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

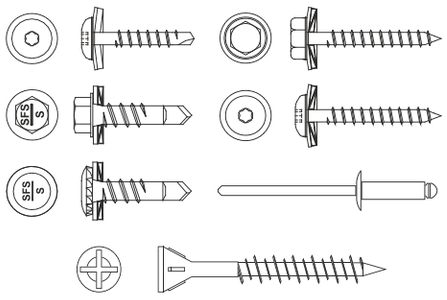
For the cladding, it suffices to use the CETRIS® BASIC board.

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 walkable!

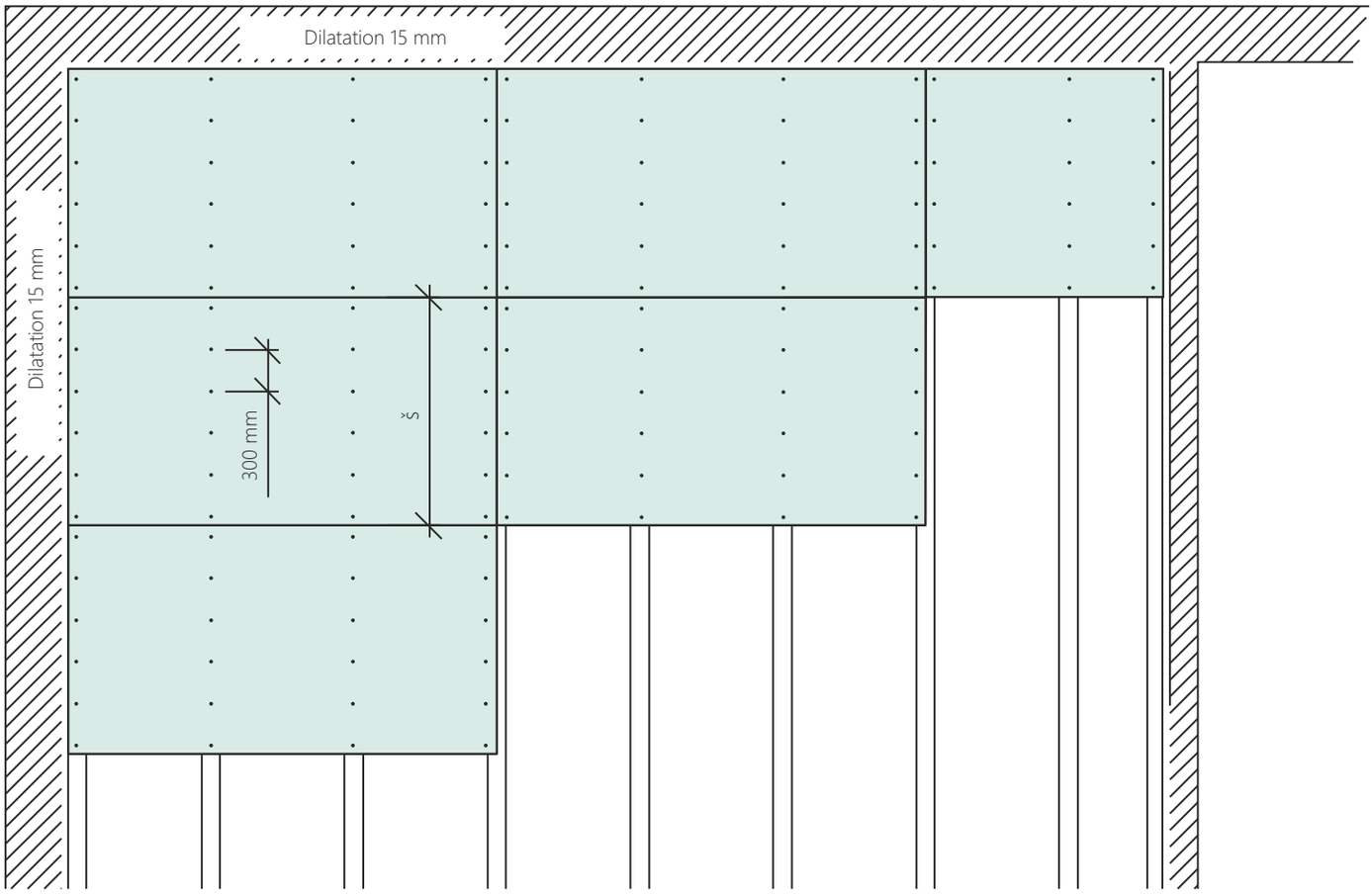
Board anchoring

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.

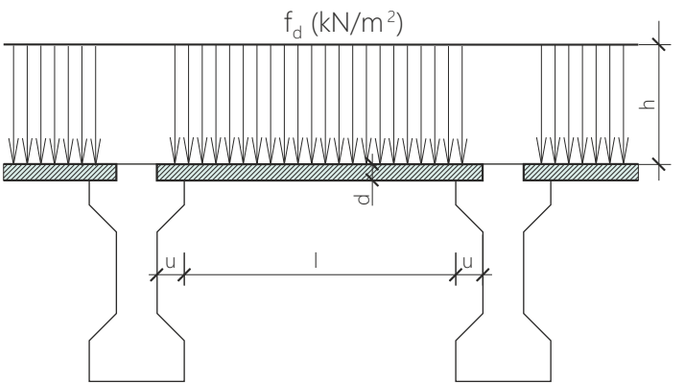
Determination of thickness "d" of CETRIS® boards

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.



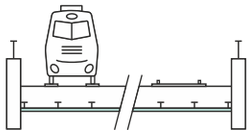
Case 1 - horizontal action
(the CETRIS boards forms the lower shuttering of the bridges, beams, etc.)

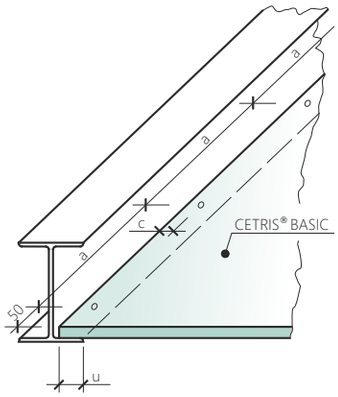
Modulus of elasticity	4500 Nmm^{-2}
Bending tensile strength	9 Nmm^{-2}
Modulus of shear perpendicular to the board plane	2500 Nmm^{-2}
Shear strength	2 Nmm^{-2}
Volume mass	1 400 kgm^{-3}
Transverse contraction coefficient	v = 0,15

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:

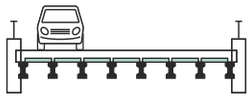
Board thickness d (mm)	a (mm)	c (mm)	u (mm)
18, 20	300	25	min. 40
22,24,26,28,30	400		
32,34,36,38,40	500		

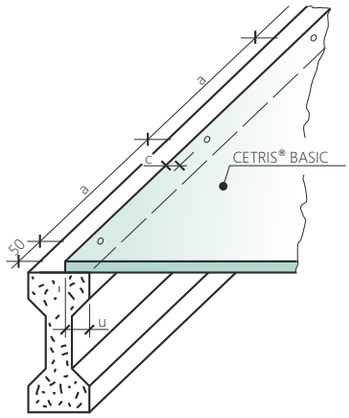
Railway bridge





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 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).

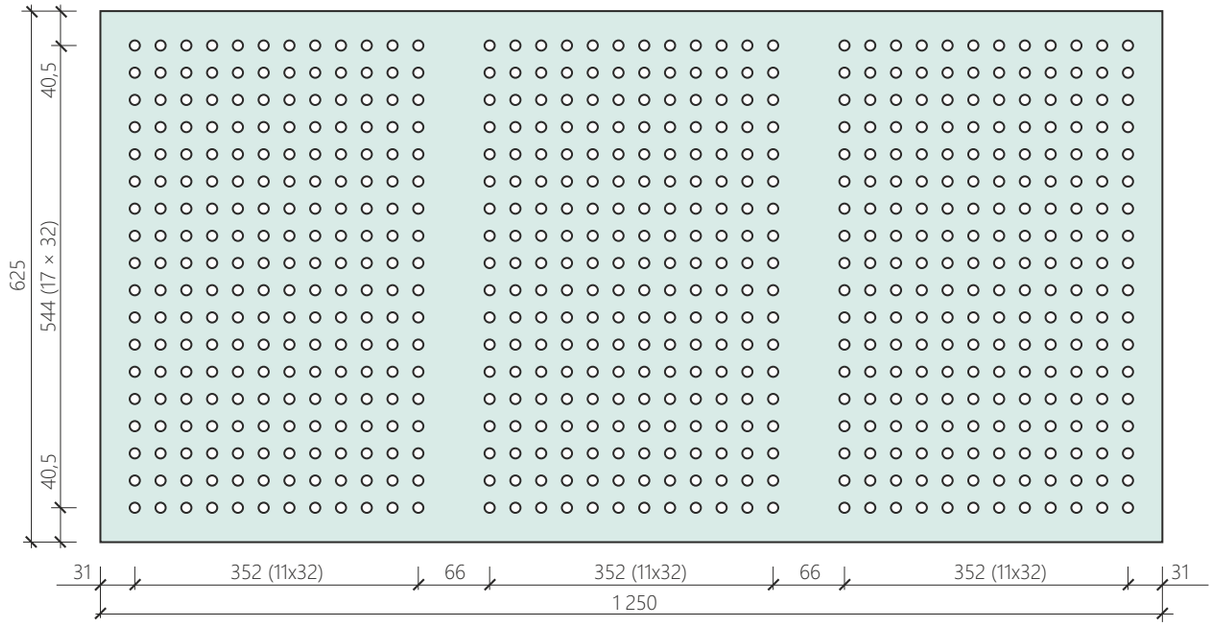
These parameters make this new type of CETRIS® board ideally suited mainly for use in sports facilities, areas with fluctuating temperatures and moistures and buildings with specific requirements. By building the CETRIS® AKUSTIC cement bound particle-board into the wall cladding system or the soffit (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



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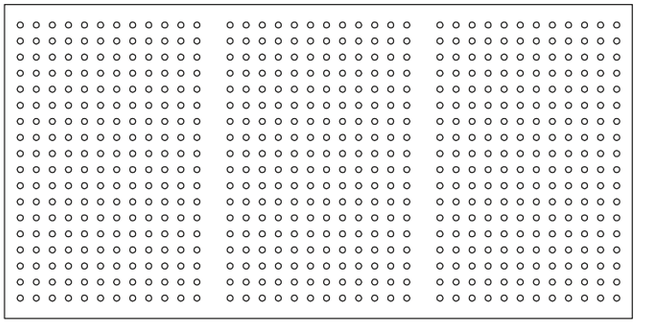
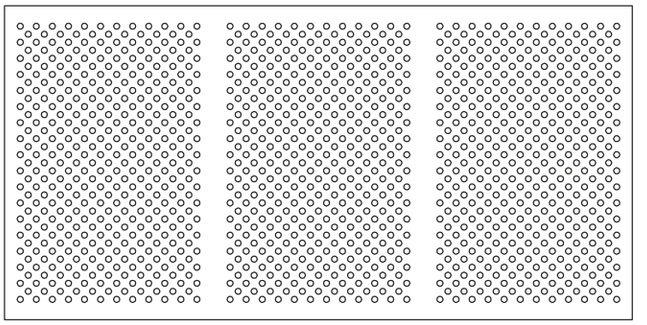
The size of all the boards stated here is 1,250 x 625 mm.

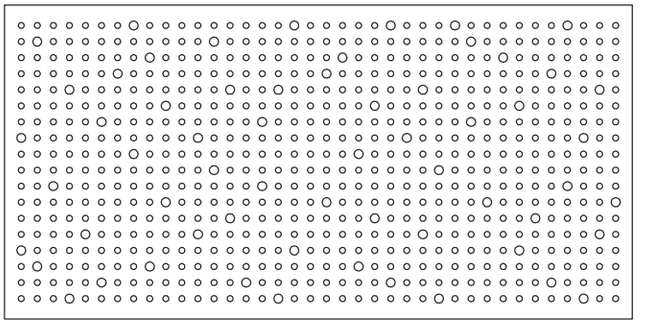
CETRIS® AKUSTIC A



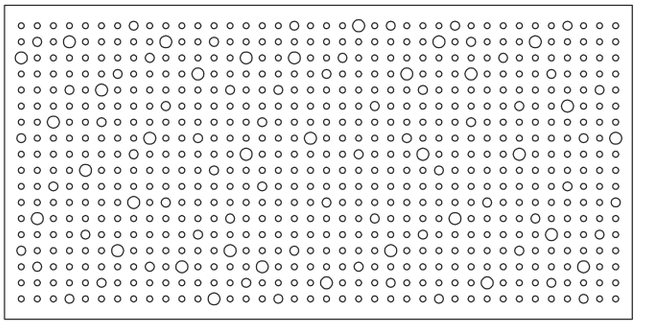
CETRIS® AKUSTIC B



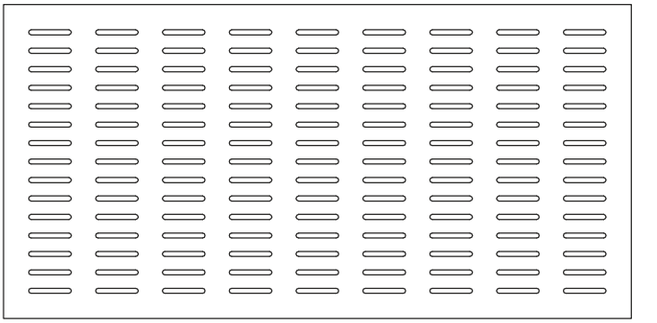
CETRIS® AKUSTIC C



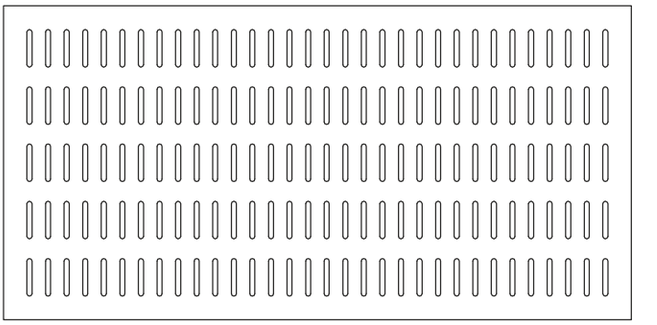
CETRIS® AKUSTIC D



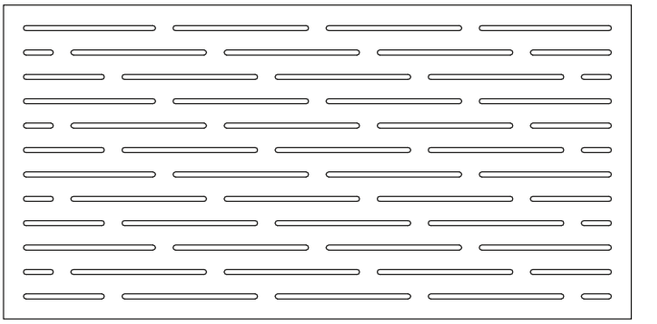
CETRIS® AKUSTIC E



CETRIS® AKUSTIC F

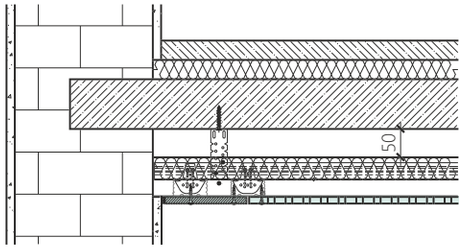
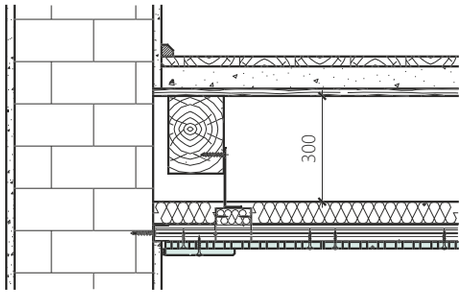


CETRIS® AKUSTIC G



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	
	Board CETRIS® AKUSTIC typ A 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
	Board CETRIS® AKUSTIC typ A 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
	Board CETRIS® AKUSTIC typ D board of thickness 8 mm Vlies fabric Mineral wool 60 mm Air gap of size 50 mm	0,20	0,82	0,84	0,55	0,41	0,34	0,66
	Board CETRIS® AKUSTIC typ E board of thickness 10 mm Vlies fabric Mineral wool 60 mm VAir gap of size 50 mm	0,21	0,84	0,82	0,52	0,40	0,35	0,66
	Board CETRIS® AKUSTIC typ A 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
	Board CETRIS® AKUSTIC typ A 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
	Board CETRIS® AKUSTIC typ D board of thickness 8 mm Vlies fabric Mineral wool 60 mm Air gap of size 300 mm	0,48	0,97	0,92	0,52	0,41	0,33	0,70
	Board CETRIS® AKUSTIC typ E board of thickness 10 mm Vlies fabric Mineral wool 60 mm Air gap of size 300 mm	0,48	0,96	0,92	0,50	0,42	0,35	0,69

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.

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:

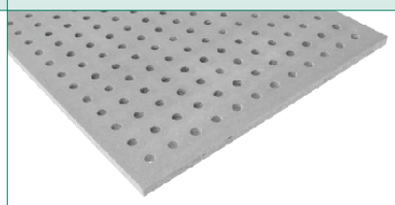
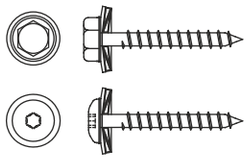
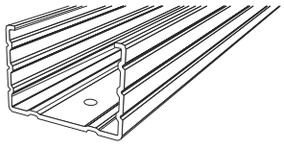
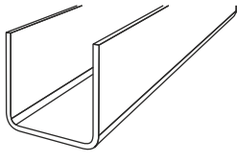
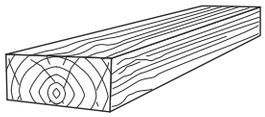
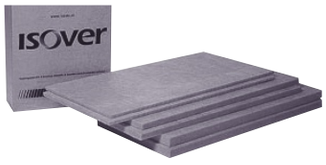
During installation of cladding on large ceiling or wall constructions (longer or taller than 6 m) dilations in the load-bearing construction must be designed and made visible in the cladding of CETRIS® AKUSTIC boards as well.

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

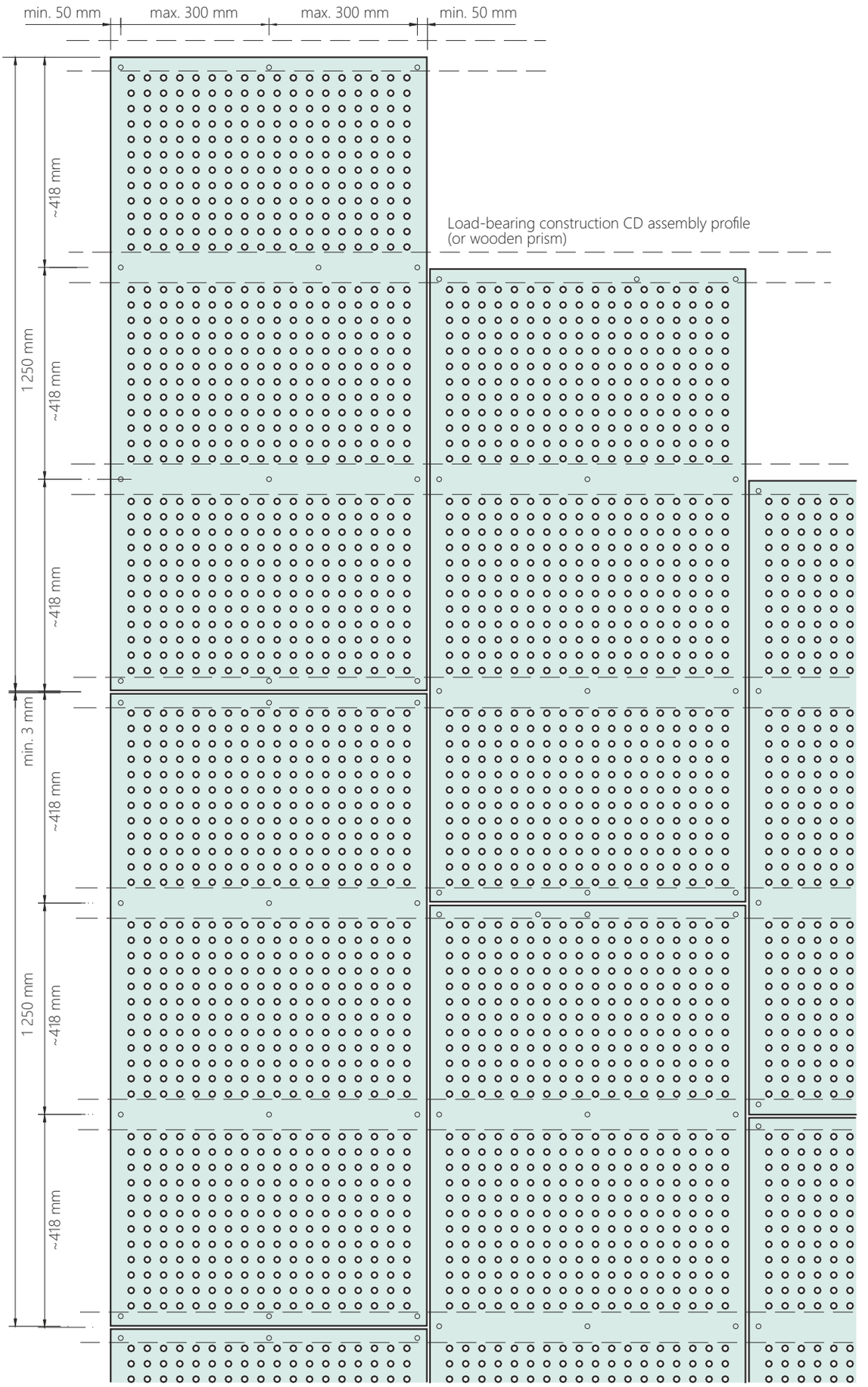
Additional load

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.

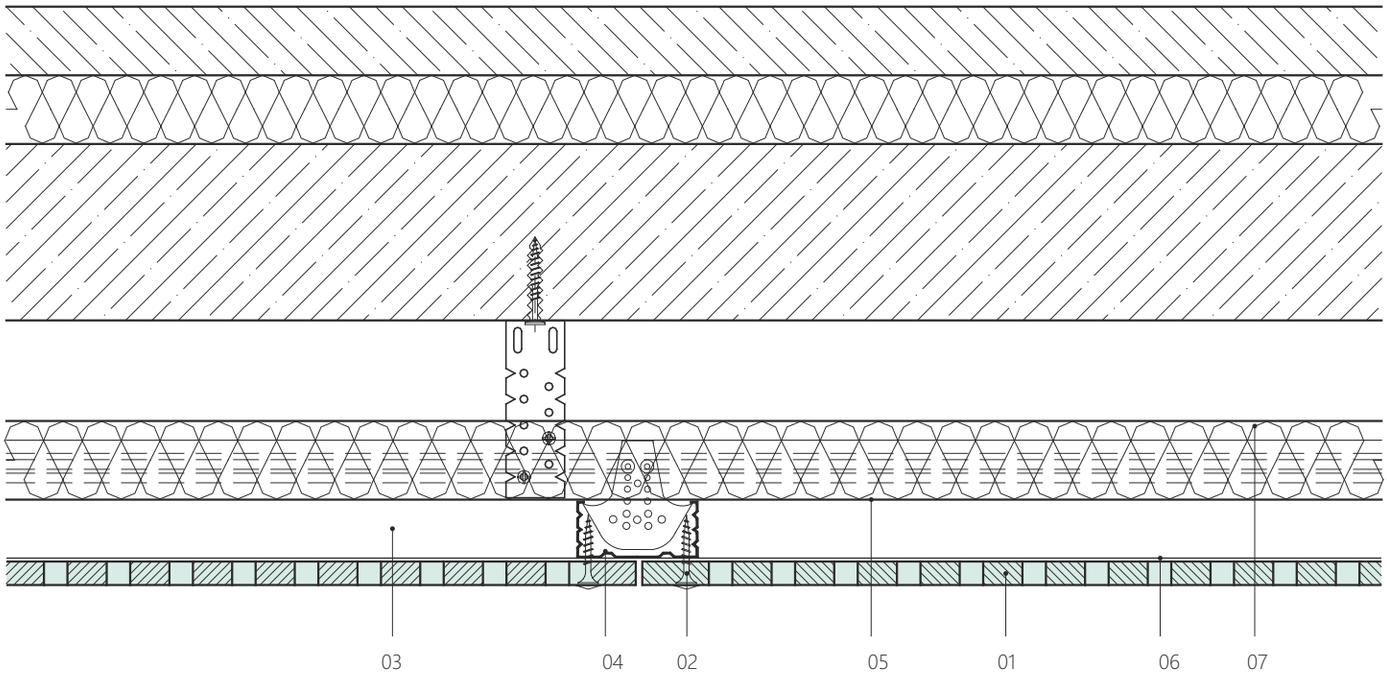
Materials for the assembly of the CERTIS® AKUSTIC perforated boards – specification

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

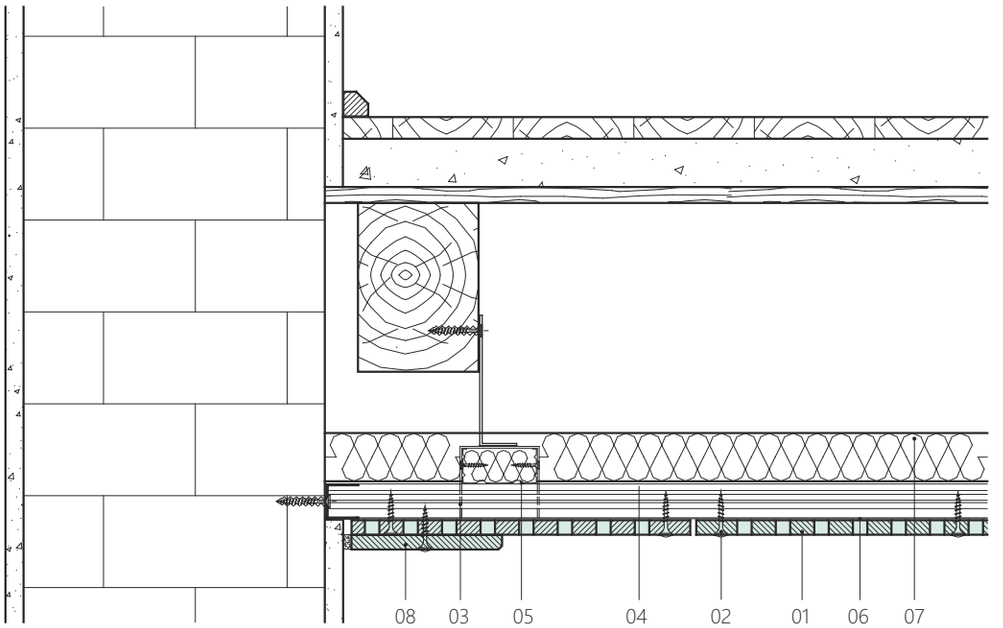


Joint between the boards



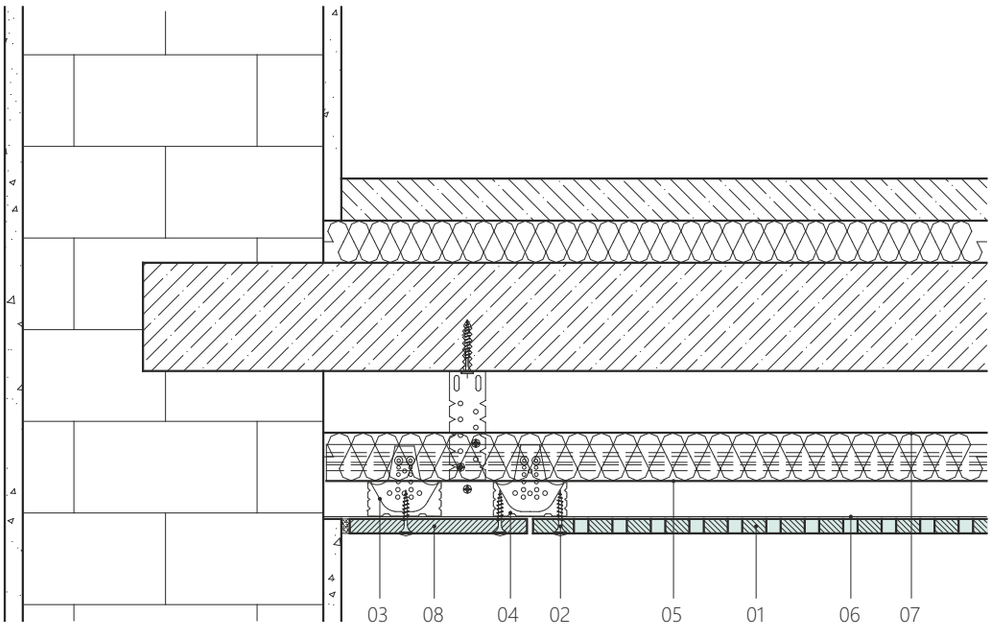
01 CETRIS® AKUSTIC board
02 screw 4.2×25 (35) mm
03 cross-coupling
04 CD assembly profile (or wooden prism)
05 CD load-bearing profile (or wooden prism)
06 vlies absorptive fabric
07 mineral wool

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

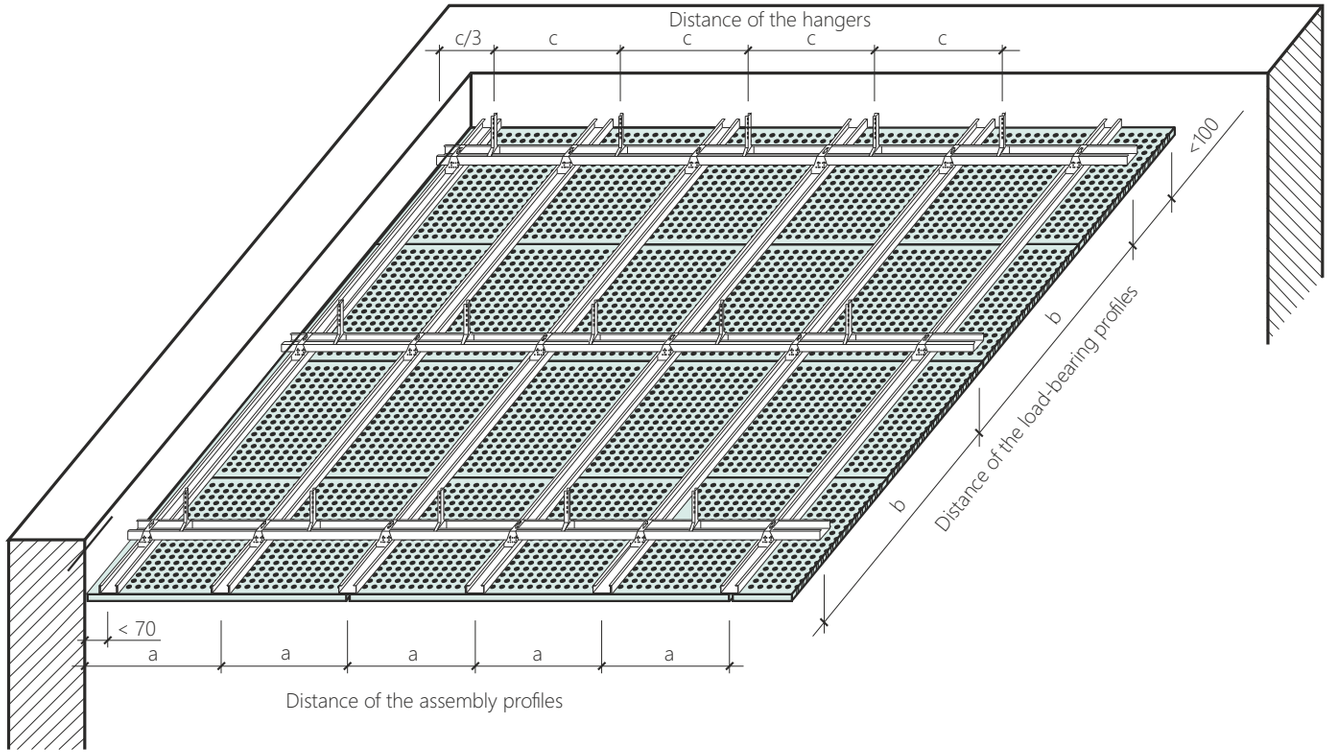
Soffit edge detail – full strip
Transverse section

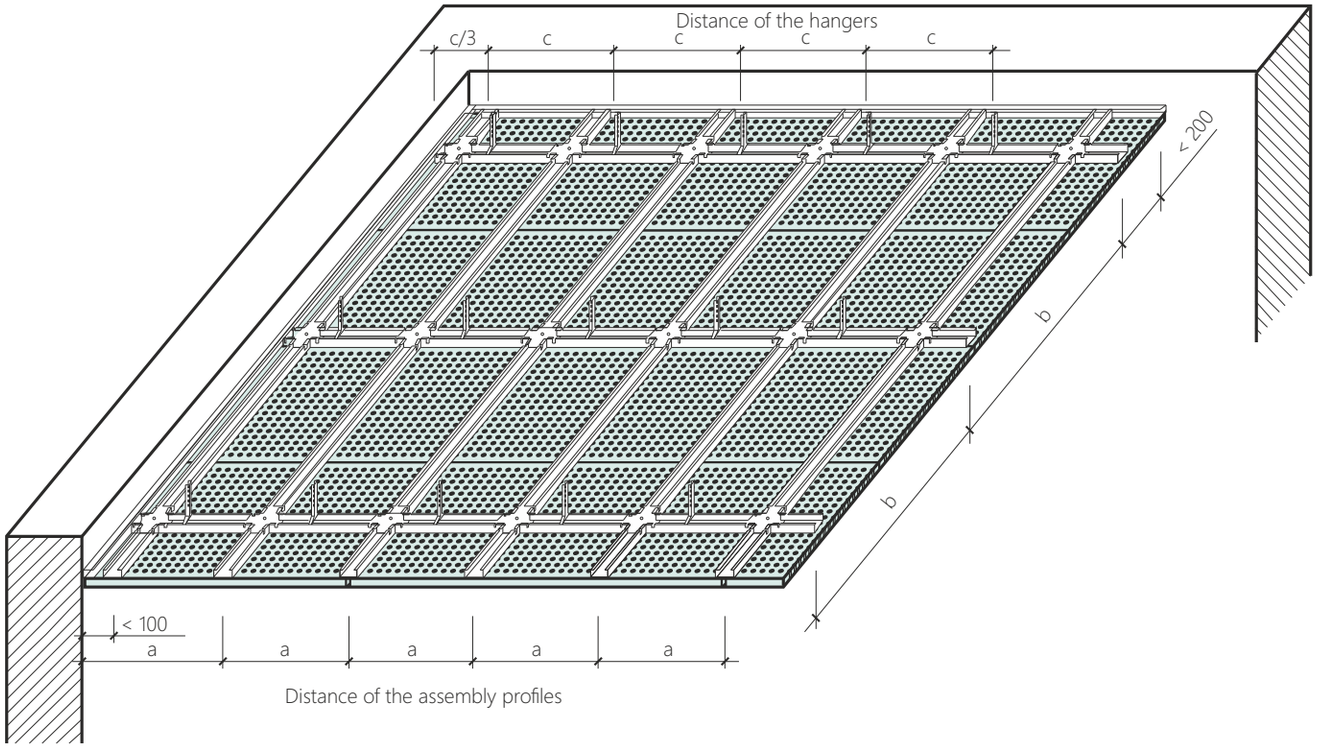


01 CETRIS® AKUSTIC board
02 screw 4.2×25 (35) mm with plastic facing cap
03 cross-coupling
04 CD installation profile (or wooden prism)
05 CD support profile (or wooden prism)
06 vlies absorptive fabric
07 mineral wool
08 strip – CETRIS® BASIC board

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

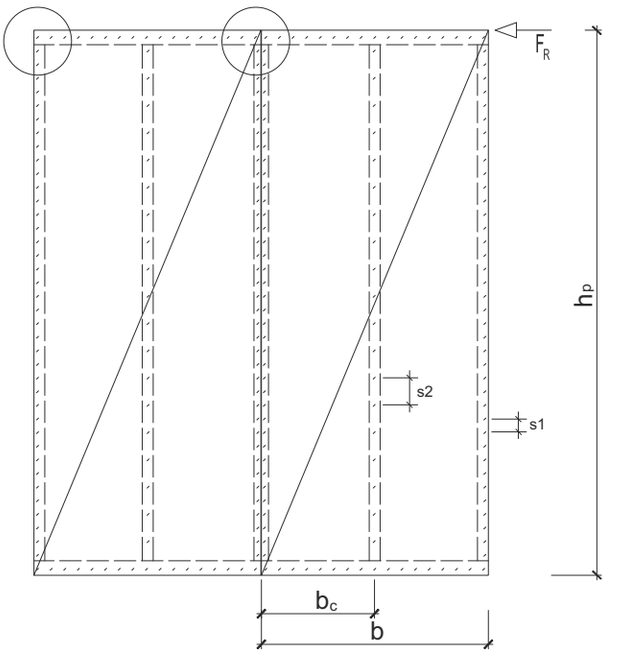
Board thickness (mm)	Spacing of mounting profiles a (mm)	Spacing of load-bearing profiles b (mm)	Spacing of suspensions c (mm)
8	Max. 420	Max. 1 000	Max. 625
10	Max. 420	Max. 1 000	Max. 420





9.4 Reinforcement capacity of wall panels cladded with CETRIS® boards

The stability of the wall panels of timber buildings can be achieved by cladding on one or both sides with CETRIS® Basic cement-bonded particleboard, which prevents the columns from buckling or twisting in the plane of the wall. The experimentally determined load capacity was then compared with the load capacity determined by calculation pursuant to EN 1995-1-1 (Eurocode 5), method A. The calculation was shown to be on the safe side. The output of the collaboration is design tables for designers to calculate the load capacity of reinforced walls cladded with CETRIS® cement-bonded particleboard.

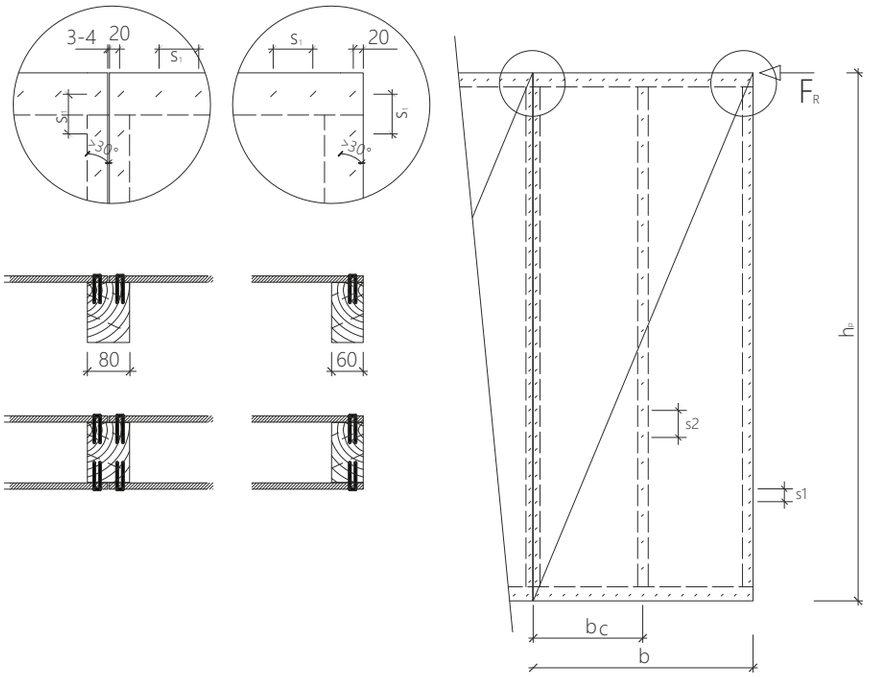


Design values of reinforcement capacity of wall panels clad with CETRIS® boards

Load capacity values determined by calculation pursuant to EN 1995-1-1 (EN 1995-1-1 (73 1701), 2006). Wall reinforcement load capacity assessments are carried out pursuant to Article 9.2.4.2 - Methods A. The calculation was carried out on a wall panel with a width of 1250 (1000) mm.

Wall height h_p = 3000 mm.

Board type	Board thickness t (mm)	Cladding m	Fastener				Panel width b [mm]	Support distance b_c [mm]	Reinforcement capacity	
			Type	Diameter d (mm)	Length l (mm)	Spacing s_i (mm)			Specific F_{Rk} [kN]	Designed F_{Rd} [kN]
Cetris BASIC	10	one-sided	staple	1,53	45	75	1000	500	5,10	3,12
Cetris BASIC	10	one-sided	nail	2,1	50	75	1000	500	5,38	3,28
Cetris BASIC	10	one-sided	screw	4,2	45	250	1000	500	3,03	1,85
Cetris BASIC	10	double-sided	staple	1,53	45	75	1000	500	10,21	6,23
Cetris BASIC	10	double-sided	nail	2,1	50	75	1000	500	10,75	6,57
Cetris BASIC	10	double-sided	screw	4,2	45	250	1000	500	6,06	3,70
Cetris BASIC	12	one-sided	staple	1,53	45	75	1250	625	7,98	4,87
Cetris BASIC	12	one-sided	nail	2,1	50	75	1250	625	8,40	5,13
Cetris BASIC	12	one-sided	screw	4,2	45	250	1250	625	5,17	3,16
Cetris BASIC	12	double-sided	staple	1,53	45	75	1250	625	15,95	9,74
Cetris BASIC	12	double-sided	nail	2,1	50	75	1250	625	16,80	10,26
Cetris BASIC	12	oboustrdouble-	screw	4,2	45	250	1250	625	10,35	6,32
Cetris BASIC	14	one-sided	staple	1,53	50	75	1250	625	7,98	4,87
Cetris BASIC	14	one-sided	nail	2,1	55	75	1250	625	8,40	5,13
Cetris BASIC	14	one-sided	screw	4,2	50	250	1250	625	4,95	3,02
Cetris BASIC	14	double-sided	staple	1,53	50	75	1250	625	15,95	9,74
Cetris BASIC	14	double-sided	nail	2,1	55	75	1250	625	16,80	10,26
Cetris BASIC	14	double-sided	screw	4,2	50	250	1250	625	9,90	6,05
Cetris BASIC	16	one-sided	staple	1,53	50	75	1250	625	7,98	4,87
Cetris BASIC	16	one-sided	nail	2,1	55	75	1250	625	8,40	5,13
Cetris BASIC	16	one-sided	screw	4,2	50	250	1250	625	4,73	2,89
Cetris BASIC	16	double-sided	staple	1,53	50	75	1250	625	15,95	9,74
Cetris BASIC	16	double-sided	nail	2,1	55	75	1250	625	16,80	10,26
Cetris BASIC	16	double-sided	screw	4,2	50	250	1250	625	9,47	5,78



Wall height h_p=2600 mm

Board type	Board thickness t [mm]	Cladding m	Fastener				Panel width b [mm]	Support Distance b_c [mm]	Reinforcement capacity	
			Type	Diameter d [mm]	Lenght l [mm]	Spacing s_1 [mm]			Specific F_{Rk} [kN]	Designed F_{Rd} [kN]
Cetris BASIC	10	one-sided	staple	1,53	45	75	1000	500	5,89	3,60
Cetris BASIC	10	one-sided	nail	2,1	50	75	1000	500	6,20	3,79
Cetris BASIC	10	one-sided	screw	4,2	45	250	1000	500	3,50	2,13
Cetris BASIC	10	double-sided	staple	1,53	45	75	1000	500	11,78	7,19
Cetris BASIC	10	double-sided	nail	2,1	50	75	1000	500	12,41	7,58
Cetris BASIC	10	double-sided	screw	4,2	45	250	1000	500	6,99	4,27
Cetris BASIC	12	one-sided	staple	1,53	45	75	1250	625	9,20	5,62
Cetris BASIC	12	one-sided	nail	2,1	50	75	1250	625	9,69	5,92
Cetris BASIC	12	one-sided	screw	4,2	45	250	1250	625	5,97	3,64
Cetris BASIC	12	double-sided	staple	1,53	45	75	1250	625	18,41	11,24
Cetris BASIC	12	double-sided	nail	2,1	50	75	1250	625	19,39	11,84
Cetris BASIC	12	double-sided	screw	4,2	45	250	1250	625	11,94	7,29
Cetris BASIC	14	one-sided	staple	1,53	50	75	1250	625	9,20	5,62
Cetris BASIC	14	one-sided	nail	2,1	55	75	1250	625	9,69	5,92
Cetris BASIC	14	one-sided	screw	4,2	50	250	1250	625	5,71	3,49
Cetris BASIC	14	double-sided	staple	1,53	50	75	1250	625	18,41	11,24
Cetris BASIC	14	double-sided	nail	2,1	55	75	1250	625	19,39	11,84
Cetris BASIC	14	double-sided	screw	4,2	50	250	1250	625	11,43	6,98
Cetris BASIC	16	one-sided	staple	1,53	50	75	1250	625	9,20	5,62
Cetris BASIC	16	one-sided	nail	2,1	55	75	1250	625	9,69	5,92
Cetris BASIC	16	one-sided	screw	4,2	50	250	1250	625	5,46	3,34
Cetris BASIC	16	double-sided	staple	1,53	50	75	1250	625	18,41	11,24
Cetris BASIC	16	double-sided	nail	2,1	55	75	1250	625	19,39	11,84
Cetris BASIC	16	double-sided	screw	4,2	50	250	1250	625	10,93	6,67

The following methods of joining plates to columns are permissible:

	Board thickness (mm)	Minimal diameter (mm)	Minimum lenght of fastener (mm)	Spacing (corner column) s1 (mm)	Spacing (central column) s2 (mm)
Screws	10, 12	4,2	45	250	400
	14, 16		50		
Staples	10, 12	1,53	45	75	150
	14, 16		50		
Nails	10, 12	2,1	50	75	150
	14, 16		55		

When calculating, the design margin conditions pursuant to EN 1995-1-1, chapter 9.2.4.and the following assumptions are considered:

• the edge ribs of the wall assembly are fitted with a tension anchor that is directly connected to the substructure. The anchorage of the panel to the substructure must be assessed individually. The wall must be sufficiently anchored to prevent tipping and shifting

• the spacing of the fasteners connecting the cladding to the timber frame shall be constant around the perimeter of the cladding. The spacing of the fasteners in the centre rib shall not be more than twice the spacing of the fasteners along the edges of the cladding, up to a maximum of 400 mm in the case of screw anchorage. Any increase in the diameter of the fastener has an effect on the size of the spacing. The minimum spacing of the fasteners from the vertical edge of the CETRIS board is 20 mm. The fasteners must be placed diagonally to the edge of the board at a minimum angle of 30°.

• when determining the spacing of fasteners, it can be assumed that the edges are not loaded

• the wall assembly does not contain door or window openings

• the minimum cross-sectional dimensions of the timber elements of the supporting frame are 60 x 100 mm, 80 x 100 mm at the contact point of the two boards, using lumber of class min. C24, characteristic density min. 350 kg/m3. The moisture content of the timber must correspond to class B according to EN 13183-3, i.e. it must be sufficiently dry, planned, preferably glued or galvanised (KVH or BSH).

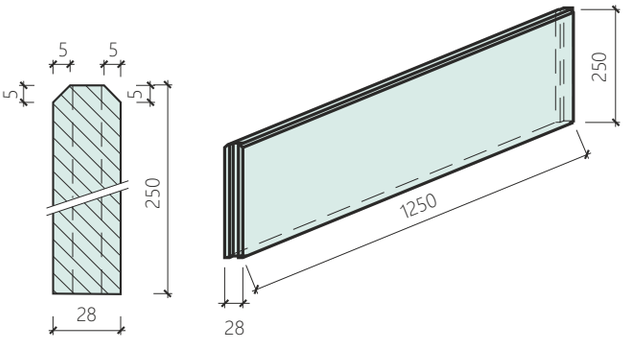
• the maximum spacing of the vertical elements of the timber frame is 625 mm (500 mm in the case of a 10 mm thick board);

• the cladding is made to the full height of the wall (no connection of boards in height is allowed)

• service class TP1 and TP 2 , load duration class - short-term.
• The principles of anchoring with screws, staples or nails are given in chapter 4.1.

9.5 CETRIS® HOBBY Flowerbed curb

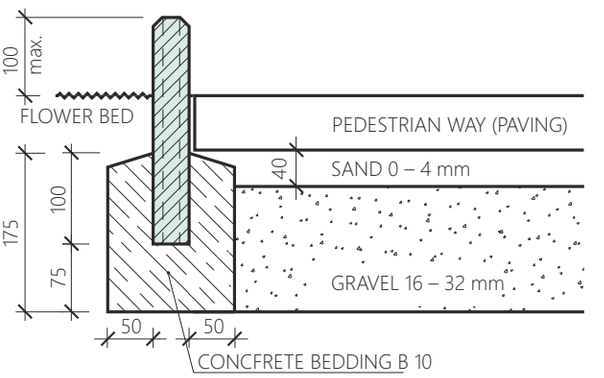
CETRIS® HOBBY Flowerbed curb is a CETRIS® cement bonded particleboard of size of 1,250 × 250 × 28 mm, cut from CETRIS® BASIC board. The top edge is bevelled on both sides, the side edges are milled to allow (tongue+groove) joining. The flowerbed curb can be drilled or milled.



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.

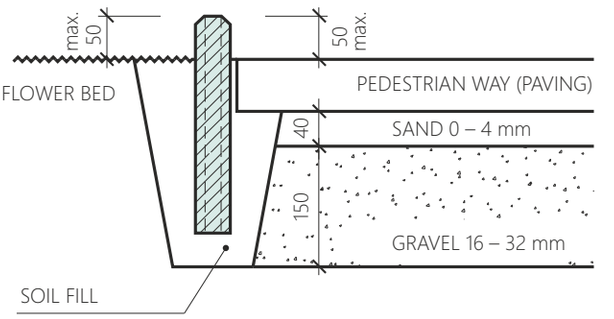
When installed in a concrete bed it is necessary to set it a minimum depth of 100 mm. Above the beds (of pedestrian way) the curb may overlap by max. 100 mm. The base concrete must be of minimum class C15.



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.