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Member of EOTA
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European Technical Assessment

ETA 21/1042 of 04/04/2025

General Part

Technical Assessment Body issuing the ETA:	**TECNALIA RESEARCH & INNOVATION**
Trade name of the construction product	CORTAFUEGO DF
Product family to which the construction product belongs	Fire protective board
Manufacturer	**KNAUF GmbH Sucursal en España** Avenida de Burgos 114, 6 planta E- 28050 Madrid, Spain
Manufacturing plants	KNAUF GmbH Sucursal en España, Ctra. de Incar Km 2,8; E-18130 Escúzar (Granada), Spain KNAUF GmbH Sucursal en España, Ctra. de Berga Km 28,5; E-25285 Guixers (Lérida) Spain
This European Technical Assessment contains	67 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 350142-00-1106 Fire protective board, slab and mat products and kits

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Table of contents

1. Technical description of the product

CORTAFUEGO DF board is a laminated plasterboard composed of a gypsum core with additives and covered on both sides with a cellulose sheet. It is manufactured using a continuous lamination process in accordance with the EN 520 standard.

It has a pink-coloured exposed side that allows any final finish as indicated in the technical data sheet. The hidden side is brown. To facilitate the treatment of joints, the longitudinal edges are sharp-edged or square-edged for special applications. The transverse edges are cut off.

These boards are used in the interior of all types of new or refurbished buildings, both for ceilings and protection of structure elements, where a higher fire resistance is required.

		Nominal value (mm)	Tolerance
Thickness (mm)		12.5, 15	±0.5
		25	±0.4
Length (mm)	12.5 mm boards	From 2500 to 3000	+0 / -5
	15 mm boards	From 2500 to 3000	
	25 mm boards	2000	
Width (mm)		1200	+0 / -4

Table 1: Dimensions of the CORTAFUEGO DF boards.

The ancillary products referred to in this ETA as a part of installation provisions or in the framework of determining performances are not covered by this ETA.

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

2.1. Intended use

The intended use of CORTAFUEGO DF board is to provide fire protection of loadbearing building elements when applied according to intended use type 3, type 4 and type 8, and installed in assemblies in accordance with the provisions respectively given in Annex A, Annex B and Annex C.

Use category related to the element(s) intended to be protected:

- Type 3: Fire protective products to protect load-bearing concrete elements.
- Type 4: Fire protective products to protect load-bearing steel elements.
- Type 8: Fire protective products that contribute to the fire resistance of fire separating assemblies with no load bearing requirements.

Use category related to environmental conditions:

- Type Z2: internal use only

2.2. Working life

The provisions made in this European Technical Assessment are based on an assumed working life of 25 years as minimum, provided that CORTAFUEGO DF are subject to appropriate use and maintenance. The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3. Performance of the product and references to the methods used for its assessment

The assessment of CORTAFUEGO DF board has been performed in accordance with EAD 350142-00-1106 Fire protective board, slab and mat products and kits.

Basic requirement for construction work	Essential characteristic	Performance
BWR 2 Safety in case of fire	Reaction to fire	Class A2-s1,d0. See Clause 3.1.1
	Resistance to fire	See Clause 3.1.2 and Annex A to Annex C
	Durability	Z_2. See Clause 3.1.3
BWR 4 Safety and accesibility in use	Flexural strength	See clause 3.2.1
	Dimensional stability	See clause 3.2.2

Table 2: Summary of CORTAFUEGO DF board performance

The rest of relevant essential characteristics included in EAD 350142-00-1106 has not been assessed in this ETA.

3.1Safety in case of fire (BWR 2)

3.1.1 Reaction to fire

The fire protective board CORTAFUEGO DF board has been assessed without further testing according to 2006/673/CE Decision. CORTAFUEGO DF board has a reaction to fire classification A2-s1,d0, in accordance with EN 13501-1 and Regulation (EU) 2016/364.

3.1.2 Resistance to fire

The resistance to fire performance, classified according to EN 13501-2, is given in Annex A to Annex C of this document.

The tests and evaluation methods are also given in Annex A to Annex C.

3.1.3 Durability

The fire protective board CORTAFUEGO DF fulfils the requirements of use category Z_2 in accordance with EAD 350142-00-1106.

3.2 Safety and accessibility in use (BWR 4)

3.2.1 Flexural strength

Flexural strength has been determined in accordance with EAD 350142-00-1106 Clause 2.2.2.9 and EN 12467.

BOARD	MOR (MPa)
CORTAFUEGO DF 12,5	6.7
CORTAFUEGO DF 25	1.8

Table 3: Flexural strength

3.2.2 Dimensional stability

Dimensional stability of CORTAFUEGO DF boards has been determined in accordance with EAD 350142-00-1106 Clause 2.2.2.10 and EN 318.

	$\delta l_{65/85}$ (mm/m)	$\delta t_{65/85}$ (%)	$\delta l_{65/30}$ (mm/m)	$\delta t_{65/30}$ (%)
CORTAFUEGO DF 12,5 Longitudinal	0.1	0.4	-0.2	-2.0
CORTAFUEGO DF 12,5 Transversal	0.1	0	-0.2	-1.8
CORTAFUEGO DF 25 Longitudinal	0.2	0.3	-0.2	-1.1
CORTAFUEGO DF 25 Transversal	0.1	0	-0.2	-1.3

Table 4: Dimensional stability

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the Decision 1999/454/EC of the European Commission, the system of AVCP (see EC Delegated Regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the following table applies.

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Fire protective products	For fire compartmentation and/or fire protection or fire performance	Any	1

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the Assessment and Verification of Constancy of Performance (AVCP) system are laid down in the control plan deposited at Tecnalia Research & Innovation.

The Control Plan is a confidential part of the ETA and is only handed over to the notified body involved in the assessment and verification of constancy of performance.

Issued in Azpeitia, on 04/04/2025

TECNALIA LAB_SERVICES

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Miguel Mateos
Innovation and Conformity Assessment Point
Tecnalia Research & Innovation

Annex A: Specification and assessment of fire protection of a load bearing concrete elements protected by CORTAFUEGO DF (intended use type 3)

The system described in this annex has been tested and evaluated according to EN 13381-3 and classified in accordance with EN 13501-2.
The system installation should be carried out in accordance with the manufacturer's instructions and the provisions given in this ETA.

A.1 ASSESSMENT OF THE FIRE PERFORMANCE ON CONCRETE BEAMS (SINGLE LAYER FIRE PROTECTION)

A.1.1 Tested assembly

CORTAFUEGO DF boards were fixed to the concrete members with steel anchors of two types (8x40 mm for 12.5 mm thickness boards and 9x60 mm for 25 mm thickness boards) in distance 50 mm from the perimeter of the boards and spacing 600 mm on the width and 500 mm on the length of the concrete member. All joints between the panels were filled with Knauf gypsum-based filling compound and a reinforcing tape was embedded. The heads of the fixings were covered with Knauf filling compound.

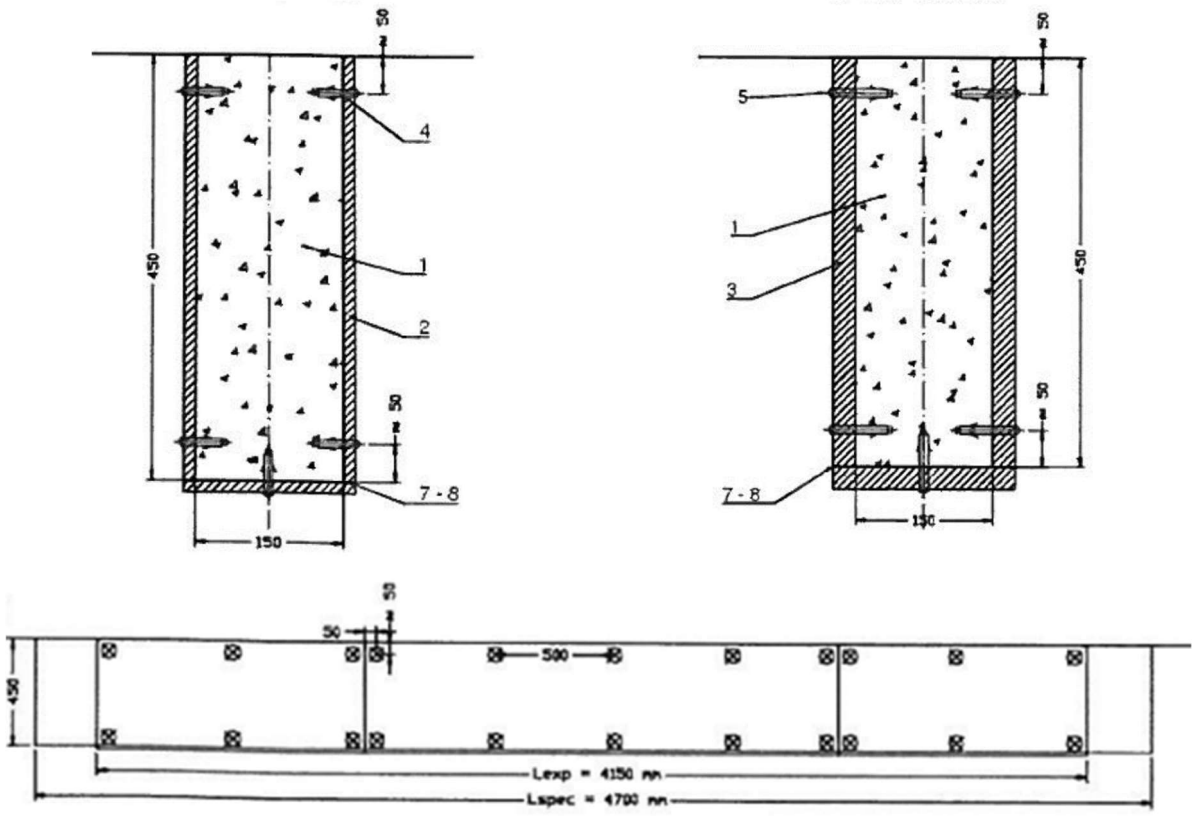


Figure 1: tested assembly

Components list	
1	Concrete beam dimensions 450 x 150 mm, length 4150 mm
2	Plasterboard Knauf CORTAFUEGO DF thickness 12.5 mm
3	Plasterboard Knauf CORTAFUEGO DF thickness 25 mm
4	Steel anchor Ø8x40 mm
5	Steel anchor Ø9x60 mm
7	Knauf gypsum-based filling compound
8	Knauf reinforcing tape

A.1.2. Equivalent thickness of concrete:

Concrete element	Thickness of CORTAFUEGO DF (mm)	Equivalent thickness of concrete (mm)					
		30 min	60 min	90 min	120 min	180 min	240 min
Beam	12.5	49	57	56	45	-	-
	25	60	87	92	88	95	97

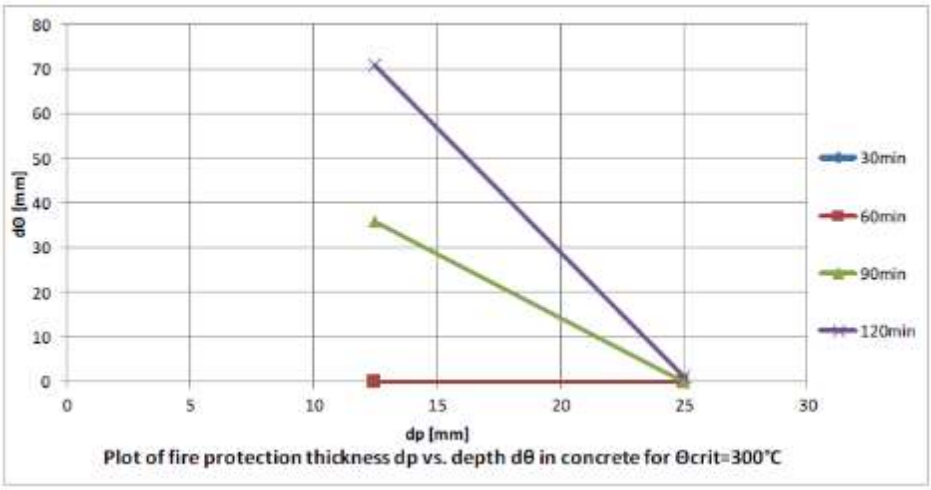
A.1.3 Required thickness of CORTAFUEGO DF:

Depth axes:

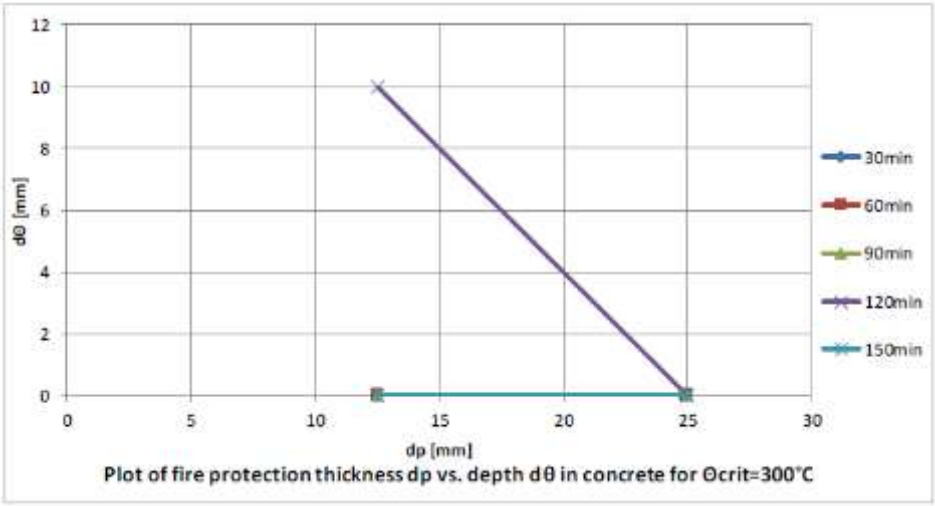
- Axis z: vertical axis of a beam cross-section
- Axis y: horizontal axis of a beam cross-section
- Axis w1, w2: diagonal depth axis

Graph A.1.1 Required thickness of CORTAFUEGO DF for T300ºC

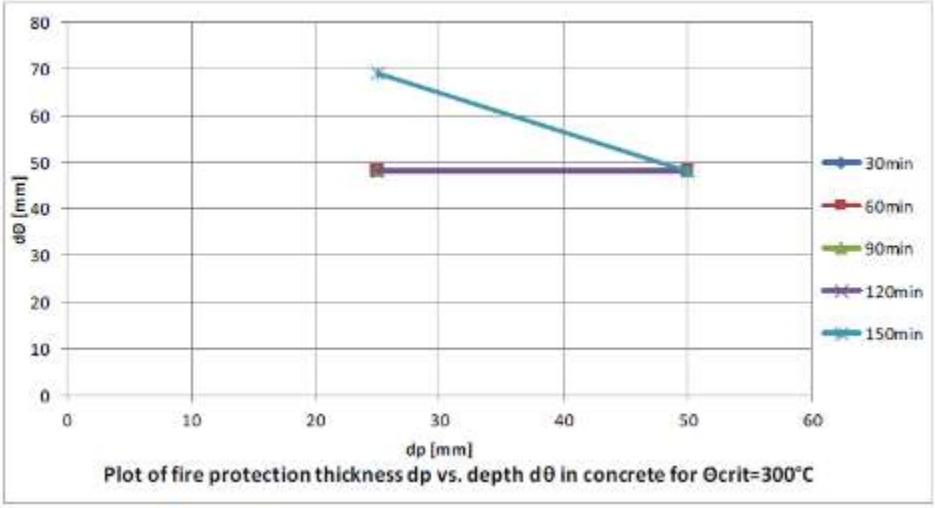
Depth along axis z



Depth along axis y

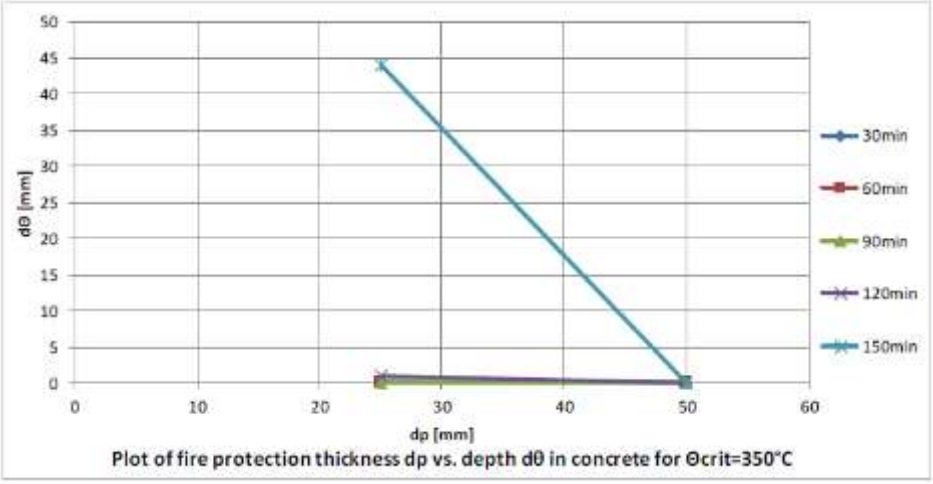


Depth along axis w1, w2

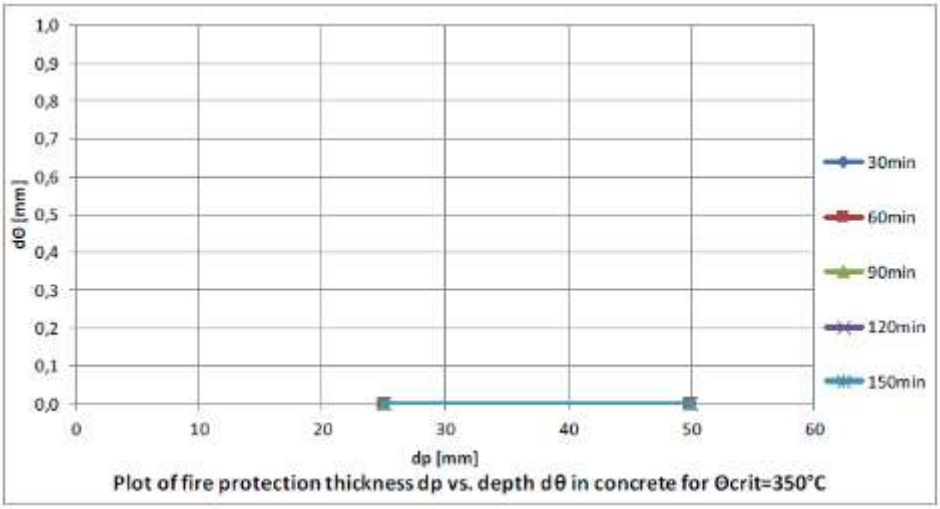


Graph A.1.2 Required thickness of CORTAFUEGO DF for T350ºC

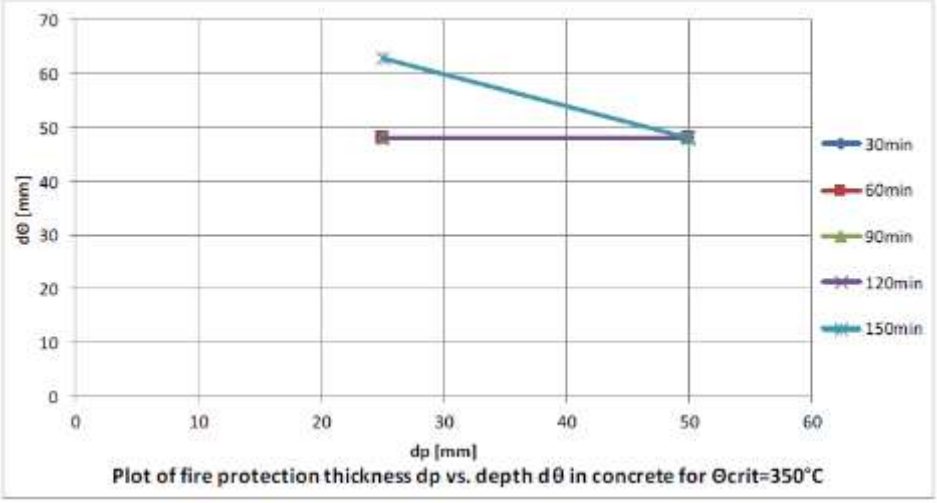
Depth along axis z



Depth along axis y

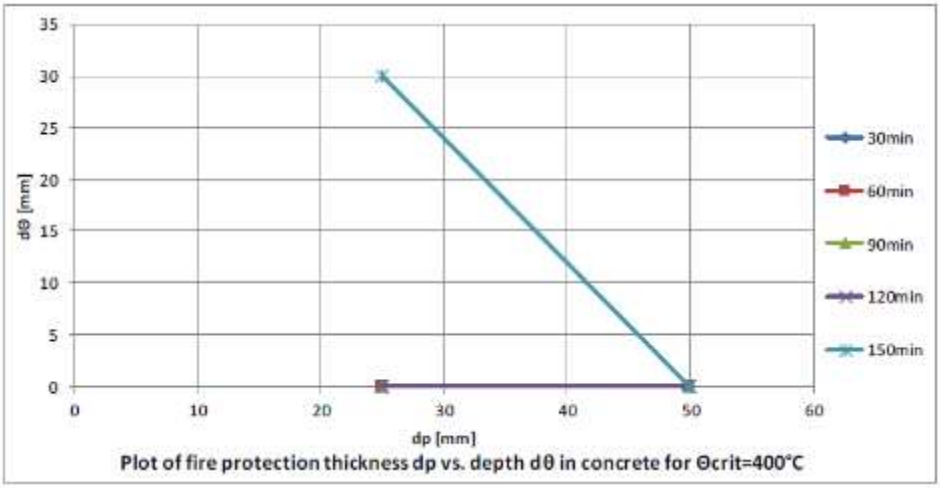


Depth along axis w1, w2

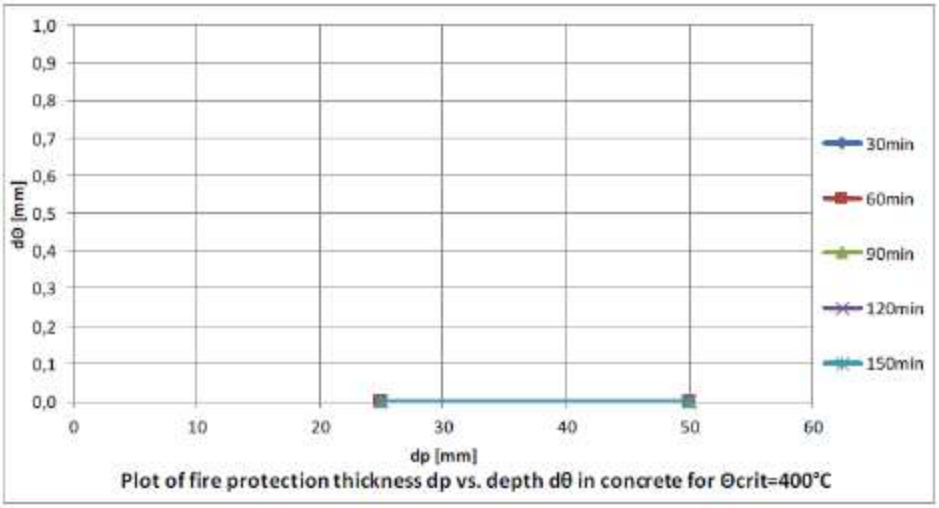


Graph A.1.3 Required thickness of CORTAFUEGO DF for T400ºC

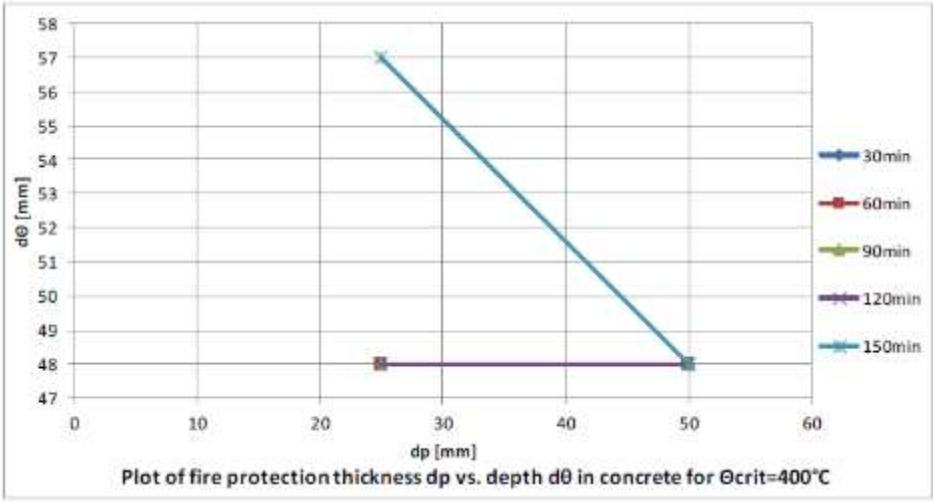
Depth along axis z



Depth along axis y

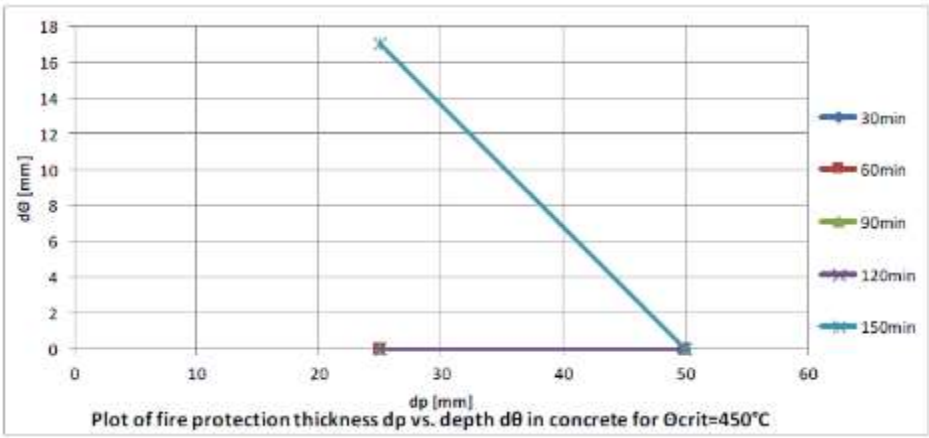


Depth along axis w1, w2

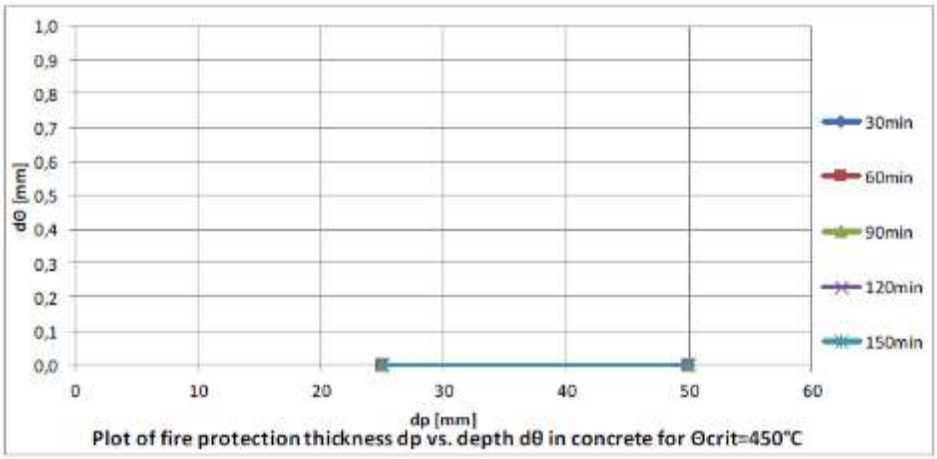


Graph A.1.4 Required thickness of CORTAFUEGO DF for T450ºC

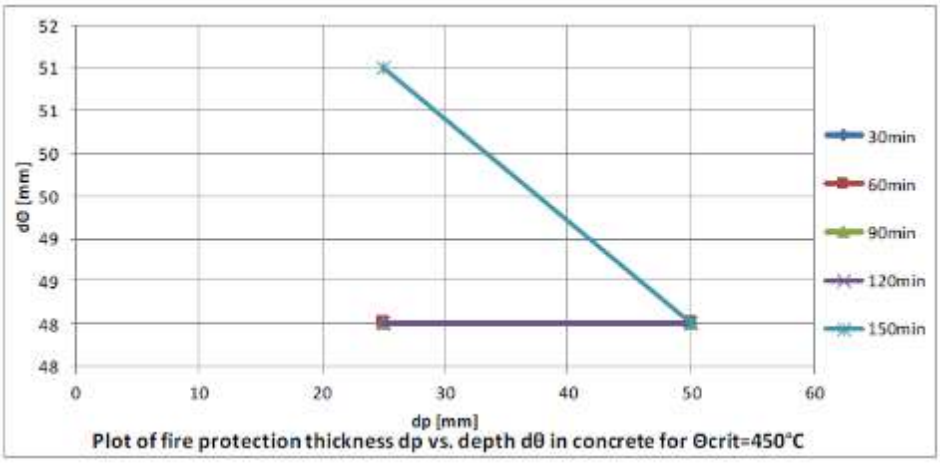
Depth along axis z



Depth along axis y

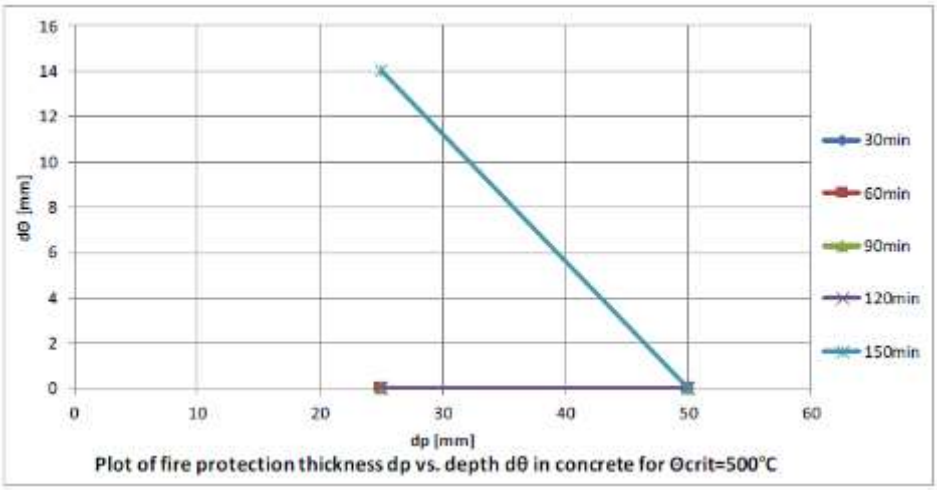


Depth along axis w1, w2

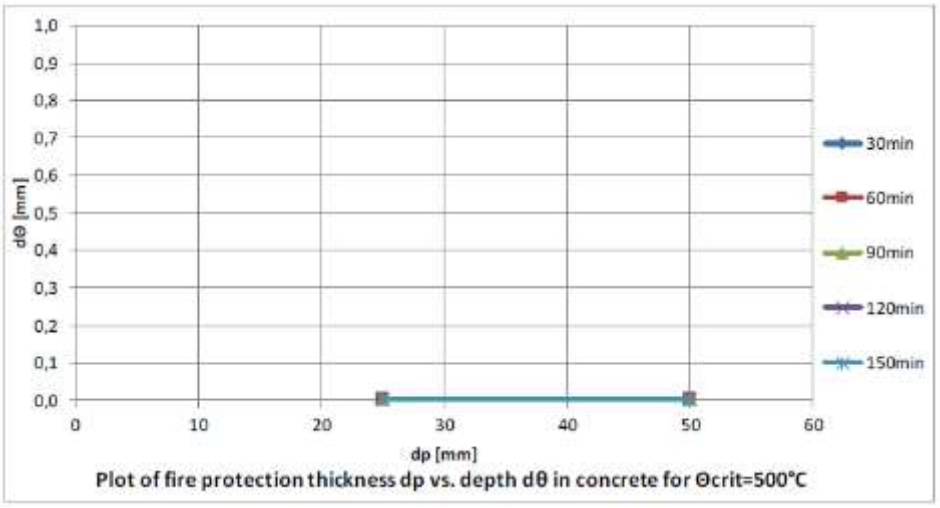


Graph A.1.5 Required thickness of CORTAFUEGO DF for T500ºC

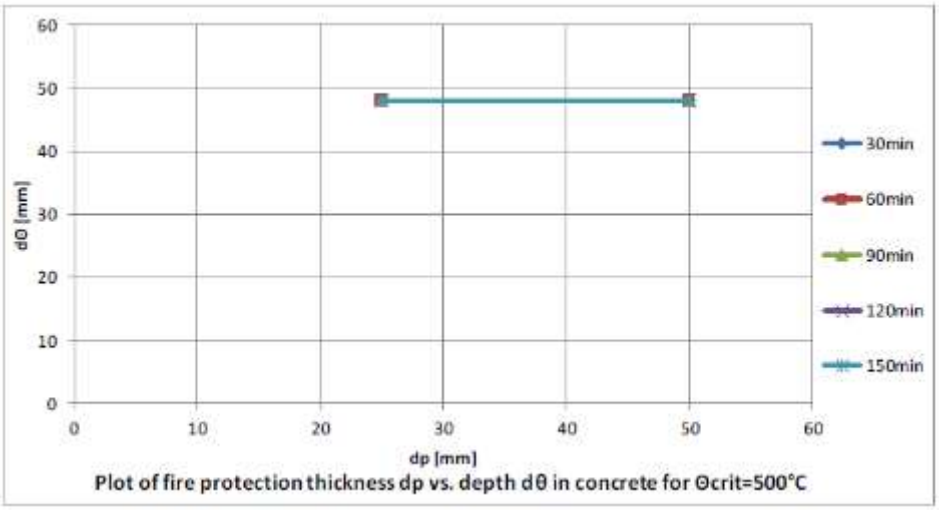
Depth along axis z



Depth along axis y

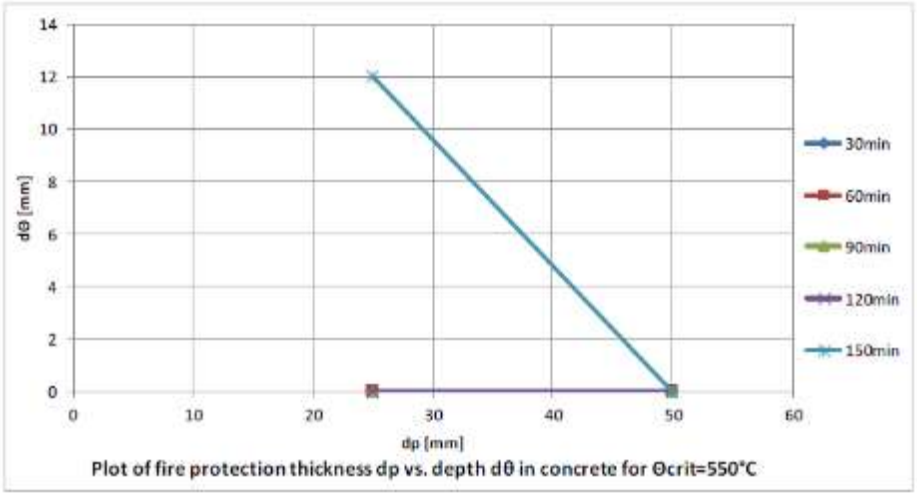


Depth along axis w1, w2

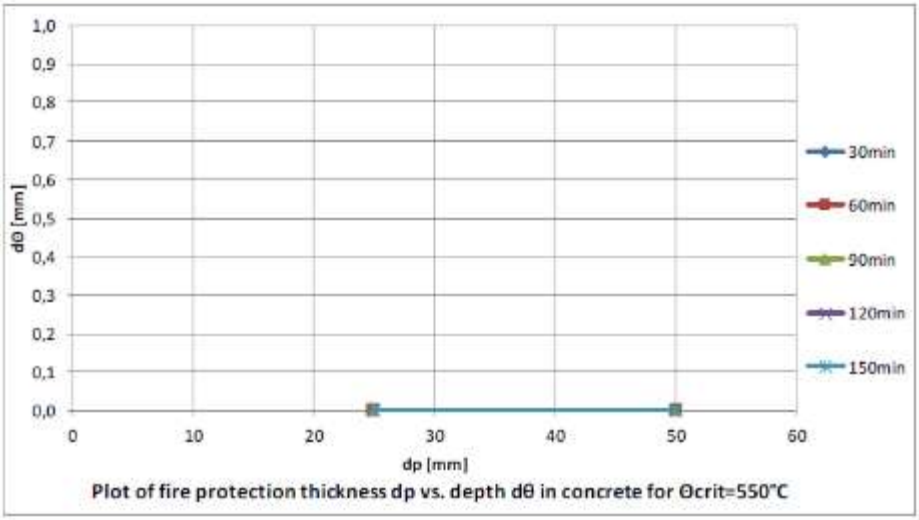


Graph A.1.6 Required thickness of CORTAFUEGO DF for T550ºC

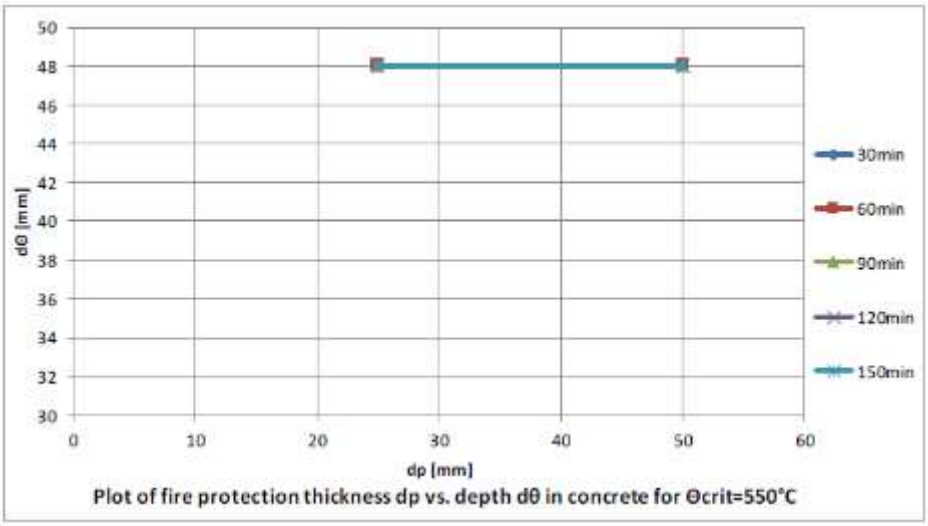
Depth along axis z



Depth along axis y

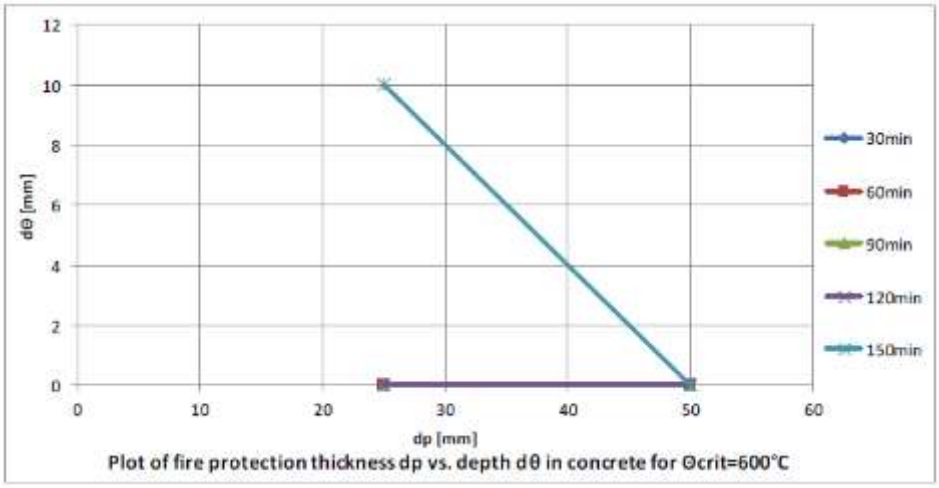


Depth along axis w1, w2



Graph A.1.7 Required thickness of CORTAFUEGO DF for T600ºC

Depth along axis z



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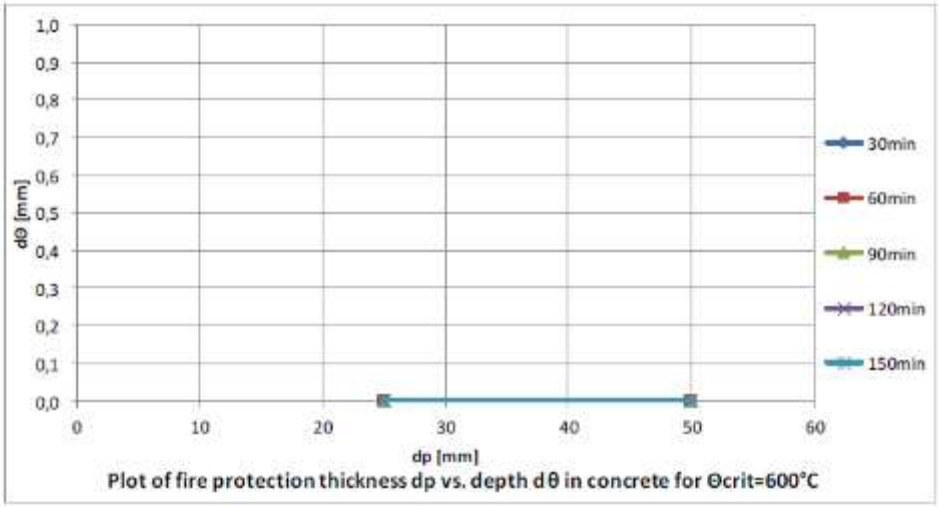
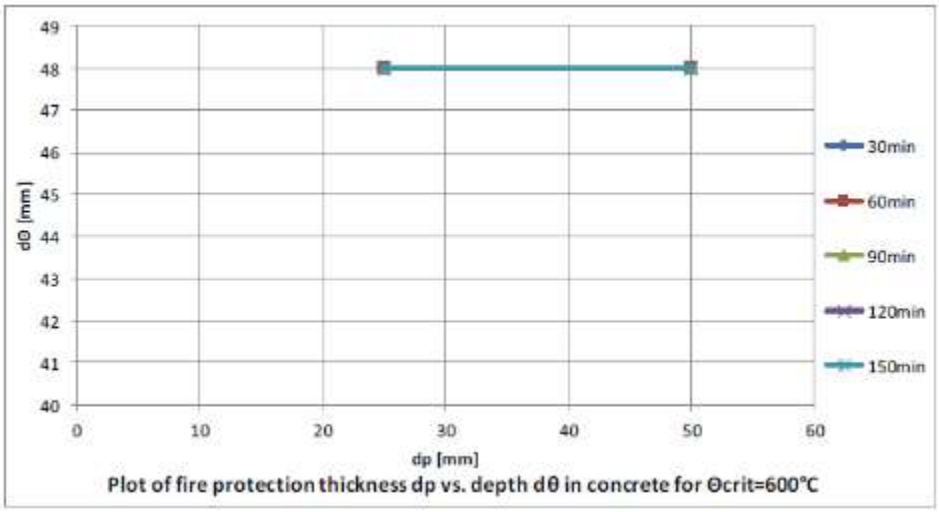
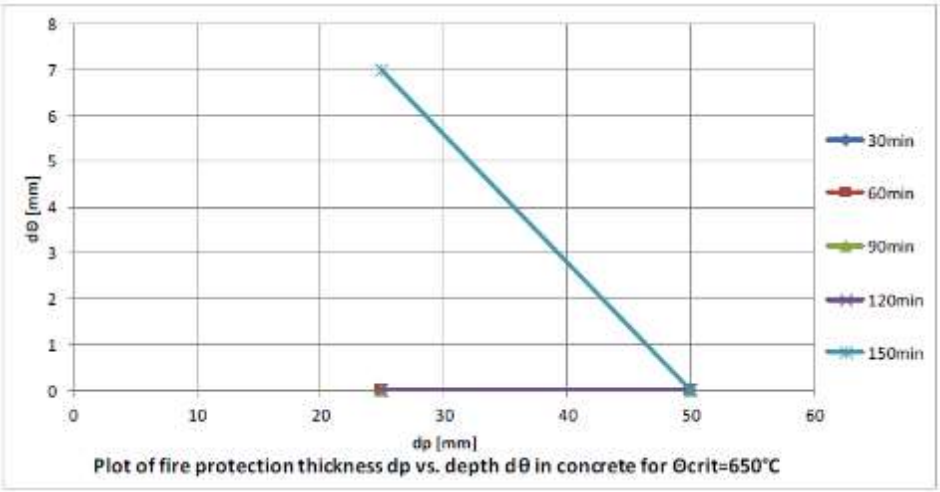


Depth along axis w1, w2

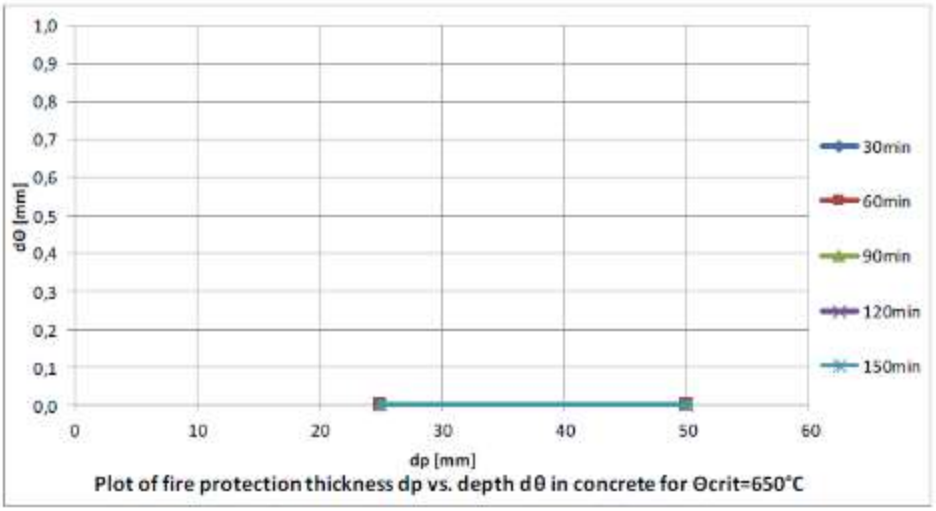


Graph A.1.8 Required thickness of CORTAFUEGO DF for T650ºC

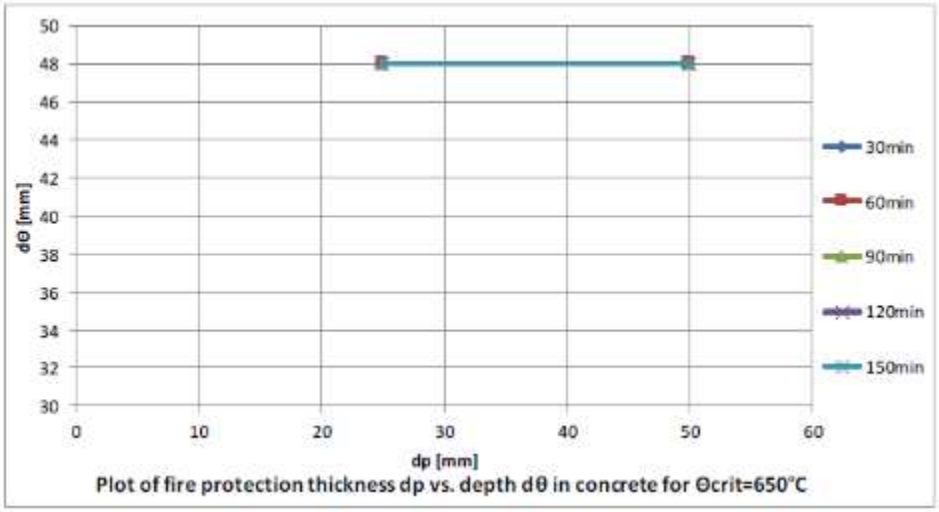
Depth along axis z



Depth along axis y



Depth along axis w1, w2



A.1.4 Stickability performance

The limiting exposure time has been defined according to EN 13381-3 § 13.5.

The time during the test, the maximum temperature recorded at any point on the exposed surface of the concrete (after reaching 200 °C) has been continuously more than 50 % above the mean of all temperatures recorded on the surface:

- 12.5 mm protection beam: not recorded.
- 25 mm protection beam: not recorded.

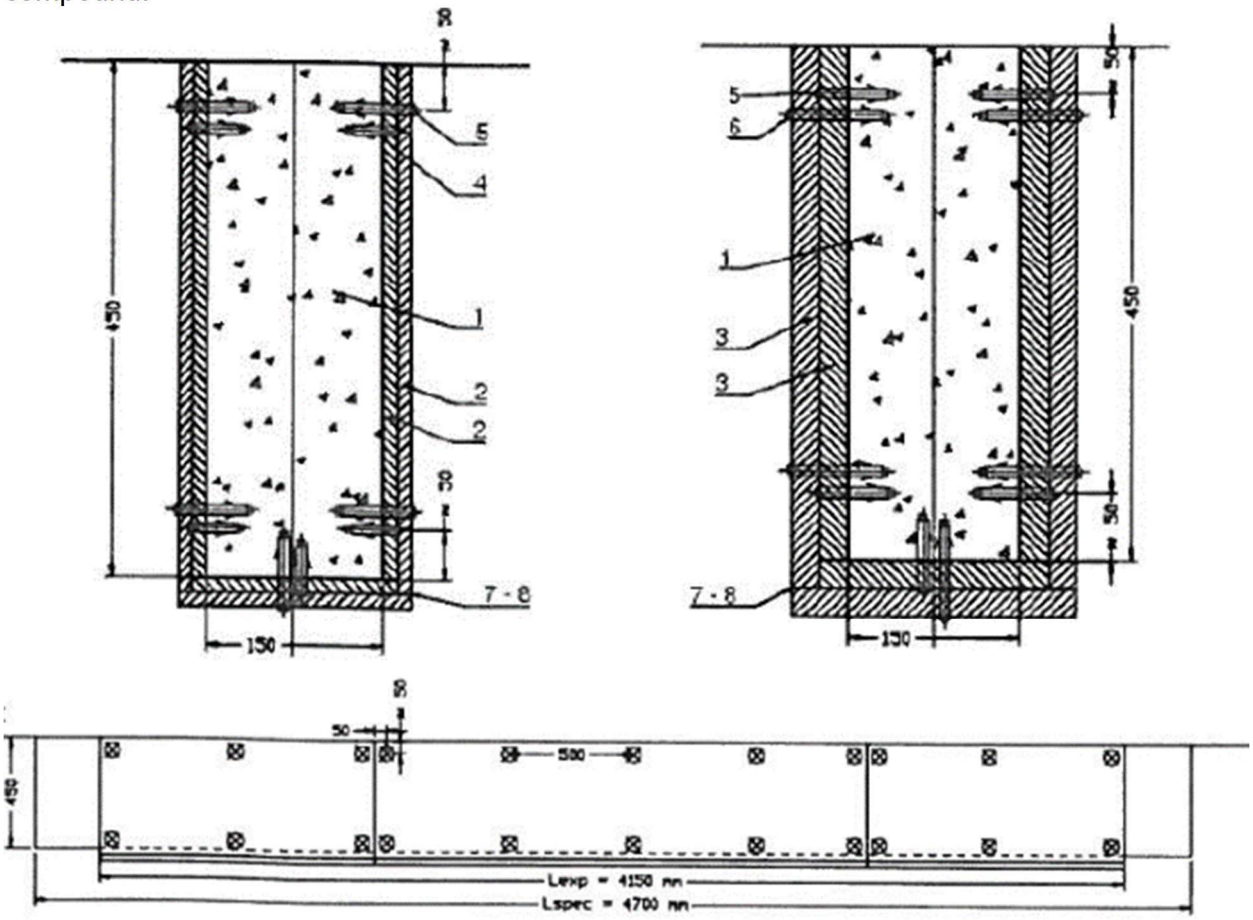
Significant detachment of the fire protection system observed in the furnace:

- 12.5 mm protection beam: 114th minute of the test.
- 25 mm protection beam: 180th minute of the test.

A.2 ASSESSMENT OF THE FIRE PERFORMANCE ON CONCRETE BEAMS (MULTIPLE LAYER FIRE PROTECTION)

A.2.1 Tested assembly

CORTAFUEGO DF boards have to be fixed to the concrete members with steel anchors of three types (8x40 mm for 12.5 mm thickness boards, 9x60 mm for 2x12.5 mm and 25 mm thickness boards and 9x80 mm for 2x25 mm boards) in distance 50 mm from the perimeter of the boards and spacing 600 mm on the width and 500 mm on the length of the concrete member. All joints between the panels have to be filled with Knauf gypsum-based filling compound and a reinforcing tape has to be embedded. The heads of the fixings have to be covered with Knauf filling compound.



	Components list
1	Concrete beam dimensions 450 x 150 mm, length 4150 mm
2	Plasterboard Knauf CORTAFUEGO DF thickness 12.5 mm
3	Plasterboard Knauf CORTAFUEGO DF thickness 25 mm
4	Steel anchor Ø8x40 mm
5	Steel anchor Ø9x60 mm
6	Steel anchor Ø9x80 mm
7	Knauf gypsum-based filling compound
8	Knauf reinforcing tape

A.2.2 Equivalent thickness of concrete:

Concrete element	Thickness of CORTAFUEGO DF (mm)	Equivalent thickness of concrete (mm)					
		30 min	60 min	90 min	120 min	180 min	240 min
Beam	25	65	87	88	77	68	-
	50	79	105	118	136	154	160

A.2.3 Required thickness of CORTAFUEGO DF:

Depth axes:

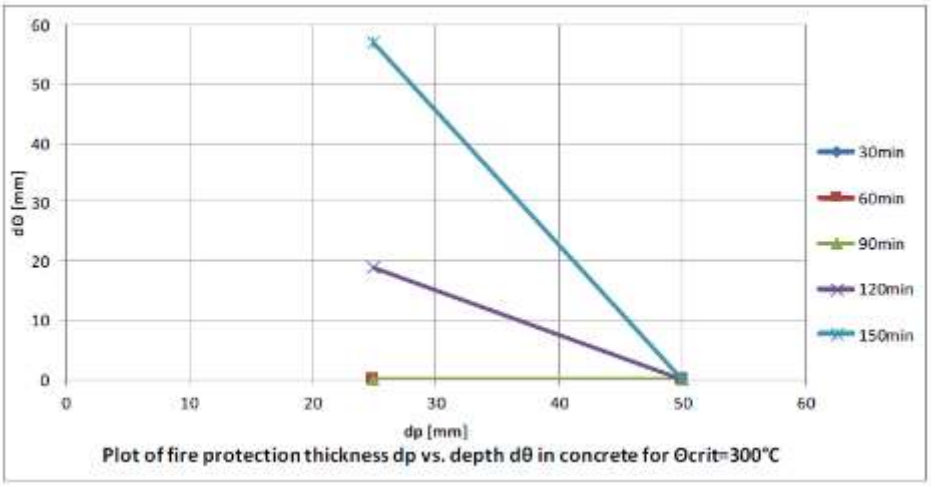
- Axis z: vertical axis of a beam cross-section

- Axis y: horizontal axis of a beam cross-section

- Axis w1, w2: diagonal depth axis

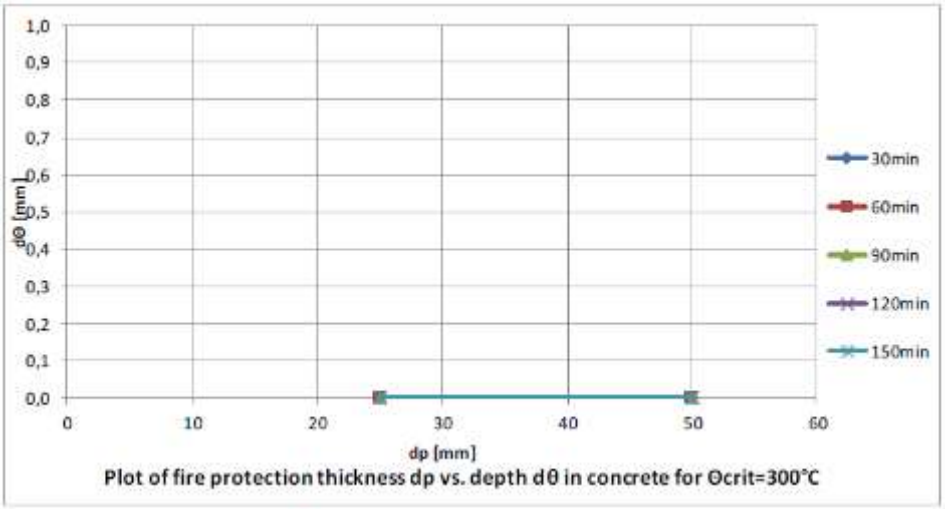
Graph A.2.1 Required thickness of CORTAFUEGO DF for T300ºC

Depth along axis z



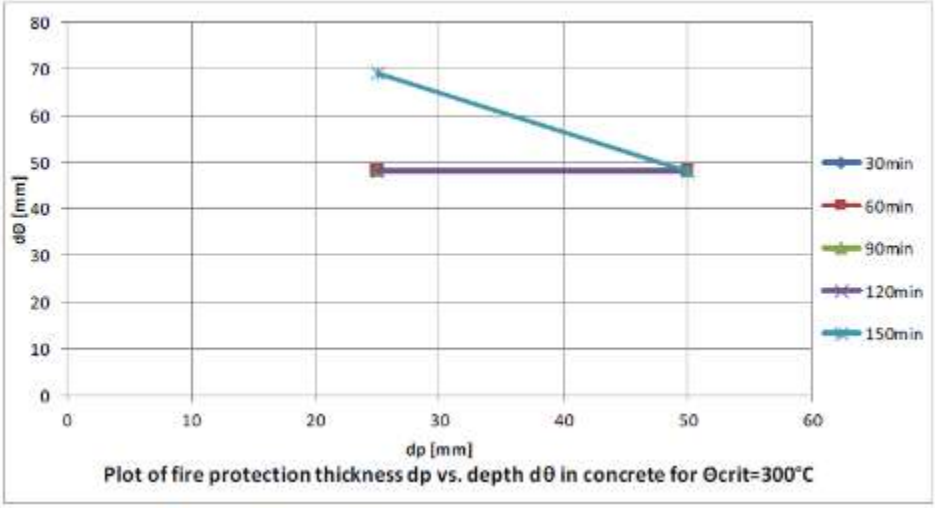
Plot of fire protection thickness dp vs. depth dθ in concrete for Θcrit=300°C

Depth along axis y



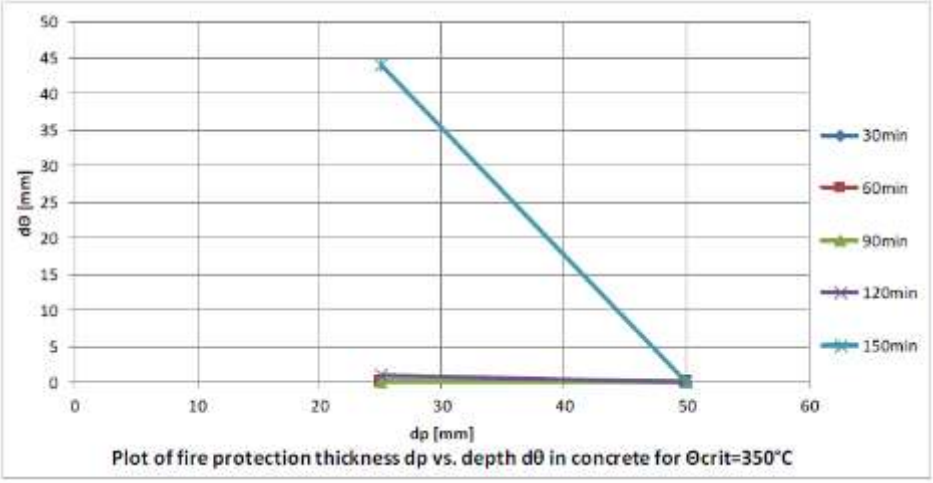
Plot of fire protection thickness dp vs. depth dθ in concrete for Θcrit=300°C

Depth along axis w1, w2

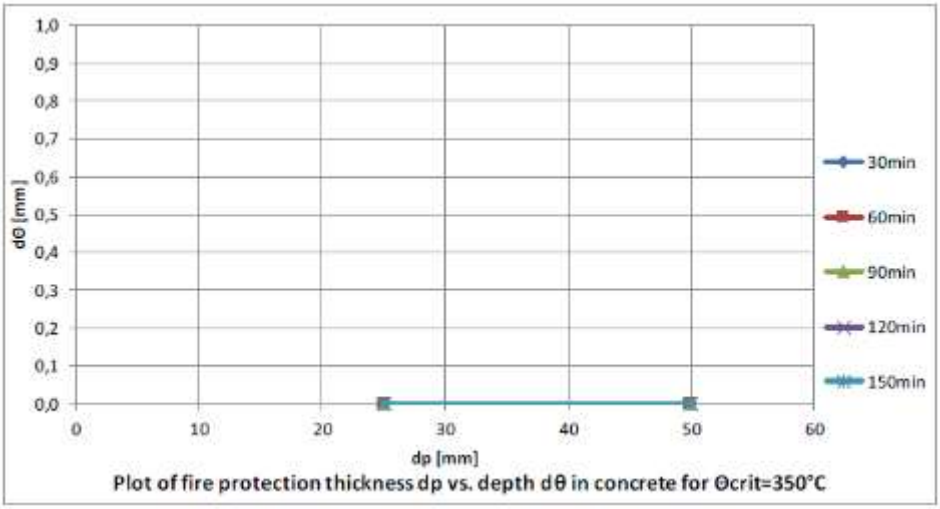


Graph A.2.2 Required thickness of CORTAFUEGO DF for T350ºC

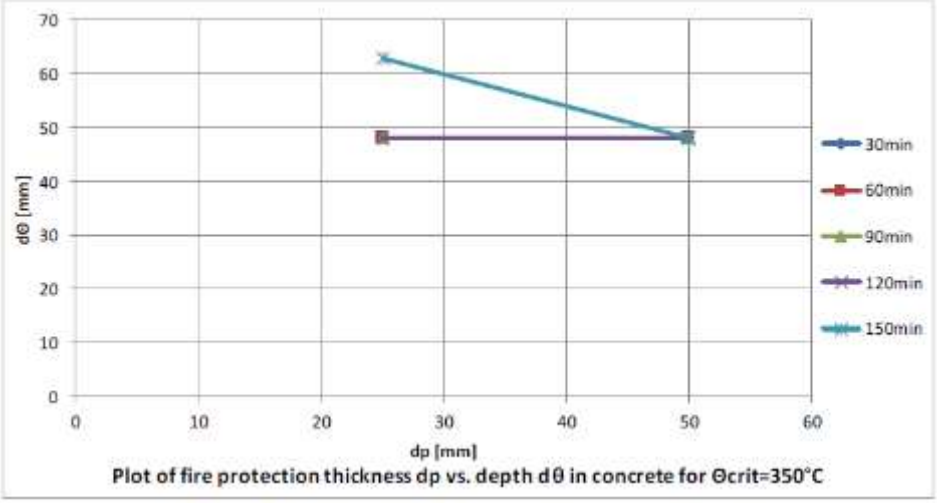
Depth along axis z



Depth along axis y

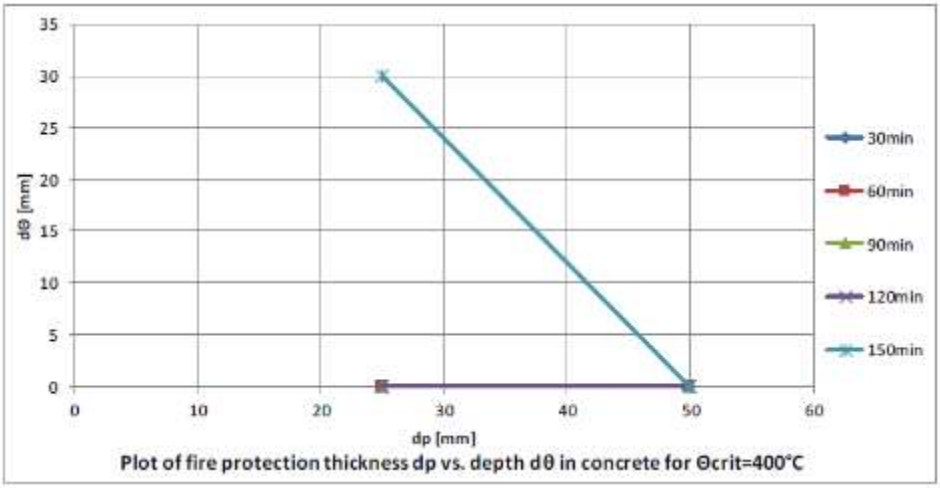


Depth along axis w1, w2

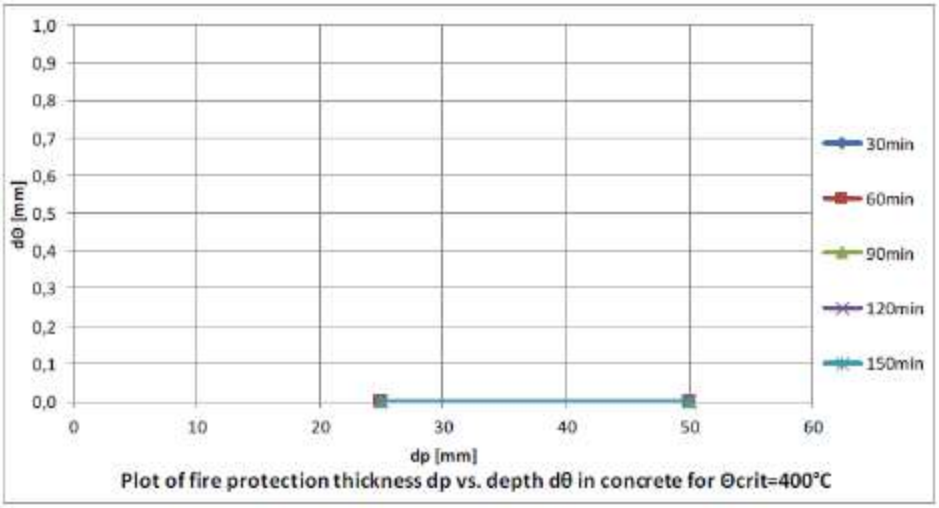


Graph A.2.3 Required thickness of CORTAFUEGO DF for T400ºC

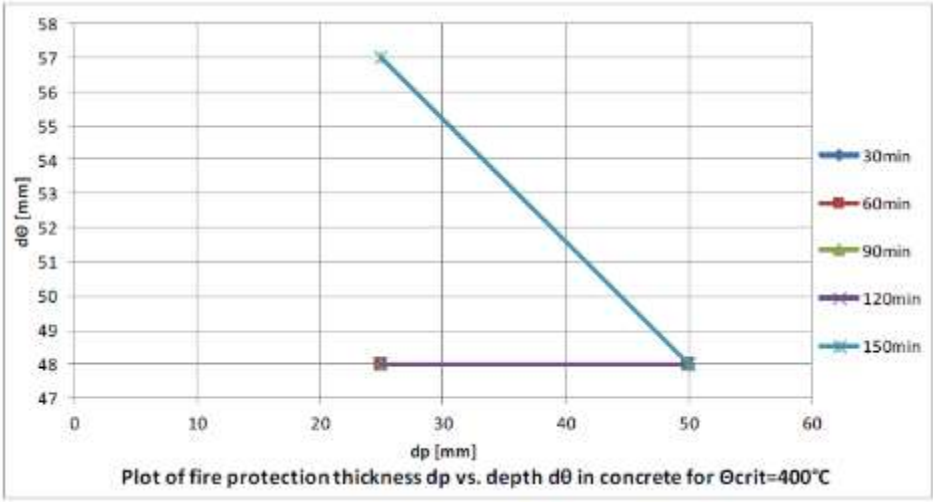
Depth along axis z



Depth along axis y

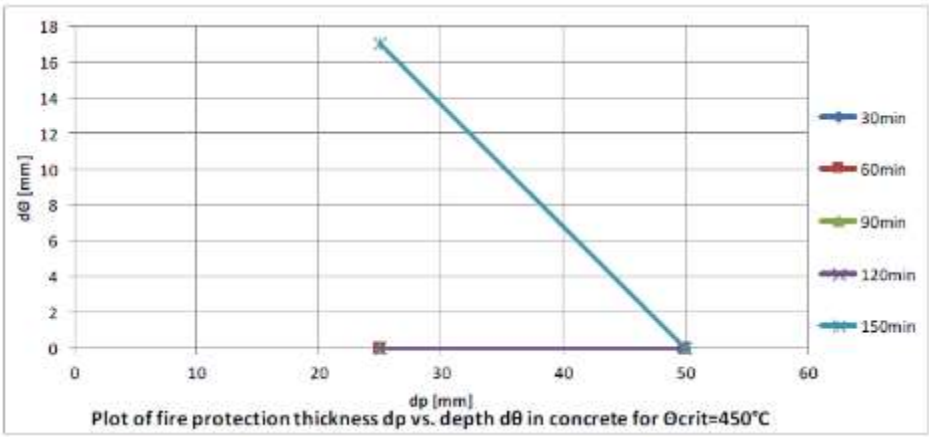


Depth along axis w1, w2

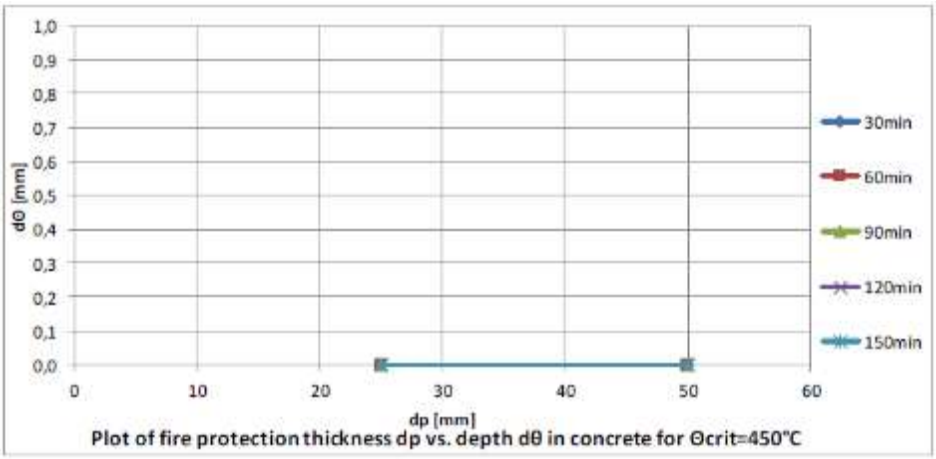


Graph A.2.4 Required thickness of CORTAFUEGO DF for T450ºC

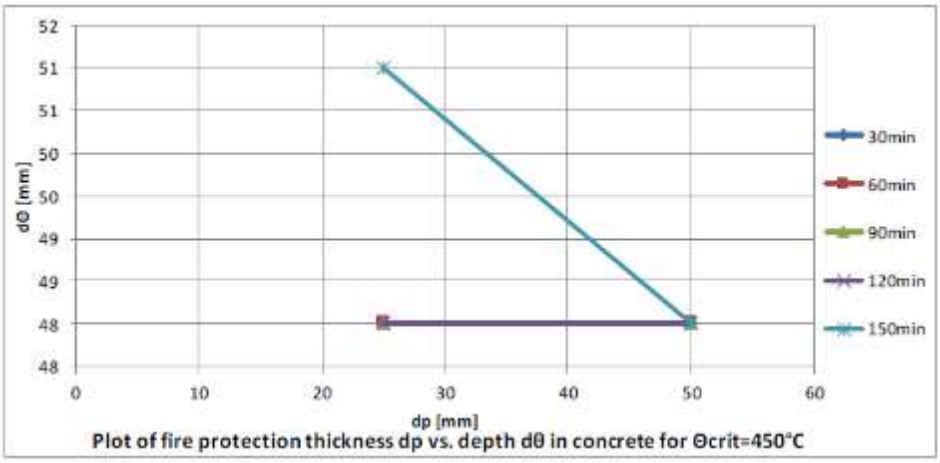
Depth along axis z



Depth along axis y

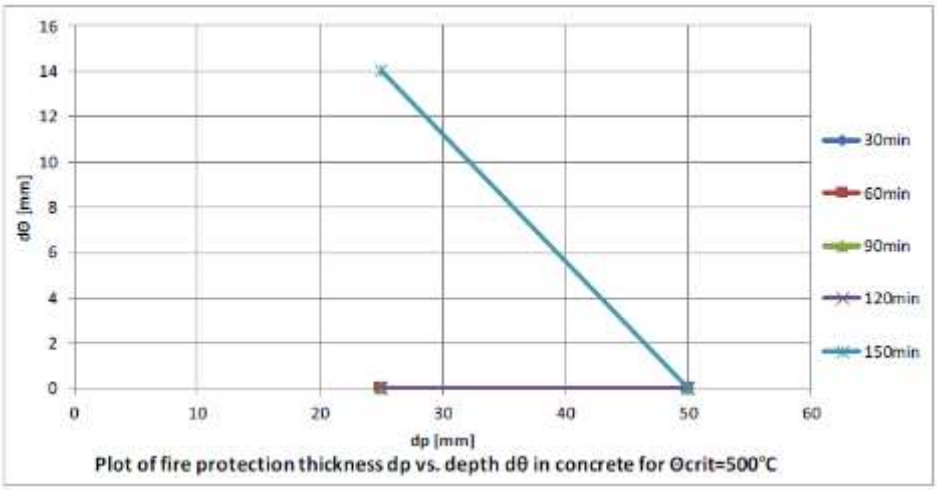


Depth along axis w1, w2

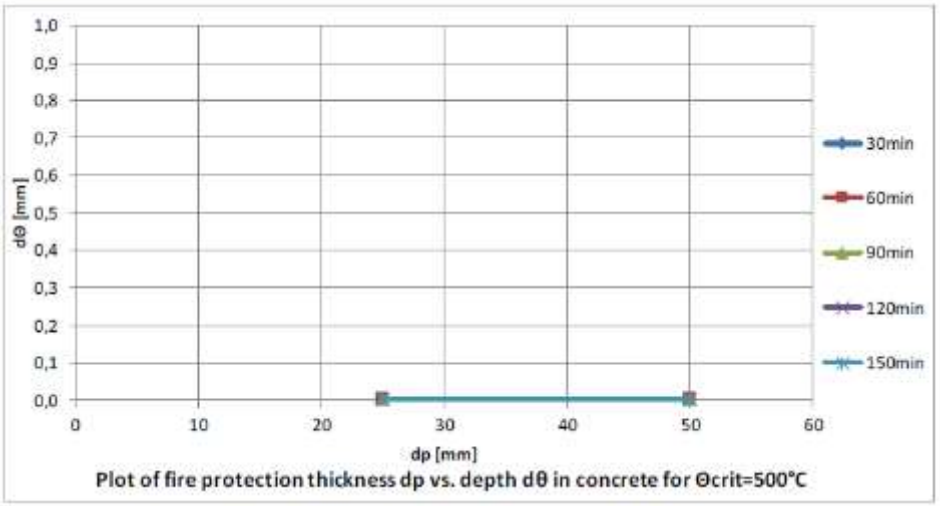


Graph A.2.5 Required thickness of CORTAFUEGO DF for T500ºC

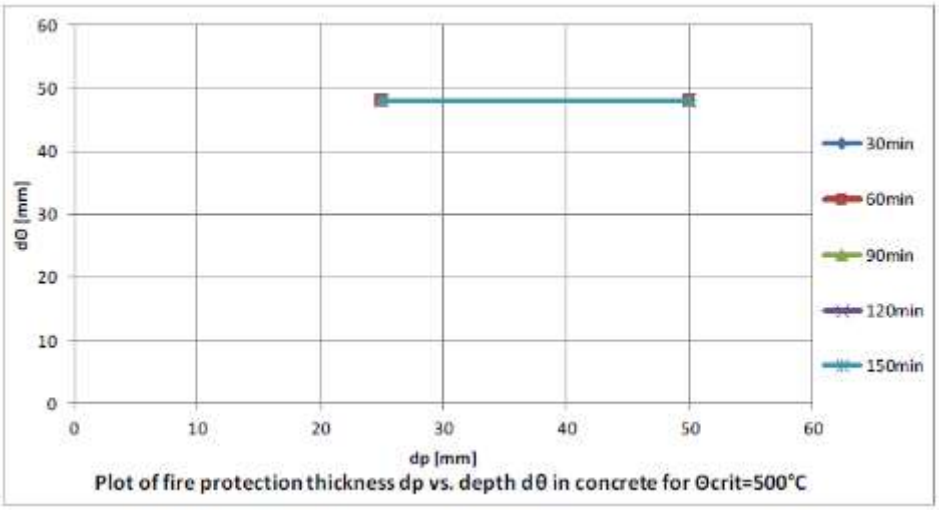
Depth along axis z



Depth along axis y

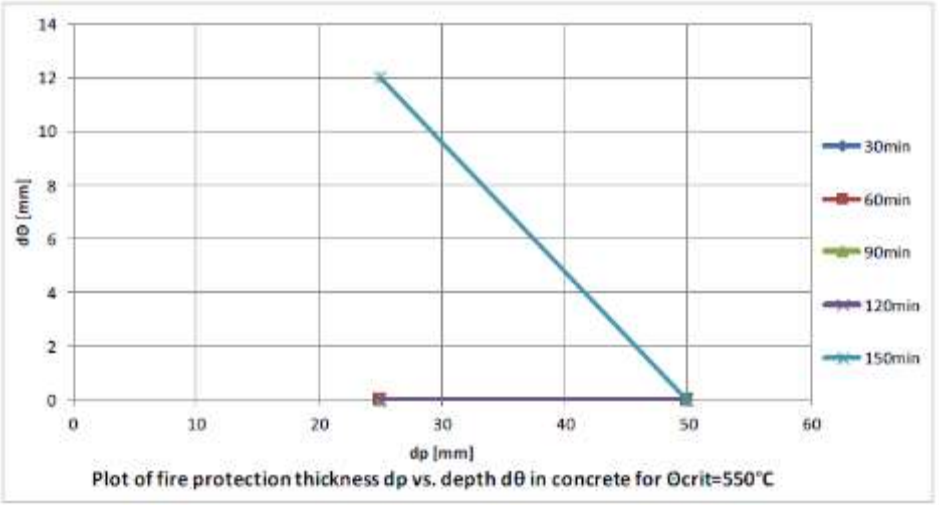


Depth along axis w1, w2

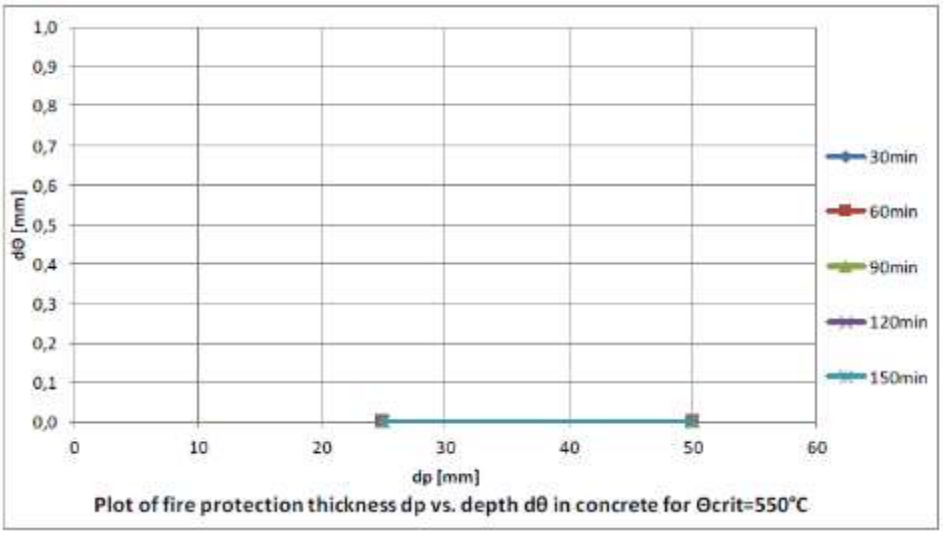


Graph A.2.6 Required thickness of CORTAFUEGO DF for T550ºC

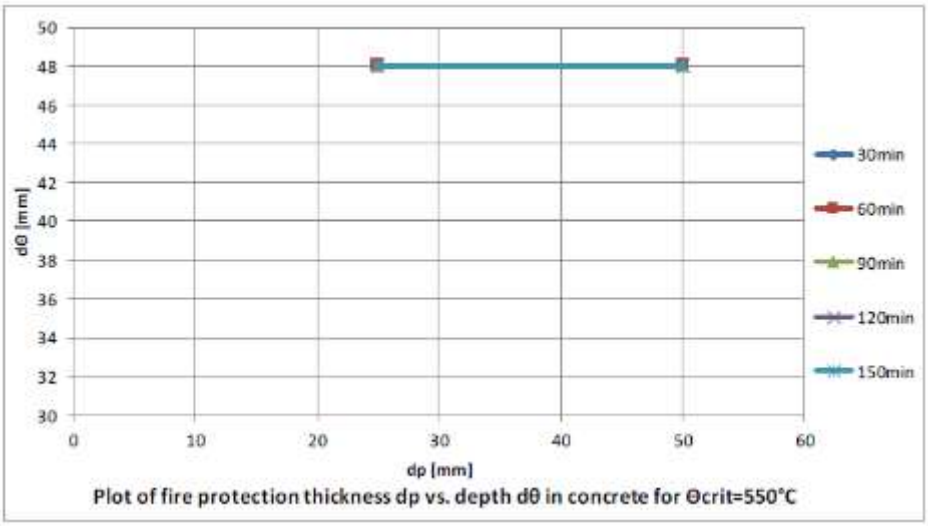
Depth along axis z



Depth along axis y

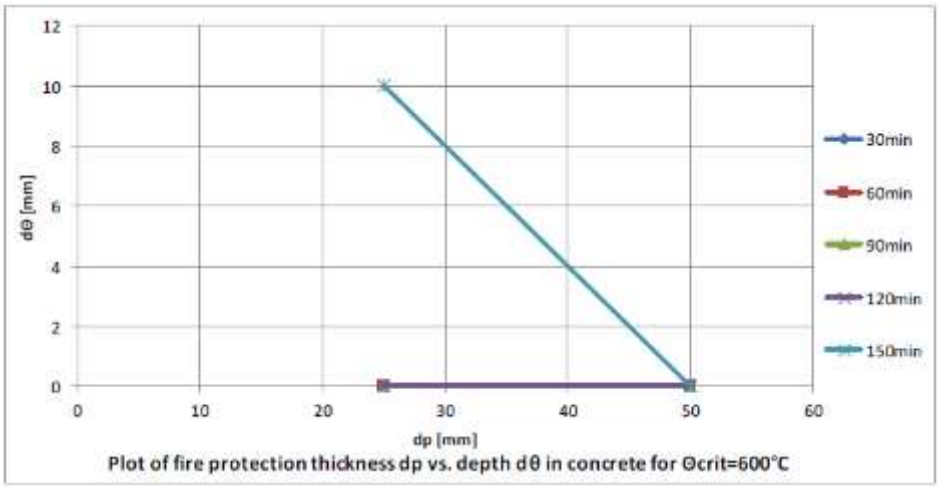


Depth along axis w1, w2

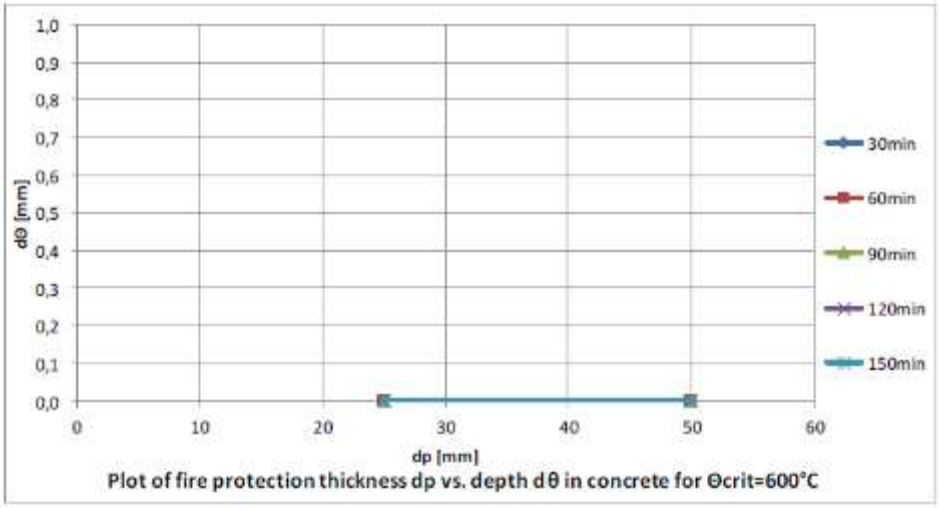


Graph A.2.7 Required thickness of CORTAFUEGO DF for T600ºC

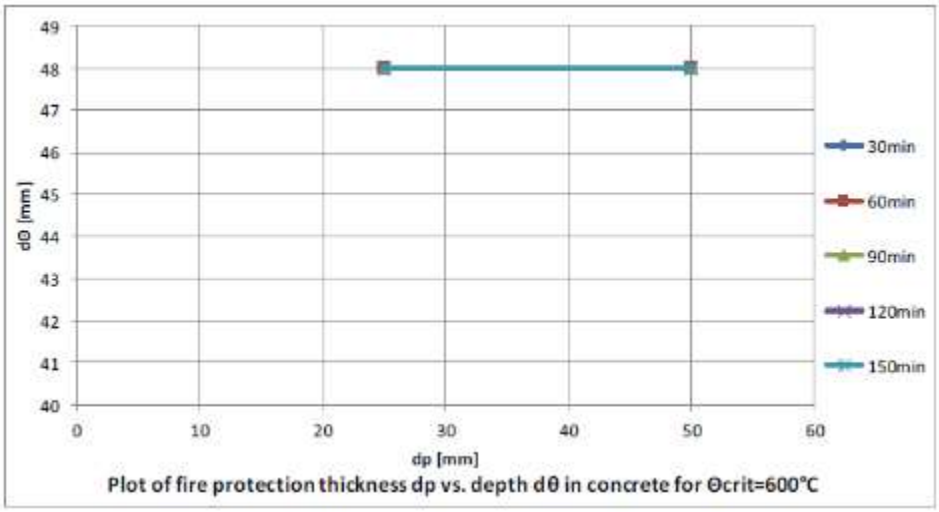
Depth along axis z



Depth along axis y

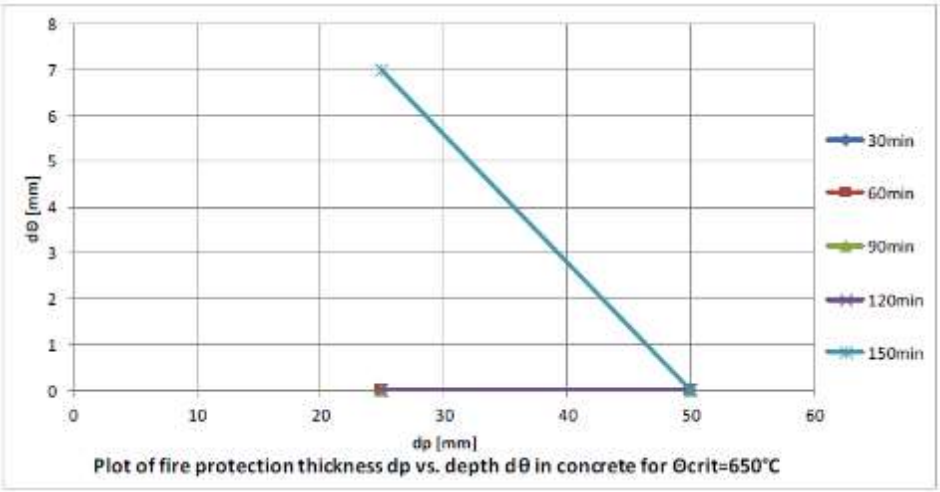


Depth along axis w1, w2

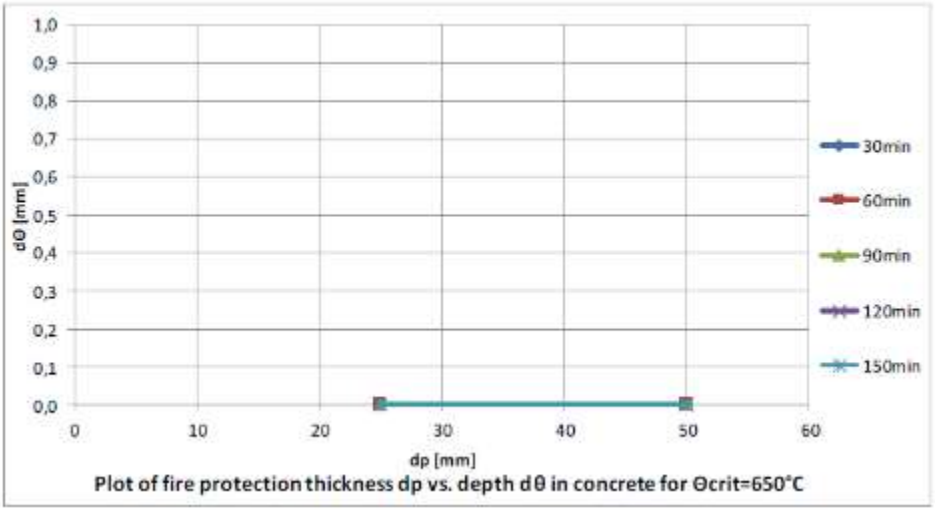


Graph A.2.8 Required thickness of CORTAFUEGO DF for T650ºC

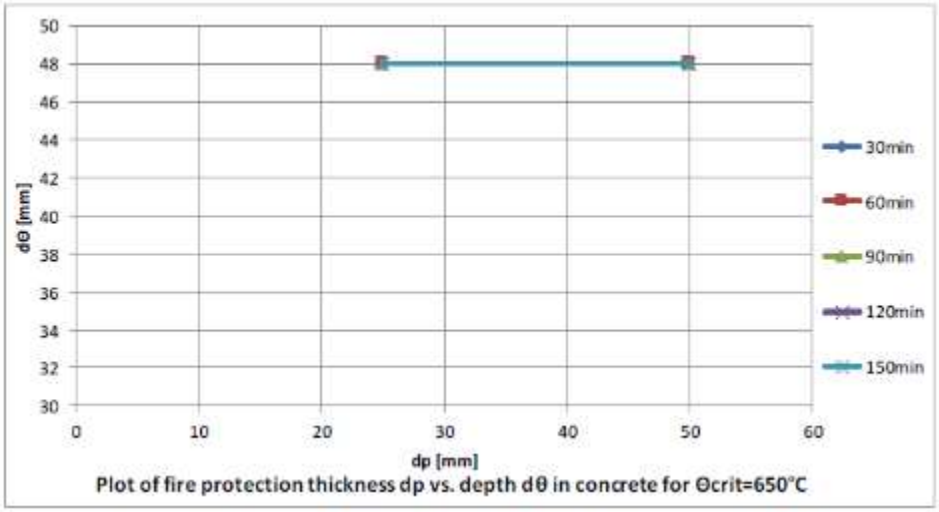
Depth along axis z



Depth along axis y



Depth along axis w1, w2



Plot of fire protection thickness dp vs. depth dθ in concrete for Θcrit=650°C

A.2.4 Stickability performance

The limiting exposure time has been defined according to EN 13381-3 § 13.5.

The time during the test, the maximum temperature recorded at any point on the exposed surface of the concrete (after reaching 200 °C) have been continuously more than 50 % above the mean of all temperatures recorded on the surface:

- 25 mm protection beam: not recorded.
- 50 mm protection beam: 221st minute of the test

Significant detachment of the fire protection system observed in the furnace:

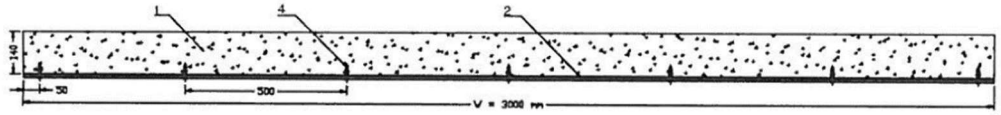
- 25 mm protection beam: 90th minute (first layer) and 150th minute (second layer) of the test
- 50 mm protection beam: 120th minute (first layer) and 240th minute (second layer) of the test

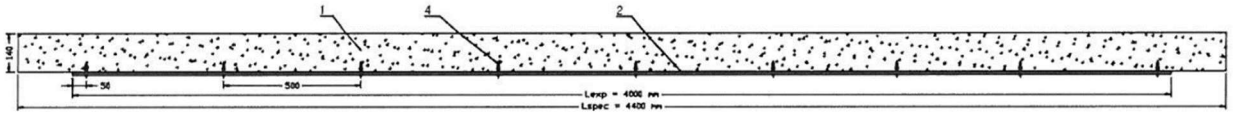
A.3 ASSESSMENT OF THE FIRE PERFORMANCE ON CONCRETE SLABS (SINGLE LAYER FIRE PROTECTION)

A.3.1 Tested assembly

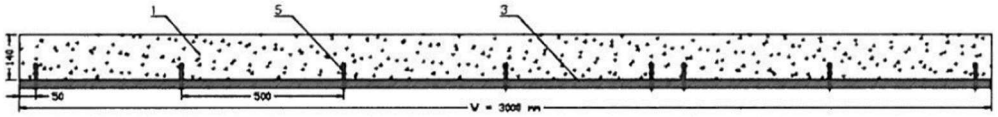
CORTAFUEGO DF boards were fixed to the concrete members with steel anchors of two types (8x40 mm for 12,5 mm thickness boards and 9x60 mm for 25 mm thickness boards) in distance 50 mm from the perimeter of the boards and spacing 600 mm on the width and 500 mm on the length of the concrete member. All joints between the panels were filled with Knauf gypsum-based filling compound and a reinforcing tape was embedded. The heads of the fixings were covered with Knauf filling compound.

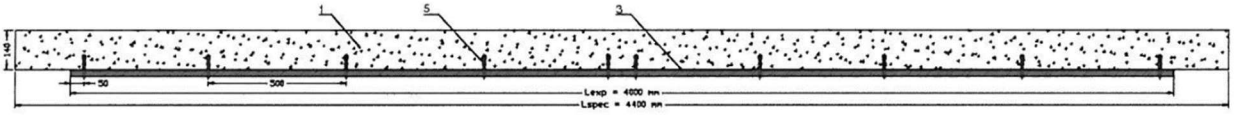
Minimum thickness (CORTAFUEGO DF 12.5 mm):





Maximum thickness (CORTAFUEGO DF 25 mm):





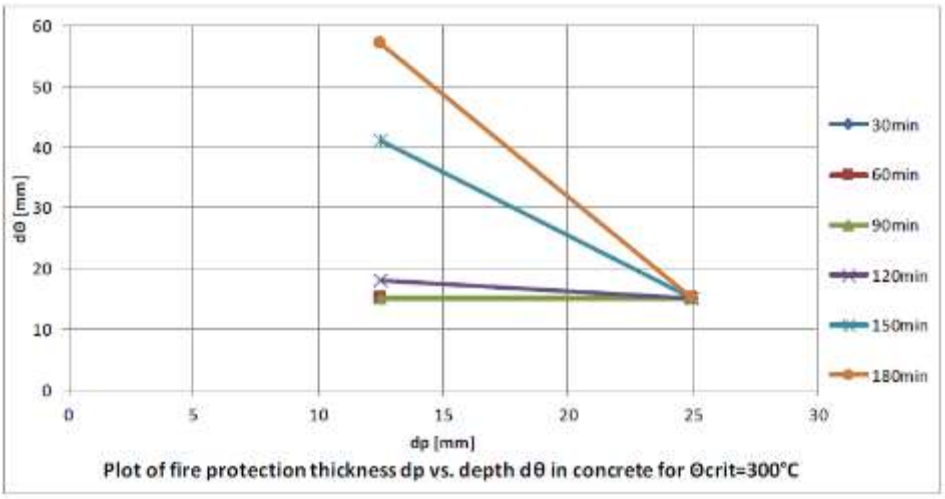
	Components list
1	Concrete beam dimensions 450 x 150 mm, length 4150 mm
2	Plasterboard Knauf CORTAFUEGO DF thickness 12.5 mm
3	Plasterboard Knauf CORTAFUEGO DF thickness 25 mm
4	Steel anchor Ø8x40 mm
5	Steel anchor Ø9x60 mm

A.3.2 Equivalent thickness of concrete:

Concrete element	Thickness of CORTAFUEGO DF (mm)	Equivalent thickness of concrete (mm)					
		30 min	60 min	90 min	120 min	180 min	240 min
Slab	12.5	41	53	58	45	8	-
	25	52	75	81	88	92	104

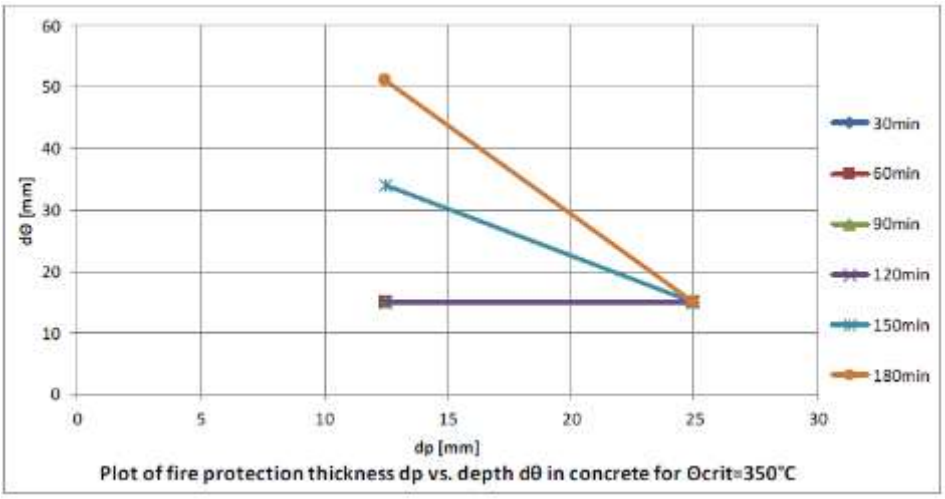
A.3.3 Required thickness of CORTAFUEGO DF:

Graph A.3.1 Required thickness of CORTAFUEGO DF for T300ºC



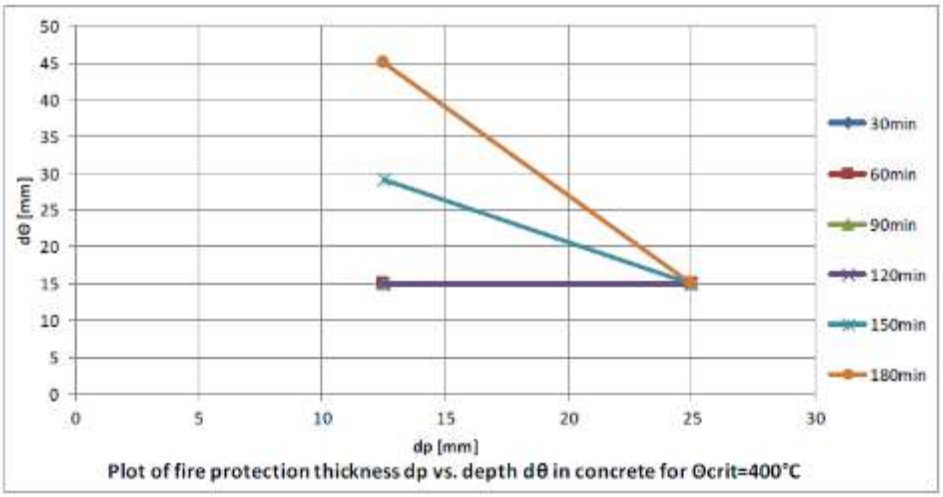
Plot of fire protection thickness dp vs. depth dθ in concrete for Θcrit=300°C

Graph A.3.2 Required thickness of CORTAFUEGO DF for T350ºC

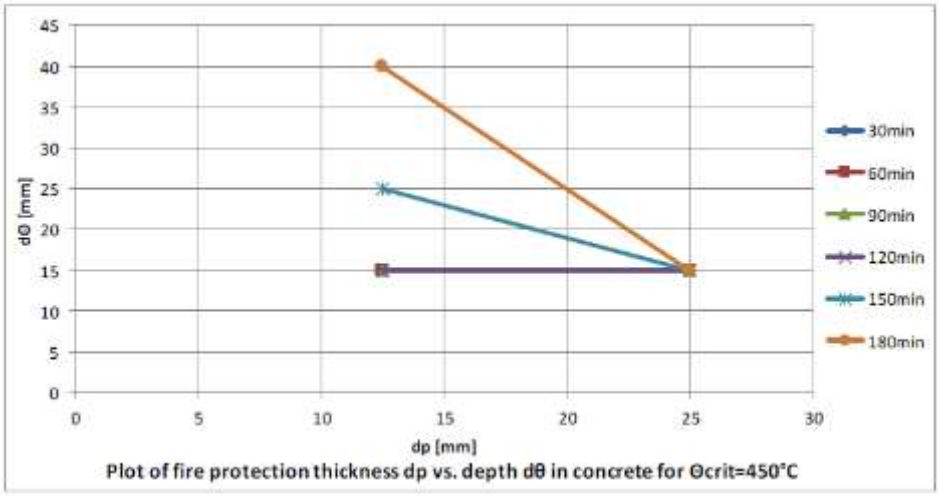


Plot of fire protection thickness dp vs. depth dθ in concrete for Θcrit=350°C

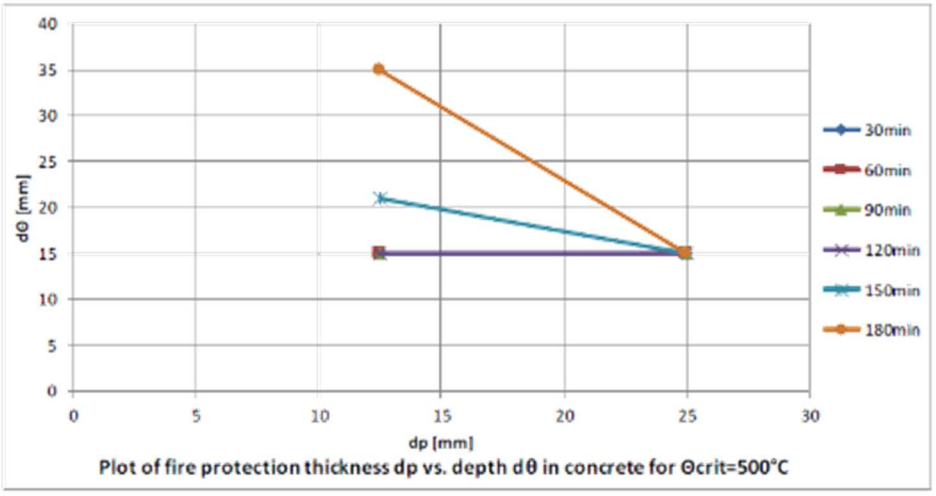
Graph A.3.3 Required thickness of CORTAFUEGO DF for T400ºC



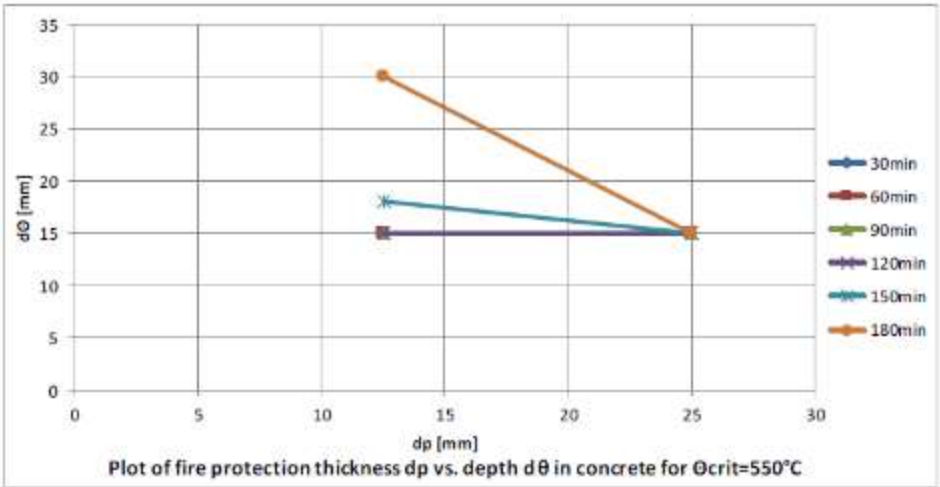
Graph A.3.4 Required thickness of CORTAFUEGO DF for T450ºC



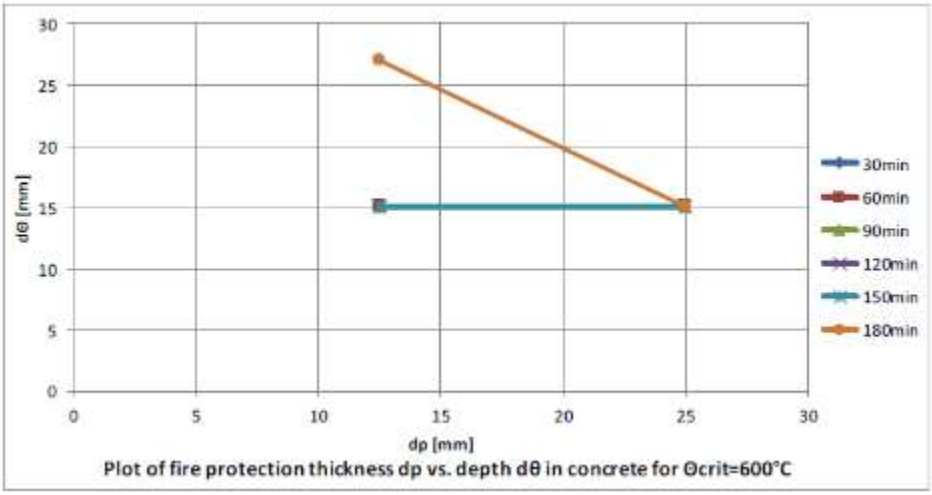
Graph A.3.5 Required thickness of CORTAFUEGO DF for T500ºC



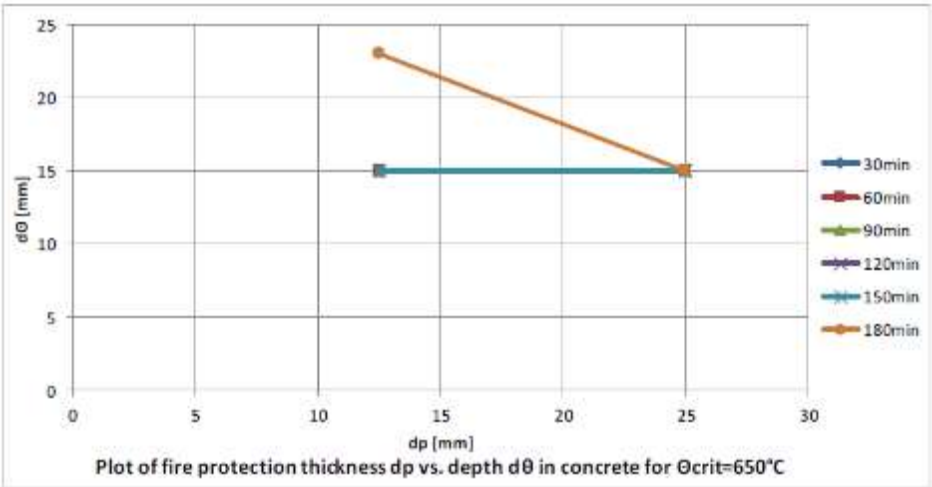
Graph A.3.6 Required thickness of CORTAFUEGO DF for T550ºC



Graph A.3.7 Required thickness of CORTAFUEGO DF for T600ºC



Graph A.3.8 Required thickness of CORTAFUEGO DF for T650ºC



A.3.4 Stickability performance

The limiting exposure time has been defined according to EN 13381-3 § 13.5.

The time during the test, the maximum temperature recorded at any point on the exposed surface of the concrete (after reaching 200 °C) have been continuously more than 50 % above the mean of all temperatures recorded on the surface:

- 12.5 mm protection slab: 117th minute of the test
- 25 mm protection slab: 255th minute of the test

Significant detachment of the fire protection system observed in the furnace:

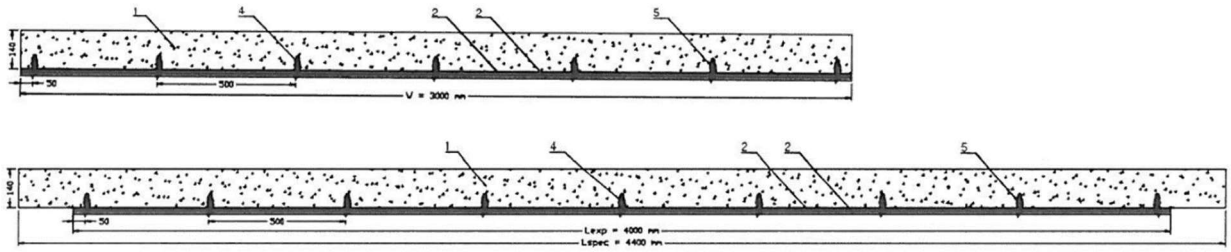
- 12.5 mm protection slab: 120th minute of the test
- 25 mm protection slab: 240th minute of the test

A.4 ASSESSMENT OF THE FIRE PERFORMANCE ON CONCRETE SLABS (MULTIPLE LAYER FIRE PROTECTION)

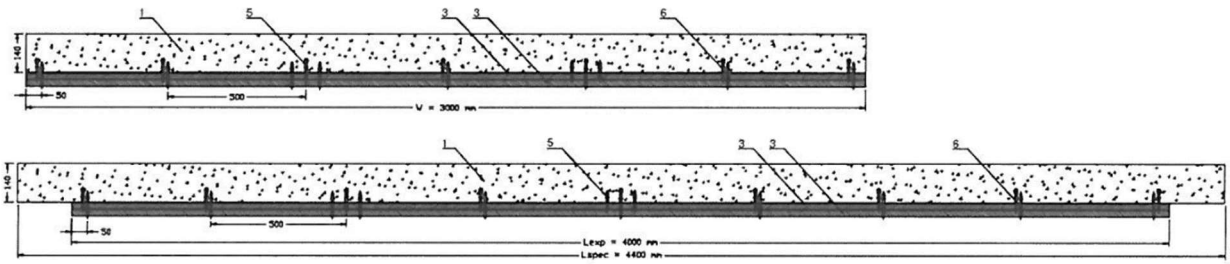
A.4.1 Tested assembly

CORTAFUEGO DF boards have to be fixed to the concrete members with steel anchors of three types (8x40 mm for 12.5 mm thickness boards, 9x60 mm for 2x12.5 mm and 25 mm thickness boards and 9x80 mm for 2x25 mm boards) in distance 50 mm from the perimeter of the boards and spacing 600 mm on the width and 500 mm on the length of the concrete member. All joints between the panels have to be filled with Knauf gypsum-based filling compound and a reinforcing tape has to be embedded. The heads of the fixings have to be covered with Knauf filling compound.

Minimum thickness (CORTAFUEGO DF 2x12.5 mm):



Maximum thickness (CORTAFUEGO DF 2x25 mm):



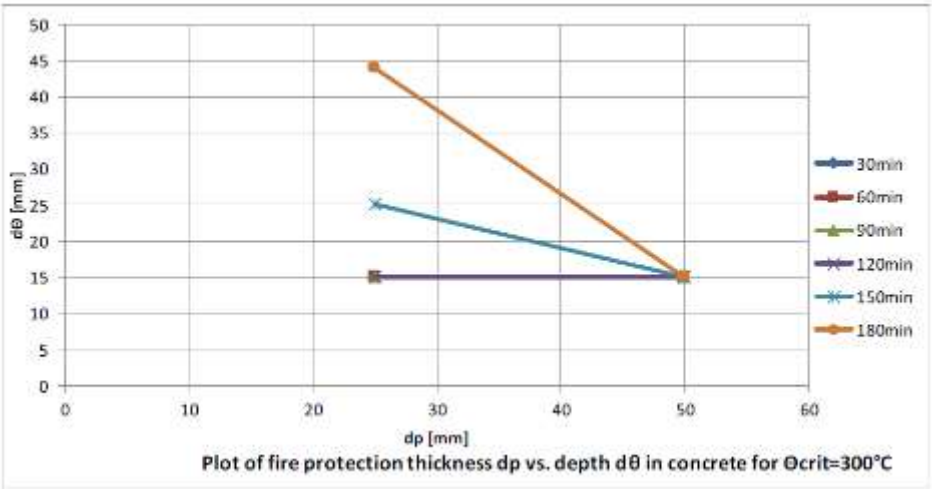
	Components list
1	Concrete beam dimensions 450 x 150 mm, length 4150 mm
2	Plasterboard Knauf CORTAFUEGO DF thickness 12.5 mm
3	Plasterboard Knauf CORTAFUEGO DF thickness 25 mm
4	Steel anchor Ø8x40 mm
5	Steel anchor Ø9x60 mm
6	Steel anchor Ø9x80 mm
7	Knauf gypsum-based filling compound
8	Knauf reinforcing tape

A.4.2 Equivalent thickness of concrete:

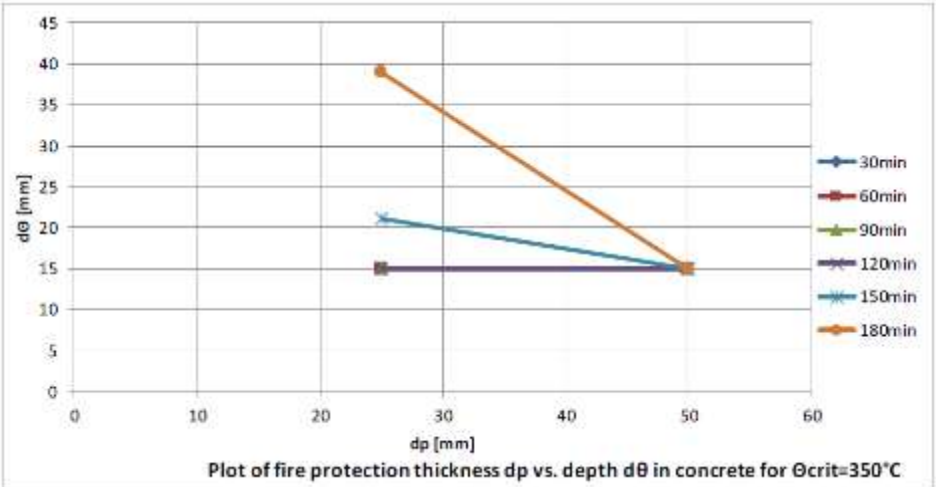
Concrete element	Thickness of CORTAFUEGO DF (mm)	Equivalent thickness of concrete (mm)					
		30 min	60 min	90 min	120 min	180 min	240 min
Slab	25	57	76	80	73	13	-
	50	72	96	111	121	132	104

A.4.3 Required thickness of CORTAFUEGO DF:

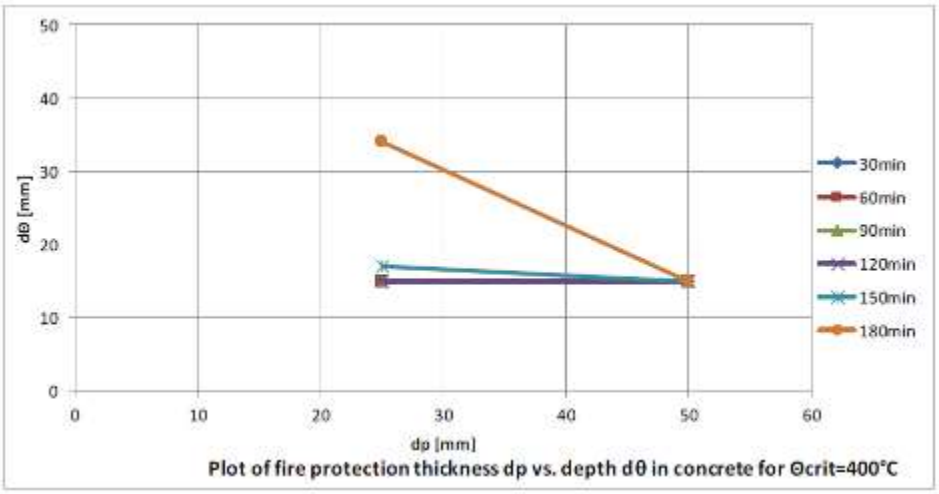
Graph A.4.1 Required thickness of CORTAFUEGO DF for T=300ºC



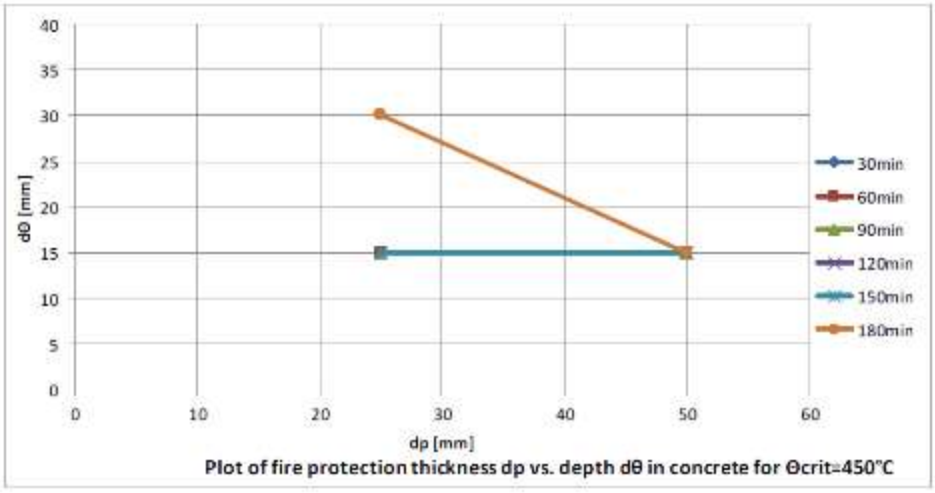
Graph A.4.2 Required thickness of CORTAFUEGO DF for T=350ºC



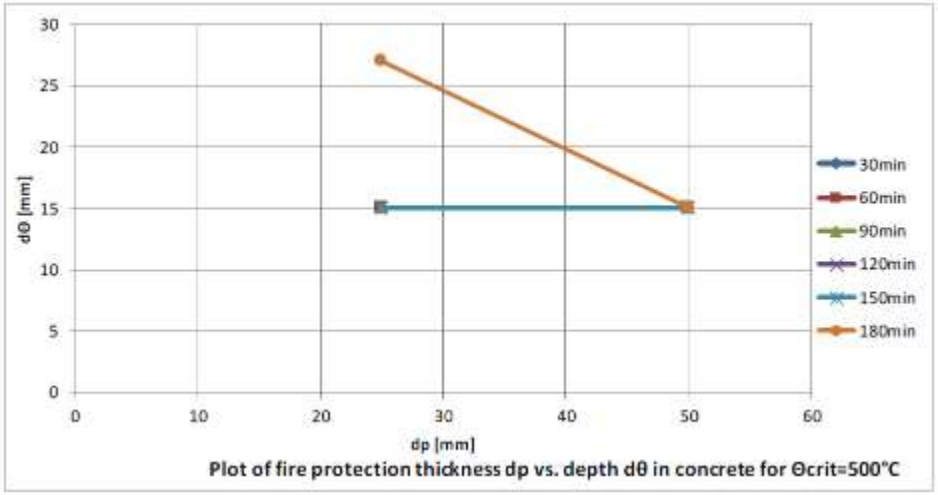
Graph A.4.3 Required thickness of CORTAFUEGO DF for T=400ºC



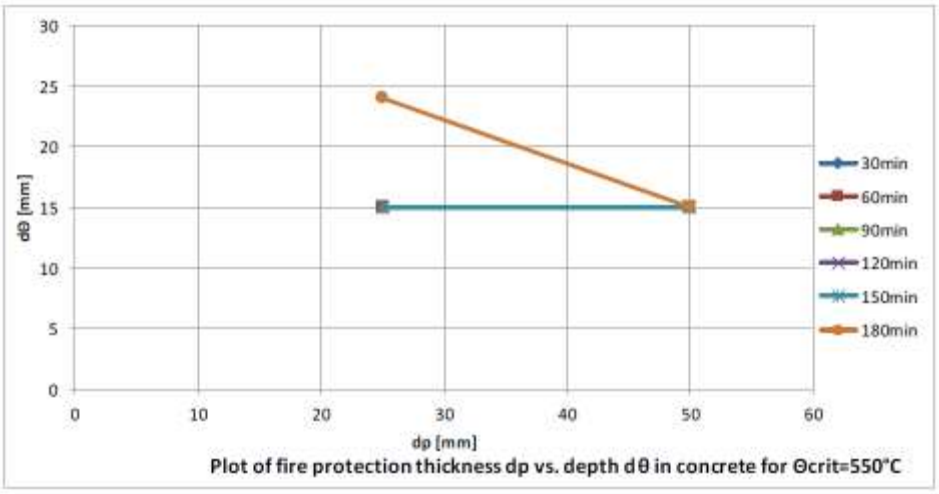
Graph A.4.4 Required thickness of CORTAFUEGO DF for T=450ºC



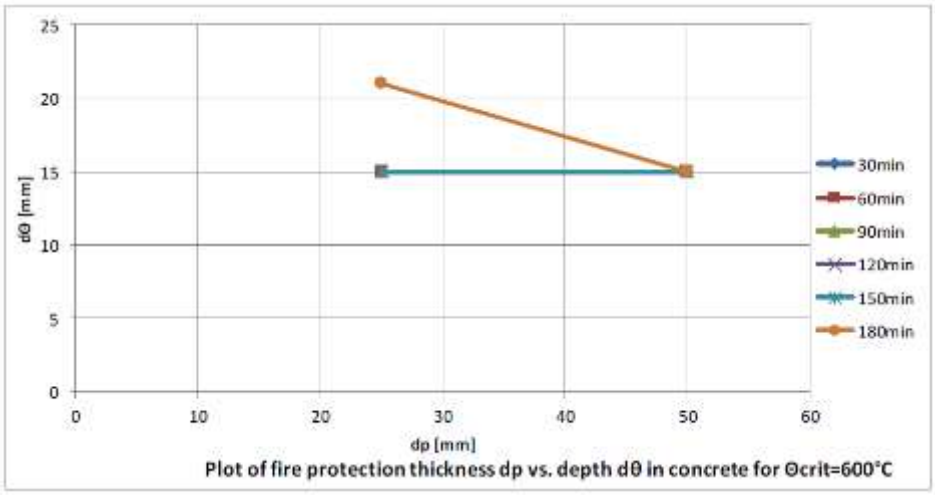
Graph A.4.5 Required thickness of CORTAFUEGO DF for T=500ºC



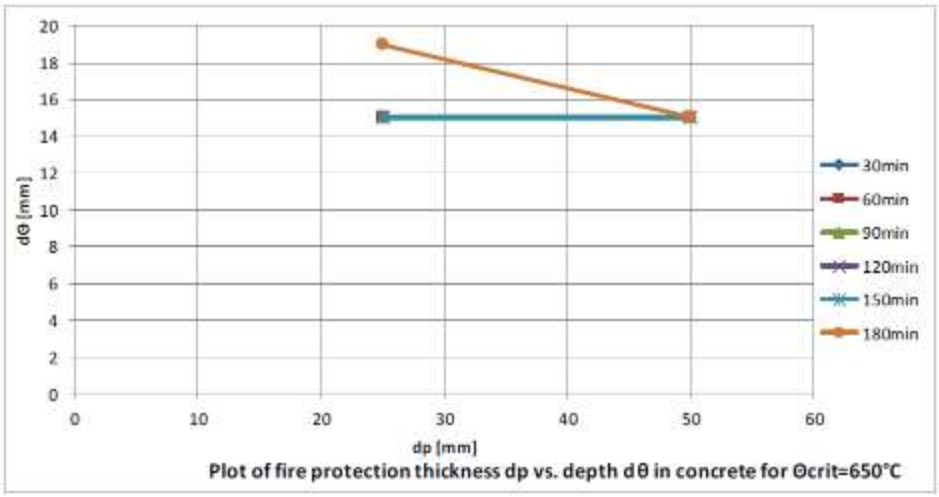
Graph A.4.6 Required thickness of CORTAFUEGO DF for T=550ºC



Graph A.4.7 Required thickness of CORTAFUEGO DF for T=600ºC



Graph A.4.8 Required thickness of CORTAFUEGO DF for T=650ºC



A.4.4 Stickability performance

The limiting exposure time has been defined according to EN 13381-3 § 13.5.

The time during the test, the maximum temperature recorded at any point on the exposed surface of the concrete (after reaching 200 °C) have been continuously more than 50 % above the mean of all temperatures recorded on the surface:

- 25 mm protection slab: 153rd minute of the test
- 50 mm protection slab: 211th minute of the test

Significant detachment of the fire protection system observed in the furnace:

- 25 mm protection slab: 83rd minute (first layer) and 150th minute (second layer) of the test
- 50 mm protection slab: 150rd minute (first layer) and 210th minute (second layer) of the test

A.5 LIMITS OF APPLICABILITY:

- Applicable to:
  - Slabs (fire exposure from one side)
  - Walls (fire exposure from one side)
  - Beams
  - Columns
- Density of concrete
  - Slabs and walls with single layer protection: 1998 to 2733 kg/m^3
  - Beams and columns with single layer protection: 1996 to 2762 kg/m^3
  - Slabs and walls with multiple layer protection: 1998 to 2719 kg/m^3
  - Beams and columns with multiple layer protection: 1965 to 2762 kg/m^3
- Concrete strength C30/37 or C35/45
- Applicable to pre-stressed structures.
- Applicable to concrete members with concrete prepared from any type of aggregate (siliceous, non-siliceous).
- Applicable to all concrete beams with equal or higher width as that tested (150 mm) and with equal or higher height as that tested (450 mm). It is possible to decrease the height provided the section surface remains the same or higher.
- Only applicable to fire protection systems where the fixing and jointing systems are the same as that tested.
- The results of single layer assessment are applicable only to single layer fire protection systems.
- The results of the multilayer assessment are applicable only to multilayer fire protection systems.
- The maximum thickness of the total protection is up to 5% above the maximum thickness tested on the loaded elements.
  - Single layer: 26.3 mm
  - Multiple layer: 52.5 mm
- The minimum permitted thickness of the total protection is up to 5% below the minimum thickness tested on loaded elements.
  - Single layer: 11.9 mm
  - Multiple layer: 23.8 mm

Annex B: Specification and assessment of fire protection of a load bearing steel elements protected by CORTAFUEGO DF (intended use type 4)

The system described in this annex has been tested and evaluated according to EN 13381-4 and classified in accordance with EN 13501-2.

The assessment of the required thickness of CORTAFUEGO DF boards for the relevant resistance to fire period, at the design temperature within the range of 350 ºC to 750 ºC and in function of the section factor of the steel element, is given in section B.2 of this annex.

B.1 Installation requirements

The system installation should be carried out in accordance with the manufacturer's instructions and the provisions given in this ETA.

B.1.1Components list

Designation	Trade reference	Characteristics
Plasterboard	CORTAFUEGO DF 12.5	Thickness=12.5 mm
	CORTAFUEGO DF 15	Thickness=15 mm
Clips	Clip3P/"Clip for CD 60/27"	
Profiles	CD 60/27	27x60x27 mm Thickness=0.6 mm
	M 48/35	34x47x36 mm Thickness=0.6 mm
	CW 50	48x49x50 mm Thickness=0.6 mm
Rails	UD 60 – UD 27/28	28x27x28 mm Thickness=0.6 mm
	R 48	28x48x28 mm Thickness=0.5 mm
	UW 50	30x50x30 mm Thickness=0.5 mm
Screw profiles/rails	TRPF	Ø3.5x9 mm
Screw boards/boards	TTPL	Ø3.9x38 mm
Screw boards/profiles	TTPC	Ø3.5x25 mm Ø3.5x35 mm Ø3.5x55 mm
Corner beads	Cornerbead	
Jointing compound	Uniflott, UNIK or SILK	

B.1.2 Installation of the plasterboards

The plasterboards may be installed with single or multilayer respecting:

- Single layer: 1 x CORTAFUEGO DF 12.5
- Multilayer: from 2 x CORTAFUEGO DF 12.5 to 3 x CORTAFUEGO DF 15.

In case of mixing of CORTAFUEGO DF 12.5 and CORTAFUEGO DF 15 plasterboards, thickest boards are installed firstly on steel members.

Many procedures can be followed for the mounting of plasterboards around steel members, depending on:

- The type of boxing: 3 or 4 sides
- The number of plasterboard layers: 1, 2 or 3

B.1.2.1Three sides boxing

Single layer of plasterboards CORTAFUEGO DF 12,5

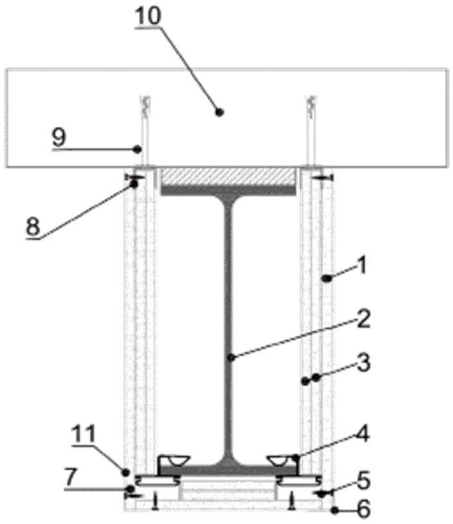
A U-shaped track UD60 – UD 27/28 is installed under the cellular concrete slabs, against the upper flange of the steel beams IPE 400, on each side. It is fixed to the cellular concrete by steel anchors reference HRD-C8/60 (HILTI), located every 600 mm.

On the lower flange of the steel beams, steel clips, referenced Clip 3P ”Clip poutrelle pour CD 60/27”, are clipped on both sides of the lower flanges, every 1000 mm.

Steel tracks, reference CD 60/27, are then inserted into the clips along the lower flange of the steel beams IPE 400, on each side.

Then, plasterboards CORTAFUEGO DF 12,5, are fixed along the steel beam to create a 3 sides protective boxing. They are fixed on the U-shaped tracks and lower rails by means of screws 3,5 x 25 mm, reference TTPC / Vis rapide 25, every 300 mm.

At the junction between 2 adjacent plasterboards, an internal covering strip made of two 100 mm wide layers of CORTAFUEGO DF 12,5 plasterboards is fixed to the plasterboard by screws 3,5 x 45 mm every 100 mm.



IPE 400
Parement simple

1	Protection en plaque de plâtre type Knauf KF – DF 12,5 mm
2	Poutre en acier profilé IPE 400 longueur 4850 mm
3	Couvre joint en plaque de plâtre Knauf KF - DF 12,5 mm larg. 100 mm
4	Clip de fixation poutrelle pour CD 60/27 tous les 1000 mm
5	Profilé Knauf CD 60/27 en acier zingué épaisseur 0,6 mm
6	Protection d'angle en acier zingué type Knauf cornière d'angle - cornerbead
7	Vis TTPC - rapide Knauf 25 mm placée tous les 300 mm
8	Profilé Knauf UD 60 - UD 27/28 en acier zingué épaisseur 0,6 mm
9	Cheville métallique expansive placée tous les 300 mm
10	Dalle de béton cellulaire e = 120 mm
11	Enduit Knauf Uniflott sur cornière d'angle - corner bead

Multilayers of plasterboards CORTAFUEGO DF 12,5 and CORTAFUEGO DF 15

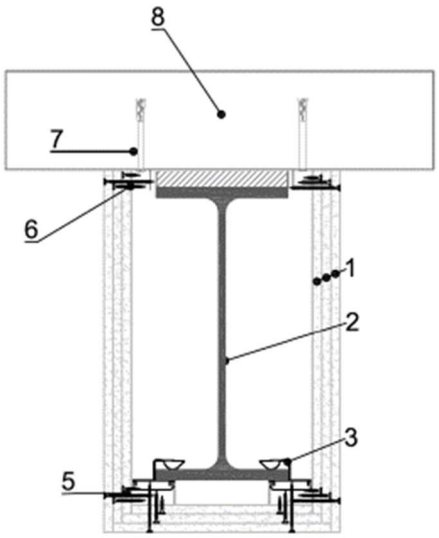
A U-shaped track UD60 – UD 27/28 is installed under the cellular concrete slabs, against the upper flange of the steel beams IPE 400, on each side. It is fixed to the cellular concrete by steel anchors reference HRD-C8/60 (HILTI), located every 600 mm.

On the lower flange of the steel beams, steel clips, referenced Clip3P/“Clip poutrelle pour CD 60/27”, are clipped on both sides of the lower flanges, every 1000 mm. Steel tracks, reference CD 60/27, are then inserted into the aforementioned clips along the lower flange of the steel beams IPE 400, on each side.

Then, two or three layers of plasterboards CORTAFUEGO DF 15 or 13, are fixed along the steel beams in order to create a 3 sides protective boxing. The first layer is fixed on the U-shaped tracks and lower rails by means of screws 3,5 x 35 mm, reference TTPC / Vis rapide 35, every 300 mm. The second layer is fixed on the U-shaped tracks and lower rails by means of screws 3,5 x 45 mm, reference TTPC / Vis rapide 45, every 300 mm. The third layer is fixed on the U-

shaped tracks and lower rails by means of screws 3,5 x 55 mm, reference TTPC / Vis rapide 55, every 300 mm.

At the joint between 2 adjacent plasterboards, on the same side of the boxing, the plasterboard are fixed to the previous layer of plasterboards by screws 3,5 x 45 mm for the second layer and 3,5 x 75 mm for the third layer, every 100 mm. Joints between plasterboards of one layer are successively staggered over 400 mm with joints of the previous layer installed.



IPE 400
Parement triple

1	Protection en plaque de plâtre type Knauf KF - DF 15 mm
2	Poutre en acier profilé IPE 400 longueur 4850 mm
3	Clip de fixation poutrelle pour CD 60/27 tous les 1000 mm
4	Profilé Knauf CD 60/27 en acier zingué épaisseur 0,6 mm
5	Vis TTPC - rapide Knauf 25 - 45 - 75 mm placée tous les 300 mm
6	Profilé Knauf UD 60 - UD 27/28 en acier zingué épaisseur 0,6 mm
7	Cheville métallique expansive placée tous les 600 mm
8	Dalle de béton cellulaire e = 120 mm

B.1.2.2 Four sides boxing

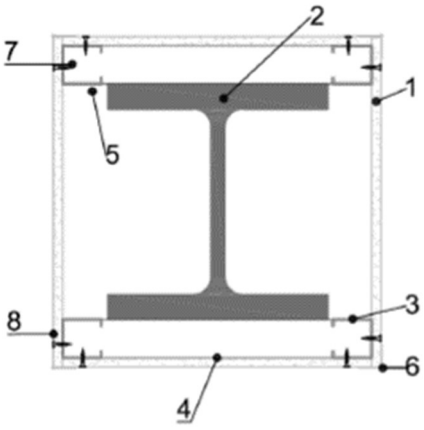
In case of a four sides boxing, typically around steel columns, steel parts, referenced Clip3P/“Clip poutrelle pour CD60/27”, CD 60/27 M48/35 or CW50, are installed along the 4 edges of both flanges of steel columns, at 800 mm centres.

A U-shaped track referenced CD 60/27, R48 or UW50, was inserted into the clips along the steel columns.

Then, plasterboards, CORTAFUEGO DF 15 or 12.5, are fixed along the steel element in order to create a 4 sides protective boxing. The first layer is fixed on the U-shaped tracks and lower rails

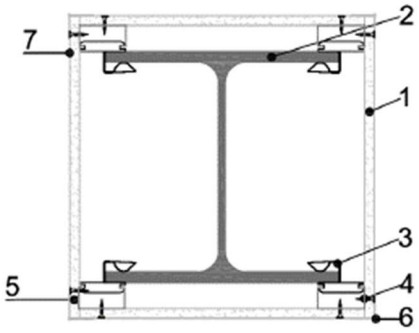
by means of screws 3,5 x 35 mm, reference TTPC / Vis rapide 35, every 300 mm. The second layer is fixed on the U-shaped tracks and lower rails by means of screws 3,5 x 45 mm, reference TTPC / Vis rapide 45, every 300 mm. The third layer is fixed on the U-shaped tracks and lower rails by means of screws 3,5 x 55 mm, reference TTPC / Vis rapide 55, every 300 mm.

The angles of all single layer plasterboard boxings are reinforced with a steel corner bead, reference “Cornière d’angle” / Cornerbead, and with a jointing compound, referenced Uniflott, EFR or SILK. The heads of screws are treated with the same jointing compound.



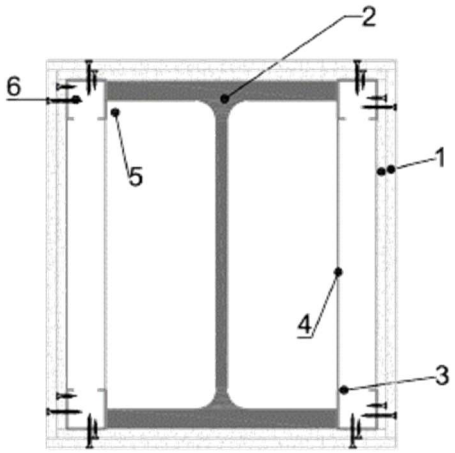
HEM 280
Parement simple

1	Protection en plaque de plâtre type Knauf KF - DF 13 mm
2	Poteau - Colonne en acier profilé HEM 280 longueur 1000 mm
3	Profilé Knauf M48 - CW 50 en acier galvanisé épaisseur 0,6 mm
4	Profilé Knauf R48 - UW 50 en acier galvanisé épaisseur 0,5 - 0,6 mm
5	Vis TRPF - autoforante 16 x 3,5 mm
6	Protection d'angle en acier zingué type Knauf cornière d'angle - cornerbead
7	Vis TTPC - rapide Knauf 25 mm placée tous les 300 mm
8	Enduit Knauf Uniflott sur cornière d'angle - corner bead



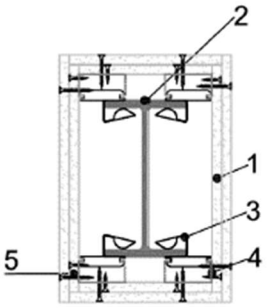
HEB 300
Parement simple

1	Protection en plaque de plâtre type Knauf KF - DF 13 mm
2	Poteau - Colonne en acier profilé HEB 300 longueur 1000 mm
3	Clip de fixation poutrelle pour CD 60/27 tous les 1000 mm
4	Profilé Knauf CD 60/27 en acier zingué épaisseur 0,6 mm
5	Vis TTPC - rapide Knauf 25 mm placée tous les 300 mm
6	Protection d'angle en acier zingué type Knaufcornière d'angle - cornerbead
7	Enduit Knauf Uniflott sur cornière d'angle - corner bead



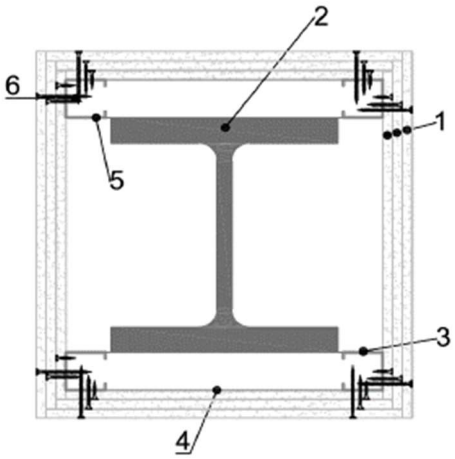
HEB 450
Parement double

1	Protection en plaque de plâtre type Knauf KF - DF 13 mm
2	Poteau - Colonne en acier profilé HEB 450 longueur 1000 mm
3	Profilé Knauf M48 - CW 50 en acier galvanisé épaisseur 0,6 mm
4	Profilé Knauf R48 - UW 50 en acier galvanisé épaisseur 0,6 - 0,5 mm
5	Vis TRPF - autoforante 16 x 3,5 mm
6	Vis TTPC - rapide Knauf 25 - 35 mm placée tous les 300 mm



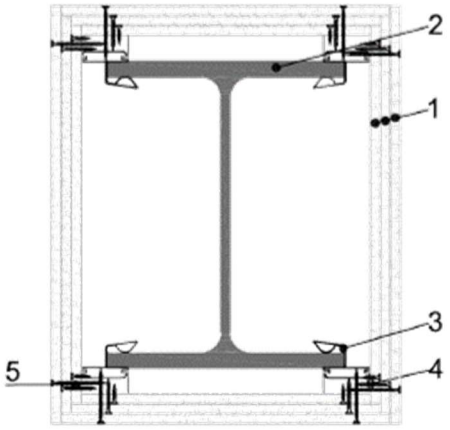
IPE 200
Parement simple

1	Protection en plaque de plâtre type Knauf KF - DF 15 mm
2	Poteau - Colonne en acier profilé IPE 200 longueur 1000 mm
3	Clip de fixation poutrelle pour CD 60/27 tous les 1000 mm
4	Profilé Knauf CD 60/27 en acier zingué épaisseur 0,6 mm
5	Vis TTPC - rapide Knauf 25 - 45 mm placée tous les 300 mm



HEM 280
Parement triple

1	Protection en plaque de plâtre type Knauf KF - DF 13 mm
2	Poteau - Colonne en acier profilé HEM 280 longueur 1000 mm
3	Profilé Knauf M48 - CW 50 en acier galvanisé épaisseur 0,6 mm
4	Profilé Knauf R48 - UW 50 en acier galvanisé épaisseur 0,6 - 0,5 mm
5	Vis TRPF - autoforante 16 x 3,5 mm
6	Vis TTPC - rapide Knauf 25 - 35 - 55 mm placée tous les 300 mm



HEA 400
Parement triple

1	Protection en plaque de plâtre type Knauf KF - DF 13 mm
2	Poteau - Colonne en acier profilé HEA 400 longueur 1000 mm
3	Clip de fixation poutrelle pour CD 60/27 tous les 1000 mm
4	Profilé Knauf CD 60/27 en acier zingué épaisseur 0,6 mm
5	Vis TTPC - rapide Knauf 25 - 35 - 55 mm placée tous les 300 mm

B.2 ASSESSMENT OF THE FIRE PERFORMANCE ON STEEL

Table B.1. Classification of fire resistance R15

Shape factor (m^{-1})	Minimum required thickness of plasterboard to reach R15 (mm)								
	Standard steel temperature (°C)								
	350	400	450	500	550	600	650	700	750
≤ 46	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
50	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
60	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
70	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
80	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
90	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
100	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
110	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
120	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
130	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
140	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
150	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
160	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
170	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
180	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
190	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
200	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
210	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
220	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
230	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
240	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
250	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
260	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
270	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
280	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
290	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
300	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
310	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
320	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
330	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
340	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
350	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
360	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
370	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
372	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5

Table B.2. Classification of fire resistance R30

Shape factor (m^{-1})	Minimum required thickness of plasterboard to reach R30 (mm)								
	Standard steel temperature (°C)								
	350	400	450	500	550	600	650	700	750
≤ 46	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
50	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
60	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
70	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
80	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
90	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
100	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
110	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
120	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
130	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
140	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
150	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
160	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
170	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
180	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
190	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
200	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
210	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
220	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
230	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
240	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
250	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
260	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
270	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
280	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
290	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
300	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
310	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
320	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
330	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
340	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
350	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
360	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
370	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
372	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5

Table B.3. Classification of fire resistance R60

Shape factor (m^{-1})	Minimum required thickness of plasterboard to reach R60 (mm)								
	Standard steel temperature (°C)								
	350	400	450	500	550	600	650	700	750
≤ 46	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
50	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
60	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
70	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
80	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
90	25	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5
100	25	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5
110	25	25	25	12,5	12,5	12,5	12,5	12,5	12,5
120	25	25	25	12,5	12,5	12,5	12,5	12,5	12,5
130	25	25	25	12,5	12,5	12,5	12,5	12,5	12,5
140	25	25	25	12,5	12,5	12,5	12,5	12,5	12,5
150	25	25	25	25	12,5	12,5	12,5	12,5	12,5
160	25	25	25	25	12,5	12,5	12,5	12,5	12,5
170	25	25	25	25	12,5	12,5	12,5	12,5	12,5
180	25	25	25	25	25	12,5	12,5	12,5	12,5
190	25	25	25	25	25	12,5	12,5	12,5	12,5
200	27,5	25	25	25	25	12,5	12,5	12,5	12,5
210	27,5	25	25	25	25	12,5	12,5	12,5	12,5
220	27,5	25	25	25	25	12,5	12,5	12,5	12,5
230	27,5	25	25	25	25	25	12,5	12,5	12,5
240	27,5	25	25	25	25	25	12,5	12,5	12,5
250	27,5	25	25	25	25	25	12,5	12,5	12,5
260	27,5	25	25	25	25	25	12,5	12,5	12,5
270	27,5	25	25	25	25	25	12,5	12,5	12,5
280	27,5	27,5	25	25	25	25	12,5	12,5	12,5
290	27,5	27,5	25	25	25	25	12,5	12,5	12,5
300	27,5	27,5	25	25	25	25	25	12,5	12,5
310	27,5	27,5	25	25	25	25	25	12,5	12,5
320	27,5	27,5	25	25	25	25	25	12,5	12,5
330	27,5	27,5	25	25	25	25	25	12,5	12,5
340	27,5	27,5	25	25	25	25	25	12,5	12,5
350	27,5	27,5	25	25	25	25	25	12,5	12,5
360	27,5	27,5	25	25	25	25	25	12,5	12,5
370	27,5	27,5	25	25	25	25	25	12,5	12,5
372	30	27,5	25	25	25	25	25	12,5	12,5

Table B.4. Classification of fire resistance R90

Shape factor (m^{-1})	Minimum required thickness of plasterboard to reach R90 (mm)								
	Standard steel temperature (°C)								
	350	400	450	500	550	600	650	700	750
≤ 46	25	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5
50	25	25	12,5	12,5	12,5	12,5	12,5	12,5	12,5
60	25	25	25	12,5	12,5	12,5	12,5	12,5	12,5
70	25	25	25	25	12,5	12,5	12,5	12,5	12,5
80	27,5	25	25	25	12,5	12,5	12,5	12,5	12,5
90	30	27,5	25	25	25	12,5	12,5	12,5	12,5
100	30	27,5	25	25	25	25	12,5	12,5	12,5
110	30	30	27,5	25	25	25	12,5	12,5	12,5
120	37,5	30	27,5	25	25	25	25	12,5	12,5
130	37,5	30	30	27,5	25	25	25	12,5	12,5
140	37,5	37,5	30	27,5	25	25	25	25	12,5
150	37,5	37,5	30	27,5	25	25	25	25	12,5
160	37,5	37,5	30	27,5	27,5	25	25	25	25
170	37,5	37,5	30	30	27,5	25	25	25	25
180	37,5	37,5	37,5	30	27,5	25	25	25	25
190	37,5	37,5	37,5	30	27,5	27,5	25	25	25
200	37,5	37,5	37,5	30	27,5	27,5	25	25	25
210	37,5	37,5	37,5	30	30	27,5	25	25	25
220	37,5	37,5	37,5	30	30	27,5	25	25	25
230	37,5	37,5	37,5	30	30	27,5	25	25	25
240	37,5	37,5	37,5	37,5	30	27,5	27,5	25	25
250	37,5	37,5	37,5	37,5	30	27,5	27,5	25	25
260	37,5	37,5	37,5	37,5	30	27,5	27,5	25	25
270	37,5	37,5	37,5	37,5	30	27,5	27,5	25	25
280	37,5	37,5	37,5	37,5	30	30	27,5	25	25
290	37,5	37,5	37,5	37,5	30	30	27,5	25	25
300	37,5	37,5	37,5	37,5	30	30	27,5	25	25
310	37,5	37,5	37,5	37,5	30	30	27,5	25	25
320	37,5	37,5	37,5	37,5	30	30	27,5	27,5	25
330	37,5	37,5	37,5	37,5	30	30	27,5	27,5	25
340	37,5	37,5	37,5	37,5	37,5	30	27,5	27,5	25
350	37,5	37,5	37,5	37,5	37,5	30	27,5	27,5	25
360	37,5	37,5	37,5	37,5	37,5	30	27,5	27,5	25
370	37,5	37,5	37,5	37,5	37,5	30	27,5	27,5	25
372	37,5	37,5	37,5	37,5	37,5	30	27,5	27,5	25

Table B.5. Classification of fire resistance R120

Shape factor (m^{-1})	Minimum required thickness of plasterboard to reach R120 (mm)								
	Standard steel temperature (°C)								
	350	400	450	500	550	600	650	700	750
≤ 46	27,5	25	25	25	12,5	12,5	12,5	12,5	12,5
50	30	25	25	25	12,5	12,5	12,5	12,5	12,5
60	37,5	30	27,5	25	25	12,5	12,5	12,5	12,5
70	37,5	37,5	30	27,5	25	25	12,5	12,5	12,5
80	37,5	37,5	37,5	30	27,5	25	25	12,5	12,5
90	37,5	37,5	37,5	37,5	30	27,5	25	25	12,5
100	40	37,5	37,5	37,5	37,5	30	25	25	25
110	40	37,5	37,5	37,5	37,5	30	27,5	25	25
120	40	40	37,5	37,5	37,5	37,5	30	27,5	25
130	42,5	40	37,5	37,5	37,5	37,5	30	27,5	25
140	42,5	40	40	37,5	37,5	37,5	37,5	30	27,5
150	42,5	40	40	37,5	37,5	37,5	37,5	30	27,5
160	42,5	42,5	40	37,5	37,5	37,5	37,5	30	27,5
170	42,5	42,5	40	37,5	37,5	37,5	37,5	37,5	30
180	42,5	42,5	40	40	37,5	37,5	37,5	37,5	30
190	42,5	42,5	40	40	37,5	37,5	37,5	37,5	30
200	45	42,5	40	40	37,5	37,5	37,5	37,5	30
210	45	42,5	42,5	40	37,5	37,5	37,5	37,5	37,5
220	45	42,5	42,5	40	37,5	37,5	37,5	37,5	37,5
230	45	42,5	42,5	40	37,5	37,5	37,5	37,5	37,5
240	45	42,5	42,5	40	40	37,5	37,5	37,5	37,5
250	45	42,5	42,5	40	40	37,5	37,5	37,5	37,5
260	45	42,5	42,5	40	40	37,5	37,5	37,5	37,5
270	45	42,5	42,5	40	40	37,5	37,5	37,5	37,5
280	45	42,5	42,5	40	40	37,5	37,5	37,5	37,5
290	45	45	42,5	40	40	37,5	37,5	37,5	37,5
300	45	45	42,5	40	40	37,5	37,5	37,5	37,5
310	45	45	42,5	42,5	40	37,5	37,5	37,5	37,5
320	45	45	42,5	42,5	40	37,5	37,5	37,5	37,5
330	45	45	42,5	42,5	40	37,5	37,5	37,5	37,5
340	45	45	42,5	42,5	40	40	37,5	37,5	37,5
350	45	45	42,5	42,5	40	40	37,5	37,5	37,5
360	45	45	42,5	42,5	40	40	37,5	37,5	37,5
370	45	45	42,5	42,5	40	40	37,5	37,5	37,5
372	45	45	42,5	42,5	40	40	37,5	37,5	37,5

Table B.6. Classification of fire resistance R180

Shape factor (m^{-1})	Minimum required thickness of plasterboard to reach R180 (mm)								
	Standard steel temperature (°C)								
	350	400	450	500	550	600	650	700	750
≤ 46	na	na	45	40	37,5	37,5	25	25	12,5
50	na	na	45	42,5	40	37,5	37,5	25	12,5
60	na	na	na	na	45	42,5	40	37,5	37,5
70	na	na	na	na	na	na	45	42,5	37,5
80	na	na	na	na	na	na	na	45	42,5
90	na	na	na	na	na	na	na	na	45
100	na	na	na	na	na	na	na	na	45

na : not applicable

B.3 LIMITS OF APPLICABILITY:

- Plasterboards CORTAFUEGO DF 12.5 and CORTAFUEGO DF 15 composition identical and mounting conditions similar to those noted during reference fire tests.
- Plasterboard installed on bare steel, galvanised steel or steel protected with anticorrosive primers.
- Density of the plasterboards:
  - CORTAFUEGO DF 12.5: between 749 and 1013 kg/m^3
  - CORTAFUEGO DF 15: between 736 and 996 kg/m^3
- Combination of plasterboards:
  - Single layer: 1 x CORTAFUEGO DF 12.5
  - Multilayer: from 2 x CORTAFUEGO DF 12.5 to 3 x CORTAFUEGO DF 15

Configuration	Combinations	Total thickness (mm)
One layer	1 x CORTAFUEGO DF 12.5	12.5
Two layers	2 x CORTAFUEGO DF 12.5	25
	1 x CORTAFUEGO DF 12.5 + 1 x CORTAFUEGO DF 15	27.5
	2 x CORTAFUEGO DF 15	30
Three layers	3 x CORTAFUEGO DF 12.5	37.5
	2 x CORTAFUEGO DF 12.5 + 1 x CORTAFUEGO DF 15	40
	1 x CORTAFUEGO DF 12.5 + 2 x CORTAFUEGO DF 15	42.5
	3 x CORTAFUEGO DF 15	45

- Shape factors of steel members protected by CORTAFUEGO DF 12.5 and CORTAFUEGO DF 15 included in 46 and 372 m^{-1}.
- Maximum duration of the exposure to the conventional thermal program as described by EN 1363-1 equal to 3 hours.
- Valid for loaded beams and columns exposed on 3 or 4 sides.
- Valid for steel profiles:
  - I or H section
  - Angles, channels and T-sections for the same shape factor whether used as individual element or as bracing
  - Hollow section (rectangular, square or circular) for the same shape factor
- Steel members with shape factor lower than 46 m^{-1}, can be protected with the thickness of plasterboards CORTAFUEGO DF 12.5 and CORTAFUEGO DF 15 determined for steel members with shape factors equal to 46 m^{-1}.
- Assessment results valid for steel profiles with a web depth lower or equal than 600 mm.
- Assessment results valid for the fixing method described in the document. Any modification must be evaluated.
- Assessment valid for steel limit temperature included in 350 and 750 ºC.
- The results of the assessment are applicable to all other grades of steel to that tested and as given in EN 10025-1 as specified in paragraph 6.1 of standard EN 13381-4 and with the limitations given therein. The results of the assessment may be also applicable to fabricated sections.

Annex C: Specification and assessment of fire separating element: fire separating ceilings with CORTAFUEGO DF (intended use type 8)

The systems described in this annex has been tested and evaluated according to EN 1364-2 and classified in accordance with EN 13501-2.

The system installation should be carried out in accordance with the manufacturer's instructions and the provisions given in this ETA.

C.1. Suspended ceilings

C.1.1. Suspended ceiling type D113

Suspended ceiling type D113 composed by CORTAFUEGO DF boards (see composition table below) screwed to a metal structure using screws. The metal structure has been formed using primary profiles fixed every 1200 mm and suspended from the floor slabs using hangers every 600 mm, with assembly secondary profiles fixed perpendicularly to the first ones and placed with a maximum distance of 400 or 500 mm (see table below). The perimeter frames and profiles are fastened to the supporting construction with anchors. An acoustic strip was fitted to the perimeter of the metal structure. All the joints between boards are fixed in each of the layers with filler and joint strips put in place. The heads of the screws of all the boards have also been covered.

System	Composition of boards	Profile	Hangers distance (mm)	Primary profiles distance (mm)	Secondary profiles distance (mm)	Classification
D113	4x15	CD 60/27/0,6	600	1200	400	EI 120(a←b)
D113	2x25	CD 60/27/0,6	600	1200	400	EI 120(a←b)
D113	25	CD 60/27/0,6	600	1200	500	EI 45(a←b)
D113	2x15	CD 60/27/0,6	600	1200	400	EI 60(a←b)
D113	3x12,5	CD 60/27/0,6	600	1200	400	EI 90(a←b)

Ancillary products:

Designation	Reference	Material	Characteristics
Knauf U-profile (perimeter profile)	U Profile 30x30	Galvanised steel	Thickness = 6/10e 28x28x28
Knauf ceiling profile	CD channel 60x27x0.6	Galvanised steel	Thickness = 6/10e 27x60x27
Lifting accessories	Nonius Hanger Upper part	Galvanised steel	125/30/54 mm
Connection accessories between masters	Flush connector for master 60/27	Galvanised steel	
Knauf joint strips		Micro-perforated paper	Width = 52 mm Thickness = 2/10
Knauf jointfiller	Knauf Unik 30'	Powdered gypsum + additives	
Acoustic strip	Knauf acoustic strip	Polyurethane foam tape.	Width = 30 mm Thickness = 3.2 mm
Clamping fixture to metal beam		Galvanised steel	

C.1.2. Suspended ceiling type D112 CD 60/27

Suspended ceiling type D112 formed by CORTAFUEGO DF boards (see composition table below) screwed to a galvanised steel structure comprised of primary profiles with a distance between axes of 800 and suspended from the supporting construction using hangers with a distance of 700 mm between them and secondary profiles fixed perpendicularly to the primary ones with stand for profiles and placed with a maximum modulation of 400 or 500 mm (see table below) between axes. A 30x30 U-profile is fixed to the perimeter with fastenings every 600 mm approximately and an acoustic strip in the back of the whole profile. The profiles of the primary structure are supported on this U-channel in a lengthwise direction and the secondary profiles are then fitted onto this profile. For the fastenings of boards self-drilling screws are used. All the joints between boards are fixed in each of the layers with filler and joint strips put in place. The heads of the screws of all the boards have also been covered.

System	Composition of boards	Profile	Hangers distance (mm)	Primary profiles distance (mm)	Secondary profiles distance (mm)	Classification
D112	2x15	CD 60/27/0,6	700	800	400	EI 60(a←b)
D112	3x12,5	CD 60/27/0,6	700	800	500	EI 90(a←b)
D112	2x25	CD 60/27/0,6	700	800	400	EI 120(a←b)

Ancillary products:

Designation	Reference	Material	Characteristics
Knauf U-profile (perimeter profile)	U Profile 30x30	Galvanised steel	Thickness = 6/10e 27x28x27
Knauf ceiling profile	CD channel 60x27x0.6	Galvanised steel	Thickness = 6/10e 27x60x27
Lifting accessories	Nonius Hanger Upper part	Galvanised steel	125/30/54 mm
Connection accessories between masters	Cross connector	Galvanised steel	
Knauf joint strips		Micro-perforated paper	Width = 52 mm Thickness = 2/10
Knauf jointfiller	Knauf Unik 30’	Powdered gypsum + additives	
Acoustic strip	Knauf acoustic strip	Polyurethane foam tape.	Width = 30 mm Thickness = 3.2 mm

C.1.3. Suspended ceiling type D112 F47/17

Suspended ceiling type D112 formed by CORTAFUEGO DF boards (see composition table below) screwed to a galvanised steel structure comprised of primary profiles with a distance between axes of 800 or 1000 mm (see table below) and suspended from the supporting construction using hangers with a distance of 700 or 750 mm between them (see table below) and secondary profiles fixed perpendicularly to the primary ones with stand for profiles and placed with a maximum modulation of 500 mm between axes. A 30x30 U-profile is fixed to the perimeter with fastenings every 600 mm approximately and an acoustic strip in the back of the whole profile. The profiles of the primary structure are supported on this U-channel in a lengthwise direction and the secondary profiles are then fitted onto this profile. For the fastenings of boards self-drilling

screws are used. All the joints between boards are fixed in each of the layers with filler and joint strips put in place. The heads of the screws of all the boards have also been covered.

System	Composition of boards	Profile	Hangers distance (mm)	Primary profiles distance (mm)	Secondary profiles distance (mm)	Classification
D112	2x15	F47/17/0,6	750	1000	500	EI 60(a←b)
D112	3x12.5	F47/17/0,6	700	800	500	EI 90(a←b)

Ancillary products:

Designation	Reference	Material	Characteristics
Perimeter profile	Clip 18 channel	Galvanised steel	Thickness = 5.5/10e 17x20x28
Knauf ceiling profile	F channel 47x17x0.6	Galvanised steel	Thickness = 6/10e 17x47x17
Lifting accessories	Pivot Hanger	Galvanised steel	Thickness = 6/10e
Connection accessories between masters	Flush connector for F 47/17	Galvanised steel	
Knauf joint strips		Micro-perforated paper	Width = 52 mm Thickness = 2/10
Knauf jointfiller	Knauf Unik 30'	Powdered gypsum + additives	
Acoustic strip	Knauf acoustic strip	Polyurethane foam tape.	Width = 30 mm Thickness = 3.2 mm
Clamping fixture to metal beam		Galvanised steel	

C.1.4. Field of application

- Any dimension of ceiling provided that the distribution per unit area of the hangers is not reduced, and the distance between hangers is not increased. The distance between grid members and the load on the hanger, shall not be increased.
- Any height of cavity.
- Any length of hangers.
- Inclusion of cables, pipes, etc. above the ceiling provided they are installed in such a manner that they give no additional mechanical load to the ceiling during the fire.
- Use of access panels for the following systems:
    - System D112, 2 x 25, CD 60/27/0,6: Trapdoor KNAUF CORTAFUEFO TEC EI120. Dimensions between 300 mm x 300 mm and 800 mm x 800 mm.
    - System D112, 3 x 12.5, F47/17/0,6: Trapdoor KNAUF CORTAFUEGO TEC EI90. Dimensions between 300 mm x 300 mm and 800 mm x 800 mm.
    - System D112, 2 x 15, F47/17/0,6: Trapdoor KNAUF CORTAFUEGO TEC EI 60' 30 mm. Dimensions between 300 mm x 300 mm and 800 mm x 800 mm.

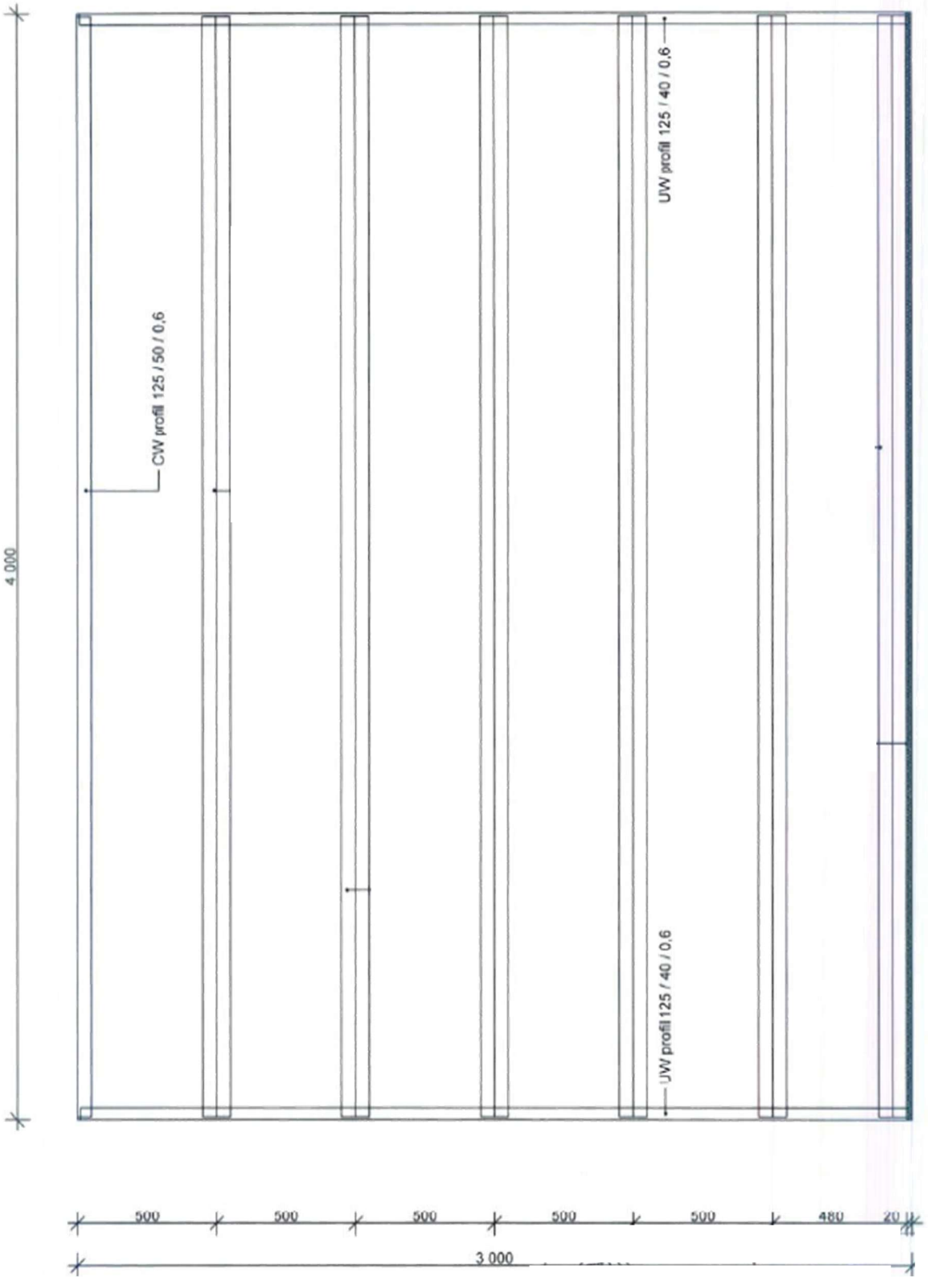
- Use of additional suspended load of 20 kg/m^2 for the following systems, provided that the suspended materials have a minimum fire reaction classification of B s2 d0 and the loads are suspended using KNAUF direct anchoring elements by using Knauf TN screws:
    - System D112, 2 x 25, CD 60/27/0,6.
    - System D112, 3 x 12,5, F47/17/0,6.
    - System D112, 2 x 15, F47/17/0,6.

C.2. Self-supporting ceilings

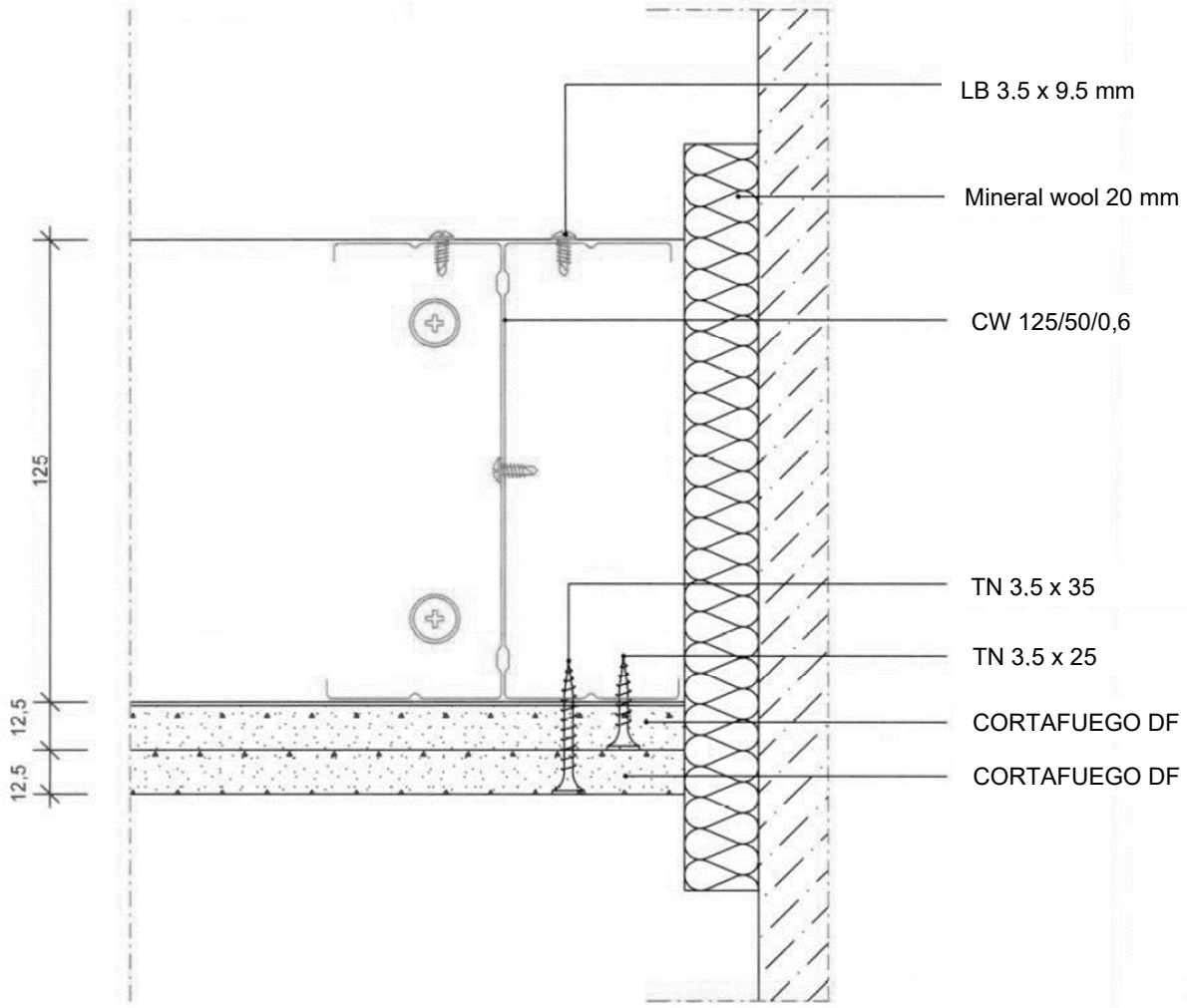
C.2.1. Knauf D 131 with CORTAFUEGO DF 12.5 mm with inspection closures

C.2.1.1. Tested assembly

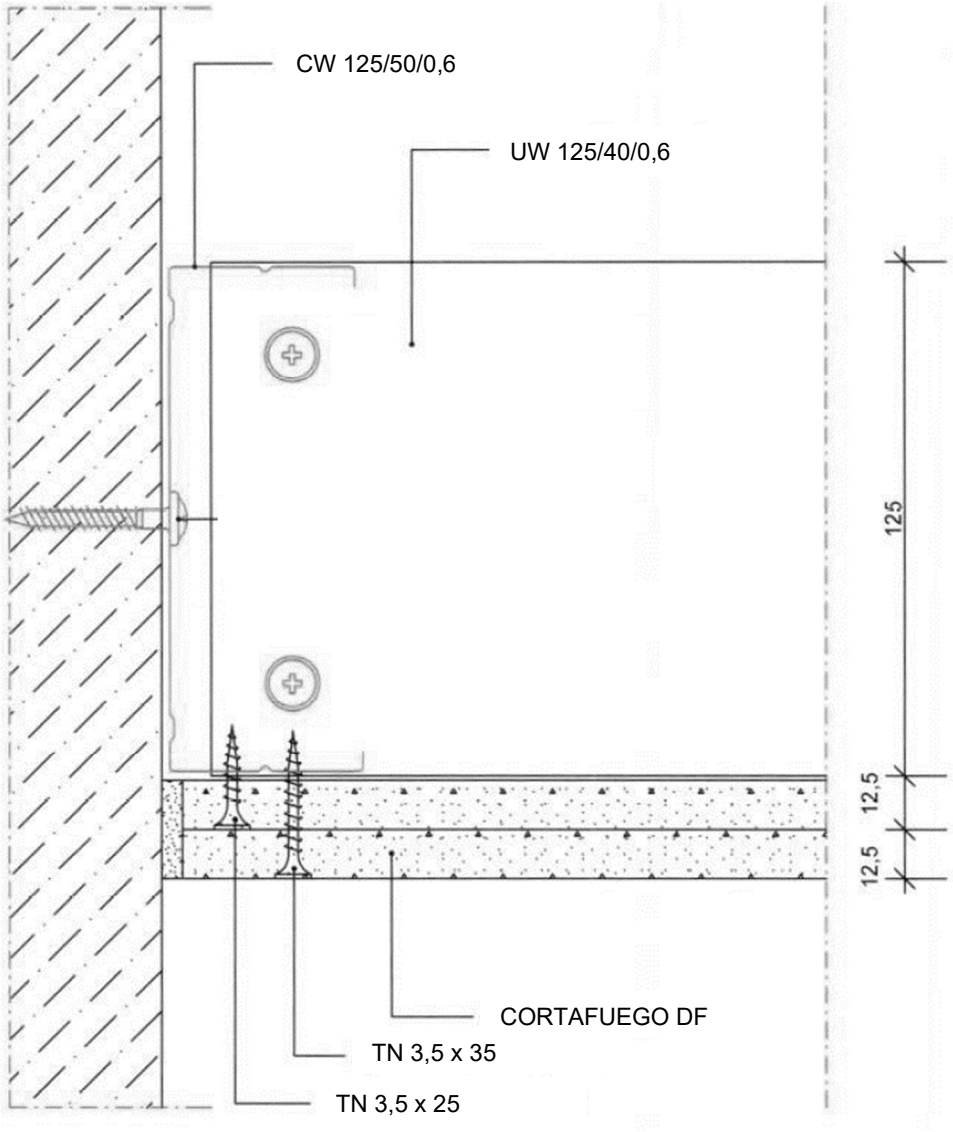
Double longitudinal profiles KNAUF CW 125 mm are placed in spacing of 500 mm. The profiles are fixed to cross edge profiles UW 125. The profiles CW 125 are fixed to each other by screws Ø3,5 x 9,5 mm, in spacing of 400 mm.
Two layers of plasterboards CORTAFUEGO DF 12,5 mm are fixed to the CW profiles. First layer is fixed by screws TN 3,5 x 25 and second layer is fixed by screws TN 3,5 x 35 placed in spacing of 170 mm. Joints of boards are filled by mastic KNAUF Fugenfüller Leicht with glass fibre tape.
Inspection closures ELM and F-TEC_2 are placed between longitudinal profiles. Inspection closure ELM with opening dimension (270 x 1500) mm consists of frame and closure. Frame is made from plaster fibre board strips 12,5 mm thick and 50 mm wide. Frame is fixed to the ceiling by screws TN 3,5 x 35 mm, placed in spacing of 200 mm. Closure is made of two layer of boards, bottom plaster fibre board 12,5 mm thick and upper gypsum board CORTAFUEGO DF 12,5 mm thick. The boards are fixed by adhesive and stapling.
Inspection closure F-TEC_2 with opening dimension (765 x 285) mm consists of aluminium frame and tipping closure. The closure is made of plasterboard CORTAFUEGO DF 12,5 mm placed at the bottom side and mineral wool board, 40 mm thick with bulk density 230 kg/m3 placed at the upper side.


UW profil 125 / 40 / 0,6
CW profil 125 / 50 / 0,6
4.000
UW profil 125 / 40 / 0,6
500
500
500
500
500
480
20
3.000

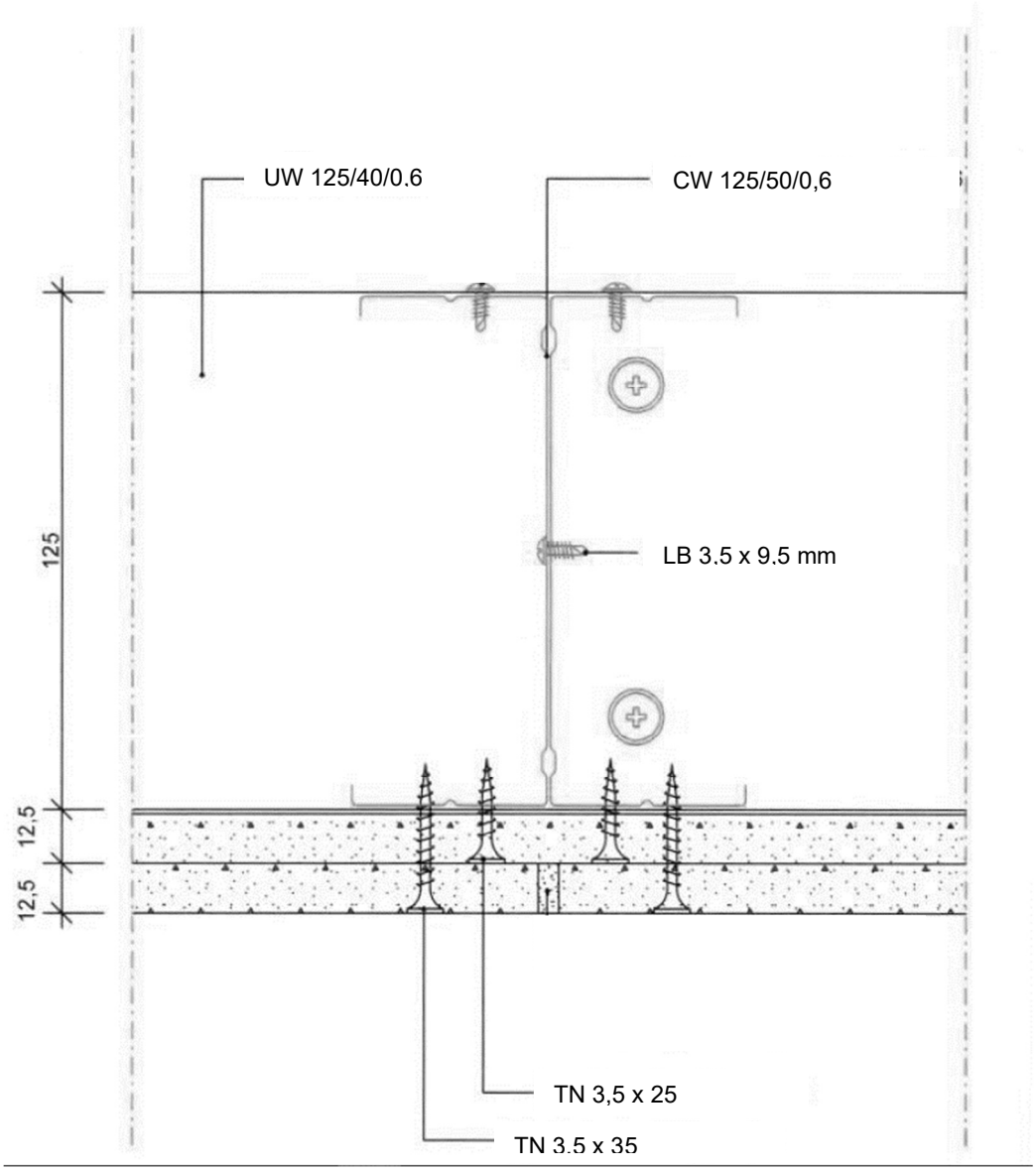
Detail of free edge:



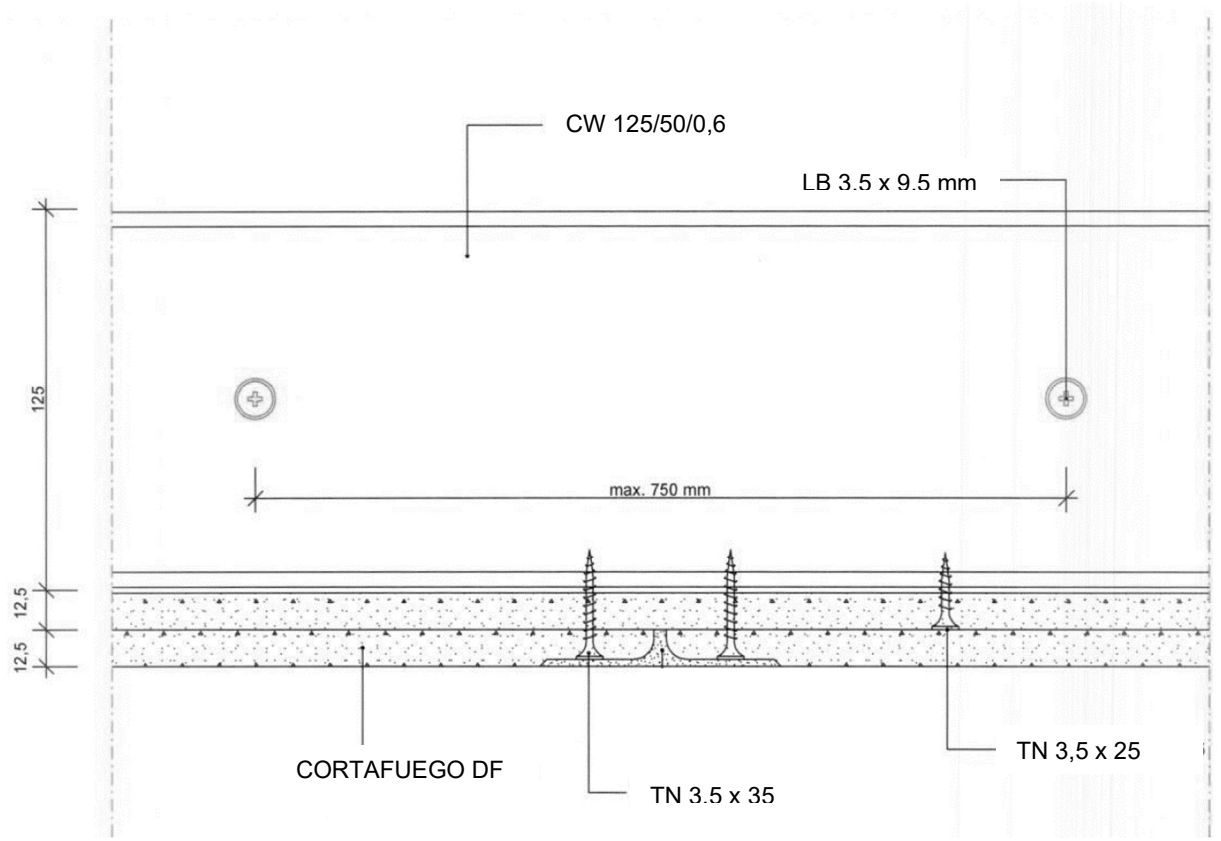
Detail of fixed edge:



Detail of fixing boards to CW profiles:

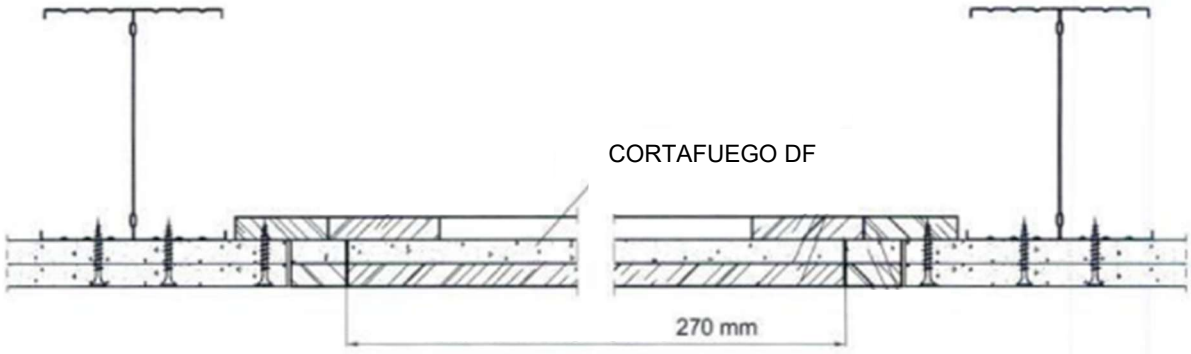


Detail of fixing boards to UW profiles:

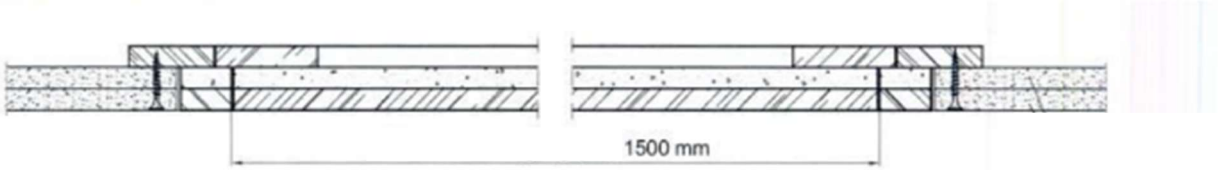


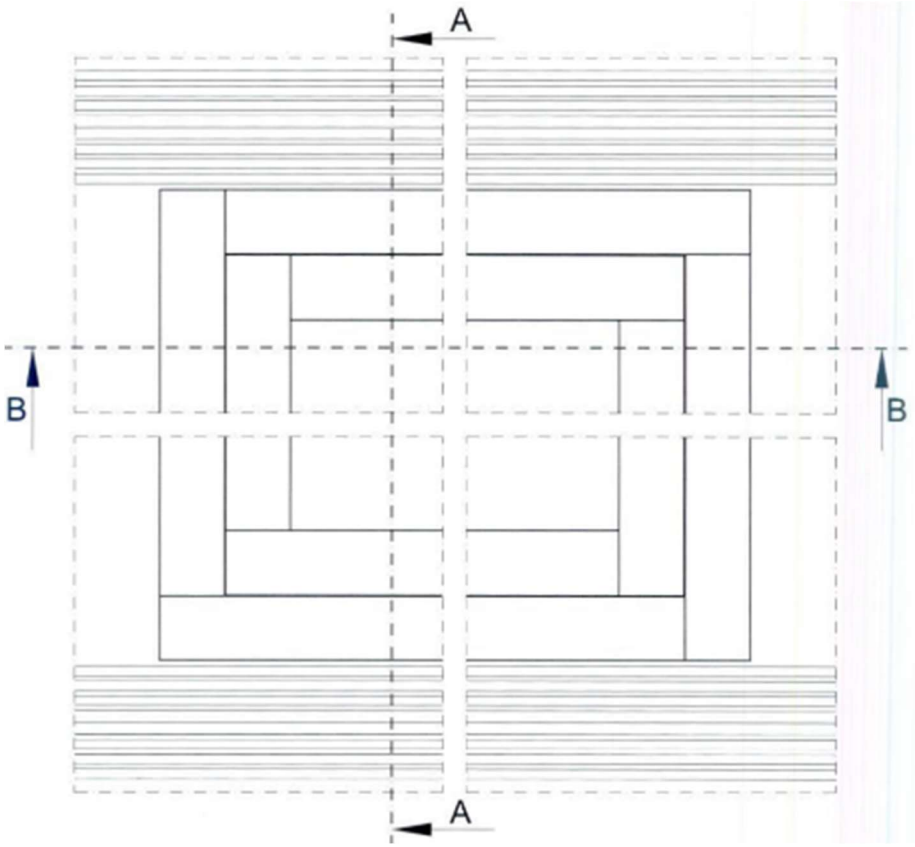
Inspection closure ELM:

Section A-A'



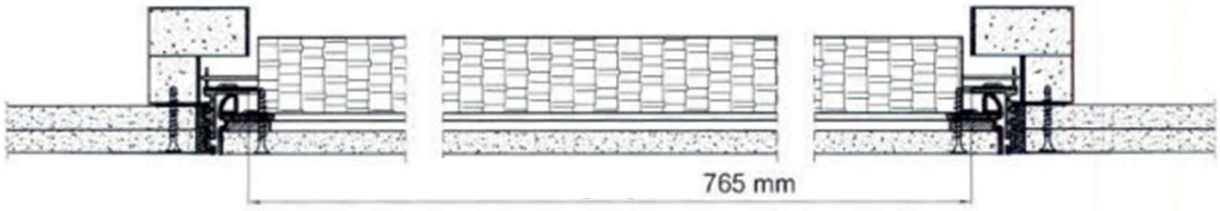
Section B-B'



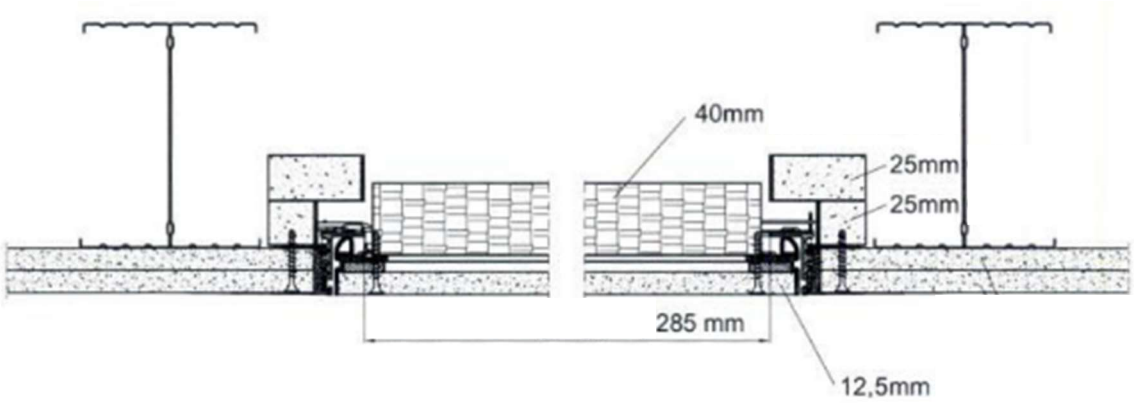


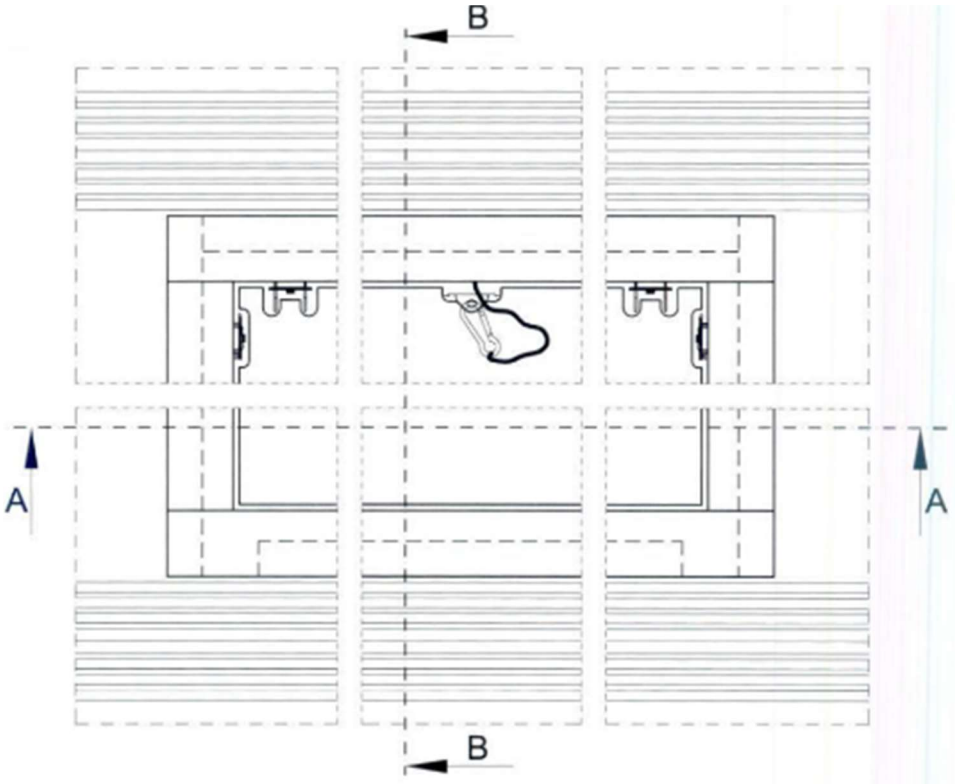
Inspection closure F-TEC_2:

Section A-A'



Section B-B'





C.2.1.2. Classification

EI 30(a←b)

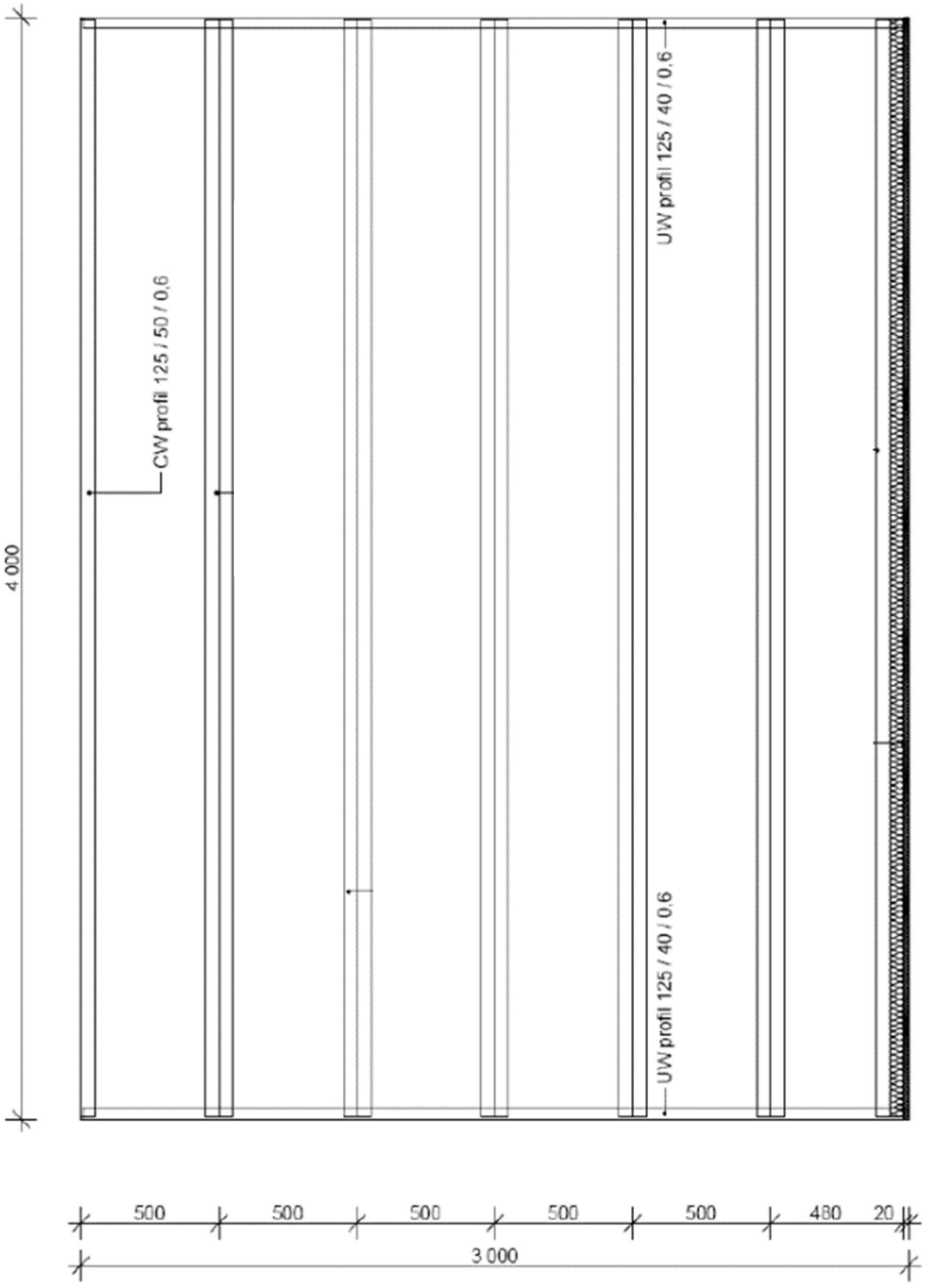
C.2.1.3. Field of application

- Length up to 4,4 m and any width of ceiling
- Distance between fittings can't be larger
- Any height of cavity

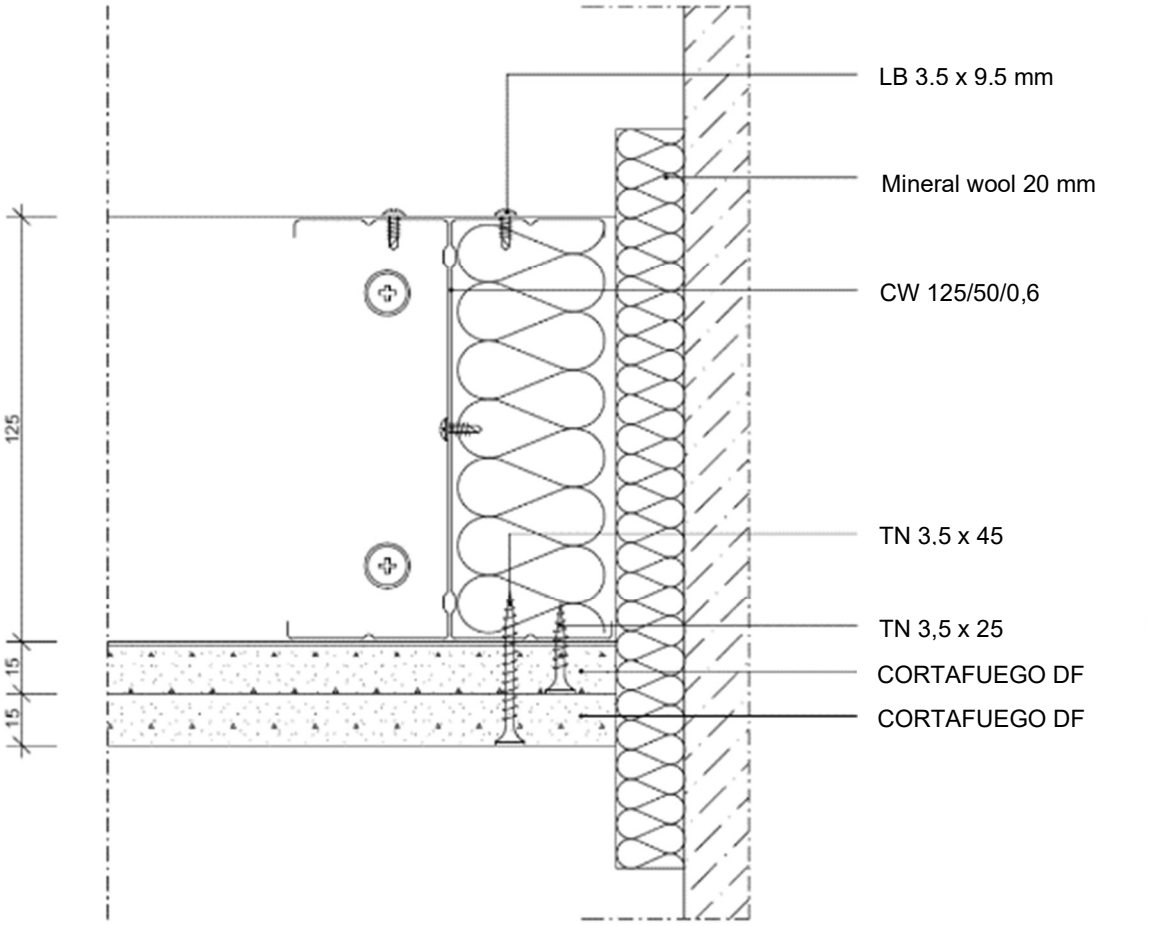
C.2.2. Knauf D 131 with CORTAFUEGO DF 15 mm

C.2.2.1. Tested assembly

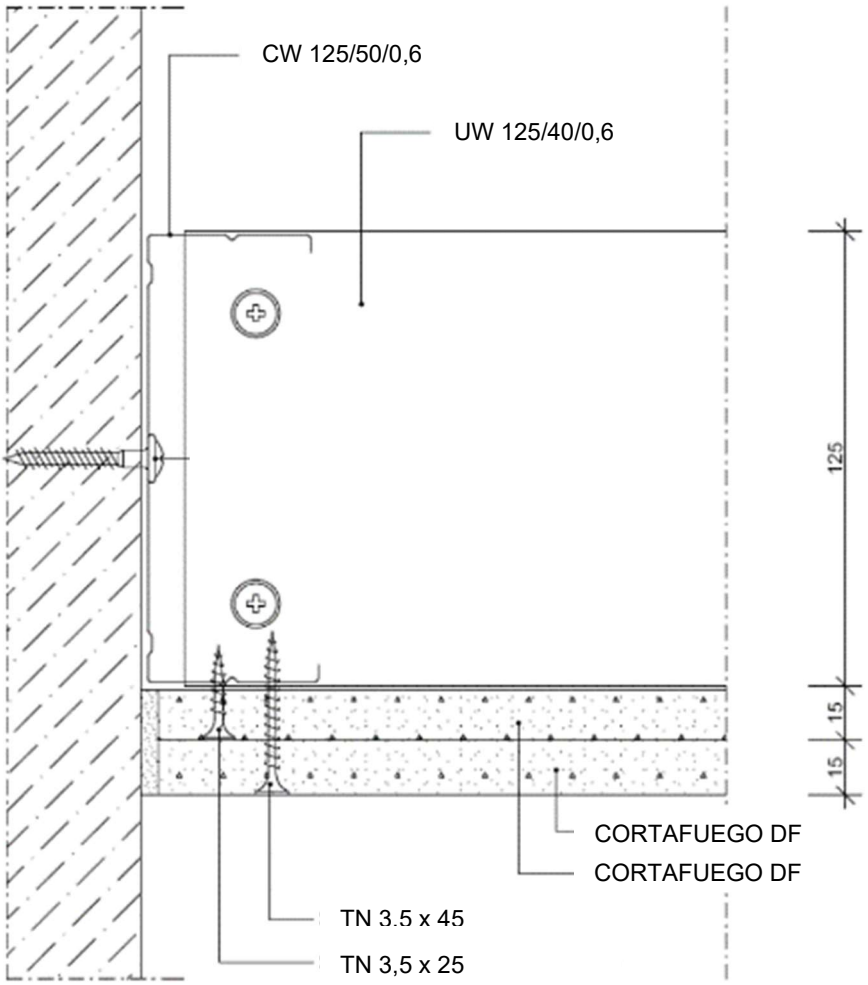
Loadbearing construction is made of longitudinal double profiles KNAUF CW (125 x 50 x 0,6) mm placed in spacing 500 mm, which are fixed to cross edge profiles UW (125 x 40 x 0,6) mm. Profiles KNAUF CW are fixed to edge profiles by screws (Ø 3,5 x 9,5) mm. Double profiles are screwed together by screws (Ø 3,5 x 9,5) mm placed in spacing max. 750 mm.
Two layers of fire resistant gypsum boards CORTAFUEGO DF 15 mm thick are screwed to loadbearing construction system. First layer of boards is fixed by means of screws TN (3,5 x 25) mm and second layer is fixed by means of screws TN (3,5 x 45) mm placed in spacing 170 mm. Joints between boards are filled by mastic KNAUF Fugenfuller Leicht with glass fibre tape.


CW profil 125 / 50 / 0,6
UW profil 125 / 40 / 0,6
UW profil 125 / 40 / 0,6
4.000
500
500
500
500
500
480
20
3.000

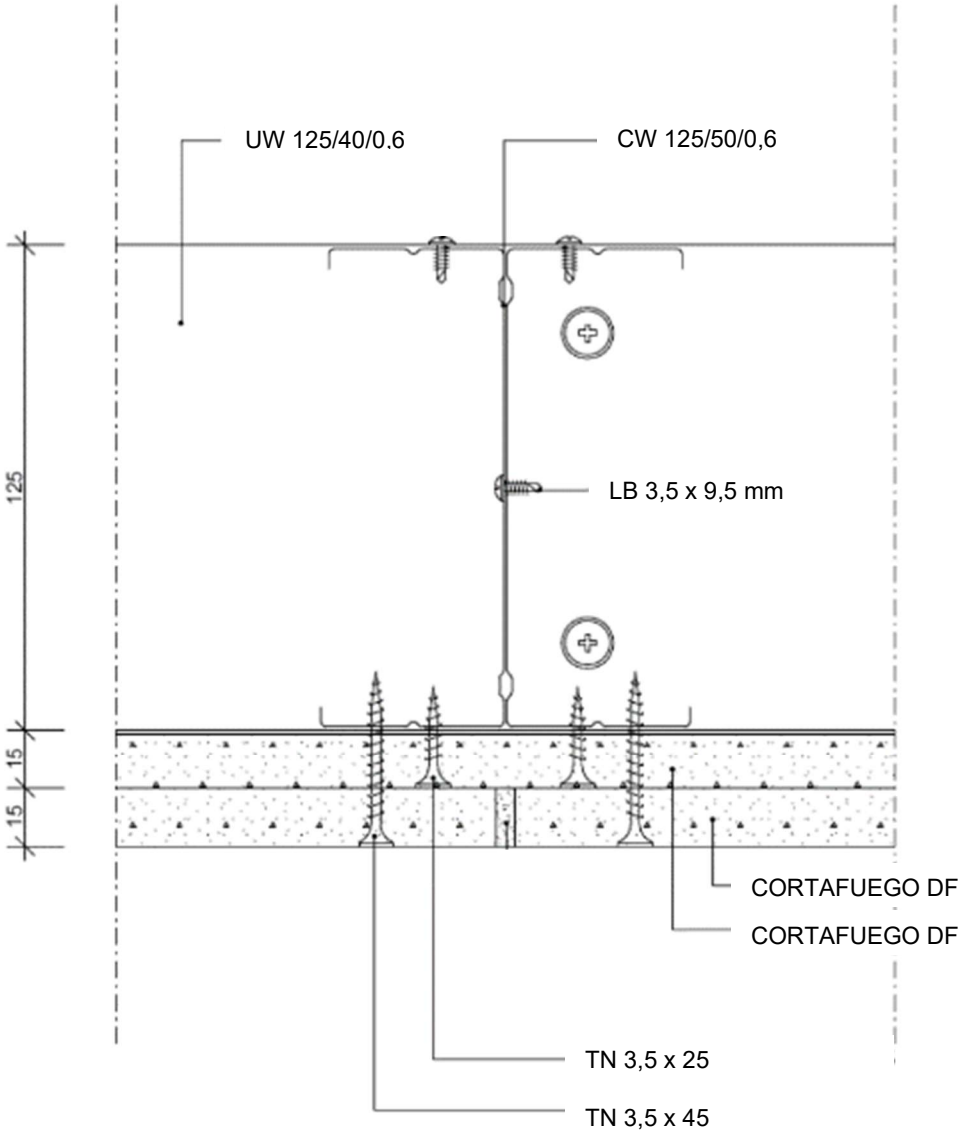
Detail of free edge:



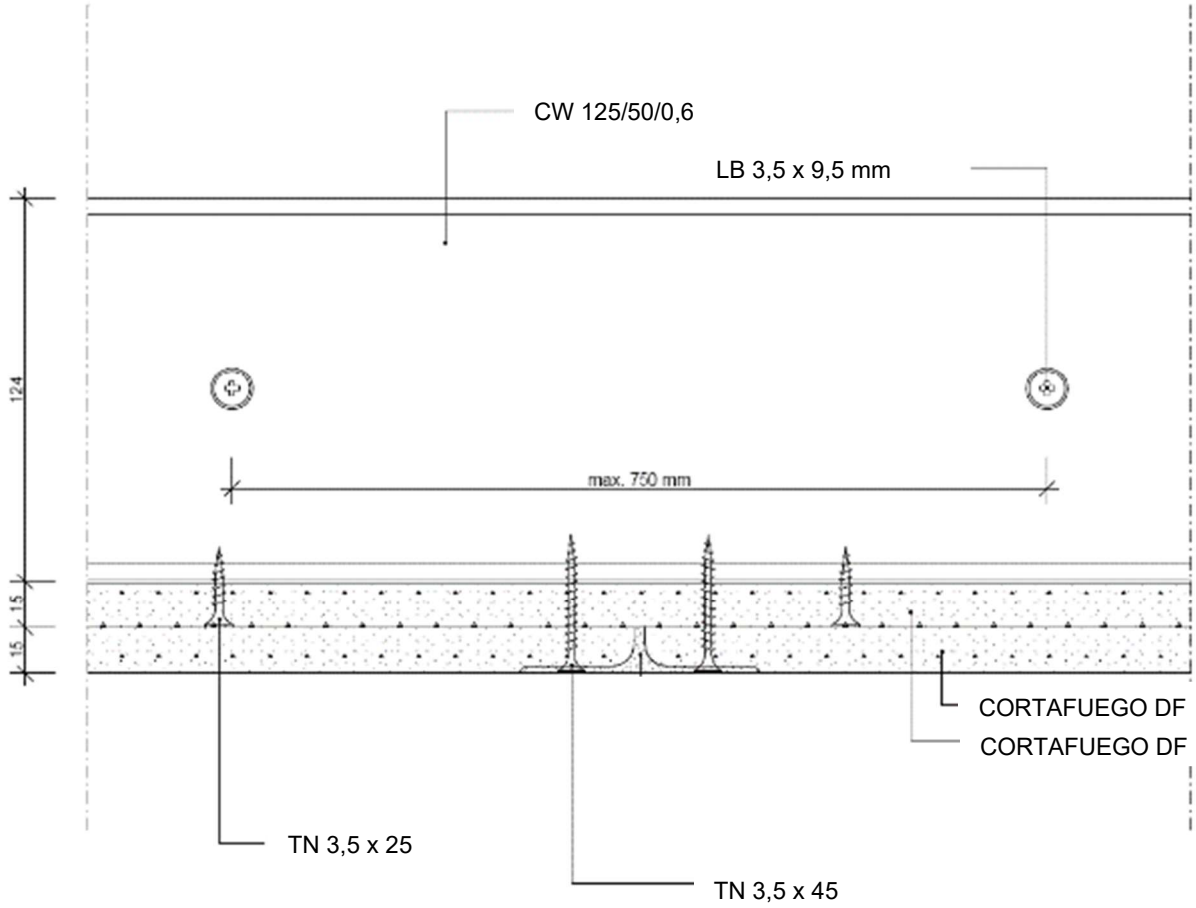
Detail of fixed edge:



Detail of fixing boards to CW profiles:



Detail of fixing boards to UW profiles:



C.2.2.2. Classification

EI 60(a←b)

C.2.2.3. Field of application

- Length up to 4,4 m and any width of ceiling
- Distance between fittings can't be larger
- Any height of cavity.