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# Other CETRIS® Board Applications

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### 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.

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](http://www.cetris.cz).

#### Board type selection

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

#### Choice of board thickness, distance of the supports

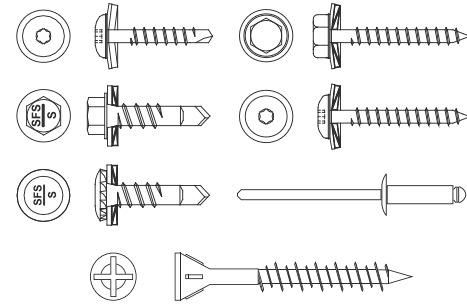
Span V (m)	Maximum vertical load in kN/m <sup>2</sup> - for these board thicknesses:											
	18 mm	20 mm	22 mm	24 mm	26 mm	28 mm	30 mm	32 mm	34 mm	36 mm	38 mm	40 mm
0,200	38,63	47,72	57,77	68,78	80,76	93,69	107,58	101,95	115,12	129,10	143,87	159,44
0,250	24,63	30,44	36,86	43,90	51,55	59,82	68,70	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!*



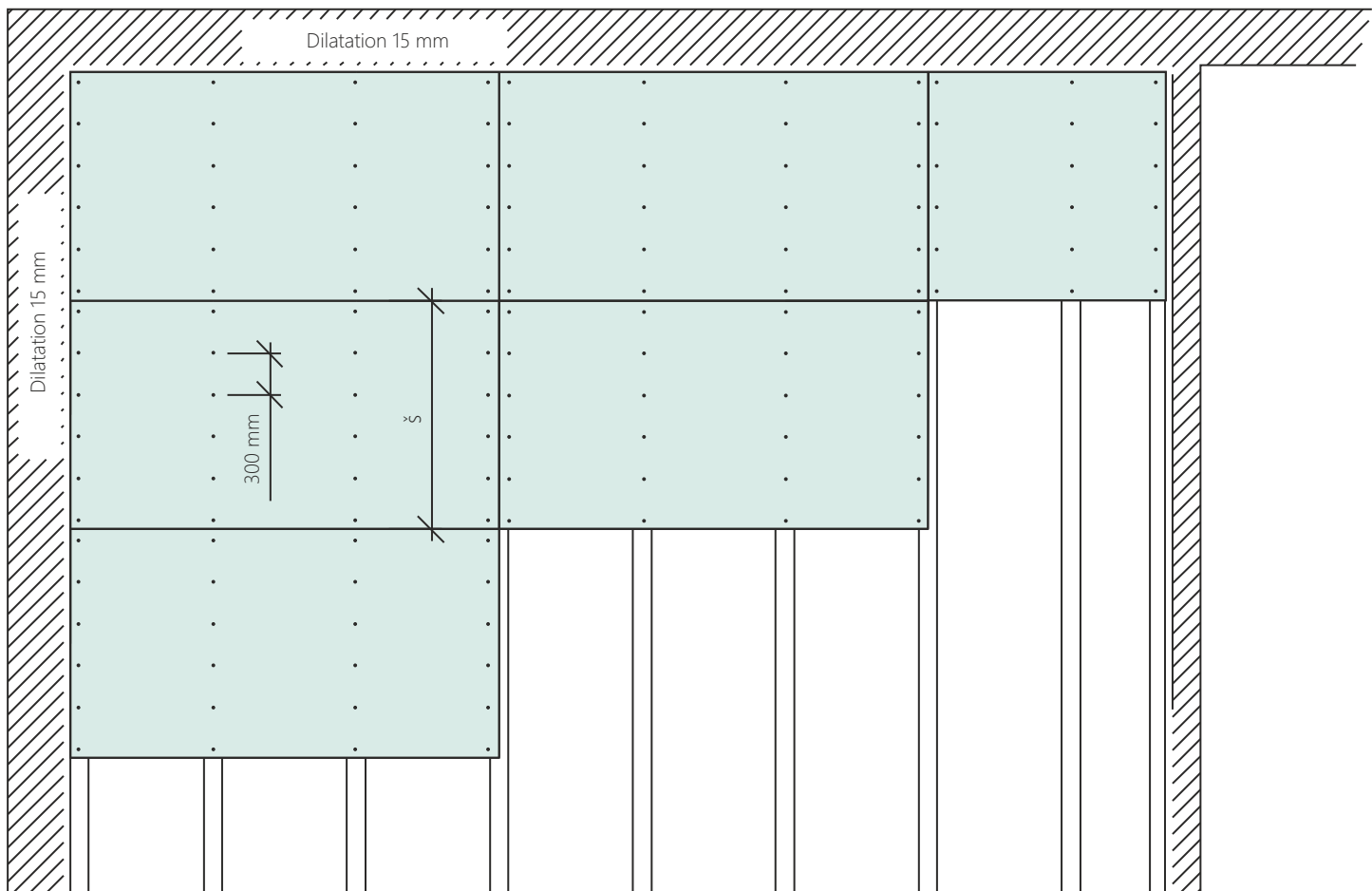
## Board anchoring

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 may 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

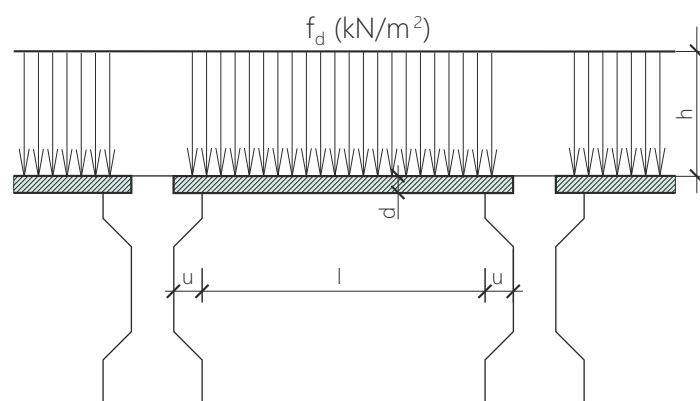
In the construction or reconstruction of transport structures system of permanent shuttering in the joints on bridge supporting structures (between beams or between the beam prefa ledge) is mainly applied. The CETRIS® board creates a flat bottom (or side) shuttering surface of the planned element (column, 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/mm<sup>2</sup> for boards of thickness up to 32 mm, and 3.00 N/mm<sup>2</sup> 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.



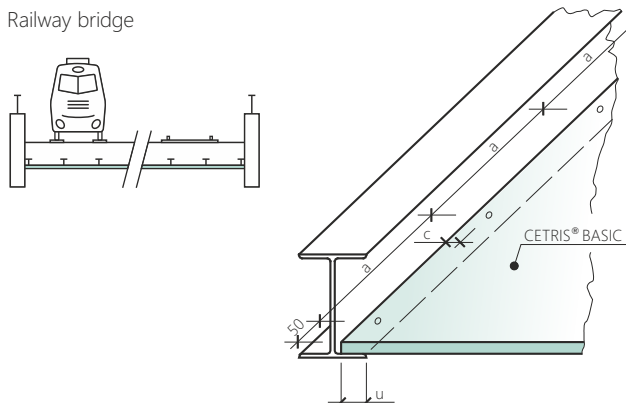
**Case 1 - horizontal action  
(the CETRIS boards forms the lower shuttering  
of the bridges, beams, etc.)**

Modulus of elasticity	4500 Nmm <sup>-2</sup>
Bending tensile strength	9 Nmm <sup>-2</sup>
Modulus of shear perpendicular to the board plane	2500 Nmm <sup>-2</sup>
Shear strength	2 Nmm <sup>-2</sup>
Volume mass	1 400 kgm <sup>-3</sup>
Transverse contraction coefficient	$\nu = 0,15$

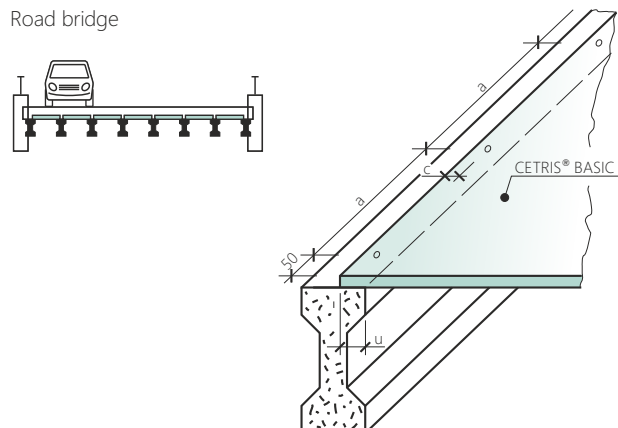
4. The length of the mounting of the CETRIS® boards on the “u” profile supports must be at least 40 mm. This value is set with regard to the eventual anchoring of the boards in the support – the recommended distance of the screw from the board edge is 25 mm – see the table and figures:

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/m<sup>2</sup>

Span V m	Maximum vertical load in kN/m <sup>2</sup> - 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/m<sup>3</sup>.



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
0,450	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.

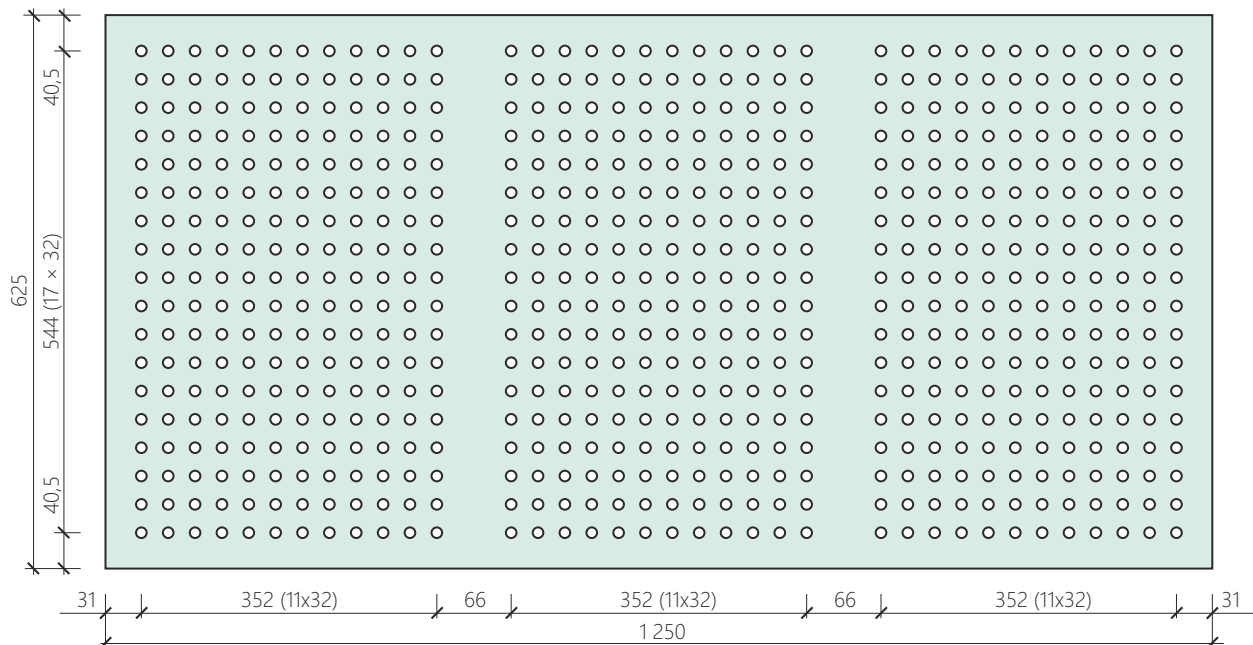
Acoustics is also one of the important criteria in designing and implementing the civil engineering projects. It is the requirements for the impact transmission loss and the airborne sound transmission loss that are mainly put to the engineering structures – predominantly in cases when the structures (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 <sup>3</sup>
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 <sup>-3</sup>
Heat expansion coefficient according to EN 471 (change in temperature from 20°C to 65°C)	10,8 x 10 <sup>-6</sup> K <sup>-1</sup>
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:

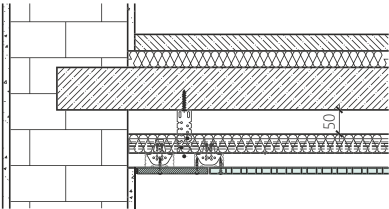
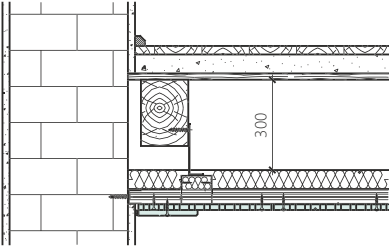
Ceilings from CETRIS® AKUSTIC boards of thickness 10 mm (resistance class 2A) may be installed in sports halls and gyms with a limited presence of ball sports and games, also in other, heavily stressed school premises.

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  $\alpha$  according to EN ISO 354**

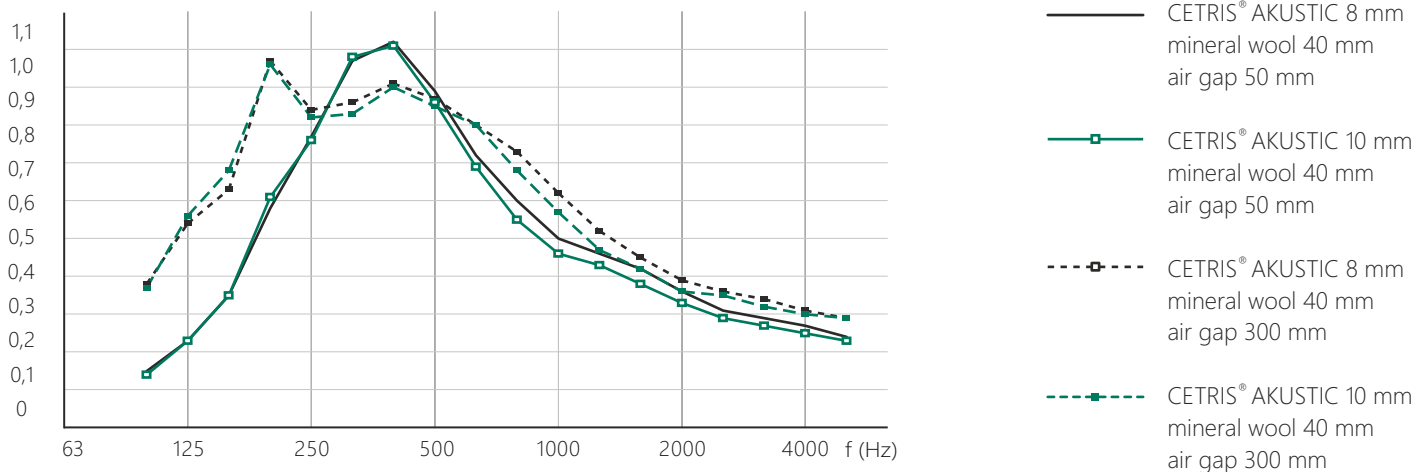
The sound absorption rate indicates the ratio of the unreflected sound energy and the reflected sound energy. At full deflection  $\alpha = 0$ , at full absorption  $\alpha = 1$ . The course of the sound absorption in relation to the frequency is determined in these different composition options of the 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 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:

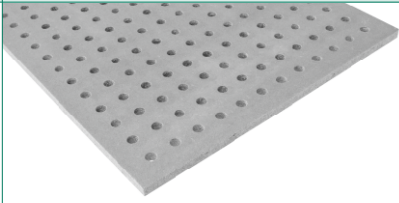

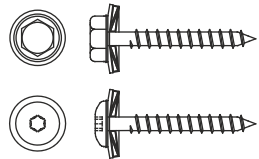
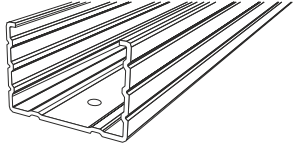
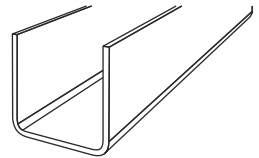
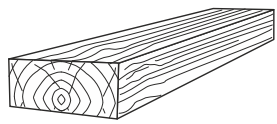



*During installation of cladding on large ceiling or wall constructions (longer or taller than 6 m) dilatations in the load-bearing construction must be designed and made visible in the cladding of CETRIS® AKUSTIC boards as well.*

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

### Additional load

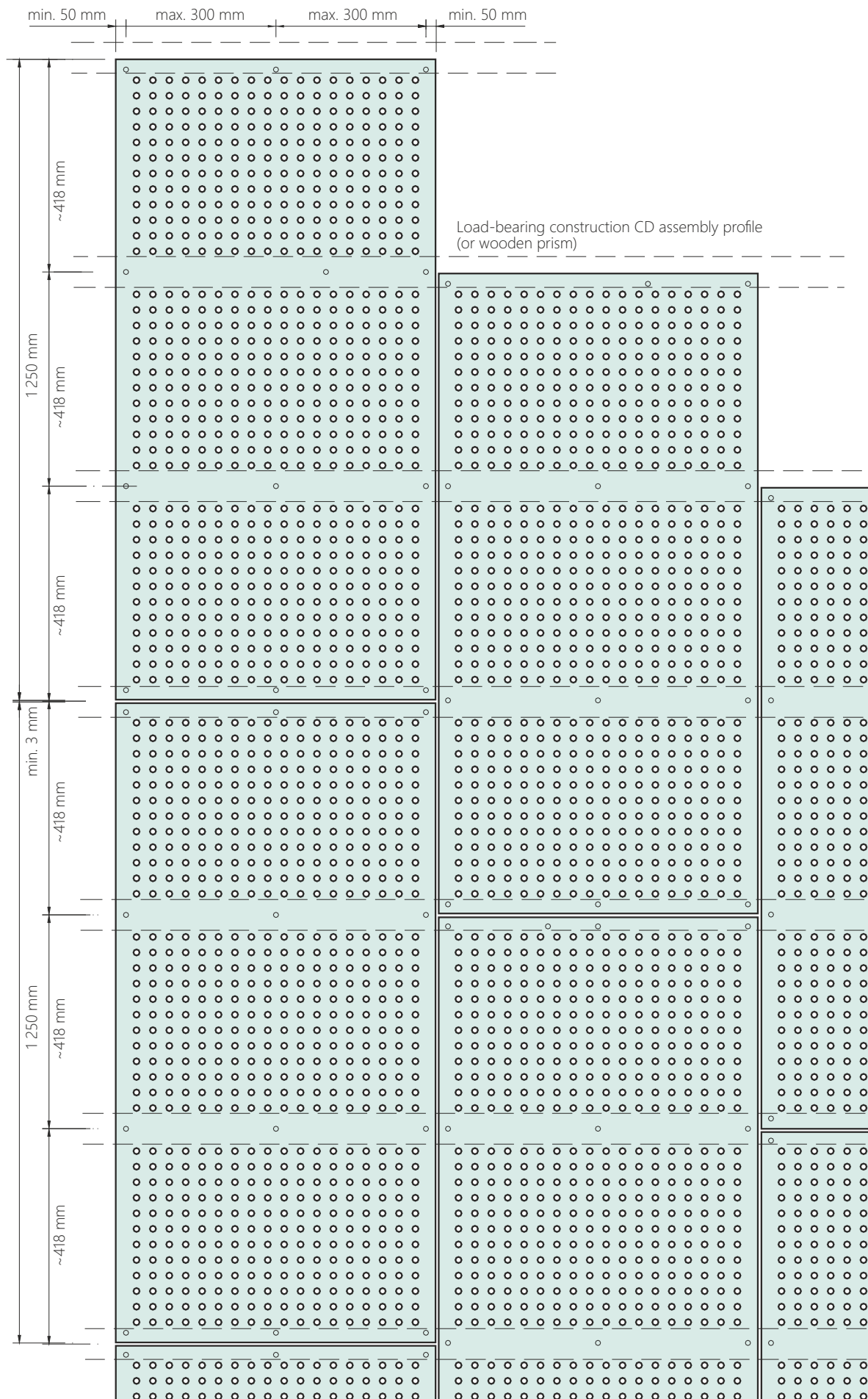
Additional burdens can be attached to the very sheathing of the CETRIS® AKUSTIC board (e.g., lights, air-conditioning, etc.) of a max. weight of 1.5 kg. A maximum of one burden is can be mounted in one field delimited by the bearing structure (CD profiles or wooden laths). Burdens (suspended objects) 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<sup>2</sup>. 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

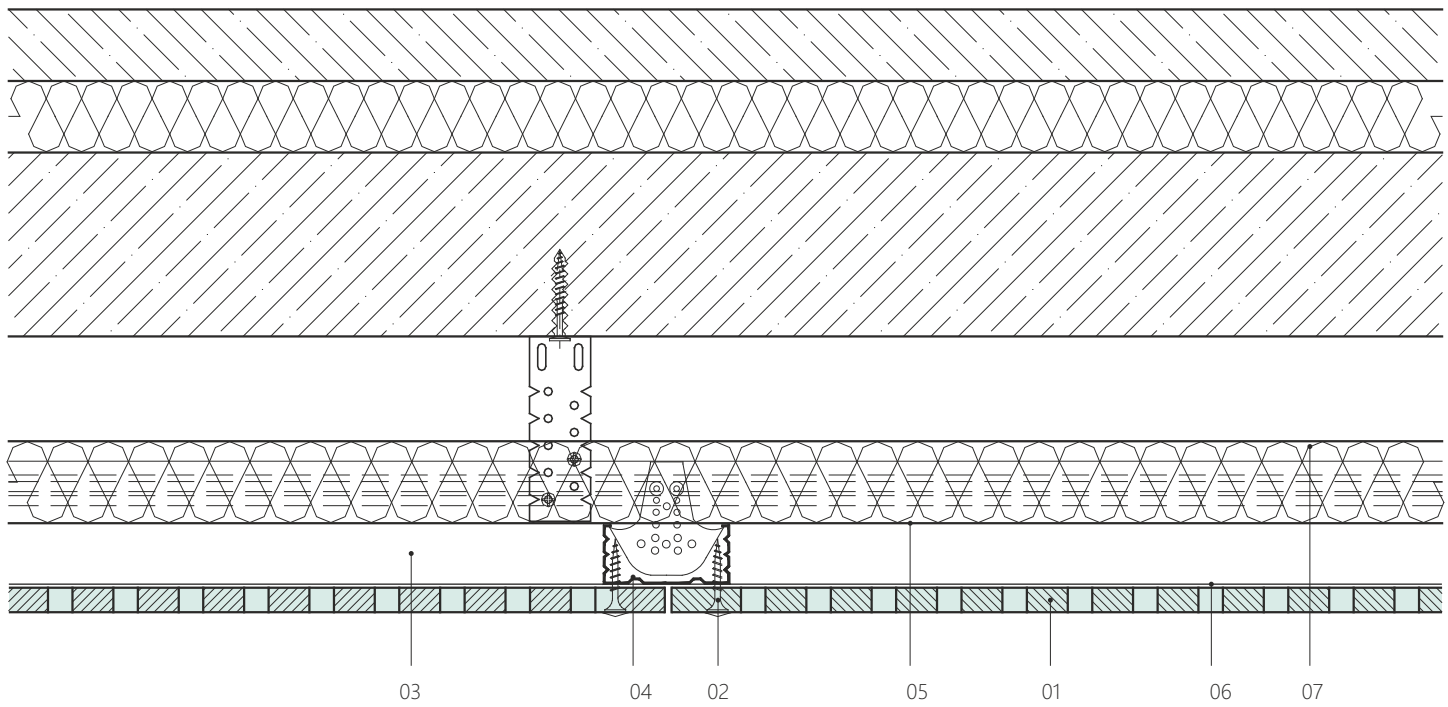
Description	Visualisation	Note
<p>CETRIS® AKUSTIC board Cement bonded particleboard, smooth surface, cement grey. Format 1,250 x 625 mm.</p>		<p>Thickness according to the fire resistance requirements</p>
<p>Screw 4.2x25, 35, 45, 55 mm Counter-sunk, self-tapping screws</p>		<p>Screw type according to the thickness of the lining and type of load-bearing construction.</p>
<p>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</p>		<p>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)</p>
<p>CD profile Galvanised sheet metal profile 27x60x0.6 mm</p>		<p>Creation of load-bearing grating for installation of the ceilings. They are fixed using a straight or Nonius hanger on the ceiling (roof) construction.</p>
<p>UD profile Galvanised sheet metal profile 28x27x0.6 mm</p>		<p>It is used to fix the profiles to the walls, masonry with dowels.</p>
<p>Wooden prism Spruce timber of minimum class SII, max. Humidity 18%</p>		<p>Creation of load-bearing grating for installation of the ceilings. Dry impregnated timber class S10 (strength class C24).</p>
<p>Vlies fabric Absorption glass-fibre fabric – it prevents the mineral wool fibres or, as the case may be, dust from falling through.</p>		<p>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).</p>
<p>Heat-insulation Mineral or rock wool of thickness 40 mm (Isover, Rock wool, Knauf Insulation ...)</p>		<p>Can be replaced with another type of mineral / rock wool with density of 22 kg/m<sup>3</sup> and reaction to fire class A1.</p>
<p>Mineral wool Isover Akustik SSP 2 thickness 40 mm.</p>		<p>Hydrophobic mineral wool with single side bonded black glass fabric, reaction-to-fire class A1</p>



# 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

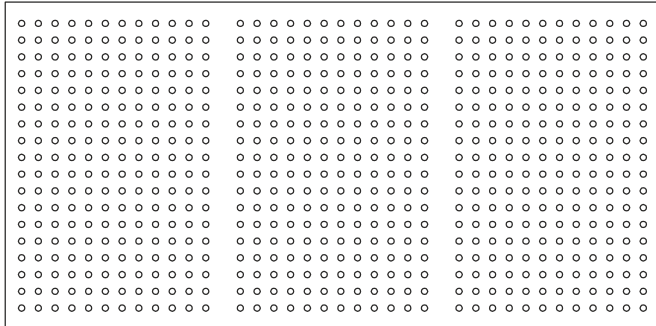
07 mineral wool

## CETRIS® AKUSTIC boards in new designs

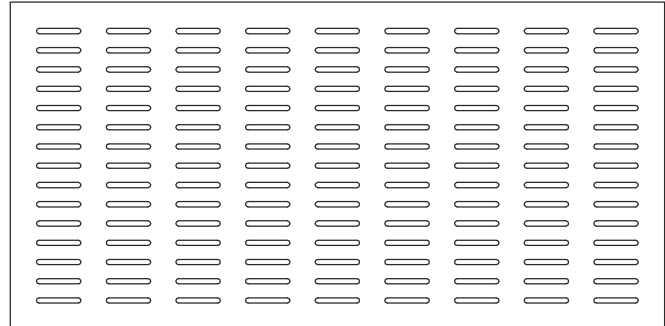
We newly offer acoustic boards in other perforated options.  
Details are available at our website at the address [www.cetris.cz](http://www.cetris.cz)

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

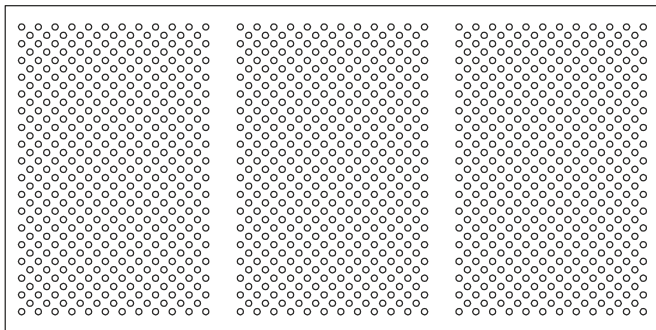
### CETRIS® AKUSTIC A



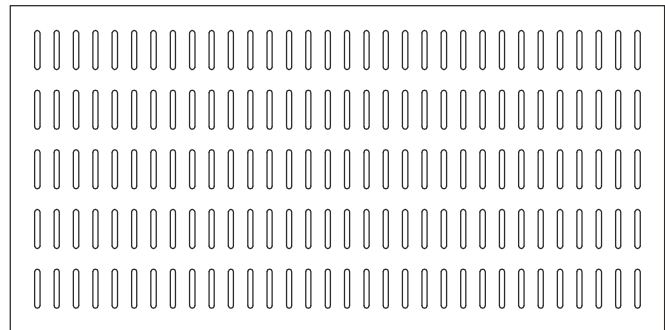
### CETRIS® AKUSTIC E



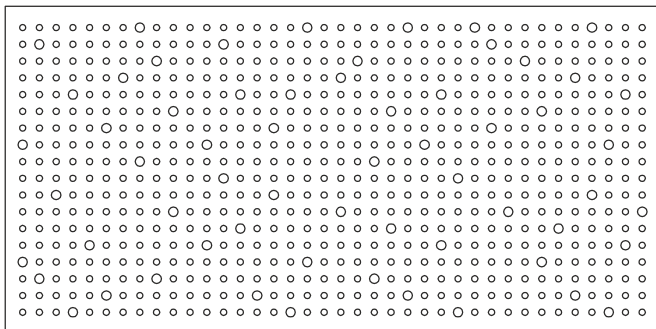
### CETRIS® AKUSTIC B



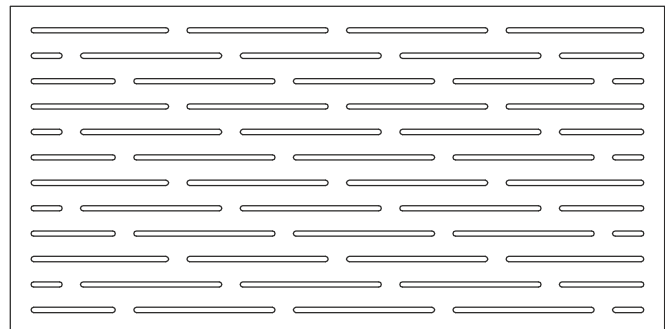
### CETRIS® AKUSTIC F



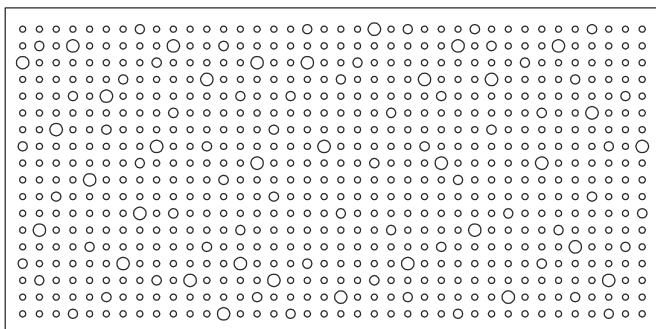
### CETRIS® AKUSTIC C



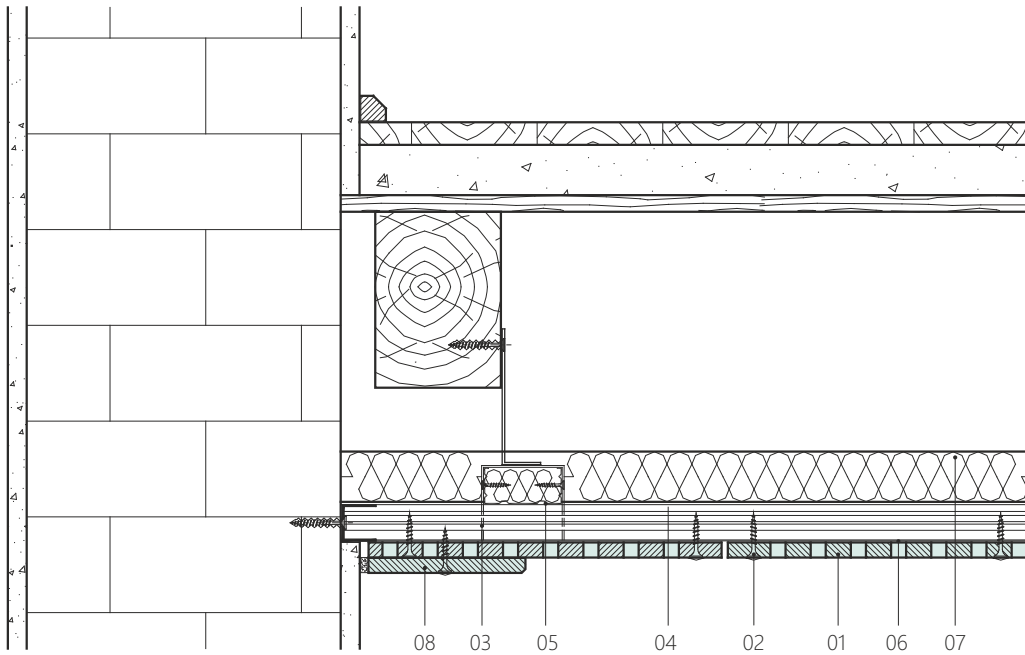
### CETRIS® AKUSTIC G



### CETRIS® AKUSTIC D



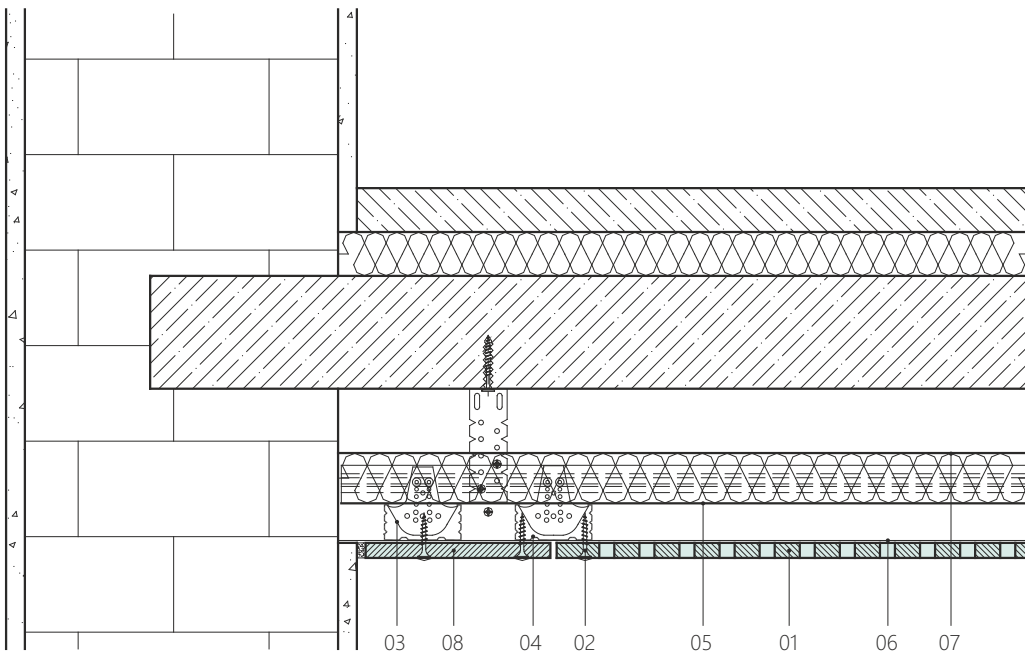
### Soffit edge detail – rim



- 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

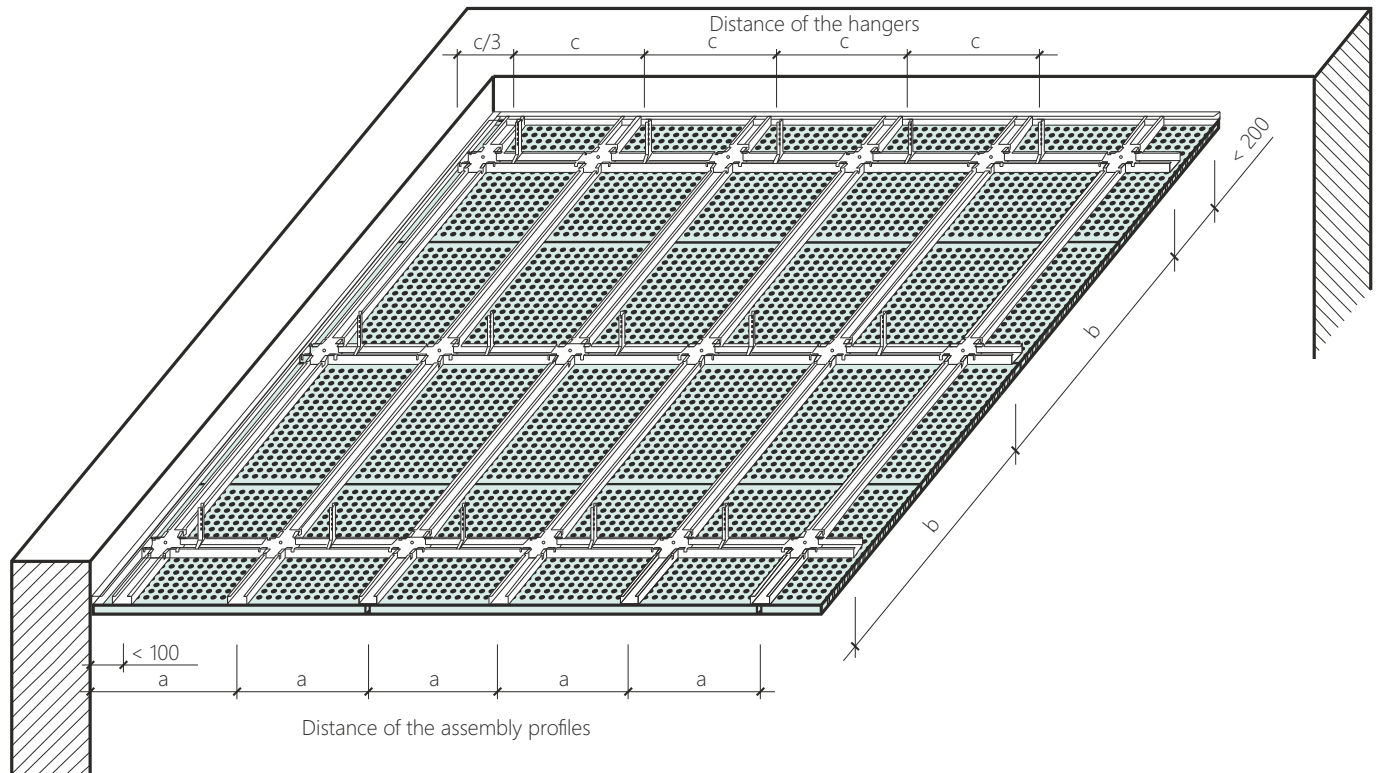
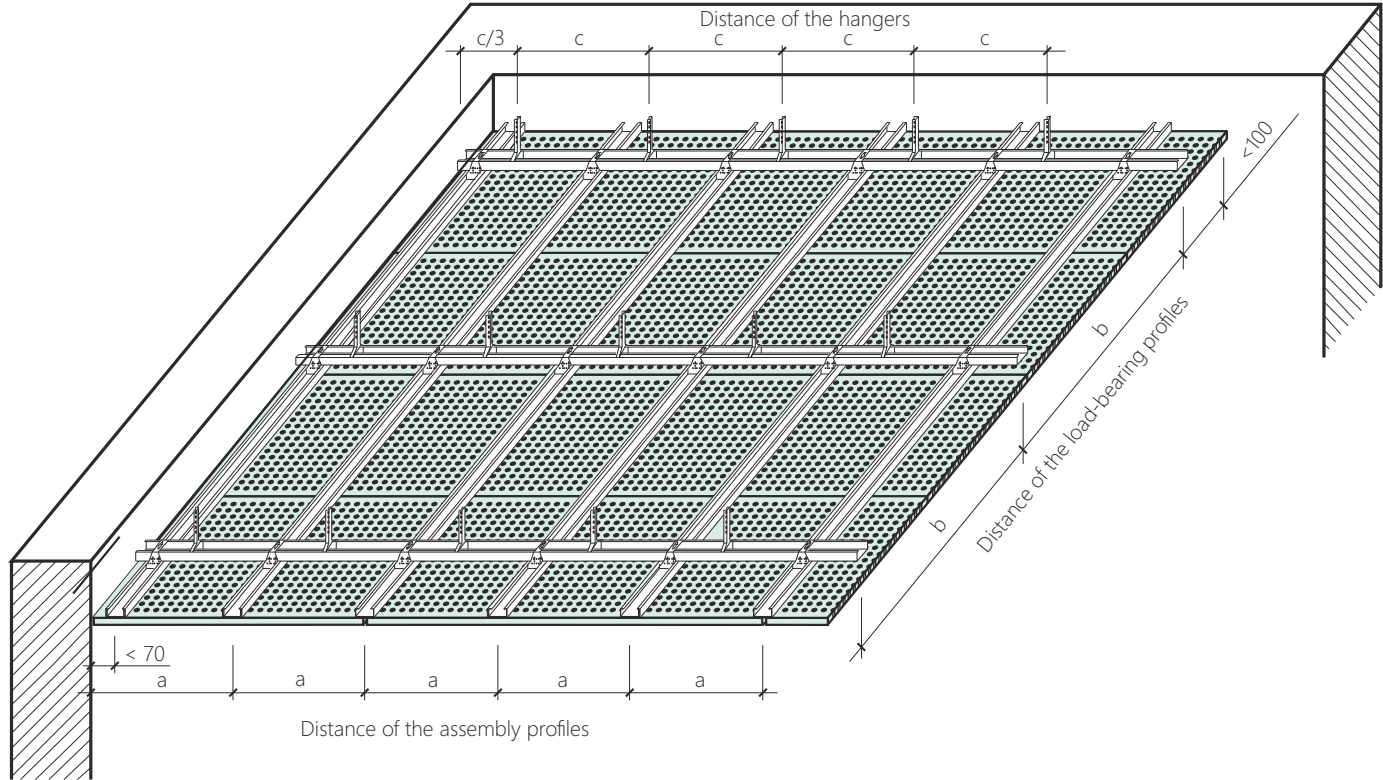


- 01 CETRIS® AKUSTIC board
- 02 screw 4.2×25 (35) mm  
with plastic facing cap
- 03 cross-coupling
- 04 CD installation profile  
(or wooden prism)
- 05 CD support profile  
(or wooden prism)
- 06 vlies absorptive fabric
- 07 mineral wool
- 08 strip – CETRIS® BASIC board



**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



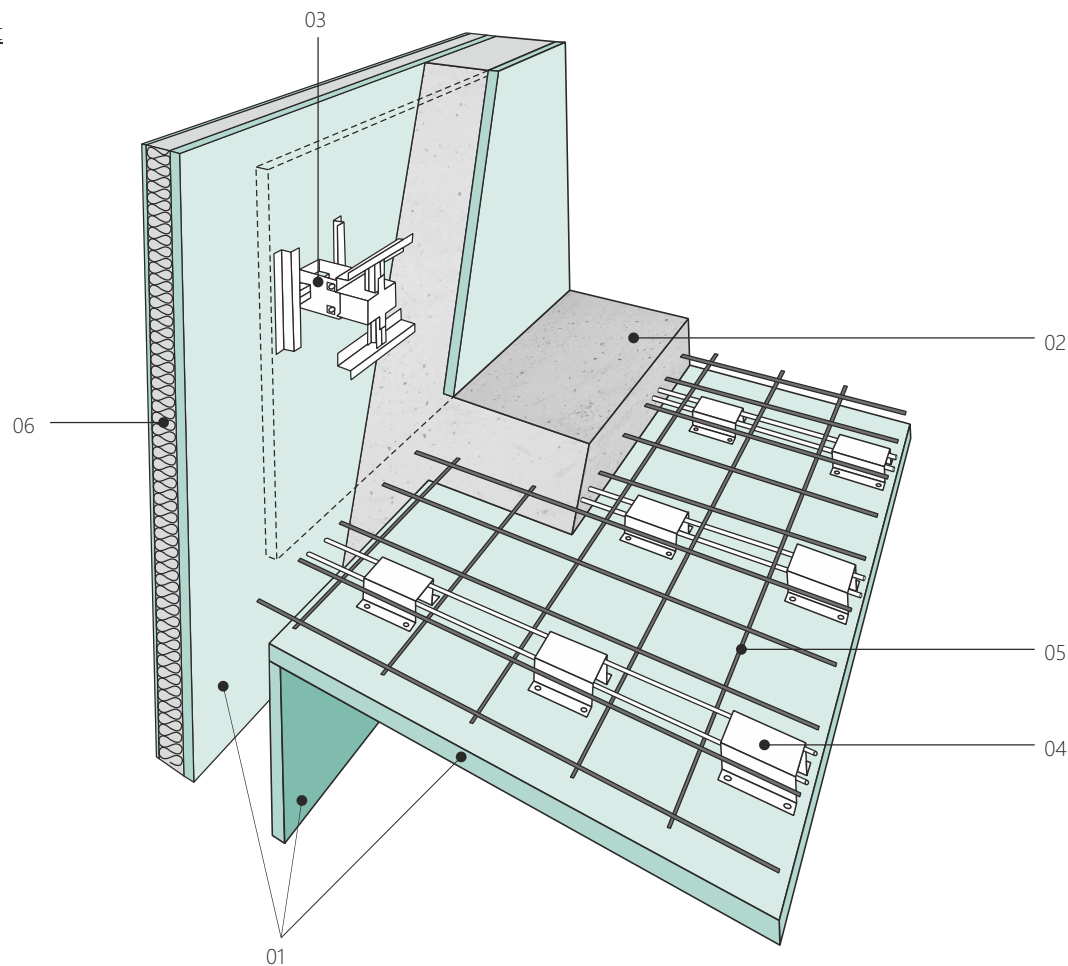
## 9.4 Permanent Shuttering System

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.

Wall and ceiling construction of permanent shuttering from VST

[www.vst-austria.at](http://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

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



## 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<sub>wr</sub> 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.

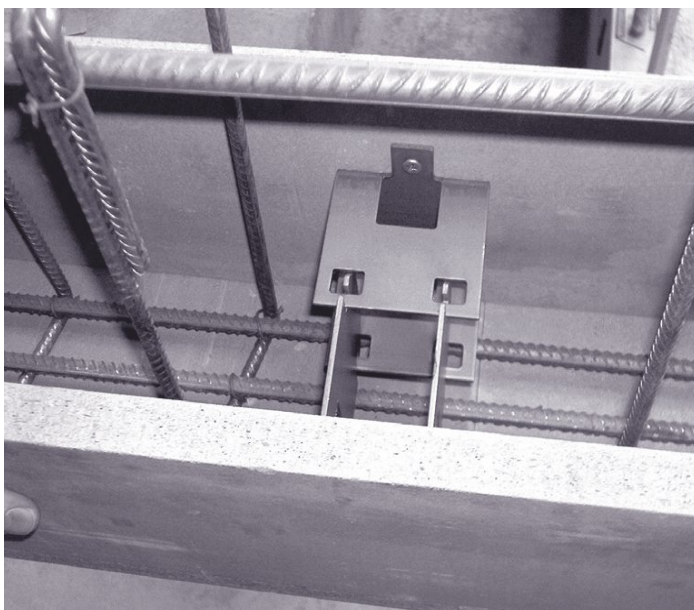
### Extremely short construction time

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.





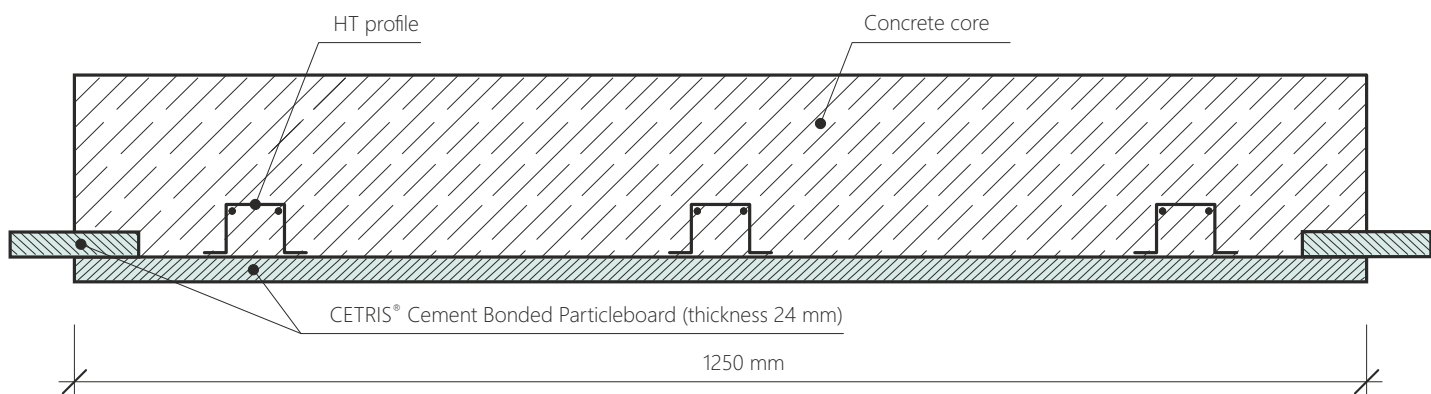
### 9.4.3 Ceiling Elements

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 m<sup>2</sup> 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<sup>2</sup>.



## 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:

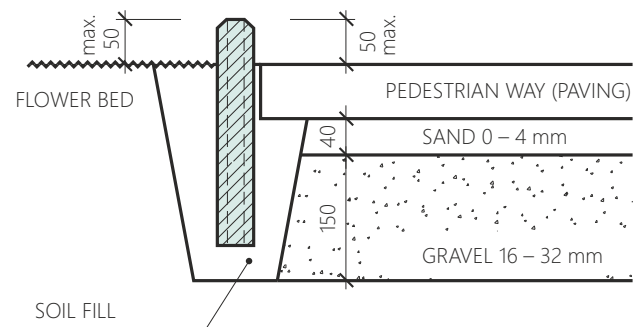
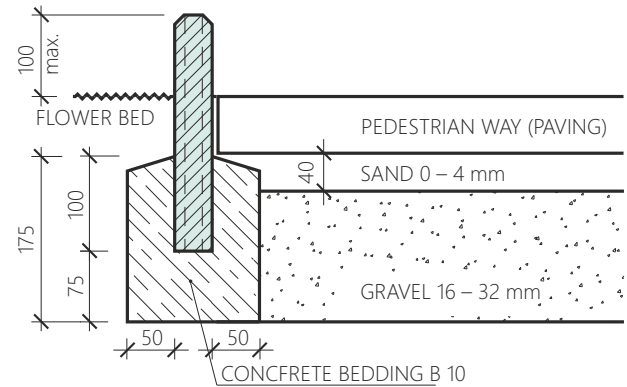
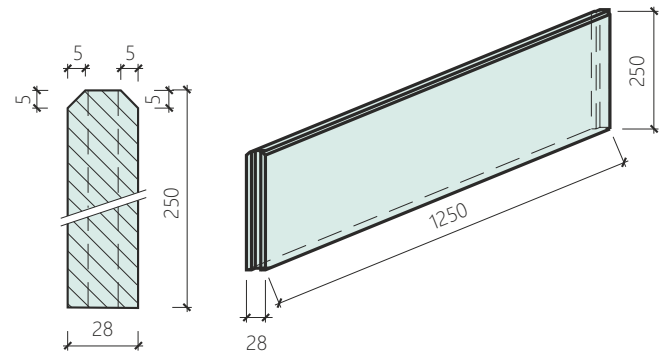
The CETRIS® HOBBY Flowerbed curb is used to demarcate garden beds and pedestrian ways. The boards may be set in concrete, or directly in a furrow and filled with soil. The curbs are installed tightly against each other and it is recommended to use a lath or a tight rope to ensure straightness. When bordering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



