

ACOUSTIC IMPACT STUDY

COMPLIANCE WITH THE CTE DB-HR IN THE EXPANSION OF THE INSTITUTE OF TIANA

Report: AA21032-1. v1

OWNER: WITH - TIANA TOWNSHIP
LOCATION: AVENUE EDUARD FONTSERÈ s/n,
08391 - TIANA (BARCELONA)

Acoustic Consultant
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May 07, 2021

This document concerns only and exclusively the samples made. Ref: AA21032-1 v1 EIA APLIACIO INSTITUT DE TIANA
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1. PREVIOUS DATA

1.1. DATA OF THE APPLICANT

Applicant: rga architects

IDENTITY CARD. / CIF: --

Fiscal domicile: Carrer Montserrat nº95
08221 Terrassa (Barcelona)

Building type: Building for teaching / educational use

Site: Avinguda Eduard Fontserè s/n,
08391 Tiana (Barcelona)

1.2. DATA OF THE TECHNICIAN

Technician: Jesus Uriol and Chavarriga

Collegiate: 15,385L

Address: Agricultural Science and Technology Park of Lleida
Parc de Gardeny, Building H2, 1st floor, office A3
25003 – Lleida

1.3. OBJECT

At the request of rga arquitectes, we are writing the acoustic impact study for the expansion of the Tiana high school that is to be built adjacent to the existing building, on Avinguda Eduard Fontserè s/nº, in the municipality of Tiana (Barcelona), in order to comply with the minimum levels required in the Technical Building Code Basic Document in front of Noise (CTE DB-HR).

1.4. BRIEF DESCRIPTION OF THE BUILDING

It is a wooden construction building with two heights: ground floor and first floor in which the main activity will be carried out on the first floor.

The ground floor will be practically all exterior forming a large porch area and in the central part will be located a distributor to give access to the first floor, and a dining room.

On the first floor is where the classrooms and bathrooms will be located:

- 3 classrooms for 4th ESO • 2
- classrooms for 1st high school • 2
- classrooms for 2nd high school • 3
- reinforcement classrooms 1 science
- laboratory
- Separate male/female floor bathrooms

An elevated corridor will be built that will connect the first floor of the new building with the first floor of the existing building.

The roof of the building will be flat finished with landscaping. The 2 heat recuperators for air renewal in the classrooms will be located on the roof.

The planned lift is a backpack type.

2. LOCATION

The building will be located in:

**Avinguda Eduard Fontserè s/n,
08391 – Tiana (Barcelona)**

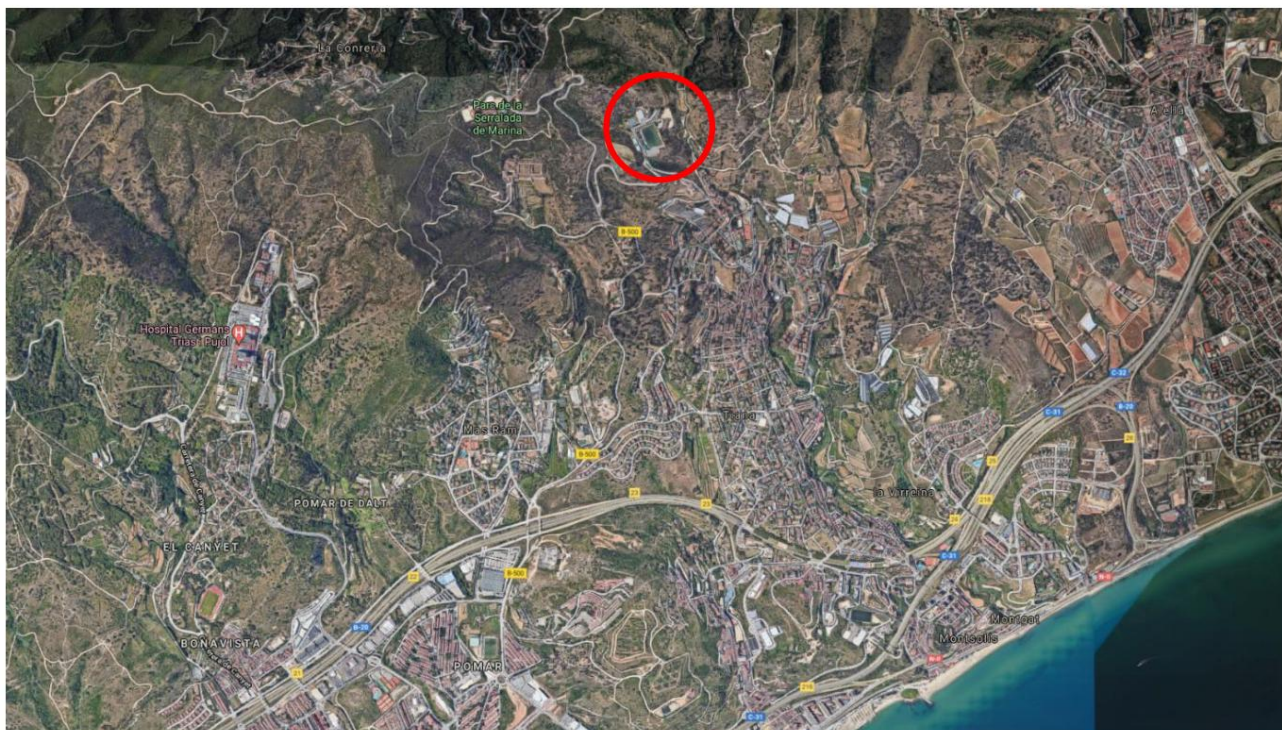


Image 2.1. Location overview.



Image 2.2. Site.

3. REGULATIONS

This document complies with the following regulations in force.

- Decree 176/2009 of November 10, which approves the Regulations of Law 16/2002, of 28 June, on protection against noise pollution, and the annexes are adapted.
- Royal Decree 1367/2007, of October 19, which develops Law 37/2003, of November 17 on Noise, regarding acoustic zoning, quality objectives and acoustic emissions.
- Royal Decree 1371/2007, of October 19, which approves the basic document "DB-HR Protección frente al ruido" of the Technical Building Code and modifies Royal Decree 314/2006, of 17 March, with which the Technical Building Code is approved.
- Royal Decree 732/2019 of December 20, amending the Technical Building Code, approved by Royal Decree 314/2006.

3.1. DECREE 176/2009

3.1.1. DECREE 176/2009 ANNEX A. QUALITY OBJECTIVES

Land uses	Immission limit values in dB(A)		
	Sat (7am-9pm)	Le (9pm-11pm)	Mon (11pm-7am)
AREA OF HIGH ACOUSTIC SENSITIVITY, (A)			
(A2) Predominance of land for health, teaching and cultural use	55	55	45
(A3) Homes located in rural areas	57	57	47
(A4) Predominance of land for residential use	60	60	50
AREA OF MODERATE ACOUSTIC SENSITIVITY, (B)			
(B1) Coexistence of land for residential use with existing activities and/or transport infrastructure	65	65	55
(B2) Predominance of tertiary use land other than C1	65	65	55
(B3) Existing built-up areas affected by industrial land	65	65	55
AREA OF LOW ACOUSTIC SENSITIVITY, (C)			
(C1) Recreational and entertainment uses	68	68	58
(C2) Predominance of land for industrial	70	70	60

use **Table 3.1.** Decree 176/2009 annex A Quality objectives

3.1.2. DECREE 176/2009 APPENDIX 7, IMPMISSION OF VIBRATIONS INTO BUILDINGS

These are the limit values of vibrations that can be inside a building according to its category:

Use of the building	Immission limit values <i>law</i> [dB]
Home or residential use	75
hospital	72
Educational or cultural	72

Table 3.2. Decree 176/2009 annex 7 Limit levels of vibrations

3.2. TECHNICAL CODE OF THE BUILDING. DB-HR

3.2.1. ACOUSTIC INSULATION OF FACADES, ROOFS AND FLOORS IN CONTACT WITH THE OUTSIDE

Noise index Day dB(A)	Ld	Minimum acoustic insulation values on facades against airborne noise D2m,nT,Atr dB(A)			
		Building for Residential and Sanitary use		Cultural, educational, administrative and religious use building	
		Bedroom	Stays	Stays	classrooms
Ld ≤ 60		30	30	30	30
60 < Ld ≤ 65		32	30	32	30
65 < Ld ≤ 70		37	32	37	32
70 < Ld ≤ 75		42	37	42	37
Ld > 75		47	42	47	42

Table 3.3. Insulation of facades according to the CTE DB-HR

If the sound insulation value of the internal noise dominates that of aircraft, air noise D2m,nT,Atr obtained at the previous table

Facades facing roads, to Indoor enclosed island patio, indoor patios, facades not subjected directly to traffic noise
 aircraft, industrial and commercial activities or the area's sports, will consider day noise index Ld 10dB(A) less than one
 daytime noise index.

3.2.2. ACOUSTIC INSULATION OF THE MITERNS

At least one of the two requirements described below must be met:

Minimum value of acoustic insulation to airborne noise of the partitions	
Set of the two closures that make up the median	DnTA ≤ 50dB(A)
Each of the median closures	D2m,nT,Atr ≤ 40dB(A)

Table 3.4. Isolation of the partitions according to the CTE DB-HR

3.2.3. ACOUSTIC INSULATION OF INTERIOR HORIZONTAL SEPARATIONS

Minimum value of acoustic insulation to airborne noise of internal horizontal separations	
PRECINCTS OF DIFFERENT USE UNITS	
Between a protected enclosure and any other habitable or protected enclosure	DnTA ≤ 50dB(A)
Between a habitable enclosure and any other habitable or protected enclosure	DnTA ≤ 45dB(A)
INSTALLATION PREMISES AND ACTIVITY PREMISES	
Between a protected area and any facility or activity area	DnTA ≤ 55dB(A)
Between a residential area and any facility or activity area	DnTA ≤ 45dB(A)

Table 3.5. Isolation of horizontal separations according to the CTE DB-HR

3.2.4. ACOUSTIC INSULATION OF INTERIOR VERTICAL SEPARATIONS

Minimum value of acoustic insulation to airborne noise of interior vertical separations in PROTECTED ENCLOSURES		
PREMISES OF THE SAME USE UNIT		
	in advance	RA $\geq$ 33dB(A)
PRECINCTS OF DIFFERENT USE UNITS		
Between a protected enclosure and any other habitable or protected enclosure with which it does not share doors or windows		DnTA $\geq$ 50dB(A)
Between a protected enclosure and any other habitable or protected enclosure when they share doors or windows	door	RA $\geq$ 30dB(A)
	closure	RA $\geq$ 50dB(A)
INSTALLATION PREMISES AND ACTIVITY PREMISES		
Between a protected enclosure and any installation or activity enclosure		DnTA $\geq$ 55dB(A)

Table 3.6. Isolation of vertical separations according to the CTE DB-HR

Minimum value of acoustic insulation to airborne noise of interior vertical separations in HABITABLE ENCLOSURES		
PREMISES OF THE SAME USE UNIT		
	in advance	RA $\geq$ 33dB(A)
PRECINCTS OF DIFFERENT USE UNITS		
Between a habitable enclosure and any other habitable or protected enclosure with which it does not share doors or windows		DnTA $\geq$ 45dB(A)
Between a habitable enclosure and any other habitable or protected enclosure when they share doors or windows	door	RA $\geq$ 20dB(A)
	closure	RA $\geq$ 50dB(A)
INSTALLATION PREMISES AND ACTIVITY PREMISES		
Between a habitable enclosure and any installation or activity enclosure with which it does not share doors or windows		DnTA $\geq$ 45dB(A)
Between a living area and any installation or activity area when they share doors or windows	door	RA $\geq$ 30dB(A)
	closure	RA $\geq$ 50dB(A)

Table 3.7. Isolation of vertical separations according to the CTE DB-HR

Minimum value of acoustic insulation to airborne noise of the elevator enclosures	
Between a protected enclosure and the elevator enclosure, if the machine is inside (backpack elevator)	DnTA $\geq$ 55dB(A)
Between a habitable enclosure and the elevator enclosure, if the machine is inside (backpack elevator)	DnTA $\geq$ 50dB(A)
Between a protected or habitable enclosure and the elevator enclosure, if the machine is in a separate facility enclosure	RA $\geq$ 50dB(A)

Table 3.8. Isolation of the separations of the elevator enclosure according to the CTE DB-HR

Minimum value of acoustic insulation to airborne noise of the installation drawers	
Between the installation drawer and any unit of use	RA y 33dB(A)
If the fume extraction from the garage takes place through the installation drawer	RA y 50dB(A)

Table 3.9. Isolation of installation pads according to the CTE DB-HR

3.2.5. ACOUSTIC INSULATION TO IMPACT NOISE

Minimum value of acoustic insulation to impact noise	
Between a protected area and any other area they do not belong to it unit of use	The nT,w y 65dB(A)
Between a protected area and an installation or activity area	The nT,w y 60dB(A)
Between a residential area and an installation or activity area	The nT,w y 60dB(A)

Table 3.10. Noise isolation from impacts according to the CTE DB-HR

3.2.6. REVERBERATION TIME

- 1 En conjunto los elementos constructivos, acabados superficiales y *revestimientos* que delimitan un aula o una sala de conferencias, un comedor y un restaurante, tendrán la absorción acústica suficiente de tal manera que:
 - a) El *tiempo de reverberación* en aulas y salas de conferencias vacías (sin ocupación y sin mobiliario), cuyo volumen sea menor que 350 m³, no será mayor que 0,7 s.
 - b) El *tiempo de reverberación* en aulas y en salas de conferencias vacías, pero incluyendo el total de las butacas, cuyo volumen sea menor que 350 m³, no será mayor que 0,5 s.
 - c) El *tiempo de reverberación* en restaurantes y comedores vacíos no será mayor que 0,9 s.

La exigencia de tiempo de reverberación menor que 0,9 s aplicable a comedores y restaurantes también es de aplicación a recintos como cafeterías y bares donde se sirven comidas en mesas, ya que dichos recintos tienen un uso asimilable a un comedor o restaurante.

El DB HR no regula ni los criterios, ni los procedimientos para el diseño acústico de recintos destinados a espectáculos, ni de aulas y salas de conferencias de volúmenes mayores que 350m³. Sin embargo, si uno de estos recintos fuera colindante con un recinto protegido o habitable de una unidad de uso diferente, deben cumplirse los valores límite de aislamiento acústico especificados en el apartado 2.1 del DB HR. (Apartados 2.0 de la Guía de Aplicación del DB HR Protección frente al ruido).
- 2 Para limitar el ruido reverberante en las *zonas comunes* los elementos constructivos, los acabados superficiales y los *revestimientos* que delimitan una *zona común* de un edificio de uso residencial público, docente y hospitalario colindante con *recintos protegidos* con los que comparten puertas, tendrán la absorción acústica suficiente de tal manera que el área de absorción acústica equivalente, A, sea al menos 0,2 m² por cada metro cúbico del volumen del *recinto*.

3.3. ANALYSIS OF ENVIRONMENTAL NOISE

The municipality of Tiana does not have a Noise map / strategic noise map, therefore to obtain the value of the daytime noise index of the area of the building we will follow the criterion indicated by the technical code of the building , basic HR document in section 2.1.1. a) iv):

- El valor del índice de ruido día, L_d , puede obtenerse en las administraciones competentes o mediante consulta de los mapas estratégicos de ruido. En el caso de que un recinto pueda estar expuesto a varios valores de L_d , como por ejemplo un recinto en esquina, se adoptará el mayor valor.
- Cuando no se disponga de datos oficiales del valor del índice de ruido día, L_d , se aplicará el valor de 60 dBA para el tipo de área acústica relativo a sectores de territorio con predominio de suelo de uso residencial. Para el resto de áreas acústicas, se aplicará lo dispuesto en las normas reglamentarias de desarrollo de la Ley 37/2003, de 17 de noviembre, del Ruido en lo referente a zonificación acústica, objetivos de calidad y emisiones acústicas.

(Apartado 2.1.1.1 de la Guía de Aplicación del DB HR)

Therefore, we will consider a noise figure L_d of 60dB(A).

4. CONSTRUCTION SYSTEMS

4.1. LOCATION OF BUILDING SYSTEMS

The plans detail where each type of treatment corresponds in order to be able to correctly locate the type of treatment to be applied in each case.

Depending on whether the enclosure is located in a wet room (kitchens and bathrooms) or not, one or another type of final finish will have to be applied.

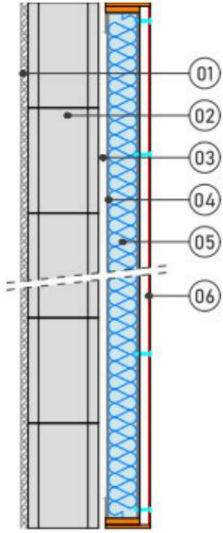
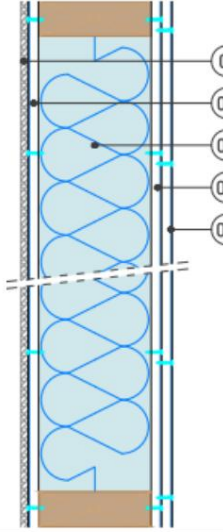
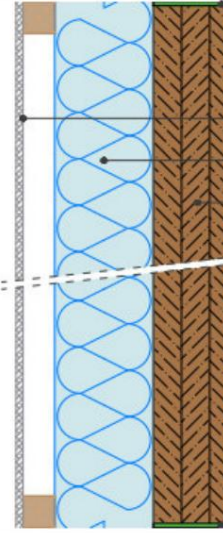
Treatment plan for the vertical separation elements

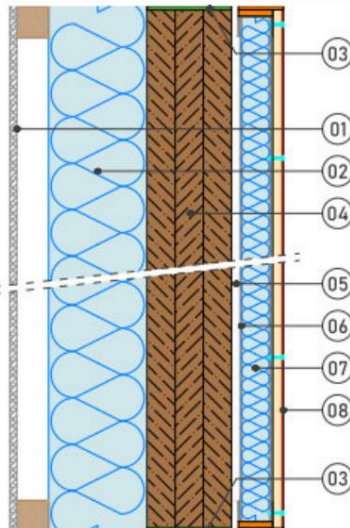
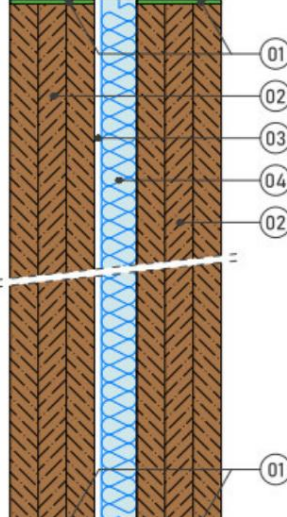
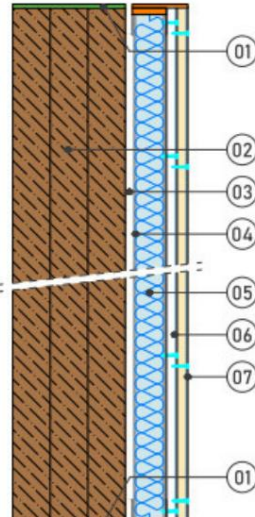


Treatment plan of the horizontal separation elements

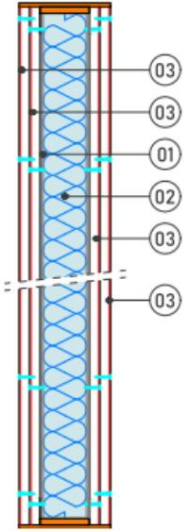
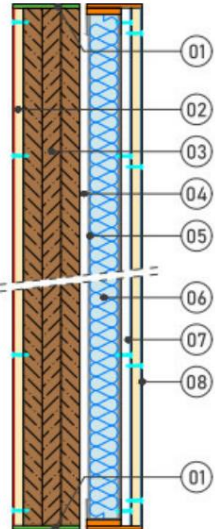


4.2. VERTICAL SEPARATION ELEMENTS

VERTICAL SEPARATION ELEMENT	Vertical element information
	[FA-01] TANCAMENT DE FAÇANA 01 <i>(Façana Planta baixa)</i> 01. Xapa llisa 02. Bloc de formigó de 100mm d'ample, armat i reblert de formigó 03. Separació 10mm 04. Estructura autoportant amb canals i muntants en "H" de 48mm, sobre banda elàstica 05. Llana de roca 70kg/m³ 40mm 06. Placa de guix laminat de 15mm Global sound reduction index, RaTr: 48 dBA weighted A: Weight: γ 228 kg/m² Thickness: γ 18 cm
	[FA-02] TANCAMENT DE FAÇANA 02 <i>(Façana menjador planta baixa)</i> 01. Xapa llisa 02. Placa de guix laminat Aqua 15mm 03. Estructura de 160mm amb llana de roca de 70kg/m³ i 160mm entre muntants 04. Doble placa de guix laminat 13mm Global sound reduction index, RaTr: 40 dBA weighted A: Weight: γ 47 kg/m² Thickness: γ 21 cm
	[FA-03] TANCAMENT DE FAÇANA 03 <i>(Façana CLT vist planta primera)</i> 01. Xapa microperforada 02. Llana de roca 180kg/m³ 140mm 03. Banda elàstica (dimensionada segons càrregues) 04. CLT 120mm Global sound reduction index, RaTr: 32 dBA weighted A: Weight: γ 94 kg/m² Thickness: γ 30 cm

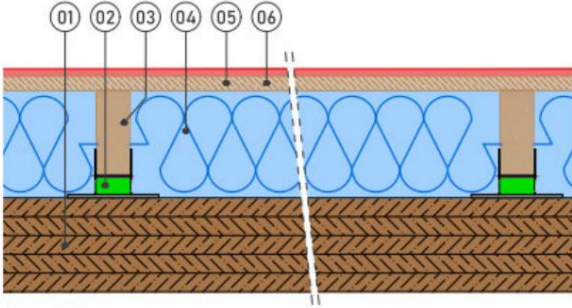
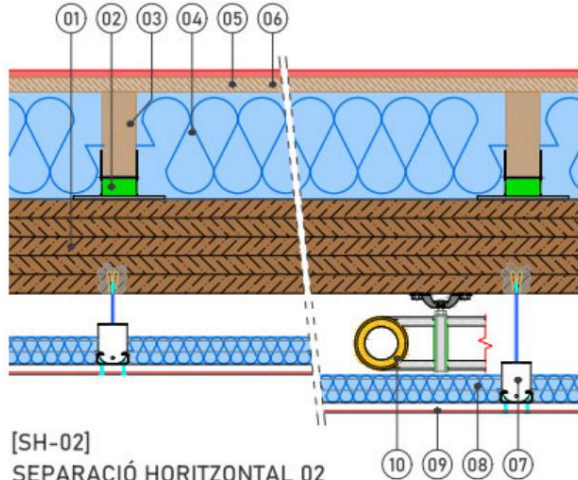
VERTICAL SEPARATION ELEMENT		Vertical element information	
	[FA-04] TANCAMENT DE FAÇANA 04 <i>(Façana de amb extradòs planta primera)</i> 01. Xapa microperforada 02. Llana de roca 180kg/m3 140mm 03. Banda elàstica <i>(dimensionada segons càrregues)</i> 04. CLT 120mm 05. Separació 10mm 06. Estructura autoportant amb muntants en "H" de 48mm, sobre banda elàstica 07. Llana de roca 70kg/m3 40mm 08. Placa de guix laminat alta duresa (1150kg/m3) de 15mm	Global sound reduction index, RaTr: 48 dBA weighted A: Weight: γ 109 kg/m2 Thickness: γ 37 cm	
	[DV-01] DIVISÒRIA INTERIOR 01 <i>(Divisòria entre aules)</i> 01. Banda elàstica <i>(dimensionada segons càrregues)</i> 02. CLT 120mm 03. Separació / cambra d'aire 04. Llana de roca 70kg/m3 50mm	Global sound reduction index, Ra: 54 dBA weighted A: Weight: γ 114 kg/m2 Thickness: γ 30 cm	
	[DV-02] DIVISÒRIA INTERIOR 02 <i>(Divisòria entre aules i passadís)</i> 01. Banda elàstica <i>(dimensionada segons càrregues)</i> 02. CLT 160mm 03. Separació 10mm 04. Estructura autoportant amb muntants en "H" de 48mm, sobre banda elàstica 05. Llana de roca 70kg/m3 40mm 06. Placa de guix laminat 13mm 07. Placa de guix laminat alta duresa (1150kg/m3) de 13mm	Global sound reduction index, Ra: 54 dBA weighted A: Weight: γ 100 kg/m2 Thickness: γ 24 cm	

All interior doors and windows must have a $R_a > 30\text{dBA}$. (Double sealed gable and lower retractable guillotine embedded in the door leaf, to be defined in the execution process pending receipt and review of a laboratory test by an Acoustic Consultant).

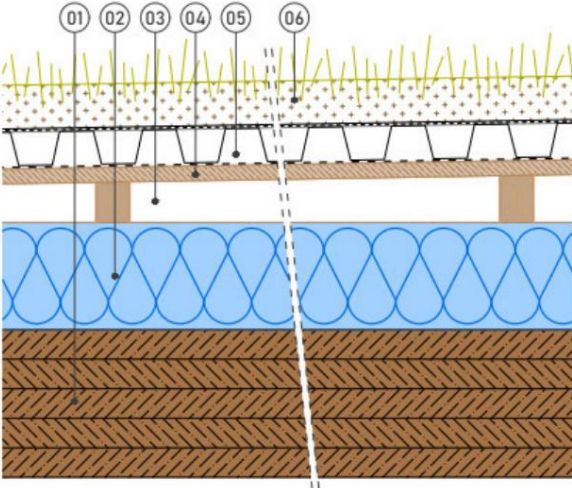
VERTICAL SEPARATION ELEMENT	Vertical element information
	[DV-03] DIVISÒRIA INTERIOR 03 <i>(Divisòria banys i menjador-passadís)</i> 01. Estructura autoportant amb canals i muntants en "H" de 70mm, sobre banda elàstica 02. Llana de roca 70kg/m3 60mm 03. Doble placa de guix laminat 13mm Global sound reduction index, Ra: 41 dBA weighted A: Weight: γ 54 kg/m2 Thickness: γ 12 cm
	[DV-04] DIVISÒRIA INTERIOR 04 <i>(Calaix d'ascensor)</i> 01. Banda elàstica <i>(dimensionada segons càrregues)</i> 02. Placa de guix laminat alta duresa (1150kg/m3) de 15mm 03. CLT 80mm 04. Separació 10mm 05. Estructura autoportant amb muntants en "H" de 48mm, sobre banda elàstica 06. Llana de roca 70kg/m3 40mm 07. Placa de guix laminat 13mm 08. Placa de guix laminat alta duresa (1150kg/m3) de 13mm Global sound reduction index, Ra: 51 dBA weighted A: Weight: γ 78 kg/m2 Thickness: γ 18 cm

All interior doors and windows must have a Ra > 30dBA. (Double sealed gable and lower retractable guillotine embedded in the door leaf, to be defined in the execution process pending receipt and review of a laboratory test by an Acoustic Consultant).

4.3. HORIZONTAL SEPARATION ELEMENTS

HORIZONTAL SEPARATION ELEMENT	Horizontal element information
 [SH-01] SEPARACIÓ HORIZONTAL 01 (Forjat entre planta baixa i planta primera) 01. Forjat CLT 140mm 02. Suports Akustic+Sylomer Floor Mount o similar (Dimensionats segons càrregues) 03. Rastrells de fusta 04. Llana de roca 30kg/m3 160mm 05. Taulell aglomerat Superpan 22mm 06. Paviment continu de linoleum	RA: 51 dBA Ln, w: 55 dB Base element weight: γ 82 kg/m2
 [SH-02] SEPARACIÓ HORIZONTAL 02 (Forjat entre planta baixa i planta primera al menjador) 01. Forjat CLT 140mm 02. Suports Akustic+Sylomer Floor Mount o similar (Dimensionats segons càrregues) 03. Rastrells de fusta 04. Llana de roca 30kg/m3 160mm 05. Taulell aglomerat Superpan 22mm 06. Paviment continu de linoleum 07. Estructura per a cel ras formada de suports i canals TC60 08. Llana de roca de 70kg/m3 i 40mm 09. Placa de guix laminat 15mm 10. Instal·lacions (com per ex. baixants) revestides amb Tecound FT75 o similar i penjades amb suports antivibratoris de cautxú-metall i brides isofòniques	RA: 64 dBA Ln, w: 55 dB Base element weight: γ 94 kg/m2

HORIZONTAL SEPARATION ELEMENT	Horizontal element information
-------------------------------	--------------------------------



[SH-03]
SEPARACIÓ HORIZONTAL 03
(Coberta plana)

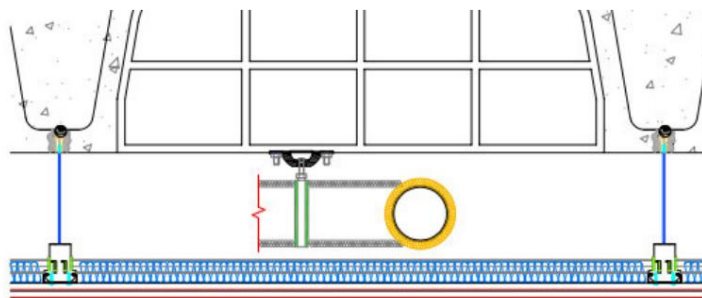
01. Forjat CLT 220mm
 02. Aïllament de llana de roca de 30kg/m3 160mm
 03. Cambra d'aire i restrells per a la formació de pendents
 04. Taulell aglomerat Superpan 22mm
 05. Làmina impermeable + drenatge
 06. Sèrum 22mm + plantació

RATr: **45 dBA**

Base element weight: **95 kg/m2**

In those areas or rooms (both habitable and protected) where there are downspouts and pipes between the flat ceiling and the slab, the following must be placed: 70kg/m3 rock wool and 40mm thick above the flat ceiling and double laminated plasterboard. In addition, downspouts and pipes must be surrounded with an insulating material such as Tecsound FT75 from the Soprema brand [TEXSA] or similar.

All these ducts and downspouts must be glued to the slab using anti-vibration supports and isophonic flanges.



Example of a window model that meets the requirements:

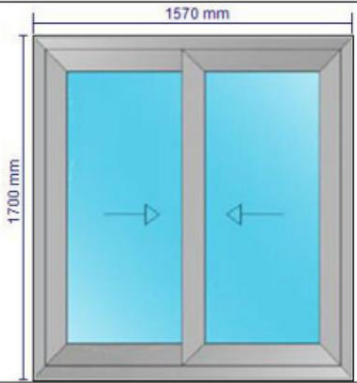
(let's use the example with sliding windows, which are the most unfavorable)



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SERIE [4700]
REF. Institut Tiana Finestra F1

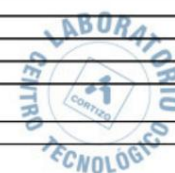
DATOS DE LA MUESTRA

Ancho (mm)	1570	
Alto (mm)	1700	
Apertura	Corredera	
Transmitancia térmica según EN 10077	3,5	
Aislamiento acústico según UNE EN 12354-3 (dB)	Rw: 36 C: -1 Ctr: -3	

PRESTACIONES DE CADA MÓDULO

Módulo	Corredera de 2 hojas
Ancho (mm)	1570
Alto (mm)	1700
Composición	6(10)44,1
Prestaciones del vidrio	Ug: 2,90 Rw: 37 C: -1 Ctr: -5 Sg: 0,75
Serie	[4700]
Longitud de poliamida	20-25
Sección de marco (mm)	115-120
Sección de hoja (mm)	50
Espesor de perfilera (mm)	1,50
Permeabilidad al aire según UNE EN 1026 y UNE EN 12207 *	3
Etanqueidad al agua según UNE EN 1027 y UNE EN 12208 *	7A
Resistencia a la carga de viento según UNE EN 12211 y UNE EN 12210 *	C5

*Valores obtenidos en [BALCONERA] de 2 hojas de dimensiones 1800 x 2200 mm.



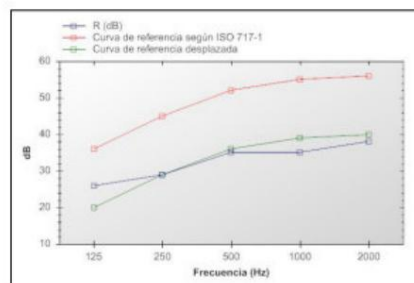


SERIE [4700]
REF. Institut Tiana Finestra F1

FICHA DE AISLAMIENTO ACÚSTICO

Sistemista	ALUMINIOS CORTIZO, S.A.
Ancho de la muestra (mm)	1570
Alto de la muestra (mm)	1700
Área de la muestra (m²)	2,67
Descripción	Corredera
Modelo	[4700]
FECHA	05/05/2021

Frecuencia (Hz)	R en dB de octavas
125	26
250	29
500	35
1000	35
2000	38



Índice global de reducción acústica según ISO 717-7	Rw: 36 C: -1 Ctr: -3
Índice global de reducción acústica, ponderado A, R_A	35 dBA
Índice global de reducción acústica, ponderado A, para ruido exterior de automóviles R_{Atr}	33 dBA

Evaluación basada en resultados obtenidos según EN 12354-3:2000 mediante un método de ingeniería. Para la obtención de los resultados se ha partido de ensayos realizados por Aluminios Cortizo, SA en sus instalaciones y no indican una característica de constancia en la calidad de la producción.



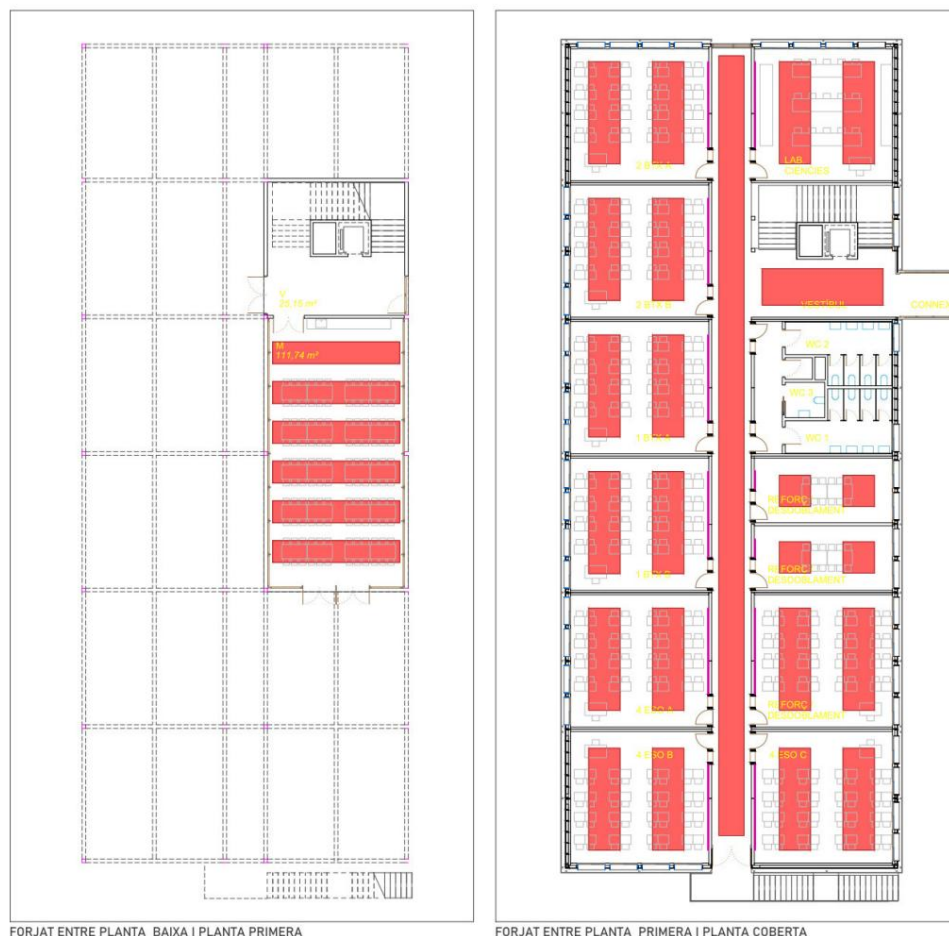
4.5. SOUND-ABSORBING COATINGS

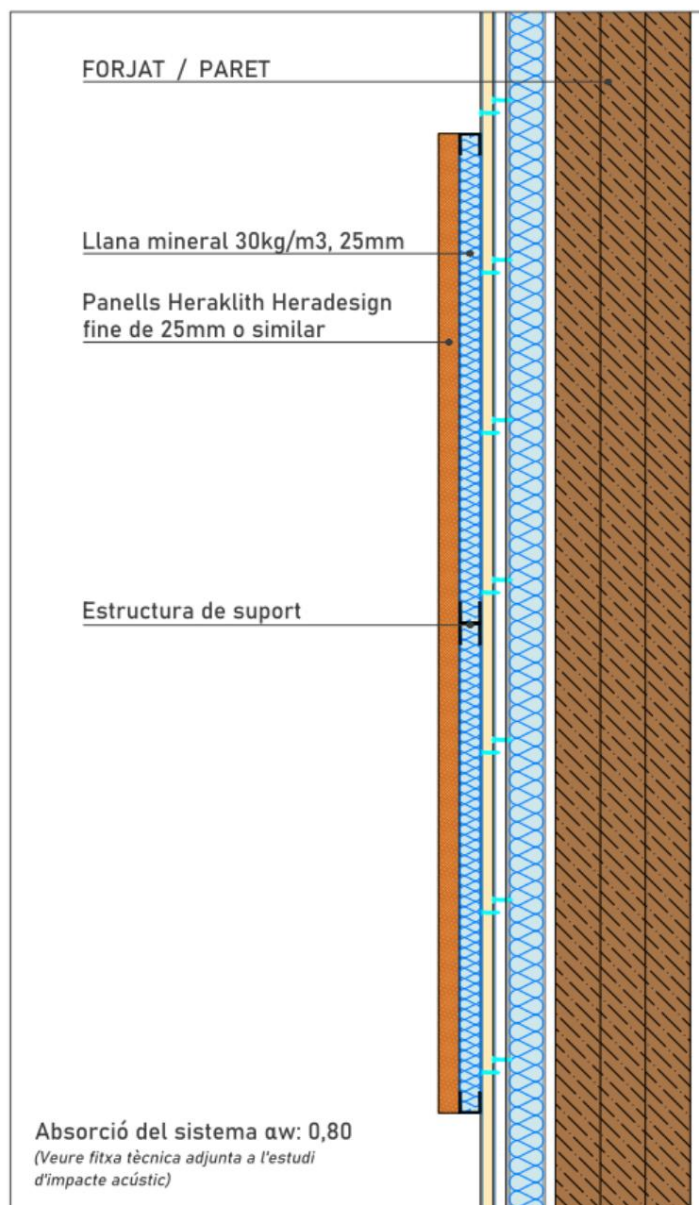
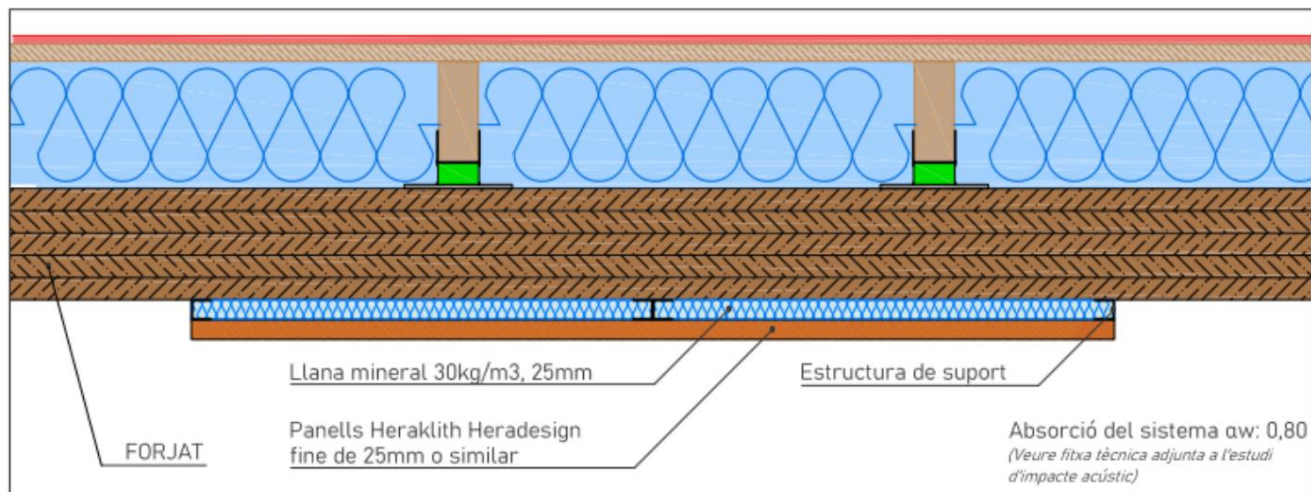
The planned sound-absorbing treatment is through islands that allow the posterior CLT to be partially visible.

Calculations have been made of the minimum % required in each classroom, corridor and dining room in order to comply with the requirement.

TANCAMENTS DE COBERTA	
	Absorció a sostres Sistema Heraklith 25mm + llana mineral 25mm Superfície mínima requerida per al compliment de 0,70s: Aules grans: 50% de la superfície del sostre Aules petites: 50% de la superfície del sostre Passadís: 73m² Menjador: 45% de la superfície del sostre
	Absorció a paret Sistema Heraklith 25mm + llana mineral 25mm Superfície requerida per al compliment de 0,70s: Aules grans: 40% de la superfície de la paret aula-passadís Aules petites: 40% de la superfície de la paret aula-passadís Passadís: -- Menjador: --

We have planned their placement forming islands on the ceilings and forming islands on the wall of laminated plasterboard that separates the classrooms from the corridor.





5. DETAILS

All solutions must be executed correctly in order to avoid creating acoustic bridges that decrease the level of insulation to airborne noise / impact noise.

In the Catalog of Constructive Elements of the Technical Building Code, the Silensis guide, and other manufacturers' catalogs include execution details and encounters between different types of closures and constructive so

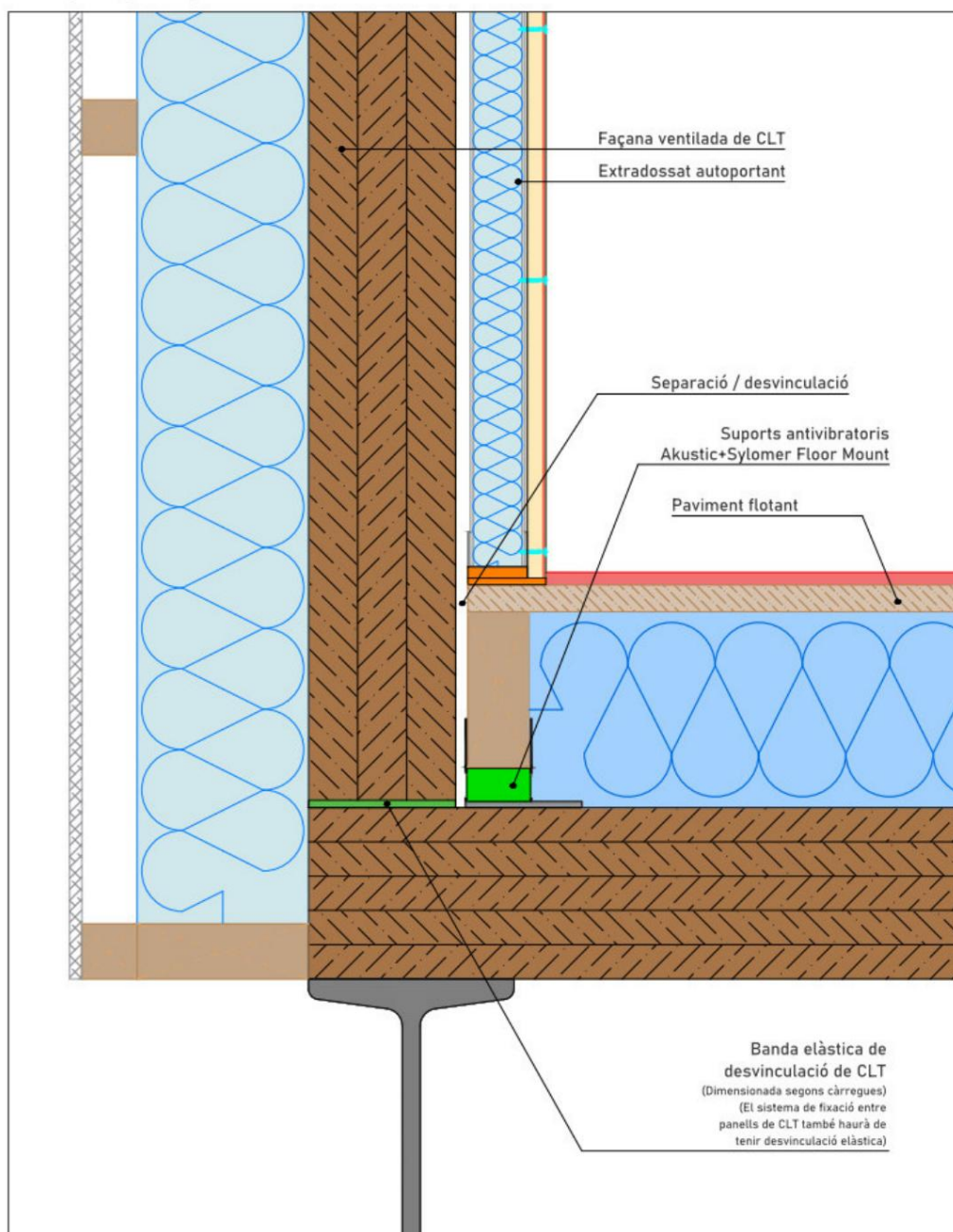
<https://www.codigotecnico.org>

<http://www.silensis.es/informacion-tecnica/manual-ejecucion-silensis>

<http://www.atedyplacayeso.com/documentacion.php>

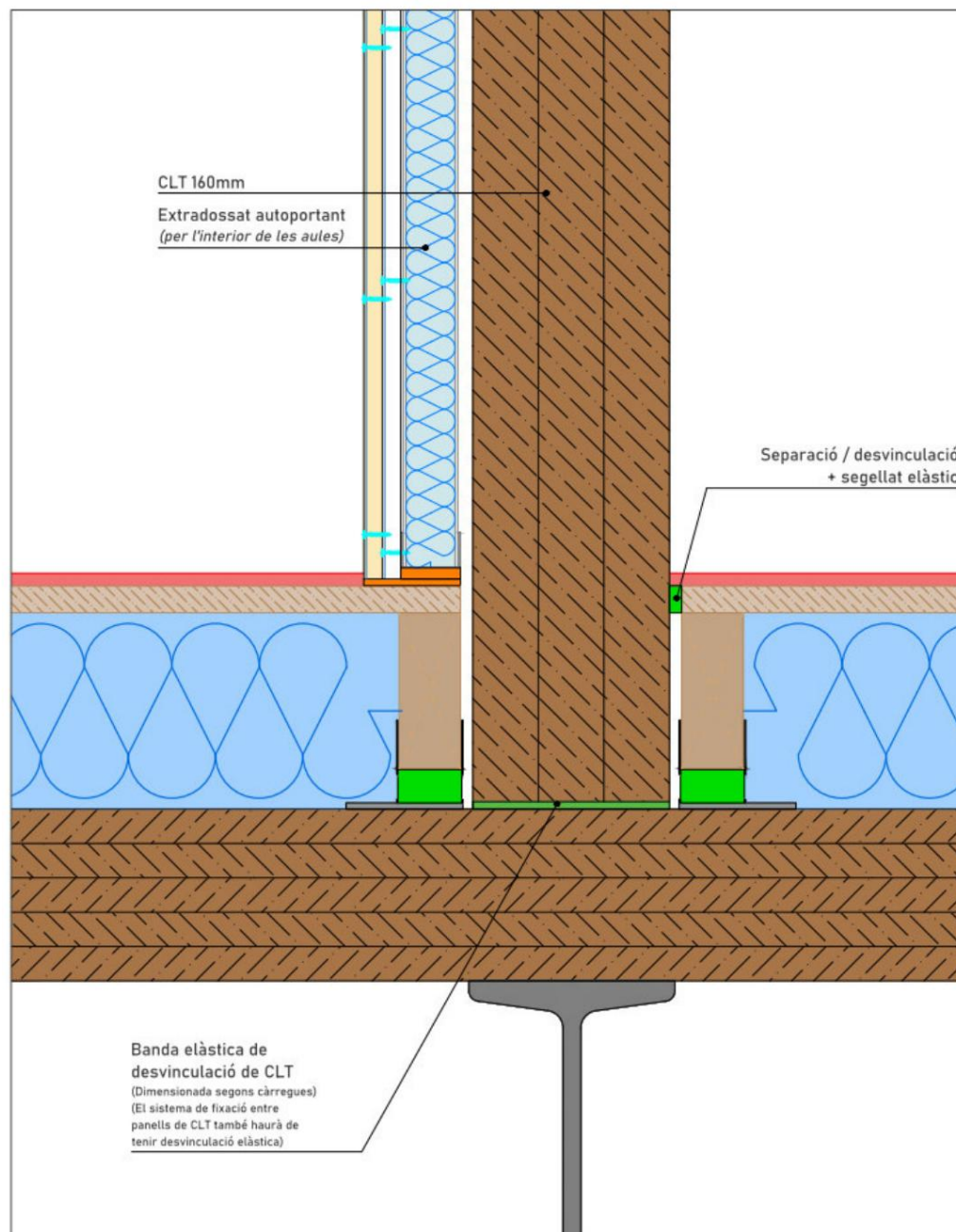
5.1. FACING CLT FACADE – FORGED CLT

Detall de l'encontre entre la façana de CLT i forjat entre planta baixa i planta primera, també de CLT



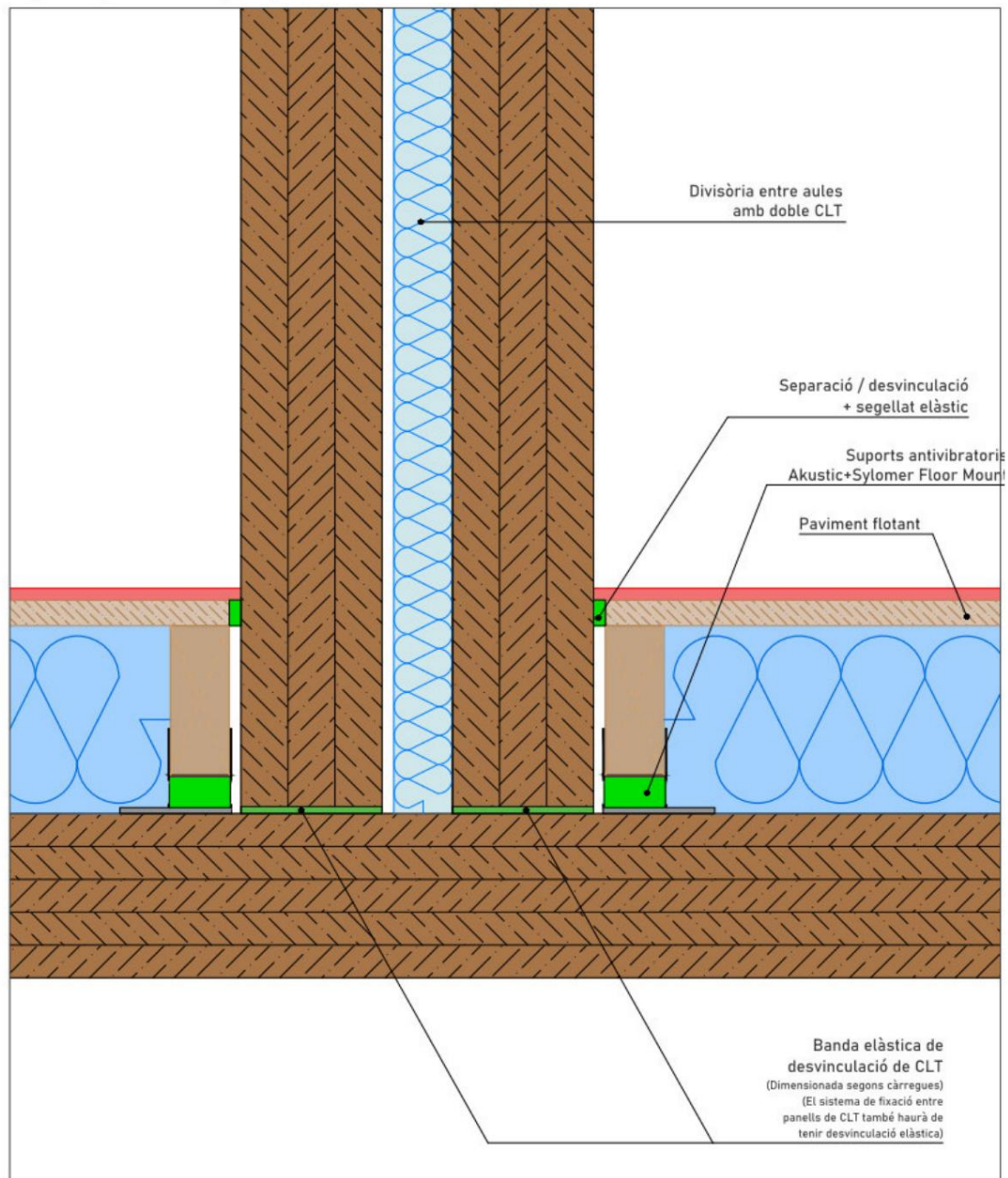
5.2. FIND DIVIDING BETWEEN USERS CLT – FORJAT CLT

Detall de l'encontre entre la divisòria de CLT entre aules i passadís
 i el forjat entre planta baixa i planta primera, també de CLT



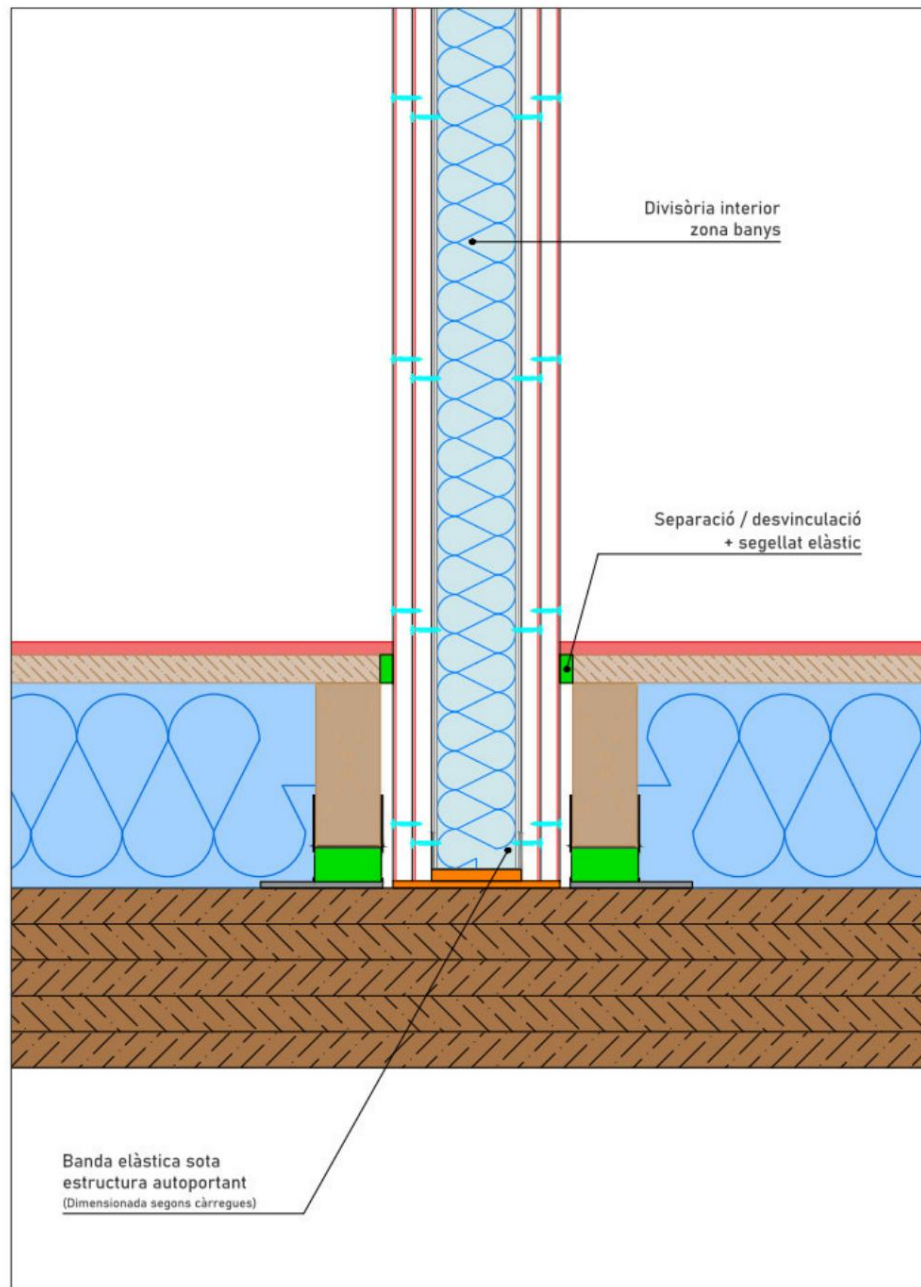
5.3. FIND CLASSROOM-HALLWAY DIVIDER - FORJAT CLT

Detall de l'encontre entre la divisòria de CLT entre aules i el forjat entre planta baixa i planta primera, també de CLT



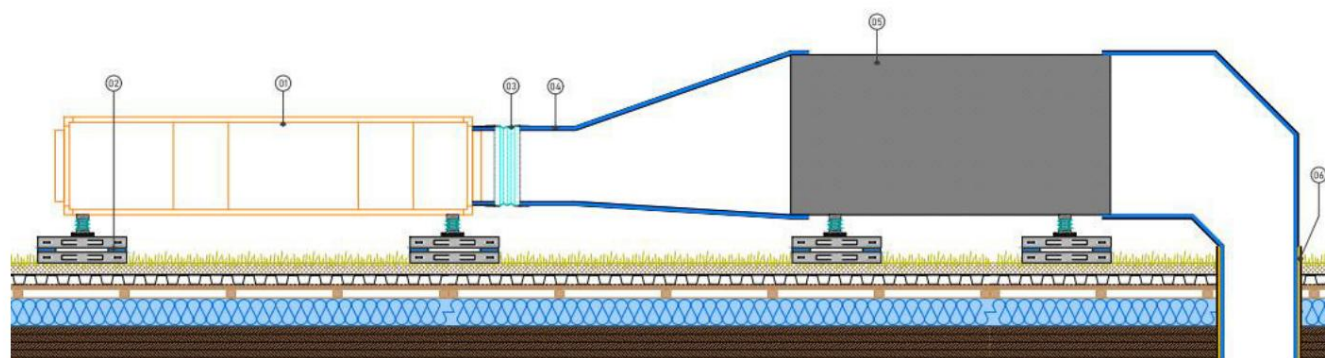
5.4. FIND DIVIDING PLASTER PLATES LAMINATED - FORGED CLT

Detall de l'encontre entre la divisòria de plaques de guix laminat
entre banys i el forjat entre planta baixa i planta primera de CLT



5.5. MACHINES ON DECK

The machines that are placed on the non-passable cover, in addition to carrying out a proper anti-vibration treatment of the machines and their pipes, must also carry out an airborne noise treatment in order to prevent the noise from from the recuperator to the classrooms.



LLEGENDA

01. Recuperador de calor

Aules P1: CADB-HE-100-PRO-D de 8100m³/h

Aules P1: CADB-HE-60-PRO-D de 5760m³/h

Menjador PB: CADB-HE-27-PRO-DC de 2232m³/h

02. Tractament antivibratori dels equips i dels silenciadors, format per:

02.1. Suports antivibratoris de mottles metàl·liques entre l'equip i la bancada
 (Dimensionats segons càrregues)

02.2. Bancada d'inèrcia prefabricada "ROBUSTA" de 500x500x60mm

02.3. Suport antivibratori de cautxú entre bancades

02.4. Bancada d'inèrcia prefabricada "ROBUSTA" de 500x500x60mm

03. Junta elàstica Durodyne o similar

04. Conductes Climaver Apta A1 de Isover o similar

05. Silenciador acústic:

Per al recuperador CADB-HE-27-PRO-DC de 2232m³/h: 1800mm de recorregut, 600mm d'amplada i 500mm d'alçada, amb cel·les intermèdies de 200mm, cel·les laterals de 100mm, espai entre cel·les de 100mm

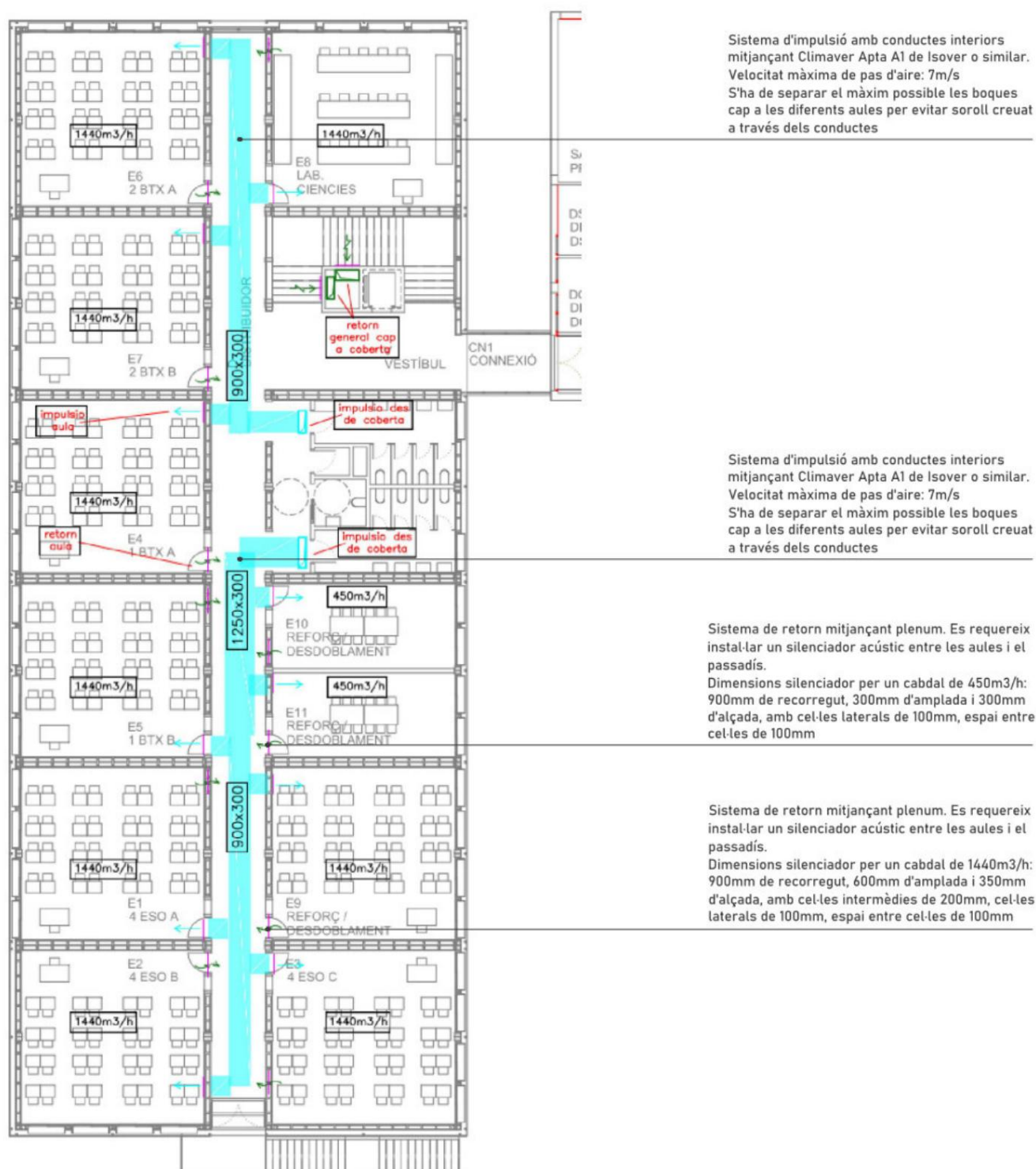
Per al recuperador CADB-HE-60-PRO-D de 5760m³/h: 1800mm de recorregut, 900mm d'amplada i 900mm d'alçada, amb cel·les intermèdies de 200mm, cel·les laterals de 100mm, espai entre cel·les de 100mm

Per al recuperador CADB-HE-100-PRO-D de 8100m³/h: 1800mm de recorregut, 1200mm d'amplada i 900mm d'alçada, amb cel·les intermèdies de 200mm, cel·les laterals de 100mm, espai entre cel·les de 100mm

(En tots els casos es requereix silenciador tant a l'impulsió com al retorn)

06. Pasamurs elàstic format per Tecsound FT75 i segellat erimètral amb Sikaflex o similar

5.6. CLIMATE DUCTS FOR THE INTERIOR



Calculation of silencers between classrooms-corridors of the plenum return system:

Large classrooms:

CÁLCULO DE SILENCIADORES		CAUDAL BUSCADO											
DIMENSIONES <table border="1"> <tr><td>Ancho</td><td>600 mm</td></tr> <tr><td>Alto</td><td>350 mm</td></tr> <tr><td>Longitud</td><td>900 mm</td></tr> <tr><td>Paso</td><td>100 mm</td></tr> <tr><td>Celdilla</td><td>200 mm</td></tr> </table>		Ancho	600 mm	Alto	350 mm	Longitud	900 mm	Paso	100 mm	Celdilla	200 mm	CAUDAL: 1.440 m³/h	
Ancho	600 mm												
Alto	350 mm												
Longitud	900 mm												
Paso	100 mm												
Celdilla	200 mm												
CARACTERÍSTICAS OPCIÓN A <table border="1"> <tr><td>Nº Celdillas</td><td>1</td></tr> <tr><td>2 Laterales</td><td>100 mm</td></tr> </table> OPCIÓN B <table border="1"> <tr><td>Nº Celdillas</td><td>1</td></tr> <tr><td>2 Laterales</td><td>100 mm</td></tr> </table> ¿OPCIÓN? b		Nº Celdillas	1	2 Laterales	100 mm	Nº Celdillas	1	2 Laterales	100 mm	Superficie libre de paso: 0,07 m² Velocidad flujo de aire: 5,71 m/s 20,6 km/h Superficie frontal ocupada: 0,21 m² P.d.c. SPI-10: 1,8 mm cda 17,63 Pa P.d.c. SPI-15: 1,4 mm cda 13,40 Pa P.d.c. SPI-20: 0,9 mm cda 9,05 Pa Atenuación global a rosa 25,7 dBA 17,7 dBA 14,5 dBA Nivel sonoro autogenerado: 7,2 dBA Ruido autogenerado influye? NO			
Nº Celdillas	1												
2 Laterales	100 mm												
Nº Celdillas	1												
2 Laterales	100 mm												

Small classrooms:

CÁLCULO DE SILENCIADORES		CAUDAL BUSCADO											
DIMENSIONES <table border="1"> <tr><td>Ancho</td><td>300 mm</td></tr> <tr><td>Alto</td><td>300 mm</td></tr> <tr><td>Longitud</td><td>900 mm</td></tr> <tr><td>Paso</td><td>100 mm</td></tr> <tr><td>Celdilla</td><td>200 mm</td></tr> </table>		Ancho	300 mm	Alto	300 mm	Longitud	900 mm	Paso	100 mm	Celdilla	200 mm	CAUDAL: 450 m³/h	
Ancho	300 mm												
Alto	300 mm												
Longitud	900 mm												
Paso	100 mm												
Celdilla	200 mm												
CARACTERÍSTICAS OPCIÓN A <table border="1"> <tr><td>Nº Celdillas</td><td>0</td></tr> <tr><td>2 Laterales</td><td>100 mm</td></tr> </table> OPCIÓN B <table border="1"> <tr><td>Nº Celdillas</td><td>0</td></tr> <tr><td>2 Laterales</td><td>100 mm</td></tr> </table> ¿OPCIÓN? b		Nº Celdillas	0	2 Laterales	100 mm	Nº Celdillas	0	2 Laterales	100 mm	Superficie libre de paso: 0,03 m² Velocidad flujo de aire: 4,17 m/s 15,0 km/h Superficie frontal ocupada: 0,09 m² P.d.c. SPI-10: 1,0 mm cda 10,13 Pa P.d.c. SPI-15: 0,8 mm cda 7,71 Pa P.d.c. SPI-20: 0,4 mm cda 4,41 Pa Atenuación global a rosa 25,7 dBA 17,7 dBA 14,5 dBA Nivel sonoro autogenerado: -6,1 dBA Ruido autogenerado influye? NO			
Nº Celdillas	0												
2 Laterales	100 mm												
Nº Celdillas	0												
2 Laterales	100 mm												

6. NOISE AND VIBRATION OF THE FACILITIES

This document tries to collect the constructive solutions necessary for compliance with the DB HR PROTECTION AGAINST NOISE, of the building's facilities.

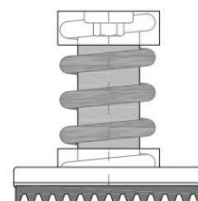
We will deal with the acoustic insulation, the vibration of machines and their attached installations, air conditioning systems, ventilation, electricity, sanitary water pipes going down, in order to achieve an optimal degree of habitability.

6.1. DATA THAT SUPPLIERS - INSTALLERS MUST PROVIDE

1. The level of acoustic power, L_w , of equipment that produces stationary noise.
2. Complete technical sheet of equipment that produces noise (such as air conditioning machines, extractors, pumps and pressure equipment, etc.)
3. The dynamic stiffness, s' and the maximum load, m of the materials used in the inertia benches.
4. The damping C , the transmissibility T , and the maximum load m , of the specific anti-vibration systems used in the insulation of machinery and ducts.
5. The acoustic absorption coefficient, $\bar{\gamma}$, of absorbent products used in ventilation and air ducts conditioned
6. The attenuation of prefabricated ducts, expressed as insertion loss D , and the total attenuation of silencers that are interposed in ducts or embedded in facades or other constructive elements.

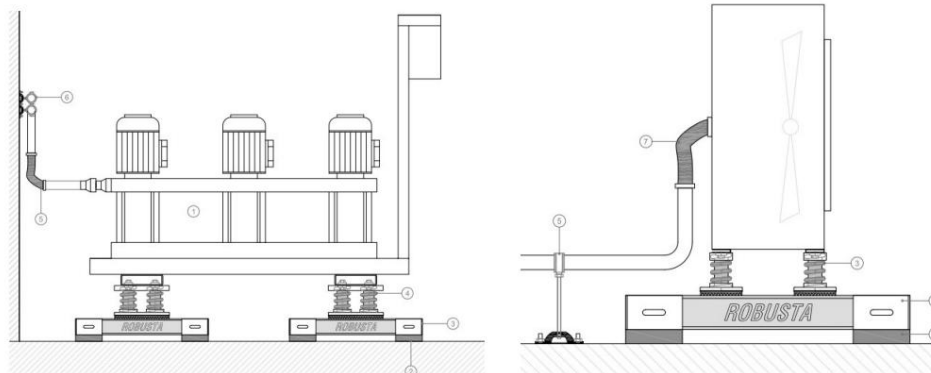
6.2. ASSEMBLY CONDITIONS OF STATIONARY NOISE GENERATING EQUIPMENT

1. The equipment will be installed on anti-vibration mounts of metal spring with a toothed mat base when it comes to equipment weighing less than 80 Kg (small and compact equipment in accordance with the CTE), or when the equipment has its own sufficiently rigid base to withstand the efforts caused by its function or the alignment of components is needed, such as motor and fan or motor and pump.

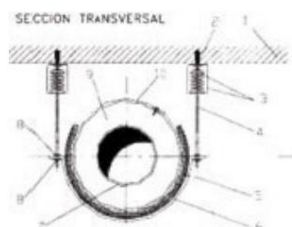


2. In the case of equipment installed on an inertial bench, such as impulse pumps, the bench must be made of concrete or be made in such a way that it has sufficient mass and inertia to prevent the passage of vibrations in the building.

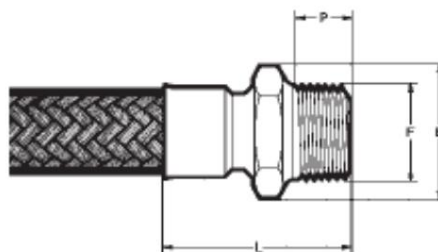
In specific cases the mass of the inertia bench will have to be 2 times the mass of the machine, a matter to be taken into account at the structural level of the building.



3. Anti-vibration supports and flexible connectors that comply with UNE 100153 are considered correct IN.



4. In the chimneys of the thermal installations, which carry electromechanical devices for the extraction of combustion products silencers will be inserted.
5. Flexible double-wave or metal mesh connectors will be installed at the entrance and exit of the equipment pipes.



Once the team's data has been provided, the Acoustic Consultant responsible for the project will determine the assembly conditions and their dimensions, controlling the correct execution on site.

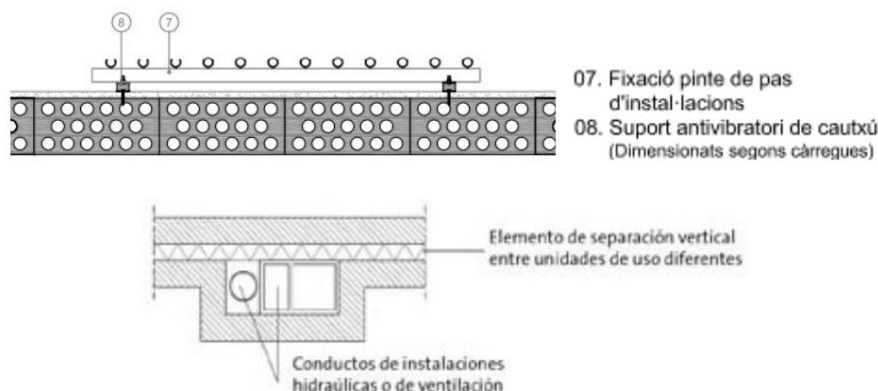
Use the flexible metal tube within the values of resistance to pressure, temperature and radius of curvature determined.

For the calculation use useful flexible length, excluding corners and brush bells.

Make the assemblies respecting the geometries described as CORRECT:

6.3. DRIVES AND EQUIPMENT

1. The building's collective pipes must be treated so as not to cause discomfort in adjacent living or protected areas.

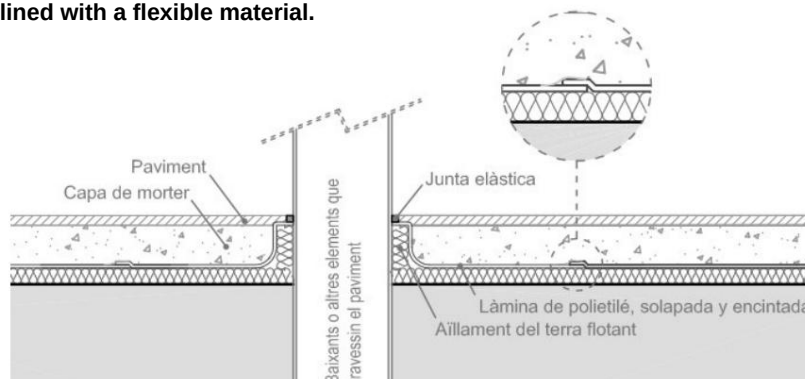


When a conduit for hydraulic or ventilation installations is inserted into a vertical separation element between different units of use, it will be coated in such a way that the acoustic insulation of the separation element does not decrease and the continuity of the constructive solution.

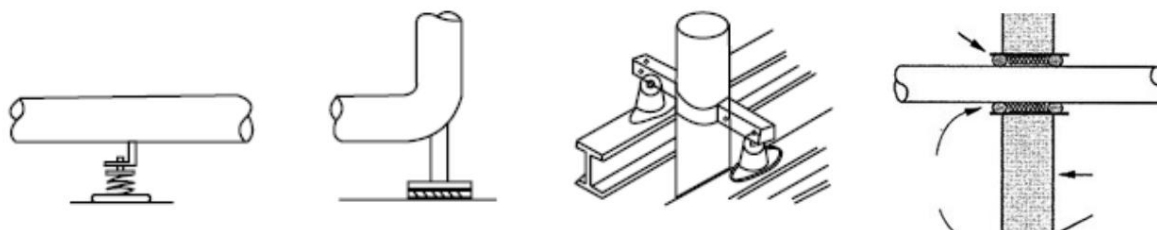
For joints between installation pipes and horizontal separation elements:

The ducts must be covered with an elastic material that does not allow the passage of vibrations to the structure of the building and that makes the clearances of the passers-by made in the slab for the passage of installations watertight.

The contacts between the floating floor and the installation ducts that pass under it must be eliminated. That is why the ducts will be lined with a flexible material.

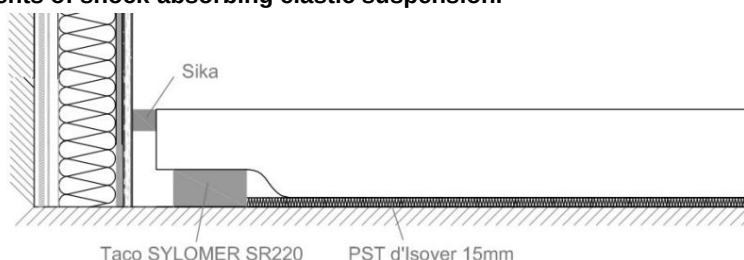


2. In the passage of pipes through constructive elements, anti-vibration systems such as watertight elastic joints, shells, watertight grommets and isophonic flanges will be used.



3. The anchoring of collective pipes will be carried out to constructive elements of mass per surface unit greater than 150 Kg/m².
4. In wet rooms in which the water evacuation installation is suspended from the floor, a ceiling (of around 30Kg/m²) must be installed suspended by means of anti-vibration supports, and with absorbent the air chamber.

5. The speed of water circulation will be limited to 1m/s in the heating pipes and radiators of homes
6. The taps mounted inside the living areas will be of group II at least, according to the classification of UNE EN 200.
7. The use of high discharge cisterns through pipes and taps to fill cisterns will be avoided of air discharge.
8. Bathtubs and shower trays must be assembled by interposing elastic elements in all their points of contact with the structure of the building: floor and walls. The hydromassage systems will have to be mounted on elements of shock-absorbing elastic suspension.

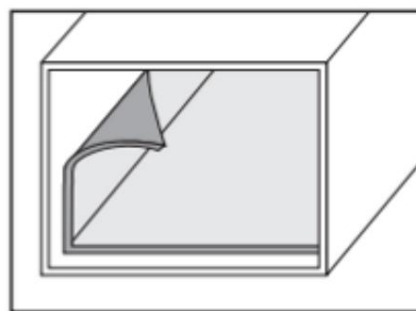
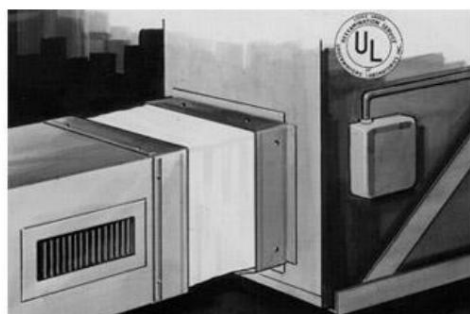


9. Radiators should not be supported on the floor and fixed to the wall at the same time, unless the wall is supported on the floating floor.
10. The changes of direction in the drives will be gradual with a double section of 45 degrees, they will never be direct with 90° elbows.

6.4. AIR CONDITIONING

1. The air conditioning ducts must be acoustic absorbent inside when the installations require it, the joints between the duct and the machine must be made by means of an elastic joint and specific silencers must be used.

The sections of the ventilation ducts must be reduced proportionally along the duct, avoiding sudden changes in direction and section. The speed of air through the ducts can never be higher than 6 m/s.



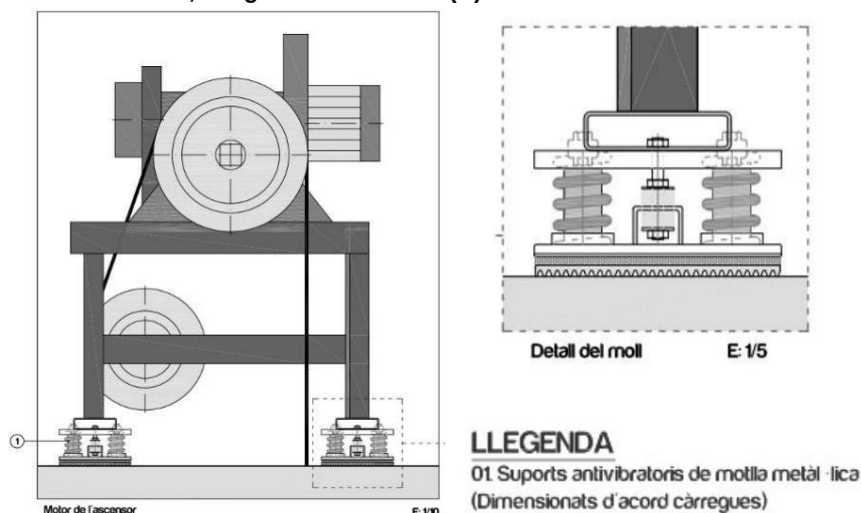
2. The passage of vibrations in the ducts to the construction elements will be avoided by means of anti-vibration systems, such as isophonic flanges, hoses and elastic suspensions.
3. Once the location of the machines has been analyzed, the Acoustic Consultant in charge of supervising the work will decide the need to reinforce the insulation level of the passenger compartment, provide for silenced entrances and exits if it is mounted inside or outside shield it or close it integrally if it eventually goes outside.

6.5. VENTILATION

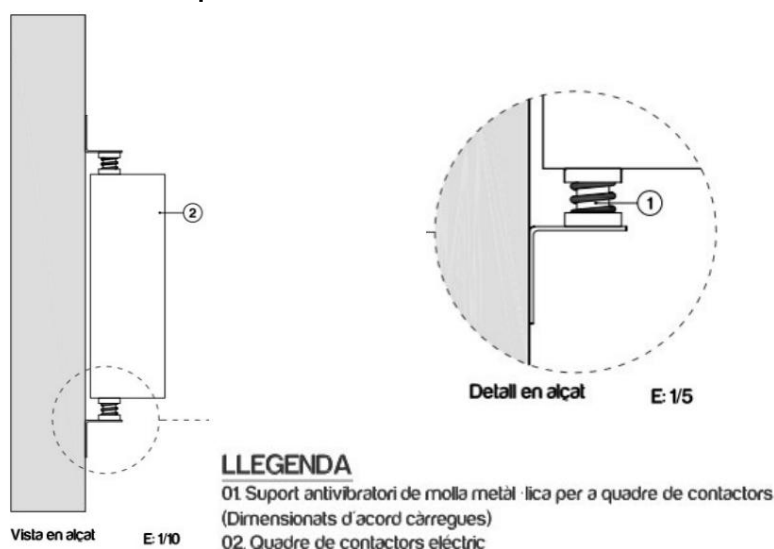
1. The air conditioning ducts must be acoustic absorbent inside when the installations require it, the joints between the duct and the machine must be made by means of an elastic joint and specific silencers must be used.
2. The sections of the ventilation ducts must be reduced proportionally along the duct, avoiding sudden changes in direction and section. The air speed through the ducts can never be higher than 6m/s.
3. When a conduit for hydraulic or ventilation installations is inserted into a vertical separation element between different units of use, it will be coated in such a way that it does not reduce the acoustic insulation of the separation element and guarantees the continuity of the constructive solution.
4. For joints between installation pipes and horizontal separation elements:
The ducts must be covered with an elastic material that does not allow the passage of vibrations to the structure of the building and that makes the clearances of the passers-by made in the slab for the passage of installations watertight.
The contacts between the floating floor and the installation ducts that pass under it must be eliminated. That is why the ducts will be lined with a flexible material.
5. The extraction ducts that cross within the unit of use must be covered with constructive elements, with the global weighted acoustic reduction index A, RA is at least 33dB(A), unless they are d 'extraction of fumes from garages, because they will have to be covered with constructive elements, with the global index of acoustic reduction weighted A, RA being at least 45dB(A).
6. In the event that two horizontal use units share the same collective extraction duct, the specific conditions in DB HS3 will be met.

6.6. ELEVATORS AND LOAD LIFTS

1. The traction systems of the elevators and forklifts, as well as the guides, will be attached to the structural systems of the building by means of vibration dampening elements. The elevator enclosure, when the machine is inside it, will be considered an installation enclosure for acoustic insulation purposes. When this is not the case, the elements that separate the lift from a unit of use must have an acoustic reduction index, RA greater than 50dB(A).

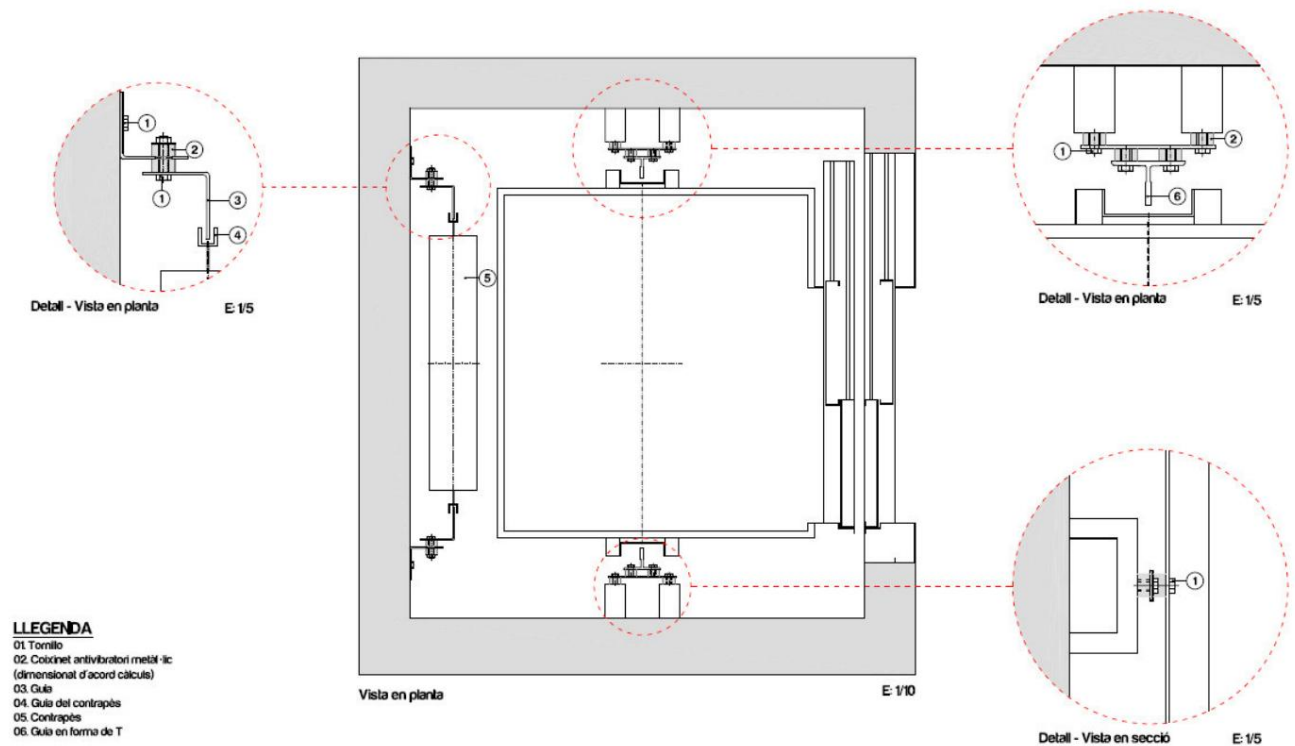


2. The elevator access doors on the different floors must have elastic supports that ensure the practical cancellation of the impact against the frame during closing operations.
3. The control panel, which includes the start and stop relays, will be elastically mounted ensuring adequate isolation from impact noise and vibrations.



*To be defined in execution process pending receipt and review of tractor group weight, load distribution and sound pressure level of the equipment, by the Acoustic Consultant.

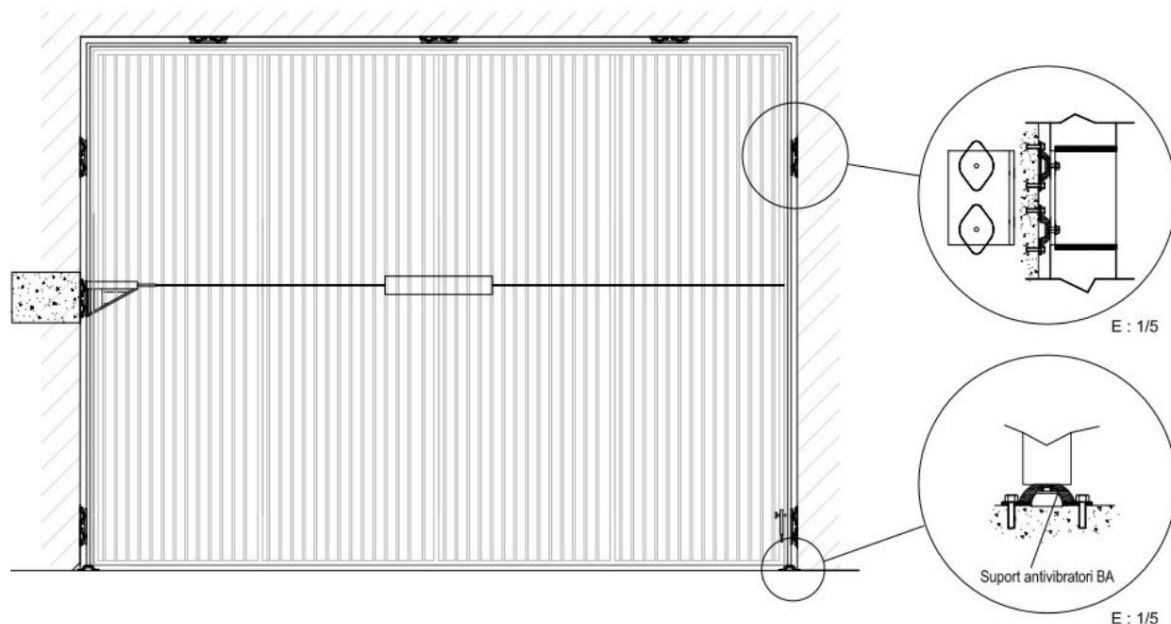
Detail of the anchoring of the elevator guides and counterweight:



*To be defined in pending execution process to receive and review tractor group weight, load distribution, by Acoustic Consultant.

6.7. DOORS

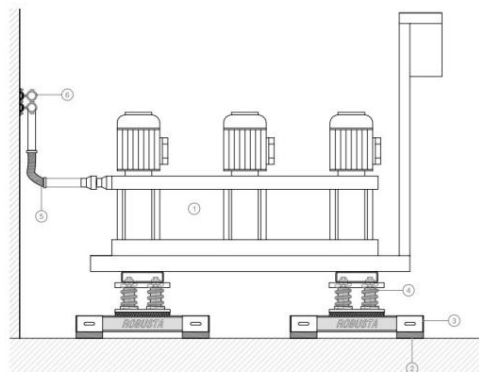
1. The interior doors of homes and access doors to homes must have a Global Sound Reduction Index $RA > 30\text{dBA}$.
2. It is possible that in installation rooms it is necessary to install an acoustic door that avoids the propagation of the noise generated inside towards the habitable and protected areas of the building. To determine the need or not for an acoustic door, it is necessary to know the facilities that will be there, their technical characteristics sheet and the acoustic power level L_w .
3. The garage doors, both manual and automatic, as well as their guide system will have to incorporate anti-vibration systems or elastic supports such that they avoid the transmission of vibrations to the structure of the building



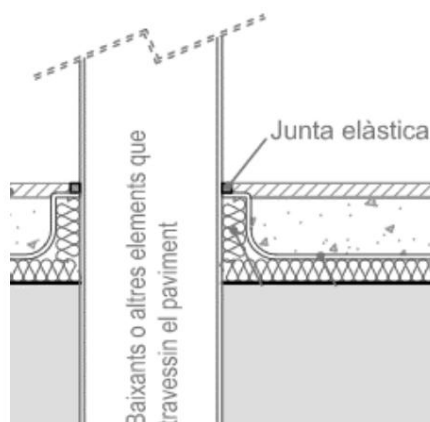
*To be defined in execution process pending receiving Acoustic Consultant. and review weight and anchor points, by

6.8. IMPULSION PUMPS AND SWIMMING POOL CLEANERS

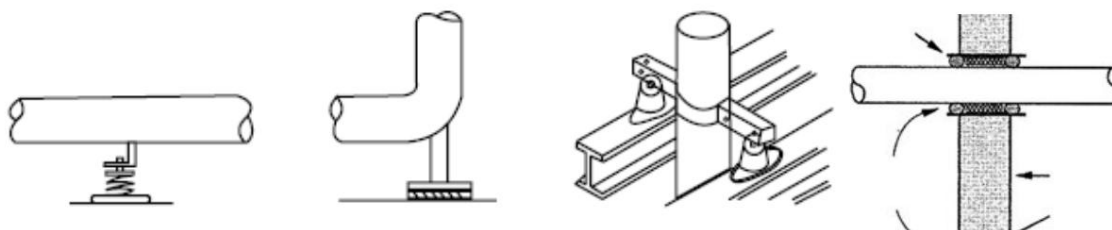
In the case of equipment installed on an inertial bench, such as impulse pumps, the bench must be made of concrete or be made in such a way that it has sufficient mass and inertia to prevent the passage of vibrations to the building



The contacts between the floating floor and the installation ducts that pass under it must be eliminated. That is why the ducts will be lined with a flexible material.



In the passage of pipes through constructive elements, anti-vibration systems such as watertight elastic joints, shells, watertight grommets and isophonic flanges will be used.



The anchorage of collective pipes will be carried out to constructive elements of mass per surface unit greater than 150 Kg/m².

*To be defined in pending execution process receiving and reviewing tractor group weight, load distribution and sound pressure levels Acoustic Consultant. of the same, by

7. NOISE DURING THE WORKS

This chapter is dedicated to new construction or renovation projects that are likely to cause noise nuisance to the neighbors of the site.

The aim is to anticipate, manage and limit noise nuisance and its effects.

In addition to the application of the legal rules related to the effects of noise in nearby areas, other actions aimed at facilitating the integration of the construction into the district must be put into practice from the beginning of the design stage where it is built

These actions must include at least the following:

- Evaluation by the design team of the specific requirements of the neighborhood and, in particular, of the characteristics of the area surrounding the site: environmental noise levels, presence of delicate facilities (hospitals, schools, homes for the elderly, etc...), experiences of recent construction projects, etc...
- Research by the design team and the contractors aimed at finding solutions to limit the emission of noise from the location, implementing actions related, in particular, to the organization of the same, as well as the techniques and the equipment to be used. The solutions adopted will have to become a contractual requirement and form part of the contract of contracts.
- Communication by the project/work manager with the neighbors to inform them of the nature of the project, make them aware of the proposed action plan to limit noise and anticipate the stages that are expected to be noisiest.

8. CONTROL OF THE FINISHED WORK

Any modification that may be introduced during execution will be included in the documentation of the executed work, without in any case failing to meet the minimum conditions indicated in the DB-HR.

Several municipal ordinances establish a minimum number of tests to be carried out with the finished work in order to ensure that they comply with the minimum insulation levels established by the CTE DB-HR. We consider that the minimum required test to be carried out are the following:

No. of homes / units of use (n)	No. of samplings			
	Isolation between units of use (1)	Isolation in front of facilities / activities (1)	Facade insulation	Noise levels of facilities
$n \leq 20$	1 (1)	1 (1)	1	1
$20 < n \leq 40$	2 (1)	1 (1)	2	1
$40 < n \leq 60$	3 (1)	1 (1)	2	1
$60 < n \leq 80$	4 (1)	1 (1)	3	1
$80 < n \leq 110$	5 (1)	1 (1)	3	1
$n > 110$	$n \times 0.05$ (1) (2)	1 (1)	$n \times 0.025$ (2)	1

(1) In each sampling, isolation must be carried out for airborne noise and impact noise, both vertically and horizontally.

(2) Rounding to the largest whole number.

If a municipal, community or state ordinance establishes a higher minimum number, what these ordinances, decrees or laws indicate must always be respected.

When on-site measurements are carried out to check the requirements, they must be carried out in accordance with what is established by the rules in force:

- Acoustic insulation to airborne noise UNE EN ISO 16283-1 (or replace it) that
- Acoustic insulation of facade elements UNE EN ISO 16283-3 (or replace it) that
- Acoustic insulation to impact noise UNE EN ISO 16283-2 (or replace it) that
- Reverberation time limitation UNE EN ISO 3382 (or replace it) that
- Noise levels of installations Decree 176/2009 (Catalonia) (or replace it) that

9. JUSTIFICATION FOR COMPLIANCE WITH THE CTE DB-HR

Aerial noise estimate according to UNE EN 12354-1,2,3:

- Aerial noise between enclosures.
 - Impact noise level between enclosures. •
- Isolation of air noise coming from the outside.

RESULTS OF THE ACOUSTIC INSULATION ESTIMATION

The most unfavorable results of acoustic insulation calculated in the building are presented here, classified according to the different combinations of transmitter and receiver enclosures present in current regulations.

Specifically, compliance with the acoustic requirements described in Section 2.1 (CTE DB HR) is checked here, on the limit values of acoustic insulation to indoor and outdoor air noise, and of acoustic insulation to impact noise, for the habitable and protected areas of the building.

The final results shown are accompanied by the most significant intermediate values, presenting the details of the results obtained in the results justification chapter of this same document, for each of the entries in the results tables.

Vertical separation element between:				
Issuing site	precinct receiver	type	Characteristics	Acoustic insulation In project required
Any premises not belonging to the unit of use (1) (If the enclosures do not share doors or windows)		<u>Base item:</u> [DV-01] 120mm CLT on acoustic strips + 70kg/m3 50mm rock wool + 10mm air chamber / separation + 120mm CLT on acoustic strips	m (kg/m2) = 114.0 RA (dBA) = 54.0	DnT,A = 50 dBA ÿ 50 dBA
		<u>Extradosed:</u> -	ÿRA (dBA) = -	
<u>Door or window:</u> Pass door / access to classrooms + adjacent glass viewer			RA = 30 dBA ÿ 30 dBA	
<u>Closing:</u> [DV-02] CLT 160mm on acoustic bands <u>Extradosed:</u> Free self-supporting extrados using channel and double "H" uprights of 48mm, with rock wool of 70kg/m3 between uprights and a normal laminated plasterboard of 13mm and a laminated plasterboard of high hardness (1150kg/m3) of 13mm (extradosed inside the classrooms)			RA = 54 dBA ÿ 50 dBA	
Of facilities		<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Extradosed:</u> -	ÿRA (dBA) = -	
Of activity		<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Extradosed:</u> -	ÿRA (dBA) = -	

(1) As long as it is not an installation site or an activity site

Vertical separation element between:				
Issuing site	precinct receiver	type	Characteristics	Acoustic insulation In project required
Any premises not belonging to the unit of use (1) (If the enclosures do not share doors or windows)	—	<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Extradosed:</u> -	γRA (dBA) = -	
Any premises not belonging to the unit of use (1) (If the enclosures share doors or windows)		<u>Door or window:</u> -		Not applicable
		<u>Closing:</u> - <u>Extradosed:</u> -		Not applicable
Of facilities		<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Extradosed:</u> -	γRA (dBA) = -	
Of facilities (If the enclosures share doors or windows)		<u>Door or window:</u> Elevator door		RA = 30 dBA γ 30 dBA
		<u>Closing:</u> [DV-04] High hardness laminated gypsum board (1150kg/m3) 15mm + CLT 80mm (or more) <u>Extradosed:</u> Extradosed by channel and double 48mm “H” uprights, fixed to the base enclosure with anti-vibration rubber supports, with 70kg/m3 rock wool between uprights and a 13mm normal laminated plasterboard and a 13mm laminated plasterboard high hardness (1150kg/m3) of 13mm (extradosed inside the classrooms)		RA = 51 dBA γ 50 dBA
Of activity		<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Extradosed:</u> -	γRA (dBA) = -	
Of activity (If the enclosures share doors or windows)		<u>Door or window:</u> -		Not applicable
		<u>Closing:</u> - <u>Extradosed:</u> -		Not applicable

(1) As long as it is not an installation site or an activity site

Horizontal separation element between:				
Issuing site	precinct receiver	type	Characteristics	Acoustic insulation In project required
Any premises not belonging to the unit of use (1)		<u>Base item:</u> [SH-02] CLT 140mm	m (kg/m ²) = 124.9 RA (dBA) = 38.0	DnT,A = 55 dBA ÷ 50 dBA
		<u>Floating floor:</u> [SH-02] Akustic+Sylomer anti-vibration supports Floor Mount or similar (dimensioned according to loads) + wooden slats + 30kg/m ³ rock wool and 160mm between slats + 22mm Superpan wood chipboard + linoleum	γRA (dBA) = 13	
		<u>Suspended ceiling:</u> Suspended flat ceiling with metal structure, 70kg/m ³ and 40mm rock wool and finished with a 15mm laminated plasterboard	γRA (dBA) = 13	
		<u>Base item:</u> [SH-02] CLT 140mm	m (kg/m ²) = 124.9 Ln,w (dB) = 83.0	LnT,w = 36 dBA ÷ 65 dBA
		<u>Floating floor:</u> [SH-02] Akustic+Sylomer anti-vibration supports Floor Mount or similar (dimensioned according to loads) + wooden slats + 30kg/m ³ rock wool and 160mm between slats + 22mm Superpan wood chipboard + linoleum	γLW (dB) = 28	
		<u>Suspended ceiling:</u> -	γLW (dB) = -	
Of facilities		<u>Base item:</u> -	m (kg/m ²) = - Ln,w (dB) = -	Not applicable
		<u>Floating floor:</u> -	γLW (dB) = -	
		<u>Suspended ceiling:</u> -	γLW (dB) = -	
Of activity		<u>Base item:</u> -	m (kg/m ²) = - RA (dBA) = -	Not applicable
		<u>Floating floor:</u> -	γRA (dBA) = -	
		<u>Suspended ceiling:</u> -	γRA (dBA) = -	
		<u>Base item:</u> -	m (kg/m ²) = - Ln,w (dB) = -	Not applicable
		<u>Floating floor:</u> -	γLW (dB) = -	
		<u>Suspended ceiling:</u> -	γLW (dB) = -	

(1) As long as it is not an installation site or an activity site

Horizontal separation element between:				
Issuing site	precinct receiver	type	Characteristics	Acoustic insulation In project required
Any premises not belonging to the unit of use (1)	-----	<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Floating floor:</u> -	ȳRA (dBA) = -	
		<u>Suspended ceiling:</u> -	ȳRA (dBA) = -	
Of facilities		<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Floating floor:</u> -	ȳRA (dBA) = -	
		<u>Suspended ceiling:</u> -	ȳRA (dBA) = -	
		<u>Base item:</u> -	m (kg/m2) = - Ln,w (dB) = -	Not applicable
		<u>Floating floor:</u> -	ȳLW (dB) = -	
		<u>Suspended ceiling:</u> -	ȳLW (dB) = -	
Of facilities		<u>Base item:</u> -	m (kg/m2) = - RA (dBA) = -	Not applicable
		<u>Floating floor:</u> -	ȳRA (dBA) = -	
		<u>Suspended ceiling:</u> -	ȳRA (dBA) = -	
		<u>Base item:</u> -	m (kg/m2) = - Ln,w (dB) = -	Not applicable
		<u>Floating floor:</u> -	ȳLW (dB) = -	
		<u>Suspended ceiling:</u> -	ȳLW (dB) = -	

(1) As long as it is not an installation site or an activity site

Facades, roofs and floors in contact with the outside air:			
Outside noise	precinct receiver	type Characteristics	Acoustic insulation In project required
Ld = 60 dBA	protected (Classroom)	<u>blind part:</u> [FA-03]Ventilated facade with a micro-perforated sheet + air chamber / separation + 140mm high density rock wool 180kg/m3 + CLT 120mm + Free self-supporting extrados using a channel and double "H" uprights of 48mm, with rock wool of 70kg/m3 between uprights and a high-hardness (1150kg/m3) laminated plasterboard of 15mm [FA-04]Ventilated facade with a micro-perforated sheet + air chamber / separation + 140mm high density rock wool 180kg/m3 + CLT 120mm + Free self-supporting extrados using a channel and double "H" uprights of 48mm, with rock wool of 70kg/m3 between uprights and a high-hardness (1150kg/m3) laminated plasterboard of 15mm [SH-03] Flat vegetable cover on the slab consisting of: planting + serum 22mm + drainage layer + waterproof sheet forming slopes + 22mm Superpan wood agglomerated table + air chamber with rakes forming slopes + 160mm rakes high and rock wool of 30kg/m3 and 160mm between rakes + CLT 220mm <u>Empty:</u> FE-01 two-leaf sliding window with glazing 6 / 10 / 44.1 Rw: 33 (-1 : -4)	D2m,nT,Atr = 30 dBA ÿ 30 dBA

Means:			
Issuing site	Receiving area	type Characteristics	Acoustic insulation In project required
Outdoor	anyone	Closing: - Extradosed: -	Does not apply

The following table lists the exact situation in the building of each receiving area, for the most unfavorable values of acoustic insulation calculated (DnT,A, L'nT,w, and D2m,nT,Atr), shown in the supporting documents compliance with the acoustic insulation limit values imposed in the CTE DB HR Basic Document, calculated using the general option.

Calculation type	Emitter	Receiving area		Precinct name
		type	plant	
Indoor air noise between vertical separation elements	Enclosure outside the unit of use	protected	Plant 1	Classroom 4 ESO C
	Of facilities		-	-
	Of activity		-	-
	Enclosure outside the unit of use	Habitable	-	-
	Of facilities		-	-
	Of activity		Plant 1	Lobby / Corridor
Indoor air noise between horizontal separation elements	Enclosure outside the unit of use	protected	Plant 1	Reinforcement Classroom 2
	Of facilities		-	-
	Of activity		-	-
	Enclosure outside the unit of use	Habitable	-	-
	Of facilities		-	-
	Of activity		-	-
Impact noise on horizontal separation elements	Enclosure outside the unit of use	protected	-	-
	Of facilities		-	-
	Of activity		-	-
	Of facilities	Habitable	-	-
	Of activity		-	-
Outdoor air noise on facades, roofs and floors in contact with the outside air		protected	Plant 1	Classroom 4 ESO C
			-	-
Exterior air noise in partitions		Habitable	-	-

Acoustic absorption / Reverberation time							
Type of venue: Large classrooms			Volume (m3): 168.00				
element	Finished	S Area (m2)	Average sound absorption coefficient 500Hz 1000Hz 2000Hz $\bar{\alpha}$ m				Acoustic absorption (m2) $\bar{\alpha}$ m · S
[SH-01] Forged floor between ground floor and first floor	linoleum	56.0	0.04	0.04	0.03	0.04	2.05
[SH-03] Forged, [DV-01] Partition between classrooms and [FA-03] Façade P1	CLT	85.2	0.05	0.04	0.04	0.04	3.69
[DV-02] Classroom-corridor partition	Double laminated plasterboard	11.3	0.10	0.17	0.13	0.13	1.50
Front and corridor windows	Double glazing	10.7	0.07	0.06	0.04	0.06	0.60
doors	door	1.9	0.06	0.08	0.10	0.08	0.15
Sound absorbing islands	Heraklith 25mm + mineral wool 25mm	36.8	1.00	0.75	0.80	0.85	31.27
Air absorption (1)			Air attenuation coefficient 500Hz 1000Hz 2000Hz				
No, V < 250m3			0.003	0.005	0.01	0.006	---
A, (m2) Acoustic absorption of the resulting enclosure							39.27
T, (s) Resulting reverberation time							0.68
In project required							
Acoustic absorption resulting from the common area		A (m2) =	Does not apply				
Resulting reverberation time		T (s) =	0.68	$\bar{\alpha}$	0.7		

(1) Only for volumes greater than 250m3

Acoustic absorption / Reverberation time							
Type of venue: Large corner classrooms					Volume (m3): 167.90		
element	Finished	S Area (m2)	Average sound absorption coefficient 500Hz 1000Hz 2000Hz $\bar{\alpha}$				Acoustic absorption (m2) $\bar{\alpha}$ · S
[SH-01] Forged floor between ground floor and first floor	linoleum	56.0	0.04	0.04	0.03	0.04	2.05
[SH-03] Forged, [DV-01] Partition between classrooms and [FA-03] Façade P1	CLT	62.2	0.05	0.04	0.04	0.04	2.70
[DV-02] Classroom-corridor partition	Double laminated plasterboard	11.3	0.10	0.17	0.13	0.13	1.50
[FA-03] Facade with extrados	Laminated plasterboard	22.9	0.05	0.05	0.05	0.05	1.15
Front and corridor windows	Double glazing	10.7	0.07	0.06	0.04	0.06	0.60
doors	door	1.9	0.06	0.08	0.10	0.08	0.15
Sound absorbing islands	Herakliith 25mm + mineral wool 25mm	36.8	1.00	0.75	0.80	0.85	31.27
Air absorption (1)			Air attenuation coefficient 500Hz 1000Hz 2000Hz				
No, V < 250m3			0.003	0.005	0.01	0.006	---
A, (m2) Acoustic absorption of the resulting enclosure							39.42
T, (s) Resulting reverberation time							0.68
In project required							
Acoustic absorption resulting from the common area		A (m2) =		Does not apply			
Resulting reverberation time		T (s) =		0.68	$\bar{\alpha}$	0.7	

(1) Only for volumes greater than 250m3

Acoustic absorption / Reverberation time							
Type of venue: Small classrooms (reinforcement)				Volume (m3): 81.93			
element	Finished	S Area (m2)	Average sound absorption coefficient 500Hz 1000Hz 2000Hz $\bar{\alpha}$ m				Acoustic absorption (m2) $\bar{\alpha}$ m · S
[SH-01] Forged floor between ground floor and first floor	linoleum	27.3	0.04	0.04	0.03	0.04	1.00
[SH-03] Forged, [DV-01] Partition between classrooms and [FA-03] Façade P1	CLT	64.9	0.05	0.04	0.04	0.04	2.81
[DV-02] Classroom-corridor partition	Double laminated plasterboard	4.5	0.10	0.17	0.13	0.13	0.60
Front and corridor windows	Double glazing	5.3	0.07	0.06	0.04	0.06	0.30
doors	door	1.9	0.06	0.08	0.10	0.08	0.15
Sound absorbing islands	Heraklith 25mm + mineral wool 25mm	17.9	1.00	0.75	0.80	0.85	15.25
Air absorption (1)			Air attenuation coefficient 500Hz 1000Hz 2000Hz				
No, V < 250m3			0.003	0.005	0.01	0.006	---
A, (m2) Acoustic absorption of the resulting enclosure							20.12
T, (s) Resulting reverberation time							0.65
In project				required			
Acoustic absorption resulting from the common area		A (m2) =		Does not apply			
Resulting reverberation time		T (s) =		0.65	$\bar{\alpha}$	0.7	

(1) Only for volumes greater than 250m3

Acoustic absorption / Reverberation time							
Precinct type: Corridor / lobby			Volume (m3): 384.10				
element	Finished	S Area (m2)	Average sound absorption coefficient 500Hz 1000Hz 2000Hz $\bar{\alpha}$ m				Acoustic absorption (m2) $\bar{\alpha}$ m · S
[SH-01] Forged floor between ground floor and first floor	linoleum	153.0	0.04	0.04	0.03	0.04	5.61
[SH-03] Forged, [DV-02] Classroom-corridor partition and [FA-03] Façade P1	CLT	130.2	0.05	0.04	0.04	0.04	5.64
Front and corridor windows doors	Double glazing	30.6	0.07	0.06	0.04	0.06	1.74
	door	27.3	0.06	0.08	0.10	0.08	2.18
Sound absorbing islands	Heraklith 25mm + mineral wool 25mm	73.9	1.00	0.75	0.80	0.85	62.05
Air absorption (1)			Air attenuation coefficient 500Hz 1000Hz 2000Hz				
Yes, V < 250m3			0.003	0.005	0.01	0.006	9.19
A, (m2) Acoustic absorption of the resulting enclosure							86.42
T, (s) Resulting reverberation time							0.71
In project required							
Acoustic absorption resulting from the common area		A (m2) = 86.41	$\bar{\alpha}$	76.82 = 0.2 · V			
Resulting reverberation time		T (s) =	Does not apply				

(1) Only for volumes greater than 250m3

Acoustic absorption / Reverberation time							
Precinct type: Dining room				Volume (m3): 347.80			
element	Finished	S Area (m2)	Average sound absorption coefficient 500Hz 1000Hz 2000Hz $\bar{\alpha}$				Acoustic absorption (m2) $\bar{\alpha}$ · S
Linoleum flooring	linoleum	110.4	0.04	0.04	0.03	0.04	4.05
[FA-02] Dining room facade	Double laminated plasterboard	61.9	0.10	0.17	0.13	0.13	8.26
[SH-01] Forging between ground floor and first floor in the dining room	Laminated plasterboard	60.7	0.05	0.05	0.05	0.05	3.04
Windows	Double glazing	74.9	0.07	0.06	0.04	0.06	4.25
doors	door	3.6	0.06	0.08	0.10	0.08	0.29
Sound absorbing islands	Heraklith 25mm + mineral wool 25mm	49.7	1.00	0.75	0.80	0.85	42,23
Air absorption (1)			Air attenuation coefficient 500Hz 1000Hz 2000Hz				
Yes, V < 250m3			0.003	0.005	0.01	0.006	8.05
A, (m2) Acoustic absorption of the resulting enclosure							70.16
T, (s) Resulting reverberation time							0.79
In project				required			
Acoustic absorption resulting from the common area		A (m2) =		Does not apply			
Resulting reverberation time		T (s) =		0.79	$\bar{\alpha}$	0.9	

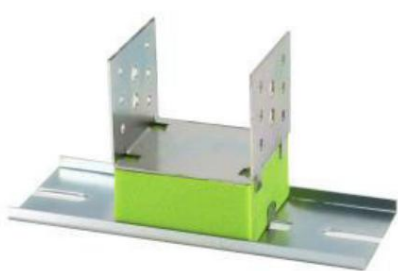
(1) Only for volumes greater than 250m3

APPENDIX 01. TECHNICAL SHEETS OF MATERIALS

APPENDIX 02.1. ACOUSTIC+SYLOMER FLOOR MOUNT SUPPORTS

Soportes Antivibratorios Caucho-Metal

AKUSTIK+SYLOMER® FLOOR MOUNT



Los soportes de suelo Akustik+Sylomer® han sido diseñados para la suspensión de suelos flotantes. Las excelentes propiedades del poliuretano microcelular Sylomer® consiguen elevados valores de aislamiento frente a otros soportes que utilizan caucho o corcho, o una combinación de ambos.

Estos soportes antivibratorios se fabrican en dos mezclas especiales y con un espesor de Sylomer® para adaptarse mejor a la carga de cada aplicación.

Una gran variedad de armaduras y elementos metálicos de fijación facilitan la instalación y se adaptan mejor a cada tipo de trabajo. Sus robustas piezas metálicas resisten a los esfuerzos de tracción. Se suministran con un tratamiento anticorrosivo que puede soportar los entornos más duros.









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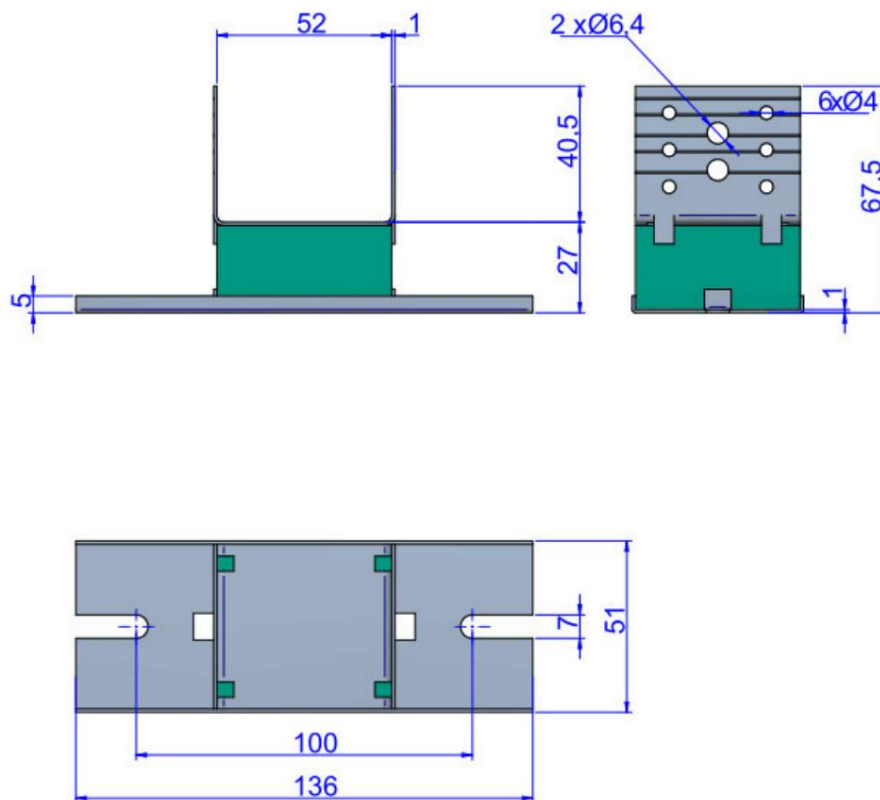
www.mecanocaucho.com
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Soportes Antivibratorios Caucho-Metal

AKUSTIK+SYLOMER® FLOOR MOUNT

PLANOS



DIMENSIONES

Tipo	RESUMEN	Peso (kg)	Carga máx (kg)	ESPESOR (mm)	Código
Akustik+Sylomer® 25 Floor Mount	Soportes para instalar suelos de madera con sistema rastrel.	-	25	25	23562

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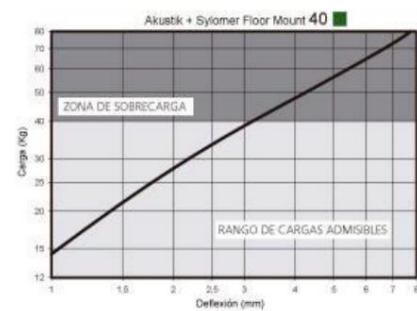
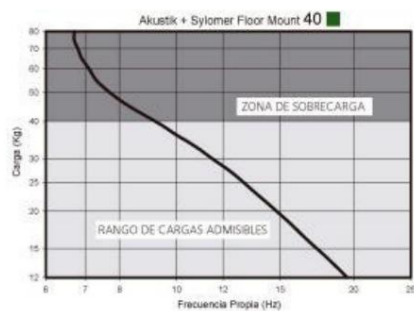
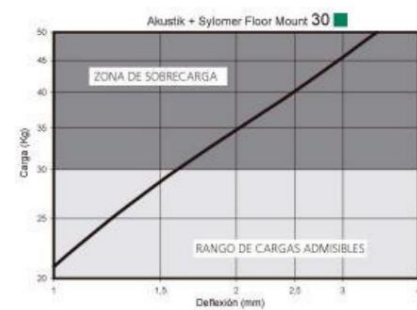
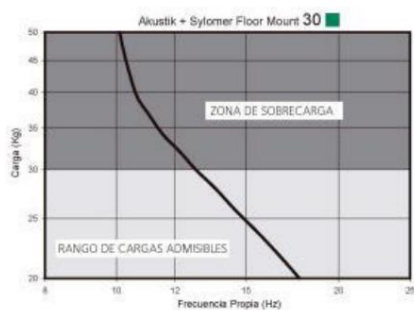
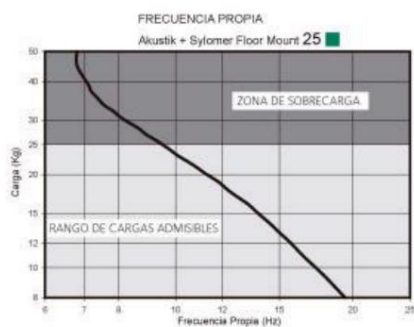
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Soportes Antivibratorios Caucho-Metal

AKUSTIK+SYLOMER® FLOOR MOUNT

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Propiedades elásticas



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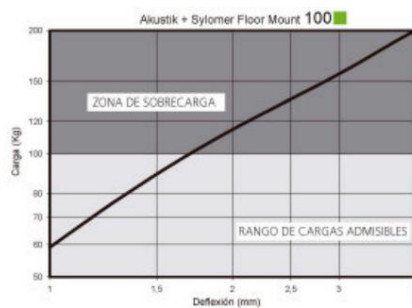
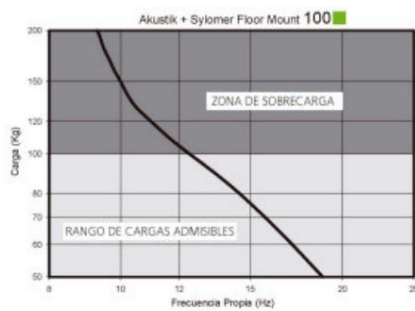
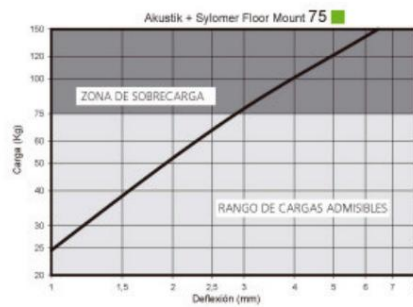
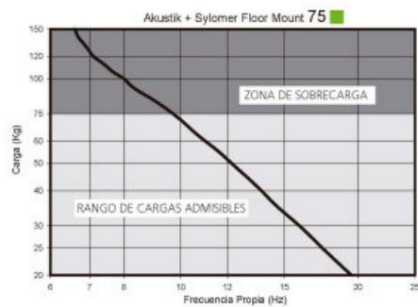
www.mecanocaucho.com
 www.akustik.com

Con el objeto de adaptar sus productos al estado de la técnica, AMC S.A. se reserva el derecho de modificar sin previa notificación la concepción y realización de los materiales presentados en este catálogo.

Soportes Antivibratorios Caucho-Metal

AKUSTIK+SYLOMER® FLOOR MOUNT

Propiedades elásticas



AMC MECANOCAUCHO
 Industria/idea Zona A - Pab. 35.
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Con el objeto de adaptar sus productos al estado de la técnica, AMC S.A. se reserva el derecho de modificar sin previa notificación la concepción y realización de los materiales presentados en este catálogo.



Ref.: CAM20090054-1/IMP-MEJ

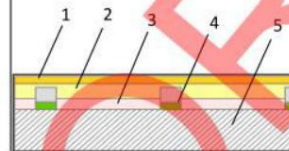
Pág.: 14 / 14

Cliente: AMC Mecanocaucho
Identificación de la muestra:

- (1) Tablero OSB 22 mm
- (2) Rastres de madera 5 cm
- (3) Lana mineral 45 mm
- (4) Soporte Akustik + Sylomer® Floor Mount 100
- (5) Losa de referencia de hormigón de 14 cm

Método de ensayo: UNE-EN ISO 10140-1, Anexo H.
 Muestra de categoría II

Espesor: 22,65 cm; **Masa superficial:** 371,4 kg/m²



Frec. <i>f</i> Hz	<i>L</i> _{n,0} dB	ΔL dB
100	58,8	5,3
125	58,6	4,7
160	63,1	9,6
200	64,7	15,0
250	68,4	18,1
315	70,0	23,9
400	71,7	26,6
500	72,8	31,2
630	73,4	34,6
800	72,9	37,8
1000	71,1	39,5
1250	70,5	42,1
1600	70,5	48,6
2000	69,3	56,8
2500	68,9	61,9
3150	69,5	64,1
4000	68,4	61,6
5000	68,1	61,6



Reducción ponderada del nivel de presión sonora de impactos según la Norma ISO 717-2:2013

$\Delta L_w = 28$ dB

CIA = -13 dB

$L_n w, r = 50$ dB

CI, r = 2 dB

$L_n w, 0 = 76$ dB

CI, 0 = -9 dB



Fecha ensayo:
 9 y 19 de octubre
 de 2020

Realizado por:

Fdo: Ángel Arenaz



Audiotec, Ingeniería Acústica S.A. inscrita en el Registro Mercantil de Valladolid. Asiento 1.515. Folio 143 del Libro 12. C.I.F. A-47237516

APPENDIX 02.2. HERAKLITH SOUND-ABSORBING ISLANDS



Heradesign® *fine*
Ficha técnica & peritajes

Datos del producto

Heradesign® fine

Placa acústica de **1 capa** de viruta de madera ligada con magnesita (ancho de fibra: aprox. 2 mm). Estructura de superficie característica, recomendada para bioconstrucción.

Colores

La estructura natural característica de la viruta de madera se presta excelentemente como superficie para la creación de un colorido creativo. Se dispone de una gama de colores prácticamente ilimitada. ¡Se pueden elegir casi todos los colores de los sistemas de color usuales como RAL, NCS, BS o StoColor!

Medida nominal mm	600 x 600, 625 x 625 1200 x 600, 1250 x 625		
Espesor mm	15	25	35
Peso kg/m ²	8,2	12,4	16,3
Valor de absorción acústica α_w	de hasta 0,90		
Brandgedrag conform EN:	B-s1, d0		
Declaración del producto:	WW-EN 13168-L3-W2-T2-S3-P2-CS(10) 200-C13		
	Certificado de conformidad CE No. de reg.: K1-0751-CPD-209.0-02-01/2011		
	Homologación general de la Inspección de Construcción Alemana ABZ: Z-23.15-1562		

blanco similar a RAL 9010	beige color natural 13	colores pasteles	colores directos	colores metalizados	colores especiales
✓	✓	✓	✓	✓	✓

Campo de utilización

En falsos techos y revestimientos de techos y paredes decorativos, con excelente eficacia acústica, tanto para aplicaciones en el interior como aplicaciones cubiertas al exterior, no expuestas a la intemperie, como la lluvia o contaminación.

Limitaciones de uso

- ¡Ancho máximo 600 mm!
- Apto para áreas con una humedad relativa del aire constante de hasta el 90 %. ¡En caso de utilización en recintos con una humedad relativa del aire constante superior al 80 % se recomienda solicitar asesoramiento en física de la construcción!
- ¡No apto para el montaje por encolado!

Montaje

El montaje de las placas acústicas de Heradesign forma parte de la arquitectura de interiores y sólo debe llevarse a cabo bajo condiciones de humedad y temperatura controladas. Todas las actividades de construcción que provoquen

polvo deberán haber sido terminadas antes de comenzar con el montaje.

Almacenar las placas horizontalmente en un lugar plano y protegerlas contra la humedad y la suciedad. ¡El embalaje no protege los productos contra la lluvia! ¡Preste atención a las directivas de utilización, montaje y almacenamiento pertinentes a las placas acústicas Heradesign!

Indicaciones adicionales

- Variaciones en el matiz de los colores respecto a la tabla de colores y la percepción del color son posibles como consecuencia a la naturaleza de las fibras, la estructura y la superficie ásperas de las placas.
- Tolerancia de acabado en medida nominal: L3, A2, E2: ± 1 mm, para longitudes > 1200 mm L3: ± 2 mm
- Si se utiliza una base de lana mineral, se recomienda usar una lámina de plástico (grosor $< 30 \mu\text{m}$) como protección contra la caída de polvo.
- Alteración máxima de las dimensiones en condiciones ambientales normales de $23^\circ \text{C}/50\%$ de humedad relativa del aire: $\pm 1\%$

La presente ficha técnica corresponde al estado de desarrollo actual de nuestros productos y pierde su validez tan pronto como surja una nueva edición. Asegúrese de utilizar la edición más actualizada de esta información. Las cualidades del producto no están garantizadas para aplicaciones especiales en casos singulares. La garantía y responsabilidad al momento de la entrega están detalladas en nuestras condiciones generales de venta. Todos los datos indicados no tienen ningún tipo de garantía y podrán variar sin previo aviso.
 Versión del 1 de abril de 2011.



Página 2

Resumen de peritajes

Resistencia a impactos de pelota según la norma DIN 18 032 / 3a. parte / Techo

Heradesign® fine					
Espeor: 25 mm Formato: 1250 x 625 Canto: AK-01	Montaje con tornillos, perfiles CD 27 x 60 x 0,6 mm, distancia interaxial ≤ 625 mm, sujeción: 9 piezas/placa, tornillos Heradesign	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/15/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte
Espeor: 25 mm Formato: 1250 x 625 Canto: AK-01	Montaje con tornillos, perfiles de acero en forma de U 26 x 80 x 26 x 0,55 mm, distancia interaxial ≤ 625 mm, sujeción: 9 piezas/placa, tornillos Heradesign	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/24/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte, o bien clase 1A según la norma EN 13964 anexo D
Espeor: 25 mm Formato: 1250 x 600 Canto: SK-04	Montaje por encaje, suspensión (Quicklock), distancia interaxial 1200 mm, perfiles en T 24 x 38 x 0,5 mm	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/19/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte, o bien clase 1A según la norma EN 13964 anexo D
Espeor: 35 mm Formato: 1250 x 625 Canto: AK-01	Montaje con tornillos, perfiles CD 27 x 60 x 0,6 mm, distancia interaxial ≤ 625 mm, sujeción: 9 piezas/placa, tornillos Heradesign	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/12/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte
Espeor: 35 mm Formato: 1250 x 625 Canto: AK-01	Montaje con tornillos, dimensión de los listones de madera 60 x 30 mm, distancia interaxial ≤ 625 mm, sujeción: 9 piezas/placa, tornillos Heradesign	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/07/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte, o bien clase 1A según la norma EN 13964 anexo D

Resistencia a impactos de pelota según la norma DIN 18 032 / 3a. parte / Pared

Heradesign® fine					
Espeor: 25 mm Formato: 1250 x 625 Canto: AK-01	Montaje con tornillos, perfiles CD 27 x 60 x 0,6 mm, distancia interaxial ≤ 625 mm, sujeción: 9 piezas/placa, tornillos Heradesign	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/26/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte
Espeor: 35 mm Formato: 1250 x 625 Canto: AK-01	Montaje con tornillos, perfiles CD 27 x 60 x 0,6 mm, distancia interaxial ≤ 625 mm, sujeción: 9 piezas/placa, tornillos Heradesign	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/25/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte
Espeor: 35 mm Formato: 1250 x 625 Canto: AK-01	Montaje con tornillos, dimensión de los listones de madera 60 x 30 mm, distancia interaxial ≤ 625 mm, sujeción: 9 piezas/placa, tornillos Heradesign	D	Institución para la investigación y el examen de materiales de Baden-Württemberg, FMFA Stuttgart	901 7927 00/04/Sc/Kf	"resistente a impactos de pelota" según la norma DIN 18 032/ 3a. parte, o bien clase 1A según la norma EN 13964 anexo D

Valores de absorción acústica

Objeto de prueba				Peritaje			Grados de absorción acústica α									
Tipo de placa	Espeor (mm)	ATC ¹⁾ (mm)	Relleno posterior (mm)	Tipo ²⁾	Institución examinadora/ País	No.	Fecha	Frecuencias (Hz) , α_p						Rango completo		Clase
Heradesign fine	15	15	0	---	RIU	6000	01.03.10	0,05	0,10	0,20	0,45	0,90	0,60	0,40	0,30 (A)	D
Heradesign fine	15	45	0	---	TGM/Viena	TM TGM 11233_23	15.12.08	0,10	0,20	0,60	0,75	0,55	0,75		0,50 (MA)	D
Heradesign fine	15	115	0	---	Fraunhofer **	P-BA 125/2009	15.12.09	0,15	0,50	0,80	0,55	0,50	0,70		0,55 (MA)	D
Heradesign fine	15	215	0	---	Fraunhofer **	P-BA 131/2009	15.12.09	0,35	0,70	0,65	0,45	0,55	0,75		0,55 (BA)	D
Heradesign fine	25	25	0	---	RIU	5998	01.03.10	0,05	0,15	0,35	0,95	0,75	0,80	0,55	0,40 (MA)	D
Heradesign fine	25	125	0	---	Fraunhofer **	P-BA 115/2009	15.12.09	0,15	0,55	0,89	0,59	0,69	0,66		0,70	C
Heradesign fine	25	200	0	---	RIU	5989	01.03.10	0,30	0,70	0,65	0,55	0,75	0,85	0,70	0,65 (BA)	C
Heradesign fine	25	200	0	---	RIU	5992	01.03.10	0,35	0,80	0,65	0,60	0,80	0,90	0,75	0,65 (BA)	C
Heradesign fine	25	225	0	---	Fraunhofer **	P-BA 126/2009	15.12.09	0,45	0,75	0,60	0,55	0,75	0,80		0,60 (BA)	C
Heradesign fine	25	625	0	---	TGM/Viena	TM TGM 11233_5	15.12.08	0,60	0,40	0,45	0,55	0,70	0,85	0,50	0,55 (BA)	D
Heradesign fine	35	35	0	---	RIU	6021	15.03.10	0,10	0,25	0,55	1,00	0,70	0,90	0,65	0,55 (MA)	D
Heradesign fine	35	135	0	---	Fraunhofer **	P-BA 122/2009	15.12.09	0,20	0,70	0,80	0,60	0,80	0,80		0,70	C
Heradesign fine	35	320	0	---	TGM/Viena	TM TGM 11233_11	15.12.08	0,55	0,70	0,50	0,65	0,85	0,80	0,70	0,60 (BA)	D
sin relleno posterior																
Heradesign fine	15	40	25	DP-9	RIU	6001	01.03.10	0,10	0,50	1,00	0,85	0,65	0,75	0,80	0,70 (M)	C
Heradesign fine	15	45	30	DP-4	TGM/Viena	TM TGM 11233_22	15.12.08	0,15	0,65	1,00	0,75	0,65	0,80		0,75 (M)	C

Página 3

Resumen de peritajes

Valores de absorción acústica

Objeto de prueba				Peritaje			Grados de absorción acústica α										Clase
Tipo de placa	Espesor (mm)	ATC ¹⁾ (mm)	Relleno posterior (mm)	Tipo ²⁾	Institución examinadora/ País	No.	Fecha	Frecuencias (Hz) , α_0						Rango completo			
								125	250	500	1000	2000	4000	NRC ³⁾	α_w		
con lana mineral																	
Heradesign fine	15	115	30	DP-4	TGM/Viena	TM TGM 11233_18	15.12.08	0,40	0,90	0,90	0,65	0,65	0,80		0,70 (B)		C
Heradesign fine	15	290	40	DP-4	TGM/Viena	TM TGM 11233_09	15.12.08	0,60	0,85	0,80	0,75	0,65	0,80		0,75 (B)		C
Heradesign fine	15	200	50	DP-5	RU	6007	01.03.10	0,65	1,00	1,00	0,95	0,80	1,00	1,00	0,90 (B)		A
Heradesign fine	15	200	50	DP-5	RU	6008	01.03.10	0,65	1,00	1,00	0,80	0,70	1,00	0,90	0,90 (B)		B
Heradesign fine	25	55	25	DP-9	RU	6002	01.03.10	0,15	0,75	1,00	0,75	0,80	0,80	0,85	0,80		B
Heradesign fine	25	200	25	DP-9	RU	5993	01.03.10	0,50	0,90	0,85	0,75	0,85	0,85	0,85	0,85		B
Heradesign fine	25	200	25	DP-9	RU	5993	01.03.10	0,50	0,90	0,85	0,75	0,85	0,85	0,85	0,85		B
Heradesign fine	25	200	25	DP-9	RU	5996	01.03.10	0,45	0,90	0,95	0,85	0,85	0,90	0,90	0,90		A
Heradesign fine	25	85	30	DP-4	TGM/Viena	TM TGM 11233_20	15.12.08	0,40	0,90	0,90	0,70	0,80	0,80		0,80 (B)		B
Heradesign fine	25	200	50	DP-5	RU	6006	01.03.10	0,60	1,00	0,90	0,75	0,85	0,90	0,85	0,85 (B)		B
Heradesign fine	25	200	50	DP-5	RU	5997	01.03.10	0,55	0,95	0,95	0,80	0,80	0,85	0,90	0,85 (B)		B
Heradesign fine	25	625	50		TGM/Viena	TM TGM 11233_4	15.12.08	0,70	0,70	0,90	0,80	0,80	0,90		0,85		B
Heradesign fine	25	125	60	DP-4	TGM/Viena	TM TGM 11233_14	15.12.08	0,55	1,00	0,80	0,75	0,80	0,80		0,80 (B)		B
Heradesign fine + 20 µm de lámina protectora de polietileno	25	225	60	DP-5	Fraunhofer **	P-BA 129/2009	15.12.09	0,55	0,85	0,80	0,80	0,80	0,85		0,80 (B)		B
Heradesign fine	25	105	80	DP-4	TGM/Viena	TM TGM 11233_19	15.12.08	0,70	1,00	0,80	0,75	0,80	0,80		0,80 (B)		B
Heradesign fine	25	225	200	DP-5	MBBM *	TM M84 565/19	28.01.10	0,85	0,90	0,90	0,75	0,75	0,85	0,85	0,80 (B)		B
Heradesign fine + 30 mm de espacio de aire + 43 µm de lámina protectora de polietileno	25	255	200	DP-5	MBBM *	TM M84 565/22	28.01.10	0,85	0,95	0,85	0,70	0,80	0,85	0,85	0,80 (B)		B
Heradesign fine + 43 µm de lámina protectora de polietileno + 30 mm de espacio de aire	25	255	200	DP-5	MBBM *	TM M84 565/26	28.01.10	0,80	0,85	0,80	0,75	0,85	0,85	0,80	0,80 (B)		B
Heradesign fine + 43 µm de lámina protectora de polietileno	25	225	200	DP-5	MBBM *	TM M84 565/20	28.01.10	0,70	0,80	0,90	0,80	0,85	0,85	0,85	0,85		B
Heradesign fine + 43 µm de lámina protectora de polietileno + 30 mm de espacio de aire	25	255	200	DP-5	MBBM *	TM M84 565/23	28.01.10	0,80	0,90	0,85	0,70	0,80	0,85	0,85	0,80 (B)		B
Heradesign fine + 0,47 mm de Hygrodiode (barrera de vapor)	25	225	200	DP-5	MBBM *	TM M84 565/21	28.01.10	0,60	0,70	0,85	0,80	0,90	0,80	0,80	0,85		B
Heradesign fine + 0,47 mm de Hygrodiode (barrera de vapor) + 30 mm de espacio de aire	25	255	200	DP-5	MBBM *	TM M84 565/24	28.01.10	0,80	0,90	0,80	0,80	0,75	0,85	0,80	0,80 (B)		B
Heradesign fine + 20 µm lámina protectora de polietileno	25	225	200	DP-5	Fraunhofer **	P-BA 132/2009	15.12.09	0,70	0,85	0,85	0,75	0,75	0,85	0,80	0,80 (B)		B
Heradesign fine	35	65	25	DP-9	RU	6044	15.03.10	0,25	0,75	1,00	0,80	0,95	0,90	0,90	0,90		A
Heradesign fine	35	65	30	DP-5	TGM/Viena	TM TGM 10656_7	18.06.03	0,20	0,70	1,00	0,75	0,80	0,90		0,80		B
Heradesign fine	35	200	40	DP-9	RU	6031	15.03.10	0,65	1,00	0,90	0,80	0,95	0,90	0,95	0,90 (B)		A
Heradesign fine	35	320	40	DP-4	TGM/Viena	TM TGM 11233_10	15.12.08	0,65	0,80	0,80	0,80	0,90	0,90	0,80	0,85		B
Heradesign fine	35	95	60	DP-5	Fraunhofer **	P-BA 124/2009	15.12.09	0,60	1,00	0,80	0,70	0,85	0,80		0,80 (B)		B
Heradesign fine	35	135	60	DP-4	TGM/Viena	TM TGM 11233_17	15.12.08	0,60	1,00	0,85	0,75	0,85	0,85	0,85	0,85 (B)		B
Heradesign fine	35	235	60	DP-5	Fraunhofer **	P-BA 130/2009	15.12.09	0,70	0,90	0,75	0,75	0,88	0,89		0,80 (B)		B

1) ATC: Altura total de construcción: del canto inferior del techo inacabado hasta el canto inferior de la placa acústica de Heradesign

2) Tipo: DP-4: densidad aparente = 40 kg/m³ / DP-5: densidad aparente = 50 kg/m³ / DP-9: densidad aparente = 90 kg/m³

3) Valor NRC: valor medio de α_0 de las frecuencias (250 + 500 + 1000 + 2000); 4, redondeado al incremento siguiente 0,05

* MBBM / Munich

** Fraunhofer IBP / Stuttgart

APPENDIX 02.3. ROBUST INERTIA BENCH


 BANCADA DE INERCIA MODULAR

DESCRIPCIÓN DEL MATERIAL	
Material:	Hormigón armado y acero galvanizado
Peso total:	34,3 Kg
Ancho:	500mm x 500mm
Grosor:	60mm

FICHA TÉCNICA

CARACTERÍSTICAS TÉCNICAS	
Carga de rotura:	19,8 kN

Ensayo según norma:
UNE - EN 1339:2004

Ensayo 19.09/HMV-03/01.01, del 19 de Septiembre de 2019, realizado por ICEC



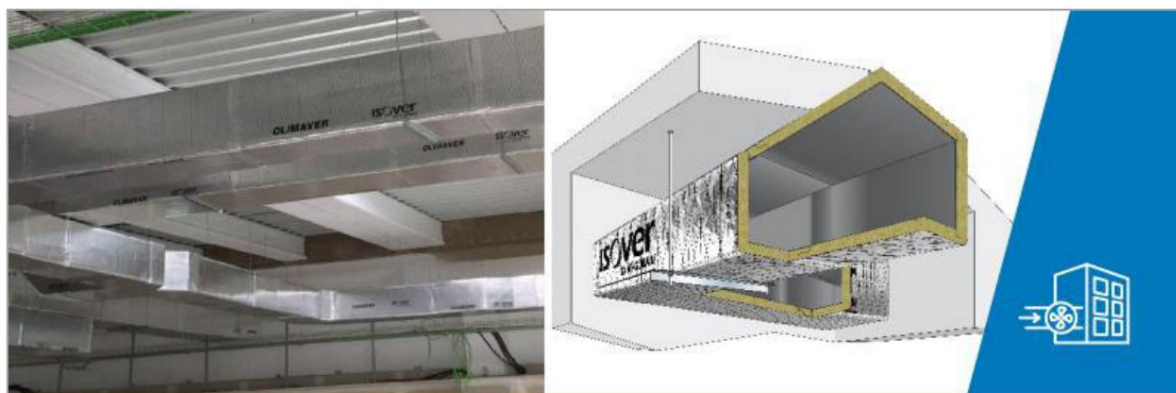




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APPENDIX 02.4. SOUND ABSORBING PIPE CLIMAVER APPA A1



CLIMAVER A1 APTA

Conductos Autoportantes CLIMAVER

Descripción

Panel rígido de lana de vidrio ISOVER con excelente reacción al fuego, ya que no contribuye al incendio en ninguna fase del mismo. Es un panel de alta densidad, revestido por la cara exterior con una lámina de aluminio reforzada con papel kraft y malla de vidrio, que actúa como barrera de vapor, y por su cara interior, con un tejido Neto de vidrio reforzado de color negro de gran resistencia mecánica.

Aplicaciones

Por sus excelentes prestaciones en cuanto a aislamiento térmico y acústico, **CLIMAVER A1 APTA** es la mejor solución de conducto autoportante existente en el mercado, ya que es capaz de satisfacer los más altos requisitos de reacción al fuego, para la instalación de:

- Redes de conductos autoportantes de distribución de aire en las instalaciones térmicas de Climatización de los edificios.

RITE Propiedades técnicas

Símbolo	Parámetro	Icono	Unidades	Valor	Norma
λ_D	Conductividad térmica declarada en función de la temperatura		W/m·K (°C)	0,032 (10) 0,033 (20) 0,036 (40) 0,039 (60)	EN 12667 EN 12939
	Reacción al fuego		Euroclase	A1	EN 13501-1 EN 15715
MU	Resistencia a la difusión de vapor de agua de la lana mineral, μ		-	1	EN 12086
Z	Resistencia a la difusión de vapor de agua del revestimiento		m ² ·h·Pa/mg	130	EN 12086
MV	Espesor de la capa de aire equivalente a la difusión del vapor de agua, S_d		m	100	EN 12086
DS	Estabilidad dimensional, $\Delta\epsilon$		%	<1	EN 1604
	Estantidumbre		Clase	D	UNE-EN 13403 EN 12237
	Resistencia a la presión		Pa	800	UNE-EN 13403

Condiciones de trabajo: velocidad de aire de hasta 18 m/s y temperatura de aire de circulación de hasta 90°C.

Espesor d, mm	Coefficiente ponderado de absorción acústica, AW, α_n	Clase de absorción acústica	Código de designación
EN 823	EN ISO 354 EN ISO 11654	UNE EN ISO 11654	EN 14303
40	0,90	A	MW-EN 14303-T5-MV1

Ensayos acústicos con plenum: CTA 140003/REV.

⁽¹⁾ Coeficiente ponderado de absorción acústica AW, α_n sin plenum 0,70 (40mm espesor) CTA 140053/REV-2 y α_n sin plenum 0,90 (50mm espesor) CTA 140045/REV-2.

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isover.es@saint-gobain.com
www.isover-aislamiento-tecnico.es

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isoveres

	Frecuencia (Hz)					
	125	250	500	1000	2000	4000
Espesor d, mm	Coeficiente práctico de absorción acústica, α_p , EN ISO 354 / EN ISO 11654					
40	0,40	0,70	0,85	0,85	0,90	1,00
Sección, 5 mm²	Atenuación acústica, en un tramo recto, ΔL (dB/m)*					
200x200	5,82	12,75	16,73	16,73	18,12	21,00
300x400	3,40	7,43	9,76	9,76	10,57	12,25
400x700	2,29	5,01	6,57	6,57	7,12	8,25

*Estimación mediante la fórmula: $\Delta L = 1,05 \cdot \alpha_p \cdot \frac{P}{S}$ (P=perímetro) para potencia sonora de un ventilador con un caudal de 20000 m³/h, pérdida de carga 15mm ca.

Presentación



Espesor d (mm)	Largo l (m)	Ancho b (m)	m²/bulto	m²/palé	m³/camión
40	3,00	1,21	18,15	199,70	1,597

Ventajas

- Excelente reacción al fuego.
- Elevados rendimientos térmicos.
- Máxima clase de estanqueidad definida por el RITE
- Óptima calidad del ambiente acústico
- Resistencia a métodos de limpieza más agresivos, UNE 100012.
- Exclusivo marcado de líneas guía para corte por MTR.
- Instalación más fácil y rápida. Máxima eficiencia en obra.
- Continuidad en las uniones gracias al exclusivo machihembrado de los paneles
- No proliferación de mohos y bacterias, EN 13403.
- Producto sostenible. 100% reciclable. Material reciclado > 50%.



Certificados



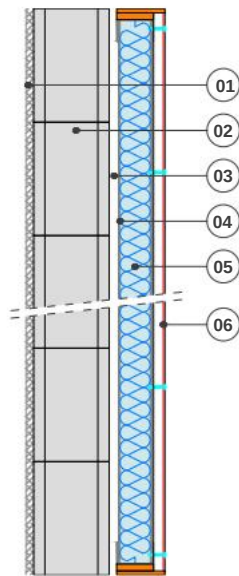
Guía de instalación

Consultar Manual de Montaje de conductos CLIMAVER
Información adicional disponible en: www.isover.es

ISOVER
SAINT-GOBAIN

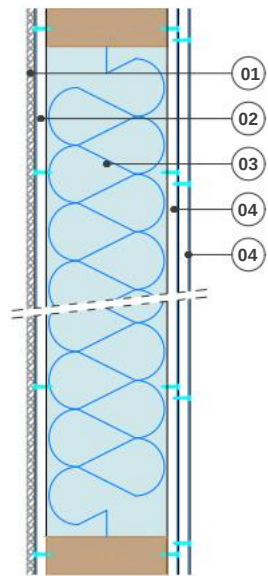
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APPENDIX 3. PLANS



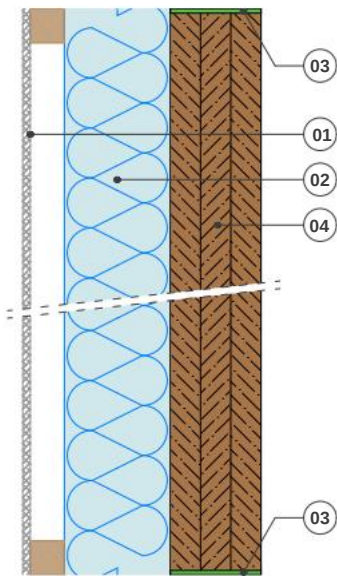
[FA-01]
FACADE CLOSURE 01
(Façade ground floor)

01. Smooth sheet
02. Concrete block 100mm wide, reinforced and reinforced with concrete
03. Separation 10mm
04. Self-supporting structure with channels and uprights in "H" of 48mm, on elastic band
05. Rock wool 70kg/m3 40mm
06. Laminated gypsum board of 15mm



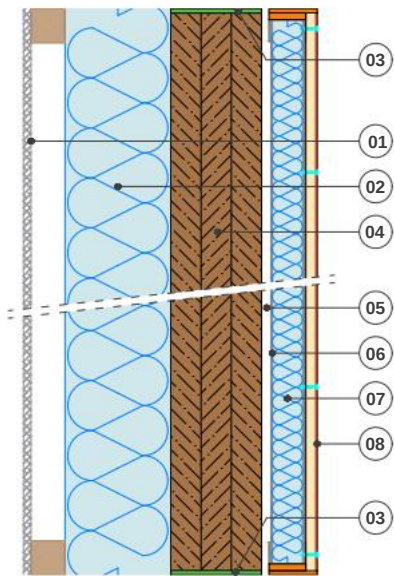
[FA-02]
FACADE CLOSURE 02
(Ground floor dining room front)

01. Smooth veneer
02. Aqua laminated plasterboard 15mm
03. 160mm structure with 70kg/m3 rock wool and 160mm between uprights
04. Double laminated gypsum board 13mm



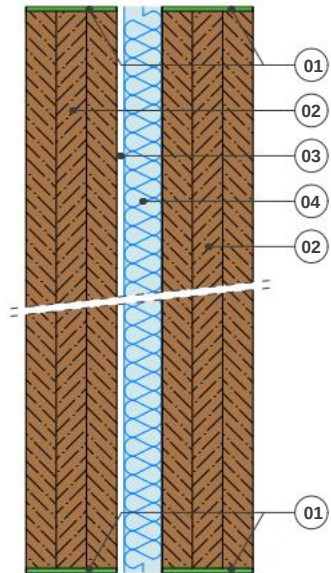
[FA-03]
FACADE CLOSURE 03
(Façade CLT seen first floor)

01. Micro-perforated sheet
02. Rock wool 180kg/m3 140mm
03. Elastic band
(dimensioned loads) seconds
04. CLT 120mm



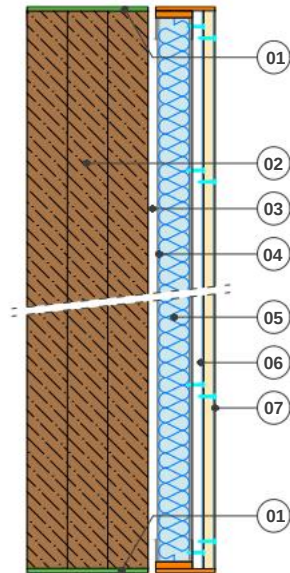
[FA-04]
FACADE CLOSURE 04
(Extrados first facade) of with plant

01. Micro-perforated sheet
02. Rock wool 180kg/m3 140mm
03. Elastic band
(dimensioned loads) seconds
04. CLT 120mm
05. Separation 10mm
06. Self-supporting structure with 48mm "H" uprights, on elastic band
07. Rock wool 70kg/m3 40mm
08. High hardness laminated plasterboard (1150kg/m3) 15mm



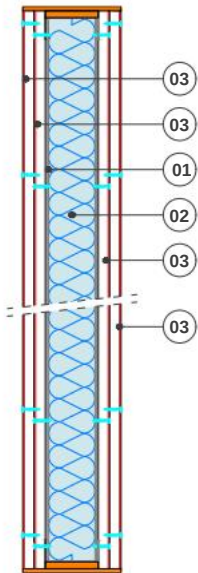
[DV-01]
INTERIOR PARTITION 01
(Classroom divider) between

01. Elastic band
(dimensioned loads) seconds
02. CLT 120mm
03. Separation / air chamber
04. Rock wool 70kg/m3 50mm



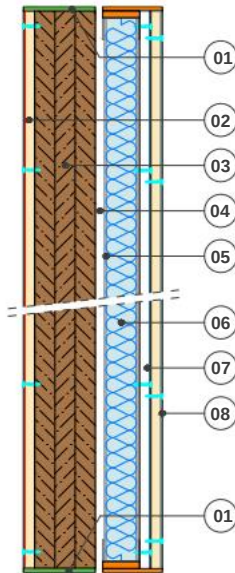
[DV-02]
INTERIOR PARTITION 02
(Hallway divider) between classrooms and

01. Elastic band
(dimensioned loads) seconds
02. CLT 160mm
03. Separation 10mm
04. Self-supporting structure with uprights in "H" of 48mm, on elastic band
05. Rock wool 70kg/m3 40mm
06. Laminated gypsum board 13mm
07. High hardness laminated gypsum board (1150kg/m3) 13mm



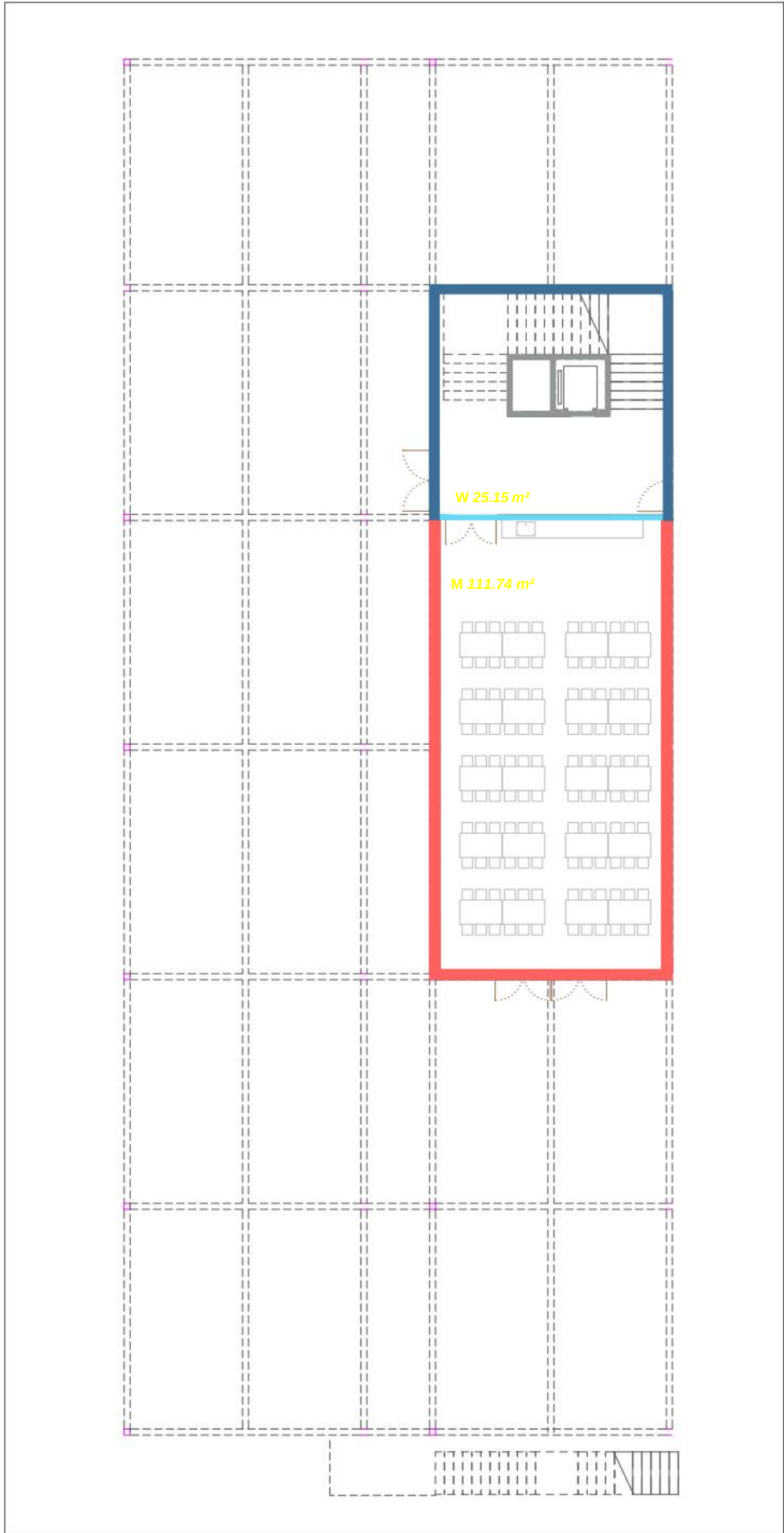
[DV-03]
INTERIOR PARTITION 03
(Living room hallway partition) bathrooms

01. Self-supporting structure with channels and uprights in "H" of 70mm, on elastic band
02. Rock wool 70kg/m3 60mm
03. Double laminated gypsum board 13mm



[DV-04]
INTERIOR PARTITION 04
(elevator drawer)

01. Elastic band
(dimensioned loads) seconds
02. High hardness laminated gypsum board (1150kg/m3) of 15mm
03. CLT 80mm
04. Separation 10mm
05. Self-supporting structure with 48mm "H" uprights, on elastic band
06. Rock wool 70kg/m3 40mm
07. Laminated gypsum board 13mm
08. High hardness laminated gypsum board (1150kg/m3) 13mm



GROUND FLOOR



FIRST FLOOR

LEGEND OF VERTICAL CLOSURES

EXTERNAL CLOSURES

Ground floor facade closure

type FA-01

Facade closure of the ground floor dining room

type FA-02

CLT facade closure seen from the first floor

type FA-03

CLT facade closure + first floor extrados

type FA-04

INTERNAL CLOSURES

Vertical closure between classrooms

type DV-01

Vertical closure between classrooms and corridor

type DV-02

Vertical closure between bathrooms and between dining room-corridor

type DV-03

Elevator drawer

type DV-04

PROJECT: Compliance with the CTE DB-HR in the expansion of the Tiana high school
Avinguda Eduard Fontserè s/n - Tiana (Barcelona)

PLAN: Vertical separation elements - Location of the different types

SCALE:
A3: 1 / 200
A1: 1 / 100

ENGINEER: JESUS URIOL and CHAVARRIGA.
Registered Mechanical Industrial Technical Engineer nº 15.385L
Query: <http://www.cetill.cat/CatalogoColegiados/Listado.aspx?IdMenu=21E594F2-2789-4AC8-A103-D57F828C9AE2&Idioma=ca-ES>

ARQ. TECHNICIAN: Adrià Sánchez Picamal

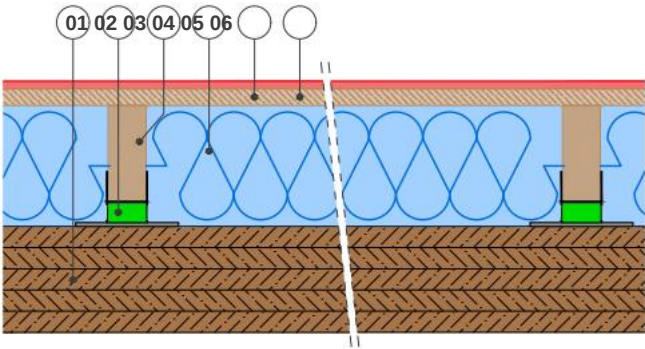
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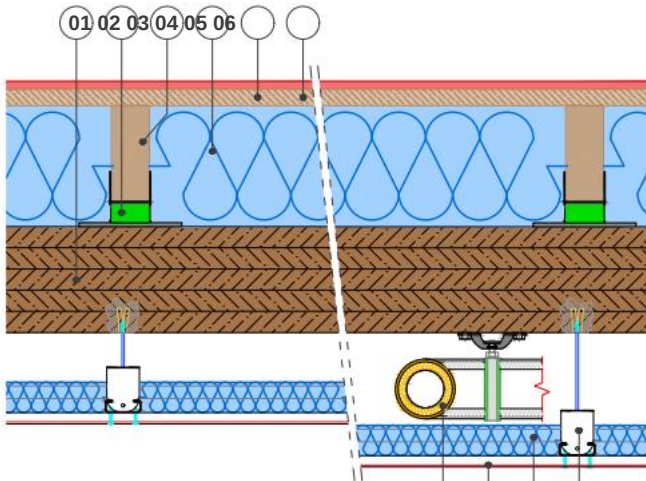
as

PLAN NO.:
02/10



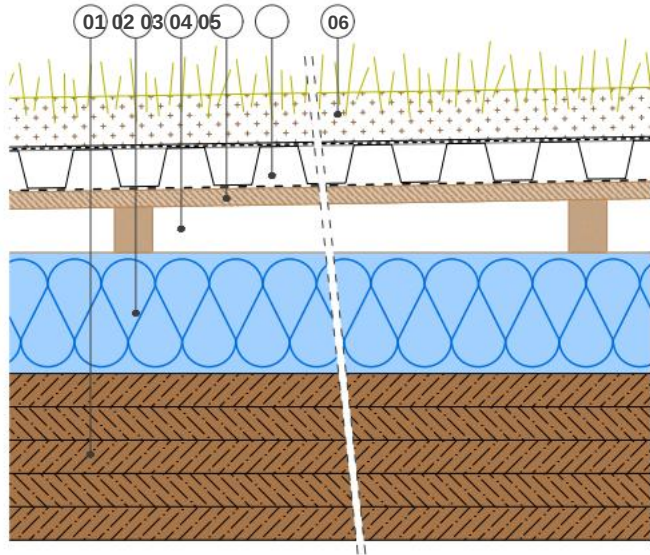
[SH-01]
HORIZONTAL SEPARATION 01
(First floor) between ground floor and first floor

01. Forged CLT
140mm 02. Acoustic+Sylomer Floor Mount supports or similar
(Dimensioned loads) according
03. Wooden rakes
04. Rock wool 30kg/m3 160mm 05.
Superpan chipboard 22mm 06.
Continuous linoleum flooring



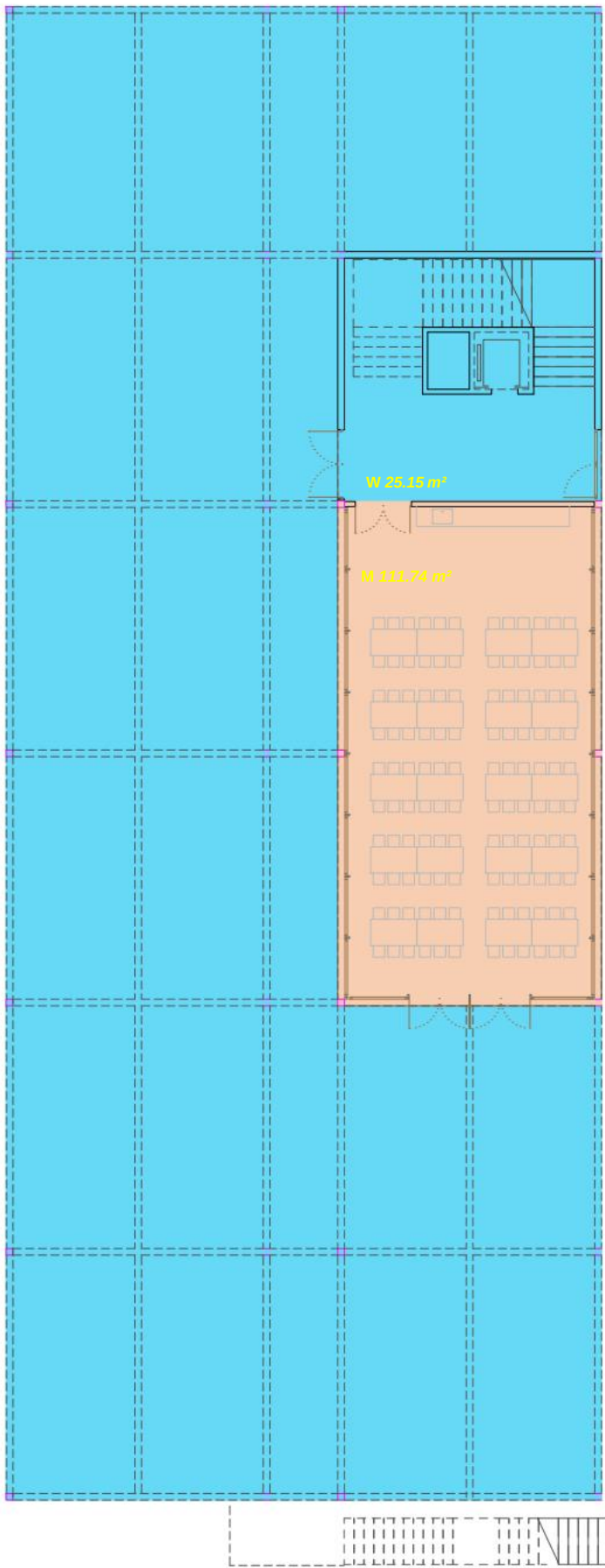
[SH-02]
HORIZONTAL SEPARATION 02
(Forged between ground floor and first floor in the dining room)

01. Forged CLT
140mm 02. Acoustic+Sylomer Floor Mount supports or similar
(Dimensioned according to loads)
03. Wooden rakes 04.
Rock wool 30kg/m3 160mm 05.
Superpan chipboard 22mm 06.
Continuous linoleum floor 07. Structure
for a flat ceiling made of TC60 supports and channels 08.
Rock wool 70kg/m3 and 40mm 09. Laminated gypsum board
15mm 10. Facilities
(like eg. downcomers) coated with Tecound FT75 or
similar and hung with rubber-metal anti-vibration supports
and isophonic flanges

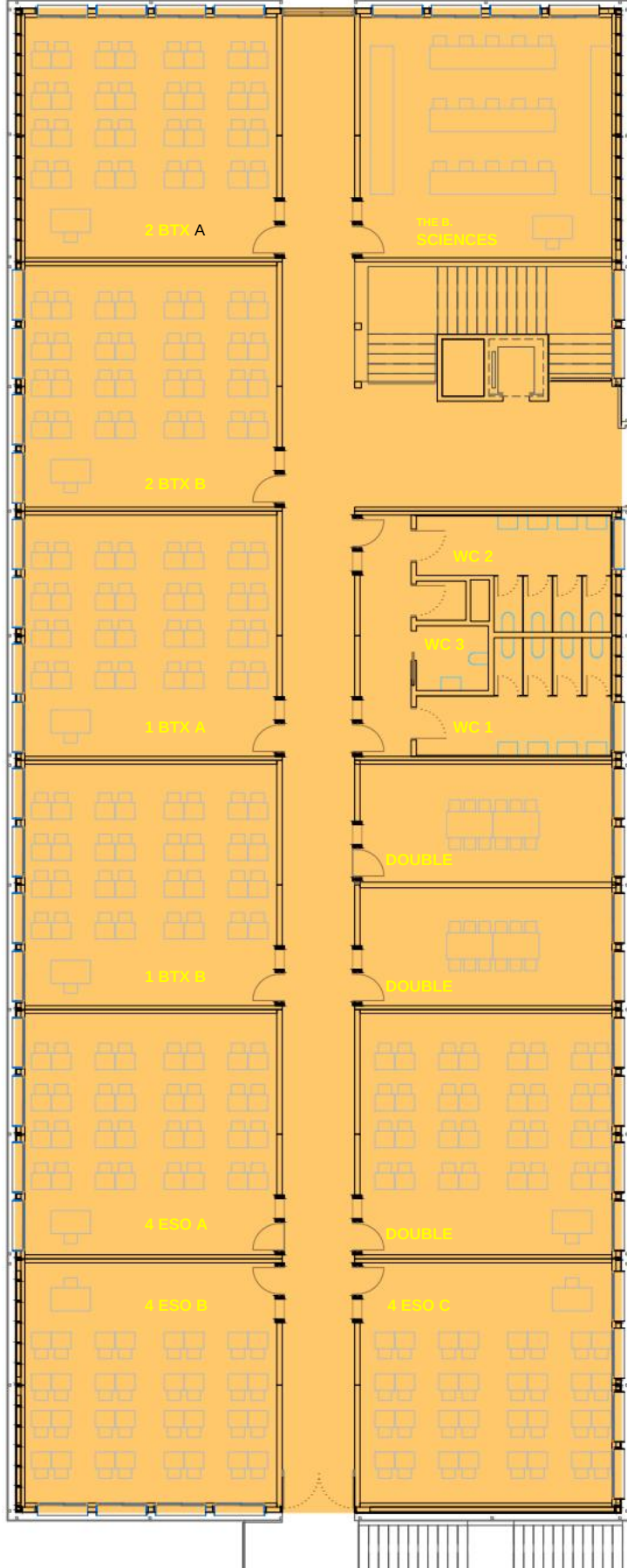


[SH-03]
HORIZONTAL SEPARATION 03
(flat cover)

01. Forged CLT
220mm 02. Rock wool insulation 30kg/m3 160mm
03. Air chamber and screeds for the formation of slopes
04. Superpan chipboard 22mm 05. Waterproof sheet +
drainage 06. Serum 22mm + planting



FOUNDATION BETWEEN GROUND FLOOR AND FIRST FLOOR



FORGED BETWEEN FIRST FLOOR AND COVERED FLOOR

LEGEND OF IZONTAL HOR CLOSURES

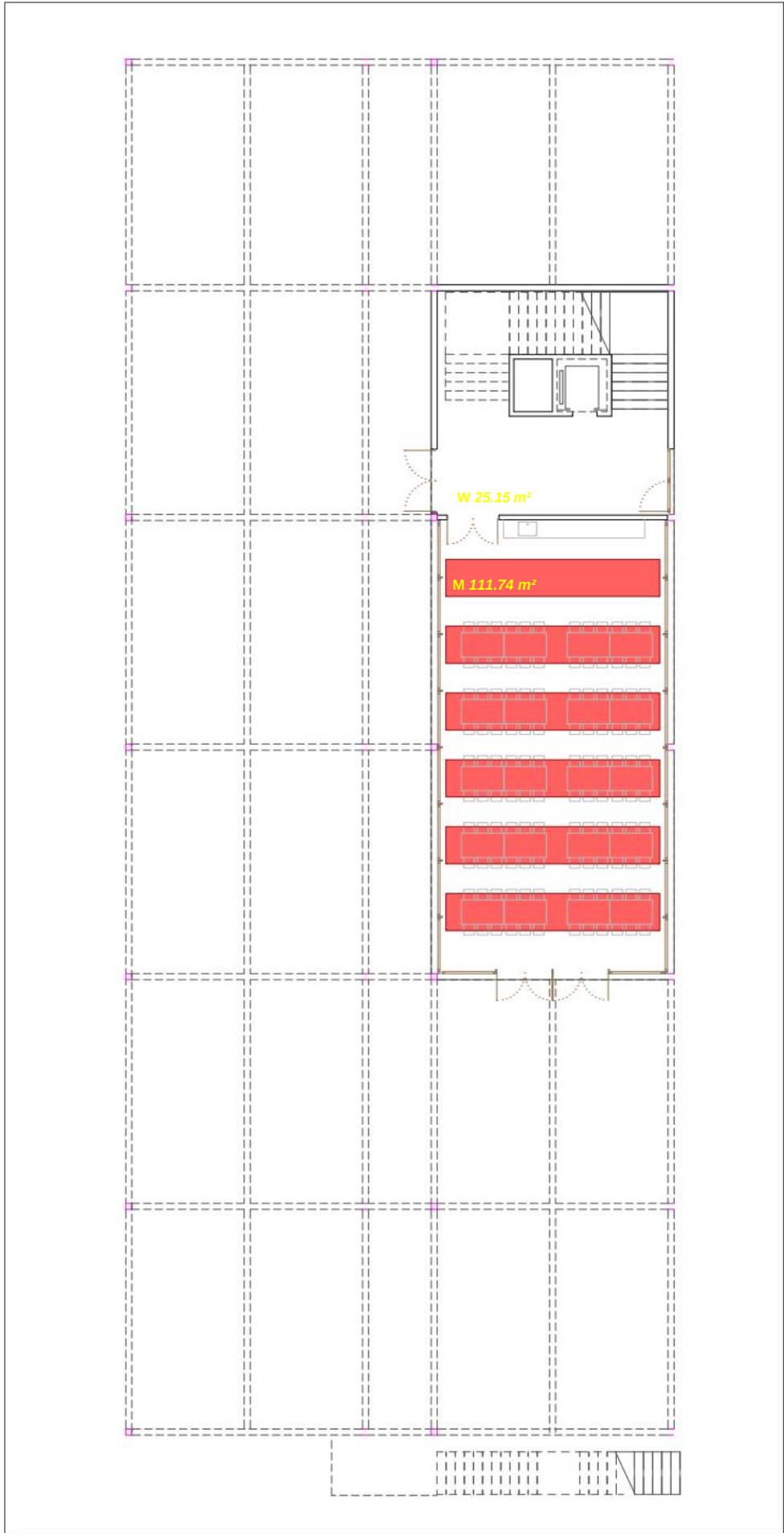
COVER CLOSURES

Forged CLT 220 + green cover
type SH-03

INTERNAL CLOSURES

Forged CLT 140 + floating floor
type SH-01

Forged CLT 140 + floating floor + sky level pyl
type SH-02



FOUNDATION BETWEEN GROUND FLOOR AND FIRST FLOOR



FORGED BETWEEN FIRST FLOOR AND COVERED FLOOR

LEGENDAREABSORBENT CLOTHING

COVER CLOSURES

Absorption to ceilings
system Heraklith 25mm + mineralwool 25mm

Minimum area required for compliance with 0.70s:

Large classrooms: 50 of the roof area

Small classrooms: 50 of the roof area

Corridor: 73m

Dining room: 45 of the ceiling surface

Wall absorption
25mm system Heraklith + mineral wool 25mm

Area required for compliance with 0.70s:

Large classrooms: 40 of the classroom-corridor wall surface

Small classrooms: 40 of the classroom-corridor wall surface

Corridor: --

Dining room: --

FLOOR / WALL

Mineral wool 30kg/m3, 25mm

Heraklith Heradesign fine
25mm panels or similar

Support structure

System absorption α_w : 0.80

(See attached acoustic sheet) of the study
impact

PROJECT: Compliance with the CTE DB-HR in the expansion of the Tiana high school
Avinguda Eduard Fontserè s/n - Tiana (Barcelona)

SCALE:
A3: 1 / 200
A1: 1 / 100

ENGINEER: JESUS URIOL and CHAVARRIGA.
Registered Mechanical Industrial Technical Engineer nº 15.385L
Query: <http://www.cetill.cat/CatalogoColegiados/Listado.aspx?IdMenu=21E594F2-2789-4AC8-A103-D57F828C9AE2&Idioma=ca-ES>

ARQ. TECHNICIAN: Adrià Sánchez Picamal

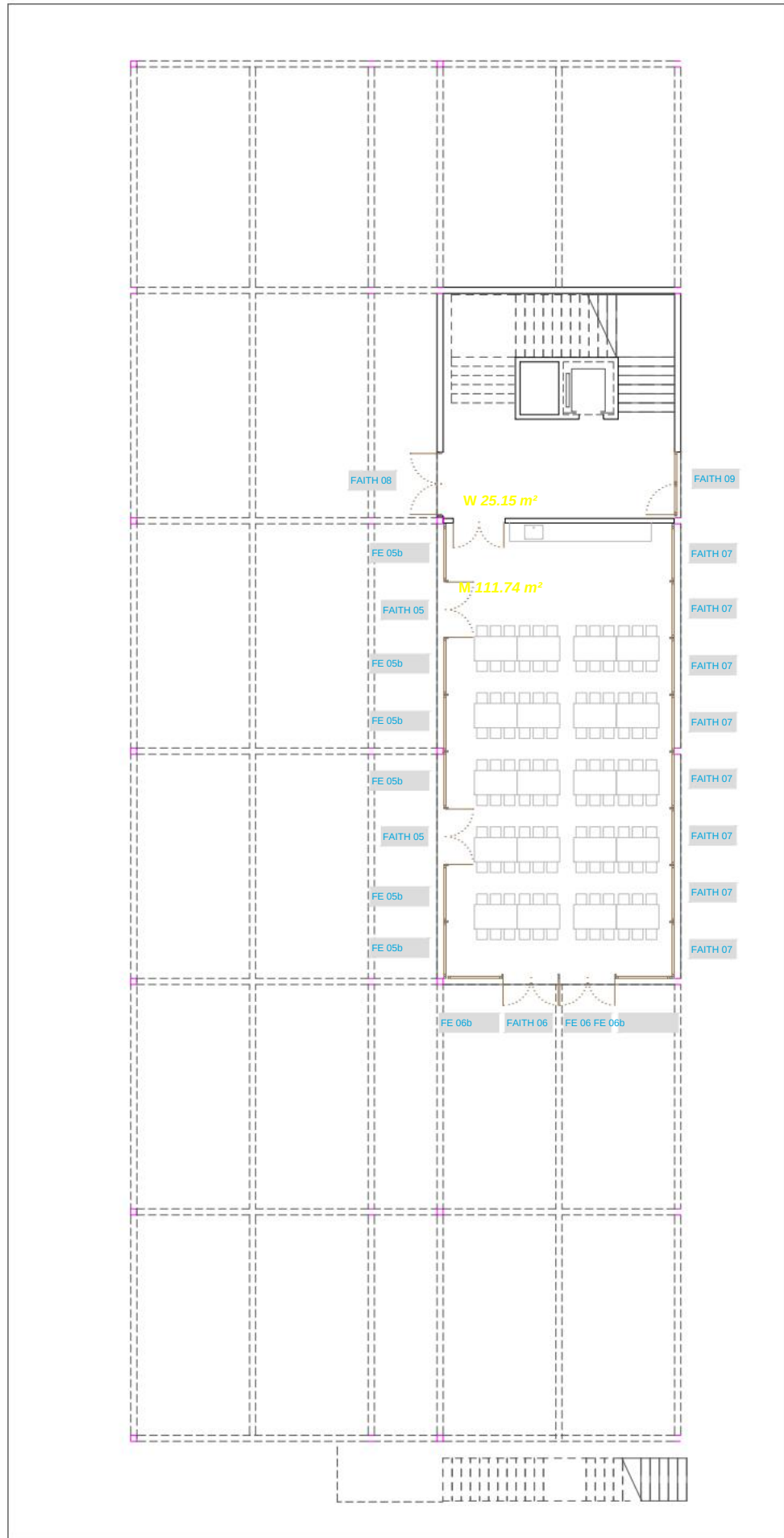
DATE: 05/07/2021

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PLAN NO.:
05/10



GROUND FLOOR



FIRST FLOOR

WINDOW LEGEND

Núm. *	Tipus de finestra	Ubicació	Envidriament (Vidre ext. / cambra / Vidre int.)	Rw MÍN/M
FE-01	Finestra corredissa de dues fulles 1530x1670mm	Planta primera Aules	6 / 10 / 44.1	33 (-1 ; -4)
FE-02	Balconera practicable de dos fulles 2200x2100mm	Planta primera Passadís	6 / 10 / 44.1	33 (-1 ; -4)
FE-03	Balconera practicable de dos fulles 2200x2100mm	Planta primera Passadís	6 / 10 / 44.1	33 (-1 ; -4)
FE-05	Balconera practicable de dos fulles 1840x2100mm	Planta baixa Menjador	6 / 10 / 44.1	33 (-1 ; -4)
FE-05b	Pany fix 1840x2100mm	Planta baixa Menjador	6 / 10 / 44.1	33 (-1 ; -4)
FE-06	Balconera practicable de dos fulles 1900x2100mm	Planta baixa Menjador	6 / 10 / 44.1	33 (-1 ; -4)
FE-06b	Pany fix 1900x2100mm	Planta baixa Menjador	6 / 10 / 44.1	33 (-1 ; -4)
FE-07	Pany fix 1840x2100mm	Planta baixa Menjador	6 / 10 / 44.1	33 (-1 ; -4)
FE-08	Balconera practicable de dos fulles 2100x2100mm	Planta baixa Vestíbul	6 / 10 / 44.1	33 (-1 ; -4)
FE-09	Balconera practicable de dos fulles 2100x2100mm	Planta baixa Vestíbul	6 / 10 / 44.1	33 (-1 ; -4)

PROJECT: Compliance with the CTE DB-HR in the expansion of the Tiana high school
Avinguda Eduard Fontserè s/n - Tiana (Barcelona)

SCALE:
A3: 1 / 200
A1: 1 / 100

ENGINEER: JESUS URIOL and CHAVARRIGA.
Registered Mechanical Industrial Technical Engineer nº 15.385L
Query: <http://www.cetill.cat/CatalogoColegiados/Listado.aspx?IdMenu=21E594F2-2789-4AC8-A103-D57F828C9AE2&Idioma=ca-ES>

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DATE: 05/07/2021

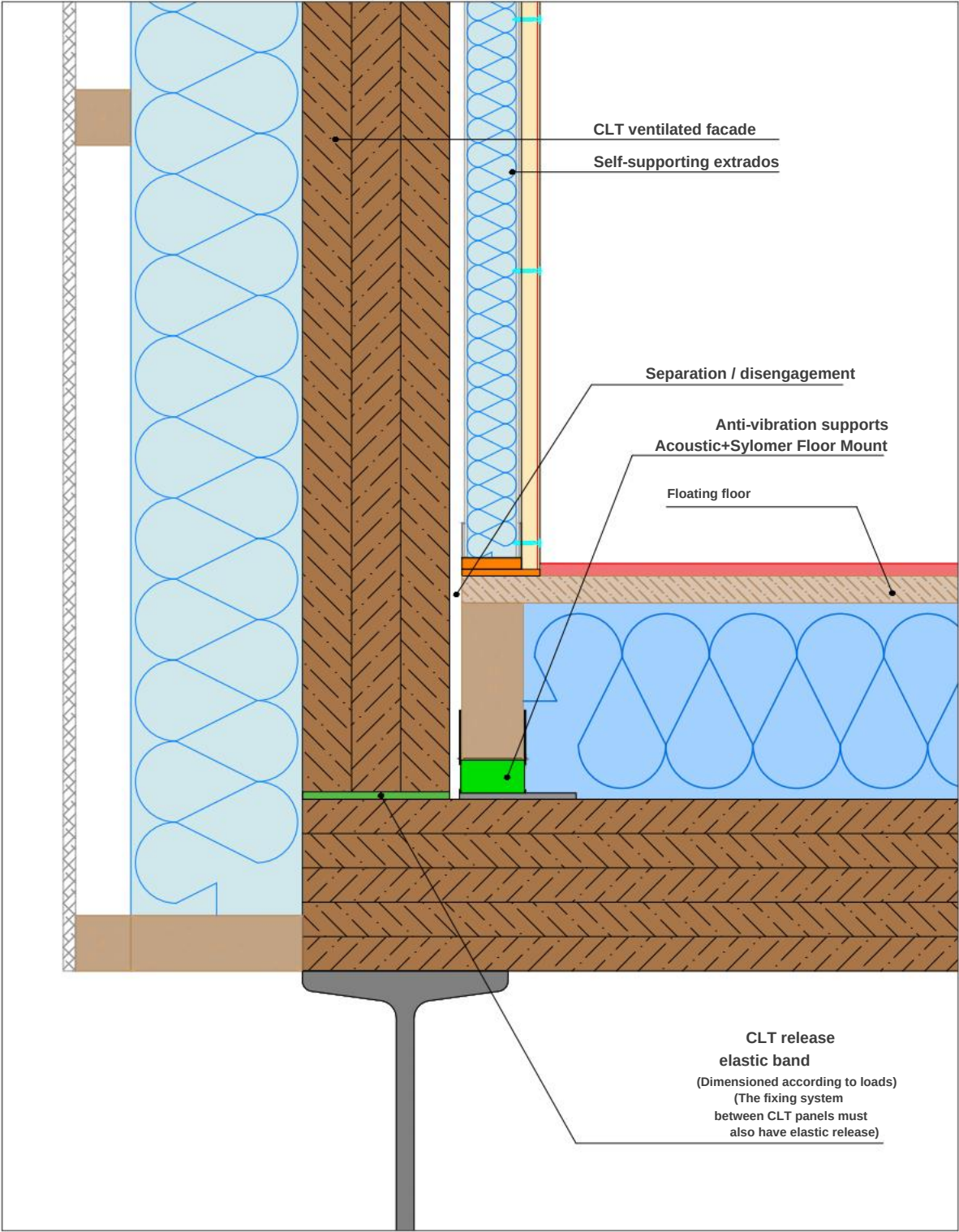
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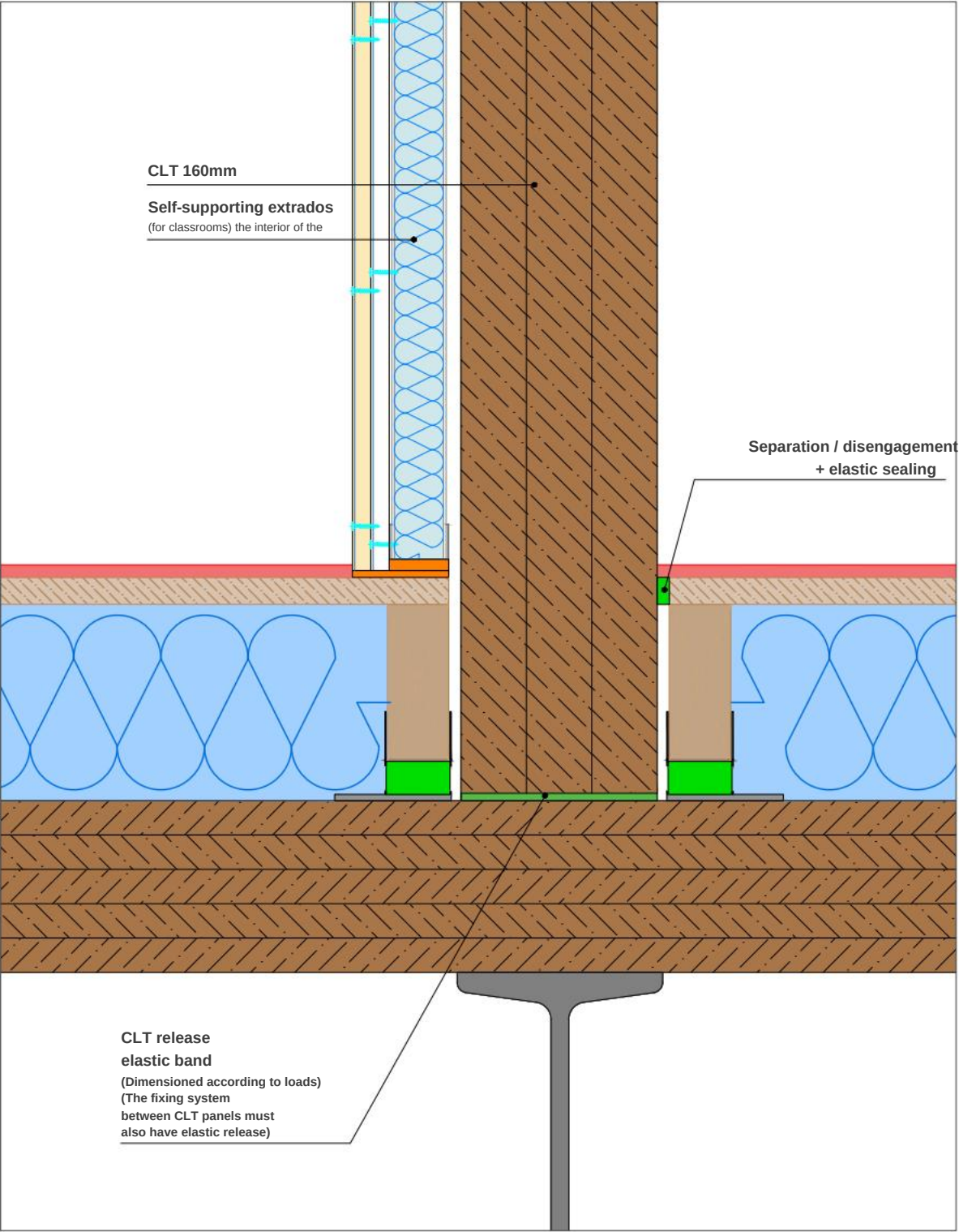


PLAN NO.: 06/10

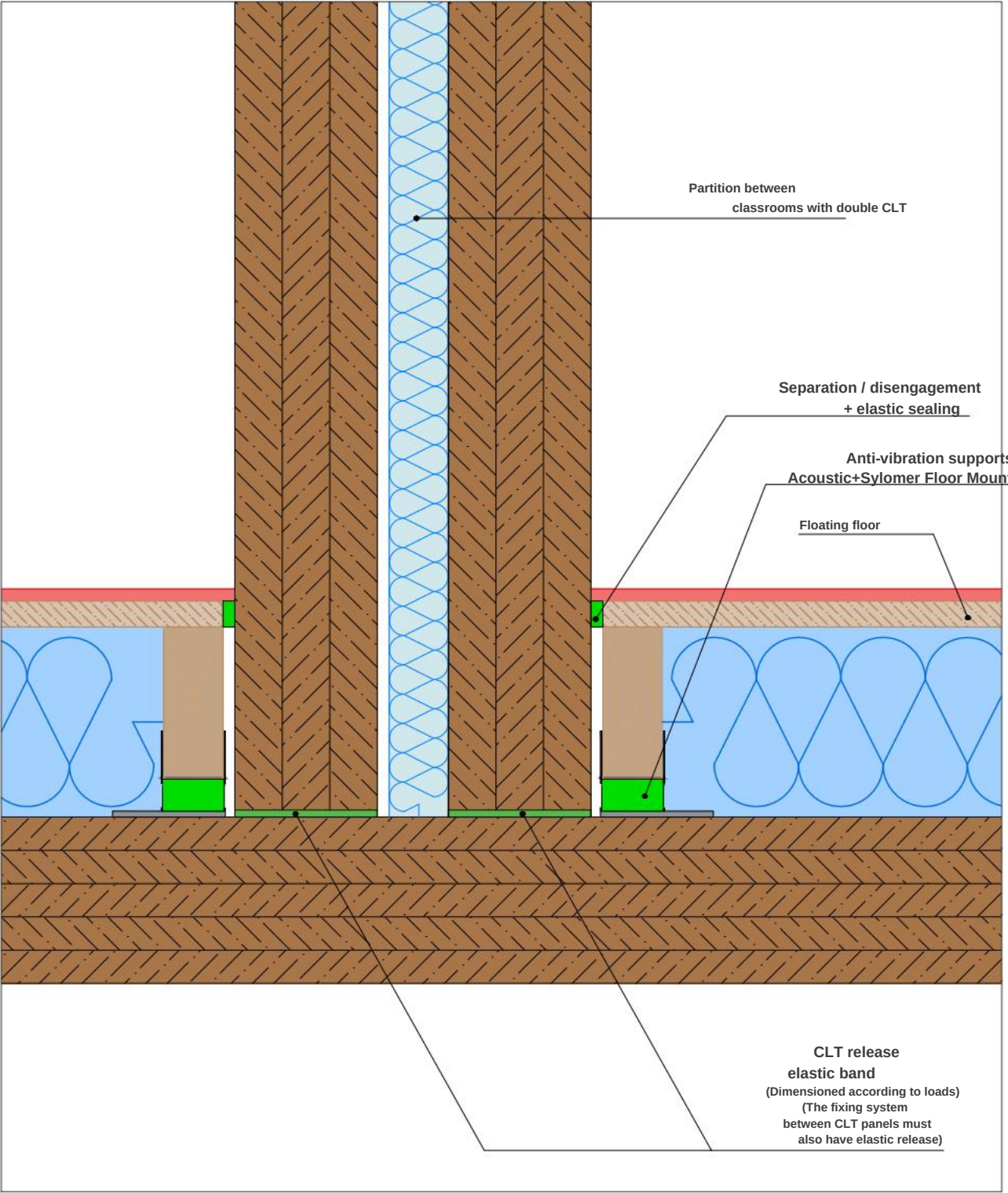
Detail of the junction between the CLT facade and the slab between the ground floor and the first floor, also of CLT



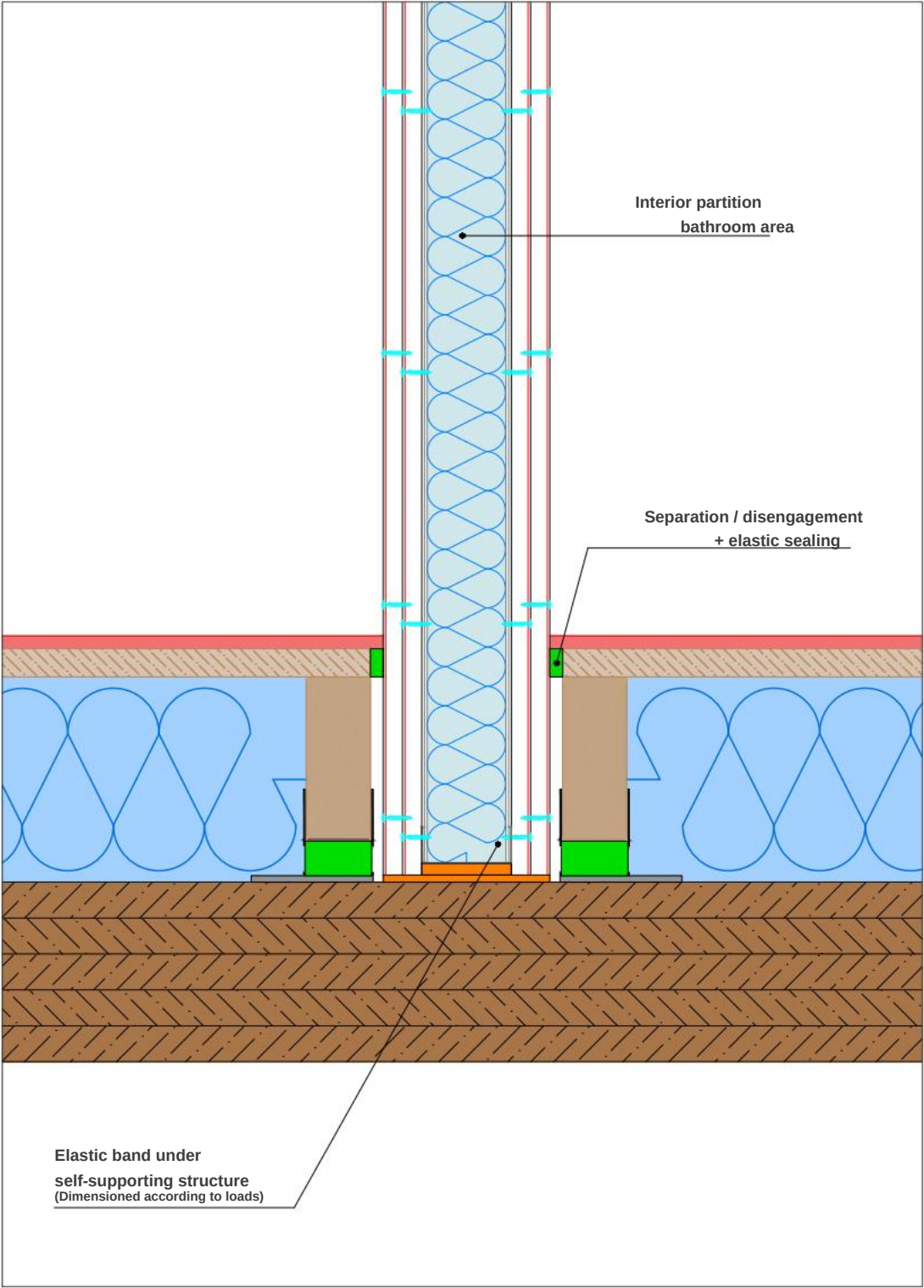
Detail of the junction between the CLT partition between classrooms and corridor and the slab between ground floor and first floor, also CLT



Detail of the junction between the CLT partition between classrooms and the slab between the ground floor and the first floor, also of CLT



Detail of the junction between the partition of laminated plasterboard between bathrooms and the slab between ground floor and first floor of CLT



TREATMENT OF RECOVERERS

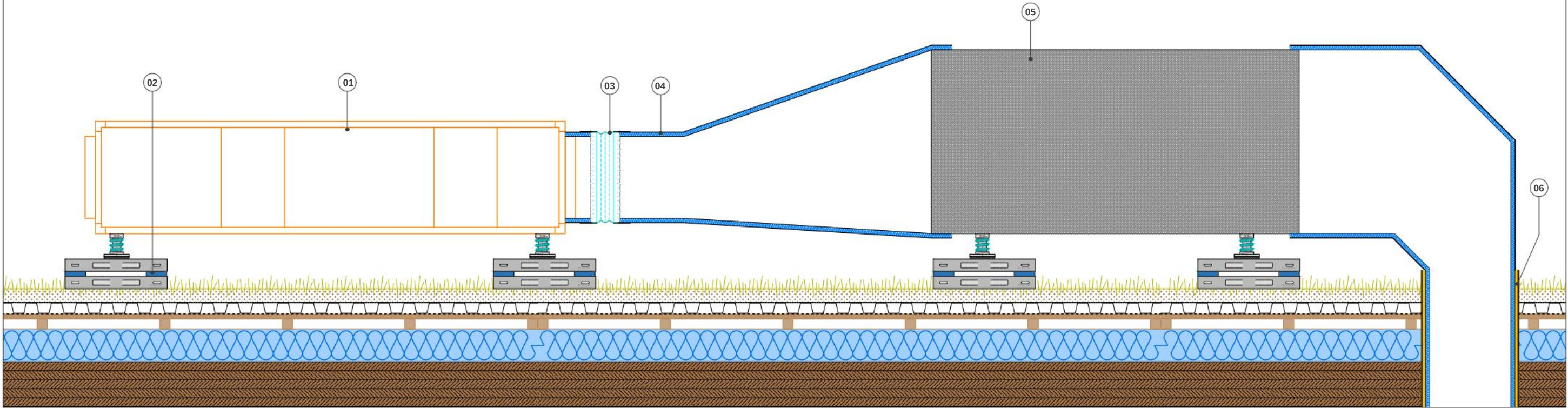
LEGEND 01.

Heat recuperator
Classrooms P1: CADB-HE-100-PRO-D of 8100m3/h
Classrooms P1: CADB-HE-60-PRO-D of 5760m3/h
Canteen PB: CADB-HE-27-PRO-DC of 2232m3/h

02. Anti-vibration treatment of equipment and silencers, made up of:
02.1. Anti-vibration supports of metal molds between the equipment and the bench (Dimensioned ~~loads~~) according
02.2. Prefabricated inertia bench "ROBUST" of 500x500x60mm
02.3. Rubber anti-vibration support between benches
02.4. Prefabricated inertia bench "ROBUST" of 500x500x60mm

03. Durodyne elastic gasket or similar
04. Climaver Apta A1 pipes from Isover or similar
05. Acoustic silencer:
For the CADB-HE-27-PRO-DC recuperator of 2232m3/h: 1800mm of travel, 600mm of width and 500mm of height, with intermediate cells of 200mm, lateral cells of 100mm, space between cells the 100mm ones
For the CADB-HE-60-PRO-D recuperator of 5760m3/h: 1800mm of travel, 900mm of width and 900mm of height, with intermediate cells of 200mm, lateral cells of 100mm, space between cells the 100mm ones
For the CADB-HE-100-PRO-D recuperator of 8100m3/h: 1800mm of travel, 1200mm of width and 900mm of height, with intermediate cells of 200mm, side cells of 100mm, space between cells the 100mm ones
(In all cases requires muffler both to the drive how on return)

06. Elastic grommet formed by Tecsound FT75 and sealed with Sikaflex or similar



PROJECT: Compliance with the CTE DB-HR in the expansion of the Tiana high school
Avinguda Eduard Fontserè s/n - Tiana (Barcelona)

PLAN: Pipes and system of heat recuperators - Treatment of heat recuperators

SCALE:
A3: 1 / 20
A1 : 1 / 10

ENGINEER: JESUS URIOL and CHAVARRIGA.
Registered Mechanical Industrial Technical Engineer nº 15.385L
Query: <http://www.cetill.cat/CatalogoColegiados/Listado.aspx?IdMenu=21E594F2-2789-4AC8-A103-D57F828C9AE2&Idioma=ca-ES>

ARQ. TECHNICIAN: Adrià Sánchez Picamal

DATE: 05/07/2021

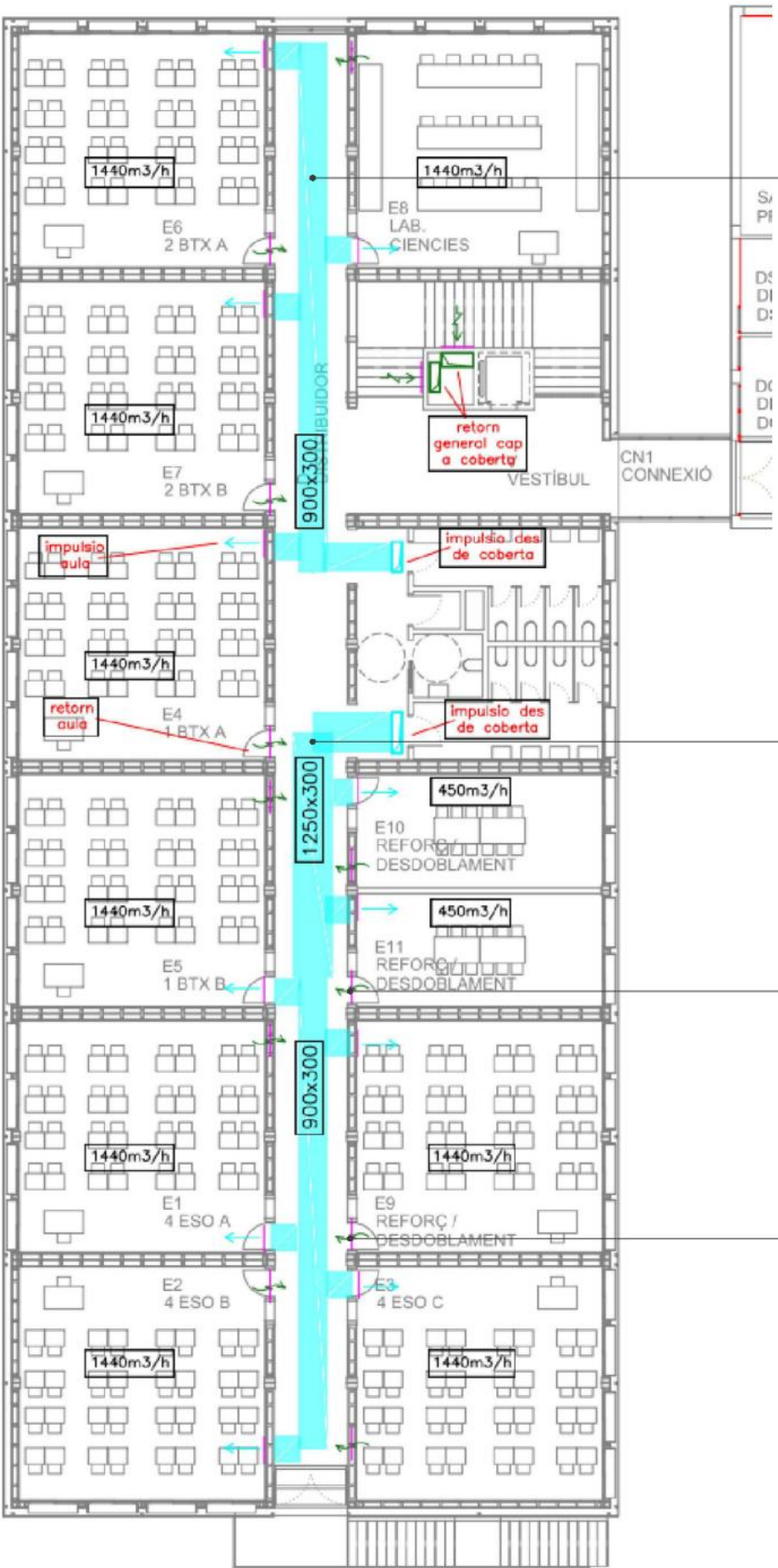
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PLAN NO.:
09/10

TREATMENT OF DUCT AND AIR TREATMENT SYSTEM



Impulse system with internal ducts using Climaver Apta A1 from Isover or similar.
Maximum speed of air passage: 7m/s
The mouths to the different classrooms must be separated as much as possible to avoid cross noise through the ducts

Impulse system with internal ducts using Climaver Apta A1 from Isover or similar.
Maximum speed of air passage: 7m/s
The mouths to the different classrooms must be separated as much as possible to avoid cross noise through the ducts

Return system through plenum. An acoustic silencer is required to be installed between the classrooms and the corridor.
Silencer dimensions for a flow rate of 450m³/h:
900mm length, 300mm width and 300mm height, with 100mm side cells, 100mm space between cells

Return system through plenum. An acoustic silencer is required to be installed between the classrooms and the corridor.
Silencer dimensions for a flow rate of 1440m³/h:
900mm length, 600mm width and 350mm height, with intermediate cells of 200mm, side cells of 100mm, space between cells of 100mm

PROJECT: Compliance with the CTE DB-HR in the expansion of the Tiana high school
Avinguda Eduard Fontserè s/n - Tiana (Barcelona)

PLAN: Ducts and system of heat recuperators - Treatment of interior ducts

SCALE:
A3: - / -
A1: - / -

ENGINEER: JESUS URIOL and CHAVARRIGA.
Registered Mechanical Industrial Technical Engineer nº 15.385L
Query: <http://www.cetill.cat/CatalogoColegiados/Listado.aspx?IdMenu=21E594F2-2789-4AC8-A103-D57F828C9AE2&Idioma=ca-ES>

ARQ. TECHNICIAN: Adrià Sánchez Picamal

DATE: 05/07/2021

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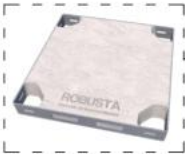


PLAN NO.:
10/10

In the event that the premises need to install smoke extraction machines, ventilation, air conditioning and/or other machines that can produce noise and vibrations, we recommend that these be placed on the roof.

Depending on the location of the machine, the vertical extraction stand, the type of duct installed or existing and the air flow rate, it may be necessary to install an acoustic silencer that attenuates the noise that it is transmitted through the inside of the duct.

shielding or encapsulation machine by cabin or technical acoustic partitioning to receive file from characteristics of the machines and his location. (complete technical sheet where indicate the radiated noise at 1m from the driven and not driven) *



LEGEND 01.

Elastic band Sylomer SR

(Dimensioned calculations and second loads)

02. Prefabricated inertia bench of "ROBURST" 500x500x60mm

03. Anti-vibration supports of metal molds

(Dimensioned according to loads)

04. Rubber-metal anti-vibration supports

(Dimensioned loads) according to

05. Isophonic flanges

06. Durodyne elastic gasket or similar

07. Insulated ducts

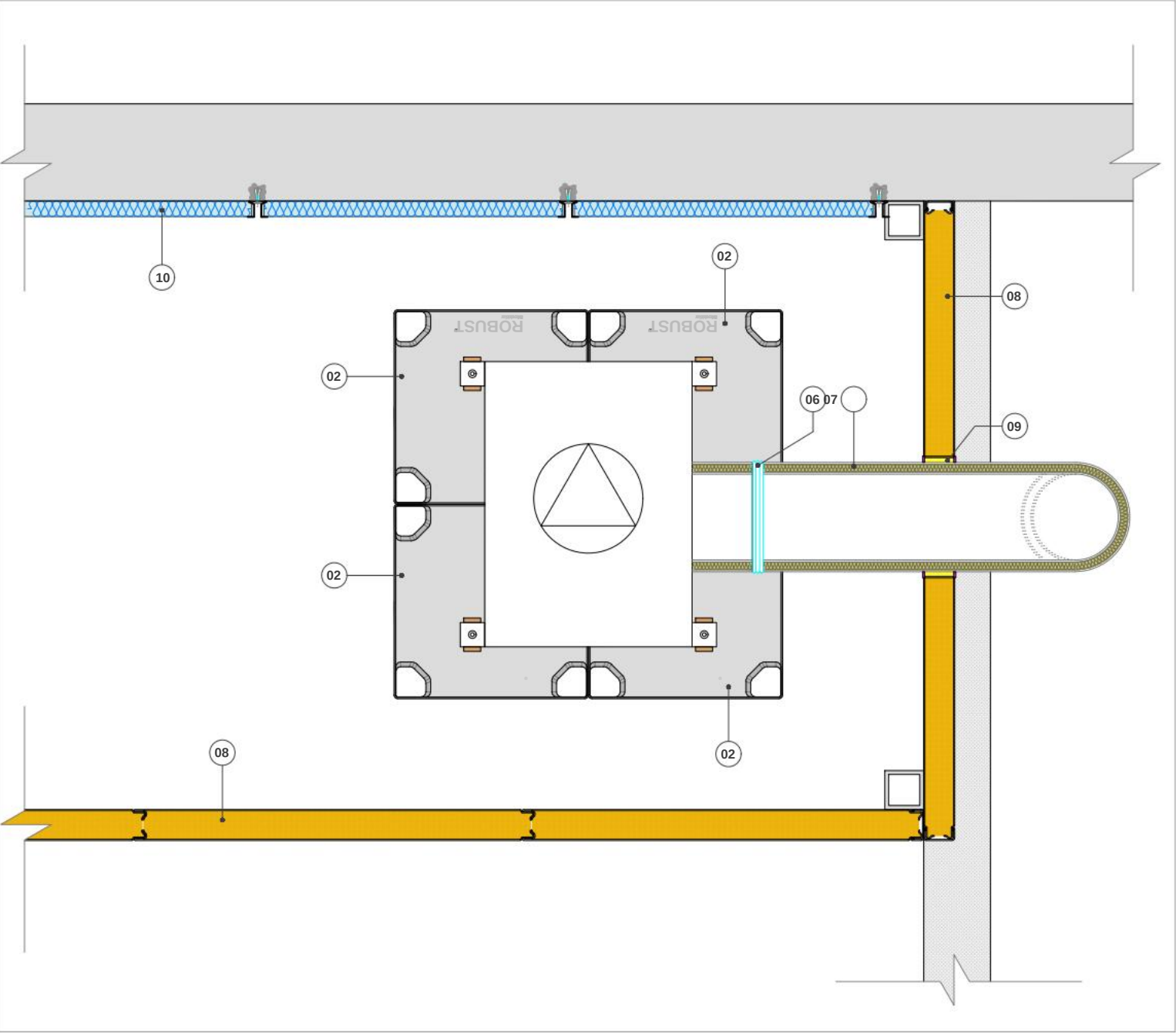
08. Acoustic screen dimensioned according to calculations and location of the possible affected, with top/crown with 50cm of screen at 45°

(Micro-perforated part of the directed towards screen inside)

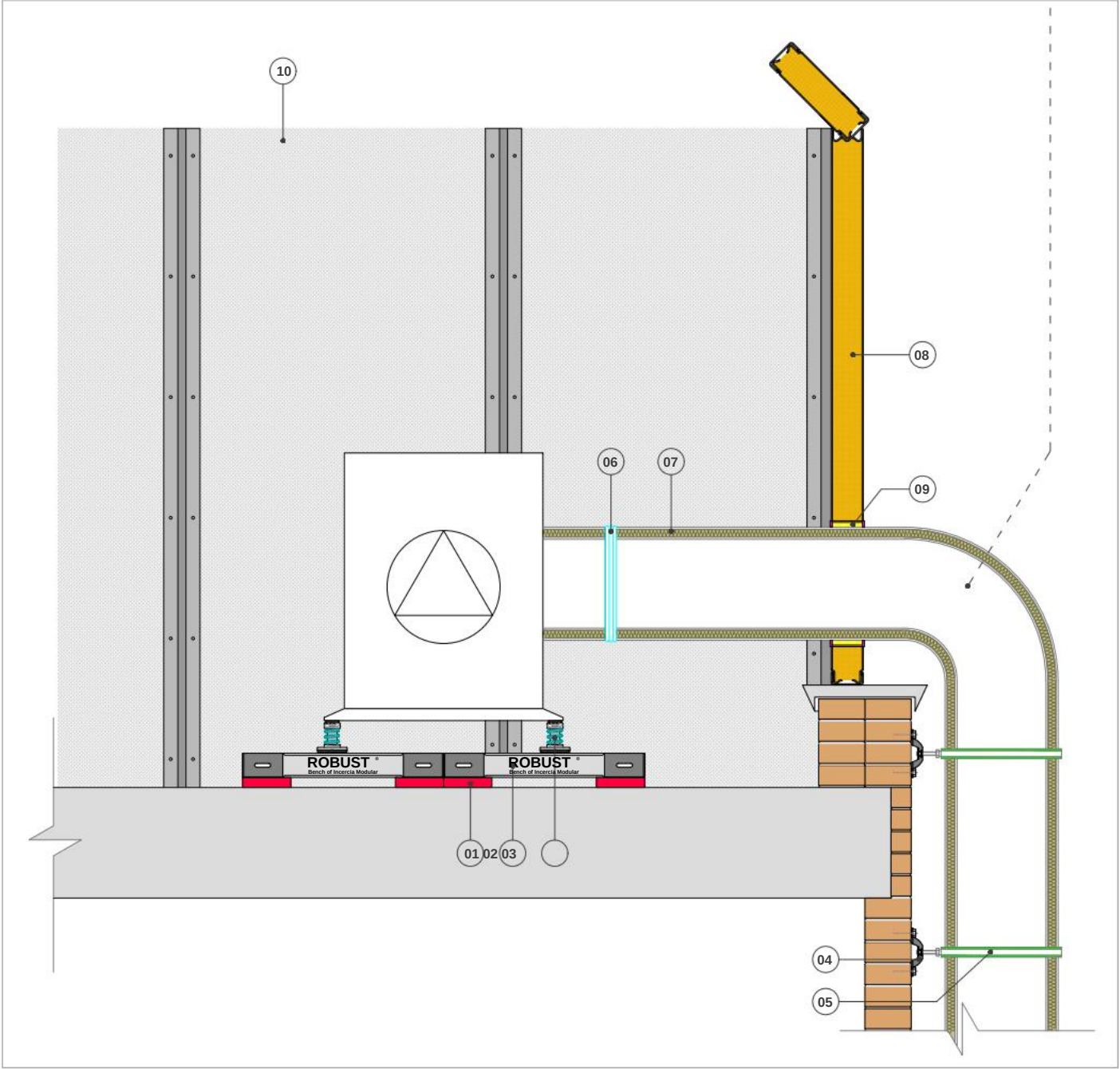
09. Elastic joint

10. Sound-absorbing material anchored with omega profiles or a similar system to the existing side walls

location of the machine of the is possible be that necessary to insert one silencer)

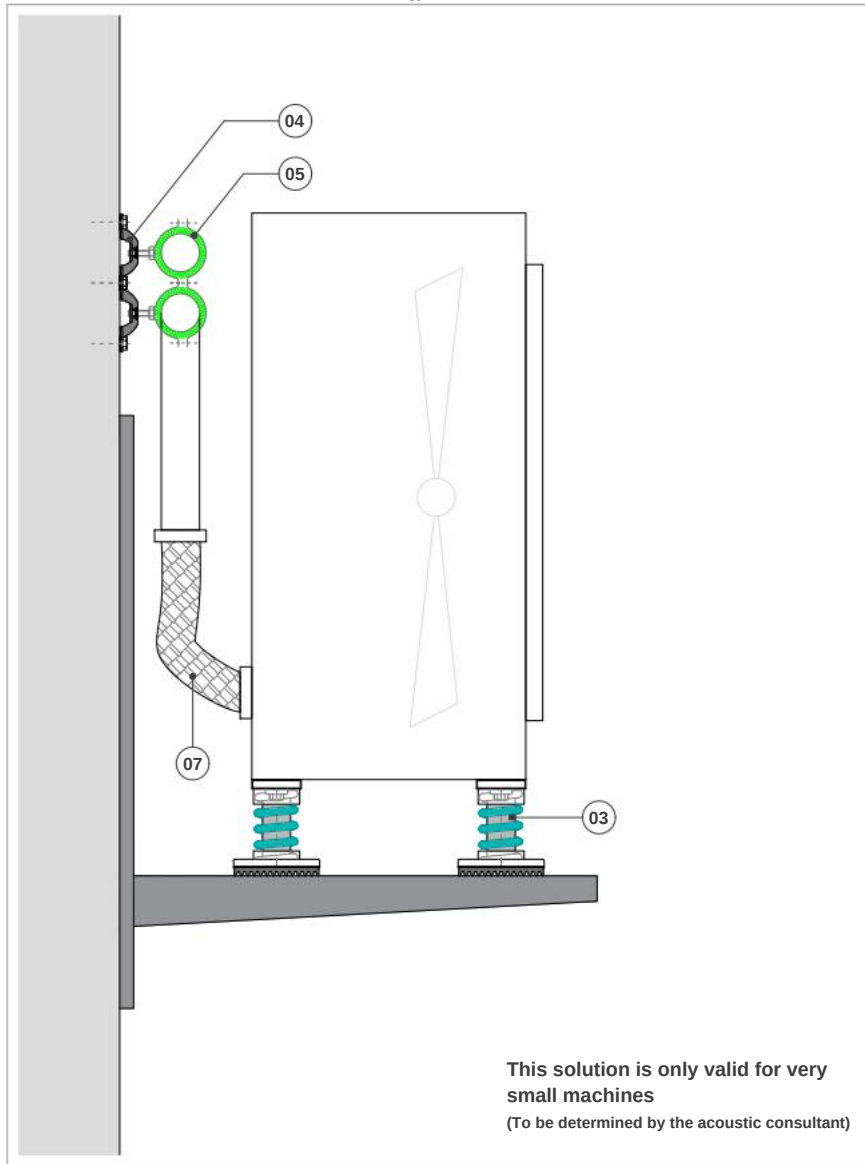


Detail AA01. Plan view of exterior machine located on deck

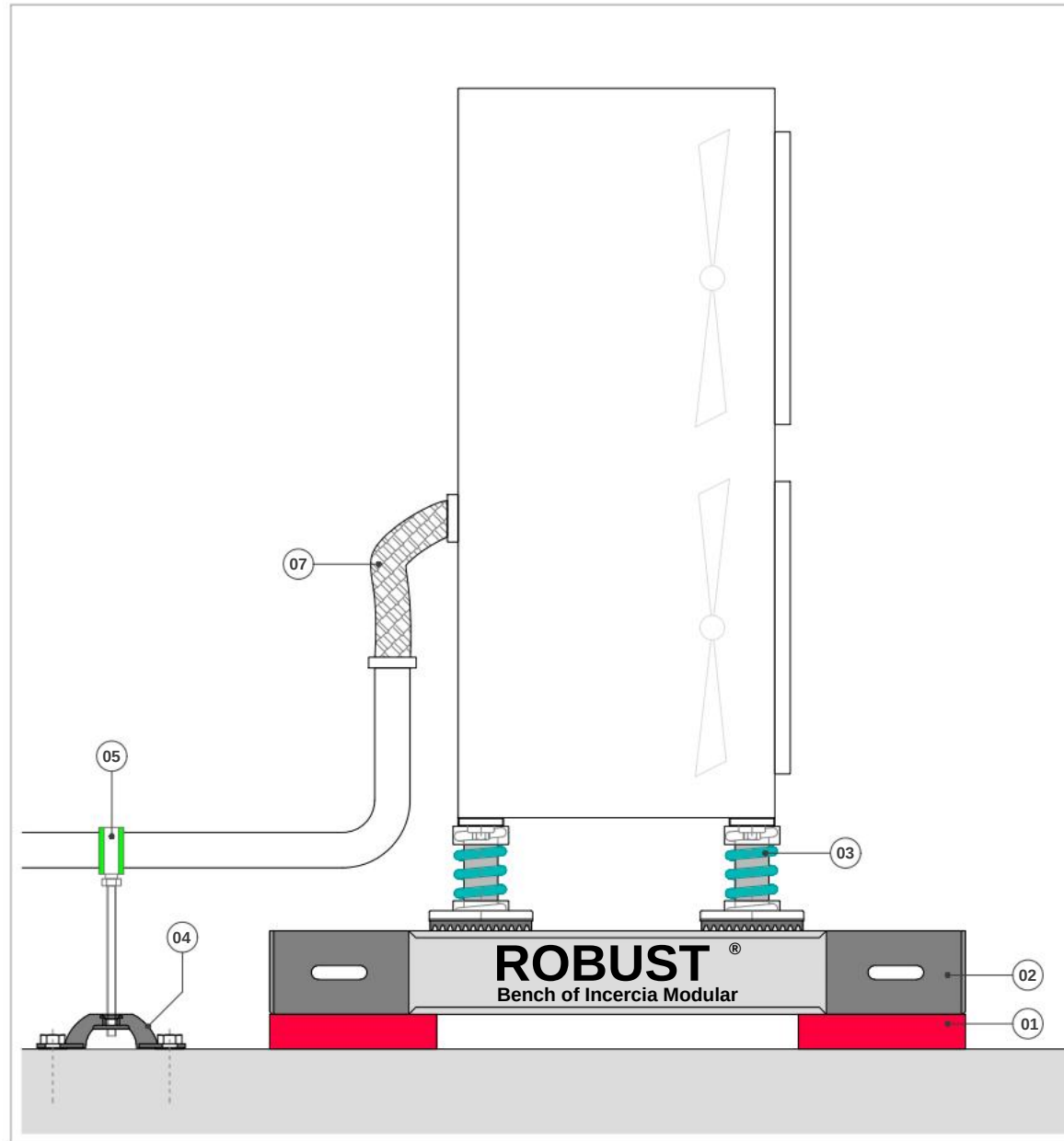


Detail AA02. Section view of exterior machine located on deck

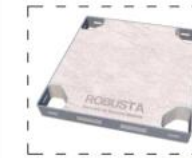
* shielding or encapsulation machine by cabin or technical acoustic barrier to receive file from characteristics of the machines and his location. (complete technical sheet where indicate the indicated noise at 1m from the driven and without driving)



Detail AA01. Outdoor machine hung on the wall with anti-vibration treatment on the machine and ducts



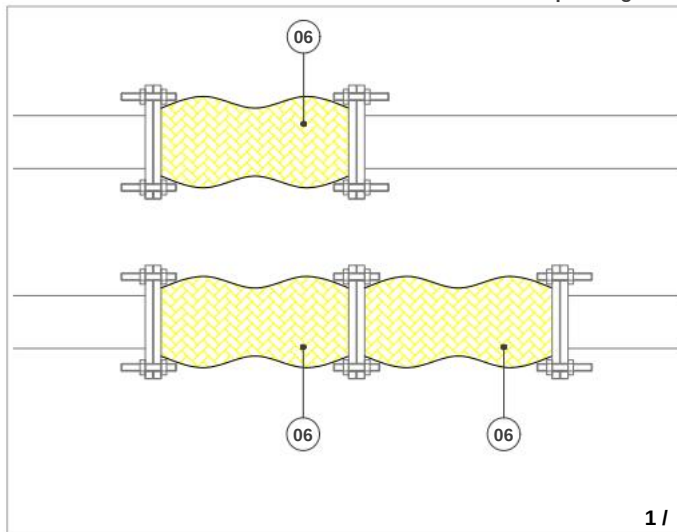
Detail AA02. Outdoor machine resting on the floor with anti-vibration treatment on the machine and ducts



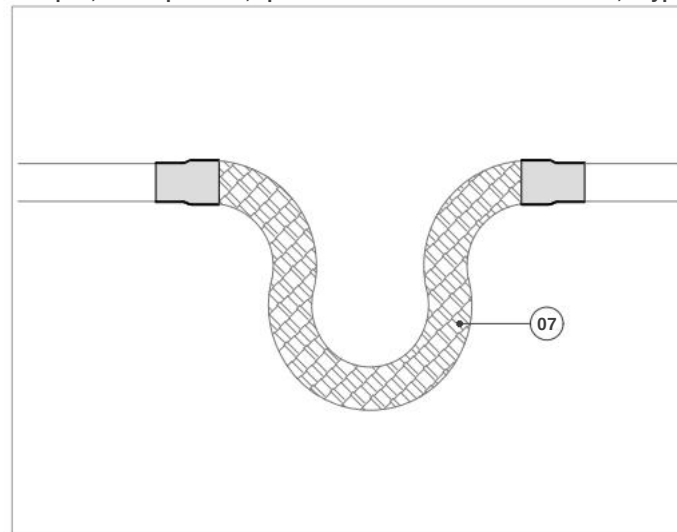
- LEGEND 01.**
Elastic band Sylomer SR
(Dimensioned load calculations) and seconds
02. Prefabricated inertia bench "ROBUST" of 500x500x60mm
03. Anti-vibration supports of metal molds
(Dimensioned second loads)
04. Rubber-metal anti-vibration supports
(Dimensioned loads) according to
05. Isophonic flanges
06. Double wave joint
07. Flexible sleeves with or without lyre shape
(To be determined work)

In the event that the premises need to install smoke extraction machines, ventilation, air conditioning and/or other machines that can produce noise and vibrations, we recommend that these be placed on the roof.

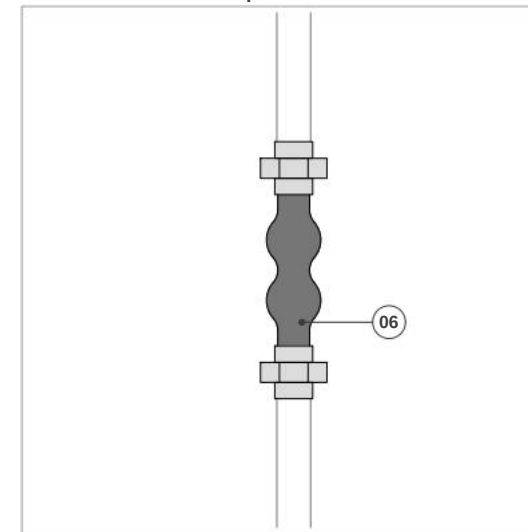
Depending on the type of liquid, its temperature, speed and the location of the machine, a type of joint and/or sleeve must be placed



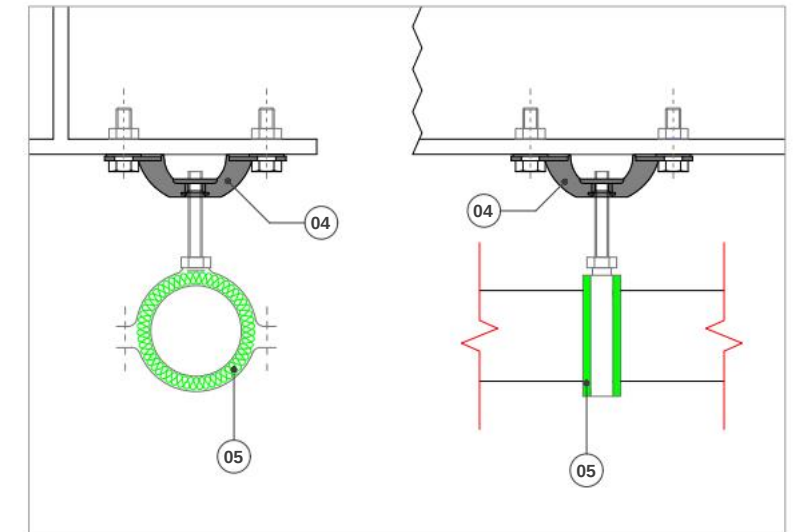
10 Detail AA03. Example double wave joint and double double wave joint



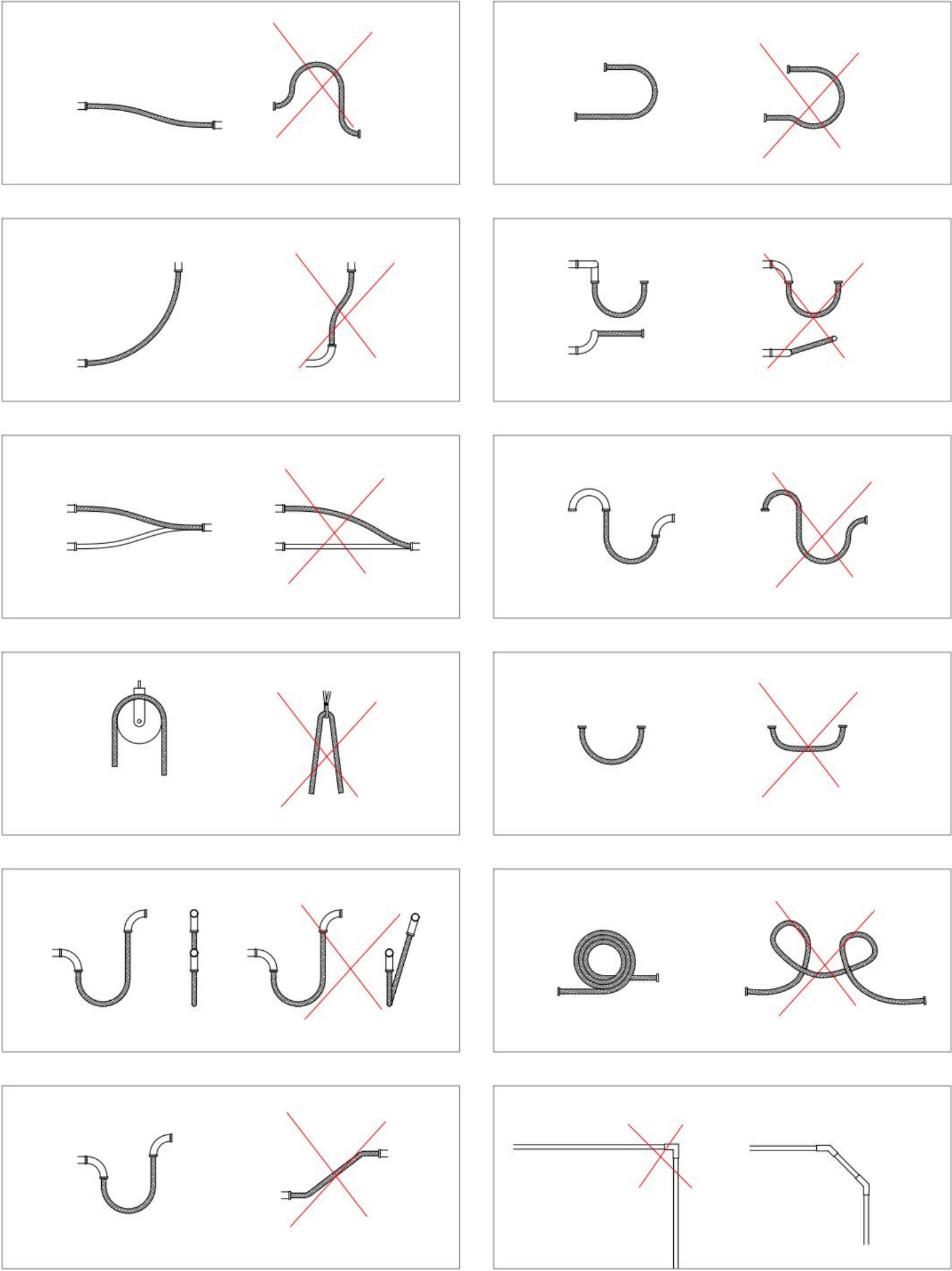
Detail AA04. Example braided sleeve in the shape of a lyre



Detail AA05. Example elastic rubber sleeve



Detail AA06. Isophonic flange detail and rubber-metal support

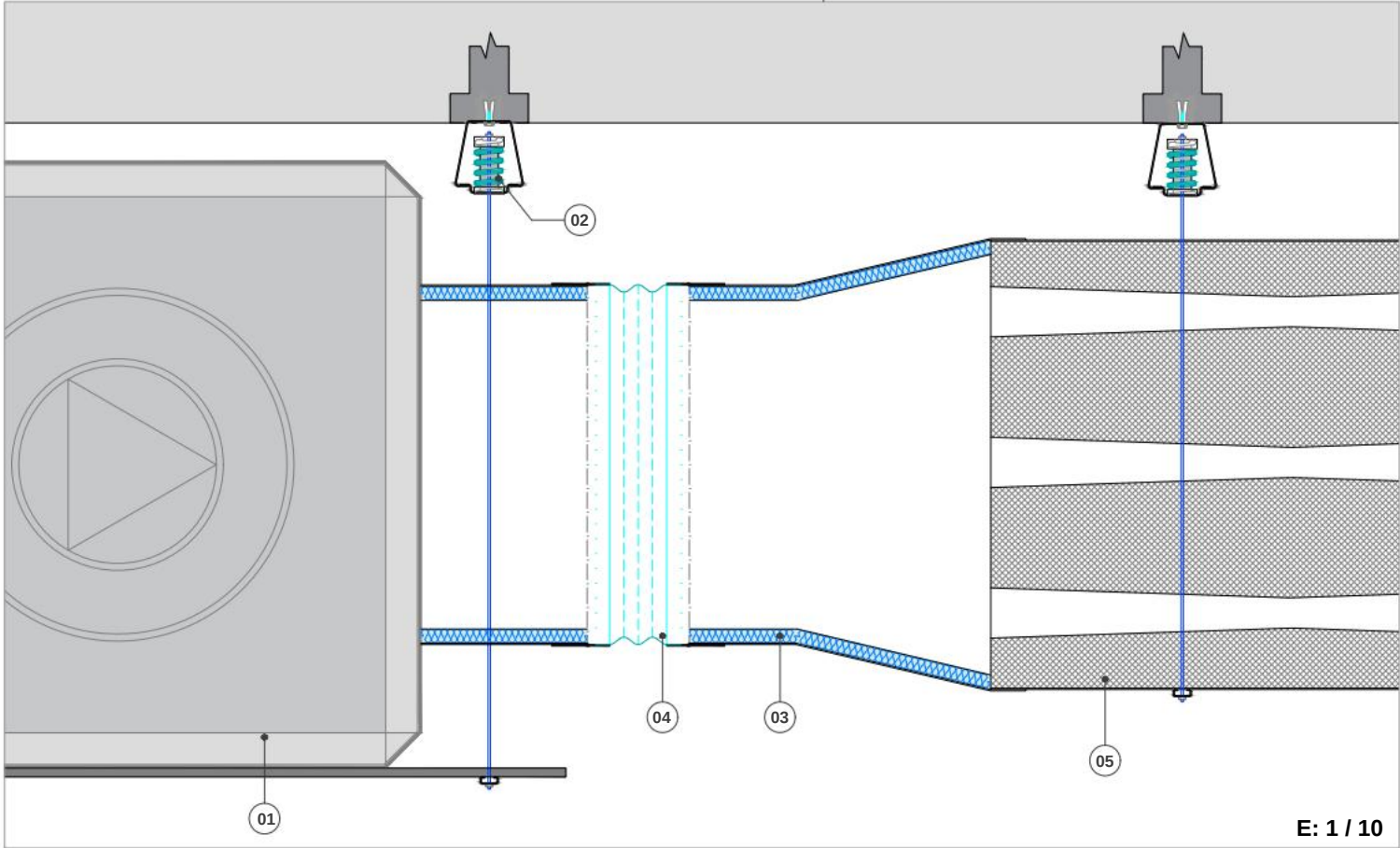
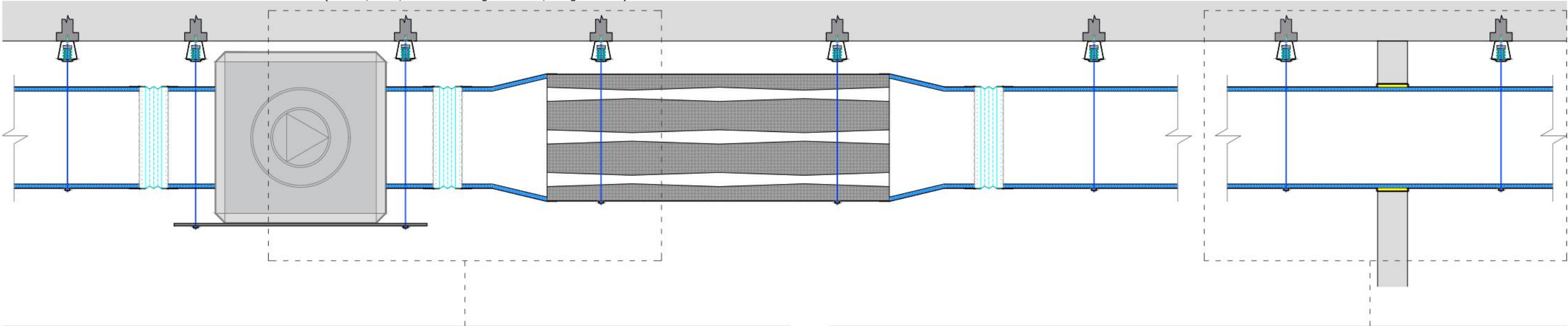


In the event that the premises need to install smoke extraction machines, ventilation, air conditioning and/or other machines that can produce noise and vibrations, they must be installed according to plans and with a correct dimensioned of all elements.

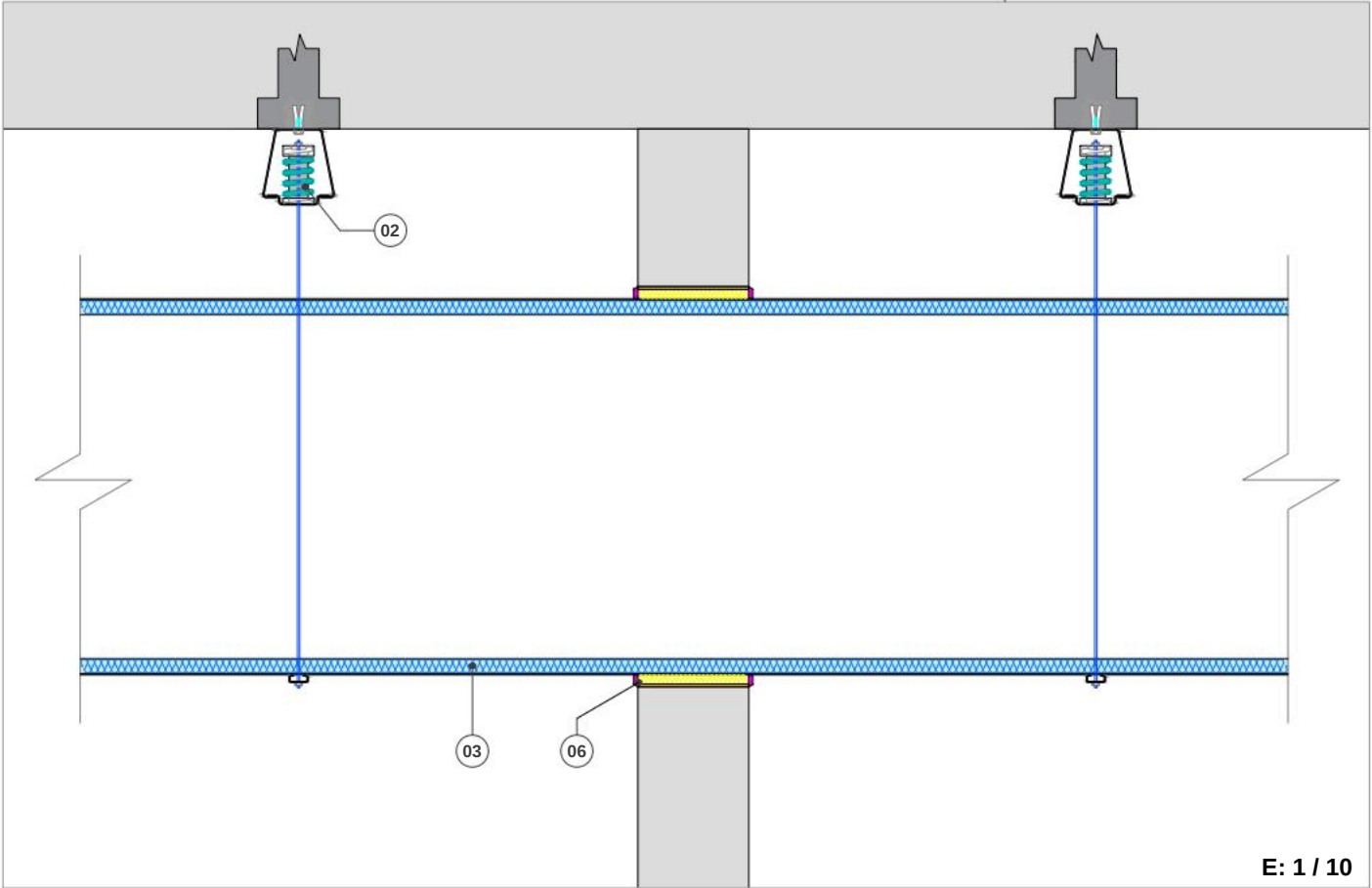
Depending on the location of the machine, the vertical extraction stand, the type of duct installed or existing and the air flow rate, it may be necessary to install an acoustic silencer that attenuates the noise that it is transmitted through the inside of the duct.

This detail refers to a turbine hanging from the ceiling, but anti-vibration systems must be placed on any machine that can generate vibrations (turbine, hood, air conditioning machines, refrigerators...) and in its ducts.

- LEGEND 01.**
Turbine, fume extraction hood, AA machine or any machine that generates vibrations 02.
Anti-vibration supports of metal molds (Dimensioned according to loads)
03. Climaver Neto ducts from ISOVER or similar
04. Elastic joint for Durodyne type ducts or similar
05. Acoustic silencer (Dimensioned attenuation required) capitaland seconds
06. Elastic grommet using Tecsound FT75 surrounding the duct and final finishing with SikaFlex elastic joint or similar



Detail AA01. Machine connection detail with ducts and silencer



Detail AA02. Passage of ducts through walls and enclosures

The elevator manufacturer should be responsible for validating the compatibility and feasibility of the measures

proposed with the elevator system installed

LEGEND

ELEVATOR MOTOR

01. Elevator motor, on metal structure
02. Mold anti-vibration supports

metal on elastic mat, and with
safety retainer
(Dimensioned according to loads a
leg) each

SPEED LIMITER 03.

Speed limiter 04.

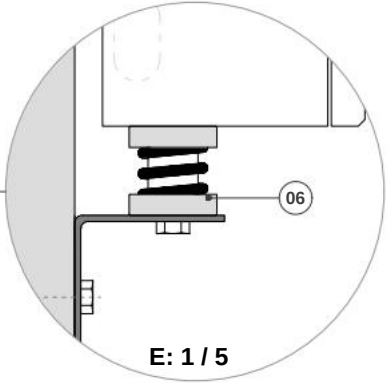
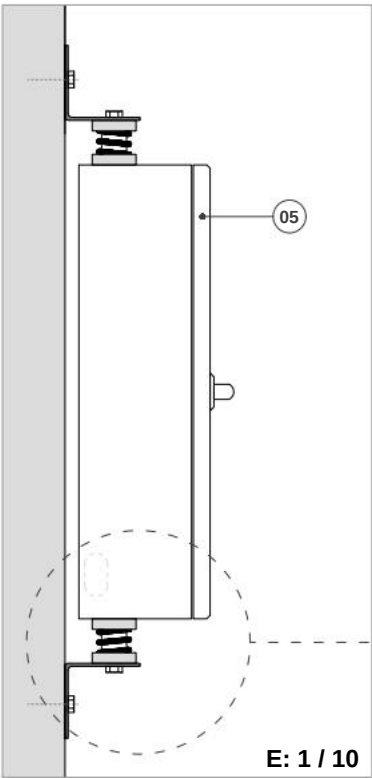
Installation of metal anti-vibration
bearings between the speed limiter
and the supporting slab

CONTACTOR PANEL 05.

Electrical contactor panel 06.

Mold anti-vibration supports
metallic for contactor panels
(Dimensioned according to loads)

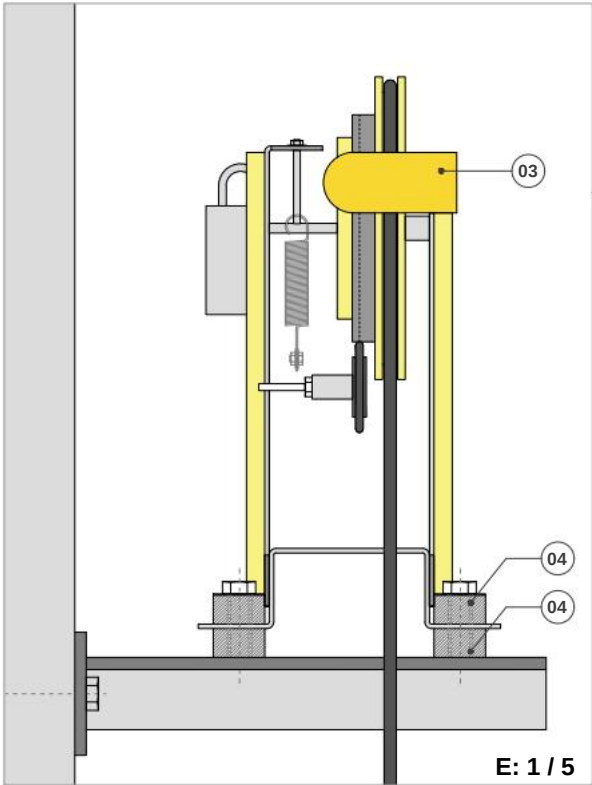
(*) If the electrical contactor panels are
wall (<150kg/m²) or on the ceiling, it is
recommended to place them



E: 1 / 5
Detail AA05.
Detail of the mold

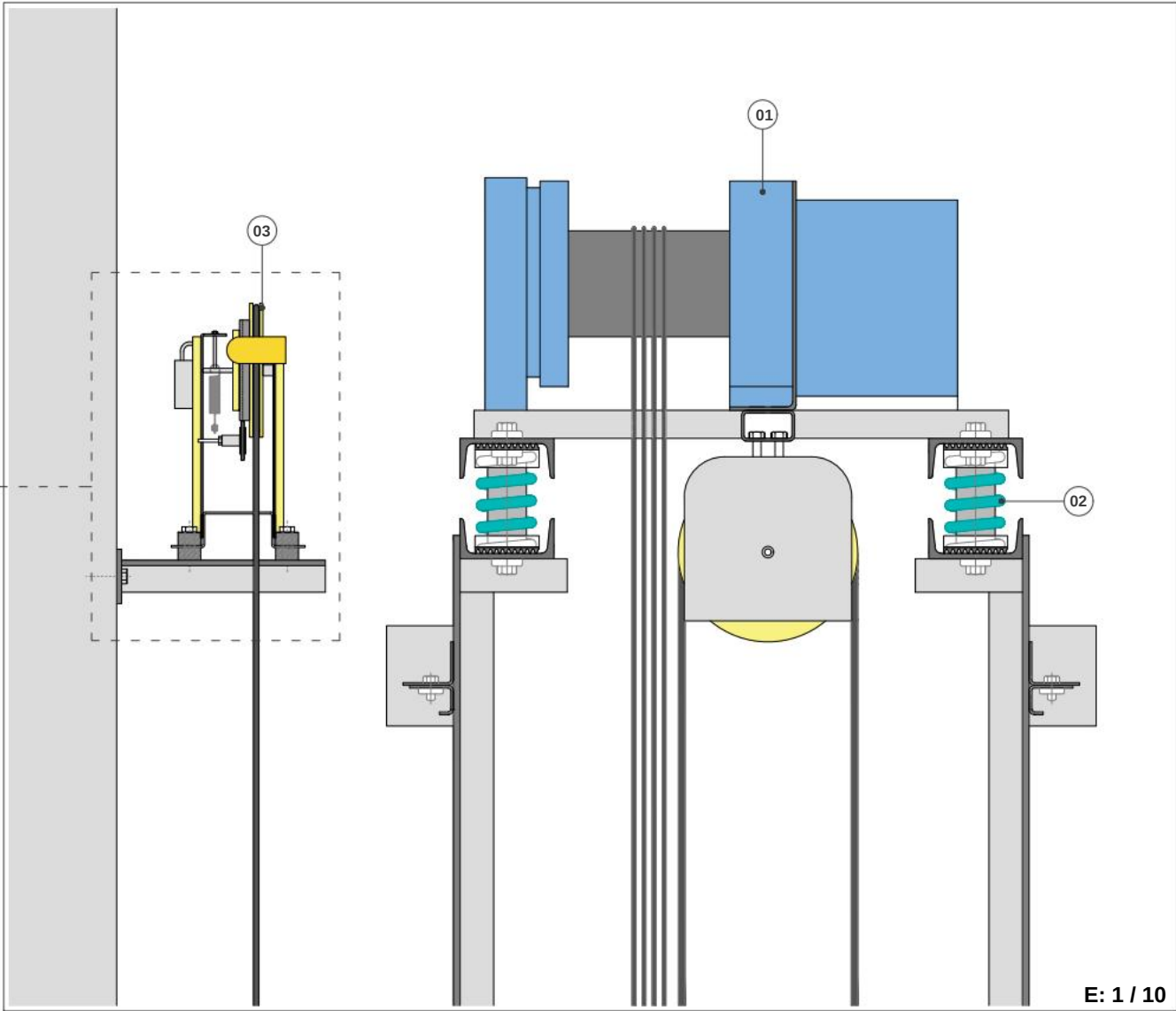
Detail AA04. Contactor panel

Care must be taken vibration supports
are installed so that they do not touch
contactors no



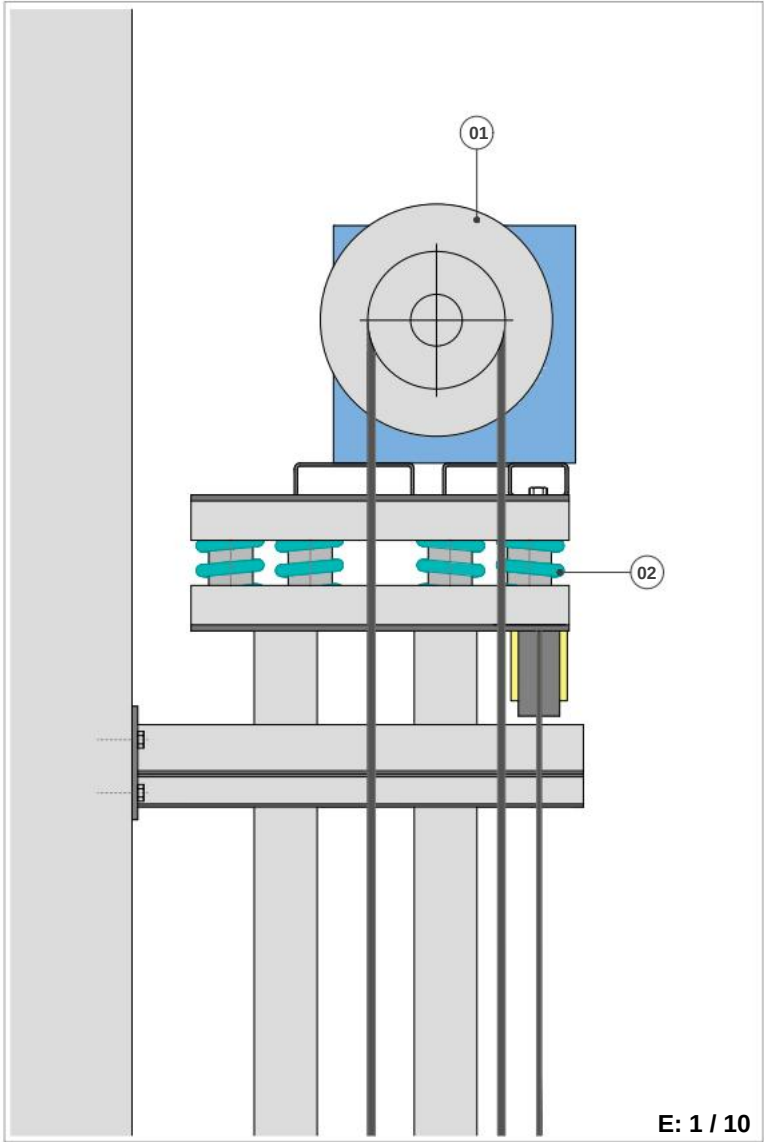
E: 1 / 5

Detail AA03. Speed limiter treatment detail



E: 1 / 10

Detail 02. Backpack lift motor and speed limiter



E: 1 / 10

Detail 01. Profile backpack lift motor

General details for PROJECT

installations: ACOUSTICS AMBIENT SL

SCALE:

A3: 1 / 10

ENGINEER:

JESUS URIOL and CHAVARRIGA.
Registered Mechanical Industrial Technical Engineer n° 15.385L
Query: <http://www.cetill.cat/CatalogoColegiados/Listado.aspx?IdMenu=21E594F2-2789-4AC8-A103-D57F828C9AE2&Idioma=ca-ES>

ARQ. TECHNICIAN: Adrià Sánchez Picamal

DATE: 12/05/2016

Version 04, dated 04/18/2019. In the event of
executing any type of variation in the execution, it must
be communicated in writing to the property and the signing technician.

ACOUSTICS AMBIENT SL
Lleida Science and Technology Park
Building H2, 1st floor, office A3 - 25003 Lleida
Tel: 973 224 708 info@acusticsambient.com



PLAN NO.:

INS. 10

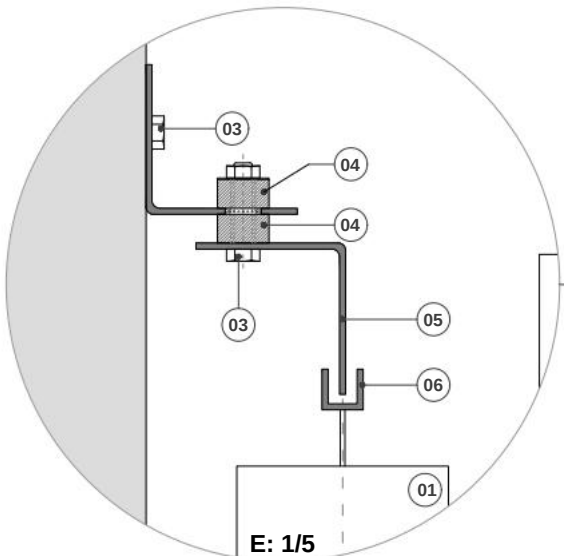
The elevator manufacturer should have to provide and will have to provide to validate the compatibility and feasibility of the measures

proposed with the elevator system installed

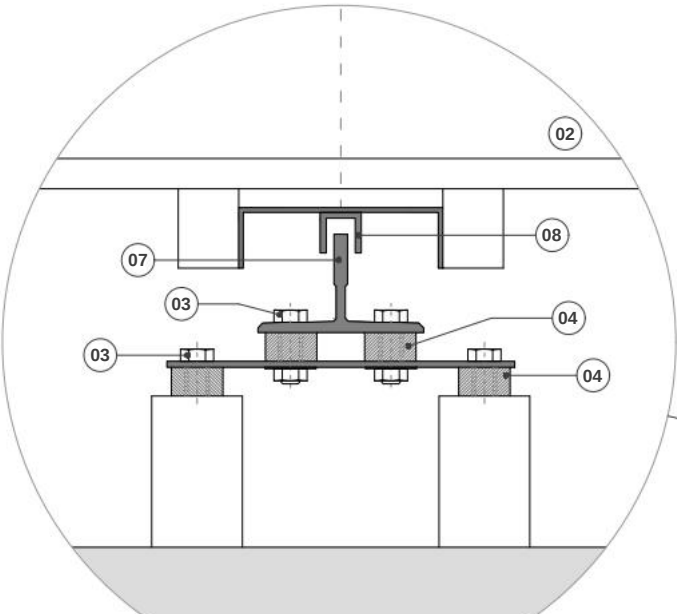


- LEGEND**
SYSTEM OF GUIDES
- 01. Elevator counterweight
 - 02. Elevator cabin
 - 03. Clamping screws
 - 04. Metal anti-vibration bearings
 - 05. Counterweight guide
 - 06. Counterweight guide
 - 07. Cab guide
 - 08. Cab guide

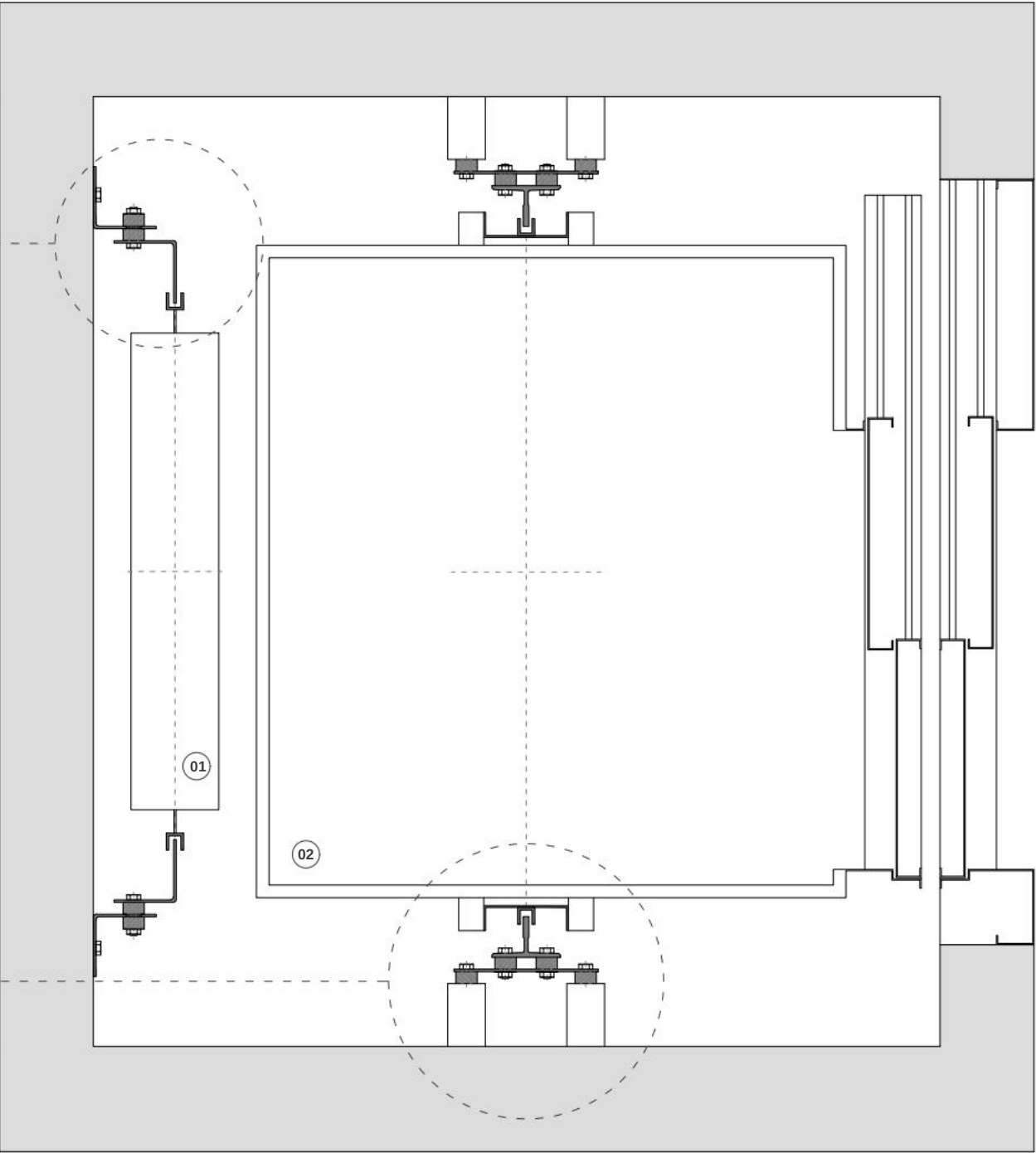
Apart from the anti-vibration treatment, it will be necessary to carry out adequate maintenance to ensure that the guides are clean and properly lubricated / greased.



E: 1/5
Detail AA01.
Counterweight guides



E: 1 / 5
Detail AA01.
Cabin guides



General details for PROJECT

installations: ACOUSTICS AMBIENT SL

SCALE:

A3: 1 / 10

ENGINEER:

JESUS URIOL and CHAVARRIGA.
Registered Mechanical Industrial Technical Engineer n° 15.385L
Query: <http://www.cetill.cat/CatalogoColegiados/Listado.aspx?IdMenu=21E594F2-2789-4AC8-A103-D57F828C9AE2&Idioma=ca-ES>

ARQ. TECHNICIAN: Adrià Sánchez Picamal

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Tel: 973 224 708 info@acusticsambient.com



PLAN NO.:

INS. 12