

Cement Bonded Particleboard CETRIS® AKUSTIC

The CETRIS® AKUSTIC cement bonded particleboard is made by working (drilling the regular holes) the basic type of CETRIS® BASIC board. Aside from the existing high mechanical parameters, this treatment also improves the product's acoustic properties. While the solid – base board of CETRIS® stands out predominantly with its high value of sound transmission loss, the drilled board is used as a sound absorbing cladding.

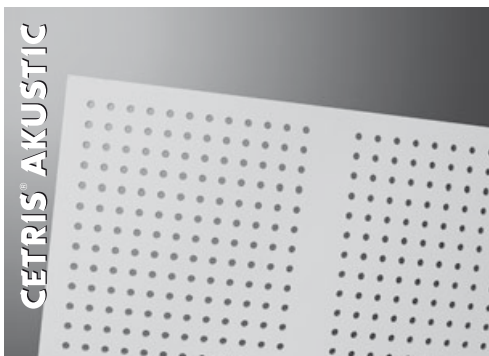
As compared to other acoustic cladding materials when the CETRIS® AKUSTIC cement bonded particleboard is used, an extra high mechanical break-through resistance (for example, impact of a ball)

and moisture resistance are secured – all of this with a high reaction-to-fire class (A2 -s1,d0) maintained. These parameters predestinate this new type of CETRIS® board mainly for the sports facilities, the areas with fluctuating temperatures and moistures and the structures 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.

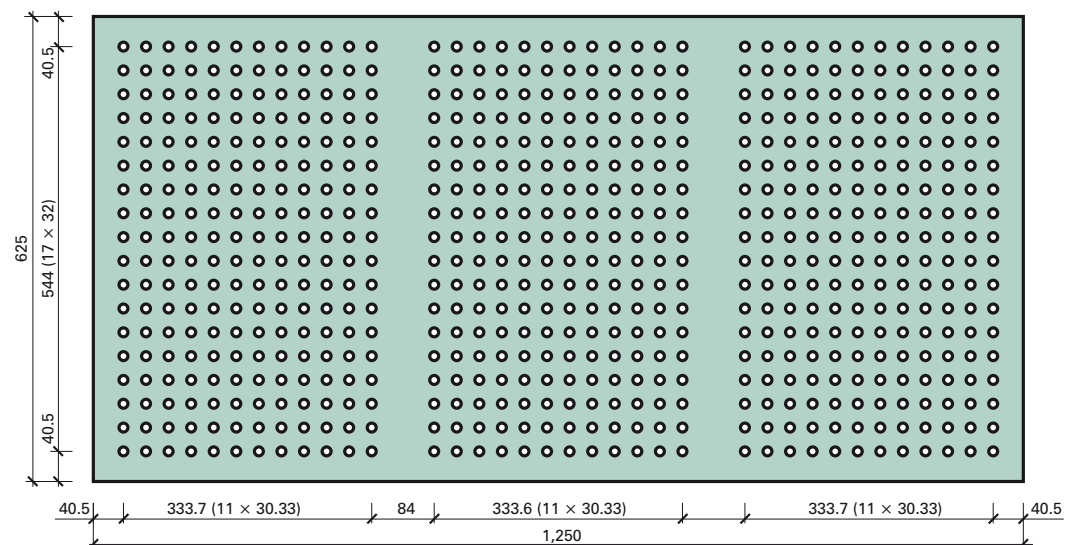
In the situation when both noise source and users are present in the same room it is necessary to deal with the architectural acoustics. The lining of CETRIS® AKUSTIC board participates favourably in the improvement of architectural acoustics and sound absorption in inner premises.



CETRIS® AKUSTIC	A cement bonded particleboard with pre-drilled holes, smooth cement surface
Basic size	1,250 × 625 mm
Thickness of board	8, 10 mm (12, 14, 16, 18 mm as agreed upon)
Bulk density	1,150 – 1,450 kg/m ³
Basic weight	th. 8 mm – 10 kg/m ² , th. 10 mm – 12.5 kg/m ²
Holes	drilled holes – Ø 12 mm, spacing of holes 30 – 32 mm (see Figure)
Surface	smooth
Surface finish	without surface finish

Limit size deviations of CETRIS® AKUSTIC board

THICKNESS OF BOARD (mm)	TOLERANCES (mm)			
	thickness	width	length	spacing of holes
8, 10	±0.7	±3.0	±3.0	±2.0
12, 14	±1.0			
16, 18	±1.2			



Summary of physical and mechanical properties of the CETRIS® AKUSTIC cement bonded particleboard

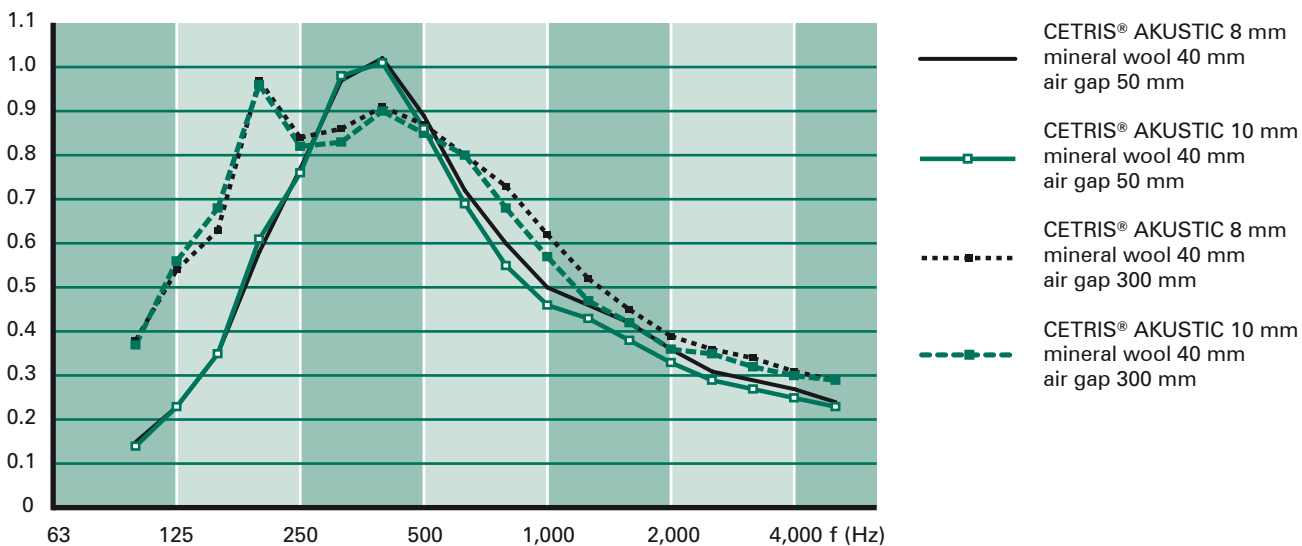
Density	1,150 – 1,450 kg/m ³
Mass balanced moisture at 20° C and relative humidity of 50 % as per EN 634-1	9 ± 3 %
Moisture expansion coefficient under the air humidity change from 35 % to 60 % as per EN 13 009	39.6 × 10 ⁻³
Thermal expansion coefficient as per EN 13 471 (temperature change from 20° C to 60° C)	10.8 × 10 ⁻⁶ K ⁻¹
Ball impact resistance class as per EN 13 964	th. 8 mm 3A class (velocity of 4 m/s)
	th. 10 mm 2A class (velocity of 8 m/s)
Reaction-to-fire class as per EN 13 501-1	A2 -s1,d0

Sound Absorption Factor α as per EN ISO 354

The sound absorption rate indicates the ratio of the unreflected sound energy and the reflected sound energy. $\alpha = 0$ by complete reflection while $\alpha = 1$ by complete absorption. The course of sound absorption factor in dependence on frequency in the various composition options with the CETRIS® AKUSTIC board is determined as follows (see Table):

DIAGRAM	STRUCTURE DESCRIPTION	VALUES OF ABSORPTION COEFFICIENT α (in dependence on the sound frequency)						MEAN VALUE OF α
		125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	
	The CETRIS® AKUSTIC board, th. 8 mm Vlies fabric, mineral wool th. 40 mm Air gap, th. 50 mm	0.23	0.77	0.89	0.50	0.36	0.27	0.63
	The CETRIS® AKUSTIC board, th. 10 mm Vlies fabric, mineral wool th. 40 mm Air gap, th. 50 mm	0.23	0.76	0.86	0.46	0.33	0.25	0.61
	The CETRIS® AKUSTIC board, th. 8 mm Vlies fabric, mineral wool th. 40 mm Air gap, th. 300 mm	0.56	0.82	0.85	0.57	0.36	0.30	0.69
	The CETRIS® AKUSTIC board, th. 10 mm Vlies fabric, mineral wool th. 40 mm Air gap, th. 300 mm	0.54	0.84	0.87	0.62	0.39	0.31	0.67

Graphical representation of the course of the sound absorption factor



Storage, Handling, Packaging

The drilled CETRIS® AKUSTIC cement bound particle-boards are stacked on the transport sole pieces that allow for handling. The particle-boards are fixed by wrapping them to the sole piece crosswise. The CETRIS® AKUSTIC boards are protected against climatic influences by the PE foil. However, this type of packaging is not intended for long-term protection against climatic influences. When stored, the top board may suffer deflection due to irregular drying of the CETRIS® board. This

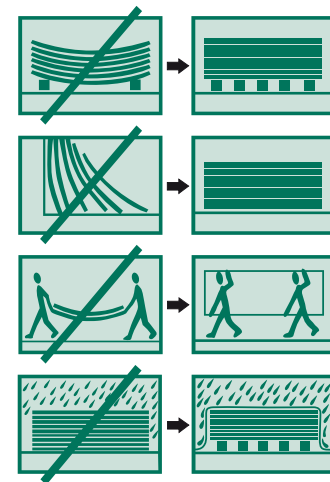
phenomenon can be rectified by turning the particle-board upside down.

We recommend to store the CETRIS® AKUSTIC boards in dry and covered premises so that the boards do not contain higher moisture before being built into the structure. When warehousing, we do not recommend to store more packages with CETRIS® AKUSTIC boards on each other – danger of mechanical damage. The standard size of CETRIS®

AKUSTIC boards (1,250 × 625 mm) is selected so that the boards can be handled by one worker. The board must always be carried in vertical position.

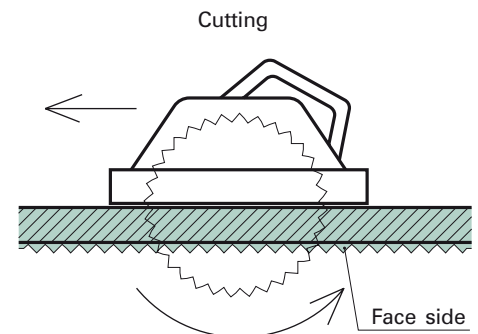
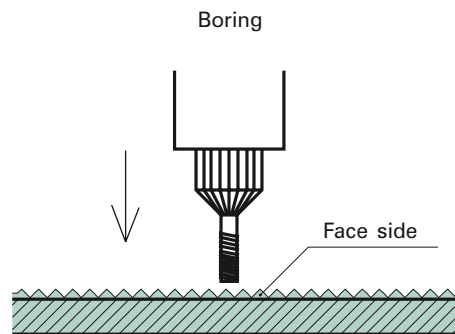
The basic data on packaging the CETRIS® AKUSTIC boards
(applicable for a standard size of 1,250 × 625 mm)

THICKNESS OF BOARD (mm)	REFERENCE WEIGHT (kg/m ²)	REFERENCE WEIGHT OF BOARD (kg/pc)	NUMBER OF BOARDS ON PALLET (pc)	AREA OF BOARDS ON PALLET (m ²)	WEIGHT OF BOARDS PLUS PALLET (kg)
8	10.0	7.80	100	78.13	810
10	12.5	9.75	80	62.50	805
12	15.0	11.70	70	54.68	840
14	17.5	13.65	60	46.88	840
16	20.0	15.60	50	39.07	805
18	22.5	17.55	45	35.15	820



Working the CETRIS® AKUSTIC Boards

Circular saw with a sintered-metal tipped blade is sufficient for cutting the perforated boards. For the cut to be clean and straight a guide gib must be used and the boards should be cut from the back side – thus the face side shall not be damaged. Pre-drilling the holes is done using a drill without impact. A drilling bit for metals is recommended for the pre-drilling. Essentially, the drilling must be done from the adjusting face.



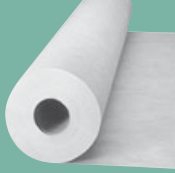

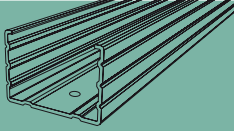
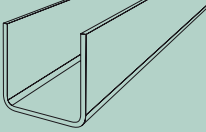
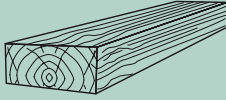

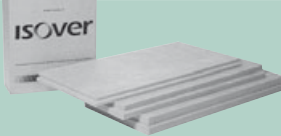
Surface Finish

We recommend that the gaps between the CETRIS® AKUSTIC boards remain open (free) and underlaid with separation fabric (flees). When applying paint to the perforated boards the principles apply that are

listed in the CETRIS® Basic data for Designing and for Realization, Chapter no. 6 Surface treatment.

Because of pre-drilling, the built-in boards must not be painted by spraying for the acoustic textile not to be damaged.

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

DESCRIPTION/DESIGNATION	IMAGE (DIAGRAM)	REMARK
Flees Fabric Absorption glass-fibre fabric – it prevents the mineral wool fibres or, as the case may be, dust from falling through. Manufacturer: Saint-Gobain Vertex, s.r.o.		To comply with the reaction to fire of A2 for the complete composition a special type of insulation – Isover Akustic SSP 2 (with one-side bonded black glass fabric) – must be used instead of the flees fabric and standard mineral wool.
Screw 4.2 × 25 mm (4.2 × 35 mm) Self-drilling countersink-head wood screws.		Screws for anchoring the CETRIS® AKUSTIC board th. 8 and 10 mm to the CD profile (in case of wooden grate the screw of 4.2 × 35 mm must be used). Upon the completion of assembly a plastic front cap is put on the screw. The front-head screws may be used as alternative.
CD Profile A galvanized metal-sheet open profile of 27 × 60 × 0.6 mm, length of 2.50 – 4.50 m.		It forms a carrying grid for the assembly of soffits. The soffits are mounted to the ceiling or roof structure using either straight or nonius suspension.
UD Profile A galvanized metal-sheet open profile of 28 × 27 × 0.6 mm, length 3.00 m.		It is used for fixing the profiles to the walls, using steel dowels.
Whole Timber Section of 80 × 40 mm.		It forms a wooden strapping (mounting profile as well as carrying profile). The dried up impregnated structural lumber of S10 class (strength class C24).
Mineral Wool Thickness 40 mm, Orsil ORSIK type, inserted between the carrying CD profiles (eventually wooden laths).		It can be replaced with another type of mineral wool with density of 22 kgm ⁻³ , reaction-to-fire class A1.
Mineral Wool Isover Akustik SSP 2 (P3/4) 4, th. 40 mm.		Hydrophobized mineral wool with single side bonded black glass fabric, reaction-to-fire class A1.

Assembly

The system of soffits of CETRIS® AKUSTIC is fixed to a metal grate of CD profiles that are crossed either in one plane (using the cross connectors) or at two levels (connectors). As alternative, the substructure of wooden laths and scantlings can be used. Then, the CETRIS® AKUSTIC boards are mounted in one layer to the auxiliary structure using the screws.

The following rules must be observed during assembly:

We recommend to secure the KNAUF cross connectors for CD 60 × 27 profiles with M 6 × 40 screw with nut and washer as minimum. The connection of the carrying grid of 80 × 40 mm scantlings (mounting profiles and carrying profiles) must be secured

with two 4.2 × 70 mm screws as minimum. To connect the wooden carrying profile to the straight suspension, a minimum of two 4.5 × 35 mm screws must be used.

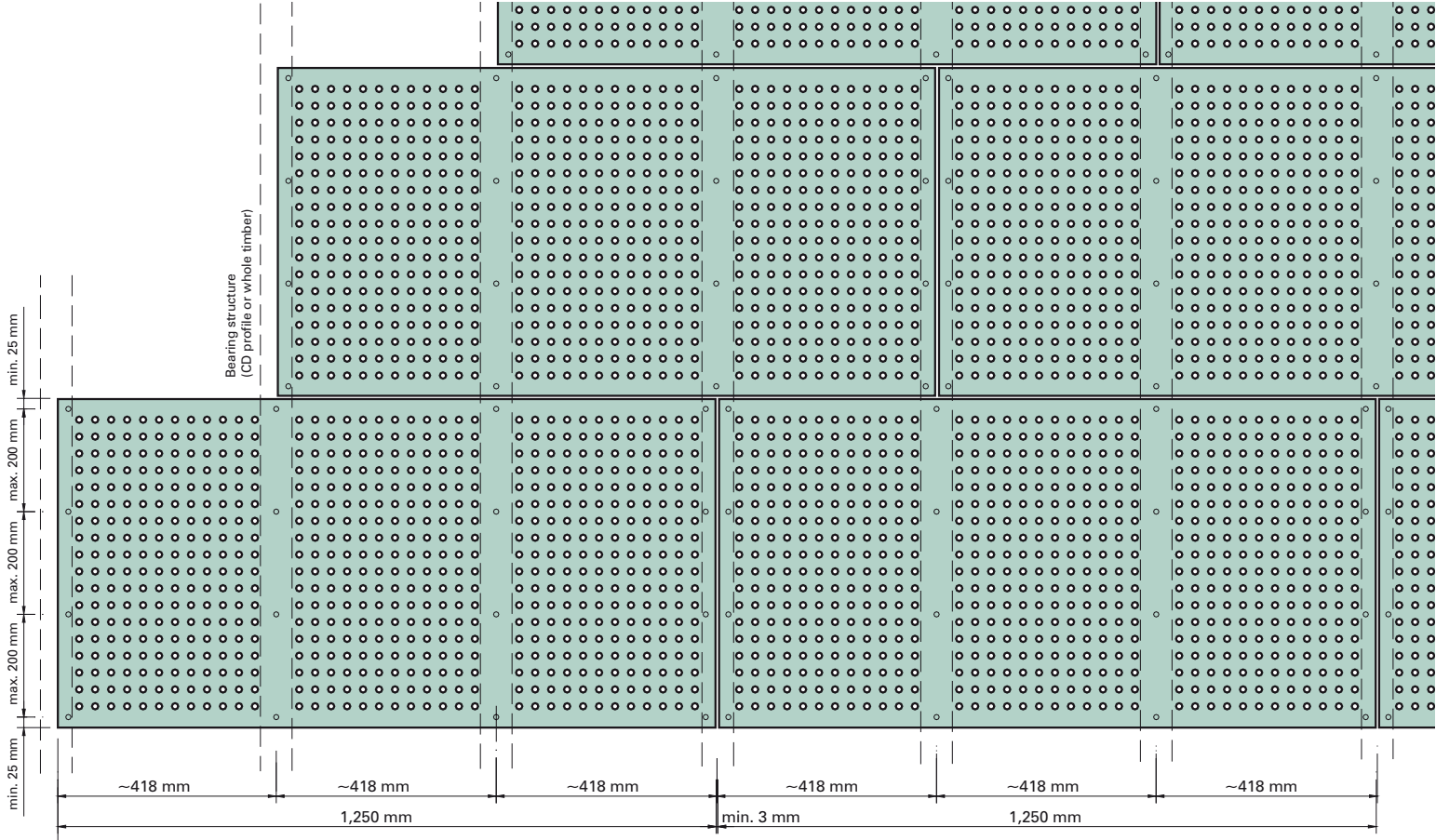
The CETRIS® AKUSTIC boards can be laid with overlap ("to bind") or with so called cross joint. The spacing of holes in inner pane is identical to the outer pane.

Sheathing with perforated boards always begins from the room centre. That is the reason why it is convenient to mark the positions of boards on the bearing structure. With irregular or non-rectangular ceiling plan view a jointless (undrilled) strip of the

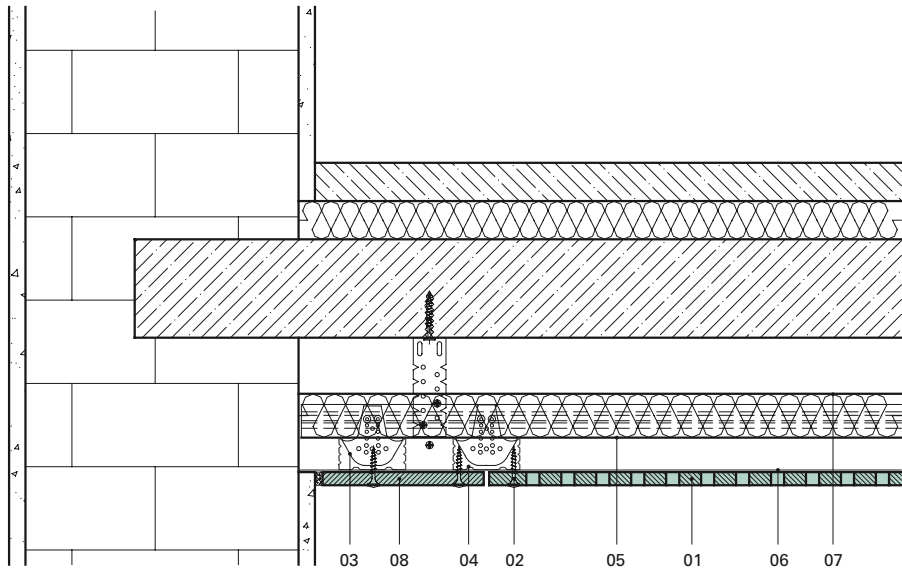
CETRIS® BASIC board is recommended along the perimeter approx 150 mm wide.

The CETRIS® AKUSTIC boards must always be assembled with their longer edge perpendicular to the carrying 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 (it applies for a standard format of 1,250 × 625 mm). The joint must be considered along the room's perimeter as well.

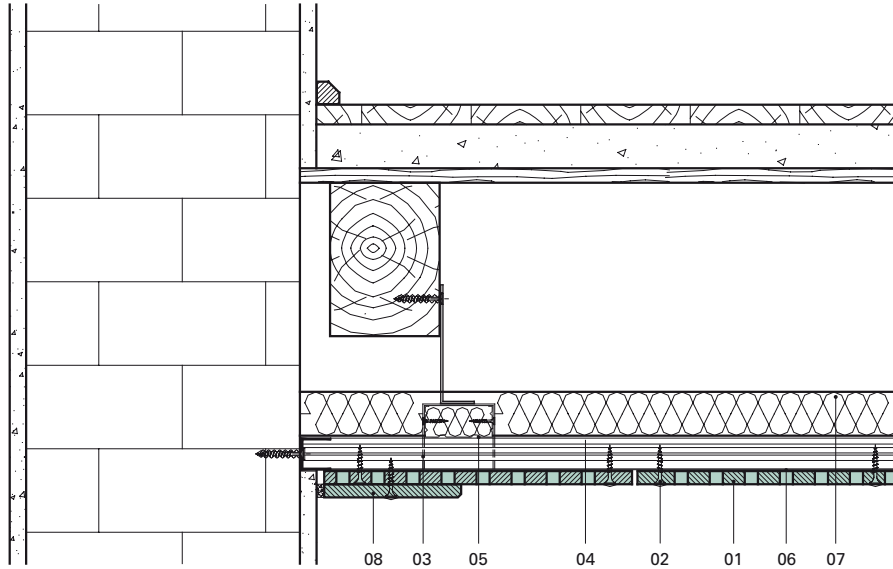


Soffit edge detail – full strip



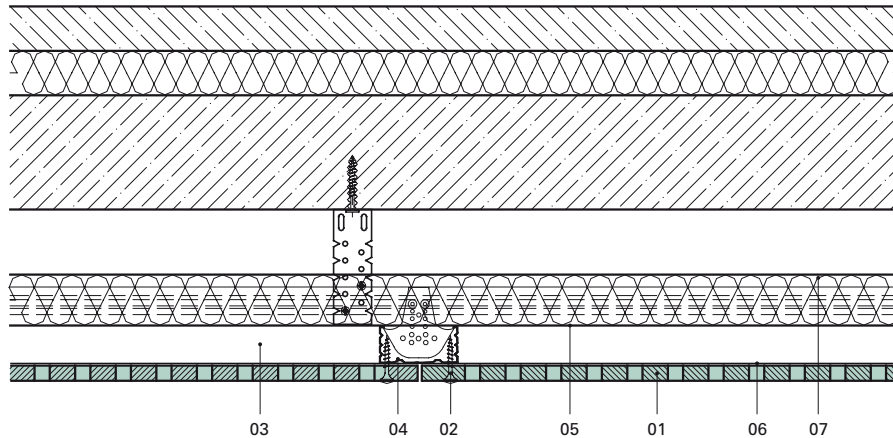
- 01 CETRIS® AKUSTIC board
- 02 Screw 4.2 × 25 (35) mm with plastic front cap
- 03 Cross connector
- 04 Mounting CD profile (or a whole timber)
- 05 Carrying CD profile (or a whole timber)
- 06 Absorption fleece
- 07 Mineral wool
- 08 Strip – CETRIS® BASIC board

Soffit edge detail – rim



- 01 CETRIS® AKUSTIC board
- 02 Screw 4.2 × 25 (35) mm with plastic front cap
- 03 Cross connector
- 04 Mounting CD profile (or a whole timber)
- 05 Carrying CD profile (or a whole timber)
- 06 Absorption fleece
- 07 Mineral wool
- 08 Rim – CETRIS® BASIC board

Joint between the boards



- 01 CETRIS® AKUSTIC board
- 02 Screw 4.2 × 25 (35) mm with plastic front cap
- 03 Cross connector
- 04 Mounting CD profile (or a whole timber)
- 05 Carrying CD profile (or a whole timber)
- 06 Absorption fleece
- 07 Mineral wool

The CETRIS® AKUSTIC boards must not bind directly from the wall or soffit sheathing to the surrounding structures. They must not be anchored to the perimeter profile. The contraction joint in a structure must also be considered in the sheathing of CETRIS® AKUSTIC boards.

Before anchoring the boards, the hole row linkage must be verified - not only in a crosswise and longitudinal directions but in a diagonal direction as well. Using self-drilling screws the acoustic boards shall be fastened to the sub-structure of either wooden laths or CD profiles. The CETRIS® AKUSTIC

boards shall be pressed against the sub-structure. Tighten firstly the screws in a corner where they are in contact with the already fastened boards on the face or lateral side. Then proceed with driving in the screws to the open area so that possible tension is removed.

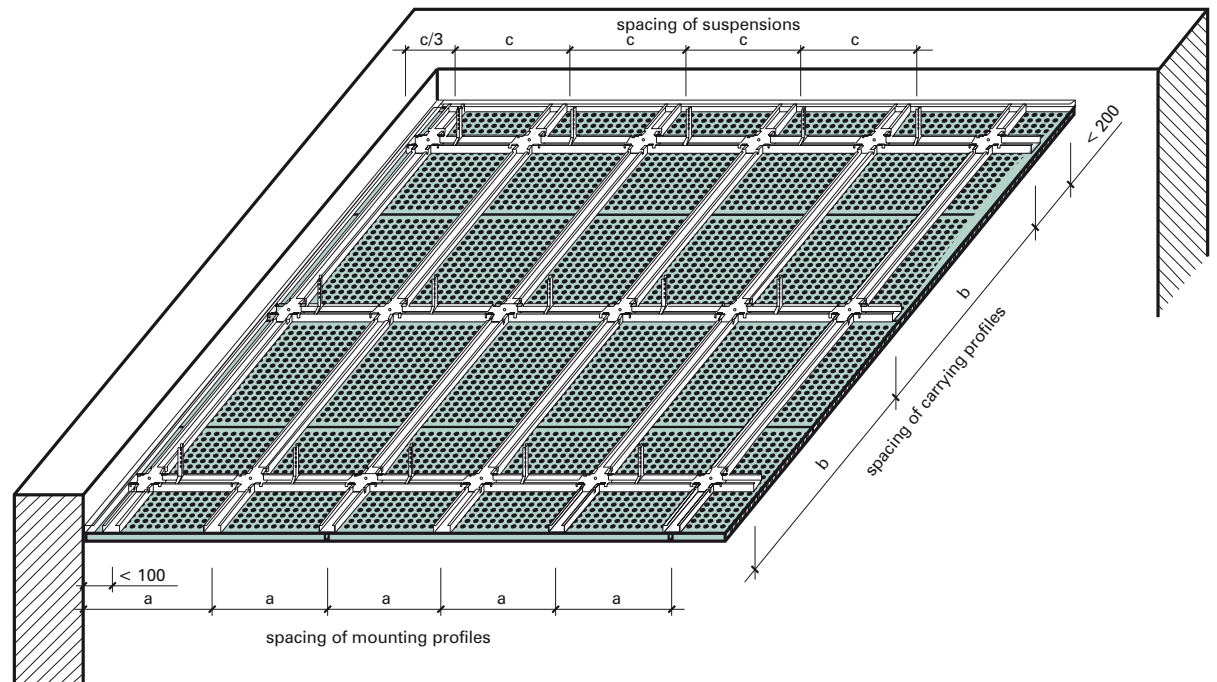
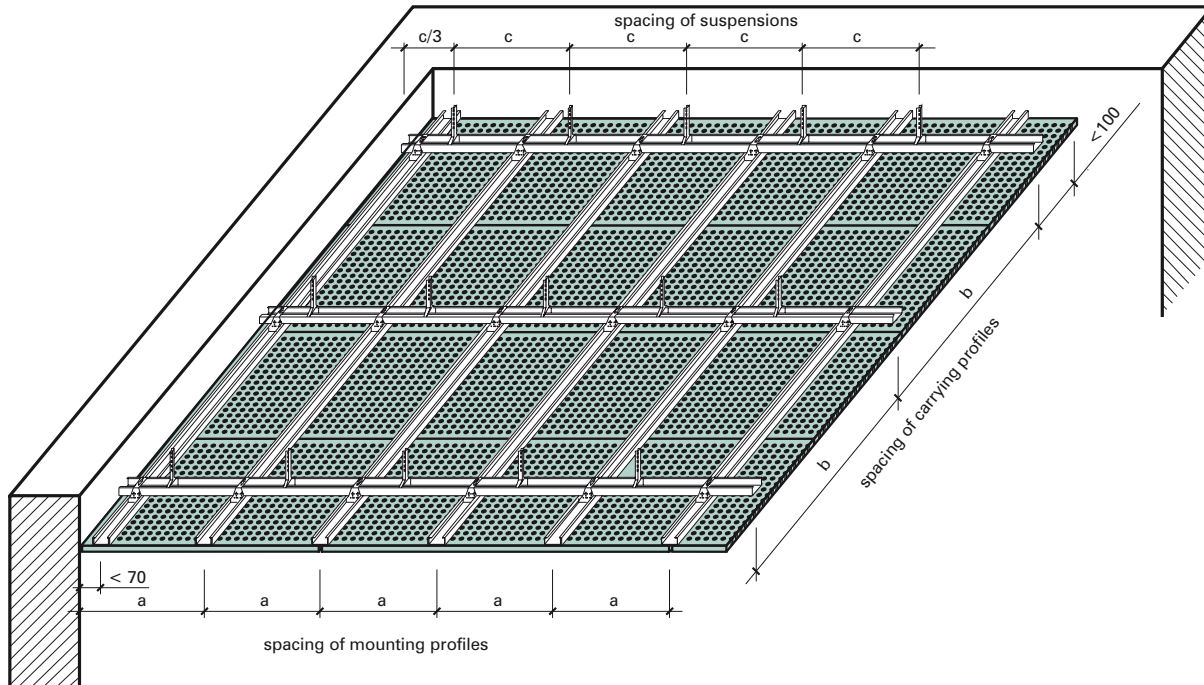
Max. pitches of the screws that anchor the CETRIS® AKUSTIC boards to the CD profiles or wooden laths in soffits must not be larger than 200 mm from each other and a minimum of 25 mm from the board edge. When being screwed the board must always be firmly pressed to the carrying CD profiles, and

it is recommended to pre-drill the board – the diameter of drilling bit corresponds to 1.2 times the screw diameter (this applies for internal premises). 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.

We recommend that the assembly is executed by two workers as minimum.

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

THICKNESS OF BOARD (mm)	SPACING OF MOUNTING PROFILES a (mm)	SPACING OF CARRYING PROFILES b (mm)	SPACING OF SUSPENSIONS c (mm)
8	<420	<1,000	<625
10	<420	<1,000	<420



Additional load of the soffit

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. Max. one burden is permitted to be mounted in one pane as delimited by the bearing structure (CD profiles or wooden laths).

With burdens (suspended objects) of a weight up to 10 kg, these burdens must be anchored to the structural elements (of the bearing structure). Maximum permitted additional load of the bearing structure is 15 kg/m². Larger objects must be an-

chored separately to the bearing structure of a ceiling – adhering to the instructions given in the contract documents.

Other Applications of CETRIS® Boards



Grammar school Wil, Switzerland



Thousands of options...

CIDEM Hranice, a.s., division CETRIS
 Nová ulice 223
 CZ-753 01 Hranice
 Czech Republic
 phone: +420 581 676 281
 fax: +420 581 601 623
 e-mail: cetris@cetris.cz
www.cetris.cz