EFECTIS France
Voie Romaine
F-57280 Maizières-lès-Metz
Tel.: +33 (0)3 87 51 11 11
Fax.: +33 (0)3 87 51 10 58

CLASSIFICATION REPORT

Laboratoire agréé
Efectis
par le Ministère de l'Intérieur

CLASSIFICATION REPORT no. 11 - A - 147 - Revision 2

According to standards EN 15650: 2010 and EN 13501-3: 2007

Regarding	A range of "CU2" type fire dampers Operating vacuum pressure: - 500Pa
Sponsor	RF TECHNOLOGIES Lange Ambachtstraat, 40 B - 9860 OOSTERZELE

This classification report supersedes the classification report no. 11 - A - 147 - Revision 1.

This document is a translation. In case of disagreement, the original version will be used.

CHANGE HISTORY

Revision level	Date	Change(s)	Author
2	17/07/17	- Validation of minimum installation distance - Validation of sealing of fire dampers using plaster	RST

1. INTRODUCTION

This classification report defines the classification assigned to a range of "CU2"-type fire dampers in accordance with the procedures set out in the standard EN 13501-3: 2007 "Fire classification of construction products and building elements – Part 3: Classification using data from fire resistance tests, on products and elements used in building service installations: fire resisting ducts and fire dampers" and in the standard EN 15650: 2010 "Ventilation for buildings. Fire dampers".

2. BODY

Efectis France
Voie Romaine
F - 57280 MAIZIERES-LES-METZ

Notified body: 1812

3. SPONSOR

RF TECHNOLOGIES
Lange Ambachtstraat, 40
B - 9860 OOSTERZELE

4. REFERENCE AND ORIGIN OF THE TEST SPECIMENS

Reference:	CU2
Origin:	RF TECHNOLOGIES Lange Ambachtstraat, 40 B - 9860 OOSTERZELE

5. OVERALL PRINCIPLE

5.1. TYPE OF FUNCTION

The "CU2"-type damper is defined as a "fire damper". Its function is to be fire-resistant as regards fire integrity, thermal insulation and leakage flow rates.

5.2. GENERAL POINTS

Each fire damper is composed of a tunnel, within which a horizontally-mounted mobile blade pivots using an external mechanism and a transmission.

Approved fire dampers have flow cross-section dimensions of between 200 x 200mm and 1200 x 800mm / 200 x 200mm and 1500 x 1000mm.

5.3. DETAILED DESCRIPTION OF THE ELEMENTS

5.3.1. Fire damper casing

The rectangular tunnel is made by assembling four 15mm-thick “PROMATECT H” plasterboard panels, allowing room for flow cross-section dimensions of (Bn - 6) x (Hn - 6) mm, where Bn is the nominal width of the fire damper and Hn is the nominal height.
The length of the standard tunnel, reference “CU 2”, is 330mm. The panels are clamped together using 32mm clips.
The ends of the tunnel are each fitted with a 1.25mm-thick connection flange, 10 x 33 x 35 x 16.5 x 35mm, fixed using screws in the tunnel. The overall length of the fire damper is therefore 400mm.
1mm-thick, 25 x 25mm plastic corner brackets are fixed using steel nails on the outer corners of the tunnel.

The side of the tunnel on the mechanism side has an opening of 138.5 x 95mm to allow the mechanism control lever and thermal fuse to pass through.
The inside of the tunnel is equipped with galvanized steel bearings, placed on the lower semi-perimeter on the mechanism side, and on the upper semi-perimeter on the opposite to mechanism side, and fixed using rivets (4.8 x 25.4mm).

An open-cell “SITUSEAL”-type foam seal, with cross section dimensions of 15 x 25mm, is placed in the bearing opening. Furthermore, a washer made of the same material, with a diameter of 80mm and 6mm thick, is also placed between the tunnel and the damper blade, around each rotational axis.

5.3.2. Blade

The damper blade, with dimensions of (B - 24) x (H - 24) x 45mm, is made using two 15mm-thick “PROMATECT H” plates, forming a sandwich above and below a strip of “PROMATECT H” with cross section dimensions of 15 x 40mm fixed using clips.
Two 1.25mm-thick “U”-shaped sections (15 x 30 x 15mm) are screwed on the vertical edges, on the inside of the blade.

The various blade components are assembled using clips (32mm clips).

A PVC-coated “PALUSOL”-type intumescent seal (55 x 2mm) is fixed perpendicular to the blade on the inside of the tunnel using 12.5mm steel spikes spaced at intervals of 50mm in three rows.

Two drawn steel hinge pins (Ø 12mm) are welded to the sections in the centre of the blade, halfway along its length, in order to enable rotation.
Each of the hinge pins are driven into a riveted nylon bearing in the tunnel, with a steel DIN 9021 M12 washer placed before the bearing.

A 5mm clearance is left between the blade and the intumescent seal placed in the tunnel.

5.3.3. Mechanism

The control mechanism is fully installed on the outside of the fire damper and is composed of the following elements:

- An automatically- or remote-controlled mechanism
- A transmission mechanism consisting of a steel con-rod system

If the fuse is activated, the internal spring shuts the fire damper.

6. INSTALLATION OF THE TEST SPECIMENS

The classification obtained with CU2 fire dampers for standard installation in the various construction elements and their respective sealing remain valid for fire dampers installed with horizontal or vertical axis, with a space:

- of 50mm to 200mm between fire dampers installed in separate ducts;
- of 50mm to 75mm between the fire damper and a construction element wall.
- of 50mm to 75mm between the fire damper and a construction element floor.

At most, two rectangular dampers can be installed at a minimum distance from each other, vertically and horizontally (with a group of up to 4 dampers).

Sealing between the fire dampers or between the single fire damper and the supporting construction (wall or floor) is performed using a maximum of eight layers (three layers on each side of the wall and two layers in the opening) of stone wool of a total width of 400mm (stone wool with the following characteristics:)

- For a space ≥ 50mm: thickness of the layer = 50mm, density = 150kg/m³, thermal conductivity λ = 0.041W/mK at 50°C and water vapour absorption = 0.02%, Euroclass A1).
- For a space < 50mm: stone wool reference ROCKFIT 431 (ROCKWOLL) with density = 40kg/m³, compressed at least 40%.

6.1. INSTALLATION IN A 100MM-THICK AERATED CONCRETE WALL

The fire damper is installed in feed-through in a 100mm-thick aerated concrete wall with a density of 550kg/m^3.

The fire damper is positioned in an opening with dimensions (W + 100) x (h + 100) mm. The fire damper is then sealed with standard mortar or plaster.

The fire damper can be positioned with a horizontally- or vertically-mounted blade.

6.2. INSTALLATION IN AN AERATED CONCRETE FLOOR

The fire damper is installed in feed-through in a 150 mm-thick reinforced concrete floor with a density of 650kg/m^3.

The fire damper is positioned in an opening with dimensions (W + 100) x (h + 100) mm. The fire damper is then sealed with standard mortar.

6.3. INSTALLATION IN A PLASTERBOARD PANEL PARTITION

The partition is made using a plasterboard panel assembly with dimensions 660 x 400 x 70mm (w x h x th.) and a density of 850kg/m^3.

The panels are put together using plasterboard adhesive.

The panels are installed using offset joints, with a half panel offset from one row to another.
The joints are approximately 2mm thick.

For each fire damper, an opening with dimensions (W + 100) x (H + 100) mm is made in the partition by cutting out part of the plasterboard panels.

On both the fire side and the opposite to fire side, the clearance between the fire damper's tunnel and the opening is plugged with plasterboard adhesive.

The fire damper can be positioned with a horizontally- or vertically-mounted blade.

6.4. BATTERY ASSEMBLY OF FIRE DAMPERS IN A CONCRETE WALL

CU2 reference fire dampers, described in the reference report (*procès-verbal*) may be battery assembled.

The maximum dimensions of the battery are 2450 x 1650mm (W x h) composed of fire dampers with maximum dimensions of 1200 x 800mm.

The battery assembly of fire dampers requires the following installation:

Unmodified individual fire dampers from the CU2 range with PM connection, are installed in battery assembly by applying the following construction provisions:

- 12.5mm Promatect H 50 horizontal and vertical brackets are fixed using a graphite-based EX174 seal fixed to the underside of the plates. The Promatect H plates are clamped using 25mm long steel clips (supplier: Senco).

- Side-by-side/stacked installation of fire dampers.

- Mechanical links for the side-by-side or stacked fire dampers provided by screwing 125/100mm-thick steel sheet plates. These plates are fixed on the fire damper flanges using self-drilling screws (Ø 4.2 x 13mm). The maximum distance between the screws is 200mm.

- The sections between the fire dampers are "U"-shaped and have dimensions of 54 x 40mm.

- The sections around the battery assembly are "L"-shaped and have dimensions of 40 x 32mm.

- The steel sheet sections and the fire damper flanges are sealed using BCM mastic (supplier: Rf-Technologies).

Battery assembly of fire dampers from the CU2 range is limited to the following configurations:
  - Installation of a maximum of two rows of side-by-side fire dampers.
  - Installation of a maximum of two levels of stacked fire dampers

The fire dampers are installed in feed-through in a concrete wall with a minimum thickness of 110mm and density of 2200kg/m³.
The fire dampers are positioned in an opening with overall dimensions (W + 100) x (h + 100) mm. The battery assembly is then sealed using standard mortar.
The fire damper blades are located in the thickness of the concrete wall, their front side aligned with the front of the wall. Their rotational axes are positioned horizontally.
The control mechanisms are offset from the wall and are always placed on the sides.

6.5. INSTALLATION IN A PLASTERBOARD (GYPSUM) PARTITION

6.5.1. Partition

The fire dampers are installed in a "D 98/48"-type partition.

This partition is made using a metal framework fitted with twin-layer facings with type A or type F gypsum plasterboard; the partition has an overall thickness of 98mm, with an internal cavity of 48mm filled with stone wool.

6.5.2. Outer framework

The outer framework is made using 6/10mm-thick galvanised steel MSH 50 rails, fixed to the concrete support frame with steel screws (Ø 6mm) and anchors (Ø 6mm), spaced at intervals of 800mm.

6.5.3. Central framework

The framework of the partition is made using single, 6/10mm-thick galvanised steel MSV 50 studs, slotted into the upper and lower rails and screwed at the base with a centre-to-centre distance of 600mm.

A thermal expansion gap of approximately 5mm was left at the top of each stud.

6.5.4. Header joist

A header joist designed to allow the fire damper to pass through is made using MSV 50 studs and MSH 50 rails.

The header joist is made of:

- A stud (A) added to the central framework of the partition spaced (L + 65) mm [for sealing with/without heels + stone wool] or (L + 80) mm [for sealing with plaster or mortar] from the stud belonging to the central framework (B) and acting as a second support stud for the weight of the fire damper itself;
- An R 48 horizontal rail (C), sheared and bent, and installed perpendicular to the additional studs at the top and bottom and spaced (Ø + 65) mm [for sealing with/without heels + stone wool] or (L + 80) mm [for sealing with plaster or mortar] apart from one another;
- For fire dampers with a length (L + 65) mm [for sealing with/without heels + stone wool] or (L + 80) mm [for sealing with plaster or mortar] greater than 600mm, the stud belonging to the central framework (D) is interrupted for the installation of the header joist.

The various elements are fixed together using screws (Ø 3.5mm).

The fire damper can be positioned with a horizontally- or vertically-mounted blade.

6.5.5. Facings

The partition is made using 2 x 12.5mm-thick BPB GYPROC ABA or GYPROC Rf-type plasterboards with a density of 750kg/m^3. The facings can also be made using BA18 or BA25 plasterboard panels provided the reports (*procès-verbaux*) associated with the partitions made using these panels show that they meet the EI120 (for type F) or EI90 (for type A) fire resistance criterion.

For BA 13 panels, the plasterboard is installed with the vertical joints of one facing offset in relation to the other within the same facing and also between the inner surfaces of both facings.

The vertical joints of the plasterboards are perpendicular to the studs. The plasterboards are fixed to the framework with 212/25-type self-drilling screws spaced at intervals of 500mm for the first layer and 212/35-type screws at intervals of 300mm for the second layer.

The visible joints between the plasterboards and the screeds with concrete frame are treated using the JOINTFILLER filler + jointing tape technique. The screw heads are also concealed with the same filler.

The cavity between the plasterboards is filled with ROCKFIT 431-type stone wool with a density of 33kg/m^3.

6.5.6. Sealing around the fire damper

Solution 1:
The space between the tunnel of the fire damper and the wall is approximately 30mm. A plasterboard heel, with a density of 750kg/m^3, thickness of 12.5mm and width of 100mm, the same type as the facing and fixed to the entire periphery of the fire damper, is fixed to the wall every 250mm using self-drilling, steel M6 screws above this space.
The cavity between the two heels and between the fire damper and the wall is filled with stone wool with a density of 40kg/m^3.

All the joints between the plasterboard are covered with BPB GYPROC Jointfiller 45-type filler.

The screws are also covered with the same type of filler.

Solution 2:
The joint between the CR120 fire damper casing and the wall is plugged with stone wool with a density of 60kg/m^3. The clearance between the tunnel and the wall is approximately 25mm. On both the exposed and unexposed sides, the free space between the fire dampers and the wall, previously filled with stone wool, is covered with a layer of PREGYLYS (LAFARGE) type filler, spread across the fire damper casing and the supporting construction over a minimum length of 50mm, so as to ensure the two surfaces are perfectly sealed.

Solution 3:
On both the fire side and the opposite to fire side, the clearance between the fire damper's tunnel and the opening is plugged with standard plaster or mortar.

7. FIRE RESISTANCE CLASSIFICATIONS

7.1. CLASSIFICATION REFERENCE

This classification procedure was conducted in accordance with section 7.2.4 of the standard EN 13501-4.

7.2. CLASSIFICATIONS

The elements are classified according to the following combinations of performance parameters and classes for the following supporting constructions.

- 100 mm-thick aerated concrete wall
- 70mm-thick plasterboard panel partition
- Light partition made using 100mm-thick 98/48 type gypsum plasterboard panels
- 150mm-thick aerated concrete floor slab

The dimensional range covered by the performances stated below is 200 x 200mm to 1200 x 800mm / 200 x 200mm to 1500 x 1000mm.

No other classification is authorised.

7.2.1. For fire dampers built into a 100mm aerated concrete wall:

- Fire dampers with cross section dimensions of between 1200 x 800 and 1500 x 1000mm:

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**60**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

- Fire dampers with cross section dimensions of between 200 x 200 and 1200 x 800mm (mortar sealing):

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**120**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

- Fire dampers with cross section dimensions of between 200 x 200 and 1200 x 800mm (plaster sealing):

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**90**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

7.2.2. For the fire dampers, with cross section dimensions of between 200 x 200 and 1200 x 800mm, built into a type F or type A (EN520) partition made using 100mm-thick gypsum plasterboard (sealing with heels + 40kg/m^3 density stone wool or sealing without heel + 60kg/m^3 density stone wool):

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**90**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

7.2.3. For the fire dampers, with cross section dimensions of between 200 x 200 and 1200 x 800mm, built into a type A (EN520) partition made using 100mm-thick BA13 gypsum plasterboard (plaster or mortar sealing)

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**90**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

7.2.4. For the fire dampers, with cross section dimensions of between 200 x 200 and 1200 x 800mm, built into a type F (EN520) partition made using 100mm-thick special fire-resistant BA13, BA18 or BA25 gypsum plasterboard (sealing with heels + 40kg/m^3 density stone wool or sealing without heel + 60kg/m^3 density stone wool):

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**90**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

7.2.5. For the fire dampers, with cross section dimensions of between 200 x 200 and 1200 x 800mm, built into a 100mm-thick type F (EN520) partition, <u>sealed using standard plaster</u> or mortar

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**90**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

7.2.6. For the fire dampers, with cross section dimensions of between 200 x 200 and 1200 x 800mm, built into a partition made using 70 mm-thick plasterboard panels

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**120**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

7.2.7. For the fire dampers, with cross section dimensions of between 200 x 200 and 1200 x 800mm, built into a 150mm-thick concrete floor

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**120**			**-**	**ho**	**-**	**i**	↔	**o**	**-**	**S**

7.2.8. For battery assembly fire dampers (CU2/B), with maximum dimensions of 2450 x 1650mm, built into a 110mm-thick reinforced concrete wall (mortar sealing)

E	I		t		ve	-	ho	-	i	↔	o	-	S
E	**I**		**120**		**ve**	**-**		**-**	**i**	↔	**o**	**-**	**S**

The above performances of the elements are valid for heating as described in section 5.1.1 of the European standard EN 1363-1.

8. FIELD OF APPLICATION OF THE RESULTS

8.1. GENERAL POINTS

The requirements related to the field of application of all the fire dampers tested in accordance with EN 1366-2 apply, as well as the following items.

8.2. DIMENSIONS OF THE FIRE DAMPER

In accordance with section 13.1 of the standard EN 1366-2, the classifications indicated in section 7.2 of this classification report are valid for all fire dampers of the same type (including all the side reports), provided the maximum flow cross-section dimensions do not exceed 1200 x 600mm / 1500 x 1000m and that the minimum flow cross-section dimensions are not less than 200 x 200mm.

8.3. SEPARATION BETWEEN FIRE DAMPERS AND BETWEEN FIRE DAMPERS AND CONSTRUCTION ELEMENTS

In accordance with section 13.5 of the standard EN 1366-2, the fire classifications indicated in section 7.2. of this classification report apply, in practice, with a minimum spacing:

a) of 200mm between fire dampers installed in separate ducts;

b) of 75mm between the fire damper and a construction element (wall or boards).

8.4. SUPPORTING CONSTRUCTIONS

In accordance with section 13.6.1 of the standard EN 1366-2, the classifications indicated in section 7.2 of this classification report apply only to fire dampers installed in feed-through or offset in an aerated concrete wall with a minimum thickness of 100mm and a minimum density of 550kg/m^3, in feed-through in an aerated concrete wall with a minimum thickness of 150mm and a minimum density of 650kg/m3, in feed-through in a reinforced concrete wall with a minimum thickness of 100mm and a minimum density of 2200kg/m^3 or installed in feed-through or offset in a supporting construction of the same type as the standardized flexible supporting construction used in the test, with equal or greater fire resistance properties (greater thickness, higher density or more layers of plasterboard, as appropriate).

The test result may also apply to hollow masonry blocks or slabs possessing a fire resistance time that is equal to or greater than the one stated for the installation of the fire damper.

If a specific supporting construction, different to those mentioned above, is chosen – in this case, a 70mm-thick plasterboard panel wall with a density of 850kg/m^3 – the test results obtained are only applicable to this specific wall, partition or floor if it has a greater thickness or density than that of the test specimen.

No modifications may be applied to the dimensions expressed above and no modifications may be made to the structure of the element without the prior issue of a classification extension by the laboratory.

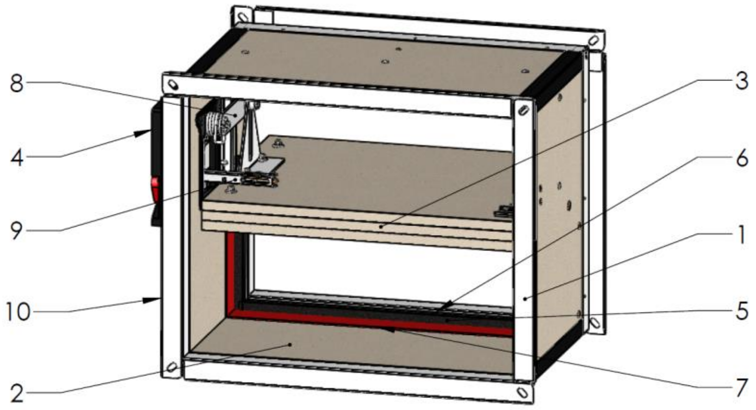
Issued in Maizières-lès-Metz, 17 July 2017

Romain Stouvenot
Project Manager

Mathieu Fenucci
Smoke Extraction Technical Director

APPENDIX - FIGURES

Rf-t www.rft.be	Reference - Subject - Date **CU2_Commercial_07_12_16**	Plate A 2/2



1. Connection flange
2. Casing out of refractory material
3. Damper blade
4. Operating mechanism
5. Sealing cold smoke
6. Blade bumper
7. Intumescent strip
8. Transmission with locking (open/closed)
9. Fusible link 72°C
10. Product identification

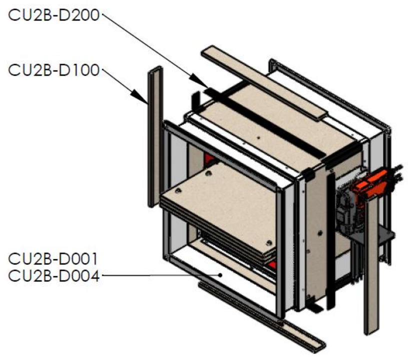
	PRODUCT RANGE	
	Minimim dimensions	Maximum dimensions
WxH(mm)	200x200(*)	1500x1000(*)
W= Width H= Height		

** W/H per step of 50mm, intermediate dimensions available at an additional cost*

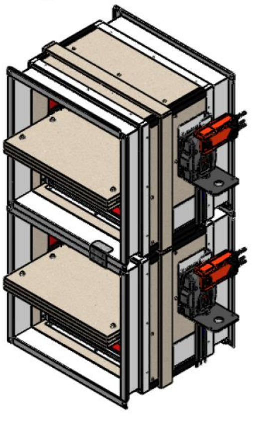
Plan Title:

Rf-t www.rft.be	Reference - Subject - Date CU2_Parts_Fasteners_05_12_2016	Plate B 6/9

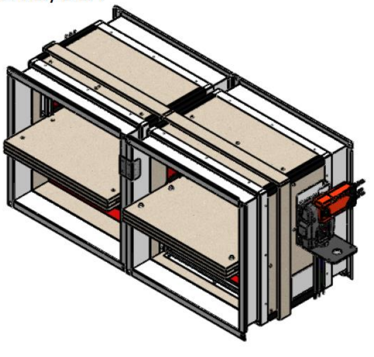
Battery assembly CU2/B



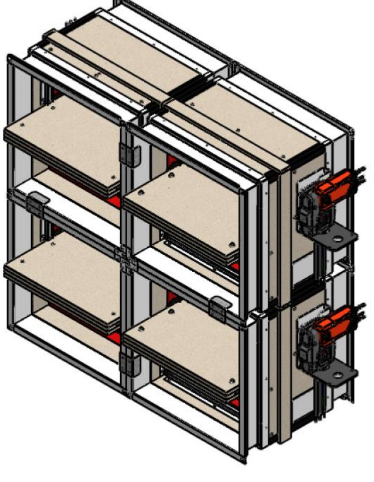
CU2/B12



CU2/B21



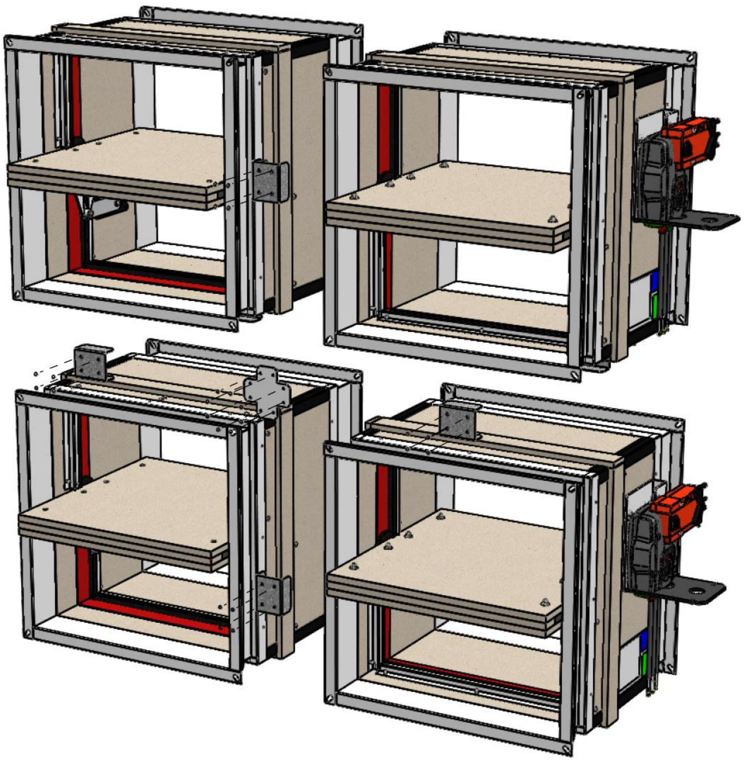
CU2/B22

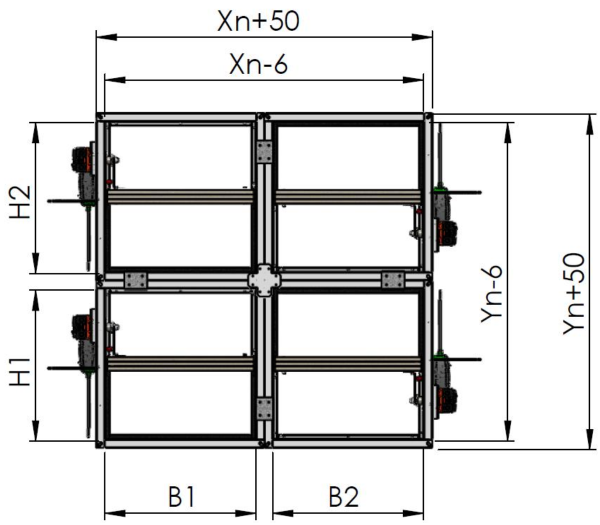


Plan Title:

Rf-t www.rft.be	Reference - Subject - Date CU2_Parts_Fasteners_05_12_2016	Plate B 7/9

Battery assembly CU2/B





WIDTH	B1	B2
For X multiple of 100	(Xn-100)/2	Xn/2
For X ending with 50	(Xn-50)/2	
HEIGHT	**H1**	**H2**
For Y multiple of 100	(Yn-100)/2	Yn/2
For Y ending with 50	(Yn-50)/2	

Plan Title:

Rf-t www.rft.be

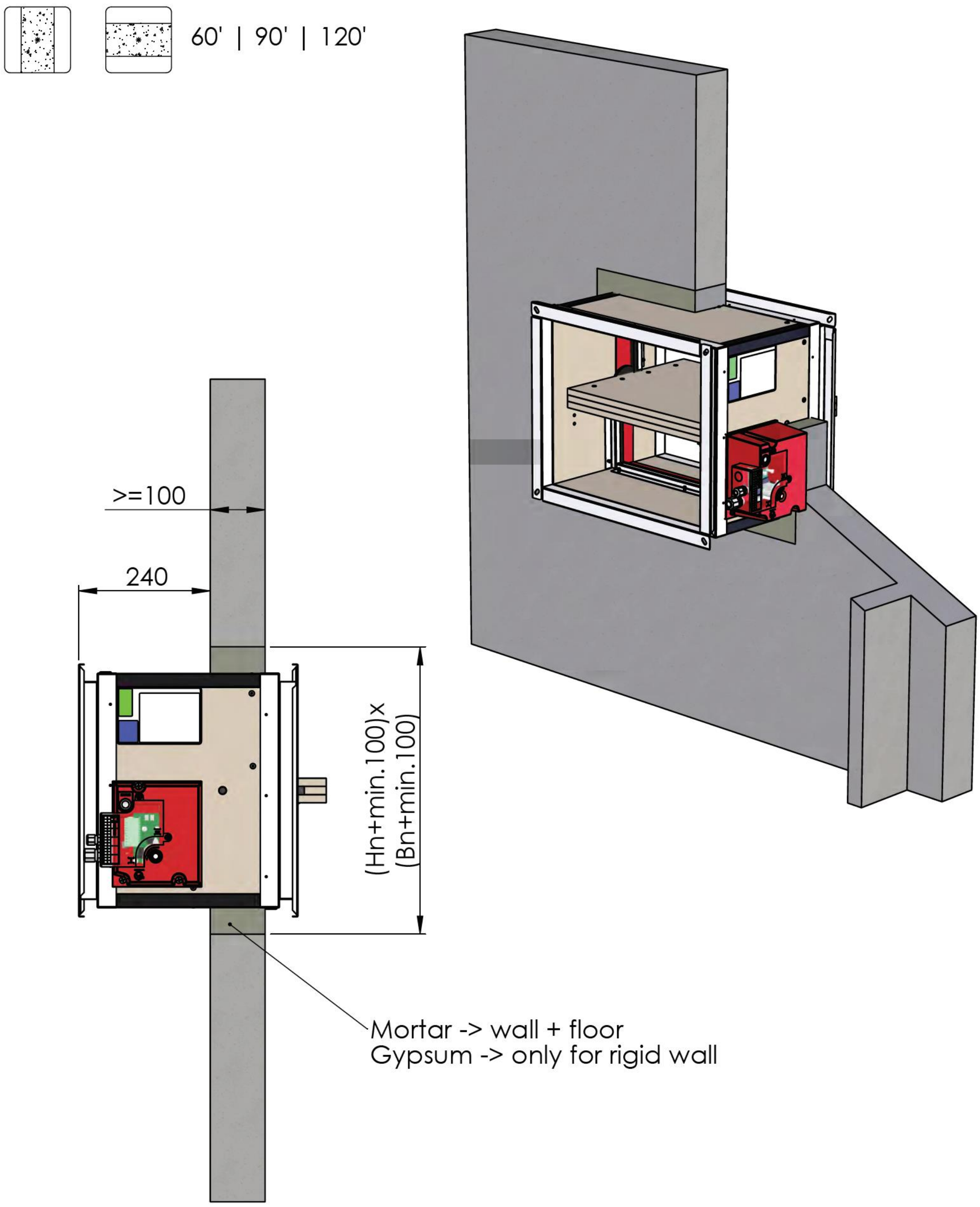
Reference - Subject - Date

CU2_Installation_16_06_2017

Plate

E 2/9

Rigid wall and floor



Plan Title:

Rf-t
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Reference - Subject - Date

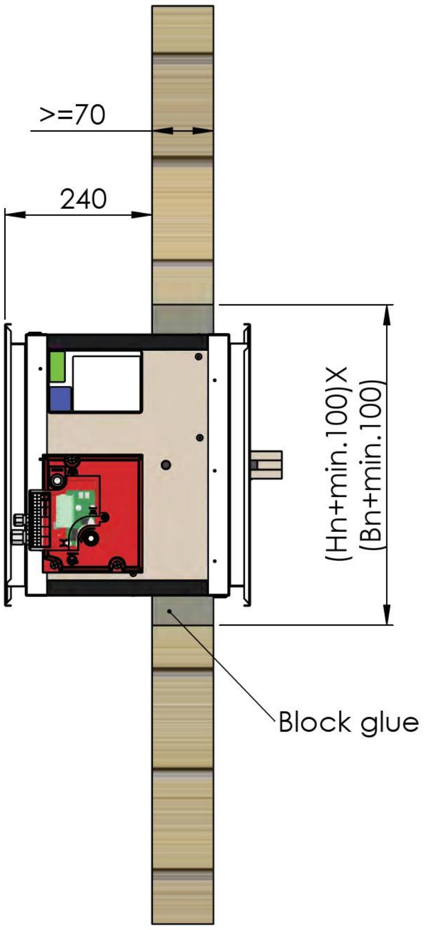
CU2_Installation_16_06_2017

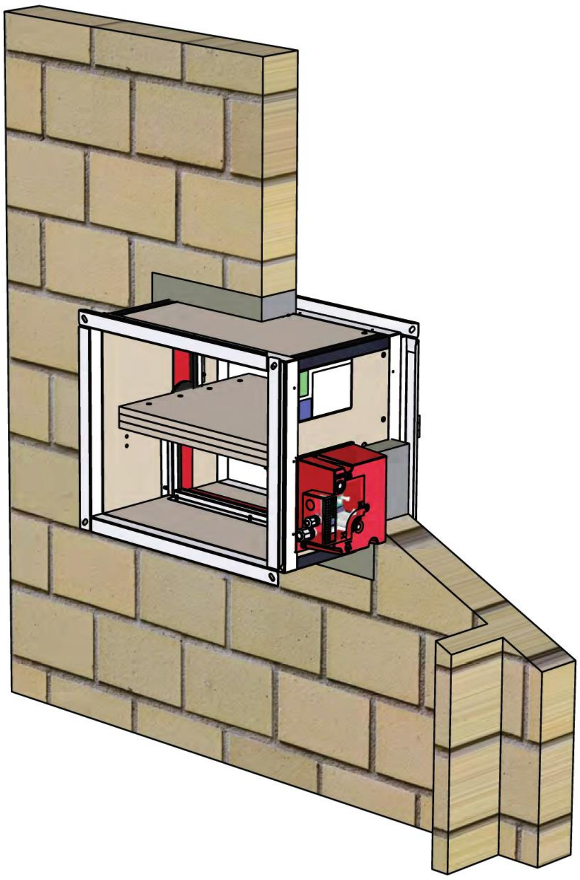
Plate

E 3/9

Gypsum block wall

120'

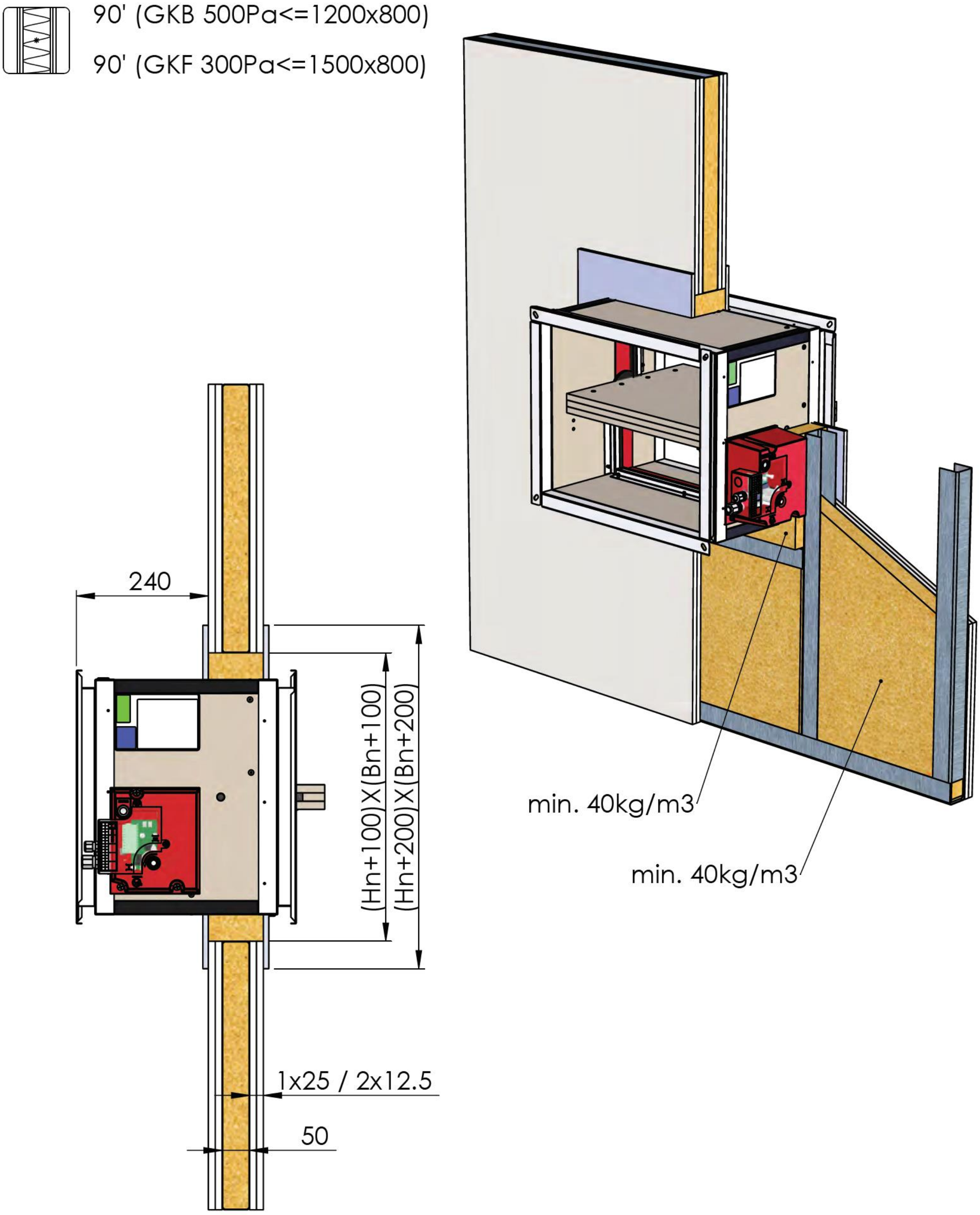




Plan Title:

Rf-t www.rft.be	Reference - Subject - Date **CU2_Installation_16_06_2017**	Plate E 4/9

Flexible wall - Metal stud gypsum plasterboard wall



Plan Title:

Rf-t
www.rft.be

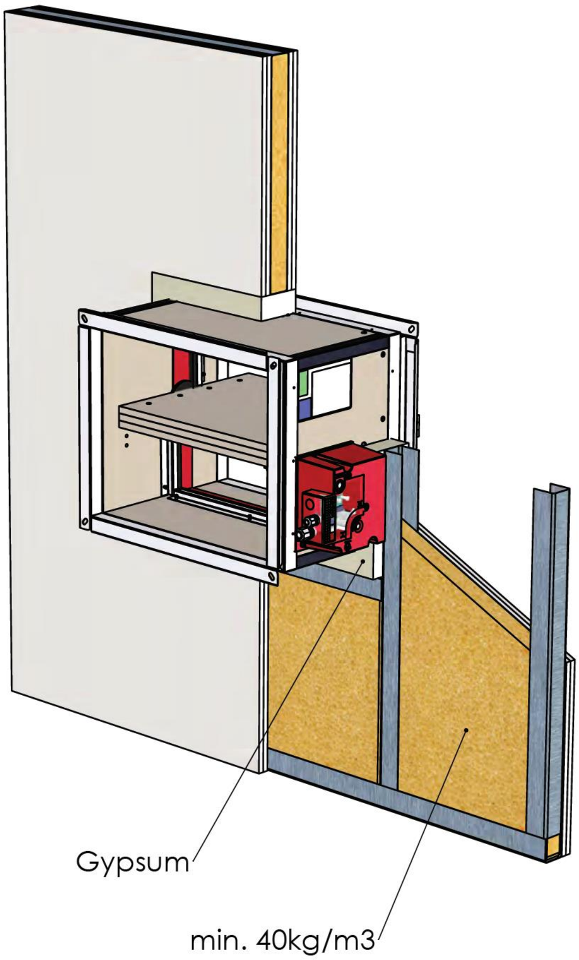
Reference - Subject - Date	Plate
CU2_Installation_16_06_2017	E 6/9

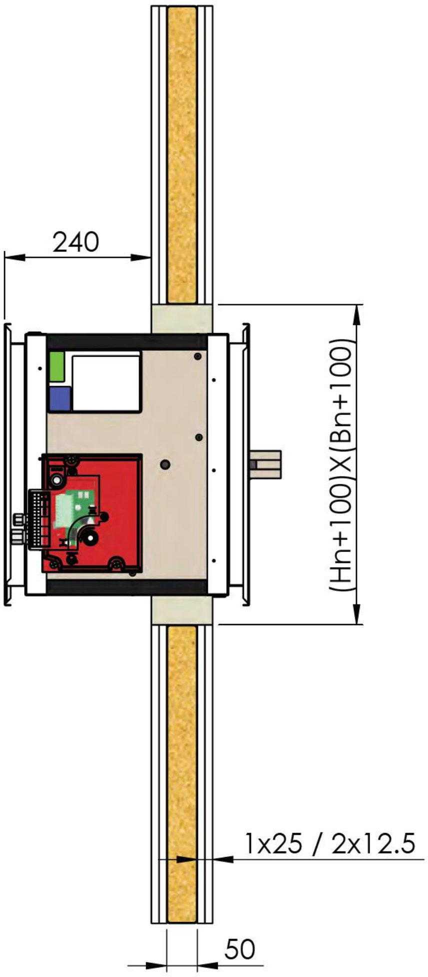
Flexible wall - Metal stud gypsum plasterboard wall

90' (GKB 500Pa<=1200x800)

90' (GKF 300Pa<=1500x800)

Gypsum wall type A/F acc EN 520





Plan Title:

Rf-t www.rft.be

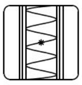
Reference - Subject - Date

CU2_Installation_16_06_2017

Plate

E 6/9

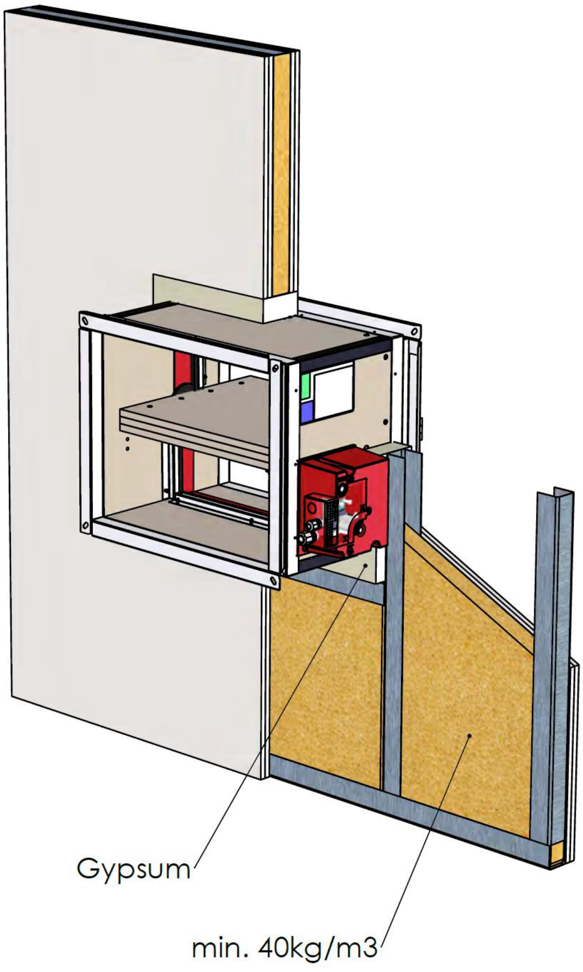
Flexible wall - Metal stud gypsum plasterboard wall

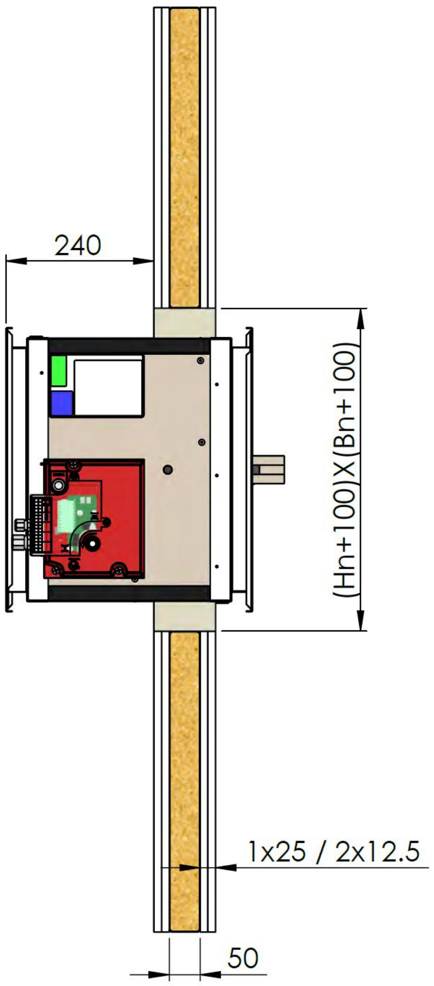


90' (GKB 500Pa<=1200x800)

90' (GKF 300Pa<=1500x800)

Gypsum wall type A/F acc EN 520

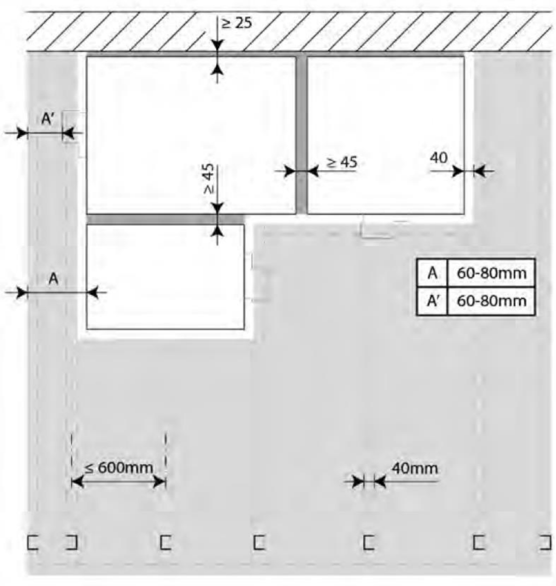




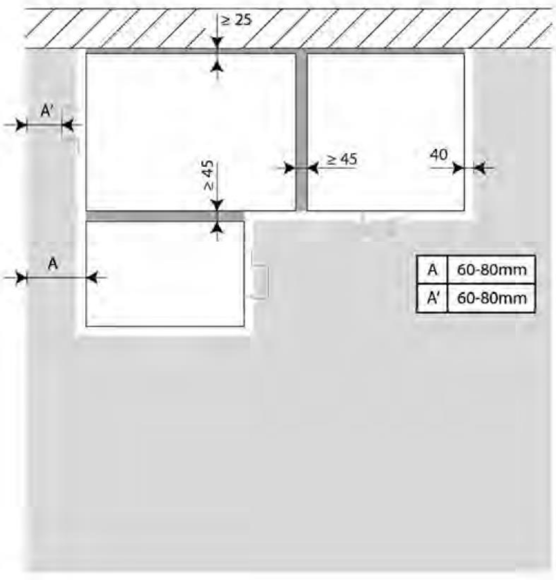
Plan Title:

Rf-t www.rft.be	Reference - Subject - Date CU2_Installation_16_06_2017	Plate E 9/9

Mounting flexible wall at 0 distance



Mounting rigid wall at 0 distance



Plan Title: