during subsequent work. This tape is cut to the desired height upon completion of the final surface finishing of the floating floor before installation of the floorings.

8 – Start laying the CETRIS® PDI board with a whole board opposite the door. The boards are laid tightly with a cross joint.

9 - The CETRIS®PDI boards are laid from right to left and no cross-joints may appear when laying the boards; the minimum overlap between joints is 200 mm. The protruding tongue of the first panel in the first row must be cut both on the long (longitudinal) and short (transverse) side. In the case of the rest of the boards in the first row, the tongue must be cut on the longer (longitudinal) side. Before laying the boards, apply glue to the top side of the tongue of the inserted panel and in the groove (bottom part) of the already laid panel. Use polyurethane glue for wood (e.g. Den Braven D4, Soudal PRO 45P, etc.). The approximate glue consumption is 40 g/m2 of laid area (500 ml pack = 12 m2 of floor area). The floor panels must be glued at a maximum relative air humidity of 80 % and a minimum room temperature of 5° C. The CETRIS® PDI panels must be in full contact with each other.

10 - When laying the final panel, first cut it to the required length and then cut-off the tongue on the longitudinal side. You can use the cut-off piece (minimum length of 200 mm) to start the second row.

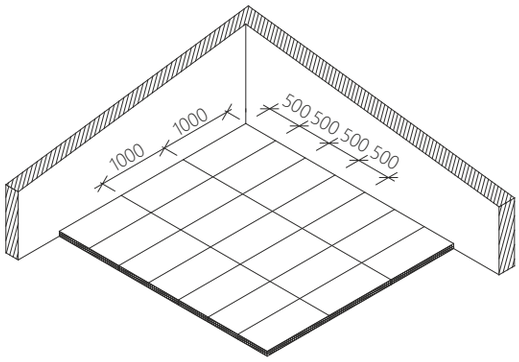
11 – After joining both layers of CETRIS® PDI boards, use a knife to cut-off the edge strip and the insulation foil at the required height.

12 – When laying a large floor area, we recommend sequential installation of the insulation and panels in the individual areas of the dilatation zone. This reduces the risk of damage to the insulation boards from the movement of the workers.

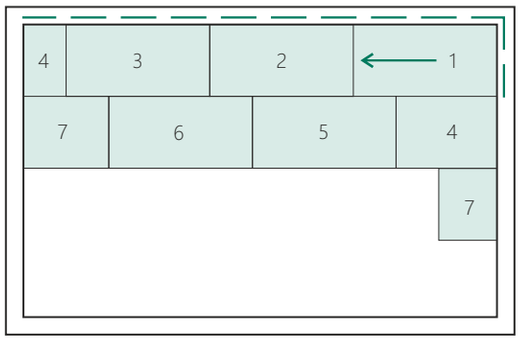
13 – Full loading of the floor or performance of other operations (laying the floor covering) on the floor can be done only after complete curing of the polyurethane glue (min. 24 hours). Remove the excessive glue with a spatula after curing of the glue. A screw-jointed floor is immediately walkable. It is possible to install the wear layer immediately.

Note: Due to drying and gradual acclimatisation of the CETRIS® PDI boards after laying of the floor, especially in winter months, moderate lifting of the free edges (by the walls, in the corners) may occur. This effect may be eliminated by local anchoring of the CETRIS®PDI boards to the base (sub-floor, ceiling).

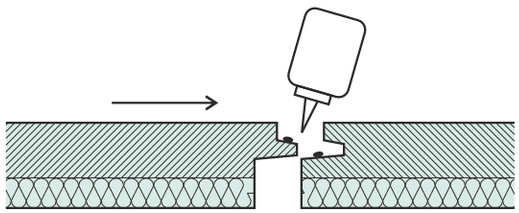
Laying of the insulation boards



Without a tongue on the longitudinal side

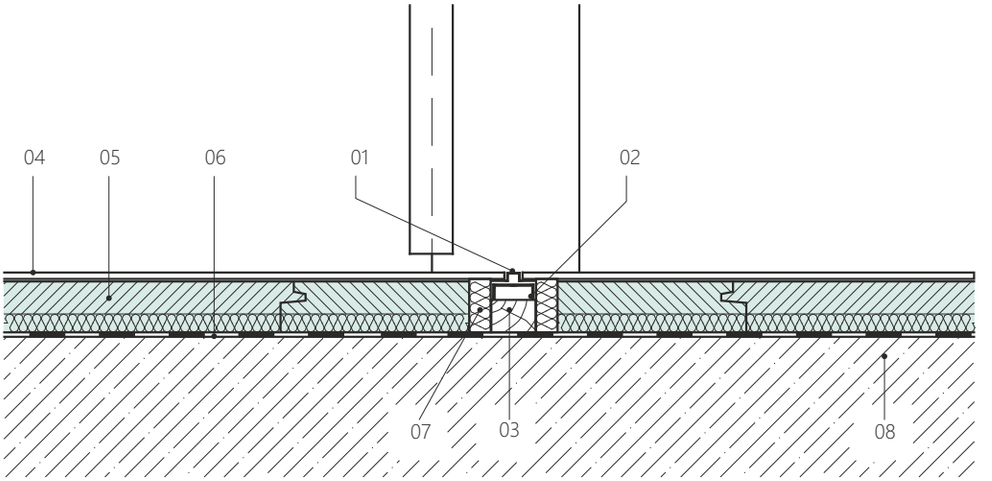


Without a tongue on the transverse side



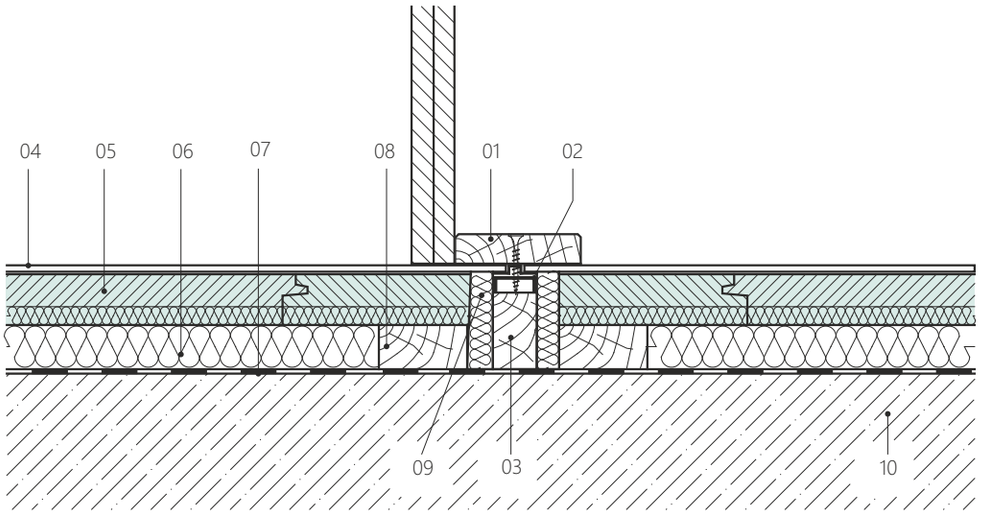
Details of the CETRIS® PDI floor

Threshold free floor transition - vertical section



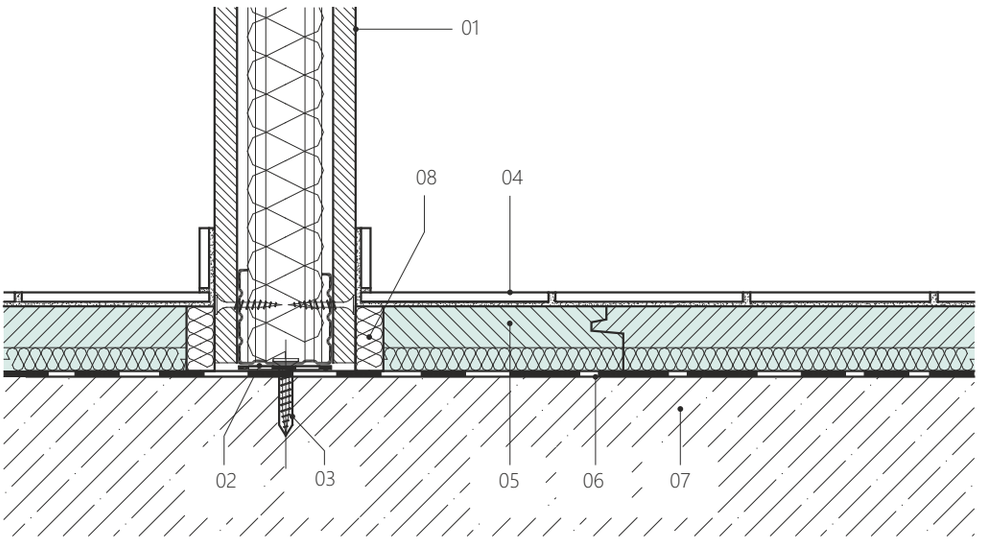
01 Schlűter DILEX dilatation profile
02 threshold link to the door frame
03 wooden base section under the door frame
04 wear layer
05 CETRIS® PDI floor panel
06 vapour barrier
07 dilatation joint 15 mm
08 ceiling construction

Floor transition over a threshold - vertical cross-section



01 wooden threshold with a thickness of 20 mm
02 threshold link to the door frame
03 wooden base section under the door frame
04 wear layer
05 CETRIS® PDI floor panel
06 insulation board (max. thickness 50 mm)
07 vapour barrier
08 wooden base batten
09 dilatation joint 15 mm
10 ceiling construction

Connection of the floor to a partition wall - vertical cross-section



01 partition wall
02 sealing washer
03 dowel
04 wear layer
05 CETRIS® PDI floor panel
06 vapour barrier
07 ceiling construction
08 dilatation joint

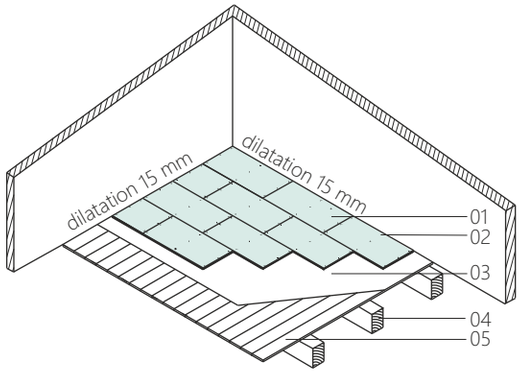
6.6 CETRIS® PD and CETRIS® PDB Floor Boards on a Load-bearing Flat Base

CETRIS® PD and CETRIS® PDB cement-bonded particleboards laid on a load-bearing base are used for rehabilitation of flooring without defects in the load-bearing construction itself but with flooring damaged by long use and physical wear or inappropriate maintenance. They are used, for instance, for rehabilitation of old wooden floors.

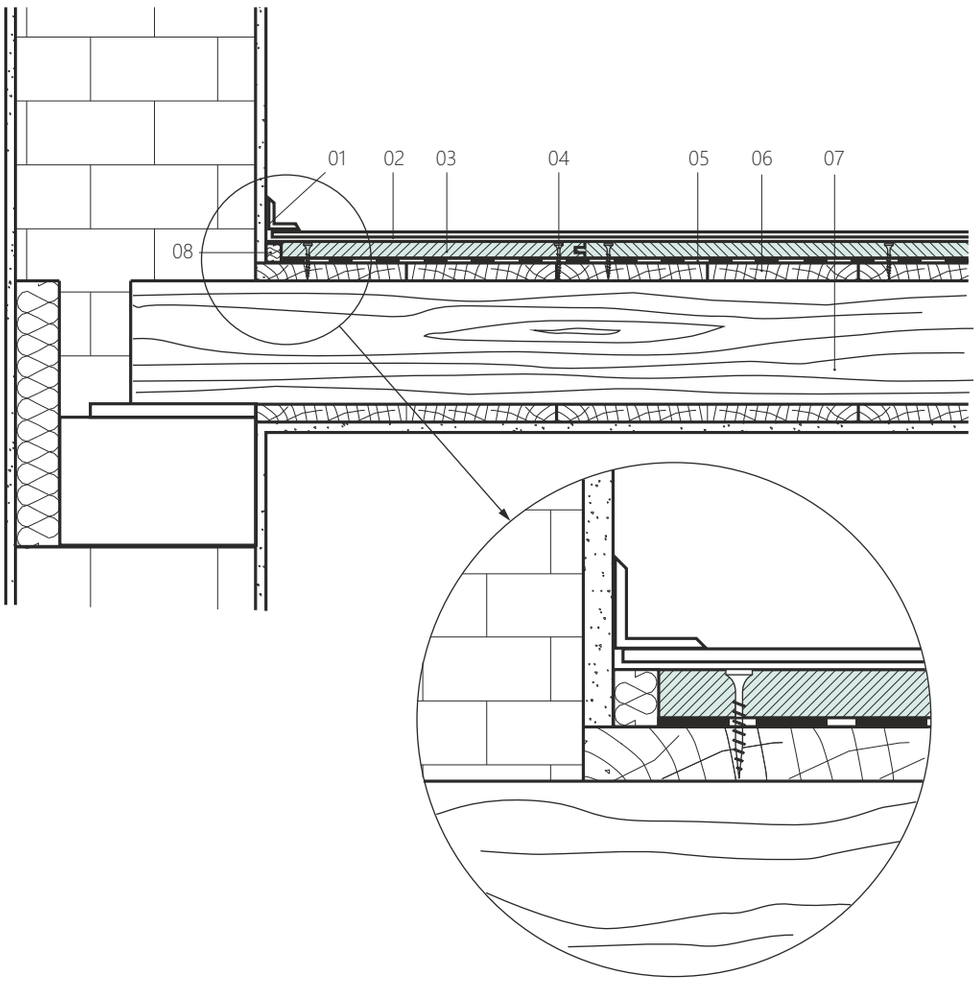
The CETRIS® PD (PDB) floor boards are thus supported over the full area and do not have any load-bearing function. They only provide a quality surface for laying the final wear layer. For this solution, the CETRIS® PD (PDB) board of thickness 16 mm is sufficient.

CETRIS® PD and CETRIS® PDB floor boards on a load-bearing base

01 CETRIS® PD (PDB) floor board
02 screw CETRIS® 4.2 × 45 mm
03 acoustic insulation base – separating foil of max. thickness 5 mm
04 ceiling construction
05 existing wooden floor



Model cross-section – CETRIS® PD (CETRIS® PDB) floor boards on a load-bearing base



01 corner lath
02 wear layer
03 CETRIS® PD (PDB) floor board
04 screw 4.2 × 45 mm
05 acoustic insulation – separating foil of max. thickness 5 mm
06 existing wooden floor
07 ceiling construction
08 dilatation joint of thickness 15 mm

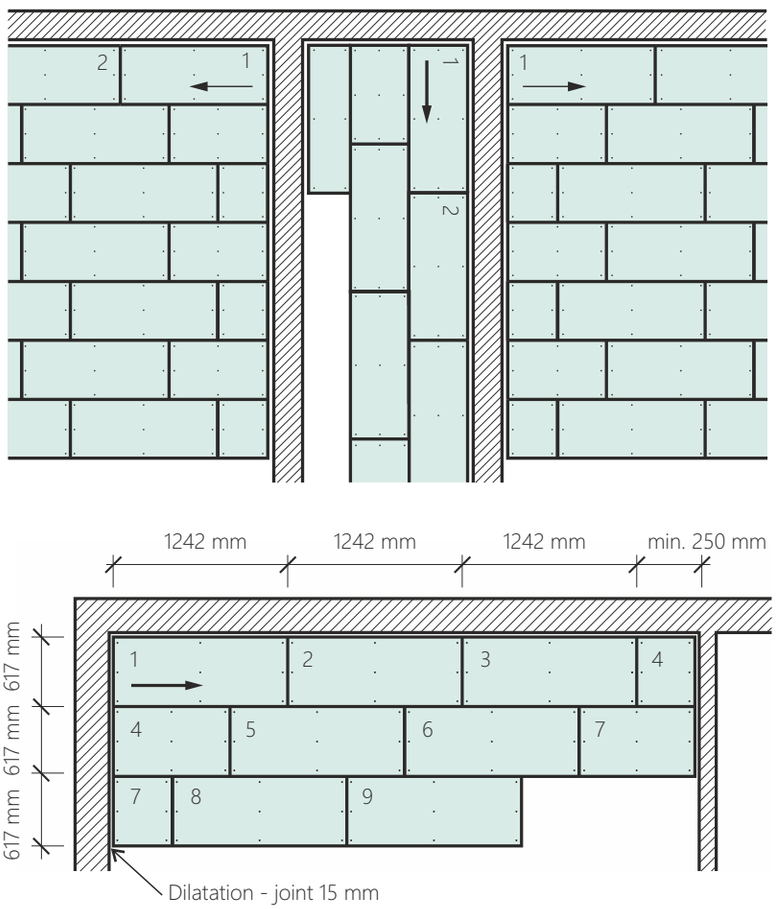
6.6.1 Load-Bearing Base, Requirements, Laying

An important precondition for application of this floor type is the ability of the base (such as the original wooden floor) and the load-bearing ceiling construction (such as ceiling joists, steel girders) to transfer the needed load.

Recommended technological procedure for rehabilitation of an original wooden floor:

- In the case of local unevenness greater than 2 mm, the eventual protrusions – knots, raised rings – are sanded (beware of reduction of the load capacity of the board surface when sanding larger areas!), depressions are filled with suitable filler.
- In the case of a healthy wooden floor that is not damaged so much and has local irregularities up to 2 mm, the existing floor is covered with a separation layer (non-woven fabric, cardboard etc.) and the CETRIS® PD (CETRIS® PDB) floor boards with a thickness of 16 mm are laid directly on the separation layer.
- Laying of the CETRIS® PD (CETRIS® PDB) floor boards starts with a whole board in the corner opposite the door. The CETRIS® PD (CETRIS® PDB) boards are laid tightly against each other and the joint is fixed with glue. The following alkali-resistant dispersion glues are recommended: UZIN MK33, MAPEI – ADESIVIL D3, SCHÓNOX HL, CONIBOND PRO 1005, HENKEL PONAL SUPER 3 (PATEX SUPER 3).
- The boards must be laid within 15 minutes (glue plasticity time). The excessive (expelled) glue is removed after pushing the boards against each other to ensure that the joint is fully filled with glue. After this, the boards are screw-jointed with the old wooden floor.
- Cross-joints are prohibited when laying CETRIS® PD (CETRIS® PDB) cement-bonded particleboards. The individual rows of the boards are laid with overlaps of a min. 1/3 of the board length, perpendicularly to the direction of the original wooden floor. The length of the first boards in a row must be selected for the minimum size of the cut board to be 250 mm. Around the vertical joints (walls, pillars, etc.) it is necessary to observe a dilatation joint of minimum width 15 mm. Around the doors the CETRIS® PD (CETRIS® PDB) boards should not create a joint perpendicular to the door profile.
- If one of the floors is afflicted by fungi or the floor is rotten, the old boards should be replaced or removed and a new CETRIS® PD (CETRIS® PDB) on joists should be laid in its place, see Chapter 6.7 CETRIS® PD and CETRIS® PDB Floor Systems on joists
- If the floor is wet it is necessary to provide dehumidification, for example, by application of a separation foil.
- If the old wooden floor shows insufficient load-bearing capacity (is too flexible) it is necessary to assess the thickness of the CETRIS® PD (CETRIS® PDB) boards against the load tables or strengthen the original wooden floor by inserting reinforcing planks. Another option is installation of a load-bearing grid on the original floor.

Laying of CETRIS® PD and CETRIS® PDB board floors on a load-bearing flat base



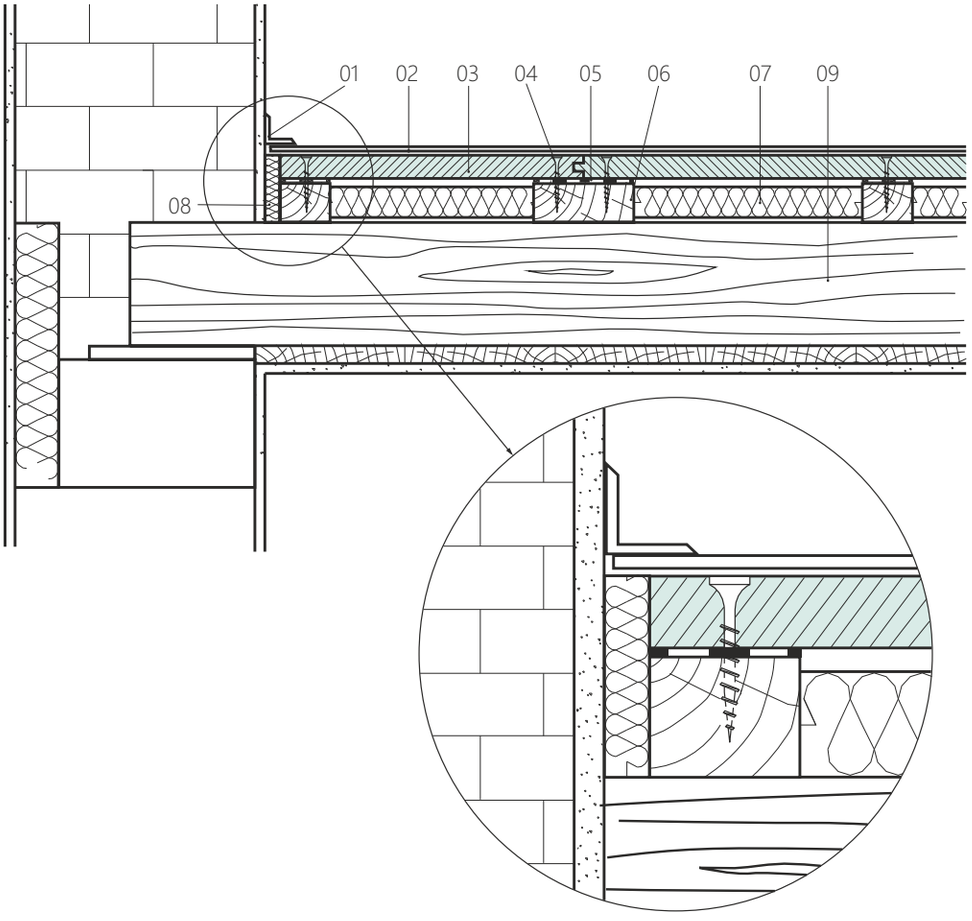
6.7 CETRIS® PD and CETRIS® PDB Floor Systems on Joists

The CETRIS® PD and CETRIS® PDB cement-bonded particleboards on joists are used both for floors in new houses and for reconstruction of old floors.

6.7.1 Description of the Construction

The classic fixed structure of the floors consists of the single or bi-directional beams (wooden prisms – pillows, steel beams, and the like). The beams are covered with CETRIS® PD and CETRIS® PDB cement-bonded particleboards in one layer screwed to the beams. The CETRIS® PD and CETRIS® PDB floor boards are laid tightly without gaps and the joints are secured with dispersion glue to ensure the interaction of the boards. Heat and sound insulation is placed between the beams as required and acoustic insulation with a maximum thickness of 5 mm is also laid over the beams to prevent formation of sound bridges. The floor is finished around the walls with a dilation joint with a width of 15 mm. It is recommended to place a 15 mm wide mineral wool or polystyrene strip into the dilatation joints along the vertical constructions to prevent clogging of the dilatation joint during subsequent works. This tape is cut at the desired height after completion of the final surface finishing of the floating floor before installation of the floorings. The beams must have an adequate load-bearing capacity, set on a load-bearing construction. It is necessary to verify their deflection. If the load-bearing construction is flat, the beams should be installed on the full length of the structure.

Vertical cross-section – Floor boards on beams



01 corner lath
02 wear layer
03 CETRIS® PD (PDB) floor board
04 screws 4.2 × 45 (55) mm
05 acoustic insulation insert with a maximum thickness of 5 mm
06 wooden beam
07 thermal insulation
08 dilatation joint
09 ceiling construction

6.7.2 Load Tables

The static calculation of the load-bearing capacity of the CETRIS® PD and PDB floor boards was done for boards mounted on beams (unidirectional mounting) or on a grid (bi-directional mounting). The span of the beams in the grid is the same in both directions (square field). The interaction of the CETRIS® PD (PDB) boards is ensured by a tongue and groove joint and its glue bonding. The calculation is done assuming the elastic behaviour of the material while respecting the following mechanical and physical characteristics:

Flexural tensile strength	f = min. 9 N/mm^2
Modulus of elasticity	E = min. 4500 N/mm^2
Density	ρ = 1400 kg/m^3

When determining the load capacity, the dead weight of the board was also taken into consideration. The maximum normal stress in the terminal fibres shall not exceed 3.60 N/mm2 (a 2.5 multiple of safety is achieved). The maximum elastic deflection of the board from the operating load including dead weight shall not exceed 1/300 of the span. The calculation was used to verify that concentrated load is decisive for the load capacity of the CETRIS® cement bonded particleboards according to ČSN 73 00 35 (load on building structures). Specification of the maximum usable load of the board respects Article 6 of ČSN 73 00 35 standard, which stipulates that in the case of ceilings, staircases, flat roofs and terraces, a concentrated standard vertical load whose value in kN is equal to the value of the standard usable uniform load per 1 m^2 of the ceiling.

It is assumed that this concentrated load acts on a square area with side of length 100 mm. The calculation further assumes that the load acts directly on the board surface and in case of the application of load distribution layers, the load capacity of the CETRIS® floor boards shall be higher, but this must be verified by a calculation for each individual case. The static calculation results are given in the following tables and graphs.

Load-bearing capacity of CETRIS® PD and CETRIS® PDB floor boards in the case of one-direction beams

Max. deflection L/300, max. flexural tensile stress 3.6 N/mm^2, loaded area 100 x 100 mm

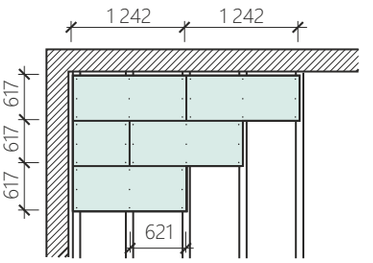
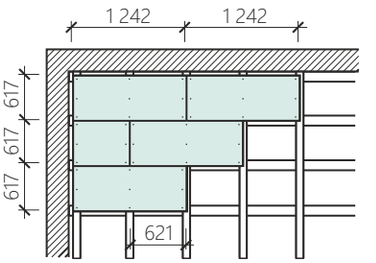
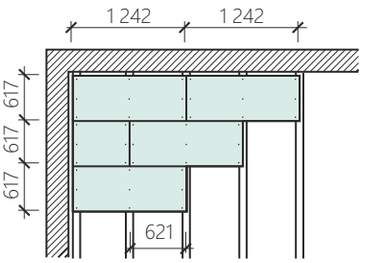
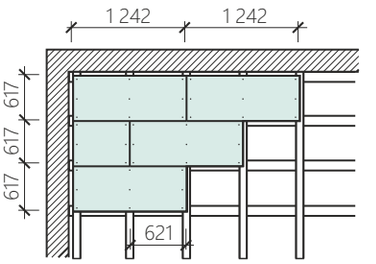
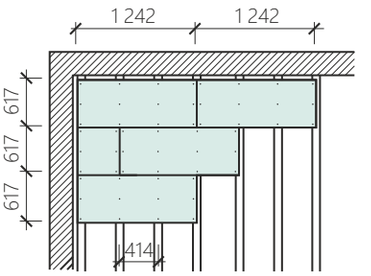
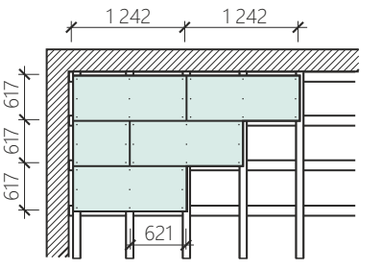
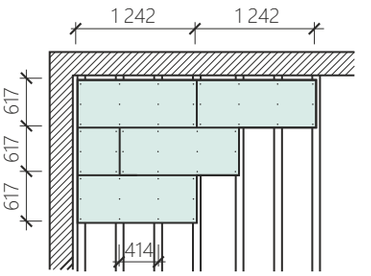
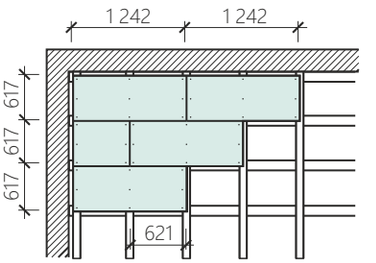
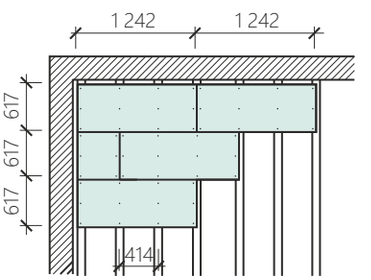
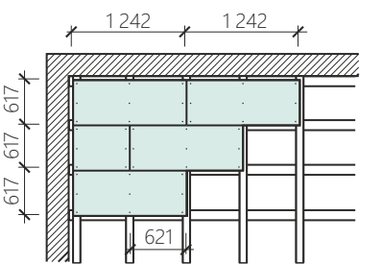
Interval	Maximum load F (kN)												
(m)	Th. 16 mm	Th. 18 mm	Th. 20 mm	Th. 22 mm	Th. 24 mm	Th. 26 mm	Th. 28 mm	Th. 30 mm	Th. 32 mm	Th. 34 mm	Th. 36 mm	Th. 38 mm	Th. 40 mm
0,200	1,532	1,940	2,396	2,899	3,451	4,052	4,700	5,396	6,140	6,932	7,773	8,661	9,598
0,250	1,335	1,691	2,089	2,529	3,010	3,534	4,100	4,708	5,357	6,049	6,783	7,559	8,376
0,300	1,200	1,520	1,878	2,274	2,707	3,179	3,688	4,235	4,820	5,443	6,104	6,802	7,539
0,350	1,099	1,393	1,721	2,085	2,483	2,916	3,384	3,886	4,423	4,995	5,602	6,244	6,920
0,400	1,020	1,293	1,599	1,937	2,308	2,711	3,146	3,614	4,114	4,646	5,211	5,809	6,438
0,450	0,922	1,212	1,499	1,817	2,165	2,544	2,953	3,392	3,862	4,363	4,894	5,455	6,047
0,500	0,802	1,144	1,415	1,716	2,045	2,403	2,790	3,207	3,651	4,125	4,628	5,160	5,720
0,550	0,703	1,010	1,343	1,628	1,942	2,282	2,651	3,047	3,470	3,921	4,400	4,906	5,439
0,600	0,620	0,893	1,235	1,551	1,851	2,176	2,528	2,906	3,311	3,742	4,199	4,683	5,192
0,650	0,550	0,794	1,101	1,476	1,769	2,081	2,418	2,781	3,168	3,581	4,020	4,483	4,972
0,700	0,488	0,708	0,985	1,323	1,695	1,994	2,318	2,667	3,039	3,436	3,857	4,303	4,773
0,750	0,435	0,634	0,884	1,190	1,559	1,915	2,227	2,562	2,920	3,303	3,708	4,138	4,590
0,800	0,387	0,568	0,795	1,073	1,409	1,807	2,141	2,465	2,810	3,179	3,570	3,984	4,421
0,850	0,345	0,509	0,715	0,970	1,276	1,639	2,062	2,373	2,707	3,063	3,441	3,841	4,263
0,900	0,307	0,456	0,644	0,877	1,157	1,489	1,878	2,288	2,610	2,954	3,320	3,706	4,114
0,950	0,272	0,408	0,580	0,793	1,049	1,354	1,711	2,124	2,518	2,851	3,204	3,578	3,973
1,000	0,240	0,364	0,522	0,717	0,952	1,232	1,560	1,940	2,375	2,752	3,094	3,456	3,838
1,050	0,211	0,325	0,469	0,648	0,864	1,121	1,423	1,773	2,174	2,630	2,989	3,339	3,710
1,100	0,184	0,288	0,420	0,584	0,783	1,020	1,298	1,621	1,991	2,412	2,887	3,227	3,586
1,150	0,159	0,254	0,375	0,526	0,709	0,927	1,184	1,482	1,823	2,212	2,651	3,119	3,466
1,200	0,136	0,223	0,334	0,472	0,641	0,842	1,079	1,354	1,669	2,029	2,434	2,889	3,350
1,250	0,115	0,194	0,296	0,423	0,578	0,763	0,982	1,235	1,527	1,860	2,235	2,656	3,126
1,300	0,095	0,166	0,259	0,375	0,517	0,687	0,888	1,121	1,390	1,696	2,042	2,430	2,863
1,350	0,076	0,141	0,225	0,332	0,462	0,618	0,803	1,018	1,265	1,548	1,867	2,226	2,626
1,400	0,059	0,118	0,195	0,292	0,412	0,556	0,726	0,924	1,153	1,414	1,710	2,042	2,412
1,450	0,043	0,097	0,167	0,256	0,366	0,499	0,656	0,840	1,051	1,293	1,567	1,875	2,219
1,500	0,029	0,077	0,141	0,223	0,325	0,447	0,592	0,762	0,959	1,184	1,438	1,724	2,044

Load-bearing capacity of CETRIS® PD and CETRIS® PDB floor boards in the case of two-direction beams

Max. deflection L/300, max. flexural tensile stress 3.6 N/mm^2, loaded area 100 x 100 mm

Interval	Maximum load F (kN)												
(m)	Th. 16 mm	Th. 18 mm	Th. 20 mm	Th 22 mm	Th. 24 mm	Th. 26 mm	Th. 28 mm	Th. 30 mm	Th. 32 mm	Th. 34 mm	Th. 36 mm	Th 38 mm	Th.40 mm
0,200	1,999	2,530	3,124	3,781	4,500	5,282	6,126	7,033	8,002	9,030	10,125	11,281	12,501
0,250	1,692	2,142	2,645	3,201	3,810	4,472	5,187	5,955	6,776	7,646	8,573	9,553	10,585
0,300	1,487	1,882	2,325	2,814	3,349	3,932	4,560	5,236	5,958	6,723	7,538	8,400	9,308
0,350	1,340	1,697	2,096	2,537	3,020	3,545	4,113	4,722	5,374	6,063	6,798	7,576	8,395
0,400	1,229	1,557	1,924	2,329	2,773	3,255	3,776	4,336	4,935	5,567	6,243	6,957	7,710
0,450	1,143	1,448	1,789	2,167	2,580	3,029	3,514	4,036	4,593	5,181	5,811	6,476	7,177
0,500	1,074	1,361	1,682	2,036	2,425	2,848	3,304	3,795	4,319	4,872	5,464	6,090	6,750
0,550	1,017	1,289	1,593	1,930	2,298	2,699	3,132	3,597	4,095	4,619	5,180	5,774	6,400
0,600	0,969	1,229	1,519	1,840	2,192	2,575	2,988	3,432	3,907	4,407	4,943	5,510	6,108
0,650	0,913	1,177	1,456	1,764	2,102	2,469	2,866	3,292	3,748	4,227	4,742	5,286	5,860
0,700	0,836	1,133	1,401	1,698	2,024	2,378	2,760	3,171	3,611	4,073	4,569	5,094	5,647
0,750	0,768	1,094	1,354	1,641	1,956	2,299	2,669	3,066	3,492	3,938	4,419	4,926	5,462
0,800	0,708	1,019	1,312	1,591	1,896	2,229	2,588	2,974	3,387	3,820	4,286	4,779	5,299
0,850	0,655	0,945	1,274	1,546	1,843	2,167	2,516	2,892	3,294	3,715	4,169	4,649	5,155
0,900	0,608	0,879	1,219	1,505	1,795	2,111	2,452	2,818	3,211	3,621	4,064	4,532	5,026
0,950	0,566	0,820	1,140	1,469	1,752	2,060	2,394	2,752	3,136	3,537	3,970	4,428	4,910
1,000	0,527	0,766	1,067	1,435	1,713	2,015	2,341	2,692	3,068	3,460	3,884	4,333	4,806
1,050	0,491	0,717	1,002	1,351	1,677	1,973	2,293	2,637	3,005	3,390	3,806	4,246	4,710
1,100	0,459	0,673	0,942	1,273	1,644	1,934	2,249	2,587	2,948	3,326	3,734	4,167	4,622
1,150	0,428	0,631	0,887	1,201	1,580	1,899	2,208	2,540	2,896	3,267	3,668	4,093	4,542
1,200	0,400	0,593	0,836	1,135	1,496	1,866	2,170	2,497	2,847	3,212	3,607	4,026	4,467
1,250	0,374	0,557	0,789	1,074	1,419	1,828	2,134	2,456	2,801	3,161	3,550	3,963	4,398
1,300	0,349	0,524	0,745	1,018	1,347	1,739	2,101	2,419	2,759	3,073	3,497	3,904	4,333
1,350	0,325	0,492	0,704	0,965	1,281	1,656	2,069	2,383	2,719	2,829	3,381	3,849	4,273
1,400	0,302	0,462	0,665	0,915	1,219	1,579	2,002	2,350	2,681	2,612	3,124	3,698	4,216
1,450	0,281	0,434	0,628	0,869	1,160	1,507	1,914	2,318	2,646	2,418	2,895	3,429	4,024
1,500	0,260	0,406	0,593	0,825	1,105	1,439	1,832	2,287	2,612	2,440	2,897	3,407	3,974

The results of the static calculation indicate the following application options for CETRIS® floor boards:

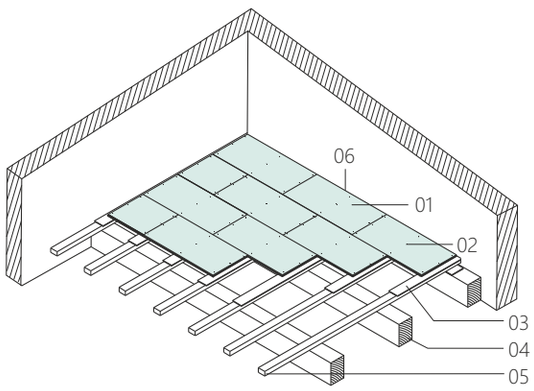
Standard load (kNm^{-2}) and nature of the room	Recommended load-bearing construction for the CETRIS® PD (PDB) floor boards	
	Single direction beams	Two-direction beams (grids)
0,75 Lofts, inaccessible terraces and flat roofs with a roofing element span of up to 9 m.	Beam span 621 mm / Board thickness 18 mm 	Beam span 621 mm / Board thickness 16 mm 
1,50 Residential apartments including ante-chambers and corridors, rooms in hostels, hotels, rooms in nurseries and childcare centres, bedrooms of school dormitories and sanatoria, hospital wards, polyclinics, other healthcare facilities, surgeries and waiting rooms.	Beam span 621 mm / Board thickness 22 mm 	Beam span 621 mm / Board thickness 20 mm 
2,00 Rooms and offices of research institutions, office buildings, reading rooms, classrooms without heavy equipment or material storage, agricultural rooms and areas.	Beam span 414 mm / Board thickness 22 mm 	Beam span 621 mm / Board thickness 24 mm 
3,00 Halls and corridors in the above-mentioned buildings with the exception of schools, lecture halls, mess halls, cafés and restaurants.	Beam span 414 mm / Board thickness 28 mm 	Beam span 621 mm / Board thickness 30 mm 
4,00 Halls and corridors of messes, cafés, restaurants, schools, railway stations (areas open to public), theatres, cinemas, clubs, concert halls, sports halls, department stores, museums, exhibition halls and pavilions, libraries and archives of industrial buildings.	Beam span 414 mm / Board thickness 32 mm 	Beam span 621 mm / Board thickness 34 mm 

Note: Cases of higher useful load or large solitary loads must be solved individually. The load capacity of two-layer CETRIS® board constructions is solved in Chapter 6.8 Two-layer CETRIS® board floors on beams

6.7.3 Laying of CETRIS® PD and CETRIS® PDB Floor Boards

1. The CETRIS® PD and CETRIS® PDB floor boards are laid as the final constructions after completion of the "wet" building construction work (after erection of the partition walls, after plastering, etc.). In a case where a light partition (plasterboard, CETRIS® on a grid) is to be installed, its weight must be considered during the design of the dimensions and layout of the floor beams. In this case, it is necessary to consider the possibility of noise transmission via the floor from one room to another.

2. The width of the beam is based not only on the load-bearing capacity requirement but also on the requirement for sufficient anchoring of the CETRIS® PD (CETRIS® PDB) floor sections in the load-bearing construction. For the wooden beams, it applies that the width of the beams at the contact point of two CETRIS® PD (CETRIS® PDB) boards must be at least 80 mm. It is recommended to place a flexible insert between the beams and the load-bearing construction (rubber, solid felt, PE foil layer of minimum thickness 5 mm) to reduce sound transmission. At the same time, the beams can be height-adjusted using supports or wedges. We anchor the balanced beams in the base, for a wooden base, we use screws, for concrete, we use drive-in dowels. The floor beams are laid at axial distances according to the required load.



Floor boards on beams – laying procedure

01 CETRIS® PD (PDB) floor boards
02 CETRIS® screw
03 supporting and adjusting washer
04 existing joist
05 beams
06 dilatation joint

3. It is recommended to separate CETRIS® PD and CETRIS® PDB boards from the beams with a separating layer (unwoven fabric, felt, rubber, cardboard) to prevent potential knocking of the floor. It is sufficient to lay a strip of the same width as the beam along its full length.

4. The tongue edge at the wall must be cut off.

5. The CETRIS® PD (CETRIS® PDB) boards are laid tightly against each other and the joint is fixed with glue. The following alkali-resistant dispersion glues are recommended: UZIN MK33, MAPEI – ADESIVIL D3, SCHÖNOX HL, HENKEL PONAL SUPER 3 (PATEX SUPER 3), etc. When using CETRIS® boards without tongue and groove, it is necessary to glue the joints (polyurethane glue, e.g. DenBraven polyurethane glue for use on wood, SOUDAL PU glue 66A, etc.). Immediately screw the floor board after application of the glue and setting of the board. The excessive (expelled) glue is removed after pushing the boards against each other to ensure that the joint is fully filled with glue. The maximum screw spacing is 300 mm in the direction of the joists (400 mm in the case of the CETRIS® boards of thickness 26 mm and above); the screws must be min. 25 mm and max. 50 mm from the board edge.

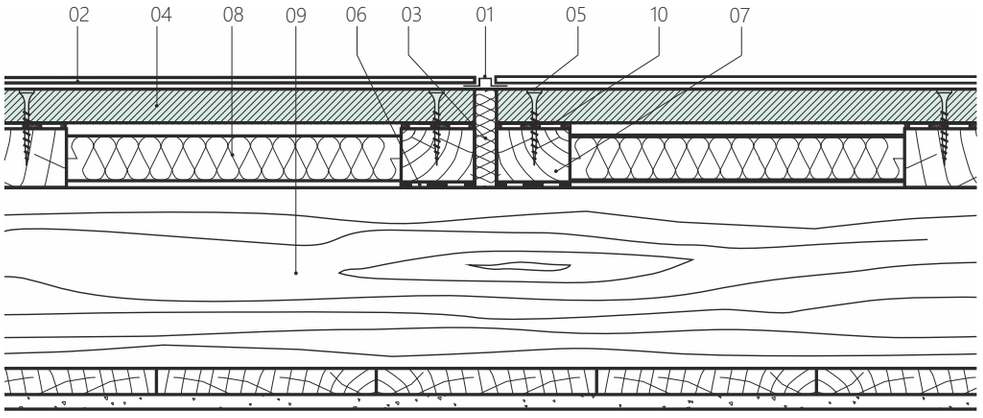
6. When laying CETRIS® PD (CETRIS® PDB) floor boards, cross joints should be avoided and the contact joints should be supported, at least, in one direction. The individual rows of the boards are laid with overlaps depending on the spacing of the beams, but at least by 1/3 of the board length. The minimum size of the finally cut board is 250 mm. Around the vertical joints (walls, pillars, etc.) it is necessary to keep a dilatation joint of minimum width 15 mm.

7. In the case of single-direction beams, CETRIS® PD (CETRIS® PDB) boards are laid with the longer side perpendicular to the beams.

8. Around the doors the CETRIS® PD (CETRIS® PDB) boards should be laid in such a manner as to avoid the creation of a cross-joint.

9. If additional thermal insulation is applied between the beams by backfill (e.g. LIAPOR) up to the beam height, it is recommended to overfill the space between the beams to allow for additional compaction. It is suitable to place full surface paper cardboard on the backfill to prevent penetration of the grain into the floor boards during their installation and also to prevent squeaking of the floor.

Floor boards on beams – solution of dilatation



01 dilatation profile
02 wear layer
03 dilatation joint
04 CETRIS® PD floor boards (CETRIS® PDB)
05 CETRIS® screw
06 supporting and adjusting washer
07 beams
08 heat and sound insulation
09 ceiling construction
10 separating washer

6.8 Two-layer CETRIS® Board Floors on Beams

Wear layer – the beams may be covered with basic CETRIS® boards in two and more layers. The given solution is considered mainly for reason of better availability of basic boards as compared with floor boards. This method is often applied also in the case of various (changing) beam axial distances (reconstruction of old wooden floors), or in case of a requirement for high floor load capacity.

Note:

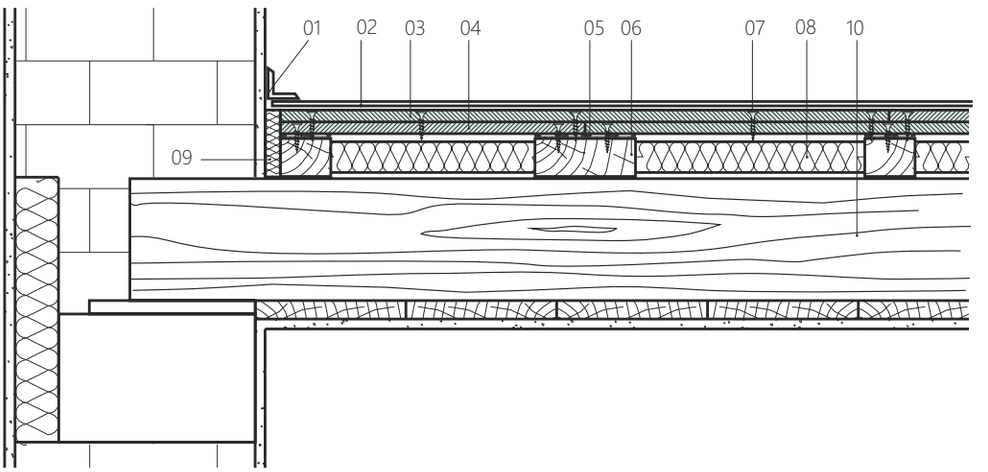
- *The total load capacity is achieved only after screw-jointing of both CETRIS® board layers! For this procedure to be effective, it is necessary to ensure perfect interaction of both CETRIS® boards (at best joined with screws for perfect transmission of shear and tensile stress). If the layers are not perfectly bonded, each of them behaves as a separate layer, which results in the risk of significant sags.*

- *The first (lower) layer of the CETRIS® boards of thickness 18 mm inclusive are not fully walkable in the case of a beam spacing of 625 mm and above. During assembly, the workers may move only at the locations of the beams (joists).*

6.8.1 Description of the Construction

The classic fixed structure of the floors consists of the single or bi-directional beams (wooden prisms – pillows, steel beams, and the like). The beams are covered with CETRIS® cement-bonded particleboards in two layers screwed. Due to static action, the largest CETRIS® board dimensions are suitable. The first layer of CETRIS® boards is laid tightly without gaps and anchored with screws to the beams. The shorter sides of the boards are laid on the beams. The second layer of CETRIS® boards is laid with an overlap in both directions, such that the shorter side again lies on the beams (the overlap is equal in the perpendicular direction to the beams over a length of one field and half the board width in the direction of the joists). The boards in the second layer are again laid tightly without gaps and anchored with screws to ensure the interaction of both board layers. Heat and sound insulation is placed between the beams as required. To prevent formation of sound bridges acoustic insulation is also laid under the beams. The floor is finished around the walls with a dilation joint with a width of 15 mm. The beams must have an adequate load-bearing capacity, set on a load-bearing construction. It is necessary to mainly verify their deflection. If the load-bearing construction is flat, the beams should be installed on the full length of the structure.

Two-layer CETRIS® board floors on beams



01 corner lath (skirting)
02 wear layer
03 CETRIS® board, upper layer
04 CETRIS® board, bottom layer
05 base and levelling acoustic layer
06 wooden beams
07 CETRIS® screws 4.2 × 35 (45, 55) mm
08 heat and sound insulation
09 dilatation joint of thickness 15 mm
10 ceiling construction

6.8.2 Load Tables

In the case of compliance with the technological procedure for laying the boards (and especially joining of the two layers) the design of this floor type may be based in the static calculation of the load-bearing capacity for CETRIS® floor boards. Joint action of the two CETRIS® board layers must be ensured by their mutual jointing - by screwing or riveting (the maximum distance of the joining elements in the longitudinal and transverse direction is 300 mm).

In the case of perfectly secured joint action of both layers the load-bearing capacity of the two-layer floor is equal to the load-bearing capacity of the single-layer CETRIS® PD (CETRIS® PDB) floor glued in the tongue and groove connections of the same total thickness, reduced by 25% for safety reasons. Other calculation assumptions and load tables are given in Chapter 6.7 CETRIS® PD and CETRIS® PDB Floor Systems on Joists.

Load-bearing capacity of two-layer CETRIS® board cladding in the case unidirectional assembly on beams
Max. deflection L/300, max. flexural tensile stress 3.6 N/mm^2, loaded area 100 x 100 mm

Span	Maximum load F (kN)													
(m)	Th. 24 mm	Th. 26 mm	Th. 28 mm	Th. 30 mm	Th. 32 mm	Th. 34 mm	Th 36 mm	Th. 38 mm	Th. 40 mm	Th 42 mm	Th. 44 mm	Th. 46 mm	Th 48 mm	Th 50 mm
	12+12	12+14	14+14	16+14	16+16	18+16	18+18	20+18	20+20	22+20	22+22	24+22	24+24	26+24
0,200	2,589	3,039	3,525	4,047	4,605	5,199	5,830	6,496	7,198	7,937	8,711	9,522	10,369	11,251
0,250	2,258	2,651	3,075	3,531	4,018	4,537	5,087	5,669	6,282	6,927	7,603	8,311	9,050	9,821
0,300	2,030	2,384	2,766	3,176	3,615	4,082	4,578	5,102	5,654	6,235	6,844	7,481	8,147	8,841
0,350	1,862	2,187	2,538	2,915	3,318	3,747	4,202	4,683	5,190	5,724	6,283	6,868	7,480	8,118
0,400	1,731	2,033	2,359	2,710	3,085	3,485	3,908	4,356	4,829	5,325	5,846	6,392	6,961	7,555
0,450	1,624	1,908	2,214	2,544	2,897	3,272	3,670	4,092	4,536	5,003	5,492	6,005	6,540	7,099
0,500	1,534	1,802	2,093	2,405	2,739	3,094	3,471	3,870	4,290	4,732	5,196	5,681	6,189	6,717
0,550	1,456	1,712	1,988	2,285	2,603	2,941	3,300	3,679	4,079	4,500	4,942	5,404	5,887	6,390
0,600	1,388	1,632	1,896	2,180	2,483	2,806	3,149	3,512	3,894	4,297	4,719	5,160	5,622	6,103
0,650	1,327	1,561	1,814	2,085	2,376	2,686	3,015	3,363	3,729	4,115	4,520	4,943	5,386	5,848
0,700	1,271	1,496	1,739	2,000	2,279	2,577	2,893	3,227	3,580	3,951	4,340	4,747	5,173	5,616
0,750	1,170	1,436	1,670	1,921	2,190	2,477	2,781	3,103	3,443	3,800	4,175	4,567	4,977	5,405
0,800	1,057	1,355	1,606	1,848	2,108	2,384	2,678	2,988	3,316	3,660	4,022	4,401	4,796	5,209
0,850	0,957	1,229	1,546	1,780	2,031	2,298	2,581	2,881	3,197	3,530	3,879	4,245	4,627	5,026
0,900	0,867	1,117	1,408	1,716	1,958	2,216	2,490	2,780	3,085	3,407	3,745	4,099	4,469	4,854
0,950	0,787	1,016	1,283	1,593	1,889	2,138	2,403	2,684	2,980	3,291	3,618	3,960	4,318	4,691
1,000	0,714	0,924	1,170	1,455	1,782	2,064	2,321	2,592	2,879	3,180	3,497	3,828	4,175	4,537
1,050	0,648	0,841	1,068	1,330	1,631	1,973	2,242	2,505	2,782	3,074	3,381	3,702	4,038	4,388
1,100	0,587	0,765	0,974	1,216	1,493	1,809	2,165	2,420	2,689	2,972	3,269	3,581	3,906	4,246
1,150	0,532	0,696	0,888	1,111	1,368	1,659	1,988	2,339	2,600	2,874	3,162	3,464	3,779	4,108
1,200	0,481	0,632	0,809	1,015	1,252	1,522	1,826	2,167	2,513	2,779	3,058	3,350	3,656	3,976
1,250	0,433	0,572	0,736	0,927	1,145	1,395	1,676	1,992	2,344	2,686	2,957	3,241	3,537	3,847
1,300	0,388	0,515	0,666	0,841	1,042	1,272	1,532	1,823	2,147	2,507	2,859	3,134	3,421	3,722
1,350	0,346	0,464	0,602	0,763	0,949	1,161	1,400	1,669	1,969	2,302	2,668	3,030	3,308	3,599
1,400	0,309	0,417	0,544	0,693	0,865	1,061	1,282	1,531	1,809	2,117	2,457	2,830	3,198	3,480
1,450	0,275	0,374	0,492	0,630	0,789	0,970	1,176	1,406	1,664	1,950	2,266	2,613	2,992	3,364
1,500	0,243	0,335	0,444	0,572	0,719	0,888	1,079	1,293	1,533	1,799	2,093	2,416	2,770	3,155

The load capacity of two-layer CETRIS® board cladding in the case unidirectional assembly on a grid
Max. deflection L/300, max. flexural tensile stress 3.6 N/mm², loaded area 100 x 100 mm

Span	Maximum load F (kN)								
(m)	Th. 24 mm	Th 26 mm	Th. 28 mm	Th 30 mm	Th. 32 mm	Th. 34 mm	Th. 36 mm	Th 38 mm	Th. 40 mm
	12+12	12+14	14+14	16+14	16+16	18+16	18+18	20+18	20+20
0,200	3,375	3,961	4,595	5,275	6,002	6,773	7,593	8,461	9,376
0,250	2,857	3,354	3,890	4,466	5,082	5,734	6,430	7,164	7,939
0,300	2,512	2,949	3,420	3,927	4,469	5,042	5,653	6,300	6,981
0,350	2,265	2,659	3,084	3,542	4,030	4,547	5,099	5,682	6,297
0,400	2,079	2,441	2,832	3,252	3,701	4,175	4,682	5,218	5,783
0,450	1,935	2,272	2,636	3,027	3,445	3,886	4,358	4,857	5,383
0,500	1,819	2,136	2,478	2,846	3,239	3,654	4,098	4,568	5,063
0,550	1,724	2,024	2,349	2,698	3,071	3,464	3,885	4,331	4,800
0,600	1,644	1,931	2,241	2,574	2,930	3,305	3,707	4,133	4,581
0,650	1,576	1,852	2,149	2,469	2,811	3,171	3,557	3,965	4,395
0,700	1,518	1,783	2,070	2,379	2,708	3,055	3,427	3,820	4,235
0,750	1,467	1,724	2,001	2,300	2,619	2,954	3,314	3,695	4,096
0,800	1,422	1,671	1,941	2,230	2,540	2,865	3,215	3,584	3,974
0,850	1,382	1,625	1,887	2,169	2,470	2,786	3,127	3,487	3,866
0,900	1,346	1,583	1,839	2,114	2,408	2,716	3,048	3,399	3,770
0,950	1,314	1,545	1,795	2,064	2,352	2,653	2,977	3,321	3,683
1,000	1,285	1,511	1,756	2,019	2,301	2,595	2,913	3,249	3,604
1,050	1,258	1,480	1,720	1,978	2,254	2,543	2,854	3,184	3,532
1,100	1,233	1,451	1,687	1,940	2,211	2,494	2,801	3,125	3,467
1,150	1,185	1,424	1,656	1,905	2,172	2,450	2,751	3,070	3,406
1,200	1,122	1,399	1,627	1,873	2,135	2,409	2,705	3,019	3,350
1,250	1,064	1,371	1,601	1,842	2,101	2,370	2,663	2,972	3,298
1,300	1,011	1,304	1,576	1,814	2,069	2,305	2,623	2,928	3,250
1,350	0,961	1,242	1,552	1,787	2,039	2,122	2,536	2,887	3,204
1,400	0,914	1,184	1,501	1,762	2,011	1,959	2,343	2,774	3,162
1,450	0,870	1,130	1,436	1,738	1,984	1,814	2,171	2,572	3,018
1,500	0,829	1,080	1,374	1,715	1,959	1,830	2,173	2,555	2,980

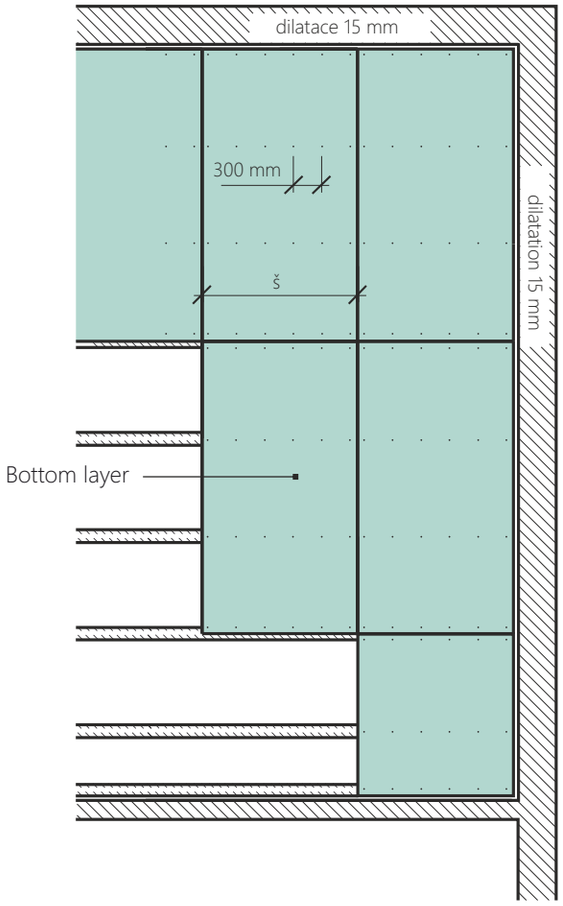
6.8.3 Laying of CETRIS® Boards

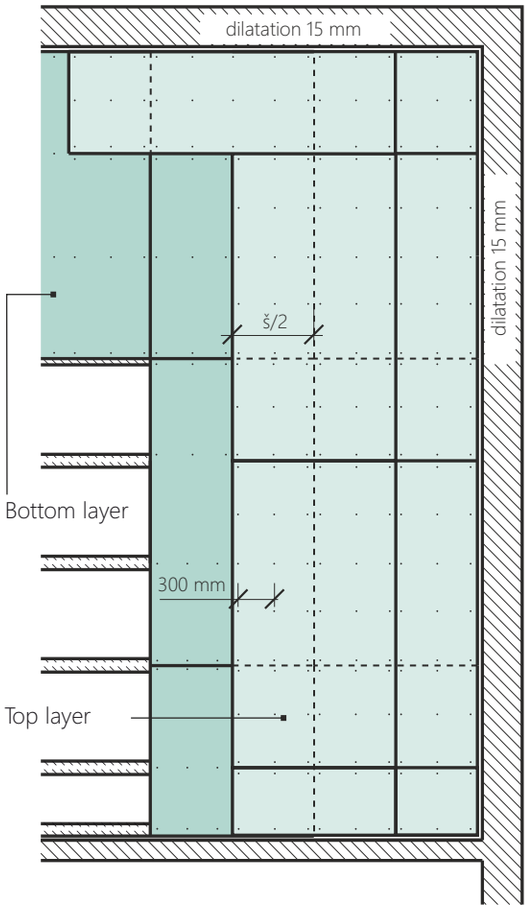
1. The CETRIS® board floor is laid as the final construction after completion of the "wet" building construction processes (after erection of the partition walls, after plastering, etc.). In a case where a light partition (plasterboard, CETRIS® on a grid) is to be installed, its weight must be supported by a floor beam. In this case, it is necessary to consider the possibility of noise transmission via the floor from one room to another.
2. The width of the beam is based not only on the load-bearing capacity requirement but also on the requirement for sufficient anchoring of the CETRIS® boards in the load-bearing construction. For the wooden beams, it applies that the width of the beams at the contact point of two CETRIS® boards must be at least 80 mm. It is recommended to place a flexible insert between the beams and the load-bearing construction (rubber, solid felt, PE foil layer of maximum thickness 5 mm) to reduce sound transmission. At the same time, the beams can be height-adjusted using supports or wedges. We anchor the balanced beams in the base, for a wooden base, we use screws, for concrete, we use drive-in dowels.
3. It is recommended to separate the CETRIS® board from the beams with a separating layer (unwoven fabric, felt, rubber, soft PE foil) to prevent potential knocking of the floor. It suffices to lay a strip of the same width as the beam along its full length.
4. The first layer of CETRIS® boards is again laid tight against each other with a cross-joint. The boards are set and screw-jointed immediately. In the case of single-direction beams the first CETRIS® board layer is laid with the longer side perpendicular to the beams and the shorter side supported by the beams. The maximum screw spacing is 300 mm in the direction of the joists; the screws must be min. 25 mm and max. 50 mm from the board edge. Around the vertical joints (walls, pillars, etc.) it is necessary to keep a dilatation joint of minimum width 15 mm.
5. In the second layer, the CETRIS® boards are laid with an overlap such that the shorter side again lies on the beams (the overlap is equal to the length of one field). The boards are again laid tight against each other with cross joint. The board is set and screw-jointed immediately with the bottom layer. The maximum screw spacing in the longitudinal and transverse directions is 300 mm (400 mm in the case of the CETRIS® ® boards of thickness 26 mm and above). The screws must be min. 25 mm and max. 50 mm from the board edge. Around the vertical joints (walls, pillars, etc.) it is necessary to keep dilatation joint of minimum width 15 mm.

Note: In the case of insertion of softened PE foil between the two CETRIS® board layers for increased impact sound transmission loss, it is necessary to use milled floor boards CETRIS® PD (PDB) in the second layer. If non-milled boards are used, different levels of local compression may occur resulting in irregularities in the cross-joints of the CETRIS® boards. The CETRIS® PD (PDB) floor board is glued in the tongue and groove joints and screwed to the bottom CETRIS® board layer.

6. Around the doors, the CETRIS® boards are laid in such a manner as to avoid the creation of a joint.
7. If additional thermal insulation is applied between the beams by backfill (e.g. LIAPOR) up to the beam height, it is recommended to overfill the space between the beams to allow for additional compaction. It is suitable to place full surface paper cardboard on the backfill to prevent penetration of the grain into the floor boards during their installation and also to prevent squeaking of the floor.

Laying of double-layer CETRIS® board floors on joists





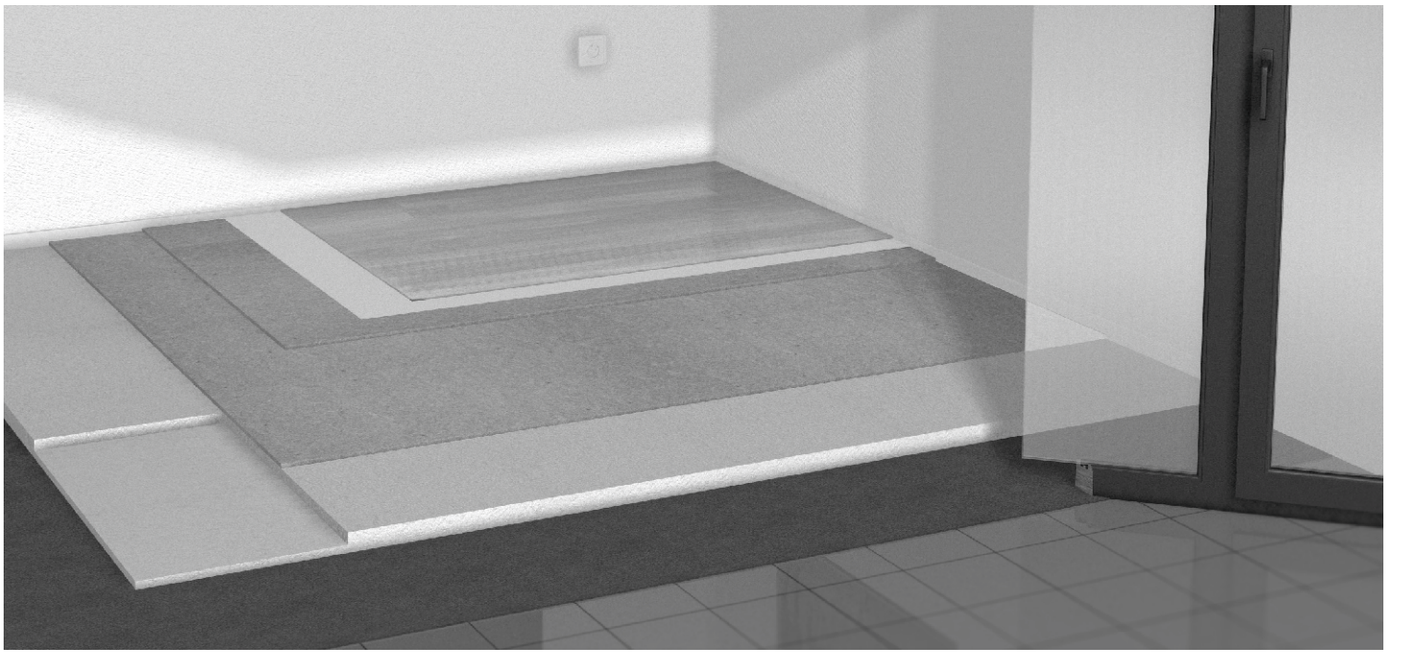
6.9 Floorings

6.9.1 Preparation of the Surface of CETRIS® Floor Boards for Laying the Wear Layers

After completion of a CETRIS® cement bonded particleboard floor, the surface must be checked for planarity deviations with a focus on elimination of the deviations between the individual boards and preparation of a perfectly flat surface for laying the wear layer. The method of elimination of potential irregularities is different for each floor finish type.

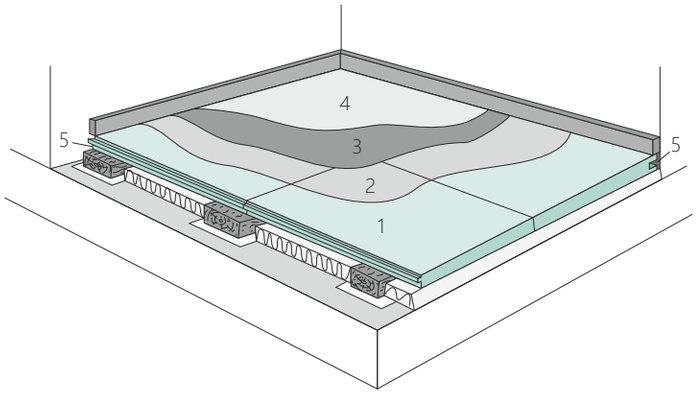
The surface is levelled by sanding the joints or application of plaster.

- The joints of the CETRIS® board need not be processed under glued wooden parquets, boards or paving.
- If the parquets are laid as floating flooring and potential unevenness does not prevent their laying, then priming is not necessary. However, it is recommended to place separation foil of unwoven textile or MIRELON foam polystyrene between the parquets and the CETRIS® boards (to minimise creaking).
- In the case of full area filler or glue applications, the CETRIS® boards must be primed. It is recommended to apply the primer to the dry and clean surface of the boards immediately after laying them. Priming is application of a coat to the CETRIS® board surfaces, which penetrates into the sub-surface layers of the board and simultaneously fulfils three functions – reduction of the effects of various forms of humidity on the linear expansion of the boards, assurance of reliable adherence of the subsequently laid layers and reduction of absorption by the board (water absorption from the plaster). Properly applied priming significantly affects the final effect of the subsequently performed works.
- In the case of use of thin layer floor covering (such as PVC, carpet), it is suitable to spread elastic filler over the entire CETRIS® board floor with emphasis on the joints of the boards, unused pre-drilled holes, and eventually also the individual connecting screws. Larger irregularities should be sanded before application of the filler.
- Priming and subsequent gluing of the floorings and paving should be done only using the complete systems of individual manufacturers, which are certified for use on cement bonded boards (MAPEI, Schönox, Basf, Botament, Henkel, Sika ...). It is not recommended to use a combination of materials from several manufacturers.
- The recommended maximum paving format is 200 × 200 mm. Paving must not be installed diagonally. When using larger format paving (max. 333 × 333 mm), it is recommended to increase the load capacity of the floor by 20 % (e.g. by reduction of the axial spacing of the supports, increase of CETRIS® board thickness), or application of other solutions, see Chapter 6.8.
- If floorings are not laid within 48 hours, it is recommended to apply a protective coating to the CETRIS® board floor, at best a primer (type according to the flooring – e.g. MAPEI Primer S, Schönox KH, Botact 11, etc.).
- The specific cases, which occur when laying the floorings should be consulted with the manufacturer of the building chemicals. During application of the individual materials, it is necessary to keep the principles stated on the packs, respectively, in the technical data sheets of the products.



6.9.2 PVC, Carpet

Under thin-layer floorings (PVC, carpet, etc.), it is necessary to apply filler to the full surface of the CETRIS® boards with emphasis on the contact joints. The unused pre-drilled holes or individual joining elements must also be filled. Larger irregularities should be sanded with an angle sander before application of the filler.



Composition of the layers when laying PVC, carpets:

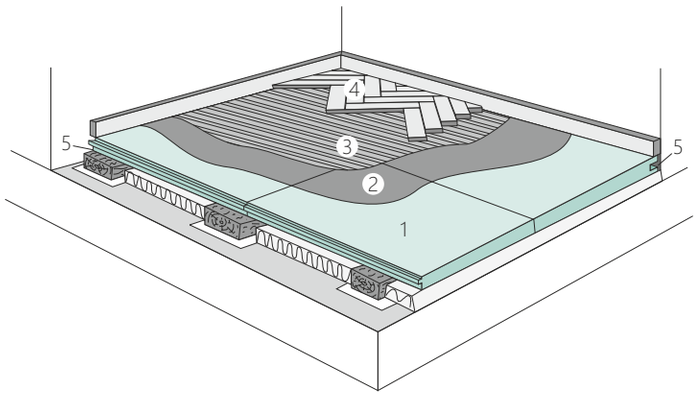
1 *CETRIS® cement bonded particleboard*
2 *priming*
3 *levelling plaster*
4 *PVC, carpet*
5 *dilatation joint*

Products for gluing PVC, carpets:

PVC, carpet			
System structure	Penetration	Levelling compound	Adhesive filler
MAPEI	MAPEPRIM SP	FIRERPLAN v tl.min. 3 mm	ROLLCOLL
SCHÖNOX	Schönox KH	Schönox SP, AM	Schönox Unitech, Tex-Object
BASF	Penetrace PGM	Mastertop 515	-
THOMSIT	Thomsit R 777, R 766	Thomsit FA 97	Thomsit K 188, T 440
UZIN	UZIN PE 360	UZIN NC 170 Level Star	UZIN UZ 57, LE 44, KE 66
MUREXIN	Murexin D7	Murexin NH 75 tl.min. 3 mm	Murexin D 321

6.9.3 Wooden Parquets

Before gluing the wooden parquets, it is necessary to prime the dry floor. If the parquets are laid as a floating flooring layer, priming is not necessary, but it is suitable to insert separating foil made of non-woven fabric or foam polyethylene (to reduce creaking) between the parquets and CETRIS® boards.



Composition of the layers when laying wooden parquets:

1 *CETRIS® cement bonded particleboard*
2 *priming*
3 *adhesive filler*
4 *wooden parquet flooring*
5 *dilatation joint*

Products for wooden parquets:

Wooden parquet flooring		
System structure	Penetration	Adhesive cement
MAPEI	not required	LIGNOBOND
SCHÖNOX	not required	SMP Classic, HARD ELASTIC
THOMSIT	Thomsit R 777	Thomsit P 600, P685
SIKA	not required	Sika Bond T52, T54, T55
LEAR	Unixin A170	Unixin P230
UZIN	UZIN PE 414 TURBO	UZIN MK 100
MUREXIN	not required	Object X-bond MS-K 509

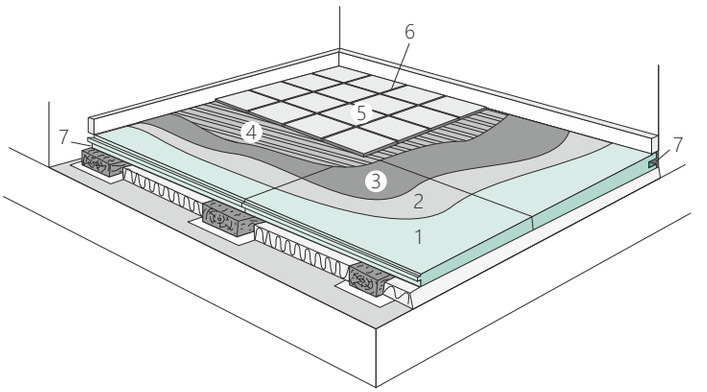
6.9.4 Ceramic Paving

Gluing of ceramics to CETRIS® boards is reliable exclusively using flexible glues. Gluing must be done using a toothed spatula with a minimum tooth size of 8 mm; two-sided gluing is used – "floating and buttering". When gluing the paving, it is necessary to carefully solve the issue of dilatation joints, which must correspond with the dilatations in the base and must be designed with regard to the dimensions and shape of the room.

Composition of the layers when laying ceramic paving:

1 *CETRIS® cement bonded particleboard*
2 *priming*
3 *hydro-insulating compound*
4 *bonding cement*
5 *ceramic paving*
6 *joint filler*
7 *dilatation joint*

Flexible filler must be used for the full area filling of the paving joints. The given compositions are suitable also for anchoring heating (resistant) mats and subsequent gluing of the ceramic paving. In rooms without water stress, it is not necessary to use hydro insulation.



Ceramic paving products:

Ceramic paving				
System structure	Penetration	Hydro insulation (bandaging of corners, dilatation)	Adhesive filler	Joint filler (dilatation joint filling)
MAPEI	not required	KERALASTIC min. 1 mm (MAPEBAND)	KERALASTIC	ULTRACOLOR (MAPESIL AC)
SCHÖNOX	Schönox KH (1:3)	Schönox HA in combination with a sealing tape Schönox ST and accessories Schönox ST-IC – inner corner, Schönox EA – outer corner including insulating collars Schönox ST-D.	Schönox PFK plus	Schönox WD FLEX Schönox SU
BASF	PCI-Gisogrund	PCI-Lastogun	PCI-Nanolight	PCI-Flexfuge
BOTAMENT	Botact D 11	Botact MD 28Botact SB 78	Botact M 21 (lower loads) Botact M 29 (higher loads)	Botact M 30 Botact S 5
CERESIT	Ceresit CT 17	Ceresit CL 51 (Ceresit CL 52)	Ceresit CM 16 (lower loads) Ceresit CM 17 (higher loads)	Ceresit CE 43 (Ceresit CS 25)
SIKA	not required	SikaBond T 8	SikaBond T 8	Sikaflex11 FC
UZIN	codexFliesengrund	codex PowerFlex Turbo (Multimoll TOP 4)	codex Power CX3	codex BrillantFlex Basic (codex quadrosil)
MUREXIN	Deep primer LF 1	Liquid sealing foil 1 KS (Self-adhesive sealing tape DBS 50)	codex Power CX 3	codex BrillantFlex Basic (codex quadrosil)

Note: When using BASF products, it is recommended to cover the CETRIS® board joints with reinforcing textile of width 300 mm and anchor to the base with staples.

6.9.5 Ceramic Paving with Hydro Insulating Foil

For places with water stress (social facilities of residential objects) it is necessary to secure adequate hydro insulation (flexible hydro insulating plaster or hydro insulating foil), which reliably protects the CETRIS® boards against potential penetration of water. The load-bearing layer of these foils is represented by polyethylene strips with one-sided (bottom) or two-sided textile (fleece) for effective anchoring in the gluing filler. The foil is used not only for insulation but also as the layer for levelling vapour overpressure and the separation layer compensating horizontal stresses in the base and it is capable of bridging cracks.

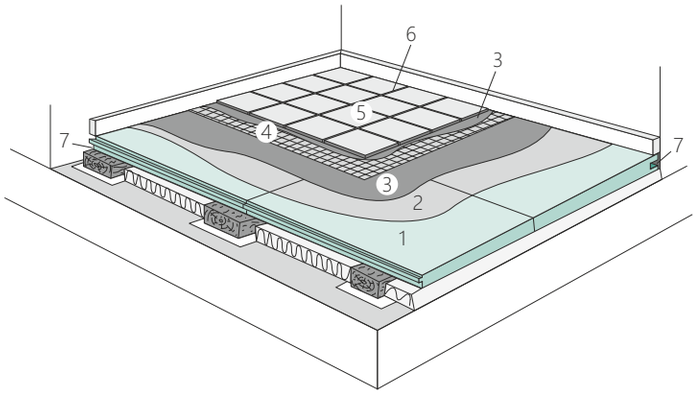
Suitable types:

- Schlűter® DITRA
- Botact insulating and separating foils
- Murexin Rapid 1K sealing foil

Hydro-insulating layer of Schlűter® DITRA foil

1 CETRIS® cement bonded particleboard
2 priming
3 gluing filler
4 hydro-insulation – mat
5 ceramic paving
6 joint filler
7 dilatation joint

The foil is laid on the gluing filler bed and the joints and corners are treated with accessories. Immediately after gluing the foil–mat, it is possible to lay the paving on a thin glue bed. The gluing filler used must be elastic and hydraulically hardening.



6.9.6 System Solution under the Ceramic Paving

System solution for impact noise absorption under the ceramic paving

This composition includes pressed boards of polymer fibre bonded with latex. By insertion of these boards in the floor composition, even in low thicknesses (6 mm), it is possible to reduce impact noise by up to 13 dB (tested pursuant to EN ISO 140-8) and separate the base from the upper layers with preservation of the very low construction height of the floor.

The boards are laid on a layer of gluing filler and pressed in – ideally with a hard roller. To prevent formation of acoustic bridges it is necessary to cover the contact joints with self-sticking cover tape.

Note: To ensure the uniform distribution of the load, it is not possible to use floor tile formats smaller than 150×150 mm, or 240×115 mm.

System solution under the ceramic paving – reduction of impact noise

System structure	Priming	Bonding of the boards	Board/mat	Gluing filler	Joint filler (elastic filler)
BOTAMENT	BOTACT D 11	Special quick-drying filler BOTACT M 26	BOTACT – separation board for impact sound absorption	BOTACT M 26 or BOTACT M 29	Elastic joint filler BOTACT M 30 or MULTIFUGE (BOTACT S 5 / BOTACT S 3)
SCHÖNOX	Schönox KH (1:3)	SCHÖNOX TT S8,SCHÖNOX TT S8 RAPID	SCHÖNOX TS 3 mm	SCHÖNOX TT S8,SCHÖNOX TT S8 RAPID	SCHÖNOX UF PREMIUM,SCHÖNOX WD FLEX (SCHÖNOX SMP,SCHÖNOX ES)
MUREXIN	Deep base LF 1	Flex KGF 65	Uni board Top Akustik	Flex KGF 65	Joint filling grout FM 60 (silicone sanitary filler SIL 60)

System solution for increased base stability

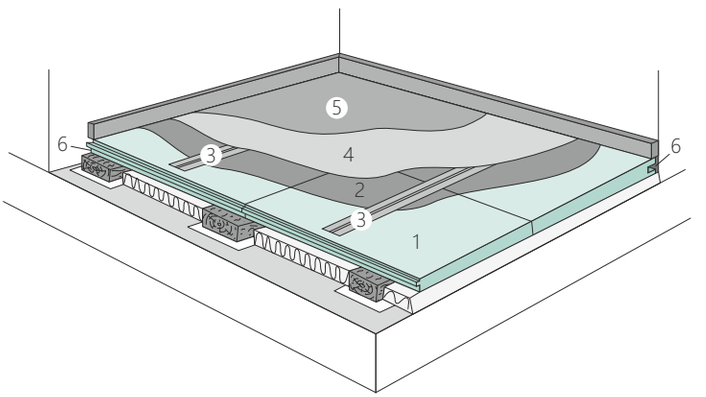
This solution is ideal for reduction of the risk of cracks in critical bases with preservation of the very low construction height of the floor. The floor composition includes a sandwich separating mat Botact, under the walking surface of the floor covering with integrated reinforcing fabric. Particularly in the rehabilitation of old houses the minimum floor height (0.7 mm) and weight of the geo textile fleece are undisputed advantages. The mat is laid on a layer of gluing filler with an overlap of 40 mm and pressed into the gluing filler – ideally with a hard roller.

Note: The minimum thickness of the ceramic paving must be 8 mm; the formats chosen must be in the size range 150×150 mm to 300×300 mm and must not be laid "over joints". This mat is not intended for bridging of dilatation joints!

System solution under the ceramic paving for increased base stability					
System structure	Priming	Bonding of the boards	Board/mat	Gluing filler	Joint filler (elastic filler)
BOTAMENT	BOTACT D 11	BOTACT M 21 Special quick-drying filler BOTACT M 24 (in moist spaces BOTACT MD 1)	BOTACT – thin separating mat	BOTACT M 26 or BOTACT M 29	Elastic joint filler BOTACT M 30 or MULTIFUGE (BOTACT S 5 / BOTACT S 3)
SCHÖNOX	Schönox KH (1:3)	SCHÖNOX TT S8, SCHÖNOX TT S8 RAPID	SCHÖNOX REMOTEX	SCHÖNOX TT S8, SCHÖNOX TT S8 RAPID	SCHÖNOX UF PREMIUM, SCHÖNOX WD FLEX (SCHÖNOX SMP, SCHÖNOX ES)

6.9.7 Self-levelling Electrostatically Conductive Cast Floor

The self-levelling electrostatically conductive cast floor, so-called, "anti-static" is used mainly in spaces with a high concentration of computers – halls, offices, etc. This floor can be applied to rooms with wheeled office chairs. The board joints must be covered with reinforcing textile of width 300 mm and anchored to the base with staples. The laying of this composition must be entrusted to a professionally trained company and consulted with the manufacturer.

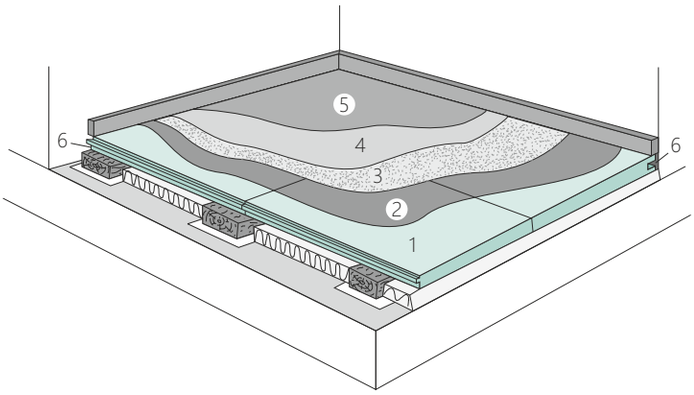


1 *CETRIS® cement bonded particleboard*
2 *priming*
3 *conductive tape*
4 *conductive paint*
5 *cast upper abrasive layers*
6 *dilatation joint*

Self-levelling electrostatically conductive cast floor				
System composition	Primer	Conductive tape	Conductive paint	Cast upper abrasive layers
BASF	MASTERTOP P 678 (Conipur 78) + Quartz sand fill of fraction 0.4 – 0.8 mm	PCI-Kupferband	MASTERTOP CP 687 W AS(Conipur 287 W-AS)	MASTERTOP BC 375 AS (Conipur 275 AS)
MUREXIN	Epoxy antistatic primer Aquapox ASG 170	Copper strip KB 20	not required	Epoxy antistatic coating ASD 130

6.9.8 Cast Comfort and Decorative Elastic Floor

This cast comfort and decorative elastic floor is intended mainly for use in spaces where an elastic surface, easy to maintain surface is required (nurseries, pensioners homes, sports surfaces with a light load). The board joints must be covered with reinforcing textile of width 300 mm and anchored to the base with staples. The laying of this composition must be entrusted to a professionally trained company and consulted with the manufacturer.



1 *CETRIS® cement bonded particleboard*
2 *priming*
3 *quartz sand backfill*
4 *abrasive layer*
5 *protective UV coating*
6 *dilatation joint*

Cast comfort and decorative elastic floor			
System composition	Primer	Abrasive layers	rotective UV coating
BASF	MASTERTOP P 678 (Conipur 78) + Silica sand backfill, fraction size 0.4 – 0.8 mm	MASTERTOP BC 375 A (Conipur 225 A)	MASTERTOP TC 467 nebo P (Conipur 67)
MUREXIN	Epoxy resin EP 90 with Silica sand backfill, fraction size 0.3 – 0.9 mm	Polyurethane film HIRES PU 300	Closing polyurethane paint PU 40

6.10 Floor Heating

6.10.1 Floor Heating under CETRIS® Foor Boards

The solution of a light floor construction with hot-water heating is described on page 60. Description and variants of the POLYCET floor, POLYCET Heat floor.

6.10.2 Electrical Floor Heating (Mats) Laid on CETRIS® Boards

Technological procedure

1. CETRIS® floor boards are primed with "weber.podklad haft".

2. Do a test measurement of the heating circuit resistance and the insulation resistance of the heating mat before laying.

3. At the point of the electric mat controller, create a groove in the floor perpendicular to the wall for application of the floor sensor. The temperature sensor shall be in a flexible protective tube, or so-called, goose neck piping of diameter 16 or 20 mm over a distance of 500 mm, perpendicular to the wall. The recommended groove depth is 20 mm in the floor to prevent incessant raising of the floor during laying of the flooring. The end of the protective tube is blinded to prevent the entry of levelling filler during its application and the floor temperature sensor is subsequently fixed. The floor temperature sensor in the protective tube must be pushed up to the blinding cap and must be free in case of the necessity to replace it due to a fault.

4. The AEG model HMA TE 50 150 heating mat is laid on a clean, flat, non-primed surface. This floor heating system has an output of 150 W/m2 with small heating cable spacing for quick, uniform, comfort heat build-up and distribution with simple and quick installation and designing. The mat is self-adhesive with one connecting cable. We recommend laying the electric mats in such a manner that the connecting cold end is as near as possible to the controller. Unroll the mat and adjust according to the required shape of the heated space. The mat width is 500 mm and during application of the individual rows, always cut the carrier grid as required at the centre of the cable arch and turn it at the required angle for completion of the laying process.

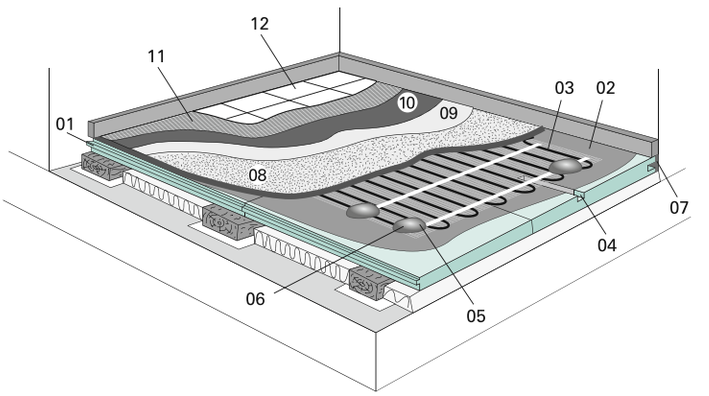
   At the installation point of the floor temperature sensor, ensure that the floor temperature sensor is at the middle of the heating loop in parallel to the heating cables. If the heating cable were laid on the temperature sensor, this would result in earlier cut-off of the entire heated surface.

5. In the installation box, connect the cold power supply end of the mat, temperature sensor and 230 V power supply to the AEG FTD 730 controller. An integral part of the controller is also the NTC floor sensor. After laying the top floorings, it is necessary to wait for 24 hours before connection to the source system and select the heat build-up.

6. If necessary, fix the unwound heating mat with quick-drying repair filler weber.bat to prevent it rising to the surface during the subsequent operation. Do a test measurement of the heating circuit resistance to ascertain that the heating circuit is not broken or interrupted by any inattentiveness during the application. Leave the repair filler to cure for at least 3 hours and then prime with weber.podklad floor primer diluted in the ratio of 1 : 3.

7. Cast the mat with Weber floor 4320 self-levelling cement filler with fibres for floor heating in a minimum thickness of 8 mm above the resistance heating cable. The material is mixed with water in the prescribed ratio. We treat the cast floor with floor flooring sabers or rakes to ensure that the material spreads on the floor in the desired thickness. If necessary, we use a pin roller to deaerate the material just after levelling. Application of the flooring material is followed by a technological break of at least 24 hours in the case of laying paving, or at least 72 hours in the case of laying vinyl.

01 CETRIS® cement bonded particleboard
02 priming
03 mat
04 groove for temperature sensor
05 local anchoring of the cable
06 priming of the local anchoring
07 dilatation joint
08 self-levelling plaster
09 priming
10 hydro insulation
11 glue
12 paving



Further procedure depends on the type of flooring:

Ceramic tile variant – moist areas – hydro insulation is a necessity in the composition

- after curing of weber.floor 4320, prime the entire base with weber.podklad A and start applying the first layer of Terizol polymer cement hydro insulation compound, mixed in the prescribed ratio with water, using a toothed steel finisher with a tooth size of 4 × 4 mm. At the same time, in the first layer of Terizol, we apply weber.BE 14 joint tape. The application of the first layer of Terizol must be followed by a technological break of at least 6 hours for the Terizol to cure.

- After 6 hours, we continue with the second layer of Terizol, which is also applied using a toothed finisher endways to the previous grooves. After this operation, the product is left to cure for at least 12 hours.

- As soon as the curing time lapses, we can continue and lay the ceramic tiles on weber.for duoflex glue.

Ceramic paving variant - application without hydro insulating layer

- The glue for tiles and paving must be mixed in the prescribed ratio with water and is applied using a steel finisher with a tooth size of 8 × 8 mm.

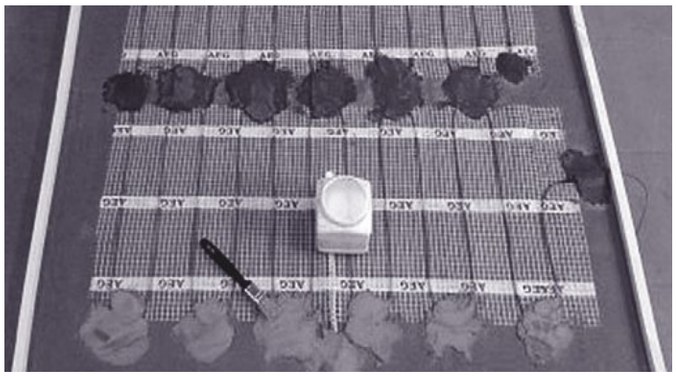
- After the paving glue curing time, approx. 24 hours, the joints between the tiles are cleaned and joint-filling with weber.color comfort filler is done using a rubber finisher. After slight hardening of the filler, the tiles are cleaned using a foam finisher and clean water. The paving is walkable approx. 24 hours after joint-filling. We fill any corner and dilatation joints with weber.color silicone or the modified silicone weber.color POLY.

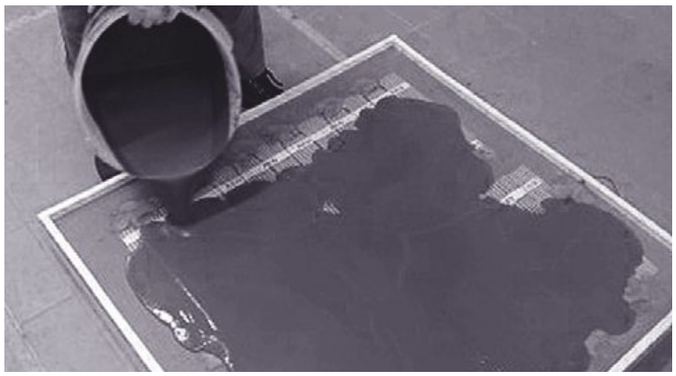
Vinyl flooring

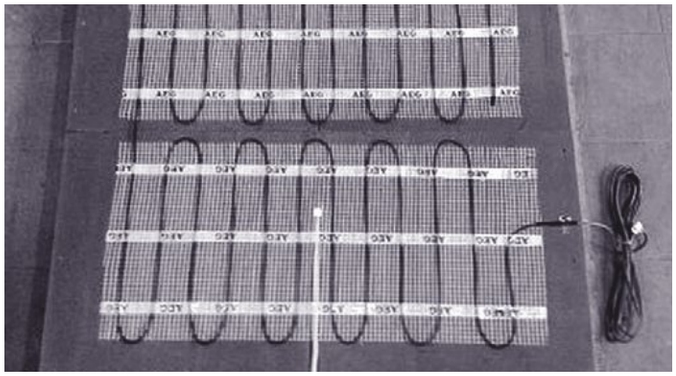
The self-levelling layer is ground as necessary using floor grinding machine; dust and impurities must be vacuum cleaned from the base. The vinyl is subsequently glued using Weber. floor UNI glue. Before first use of the floor heating system, it is necessary to let the entire strata to cure for a minimum of 7 days!

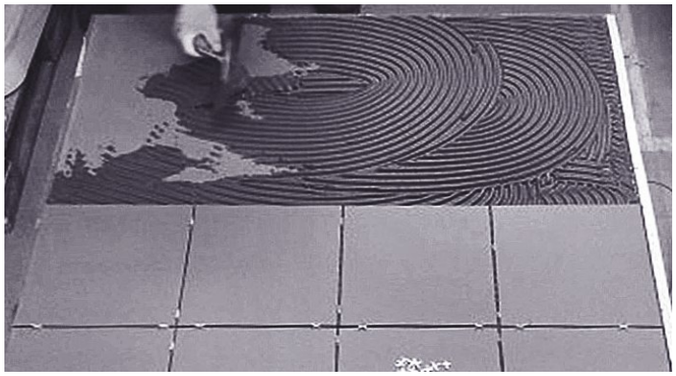
Electrical floor heating on CETRIS® boards

System composition	Primer	Heating mat, including the installation tube with a temperature sensor and connection to the temperature controller	Local anchoring of the heating cable curves	Primer	Self-levelling plaster with fibre	Primer	Glue	Hydro insulation (bathroom)	Joint-filling grout
Ceramic floor	weber. base haft	AEG type HMA TE 50 150/1 Controller AEG type FTD 730	weber.bat repair material	weber. base floor	weber. floor 4320	weber. base A	weber. for duoflex	weber Terizol	weber. color comfort
Vinyl flooring						-	Weber. floor UNI	-	-









6.10.3 Electric Floor Heating (Foil)

The carbon heating foil transforms 99% of the electric energy into infrared heat radiation. Thanks to this high efficiency and simple, quick and precision control, the electric heating foil is one of the most effective sources of heat for households. It is an ideal choice for most heating installations.

In combination with the CETRIS® floor systems, it is possible to use different variants of the heating foils:

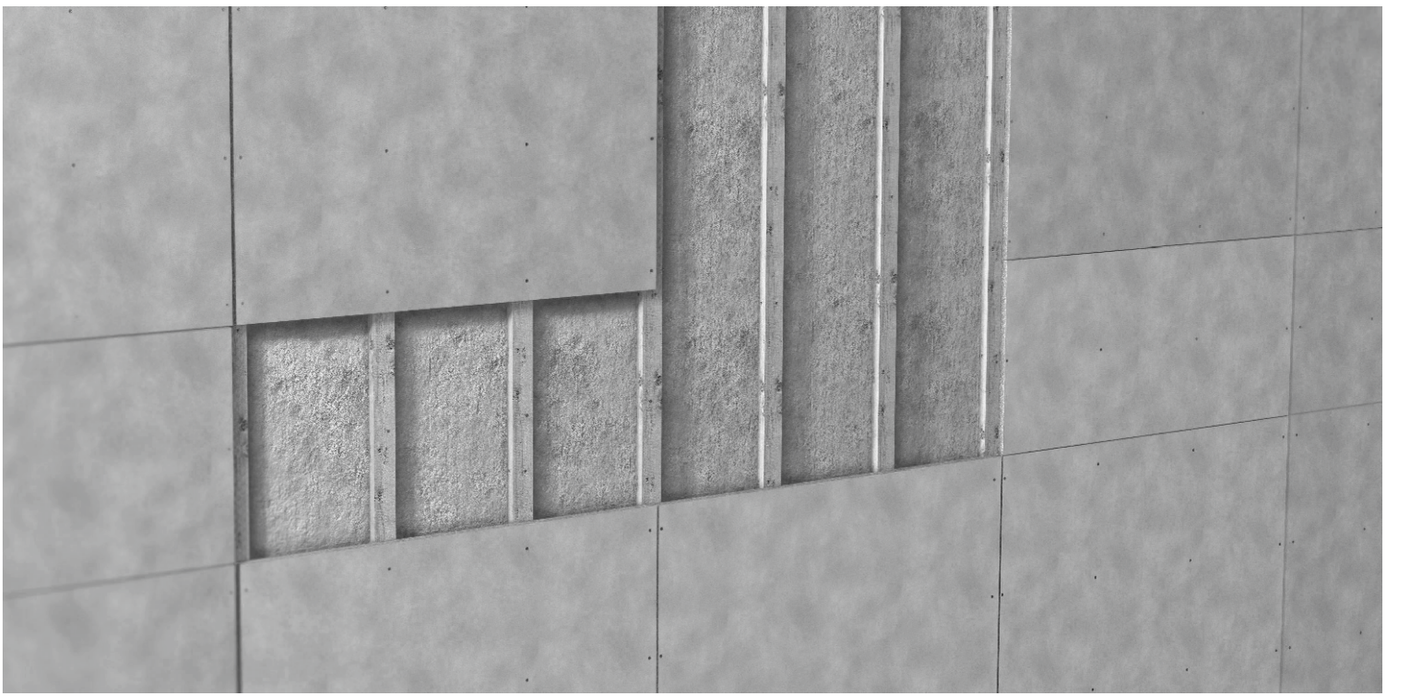
- Direct heating system - electric heating foil for use directly under the wear layer (e.g. Nexwarm ONE STEP, HEATMAX PTC). A suitable base is a CETRIS® PD (PDB) board floor, also light floating floor systems (IZOCET, POLYCET, CETRIS® PDI).
- the heating foil for installation under the accumulation distribution layer (e.g. HEATMAX CARBON FABRIC, Heatflow...). In this case, the foil is laid on insulation and the walkable layer, which simultaneously forms the accumulation element can be created from CETRIS® boards.

Recommended composition – two layers of CETRIS® boards of minimum total thickness 28 mm – e.g. bottom (first) layer of CETRIS® PD board of thickness 16 mm, second layer of CETRIS® BASIC board of thickness 12 mm.

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.

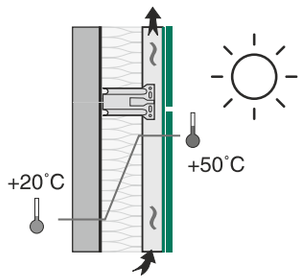
- Load-bearing construction – enables insertion of heat insulation and fixation of the façade cladding to the load-bearing wall of the building
- Thermal insulation – a layer of heat insulating material fixed to the outer face of the peripheral construction of the building
- Façade cladding – protects 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

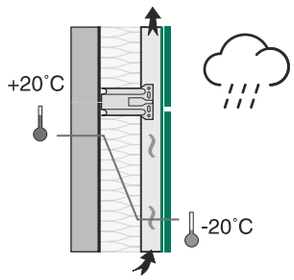
- Thermal insulation in winter – optimum design of the thermal insulation layer thickness in combination with the ventilated air gap ensures minimum energy consumption for heating
- Thermal insulation in summer – heat attenuation reduces interior overheating, which is caused by sunshine in the summer
- 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.

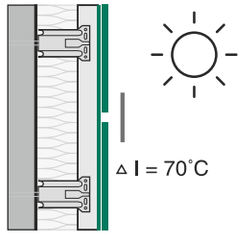
thermal load



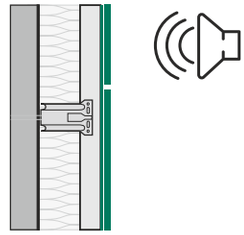
thermal resistance



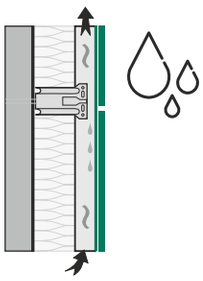
reduced swell



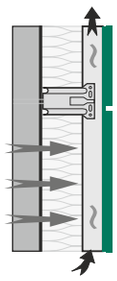
sound insulation



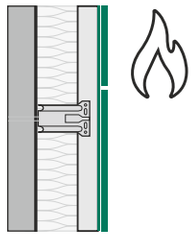
resistance to moisture



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.

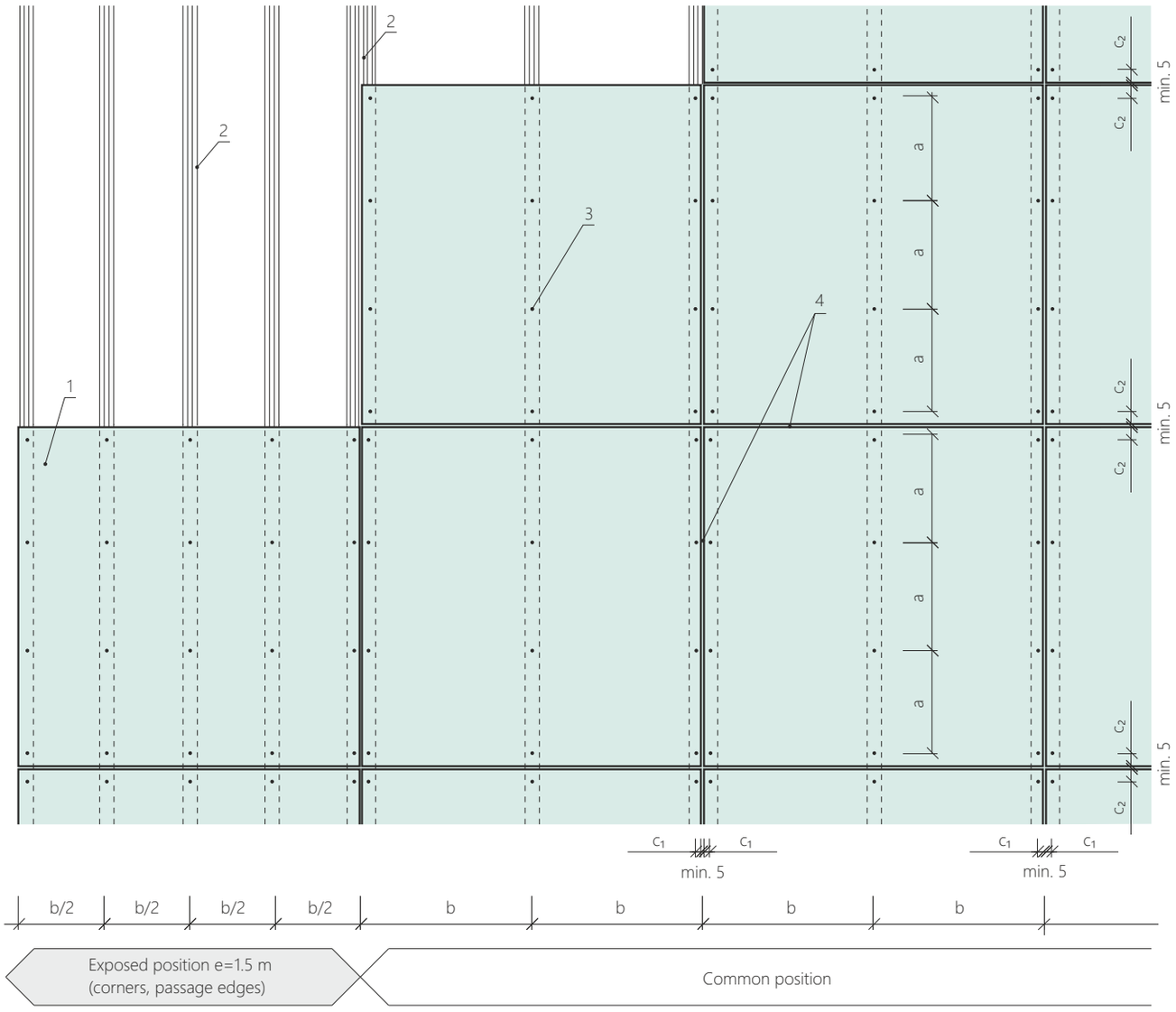
VARIO anchoring table

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.

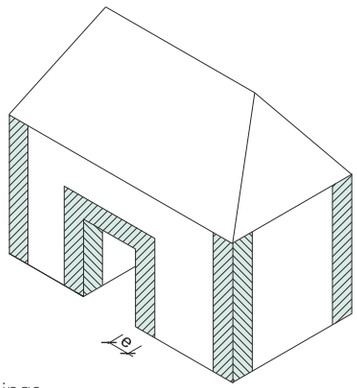
Diagram of CETRIS® board laying in the VARIO system



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



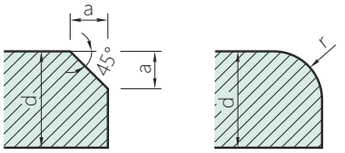
Exposed positions on building edges, openings, passages and thoroughfares in the buildings.

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

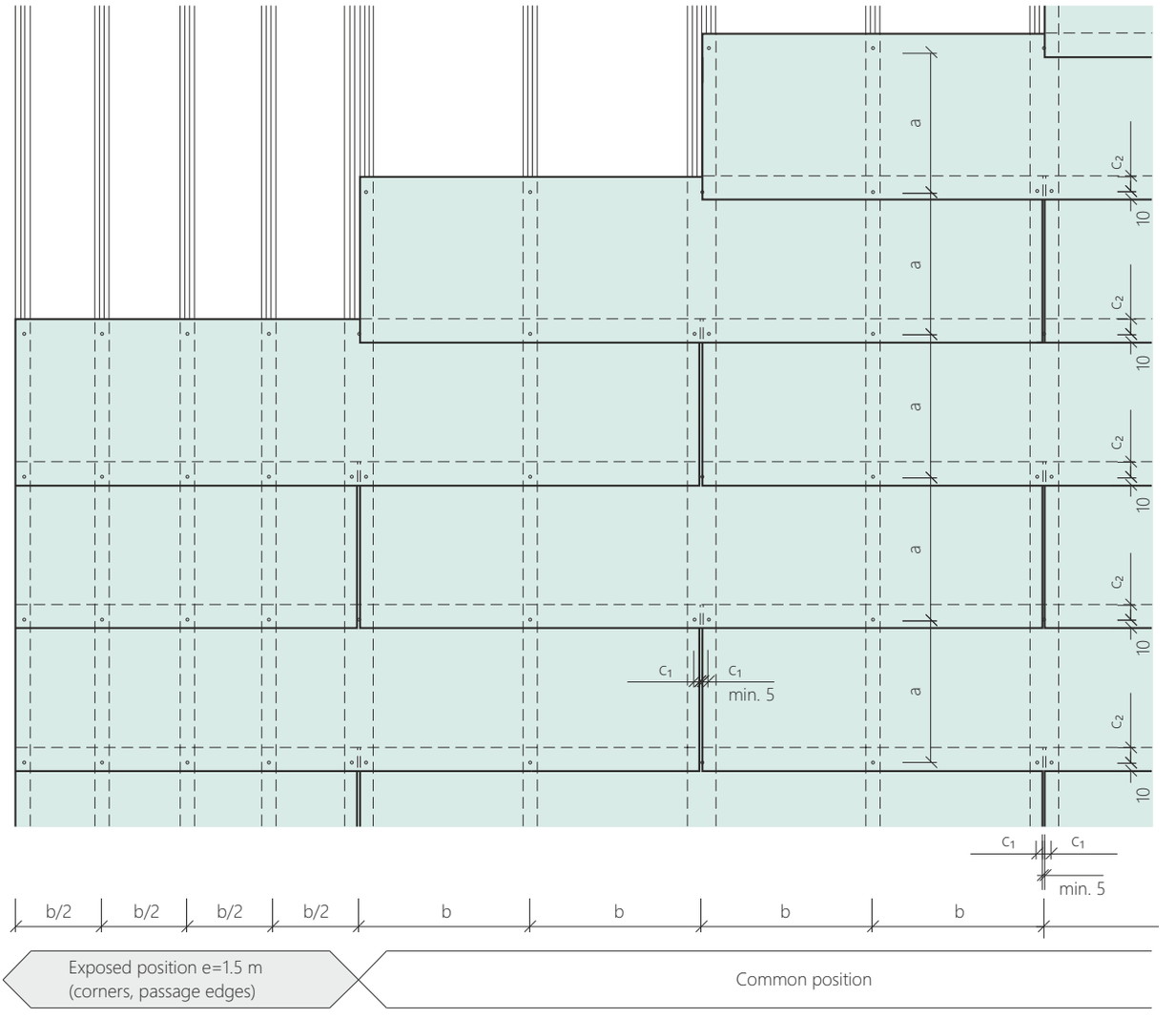
PLANK anchoring table

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.

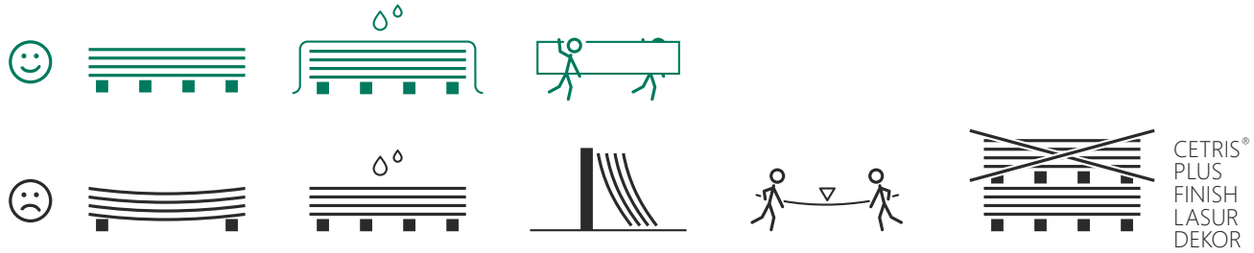
7.1.4 Processing of CETRIS® Façade Boards

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

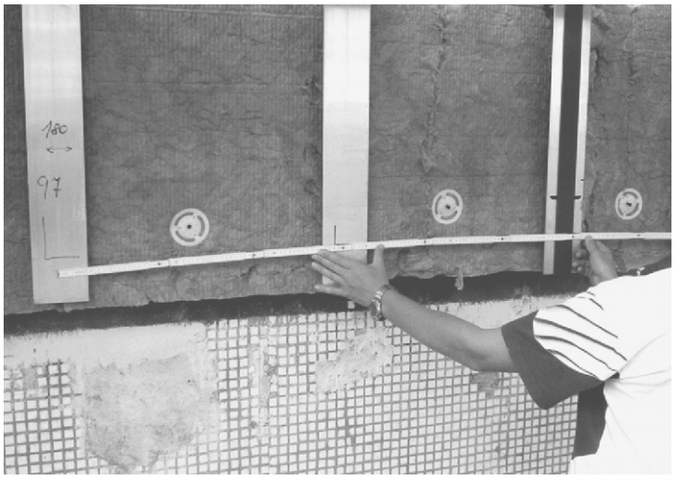
Load-bearing construction
The load-bearing skeleton consists of a grid made of wooden laths and planks. The laths and the planks are made of quality spruce cut timber dried to a max. 12% humidity. Such dried timber is impregnated with a suitable agent against mould and rot.

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

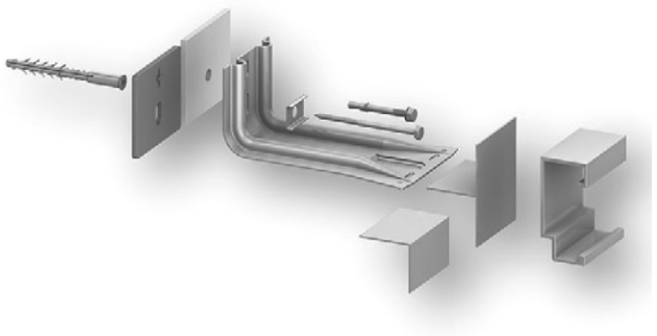
By their technical properties, the façade CETRIS® cement bonded particleboards fulfil the European regulation ETAG 034-1 and European technical approval ETA-14/0196 has been issued for them.

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

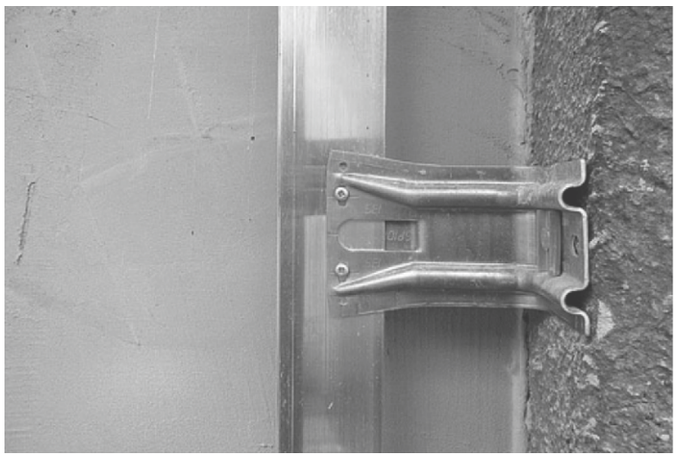
SPIDI load-bearing construction

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

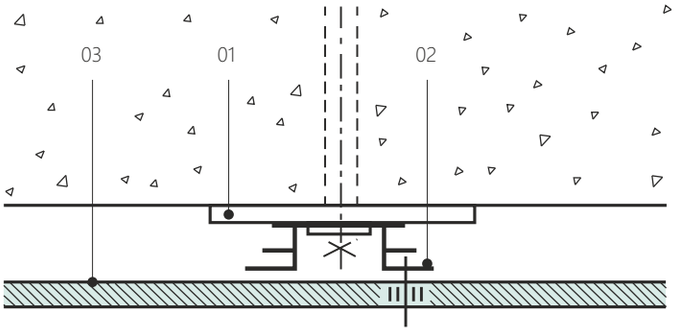
LA centrum load-bearing construction

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.

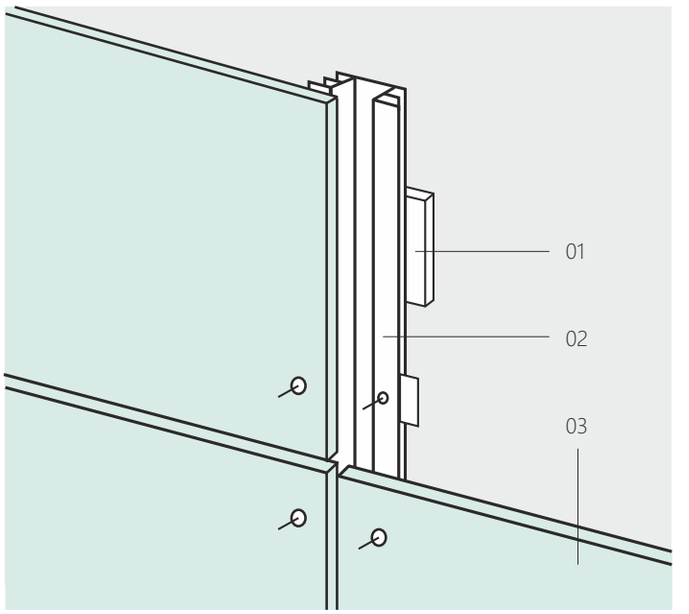
The LA-KV1 and LA-LV1 systems are suitable for fixture of the CETRIS® cement bonded particleboards.

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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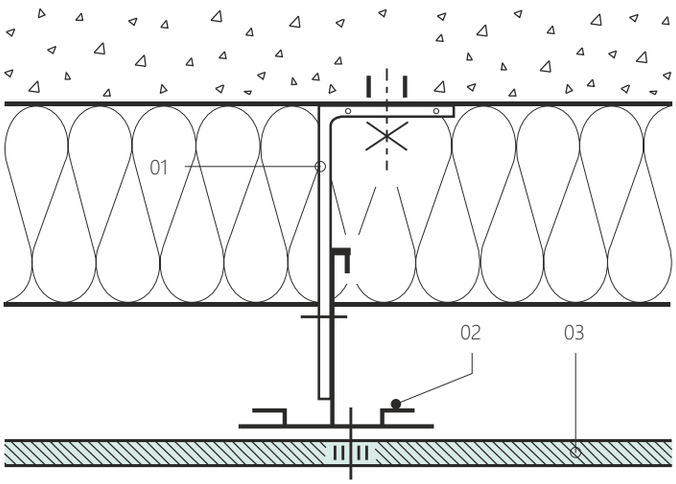
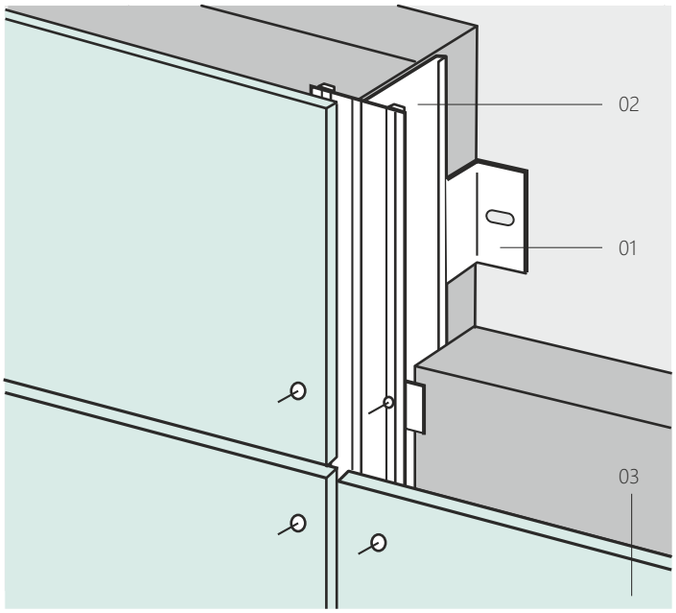
www.thermosolutions.cz



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.

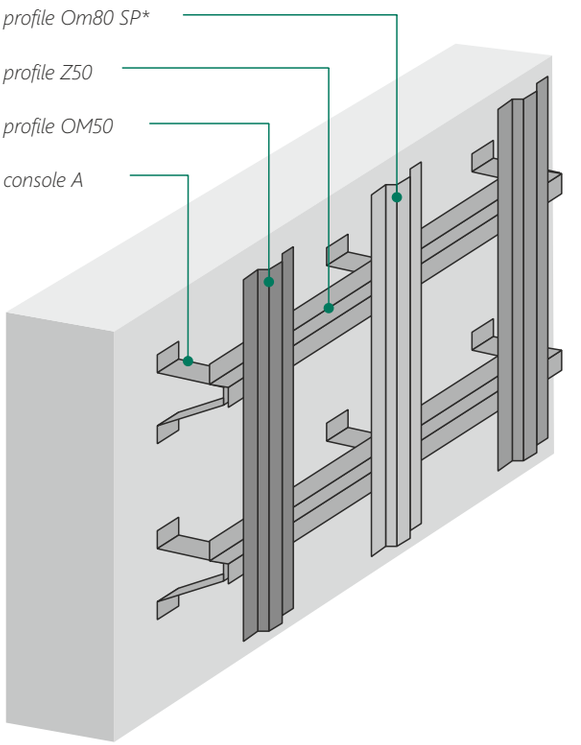
The first assembly phase of the façade system consists of the horizontal part of the grid. If the load-bearing construction comprises a skeleton, C cassettes are used. If the façade board is installed on a load-bearing wall, this grid is composed of a system of Z50 consoles and profiles. In the following 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

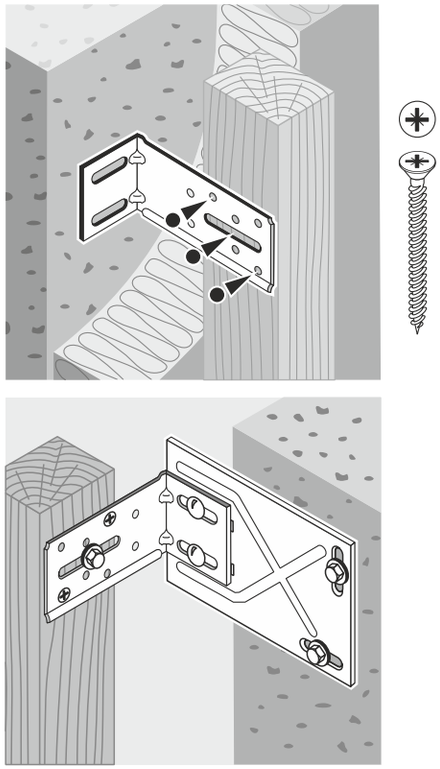


ETANCO load-bearing construction

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

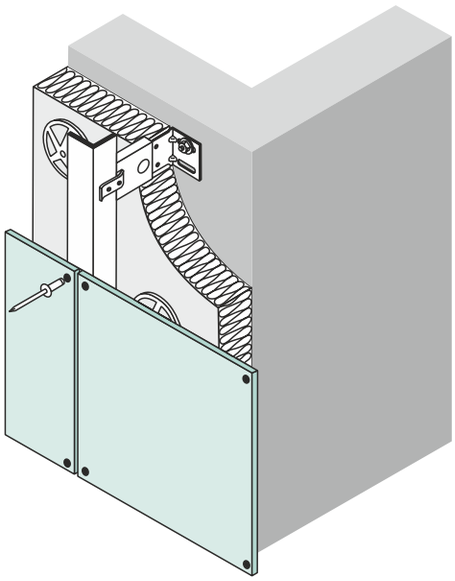
Its advantage is quick and easy assembly. Galvanising or other protective treatment is not necessary and its lower weight (as compared with steel) makes it possible to hang a larger weight on this construction or reduce the span and hence also the number of anchors. During the design and assembly of 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.

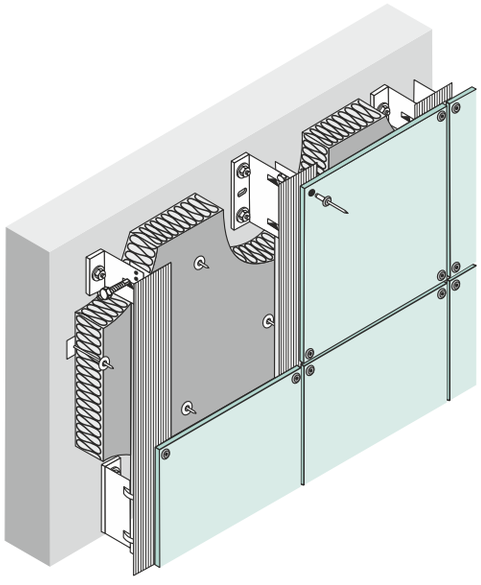
Technical service in the area of design, delivery and installation of the load-bearing structures is done by ETANCO CZ, s.r.o.

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

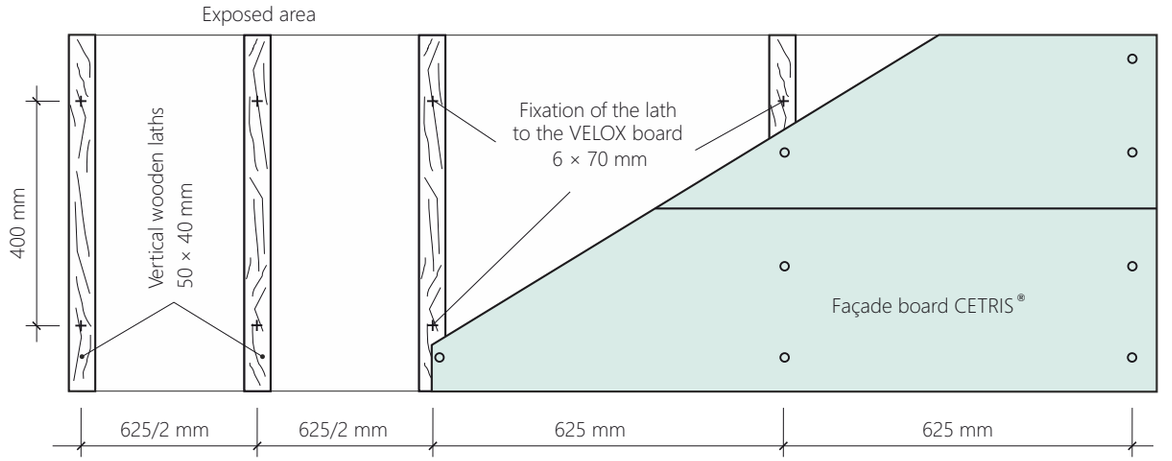
The system is applicable to refurbishment of old buildings or new buildings and also modifiable for use in wooden buildings and on extremely uneven surfaces with a high functional reserve and is undemanding in terms of machine requirements during assembly.

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

www.knaufinsulation.cz

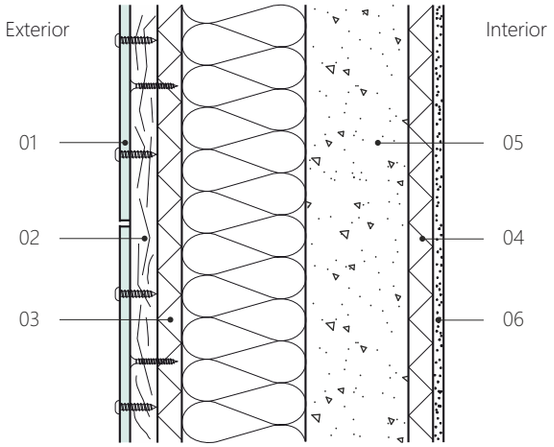
CETRIS® façade boards on a VELOX wall

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



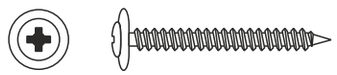
01 CETRIS® façade board
02 Vertical wooden lath 50 × 40 mm
03 VELOX WS-EPS board with thermal insulation
04 VELOX WSD board
05 Concrete
06 Plaster

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



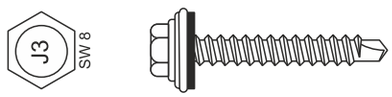
The recommended screws for the CETRIS® boards when mounted on PLANK thickness 10 (12) mm, load-bearing construction EuroFox:

- EJOT screw Climadur-Dabo TKR 4.8×35 mm

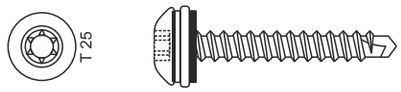
For fixture of CETRIS® boards in the VARIO system (visible joints), stainless steel or galvanized screws with semi-circular or hexagonal heads and compressive water-tight washers are used. The washers are treated on the bottom side with vulcanized elastomer EPDM for water-tight and flexible material 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:

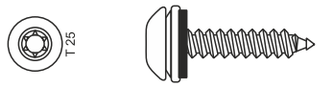
- JT 3 – 2 – 4,9 × 35 – E 14
  (max. thickness of the CETRIS® board 12 mm)



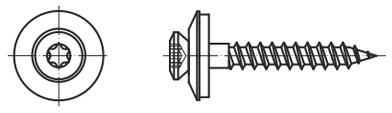
- JT 4 – FR – 2 – 4,9 × 35 – E 14
  (max. thickness of the CETRIS® board 12 mm)



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



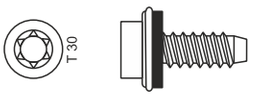
- VISIMPEX plumbing screw + EPDM,
  TX20 4,5 × 35 – 60 mm, stainless steel A2



- 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:

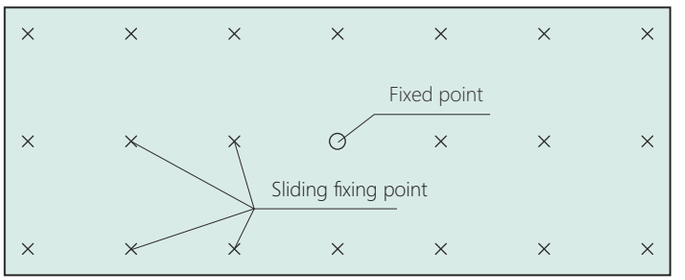
- JT 2 – 3 – 4,8 × 25 (38) – V 14



- 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

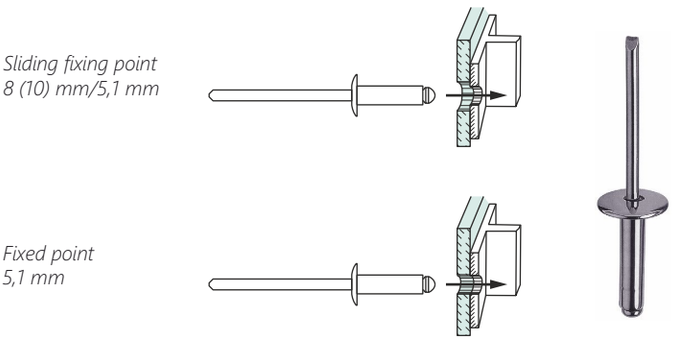
- The CETRIS® board must be pre-drilled, the hole diameter in the case of a sliding point is 8 mm (or 10 mm, if the board length is greater than 1,600 mm), for a fixed point, the pre-drilled hole diameter is 5.1 mm (diameter of the rivet body).
- The position of the pre-drilled holes in the board is 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.



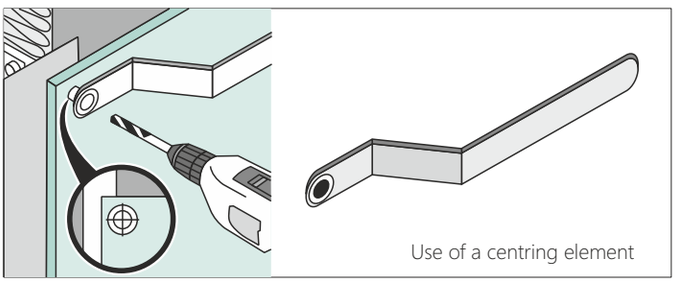
x - Sliding fixing point
o - Fixed point

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.

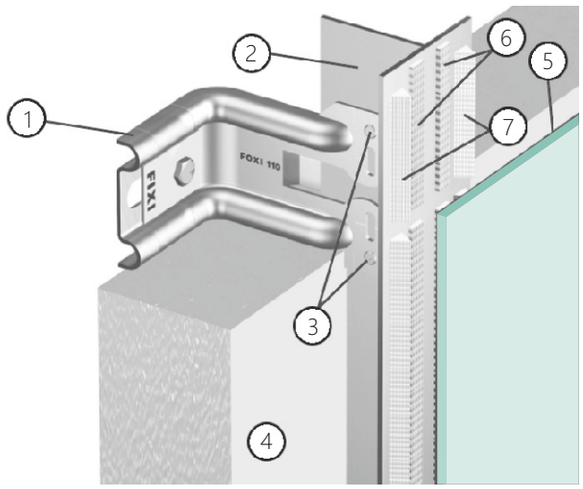
The most important principles for use of the gluing system for fixture of CETRIS® cement bonded particleboards:

- 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).

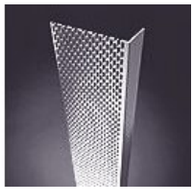
Anchoring Technique

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.

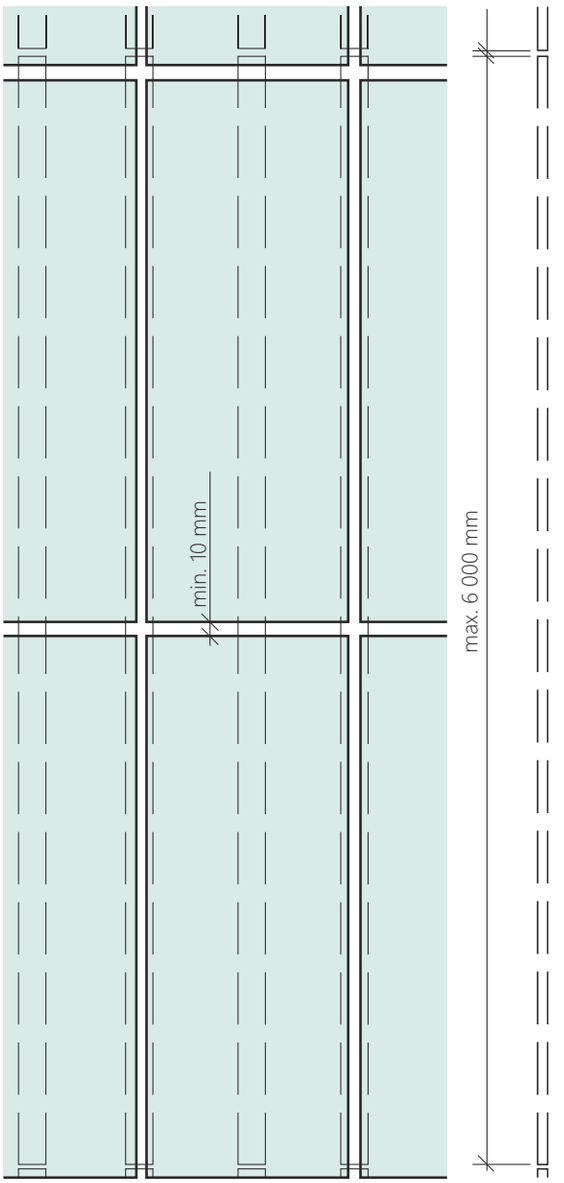
Installation of the secondary grid – vertical load-bearing laths
The vertical load-bearing laths (minimum width 50 mm, at the contact point of two boards minimum 100 mm or use two 50 or 60 mm laths) are fixed with screws to the primary grid. The axial distance of the laths must not exceed the stated 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



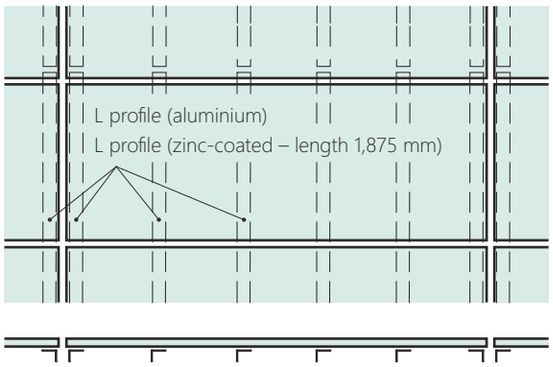
When assembling the grid of zinc-coated or aluminium profiles it is acceptable to use a joint profile for CETRIS® board laying in widths of up to 1,875 mm. For wider boards (laid lengthwise), use two separate L profiles instead of a joint profile.

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!

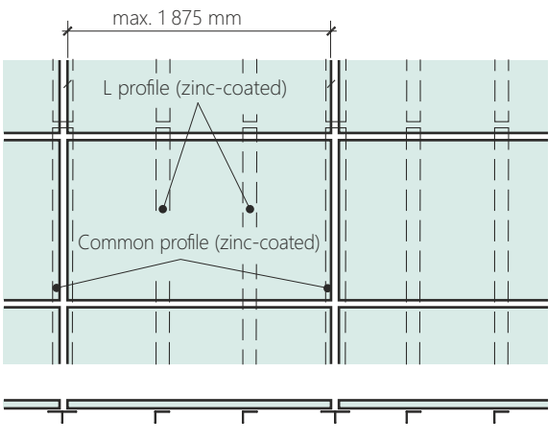
Correct assembly of L profiles at the vertical joint

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

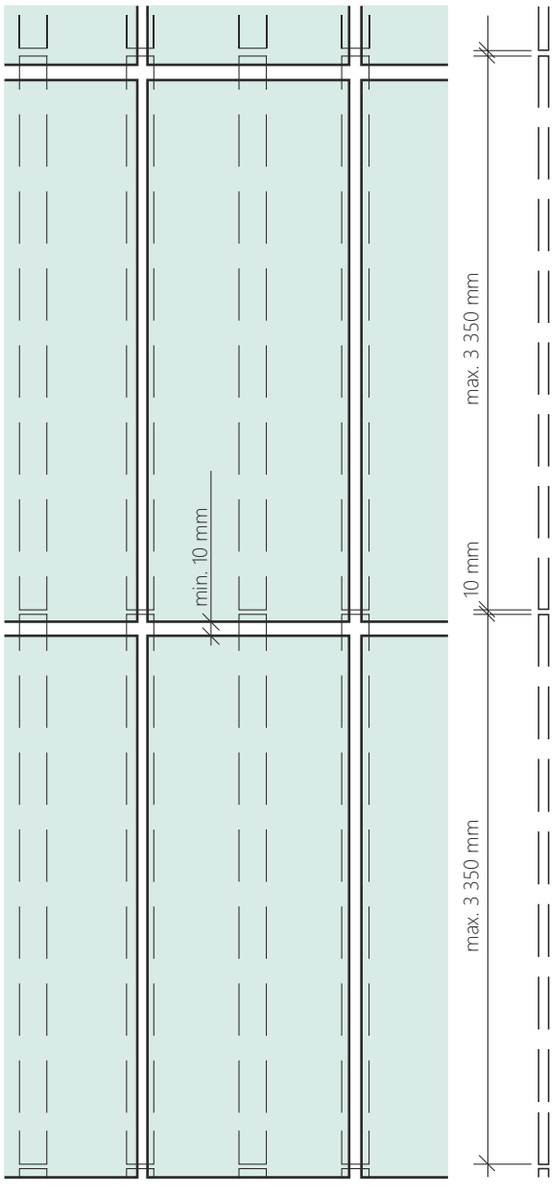


For façades wider than 8 metres, it is necessary to ensure continuous vertical dilatation in the load-bearing construction – i.e. the base construction at the points of the vertical joint must be resolved using two separate profiles.

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



Dilatation – grid of aluminium or zinc-coated profiles



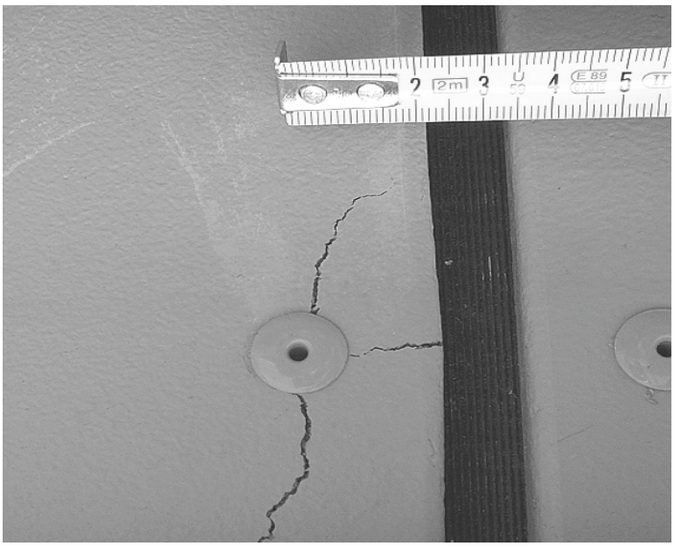
Exceeded support spacing

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)

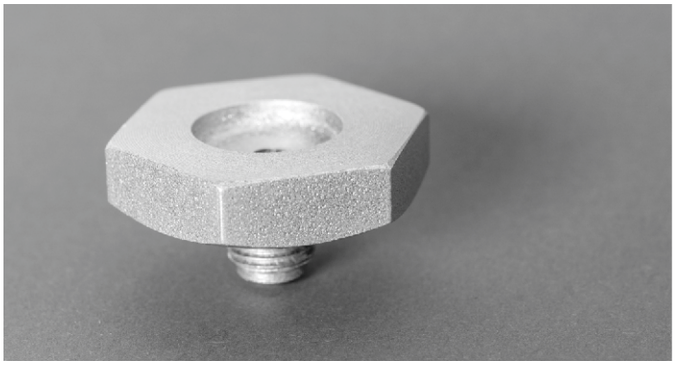
Before the board installation, mark the basic horizontal plane (pursuant to the manufacturing documentation).

The basic horizontal plane is usually delimited by the:

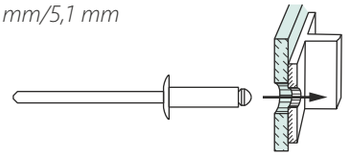
- bottom edge of the second horizontal layer of CETRIS® cement bonded particleboards
- level of the sills/parapets of the openings (windows, doors), if the joints between the boards follow this level
- level of the lintels of the openings (windows, doors), if the joints between the boards follow this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

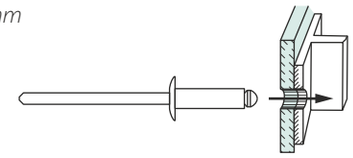
The screw tightening torque must be set to prevent deformation of the screw washers or CETRIS® board. The screw (rivet) must be placed in the middle of the pre-drilled hole perpendicularly to the board plane. When riveting, the slide joint must be achieved with a distance extension of about 1 mm.



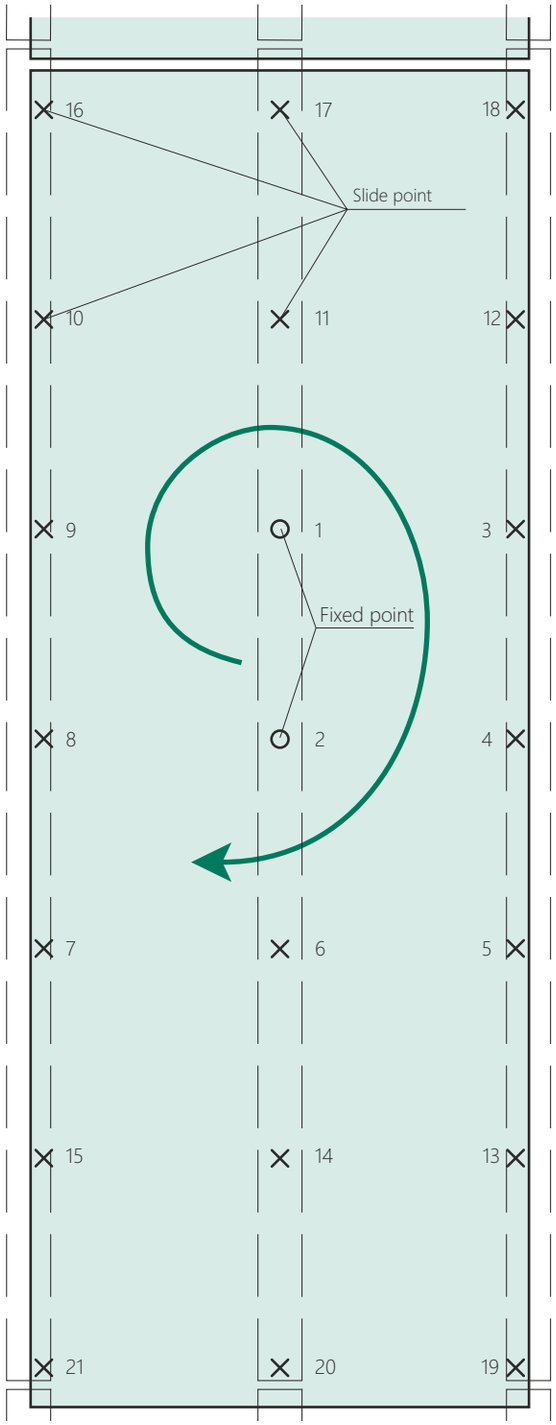
slide point 8 (10) mm/5,1 mm

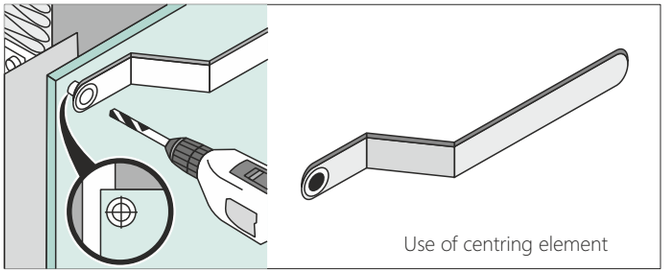


fixed point 5,1 mm



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).

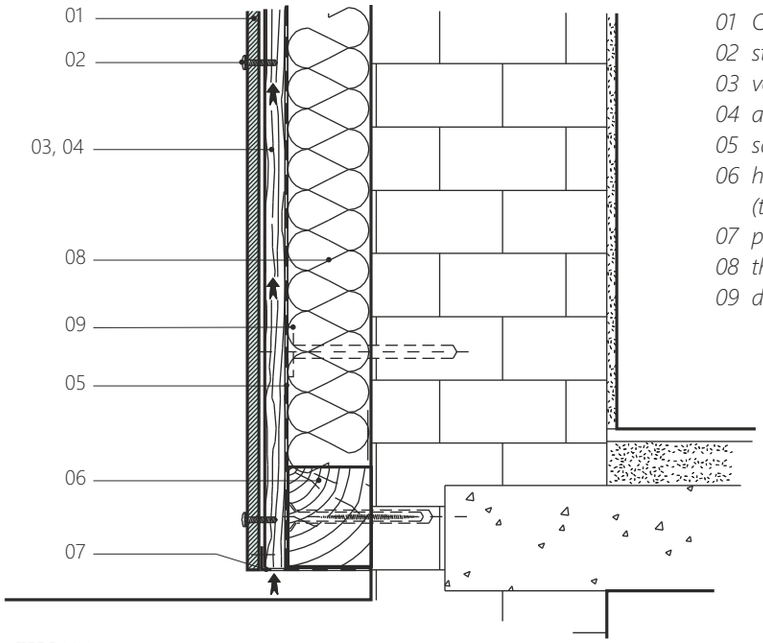
The vertical joints of the boards must be supported and their width must be at least 5 mm.

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.

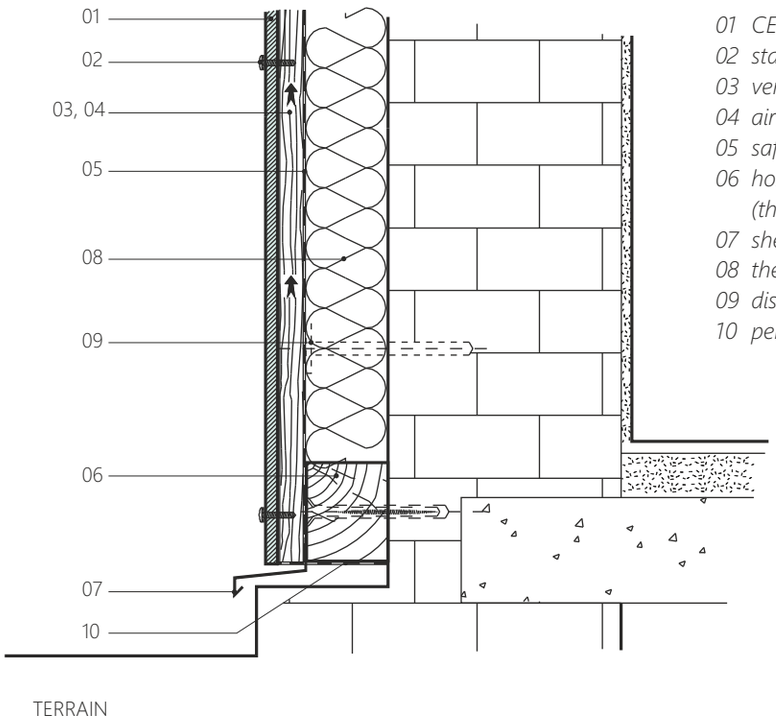
Note: The drilling and cutting (or milling) of CETRIS® cement bonded particleboards is only possible with hard metal tilled tools designed for this type of cutting operation. Where anchoring element penetration is required (for example for exterior lighting of the building, for installation of signs 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



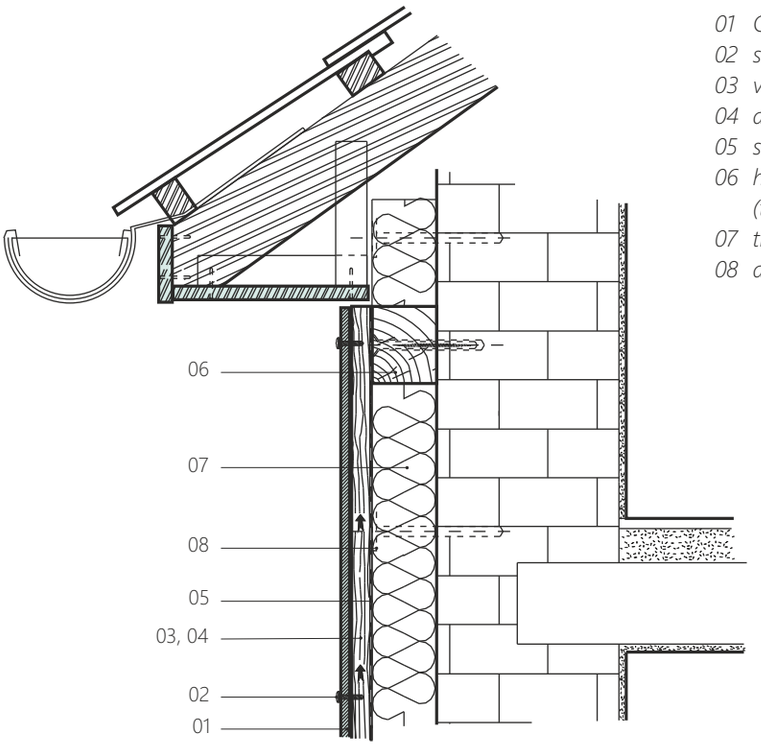
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 perforated ventilation profile (PROTECTOR)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

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



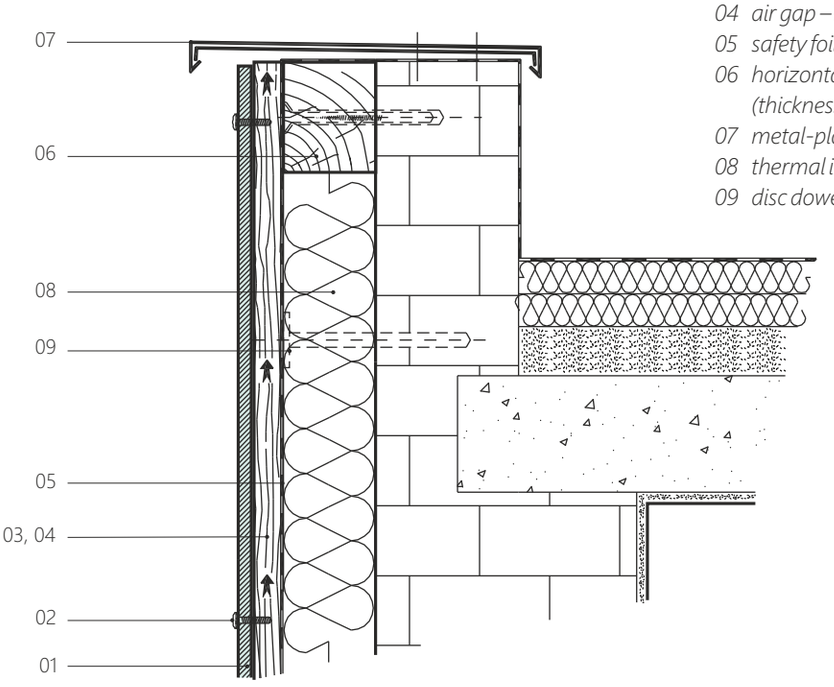
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 sheet metal plating – tinsmithing product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



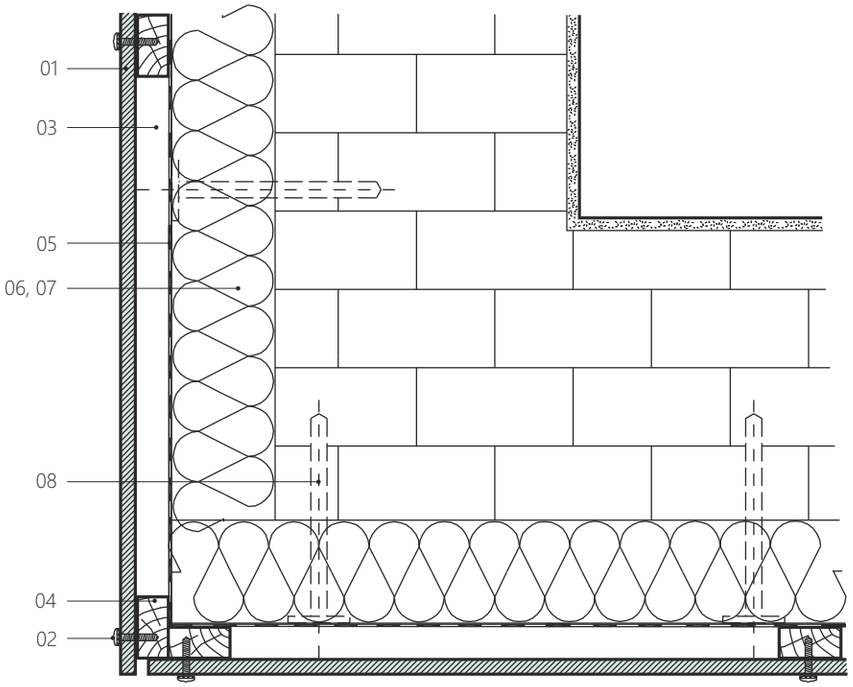
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap – min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel

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



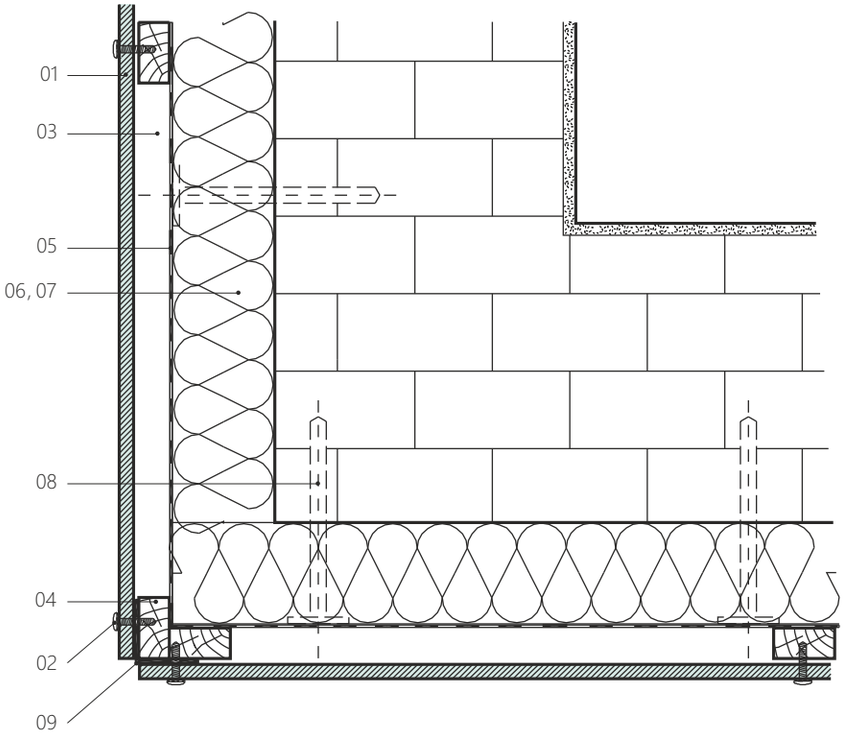
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap – min. 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 metal-plating – tinsmithing product
08 thermal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

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



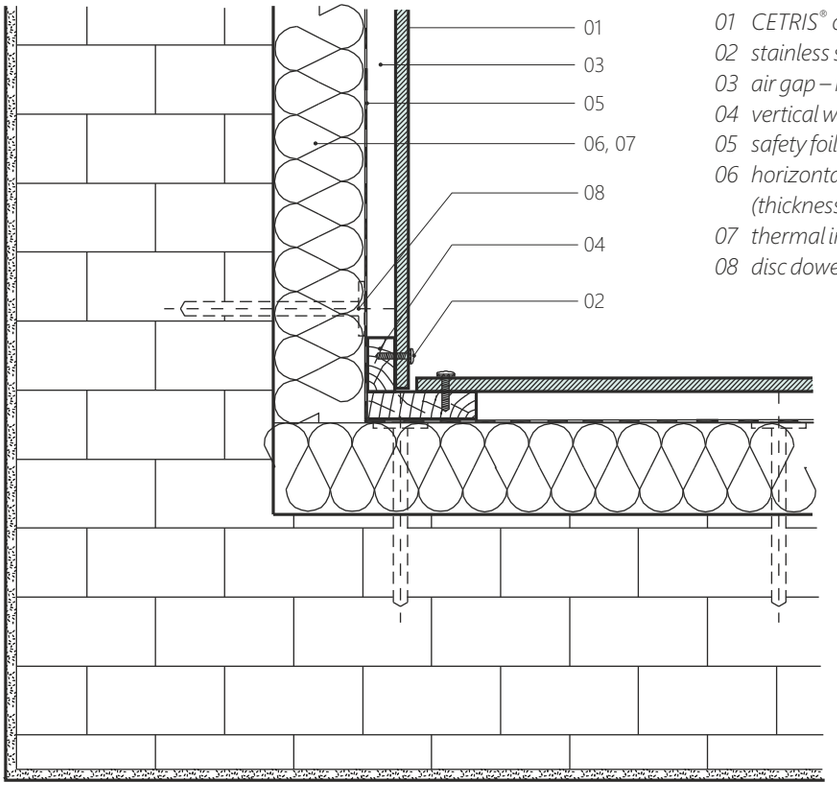
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel

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



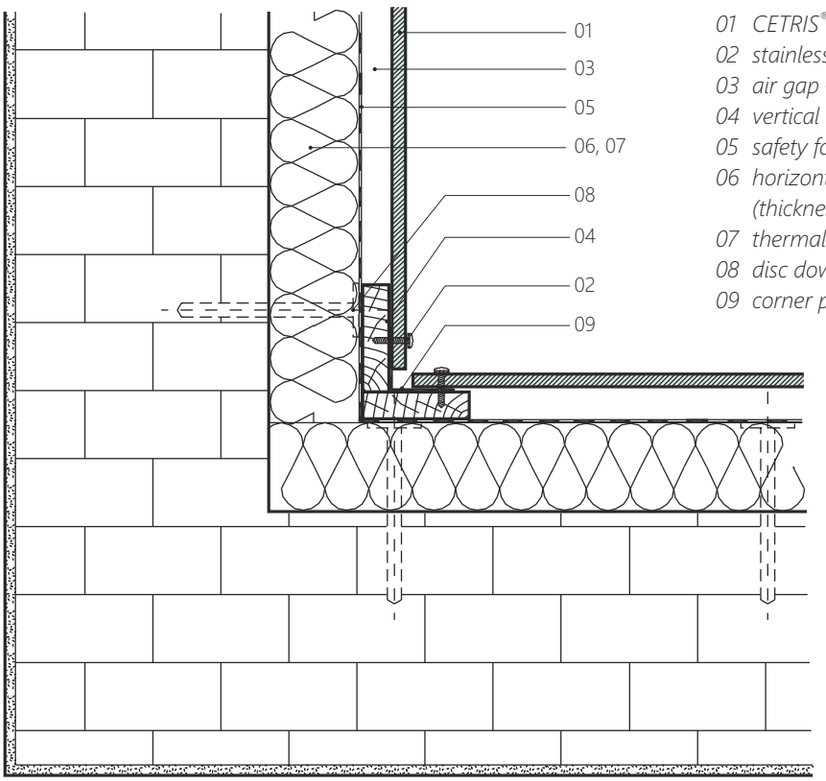
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel
09 corner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

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



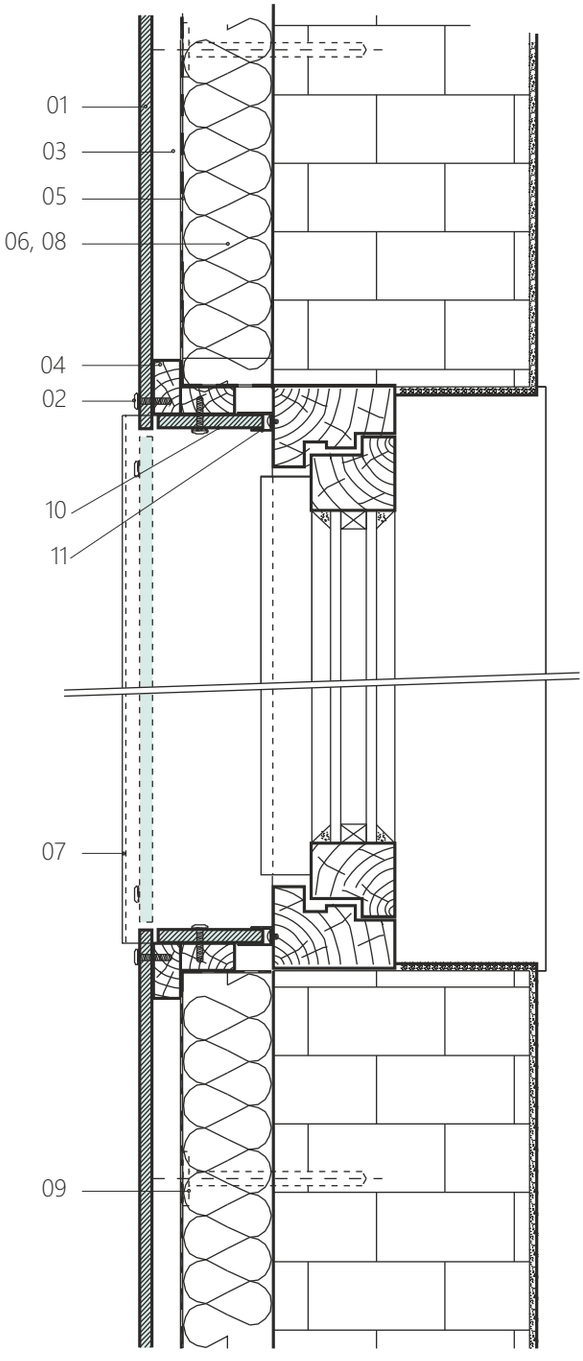
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 disc dowel

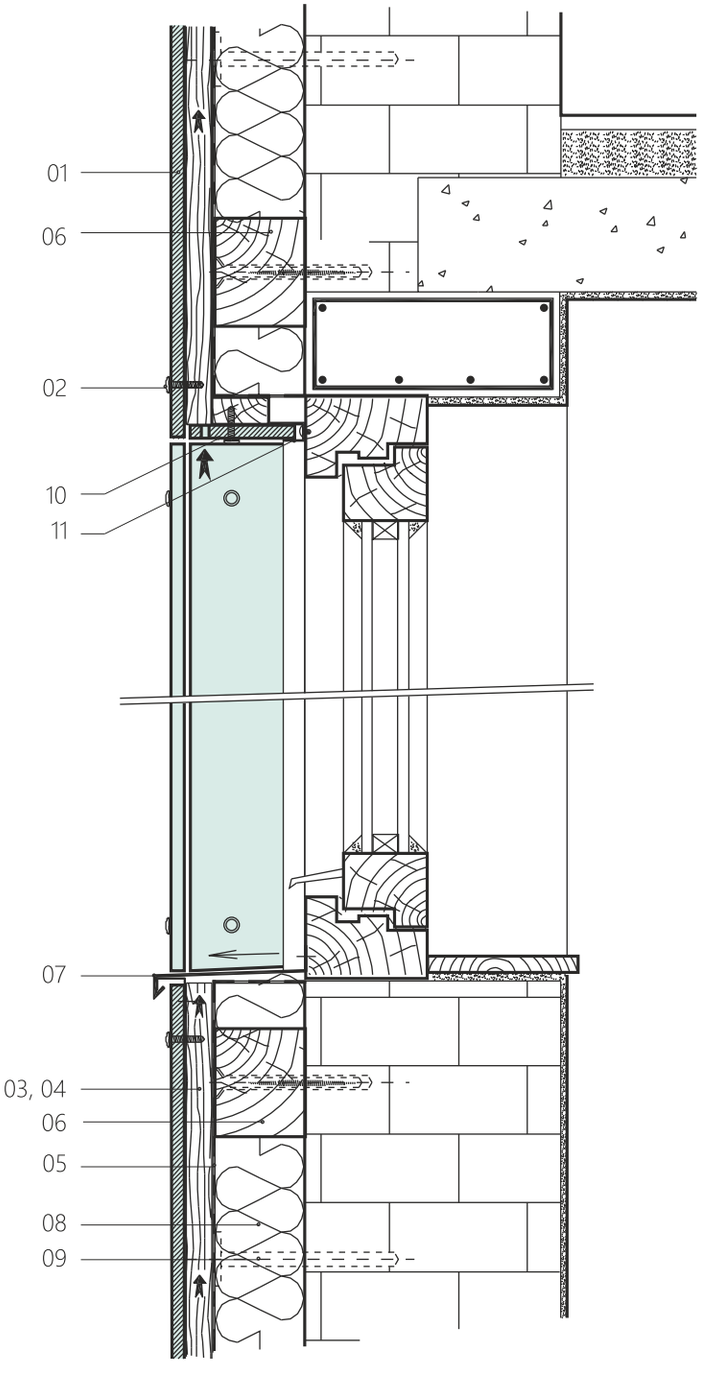
Detail of interior corner. CETRIS® board on wooden grid with corner profile, VARIO system
Horizontal section



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

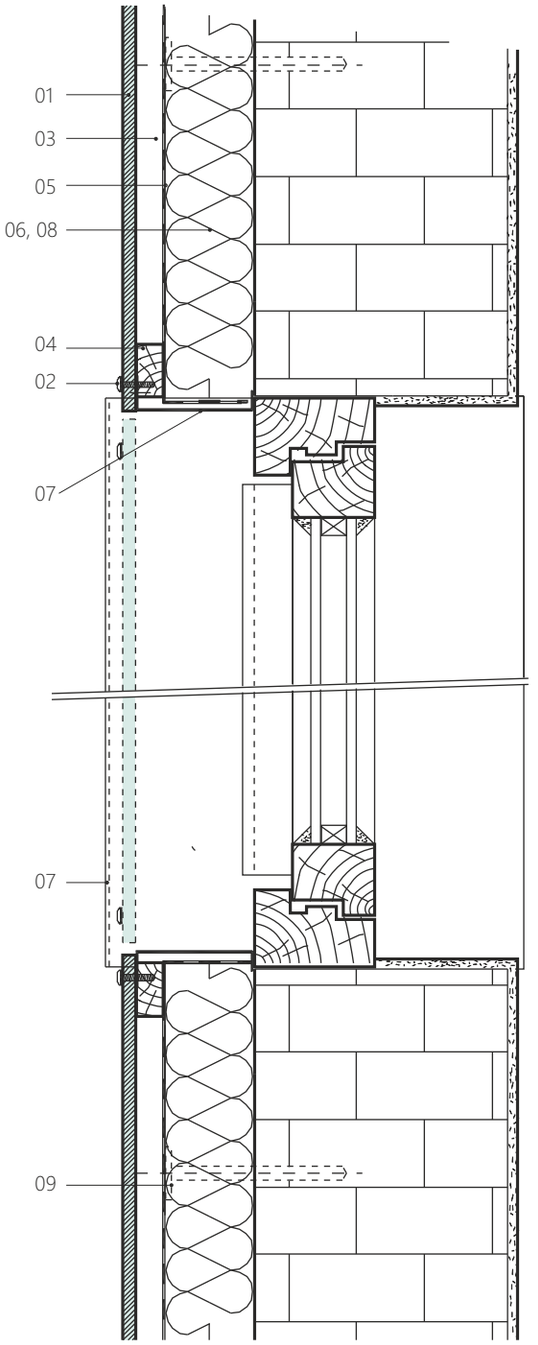
Detail of jamb and window head of opening, CETRIS® boards on wooden grid, VARIO system
Horizontal and vertical section

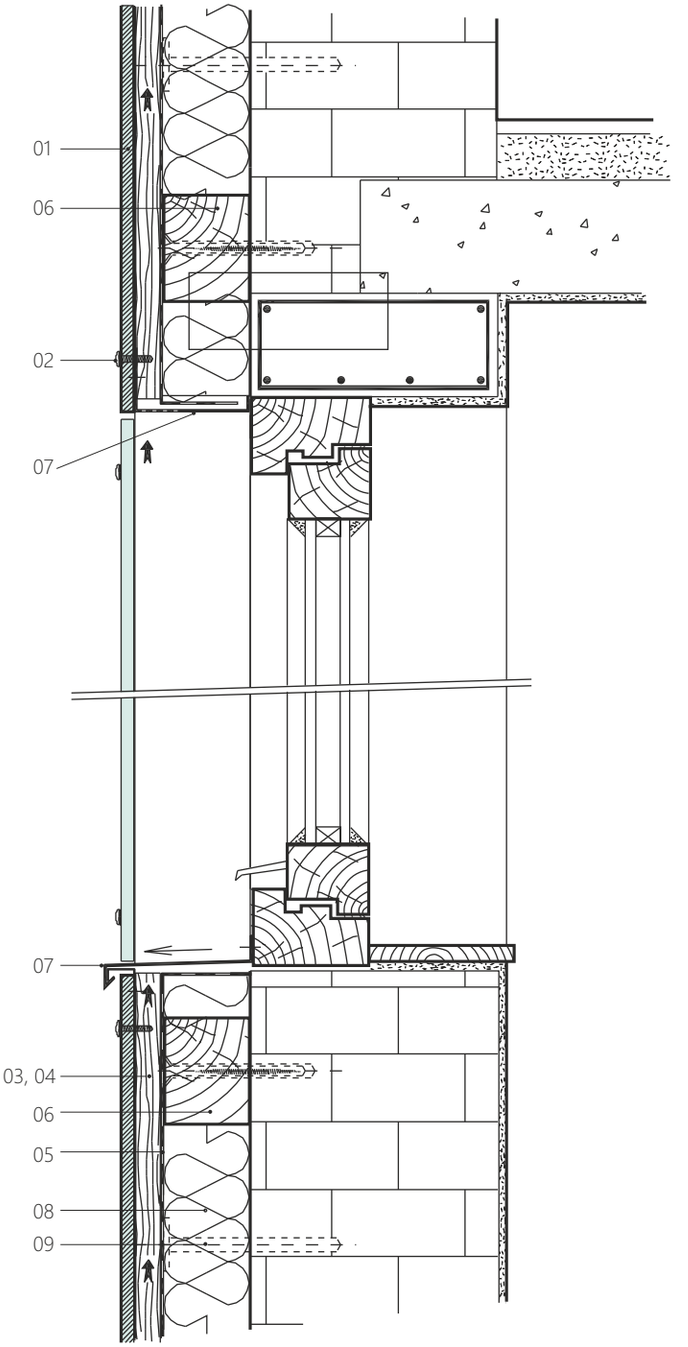




01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 metal-plating – tinsmithing product
08 thermal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

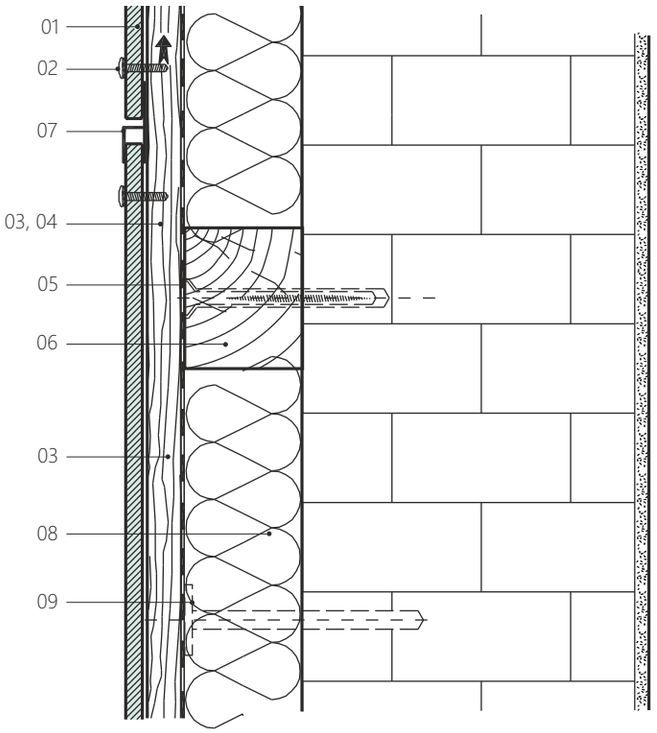
Detail of jamb and window head with sheet metal cladding of opening, CETRIS® boards on wooden grid, VARIO system
Horizontal and vertical section





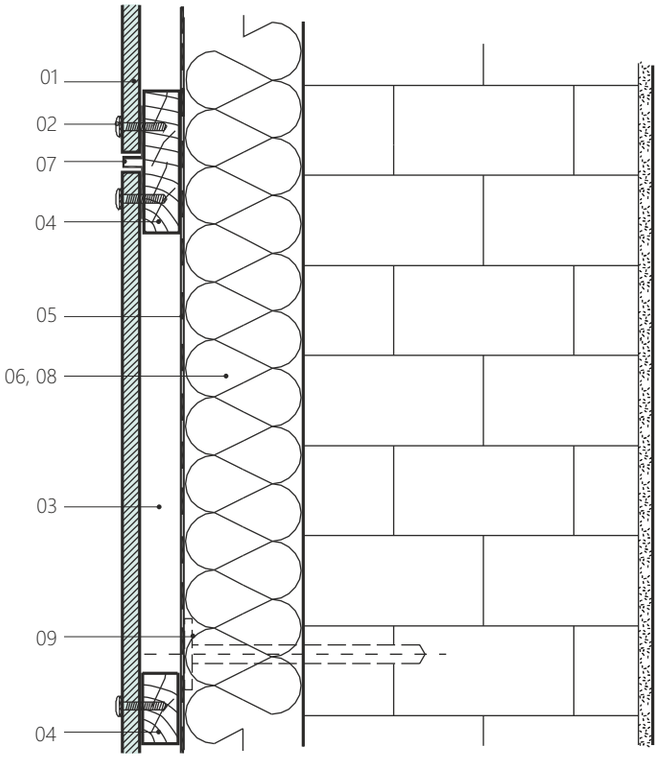
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 metal-plating – tinsmithing product
08 thermal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

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



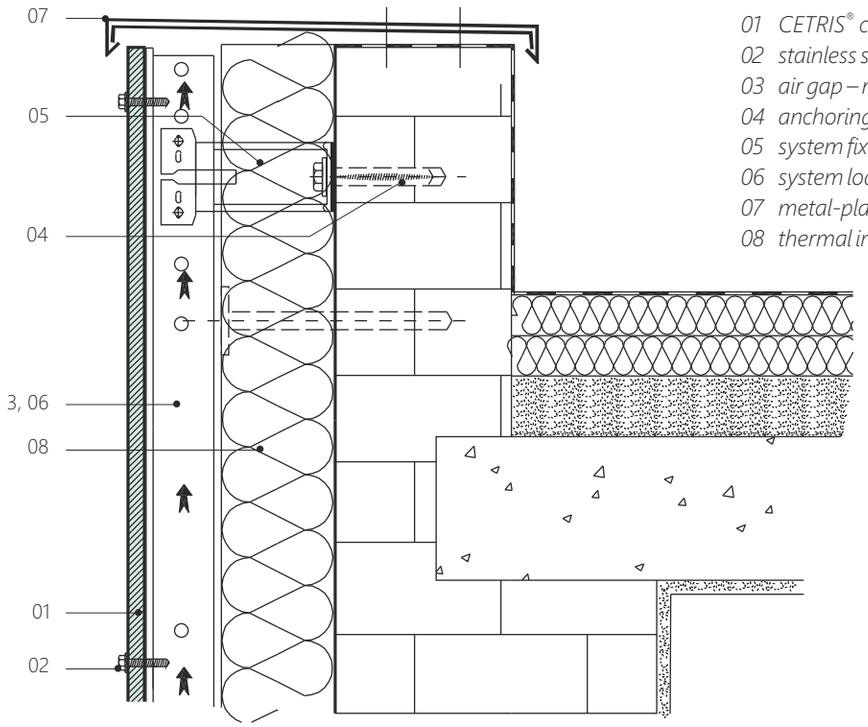
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 profile in joint – metal product, or profile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

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



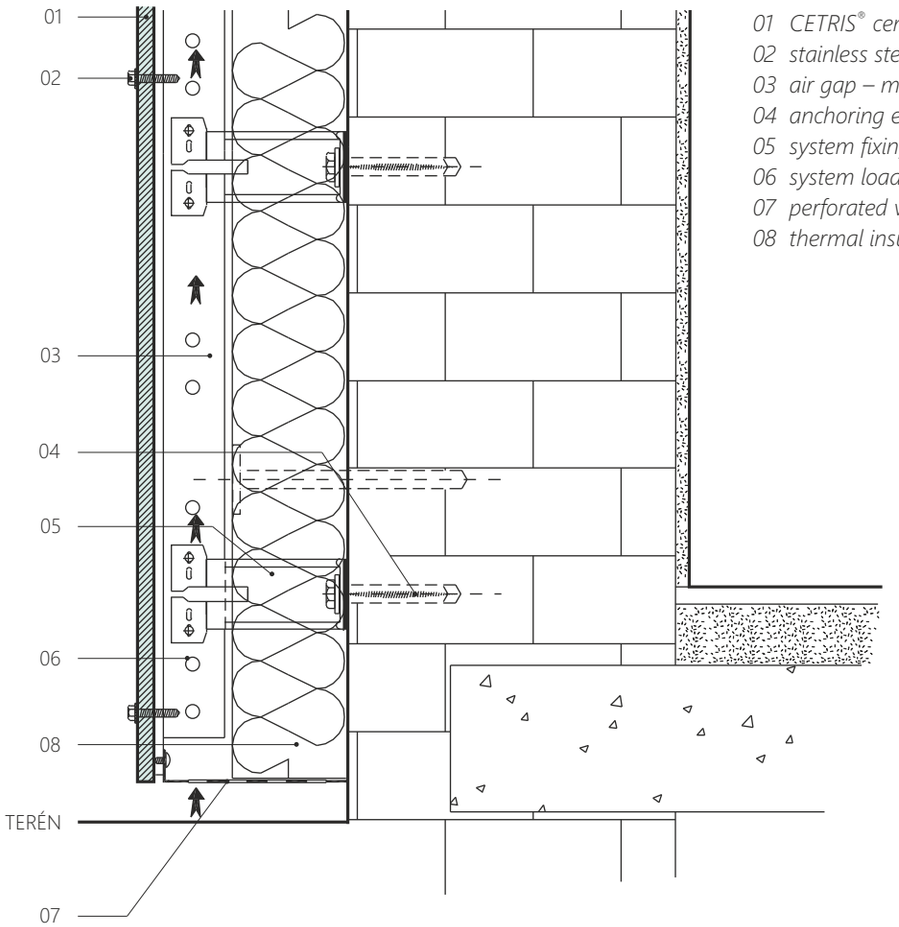
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 vertical wooden lath 50 x 25 (100 x 25) mm, impregnated
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 profile in joint – metal product, or profile protector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

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



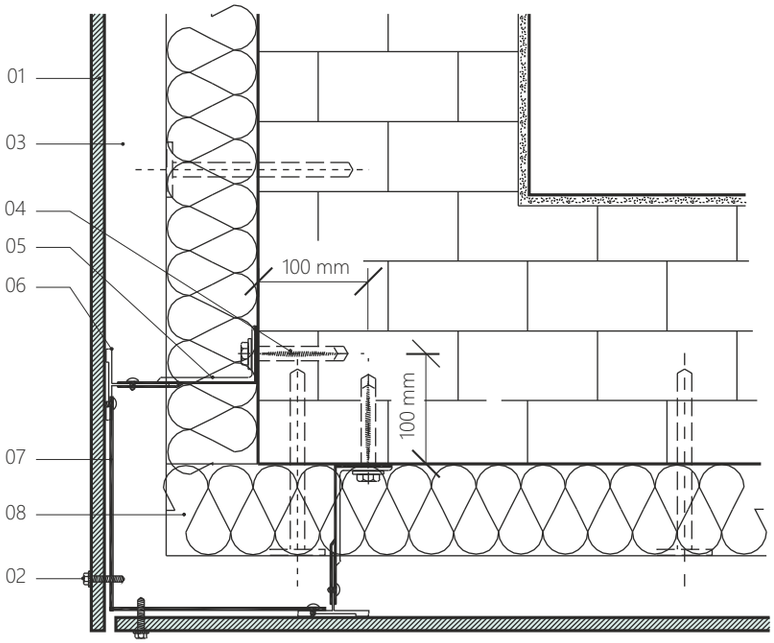
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile – angle
07 metal-plating – tinsmithing product
08 thermal insulation

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



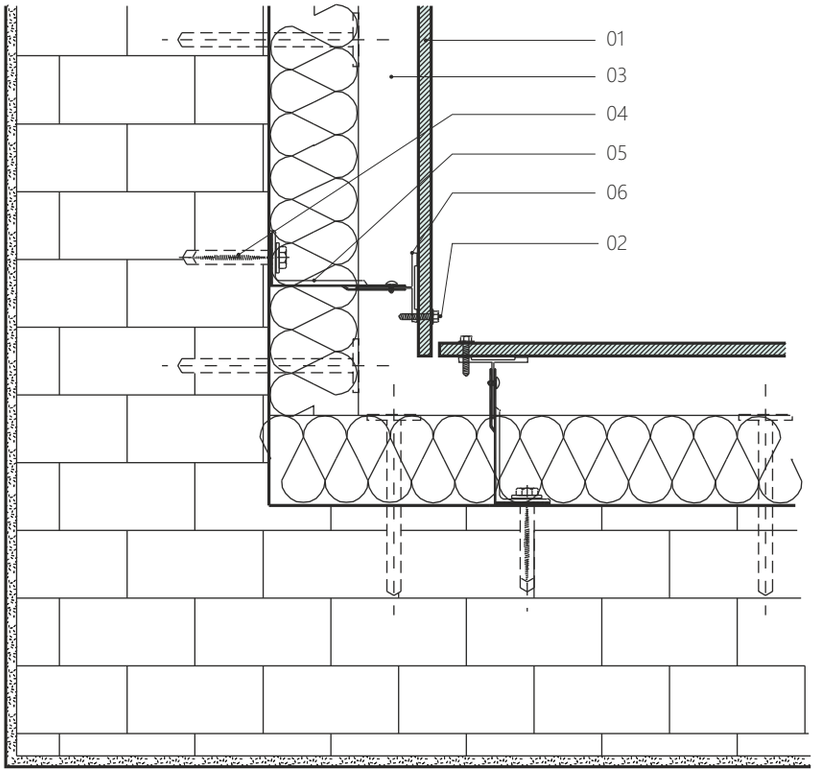
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile – angle
07 perforated ventilation profile (PROTECTOR)
08 thermal insulation

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



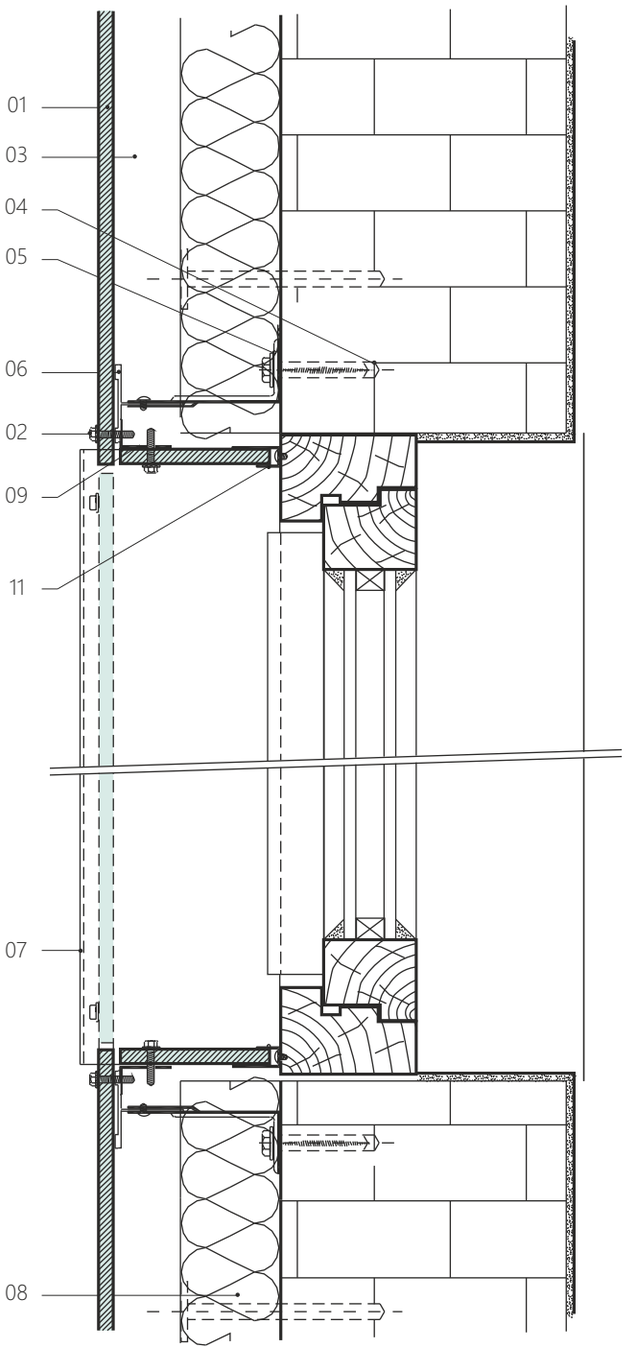
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 aluminium L profile (500 mm)
08 thermal insulation

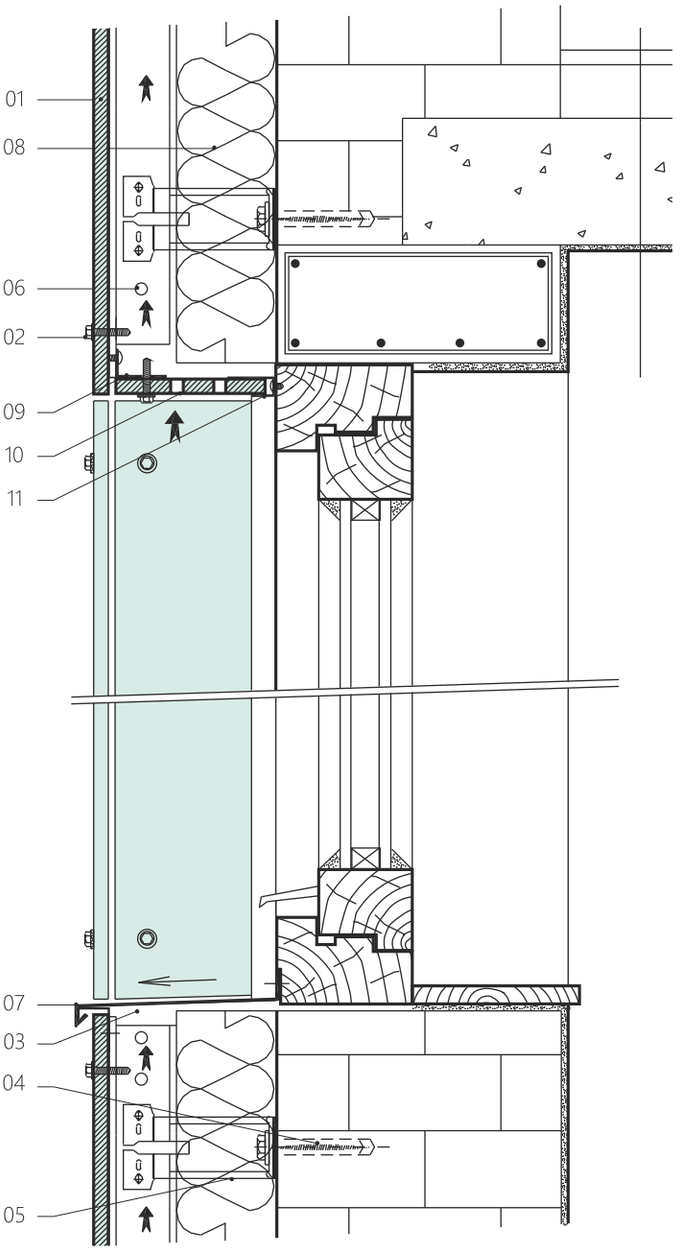
Detail of interior corner. CETRIS® board on system profiles, VARIO system
Horizontal section



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

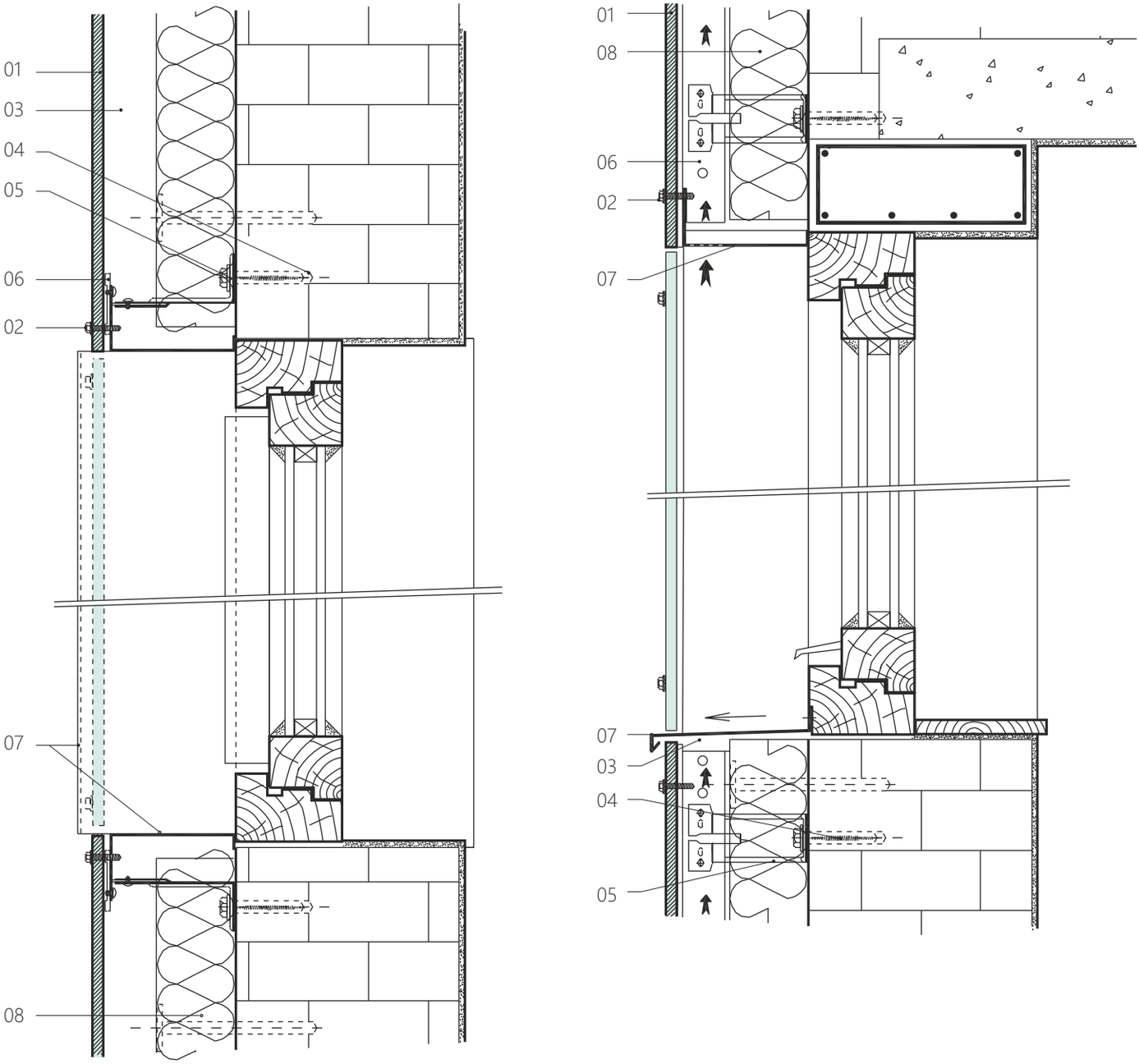
Detail of jamb and window head with opening sheet metal cladding of the opening, CETRIS® boards on system profiles, VARIO system
Horizontal and vertical section





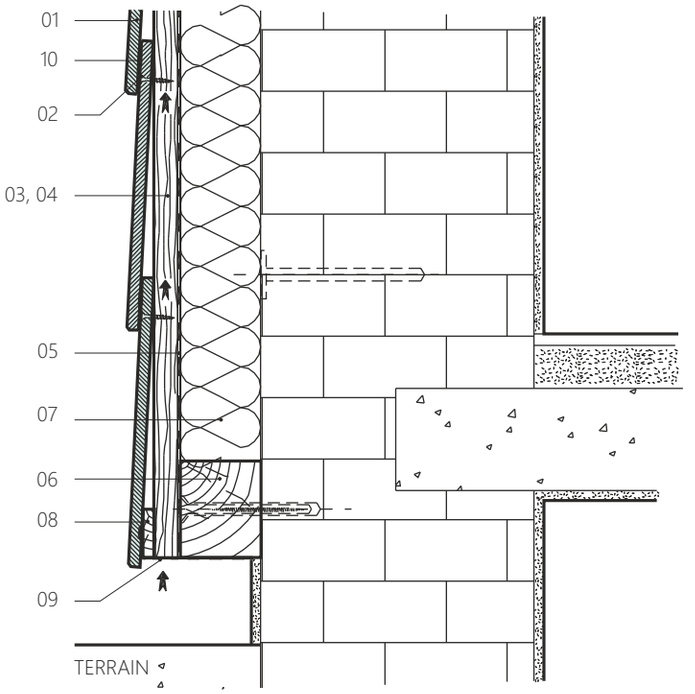
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 aluminium L profile
10 head jamb – perforated CETRIS® board
11 edge profile

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



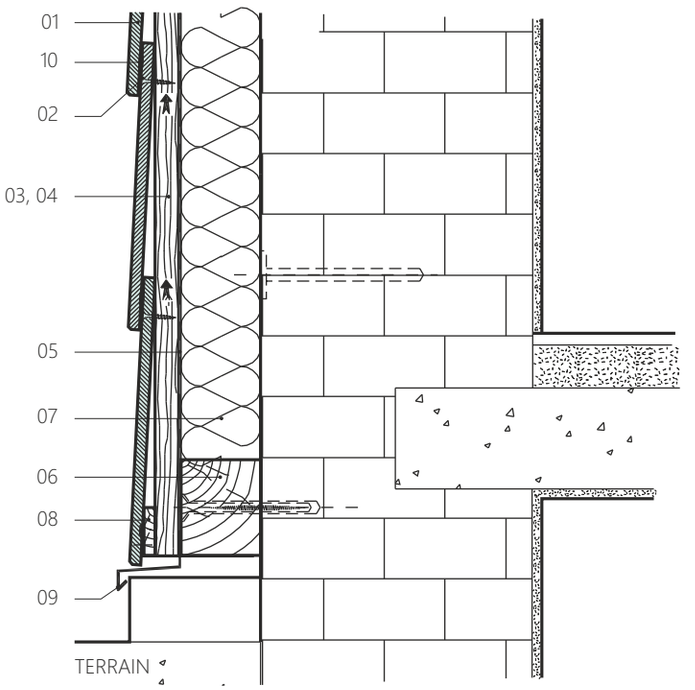
01 CETRIS® cement bonded particleboard
02 stainless steel screw with washer
03 air gap – min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation

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



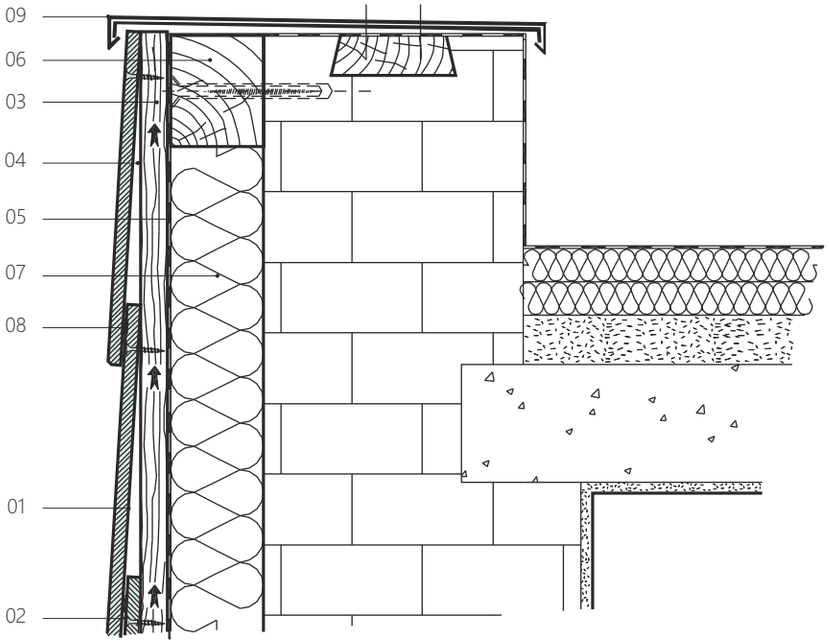
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath with a width of 100 mm (thickness according to the insulation)
07 thermal insulation
08 base plate
09 perforated ventilation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

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



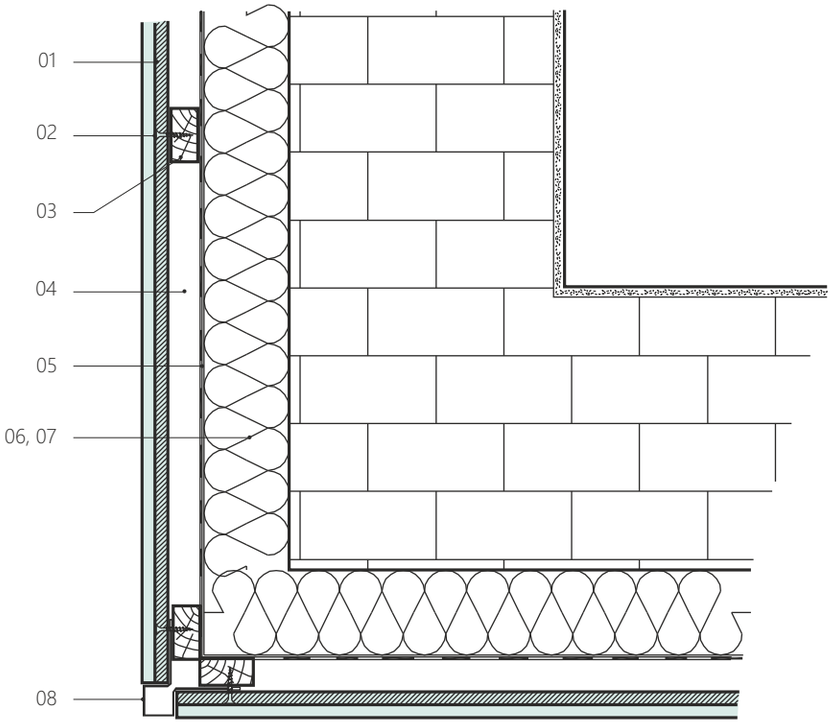
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath with a width of 100 mm (thickness according to the insulation)
07 thermal insulation
08 base plate
09 perforated ventilation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

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



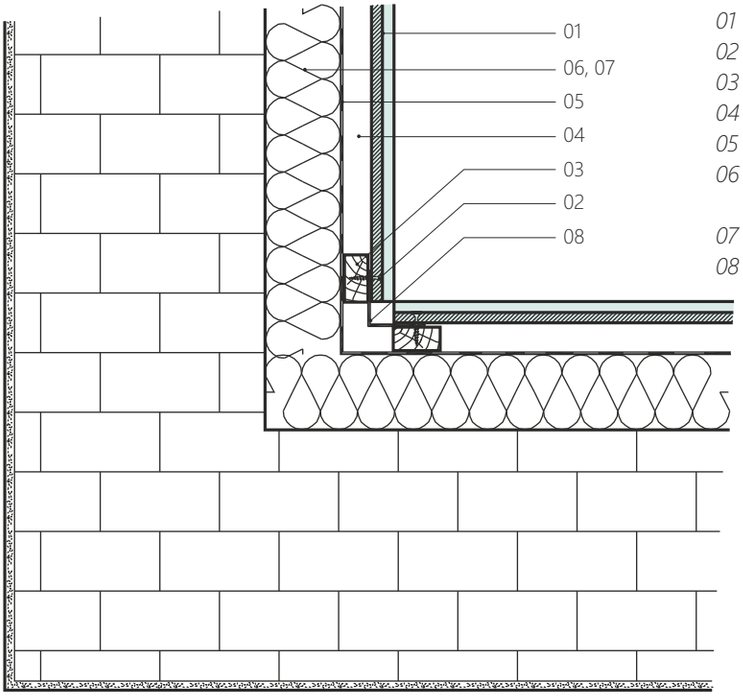
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width 100 mm (thickness according to the insulation)
07 thermal insulation
08 elastic sealant
09 metal-plating – tinsmithing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

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



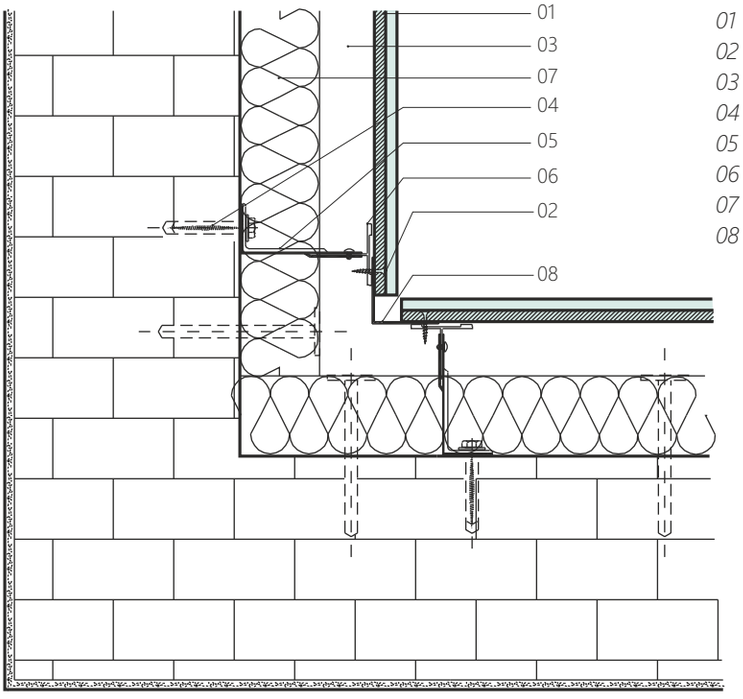
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath of width 100 mm (thickness according to the insulation)
07 thermal insulation
08 corner profile – tinsmithing products,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

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



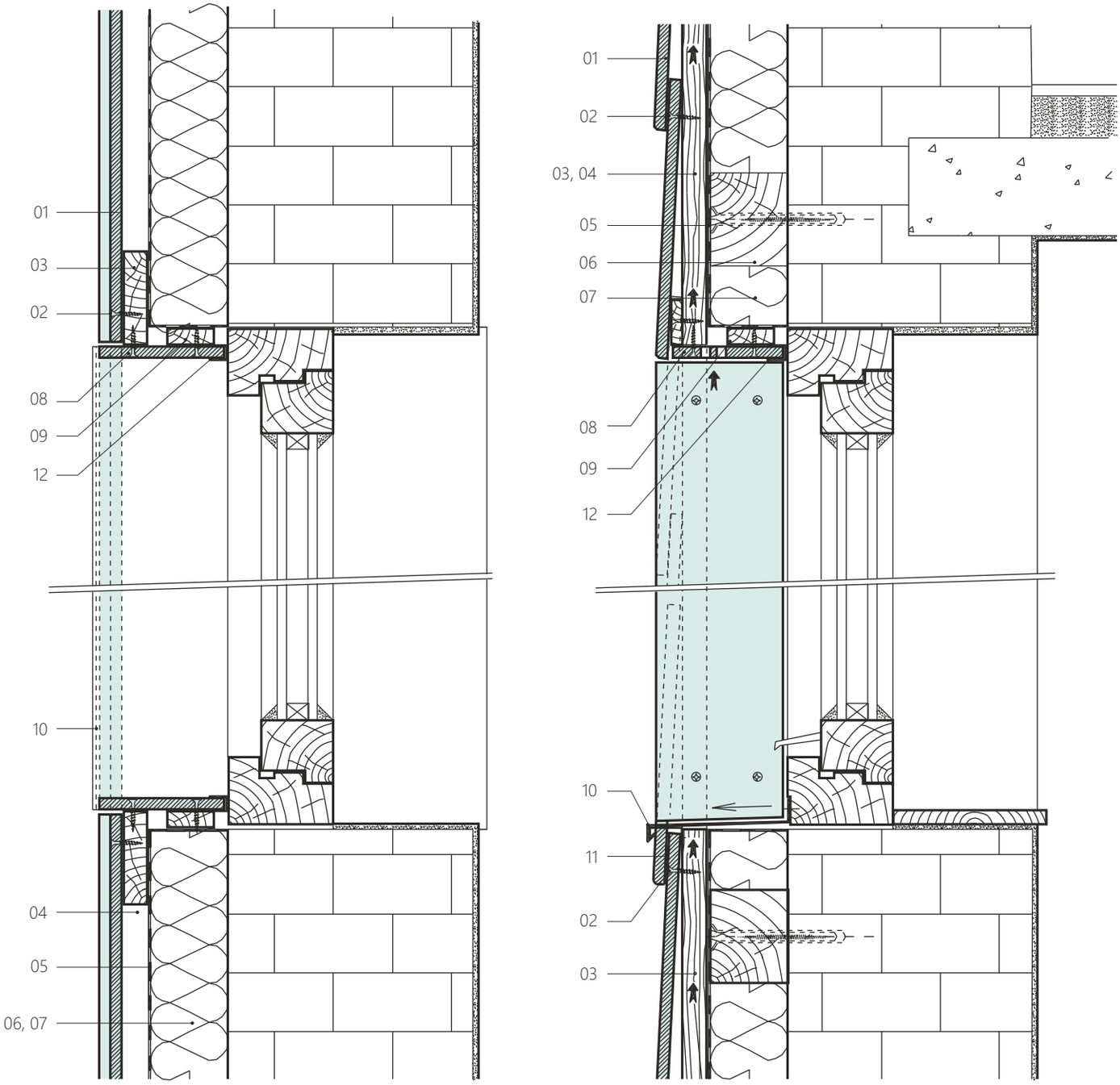
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min. 25 mm
05 safety foil
06 horizontal wooden lath with a width of 100 mm (thickness according to the insulation)
07 thermal insulation
08 corner profile – tinsmithing product,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

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



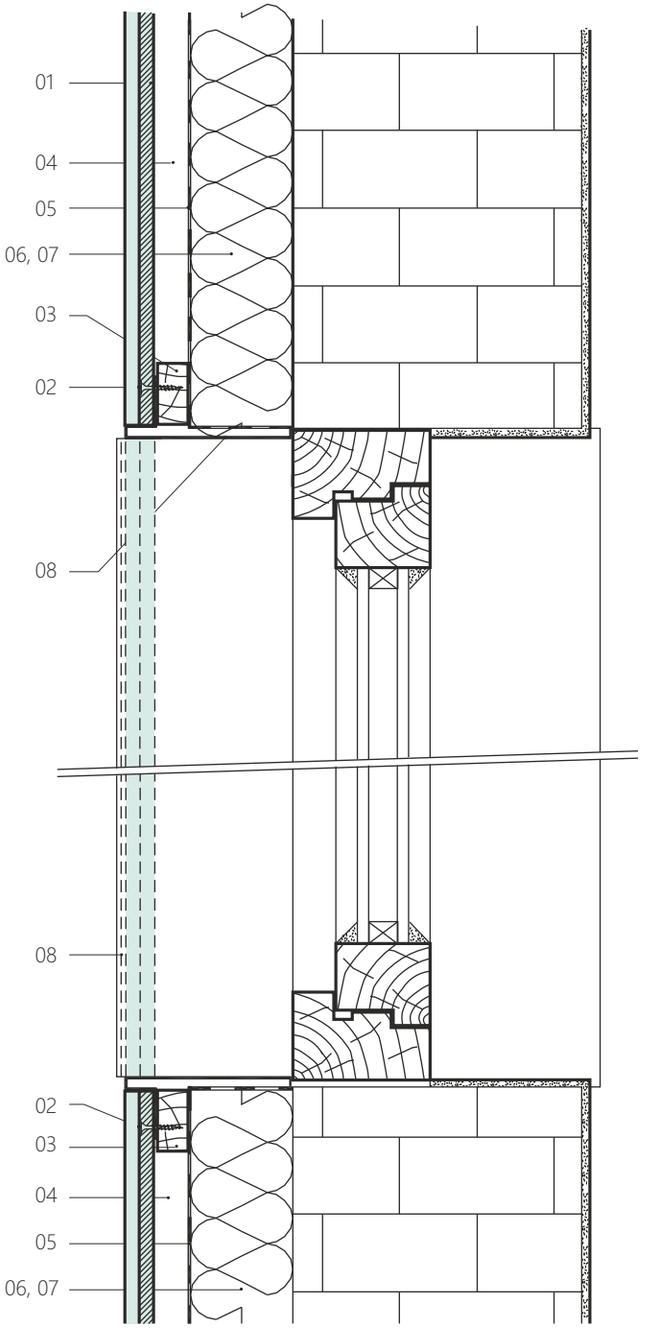
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 thermal insulation
08 corner profile – tinsmithing product, or PROTECTOR profile

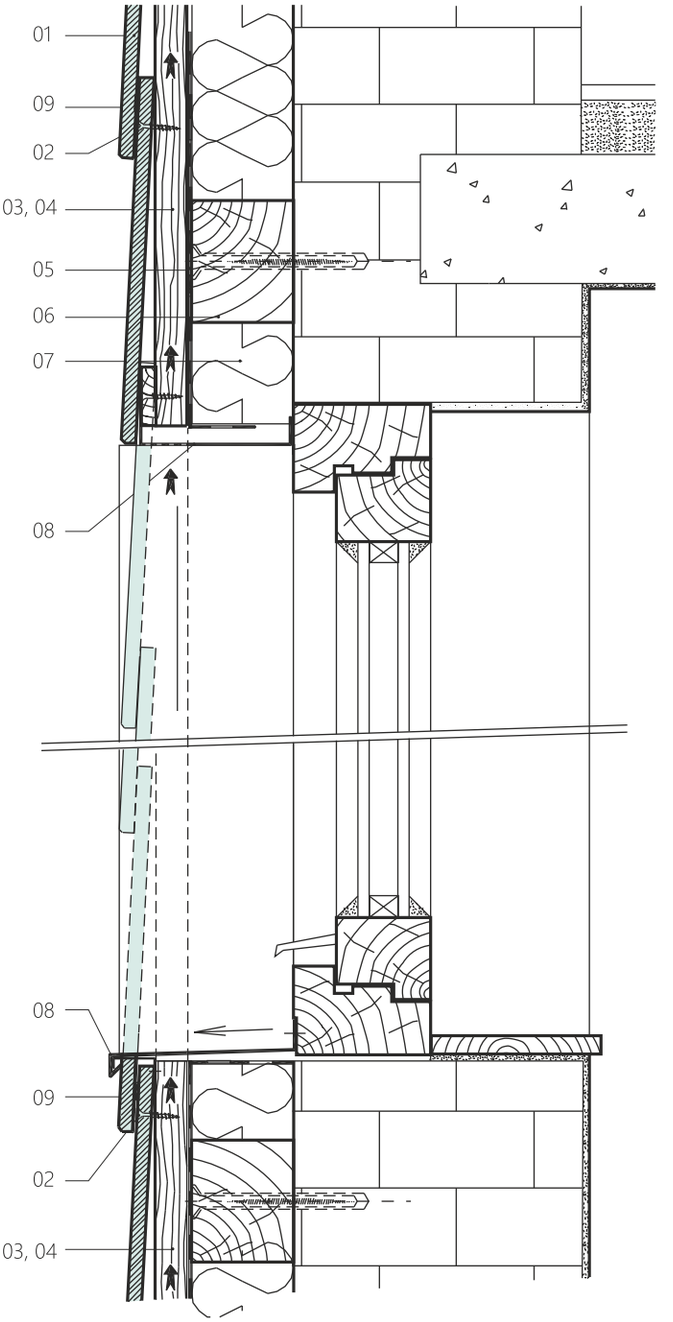
Detail of jamb and window head of opening, CETRIS® boards on wooden grid, PLANK system
Horizontal and vertical section



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)

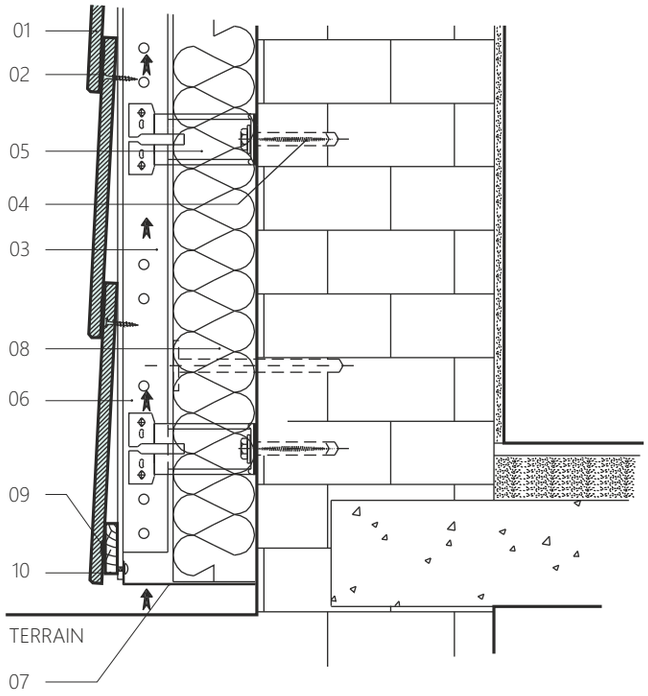
Detail of jamb and window head of opening with sheet metal cladding, CETRIS® boards on wooden grid, PLANK system
Horizontal and vertical section





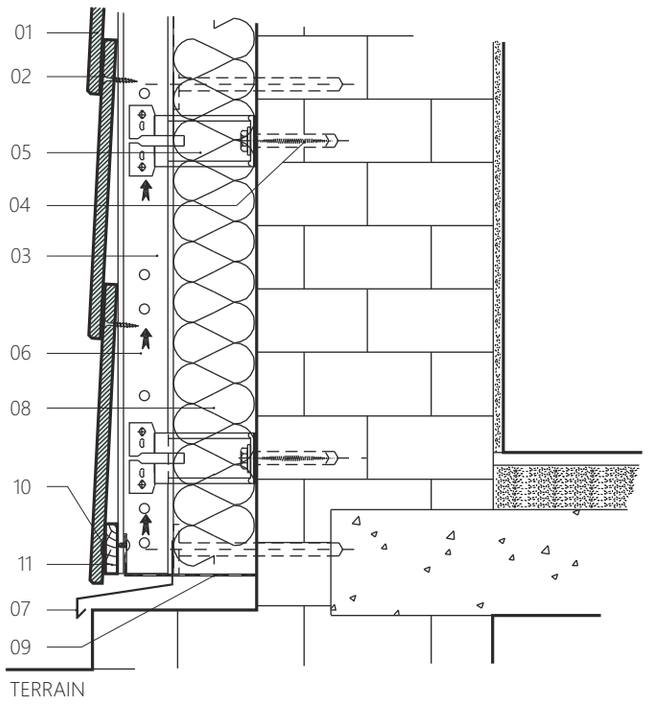
01 CETRIS® cement bonded particleboard
02 frame head screw
03 vertical wooden lath 50 × 25 (100 × 25) mm, impregnated
04 air gap min 25 mm
05 safety foil
06 horizontal wooden lath of width = 100 mm (thickness according to the insulation)
07 thermal insulation
08 metal plating – tinsmithing product, or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

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



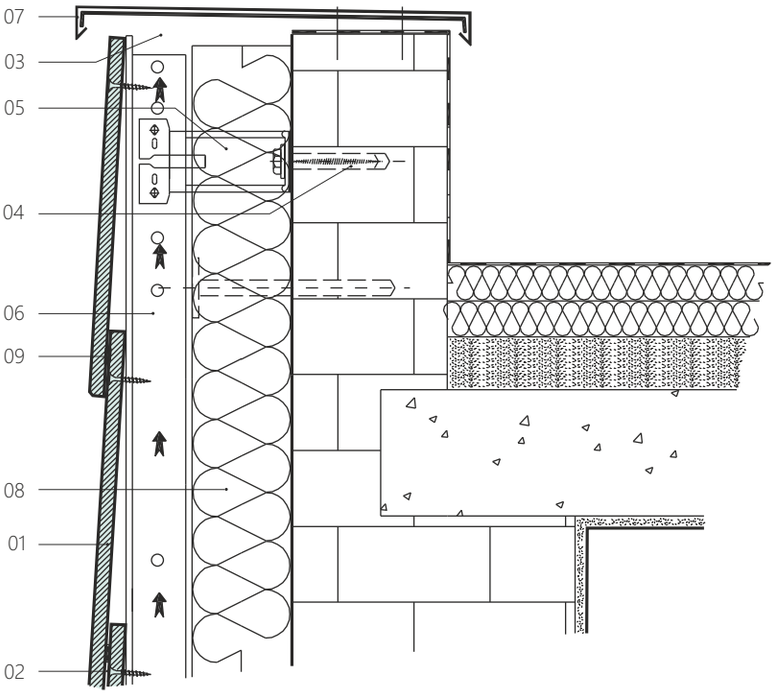
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 perforated ventilation profile (PROTECTOR)
08 thermal insulation
09 elastic sealant
10 base plate

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



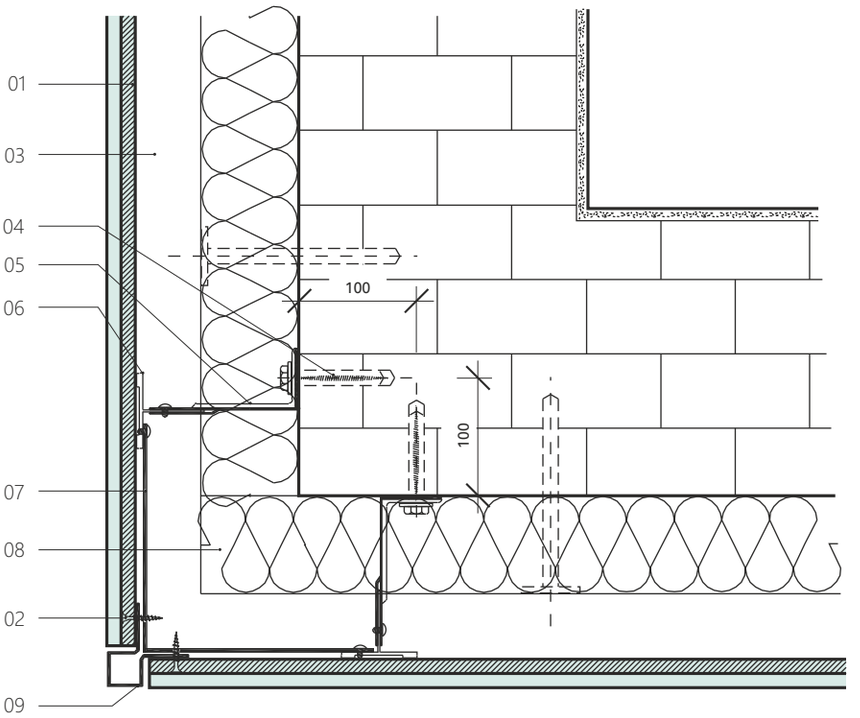
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 perforated ventilation profile (PROTECTOR)
10 elastic sealant
11 base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

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



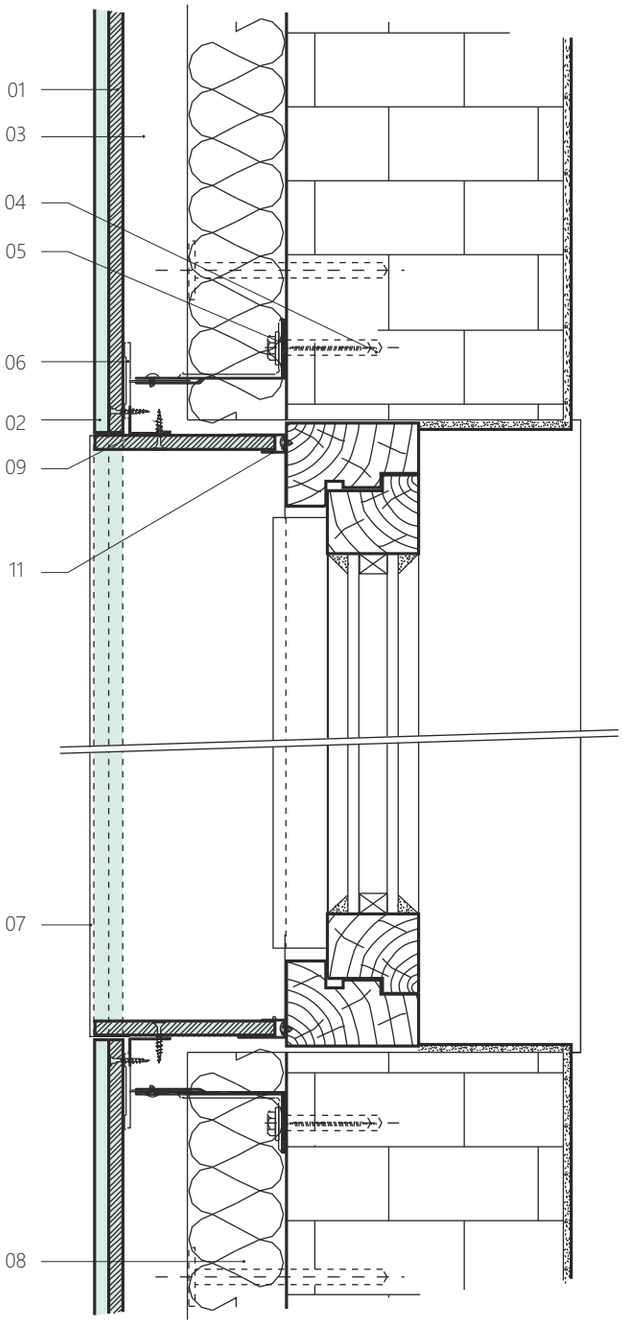
01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 elastic sealant

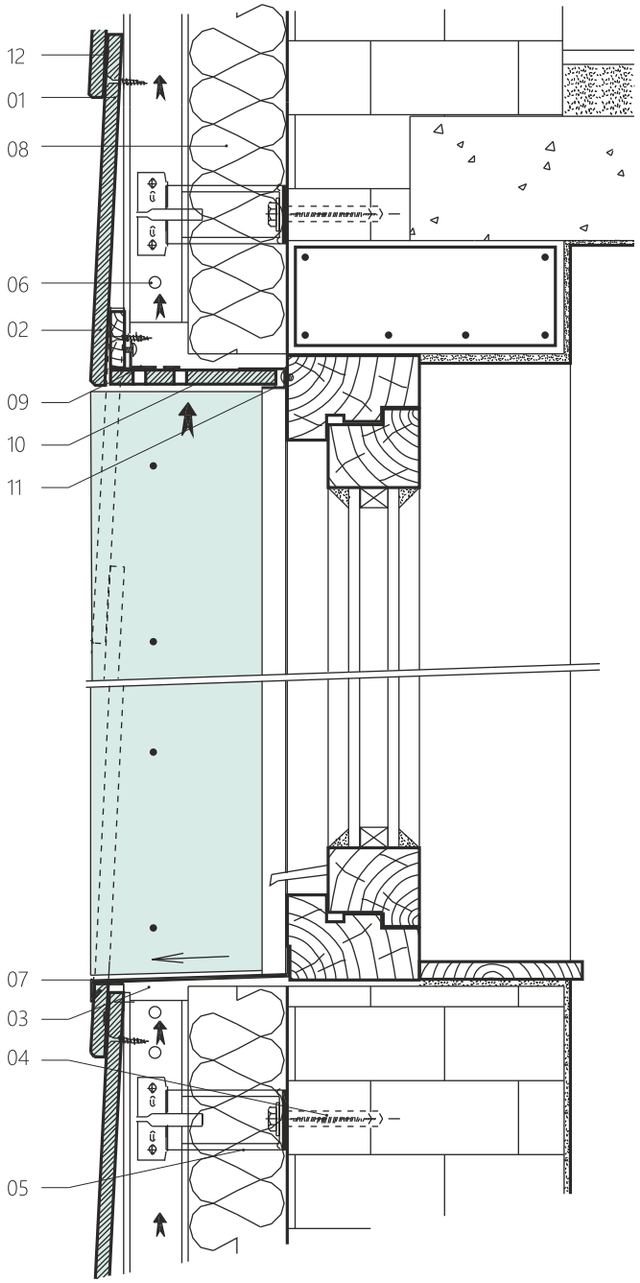
Detail of exterior corner. CETRIS® board on system profiles, PLANK system
Horizontal section



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

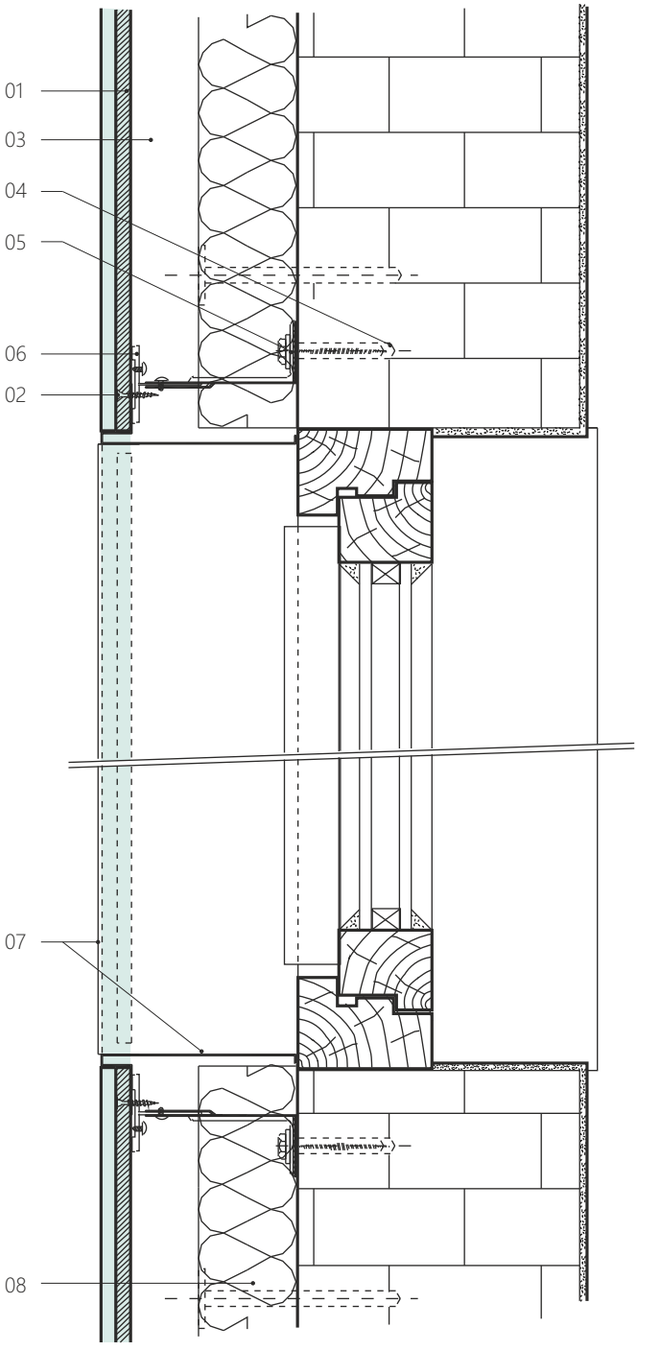
Detail of jamb and window head of opening, CETRIS® boards on system profiles, PLANK system
Horizontal and vertical section

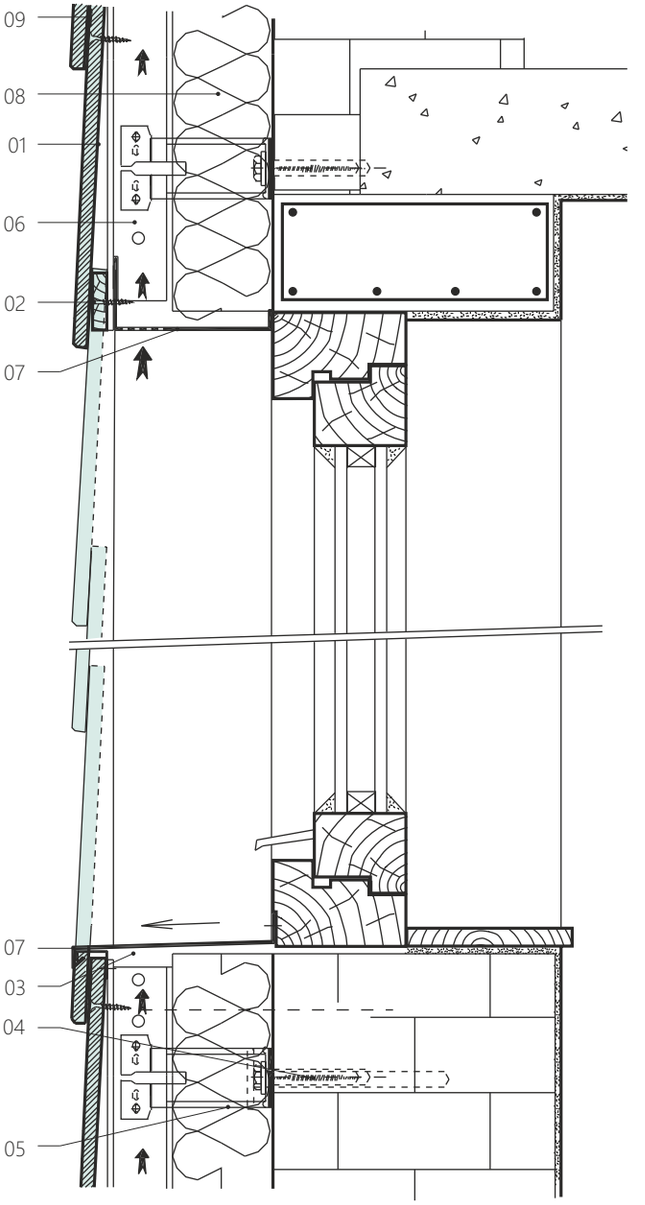




01 CETRIS® cement bonded particleboard
02 frame head screw
03 air gap min. 25 mm
04 anchoring element
05 system fixing element – anchor
06 system load-bearing profile
07 metal-plating – tinsmithing product
08 thermal insulation
09 aluminium "L"-profile
10 jamb (door head) cladding – perforated CETRIS®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

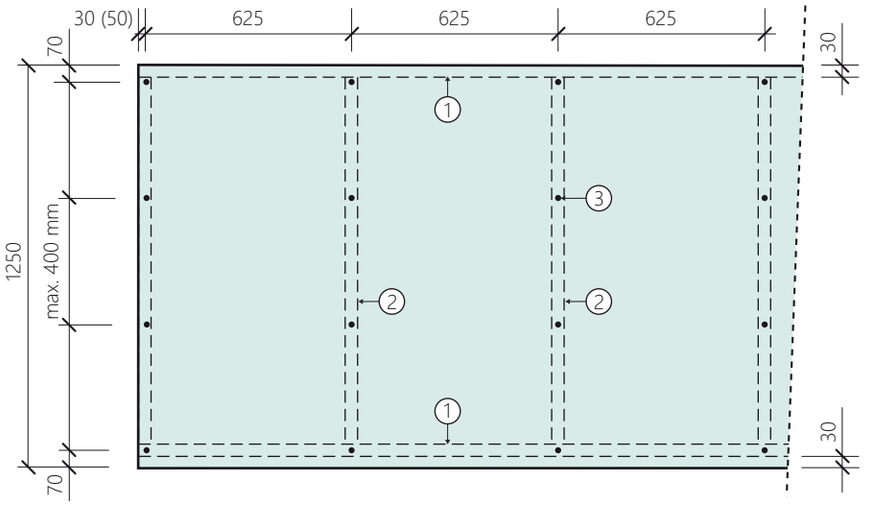
Length up to 1,670 mm:

- 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



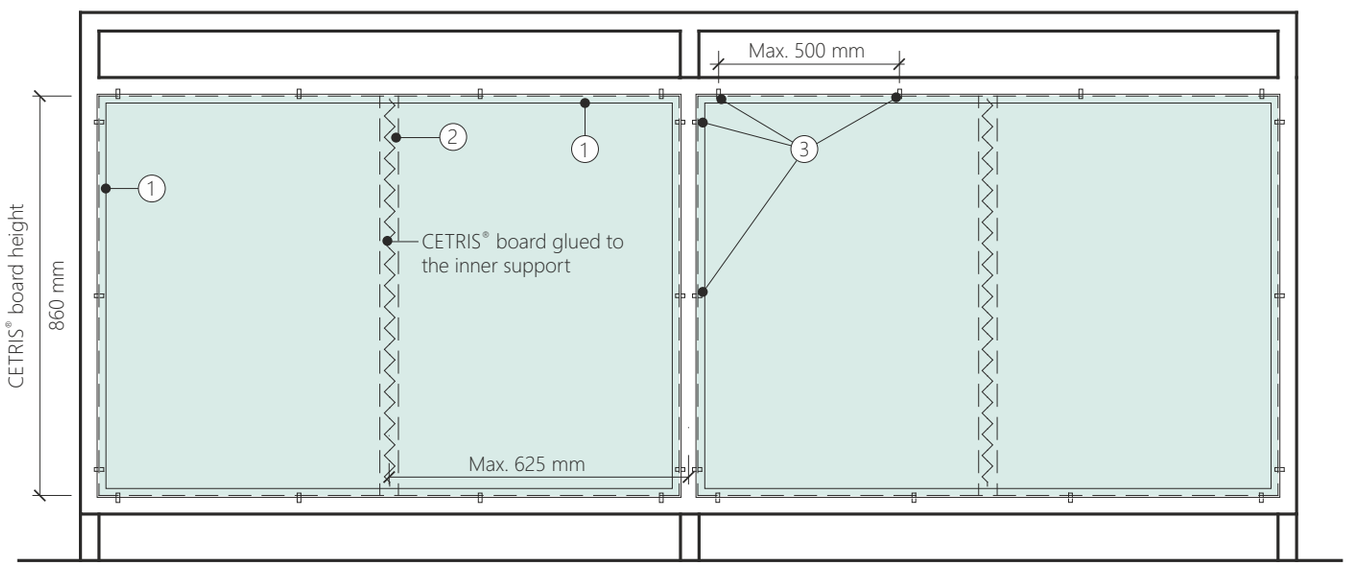
1 Horizontal profile (axial distance max 1250 mm)
2 Vertical profile (axial distance max 625 mm)
3 Screw with washer and sealing rubber

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.

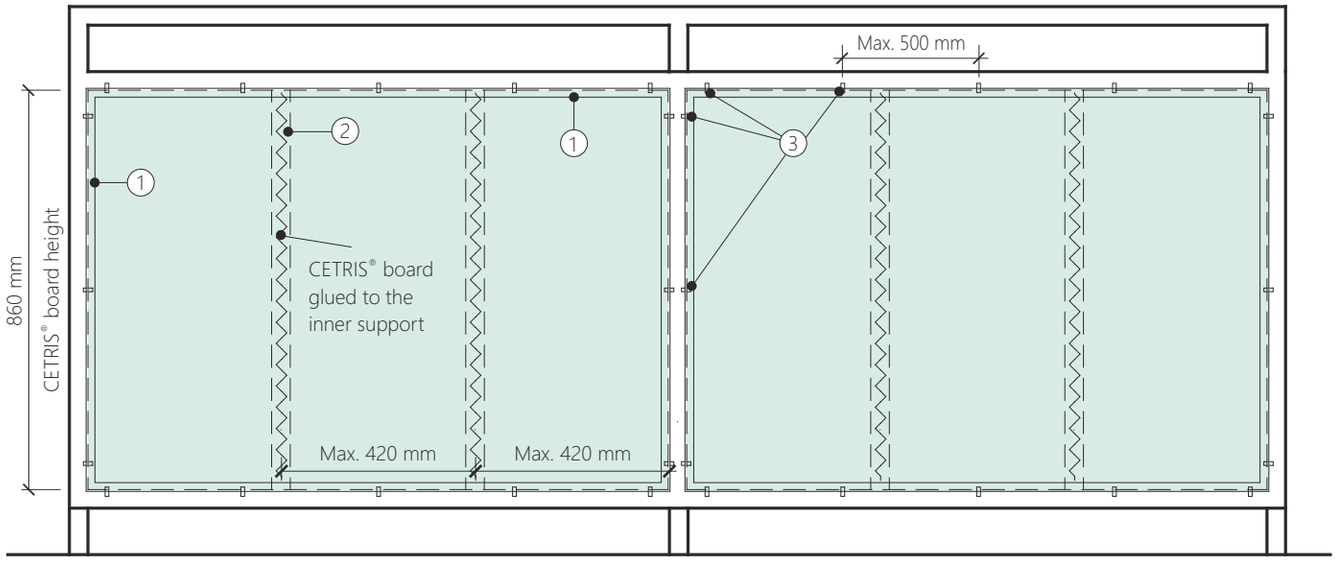
When using a CETRIS® board of thickness 16 mm, the maximum available spacing of the inner vertical reinforcements is 625 mm. A suitable type of the peripheral lath is the F profile PROAL 74009.

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

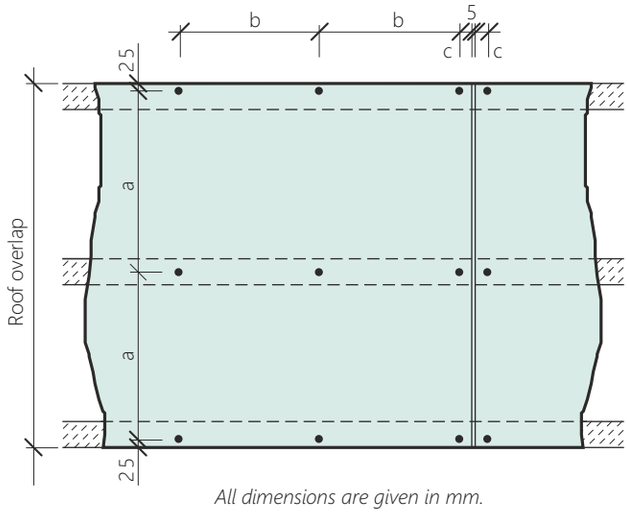
Cladding of the exterior of constructions may be done using basic CETRIS® BASIC, PROFIL, INCOL boards without surface treatment whose surfaces can be treated prior to installation, or some CETRIS® boards with surface treatment– FINISH, PROFIL FINISH, LASUR, PROFIL LASUR, DEKOR boards. The basic CETRIS® 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.

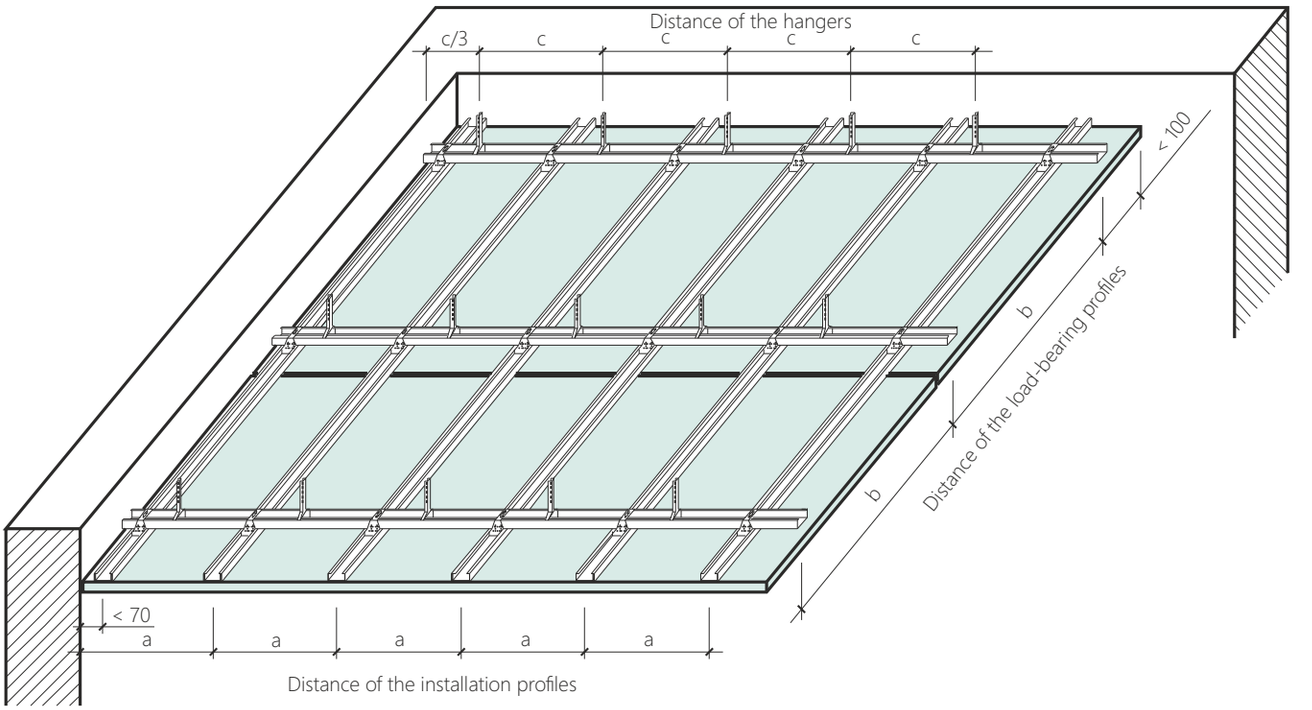


All dimensions are given in mm.

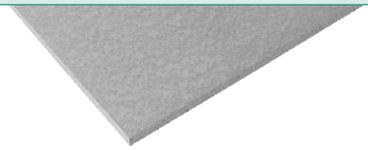
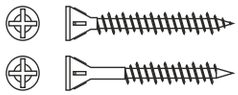
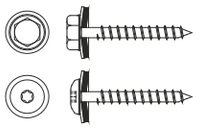
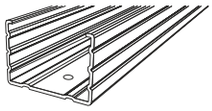
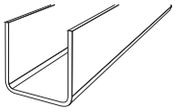
Load-bearing construction – wooden laths			
Board thickness (mm)	Support distance a (mm)	Screw distance b (mm)	Distance of screw from board edge c (mm)
8	400	200	>25 <70
10	500	250	
12	625	300	

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.

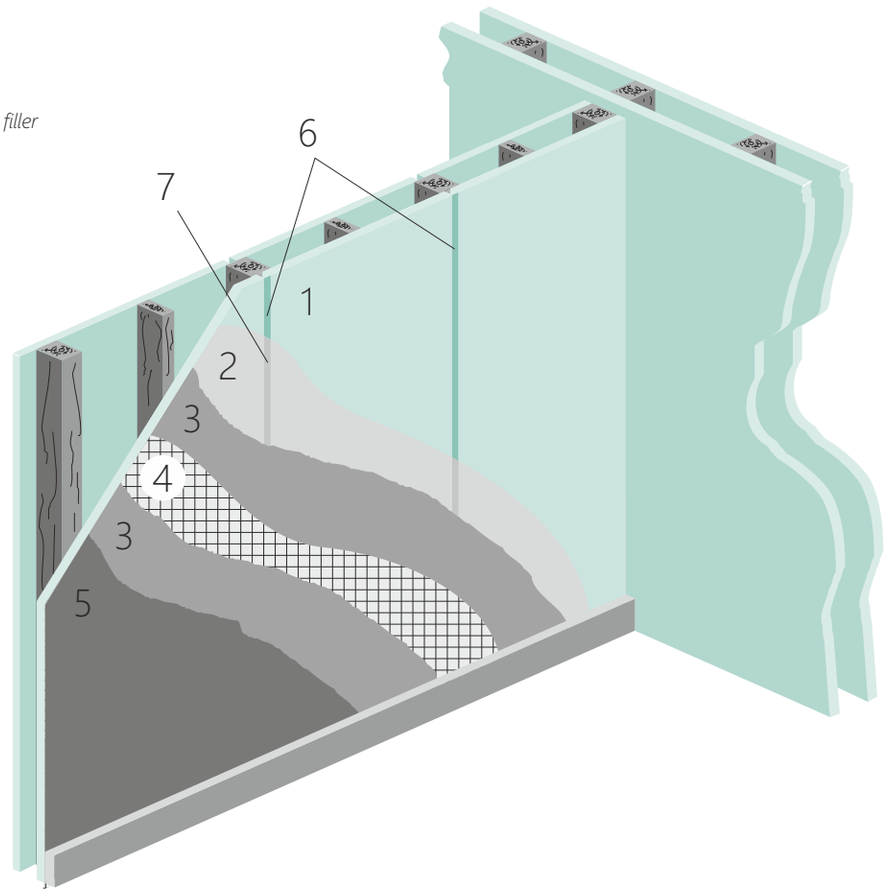
Exterior without joints – for an appearance without joints and visible screw heads, the only solution is application of a full area plaster system including full area gluing of 30 mm insulation (polystyrene, mineral wool).

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



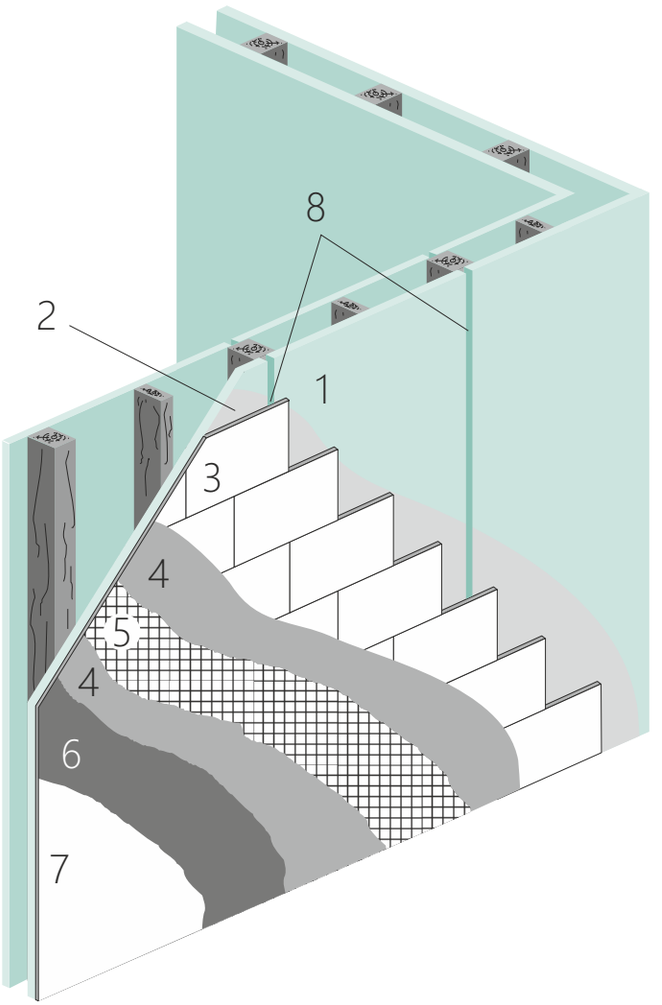
Exterior Plasters

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.

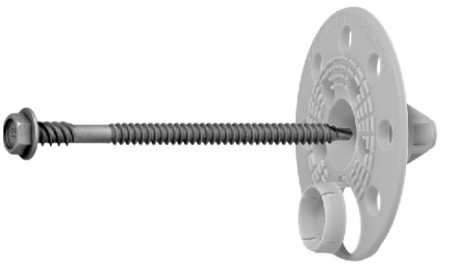
The CETRIS® boards must be treated with a penetration agent, the joints need not be filled in this case. Polystyrene and mineral wool are glued with cement glue or low-expansion foam to cover the joints between the CETRIS® cement bonded particleboards. Subsequently a trowel-on coating is applied on the 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.



Application of CETRIS® Boards in Fire Protection

8.1 Fire Protection of Building Constructions

8.1.1 Requirements of Fire Safety of Building Constructions

The requirements for fire safety of building constructions and products built in them are stipulated by the Fire Standards Code. This standard is divided into four groups:

- Design standards (requirements for building design with regard to fire safety)
- Test standards (defining methods of testing and proving the required properties)
- Value standards (fire technical properties of selected constructions and materials)
- Subject standards (technical conditions of fire safety equipment)

8.1.2 Fire-Related Properties of Building Materials – Flame Spread

ČSN 73 0863 – "Determination of flame propagation along the surface of building materials" is used for specification of the flame spread index "is", characteristics expressing the speed of flame spread in time under exactly defined test conditions.

The Flame spread index "is" has been specified for CETRIS® cement-bonded particleboard with surface treatment (Finish, Lasur, Dekor) – always with the result $i_s = 0$.

8.1.3 Classification of Building Products into Euro Classes according to Reaction to Fire

Based on these tests, the CETRIS® cement bonded particleboard is classified as A2. Its complementary classification of smoke generation is s1, its classification of flaming drops (particles) is d0, which means that the final classification is A2-s1,d0. This result applies to classification of the board behaviour in fire conditions, except for flooring.

This classification applies to all types of CETRIS® boards except for DEKOR. Due to its surface treatment (marmolite plaster), the CETRIS® DEKOR cement bonded particleboard is classified into class B. Its complementary classification of smoke generation is s1, its classification of flaming drops (particles) is d0, which means that the final classification is B-s1,d0.

8.1.4 Fire Resistance of Building Constructions

Fire resistance is a specific and decisive property of building constructions. Fire resistance is expressed in time (minutes) for which the assessed construction is able to resist effects of the so called standard fire, i.e. fire progressing under exactly specified conditions. As these parameters are specific for individual building constructions and differ according to the action of the stress on the specific construction, multiple test methodologies and standards for evaluation of these properties also exist.

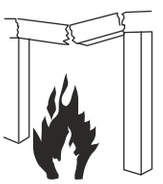
Fire resistance is specified by test or calculation, extrapolation and comparison to test standards and regulations. Fire resistance classification is done either on the basis of a test, including the conditions for direct application, or methods for expansion of the application (calculations, extrapolations, etc.) by an authorised body, which issues the fire resistance classification certificate. Fire resistance is specified in minutes on the basic scale: 15, 30, 45, 60, 90, 120 and 180 minutes. The fire resistance values for the individual limit conditions are marked as follows

Insulation ability

I

Integrity

E



Load-bearing capacity and stability

R

R - Load-bearing capacity and stability
E - Integrity
I - Insulation ability – limit temperature of the non-heated surface
W - Limit density of heat flow from the non-heated side
S - Burning product penetration (... and others, less often used).

The decisive limit conditions are defined for every construction in compliance with the relevant project standard and suitable constructions are selected according to them, for instance:

- Constructions meeting the requirements of the three basic limit conditions, i.e. stability (R), integrity (E) and insulation ability (I) are classified with fire resistance REI. These requirements must be met by fire compartment partitions, i.e. walls and ceilings.
- Non-load-bearing fire partitions (interior walls, partitions and ceiling panels) have their requirements for fire resistance defined on the basis of just two of the limit conditions, i.e. integrity (E) and insulation ability (I), i.e. EI
- For load-bearing bar elements (beams and pillars) only the load-bearing capacity and stability are required – R
- Fire closures are required to show integrity (E) and insulation ability (I), those formerly marked as closures of PB type are now marked pursuant to ČSN 730810 as closures of EI type, and those formerly marked as PO, i.e. requiring integrity (E) and limit density of heat flow (radiation-W), are now marked as closures type EW
- for the wall and ceiling cladding of wooden buildings, the fire resistance of the cladding must be K

8.2 Vertical Wall Constructions

8.2.1 Scope of Application

According to the background information provided here, the CETRIS® boards can be applied in the following types of vertical wall constructions:

- Non-load-bearing walls and partitions up to a height of 9.50 metres and a fire resistance in the range EI 15 - EI 180 minutes, with and without mineral filling (with an air gap).
- Shaft or separate advanced wall – with one-sided cladding of a wall construction with a fire resistance of EI 15 – EI 45.
- Wall on a wooden framework – as a load-bearing wall with a maximum height of 3 metres, and as non-load-bearing (filling) walls with a maximum height of 4 metres.

As stated in the protocols it is also necessary to comply with the technology of the wall assembly and all assembly procedures used and tested in the context of preparation of the samples. 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. In addition this variant solutions are recommended for applications and elements which cannot be tested because of the methodologies used or the spatial arrangement of the kilns. These solutions have also been professionally assessed and tested by expert assessments of PAVUS Praha or Fires Batizovce.

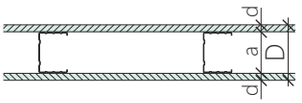
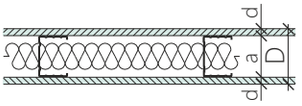
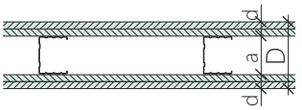
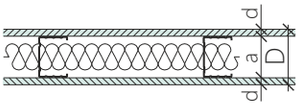
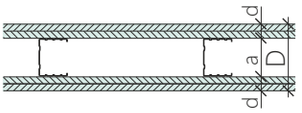
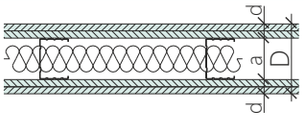
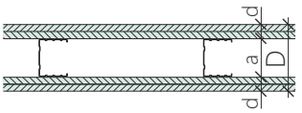
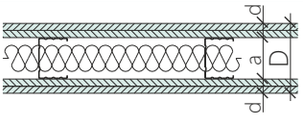
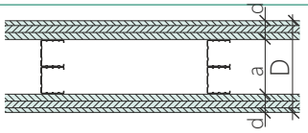
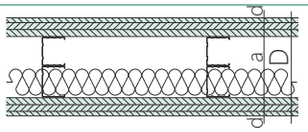
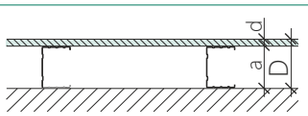
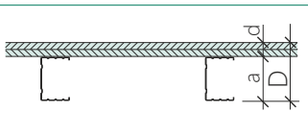
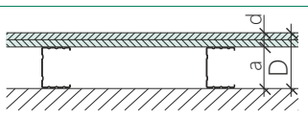
Important notice: The results of fire resistance tests and the tables following from them only assess the issue of the technical properties of the constructions in relation to their resistance to actual fire. For this reason, the axial distances and types of CW profiles / wooden pillars, which comply with the tests are stated. It is however necessary to consider them as the absolute minimum limit values. It is necessary to emphatically draw attention to the fact that when dimensioning the firewalls, the structural static requirements must also be assessed according to the real stress.

Assembly of fire constructions may only be carried out by trained staff – see Chap. 8.8. Training of assembly companies for CETRIS® board applications.

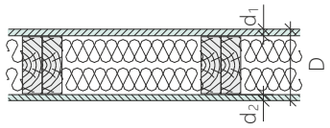
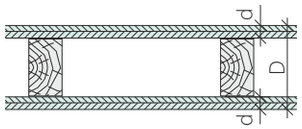
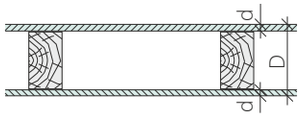
Description of the construction
The vertical fire partitions – walls and partition walls – with CETRIS® cement-bonded particleboard cladding can be designed on the basis of the fire resistance tests and extended applications of their results through theoretical calculations in several basic variants with different values of fire resistance pursuant to the following table.

Survey of wall constructions

See table on the next page.

Type / Marking	Scheme	Size			Weight (kg/m²)	Max. wall height (m)	Mineral wool		Fire Resistance	Thermal resistance (m²K/W¹)	Weighted sound transmission loss (dB)
		a (mm)	d (mm)	D (mm)			Thickness (mm)	Density (kg/m³)			
WS 01		75	16	107	45	4,50			EI 30	0,15	44
WS 02		75	12	99	38	3,60	60	50	EI 45	1,61	52
		100		124		4,00			EI 45		
		2x75		174		7,80			EI 15		
WS 03		75	10+10	115	56	4,00			EI 45	0,19	-
WS 04		75	16	107	49	3,60	60	75	EI 60	1,65	
		100		132		4,00					
WS 05		75	12+12	123	67	4,00			EI 60	0,23	50
						5,50			EI 45		
						7,30			EI 30		
WS 06		75	12+12	123	72	4,00	60	75	EI 90	1,73	56
WS 07		75	16+18	143	95	4,00			EI 90	0,32	
WS 08		75	16+18	143	95	4,00	60	75	EI 120	1,80	
WS 09		2x75	18+12+12	234	118	4,00			EI 120	0,40	
WS 10		2x75	18+12+12	234	122	4,90	60	75	EI 180	1,90	61
						6,40			EI 120		
						9,50			EI 90		
WS 11		75	16	91	22	4,00			EI 15[3])	0,08	
WS 12		75	12+12	99	34	4,00			EI 30[2])	0,11	
WS 13		75	16+16	107	48	4,00	60	50	EI 45[3])	1,67	

Supplementary classification according to ČSN 73 0810: 2010 – all walls with steel load-bearing structures with DP 1 classification.

Type / Marking	Scheme	Size			Weight (kg/m²)	Max. wall height (m)	Mineral wool		Fire Resistance	Thermal resistance (m²K/W¹)	Weighted sound transmission loss (dB)
		Supporting structure	d (mm)	D (mm)			Thickness (mm)	Density (kg/m³)			
WW 01		wooden lath 120x100 mm axially 625 mm	d_1=14 CETRIS® BASIC d_2=12,5 Knauf RED	146,5	43	3,00	120	40	REI / REW 60 DP3	0,08	
						3,00			REI / REW 15 DP2		
						4,00			EI 60 DP3		
WW 02		wooden lath 100x60 mm axially 625 mm	12+12	148	74	3,00			REI 60 DP3	0,32	
						3,00			REI 45 DP2		
						4,00			EI 60 DP3		
WW 03			14	128	45	3,00			REI 30 DP3	0,15	
						3,00			REI 15 DP2		
						4,00			EI 30 DP3		
WW 04			14	114	27	3,00			REI 15 DP2	0,08	
						4,00			EI 15 DP2		

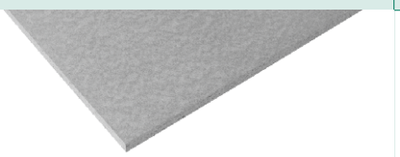
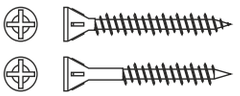
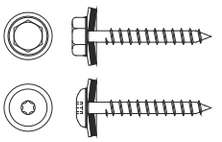
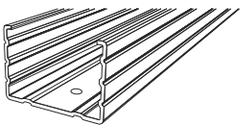
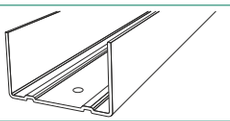
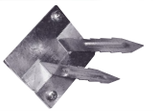
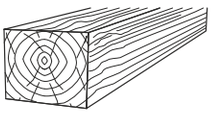
Notes to the table:

1) Informative thermal resistance value

2) Fire resistance value for exposition to fire on the CETRIS® board (full cladding) side as well as on the profile (hollow) side

3) The fire resistance value applies only to the fire stress on the CETRIS® boards

Materials for assembly of the firewall constructions – specifications

Description	Visualisation	Note
CETRIS® BASIC boardCement bonded particleboard, smooth surface, cement grey. Basic format 1,250x3,350 mm. Volume mass 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 cladding and type of load-bearing construction. Anchoring in the interior, or exterior under the warm cladding 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 on 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		Dimensions according to the fire resistance and wall height requirements. Alternatively, it is possible to use steel profiles with a cross-section area that minimally equivalent to the CW profiles.
UW profile 75, 100 (horizontal) Galvanised sheet metal profile 75x40x0.6 mm 100x40x0.6 mm		
Steel dowels For profile anchoring to masonry (concrete) walls)		Dimensions (diameter and length) by weight of structure, type of substrate and anchored material
Fireproof sealant White matter for filling the joints and looping the screw heads		DEXAFLAMM-R putty (manufactured by Tora Spytihněv), or fire-resistant DenBraven (acrylic, silicone) putty
Heat-insulation Mineral or rock wool (Isover, Rock wool, Knauf Insulation ...)		It is necessary to keep the thickness and volume mass according to the specification in the composition. Reaction to fire class A1
Adhesive pins		For stabilisation of position of the insulation boards in the frame construction.
Wooden post Spruce timber of minimum class SII, max. Humidity 18%.		Alternatively glued timber may be used; cross-section according to the specifications in the composition
FIBERFRAX DurafeltAluminium-silicon fibre mats/paper		For profile lining on the bottom side, interruption of thermal bridges, as insulation for temperatures up to 1,260° C
KNAUF GKF / RED board KNAUF plasterboard of thickness 12.5 mm. Basic size 1,250 × 2,000 (2,500) mm		Processing, anchoring, filler applications, surface finish of boards pursuant to the instructions of KNAUF Praha spol. s r.o.
KNAUF Uniflott Plasterboard joint filler.		Cannot be used for CETRIS® board joint filling!!!
Screw TN 35 Quick screw (4.0 × 35 mm) for plasterboard anchoring		Cannot be used for CETRIS® board anchoring!!!

8.2.2.1 Load-bearing Construction

The load-bearing construction is a frame consisting of steel zinc-coated profiles CW (vertical posts) and UW (horizontal profiles). For specification of the CW profile dimension in relation to the height and total thickness of the wall, the ratio of the wall height hs and thickness d should always be lower than 40. The hs/d > 40 ratio represents slenderness ratio L/i circa 140.

The peripheral profiles are anchored into the frame (masonry) with steel dowels with a spacing of 625 mm, the joint between the profiles and the masonry is filled with fire-resistant filler. The axial distance of the vertical interior profiles does not exceed 625 mm.

8.2.2.2 Construction Composition

The construction is symmetrically or asymmetrically cladded on one or both sides with one or more layers of CETRIS® cement bonded particleboards. The thickness and the number of the CETRIS® boards, and the mineral wool insertion represent the decisive elements of fire resistance (see the dimension tables for the particular specified construction types). The horizontal displacement of the boards is min. 400 mm.

For multi-layer cladding, the gaps between the boards mutually overlap – in the vertical direction by the profile (625 mm), in the horizontal direction min. 400 mm.

For CETRIS® board anchoring to the sheet metal profiles self-tapping screws with sunken heads are used; the screw heads are equipped with blades for countersinking in the board and the screw size is 4.2 × 25 or 35, 45, 55 mm. The screw length must always be at least 10 mm longer than the thickness of the screwed board (in the case of multilayer coating at least 10 mm longer than the total thickness of all anchored layers). In the exterior (the boards form a visible cladding) anchoring must be done via the pre-drilled holes using the screws with a visible head and water-tight washer. Gaps of minimum width 5 mm are left between the boards. The joint fill, the wall perimeter filling and coverage of the screw heads is done using fire-resistant filler.

Dimensions of partition walls with heights up to 4 m

(a steel framework of CW profiles, two-sided, clad with one- or a multi-layer coat of CETRIS® boards with or without interior heat insulation on mineral/rock wool basis)

Fire Resistance	Structure of the double-sided cladding made of CETRIS® boards						
	with an air gap			with thermal insulation (mineral or rock wool with resistance to fire class A1)			
	Cladding	Min. air gap thickness	Cladding	Cladding	Insulation thickness	Density	Cladding
EI 30	16	50	16	-	-	-	-
EI 45	10+10	50	10+10	12	60	50	12
EI 60	12+12	50	12+12	16	60	75	16
EI 90	18+16	50	18+16	12+12	60	75	12+12
EI 120	18+12+12	50	18+12+12	16+16	60	75	16+16
EI 180	-	-	-	18+12+12	60	75	18+12+12

Sizes of partition walls taller than 4 m

(a steel framework of CW profiles, two-sided, clad with one-or a multi-layer coat of CETRIS® boards with or without interior heat insulation on mineral/rock wool basis)

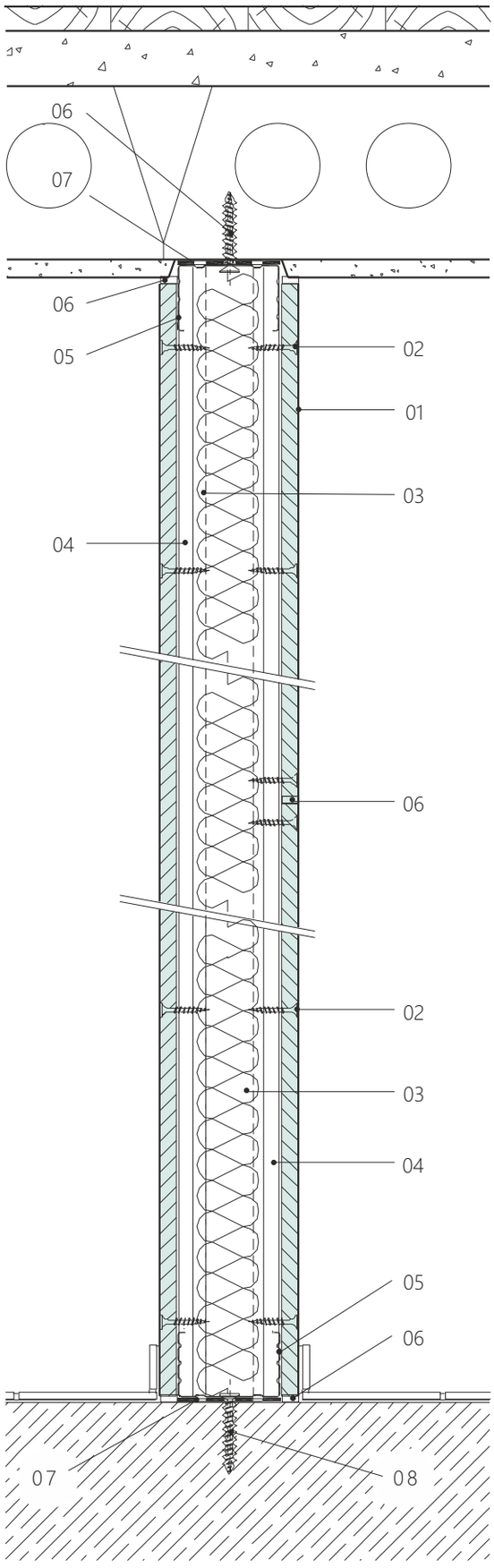
Fire resistance[1]	Structure of the double-sided cladding made of CETRIS® boards				Maximum height (m)
	Cladding	Insulation thickness[3])	Density	Cladding	
EI 15	12	60	50	12	7,8
EI 30 [2)4)5)]	16	-	-	16	4,5
EI 30 [2)4)]	12+12	-	-	12+12	7,3
EI 45 [2)4)]	12+12	-	-	12+12	5,5
EI 90	18+12+12	60	75	18+12+12	9,5
EI 120					6,4
EI 180					4,9

Supplementary classification according to ČSN 73 0810: 2010 – all walls with steel load-bearing structures with DP 1 classification.

Notes to the table:

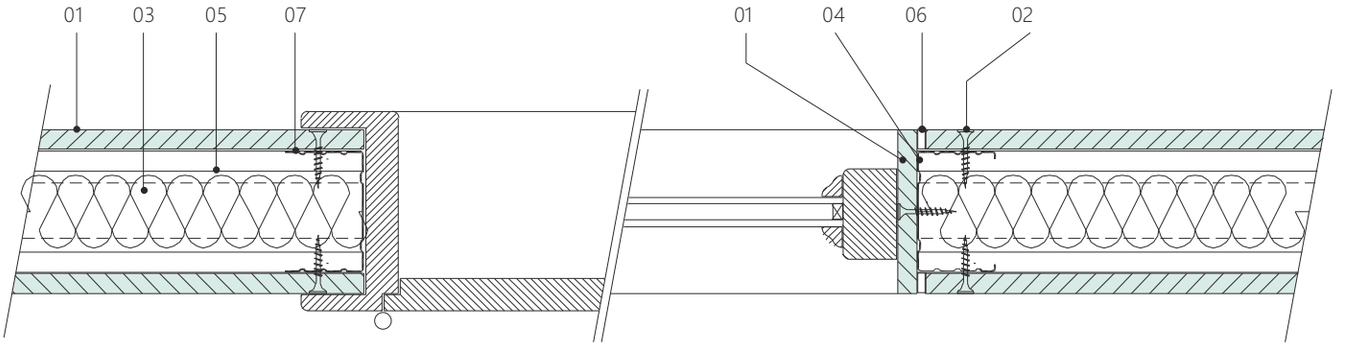
1) *Classification of limit conditions of fire resistance is performed pursuant to EOTA TR 35*
2) *The air gap width is 75 mm*
3) *Mineral or rock wool insulation (e.g. Isover, Rock wool Knauf Insulation ...) with a prescribed density and thickness, reaction to fire class of min. A2. If we are not filling the entire joint, it is necessary to secure the position of the insulation – e.g. with adhesive pins.*
4) *For partitions with a height above 4 m, it is necessary to consider a higher weight of the construction and the higher the stress in the steel cross-section, which causes a drop in the critical temperature of the steel. For this reason, in the case of higher partitions, the steel framework needs better protection – unless filled with mineral wool in the points of contact between the steel CW profiles and the boards, the coating needs to be padded with a strip of CETRIS® board with the minimum thickness of 12 mm for the strip to overlap the width of the CW profile at least by 60 mm on each side.*
5) *The upper base U profile must have a minimum height of 100 mm at the point of the CW post.*

Vertical section



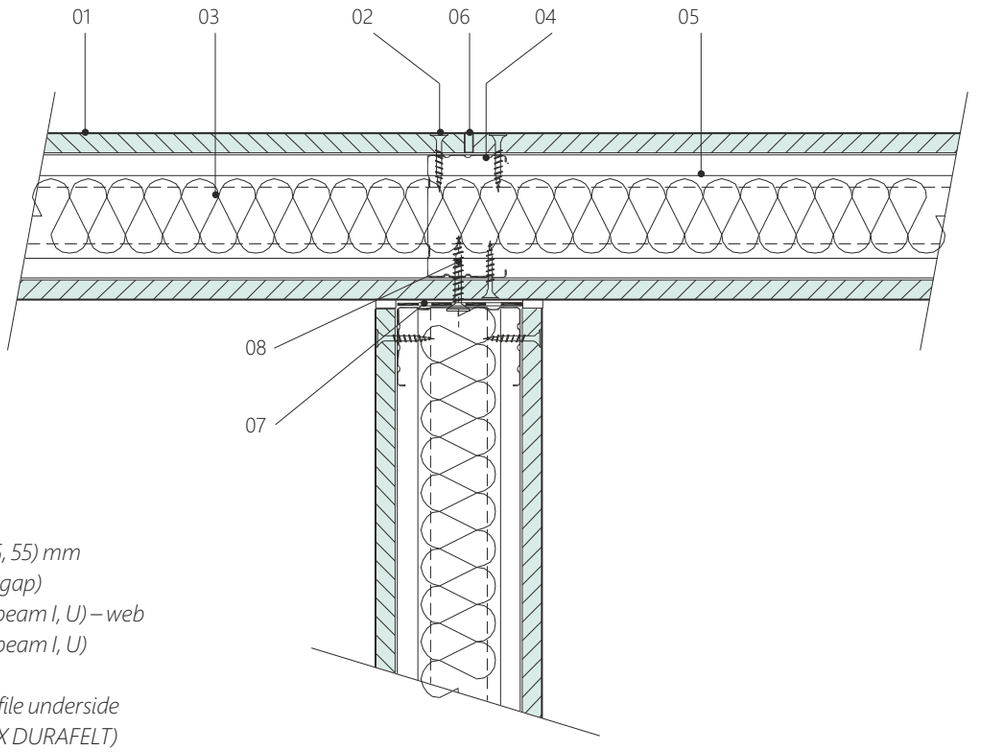
01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 DEXAFLAMM-R filler
07 sealing of the profile underside (FIBERFRAX DURAFELT paper)
08 dowel

Hole in the wall - Horizontal section



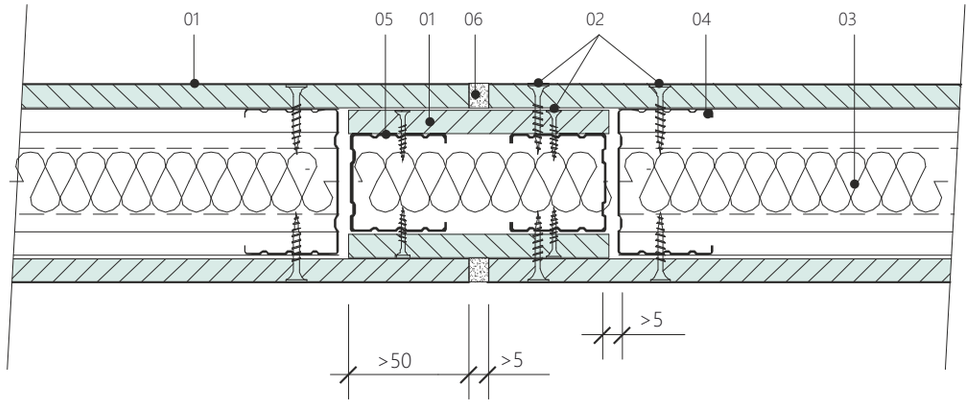
01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 UA profile

T-joint - Horizontal section



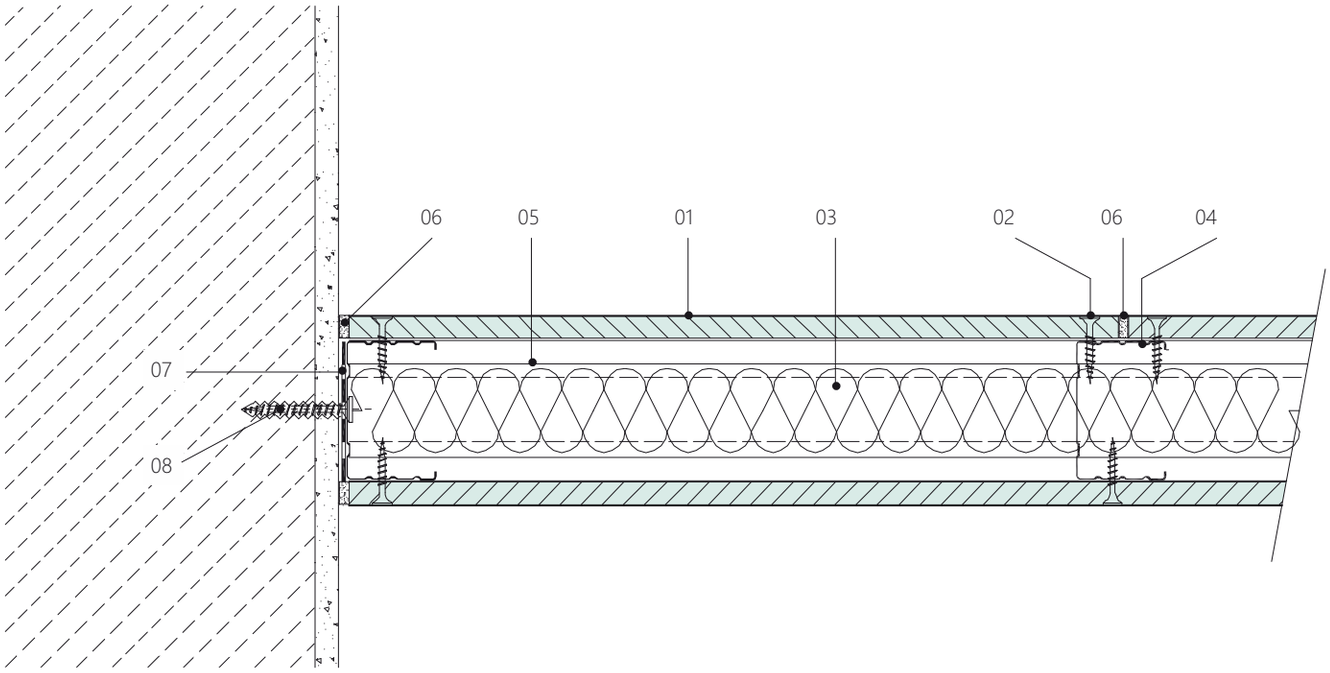
01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing of the profile underside (paper FIBERFRAX DURAFELT)
08 dowel

Joint detail – EI > 60 min - Horizontal section



01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile 75
05 UW profile 50
06 fire resistant filler.

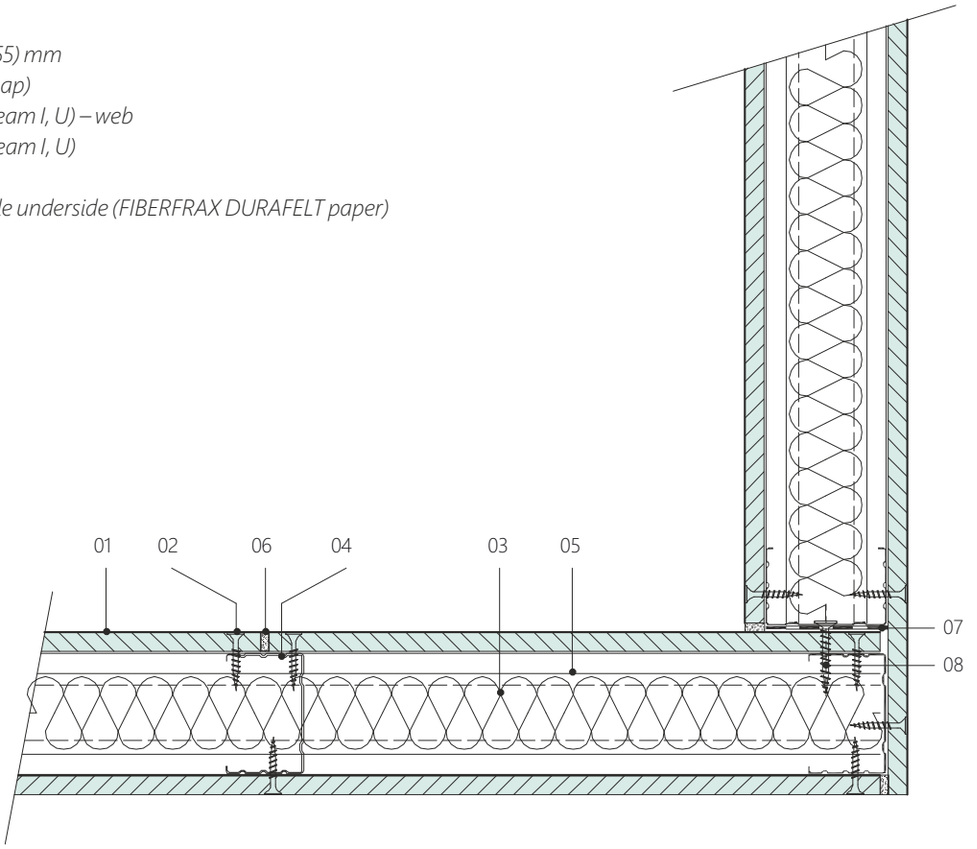
Connection at the wall - Horizontal section



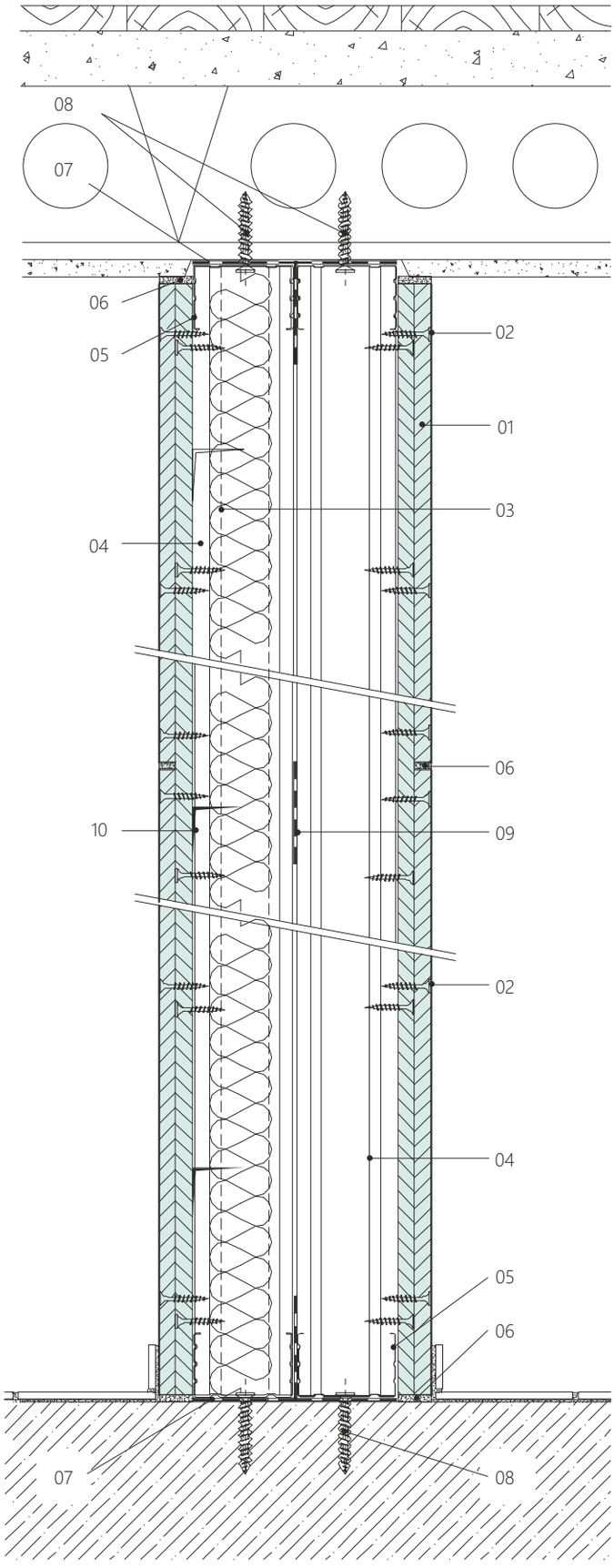
01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing of the profile underside (FIBERFRAX DURAFELT paper)
08 dowel

L-joint - Horizontal section

01 CETRIS® board
02 screw 4.2×35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing of the profile underside (FIBERFRAX DURAFELT paper)
08 dowel

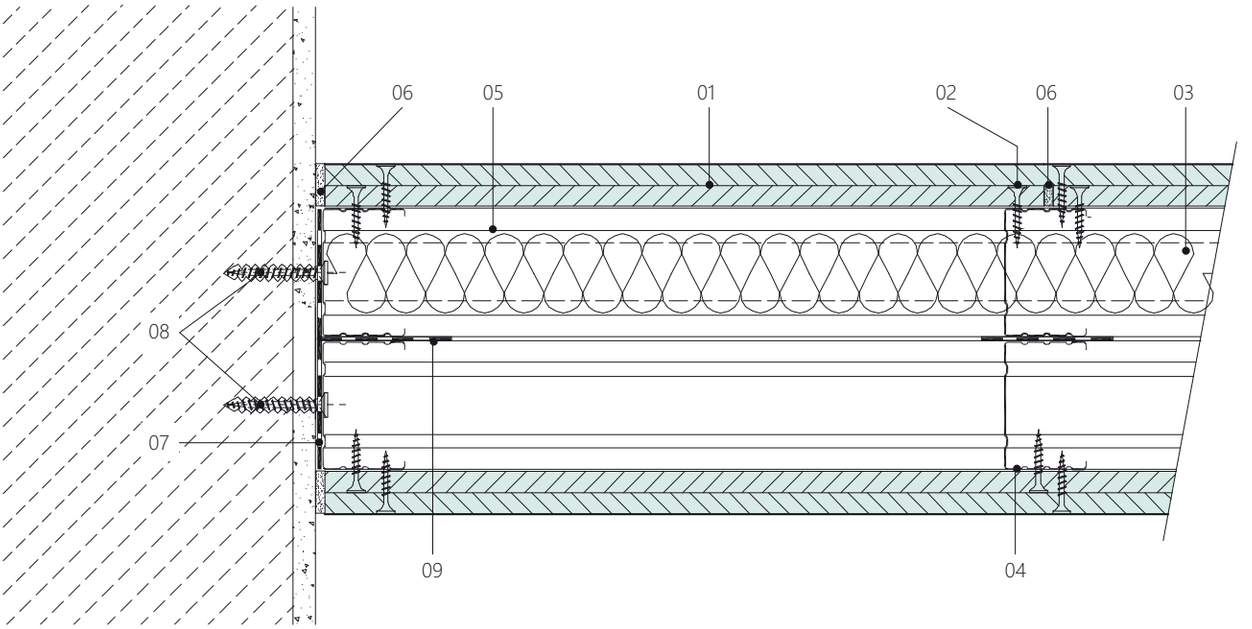


Vertical section



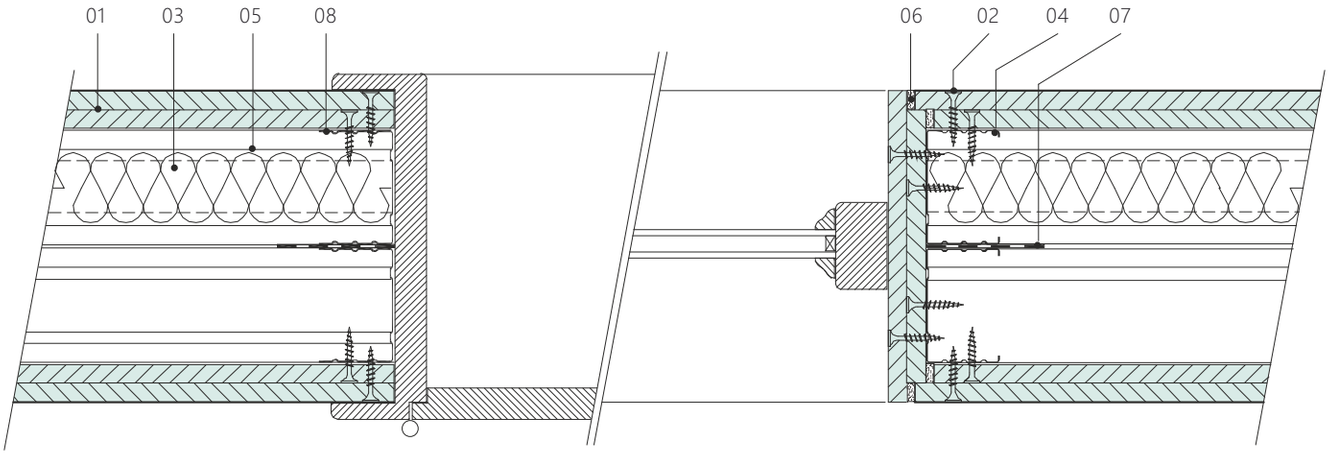
01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing of the profile underside (FIBERFRAX DURAFELT paper)
08 dowel
09 sealing tape
10 adhesive pins

Connection at the wall Horizontal section



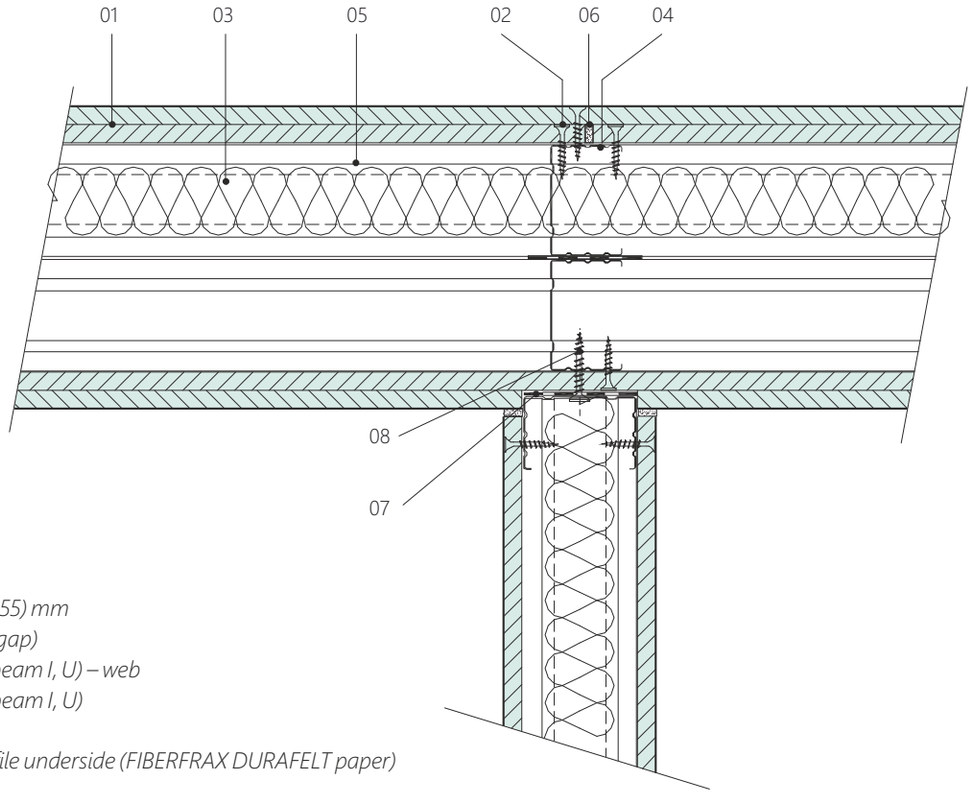
01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing of the profile underside (FIBERFRAX DURAFELT paper)
08 dowel
09 sealing tape

Hole in the wall Horizontal section



01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing tape
08 UA profile (opening jamb)

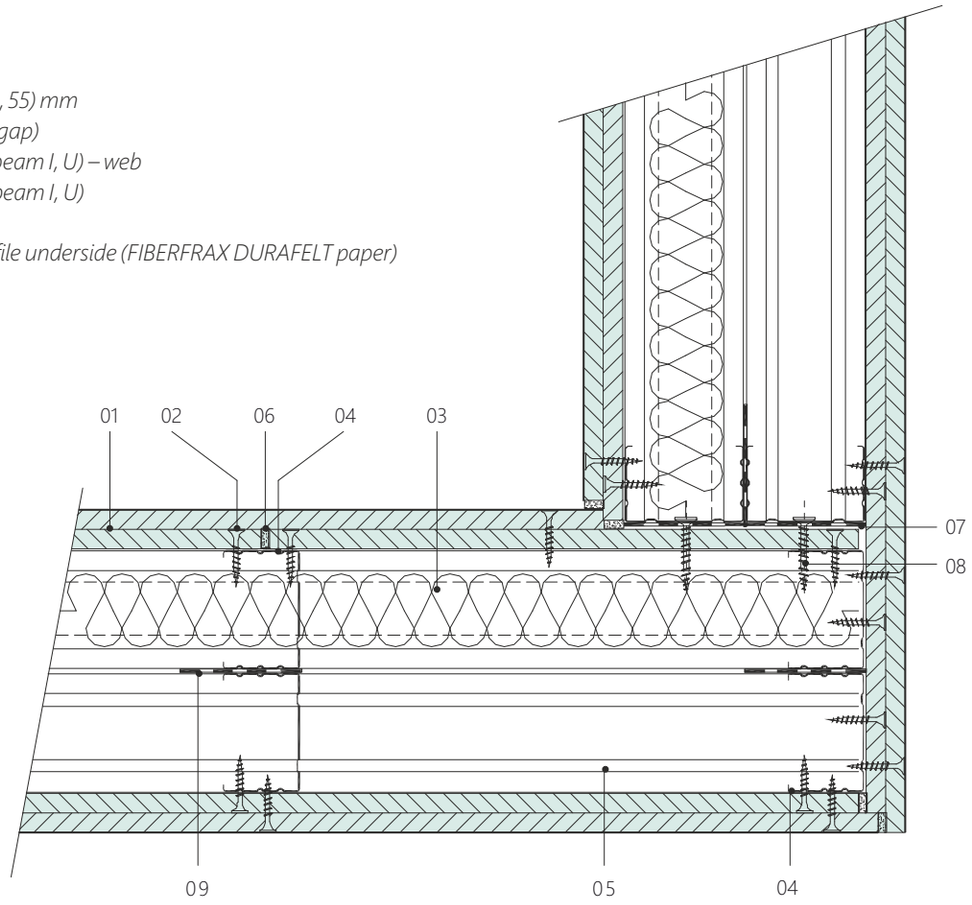
T-joint - Horizontal section



01 CETRIS® board
02 screw 4.2×35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing of the profile underside (FIBERFRAX DURAFELT paper)
08 dowel

L-joint - Horizontal section

01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 mineral wool (air gap)
04 CW profile (steel beam I, U) – web
05 UW profile (steel beam I, U)
06 fire resistant filler
07 sealing of the profile underside (FIBERFRAX DURAFELT paper)
08 dowel
09 sealing tape



8.2.3 Shaft (Advanced) Firewalls

Shaft (advanced) firewalls are wall constructions clad only with single-layer CETRIS® cement-bonded particleboards, which ensure the stipulated fire resistance.

They can be used as separate shaft walls as well as advanced walls - to increase the fire resistance of the existing constructions. In this case, it is not required for the existing constructions to exhibit any fire resistance. The maximum separate height of these constructions is 4 m. In the case of cladding of lift shafts in multi-storey buildings, use at a higher height is conditional:

- the load-bearing constructions of the cladding are anchored to the load-bearing wall of the building, or other load-bearing constructions with a maximum spacing of 4,000 mm using steel dowels,
- the load-bearing construction to which the shaft wall is fixed must have a fire resistance that is higher than that of the shaft wall itself,
- all the joints (also between the lift shaft and the load-bearing construction) must be filled fire-resistant filler.

The mechanical requirements of the lift shaft cladding are described in ČSN EN 81-20 Safety rules for the construction and installation of lifts – Lifts for the transport of persons and goods – Part 20: Passenger and goods lifts. For safe operation of the lift, the shaft wall must have such a mechanical strength that withstands the action of 1,000 N (100 kg) perpendicular to the wall from one or the other side at an arbitrary point, proportionately to the circular or square area of 300 x 300 mm:

- without permanent deformation
- with elastic deformation up to 15 mm.

This parameter was verified by the Strojírenský a zkušební ústav Brno. The CETRIS® cement bonded particleboard of thickness 12 mm in one layer anchored to the frame construction was chosen.

During the repeated test, neither permanent deformation occurred nor was the prescribed elastic deformation limit exceeded.

Overview of shaft (advanced) firewalls

Fire resistance	One-sided cladding with CETRIS® boards	Insulation thickness	Density	Fire stress
EI 15	16	-	-	only on the cladding side – CETRIS® boards
EI 30	12+12	-	-	on the cladding side – CETRIS® boards also on the side of the gap (profiles)
EI 45	16+16	60	50	only on the cladding side – CETRIS® boards

Supplementary classification according to ČSN 73 0810: 2010 – DP1.

8.2.3.1 Load-bearing Construction of Advanced Walls

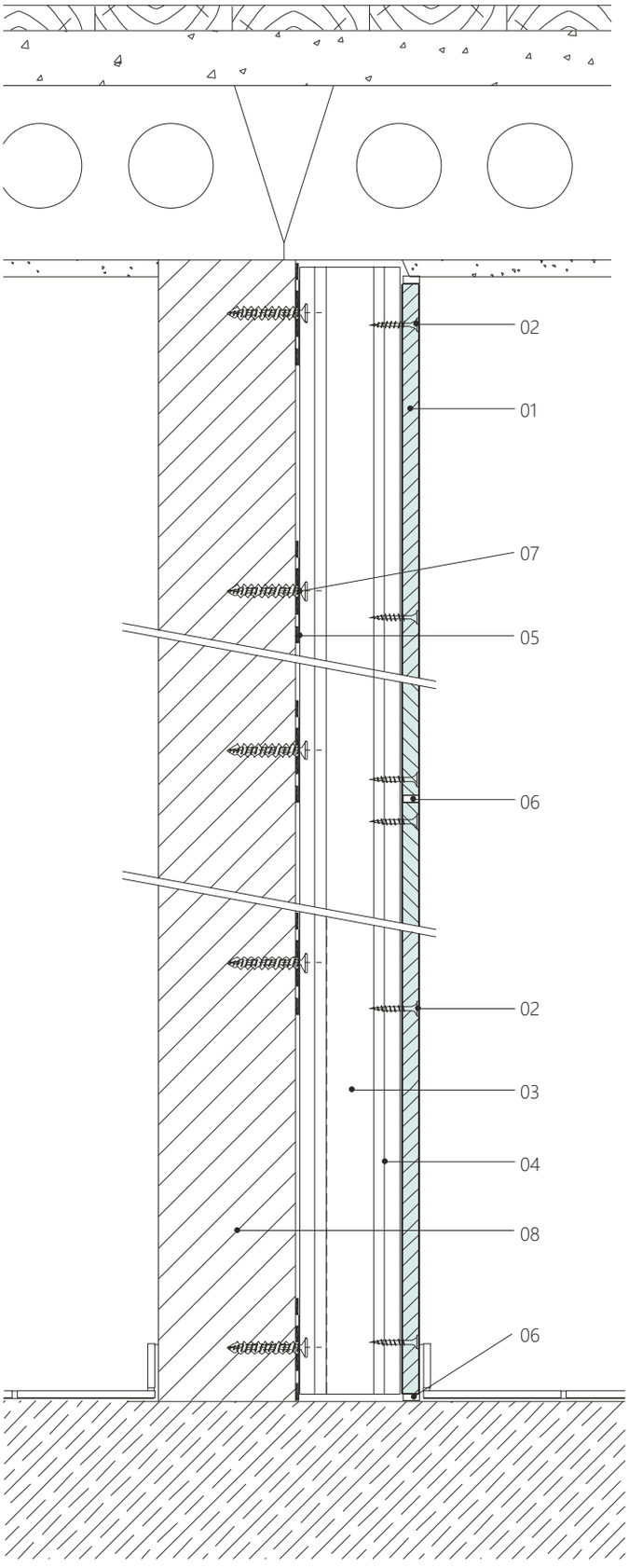
The load-bearing construction is a frame consisting of steel zinc-coated CW profiles CW 75 × 50 × 0.6 mm. The peripheral profiles are anchored into the existing masonry construction with steel dowels with a spacing of 625 mm, the joint between the profiles and the masonry is filled with fire-resistant filler. The axial distance of the vertical profiles does not exceed 625 mm.

8.2.3.2 Construction Composition

The shaft (advanced) wall has one-sided cladding with one or more layers of CETRIS® cement bonded particleboards with the option to insert thermal insulation between the vertical profiles. The horizontal overlap of the boards is min. 400 mm. For multi-layer cladding, the gaps between the boards mutually overlap – in the vertical direction by the profile (625 mm), in the horizontal direction min. 400 mm. In the case of the composition with a fire resistance of EI 45 (cladding with two layers of CETRIS® cement bonded particleboards of thickness 16 mm), it is necessary:

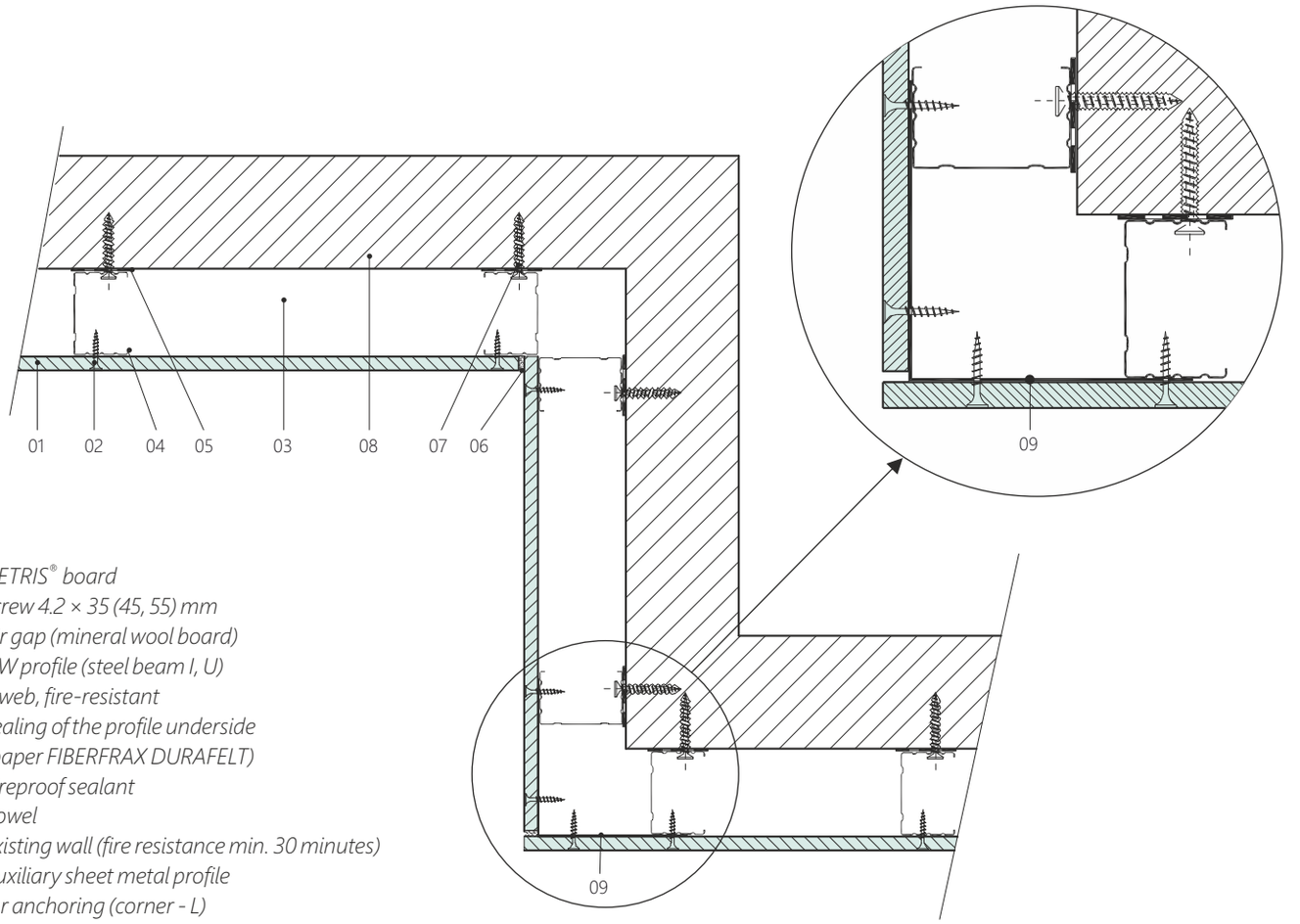
- mineral wool (of thickness 60 mm, minimum weight 50 kg/m3) and secure it against failure of the UW steel profiles of approximate length 100 mm. These profiles are located at the point of the vertical joints of the mineral wool boards (inserted insulation) and are fixed to the vertical CW post.
- apply fire-resistant filler to the contact surface of the CW steel posts with the CETRIS® boards, e.g. DEXAFLAMM-R, Den Braven acrylic fire-resistant filler.

Vertical section



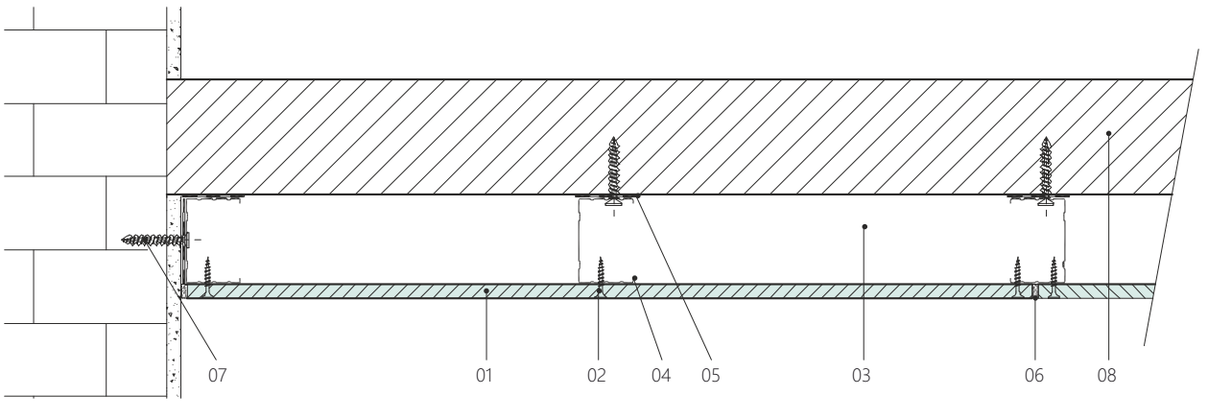
01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 air gap (mineral wool board)
04 CW profile (steel beam I, U) – web
05 sealing of the profile underside (FIBERFRAX DURAFELT paper)
06 fire resistant filler
07 dowel
08 existing wall

Inner corner, outer corner Horizontal cross-section



01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 air gap (mineral wool board)
04 CW profile (steel beam I, U) – web, fire-resistant
05 sealing of the profile underside (paper FIBERFRAX DURAFELT)
06 Fireproof sealant
07 dowel
08 existing wall (fire resistance min. 30 minutes)
09 auxiliary sheet metal profile for anchoring (corner - L)

Connection at the wall Horizontal cross-section



01 CETRIS® board
02 screw 4.2 × 35 (45, 55) mm
03 air gap (mineral wool board)
04 CW profile (steel beam I, U) – web
05 sealing of the profile underside (FIBERFRAX DURAFELT paper)
06 fire resistant filler
07 dowel
08 existing wall

8.2.3.5 General Principles of Assembly of Fire Walls on a Steel Frame

All building constructions to which the non-load-bearing fire partitions and walls of CETRIS® boards are fixed in any manner, or by which they are supported and which might threaten their stability, must have at least the same fire resistance as the CETRIS® partition itself. If these constructions are structurally stressed then their potential deformations must not interfere with the integrity of the wall of CETRIS® boards. This requirement does not apply if the supporting and load-bearing construction cannot be 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 CW profiles must not exceed 200 mm (screws by the edges), or 400 mm (across the surface) and the distance from the board edges must not be less than 25 mm in the case of fire walls. In the case of multilayer cladding the screw spacing may be doubled.
- Maximum spacing of screws on CETRIS® strips or assembly inserts must be 100 mm, or less.
- Screws used for anchoring CETRIS® boards to CW profiles must be at least 10 mm longer than the thickness of the anchored board.
- If the CETRIS® board is used as visible coating 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).
- Maximum spacing of dowels for anchoring CW and UW profiles must not exceed 625 mm.
- CETRIS® assembly inserts or strips must always be at least 12 mm thick and their thickness must be equal to the thickness of the wall cladding.
- The CETRIS® strip at the joints of the CETRIS® boards must overlap on both sides by at least 60 mm, unless otherwise specified in the detail drawing.
- Maximum spacing of CW assembly profiles must not exceed 625 mm, and at the same time must be based on the board thickness and the respective structural assessment. The length of CW profiles is about 15 mm shorter than the room height. For walls with a height greater than 4 m, the CW profile must be shorter by 20 mm – the dilatation in the lower and upper mounting of the base (U) profile must be min. 10 mm. In case of wall height > 4 mm, it is necessary to observe the principles given in the table on page 146 + points 4 and 5.
- Dilation joints and all contacts with the wall and the corner joints must be filled with fire resistant filler (e.g. DEXAFLAMM-R, Den Braven acrylic fire resistant filler). The filler must be driven in to a minimum depth of 5 mm.
- The surfaces of the CW or UW profiles adjacent to the floor and the ceiling or wall must be covered with fire resistant filler; if the fire resistance of the wall is greater than 60 minutes, we recommend lining with FIBERFRAX DURAFELT paper. This paper is also suitable for partial insulation of potential thermal bridges in the construction.
- The boards of multilayer cladding must be placed with an overlap of at least 400 mm and always without any cross joint.
- Joints of single-layer coats must always be supported with a CW profile under the joint or (in the places where this is impossible for construction reasons) with a CETRIS® strip; in exposed cases – in the case of higher demand for fire resistance – both methods may be used. In the case of multilayer coating even the inside joints of the bottom layers must be filled with filler.
- All dilation joints in fire partitions with fire resistance above 60 minutes must always be supported with CETRIS® board strips under the joints of the same thickness as the thickness of the coat pursuant to the figure on page 153.
- For fire resistances of constructions above 60 minutes, it is recommended to insulate the insides of the CW and UW profiles adjacent to the load-bearing walls and ceilings with cut mineral felt.
- The position of mineral wool in an air gap of higher thickness than the thickness of the mineral wool strip should be fixed with adhesive pins.
- All openings in CETRIS® fire partitions must be sealed with inserts or in other ways pursuant to the project specifications. Installations inside the partition walls (water distribution lines, electrical wiring, etc.) must be protected against fire with mineral wool, otherwise the fire resistance of the wall could be reduced.
- In the case of cladding of large wall 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.
- Surface treatment and filling of CETRIS® boards can be done only after acclimatization of boards in installed condition

8.2.3.6 Assembly Procedure

- Measure the locations of the UW profiles in the horizontal planes and apply fire resistant filler to the floor and ceiling, or underline it as necessary with FIBERFRAX DURAFELT paper.
- Fix the profiles to the floor, ceiling or to the walls, as the case may be, with steel dowels. The maximum spacing of the dowels with regard to the weight of the boards has been specified as 625 mm.
- Install the CW profiles in the construction with the spacing as per the structural assessment and board thickness, but with a max. spacing of 625 mm. The length of the CW profiles must be about 15 mm shorter than the height of the room.
- Insert cut mineral felt between the profiles if required.
- Screw in the CETRIS® boards on the prepared construction leaving a gap of at least 10 mm between the floor and the ceiling and the bottom and top edges of the boards. Fix the CETRIS® boards with the screws to the CW profiles only.
- In the case of double or multilayer cladding the boards are laid with an overlap of minimum 400 mm.
  Note: In the case of three-layer coats the joints of the bottom and the top coat must not be in the same places.
- The following applies to anchoring CETRIS® boards to the construction: The maximum axial distances of the screws from each other is 200 mm, only in the case of double or multilayer cladding the spacing can be increased in the first layer up to a maximum of 400 mm.

8.2.4 Fire Walls with a Wooden Supporting Structure Clad with a CETRIS® Cement Bonded Particleboard

Based on the new fire resistance tests of wall constructions, we have significantly extended the offer of wall compositions with wooden supporting structure clad with CETRIS® cement bonded particleboards. The list of structures includes compositions of bearing walls (wall height up to 3 m) and non-load-bearing walls (height up to 4 m) is given in table 6. fire resistance is determined according to EN 13 501-2 with sorting of construction components (DP2/ D. P3) in accordance with ČSN 73 0810, article 3.2.

Fire resistance	Composition of CETRIS® board double-sided cladding				Maximum height (m)
	Exterior cladding	Insulation thickness	Density	Interior cladding	
EI 15 DP2	14	-	-	-	3
REI 15 DP2					4
REI 30 DP3	14	-	-	14	3
REI 15 DP2					3
EI 30 DP3					4
REI 60 DP3	12+12	-	-	12+12	3
REI 45 DP2					3
EI 60 DP3					4
REI/REW 60 DP3	12	120	40	Knauf plaster-board GKF 12,5	3
REI/REW 15 DP2					3
EI 60 DP3					4

8.2.4.1 Load-bearing Construction

The load-bearing construction consists of a frame of wooden vertical and horizontal beams mutually connected with screws.
The cross-section of the vertical wooden beams depends on the composition of the construction – it is necessary to keep the cross section mentioned in the table with a list of compositions. The beams can be made of dry spruce lumber (moisture content 18 % compactness class min. S II), alternatively glued lumber can be used.
The wooden prisms are anchored into the frame (masonry) with steel dowels with a spacing of 625 mm, the joint between the profiles and the masonry is filled with fire-resistant filler (e.g. DEXAFLAMM-R, Den Braven acrylic fire resistant filler). The axial distance of the vertical internal wooden posts must not exceed 625 mm.

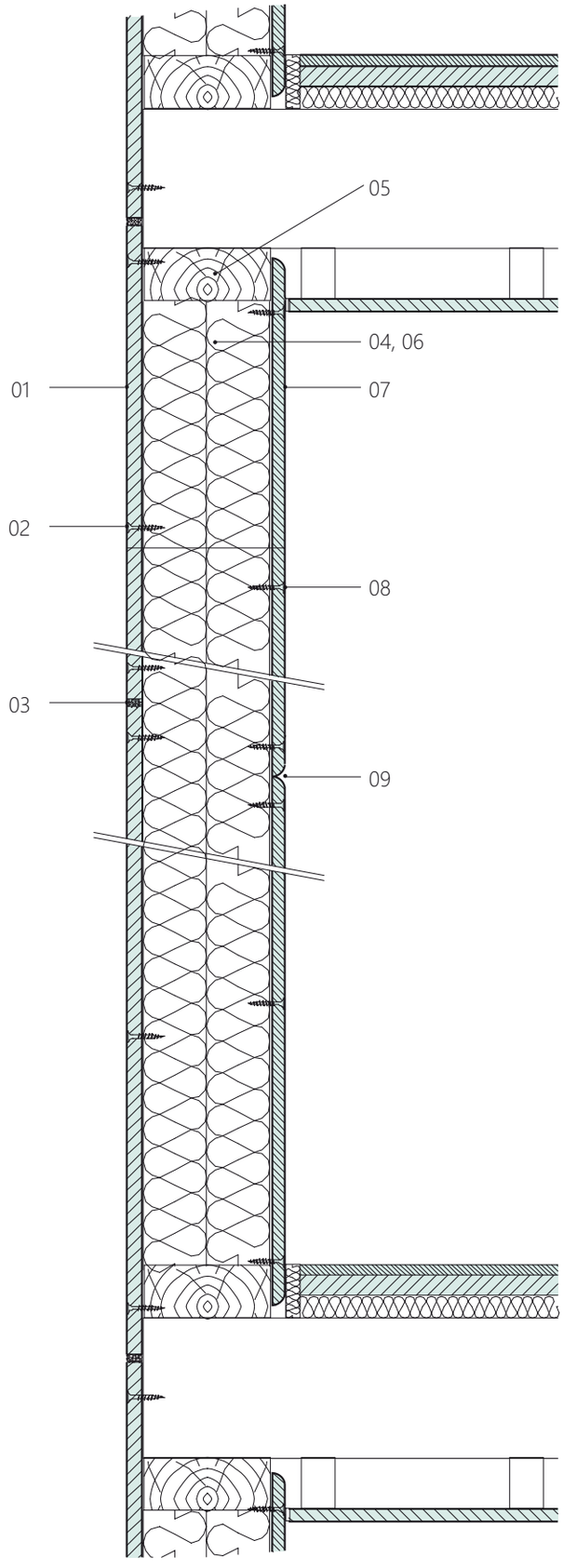
8.2.4.2 General Principles of Assembly of Fire Walls on a Wooden Frame

The following principles apply to the implementation of the load-bearing wooden frame and for anchoring of CETRIS® boards.

- Maximum spacing of the screws anchoring the CETRIS® boards to the wooden posts must not exceed 200 mm (screws by the edges), or 400 mm (across the surface) and the distance from the board vertical edges must not be less than 25 mm in the case of fire walls. • When installing CETRIS® boards it is necessary to keep joints with a minimum width of 5 mm, the joints must be filled with filler (DEXAFLAMM-R, Den Braven acrylic fire resistant filler).
- In case of two layers of CETRIS® boards, it is necessary to overlay the joints – in horizontal direction by 625 mm of the post distance, in the vertical direction by min. 400 mm. The joints must be filled with fire resistant filler. • A horizontal joint created when cladding CETRIS® boards on a wall must be supported with wooden beam of minimum width 60 mm.
- Maximum spacing of dowels for anchoring the wooden beams must not exceed 625 mm.
- The maximum spacing of the dowels for anchoring the wooden posts should not be more than 625 mm.
- Dilation joints and all contact surfaces with the wall and the corner joints must be filled with fire resistant filler. The filler must be driven in to a minimum depth of 5 mm.
- The surfaces of the wooden prisms in contact with the floor and the ceiling or masonry must be treated with fire resistant filler.
- The position of cut mineral felt in an air gap of higher thickness than the thickness of the cut mineral felt must be fixed with adhesive pins.
- If there is an underlay tape prescribed on the wooden posts in the composition, it is necessary to use a minimum board width 200 mm. The underlay tape is fixed to the wooden posts with screws with countersunk head and the screw spacing is max. 300 mm.
- All openings in the peripheral firewall must be sealed with fire packing or in some other way according to the project specifications. Installations inside the partition walls (water distribution lines, electrical wiring, etc.) must be protected against fire with cut mineral felt otherwise the fire resistance of the wall could be reduced.

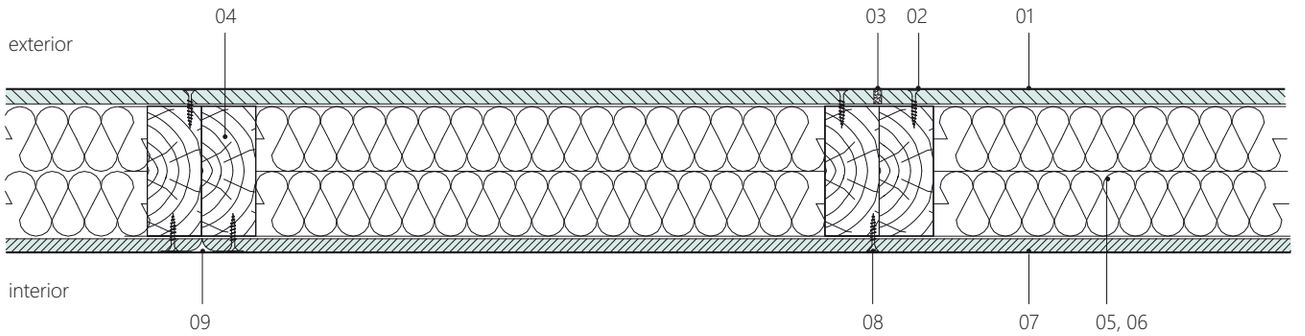
Note: Anchoring of KNAUF Red boards, joint filling and surface finish must be done in compliance with the manufacturer's recommendations.

Vertical 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 cut mineral felt (Orsil Uni) - 2× thickness 60 mm
07 Knauf GKF board - thickness 12.5 mm
08 screw TN 3.5×35 mm
09 gap filler – Knauf Uniflott

Horizontal cross-section



01 CETRIS® board of thickness 14 mm
02 screw 4.2 × 35mm
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 TN3.5×35mm
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:

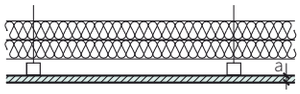
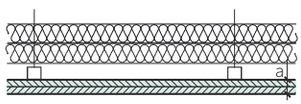
- Separate fire ceiling panel, heat (fire) exposure from underneath. In this case, the fire resistance is specified directly by the result of the fire resistance test.
- horizontal protective membrane (ceiling) sub-floor (roof) constructions, exposure to heat (fire) from below. The fire resistance is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

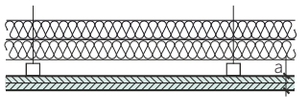
Important notice:

- *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)

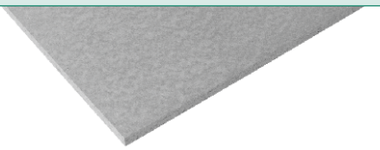
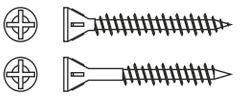
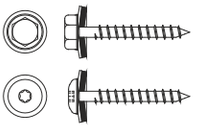
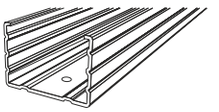
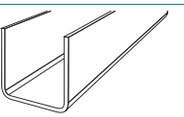
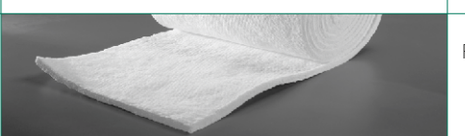
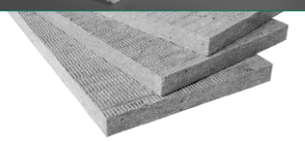
Type / Marking	Diagram	Cladding of the ceiling	Weight (kg/m²)	Mineral wool						Fire Resistance	Thermal resistance (m²K/W¹)	Weighted sound transmission loss (dB)
				Thickness (mm)	Density (kg/m³)	Description	Assembly support spacing (mm)	Load-bearing support spacing (mm)	Hanger spacing (mm)			
C 01		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/m²)	Mineral wool						Classification of protected horizontal element (ceiling/roof)
			Thickness (mm)	Density (kg/m³)	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 × 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 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 × 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 Pyrocyl)
FIBERFRAX DURAFELT paperAluminium-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.

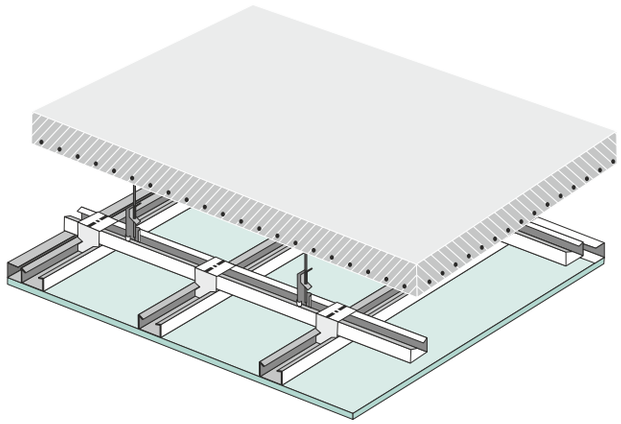
Basic conditions:

- 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

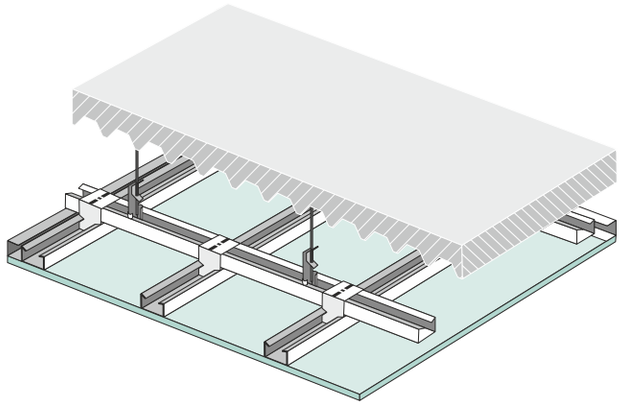


Usage conditions:

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/m3 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)



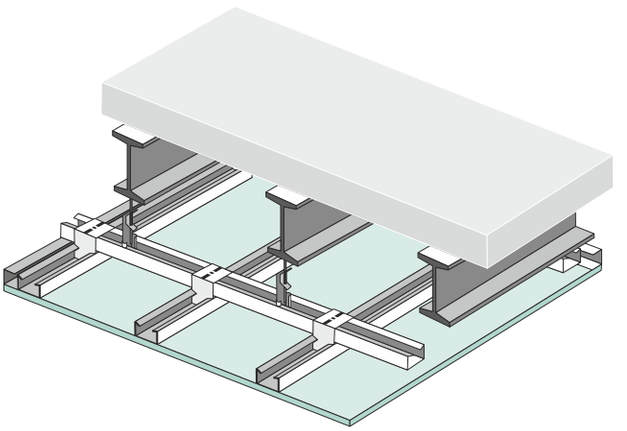
Usage conditions:

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:

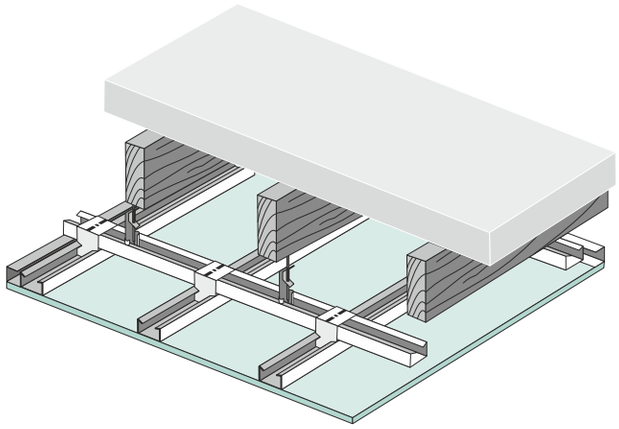
Cross-section coefficient of the steel beam A_m/V [m^{-1}]	Resistance to fire class depending on design temperature							
	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C	700 °C
≤ 160	R 20	R 20	R 20	R 20	R 20	R 20	R 30	R 30
≤ 250	R 20	R 20	R 20	R 20	R 20	R 20	R 20	R 20
≤ 300	R 20	R 20	R 20	R 20	R 20	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_m/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 45	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 60	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	R20	R 20	R 20	R 20	R 30	R 30	R 30	R 30	R 30
	100	R 20	R20	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	R20	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 45	R 45
	200	R 20	R 20	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 45	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/m3, 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).

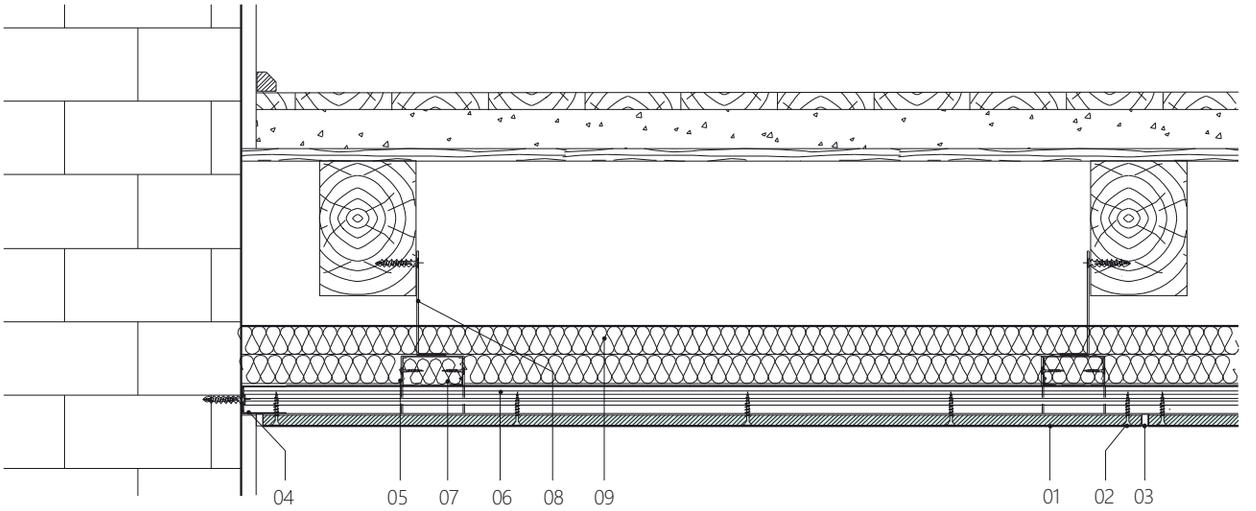
For anchoring of CETRIS® boards on CD profiles are used self-drilling self-tapping screws 4.2 × 25 mm with countersunk head, and with milling for recessing into the board. The screw length must be at least 10 mm longer than the thickness of the anchored board. In case of multi-layer cladding is necessary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

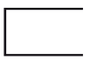
8.3.2.4 Sample Design Solutions - DETAILS

Longitudinal and transverse cross-section



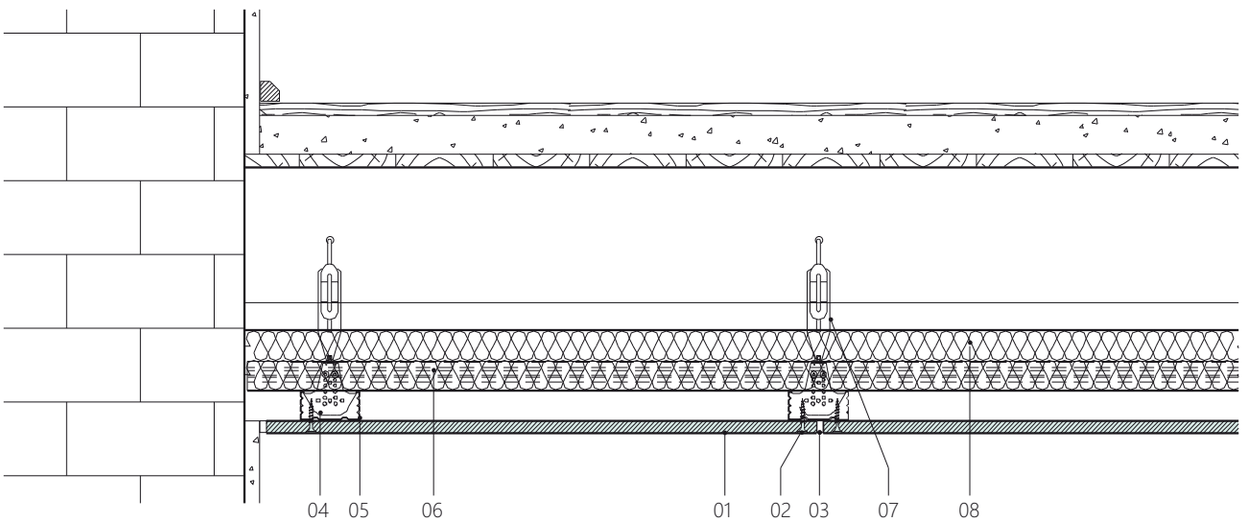
01 CETRIS® board
02 screw 4.2 × 25 (35, 45) mm
03 fire resistant filler
04 UD profile
05 cross-connector
06 CD installation profile
07 CD support profile
08 hanger
09 mineral wool

UD profile



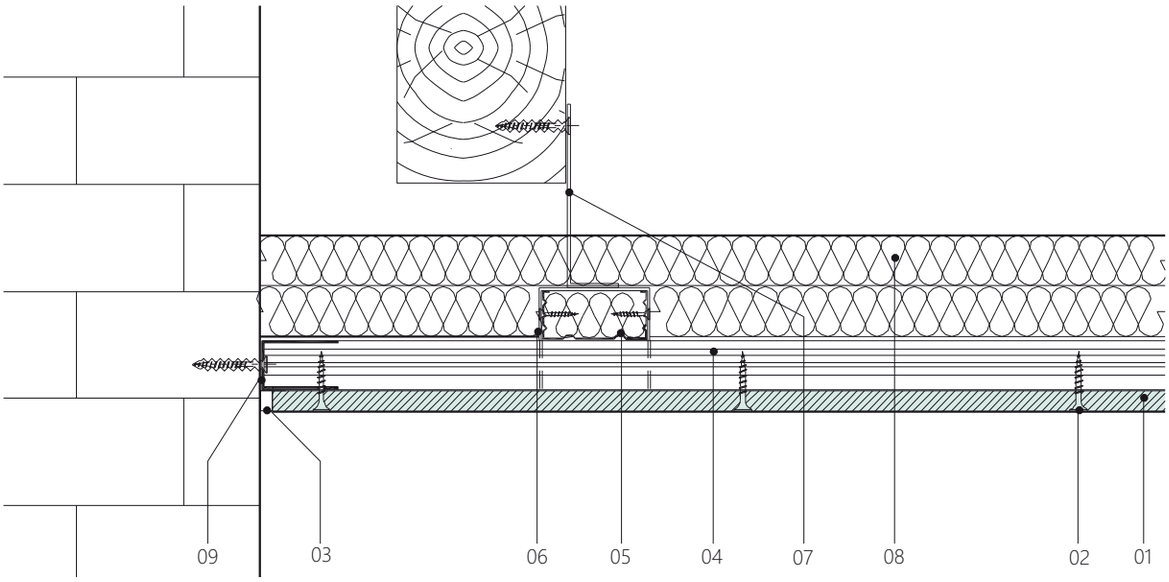
Cross-connector

CD profile



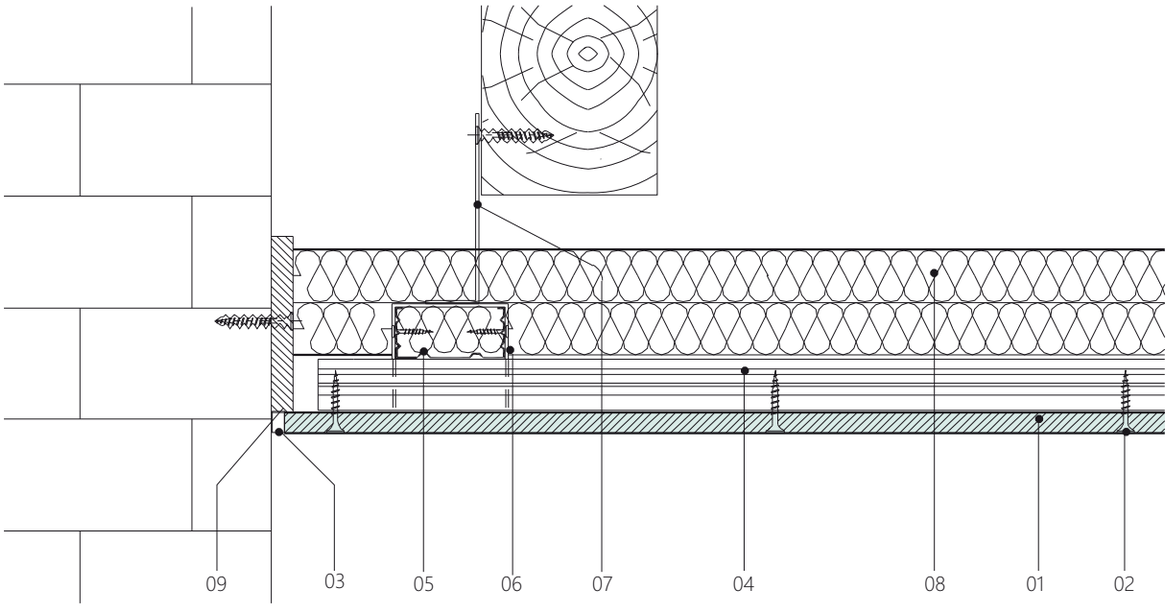
01 CETRIS® board
02 screw 4.2 × 25 (35, 45) mm
03 fire resistant filler
04 cross-connector
05 CD installation profile
06 CD support profile
07 hanger
08 mineral wool

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



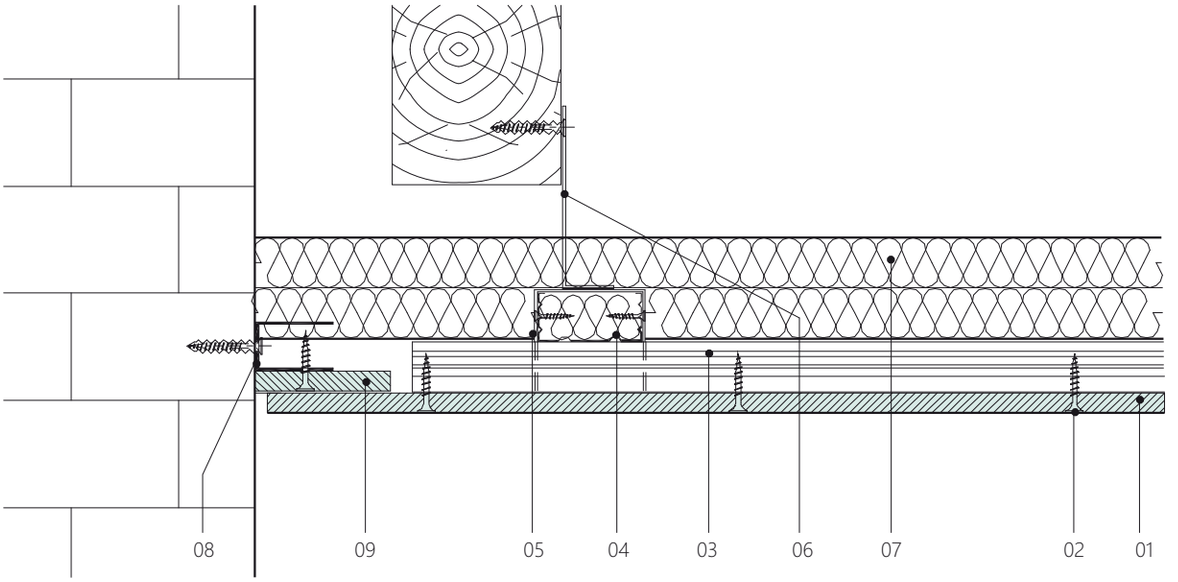
01 CETRIS® board
02 screw 4.2 × 25 (35, 45) mm
03 fire resistant filler
04 CD installation profile
05 CD support profile
06 cross-connector
07 hanger
08 cut mineral felt
09 UD profile

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



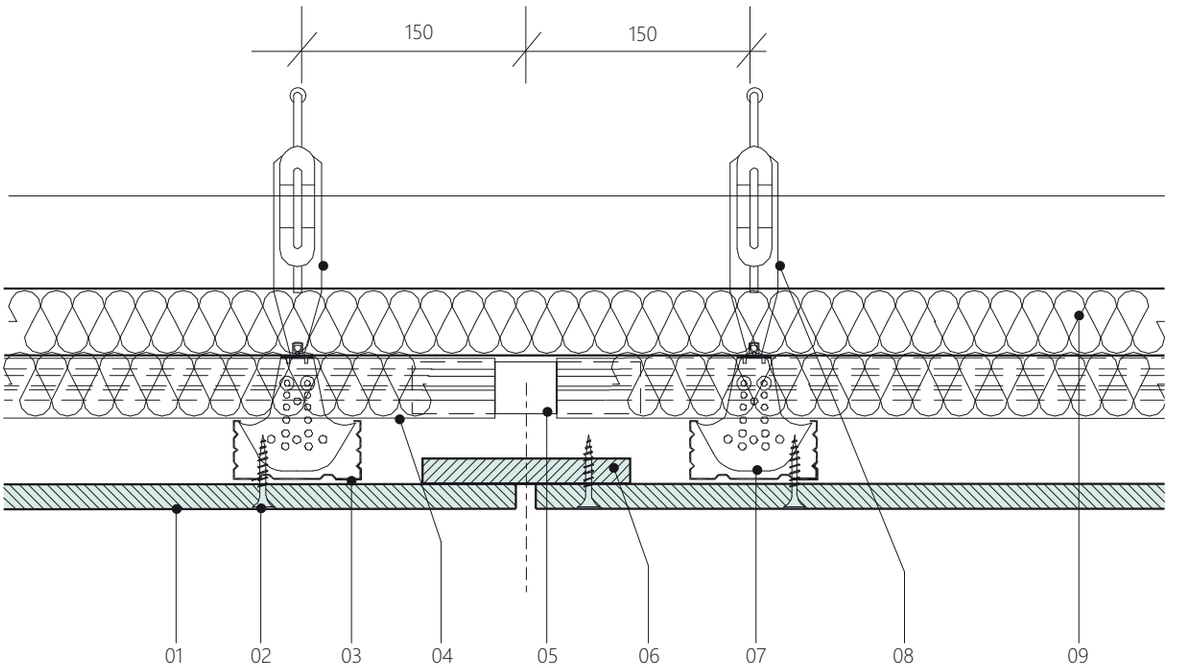
01 CETRIS® board
02 screw 4.2 × 25 (35, 45) mm
03 fire resistant filler
04 CD installation profile
05 CD support profile
06 cross-connector
07 hanger
08 cut mineral felt
09 CETRIS® tape

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



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

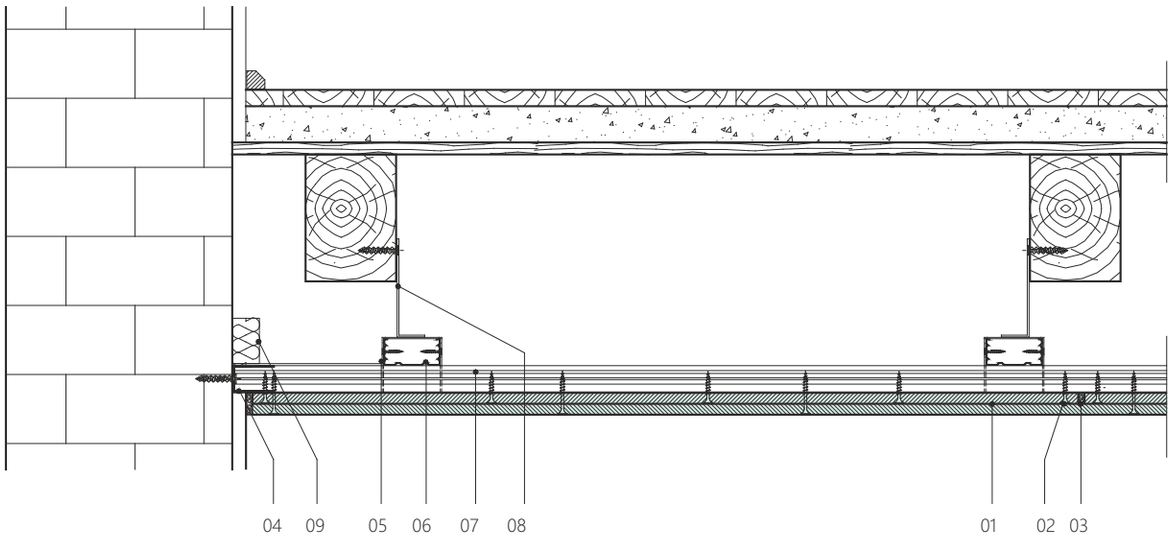
Dilatation joint in the ceiling



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

Fire-resistant ceiling

Longitudinal section



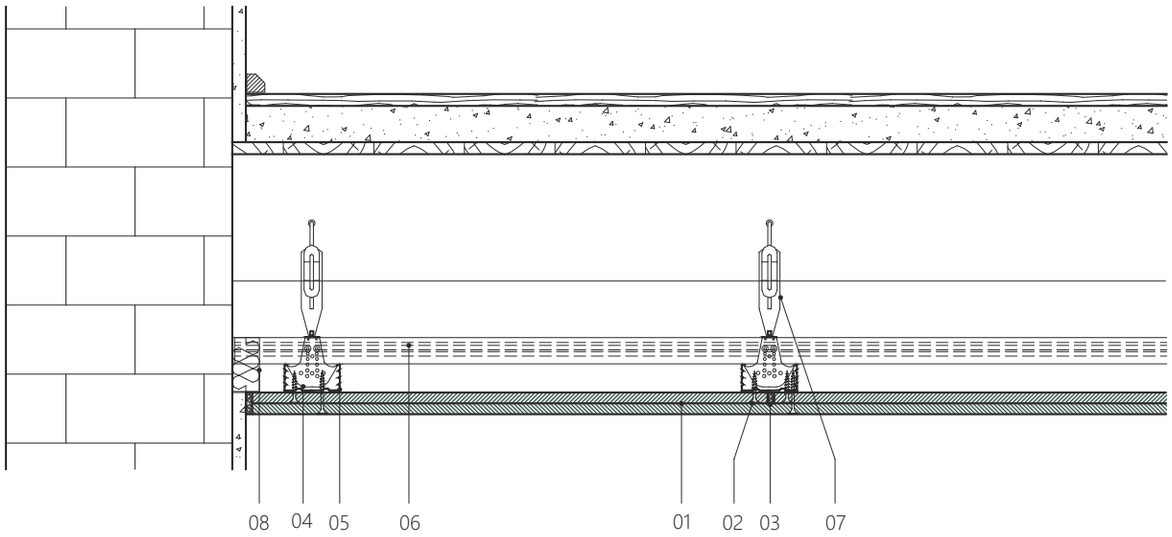
01 CETRIS® board
02 screw 4.2 × 25 (45) mm
03 fire resistant filler
04 UD profile
05 cross-connector
06 CD installation profile
07 CD support profile
08 hanger
09 mineral insulation – sealing along the walls (min. thickness 30 mm, height 50 mm)

UD profile

Cross-connector

CD profile

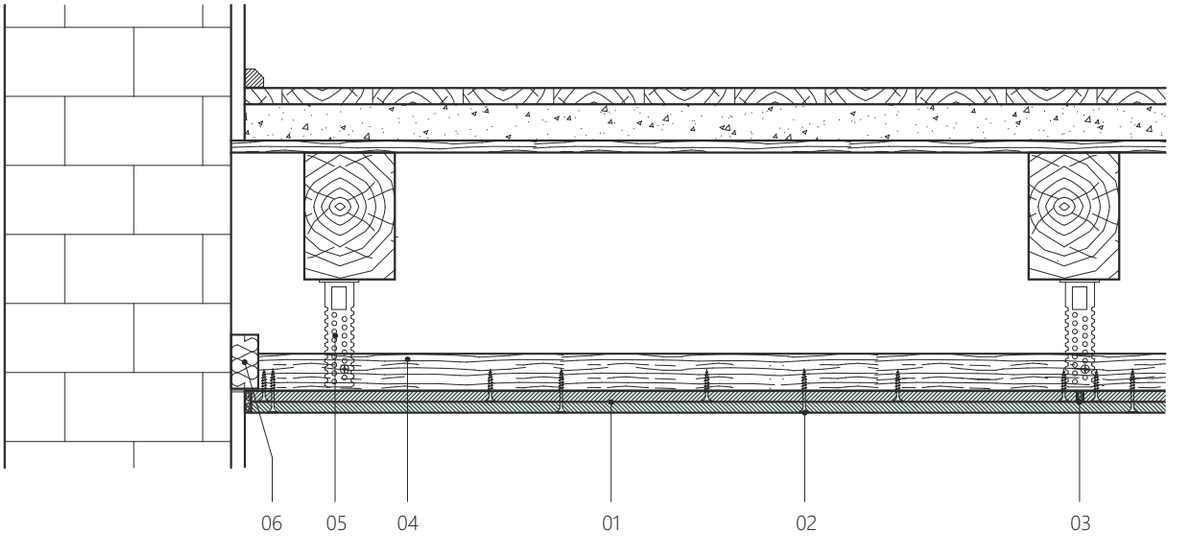
Transverse section



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

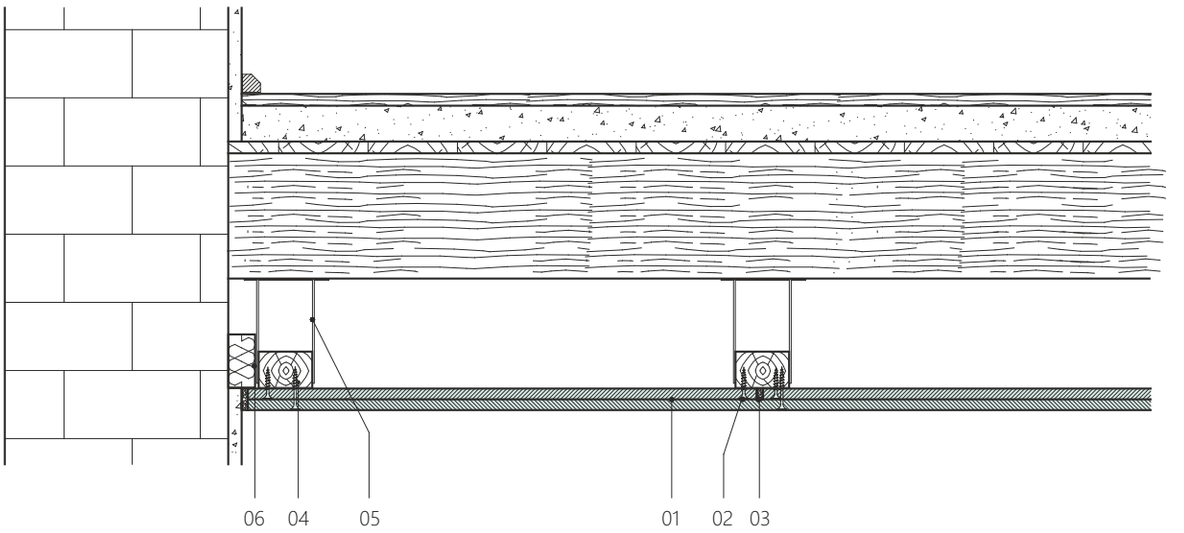
Fire-resistant ceiling

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)

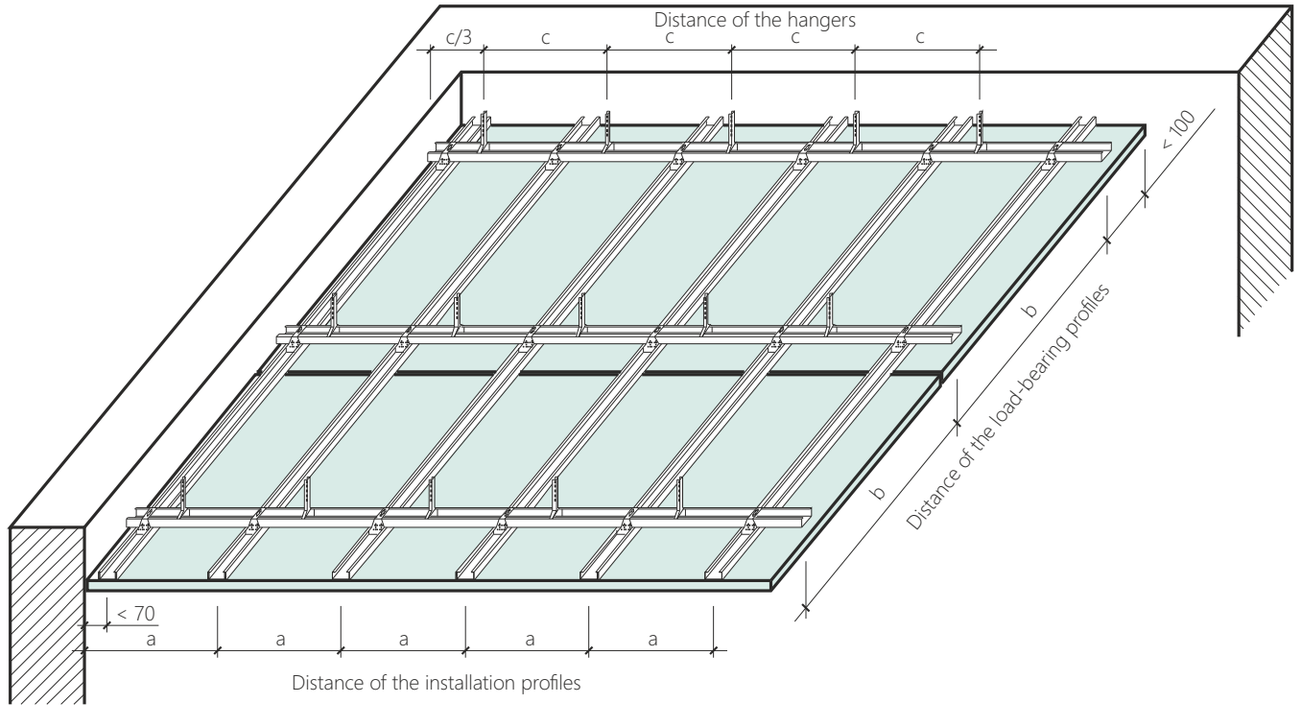
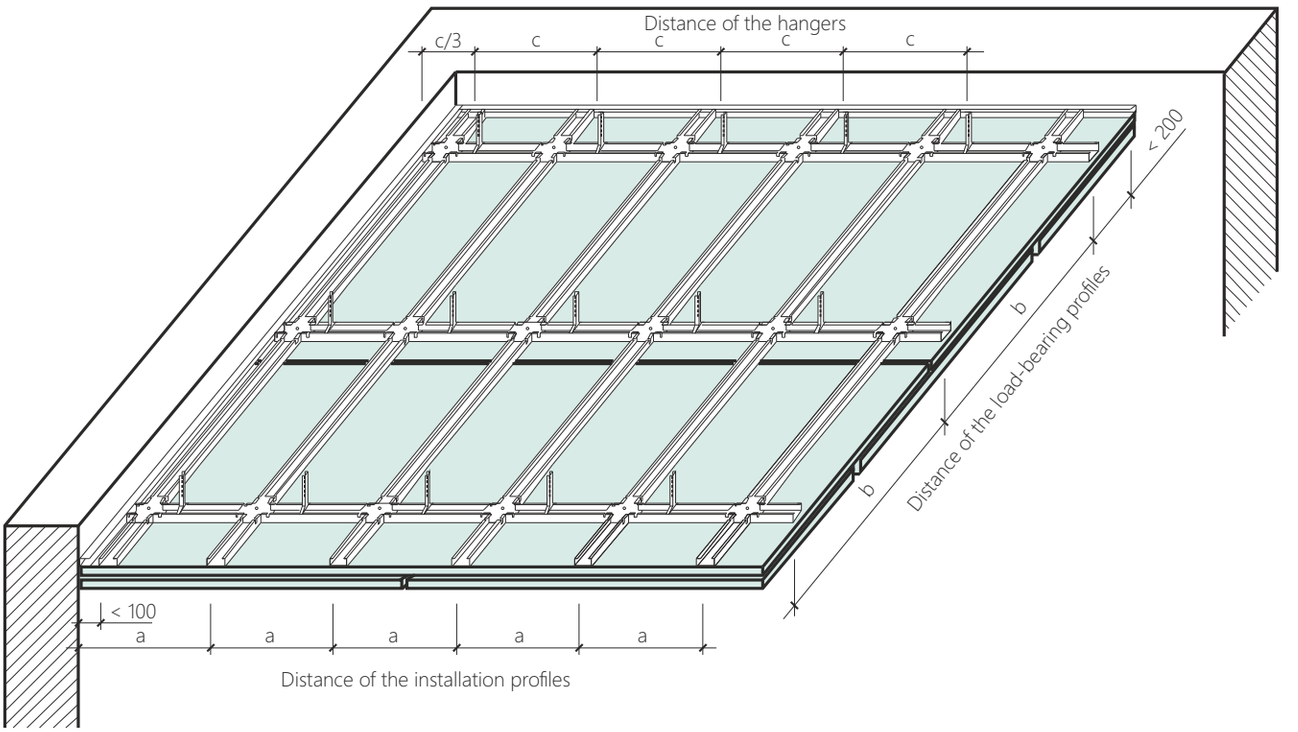


Fig. 2) Schematic drawing of the load-bearing construction of the ceiling for cladding with CETRIS® cement bonded particleboard (thickness 2 × 12 mm)



- 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.

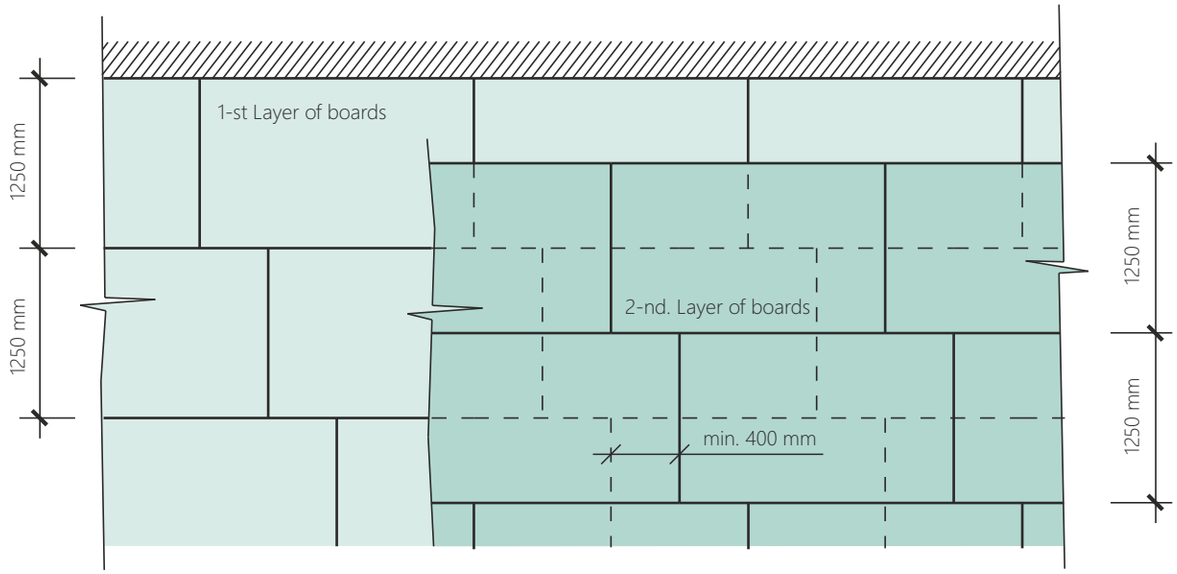
8.3.2.6 Notes to Assembly

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:



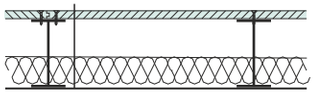
8.4 Horizontal Constructions - Ceilings and Floors (Fire from Above)

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).

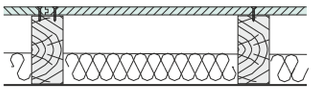
Using CETRIS® cement bonded particleboards it is also possible to achieve the fire resistance of horizontal constructions to fire stress from above. This fire load is characteristic especially for ceiling and floor constructions that form horizontal divisions between storeys.

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/m³)		
	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	

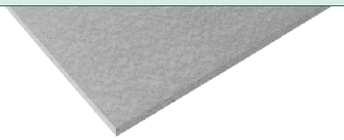
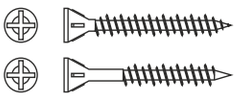
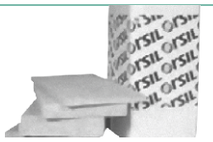
Notes to the table
1)The test was performed with steel I profiles 140 with the span of 4 m.
2) Classification of limit fire resistance pursuant to EN 13 501-2, constructions tested pursuant to EN 1365-1 and EN 1364-2 with reduced vertical load with the intensity of 100 kg/m².

The ceiling/floor construction (wooden 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/m³)		
	22	625	80	25	Wooden laths 50x30 mm for fixture of any ceiling	REI 45 / RE 30
	2x12	625	80	25		

Notes to the table:
1)The test was performed with wooden prisms 80 by 140 mm (spruce logs) 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.

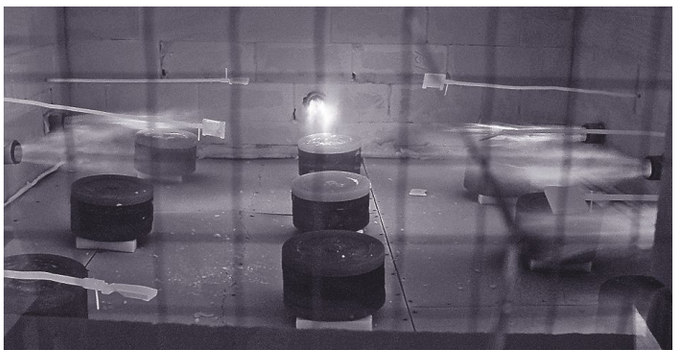
Materials for execution of fire structures

Description	Visualisation	Note
CETRIS® BASIC, or PD (PDB) 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
crew 4.2x45, 55 mm Counter-sunk, self-tapping screws		For anchoring CETRIS® boards to the load-bearing construction.
Heat-insulation Mineral or rock wool (Isover Orstrop of thickness 80 mm, density 25 kg/m^3)		It is necessary to observe the thickness and volume mass according to the specification in the composition. Reaction to fire class A1.

8.4.2 General assembly principles

For complete principles for floor construction assembly, see Chapter 6 Floor Systems.
Main principles stressed in this context:

- Maximum spacing of screws anchoring CETRIS® boards to beams must not exceed 300 mm. The minimum distance from the edge is 25 mm. The screw must be at least 20 mm longer than the thickness of the fixed board (steel construction) or 30 mm (wooden construction). When laying two layers of CETRIS® boards each layer needs to be anchored separately.
- In the case of ceiling/floor constructions CETRIS® boards are laid tightly - without gaps. CETRIS® PD (or PDB) floor boards must be glued in their tongue and groove joints with a dispersion glue – such as Uzin MK 33, Henkel Ponal etc. When using CETRIS® boards without treated edges (tongue and groove) the joints off the supports must be supported with CETRIS® tape of the same thickness. The minimum width of the tape is 100 mm, maximum spacing of screws anchoring the strip 200 mm.
- The boards must be laid to avoid cross joints – with a minimum overlap of 625 mm. The minimum size of the finally cut board is 250 mm. CETRIS® boards are always laid with the longer edge perpendicular to the beams.The ceiling cavity filling – mineral wool – must be laid across the ceiling area in the prescribed thickness of the layer.
- All joints – between the ceiling and the walls – must be sealed with mineral wool.



8.5 Steel Construction Cladding with CETRIS® Cement Bonded Particleboards

8.5.1 Introduction

Steel is an inorganic material and therefore may be classified as a non-flammable substance without special testing. Upon direct exposure to fire, steel construction elements lose their load-bearing power due to exposure to high temperatures (increasing to up to 550° C as soon as after 5 minutes of burning) and the building construction stability is compromised. It is therefore necessary to protect all steel elements adequately where fire resistance is required.

The CETRIS® cement bonded particleboard cladding ensures that the steel reaches the critical temperatures only after the defined period. The cladding of CETRIS® boards may be applied directly on the steel profiles or through an auxiliary construction.

Selection of thickness of the CETRIS® cement bonded particleboard cladding in the case of protection of steel constructions depends primarily on the following three factors:

- Time of required protection – fire resistance in minutes
- Design temperature
- Cross-sectional coefficient A_m/V

The time of the required protection (fire resistance) is required in the following intervals: 15, 30, 45, 60, 90 minutes.

The design temperature depends on the intensity of the element loading (coefficient of utilisation of the cross section at normal temperature θD). Unless specified otherwise, the value of 500 ° C is used, corresponding to the coefficient range of 0.78 to 0.80.

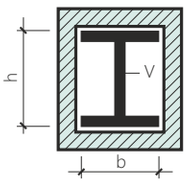
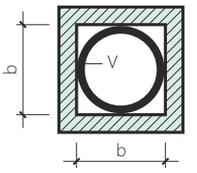
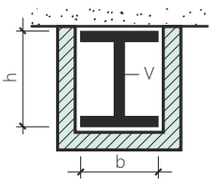
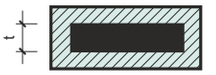
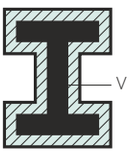
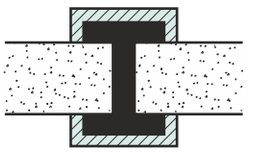
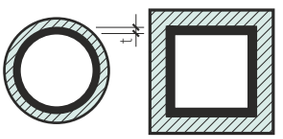
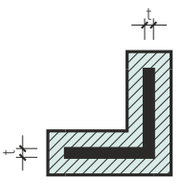
For details on determination of the coefficient of utilisation of the cross section see the ČSN EN 1993-1-2 standard, Euro code 3: Design of steel structures - Part 1 - 2: General rules – Structural fire design, chapter 4.2.4. A significant factor defining the shape of the cross section is the ratio Ap/V – cross-sectional coefficient of protected steel profile. The elements of the A_m/V ratio include:

A_m perimeter of the protected steel profile in mm.
V area of crosswise section of the steel profile in mm^2.

PWhen specifying the size of the heated perimeter it is necessary to always consider just the part of the steel construction exposed to flame in the course of fire (usually all sides of the column and three sides of the beam) – see table.

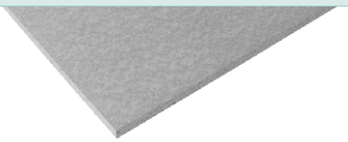
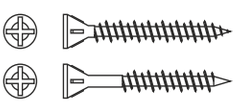
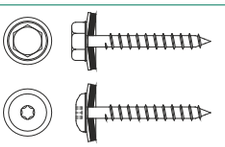
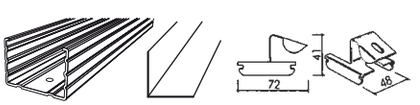
The effect of this factor is significant – subtle profiles (cross sections with high A_m/V ratios) approach the critical temperature more quickly, and therefore need to be protected with thicker cladding.

8.5.2 Calculation of Ap/V

Shape of cross-section	Exposure to fire	AP/V(m-1)	Shape of cross-section	Exposure to fire	AP/V(m-1)
	From four sides	$1000 \frac{2b + 2h}{V}$		From four sides	$1000 \frac{4b}{V}$
	From four sides	$1000 \frac{2h + b}{V}$		From four sides	$\frac{2000}{t}$
	From four sides	$1000 \frac{O}{V}$		From four sides	$\frac{1000}{t}$
	From four sides	$\frac{1000}{t}$		From four sides	$\frac{2000}{t}$

Cross-section dimensions b,h,t are in mm, cross-section area V in mm^2

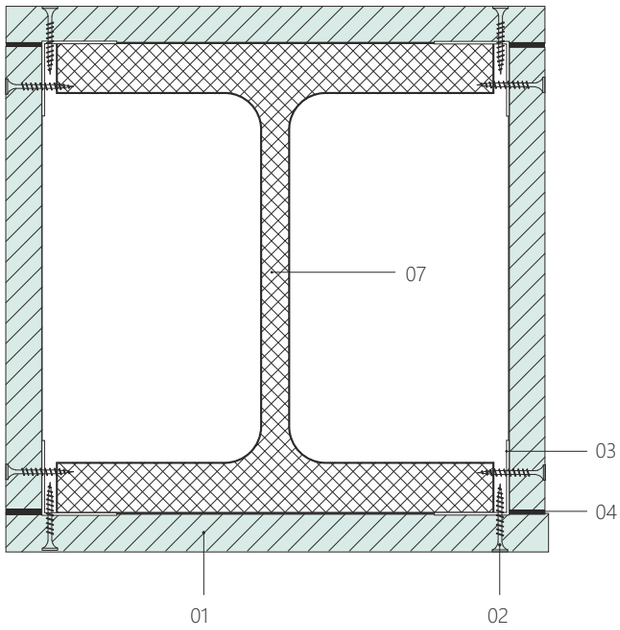
Materials for execution of fire structures

Description	Visualisation	Note
CETRIS® BASIC board Cement bonded particleboard, smooth surface, cement grey. Basic format 1,250x3,350 mm, volume mass 1320±70 kgm^{-3}		Thickness according to the fire resistance requirements
Screw 4.2x25, 35.4 mm Counter-sunk, self-tapping screws		Screw type according to the thickness of the cladding. Anchoring in the interior, or exterior under the thermal insulation system (ETICS)
Screw 4.2 – 4.8 x 38, 45 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 on the exterior – it is necessary to pre-drill the board (hole diameter 8 (10) mm)
Auxiliary structures Galvanised sheet metal profiles CD 60x27x0.6 mm, L 50x50x0.6 mm, Clamp to flanges of "I" beams		Dimensions according to fire resistance requirements and wall height. Alternatively, it is possible to use steel profiles with a cross-section area that minimally equivalent to the CW profiles.
Fire resistant filler White material for joint filling and screw head covering.		DEXAFLAMM-R filler (manufactured by Tora Spytihněv), or fire-resistant DenBraven (acrylic, silicone) filler

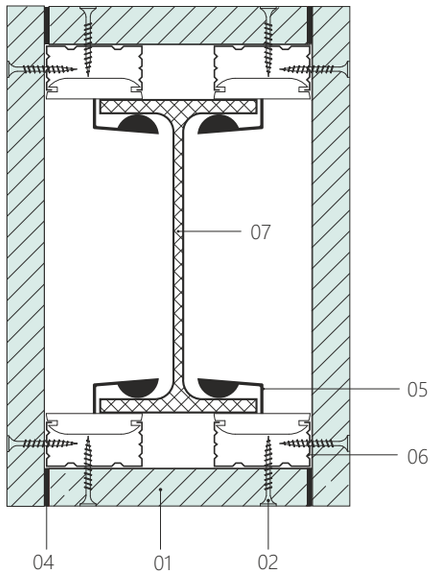
8.5.3 Methods of Cladding (Directly, or on Auxiliary Construction)

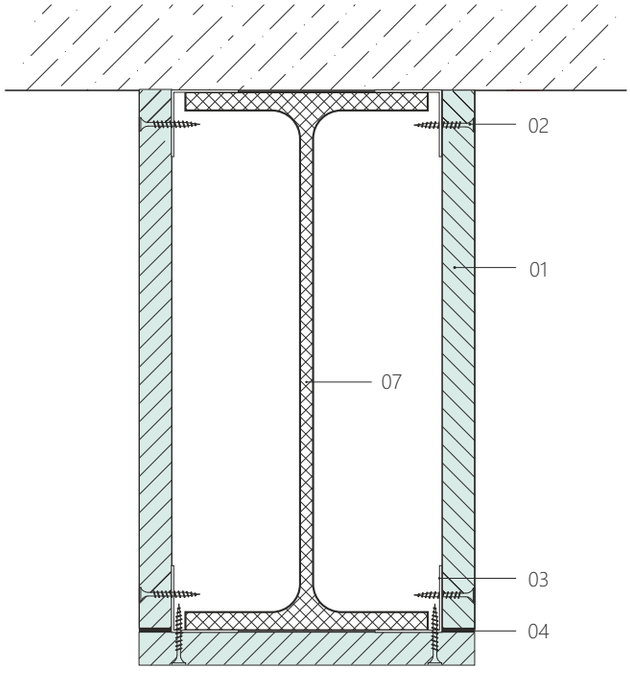
Cladding of CETRIS® cement bonded particleboards can be applied directly on the steel profile – in this case it is recommended to use the easier way of anchoring the CETRIS® boards protecting the web with the auxiliary L profile 50 × 50 × 0.6 mm. This profile is laid directly on the flange with the offset of about 6 mm from the profile edge – the gap is for the screw anchoring the upper CETRIS® board (protecting the profile flange).

Alternatively the cladding of CETRIS® cement bonded particleboards may also be assembled to an auxiliary construction – for example on CD profiles clamped to flanges of the I beams or suspensions.



01 CETRIS® board cladding
02 screw 4.2 × 25 (35, 45, 55) mm
03 auxiliary "L" profile 50×50×0.6 mm
04 fire resistant filler
05 clamp to flanges of "I" beam
06 CD profile 60 x 27 x 0.6 mm
07 protected steel cross-section





8.5.4 Dimension Tables

Resistance to fire classification R 15									
Design temperature (°C)	350	400	450	500	550	600	650	700	750
Am / V (1/m)	Thickness of CETRIS cement bonded particleboard to keep the temperature below the design temperature (mm)								
45	10	10	10	10	10	10	10	10	10
60	10	10	10	10	10	10	10	10	10
80	10	10	10	10	10	10	10	10	10
100	10	10	10	10	10	10	10	10	10
120	10	10	10	10	10	10	10	10	10
140	10	10	10	10	10	10	10	10	10
160	10	10	10	10	10	10	10	10	10
180	10	10	10	10	10	10	10	10	10
200	10	10	10	10	10	10	10	10	10
220	10	10	10	10	10	10	10	10	10
240	10	10	10	10	10	10	10	10	10
260	10	10	10	10	10	10	10	10	10
280	10	10	10	10	10	10	10	10	10
300	10	10	10	10	10	10	10	10	10
320	10	10	10	10	10	10	10	10	10
340	10	10	10	10	10	10	10	10	10
360	10	10	10	10	10	10	10	10	10
380	10	10	10	10	10	10	10	10	10
402	10	10	10	10	10	10	10	10	10
Resistance to fire classification R 30									
45	10	10	10	10	10	10	10	10	10
60	12	10	10	10	10	10	10	10	10
80	14	12	10	10	10	10	10	10	10
100	14	12	12	10	10	10	10	10	10
120	14	14	12	10	10	10	10	10	10
140	16	14	12	10	10	10	10	10	10
160	16	14	14	12	10	10	10	10	10
180	16	14	14	12	12	10	10	10	10
200	16	14	14	12	12	10	10	10	10
220	16	16	14	12	12	10	10	10	10
240	16	16	14	14	12	12	10	10	10
260	16	16	14	14	12	12	10	10	10
280	16	16	14	14	12	12	10	10	10
300	16	16	14	14	12	12	10	10	10
320	16	16	14	14	12	12	10	10	10
340	16	16	14	14	12	12	10	10	10
360	16	16	14	14	12	12	10	10	10
380	18	16	16	14	12	12	10	10	10
402	18	16	16	14	14	12	10	10	10

Resistance to fire classification R 45									
Design temperature (°C)	350	400	450	500	550	600	650	700	750
Am / V (1/m)	Thickness of CETRIS cement bonded particleboard to keep the temperature below the design temperature (mm)								
45	16	14	12	10	10	10	10	10	10
60	18	16	14	12	12	10	10	10	10
80	20	18	16	14	14	12	12	10	10
100	20	18	18	16	14	14	12	12	10
120	22	20	18	16	16	14	14	12	12
140	22	20	18	18	16	16	14	12	12
160	22	20	20	18	16	16	14	14	12
180	22	22	20	18	18	16	16	14	12
200	22	22	20	20	18	16	16	14	14
220	22	22	20	20	18	18	18	14	14
240	22	22	20	20	18	18	18	16	14
260	22	22	20	20	18	18	18	16	14
280	22	22	22	20	18	18	18	16	14
300	24	22	22	20	20	18	18	16	14
320	24	22	22	20	20	18	18	16	16
340	24	22	22	20	20	18	18	16	16
360	24	22	22	20	20	18	18	16	16
380	24	22	22	20	20	18	18	16	16
402	24	22	22	20	20	18	18	16	16
Resistance to fire classification R 60									
45	22	20	18	16	14	12	12	10	10
60	24	22	20	18	16	14	14	12	12
80		24	22	20	18	18	16	14	14
100			24	22	20	18	18	16	16
120			24	22	22	20	18	18	16
140				24	22	20	20	18	18
160				24	24	22	20	20	18
180				24	24	22	22	20	18
200					24	22	22	20	20
220					24	24	22	22	20
240					24	24	22	22	20
260						24	24	22	20
280						24	24	22	22
300						24	24	22	22
320						24	24	22	22
340							24	24	22
360							24	24	22
380							24	24	22
402							24	24	22

Resistance to fire classification R 90									
Design temperature (°C)	350	400	450	500	550	600	650	700	750
Am / V (1/m)	Thickness of CETRIS cement bonded particleboard to keep the temperature below the design temperature (mm)								
45				24	22	20	18	18	16
60						24	22	20	18
80								24	22
100									24

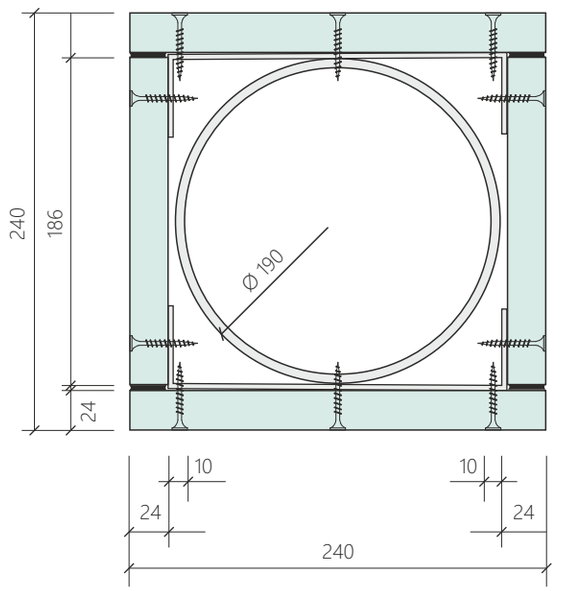
Notes to the table:

- *The values apply to pillars (with fire load from 4 sides) with a cross-sectional coefficient of 45-402 m-1 and beams (with fire load from 3 or 4 sides) with a cross-sectional coefficient of 50-402 m-1*
- *The CETRIS® board cladding can be used for right angle, circular, closed and open steel profiles. The maximum height of the web of the steel profile is 600 mm.*
- *the dimension tables apply to all steel classes excluding S 185 and all types of steels marked E (according to EN 10 025 or EN 10 113).*
- *Types of profiles:*
  - open cross-section profiles (type I, H, , T, U)
  - for rolled or welded profiles

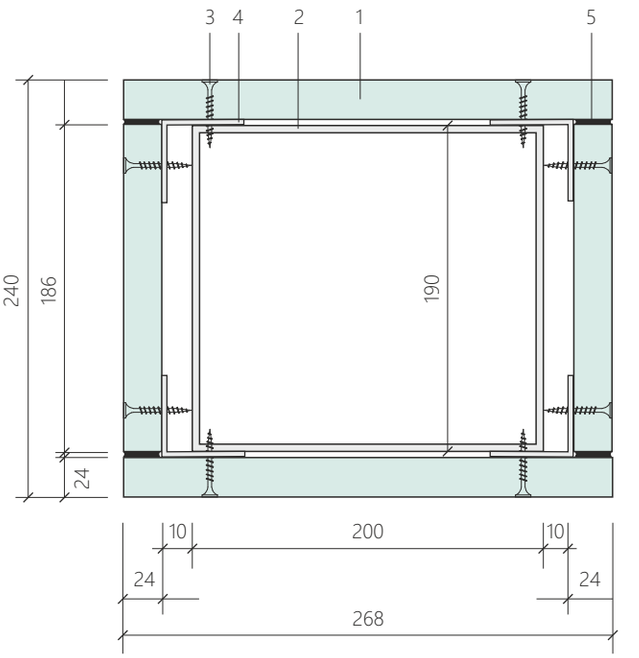
8.5.5 General Principles of Cladding Assembly

- The minimum CETRIS® board thickness is 10 mm and the maximum thickness is 24 mm.
- The maximum spacing of anchoring screws must not exceed 400 mm, when using CETRIS® 14 mm boards or thinner the distance must be reduced to 200 mm. The minimum distance from the edge is 25 mm. The screw must be at least 10 mm longer than the thickness of the fixed board.
- A sunken head screws may be used for interior anchoring. Upper layers of CETRIS® boards in exteriors must be anchored with screws with semi-circular or hexagonal heads and water tight compressive washers and the CETRIS® board must be pre-drilled (min. hole diameter. 8 mm) and the pre-drilled holes must be filled with fire resistant filler (DEXAFLAMM-R, Den Braven fire resistant filler).
- All joints between CETRIS® boards of 3 – 10 mm width, wall and corner contacts must be filled with fire resistant filler.
- When laying a cladding of circular closed profiles, it is necessary to create an auxiliary structure for the CETRIS® boards, e.g. from L profiles. The L profiles must overlap at least at two points and mechanically jointed with the circular profile – see Figure (a)
- When cladding of square closed profiles with metal profiles, it is necessary on 2 sides of the cross-sections to mechanically join the CETRIS® board cladding with the steel cross-section, see Figure (b)

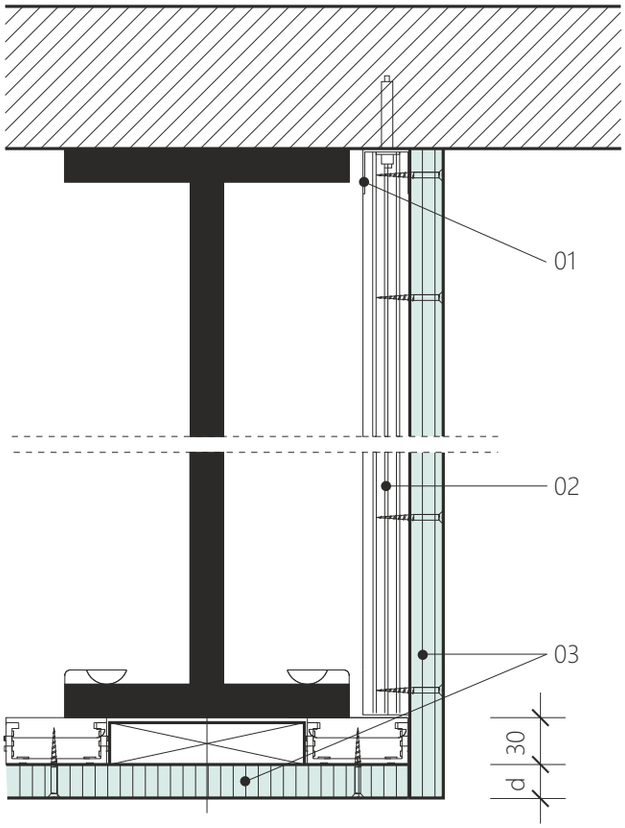
a) cladding of round closed profiles



b) cladding of square closed profiles

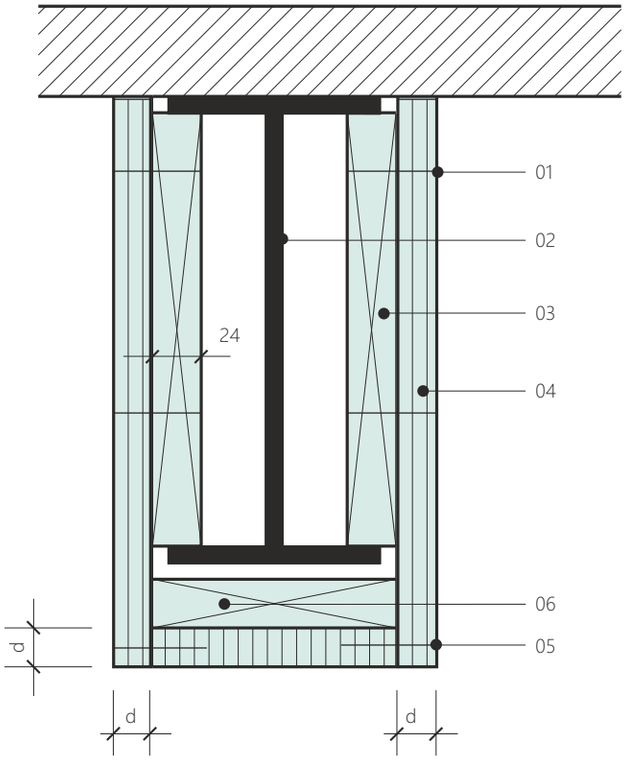


Transverse section



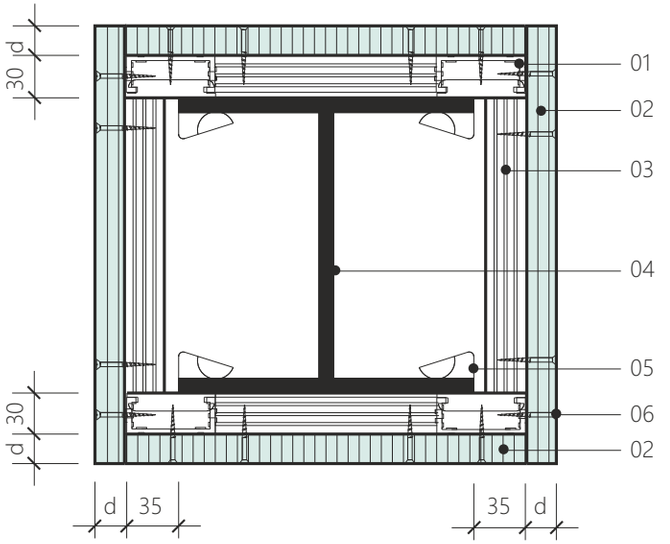
01 UD profile 28 x 27 x 0.6 mm
02 CD profile 60 x 27 x 0.6 mm, span 400 to 600 mm, according to the height of the beam and under the joints
03 CETRIS® cement bonded particleboards

Transverse section

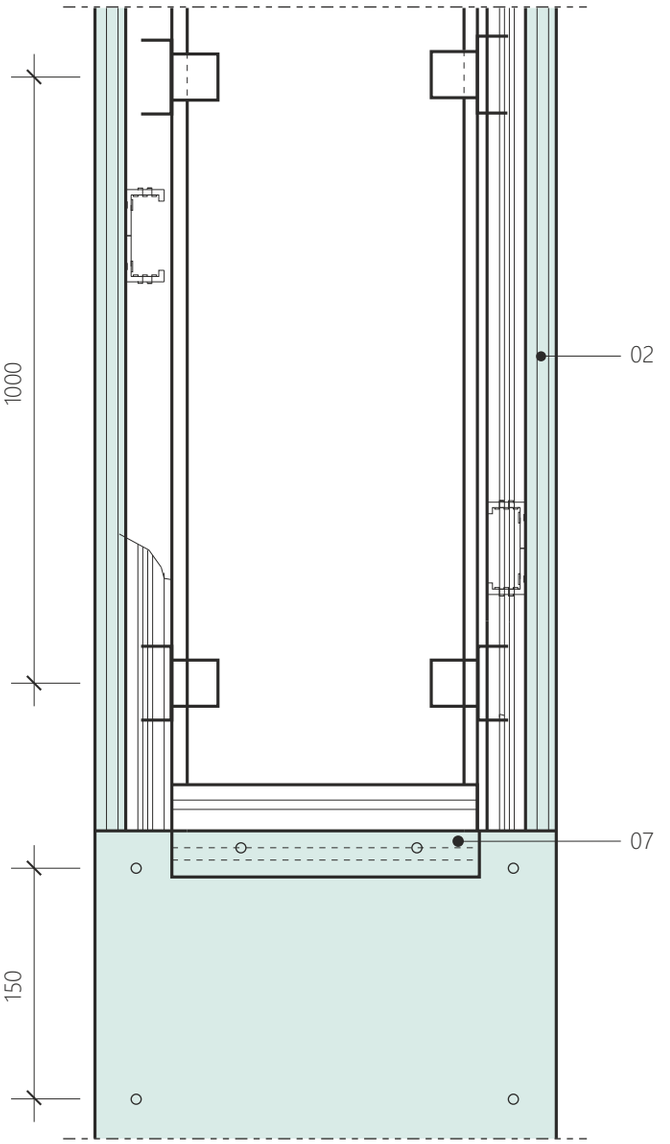


01 screws
02 steel beam
03 assembly insert of CETRIS® cement bonded particleboard
04 CETRIS® cement bonded particleboard
05 screws
06 CETRIS® board in the case of single-layer cladding for joint coverage

Horizontal section



Vertical section



01 CD profile 60 x 27 x 0.6 mm
02 CETRIS® cement bonded particleboard
03 CD profile 60 x 27 x 0.6 mm (under the gaps)
04 steel column
05 Knauf clamps
06 screws
07 CD profile 60 x 27 x 0.6 mm (under the gaps)

8.6 Wall and Ceiling Cladding with Fire Protection Effect

The CETRIS® cement bonded particleboard can be used to protect flammable materials against ignition. In the testing and classification standards the application is described as wall and ceiling cladding with fire protection effect – cladding of flammable parts of buildings. This requirement mainly applies to timber constructions in Western Europe. The cladding in this case means the outermost part of a vertical element (such as a wall, a partition, a peripheral wall) or the bottommost part of a horizontal or inclined element (such as a ceiling, a roof or a ceiling panel) and the purpose of this type of cladding is to protect flammable material against ignition. Cladding of K class protects flammable material against fire for a specified period of time, including carbonisation and other damage, and also prevents the protected elements from catching fire on both sides at the same time. Apart from this, the requirements for reaction to fire may be applied to the cladding products.

8.6.1 Test Procedure for Fire Protective Cladding

The test procedure for determination of the capability of the cladding to protect the flammable materials under it from ignition during specified exposure to fire is defined in EN 14 135 Coverings. Determination of fire protection ability. The cladding is fixed to the bottom side of a horizontally oriented flammable base and exposed from the bottom to predefined standard thermal and pressure conditions in the kiln.

The (flammable) materials covered by the cladding with a density of at least 300 kg/m3 are represented in the tests by 19 mm thick chipboard not treated with any flame retarder (not impregnated) whose density is at least 680 kg/m3.

The tested cladding is applied to a standard horizontal construction – with top wooden prisms 45 x 95 mm (spacing 600 mm) and chipboard with a thickness of 19 (±2 mm) – in the form of a plain ceiling panel.

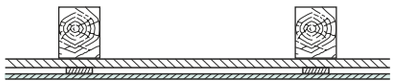
The cladding itself may be assembled directly on the chipboard (without cavity), or on auxiliary laths (with cavity).

The temperature increase on the bottom side of the flammable base is recorded. The cladding is monitored and time to damage is recorded. After the test, the damage to the cladding and defects of the flammable base are recorded. Cladding is expected to provide for fire protection of materials under them and prevent fire in cavities unless the cladding collapses in the course of the test pursuant to EN 14 135 within the given test time (for example 10 minutes, 30 minutes or 60 minutes) and unless the fire gets into any cavity in the cladding and the following requirements are fulfilled for the specified period of time:

- The average temperature measured on the bottom side of the chipboard and average temperature measured on the non-exposed side of the cladding must not exceed the baseline value by more than 250 °C and the maximum temperature measured in any place on these elements must not exceed the initial temperature by more than 270 °C,
- No ignition or carbonisation of any part of the bottom side of the chipboard or non-exposed side of the cladding may occur. Melting and shrinkage are considered as damage while discolouration is not.

8.6.2 Cladding with CETRIS® Cement Bonded Particleboard with Fire Protection Effects

CETRIS® cement bonded particleboard is tested as cladding for flammable parts of buildings in the following composition:

Cladding schematic drawing	Cladding composition	Cavity	Auxiliary structure	Fire resistance	Classification
	CETRIS® 10 mm	10 mm	Wooden laths 70x10 mm	10 minutes	$K_1$10 / $K_2$10
	CETRIS®2x12 mm	cavity not required (air gap)	not required	30 minutes	$K_2$30

8.6.3 General Principles of Assembly of Cladding of CETRIS® Cement Bonded Particleboard with Fire Protection Effects

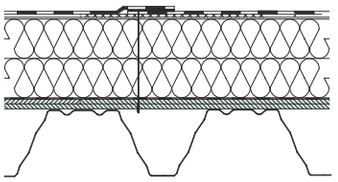
- the CETRIS® board fire cladding can be used as cladding for vertical and horizontal constructions
- CETRIS® boards must be laid without cross joints
- CETRIS® boards are laid with a minimum joint width of 4-5 mm, which is filled with fire resistant filler. In the case of multilayer cladding, the inner joints of the bottom CETRIS® board layers must also be filled with filler
- The maximum spacing of the screws used to anchor the CETRIS® board of thickness 10, or 12 mm must not exceed 200 mm (at the edges), or 400 mm (in the middle)
- for cladding of fire resistance $K_1$10 / $K_2$10, all the contact joints between the CETRIS® boards must be supported with a wooden lath. Maximum distance of support wooden laths is 625 mm, the minimum lath width is 70 mm and the minimum cavity height is 10 mm.
- when using multi-layer CETRIS® board cladding, it is necessary to lay the boards in the next layer in such a manner that they are displaced in relation to the preceding layer by at least 400 mm

8.7 Light Composed Roofing

8.7.1 Introduction

Light composed roofing is a combination of materials with resulting high-standard parameters of use The load-bearing construction is made by profiled trapeze sheet metal, fire resistance is provided by two layers of CETRIS® cement bonded particleboards, high thermal resistance is achieved by use of insulation boards of elasticised foam polystyrene. The composition also includes vapour barrier and hydro insulating layers with high resistance to weather effects. The test of fire resistance of this composition has been performed pursuant to EN 1365-2:2001 Fire resistance tests for load-bearing elements – Part 2: Floors and roofs. The assembled test sample (a beam with overlapped end) was loaded with increased load for the inside forces and tensions to correspond to the values of a continuous beam with two equal fields. Direct application allows use of this composition for inclined roofs with the slant range from 0° to 25°. This roof construction meets the fire safety requirements also pursuant to the updated ČSN 73 0810: 2009 Fire Safety of Buildings, Common Provisions. Use of CETRIS® cement bonded particleboards assures high rigidity of the roofing. At the same time the boards form a firm flat base protecting the subsequently laid heat insulating and hydro insulating layers from damage – especially during assembly.

8.7.2 Fire Characteristics

Construction drawing	Description of the construction	Fire resistance
	Hydro insulating foil Amouplan SM 120 – 180 (thickness 1.2 – 1.8 mm) Separation textile (non-woven glass fibre textile) Insulating boards EPS 100S - 2 layers, thickness 60 mm PE vapour barrier CETRIS® cement bonded particleboards Basic – 2 layers, thickness 10 mm Load-bearing trapeze sheet metal TR 150/280/0.75 (or other pursuant to structural assessment)	REI 30

8.7.3 General Assembly Principles

- Trapeze sheet metal must be anchored in supports in every bottom wave with two screws with a minimum diameter of 5.5 mm with washers. The edge supports (steel or concrete beams) must be sufficiently stiff in crosswise bend and twist for transfer of horizontal membrane forces. Lengthwise connection of trapeze sheet metal pieces must be secured with self-tapping screws 4.8 × 20 mm with the maximum spacing of 500 mm.

The limit conditions for use of other types of trapeze sheet metals are:
- Maximum bend momentum above the support 3,554 Nm
- Maximum bend momentum in the field 2,000 Nm
- Maximum transverse strength 3,703 N
- Maximum bending tension above support 99.8 MPa

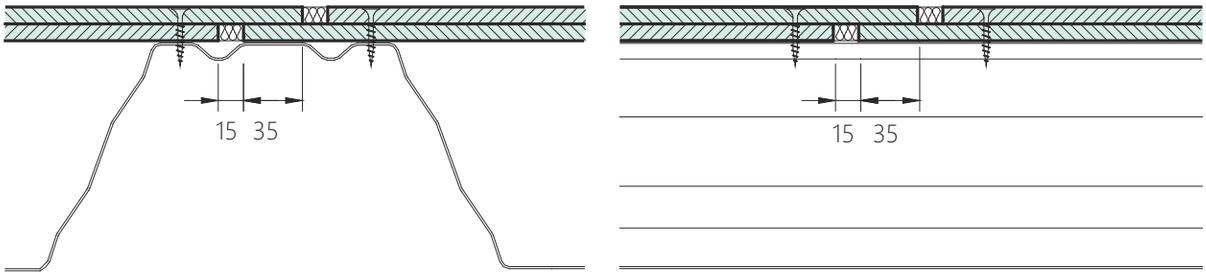
These values apply to trapeze sheet metal of steel class S 320 GD, yield limit f_y = 320 MPa.
Technical and professional services for design of suitable trapeze sheet metal are provided by Kovové profily s.r.o.

- The CETRIS® cement bonded particleboards are laid tightly in both layers, without gaps; when laying the second layer, the joint overlap must be minimum 625 mm. The CETRIS® boards are anchored with screws IR2-4.8 × 50 mm or SC3/35- PH2-4.8 × 45 mm. Both screws were tested and the supplier guarantees the minimum calculated value of 400 N for one element (safety factor 2.5). The maximum spacing of the screws in the longitudinal and transverse direction is 600 mm. The CETRIS® BASIC board are always laid tightly in one dilatation field (max. 6.70 × 6.70 m).

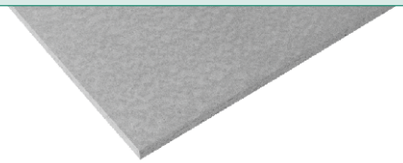
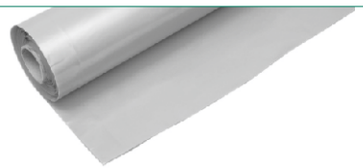
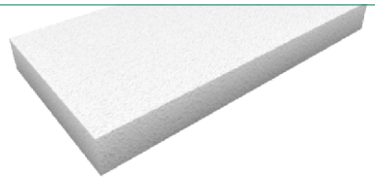
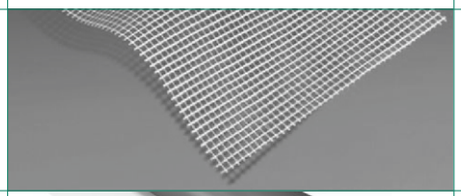
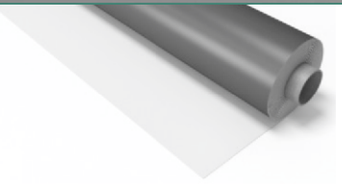
  The width of the individual dilatation joints must be 15 mm that shall be filled with mineral wool tape. If there is no requirement for fire resistance, a single layer of CETRIS® boards of minimum thickness 16 mm will suffice – even in this case the minimum rated value of load-bearing capacity 400 N is guaranteed (shearing of the screw).
- A vapour barrier must be laid pursuant to the instructions of the supplier with an overlap of about 150 mm.
- Polystyrene foam insulation boards must be laid in two layers, with the minimum thickness of each individual layer 60 mm. The joints of the upper layer of insulation boards must have an overlap of min. 250 mm.
- Separation layer – unwoven glass fibre textile 200 gr/m2. Folding with an overlap of about 150 mm.
- Hydro insulation foil type Armourplan SM 120 (thickness 1.2 mm) to Armouplan SM 180 (thickness 1.8 mm). The foil overlap is about 150 mm, and in the overlays the foil is anchored mechanically – telescope R45 × 105 and screw IG-C-6 × 60 mm (supplied by SFS intec spol. s r.o.). The anchor spacing is circa 400 mm. The screw supplier guarantees the minimum rated value of 400 N per element (safety factor 2.5). Mutual adhesion of the foils is provided by heating with a hot air gun and mechanical pressing together (with a roller).

Technical and professional design services for a suitable type of vapour barrier, separation foil and hydro insulation is provided by the company Coleman S.I., a.s. Details by the through passes, roof gullies, skylight, attics etc. must be lined with mineral wool, thickness min. 40 mm, on the side across the full height of the heat insulation layer of EPS.

Implementation of dilation joint between CETRIS® boards



Materials for assembly of fire resistant roofing

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 and number of layers according to the fire resistance requirements. One layer of minimum thickness 16 mm will suffice where no fire resistance is required.
IR2-4.8x50 or SC3/35-PH2-4.8x45 mm screws (supplied by SFS intec spol. s r.o.). Counter-sunk, self-tapping screws		The load capacity of the screws was tested – the guaranteed min. calculated capacity is 400 N.
Membrane – PE foil (supplied by Coleman S.I., a.s.).		Can be replaced by a different type, if the thickness ≤ 2 mm and heating capacity H ≤ 15 MJ/m^2. Permissible I Al foil with a thickness of up to 1 mm.
Insulation boards – foam polystyrene EPS 100S, th. 60 mm (supplied by Rigips s.r.o.).		Insulation boards used must show compressive strength of min. 100kPa, declared coefficient of thermal conductivity λ = 0.036 W/mK, fire reaction class E, max. bulk density 30 kg/m^3.)
Separation glass fibre textile – 200 gr/m^2 (supplied by Coleman S.I., a.s.).		
Hydro insulating foil type Armourplan SM 120 (thickness 1.2 mm) to Armouplan SM 180 (thickness 1.8 mm) (EUROTEC Praha a.s.)		In the composition with classification DP1 it is necessary to use hydro insulation in combination with EPS for class BROOF$_{(t3)}$.
Isofast IG and telescope R45 fasteners		

8.8 Training of Assembly Companies for CETRIS® Board Applications

8.8.1 Assembly Certification

CIDEM Hranice, a.s., CETRIS® Division in cooperation with the training centres at secondary and vocational schools trains assembly companies in the application of CETRIS® Cement Bonded Particleboards. Training is always evaluated and ends in a certificate "On Assembly Qualification". It is intended mainly for companies that build fire resistant constructions and is in this respect directly required by the competent institutions (Fire Rescue Service, Building Authorities...).

Objective of training: Obtain a certificate in assembly of CETRIS® cement bonded particleboards (walls, ceilings, floors, façades, etc.) with emphasis on fire resistance and where proof of assembly qualifications is required (Fire Rescue Service, Building Authorities).

Content: Basic properties of CETRIS® cement bonded particleboards, general principles for assembly of CTD CETRIS® constructions. CETRIS® board floor and façade systems. Fire protection of building constructions. Fire partitions and walls. Advanced walls and fire-resistant wall cladding. Ceilings and soffits.

Intended for: Qualified building workers, dry building construction assembly workers experienced in their assembly.

Training document: Certificate of the training centre or the manufacturer CIDEM Hranice, a.s.


CETRIS
www.cetris.cz
cementotřísková deska

Evid. HK...../2002

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e-mail: cetris@cetris.cz

Střední odborná škola
Střední odborné učiliště,školící středisko
Vocelova 1338, Hradec Králové, 500 02
tel.: 495 212 861
e-mail: vocelova1338@hk.czcom.cz
www.sosasou-vocelova.cz

CERTIFIKÁT

o úspěšném absolvování školení montáže
cementotřískových desek CETRIS®
s důrazem na protipožární aplikace

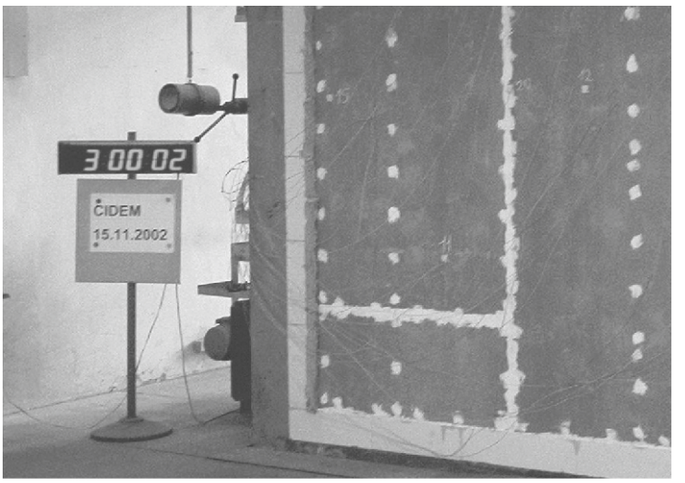
Jméno a příjmení, titul absolventa: .....
Název firmy: .....
Adresa: .....
Tel., fax, e-mail: .....
IČ: .....

V Hradci Králové, dne .....
razítko, podpis školitele

Platnost osvědčení: Základní platnost osvědčení 36 měsíců od vydání.

Poznámka: Proškolená firma nebo fyzická osoba je povinna seznámit firmě CIDEM Hranice, a.s., nebo jí pověřená osoba kontrolu kvality provádějících prací. V případě závažného porušení montážních předpisů s vybavuje CIDEM Hranice, a.s., divize CETRIS právo odejmout vydané osvědčení a informovat příslušné úřady.

CETRIS
www.cetris.cz



The list of trained companies and training centres is available at the website www.cetris.cz.

Other CETRIS® Board Applications

9.1 Decking of a Slanted and Flat Roof

The CETRIS® board can be used as decking for askew and flat truss constructions, which serve as shuttering and the load-bearing construction for the final roofing. For this reason it is necessary to choose a board thickness with regard to the axial distance of the rafters and the required roof load.

Choice of board thickness, distance of the supports

The required load is provided by the roof designer, the board thickness is obtained by deduction from the table below or input into the form in the selection guide at www.cetris.cz.

Board type selection

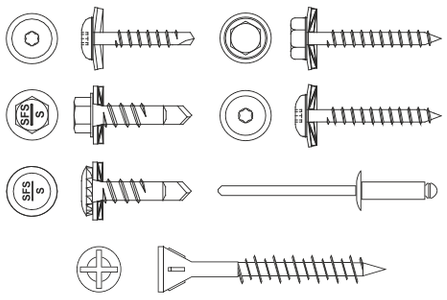
For the cladding, it suffices to use the CETRIS® BASIC board.

Span V (m)	Maximum vertical load in kN/m² - for these board thicknesses:											
	18 mm	20 mm	22 mm	24 mm	26 mm	28 mm	30 mm	32 mm	34 mm	36 mm	38 mm	40 mm
0,200	38,63	47,72	57,77	68,78	80,76	93,69	107,58	101,95	115,12	129,10	143,87	159,44
0,250	24,63	30,44	36,86	43,90	51,55	59,82	68,70	65,09	73,51	82,44	91,88	101,84
0,300	17,03	21,05	25,51	30,38	35,69	41,42	47,58	45,06	50,90	57,10	63,65	70,55
0,350	12,44	15,39	18,66	22,23	26,12	30,33	34,85	32,99	37,27	41,81	46,62	51,68
0,400	8,50	11,72	14,21	16,94	19,92	23,13	26,58	25,15	28,42	31,90	35,57	39,44
0,450	5,89	8,15	10,91	13,32	15,66	18,19	20,91	19,78	22,36	25,10	27,99	31,04
0,500	4,23	5,86	7,87	10,28	12,62	14,66	16,86	15,94	18,02	20,23	22,57	25,04
0,550	3,11	4,34	5,84	7,64	9,78	12,05	13,86	13,09	14,81	16,63	18,56	20,60
0,600	2,34	3,28	4,42	5,81	7,45	9,36	11,58	10,93	12,37	13,90	15,51	17,22
0,650	1,79	2,52	3,41	4,50	5,78	7,28	9,02	9,25	10,47	11,77	13,14	14,59
0,700	1,38	1,96	2,67	3,53	4,56	5,75	7,14	7,91	8,96	10,08	11,26	12,50
0,750	1,08	1,54	2,12	2,81	3,64	4,60	5,72	6,83	7,74	8,71	9,74	10,82
0,800	0,84	1,22	1,69	2,26	2,93	3,72	4,64	5,70	6,75	7,60	8,49	9,44
0,850	0,66	0,97	1,36	1,82	2,38	3,04	3,80	4,67	5,67	6,67	7,46	8,30
0,900	0,52	0,77	1,09	1,48	1,95	2,50	3,14	3,87	4,70	5,64	6,60	7,34
0,950	0,40	0,62	0,88	1,21	1,60	2,07	2,60	3,22	3,92	4,72	5,61	6,53
1,000	0,31	0,49	0,71	0,99	1,32	1,72	2,17	2,70	3,30	3,97	4,74	5,58
1,050	0,23	0,38	0,58	0,81	1,09	1,43	1,82	2,27	2,78	3,37	4,02	4,75
1,100	0,17	0,30	0,46	0,66	0,90	1,19	1,53	1,92	2,36	2,86	3,43	4,06
1,150	0,12	0,22	0,36	0,54	0,75	0,99	1,28	1,62	2,00	2,44	2,93	3,48
1,200	0,07	0,16	0,28	0,43	0,61	0,83	1,08	1,37	1,71	2,09	2,52	3,00
1,250	0,03	0,11	0,22	0,34	0,50	0,69	0,91	1,16	1,46	1,79	2,17	2,59

of such a marked value – board not freely walkable!

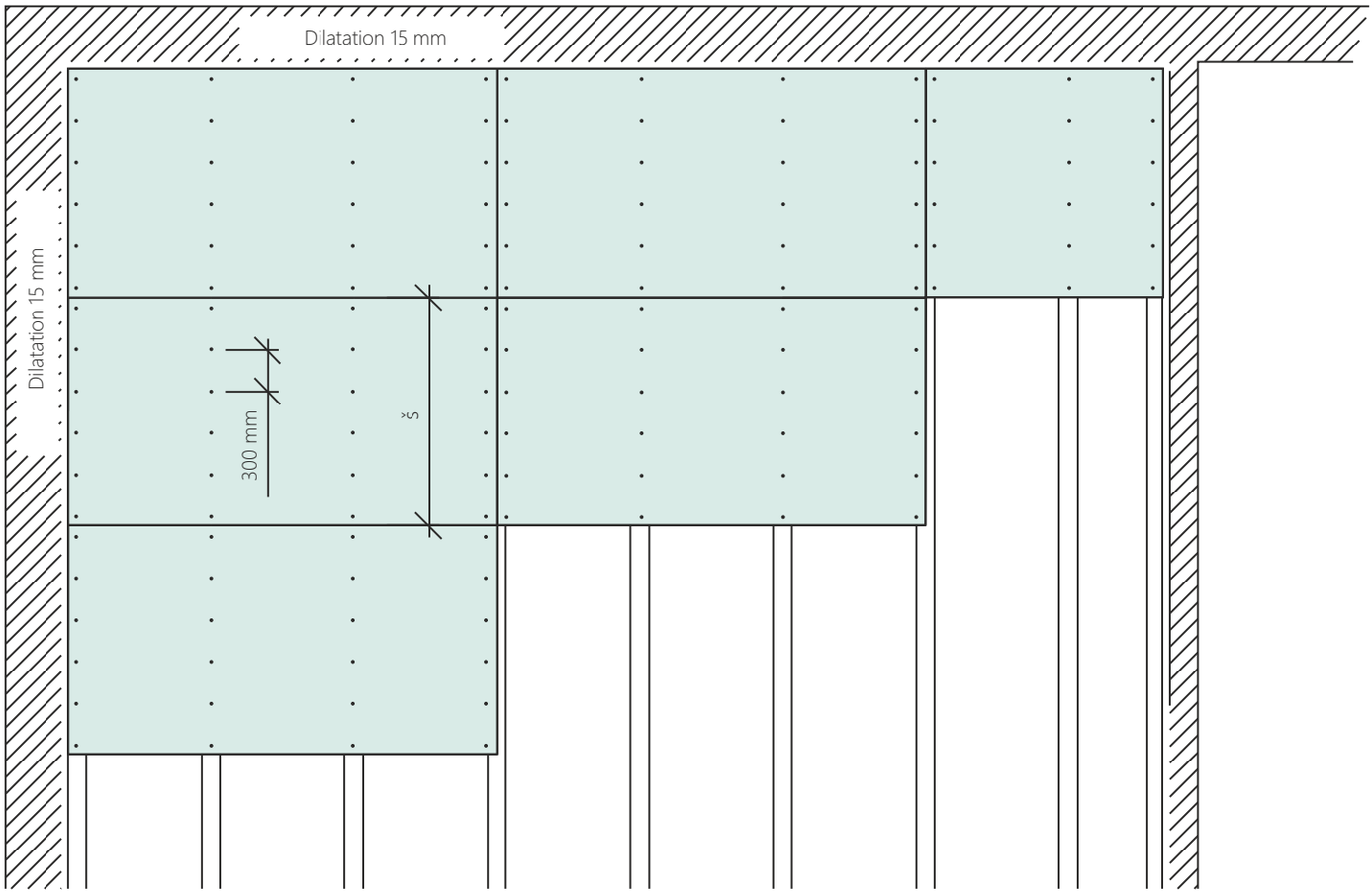
Board anchoring

CETRIS® boards are anchored mainly using visible flat head screws, the CETRIS® board is pre-drilled, the pre-drilled hole diameter is 8 mm when using screws of diameter 4 – 5 mm. At the centre of the board is a pre-drilled hole of same diameter as the screw used. This creates the fixed point to which the board is anchored first. Alternatively, the board may also be anchored with shearing rivets. The minimum distance of the screw from the edge is 25 mm, max. 100 mm. The mutual spacing of the screws nay be maximum 300 mm. In a case where the board is under hydro insulation, it can be fixed with a sunken head screw for a pre-drilled hole that is 1.2 multiple of the screw diameter.



Laying of the boards

The boards are laid with a visible joint, perpendicular to the direction of the rafters, always laid across at least two fields between the supports (trusses).



Solution of the joints, dilatation

The joint is visible between the individual board formats and mostly remains open. If it is necessary to fill the joint, a permanently elastic filler may be used. The size of the joints depends on the CETRIS® board format (up to 1,670 – the minimum joint is 4 mm, format above 1,670 mm – minimum joint 8 mm).

Anchoring of the roofing in the roof

Anchoring may be done by means of screws or staples. The anchoring method must always be verified for a specific application. Informative values of the load capacity of the screw to shearing from the CETRIS® Cement Bonded Particleboards is given in Chapter 4.1.

9.2 Use of CETRIS® Boards in Engineering and Transport Constructions

Use of CETRIS® boards

In the construction or reconstruction of transport structures system of permanent shuttering in the joints on bridge supporting structures (between beams or between the beam prefa ledge) is mainly applied. The CETRIS® board creates a flat bottom (or side) shuttering surface of the planned element (column, beam, bridge construction, etc.). During concreting, the concrete mixture and shuttering CETRIS® boards are connected, after concreting, CETRIS® board remains an integral part of the whole structure. This application does not require any treatment of the inner side and edges of CETRIS® boards before concreting. The outer (visible) side of CETRIS® board can be provided with surface treatment after concreting, which besides of aesthetic effect increases the resistance of the board against weathering, frost and especially extends its lifetime. The thickness of CETRIS® board does not lessen covering of reinforcement, it is also not counted into the anchorage depth of additionally inserted (drilled) anchors. If CETRIS® boards are designed for areas with high stress (alternating exposure to water, frost and defrosting chemicals), is the suitability of cement bonded particle boards CETRIS® verified by test of appropriate technical-qualitative conditions for the road constructions This test is based on ČSN 73 1326 (Determination of surface resistance of cement concrete against water and chemical defrosting chemicals). The cement bonded particle board CETRIS® complied with 115 frost cycles.

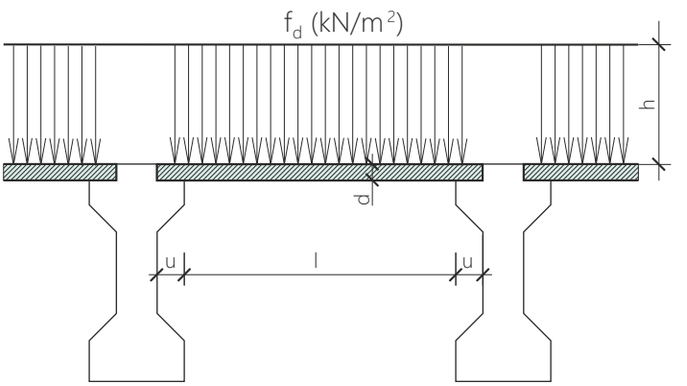
Determination of thickness "d" of CETRIS® boards

According to the magnitude of the load transferred by the board, the correct thickness of CETRIS® board is determined. The decisive load is called Mounting load during the concreting of the construction. CETRIS® board transfers the pressure (weight) of the concrete mix, and the weight of the workers via its surface to the bearing supports. After solidification and hardening the concrete with reinforcement bears the entire load, CETRIS® board fulfils only the function of the external cladding. To determine the thickness of boards, dimensioning tables are processed based on the following assumptions:

1. The vertical uniform load represents the self-weight of the concreted ceiling panel and the weight of the board itself. In case of application of CETRIS® boards where movement of people on the surface (called Walkable boards) is assumed, the boards must be able to transfer also concentrated load of normative value 1.50 kN working on the area of 100 × 100 mm directly on the surface boards in the middle of its range. Instances where boards do not meet these requirements, are shown in red boxes in the tables. The tables show the worst static condition – simple beam; if the board operates as continuous beam its load-bearing capacity is higher.

2. The calculation was done assuming the elastic behaviour of the material while respecting the following mechanical and physical characteristics of the CETRIS® boards determined by the following tests:
   Under the loads shown in given tables, the maximum normal stress in marginal fibres of the boards from standard load does not exceed 3.60 N/mm2 for boards of thickness up to 32 mm, and 3.00 N/mm2 for boards of thickness 34 – 40 mm (2.5 times the safety of boards of thickness up to 32 mm, respectively, 3 times the safety of the boards of thickness 34 up to 40 mm is achieved).

3. The maximum elastic deflection of the CETRIS® board from the operating load including dead weight must not exceed 1/300 of the span. The effect of the final shaping of the boards during long-term action of loads was not considered because the boards shall be used only as shuttering in this case.



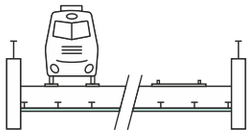
Case 1 - horizontal action
(the CETRIS boards forms the lower shuttering of the bridges, beams, etc.)

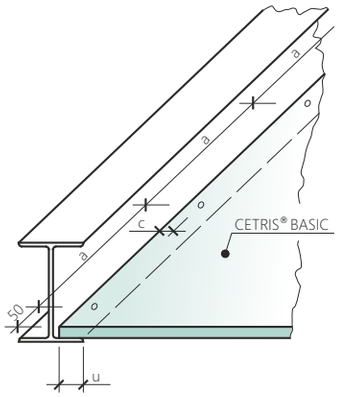
Modulus of elasticity	4500 Nmm^{-2}
Bending tensile strength	9 Nmm^{-2}
Modulus of shear perpendicular to the board plane	2500 Nmm^{-2}
Shear strength	2 Nmm^{-2}
Volume mass	1 400 kgm^{-3}
Transverse contraction coefficient	v = 0,15

4. The length of the mounting of the CETRIS® boards on the "u" profile supports must be at least 40 mm. This value is set with regard to the eventual anchoring of the boards in the support – the recommended distance of the screw from the board edge is 25 mm – see the table and figures:

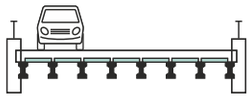
Board thickness d (mm)	a (mm)	c (mm)	u (mm)
18, 20	300	25	min. 40
22,24,26,28,30	400		
32,34,36,38,40	500		

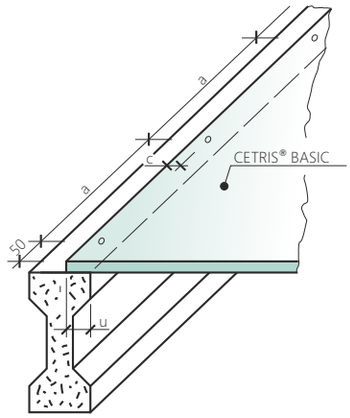
Railway bridge





Road bridge





The result of the calculation is a table showing the maximum standard vertical load of the boards in kN/m²

Span V m	Maximum vertical load in kN/m²- for these board thicknesses:											
	18 mm	20 mm	22 mm	24 mm	26 mm	28 mm	30 mm	32 mm	34 mm	36 mm	8 mm	40 mm
0,200	38,63	47,72	57,77	68,78	80,76	93,69	107,58	101,95	115,12	129,10	143,87	159,44
0,250	24,63	30,44	36,86	43,90	51,55	59,82	68,70	65,09	73,51	82,44	91,88	101,84
0,300	17,03	21,05	25,51	30,38	35,69	41,42	47,58	45,06	50,90	57,10	63,65	70,55
0,350	12,44	15,39	18,66	22,23	26,12	30,33	34,85	32,99	37,27	41,81	46,62	51,68
0,400	8,50	11,72	14,21	16,94	19,92	23,13	26,58	25,15	28,42	31,90	35,57	39,44
0,450	5,89	8,15	10,91	13,32	15,66	18,19	20,91	19,78	22,36	25,10	27,99	31,04
0,500	4,23	5,86	7,87	10,28	12,62	14,66	16,86	15,94	18,02	20,23	22,57	25,04
0,550	3,11	4,34	5,84	7,64	9,78	12,05	13,86	13,09	14,81	16,63	18,56	20,60
0,600	2,34	3,28	4,42	5,81	7,45	9,36	11,58	10,93	12,37	13,90	15,51	17,22
0,650	1,79	2,52	3,41	4,50	5,78	7,28	9,02	9,25	10,47	11,77	13,14	14,59
0,700	1,38	1,96	2,67	3,53	4,56	5,75	7,14	7,91	8,96	10,08	11,26	12,50
0,750	1,08	1,54	2,12	2,81	3,64	4,60	5,72	6,83	7,74	8,71	9,74	10,82
0,800	0,84	1,22	1,69	2,26	2,93	3,72	4,64	5,70	6,75	7,60	8,49	9,44
0,850	0,66	0,97	1,36	1,82	2,38	3,04	3,80	4,67	5,67	6,67	7,46	8,30
0,900	0,52	0,77	1,09	1,48	1,95	2,50	3,14	3,87	4,70	5,64	6,60	7,34
0,950	0,40	0,62	0,88	1,21	1,60	2,07	2,60	3,22	3,92	4,72	5,61	6,53
1,000	0,31	0,49	0,71	0,99	1,32	1,72	2,17	2,70	3,30	3,97	4,74	5,58
1,050	0,23	0,38	0,58	0,81	1,09	1,43	1,82	2,27	2,78	3,37	4,02	4,75
1.100	0,17	0,30	0,46	0,66	0,90	1,19	1,53	1,92	2,36	2,86	3,43	4,06
1,150	0,12	0,22	0,36	0,54	0,75	0,99	1,28	1,62	2,00	2,44	2,93	3,48
1,200	0,07	0,16	0,28	0,43	0,61	0,83	1,08	1,37	1,71	2,09	2,52	3,00
1,250	0,03	0,11	0,22	0,34	0,50	0,69	0,91	1,16	1,46	1,79	2,17	2,59

These values were also converted to the maximum permissible thickness of the concrete layer on the horizontal shuttering and maximum permissible height of the vertical shuttering. The considered volume mass of the concrete was 2,500 kg/m³.

Span V m	Maximum thickness of the concrete layer in m - for these board thicknesses:											
	18 mm	20 mm	22 mm	24 mm	26 mm	28 mm	30 mm	32 mm	34 mm	36 mm	38 mm	40 mm
0,200	1,55	1,91	2,31	2,75	3,23	3,75	4,30	4,08	4,60	5,16	5,75	6,38
0,250	0,99	1,22	1,47	1,76	2,06	2,39	2,75	2,60	2,94	3,30	3,68	4,07
0,300	0,68	0,84	1,02	1,22	1,43	1,66	1,90	1,80	2,04	2,28	2,55	2,82
0,350	0,50	0,62	0,75	0,89	1,04	1,21	1,39	1,32	1,49	1,67	1,86	2,07
0,400	0,34	0,47	0,57	0,68	0,80	0,93	1,06	1,01	1,14	1,28	1,42	1,58
0450	0,24	0,33	0,44	0,53	0,63	0,73	0,84	0,79	0,89	1,00	1,12	1,24
0,500	0,17	0,23	0,31	0,41	0,50	0,59	0,67	0,64	0,72	0,81	0,90	1,00
0,550	0,12	0,17	0,23	0,31	0,39	0,48	0,55	0,52	0,59	0,67	0,74	0,82
0,600	0,09	0,13	0,18	0,23	0,30	0,37	0,46	0,44	0,49	0,56	0,62	0,69
0,650	0,07	0,10	0,14	0,18	0,23	0,29	0,36	0,37	0,42	0,47	0,53	0,58
0,700	0,06	0,08	0,11	0,14	0,18	0,23	0,29	0,32	0,36	0,40	0,45	0,50
0,750	0,05	0,06	0,08	0,11	0,15	0,18	0,23	0,27	0,31	0,35	0,39	0,43
0,800		0,05	0,07	0,09	0,12	0,15	0,19	0,23	0,27	0,30	0,34	0,38
0,850			0,05	0,07	0,10	0,12	0,15	0,19	0,23	0,27	0,30	0,33
0,900				0,06	0,08	0,10	0,13	0,15	0,19	0,23	0,26	0,29
0,950				0,05	0,06	0,08	0,10	0,13	0,16	0,19	0,22	0,26
1,000					0,05	0,07	0,09	0,11	0,13	0,16	0,19	0,22
1,050						0,06	0,07	0,09	0,11	0,13	0,16	0,19
1,100						0,05	0,06	0,08	0,09	0,11	0,14	0,16
1,150							0,05	0,06	0,08	0,10	0,12	0,14
1,200								0,05	0,07	0,08	0,10	0,12
1,250								0,05	0,06	0,07	0,09	0,10

of such a marked value – board not freely walkable!

9.3 Application of CETRIS® AKUSTIC Cement Bonded Particleboard

The CETRIS® AKUSTIC cement bonded particleboard is made by working (drilling of regular holes in) the basic type of the CETRIS® BASIC board. Apart from the existing high mechanical parameters, this treatment also improves the product's acoustic properties. While the solid – basic CETRIS® board excels by its high sound transmission loss, the drilled board serves as sound absorbing cladding.

As compared with other acoustic cladding materials when the CETRIS® AKUSTIC cement bonded particle board is used, extra high resistance to mechanical penetration and moisture are secured – all of this with preservation of the high reaction to fire class (A2 -s1,d0).

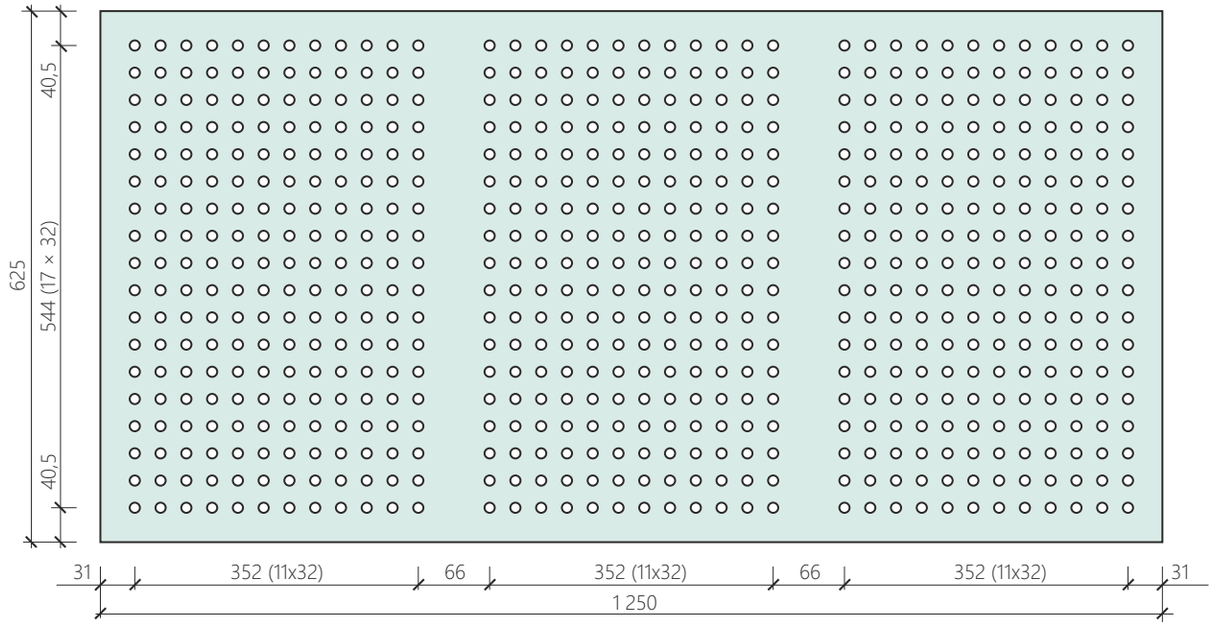
These parameters make this new type of CETRIS® board ideally suited mainly for use in sports facilities, areas with fluctuating temperatures and moistures and buildings with specific requirements. By building the CETRIS® AKUSTIC cement bound particle-board into the wall cladding system or the soffit (below the floor or roof structure) together with the bearing structure, the acoustically effective textile and inserted rock wool produce not only aesthetically interesting but also functional cladding that improves the architectural acoustics.

Acoustics is also one of the important criteria in designing and implementing the civil engineering projects. It is the requirements for the impact transmission loss and the airborne sound transmission loss that are mainly put to the engineering structures – predominantly in cases when the structures (walls, ceilings...) separate the premises with different source of sound.

In the situation when both noise source and users are present in the same room it is necessary to deal with the architectural acoustics. The cladding of CETRIS® AKUSTIC board participates favourably in the improvement of architectural acoustics and sound absorption in inner premises.

Limit size deviations of the CETRIS® AKUSTIC board

Board thickness d (mm)	Limit size deviations of the CETRIS® AKUSTIC board			
	thickness	width	length	spacing of holes
8, 10	+/-0,7	+/-3,0	+/-3,0	+/-2,0
12, 14	+/-1,0			
16, 18	+/-1,2			



Basic physical and mechanical properties of the CETRIS® AKUSTIC cement bonded particleboard	
Volume mass	1150-1450 kg/m^{-3}
Mass balanced moisture at °C and relative humidity % according to EN 634-1	9 +/- 3 %
Humidity expansion coefficient for changes in humidity from 35% to 60% according to EN 13 009	39,6 x 10^{-3}
Heat expansion coefficient according to EN 471 (change in temperature from 20°C to 65°C)	10,8 x 10^{-6} K-1
Ball impact resistance class according to EN 13 964 – thickness 8 mm	class 3A (rate 4 m/s)
Ball impact resistance class according to EN 13 964 - thickness 10 mm	class 2A (rate 8 m/s)

Note:

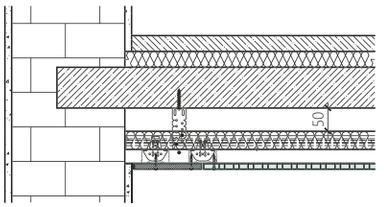
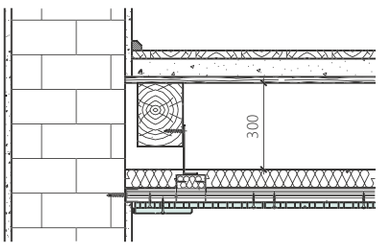
Ceilings from CETRIS® AKUSTIC boards of thickness 10 mm (resistance class 2A) may be installed in sports halls and gyms with a limited presence of ball sports and games, also in other, heavily stressed school premises.

Ceilings from CETRIS® AKUSTIC boards of thickness 8 mm (class 3A) may be installed in rooms where the ceiling should fulfil the basic requirements for impact resistance, such as classrooms, practical work rooms, school corridors, children's corners, game rooms, etc.

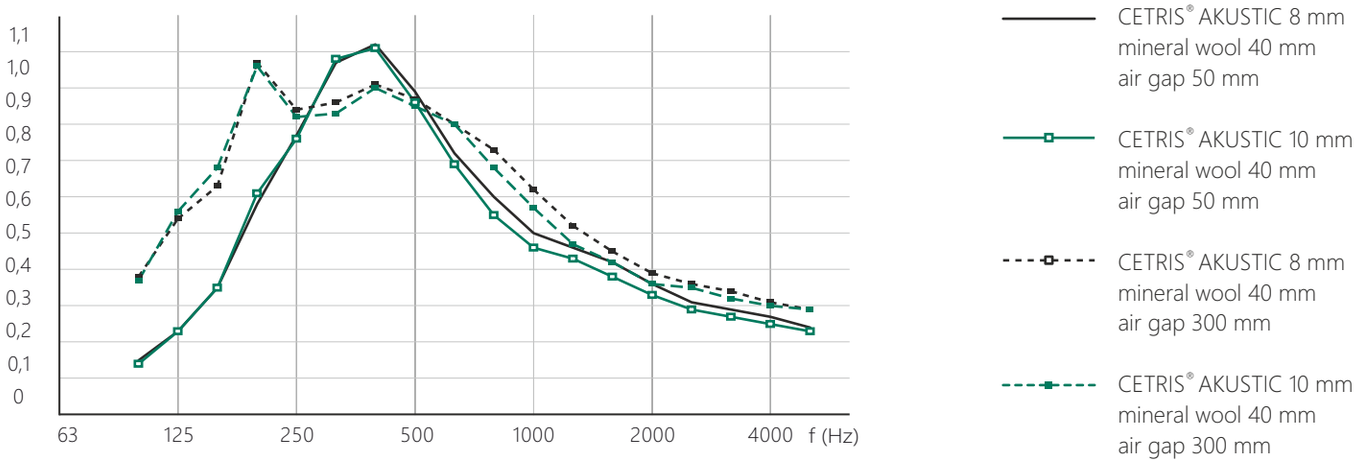
The CETRIS® AKUSTIC boards cannot be used as vertical wall cladding in sports halls and gyms with an occurrence of ball games without additional reinforcement of the base grid and use of protective nets, which dampen the impact the ball.

Sound absorption coefficient α according to EN ISO 354

The sound absorption rate indicates the ratio of the unreflected sound energy and the reflected sound energy. At full deflection α = 0, at full absorption α = 1. The course of the sound absorption in relation to the frequency is determined in these different composition options of the CETRIS® AKUSTIC board (see table):

Drawing	Description of the construction	Absorption coefficient Alpha (depending on the sound frequency)						Mean value of Alpha
		125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
	CETRIS® AKUSTIC board of thickness 8 mm Vlies fabric Mineral wool 40 mm Air gap of size 50 mm	0,23	0,77	0,89	0,50	0,36	0,27	0,63
	CETRIS® AKUSTIC board of thickness 10 mm Vlies fabric Mineral wool 40 mm Air gap of size 50 mm	0,23	0,76	0,86	0,46	0,33	0,25	0,61
	CETRIS® AKUSTIC board of thickness 8 mm Vlies fabric Mineral wool 40 mm Air gap of size 300 mm	0,56	0,82	0,85	0,57	0,36	0,30	0,69
	CETRIS® AKUSTIC board of thickness 10 mm Vlies fabric Mineral wool 40 mm Air gap of size 300 mm	0,54	0,84	0,87	0,62	0,39	0,31	0,67

Graphical representation of the sound absorption coefficient



Surface treatment

We recommend that the joints between the CETRIS® AKUSTIC boards should be left open (free) with underlying separating fabric (Vlies). For application of a coating on a perforated board, the principles stated in the CETRIS® catalogue apply Technical manual for architects, designers and manufacturers chapter 5. Surface treatments. Due to the pre-drilling, the boards must not be spray-painted after installation (assembly) to prevent damage to the acoustics fabric.

Assembly

The CETRIS® AKUSTIC board soffit system is fixed to a metal grid of CD profiles, which cross either in one plane (by means of cross-connectors) or in two planes (connectors). Alternatively, it is possible to use a wooden lath and prism base construction. CETRIS® AKUSTIC boards are then fixed to the auxiliary construction with screws in one layer.

The following assembly rules must be observed

- It is recommended to secure the KNAUF for the profiles CD 60 × 27 cross connectors with screws of minimum size M6 × 40 with nuts and washers. Connection of the load-bearing grid of wooden prisms 80 × 40 mm (assembly and load-bearing profiles) must be secured with at least two screws 4.2×70 mm. For connection of the wooden load-bearing profile to the direct suspension, it is necessary to use a minimum of two screws 4.5×35 mm
- The CETRIS® AKUSTIC boards can be laid with overlap ("to bind") or with so called cross joint.
- Cladding with perforated boards always begins from the room centre. For this reason, it is it is convenient to mark the positions of boards on the load-bearing structure. With irregular or non-rectangular ceiling plan view a jointless (undrilled) strip of the CETRIS® BASIC board of approx. width 150 mm is recommended along the perimeter.
- CETRIS® AKUSTIC boards must always be assembled with the longer edge perpendicular to the load-bearing profiles (laths). The shorter edges are placed on the mounting profiles (laths).
- During assembly, a contraction joint must be considered between each board in a uniform width of min. 3 mm (applies to standard format 1,250×625 mm). The joint should also be considered along the room's perimeter.
- The CETRIS® AKUSTIC boards must not connect directly from the wall or soffit cladding to the surrounding structures, they must not be anchored in the peripheral profile. The dilatation joint in the construction must be visible also in the CETRIS® AKUSTIC cladding
- Before anchoring the boards, the hole row linkage must be verified - not only in the crosswise and longitudinal directions but in a diagonal direction as well. The acoustic boards shall be anchored with self-tapping screws to the base wooden lath structure or the CD profiles.

  The CETRIS® AKUSTIC boards are pressed to the base structure. First tighten the screw in the corner, where face and longitudinal side are already in contact with the anchored boards. After this, continue tightening the screws in the direction of the open space in such a manner as to dissipate any potential tension
- The maximum mutual spacing of the screws that anchor the CETRIS® AKUSTIC boards to the CD profiles or wooden laths in soffits must not be larger than 300 mm and a minimum spacing of 25 mm from the horizontal board edge shall be observed, at least 50 mm from the horizontal edge.
- When screwing the board always press it tightly to the load-bearing CD profiles; pre-drilling of the board is recommended – the drill-bit diameter is equivalent to 1.2 multiple of the screw diameter (applies to interiors). When anchoring outdoors or in the premises with substantial changes in a moisture content (for example, saunas, swimming pools) the boards must be pre-drilled with a 8 mm diameter bit (for a screw diameter up to 5 mm) and screws must be used with visible heads and sealing washers.

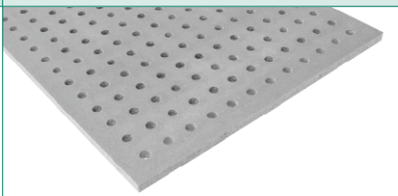
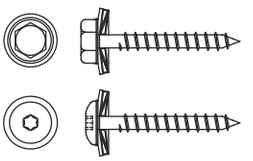
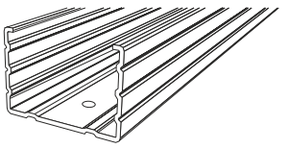
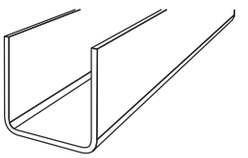
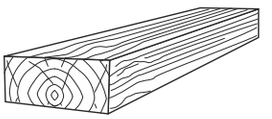
Note:
During installation of cladding on large ceiling or wall constructions (longer or taller than 6 m) dilations in the load-bearing construction must be designed and made visible in the cladding of CETRIS® AKUSTIC boards as well.

We recommend that assembly should be done by at least two workers.

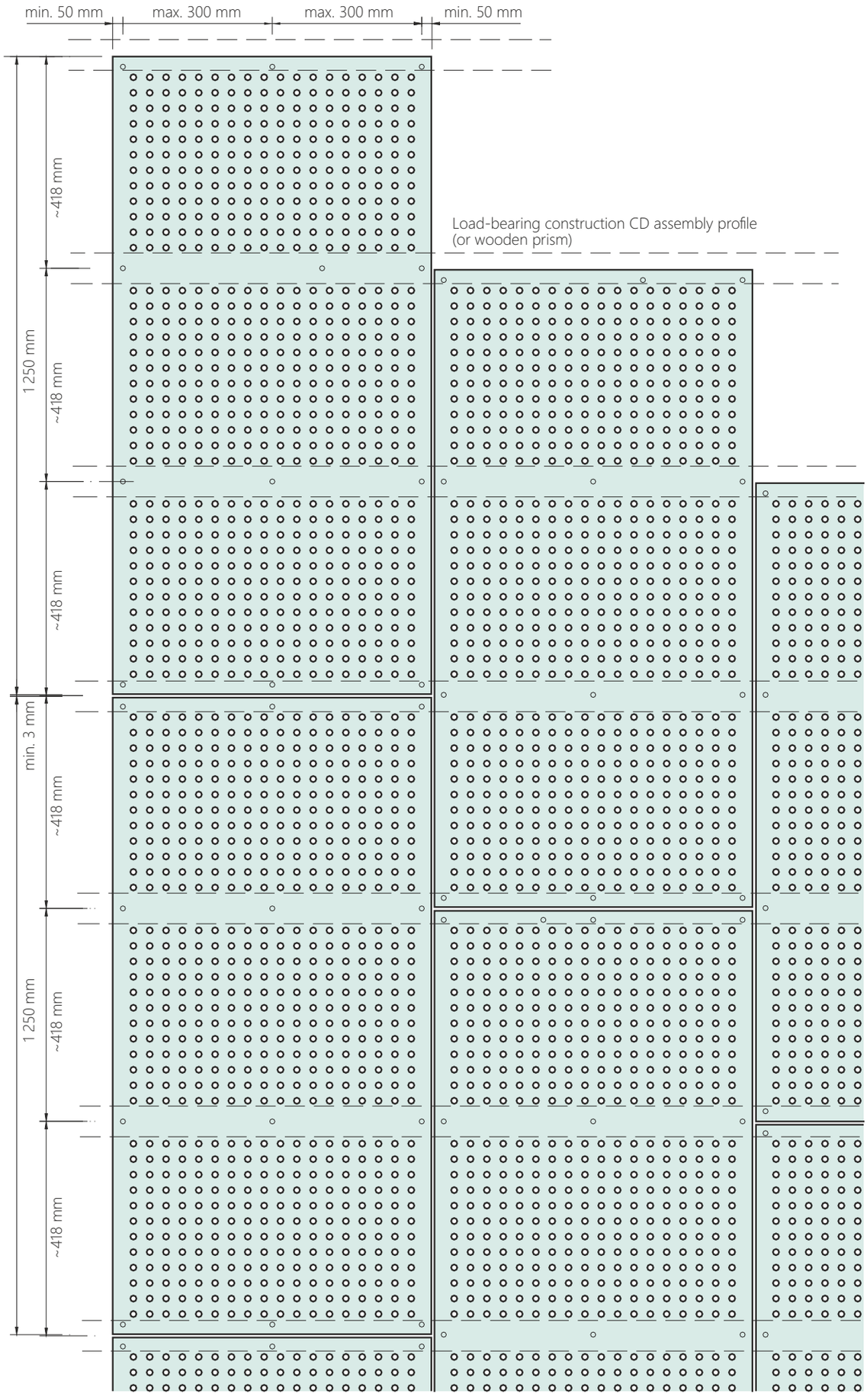
Additional load

Additional burdens can be attached to the very sheathing of the CETRIS® AKUSTIC board (e.g., lights, air-conditioning, etc.) of a max. weight of 1.5 kg. A maximum of one burden is can be mounted in one field delimited by the bearing structure (CD profiles or wooden laths). Burdens (suspended objects) that weigh up to 10 kg must be anchored to the structural elements (of the load-bearing structure). The maximum permitted additional load of the load-bearing structure is 15 kg/m^2. Larger objects must be anchored separately to the bearing structure of a ceiling – according to the instructions in the project documentation.

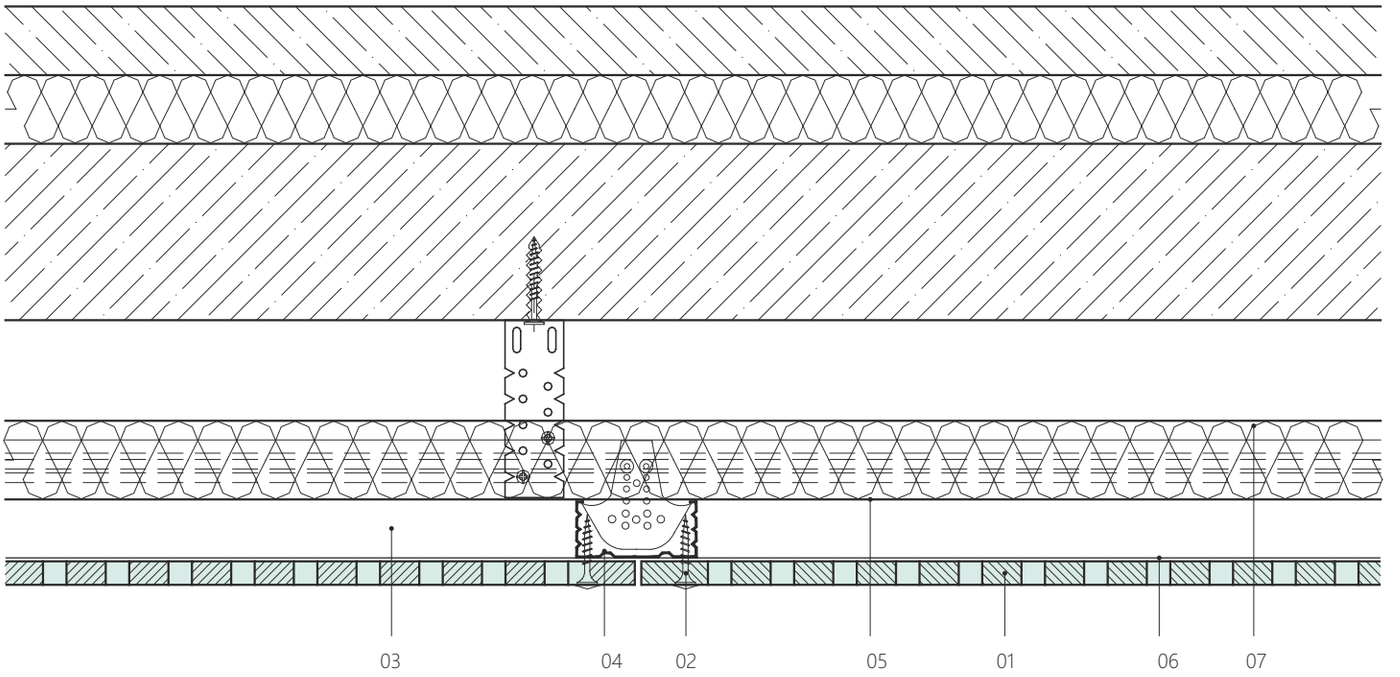
Materials for the assembly of the CERTIS® AKUSTIC perforated boards – specification

Description	Visualisation	Note
CETRIS® AKUSTIC boardCement bonded particleboard, smooth surface, cement grey. Format 1,250 x 625 mm.		Thickness according to the fire resistance requirements
Screw 4.2x25, 35, 45, 55 mmCounter-sunk, self-tapping screws		Screw type according to the thickness of the lining and type of load-bearing construction.
Screw 4.2 – 4.8 x 38, 45 mmStainless steel or galvanised screws with half-round or hex head with thrust water-tight washer		Alternatively, the CETRIS® board can also be anchored with rivets.When anchoring outdoors or in the premises with substantial changes in a moisture content (swimming pools) the boards must be pre-drilled with an 8 mm diameter bit (for a screw diameter up to 5 mm)
CD profile Galvanised sheet metal profile 27x60x0.6 mm		Creation of load-bearing grating for installation of the ceilings. They are fixed using a straight or Nonius hanger on the ceiling (roof) construction.
UD profile Galvanised sheet metal profile 28x27x0.6 mm		It is used to fix the profiles to the walls, masonry with dowels.
Wooden prism Spruce timber of minimum class SII, max. Humidity 18%		Creation of load-bearing grating for installation of the ceilings. Dry impregnated timber class S10 (strength class C24).
Vlies fabric Absorption glass-fibre fabric – it prevents the mineral wool fibres or, as the case may be, dust from falling through.		For the entire construction to fulfil reaction to fire class A2, it is necessary in place of Vlies fabric to use spec. Isover Akustic SSP 2 insulation (with one-sided bonded black fabric).
Heat-insulation Mineral or rock wool of thickness 40 mm (Isover, Rock wool, Knauf Insulation ...)		Can be replaced with another type of mineral / rock wool with density of 22 kg/m^3 and reaction to fire class A1.
Mineral wool Isover Akustik SSP 2 thickness 40 mm.		Hydrophobic mineral wool with single side bonded black glass fabric, reaction-to-fire class A1

Laying of CETRIS® AKUSTIC boards



Joint between the boards



01 CETRIS® AKUSTIC board
02 screw 4.2×25 (35) mm
03 cross-coupling
04 CD assembly profile (or wooden prism)
05 CD load-bearing profile (or wooden prism)
06 vlies absorptive fabric
07 mineral wool

CETRIS® AKUSTIC boards in new designs

We newly offer acoustic boards in other perforated options.
Details are available at our website at the address www.cetris.cz

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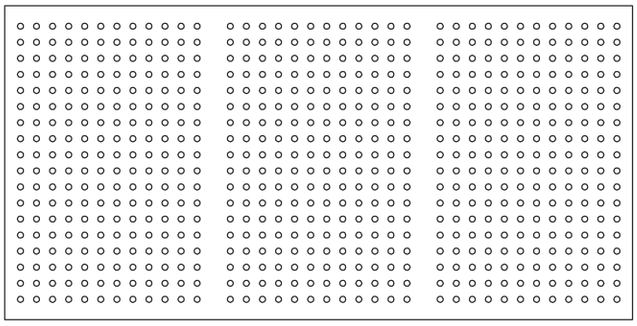
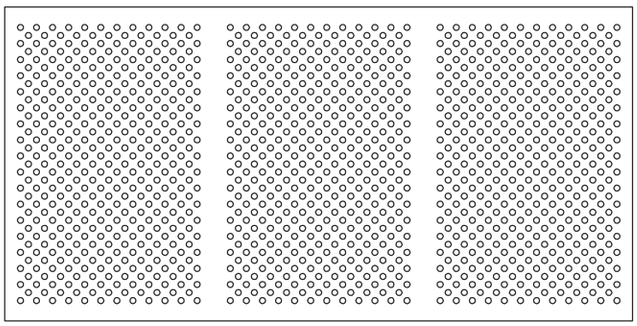
The size of all the boards stated here is 1,250 x 625 mm.

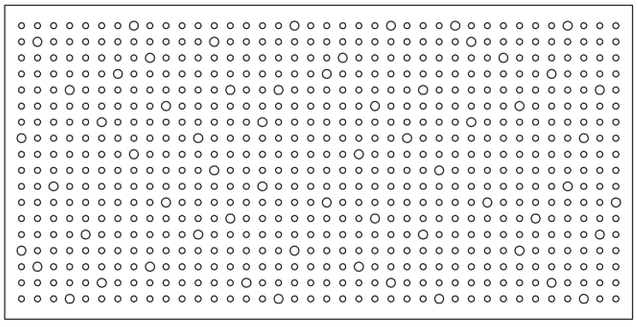
CETRIS® AKUSTIC A



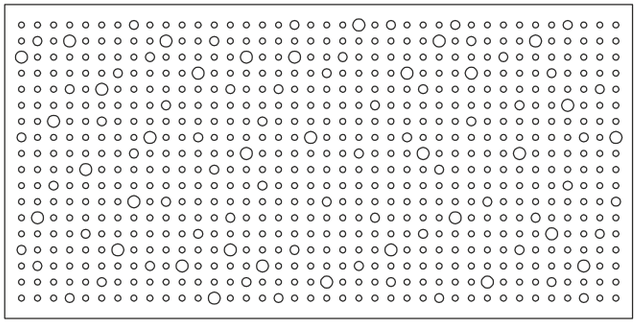
CETRIS® AKUSTIC B



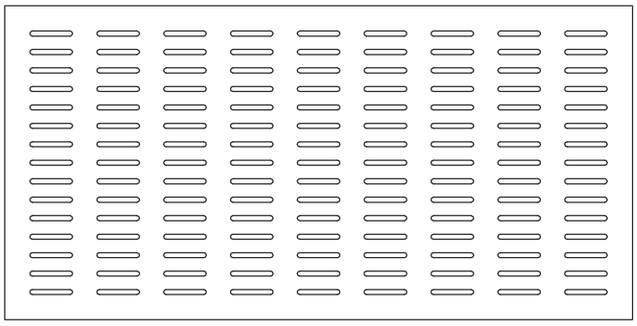
CETRIS® AKUSTIC C



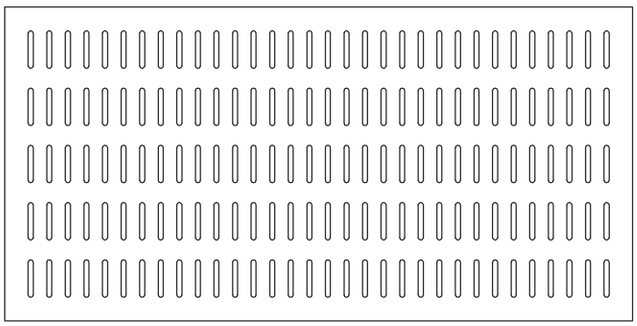
CETRIS® AKUSTIC D



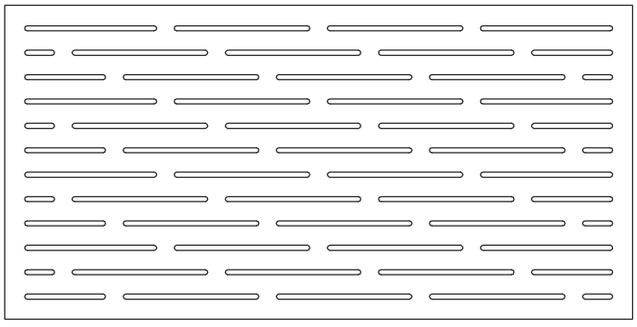
CETRIS® AKUSTIC E



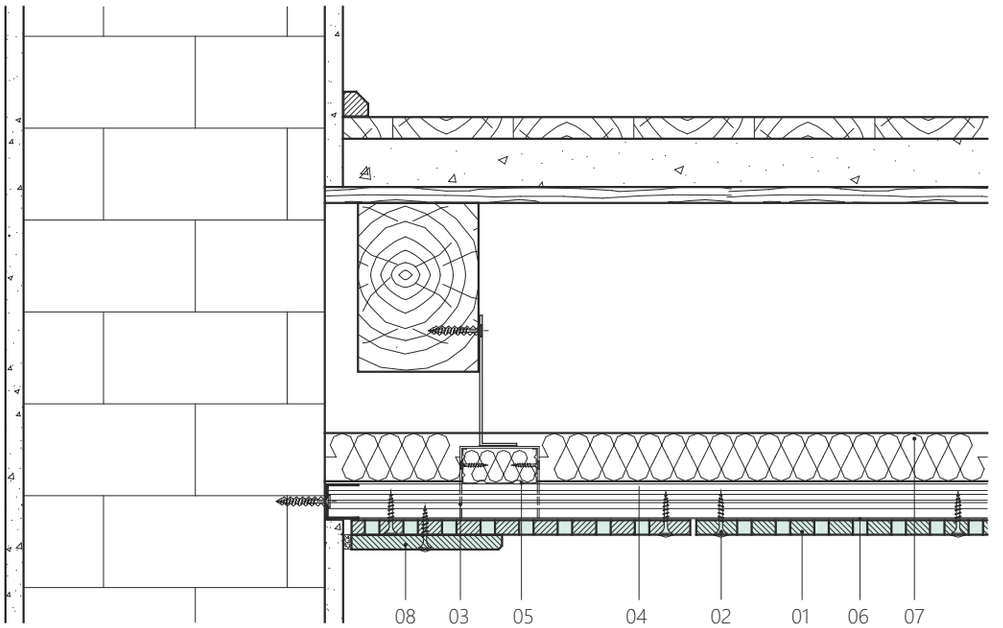
CETRIS® AKUSTIC F



CETRIS® AKUSTIC G

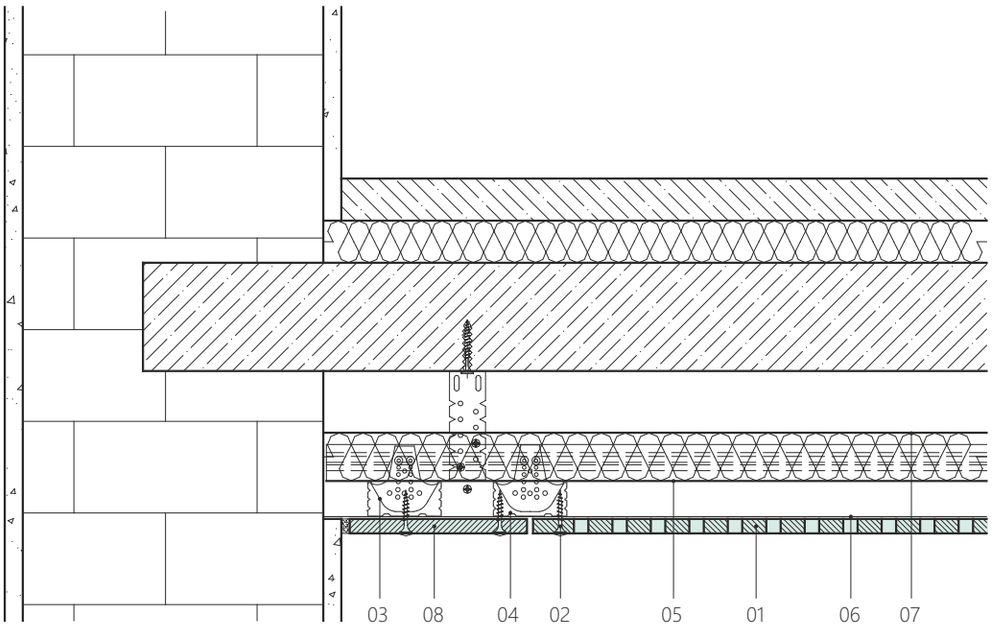


Soffit edge detail – rim



01 CETRIS® AKUSTIC board
02 screw 4.2×25 (35) mm with plastic facing cap
03 cross-coupling
04 CD installation profile (or wooden prism)
05 CD support profile (or wooden prism)
06 vlies absorptive fabric
07 mineral wool
08 rim – CETRIS® BASIC board

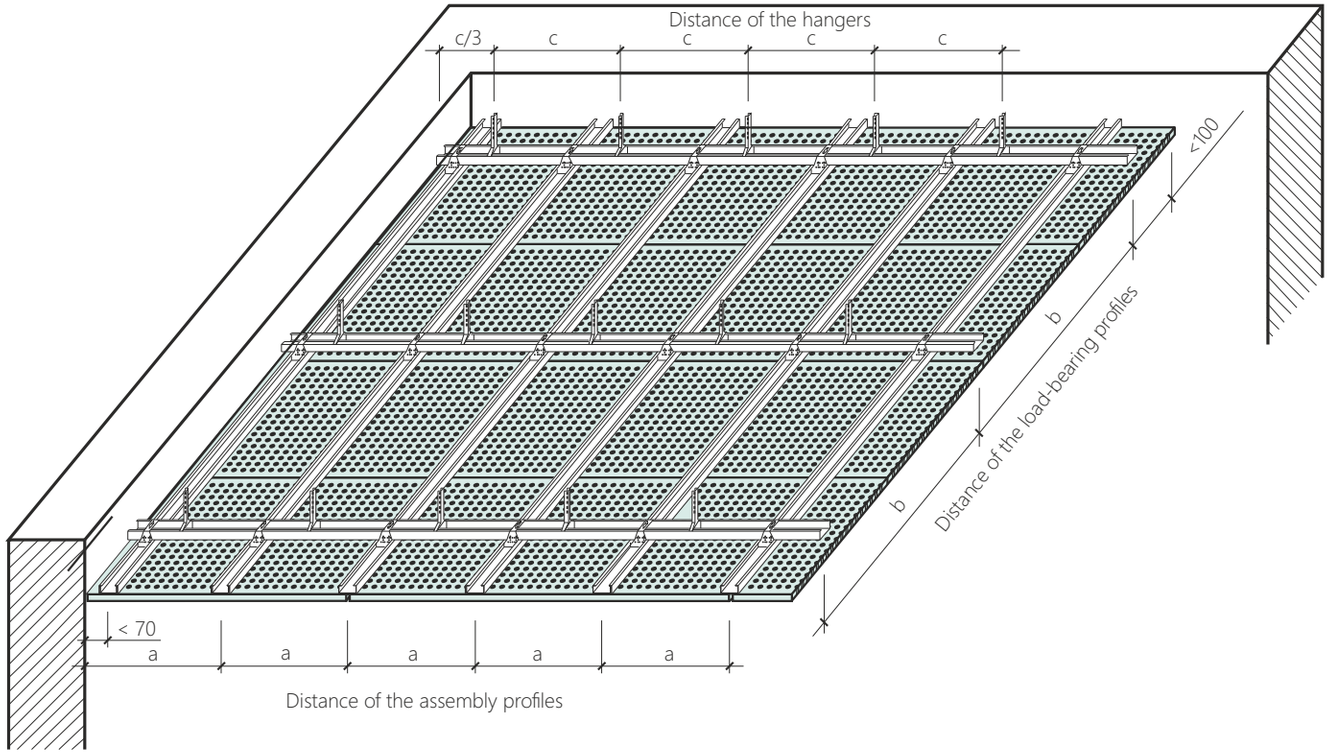
Soffit edge detail – full strip
Transverse section

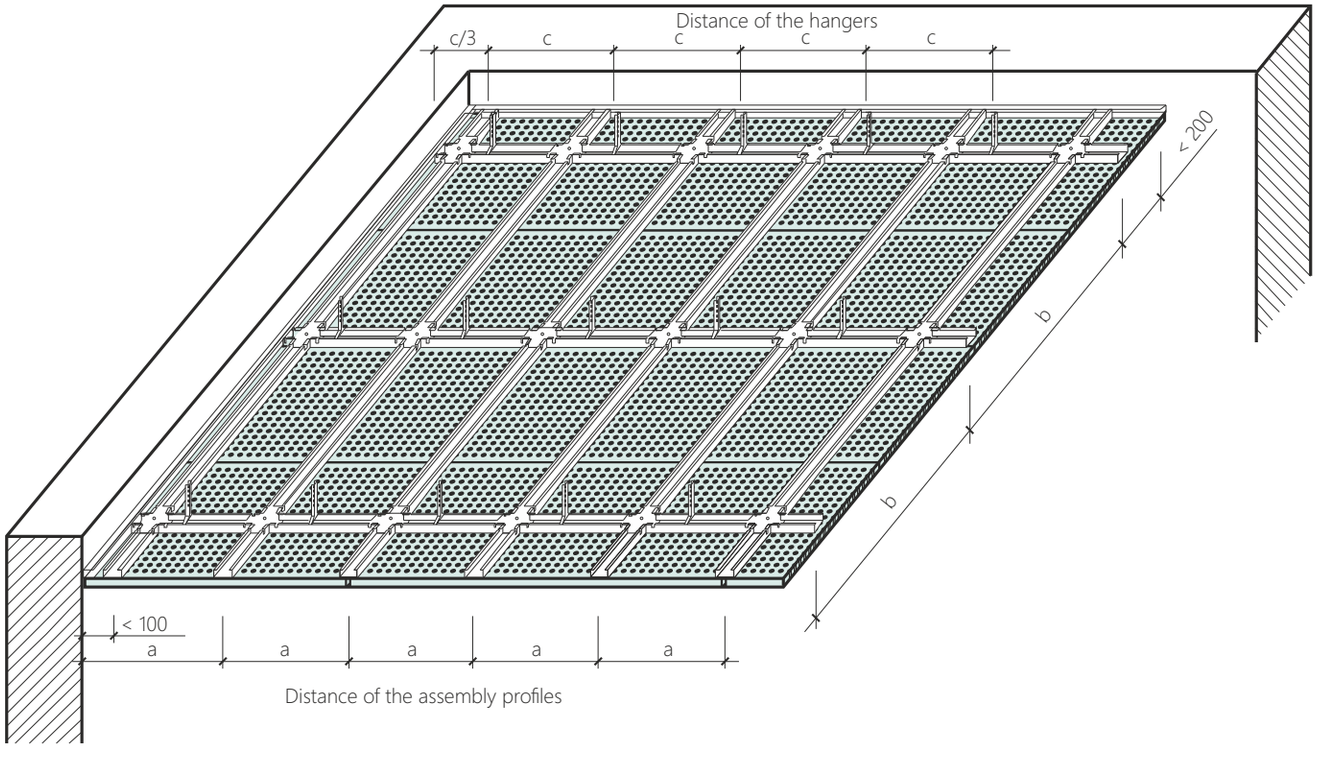


01 CETRIS® AKUSTIC board
02 screw 4.2×25 (35) mm with plastic facing cap
03 cross-coupling
04 CD installation profile (or wooden prism)
05 CD support profile (or wooden prism)
06 vlies absorptive fabric
07 mineral wool
08 strip – CETRIS® BASIC board

Axial spacing of the mounting elements and supporting members (CD profiles, wooden laths) and suspensions:

Board thickness (mm)	Spacing of mounting profiles a (mm)	Spacing of load-bearing profiles b (mm)	Spacing of suspensions c (mm)
8	Max. 420	Max. 1 000	Max. 625
10	Max. 420	Max. 1 000	Max. 420





9.4 Permanent Shuttering System

In the permanent shuttering system, the CETRIS® boards form prefabricated shuttering elements. The possibilities for use of permanent shuttering are practically boundless. The permanent shuttering system is ideal for all load-bearing structures such as walls, ceilings, beams, columns, stairways, but also slanting walls, inclined ceilings as well as non-load-bearing dividing walls and partitions.

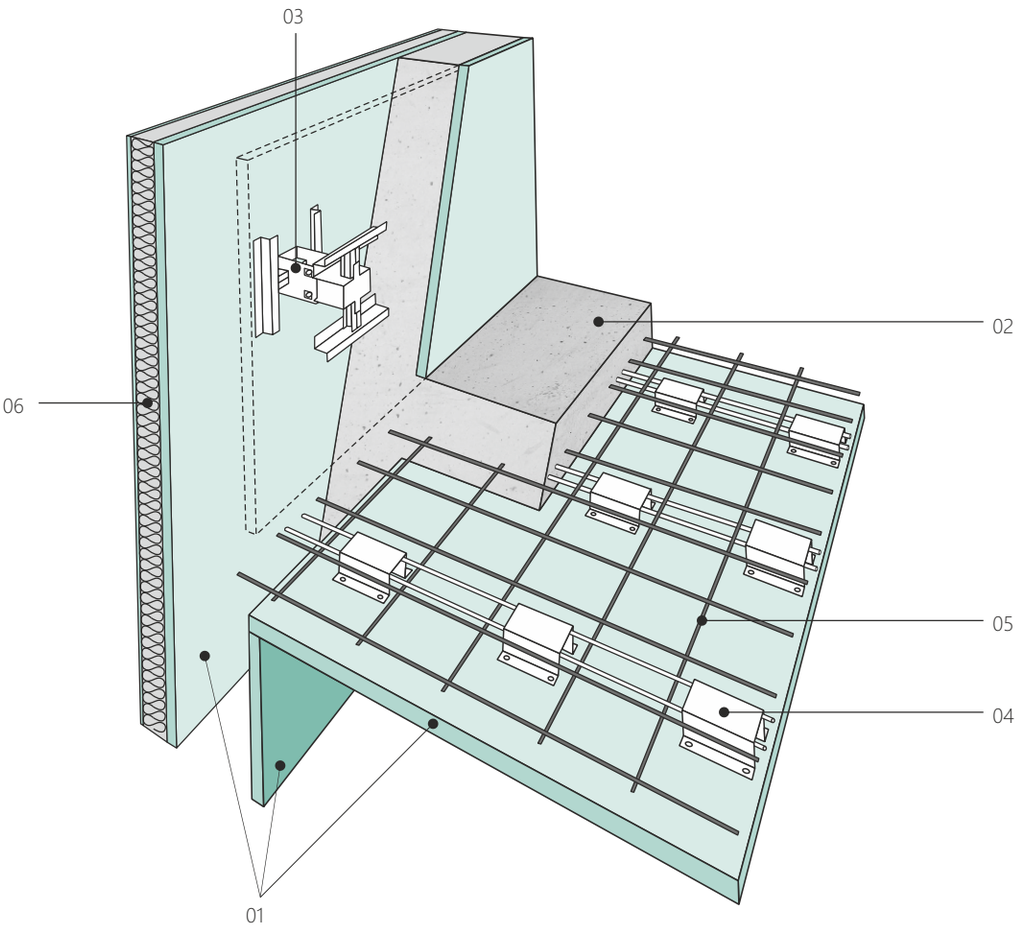
The individual system elements (wall, ceiling panels) are prefabricated – provided in the desired size and mutually connected with system profiles and metal elements. On the construction site, the element is stabilised and cast with concrete. As compared with the traditional concreting methods using large format shuttering techniques, the high costs of shuttering erection and demounting are eliminated.

The main parts of permanent shuttering:

- CETRIS® BASIC cement bonded particleboard
- Structural bearing part - the concrete mixture. The concrete mixture consists of Portland cement, silica gravel of different grain size, water and viscous additives. These additives adjust the mixture so that there is no need to add more water (always just so much that the concrete mixture is properly mixed).
- Patented connections

Wall and ceiling construction of permanent shuttering from VST

www.vst-austria.at



01 CETRIS® BASIC cement bonded particleboard, thickness 24 mm)
02 concrete
03 steel spacer wall element
04 HT steel profile
05 ceiling concrete reinforcement
06 wall thermal insulation

9.4.1 Advantages of Permanent Shuttering

Load-bearing capacity

Load capacity of a 25 cm thick wall constructed by permanent shuttering system using B25 concrete is almost ten times higher than of a wall made of hollow bricks class 6 and mortar class I (with comparative room height of about 2.6 m).

Flammability grade

CETRIS® cement bonded particle board creating cladding element of permanent shuttering is classified in reaction to fire class A2-s1, d0.

Adhesion strength (tenacity)

Wall elements of permanent shuttering system are complemented with thermal insulation from the outside. When testing the cohesion of the individual layers of the system, high tenacity values were found.

Fire Protection

In case of fire CETRIS® cement bonded particle board protects the concrete core. In the comparative test (fire test with an exposure time of 30 minutes) there was a slight peeling off part of cement bonded particle board CETRIS® layer in depth of about 7 mm.

Heat accumulation

Accumulation efficiency of 25 cm thick wall formed by permanent shuttering system is about 82% higher than of the 25 cm thick wall of hollow bricks. Both compared walls were provided with the outside 70 mm layer of mineral wool.

Moisture equalization

The inner layer of permanent shuttering system, i.e. CETRIS® cement bonded particle board, is mould and fungi resistant, and has positive effect on healthy climate in a room. The structurally important concrete core forms a vapour barrier.

Protection against airborne noise

The degree of sound reduction R'wr of a wall 25 cm wide created by permanent shuttering system is about 20% higher than of a 25 cm wide plastered wall of hollow bricks.

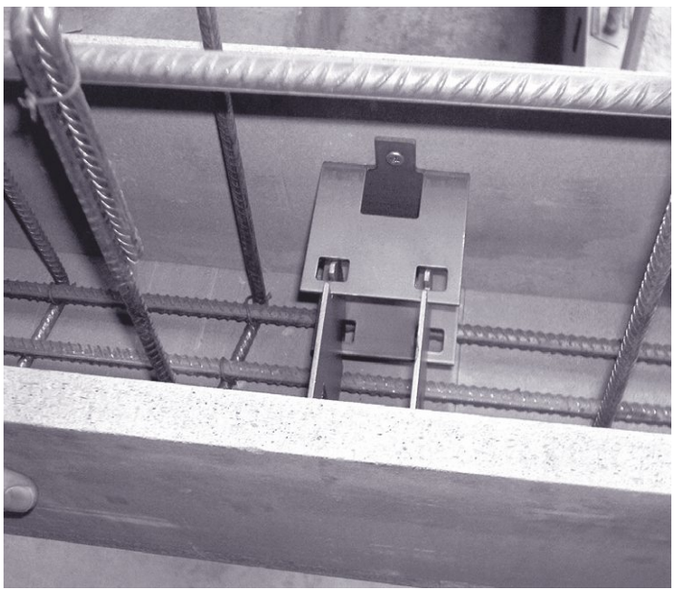
Extremely short construction time

Walls made by permanent shuttering system are constructed in extremely short construction time. Failure (tear away) has always occurred in CETRIS® cement bonded particle boards.

9.4.2 Wall Elements

The permanent shuttering system is a method of construction through components, which consist of cement bonded particle boards CETRIS® interconnected with metal spacer elements. Designed wall elements are custom-made and are simply assembled on the site, and mainly in a short time using the patented tooth technology.

Subsequently, electrical wiring is installed (thus avoiding additional demolition and plastering work). In this way the walls create the designed ground plan and after pouring concrete get the final stability.



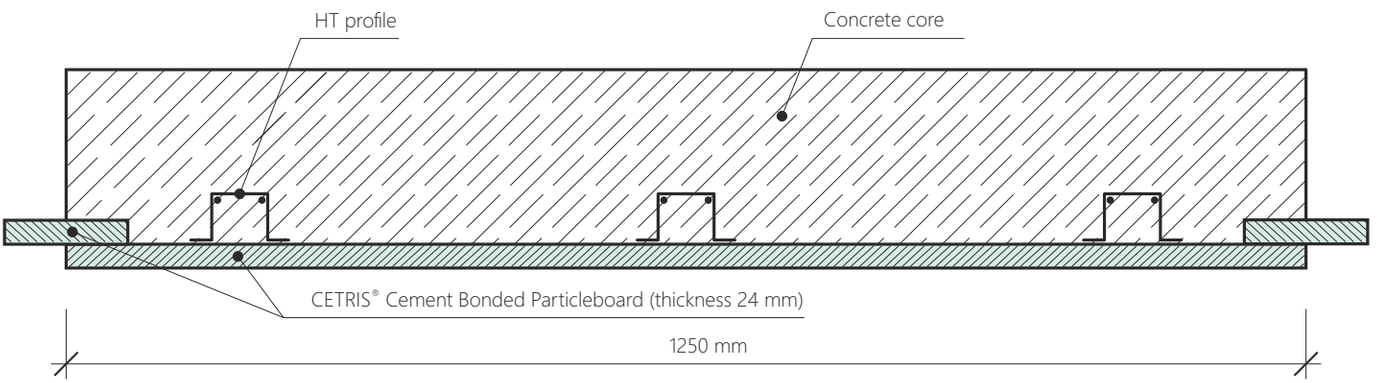
9.4.3 Ceiling Elements

The Permanent shuttering system can also be used to create horizontal components – ceiling elements. In this case, the CETRIS® Cement Bonded Particleboard is used unilaterally – on the lower face and the element is complemented by a HT profile and overlapping profile (edge profile).

The ceiling element has a standard width of 1,250 mm, the length up to 6,000 mm. During actual execution of supports at a distance of 1.25 meters under ceiling panel are sufficient. The laying of the reinforcement does not require spacer washers, the reinforcement is placed directly onto the HT profile beams. The thickness of the overconcreting depends on the span of the ceiling element, and the size of imposed load is in range of 100 – 300 mm.

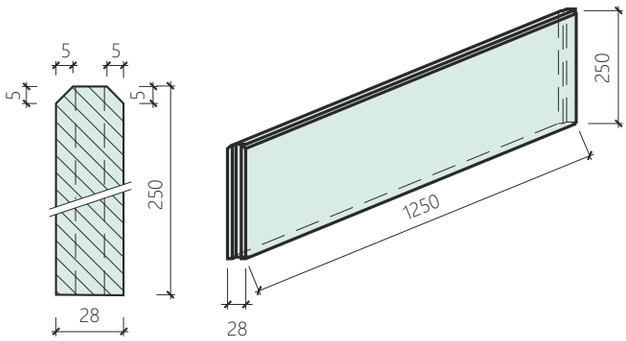
Advantages of the permanent shuttering system

- It enables delivery of up to 520 m2 of ceiling elements on one truck.
- The largest ceiling elements (weight about 285 kg) can be handled using conventional lifting devices.
- Easy installation, laying and reinforcement – supports are sufficient at a distance 1.25 m, the reinforcement is placed directly on HT profiles, average steel reinforcement consumption of about 3 kg/m^2.



9.5 CETRIS® HOBBY Flowerbed curb

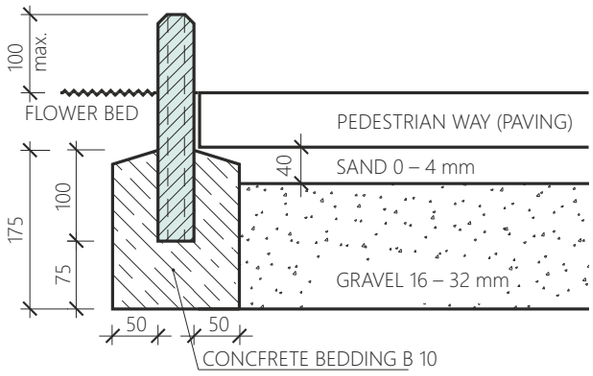
CETRIS® HOBBY Flowerbed curb is a CETRIS® cement bonded particleboard of size of 1,250 × 250 × 28 mm, cut from CETRIS® BASIC board. The top edge is bevelled on both sides, the side edges are milled to allow (tongue+groove) joining. The flowerbed curb can be drilled or milled.



Use:

The CETRIS® HOBBY Flowerbed curb is used to demarcate garden beds and pedestrian ways. The boards may be set in concrete, or directly in a furrow and filled with soil. The curbs are installed tightly against each other and it is recommended to use a lath or a tight rope to ensure straightness. When bordering the corners, the curb is cut obliquely and shaped as required.

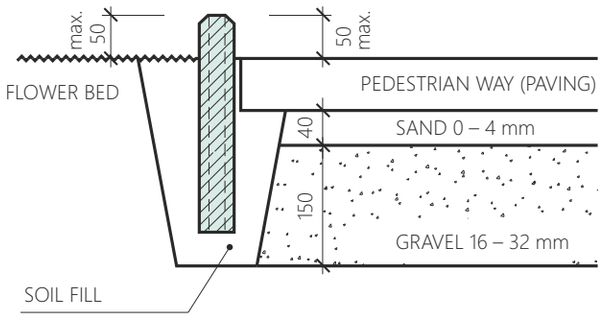
When installed in a concrete bed it is necessary to set it a minimum depth of 100 mm. Above the beds (of pedestrian way) the curb may overlap by max. 100 mm. The base concrete must be of minimum class C15.



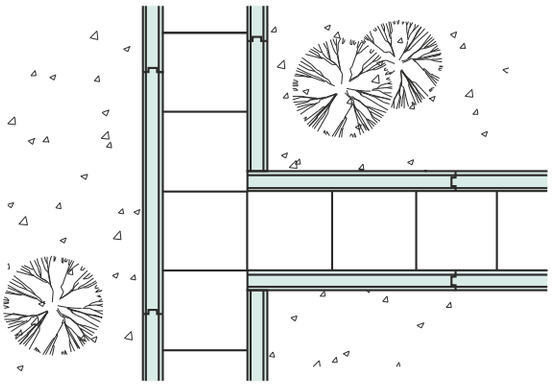
When installing the curb in grooves and sand beds, the curb may overlap the bed (or pedestrian way) by max. 50 mm. During installation the curb must be secured against lateral displacement by additional connection, e.g. using steel strips fixed to the curb with screws or bolts.

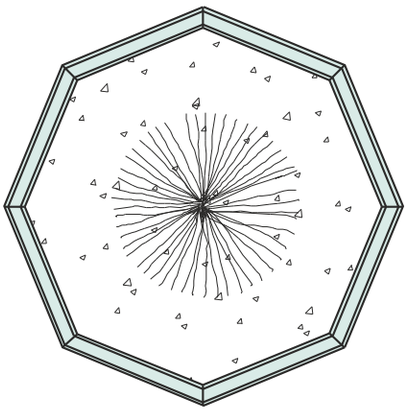
Processing:

CETRIS® flowerbed curb can be processed using the same tools as apply to the CETRIS® BASIC cement bonded particleboards. The flowerbed curb can be drilled, cut, or milled. For working the curb, it is recommended to use hard metal tools; when cutting use a hand-held circular saw with option to adjust the saw for angular cuts. Working of the boards produces a fine dust that is not harmful to health, but in spite of this, we recommend its removal.



All dimensions in mm.





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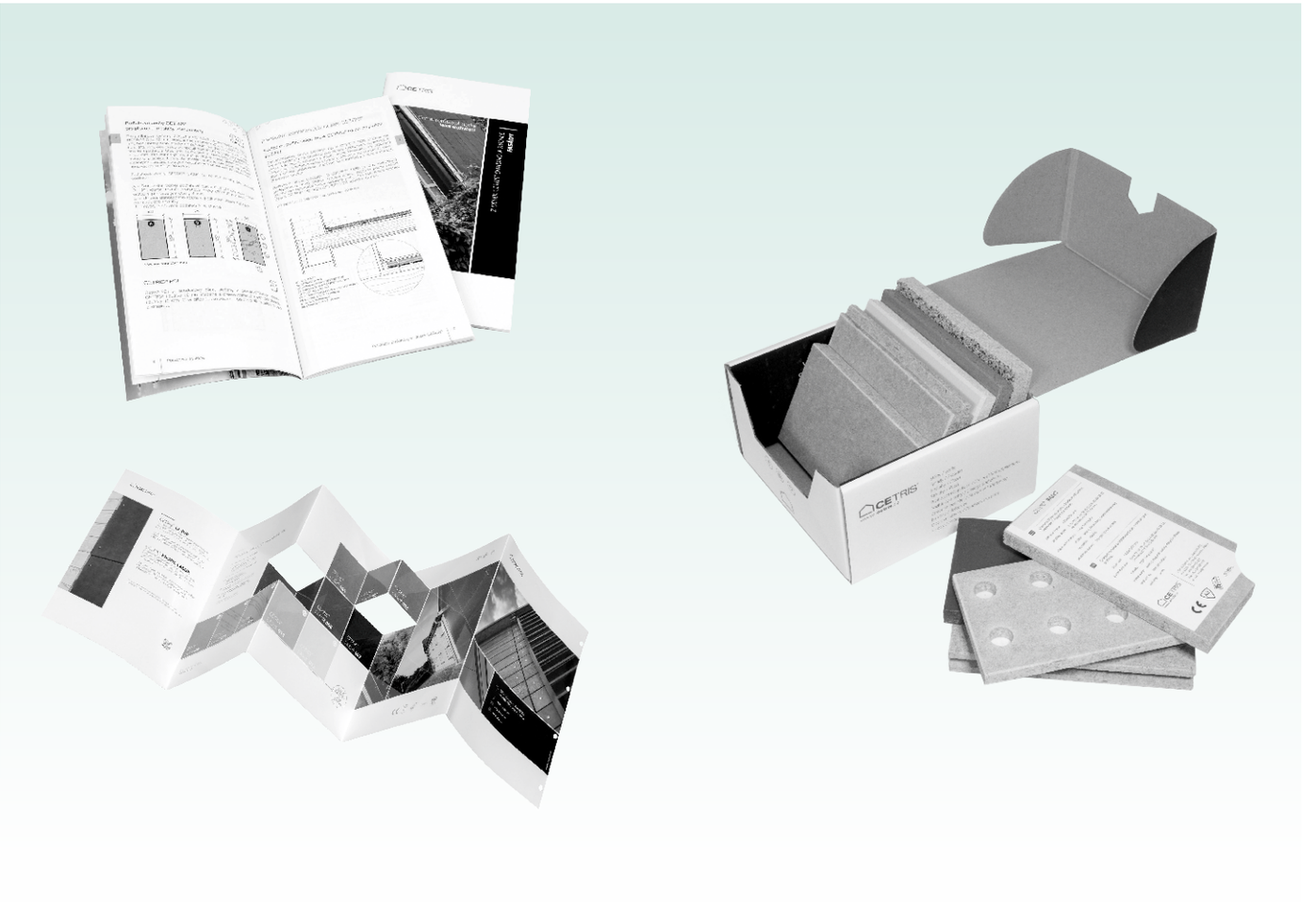
Visit our channel on the YouTube portal with many interesting presentations and assembly videos. You will find the links on our new website www.cetris.cz.

Join us on Facebook. You not only get professional news, but also exclusive reference photographs and the option to contact us directly with any query.

Get our promotional materials, catalogues, brochures, price lists, technological and assembly procedures or samples. Request brochures from us and we shall send them free-of-charge to your office address. Our engineers will answer your queries and provide you with professional advice on the given task or problem, which you are solving. Join the discussions on our website and share your experiences, opinions or ideas on use of the CETRIS® cement bonded particleboards with us.

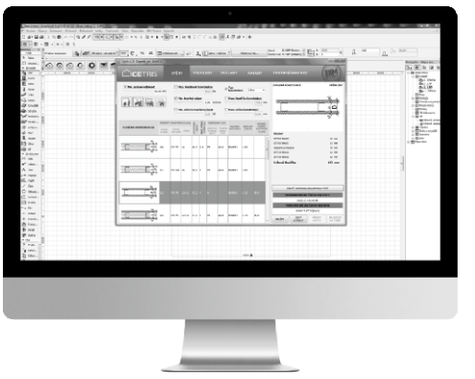


CETRIS® Bim

Electronic catalogue for ArchiCAD and REVIT

Take advantage of the FREE opportunity to add extensions to your ArchiCAD and REVIT, which will ease your work with the CETRIS® cement bonded particleboards.

www.cetris.cz

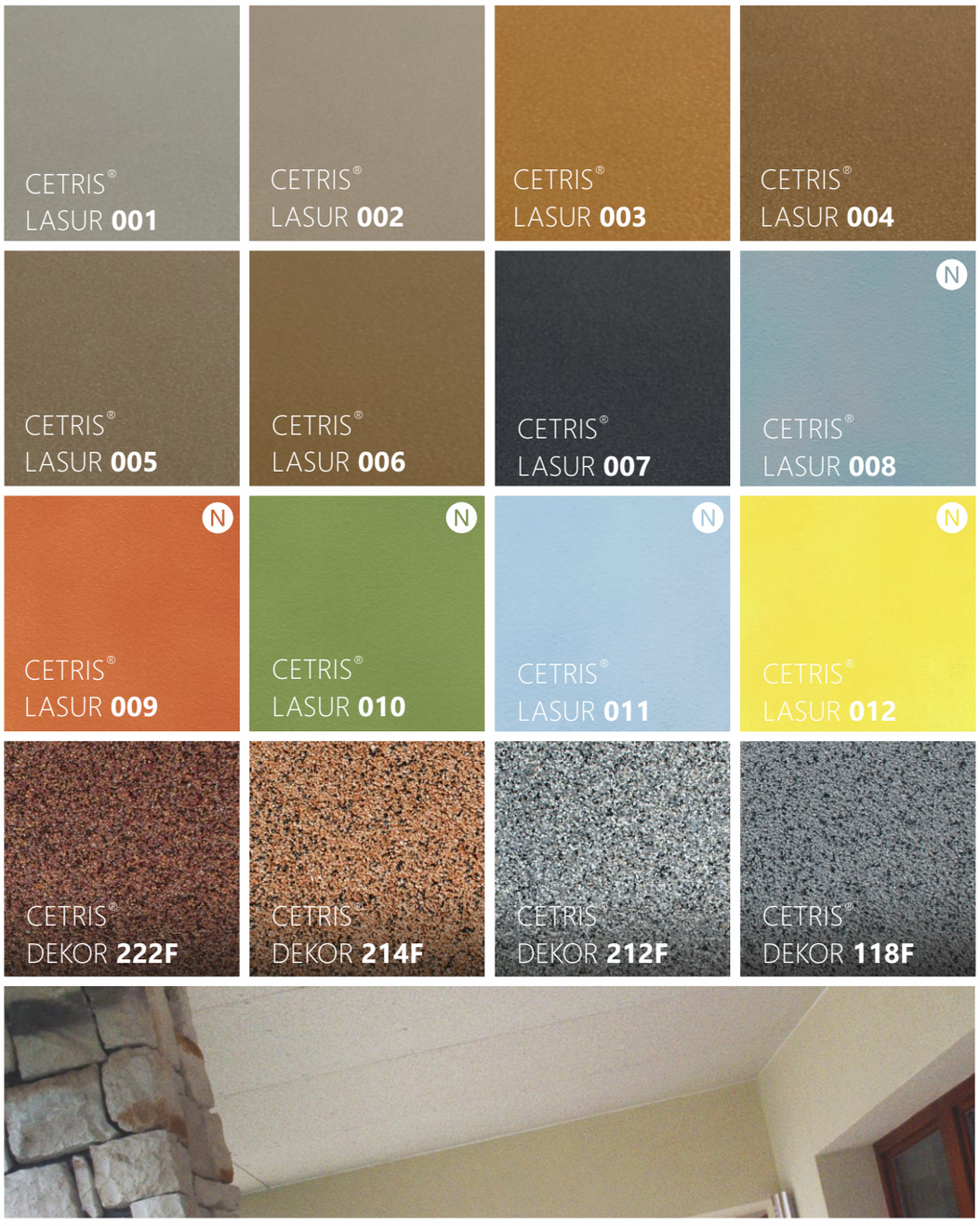


CETRIS® **LASUR**

is a cement bonded particleboard with a smooth surface provided with a primer and a glaze top coat in shades according to the swatch.

Marking of CETRIS® **LASUR** and CETRIS® **DEKOR** boards

Note that the swatch is only for orientation



CETRIS® **DEKOR**

is a cement bonded particleboard of thickness 12 and 14 mm, format 1250 x 625 mm with acrylic decorative mosaic plaster.

CETRIS®

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