

TECBOR[®] BOARDS

mcr
dunamenti

TECBOR[®]

Steelwork protection (columns and beams)

Reinforced concrete protection
Cable tray protection
Ventilation & smoke extraction ducts protection
Non-structural elements (walls) protection
Suspended ceilings and slabs protection
Curtain walls protection
Tunnel protection

ALVEOLTEC[®] (perforated and solid)

Formation of ducts for service shafts
Protection of non-structural elements (partitions)

TECBOR[®] Y

Firewall strips



mcr
tecresa



mcr
tecresa

mcr
dunamenti

This is a commercial catalogue only, it does not represent any validity for certification. This catalogue details the systems that have fire resistance tests carried out in a laboratory, therefore we decline any responsibility derived from an inadequate use of the products.

Index

05	TECBOR® Boards Presentation	
07	Technical Characteristics & Specifications	   
08	Steelwork Protection (Columns & Beams)	
16	Reinforced Concrete Protection	
21	Cable Tray Protection	
23	Ventilation & Smoke Extraction Ducts	
34	Non-Structural Elements (Walls) Protection	
45	Suspended Ceilings and Slabs Protection	
50	Curtain Walls Protection	
56	Tunnel Protection	
65	Reference	

Legend

	Fire Protection
	Thermal Insulation
	Sound Absorption
	Fire Protection for Industry and Tunnels
	Works of References

TECBOR®

GENERAL CHARACTERISTICS OF OUR BOARDS

COMPOSITION

Tecbor® Boards are rigid fire protection boards made of magnesium oxide and other additives, reinforced internally with fibreglass mesh.

TESTING

At mcr tecresa® we constantly evolve and adapt to changing standards by developing new tests, conducted in official laboratories accredited by ENAC or similar international bodies under UNE EN, ASTM and other standards.

Our priority is the comprehensive development of Tecbor®
, meaning we
conduct full-scale tunnel fire testing according to the hydrocarbon curve,
RWS curve or the American UL.

REACTION TO FIRE

Tecbor® is classified as A1 (non-combustible) under European Standard EN 13501-1.

TRACEABILITY

All our products undergo internal quality control checks to ensure we can trace the history and location of our batches.

QUALITY

Tecbor® holds the CE marking certificate (ETA 18/1017) in line with the specifications of European Assessment Document EAD 350142-00-1106 adopted by EOTA.

Dedication and commitment to achieve a leading product in our industry, certified by Applus according to ISO 9001.

HEALTH AND SAFETY

Tecbor® Boards contain no dangerous substances according to Commission database DS041/051.

TECHNICAL SUPPORT

The experts in our sales department offer personalised support and advice on both construction solutions and building regulations.

APPLICATION

We strive for the highest level of ease and speed with our assemblies, making our solutions the most competitive in the market.

GLOBALISATION

mcr, tecresa® sells its products worldwide, with the aim of leading the passive fire protection market.

TECBOR® BOARDS



Sound Absorption



Fire Protection



Thermal Insulation



Fire Protection for Industry and
Tunnels

Passive fire protection

Tecbor® Boards are available with the following
finish:

Straight edge: This finish is ideal for construction
solutions where a 90° joint between boards is
required, such as in the case of ducts, tunnels,
junctions, party walls, etc.

Technical Characteristics and Specifications

SPECIFICATIONS	MAGNESIUM OXIDE AND OTHER ADDITIVES	STANDARD
Reaction to fire	Non-combustible/Euroclass A1	UNE - EN 13501-1
Dry density (40°C)	900 Kg/m ³ ± 10%	UNE - EN 12467
Density (23°C and 50% HR)	925 Kg/m ³ ± 10%	UNE - EN 12467
Thermal conductivity	0.31 W/mk	UNE - EN 12664
Alkalinity (pH value)	8 - 10	UNE - EN 13468
Water absorption capacity	4.5 Kg/m ²	EN 1609
Water vapour permeability	3 x 10 ⁻⁹ (Kg/m ² sPa)	UNE - EN ISO 12572
Length tolerance	± 5 mm	UNE - EN 12467
Width tolerance	± 3 mm	UNE - EN 12467
Thermal expansion (20 - 100°C)	1.66 x 10 ⁻⁶ /°C in the transverse direction and 6.38 x 10 ⁻⁶ /°C in the longitudinal direction	UNE - EN ISO 10.545-8/97
Thickness tolerance	+2 mm -1 mm	UNE - EN 12467
Edge straightness	Level I -	UNE - EN 12467
Organic content	0.1% 3.3%	UNE - 103 204 / 93
Moisture resistance	RL < 0.75	UNE - EN 12467
Elastic modulus (MPa)	475	UNE - EN 12089 UNE - EN 310
Flexural strength MOR (MPa)	4.74	EN - 12467
Perpendicular-to-grain tensile strength (MPa)	1.47	EN - 1607
Compressive strength (MPa)	9.61	EN - 826
Dimensional stability	≤ 0.25%	UNE - EN 326 - 1
Parallel-to-grain tensile strength (MPa)	0.99	EN - 1608
Microbial growth	NO	EN - 13403
Service life	25 years X (outdoors)	ETA 18 / 1017

Steelwork Protection (Columns & Beams)



Steel structures are a **widely-used construction method around the world.**

One of their key advantages is that they have a **high strength per unit of weight**, making them **highly versatile and a great option for light, complex structures.**

However, one disadvantage of steel is its thermal conductivity.

Thus, during a fire, **the gradual increase in temperature, together with the steel's high rate of heat transfer, considerably reduces the load-bearing capacity and mechanical strength of the structures.**

From 250°C, the strength and yield stress change; and from about 500°C, the drop in strength is large enough that it cannot support its design load.

At **mcr tecresa®** we've conducted **extensive testing using Tecbor®** according to **UNE**

EN 13381-4, which is the basis for determining the level of fire protection provided by the board when **protecting steel structures, be they beams, columns or tension members.** **Tecbor®** has been tested to cover a **wide range of steel profiles**, distinguished by their section factors.

It is also **tested for various design temperatures** as specified by the standard.

TECBOR® Box Section Factor

The data in this table comes from the assessment report of file **058417-002.m²**.
Table based on a steel design temperature of 500°C according to **UNE EN 13381-4**.

NEW STEEL STRUCTURE PROTECTION TEST FOR A CRITICAL TEMPERATURE OF 500°C. TECBOR® BOARD THICKNESS (mm)									
Section factor	THICKNESS (mm)								
m ¹	R-15 15 min	R-20 20 min	R-30 30 min	R-45 45 min	R-60 60 min	R-90 90 min	R-120 120 min	R-180 180 min	R-240 240 min
41	9.5	9.5	9.5	9.5	9.5	9.5	13.1	23.6	34.1
70	9.5	9.5	9.5	9.5	9.5	14.5	20.3	32	43.7
80	9.5	9.5	9.5	9.5	9.8	15.8	21.8	33.7	45.7
90	9.5	9.5	9.5	9.5	10.8	16.9	23	35.1	47.3
100	9.5	9.5	9.5	9.5	11.7	17.8	24	36.3	48.6
110	9.5	9.5	9.5	9.5	12.4	18.6	24.8	37.2	49.7
120	9.5	9.5	9.5	9.8	12.9	19.2	25.5	38.1	50.6
130	9.5	9.5	9.5	10.3	13.5	19.8	26.1	38.8	51.4
140	9.5	9.5	9.5	10.7	13.9	20.3	26.6	39.4	52.1
150	9.5	9.5	9.5	11.1	14.3	20.7	27.1	39.9	52.8
160	9.5	9.5	9.5	11.4	14.6	21.1	27.5	40.4	53.3
170	9.5	9.5	9.5	11.7	14.9	21.4	27.9	40.8	53.8
180	9.5	9.5	9.5	11.9	15.2	21.7	28.2	41.2	54.2
190	9.5	9.5	9.5	12.2	15.4	22	28.5	41.6	54.6
200	9.5	9.5	9.5	12.4	15.7	22.2	28.8	41.9	55
210	9.5	9.5	9.5	12.6	15.9	22.4	29	42.2	55.3
220	9.5	9.5	9.5	12.8	16.1	22.7	29.2	42.4	55.6
230	9.5	9.5	9.6	12.9	16.2	22.8	29.5	42.7	55.9
240	9.5	9.5	9.8	13.1	16.4	23	29.6	42.9	56.1
250	9.5	9.5	9.9	13.2	16.5	23.2	29.8	43.1	56.4
260	9.5	9.5	10	13.3	16.7	23.3	30	43.3	56.6
270	9.5	9.5	10.1	13.5	16.8	23.5	30.1	43.5	56.8
280	9.5	9.5	10.2	13.6	16.9	23.6	30.3	43.6	57
290	9.5	9.5	10.3	13.7	17	23.7	30.4	43.8	57.1
300	9.5	9.5	10.4	13.8	17.1	23.8	30.5	43.9	57.3
310	9.5	9.5	10.5	13.9	17.2	23.9	30.6	44.1	57.5
320	9.5	9.5	10.6	14	17.3	24	30.7	44.2	57.6
330	9.5	9.5	10.7	14	17.4	24.1	30.8	44.3	57.7
340	9.5	9.5	10.7	14.1	17.5	24.2	30.9	44.4	57.9
350	9.5	9.5	10.8	14.2	17.6	24.3	31	44.5	58
360	9.5	9.5	10.9	14.2	17.6	24.4	31.1	44.6	58.1
370	9.5	9.5	10.9	14.3	17.7	24.4	31.2	44.7	58.2
373	9.5	9.5	11	14.3	17.7	24.5	31.2	44.7	58.3

1.1 SYSTEMFOR GUIDE RUNNING LENGTHWISE TO THE SECTION. COLUMNS

DESCRIPTION OF ASSEMBLY

Fix the 45 x 15 x 0.6 mm omega profiles to the outer side of the flange of the metal profile to be protected using steel nails at a maximum of 725 mm between each nail.

Fix the 30 x 30 x 0.6 mm angle profile to the

Tecbor® board strips and then attach these to the omega profiles using self-tapping screws every 250 mm. Assemble the strips.

Apply **Tecbor® Joint Paste** to the screw heads and board joints.

N.B. If using **Tecbor® Boards** with a thickness equal to or greater than 30 mm, they may be butted together using 5 x 80 mm screws every 250 mm.

MEGOLDÁS

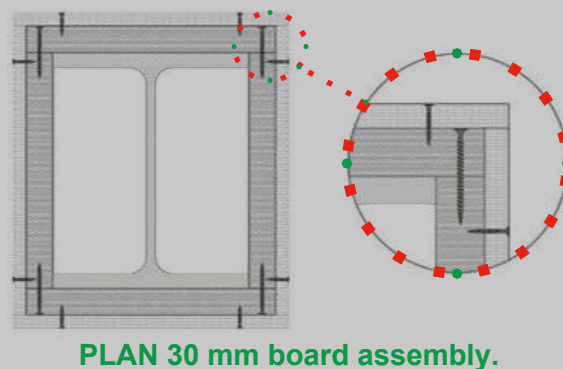
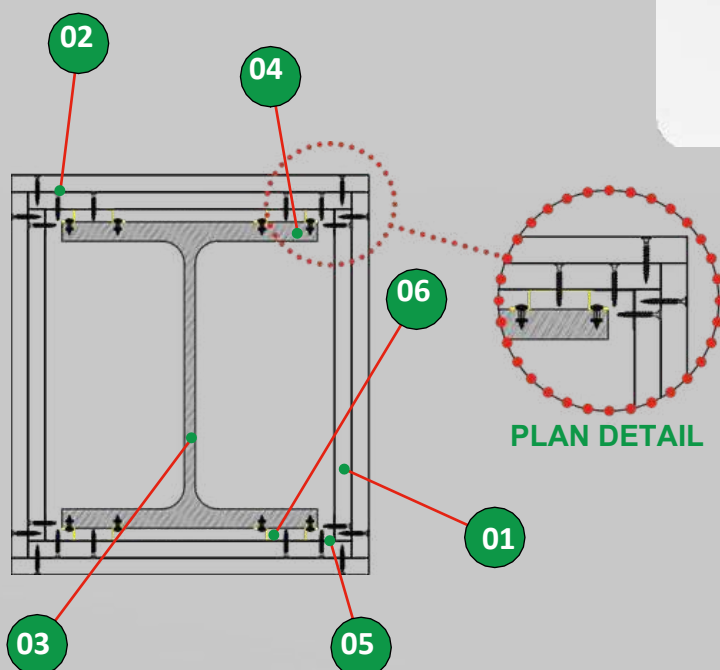
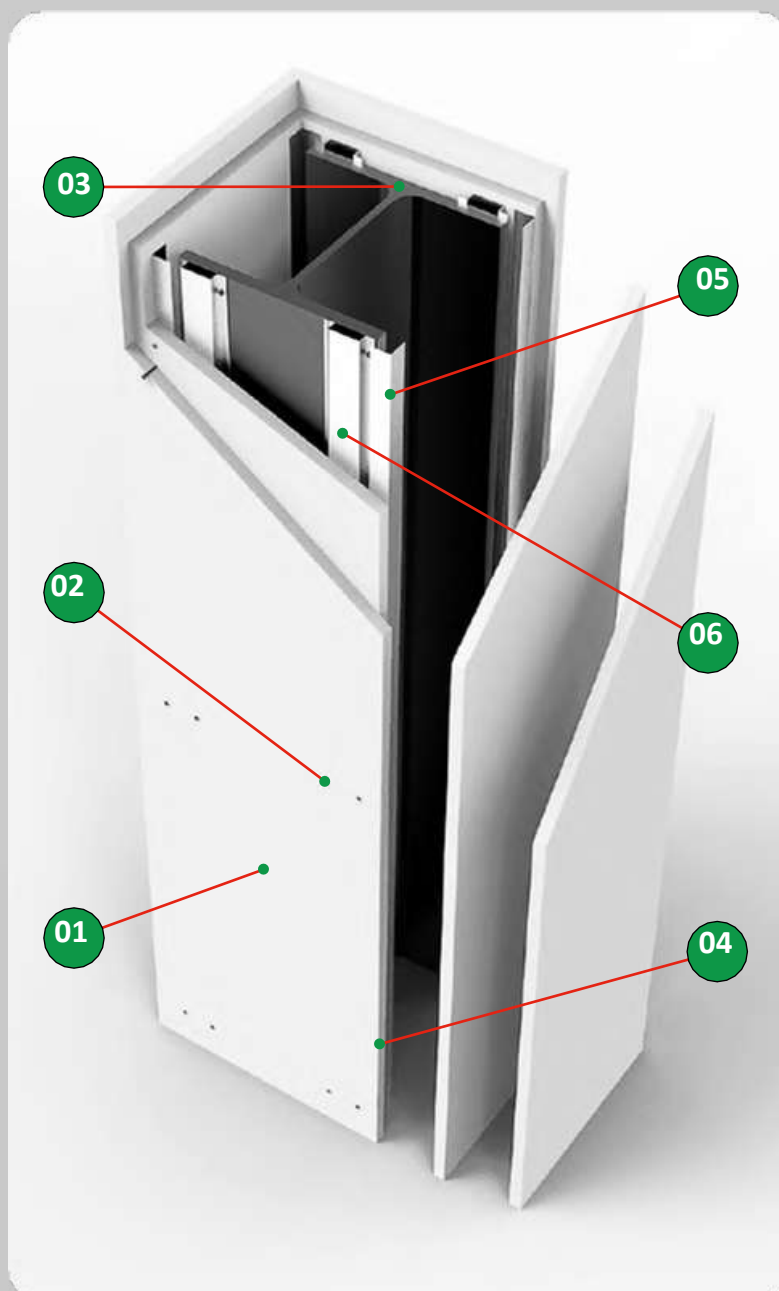
- 01 **Tecbor® Boards.**
- 02 Self-tapping screw (dimensions according to board).
- 03 Steel column.
- 04 **Tecbor® Joint Paste.**
- 05 30 x 30 x 0.6 mm angle.
- 06 45 x 15 x 0.6 mm omega profile.

TEST

Standard: UNE EN 13381-4.

Laboratory: TECNALIA.

Test no.: 058417-002.



1.2 SYSTEM FOR GUIDE RUNNING LENGTHWISE TO THE SECTION. BEAMS

DESCRIPTION OF ASSEMBLY

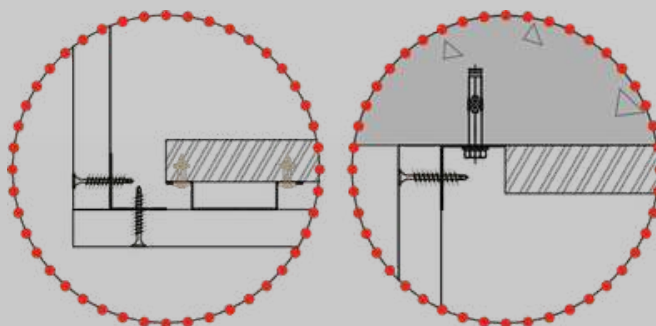
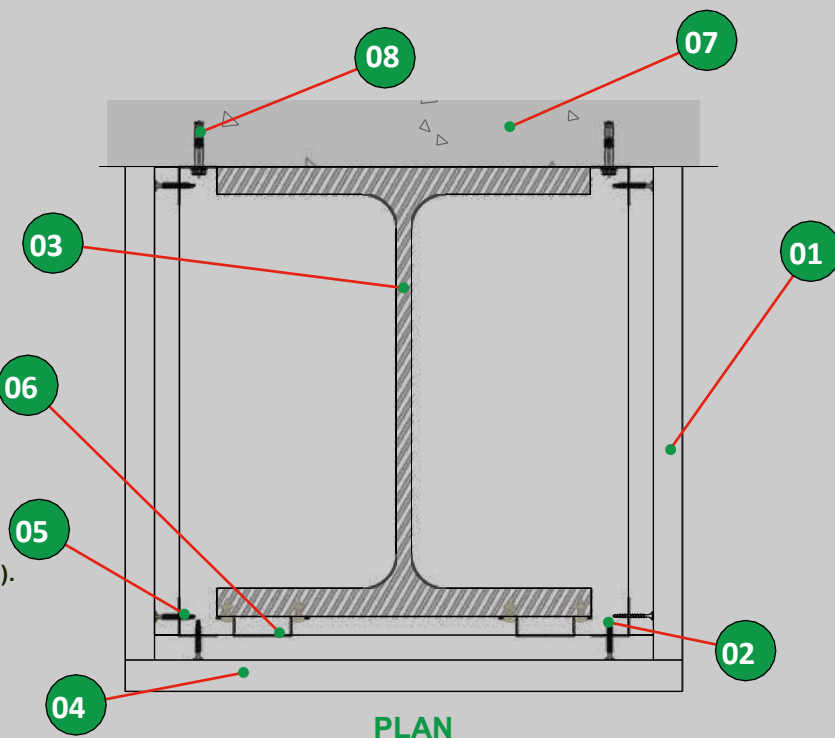
Fix the 45 x 15 x 0.6 mm omega profiles to the outer side of the flange of the metal profile to be protected using steel nails every 725 mm. Fix the 30 x 30 x 0.6 mm angle to the slab using 6 x 60 mm plugs every 300 mm.

Fix the 30 x 30 x 0.6 mm lower angle profile to the Tecbor® Board strips, then attach these to the omega profiles and to the angle anchored to the slab using self-tapping screws every 250 mm.

Apply Tecbor® Joint Paste to the screw heads and board joints.

SOLUTION

- 01** Tecbor® Boards.
- 02** Self-tapping screw (dimensions according to board).
- 03** Steel beam.
- 04** Tecbor® Joint Paste.
- 05** 30 x 30 x 0.6 mm angle.
- 06** 45 x 15 x 0.6 mm omega profile.
- 07** Slab.
- 08** 6 x 60 mm metal plug.

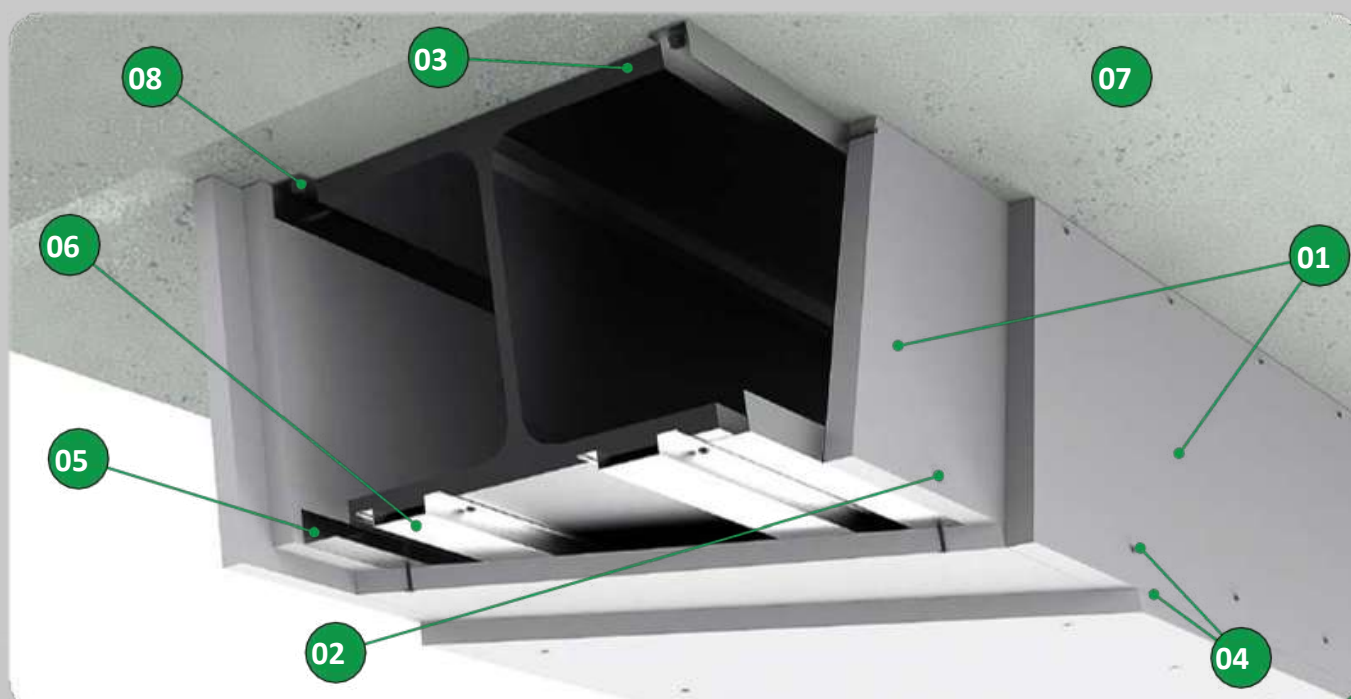


TEST

Standard: UNE EN 13381-4.

Laboratory: TECNALIA.

Test no.: 058417-002.



1.3 RENDSZER SYSTEM FOR GUIDE TO FORM A RING

DESCRIPTION OF ASSEMBLY

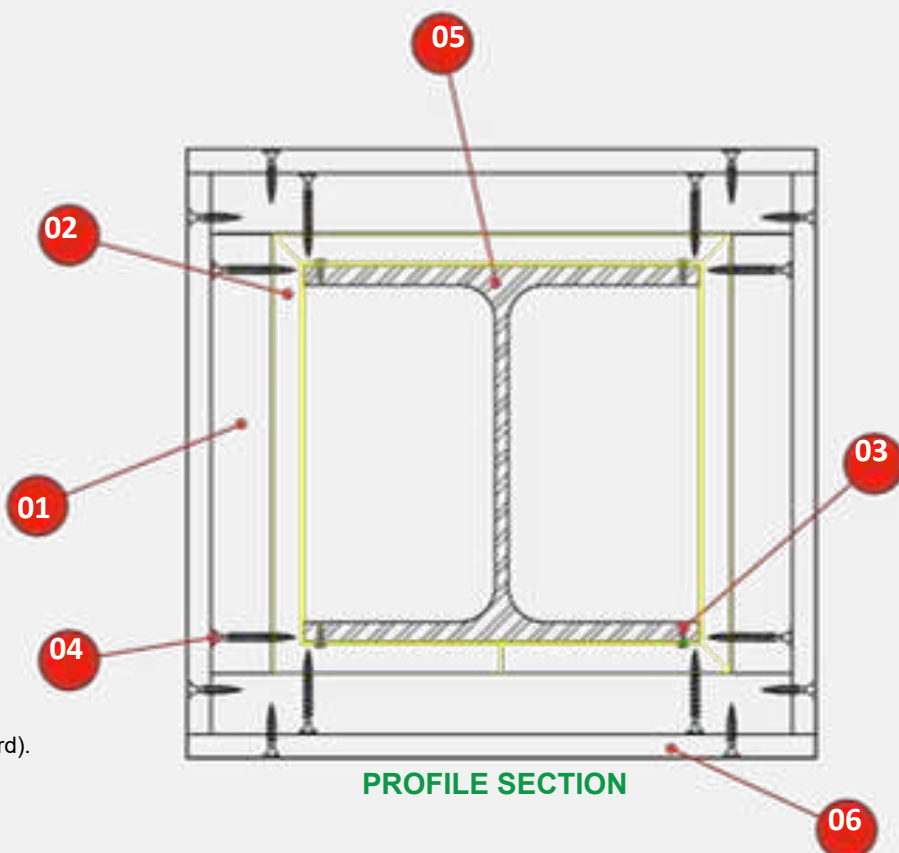
Fix the 45 x 15 x 0.6 mm omega profiles to the outer side of the flange of the metal profile to be protected using steel nails, creating a ring around it. The rings will be separated at intervals of a maximum of 575 mm. They will be placed in such a way that the horizontal joints between plates overlap on an omega profile.

Screw the Tecbor® Boards to the omega profiles using self-tapping screws every 250 mm.

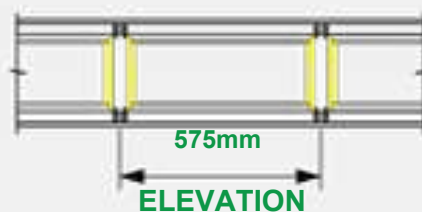
Apply Tecbor® Joint Paste to the screw heads and board joints.

SOLUTION

- 01 Tecbor® Boards.
- 02 45 x 15 x 0.6 mm omega profile.
- 03 Type X nail - DNL or similar.
- 04 Self-tapping screw (dimensions according to board).
- 05 Profile.
- 06 Tecbor® Joint Paste.



PROFILE SECTION



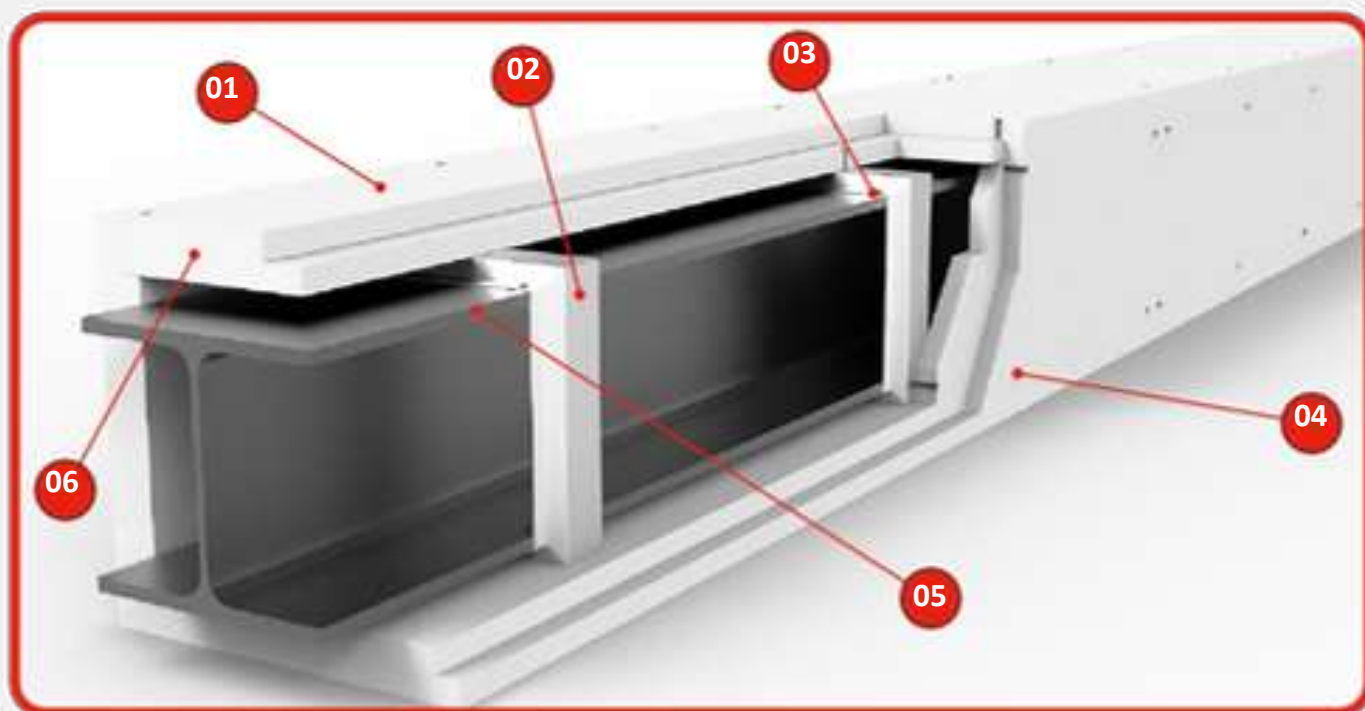
ELEVATION

TEST

Standard: UNEEN 13381-4.

Laboratory: TECNALIA.

Test No.: 058417-002.



1.4 CLIP SYSTEM

DESCRIPTION OF ASSEMBLY

Attach the Tecbor® Clip to the outer side of the metal profiles to be protected, spaced at intervals of no more than 500 mm.

Attach the 45 x 18 x 0.6 mm TC roof profiles to the Tecbor® Clip by applying pressure.

Attach the Tecbor® Boards to TC profiles using self-tapping screws every 250 mm.

Apply Tecbor® Joint Paste to the screw heads and board joints.

SOLUTION

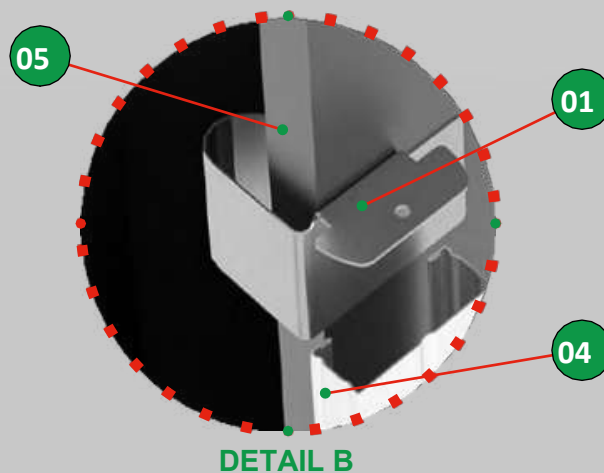
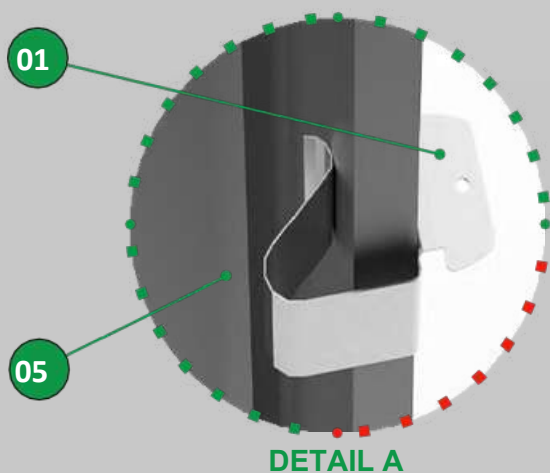
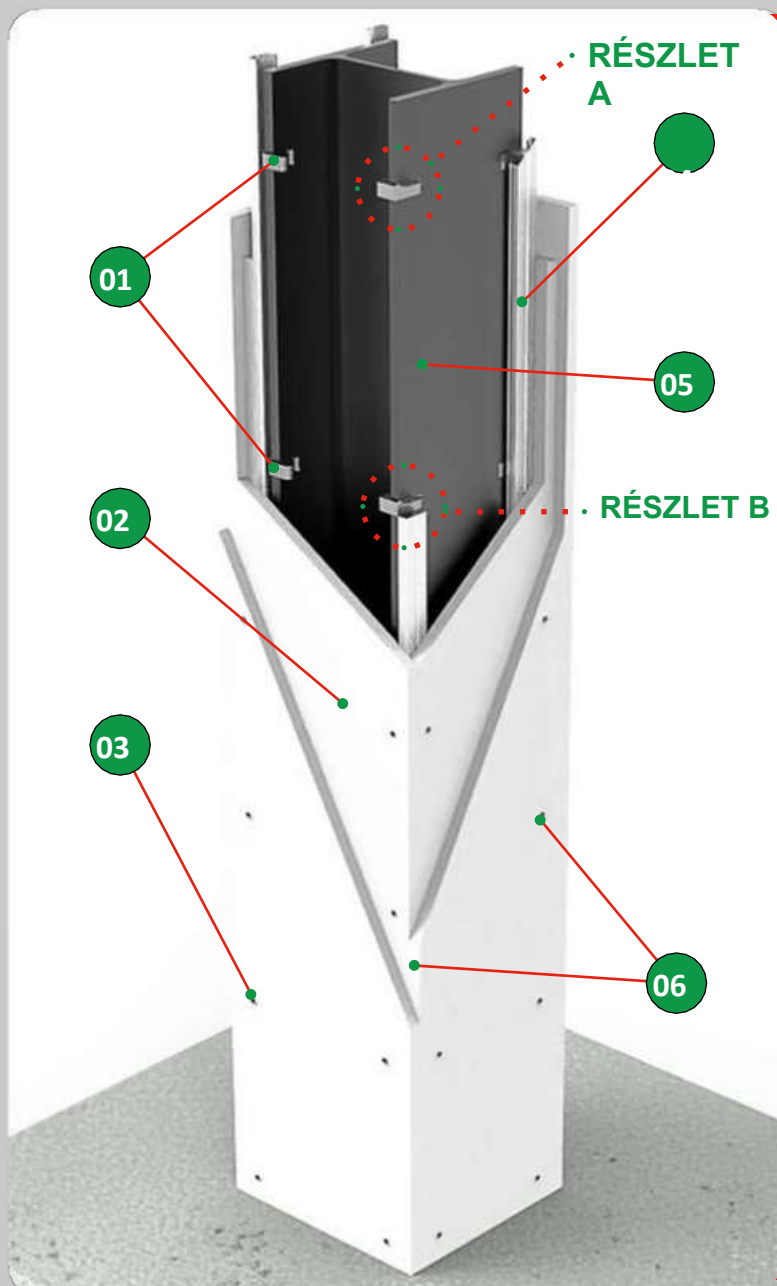
- 01 Tecbor® Clip.
- 02 Tecbor® Boards.
- 03 Self-tapping screw (dimensions according to board).
- 04 45 x 18 x 0.6 mm TC profile.
- 05 Beam type or column.
- 06 Tecbor® Joint Paste.

TEST

Szabvány: UNE EN 13381-4.

Laboratory TECNALIA.

Test No.: 058417-002.





DESCRIPTION OF ASSEMBLY

Cut stiffeners using Tecbor® 20 mm Boards, adapted to the measurements of the metal profile to be protected. Insert them perpendicular to the axis of the profile at intervals of no more than 575 mm.

Cut Tecbor® Board strips adapted to the measurement between the flanges of the metal profile to be protected. Attach these strips to the stiffeners using self-tapping screws, so that the joint between the boards overlaps on a supporting stiffener.

Attach the Tecbor® Boards of a thickness equal to or greater than 20 mm to each other and anchored onto the board strips using self-tapping screws every 250 mm.

Apply Tecbor® Joint Paste to the screw heads and board joints.

SOLUTION

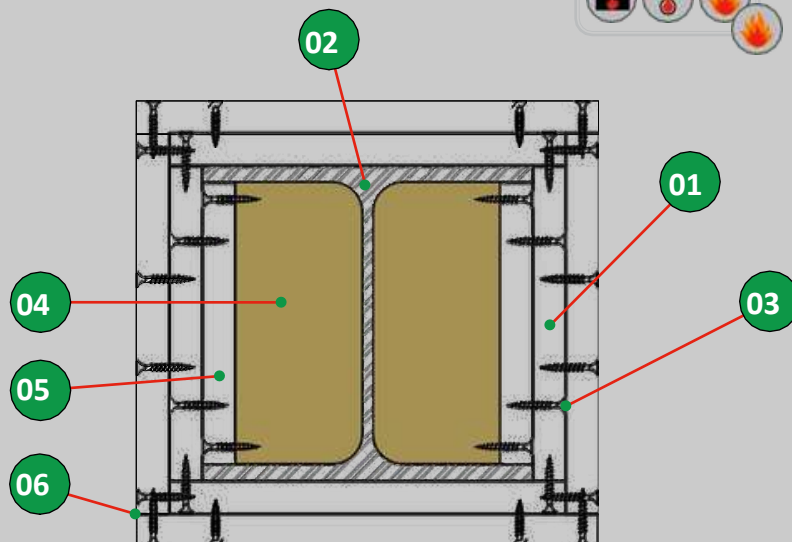
- 01 Tecbor® Boards.
- 02 Profile.
- 03 Self-tapping screw (dimensions according to board).
- 04 Tecbor® Board stiffener.
- 05 Tecbor® 20 mm Board.
- 06 Tecbor® Joint Paste.

TEST

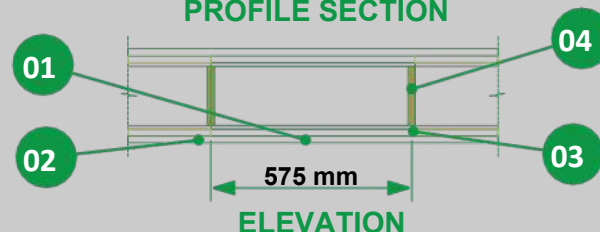
Standard: UNE EN 13381-4.

Laboratory: TECNALIA.

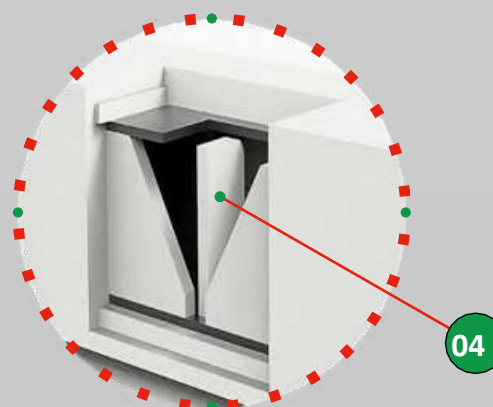
Test no.: 058417-002.



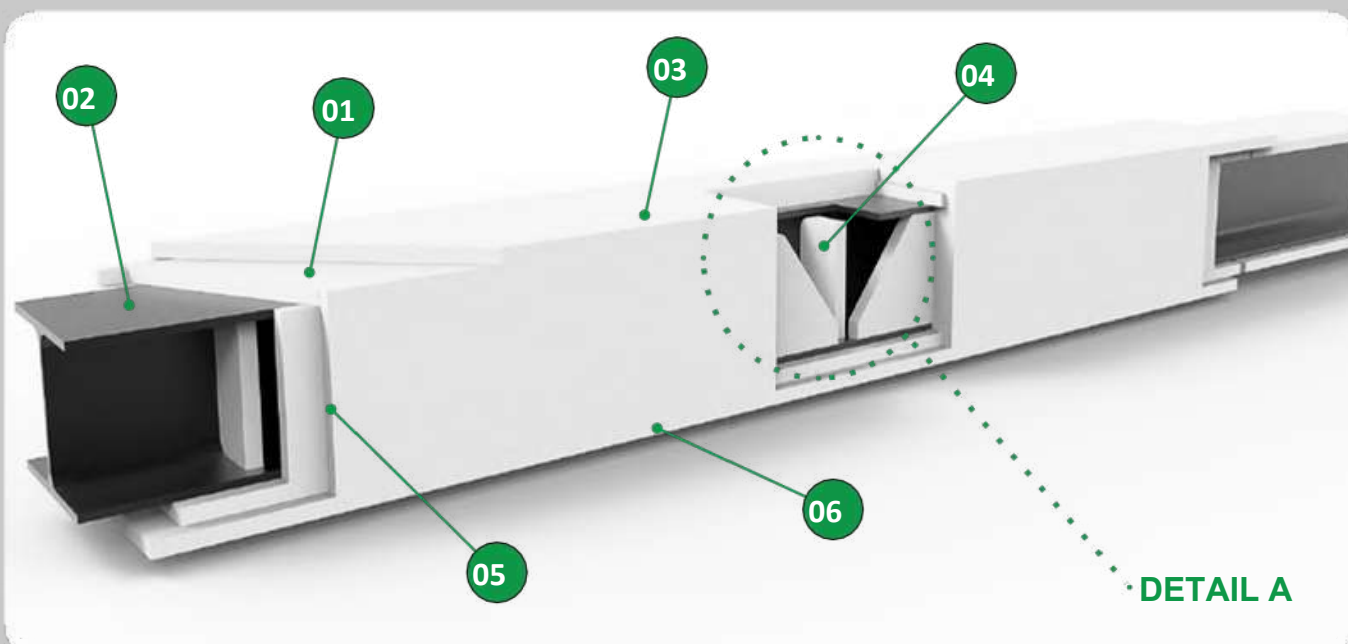
PROFILE SECTION



ELEVATION



DETAIL A



1.6 FIXING SYSTEM USING BRACKETS

DESCRIPTION OF ASSEMBLY

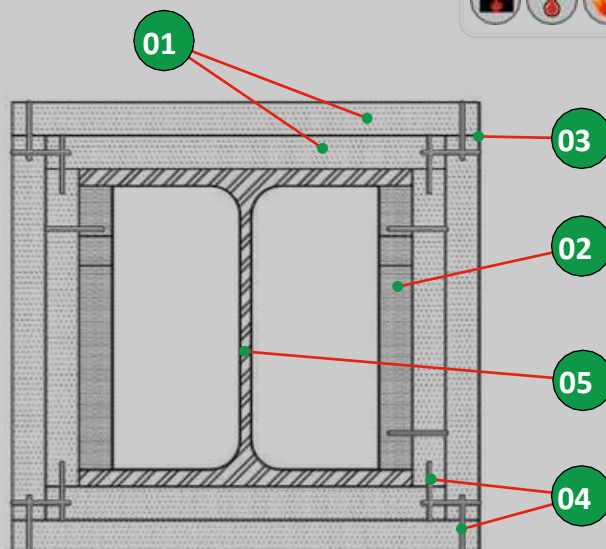
Cut stiffeners using Tecbor® 20 x 100 mm Boards, adapted to the measurements of the metal profile to be protected. Insert them using a wedge as indicated in the detailed plans at intervals of no more than 600 mm.

Attach the Tecbor® side Board to the support plugs so that the joints between the boards overlap on a support plug. These Tecbor® lateral Boards are attached using metal clamps separated at intervals of 50 mm on board joints.

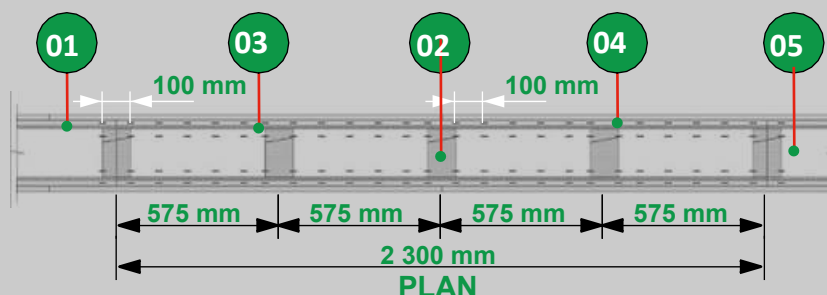
For beams only, a stiffener made using 20 x 100 mm Tecbor® Boards must be fixed to the Tecbor® lateral Boards by means of metal clamps, fixed to the underside of the profile to be protected.

Attach the lower Tecbor® Boards to the lateral boards and to the lower stiffeners using metal clamps spaced at intervals of no more than 100 mm.

Clamps of a length equal to or greater than the total thickness of the boards must be used; the minimum dimensions required are 35 x 10.6 x 1.6 mm.



PROFIL SECTION



MEGOLDÁS

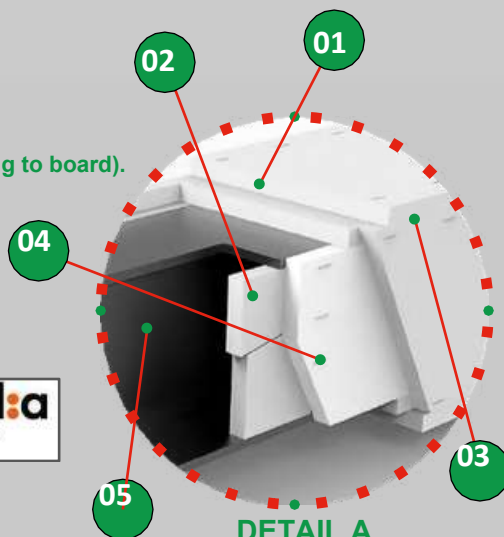
- 01 Tecbor® Boards.
- 02 Tecbor® board stiffener, 20 mm.
- 03 Tecbor® Joint Paste.
- 04 Fastening clamp (dimensions according to board).
- 05 Steel profile.

TEST

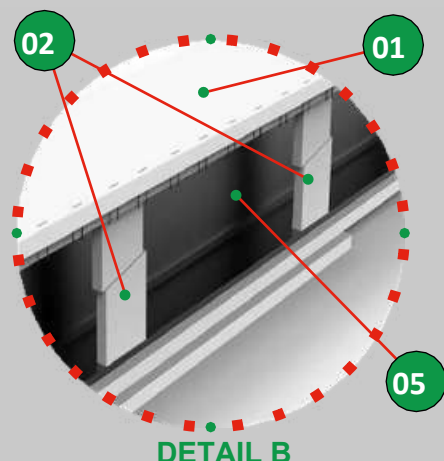
Standard: UNE EN 13381-4.

Laboratory TECNALIA.

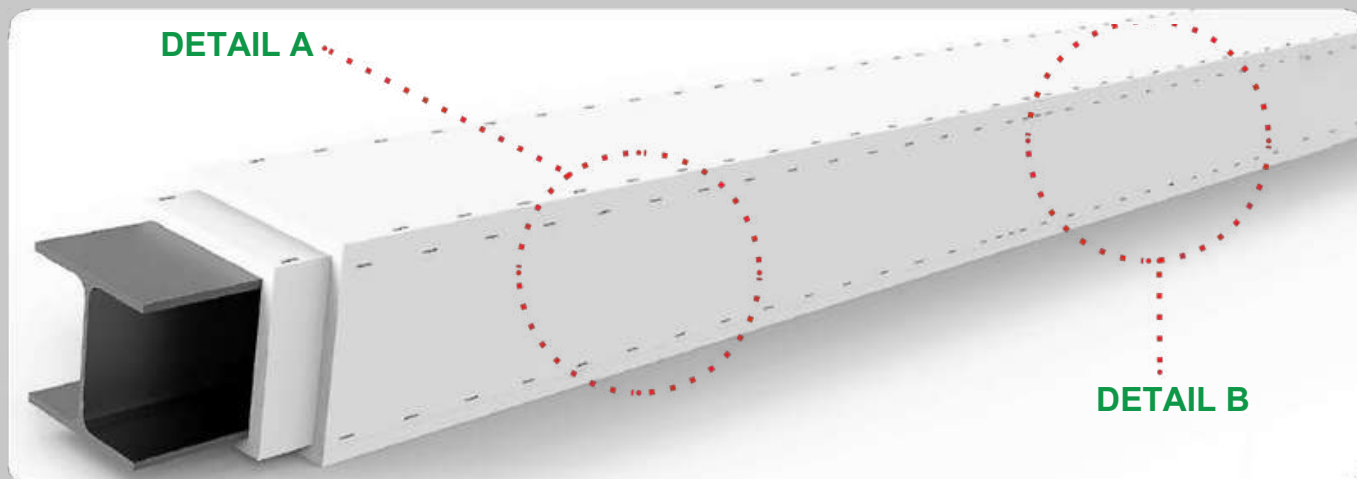
Test no.: 058417-002.



DETAIL A



DETAIL B



DETAIL A

DETAIL B

Reinforced Concrete Protection



Despite its lack of combustibility and low thermal conductivity, concrete undergoes increased pore pressure and internal tensile stress during a fire, resulting in spalling. This results in loss of sections and exposes the reinforcing steel to extremely high temperatures.

Furthermore, due to heating, especially at temperatures above 300°C, concrete loses strength. These problems can be tackled by the passive fire protection of concrete structures.

Fireproofing concrete structures serves to prevent spalling, to which a higher grade of concrete is much more sensitive.

Generally speaking, passive fire protection becomes a matter of priority in any place where the following factors are relevant: prevention of spalling; protection of reinforcement and steel from reaching critical temperatures; protection of concrete from reaching excessive temperatures.

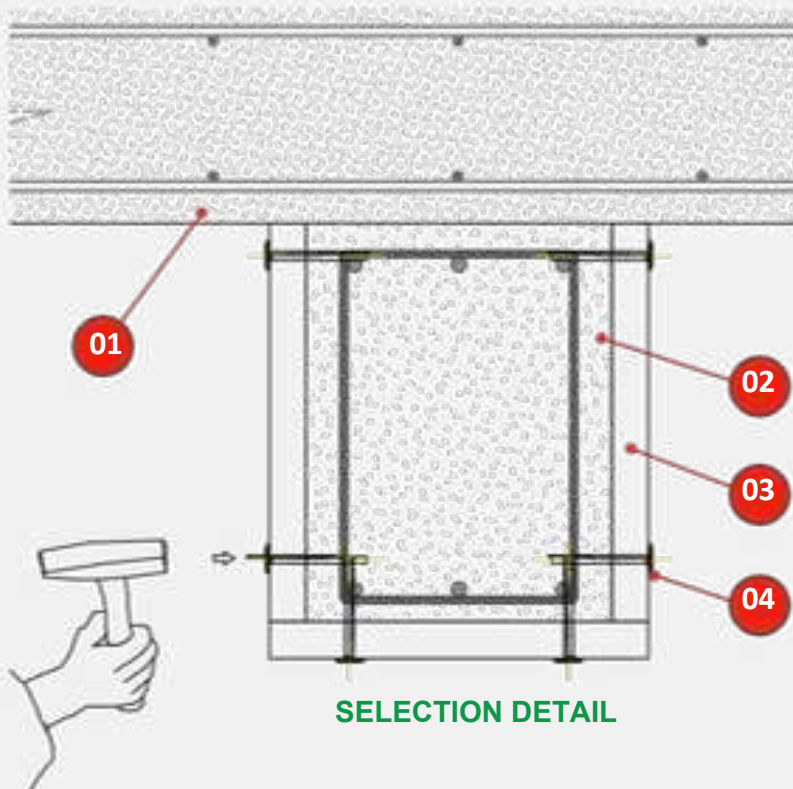
2.1 PROTECTION OF BEAMS & CONCRETE SLABS R-30/R-240

DESCRIPTION OF ASSEMBLY

As minimum and maximum thickness's were tested, depending on the requested REI, a certain number of layers will need to be installed. The Tecbor® Boards are directly attached to the concrete using Hilti DBZ strike anchors. The Tecbor® Boards are butted together without the need for any type of jointing paste. Only in the case where the gap between joints is greater than 3 mm will the application of Tecsel® Intumescent Mastic be required.

SOLUTION

- 01 Slab.
- 02 Concrete beam.
- 03 Tecbor® Boards.
- 04 DBZ 6/35 metal anchors.

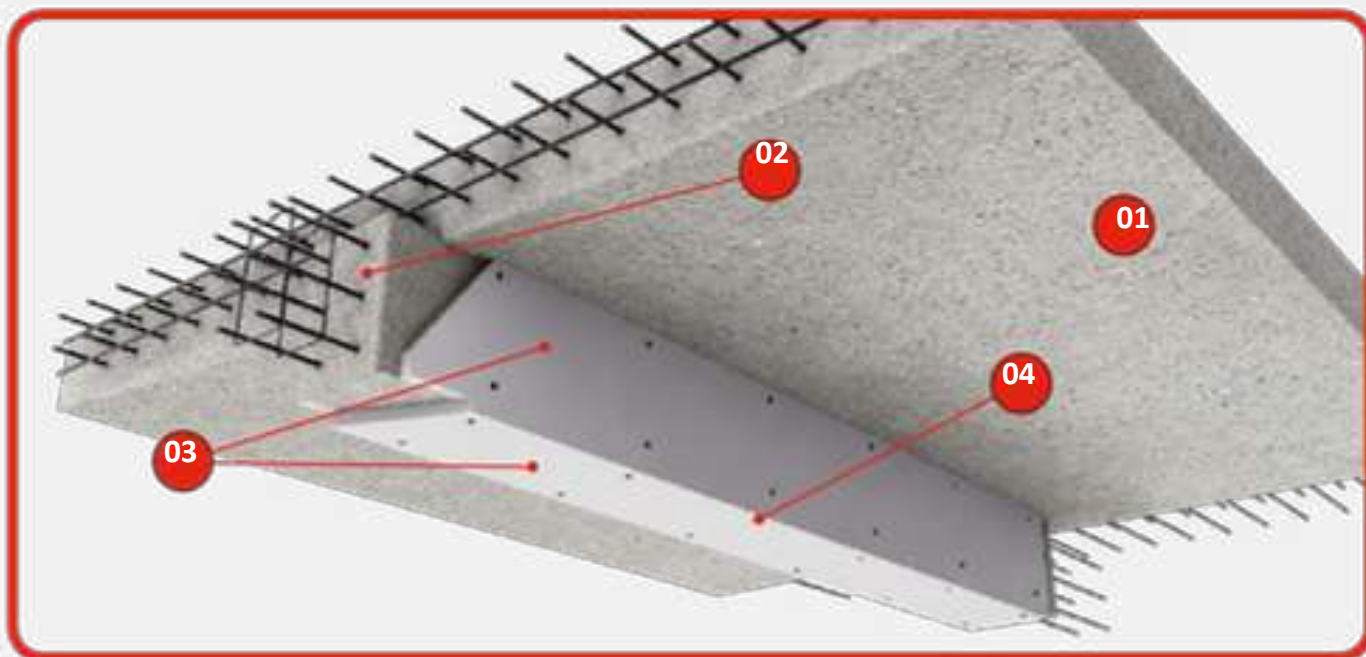


TEST

Standard: UNEEN 13381-3.

Laboratory: APPLUS.

Test no.: 12-3550-541 M-1 és 12-3550-656.



SPALLING EFFECT

This is an explosion caused by the violent rupture of the concrete layers or pieces on the surface of a structural element when exposed to a rapid rise in temperature, such as during a fire.

This normally takes place during the first 20 to 30 minutes of an outbreak. Several materials (e.g. permeability, level of saturation, size and type of aggregate, presence of cracking and reinforcement); geometric shapes (such as section size) and environment (level of resistance, or heating rate and profile) have been factors influencing spalling during a fire, as identified from research. The main factors affecting spalling are: the heating rate (especially above 2° or 3°C/minute), the permeability of the material, the level of pore saturation (especially above 2 or 3% moisture content by concrete weight), the use of reinforcement and the level of external strength applied.

Low permeability concrete shows a greater tendency to spall than that with normal concrete strength, despite its higher tensile strength.

This is because higher pore pressure builds up during heating due to the low permeability of the material. Moreover, the highest point in pore pressure occurs closer to the surface for concrete.



PROTECTION WITH **TECBOR®** BOARDS

The reinforced concrete protection varies according to their density, moisture content, composition and the factors of size and distance from the edge of the steel reinforcement axis.

Using the calculation methods given in EN 1992- 1-2 1995, Eurocode 2 part 1-2, concrete structural elements can be designed with the load-bearing and compartmentalising capacity required for a standardised thermal effect.

However, to improve the resistance capacity of concrete, Tecbor® Boards offer an economical, technical solution, simple to assemble and highly effective, increasing the reinforced concrete protection.

EUROCODE 2 stipulates the possibility of using protection and improvement systems with a corresponding test to determine both the equivalent thickness of the material and its capacity to remain cohesive and coherent with the slab.

Schedule C of the Spanish Technical Building Code (CTE) also includes these specifications.

Tecbor® Boards have been tested according to UNE EN 13381-3. This test has been used to achieve the same factors of concrete in Tecbor® Boards for different fire resistances. The thickness to be applied is determined according to these factors.

At mcr tecresa® we have carried out analysis to calculate the minimum thickness of Tecbor® Boards to reach certain critical temperatures at different cladding thickness's for both concrete slabs and beams.

Study to determine the minimum thickness of Tecbor® Boards to determine critical temperatures at different cladding thickness's for CONCRETE BEAMS.

The data obtained from the test results is shown in reports 12/3550-656, 12/3550-200, 12/3550-201, and suggest a linear relationship between the thickness of Tecbor® protection and its fire behaviour. Cells with no numerical value indicate that the corresponding value is higher than the maximum value tested (40 mm). Cells with a value of 0 indicate that the use of protection is not necessary due to the fire resistance of the concrete beam itself.

	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
Cladding thickness "g" (mm)	Minimum protective thickness (mm) for R30						
>5	0	0	0	0	0	0	0

	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
Cladding thickness "g" (mm)	Minimum protective thickness (mm) for R60						
5-9	10	0	0	0	0	0	0
>10	0	0	0	0	0	0	0

	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
Cladding thickness "g" (mm)	Minimum protective thickness (mm) for R90						
5-9	18	13	10	10	10	0	0
10-14	11	10	10	0	0	0	0
15-19	10	0	0	0	0	0	0
>20	0	0	0	0	0	0	0

	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
Cladding thickness "g" (mm)	Minimum protective thickness (mm) for R120						
5-9	28	26	23	21	18	16	16
10-14	24	21	17	14	11	10	10
15-19	17	12	10	10	0	0	0
20-24	11	10	0	0	0	0	0
25-29	10	10	0	0	0	0	0
30-34	10	10	0	0	0	0	0
35-39	10	10	0	0	0	0	0
40-44	10	0	0	0	0	0	0
45-49	10	0	0	0	0	0	0
50-54	10	0	0	0	0	0	0
55-59	10	0	0	0	0	0	0
>60	0	0	0	0	0	0	0

Tables for R180 and R240 have been obtained with data from the maximum thickness test 12/3550-200 only.

	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
Cladding thickness "g" (mm)	Minimum protective thickness (mm) for R180						
>5	40	40	40	40	40	40	40

	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
Cladding thickness "g" (mm)	Minimum protective thickness (mm) for R240						
5-9	-	-	-	-	-	40	40
10-14	-	-	-	-	40	40	40
15-19	-	-	-	40	40	40	40
20-24	-	-	40	40	40	40	40
25-29	-	40	40	40	40	40	40
30-34	-	40	40	40	40	40	40
35-39	-	40	40	40	40	40	40
40-44	-	40	40	40	40	40	40
45-49	-	40	40	40	40	40	40
>50	40	40	40	40	40	40	40

Study to determine the minimum thickness of Tecbor® Boards to reach certain critical temperatures at different cladding thickness's for CONCRETE SLABS.

The data obtained from the test results is shown in reports 12/3550-541, 12/3550-167, 12/3550-199, and suggest a linear relationship between the thickness of Tecbor® protection and its fire behaviour. Cells with no numerical value indicate that the corresponding value is higher than the maximum value tested (40 mm). Cells with a value of 0 indicate that the use of protection is not necessary due to the fire resistance of the concrete slab itself.

Cladding thickness "g" (mm)	Minimum protective thickness (mm) for R30						
>5	0	0	0	0	0	0	0
Cladding thickness "g" (mm)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
>5	0	0	0	0	0	0	0
Cladding thickness "g" (mm)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
>5	0	0	0	0	0	0	0
Cladding thickness "g" (mm)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
5-9	27	24	22	19	17	14	12
10-14	21	18	15	11	10	10	10
15-19	14	10	10	0	0	0	0
20-24	10	0	0	0	0	0	0
>25	0	0	0	0	0	0	0
Cladding thickness "g" (mm)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
5-9	30	28	26	24	22	20	17
10-14	27	25	22	20	17	15	13
15-19	24	21	18	15	12	10	10
20-24	22	18	15	11	10	10	10
25-29	19	15	11	10	10	0	0
30-34	16	12	10	10	0	0	0
35-39	10	10	10	0	0	0	0
40-44	10	10	0	0	0	0	0
>45	0	0	0	0	0	0	0
Cladding thickness "g" (mm)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
5-9	-	-	-	-	-	-	36
10-14	-	-	-	38	34	29	25
15-19	-	37	33	29	25	22	18
20-24	36	32	28	24	20	16	12
25-29	33	29	25	21	17	13	10
30-34	30	26	22	17	13	10	10
35-39	27	22	18	14	10	10	10
40-44	23	18	14	10	10	0	0
45-49	20	15	10	10	0	0	0
50-54	17	11	10	10	0	0	0
55-59	14	10	10	0	0	0	0
60-64	10	10	0	0	0	0	0
65-69	10	0	0	0	0	0	0
>70	0	0	0	0	0	0	0
Cladding thickness "g" (mm)	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C
5-9	-	-	-	-	-	-	-
10-14	-	-	-	-	-	-	-
15-19	-	-	-	-	-	-	-
20-24	-	-	-	-	-	-	-
25-29	-	-	-	-	-	-	38
30-34	-	-	-	-	-	38	28
35-39	-	-	-	-	38	28	19
40-44	-	-	-	38	29	19	10
45-49	-	-	38	29	19	10	10
50-54	-	40	31	21	12	10	0
55-59	-	33	23	14	10	0	0
60-64	36	27	18	10	0	0	0
65-69	30	21	12	10	0	0	0
70-74	25	15	10	0	0	0	0
75	20	11	10	0	0	0	0
75	15	10	0	0	0	0	0

Cable Tray Protection



When the power supply system is required to remain in perfect working order during a fire, it is essential to properly protect power cables. In tunnels, public buildings or high-rise buildings, it is essential that the core systems remain operational for an orderly evacuation.

Tecbor® 20 + 20 mm has been tested by covering a cable tray with cables from different sections, and has been assessed according to the general requirements of UNE EN 1363-1 and according to the heating curve defined by UL 1709.

Electrical conductivity, short-circuit between cables and earth fault were also included. To allow access to the inside of the structure, manhole covers can be made, and Tecsel® Grilles have also been tested to allow ventilation and to close the opening in the event of fire.. (For more information, contact our technical department).

3.1.CABLE TRAY PROTECTION. TECBOR® 20+20 EI-120

DESCRIPTION OF ASSEMBLY

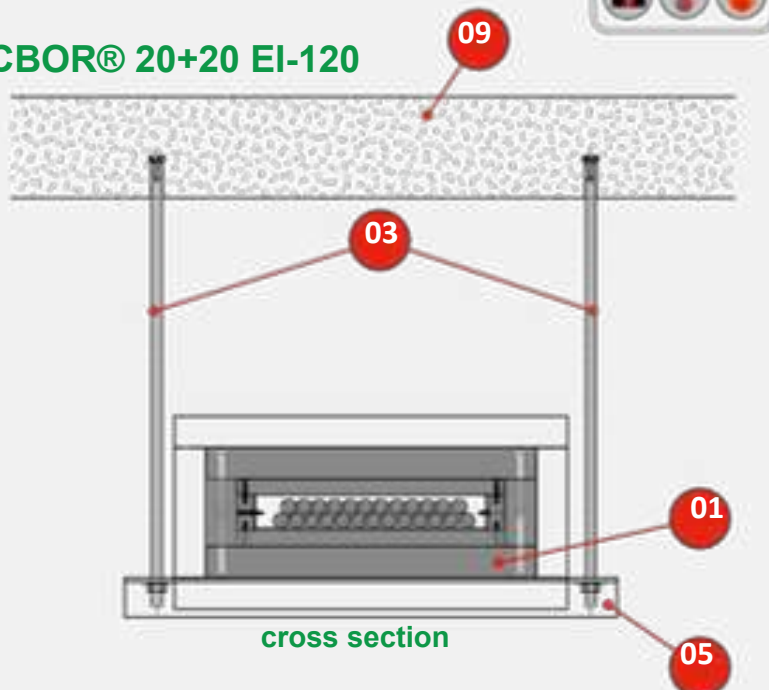
The tray is protected by two Tecbor® 20 mm Boards attached together using 5.2 x 80 mm self-tapping screws. At the junction between duct sections, place a 200 mm-wide Tecbor® 20 mm Board strip, fix it to the metal tray and to each other using 3.5 x 45 mm screws.

The duct is anchored to the slab with a 12 mm rod, supported on 50 x 50 x 5 mm angles.

Board joints and screw heads must be applied with Tecbor® Joint Paste Ready to Use.

Penetration sealing:

Fill the space between the duct and the supporting structure with 50 mm, 145 kg/m³ rock-wool and paint both sides with Tecbor® Joint Paste Ready to Use.



MEGOLDÁS

- 01 2x Tecbor® 20 mm Boards.
- 02 Cable tray.
- 03 M12 rod.
- 04 Tecbor® Joint Paste Ready to Use.
- 05 50 x 50 x 5 mm angles every 1000 mm.
- 06 3.5 x 45 mm self-drilling screw.
- 07 5.2 x 80 mm self-tapping screw.
- 08 3.5 x 45 mm self-tapping screw.
- 09 Slab.

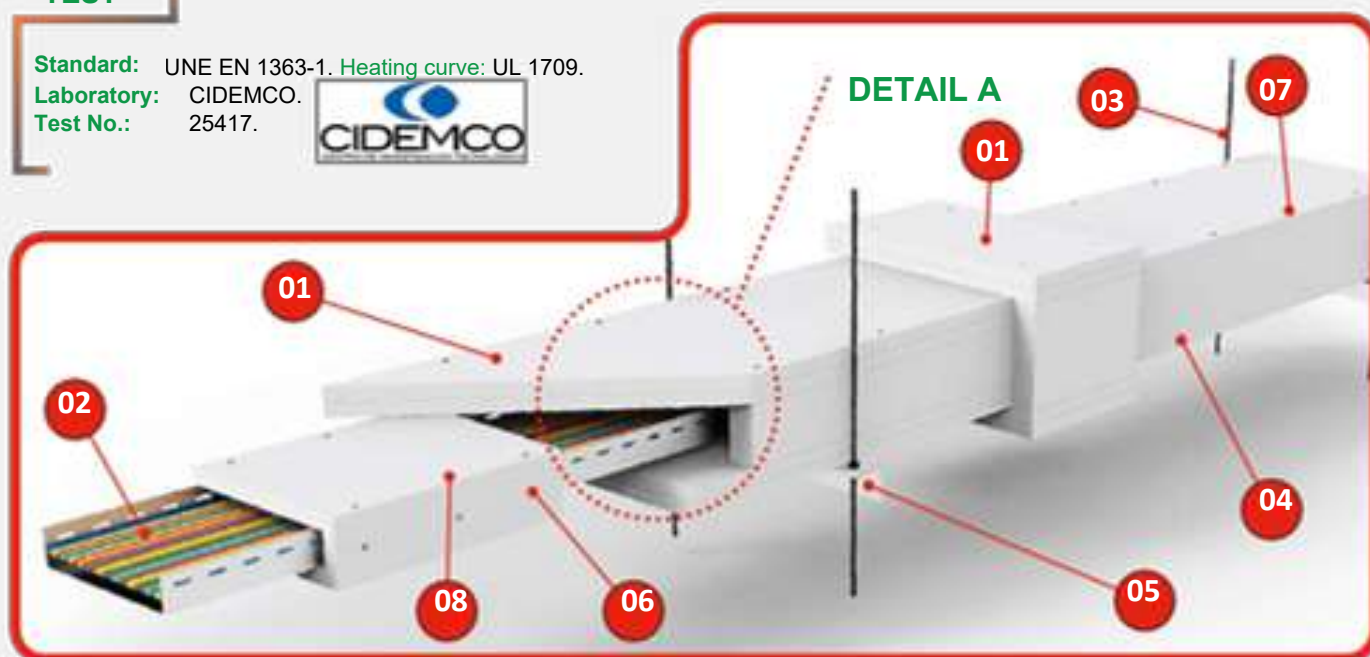


TEST

Standard: UNE EN 1363-1. **Heating curve:** UL 1709.

Laboratory: CIDEMCO.

Test No.: 25417.



Ventilation & Smoke Extraction Ducts



2-3 hours fire resistance, self-supporting horizontal and vertical installation

Tested under UNE EN 1366-1. Service facility fire resistance testing. Part 1. Ductwork. Classification in line with UNE EN 13501-2: EI-120 (ve, ho i↔o) S (Type A and B horizontal and vertical orientation).

Tested under UNE EN 1366-8. Service facility fire resistance testing. Part 8. Smoke extraction ducts (multi-compartment) classification according to UNE EN 13501-4: EI-120 S 1500 (Type C) multi.

Regulatory requirements state that separate building compartments must be in place when fixings such as pipes or ventilation and extraction ducts pass through them.

The Technical Building Code states the following in its Basic Fire Safety Document SI

1, Internal Propagation, Section 3, Point 3:

The required fire resistance of the fire compartmentation elements must be adhered

to at the points where fixtures pass through said elements, such as cables, pipes, conduits, ventilation ducts, etc. For this purpose, one of the following options may be chosen:

a) Install an element which, in the event of fire, automatically closes and has a guaranteed fire resistance at least equal to that of the penetrated element, e.g. 'EI (i↔o)' automatic fire dampers, where t is the fire resistance time required of the penetrated compartment element, or an intumescent block.

(b) Through-penetration fixtures with a fire resistance at least equal to that of the penetrated element, e.g. 'EI t (i↔o)' ventilation ducts, where t is the fire resistance time required of the penetrated compartmentation element.

The above paragraph thus stipulates that fire-resistant ducts passing through fire compartments must be fire-rated on both the inside and outside.

Article 5(7), Schedule 2 of the Spanish Fire Safety Regulations (RSCIEI) stipulates the following:

'Systems including ducts, both vertical and horizontal, which pass through compartment elements, that do not include dampers (smoke extraction, ventilation of escape routes, etc.), must be fire resistant or adequately protected along their entire length with the same degree of fire resistance as the elements they pass through, and tested in accordance with the applicable UNE-EN standards'.

The applicable UNE EN standards, as detailed in the attached CTE Basic Document

on Fire Safety (DBSI), are:

- UNE EN 1366 Part 1 for ventilation ducts.
- UNE EN 1366 Part 8 for multi-compartment extraction ducts.

4.1. VENTILATION DUCT TYPE A, B & C. TECBOR® 30 EI-120

DESCRIPTION OF ASSEMBLY

Duct composition:

Duct made of Tecbor® Boards, 30 mm thick.

Fixings between sections:

The boards are joined lengthwise using Tecsel® Adhesive.

Laterally, the duct sections are joined using perimeter joint covers made of Tecbor® Boards, 30 mm thick and 250 mm wide.

The joint covers are fixed to the section by means of 2 rows of 5 x 60 mm wood threaded screws, screwed every 250 mm along the long sides and 200 mm on the short sides. The rows are spaced 160 mm apart.

Method of duct support:

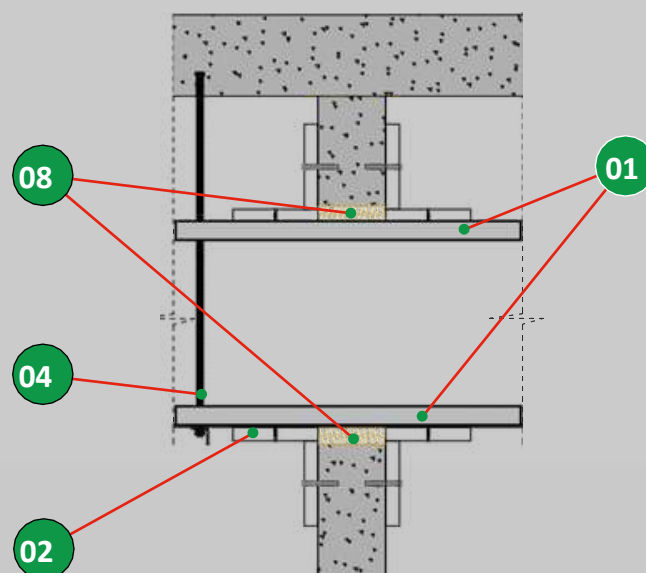
The duct is supported on an auxiliary structure consisting of M16 threaded rods and L-shaped angles measuring 50 mm x 50 mm and 5 mm thick. The maximum distance between hangers is 1200 mm.

Sealing at the point of penetration through the supporting structure. Sealing is completed with the following elements:

- Tecbor® 30 mm-thick Boards.
- Rock-wool, 50 mm thick and 145 Kg/m3 dense.

SOLUTION

- 01 Tecbor® 30 mm Boards.
- 02 Tecbor® 30 mm Boards joint covers.
- 03 Tecbor® 30 mm Boards perimeter ring.
- 04 M16 threaded rod.
- 05 50 x 50 x 5 mm angle bracket.
- 06 5 x 60 mm wood threaded screws.
- 07 6x80 mm metal anchors.
- 08 Rock-wool (50 mm thick and 145 Kg/m3 dense).
- 09 Tecsel® Adhesive



CROSS SECTION

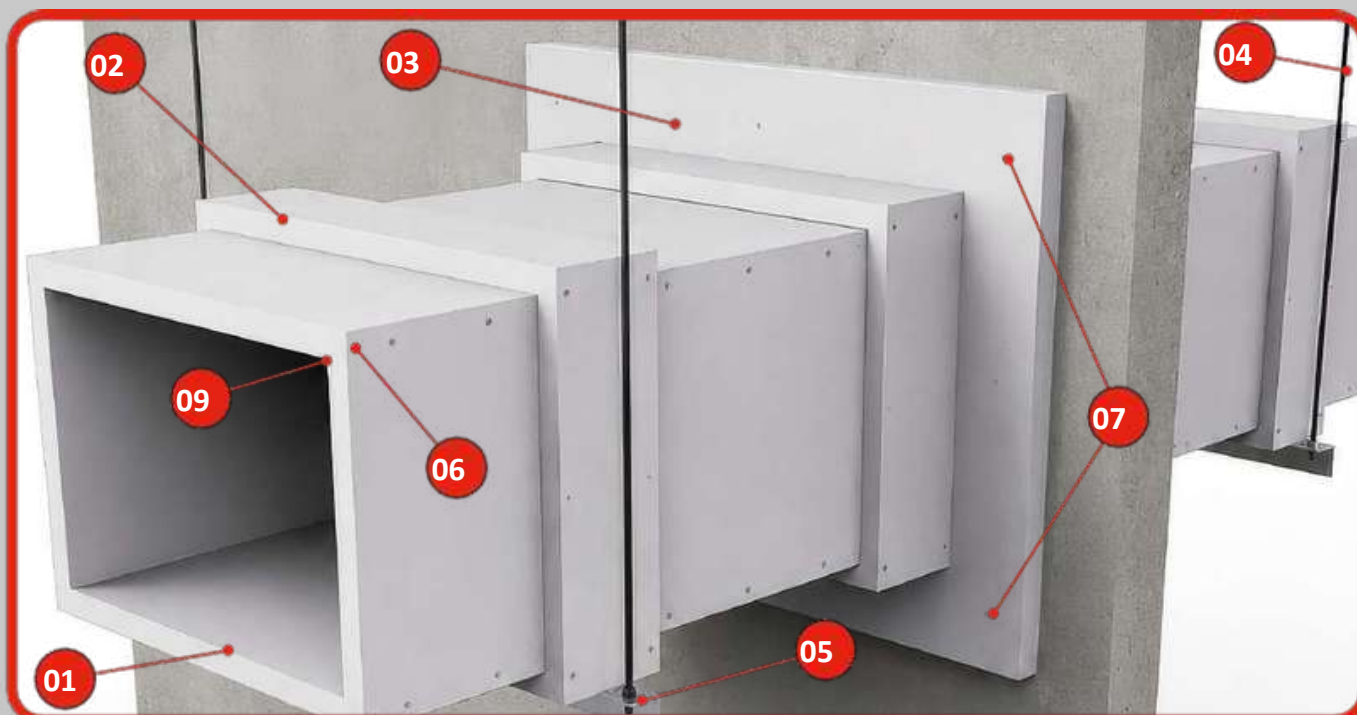
TEST

Standard: UNE EN 1366-1 és UNE EN 1366-8.

Laboratory: TECNALIA és APPLUS.

Test No.: 14_07739, 15_08681,

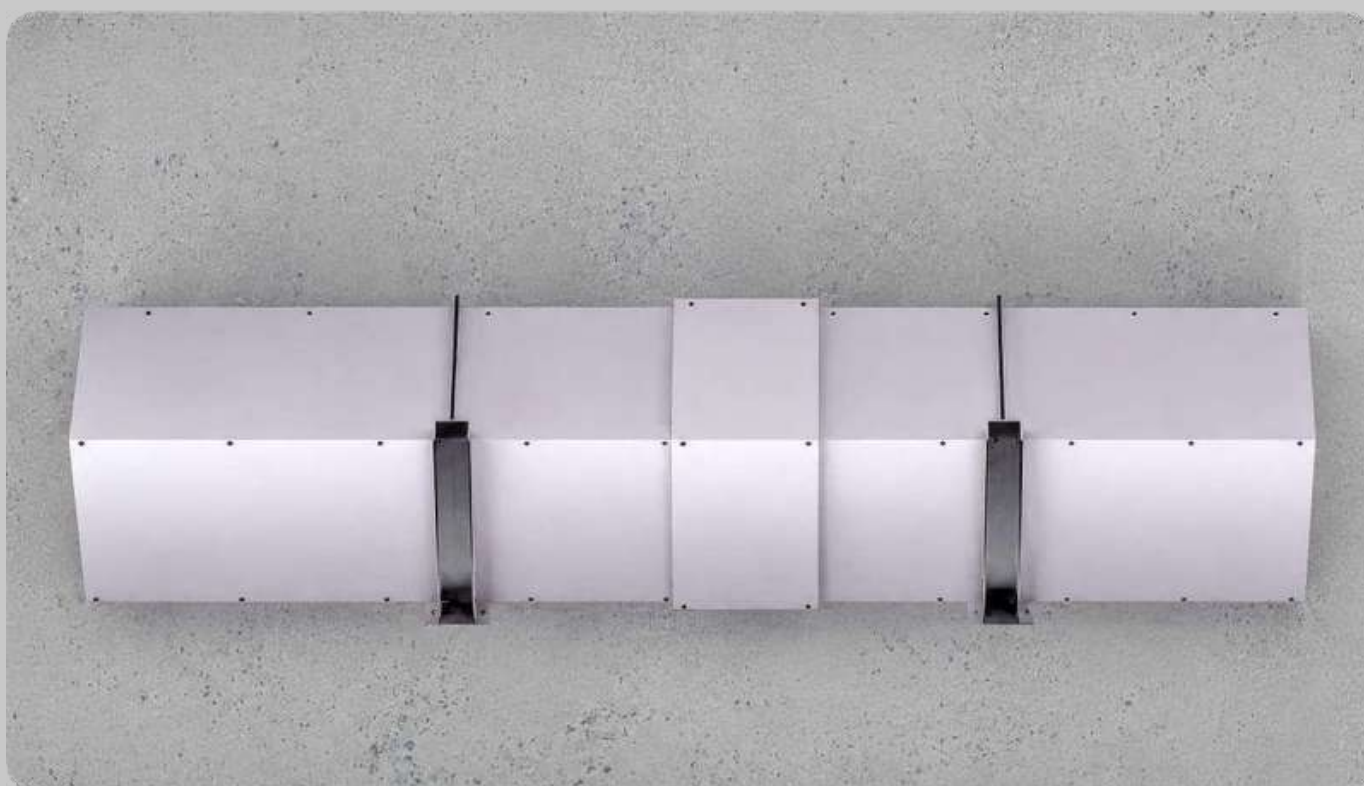
14_07738, 14/8785-1293 és 14/8785-1237.



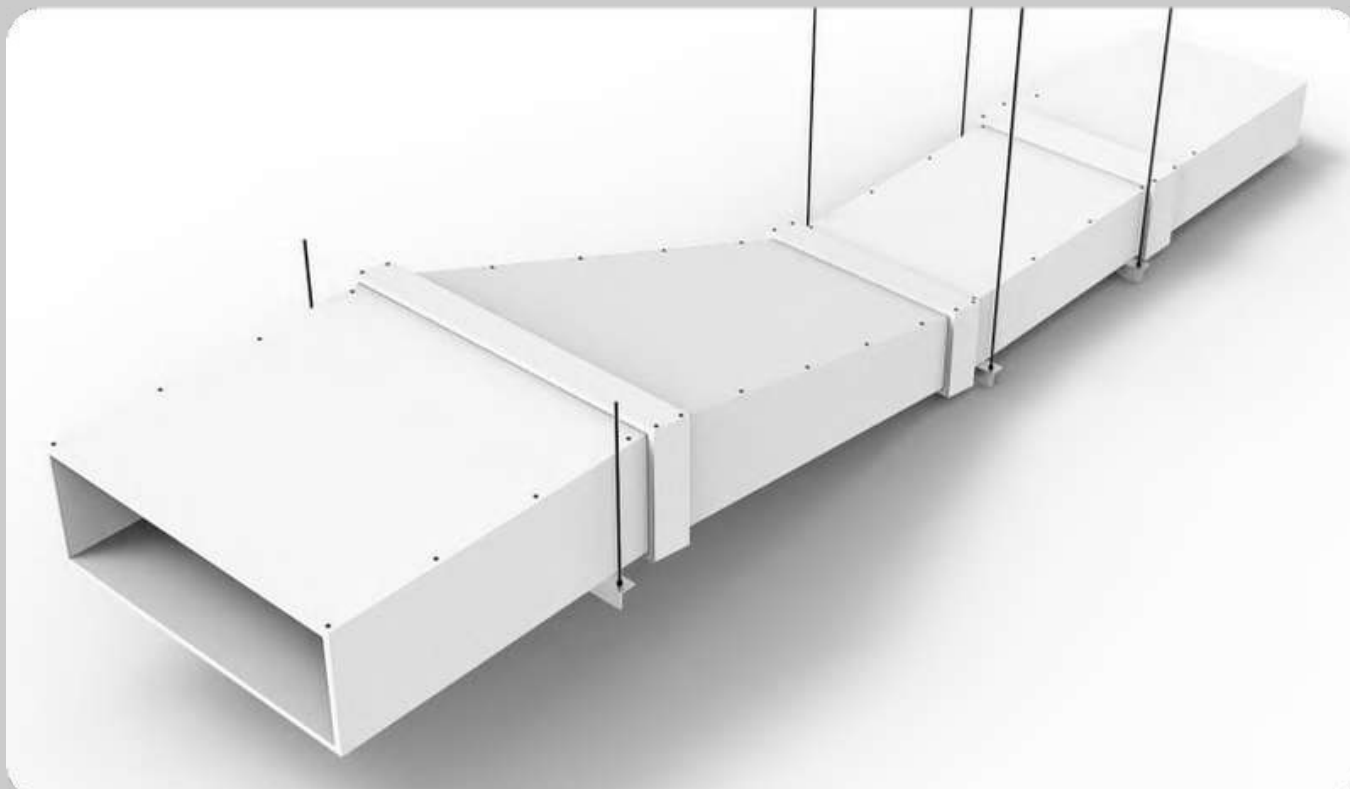
CONSTRUCTION SOLUTIONS FOR DUCTWORK



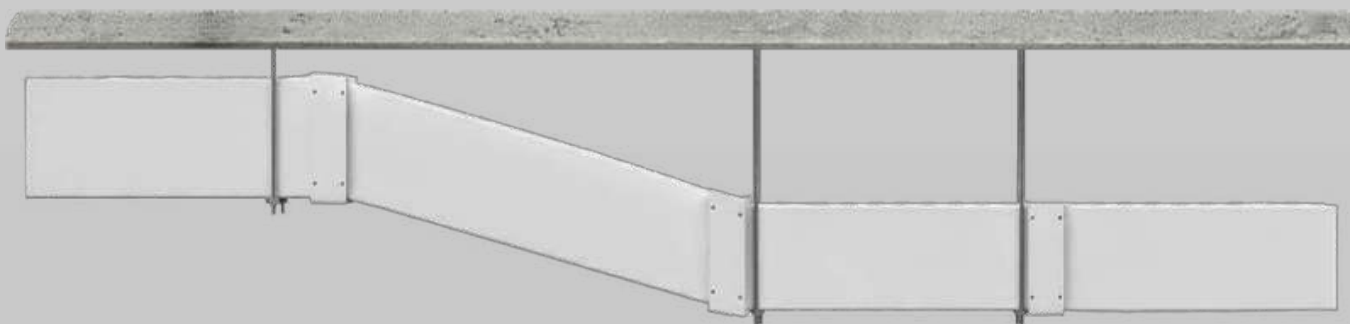
3-sided horizontal duct



2-sided horizontal duct



Section changes



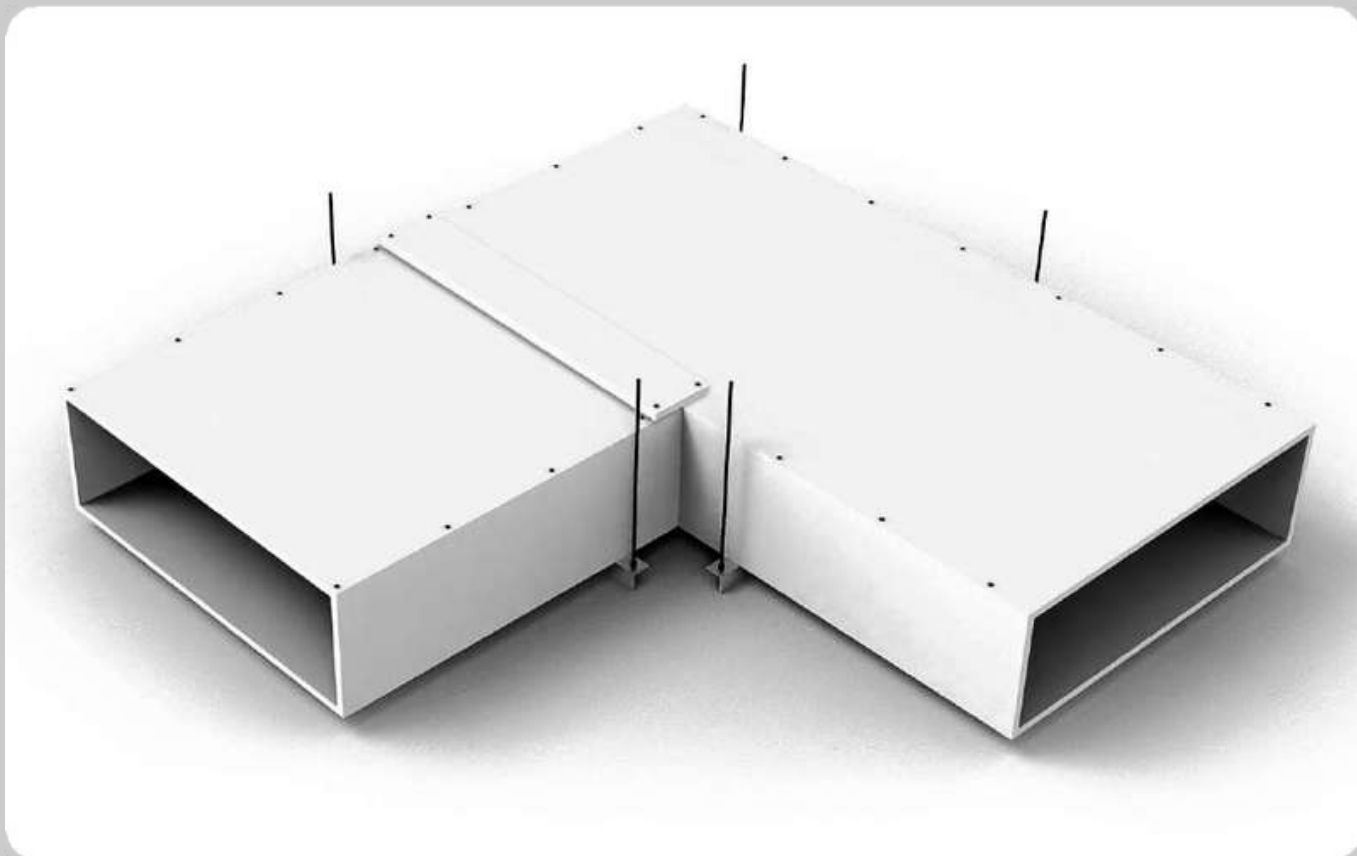
Slopes



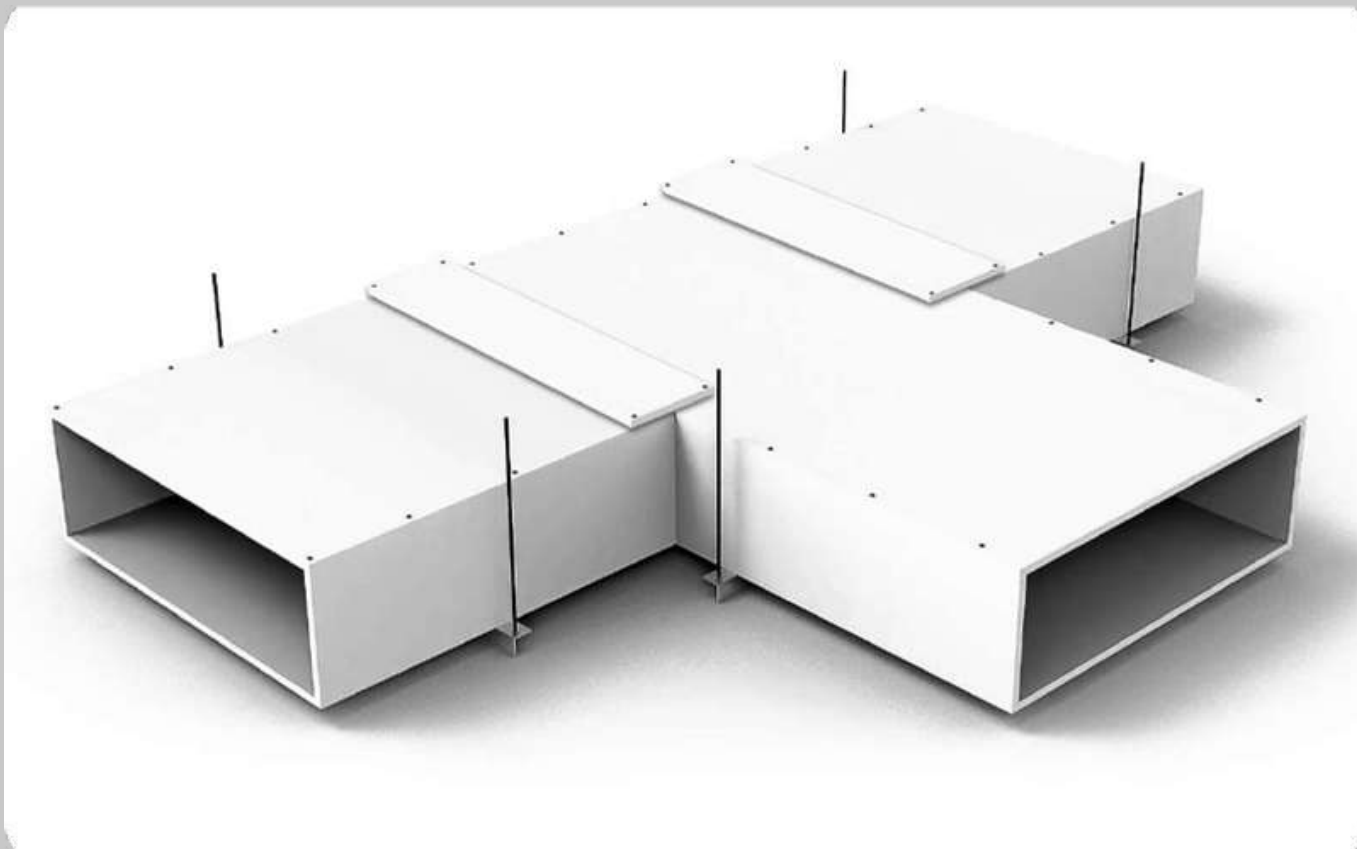
3-sided vertical duct



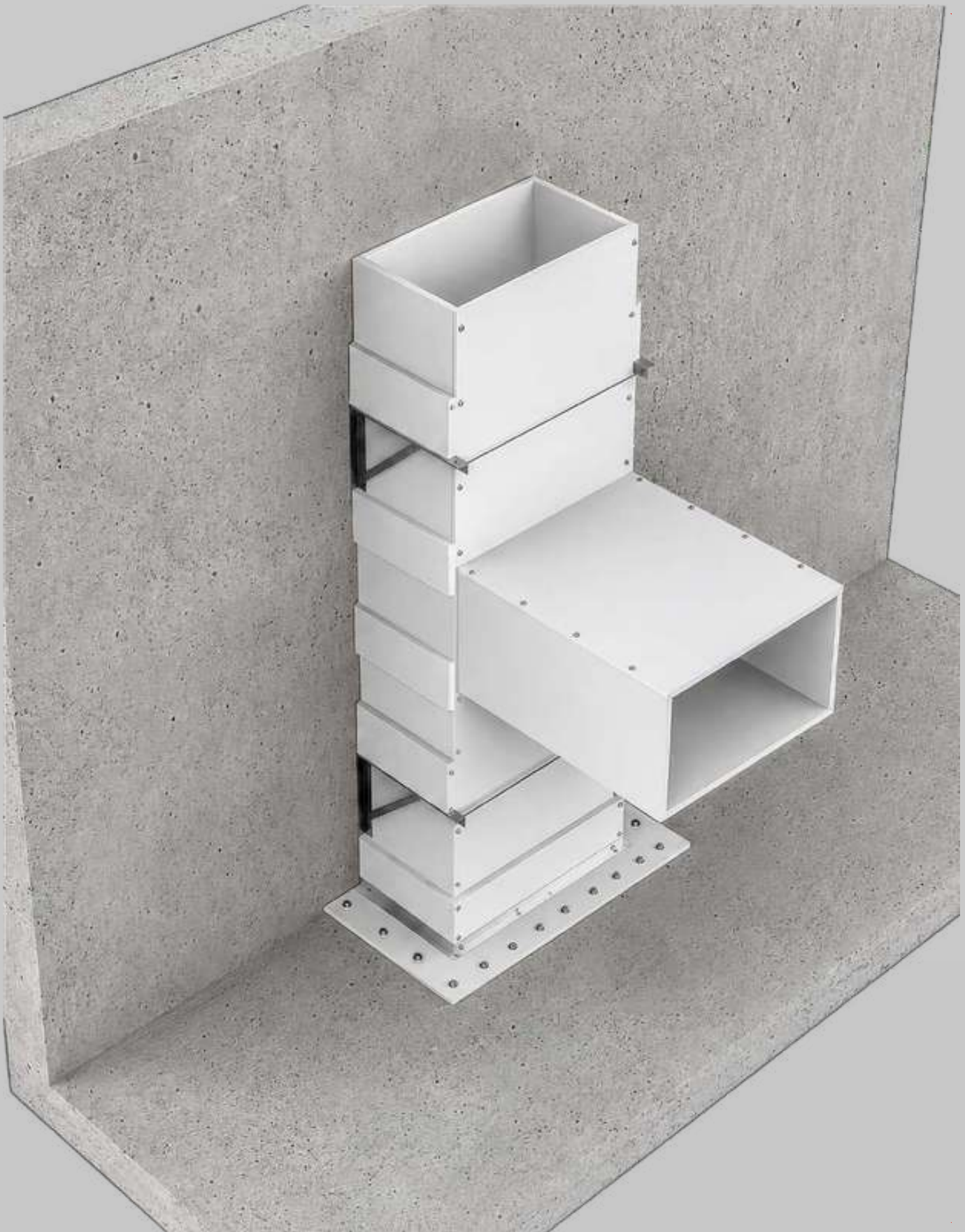
2-sided vertical duct



Elbows



Forks



Vertical anchoring and
horizontal splicing

4.2. VENTILATION DUCT TYPE A AND B. TECBOR® 30+20 EI-180

DESCRIPTION OF ASSEMBLY

The duct is made of a layer of 30 mm Tecbor® and another layer of 20 mm Tecbor®

The first layer of boards are joined using 3.9 x 45 mm self-tapping screws.

The 20 mm board is joined to the first layer using 3.9 x 35 mm screws.

The joint between duct sections is made by covering the joint with Tecbor® 20+20 mm joint covers, 250-300 mm wide, fixed to the duct by means of 3.9 x 45 mm self-tapping screws every 250 mm.

The duct is supported on 50 x 50 x 5 mm horizontal angles and suspended from the slab by means of the M16 rod, grommet and nut assembly. The hangings are spaced 1 m apart.

Board joints, junctions and screw heads must be applied with Tecbor® Joint Paste Ready to Use.

Compartment penetration:

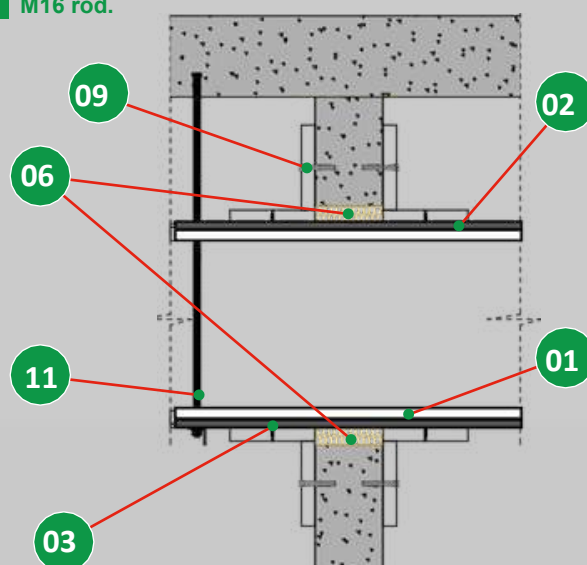
The space between the duct and the supporting structure is filled with 145 kg/m³ rock-wool, then Tecbor® 30+20 mm Board strips, about 250 mm wide, are placed around the duct and anchored to the supporting structure using 10 x 100 mm plugs on both sides.

Then we create a ring surrounding the duct with 250 mm strips attached using 3.9 x 45 mm self-tapping screws.

For more information, see the installation manual.

SOLUTION

- 01 Tecbor® 30 mm Boards.
- 02 Tecbor® 20 mm Boards.
- 03 3.9 x 45 mm self-tapping screw.
- 04 3.9 x 35 mm self-tapping screw.
- 05 50 x 50 x 5 mm angle bracket.
- 06 Rock-wool (50 mm thick and 145 Kg/m3 dense).
- 07 2 x 20 mm Tecbor® Board joint covers.
- 08 Tecbor® Joint Paste Ready to Use.
- 09 10 x 100 mm metal plug.
- 10 Manufactured structure.
- 11 M16 rod.



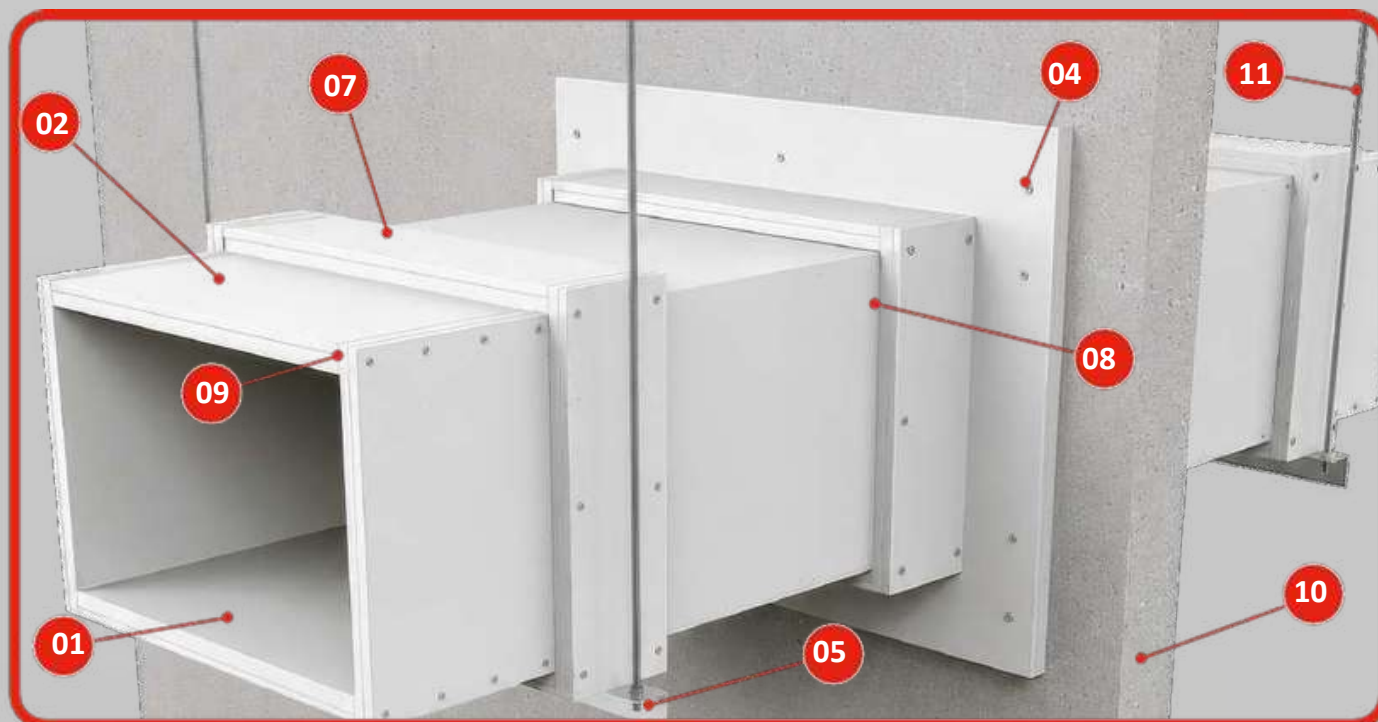
CROSS SECTION

TEST:

Standard: UNE EN 1366-1.

Laboratory: CIDEMCO.

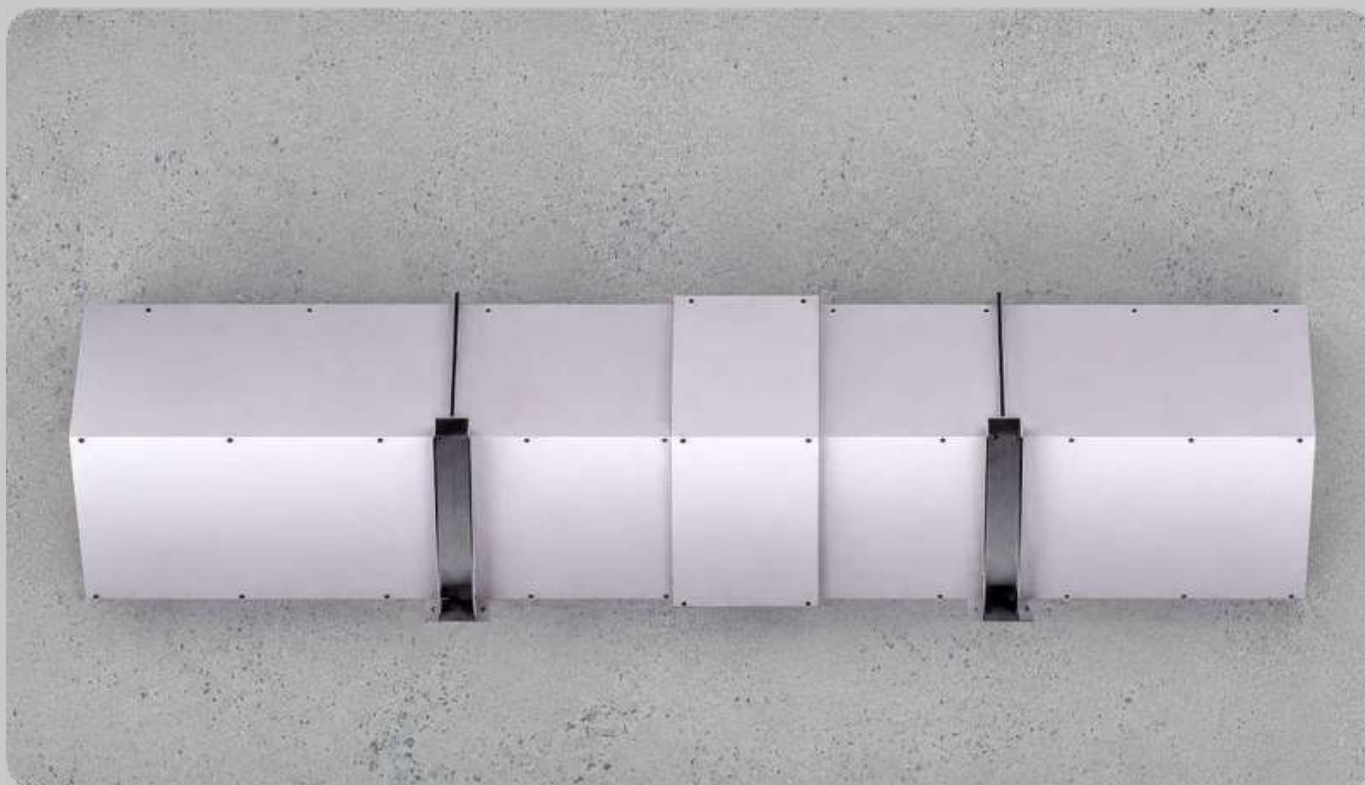
Test no.: 20529, 19967, 20330-a-M1 és 19966-1/-2-a-M1.



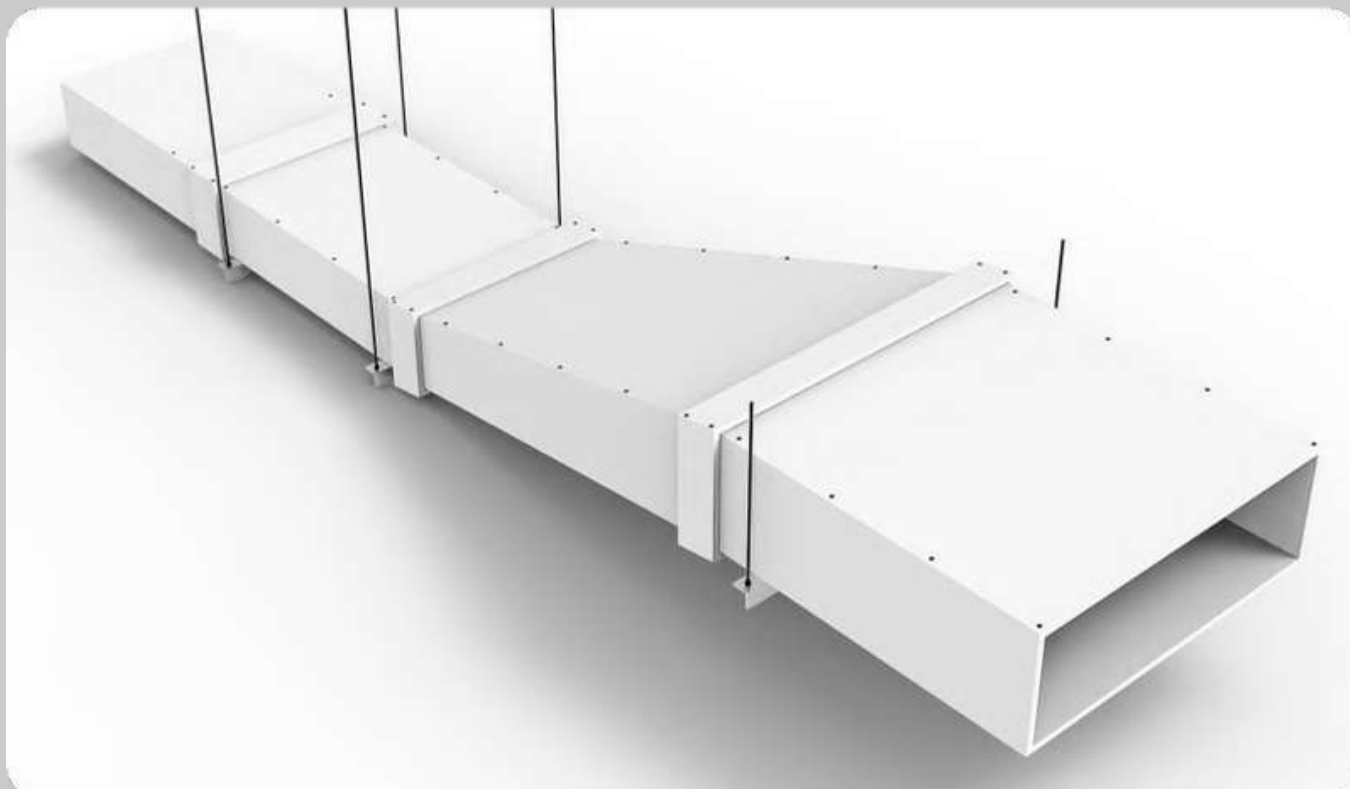
CONSTRUCTION SOLUTIONS FOR DUCTWORK



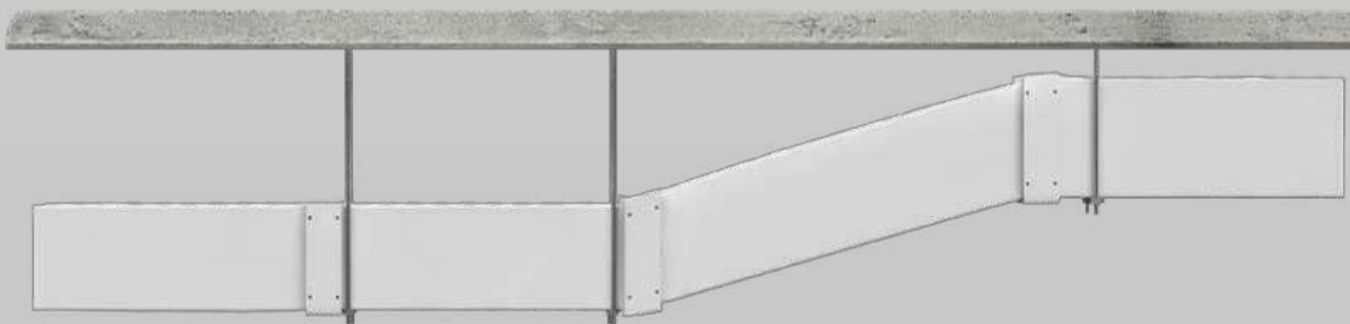
3-sided horizontal duct



2-sided horizontal duct



Section changes



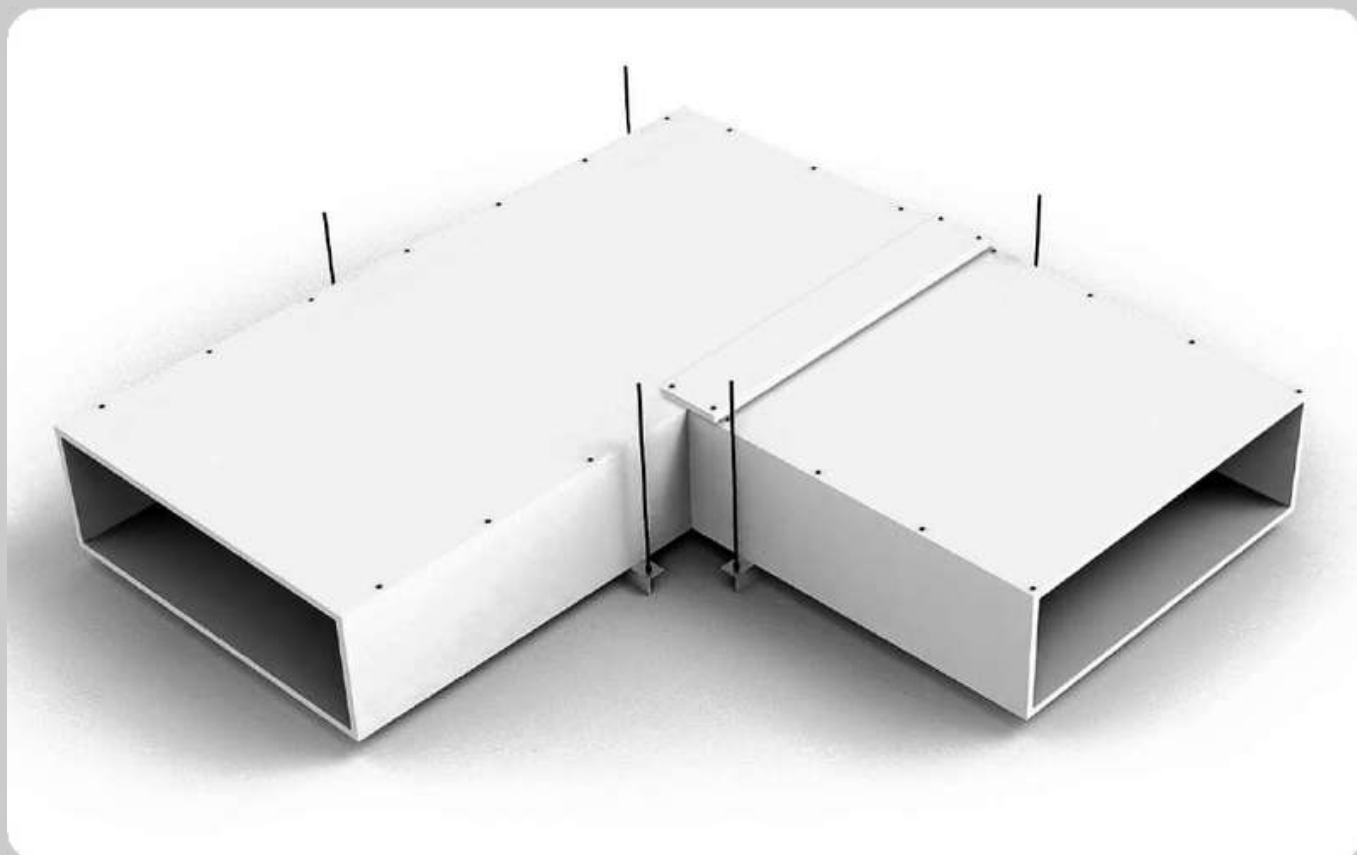
Slopes



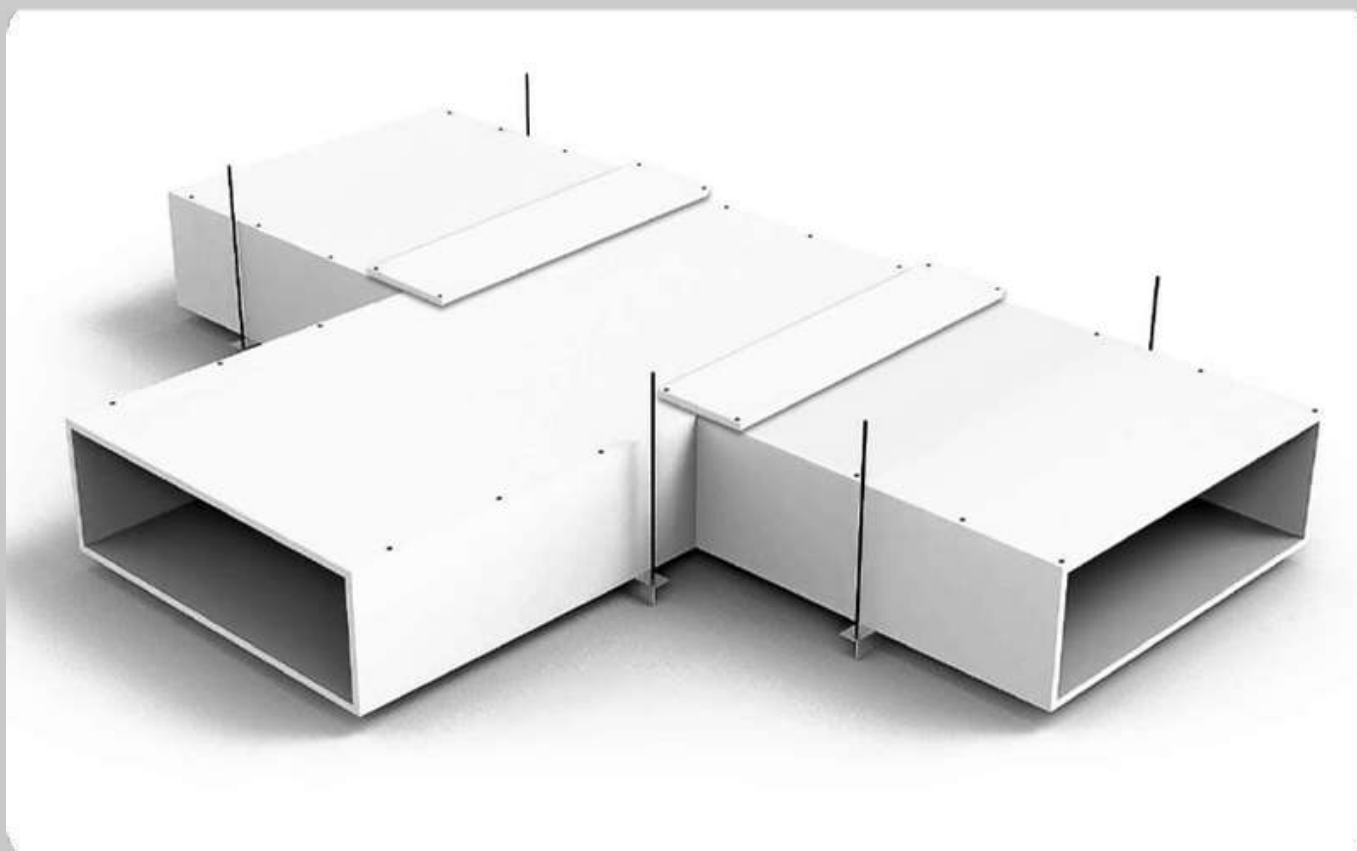
3-sided vertical duct



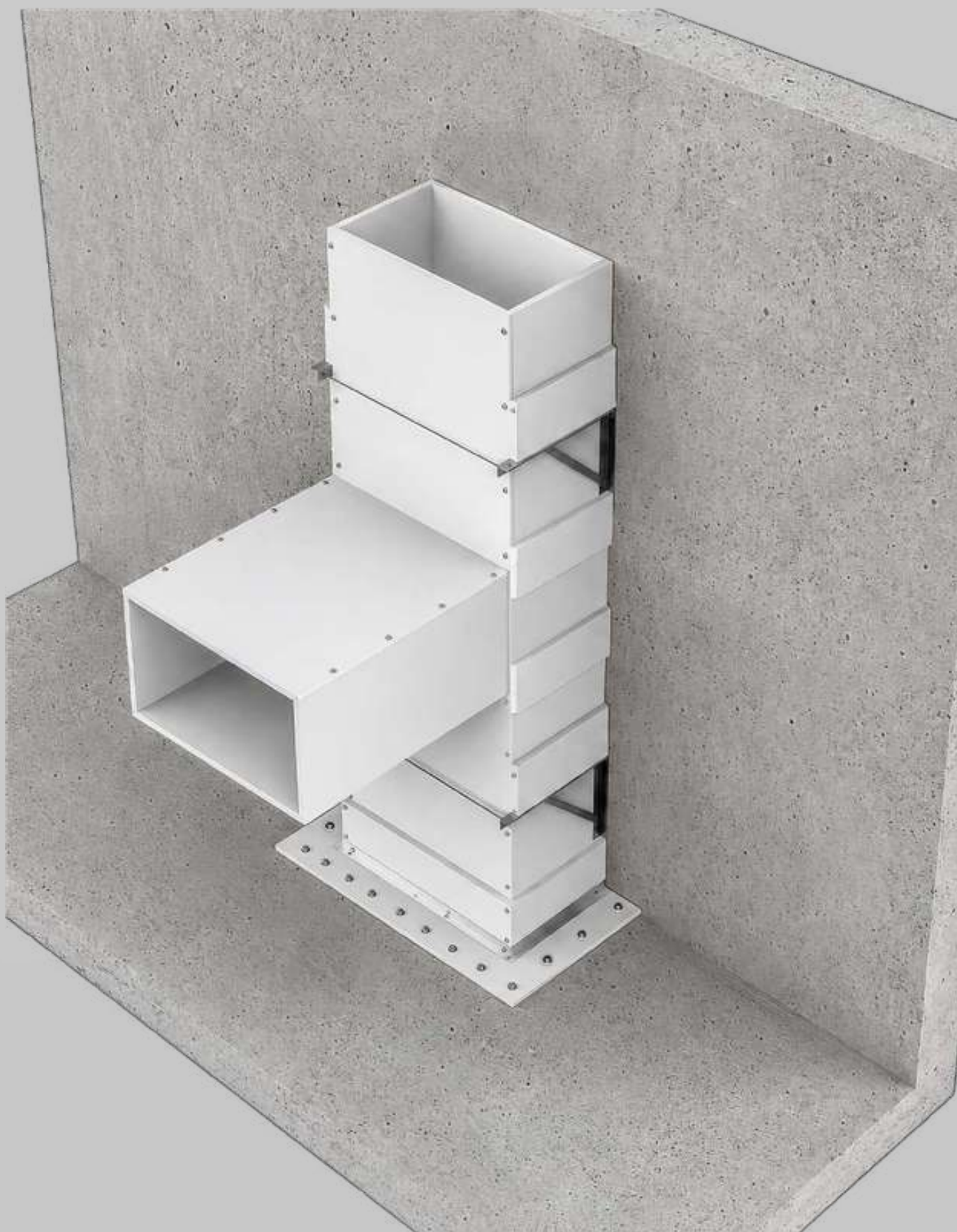
2-sided vertical duct



Elbows



Forks



Vertical anchoring and horizontal splicing

Non-Structural Elements (Walls) Protection



Non-structural walls that separate fire compartments must be fire resistant as stipulated by UNE EN 1364-1.

When testing the fire resistance of non-structural elements (Part 1: Walls) and a free edge is left, the standard allows an increase in width.

With regard to height increase, the standard is clear and concise. When testing at minimum of 3 metres in height, it can be increased to 4 metres.

It is common for partitions to be over 4 metres. At mcr tecresa® we're leaders in creating large partitions and offer the most efficient, convenient solution for this type of work.

Moreover, fires-top sealant must be used to seal any openings caused by penetrating fixtures that pass between compartments. Take a look at the Tecsel® Sealing Systems catalogue to find the best solution.

5.1. WALL WITHOUT WOOL. TECBOR® 12 EI-60.

Single partition 118/610 [Tecbor12+70+Tecbor12]

DESCRIPTION OF ASSEMBLY

Fix the 73 x 30 x 0.5 mm runners using M10 metal plugs every 250-300 mm. Complete the steel structure with 70 x 36 x 0.5 mm double studs placed at the 'H' position, spaced 610 mm apart.

Then fix Tecbor® 12 mm Boards to both sides with 3.5 x 35 mm self-tapping screws every 200-250 mm.

Finally, cover the joints between the boards and screw heads using Tecbor® Joint Paste.

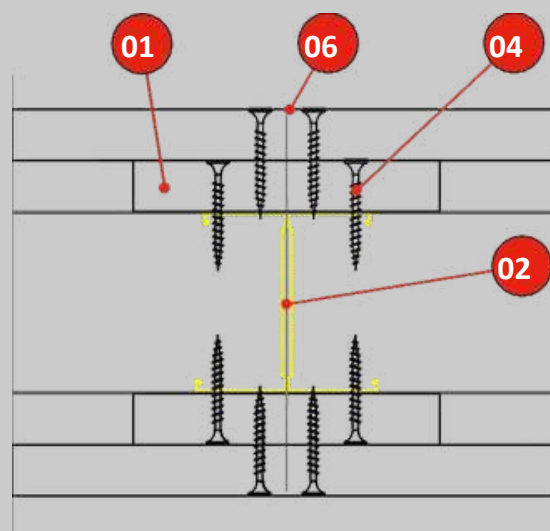
The studs are then covered with Tecbor® Board strips, to which the boards will be screwed.

TEST

Standard: UNE EN 1364-1.

Laboratory: TECNALIA.

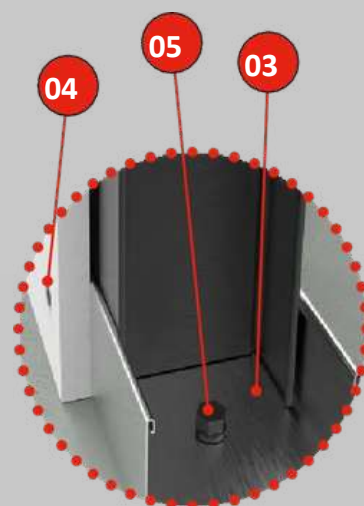
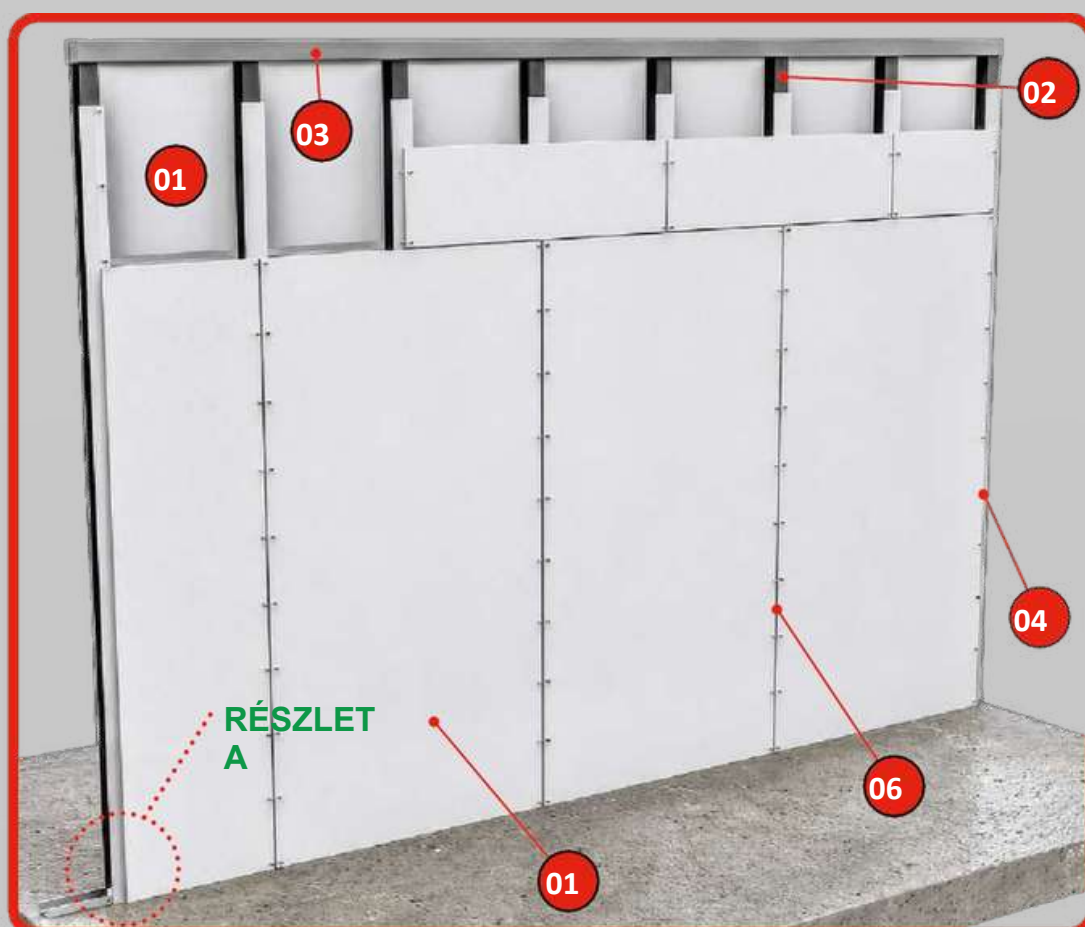
Test No: 051497-2.



CROSS SECTION

SOLUTION

- 01 Tecbor® 12 mm Boards.
- 02 70 x 36 x 0.6 mm double H-stud.
- 03 73 x 30 x 0.5 mm runner.
- 04 3.5 x 35 mm self-tapping screw.
- 05 Metal plug (M10 x 100).
- 06 Tecbor® Joint Paste.



DETAIL A

WALL. TECBOR® 12 EI-120.

Single partition 94/610 [Tecbor12+70+Tecbor12] MW(40+40)

DESCRIPTION OF ASSEMBLY

Fix the 73 x 30 x 0.5 mm runners using M6 metal plugs every 250-300 mm. Complete the steel structure with 70 x 36 x 0.6 mm double studs placed at the 'H' position, spaced 610 mm apart.

Position the rock-wool boards between the studs.

Then fix Tecbor® 12 mm Boards to both sides with

3.5x35 mm self-tapping screws every 200-250 mm.

Finally, cover the joints between the boards and screw heads using Tecbor® Joint Paste.

SOLUTION

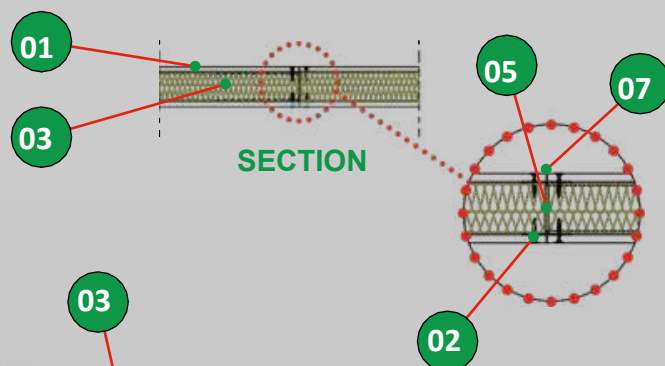
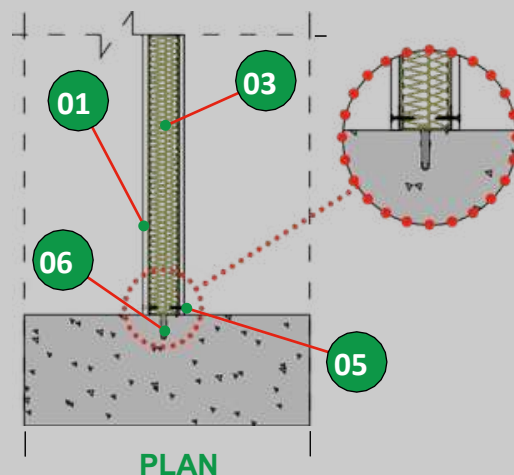
- 01 Tecbor® 12 mm Boards.
- 02 70 x 36 x 0.6 mm double H-stud.
- 03 80 mm rock-wool (40+40), 40 Kg/m3
- 04 73 x 30 x 0.5 mm runner.
- 05 3.5 x 45 mm self-tapping screw (every 250 mm).
- 06 6 mm strike anchor, every 600 mm.
- 07 Tecbor® Joint Paste.

TEST

Standard: UNE EN 1364-1.

Laboratory: TECNALIA.

Test No.: 072951- 005-2.



5.3. WALL. TECBOR® 12 EI-120.

Single partition 94/610 [Tecbor12+70+Tecbor12] MW(40+40)



DESCRIPTION OF ASSEMBLY

FiFix the 73x30x0.5 mm runners and assemble the 70x36x0.6 mm studs every 610 mm. Fill the framework with 80 mm (40+40 mm), 40 kg/m3 rock-wool boards.

Attach the 2 layers of Tecbor® 10 mm Boards using 3.5 x 35 mm self-tapping screws spaced 200 - 250 mm apart, butting up the layers.

Apply Tecbor® Joint Paste or Tecbor® Bonding Compound to the board joints and screw heads.

TEST

Standard: UNE EN 1364-1.

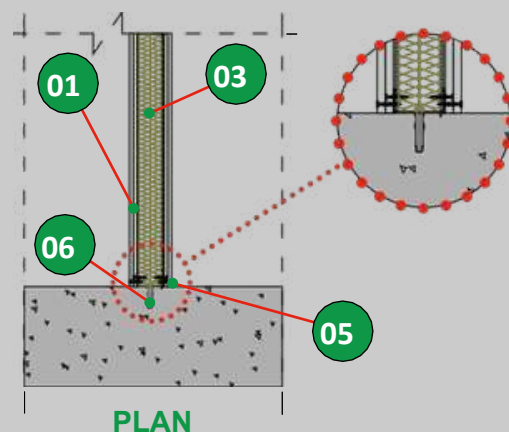
Laboratory: TECNALIA.

Test No.: 072951-006-2.

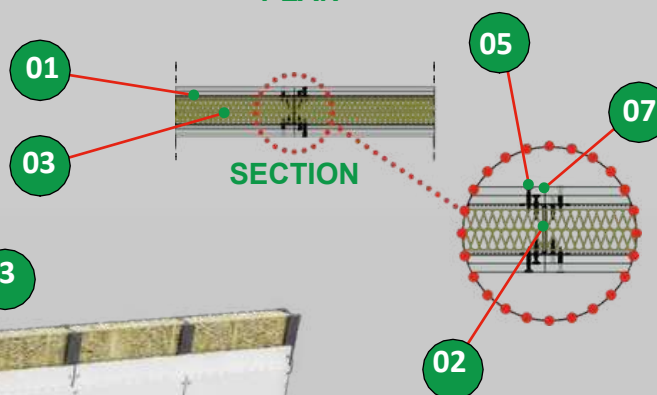


SOLUTION

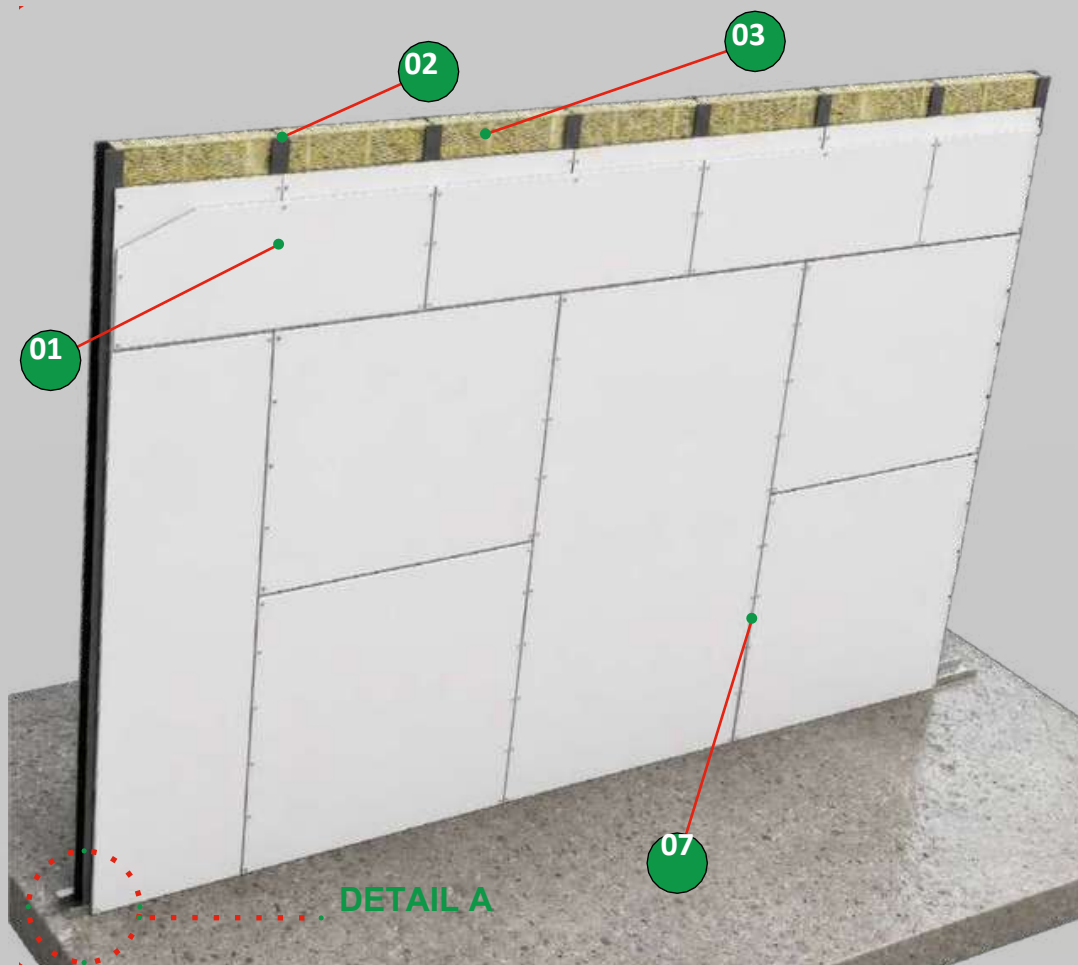
- 01** Tecbor® 10 mm Boards.
- 02** 70 x 36 x 0.6 mm H-stud
- 03** 80 mm rock-wool (40+40) and 40 Kg/m3
- 04** 73 x 30 x 0.5 mm runner.
- 05** 3.5 x 35 mm self-tapping screw.
- 06** M6 metal plug.
- 07** Tecbor® Joint Paste or Tecbor® Bonding Compound.



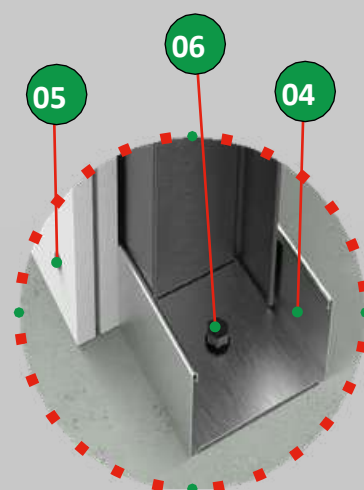
PLAN



SECTION



DETAIL A



DETAIL A

5.4. WALL. TECBOR® 15 EI-240.

Multiple partition 155/610 [12.5+2xTecbor15+70+2xTecbor15+12.5] MW(40+40)

DESCRIPTION OF ASSEMBLY

Fix the 48 x 40 x 0.6 mm runners and assemble the 46 x 40 x 0.6 mm studs every 600 mm. Fill the framework with 80 mm (40+40 mm), 40 kg/m³ rock-wool boards.

Standard: UNE EN 1364-1.

Laboratory: TECNALIA.

Test No.: 076765-001-2.

Attach the 2 layers of Tecbor® 15 mm Boards with 3.5 x 35 mm self-tapping screws spaced 200 - 250 mm apart, butting up the layers. Apply Tecbor® Joint Paste or Tecbor® Bonding Compound to the board joints and screw heads.

SOLUTION

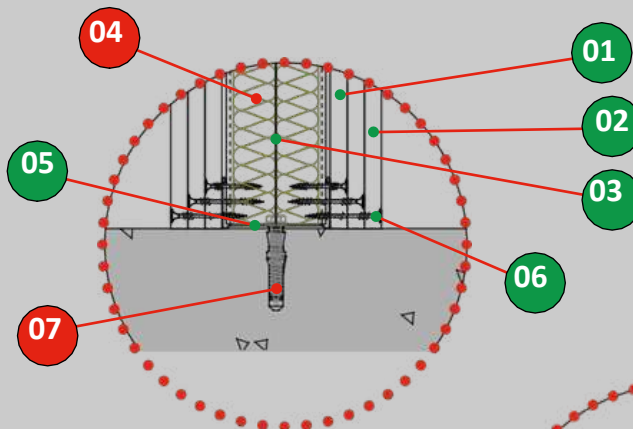
- 01 1Tecbor® 15 mm Boards.
- 02 12,5 mm laminated plasterboard.
- 03 46 x 40 x 0.6 mm double H-stud.
- 04 80 mm rock-wool (40+40), 40 Kg/m³
- 05 48 x 40 x 0.6 mm double runner.
- 06 3.5 x 35, 45 and 55 mm self-tapping screws, (every 250 mm)
- 07 6 mm strike anchor, every 600 mm.
- 08 Tecbor® Joint Paste or Tecbor® Bonding Compound.

TEST

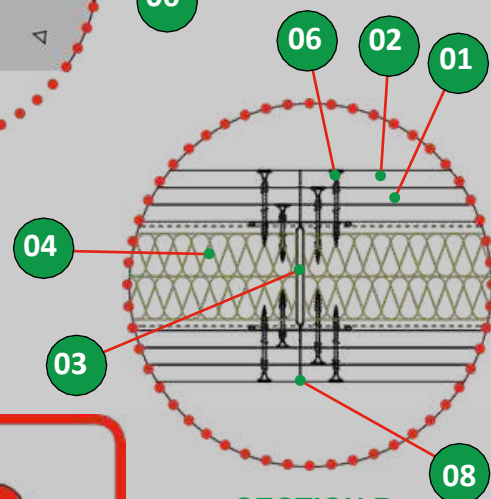
Standard: UNE EN 1364-1.

Laboratory: TECNALIA.

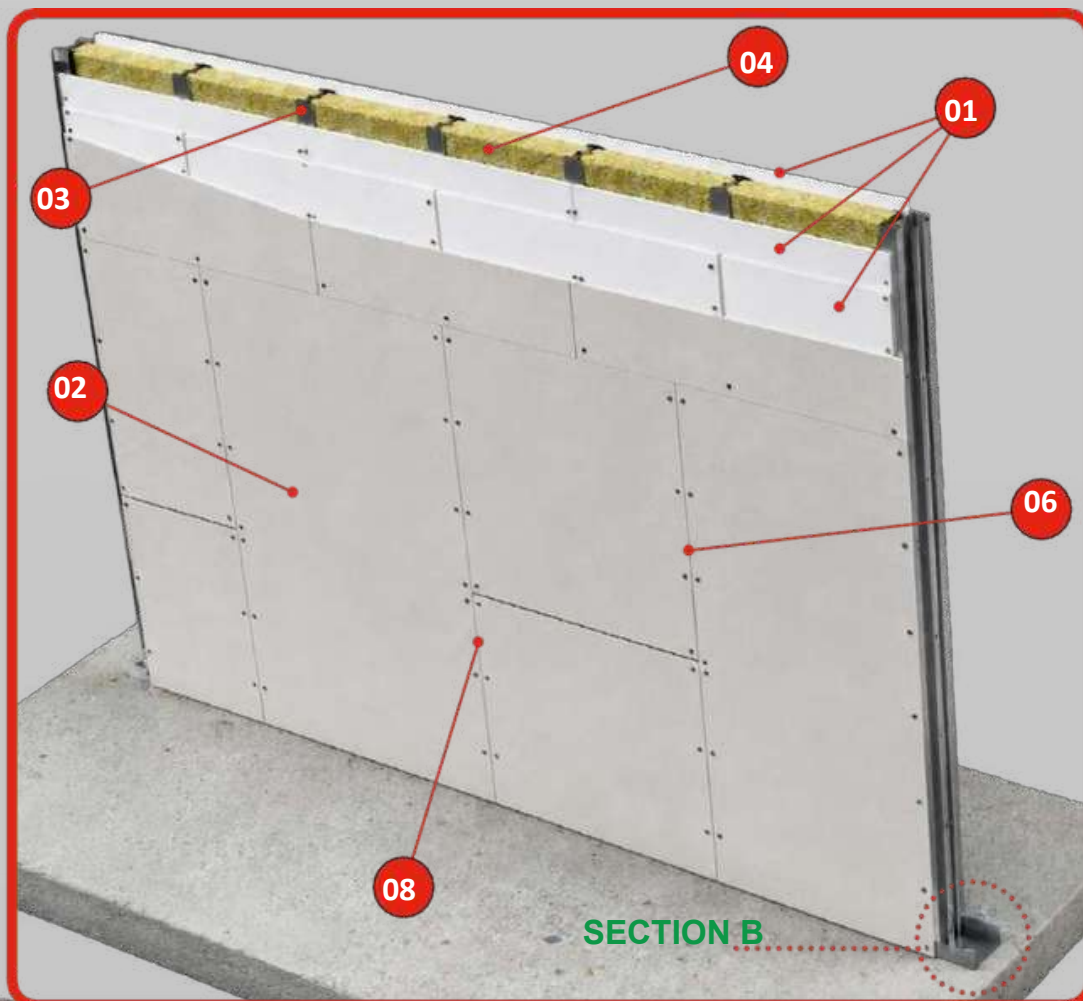
Test No.: 076765-001-2.



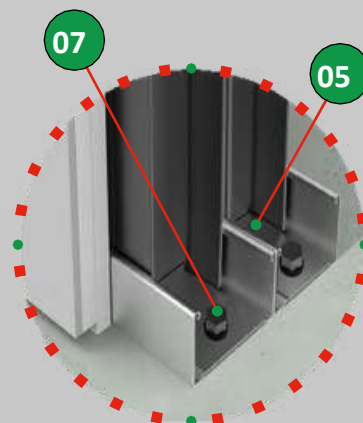
SECTION A



SECTION B



SECTION B



SECTION A

5.5. INDEPENDENT WALL LINING. TECBOR® 12 EI-120.

Multiple self-supporting wall cladding 94/610 [2xTecbor12+70] MW(40+40)

DESCRIPTION OF ASSEMBLY

Fix the 73x30x0.5 mm runners and assemble the 70x36x0.6 mm studs every 610 mm. Fill the framework with 80 mm (40+40 mm), 40 kg/m³ rock-wool boards.

Attach the 2 layers of Tecbor® 12 mm Boards using 3.5 x 35 mm self-tapping screws spaced 200 - 250 mm apart, butting up the layers.

Apply Tecbor® Joint Paste to the board joints and screw heads.

An IPN 140 metal profile was placed in the centre of the test furnace frame.

SOLUTION

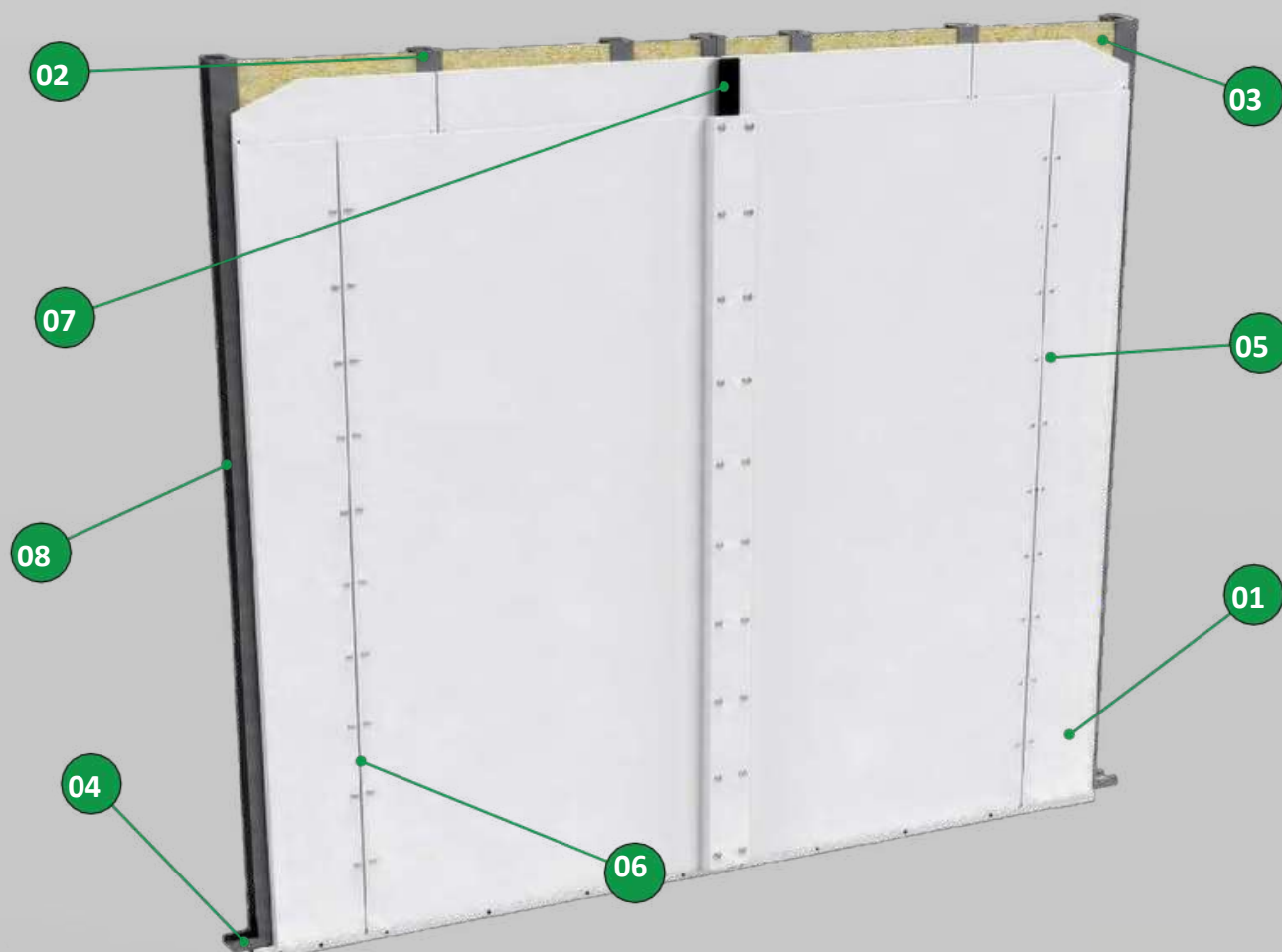
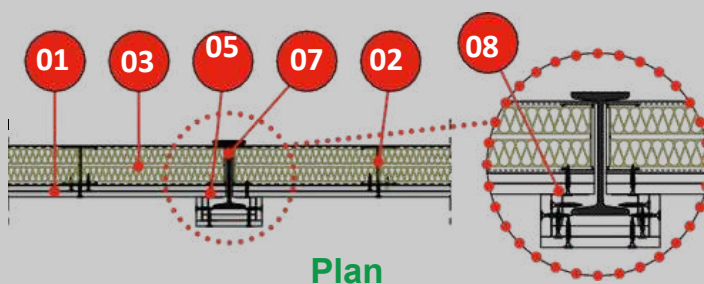
- 01 Tecbor® 12 mm Boards.
- 02 70 x 36 x 0.6 mm H-stud
- 03 80 mm rock-wool, 40 Kg/m³
- 04 73 x 30 x 0.5 mm runner.
- 05 3.5 x 35 mm self-tapping screw.
- 06 Tecbor® Joint Paste.
- 07 IPN 140 metal profile.
- 08 30 x 30 x 0.6 mm angle.
- 09 M6 metal plug.

TEST

Standard: UNE EN 1364-1.

Laboratory: TECNALIA.

Test No.: 072951-008-2.



5.6. 2-SIDED INDEPENDENT WALL LINING. TECBOR® 15 EI-120

Multiple self-supporting wall cladding 116/610 [12,5+2xTecbor15+70]

DESCRIPTION OF ASSEMBLY

Fix the 83x40x0.6 mm runners and assemble the 34.8x40x0.6 mm studs every 600 mm.

Attach the 2 layers of Tecbor® 15 mm Boards using 3.5 x 35 mm self-tapping screws spaced 250 mm apart, butting up the layers.

Apply Tecbor® Joint Paste or Tecbor® Bonding Compound to the board joints and screw heads.

SOLUTION

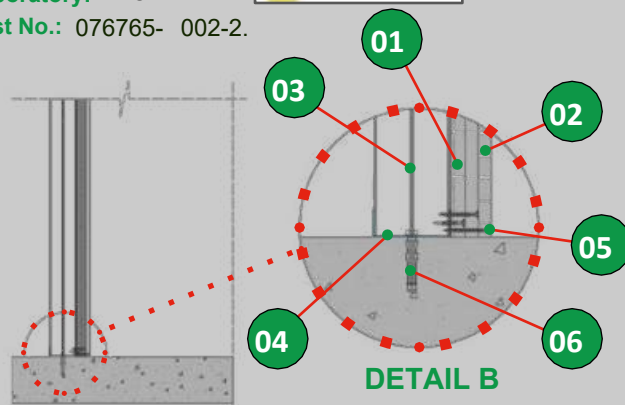
- 01 Tecbor® 15 mm Boards.
- 02 12.5 mm laminated plasterboard.
- 03 34.8 x 40 x 0.6 mm double H-stud.
- 04 83 x 40 x 0.6 mm runner.
- 05 3.5 x 35, 45 and 55 mm self-tapping screws, (every 250 mm)
- 06 6 mm strike anchor, every 600 mm.
- 07 Tecbor® Joint Paste or Tecbor® Bonding Compound.

TEST:

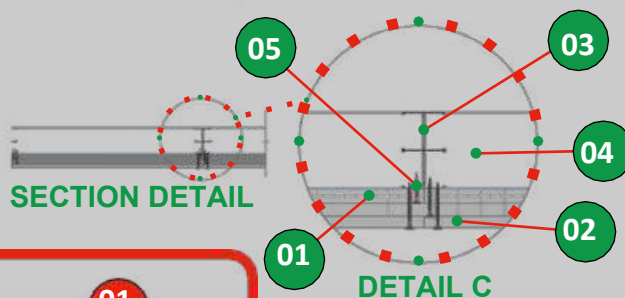
Standard: UNE EN 1364-1.

Laboratory: TECNALIA.

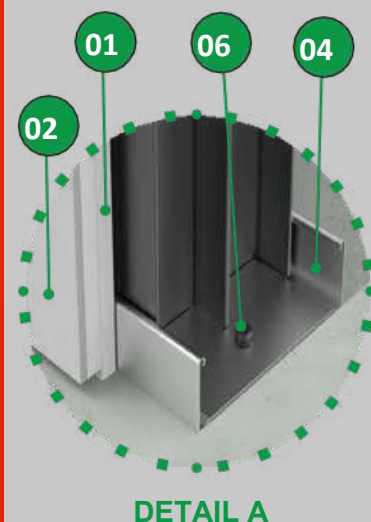
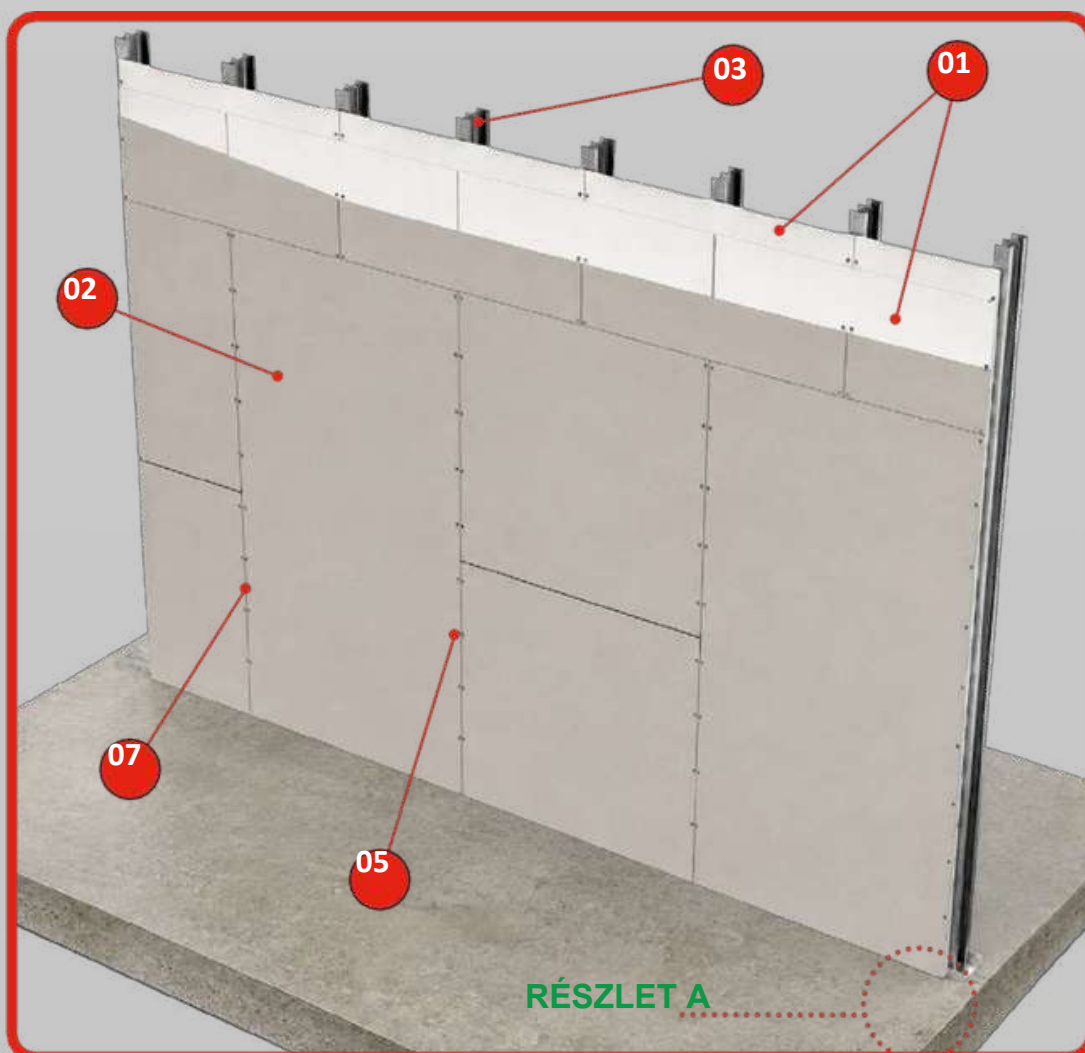
Test No.: 076765- 002-2.



SECTION DETAIL



SECTION DETAIL



5.7. INDEPENDENT WALL LINING ON CONCRETE BLOCK. TECBOR® 10 EI-120.

Egyirányúfalburkolat 26/610 [Tecbor10+Omega]

DESCRIPTION OF ASSEMBLY

On a 15 cm precast concrete wall, fix the 15 x 45 x 0.5 mm omega profiles every 610 mm using a 5 x 65 mm umbrella anchors. Then attach the Tecbor® 10 mm Boards to the omega profiles using 3.5 x 25 mm self-drilling screws. Apply Tecbor® Joint Paste to the board joints and screw heads.

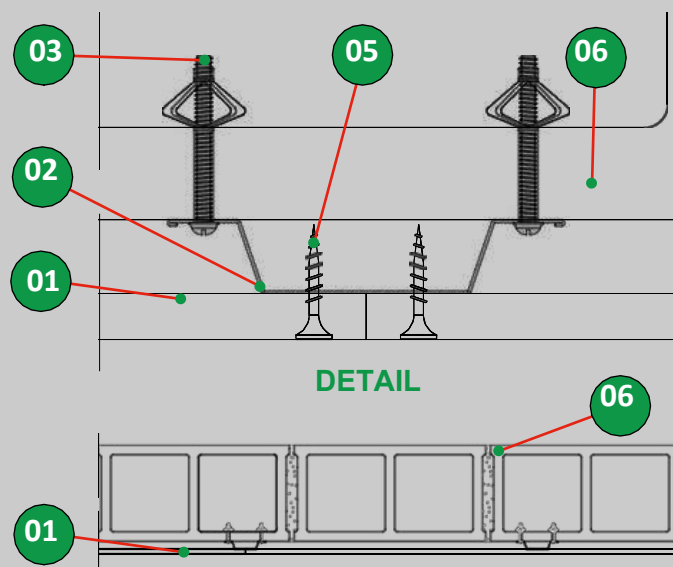
The screws must be spaced approximately 250-300 mm apart.

SOLUTION

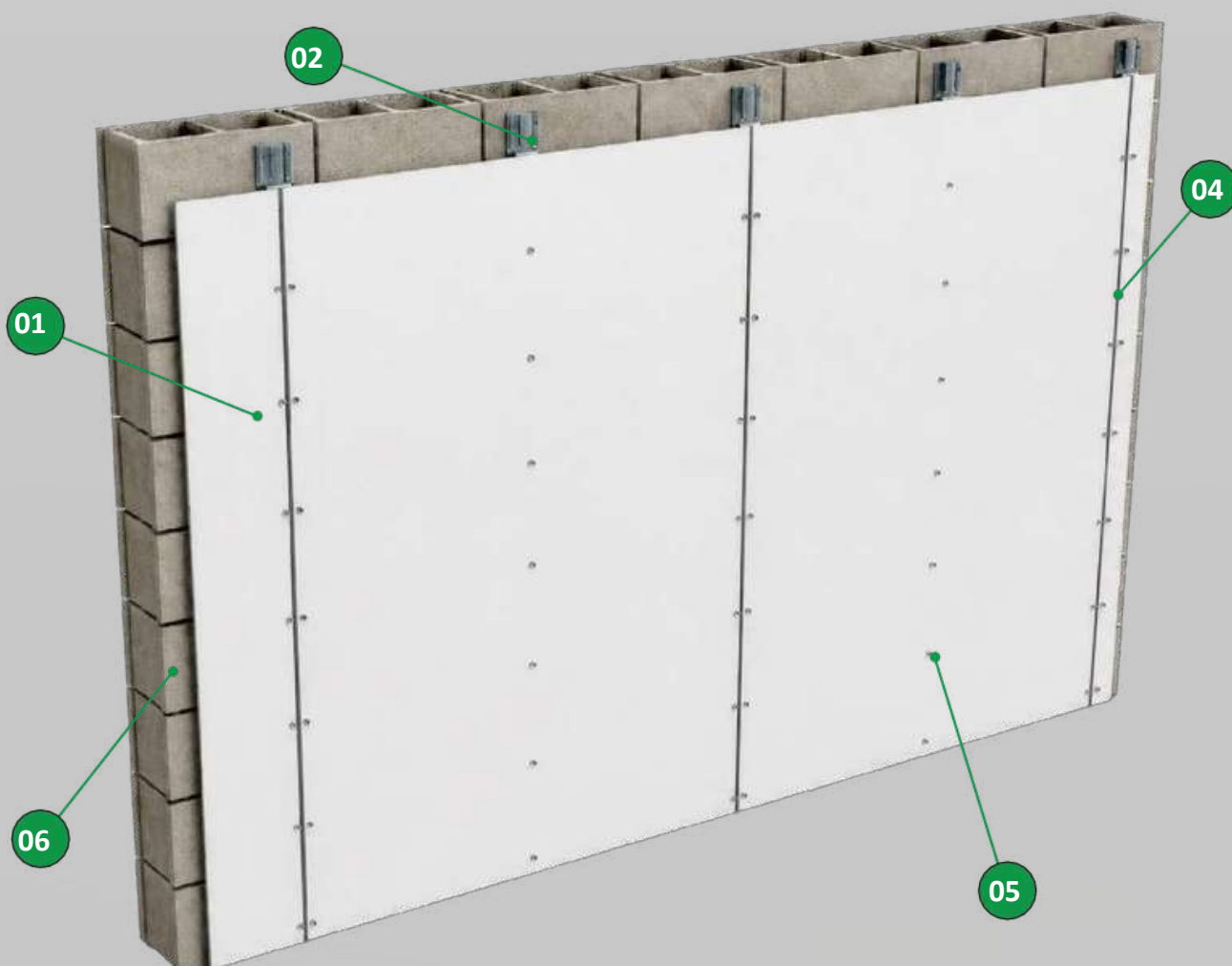
- 01 Tecbor® 10 mm Boards.
- 02 15x45x0.5 mm omega profiles.
- 03 5 x 65 mm metal umbrella plug.
- 04 Tecbor® Joint Paste.
- 05 3.5 x 25 mm self-drilling screws.
- 06 Concrete block wall.

TEST

Standard: UNE EN 1364-1.
Laboratory: CIDEMCO.
Test No.: 14736-M1-2.



PLAN



5.8. INDEPENDENT WALL LINING ON PRECAST CONCRETE SLAB. TECBOR® 12 EI-180.

Single direct wall cladding 26/610 [Tecbor12+Omega]

DESCRIPTION OF ASSEMBLY

On a 12 cm precast concrete wall, fix the 15 x 45 x 0.5 mm omega profiles every 610 mm using a 5 x 65 mm metal plug.

Then attach the Tecbor® 12 mm Boards to the omega profiles using 3.5 x 25 mm self-drilling screws.

Apply Tecbor® Joint Paste to the board joints and screw heads.

The screws must be spaced approximately 250-300 mm apart.

SOLUTION

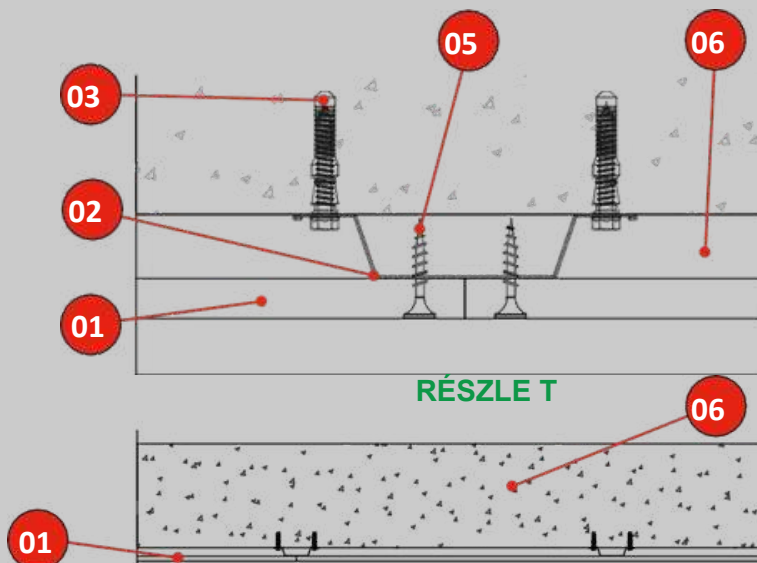
- 01 Tecbor® 12 mm Boards.
- 02 15x45x0.5 mm omega profiles.
- 03 5 x 65 mm metal umbrella plug.
- 04 Tecbor® Joint Paste.
- 05 3.5 x 25 mm self-drilling screws.
- 06 Precast concrete slab.

TEST

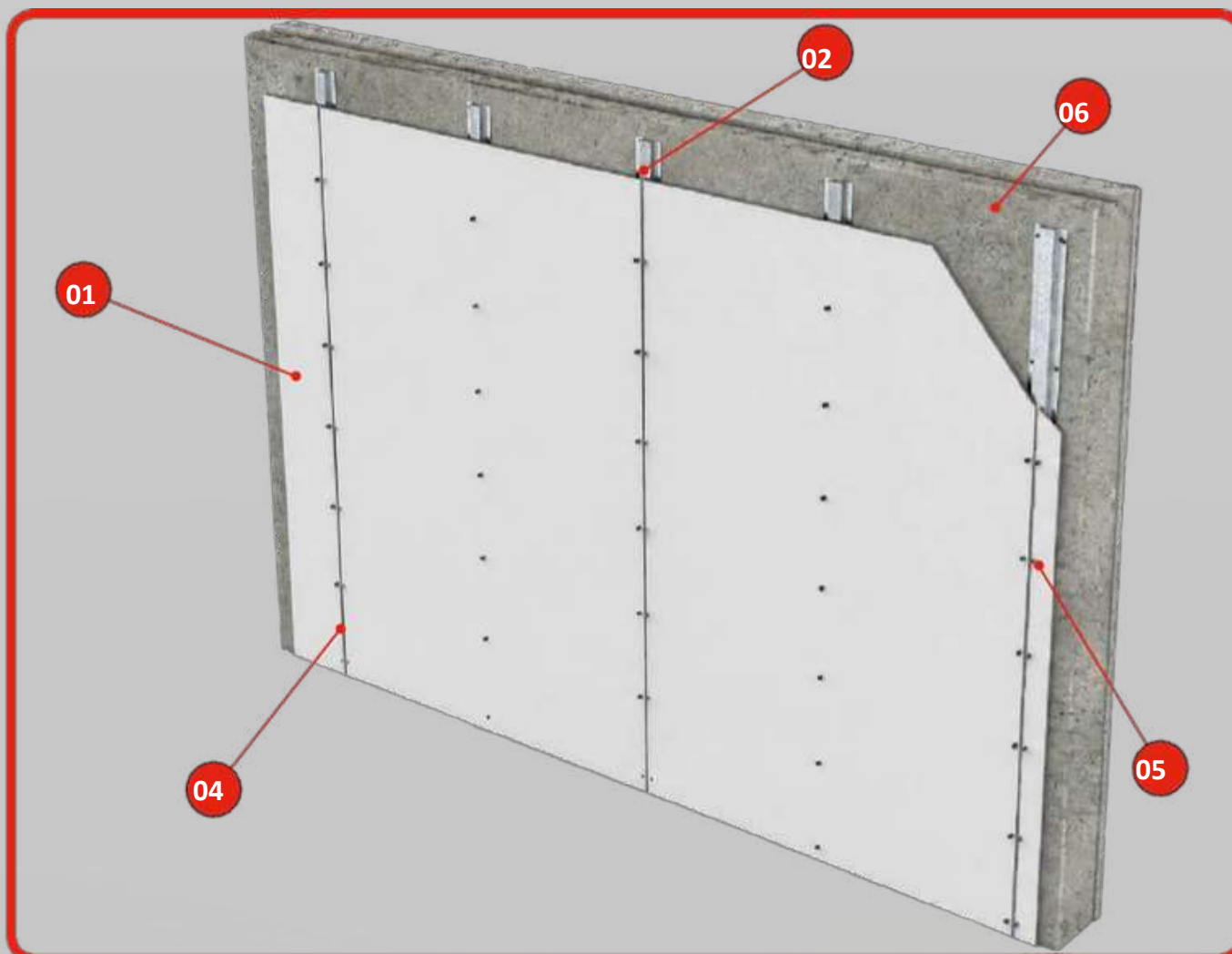
Standard: UNE EN 1364-1.

Laboratory: CIDEMCO.

Test No.: 16149-1/-2 M1.



TERV



5.9. INDEPENDENT WALL LINING ON CERAMIC BRICK. TECBOR® 12 EI-240.

Single direct wall cladding 28/610 [Tecbor12+Omega]

DESCRIPTION OF ASSEMBLY

On a wall made of 12 cm ceramic brick, plastered with 10 mm of plaster on the non-exposed side, attach 15 x 45 x 0.5 mm metal omega profiles every 610 mm using 10 x 60 mm anchors. Then attach the Tecbor® 12 mm Boards to the omega profiles using 3.5 x 25 mm self-drilling screws. Apply Tecbor® Joint Paste to the board joints and screw heads. The screws must be spaced approximately 250 - 300 mm apart.

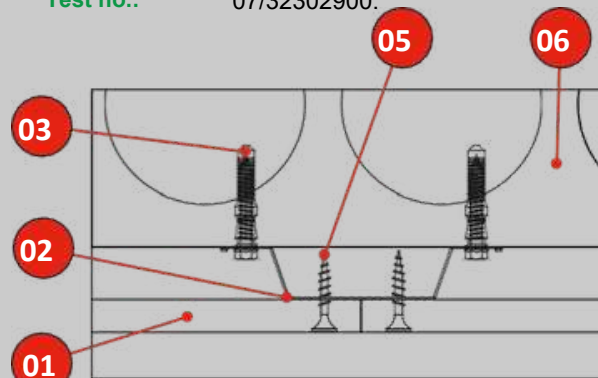
SOLUTION

- 01 Tecbor® 12 mm Boards.
- 02 15x45x0.5 mm omega profiles.
- 03 10x60 mm anchor.
- 04 Tecbor® Joint Paste.
- 05 3.5 x 25 mm self-drilling screws.
- 06 Ceramic brick wall ≥ 12.3 cm.
- 07 10 mm plastering.

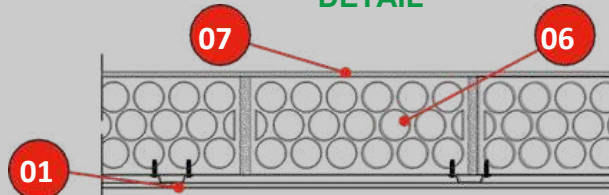
TEST



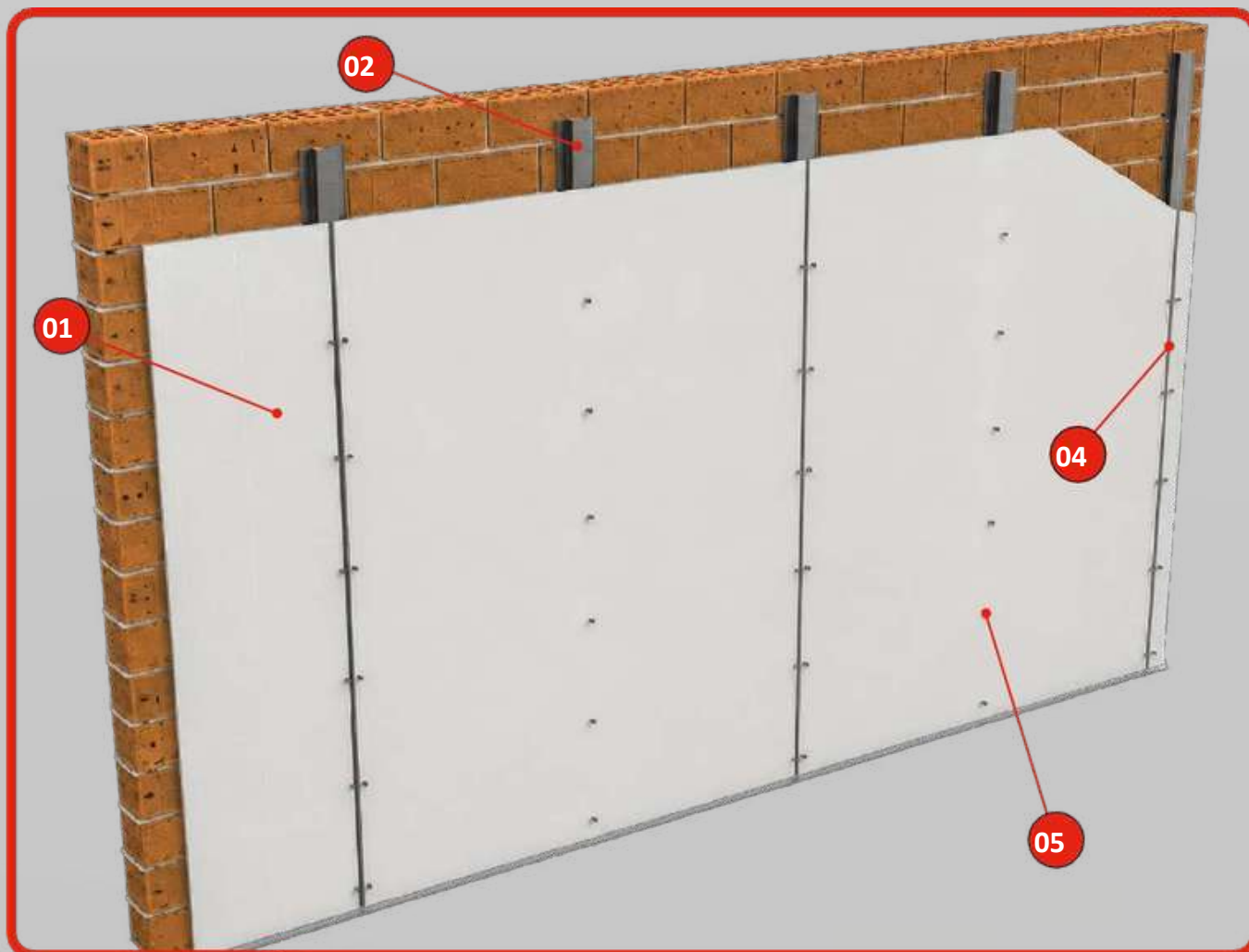
Standard: UNE EN 1364-1.
Laboratory: APPLUS.
Test no.: 07/32302900.



DETAIL



PLAN



ASSEMBLY OF METAL STRUCTURE FOR LARGE PARTITIONS (> 4 METRES HIGH)



When the dimension of a partition wall exceeds 4 metres in height, an additional structure is required.

This structural solution is offered in 5 standard pieces that are easy to install, making the partition wall free from any stress produced by expansion and temperature changes, and the building site itself.

At mcr tecresa® we've tested the assembly of metal structures for partitions over 4 metres tall, for more information contact our technical department.

Suspended Ceilings and Slabs Protection



Fire-rated suspended ceilings are mainly used in two specific situations:

The first is to vertically separate different fire compartments; this serves to confine the fire to where it started and prevent it from spreading between storeys. This solution is very useful in high-rise buildings, as inadequate compartmentation would cause the fire to advance more rapidly and lead to problems when evacuating. The second most common use is to protect elements above the ceiling, such as fixtures, structures, slabs, etc.

6.1. INDEPENDENT SUSPENDED CEILING. TECBOR® 12+12 EI-120.

Multiple continuous ceiling [2xTecbor12+TC60] MW40

SOLUTION

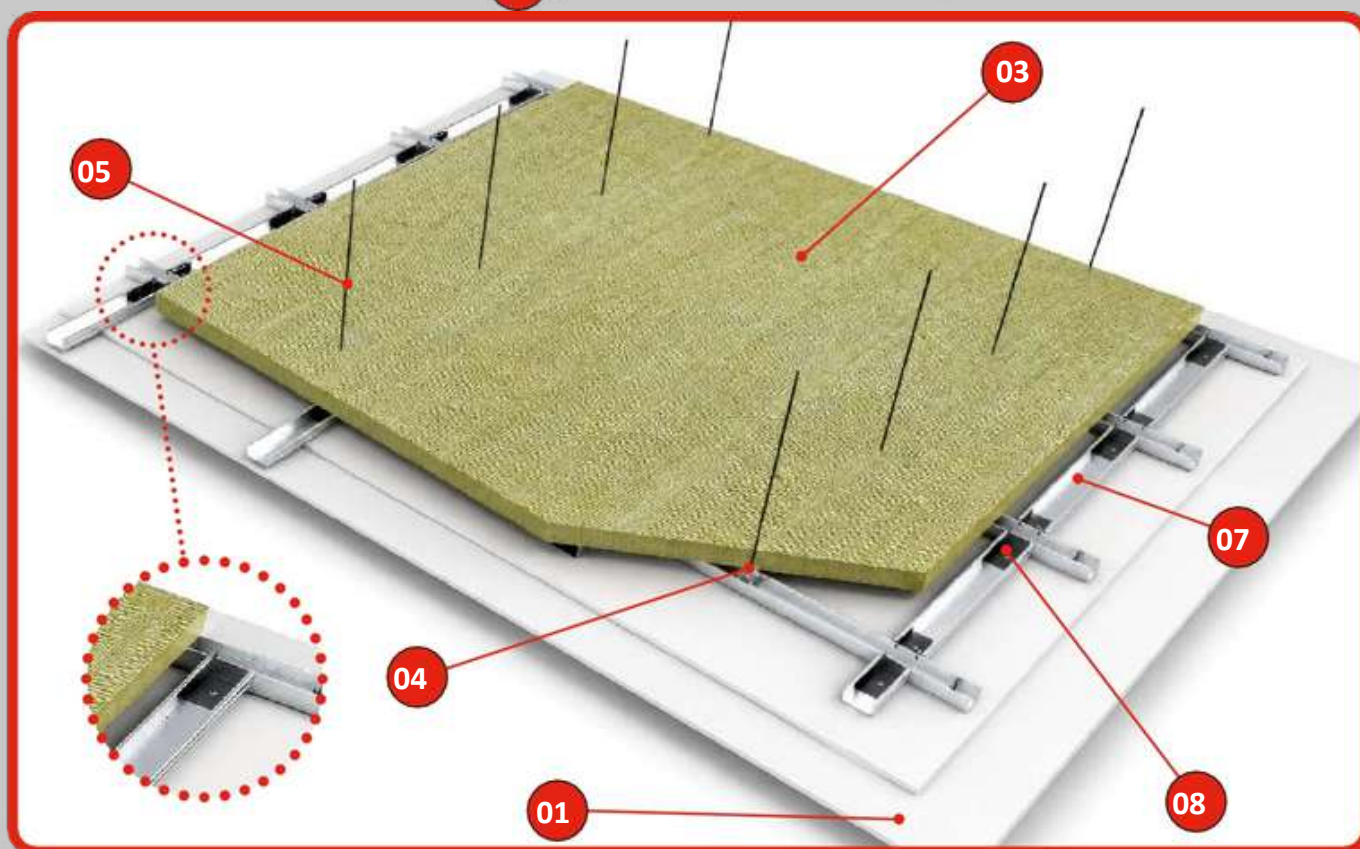
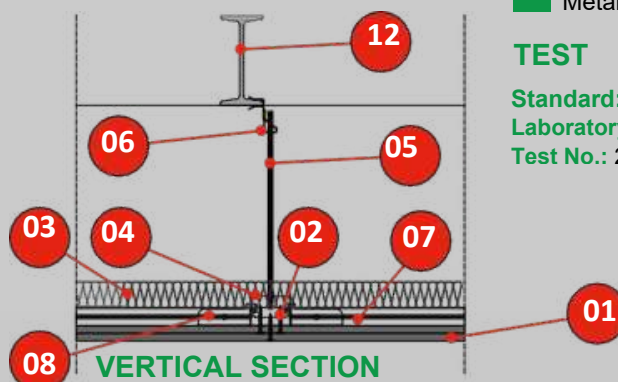
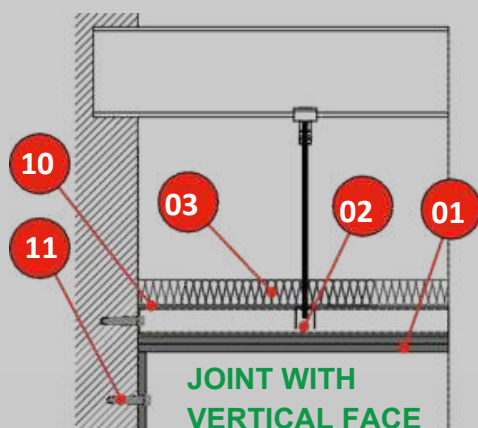
- 01 MTecbor® 12 mm Boards.
- 02 3.5 x 45 mm self-tapping screw.
- 03 40 mm rock-wool, 40 Kg/m3
- 04 Clevis for TC 60/27.
- 05 M6 threaded rod.
- 06 'Sinard' clip
- 07 TC 60/27.
- 08 Splice for TC 60/27.
- 09 Tecbor® Joint Paste.
- 10 48 x 30 x 0.5 mm runner.
- 11 10 x 100 mm plug.
- 12 Metal profile.

TEST

Standard: UNE EN 1364-2.

Laboratory: CIDEMCO.

Test No.: 20331-2M2.



6.2. FIREPROOF SUSPENDED CEILING. TECBOR® 12 EI-60.

Single continuous ceiling [Tecbor12+TC60] MW40

DESCRIPTION OF ASSEMBLY

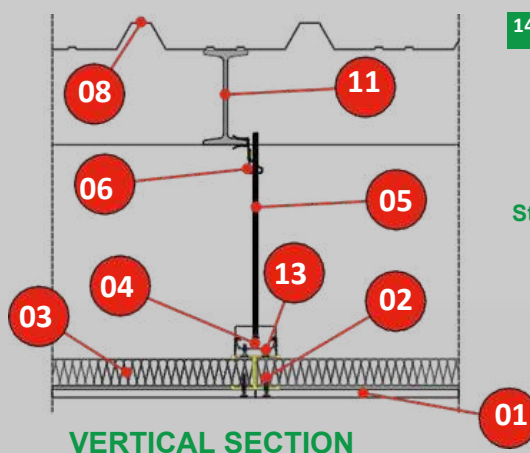
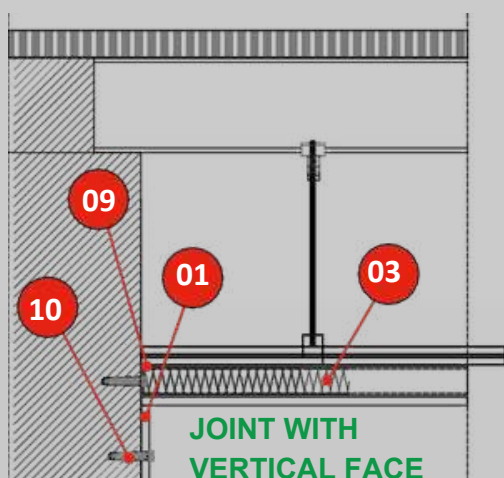
Fix the 48 x 30 x 0.5 mm runners using 10 x 100 mm plugs spaced approximately 500 mm around the entire perimeter of the ceiling. Then place the profiles consisting of two 46 x 36 x 0.6 mm studs in an 'H' shape, lying flat, between which the rock-wool boards are placed. The upper part of this stud structure is attached to TC 60/27 profiles and suspended from the slab by means of a hanging system consisting of a clevis, M6 rod and fastening clamp approximately every 600 mm. The profiles are joined together using 2.9 x 13 mm metal self-drilling screws. Then, the Tecbor® 12 mm Boards are attached using 3.5 x 35 mm self-tapping screws every 250-300 mm, and the perimeter is finished with a 150 mm wide skirting using Tecbor® 12 mm.

The distance between screws must be approx. 250-300 mm and the screw heads and board joints must be covered with Tecbor® Joint Paste.

A 0.6 mm-thick corrugated sheet is placed above the suspended ceiling, at a distance of 400 mm, and on top of the IPE 140 metal profiles.

SOLUTION

- 01 Tecbor® 12 mm Boards.
- 02 3.5 x 45 mm self-tapping screw.
- 03 40 mm rock-wool, 70 Kg/m3
- 04 Clevis for TC 60/27.
- 05 M6 threaded rod.
- 06 'Sinard' clip
- 07 TC 60/27.
- 08 Corrugated sheet, 0.6 mm thick.
- 09 48 x 30 x 0.5 mm runner.
- 10 10 x 1000 mm plug.
- 11 IPE-140 metal profile.
- 12 46 x 36 x 0.6 mm double stud.
- 13 MM self-tapping screw, 2.9 x 13 mm in the form of 'H'.
- 14 Tecbor® Joint Paste.

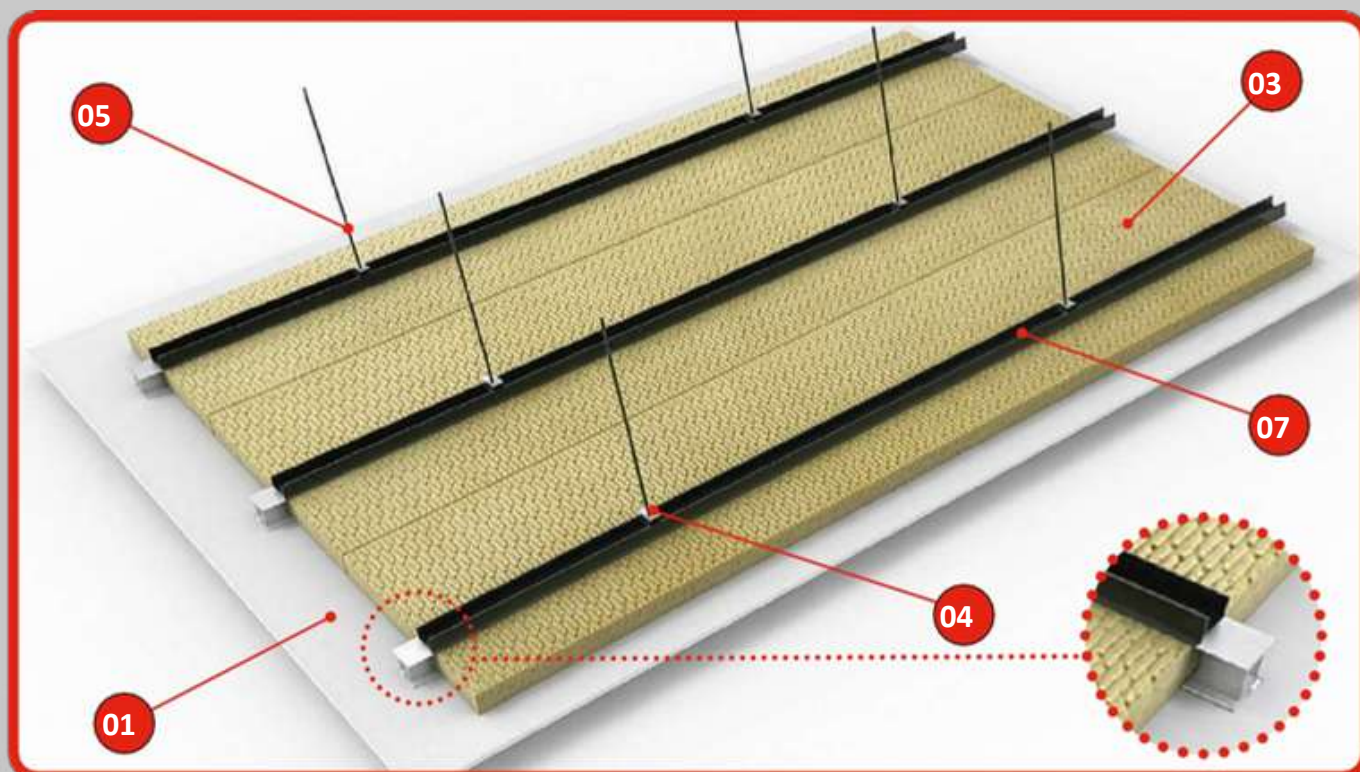


TEST

Standard::UNE EN 1365-2.

Laboratory: APPLUS.

Test No.: 10/1483-1009.



6.3. FIREPROOF SUSPENDED CEILING. TECBOR® 12+12 EI-90.

Multiple continuous ceiling [2xTecbor12+TC60] MW40

DESCRIPTION OF ASSEMBLY

Fix the 73 x 30 x 0.5 mm runners using 10 x 100 mm plugs spaced approximately 500 mm around the entire perimeter of the ceiling. Next, place the TC 60/27 profiles at a distance of 610 mm transversely between axes, and cross the profiles using a splice connection for TC 60/27, forming a 610x610 mm grid, using the clevis, M6 rod and fastening clamp to join the structure to the support on which the ceiling is hung.

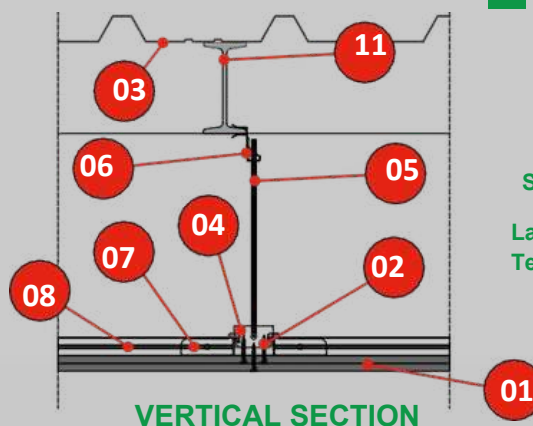
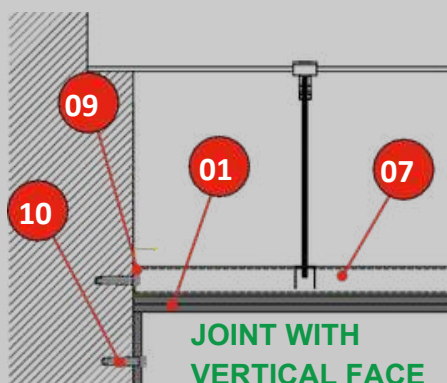
Once the metal structure is complete, attach the two layers of 12 mm Tecbor® using 35 x 45 mm self-tapping screws. The second layer of Tecbor® is butted to the first.

Finally, finish off the perimeter with a 150 mm wide skirting using Tecbor® 12 mm. The distance between screws must be approx. 250-300 mm and the screw heads and board joints must be covered with Tecbor® Joint Paste.

A 0.6 mm-thick corrugated sheet is placed above the suspended ceiling, at a distance of 550 mm, and on top of the IPE 160 metal profiles.

SOLUTION

- 01 Tecbor® 15 mm Boards.
- 02 3.5 x 45 mm self-tapping screw.
- 03 Sheet metal, 0.6 mm thick.
- 04 Clevis for TC 60/27.
- 05 M6 threaded rod.
- 06 'Sinard' clip
- 07 TC 60/27.
- 08 Splice for TC 60/27.
- 09 73 x 30 x 0.5 mm runner.
- 10 10 x 100 mm plug.
- 12 IPE-140 metal profile.

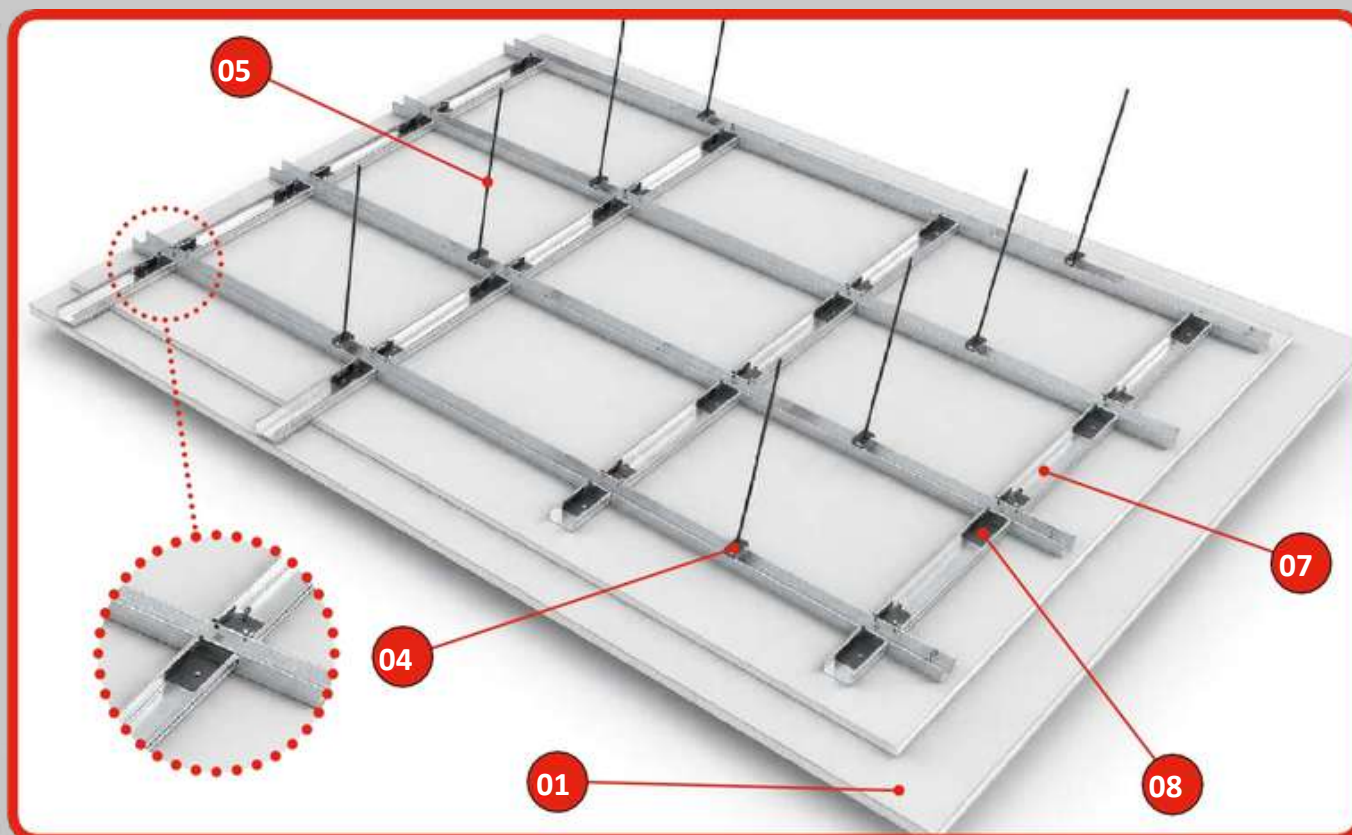


TEST

Standard: UNE EN 1365-2.

Laboratory: APPLUS.

Test No.: 10/1483-1010.



6.4. FIREPROOF SUSPENDED CEILING. TECBOR® 15+15 EI-120.

Multiple continuous ceiling [2xTecbor15+TC60] MW40

DESCRIPTION OF ASSEMBLY

R/fix the 73 x 30 x 0.5 mm runners using 10 x 100 mm plugs spaced approximately 500 mm around the entire perimeter of the ceiling. Next, place the TC 60/27

profiles at a distance of 610 mm transversely between axes, and cross the profiles using a splice connection for TC 60/27, forming a 610x610 mm grid, using the clevis, M6 rod and fastening clamp to join the structure to the support on which the ceiling is hung.

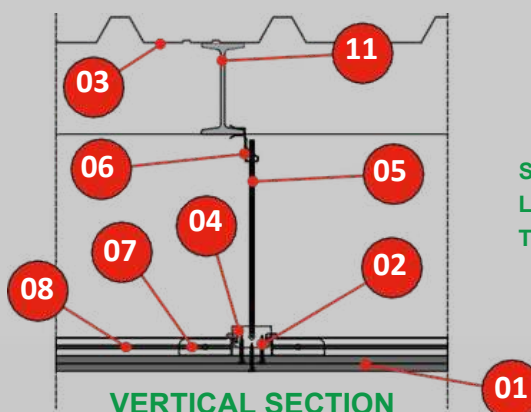
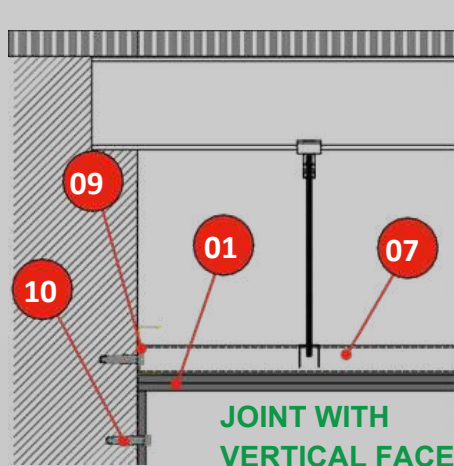
Once the metal structure is complete, attach the two layers of 15 mm Tecbor® using 3.5 x 45 mm self-tapping screws. The second layer of Tecbor® is butted to the first.

Finally, finish off the perimeter with a 150 mm wide skirting using Tecbor® 15 mm. The distance between screws must be approx. 250-300 mm and the screw heads and board joints must be covered with Tecbor® Joint Paste.

A 0.6 mm-thick corrugated sheet is placed above the suspended ceiling, at a distance of 550 mm, and on top of the IPE 160 metal profiles.

SOLUTION

- 01 Tecbor® 15 mm Boards.
- 02 3.5 x 45 mm self-tapping screw.
- 03 Sheet metal, 0.6 mm thick.
- 04 Clevis for TC 60/27.
- 05 M6 threaded rod.
- 06 'Sinard' clip
- 07 TC 60/27.
- 08 Splice for TC 60/27.
- 09 73 x 30 x 0.5 mm runner.
- 10 10 x 100 mm plug.
- 11 IPE-140 metal profile.

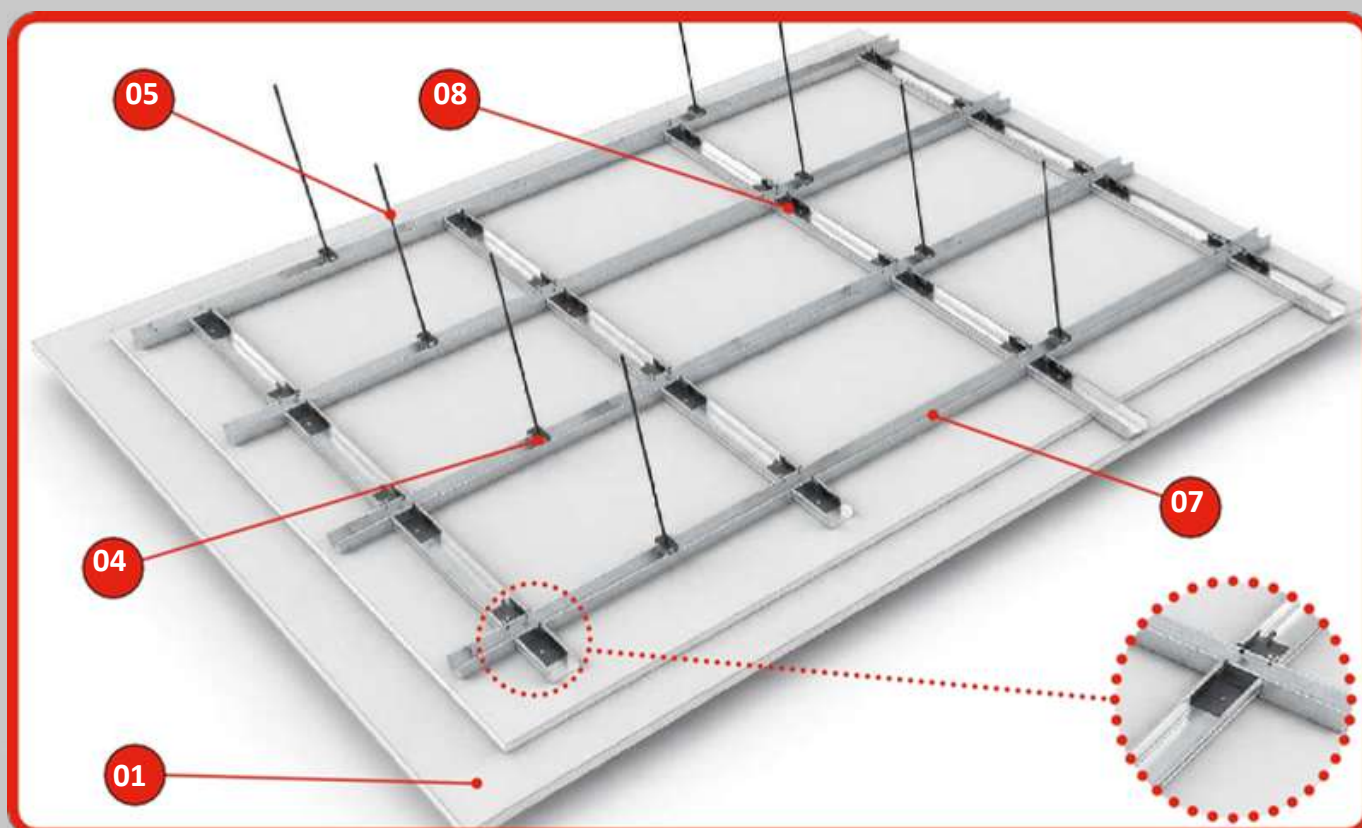


TEST

Standard: UNE EN 1365-2.

Laboratory: APPLUS.

Test No.: 10/1483-1011.



Curtain Walls Protection



The DBSI, in the section on external spread, specifies that to limit the risk of vertical spread of fire through the façade between two fire compartments, between a special high risk area and other higher areas of the building, or to a protected staircase or protected corridor from other areas, the facade must be at least EI-60 in a strip of at least 1 m in height. Disasters in high-rise buildings have demonstrated the importance of properly protecting and anchoring the joints between slabs and facades. Otherwise, the gaps between the curtain walls and the lightweight facades effectively become chimneys in the event of fire, spreading flames and smoke uncontrollably to higher parts of the building, making an orderly evacuation impossible. The varied structures of facades make it difficult to choose the most appropriate protection, therefore please do not hesitate to contact our sales department.

7.1. CURTAIN WALL WITHOUT CROSSING SYSTEM. TECBOR® 30 EI-60

DESCRIPTION OF ASSEMBLY

Fix the 40 x 40 x 2 mm angle to the 30 mm Tecbor® Board by fixing umbrella fasteners spaced 500 mm apart.

Once the angles are fixed to the boards, attach to the slab using M6 metal anchor. Join the sections using 200 mm wide connector caps and fix with 3.5 x 45 mm screws.

Finally, apply Tecbor® Joint Paste or Tecbor® Bonding Compound to the board joints and screw heads.

TEST

Standard: UNEEN 1364-1.

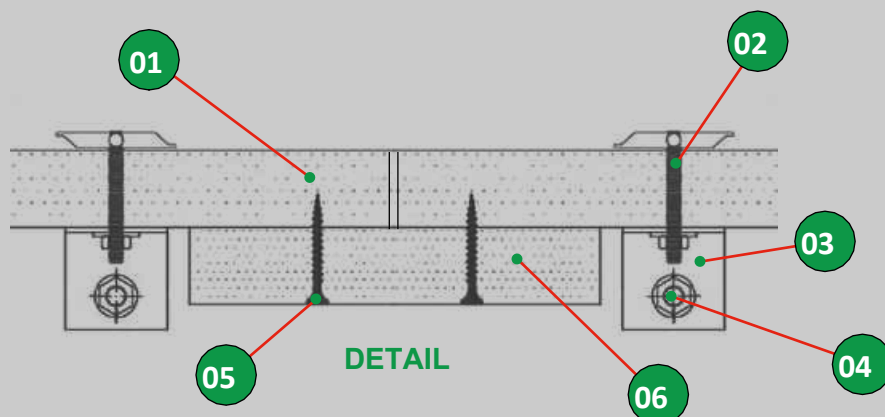
Laboratory: TECNALIA.

Test No.: 074490-001-2.

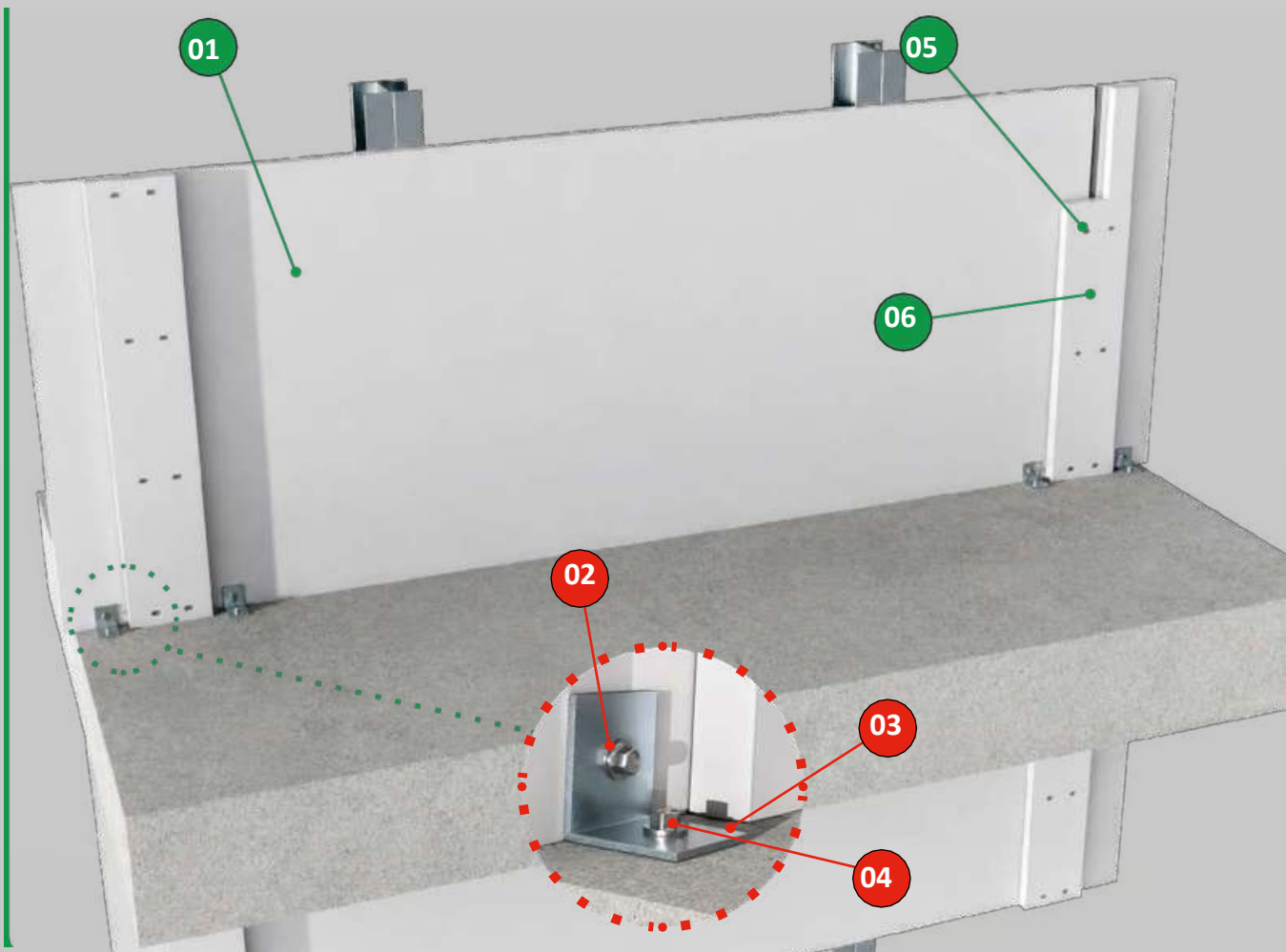


SOLUTION

- 01 Tecbor® 30 mm Boards.
- 02 Umbrella fasteners.
- 03 40 x 40 x 2 mm angle.
- 04 M6 metal anchor.
- 05 3.5 x 45 mm screws.
- 06 Tecbor® Boards 30 mm cover.



DETAIL



7.2. INDEPENDENT CURTAIN WALL. TECBOR® 20 EI-60

DESCRIPTION OF ASSEMBLY

Attach the 70 x 70 x 1 mm angle lengthwise along the Tecbor® 20 mm Board using 3.5 x 45 mm self-tapping screws roughly every 250-300 mm. Attach the flush angle to the edge of the slab with a 10 x 100 mm plug approximately every 250-300 mm.

Next, fix a Tecbor® 20 mm cover, 200-250 mm wide, to the lower part of the slab using a 10 x 100 mm plug.

Tecbor® 20 mm joint covers (200-250 mm wide) are fixed to the lower joints of the curtain wall using 3.5 x 45 mm self-tapping screws.

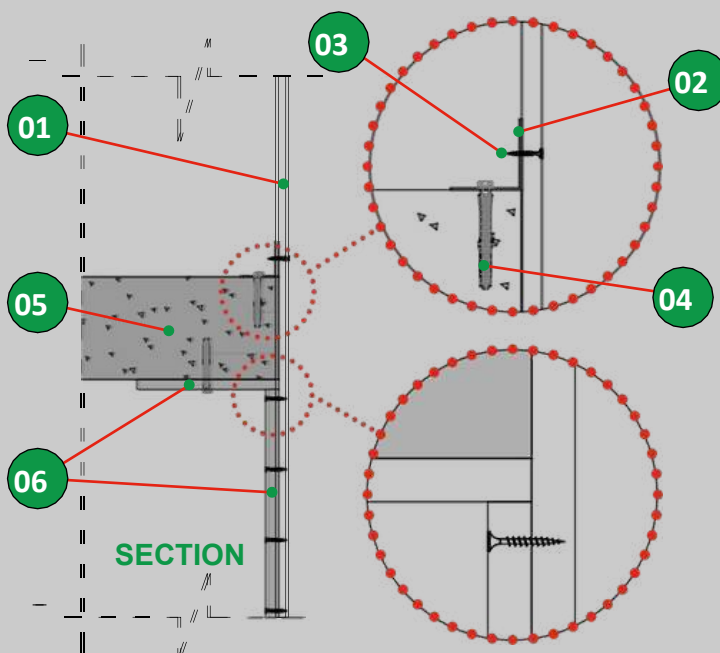
Then apply Tecbor® Joint Paste to the board joints and screw heads.

TEST

Standard: UNE EN 1364-4.

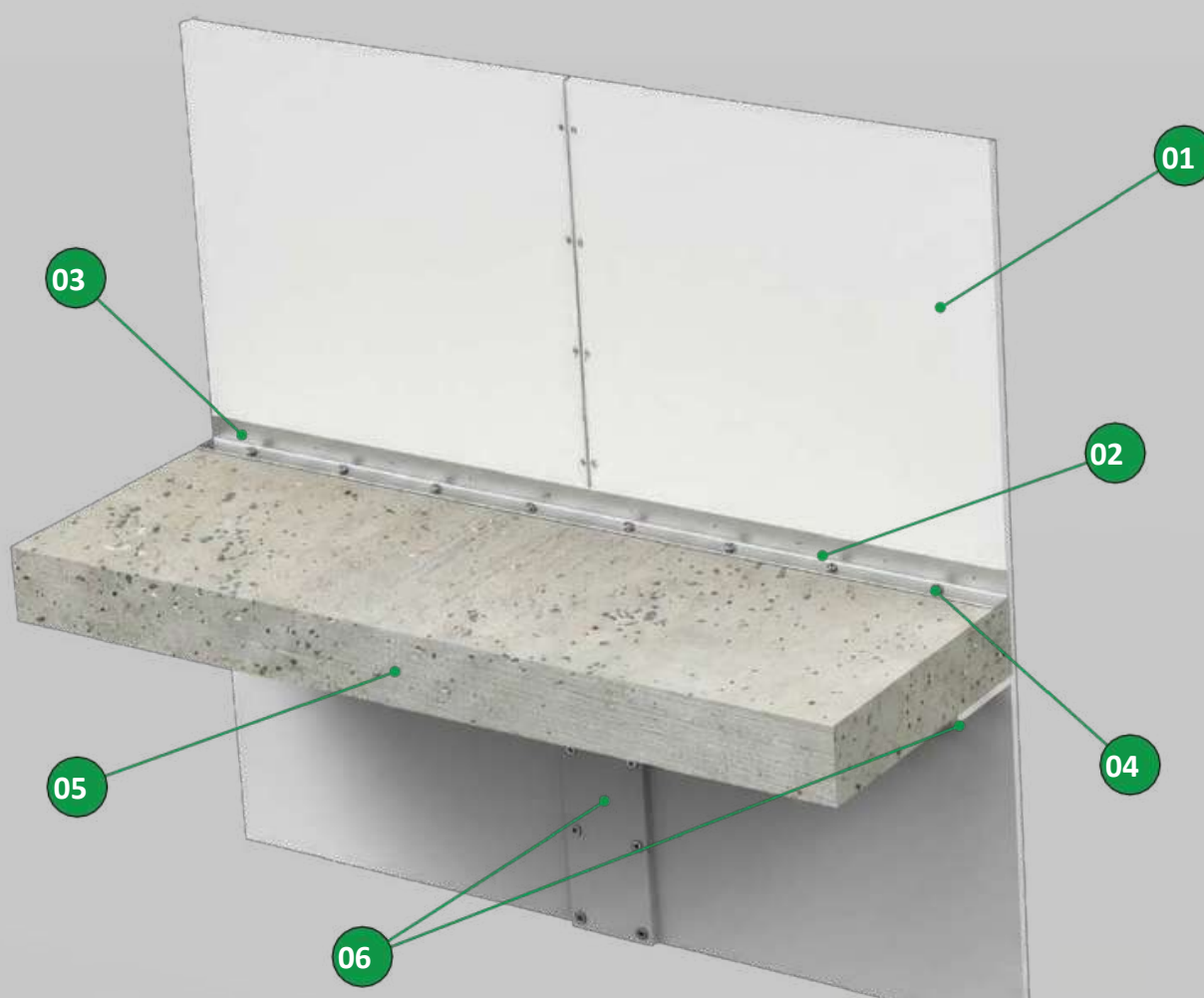
Laboratory: CIDEMCO.

Test No.: 22100-2M1.



SOLUTION

- 01 TecboTecbor® 20 mm Boards.
- 02 70 x 70 x 1 mm metal angle.
- 03 3.5 x 45 mm self-tapping screw.
- 04 10 x 100 mm metal plug.
- 05 Slab.
- 06 Tecbor® Boards 20 mm cover.



7.3. CURTAIN WALL WITHOUT CROSSING THE SLAB. TECBOR® 20 EI-90

DESCRIPTION OF ASSEMBLY

Fix the 48 x 30 x 0.5 mm runner to the slab using a 10 x 60 mm metal plug. Next, place the 46 x 36 x 0.6 mm studs, spaced 610 mm apart. Then place the 20 mm Tecbor® Boards, fixed to the structure using 3.5 x 35 mm screws. Board joints and screw heads must be applied with Tecbor® Joint Paste.

Finally, the interior part of the solution is fitted with a 13 mm plasterboard using 3.5 x 35 mm self-tapping screws. Both forms of this solution have been tested (upper and lower curtain wall), so the most suitable type can be chosen on site.

TEST

Standard: UNE EN 1364-1.

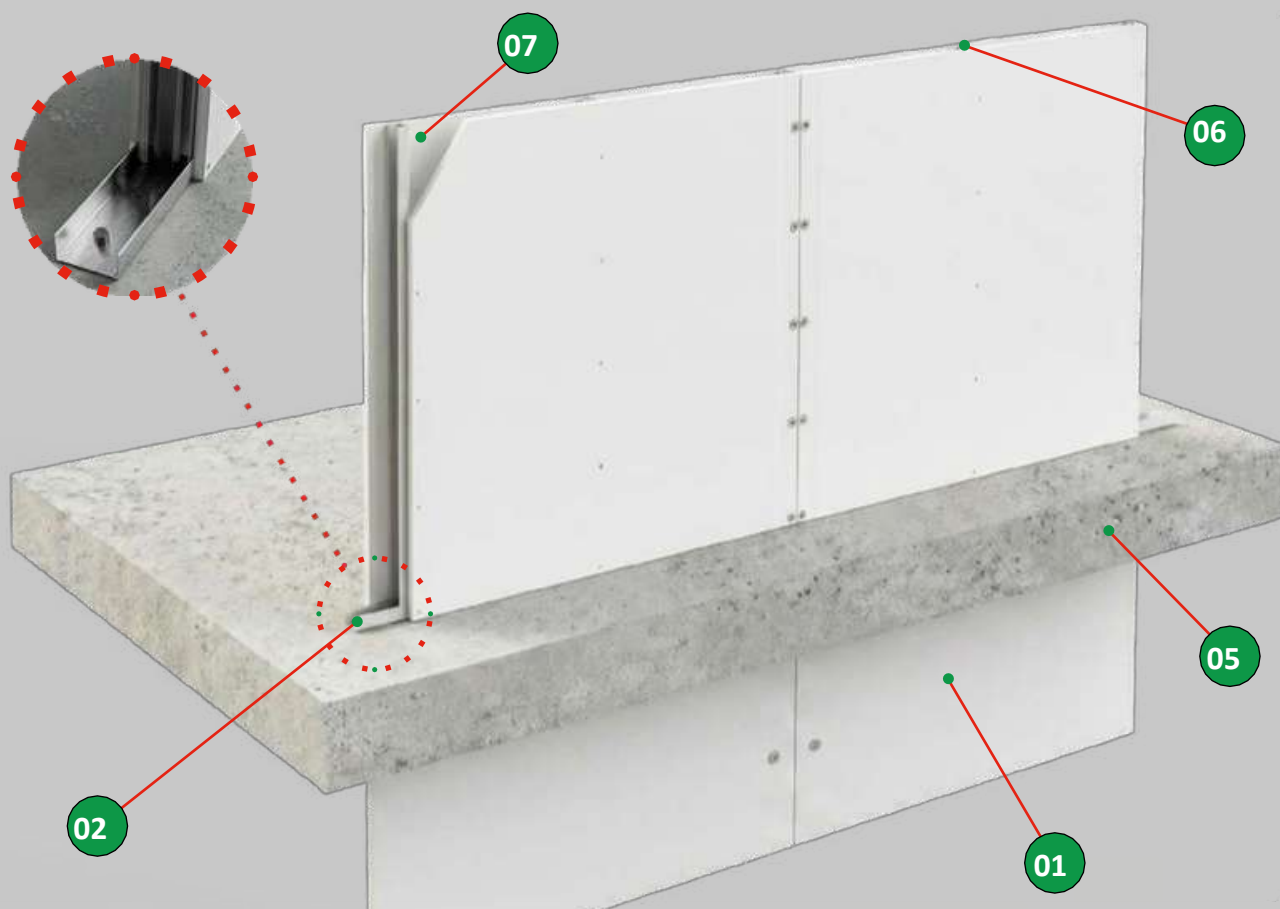
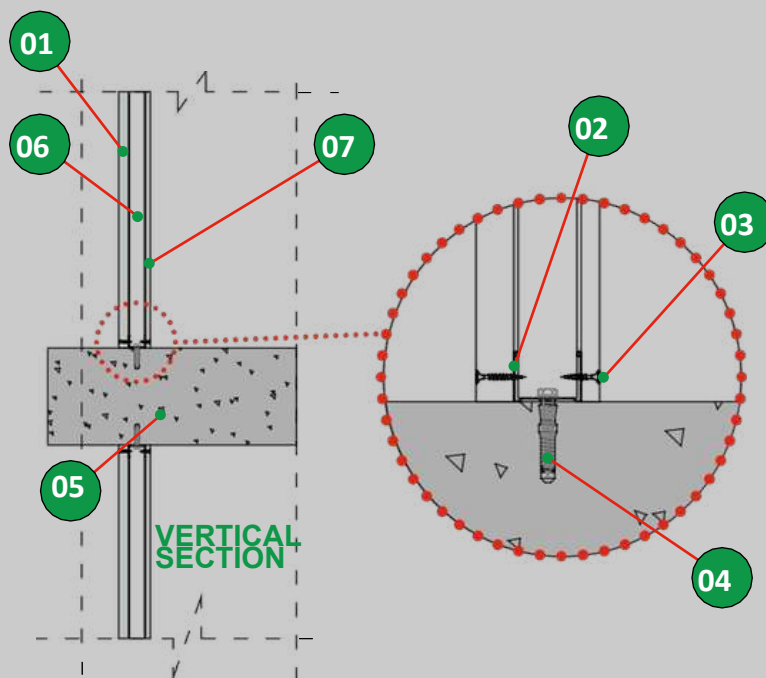
Laboratory: CIDEMCO.

Test No.: 18598-2M1.



SOLUTION

- 01** Tecbor® 20 mm Boards.
- 02** 48 x 30 x 0.5 mm runner.
- 03** 3.5 x 35 mm self-tapping screw.
- 04** 10 x 60 mm metal plug.
- 05** Slab.
- 06** 46 x 36 x 0.6 mm stud.
- 07** 13 mm plasterboard.



DESCRIPTION OF ASSEMBLY

This is a curtain wall solution without asymmetrical slab penetration. The upper part is a partition without wool. It consists of a 13 mm laminated plasterboard partition without wool, attached on the interior side to a 46 mm stud using 3.5x35 mm drywall screws. On the opposite side, a 20 mm Tecbor® Board is fixed to the 46 mm stud using 3.5x35 mm drywall screws.

On the underside of the slab, a Tecbor® Board is installed, attached using a 70x70x1 mm angle and 3.5x45 mm screws.

TEST

Standard: UNEEN 1364-4.

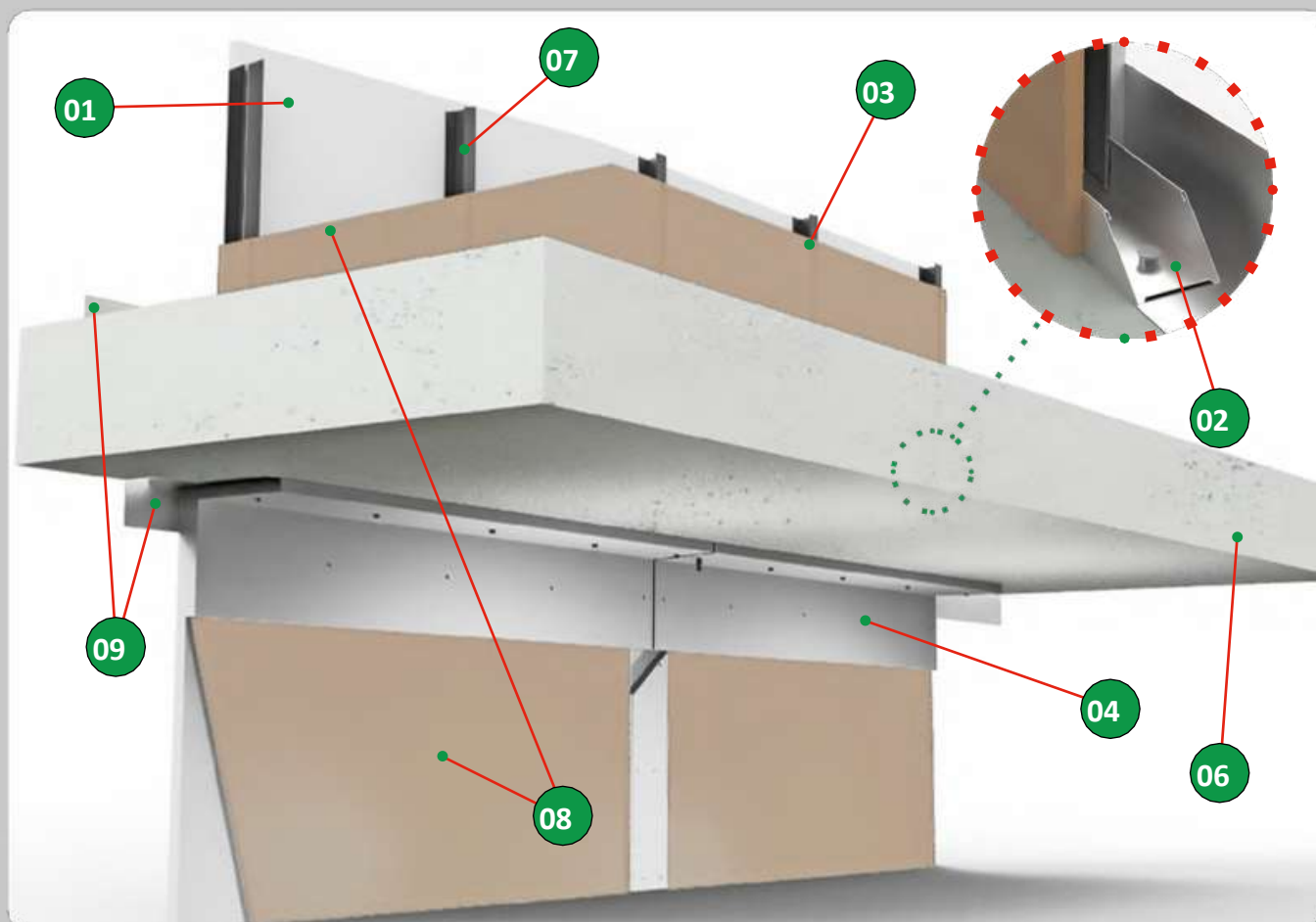
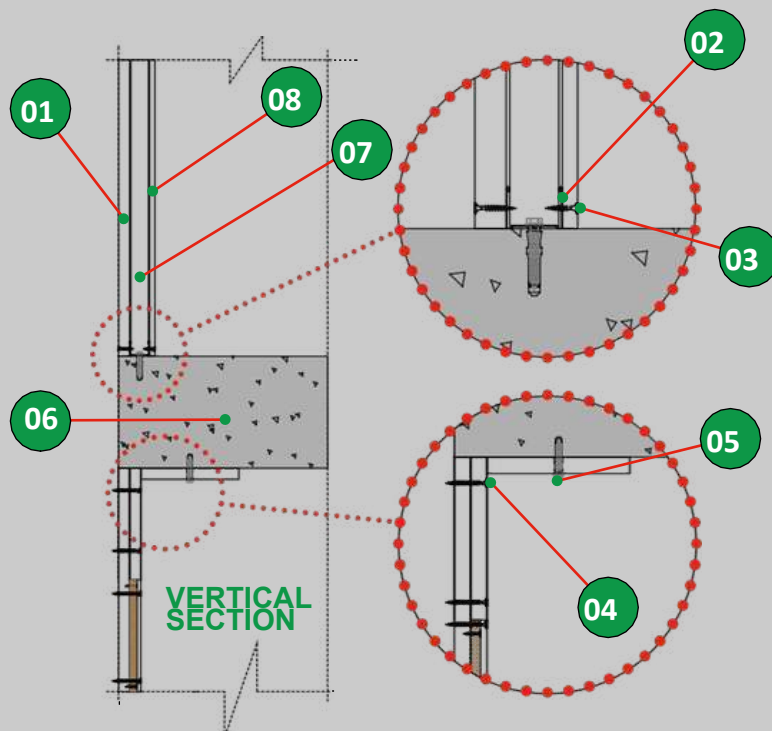
Laboratory: CIDEMCO.

Test No.: 12-02712.



SOLUTION

- 01** Tecbor® 20 mm Boards.
- 02** 48 x 30 x 0.5 mm runner.
- 03** 3.5 x 35 mm self-tapping screw.
- 04** 3.5 x 45 mm self-tapping screw.
- 05** 10 x 60 mm metal plug.
- 06** Slab.
- 07** 46 x 36 x 0.6 mm stud.
- 08** 13 mm plasterboard.
- 09** 70 x 70 x 1 mm angle.



7.5. CURTAIN WALL WITH CROSSING THE SLAB. TECBOR® 10 EI-120

DESCRIPTION OF ASSEMBLY

Place the 100 kg/m³ rock-wool between the facade studs. Once filled with rock-wool, attach the Tecbor® 10 mm Boards to the studs using 3.5 x 25 mm self-drilling screws.

Close the junction between the slab and the module with a 10 mm-thick Tecbor® Board, fixed with 10x100 mm plugs every 250 mm along the underside of the slab.

Apply Tecbor® Joint Paste to the board joints, at the confluence of the sheet metal module and screw heads.

The space between the slab and the module is filled with 145 kg/m³ dense rock-wool.

SOLUTION

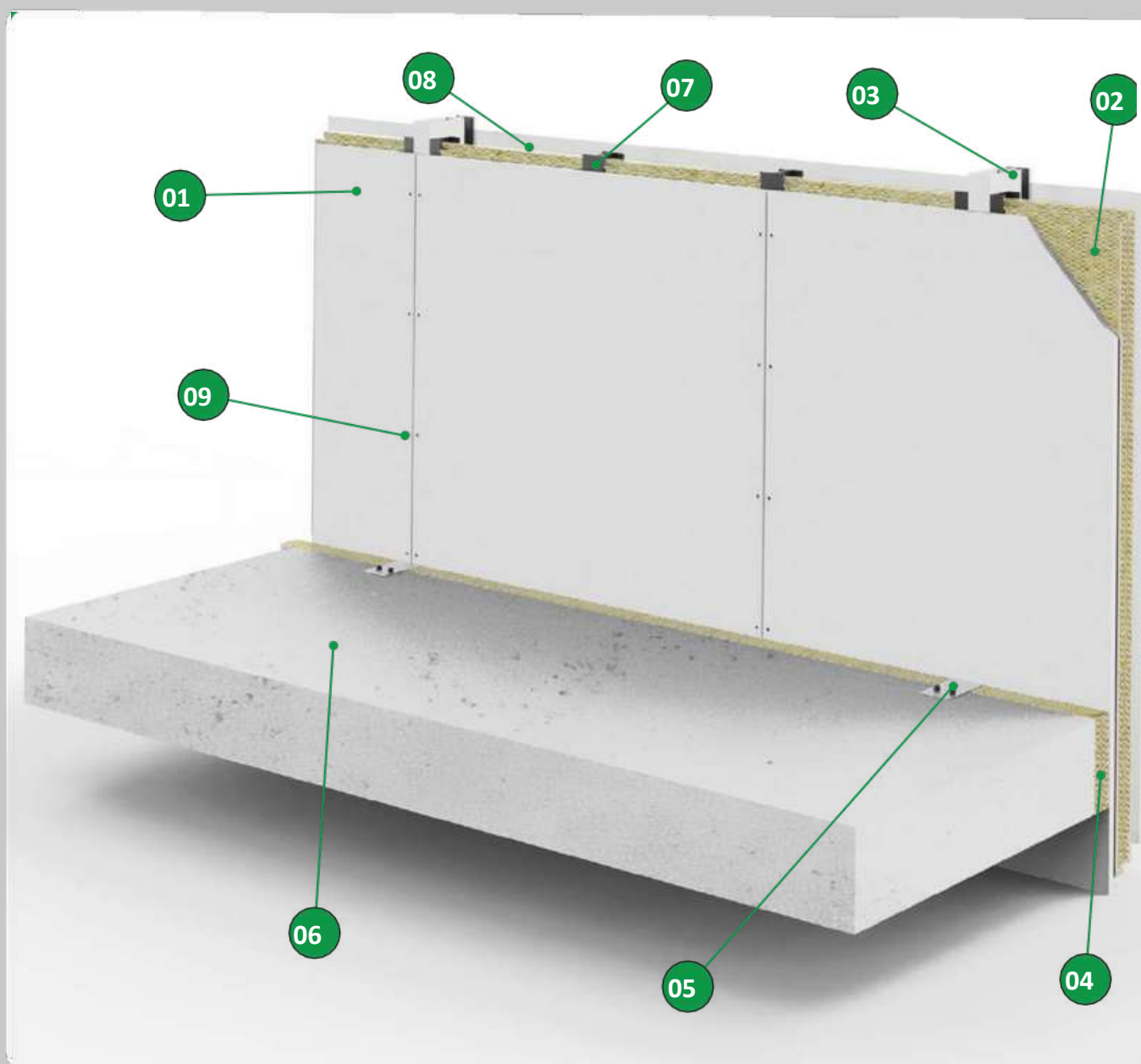
- 01 Tecbor® 10 mm Boards.
- 02 60 mm rock-wool (30+30), 100 Kg/m³
- 03 Facade.
- 04 50 mm rock-wool, 145 Kg/m³
- 05 Facade anchor angle.
- 06 Slab.
- 07 70 x 36 x 0.6 mm stud.
- 08 Closed facade (glass).
- 09 3.5 x 25 mm self-drilling screws.

TEST

standard: UNE EN 1364-1.

Laboratory: CIDEMCO.

Test No.: 13750 M1 és 14610 M1.



Tunnel Protection



In recent years, as a result of fires in tunnels, efficient solutions have been sought to secure tunnel constructions.

The aim of mcr tecresa® is to ensure people's safety by providing the tunnel with stability and integrity, thereby increasing the time required for evacuation.

The EU currently has European Directive 2004/54/EC in force across its territory, including in Spain through Royal Decree 635/2006 for tunnels, although technically there are no established regulations. Technical experts must rely on procedures adopted in other countries, such as NFP 502, the Dutch RWS, the German ZTV and others. The latter is recognised across the world.

En mcr tecresa® we offer solutions for tunnel protection based on the Dutch RWS, the heating curve of which describes a higher peak temperature; this means that our solutions cover the most unfavourable conditions in a fire.

Moreover mcr tecresa®, has carried out testing in a real tunnel, providing a fire load (diesel fuel) with an approximate power of 15 MW.. This testing was carried out in Siero tunnel (TST).

8.1. REINFORCED CONCRETE PROTECTION IN TUNNEL. TECBOR® 20+20 REI-60

DESCRIPTION OF ASSEMBLY

The ceiling is protected using two 20 mm Tecbor® Boards. Firstly, fix the 15 x 45 x 0.5 mm metal omega profiles spaced 610 mm apart, directly to the concrete slab using a 8 x 46 mm metal anchor. Place the first layer of 20 mm Tecbor® and attach it using 3.5 x 45 mm self-tapping screws. The second layer of 20 mm Tecbor® is attached using 4.2 x 55 mm self-tapping screws.

The walls are protected by means of two 20 mm Tecbor® Boards, anchored directly to the concrete. To attach the first layer, use 8x46 mm M6 metal anchors. For the second layer, use 8x76 mm M6 metal anchors.

Tecbor® Joint Paste.

Apply Tecbor® Joint Paste to the board joints and screw heads. For more information, contact our technical department.

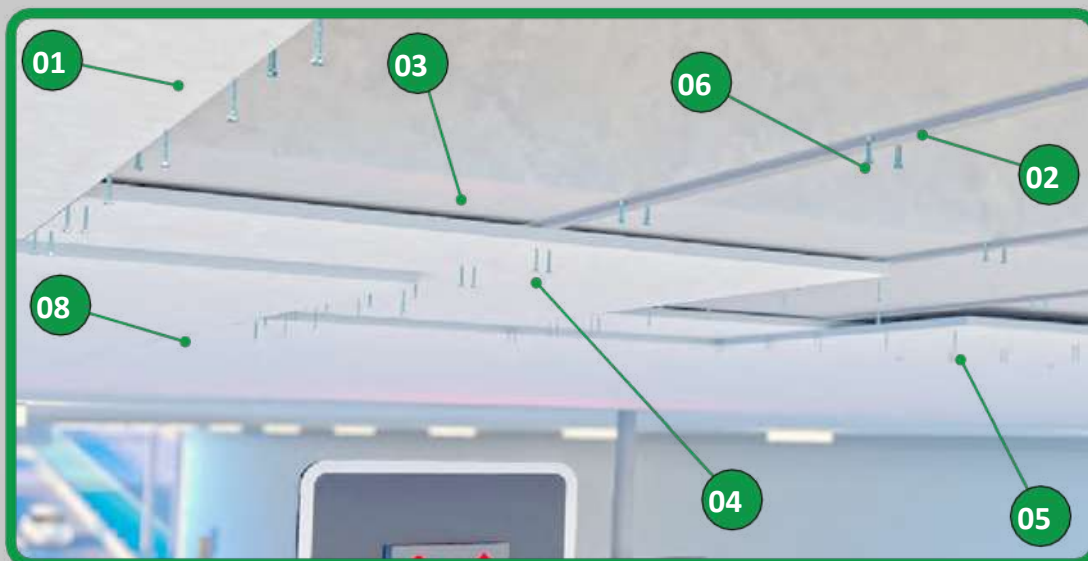
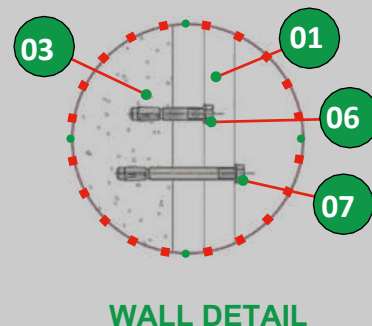
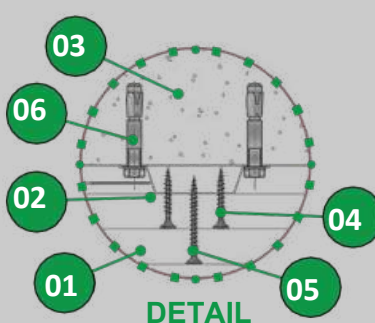
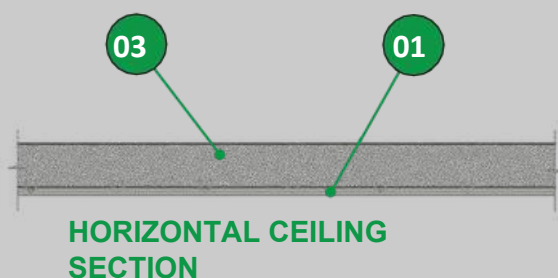
SOLUTION

- 01 Tecbor® 20 mm Boards.
- 02 15 x 45 x 0.5 mm omega profile.
- 03 Slab.
- 04 3.5 x 45 mm self-tapping screw.
- 05 4.2 x 55 mm self-tapping screw.
- 06 8x46 mm metal anchors.
- 07 8x76 mm metal anchors.
- 08 Tecbor® Joint Paste.

TEST

Laboratory: Tunnel Safety Testing S.A. (TST).

Test No.: Real Test.



8.2. TUNNEL SUSPENDED CEILING. TECBOR® 20 REI-120

DESCRIPTION OF ASSEMBLY

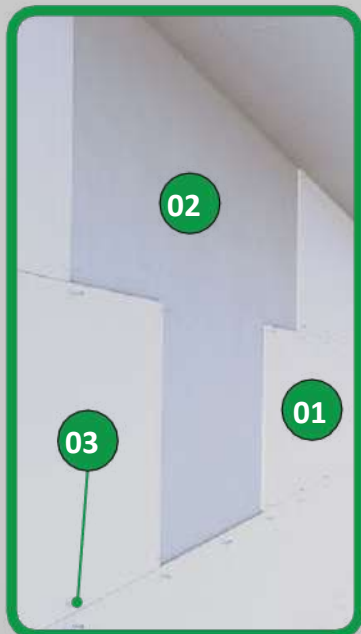
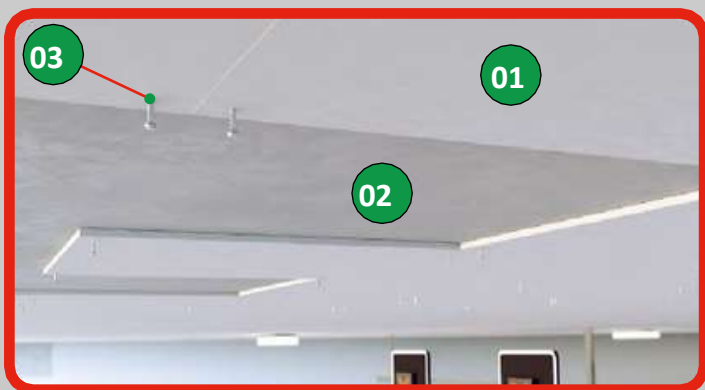
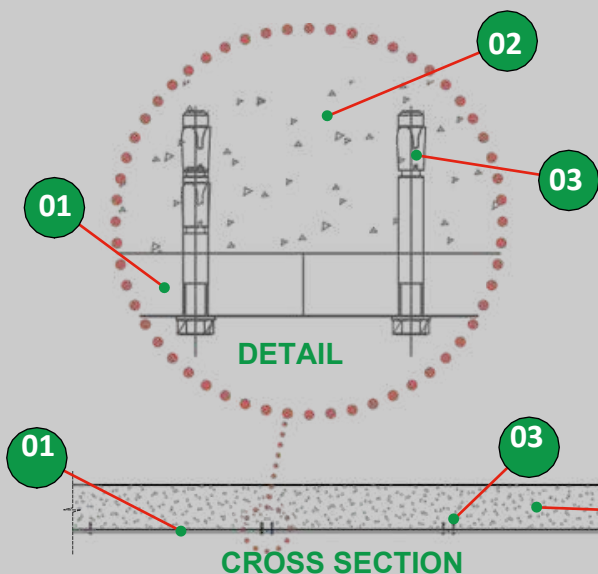
Fix the Tecbor® 20 mm Board directly onto the concrete slab using a 10 x 60 mm metal plug.
Apply Tecbor® Joint Paste to the board joints and screw heads.
For more information, contact our technical department.

SOLUTION

- 01** Tecbor® 20 mm Boards.
- 02** 120 mm slab.
- 03** 10 x 60 mm metal plug.

TEST

Standard: UNE EN1364-2.
Laboratory: CIDEMCO.
Test No.: 17566-1/-2-a-M1.



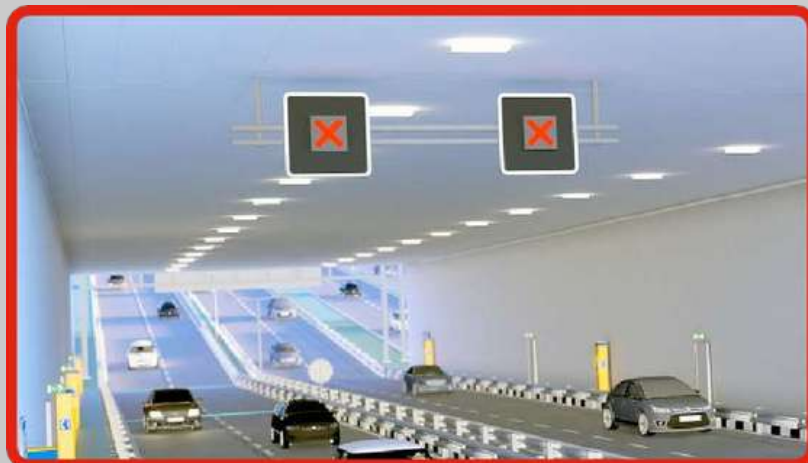
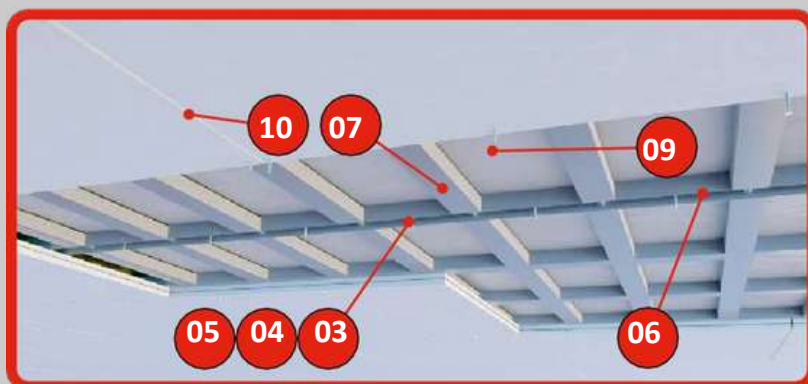
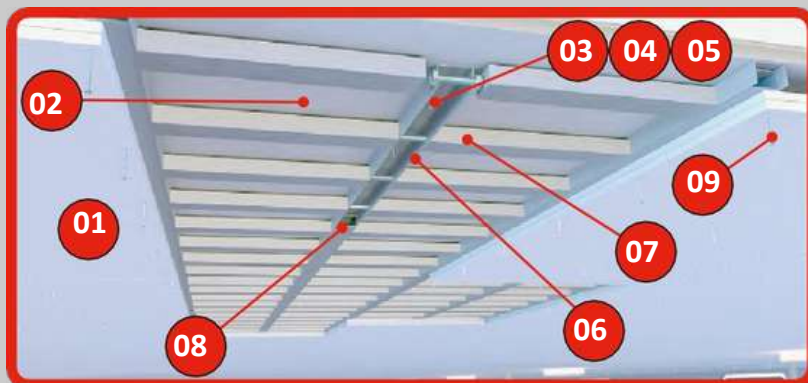
8.3. TUNNEL SUSPENDED CEILING ON METAL STRUCTURE.

TECBOR® 20+20 RWS-120 Y RWS 180

DESCRIPTION OF ASSEMBLY

Assemble the metal structure from which the suspended ceiling will hang, forming grids (check dimensions) with primary profiles of 75 x 46 x 1.2 mm and secondary profiles of 75 x 40 x 1.2 mm.

Once the metal structure has been assembled, attach the two layers of Tecbor® 20 mm Boards to the structure using 5.5 x 73 mm self-drilling screws. Mcr tecresa® offers a range of assembly options. Consult the technical department.

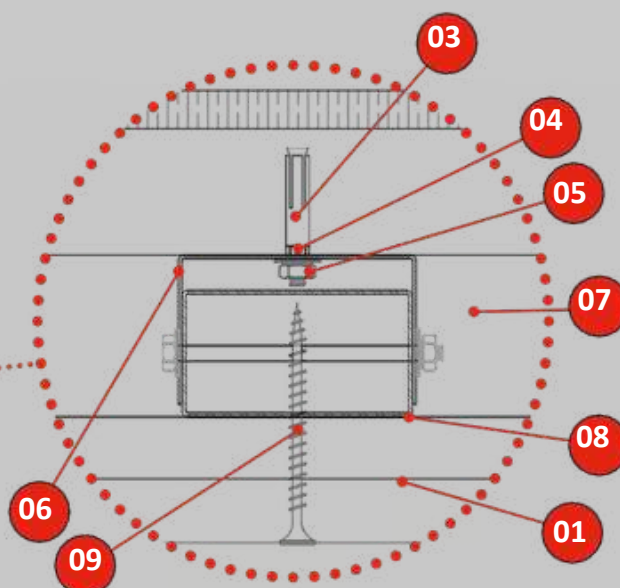
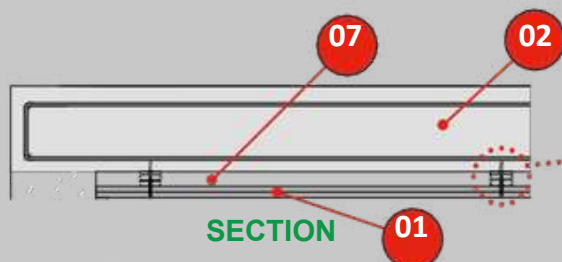


SOLUTION DETAIL

- 01 Tecbor® 20 mm Boards.
- 02 Reinforced slab.
- 03 Metal expansion anchor with internal thread.
- 04 Steel threaded rod Ø 12 mm.
- 05 Galvanised nut Ø12 mm.
- 06 75 x 46 x 1.2 mm U-profiles.
- 07 75 x 40 x 1.2 mm U-profiles.
- 08 73 x 40 x 1.2 mm tube profiles.
- 09 5.5 x 73 mm screw.
- 09 Tecsel® Mastic for joints.

TEST

- Standard: RWS fire curve
- Laboratory: EFECTIS
- Test No.: 2009-Efectis-R0998.



CROSS SECTION
DETAIL

8.4. TUNNEL SUSPENDED CEILING ON METAL STRUCTURE.

TECBOR® 20+20+12 RWS-120 AND RWS 180

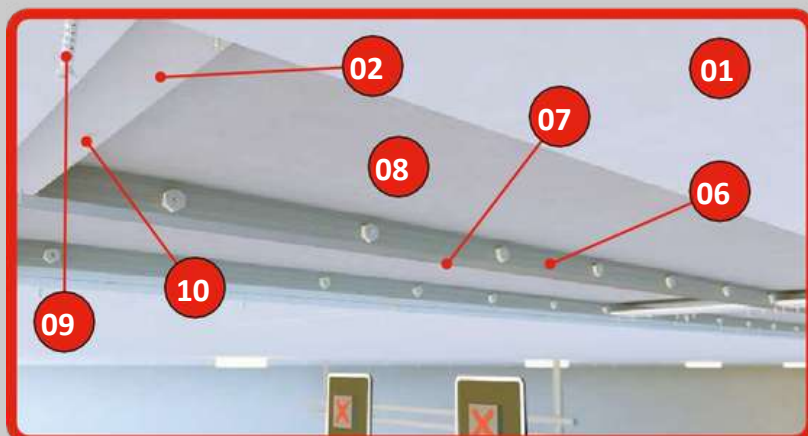
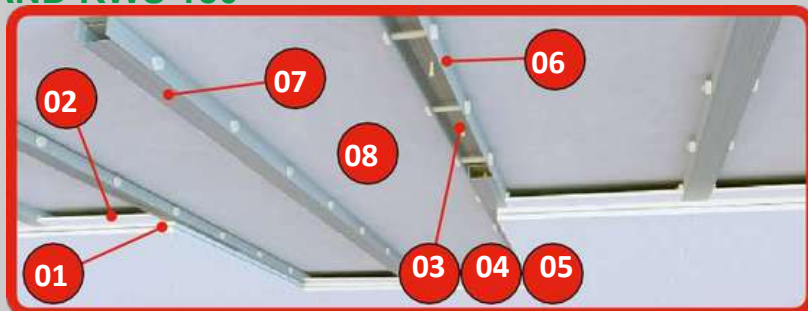
DESCRIPTION OF ASSEMBLY

Assemble the metal structure from which the suspended ceiling will hang, forming grids (check dimensions) with primary profiles of 75 x 46 x 1.2 mm. The secondary profile is substituted by a 12 x 150 mm Tecbor® Board strip.

Once the metal structure has been assembled, attach the two layers of Tecbor® 20 mm Boards to the structure using 6.3 x 65 mm self-drilling screws. Mcr tecresa® offers a range of assembly options. Consult the technical department.

SOLUTION DETAIL

- 01 Tecbor® 20 mm Boards.
- 02 Tecbor® 12 mm Boards (width 150 mm).
- 03 Metal expansion anchor with internal thread.
- 04 Steel threaded rod Ø 12 mm.
- 05 Galvanised nut Ø12 mm.
- 06 75 x 46 x 1.2 mm U-profiles.
- 07 73 x 40 x 1.2 mm tube profiles.
- 08 Reinforced slab.
- 09 6.3 x 65 mm screw.
- 10 4.5 x 50 mm Hi-Low screw.
- 11 Tecsel® Mastic for joints.

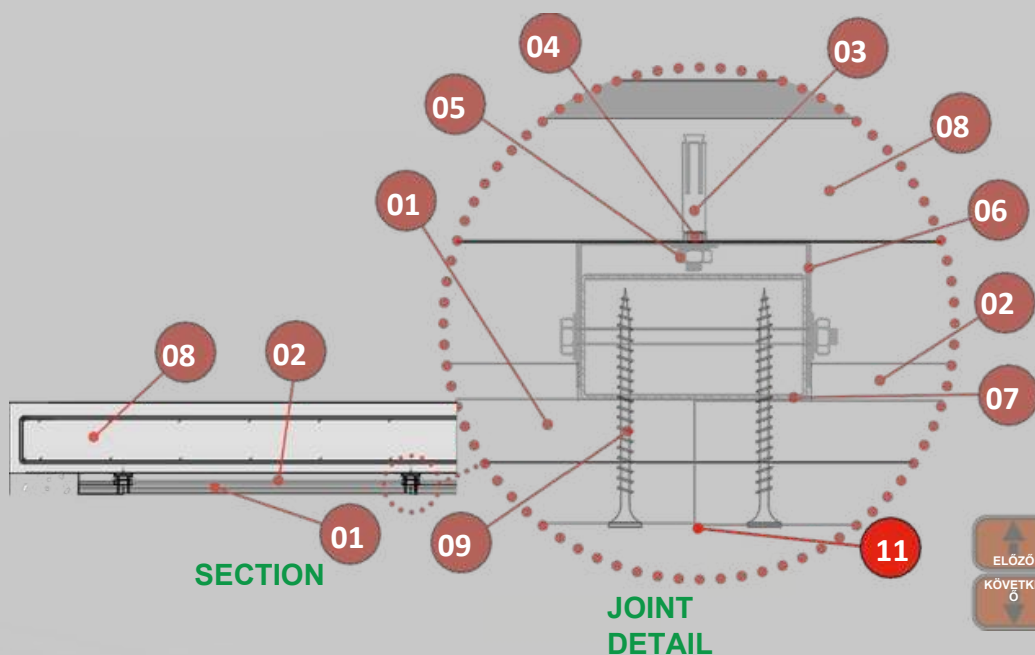
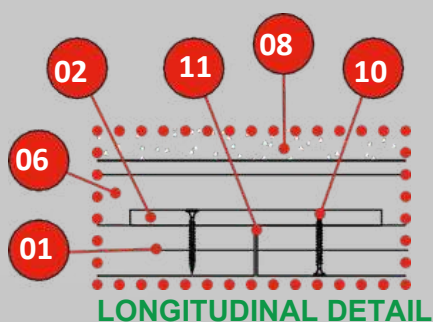


TEST

Standard: RWS FIRE CURVE

Laboratory: EFECTIS

Test No.: 2009-Efectis- R0998.



8.5. TUNNEL SUSPENDED CEILING ON METAL STRUCTURE WITH CLEVIS.

TECBOR® 20+20 RWS 120 Y RWS-180

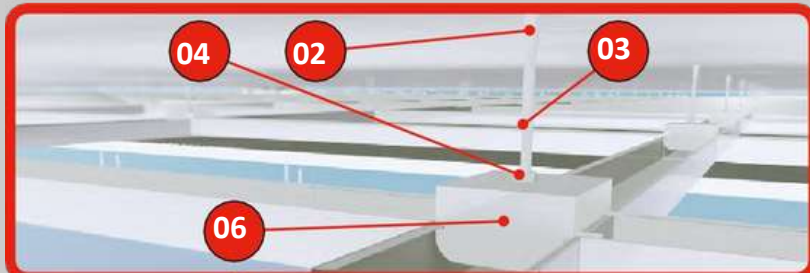
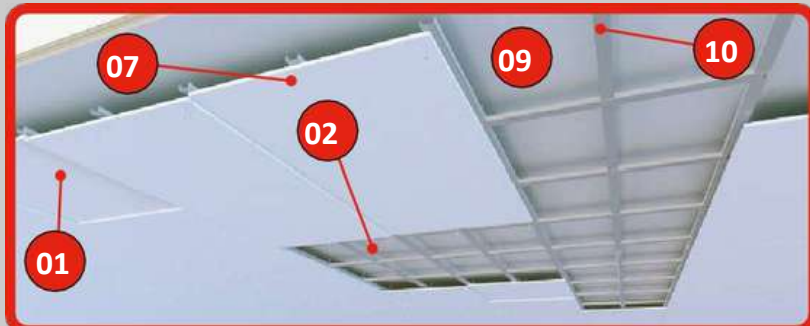
DESCRIPTION OF ASSEMBLY

Assemble the metal structure from which the suspended ceiling will hang, forming grids (check dimensions) with TC 60/27 profiles.

Once the metal structure has been assembled, attach the two layers of Tecbor® 20 mm Boards to the structure using 5.5 x 73 mm self-drilling screws. Mcr tecresa® offers a range of assembly options. Consult the technical department.

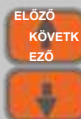
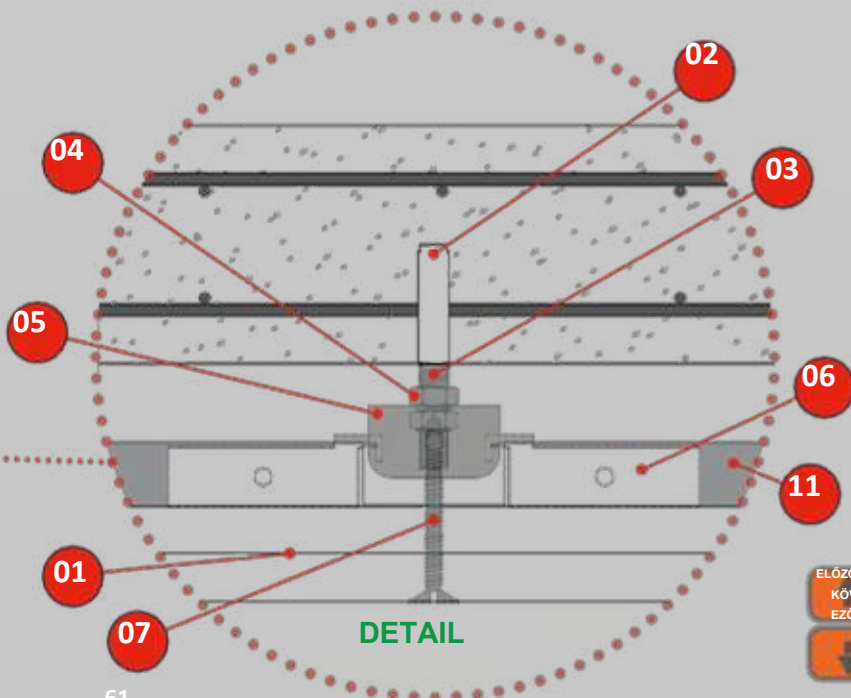
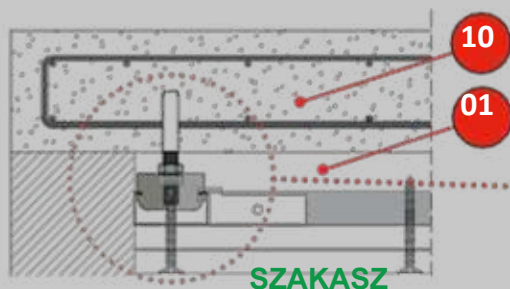
SOLUTION DETAIL

- 01** Tecbor® 20 mm Boards.
- 02** Metal expansion anchor with internal thread Ø 12 mm.
- 03** Steel threaded rod Ø 12 mm.
- 04** Galvanised nut Ø12 mm.
- 05** Clevis pivot bracket TC-60, 0.6 mm thick.
- 06** TC-60 attachment.
- 08** 5 x 80 mm screw.
- 09** Tecsel® Mastic for joints.
- 10** Reinforced slab.
- 11** TC 60/27 profile.



TEST

- Standard:** RWS fire curve.
- Laboratory:** EFECTIS
- Test No.:** 2009-Efectis- R0999.



8.6. TUNNEL SUSPENDED CEILING. TECBOR® 23 RWS-120

DESCRIPTION OF ASSEMBLY

Fix the Tecbor® 23 mm Board directly onto the concrete slab using a 10 x 60 mm metal plug.
This system does not require any kind of joint paste, however it is advised to seal gaps greater than 3 mm using Tecsel® Mastic.

For more information, contact our technical department.

SOLUTION

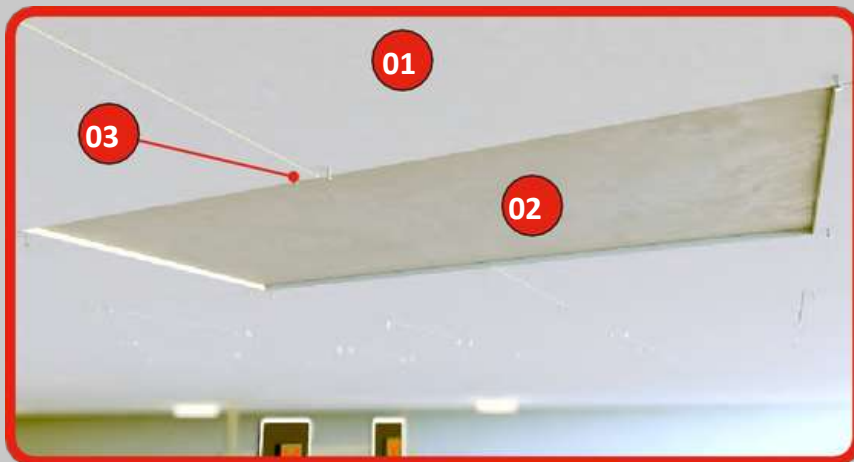
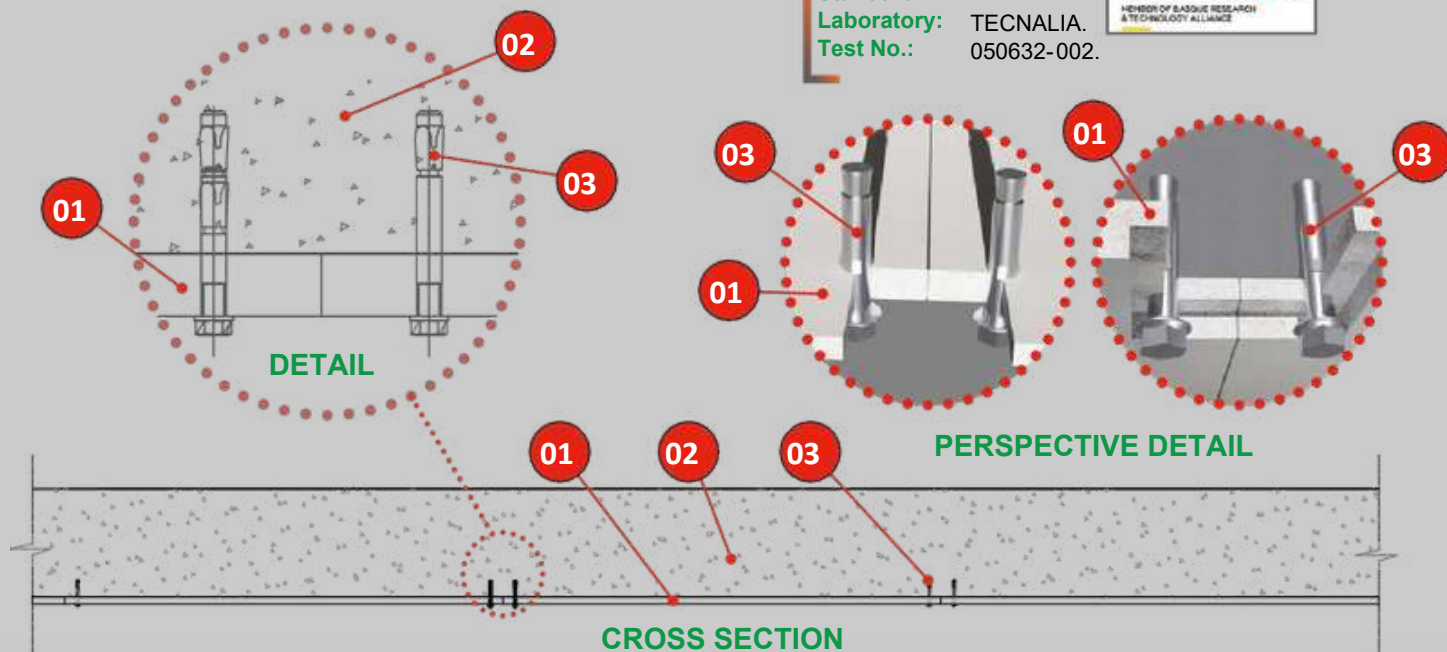
- 01 Tecbor® 23 mm-es táblák.
- 02 120 mm-es födém.
- 03 HLC-H 8 x 70 mm-es fémdugó.

TEST

Standard: RWS.

Laboratory: TECNALIA.

Test No.: 050632-002.



8.7. TUNNEL SUSPENDED CEILING. TECBOR® 24 RABT-ZTV-170

DESCRIPTION OF ASSEMBLY

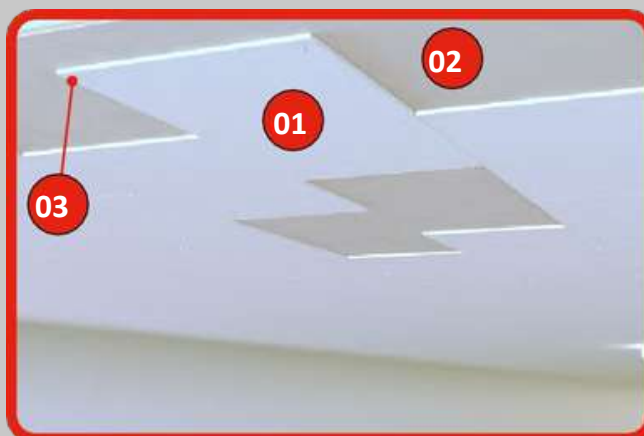
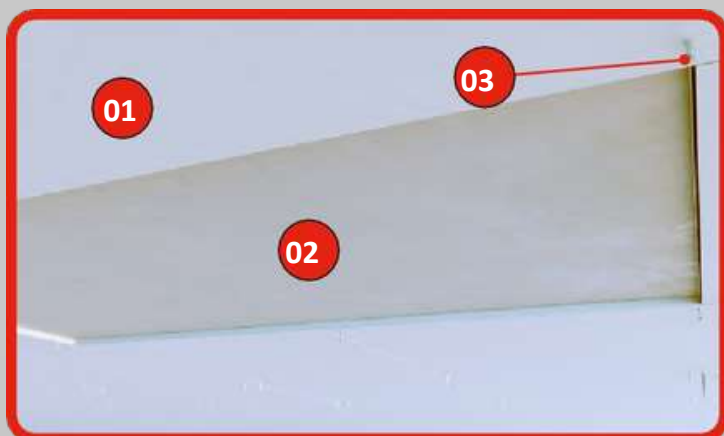
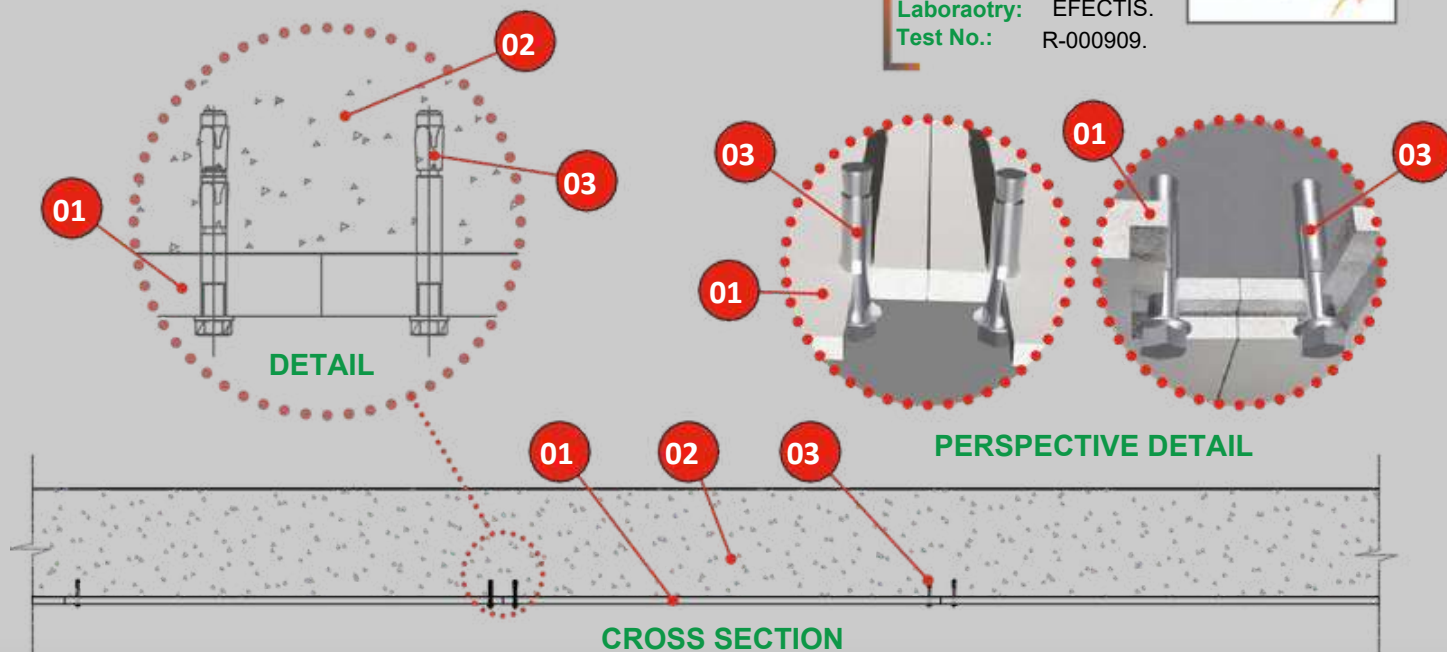
Fix the Tecbor® 24 mm Board directly onto the concrete slab using a 10 x 60 mm metal plug.
This system does not require any kind of joint paste, however it is advised to seal gaps greater than 3 mm using Tecsel® Mastic.
For more information, contact our technical department.

SOLUTION

- 01 Tecbor® 24 mm Boards.
- 02 120 mm slab.
- 03 FNA II 3 x 30 mm metal plug.

TEST

Standard: RABT-ZTV.
Laboratory: EFECTIS.
Test No.: R-000909.



8.8. TUNNEL SUSPENDED CEILING. TECBOR® 24 RWS/HCM-120

DESCRIPTION OF ASSEMBLY

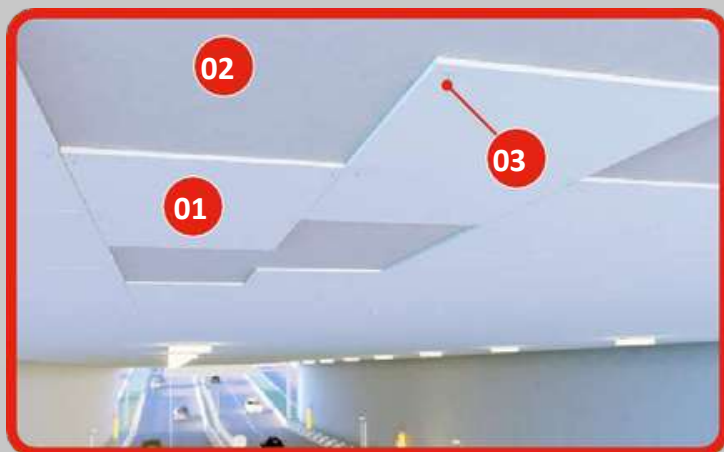
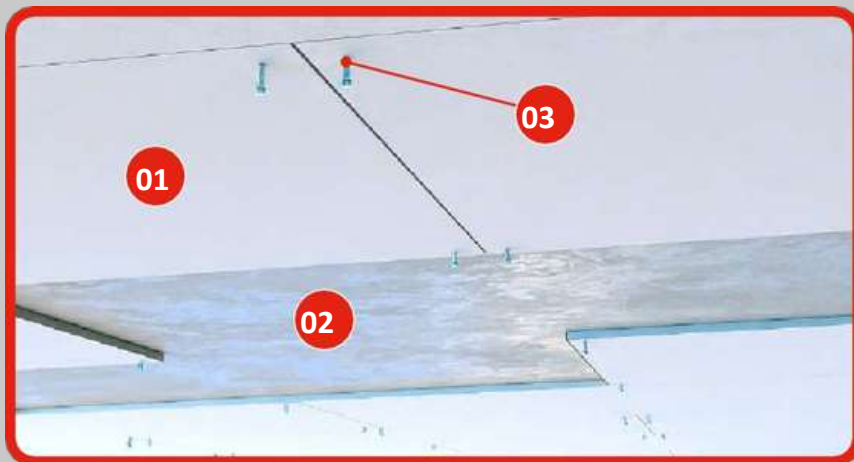
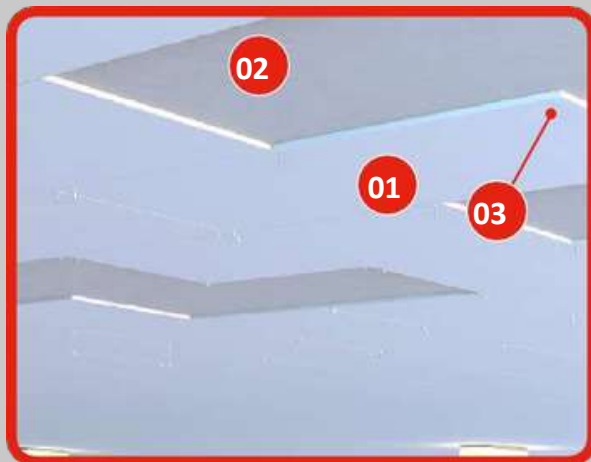
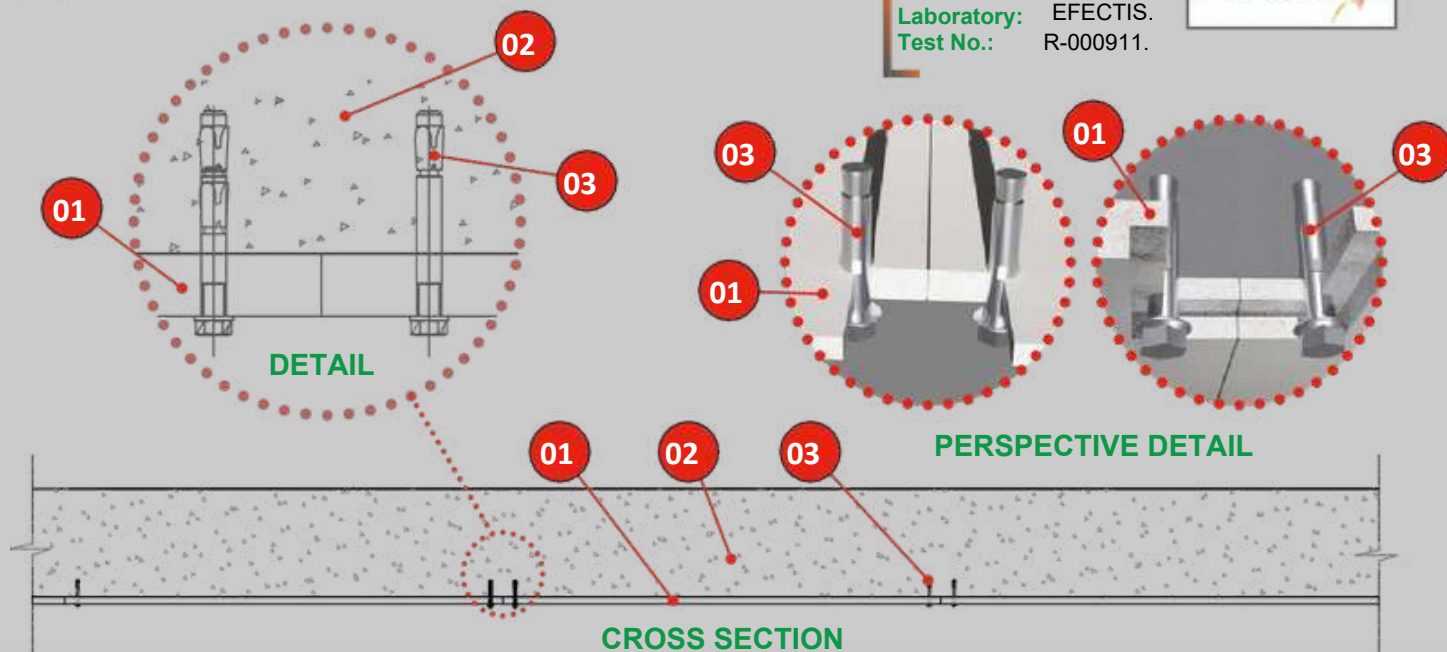
Fix the Tecbor® 24 mm board directly onto the concrete slab using a Fischer FNA II 6 x 30/30 A4 metal plug. This system does not require any kind of joint paste, however it is advised to seal gaps greater than 3 mm using Tecsel® Mastic. For more information, contact our technical department.

SOLUTION

- 01 Tecbor® 24 mm Boards.
- 02 120 mm slab.
- 03 Fischer FNA II 6 x 30/30 A4 metal plug.

TEST

tandara: RWS/HCM.
Laboratory: Efectis.
Test No.: R-000911.



Works of reference



- LAS GLORIAS ALAGÚT, BARCELONA.
- RIOS ROSAS-FÜLÖP-SZIGETEKI ALAGÚT, MADRID.
- A BANCO POPULAR ÚJ SZÉKHÁZA, MADRID.
- CALEIDO TORONY, MADRID.
- KRONOS ÉPÜLET, VALENCIA.
- INFANTA SOFÍA KÓRHÁZ, SAN SEBASTIÁN DE LOS REYES, MADRID.
- VODAFONE ÉPÜLET, AVDA. DE LES CORTS VALENCIANES, VALENCIA.
- SAN FERNANDO DE HENARES ÜZLETI PARK, MADRID.
- GRAND CAFÉ LA FINCA, MADRID.
- M-30 ÉSZAKI ÉS DÉLI KERÜLŐALAGÚT, MADRID.
- CONSERVAS CERQUEIRA RIANXÓBAN, A CORUÑA.
- AVE MADRID-MURCIA: ORIHUELA-COLADA DE LA BUENA VIDA ÚTSZAKASZ.
- KÖZLEKEDÉSI CSOMÓPONT AVDA. DE AMÉRICA, MADRID.
- PRÍNCIPE PIO KÖZLEKEDÉSI CSOMÓPONT, MADRID.
- KERESKEDELMI KAMARA, PZA. DE LA INDEPENDENCIA, MADRID.
- KERESKEDELMI KAMARA, PALACIO DE SANTOÑA, MADRID.
- LA FINCA GRAND CAFÉ, POZUELO DE ALARCÓN, MADRID.
- TEATRO DE LA COMEDIA, MADRID.
- RIALTO SZÍNHÁZ, MADRID.
- TEATRO DEL CANAL, MADRID.
- ETSI MINAS, MADRID.
- CANALEJAS KÖZPONT, MADRID
- BIZTOSÍTÁSI ÉS NYUGDÍJPÉNZTÁRI FŐIGAZGATÓSÁG ÉPÜLETE, CASTELLANA 44, MADRID.
- A REAL MADRID VÁROSI EDZŐPÁLYÁJA, VALDEBEBAS, MADRID.
- PASEO DE LA CASTELLANA, 36-38, MADRID.
- PASEO DE LA CASTELLANA, 110, MADRID.
- ÉPÜLET: AVDA. MANOTERAS, 14-16, MADRID.
- INFANTA SOFÍA KÓRHÁZ, SAN SEBASTIÁN DE LOS REYES, MADRID.
- A BARCELONAI METRÓ 9. VONALA.
- MONFORTE DE LEMOS PIO XII ALAGÚT, MADRID.
- JUAN CARLOS 1 SZÁLLÓ, BARCELONA.
- GUINARDÓ PIAC, BARCELONA.
- A DEL VALLÉS FGC MÉTRO BŐVÍTÉSE.
- EGYETEMI KÓRHÁZKOMPLEXUM, A CORUÑA.
- MARINEDA CITY BEVÁSÁRLÓKÖZPONT, A CORUÑA. BÍRÓSÁGI ÉPÜLET, OURENSE.
- PELLÍ TORONY, SEVILLA.
- CAIXAFORUM, SEVILLA.
- VITHAS NUESTRA SEÑORA DE LA SALUD KÓRHÁZ, GRANADA.
- LA FE EGYETEMI ÉS POLITECHNIKUMI KÓRHÁZ, VALENCIA.
- LA MANCHA CENTRO KÓRHÁZKÖZPONT, ALCÁZAR DE SAN JUAN, CIUDAD REAL.
- PUERTO VENECIA BEVÁSÁRLÓKÖZPONT, ZARAGOZA.
- MERCURE SZÁLLODA, BORDEAUX.
- ALMACENES COBLESA COMÉSTICOS ALCALÁ DE HENARES, MADRID.



TECBOR®

CONSTRUCTION SOLUTIONS FOR YOUR SAFETY

mcr
tecresa

mcr
dunamenti