

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.

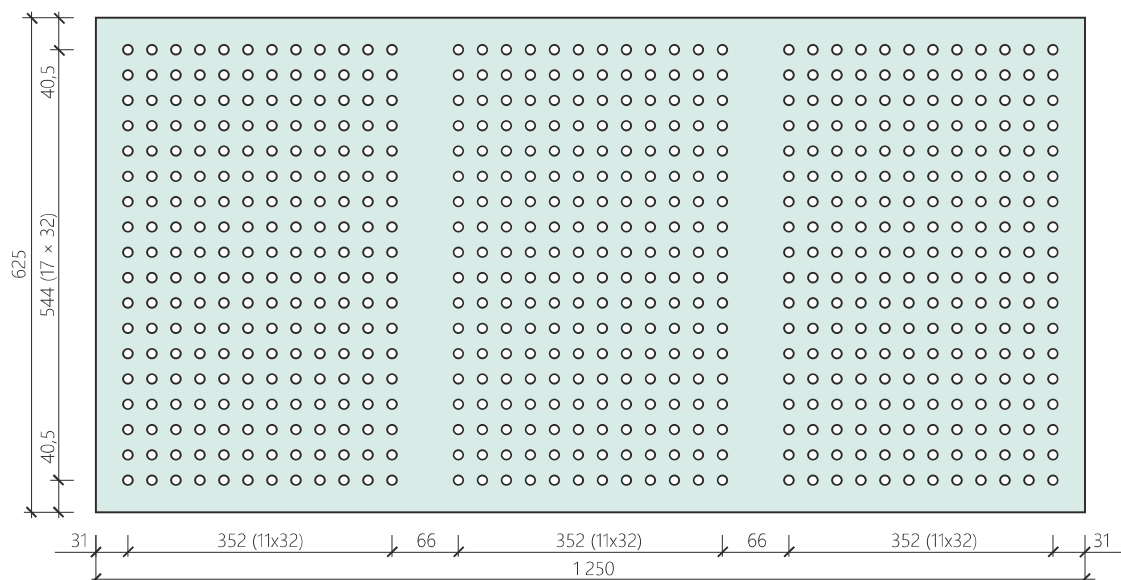
Acoustics is also one of the important criteria in designing and implementing the civil engineering projects. It is the requirements for the impact transmission loss and the airborne sound transmission loss that are mainly put to the engineering structures – predominantly in cases when the structures (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.

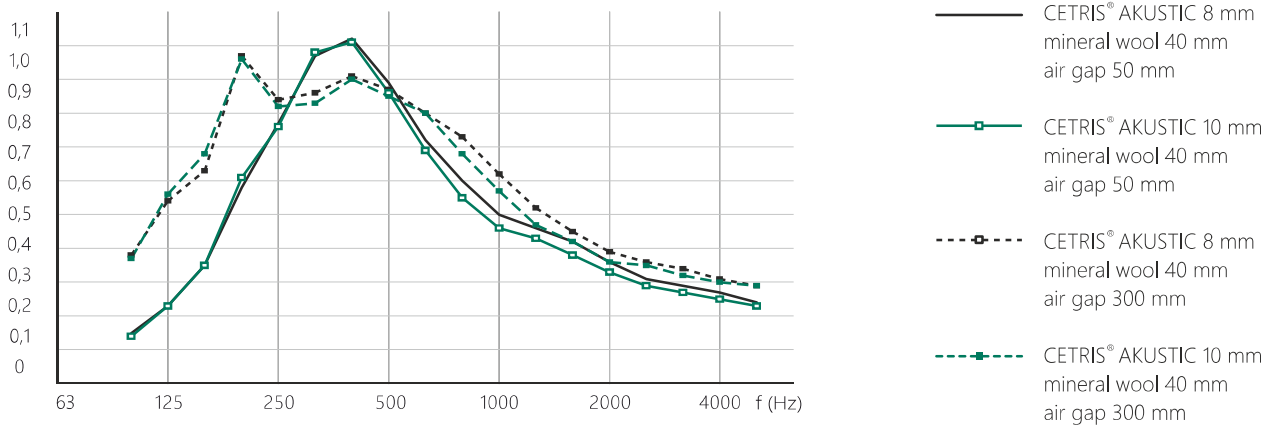
The CETRIS® AKUSTIC boards cannot be used as vertical wall cladding in sports halls and gyms with an occurrence of ball games without additional reinforcement of the base grid and use of protective nets, which dampen the impact the ball.

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 $\alpha = 0$, 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:



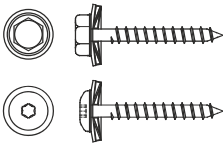
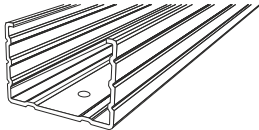
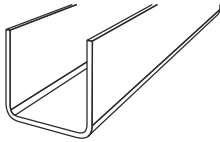
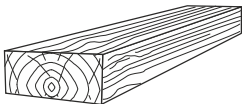



During installation of cladding on large ceiling or wall constructions (longer or taller than 6 m) dilations in the load-bearing construction must be designed and made visible in the cladding of CETRIS® AKUSTIC boards as well.

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

Additional load

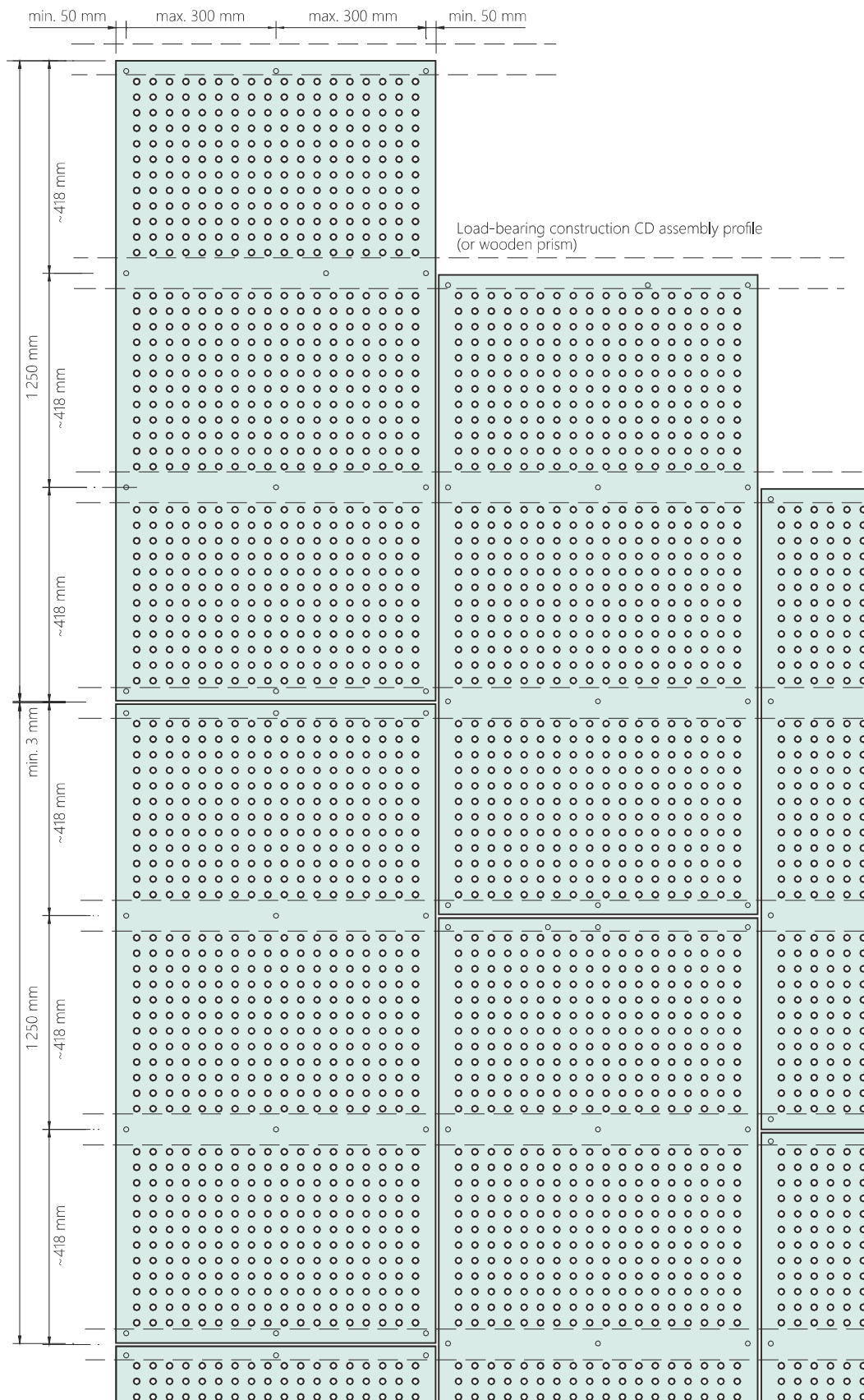
Additional burdens can be attached to the very sheathing of the CETRIS® AKUSTIC board (e.g., lights, air-conditioning, etc.) of a max. weight of 1.5 kg. A maximum of one burden is can be mounted in one field delimited by the bearing structure (CD profiles or wooden laths). Burdens (suspended objects) 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/m². 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

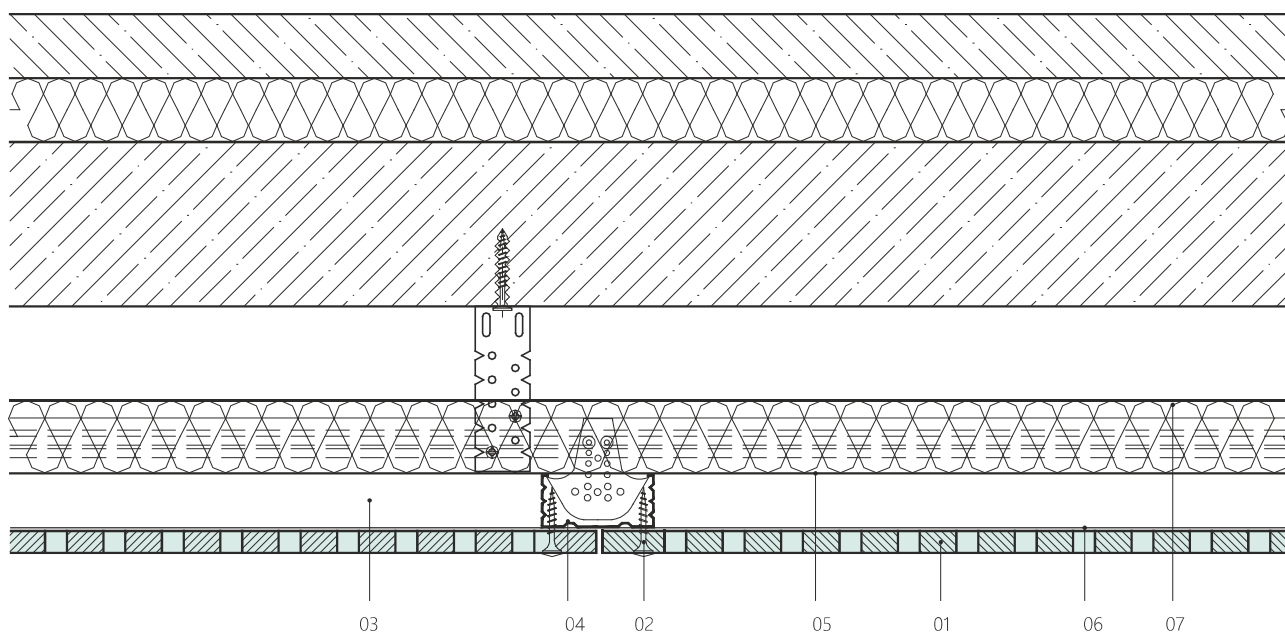
Description	Visualisation	Note
CETRIS® AKUSTIC board Cement bonded particleboard, smooth surface, cement grey. Format 1,250 x 625 mm.		Thickness according to the fire resistance requirements
Screw 4.2x25, 35, 45, 55 mm Counter-sunk, self-tapping screws		Screw type according to the thickness of the lining and type of load-bearing construction.
Screw 4.2 – 4.8 x 38, 45 mm Stainless 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/m³ 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

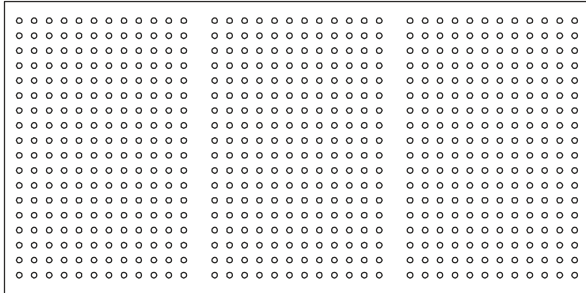
07 mineral wool

CETRIS® AKUSTIC boards in new designs

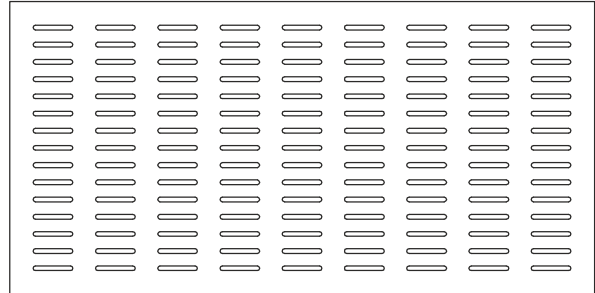
We newly offer acoustic boards in other perforated options.
Details are available at our website at the address www.cetris.cz

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

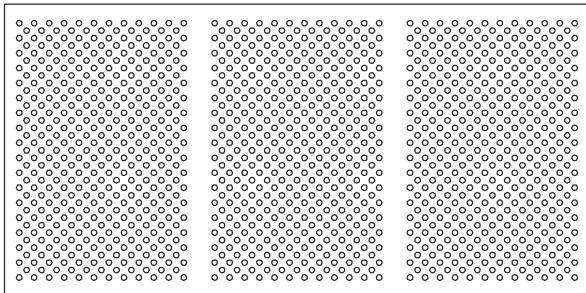
CETRIS® AKUSTIC A



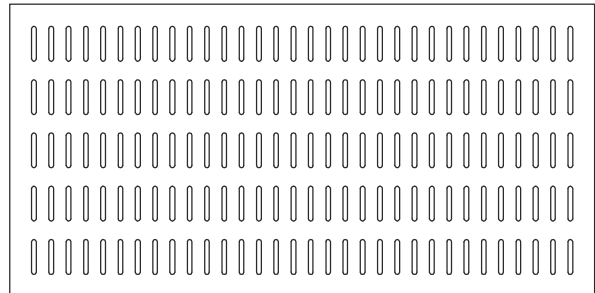
CETRIS® AKUSTIC E



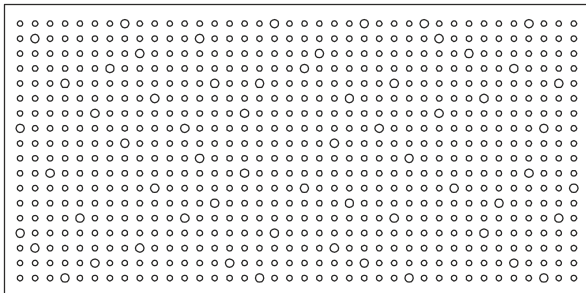
CETRIS® AKUSTIC B



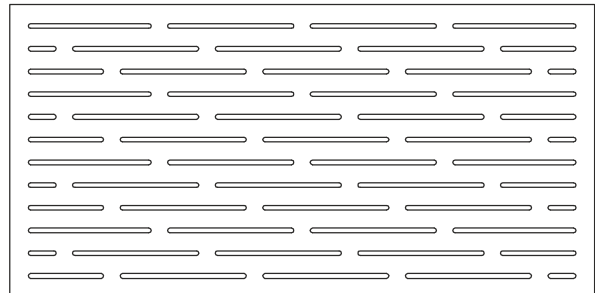
CETRIS® AKUSTIC F



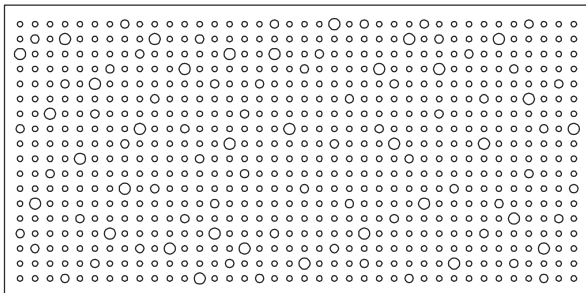
CETRIS® AKUSTIC C



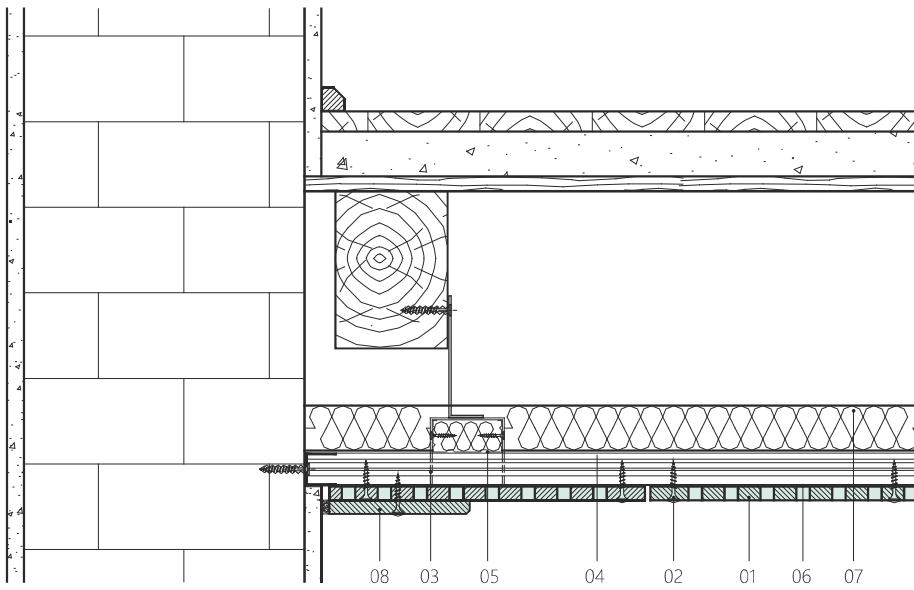
CETRIS® AKUSTIC G



CETRIS® AKUSTIC D

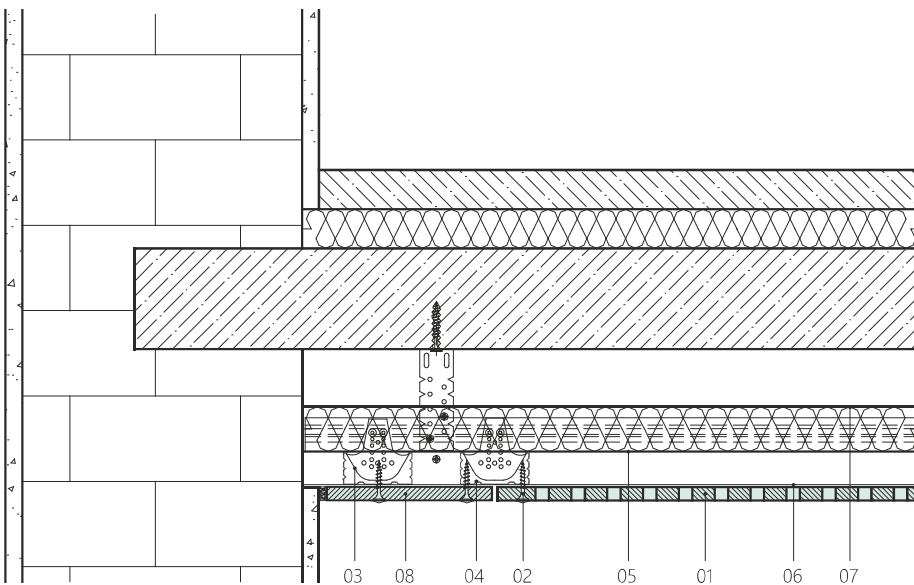


Soffit edge detail – rim



- 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

