



## FSC-EIS CE Fire damper cartridges

### DESCRIPTION

- The fire damper cartridges in the **FSC-EIS-60/120** series are installed inside circular air ducts.
- They act as a separating element between two fire sectors and provide the same fire resistance as the structural elements of the compartments, limiting the risk of fire propagating inside the building.
- Suitable for use in areas of medium special risk (See Spanish Technical Building Code; "Section SI 1 Indoor Propagation").
- FSC-EIS-60/120 fire damper cartridges comply with the following standards:

**European Testing Standard, EN 1366-2**  
(Fire resistance tests for service installations.  
Part 2: Fire dampers)

**European Classification Standard, EN 13501-3**  
(Classification based on data obtained in fire resistance tests of  
products and elements used in building service installations:  
Fire-resistant dampers and ducts)

**European Standard for CE Marking, EN 15650**  
(Ventilation of buildings. Fire dampers)

**European Testing Standard EN 1751**  
(Ventilation of buildings - Air terminal units)  
Aerodynamic testing of dampers and valves)

- The sealing leaf is activated automatically by a spring, shutting off the air passage through the duct.

- Airtight gaskets are fitted both inside and outside the cartridge, thus meeting the conditions required for the letter (S) representing airtightness to cold fumes.
- The sealing leaf comprises an asbestos-free mineral fibre board lined with intumescent material that increases its fire damper capacity and prevents the propagation of smoke at high temperatures.
- The casing is made entirely of welded galvanised steel.
- Stainless steel actuating spring.

### OPERATING CONDITIONS

- Cartridge function is guaranteed under the following conditions:
  - Maximum air speed: 12 m/s
  - Maximum differential pressure: 1200 Pa
- The cartridge can be installed in the building element regardless of orientation ( $v_e$  and  $h_o$ ) and air direction ( $i \leftrightarrow o$ ).
- The cartridges are suitable for ventilation systems where the air does not contain abrasive particles, adhesives or chemicals.
- The cartridges are designed for areas with temperate climates according to EN 60721-3-3. The temperature permitted at the place of installation is -30°C to 50°C.

## DECLARATION OF PERFORMANCE

DECLARATION OF PERFORMANCE (N° 1391-CPR-0008)					V02/19
1. Product and identification name:					Fire Damper Cartridge "FSC-EIS-60" "FSC-EIS-120"
2. Name and address of manufacturer:					Madel Air Technical Diffusion S.A. C/ Pont de les Bruixes P.5, P.I. La Gavarra, 08540 CENTELLES (Barcelona)
3. Uses to:					To prevent fire and reduce smoke spreading from one fire compartment to another through the air ductwork system which may penetrate fire separating vertical compartments, according to Standard EN 15650:2010 (annex ZA.1).
4. Assessment of conformity system:					System 1, according to Construction Products Regulation n° 305/2011
5. Certification body:					PAVUS - 1391 Performed tasks: - Determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; - Initial inspection of the manufacturing plant and of factory production control; - Continuous surveillance, assessment and evaluation of factory production control.  System 1 Certification number: 1391 – CPR – 2019/0008 Test report: Pr-18-2.100, Pr-18-2.101, Pr-18-2.102, PK3-02-18-004-C-0, PK3-02-18-005-C-0, PK3-02-18-006-C-0, Z220180291/A
6. Performances (EN 15650 :2010):					
<i>Essential characteristics</i>					<i>Performances</i>
Dimensions	Type	Wall	Type of installation	Mechanism orientation	Class
Ø 100 - 200 mm	Rigid wall ≥ 100 mm	Mortar or gypsum	Built-in		EIS 120 EIS 60
		Mineral wool boards with fire resistance coating	Built-in		EIS 90 EIS 60
		Mineral stone wool with fire stop coating and cement lime plate	Built-in		EIS 120 EIS 60
	Flexible wall ≥ 100 mm	Mortar or gypsum	Built-in		EIS 120 EIS 60
		Mineral wool boards with fire resistance coating	Built-in		EIS 90 EIS 60
		Mineral stone wool with fire stop coating and cement lime plate	Built-in		EIS 120 EIS 60
	Rigid floor ≥ 110 - Concrete ≥ 125 - Aerated concrete	Mortar or gypsum	Built-in		EIS 90 EIS 60
		Mineral wool boards with fire resistance coating	Built-in		EIS 90 EIS 60
	<b>Nominal activation conditions/ sensitivity:</b>				
Sensing element load bearing capacity					
Sensing element response temperature					
<b>Response delay according to EN 1366-2:</b>					Approved
Closure time					
<b>Operational reliability according to EN 1366-2</b>					
Cycling (opening and closing) on fire test.					NPD (Not determined)
Cycling (opening and closing) according to Standard for CE Marking					NPD (Not determined)
<b>Durability of response delay according to EN1366-2:</b>					Approved
Sensing element response temperature and load bearing capacity					
<b>Durability of operational reliability according to 15650:</b>					NPD (Not determined)
Opening and Closing cycle					
7. The performances of the product identified in point 1, are in line with the declared performance in point 6. This declaration of performance is issued under the responsibility of the manufacturer listed in point 2. Signed for and on behalf of the manufacturer:					
 Joan Arcarons Alibés (Technical director)		Centelles, 05/02/2019			

## CLASSIFICATION

**FSC-EIS- ...** Fire damper cartridge with automatic sealing by bimetallic fuse calibrated at 72°C.

Damper sealing is activated within 120s once 72°C has been reached.

Automatic sealing will not be activated if the temperature in the duct does not exceed 70°C.

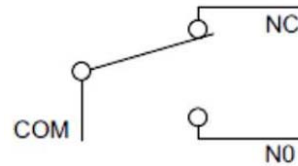
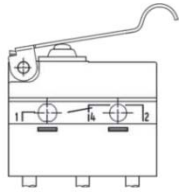
**...- 60** Fire-resistant cartridge EIS 60.

**...- 120** Fire-resistant cartridge EIS 120.



### Accessories:

**... - /CIF** Limit switch contacts to signal closed damper (both blades)



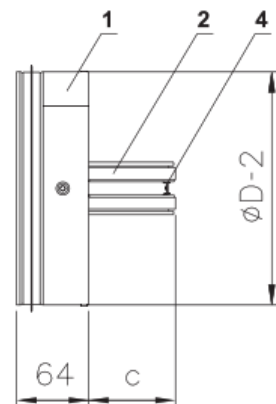
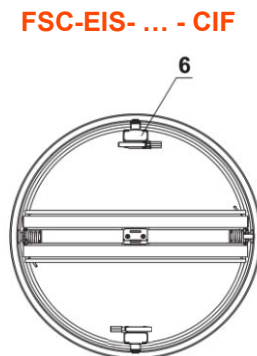
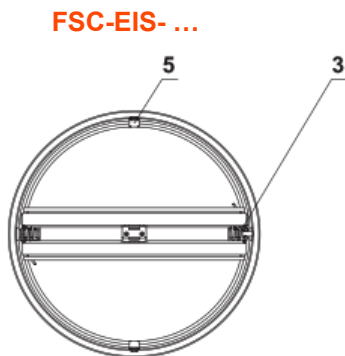
1 (COM) – Black  
2 (NC) – Grey  
4 (NO) – Blue

Rated voltage and maximum current	AC 230V / 5A
IP rating	IP 67
Operating temperature	-25°C ... +120°C

### Connections

- Open contact with closed leaf... 1 + 2
- Closed contact with closed leaf... 1 + 4

## DIMENSIONS/WEIGHTS



Ø <sub>nominal</sub> [mm]	Weight [kg]	A <sub>eff</sub> [m <sup>2</sup> ]	c [mm]
100	0.3	0.0030	17.5
125	0.4	0.0060	30.2
160	0.55	0.0119	48
200	0.75	0.0209	68

- Casing
- Sealing leaf
- Actuating spring
- Thermal fuse
- Locking strip
- CIF

## GENERAL ASPECTS

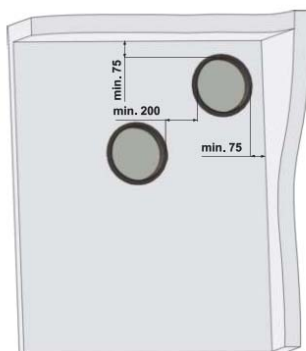
### TRANSPORT, STORAGE AND HANDLING

- Avoid transporting and storing the fire damper cartridges outdoors.
- Temperature during transport or storage must be between -30°C and +40°C, with a maximum relative humidity of 95% (to avoid condensation on the cartridge casing).
- Transport the cartridge with the sealing leaf in closed position.
- Avoid any bangs.
- Avoid contact with liquids.
- Do not place weights on the sealing leaf.
- Do not use the cartridge except for the purpose it was designed for.

### BUILDING ELEMENT AND INSTALLATION

- MADEL fire damper cartridges are classified for use in the types of building elements described in this document or ones of the same type with greater thickness/density/n° of boards (*acc. EN 1366-2*).
- The cartridge will not comply with the classification in the case of any difference in the building element, sealing and/or installation from that described in this document.
- Install the cartridge inside the duct. The axis of the sealing leaf must be inside the building element's section.
- Avoid placing building loads on the duct where the cartridge is to be installed.
- Avoid flying materials coming into contact with the inside of the tunnel and the moving parts of the cartridge.
- Once assembled, the cartridge-duct, damper interior area, damper sealing leaf, airtight gaskets and intumescent gaskets must be visually checked to ensure they are installed correctly.

### MINIMUM DISTANCES (*acc. EN 1366-2*)



- The minimum spacing between fire damper cartridges and building elements must be 75 mm.
- The minimum spacing between fire damper cartridges must be 200 mm.

## INSTALLATION

### OPENING IN BUILDING ELEMENT

Fig. 1 Opening in building element

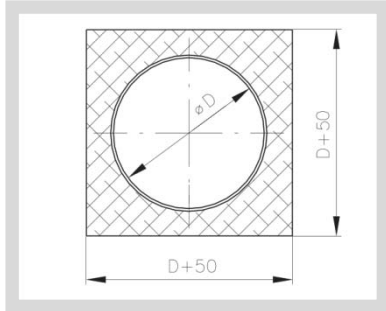


Fig. 2 Opening in building element

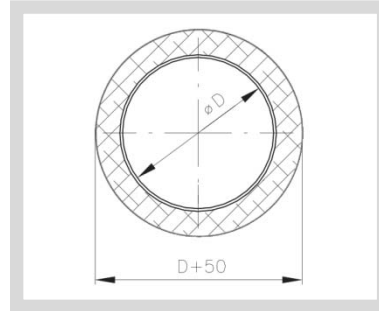
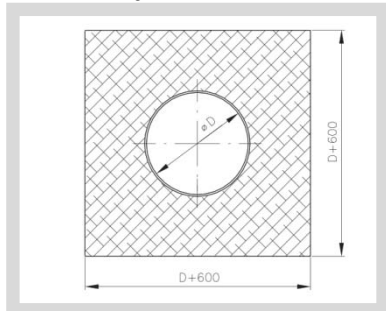


Fig. 3 Opening in building element

Mineral wool boards with fire-resistant coating

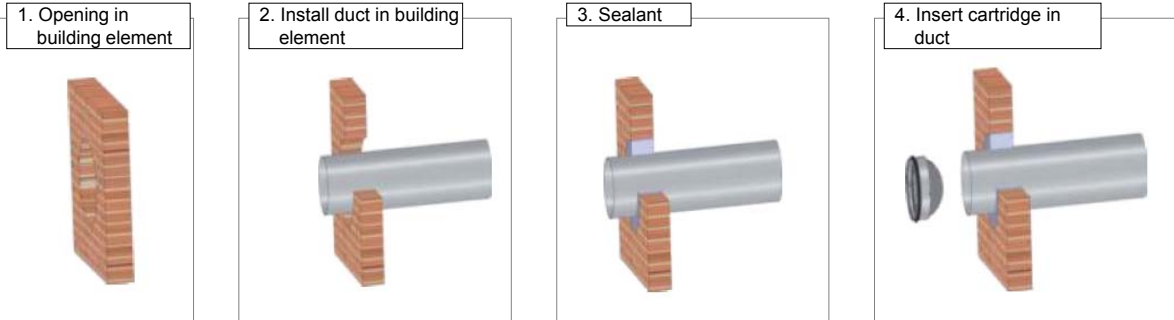


### SYSTEM CLASSIFICATION

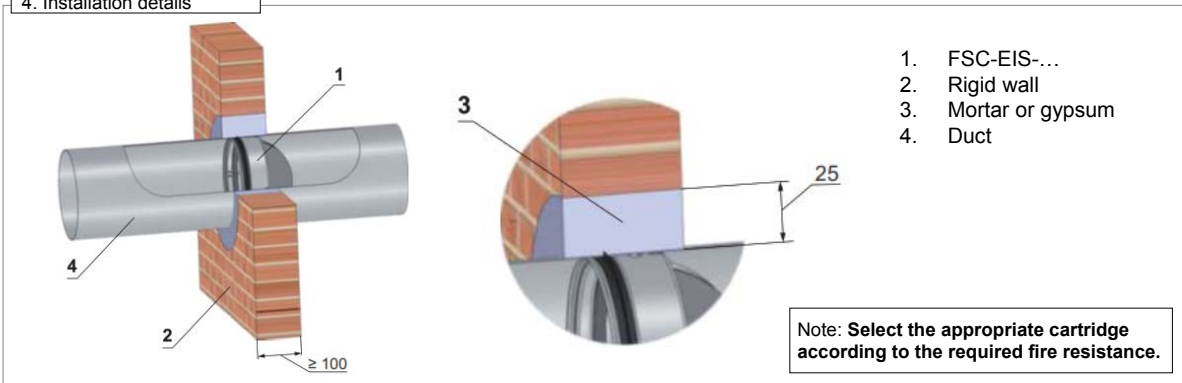
Building element	Sealant	Sealant material	Figure
Rigid wall	Humid	Mortar or gypsum	4
	Dry	Mineral wool boards with fire-resistant coating	5
	Dry	Mineral wool, fire-resistant coating and calcium silicate boards	6
Flexible wall	Humid	Mortar or gypsum	7
	Dry	Mineral wool boards with fire-resistant coating	8
	Dry	Mineral wool, fire-resistant coating and calcium silicate boards	9
Rigid slab	Humid	Mortar or gypsum	10
	Dry	Mineral wool boards with fire-resistant coating	11

## INSTALLATION

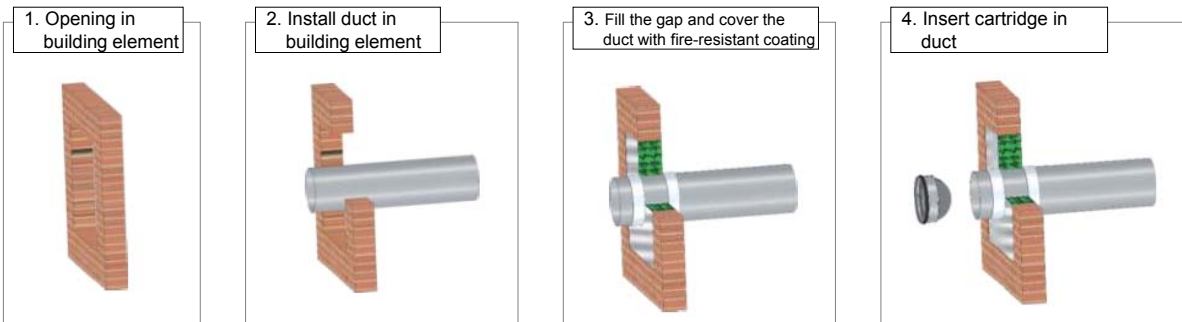
### A. RIGID WALL - Mortar or gypsum (EIS 60/EIS 90/EIS 120)



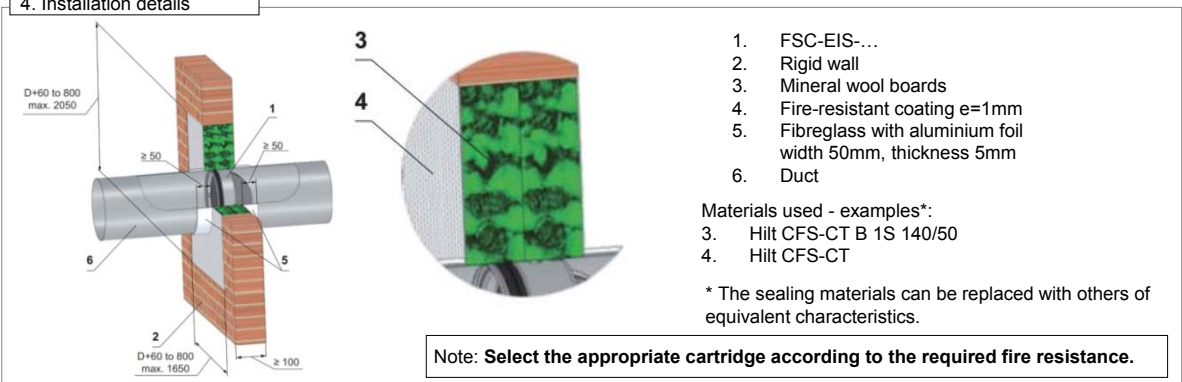
#### 4. Installation details



### B. RIGID WALL - Mineral wool boards with fire-resistant coating (EIS 60/EIS 90)

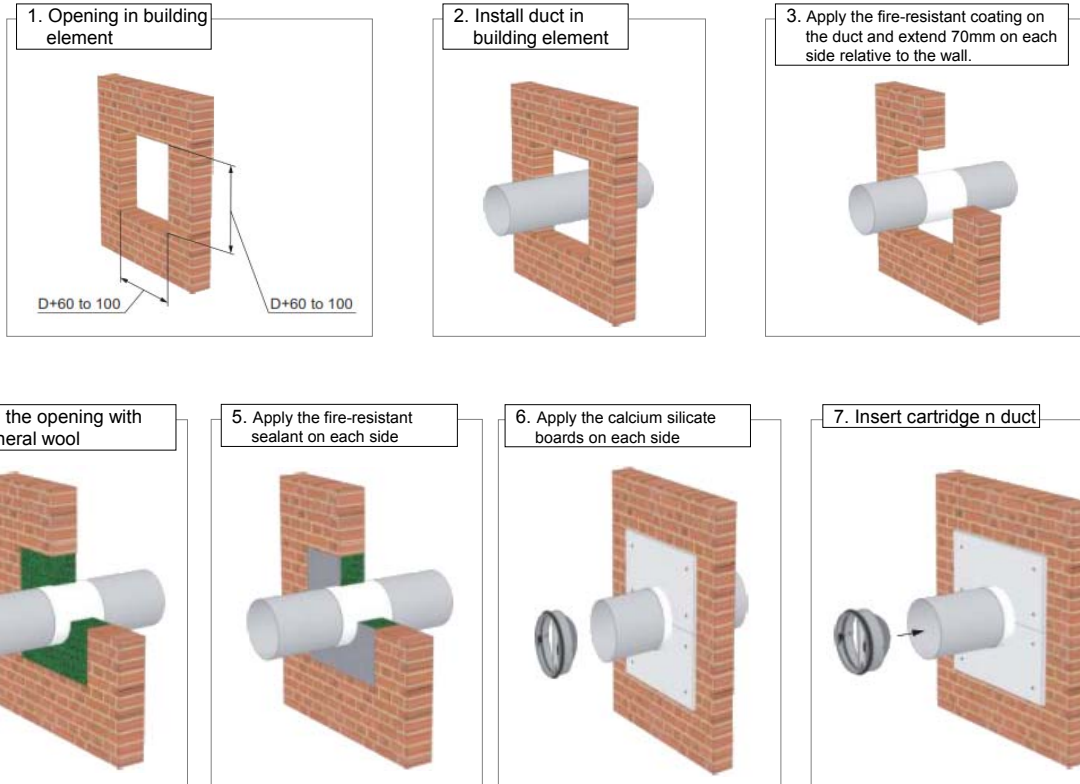


#### 4. Installation details

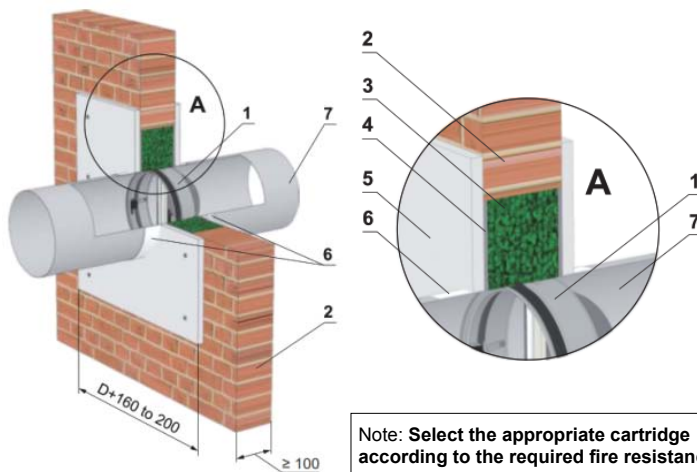


## INSTALLATION

### C. RIGID WALL - Mineral wool with fire-resistant coating and calcium silicate boards (EIS 60/EIS 90/EIS 120).



#### 4. Installation details



1. FSC-EIS-...
2. Rigid wall
3. Mineral wool
4. Fire-resistant sealant e=1mm
5. Calcium silicate board (min. 500 Kg/m<sup>3</sup>\*\*)
6. Fire-resistant coating e=1mm
7. Duct

#### Materials used - examples\*:

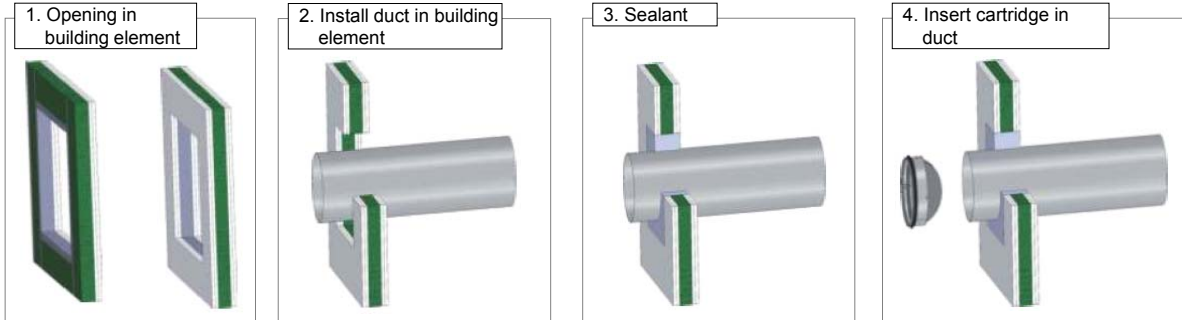
3. Mineral wool (min. 65 Kg/m<sup>3</sup>)
4. PROMASTOP-P (-I), Hilt CFS-S ACR
6. PROMASTOP-E (-CC), Hilt CFS-CT

\* The sealing materials can be replaced with others of equivalent characteristics

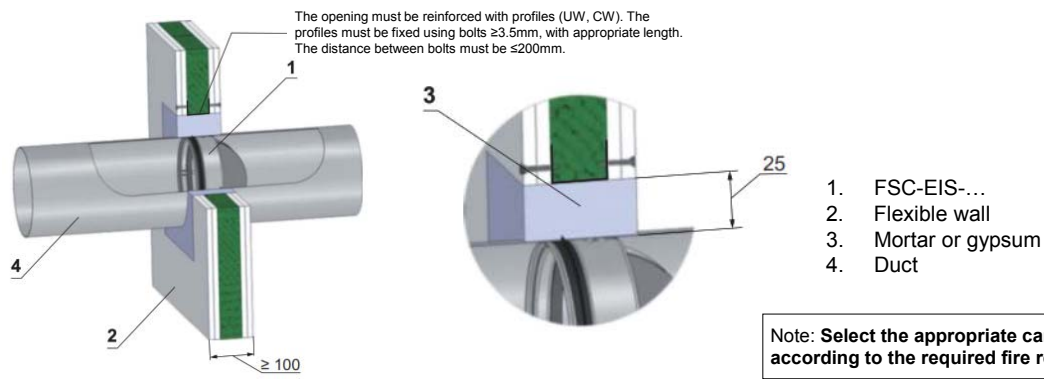
\*\* Thickness according to fire resistance:  
EIS 60: thickness 15mm  
EIS 90/EIS 120: thickness 25mm

## INSTALLATION

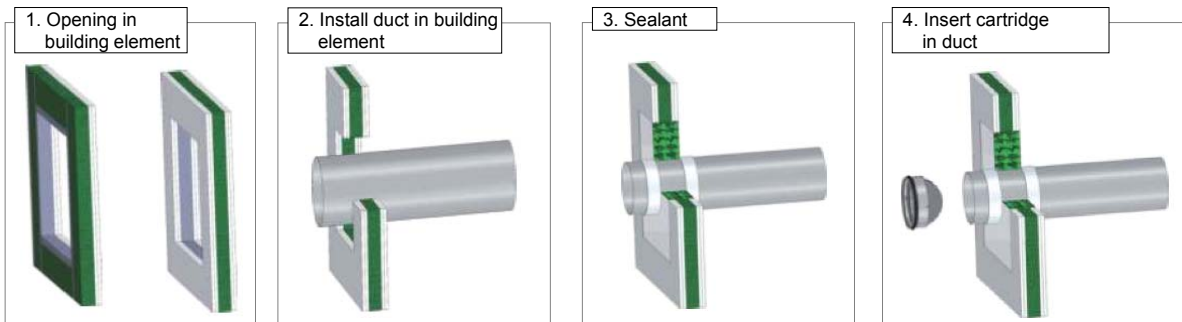
### D. FLEXIBLE WALL - Mortar or gypsum (EIS 60/EIS 90/ EIS 120)



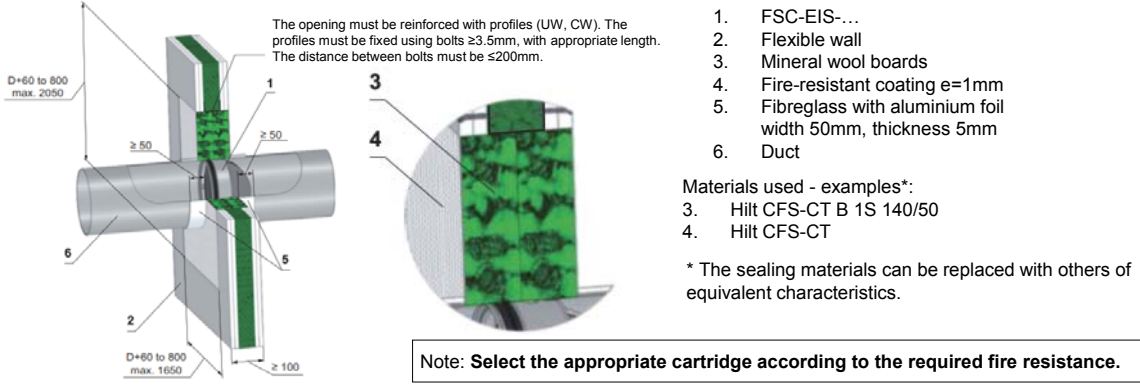
#### 4. Installation details



### E. FLEXIBLE WALL - Mineral wool boards with fire-resistant coating (EIS 60/EIS 90)



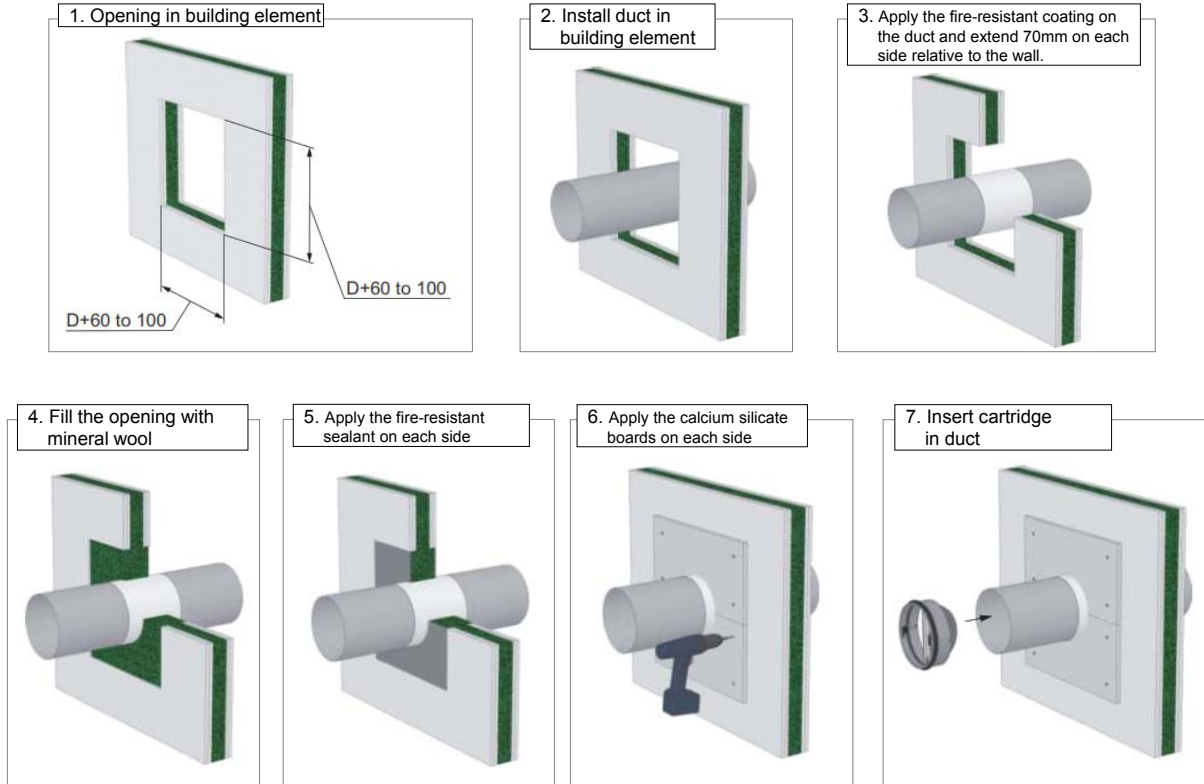
#### 4. Installation details



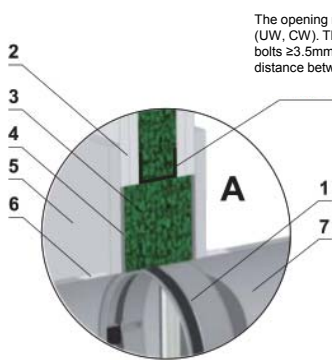


## INSTALLATION

### F. FLEXIBLE WALL - Mineral wool with fire-resistant coating and calcium silicate boards (EIS 60/EIS 90/EIS 120)



#### 4. Installation details



The opening must be reinforced with profiles (UW, CW). The profiles must be fixed using bolts  $\geq 3.5\text{mm}$ , with appropriate length. The distance between bolts must be  $\leq 200\text{mm}$ .

Materials used - examples\*:

3. Mineral wool (min.  $65\text{ Kg/m}^3$ )
4. PROMASTOP-P (-I), Hilt CFS-S ACR
6. PROMASTOP-E (-CC), Hilt CFS-CT

\* The sealing materials can be replaced with others of equivalent characteristics.

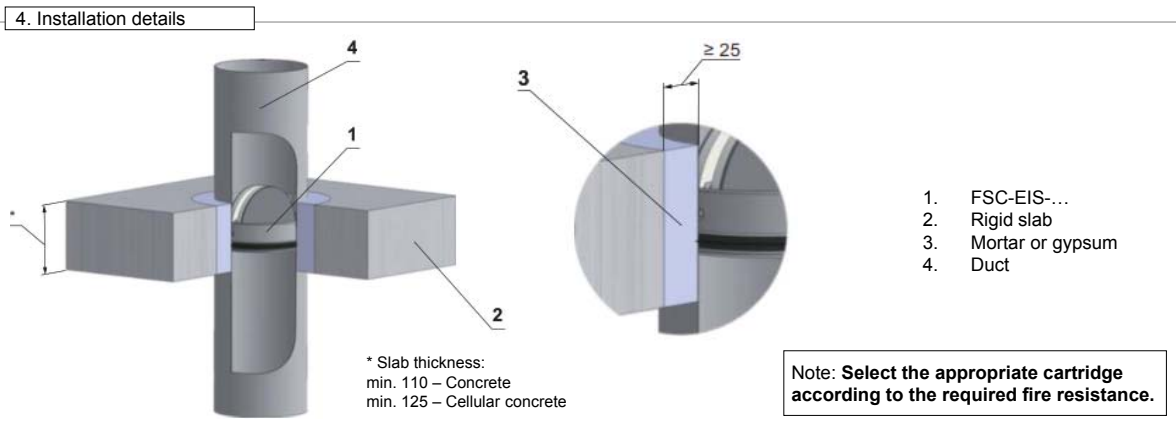
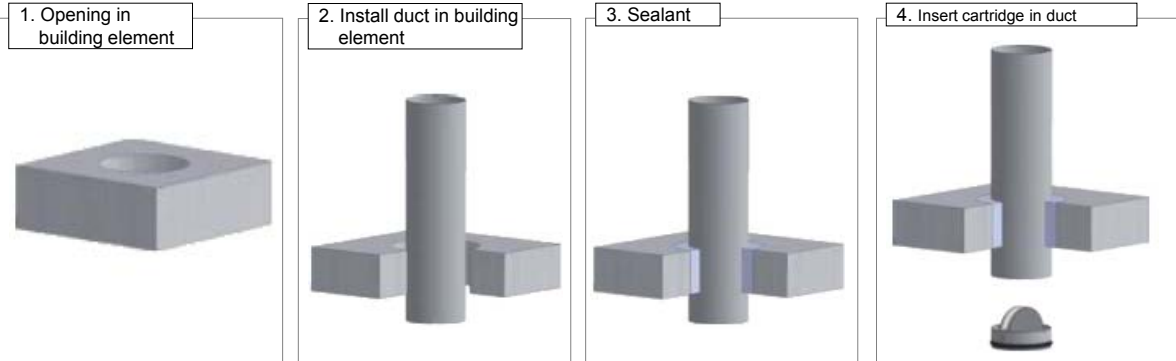
1. FSC-EIS-...
2. Flexible wall
3. Mineral wool
4. Fire-resistant sealant  $e=1\text{mm}$
5. Calcium silicate board (min.  $500\text{ Kg/m}^3$ \*\*)
6. Fire-resistant coating  $e=1\text{mm}$
7. Duct

\*\* Thickness according to fire resistance:  
EIS 60: thickness 15mm  
EIS 90/EIS 120: thickness 25mm

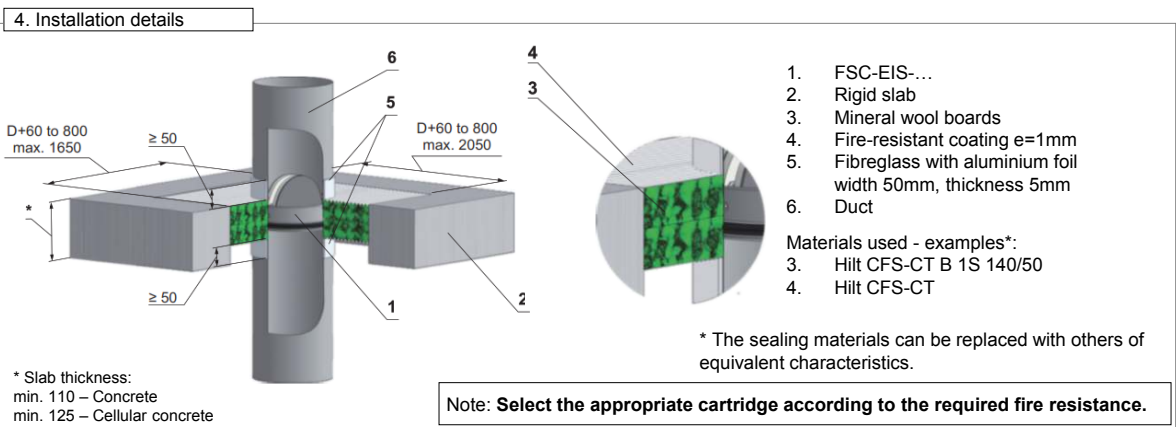
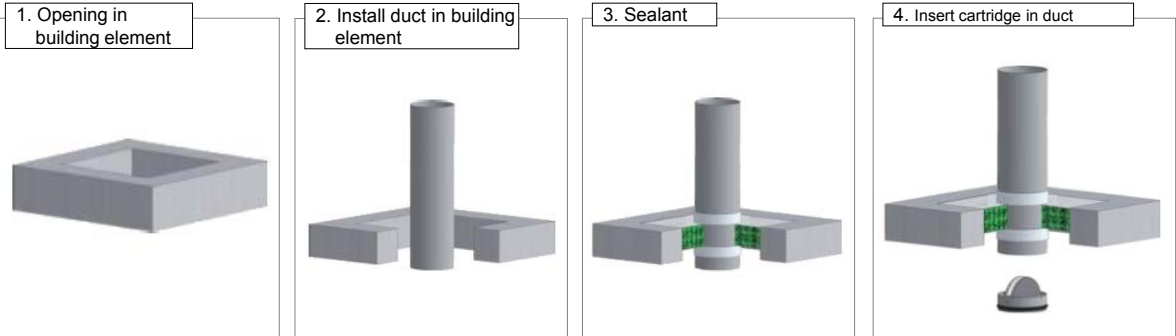
Note: Select the appropriate cartridge according to the required fire resistance.

## INSTALLATION

### G. RIGID SLAB – Mortar or gypsum (EIS 60/EIS 90)



### H. RIGID SLAB - Mineral wool boards with fire-resistant coating (EIS 60/EIS 90)



## TECHNICAL DATA

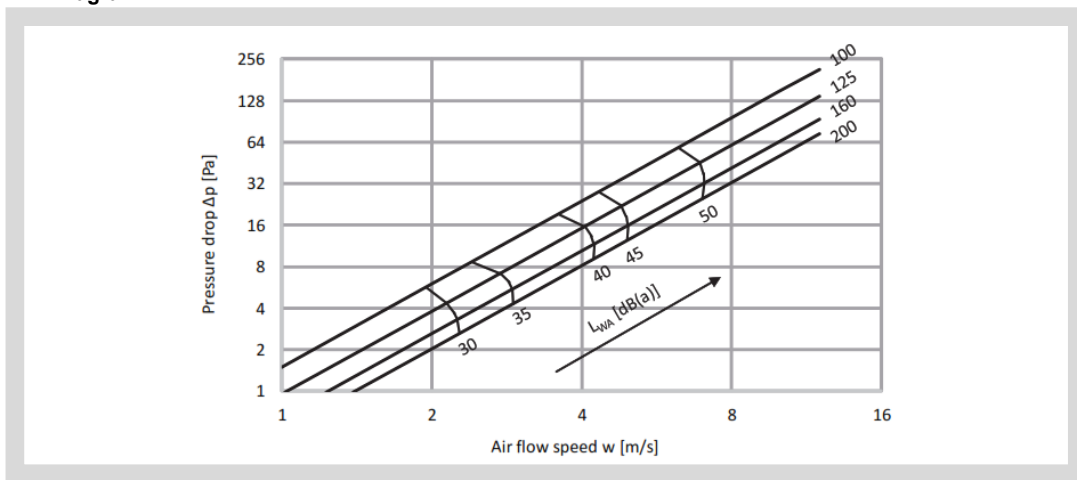
### ▪ Load Loss Calculation

$$\Delta p = \xi \cdot \rho \cdot \frac{w^2}{2}$$

**$\Delta p$  [Pa]**      Load loss  
 **$w$  [m/s]**      Air speed in nominal section  
 **$\rho$  [kg/m<sup>3</sup>]**      Air density  
 **$\xi$  [-]**            Load loss coefficient for nominal damper section

### ▪ Determination of load loss using diagram 1 ( $\rho = 1.2 \text{ kg/m}^3$ ) and acoustic data

Diagram 1



### ▪ Load loss calculation

Table 1

D	100	125	160	200
$\xi$	2,502	1,591	1,086	0,848

### Example of calculation

*Initial details:*      Fire damper cartridge FSC-EIS-120 diam. 200  
                                $V = 600 \text{ m}^3/\text{h}$   
                                $\rho = 1.2 \text{ kg/m}^3$   
                                $S_{\text{ef}} = 0.0209 \text{ m}^2$


*Calculation:*             $w \text{ [m/s]} = (V \text{ [m}^3/\text{h]} / 3600) / S_{\text{ef}} \text{ [m}^2]$   
                                $w = 7.97 \text{ m/s}$

*Table 1*                     $\xi = 0.848$

*Calculation:*             $\Delta p = \xi \cdot \rho \cdot (w^2/2) = 0.848 \cdot 1.2 \cdot (7.97^2 / 2) = 32.3 \text{ Pa}$

*Diagram 1*  $L_{\text{WA}} = 52 \text{ dB}$

**PRODUCT DOCUMENTATION**
**Label design**

MADEL Air Technical Diffusion S.A. P.O. Box 5, E-08540 Centelles (Barcelona)		FSC-EIS-60 Cartuchos cortafuego/ Fire damper cartridge/ Cartouche coupe-feu/ Serranda tagliafuoco terminale	
Clasificación / Classification / Classification / Clasificación		E160 (ve, ho i↔o) S	
Certificado / Certificat / Certificate / Certificato		1391- CPR – 2019/0008	
Diámetro / Diamètre / Diameter / Diametro		200	EN 15650:2010
N.de serie/ N. de série/ Serial Number/ N. di serie		.....	www.madel.com
Accesorios / Accessoires / Accessories / Accessori		/CIF/	<b>EIS 60</b>  1391
Peso / Poids/ Weight / Peso		0.5	

**Summary table**

Model		FSC-EIS-...		
Dimension		diam. 100 - 200		
Support construction	Support construction Thickness [mm]	Sealing	Fire resistance	Figure
Solid wall construction	100	Mortar or gypsum	EIS 120 EIS 90 EIS 60	A
	100	Mineral wool boards with fire resistance coating	EIS 90 EIS 60	B
	100	Mineral stone wool with fire stop coating and cement lime plate	EIS 120 EIS 90 EIS 60	C
Flexible wall	100	Mortar or gypsum	EIS 120 EIS 90 EIS 60	D
	100	Mineral wool boards with fire resistance coating	EIS 90 EIS 60	E
	100	Mineral stone wool with fire stop coating and cement lime plate	EIS 120 EIS 90 EIS 60	F
Solid ceiling construction	110 - Concrete 125 - Aerated concrete	Mortar or gypsum	EIS 90 EIS 60	G
	110 - Concrete 125 - Aerated concrete	Mineral wool boards with fire resistance coating	EIS 90 EIS 60	H

**Coding**

<b>FSC-EIS - 120 - /CIF/ - diam.</b>
<div style="display: flex; justify-content: space-around;"> <span style="border: 1px solid black; padding: 2px;">1</span> <span style="border: 1px solid black; padding: 2px;">2</span> <span style="border: 1px solid black; padding: 2px;">3</span> <span style="border: 1px solid black; padding: 2px;">4</span> </div>
<ol style="list-style-type: none"> <li>1. Product reference</li> <li>2. Fire resistance <ul style="list-style-type: none"> <li><b>60</b> – EIS60</li> <li><b>120</b> – EIS120</li> </ul> </li> <li>3. Accessories <ul style="list-style-type: none"> <li>- /CIF/ Limit switch contacts to signal closed damper</li> </ul> </li> <li>4. Nominal diameter (mm)</li> </ol>

**PRESCRIPTION TEXT**

Supply and assembly of fire damper cartridge to be installed inside a circular ventilation/air-conditioning duct, classified EIS 120 according to standard *EN 13501-3* and CE-certified according to standard *EN 15650*, series **FSC-EIS-120-/CIF/ diam. 200**.  
With manual actuation device.  
Made from galvanized steel and refractory material. Thermal fuse at 72° C. With intumescent and airtight gaskets to prevent the propagation of fumes. Fitted with limit switch contacts.  
With elements necessary for assembly.  
Make **MADEL**.