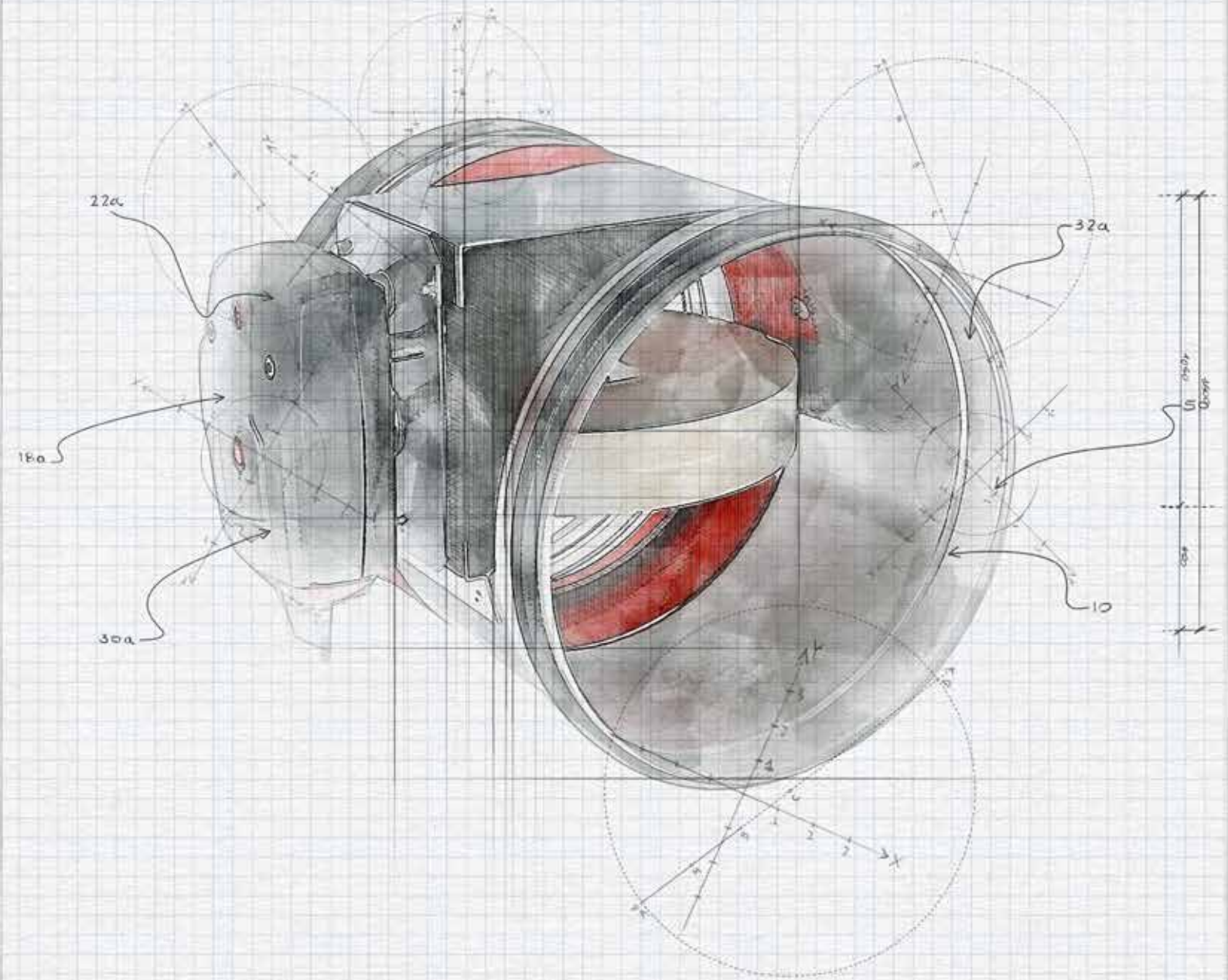
CR2

CIRCULAR FIRE DAMPER FOR LARGE DIAMETERS UP TO EI120S

Product.guide



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1 GENERAL INFO

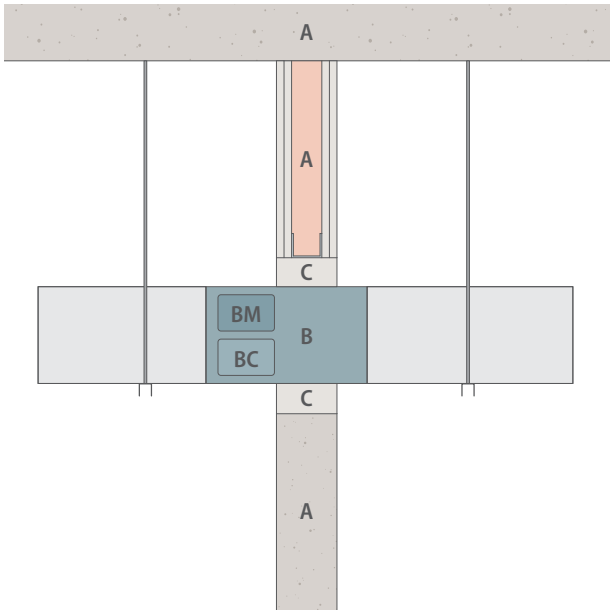
We address this guide to all parties requiring detailed technical information on the fire damper, its installation and technically and regulatory relevant aspects. From designer and design office, to contractor and maintenance engineer. This document aims to provide a clear overview of the various aspects involved in selecting, installing and maintaining a fire damper.

This guide is intended as a supplement to our existing product documentation. Price information can be found in our product catalogue or price list. For a step-by-step guide to installation, we refer you to our technical product sheet.

The logical structure of this document prioritizes ease of use first. The first chapter covers general relevant information. The second chapter delves into the technical aspects of the different models and versions of the fire damper. The third chapter guides the user through the correct installation of the fire damper.

The installation of fire dampers is based on several key principles. Chapter 3 addresses each of these aspects in a clear and concise manner:

- The (load-bearing) constructions in which the fire dampers are installed (compartment boundaries). These are indicated by the letter 'A'. Details are covered in chapter 3.1.
- The sealing of fire dampers is represented by the letter 'C'. Details of this are discussed in chapter 3.2.
- The various installation options, depending on the desired fire resistance, are documented in detail in chapter 3.3.
- Fire dampers are connected to ventilation ducts that are suspended and/or supported. This suspension is discussed in chapter 3.4.
- More info on the connection of the fire damper to the ventilation duct is given in chapter 3.5.



A (load-bearing) construction
B Fire damper
BM: mechanisms
BC: communication
C Sealing

1.1 APPLICATION

Fire dampers are part of the fire safety measures in a building. They are installed where ventilation ducts cross a wall or floor with a fire resistance (compartment boundary). Their purpose is to ensure that the fire resistant properties and smoke tightness of the compartment boundaries are maintained.
Rf-Technologies' dampers are CE marked. They can be equipped with different types of mechanisms according to the specific needs of the project and local regulations.

The CR2 is a circular fire damper for large dimensions up to Ø 630 mm with a fire resistance of up to 120 minutes. The damper tunnel is made of galvanised steel. The CR2 fire damper stands out for its fire resistance and universal installation options in the largest dimensions. For dimensions up to Ø 1000, the rectangular CU2 fire damper can be equipped with a round connection with a sealing ring.

1.2 STANDARDS AND CERTIFICATES

CE certification

All Rf-Technologies fire dampers are CE-certified according to the harmonised European product standard for fire dampers, EN 15650: 2010. Declarations of performance can be consulted at www.rft.eu/dop.

- BCCA-0749-CPR-BC1-606-0464-15650.03-0464 & 2517: certificate of constancy of performance
- EN 1366-2: test standard for fire resistance of fire dampers
- EN 13501-3: classification standard up to EI 120 (v_e, h_o, i ↔ o) S (500Pa)
- EN 60068-2-52: corrosion protection
- EN 1751 ≥ class 2 (leakage through closed damper blade)
- EN 1751 ≥ class ATC 4 (formerly B) (≥class ATC 3 (formerly C) on request) (casing leakage).
- (EU) No 305/2011: in accordance with the Construction Products Regulation
- EN 15882-5 combined penetrations

Other certificates

- The NF label ensures conformity with standard NF S 61-937 parts 1 and 5: 'Systèmes de Sécurité Incendie Dispositifs Actionnés de Sécurité'. It guarantees the classification of fire resistance in accordance with the national Decree of 22 March 2004 and its amendment of 14 March 2011. It guarantees the other properties of the product as mentioned in this document.
- VKF - no 26814
- UKCA Certificate 2822-UKCA-CPR-0054

1.3 GENERAL INSTALLATION GUIDELINES

- Rf-Technologies products should be installed according to the rules of good workmanship, in accordance with the technical manual as well as locally applicable laws, standards and regulations.
- Rf-t fire dampers are always tested in standardised (load-bearing) structures according to EN 1366-2. The results are valid for similar (load-bearing) structures with a fire resistance, thickness and density equal to or greater than the (load-bearing) test structure.
- Rf-t fire dampers can be connected to the ventilation system on one or both sides. For single-sided connections, the other side must be fitted with a non-combustible, sealing grille to prevent access to the damper blade and to ensure no risk of entrapment.
- Rf-t fire dampers can be connected to both combustible and non-combustible ventilation ducts.
- During installation, the safety distances from other construction elements must be respected.
  The operating mechanism must remain accessible: allow a minimum clearance of 200 mm between the operating mechanism and any structural element or other systems.
- Prevent obstruction of the free movement of the damper blade by adjoining ducts or fastening materials.
- Axial orientation: see declaration of performance.
- The air flow direction is arbitrary.
- To guarantee air tightness at all times, the connection between fire damper and duct must be executed correctly following best practices.
- Fire dampers are intended for indoor use and must be protected from outdoor exposure and weather conditions.
- Operating temperature between -30°C and 50°C.
- Use the damper in environments with a maximum of 95% non-condensing humidity (no droplet formation).
- It is recommended to keep the damper blade closed during installation.
- After installation, check that the damper blade can move freely.
- The damper must be accessible for inspection and maintenance.
- Rf-Technologies provides several kits to modify the operating mechanism after installation. Only use these official kits and install them according to the instructions to ensure that the fire dampers classification remains unchanged.
- Transformations or repairs made by third parties without prior written consent from RF-T are not covered under the company's responsibility.

1.4 SAFETY

- Improper use can lead to both material damage or personal injury. We emphasize the importance of adhering to general and specific safety guidelines for installers, particularly when working at heights.
- Injuries caused by sharp edges are a real risk. Wearing appropriate gloves, safety shoes and a safety helmet helps prevent accidents.
- Always pay attention to ergonomic factors when handling and installing fire dampers.
- During damper testing, ensure fingers or hands are not trapped by the damper blade.
- Electrical connections must be made by qualified personnel to avoid electrical shocks. It is recommended to switch off the power during installation work.

1.5 INSPECTION AND MAINTENANCE

A fire damper is maintenance-free. The fire damper and mechanisms must always remain accesible. After installation, the correct operation of the fire damper (opening and closing of the damper blade) must be checked immediately. Subsequently, the fire damper must be checked every six months to identify potential damage in a timely manner (see art. 8.3 of EN 15650 - product standard for fire dampers). Local inspection regulations and EN 13306 must also be followed.

Record the findings in a logbook. While this is not mandatory, it is highly practical.

The owner or user of the installation is responsible for ensuring its proper functioning.

POINTS OF ATTENTION:

During installation, sealing materials may contaminate the fire damper. Ensure no debris remains inside the damper, and the damper blade must be able to move freely. Clean the damper thoroughly inside if necessary. Keeping the damper blade closed during installation can be helpful.

The sealing materials used must also not impair the operation of the mechanisms. This can be verified by manually opening and closing the fire damper after installation. It is recommended to shield the mechanism and moving parts during installation where needed.

If using a monitoring and control system, validate the operation by opening and closing the fire damper using the control system. At the same time, confirm the proper functioning of the status indicators for the start and end position contacts.

RECOMMENDED INSPECTIONS:

- ☑ Damper cleanliness: clean where necessary with a dry or damp cloth. Local regulations often dictate how the ventilation system should be cleaned.
- ☑ Inspect the condition of the damper, its blade and the connection to the structure.
- ☑ Test the control mechanism's functionality by manually opening and closing the damper blade.
- ☑ Check the wiring for the power supply and the start and end position contacts (if applicable).
- ☑ Validate the operation of the start and end contacts (if applicable).
- ☑ When using a monitoring and control system: check the opening and closing of the damper blade through the system and confirm that the fire damper performs its function correctly within the system (if applicable).
- ☑ After the inspection, ensure that the fire damper is returned to its open position.

Contact Rf-Technologies in case of any problems (service@rft.eu / contact details at www.rft.eu).

CLEANING THE FIRE DAMPER:

We recommend regularly cleaning ventilation ducts and fire dampers. Cleaning the fire damper can be done with a dry or damp cloth. Household cleaning agents are permitted, as long as it does not contain abrasive components. Mechanical cleaning with rotating and/or telescopic brushes is not allowed.

If hygiene requirements apply, use disinfectants that comply with the applicable regulations, e.g. disinfectants according to the list of the Robert Koch Institute. Here, consider the damper's corrosion resistance.

1.6 STORAGE AND LOGISTICS

As fire dampers are safety devices, they require careful handling and storage.
Avoid shocks, damage, exposure to water and deformation of the product.

Hidden defects will only be considered for warranty if they are reported to Rf-Technologies within 5 days of detection.

It is recommended to

- ☑ unload in a dry area
- ☑ do not tilt the damper in order to move it
- ☑ not to use the damper as a rack, work table, etc.
- ☑ do not store smaller dampers inside larger dampers
- ☑ -30°C ≤ use temperature ≤ 50°C
- ☑ Sort packaging in an environmentally conscious manner.

2 TECHNICAL DATA

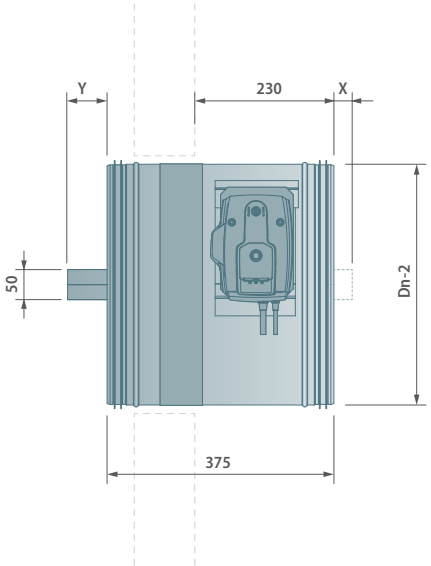
2.1 FIRE DAMPER

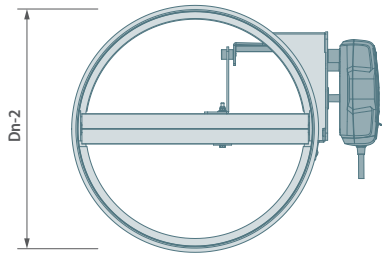
2.1.1 CR2

The CR2 fire damper is a circular fire damper, available up to a diameter of 630 mm*.It has a fire resistance of up to 120 minutes. The CR2 fire damper has a tunnel made of galvanised steel with a damper blade made of moisture-resistant and asbestos-free material.
* For dimensions up to Ø 1000 mm, see CU2 fire damper.

Range and dimensions

	≥	≤
Dn [mm]	200	630

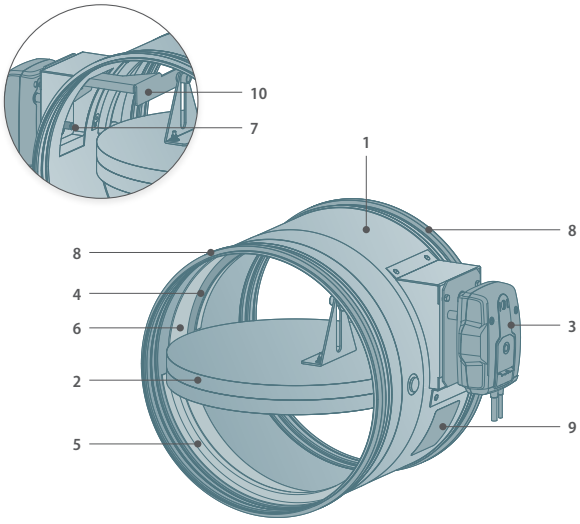




Exceeding blade: X = on the mechanism side, Y = on the wall side

Dn [mm]	200	250	315	355	400	450	500	560	630
X	-	-	-	-	-	-	-	15	50
Y	-	-	24	44	66	91	116	146	181

Components



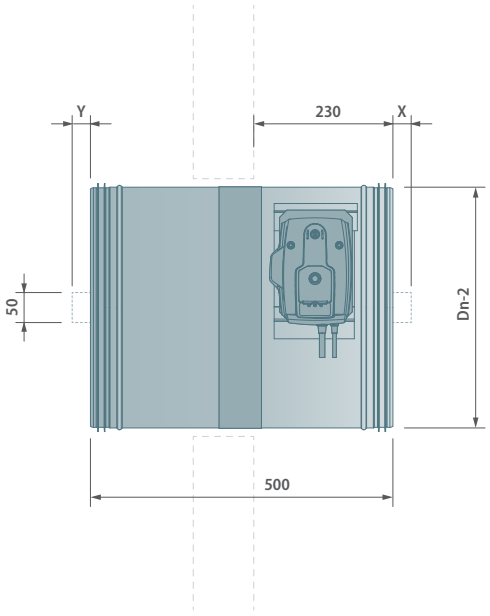
1. galvanised steel tunnel
2. damper blade
3. operating mechanism
4. cold smoke seal
5. damper blade stop
6. intumescent joint
7. fusible link
8. rubber sealing ring
9. product identification
10. transmission

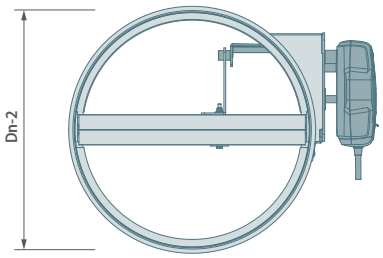
2.1.2 CR2-L500

CR2 fire damper with extended tunnel on the wall side to facilitate duct connection if walls thicker than 100 mm. For dampers up to Ø 500 mm, the damper blade does not protrude, allowing a grille or bend to be connected directly.

Range and dimensions

	≥	≤
Dn [mm]	200	630

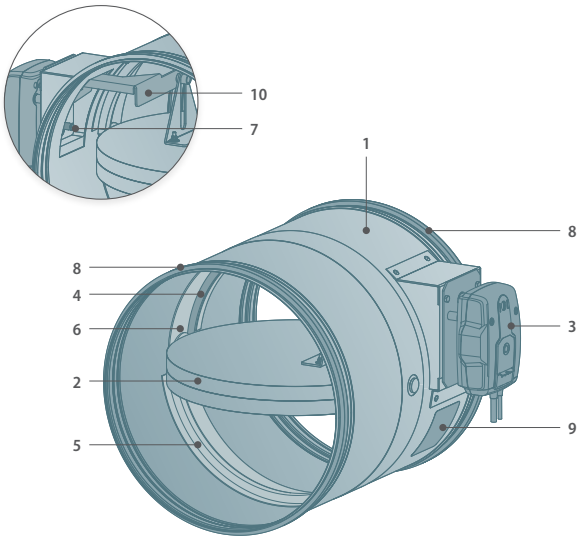




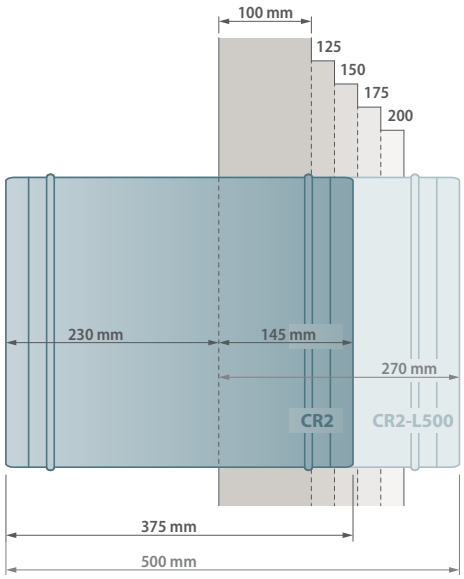
Exceeding blade: X = on the mechanism side, Y = on the wall side

Dn [mm]	200	250	315	355	400	450	500	560	630
X	-	-	-	-	-	-	-	15	50
Y	-	-	-	-	-	-	-	21	56

Components



1. galvanised steel tunnel
2. damper blade
3. mechanism
4. cold smoke seal
5. damper blade stop
6. intumescent joint
7. fusible link
8. rubber sealing ring
9. product identification
10. transmission



Extended fire dampers can facilitate installation, for example, in wider walls. To improve the ease of installation, the CR2, with a standard length of 375 mm, can be replaced by a longer 500 mm version (CR2-L500).

2.1.3 PRODUCT LABEL

The product label of the fire damper specifies unique information that allows individual traceability of the fire damper. It is possible to add an additional customer reference per fire damper on the product label. For more information, please contact Rf-t.

In addition, each fire damper is supplied with a QR-linked manual.

①	Manufacturer Air tightness class	
②	Description of the damper and its options Classification of the damper	
③	Description mechanism and performance	
④	CE marking DoP web address with declaration of performance Reference standard Certified body	Production log
⑤	Customer order reference	

2.2 MECHANISMS

2.2.1 Overview

The CR2 fire damper can be equipped with different types of mechanisms.

	MECHANISM	TYPE	VERSION	
CR2(-L500)	Fusible link	CFTH	Standard	
			CFTH + FCU	
			CFTH + FDCU	
			CFTH + FDCB	
	Motorised	ONE	24 V	Unipolar limit switch with or without plug FDCU(-ST)
				Bipolar auxiliary limit switch FDCB
			230 V	Unipolar limit switch with or without plug FDCU(-ST)
				Bipolar auxiliary limit switch FDCB
		BELIMO	24 V	With or without thermoelectric fusible link/plug BFL(T)(-ST)
				With or without thermoelectric fusible link/plug BFN(T)(-ST)
			230 V	With or without#thermoelectric fusible link/plug#BFL(T)(-ST)
				With or without#thermoelectric fusible link/plug#BFN(T)(-ST)
	Motorised with integrated communication module	ONE-X	24 V	
			230 V	

More info at https://www.rft.eu/en-gb/products/fire-damper/cr2/mechanisms

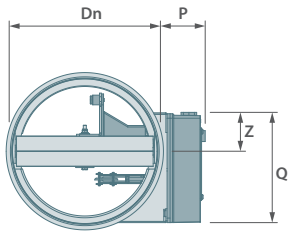
2.2.2 CR2 WITH FUSIBLE LINK MECHANISM CFTH

The release mechanism CFTH automatically closes the fire damper blade when the temperature in the duct exceeds 72°C. The temperature rise causes the fusible link to react. This causes a strained, internal torsion spring to relax which brings the damper blade to its safety position (closed). The proper functioning of the fire damper can be tested periodically by manual release and resetting.

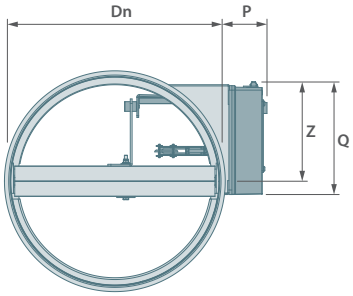
The position of the damper blade can optionnaly be monitored. An end-of-run switch (FCU) indicates that the damper blade is closed. A unipolar limit switch (FDCU) indicates an open or a closed position of the damper blade.

A bipolar auxiliary limit switch (FDCB) provides a double pass-through and signals an open position of the damper blade twice and a closed position of the damper blade twice.

1. release button
2. re-arming lever
3. cable entry



CFTH (Dn < 315 mm)



CFTH (Dn ≥ 315 mm)

Dn < 315 mm

	CFTH
P	81
Q	182
Z	58

Dn ≥ 315 mm

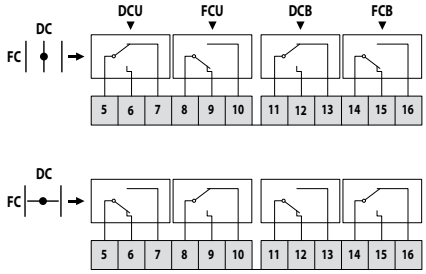
	CFTH
P	85
Q	182
Z	156

Detailed features

RUNNING TIME SPRING RETURN	POSITION SWITCHES STANDARD
1s	1mA...6A, DC 5V...AC 250V

OPERATIONAL RELIABILITY	PROTECTION CLASS
50 cycles	IP 42

Electrical connection diagram

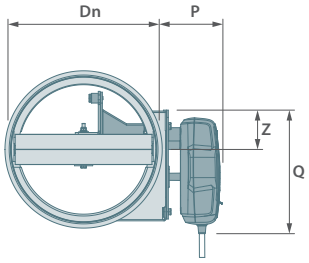


DC : Switch open position fire damper
FC : Switch closed position fire damper

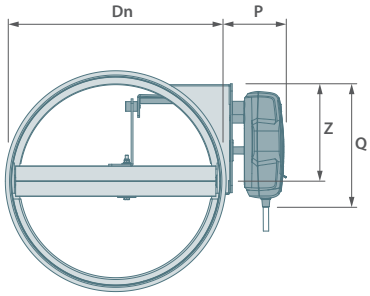
2.2.3 CR2 WITH SPRING RETURN ACTUATOR ONE

The Rf-t spring return actuator ONE has been specially developed to easily monitor and automatically and remotely control Rf-t fire dampers of all sizes. The ONE is available in 24V and 230V versions. A thermal fusible link reacts when the temperature exceeds 72°C. The ONE comes standard with a unipolar limit swicht (FDCU) but can also be fitted with a double set of start and end switch contactes (FDCB). It can also be optionally equipped with plug (ST) to facilitate connection.

1. release button
2. damper blade position indicator
3. LED
4. battery compartment for resetting
5. plug connector (ST) (optional)



ONE (Dn < 315 mm)



ONE (Dn ≥ 315 mm)

Dn < 315 mm

	ONE
P	105
Q	199
Z	60

Dn ≥ 315 mm

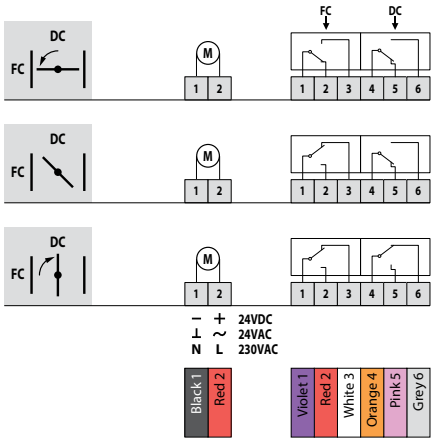
	ONE
P	105
Q	199
Z	157

Detailed features

ONE T	MOTOR RATED VOLTAGE	POWER (AT REST)	POWER (IN USE)
24 FDCU	24 V AC/DC (-10/+20%)	0,28W	4,2W
230 FDCU	230 V AC (-15/+15%)	0,57W	4,2W
24 FDCU ST	24 V AC/DC (-10/+20%)	0,28W	4,2W
230 FDCU ST	230 V AC (-15/+15%)	0,57W	4,2W
24 FDCB	24 V AC/DC (-10/+20%)	0,28W	4,2W
230 FDCB	230 V AC (-15/+15%)	0,57W	4,2W

ONE T	POSITION SWITCHES STANDARD	MOTOR REINFORCEMENT TIME
24 FDCU	1mA...1A 60V	< 75 s (wired) / < 85 s (battery)
230 FDCU	1mA...100mA 230V	< 75 s (wired) / < 85 s (battery)
24 FDCU ST	1mA...1A 60V	< 75 s (wired) / < 85 s (battery)
230 FDCU ST	1mA...100mA 230V	< 75 s (wired) / < 85 s (battery)
24 FDCB	1mA...1A 60V	< 75 s (wired) / < 85 s (battery)
230 FDCB	1mA...1A 60V	< 75 s (wired) / < 85 s (battery)

Electrical connection diagram

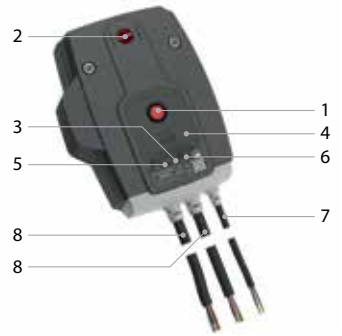


DC : Switch open position fire damper
FC : Switch closed position fire damper

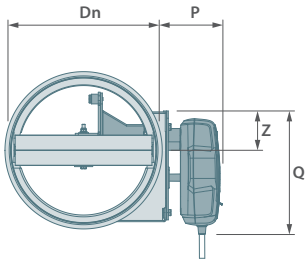
ONE T	RUNNING TIME SPRING	OPERATIONAL RELIABILITY	PROTECTION CLASS	CABLE POWER SUPPLY	CABLE SWITCH
24 FDCU	< 30 s	10,000 cycles	IP 54	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
230 FDCU	< 30 s	10,000 cycles	IP 54	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
24 FDCU ST	< 30 s	10,000 cycles	IP 54	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
230 FDCU ST	< 30 s	10,000 cycles	IP 54	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
24 FDCB	< 30 s	10,000 cycles	IP 54	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (2x) (halogen-free)
230 FDCB	< 30 s	10,000 cycles	IP 54	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (2x) (halogen-free)

2.2.4 CR2 WITH SPRING RETURN ACTUATOR ONE-X

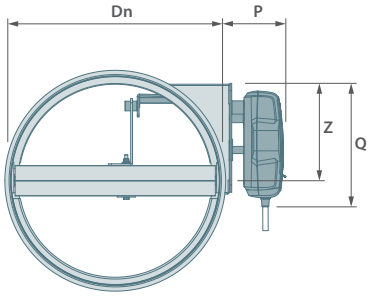
The ONE-X is a spring return actuator with an integrated communication module. The ONE-X allows automatic and remote control of the full range of Rf-t fire dampers. When the spring return actuator is energised, it brings the damper blade into its waiting position. If the voltage is interrupted or the temperature in the ventilation duct exceeds 72°C, the internally tensioned spring brings the damper into safety position. Manual rearming of the spring return actuator is done using a standard 9V battery. Thanks to the integrated communication module, using a ZENiX controller, you can read the status of the fire damper and control it remotely. Via bus communication, it is possible to read the status of the fire damper even when the power supply on the fire damper is not yet connected. 3 LEDs on the ONE-X display the status of the damper, of the bus communication and any error messages. The ONE-X exists in 2 variants: 24V and 230V.



1. release button
2. damper blade position indicator
3. LED red: status
4. battery compartment
5. LED blue: communication
6. LED orange: error message
7. power supply
8. bus cable



ONE-X (Dn < 315 mm)



ONE-X (Dn ≥ 315 mm)

Dn < 315 mm

	ONE-X
P	105
Q	199
Z	60

Dn ≥ 315 mm

	ONE-X
P	105
Q	199
Z	157

Detailed features

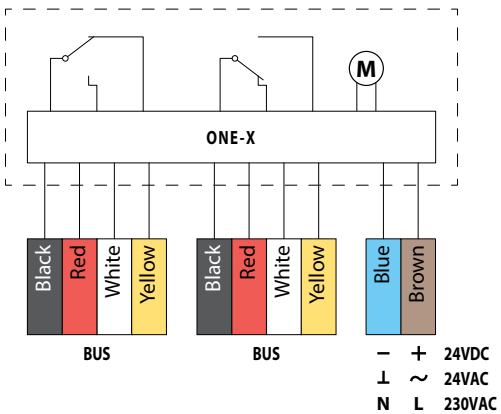
ONE-X	MOTOR RATED VOLTAGE	POWER (AT REST)	POWER (IN USE)
ONE-X 24	24 V AC/DC (-10/+20%)	0,28W	4,2W
ONE-X 230	230 V AC (-15/+15%)	0,57W	4,2W

ONE-X	POSITION SWITCHES STANDARD	MOTOR REINFORCEMENT TIME
ONE-X 24	1mA...1A 60V	< 75 s (wired) / < 85 s (battery)
ONE-X 230	1mA...1A 60V	< 75 s (wired) / < 85 s (battery)

ONE-X	RUNNING TIME SPRING	OPERATIONAL RELIABILITY	PROTECTION CLASS
ONE-X 24	< 30 s	10,000 cycles	IP 54
ONE-X 230	< 30 s	10,000 cycles	IP 54

ONE-X	CABLE POWER SUPPLY	CABLE BUS
ONE-X 24	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 4 x 0.75 mm² (2x) (halogen-free)
ONE-X 230	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 4 x 0.75 mm² (2x) (halogen-free)

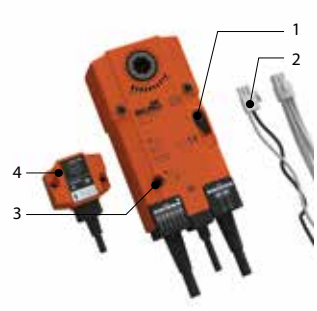
Electrical connection diagram



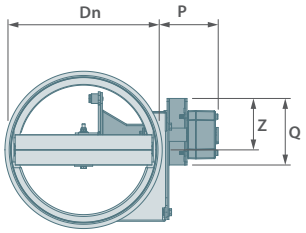
2.2.5 CR2 WITH SPRING RETURN ACTUATOR BELIMO

The spring return actuator BFL-T(-ST) is specially designed to remotely monitor, open and operate fire dampers and is available in 24V and 230V versions. The BFL version is intended for CR2 fire dampers up to and including Ø 400 mm. A thermoelectric fuse (T) that reacts when the temperature exceeds 72°C is included, a plug (ST) to facilitate connection.

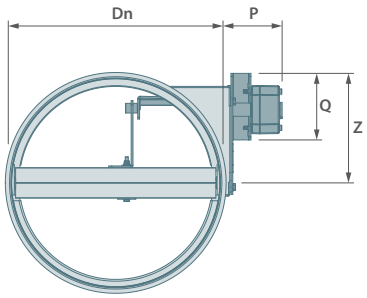
The motor is equipped with a beginning -and end of range switch as standard, but can also be fitted with a double set of beginning -and end of range switches (SN2).



1. locking button
2. plug connection (ST) (optional)
3. access for manual resetting
4. thermoelectric fuse (T)



BFL (Dn < 315 mm)



BFL (Dn ≥ 315 mm)

Dn < 315 mm

	BFL(T)
P	101
Q	110
Z	80

Dn ≥ 315 mm

	BFL(T)
P	104
Q	110
Z	179

Detailed features

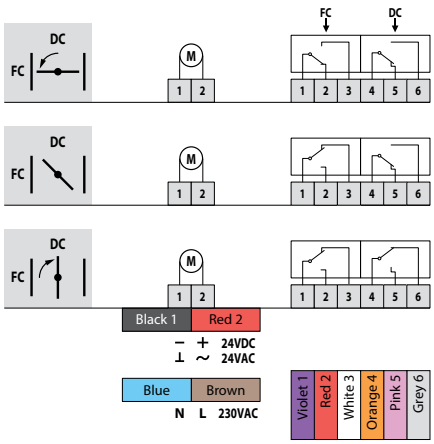
BFL(T)	MOTOR RATED VOLTAGE	POWER (AT REST)	POWER (IN USE)
BFL24(-ST)	24 V AC/DC	0,7W	2,5W
BFL230	230 V AC	0,9W	3W
BFLT24(-ST)	24 V AC/DC	0,8W	2,5W
BFLT230(-ST)	230 V AC	1,1W	3,5W

BFL(T)	POSITION SWITCHES STANDARD	MOTOR REINFORCEMENT TIME	RUNNING TIME SPRING
BFL24(-ST)	1mA...3A, AC 250V	< 60 s	20 s
BFL230	1mA...3A, AC 250V	< 60 s	20 s
BFLT24(-ST)	1mA...3A, AC 250V	< 60 s	20 s
BFLT230(-ST)	1mA...3A, AC 250V	< 60 s	20 s

BFL(T)	OPERATIONAL RELIABILITY	PROTECTION CLASS
BFL24(-ST)	10,000 cycles	IP 54
BFL230	10,000 cycles	IP 54
BFLT24(-ST)	10,000 cycles	IP 54
BFLT230(-ST)	10,000 cycles	IP 54

BFL(T)	CABLE POWER SUPPLY	CABLE SWITCH
BFL24(-ST)	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
BFLT24	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
BFLT24(-ST)	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
BFLT230(-ST)	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)

Electrical connection diagram

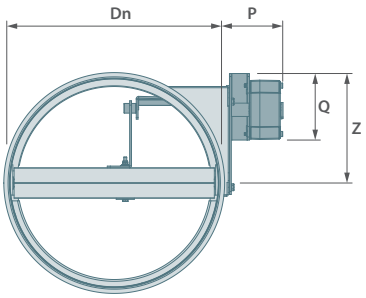


DC : Switch open position fire damper
FC : Switch closed position fire damper

The spring return actuator BFN(T)(-ST) is intended for CR2 fire dampers from Ø 450 mm and is available in 24V and 230V versions. A thermoelectric fuse (T) that reacts when the temperature exceeds 72°C.

The motor is equipped with a beginning -and end-of-range switch as standard, but can also be fitted with a double set of beginning -and end-of-range switch (SN2).

1. locking button
2. plug connection (ST) (optional)
3. access for manual resetting
4. thermoelectric fuse (T)



BFN

	BFN(T)
P	104
Q	110
Z	179

Detailed features

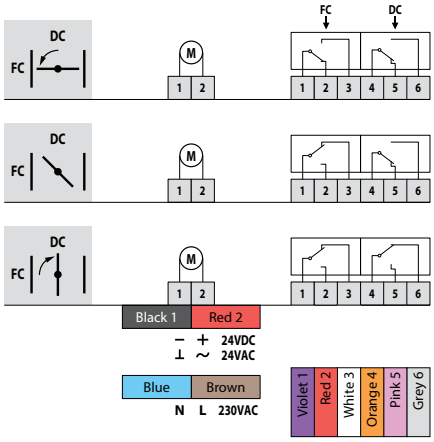
BFN(T)	MOTOR RATED VOLTAGE	POWER (AT REST)	POWER (IN USE)
BFN24(-ST)	24 V AC/DC	1,4W	4W
BFN230	230 V AC	2W	4,5W
BFNT24(-ST)	24 V AC/DC	1,4W	4W
BFNT230(-ST)	230 V AC	2,1W	5W

BFN(T)	POSITION SWITCHES STANDARD	MOTOR REINFORCEMENT TIME	RUNNING TIME SPRING
BFN24(-ST)	1mA...3A, AC 250V	< 60 s	20 s
BFN230	1mA...3A, AC 250V	< 60 s	20 s
BFNT24(-ST)	1mA...3A, AC 250V	< 60 s	20 s
BFNT230(-ST)	1mA...3A, AC 250V	< 60 s	20 s

BFN(T)	OPERATIONAL RELIABILITY	PROTECTION CLASS
BFN24(-ST)	10,000 cycles	IP 54
BFN230	10,000 cycles	IP 54
BFNT24(-ST)	10,000 cycles	IP 54
BFNT230(-ST)	10,000 cycles	IP 54

BFN(T)	CABLE POWER SUPPLY	CABLE SWITCH
BFN24(-ST)	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
BFN230	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
BFNT24(-ST)	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)
BFNT230(-ST)	1 m, 2 x 0.75 mm² (halogen-free)	1 m, 6 x 0.75 mm² (halogen-free)

Electrical connection diagram



DC : Switch open position fire damper
FC : Switch closed position fire damper

2.3 MONITORING AND CONTROL OF FIRE DAMPERS

Fire dampers with spring return actuators need to be monitored and controlled remotely. A bus network-based control and monitoring system can be used for this purpose. Such a system allows continuous and individual monitoring of all fire dampers (including non-motorised ones). It can automate function tests and provide the necessary reporting. In case of fire, the control system will automatically and immediately execute the programmed scenarios (close the necessary fire dampers so that other compartments remain protected from fire and smoke).

Rf-Technologies has developed its own control and monitoring system to ensure optimal cooperation with our products.

The ZENiX system is a full-fledged system for controlling fire dampers, smoke control dampers and shutters, inputs and outputs. It permanently monitors the status of all components in the bus network and adjusts where necessary.

Flexibility characterises the ZENiX system: fire dampers can not only be controlled by a pre-programmed scenario. It is also possible to handle a matrix of scenarios defining different fire zones. The Zenix system can be interfaced with all common fire and building management systems or operate standalone.

The ONE-X is a unique component of the ZENiX system: a fire damper actuator with an integrated ZENiX field module. It comes pre-assembled on the fire damper, requires no addressing or configuration and is immediately ready to be connected. The ONE-X saves installation time, reduces wiring errors and saves installation space.

2.4 WEIGHTS

2.4.1 CR2

Weight of damper without mechanism (kg)

Dn [mm]	200	250	315	355	400	450	500	560	630
kg	5,1	6,2	9,2	11,2	14,2	16,2	19,2	22,2	26,2

Weight of the mechanism (incl. mounting plate) (kg)

CFTH	ONE(X)	BFL(T)	BFN(T)
1,8	2,6	2	2,3

2.4.2 CR2-L500

Weight of damper without mechanism (kg)

Dn [mm]	200	250	315	355	400	450	500	560	630
kg	6,3	7,7	11,2	13,5	16,8	19,7	23,2	26,7	31,3

Weight of the mechanism (incl. mounting plate) (kg)

CFTH	ONE(X)	BFL(T)	BFN(T)
1,8	2,6	2	2,3

2.5 NET PASSAGE

Below is an overview of the net passage for the different dimensions of our fire damper. Discover the full aeraulic data via our BIM library (https://bim.rft.eu).

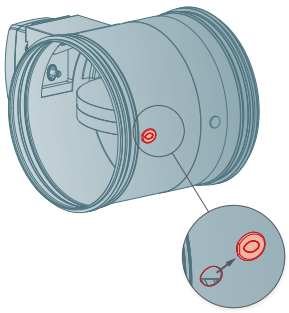
Dn [mm]	200	250	315	355	400	450	500	560	630
Sn (m^2)	0,013	0,025	0,047	0,064	0,086	0,114	0,146	0,189	0,247

2.6 OPTIONS

2.6.1 INSPECTION HATCH (UL)

The inspection opening (UL) allows visual inspection of the condition of the damper and damper blade using an endoscope. A digital endoscope suitable for internal inspection of fire dampers is available.

For fire dampers equipped with the ONE mechanism, it is possible to insert the endoscope into the fire damper through the fusible link opening.



2.6.2 EPOXY

The fire damper can be fitted with an epoxy coating along the inside of the damper for higher resistance to corrosive influences and/or very high humidity. In swimming pool environments, this is recommended due to the presence of chlorinated air. Information on specific resistance in different environments is available on request.

Rf-t fire dampers have been successfully fire tested after undergoing a salt spray test. The salt spray test is a method of testing the corrosion resistance of a material or product via artificial/accelerated ageing.

2.6.3 EN 1751 - CLASS C

CR2 fire dampers are class B as standard. CR2 fire dampers with dimensions > Ø 315 mm are available with air tightness class C according to EN 1751. This corresponds to classes C/D for ventilation ducts. Pay attention to an airtight connection between duct and fire damper.

2.7 VARIA

2.7.1 FLEXIBLE CONNECTION

Flexible connections may be used. For example, based on local or regional regulations or guidelines (e.g. M-LüAR, DW145).

The designer and/or installer of the ventilation ducts selects the way these flexible connections are realised and applied. Both elastic connections and flexible ventilation ducts are possible to avoid possible forces on the installed fire damper. The ventilation ducts are then suspended independently of the fire damper.

Take grounding into account and provide an equipotential connection to ensure conductivity if necessary.

2.7.2 INSULATION

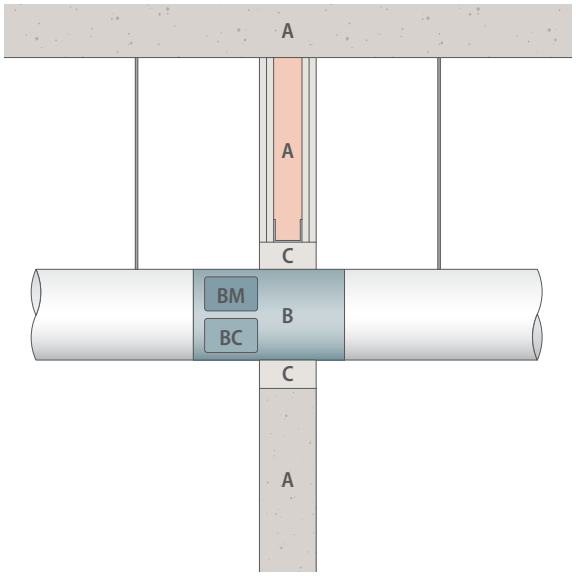
Ventilation ducts can be insulated to avoid condensation, to save energy or to make them fire-resistant. The flanges of fire dampers may also be insulated according to the rules of good workmanship and to the specifications of the insulation product. The operating mechanism of the fire damper must be accessible at all times. The fire damper should be sealed as indicated in the declaration of performance (DoP) and installation instructions.

If condensation is a concern, we recommend using fire batts, which ensures continuous insulation at the level of the penetration.

3 INSTALLATION

The installation of fire dampers relies on several key principles. This third chapter deals with each of these aspects in a clear and concise manner:

- The (load-bearing) structures in which the fire dampers are installed (compartment boundaries). These are indicated by the letter 'A'. Details are covered in chapter 3.1.
- The sealing of fire dampers is represented by the letter 'C'. Details of this are discussed in chapter 3.2.
- The various installation options, depending on the desired fire resistance, are documented in detail in chapter 3.3.
- Fire dampers are connected to ventilation ducts that are suspended and/or supported. This suspension is discussed in chapter 3.4.
- More info on the connection of the fire damper to the ventilation duct is given in chapter 3.5.



A (load-bearing) construction
B Fire damper
BM: mechanism
BC: communication
C Sealing

3.1 (LOAD-BEARING) CONSTRUCTIONS

3.1.1 GENERAL

Rf-t fire dampers are tested in standardised (load-bearing) structures according to EN 1366-2. The results obtained apply to similar (load-bearing) structures with a fire resistance, thickness and density equal to or greater than the tested (load-bearing) structure.

According to the test standard, it is possible in certain cases to transfer the solutions of one (load-bearing) structure to another (load-bearing) structure.

The test results obtained in an aerated concrete (load-bearing) construction are applicable in rigid (load-bearing) structures made of hollow blocks provided that the hollow blocks in the cavity are filled with mortar suitable for the required fire resistance before sealing the cavity around the fire damper.

For flexible structures, it is possible to extend the test results to:

- A rigid construction with a thickness and fire resistance greater than or equal to that of the tested wall. The sealing here should be the same as the sealing tested in the flexible wall.
- A flexible construction without insulation between the plasterboard sheets, even if the test was carried out with insulation. Provided, however, that the non-insulated wall has at least the same fire resistance as the tested wall including insulation.

Common extensions are listed in the table below.

		TESTED (LOAD-BEARING) STRUCTURE											
		SHAFTWALL		FLEXIBLE WALL			RIGID WALL			RIGID FLOOR			
Possible extension to:		Metal stud gypsum plasterboard F (EN 520)	Aerated concrete	Metal stud gypsum plasterboard A (EN 520)	Metal stud gypsum plasterboard F (EN 520)	Gypsum blocks	Aerated concrete	Concrete	Reinforced concrete	Aerated concrete	Concrete	Reinforced concrete
Shaftwall	Metal stud gypsum plasterboard F	•										
	Aerated concrete	•	•									
Flexible wall	Metal stud gypsum board A			•								
	Uninsulated stud gypsum board A			•								
	Metal stud gypsum board F			•	•							
	Uninsulated stud gypsum board F			•	•							
	Gypsum blocks					•						
Rigid wall	Aerated concrete			•	•		•					
	Concrete			•	•		•	•				
	Reinforced concrete			•	•		•	•	•			
	Masonry hollow brick			•	•		•	•	•			
	Masonry solid brick			•	•		•	•	•			
Rigid floor	Aerated concrete									•		
	Prestressed concrete units									•		
	Concrete									•	•	
	Reinforced concrete									•	•	•

3.1.2 FLEXIBLE WALL TYPE A

Flexible walls type A are constructed with metal studs according to manufacturer's guidelines or standards in force locally.

The wall thickness is at least 98 mm, with 2 x 12.5 mm double-sided gypsum plasterboard, namely gypsum (cardboard) boards of type A according to EN 520 (GKB according to DIN 18180). The internal cavity ≥ 48 mm is filled with stone wool ≥ 40 mm of 40 kg/m^2.

According to EN 1366-2, the insulation of the flexible wall may be omitted. Addition of additional layers use of thicker boards and wider metal studs is allowed.

The horizontal metal profiles consist of at least 0.6 mm thick galvanised steel and are fixed every ≤ 800 mm by Ø 6 mm steel screws and 6 mm anchors to the rigid (load-bearing) construction. The vertical metal profiles are at least 0.6 mm thick galvanised steel and are placed centre-to-centre at maximum 625 mm apart (see manufacturer's instructions). A clearance of 5 mm accommodates thermal expansion. The profiles conform to EN 14195. The profiles are fixed together with Ø 3.5 mm screws, with pop rivets or with metal stud fixing pliers.

The cladding is fixed to the metal profiles with screws Ø 3.5 mm.

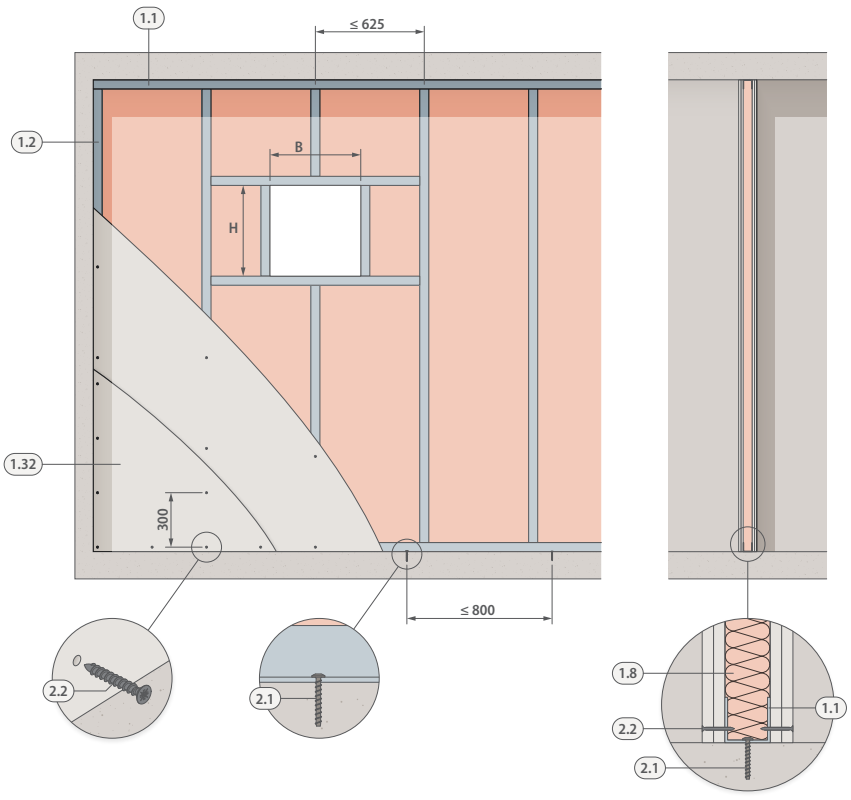
The visible joints and the connection with the (load-bearing) construction are finished with covering tape and joint filler, as specified by the manufacturer. The screw heads are smeared.

A reinforcement of metal horizontal and vertical profiles is provided around the damper, which is fixed to the metal framework of the wall construction (unless otherwise specified). These profiles are spaced ‘s’ around the fire damper, which is the gap to be provided for sealing the fire damper. If the distance between fire damper and (load-bearing) construction on the one hand or between fire damper and a second fire damper on the other hand is less than 75 and 200 mm respectively as prescribed by the standard, it is not required to provide a profile at this location (see "3.1.8 Installation at minimal distance"").

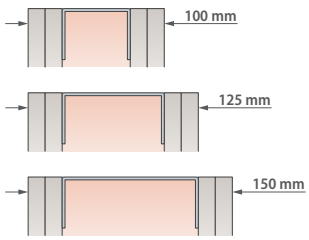
Rf-t tests fire dampers without drywall or anchors in the day edges. The addition of such components does not negatively affect the classification of the fire dampers.

Flexible walls type A are typically used in installation methods for fire resistance of 60 minutes.

The solutions in these flexible wall constructions are also applicable to rigid walls.

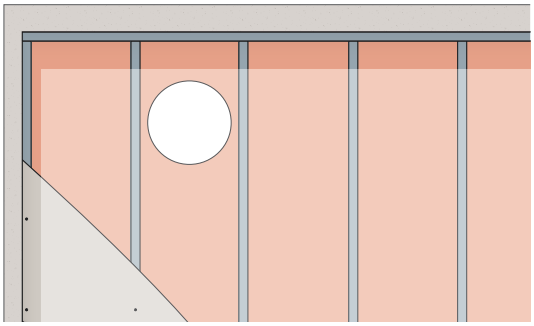


1.1	horizontal profile
1.2	vertical profile
1.32	plasterboard
2.1	mounting screws Ø 6 mm
2.2	mounting screws Ø 3.5 mm
1.8	stone wool 40 kg/m^3



Alternative: without horizontal bracing.

When installing a fire damper in a flexible metal stud wall, some installation methods do not require reinforcing profiles around the wall opening from a fire technical point of view. Where applicable, this alternative is shown with the installation methods in section 3.3.



When constructing this type of wall, always take into account the general instructions of the manufacturer of these wall systems.

3.1.3 FLEXIBLE WALL TYPE F

Flexible walls type F are built using metal studs as specified in European standard EN 1363-1. The walls are constructed according to the manufacturer's guidelines or to the standards in force locally.

The wall thickness is at least 98 mm, with 2 x 12.5 mm double-sided gypsum plasterboard, namely gypsum (cardboard) boards type F according to EN 520 (GKF according to DIN 18180). The internal cavity ≥ 48 mm is filled with stone wool ≥ 40 mm of 40 kg/m^2.

According to EN 1366-2, the insulation of the flexible wall may be omitted. Addition of additional layers use of thicker boards and wider metalstuds is allowed.

The horizontal metal profiles consist of at least 0.6 mm thick galvanised steel and are fixed every ≤ 800 mm by Ø 6 mm steel screws and 6 mm anchors to the rigid (load-bearing) construction. The vertical metal profiles are at least 0.6 mm thick galvanised steel and are placed centre-to-centre at maximum 625 mm apart (see manufacturer's instructions). A clearance of 5 mm accommodates thermal expansion. The profiles conform to EN 14195. The profiles are attached to each other with Ø 3.5 mm screws, with pop rivets or with metal stud fixing pliers.

The cladding is fixed to the metal profiles with screws Ø 3.5 mm.

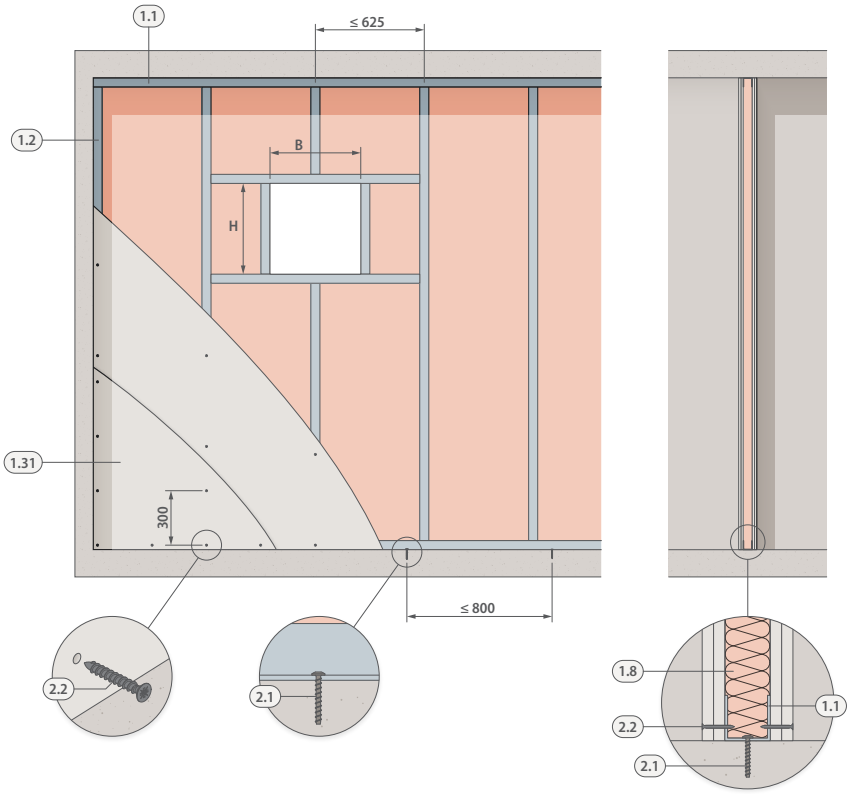
The visible joints and the connection with the (load-bearing) construction are finished with covering tape and joint filler, as specified by the manufacturer. The screw heads are smeared.

A reinforcement of metal horizontal and vertical profiles is provided around the damper, which is fixed to the metal framework of the wall construction (unless otherwise specified). These profiles are spaced 's' around the fire damper, which is the gap to be provided for sealing the fire damper. If the distance between fire damper and (load-bearing) construction on the one hand or between fire damper and a second fire damper on the other hand is less than 75 and 200 mm respectively as prescribed by the standard, it is not required to provide a profile at this location (see "3.1.8 Installation at minimal distance"").

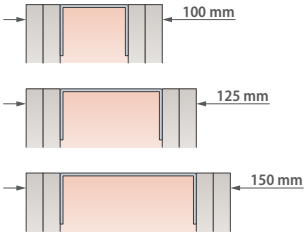
Rf-t tests fire dampers without drywall or anchors in the day edges. The addition of such components does not negatively affect the classification of the fire dampers.

Flexible walls type F are typically used in installation methods for fire resistance of 90 or 120 minutes.

The solutions in these flexible wall constructions are also applicable to rigid walls.

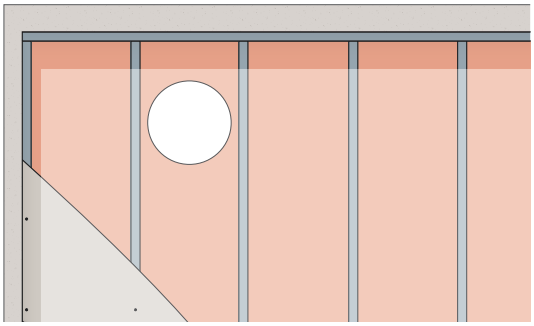


1.1	horizontal profile
1.2	vertical profile
1.31	plasterboard
2.1	fixing screws Ø 6 mm
2.2	mounting screws Ø 3.5 mm
1.8	stone wool 40 kg/m^3



Alternative: without horizontal bracing.

When installing a fire damper in a flexible metal stud wall, some installation methods do not require reinforcing profiles around the wall opening from a fire technical point of view. Where applicable, this alternative is shown with the installation methods in section 3.3.



Always follow the general instructions of the manufacturer of these wall systems when constructing this type of wall.

3.1.4 GYPSUM BLOCK WALL

A gypsum block wall is a non-load-bearing partition wall made of prefabricated gypsum blocks with a density ≥ 850 kg/m^3 (EN 12859). The blocks are lined (half-brick bond) with gypsum-based block glue. The joint thickness is about 2 mm, larger gaps can be sealed with block glue according to the manufacturer's specifications.

3.1.5 RIGID WALL

Rigid walls are walls made of cellular concrete, concrete or masonry with a minimum specific gravity of 650 ± 200 kg/m^3 (EN 1363-1) and can also be applied to rigid walls made of hollow blocks. Any hollow spaces around the fire damper should be filled. The solutions in flexible wall constructions are also applicable to rigid walls.

3.1.6 RIGID FLOOR

Rigid floors are cellular concrete or concrete floors with a specific gravity of at least 650 ± 200 kg/m^3 (EN 1363-1). Any voids around the fire damper should be filled.

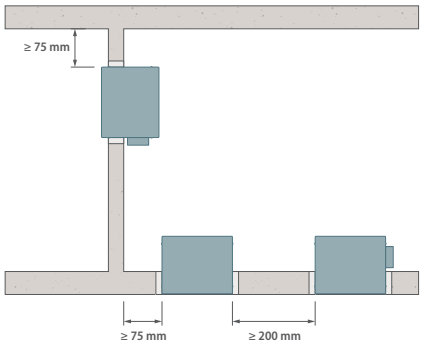
Rf-t fire dampers can be installed either with mechanism below or above the floor.

3.1.7 SANDWICH PANEL SYSTEM

Paroc panels with thickness ≥ 100 mm, type: AST S, AST S+, AST F, AST F+, AST E; metal shell 0.6/0.6.
For full information regarding the construction of this type of wall, please refer to Paroc's installation details.

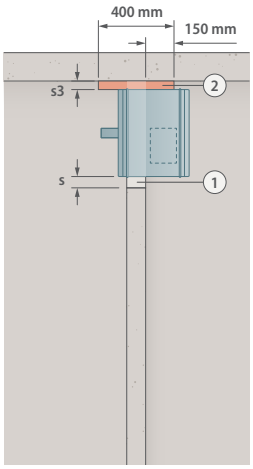
3.1.8 INSTALLATION AT MINIMAL DISTANCE

According to European test standard EN 1366-2, the minimum required distance between 2 fire dampers is 200 mm and between a fire damper and another (load-bearing) construction 75 mm. Rf-t fire dampers were successfully tested and may be installed at a shorter nominal distance than the minimum specified by the standard, both in vertical wall and floor/ceiling.



Standard installation according to EN 1366-2 ➲

The certified solution for Rf-t fire dampers consists of the following elements: on the one hand, to apply a **universal sealing** where the distance between fire damper and a second fire damper or to a structural component is smaller than the minimum specified by the standard and, on the other hand, to apply the **approved sealing methods** according to our existing classifications where the distance is equal to or greater than specified by the standard:



Universal sealing for distance smaller than specified by the standard

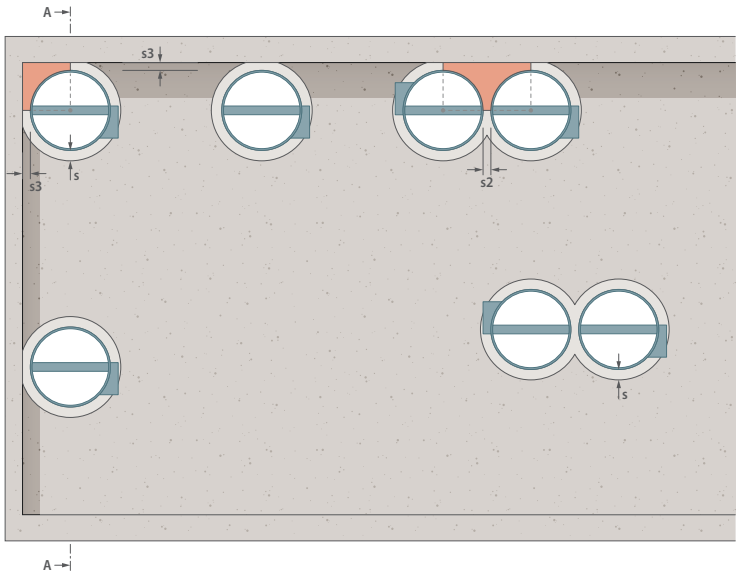
s3 Spacing between fire damper and vertical or horizontal (load-bearing) construction:
30 ≤ s3 < 75 mm
② Stone wool sheets ≥ 150 kg/m^3 over a depth of 400 mm, including 150 mm on the mechanism side of the wall[*]. The area of this sealing is determined by the central axes of the fire dampers among themselves, or from the fire damper to the structural member.

s2 Spacing between two fire dampers: **30 ≤ s2 < 200 mm**
② Stone wool sheets ≥ 150 kg/m^3 over a depth of 400 mm, including 150 mm on the mechanism side of the wall[*]. The area of this sealing is determined by the central axes of the fire dampers among themselves, or from the fire damper to the structural member.

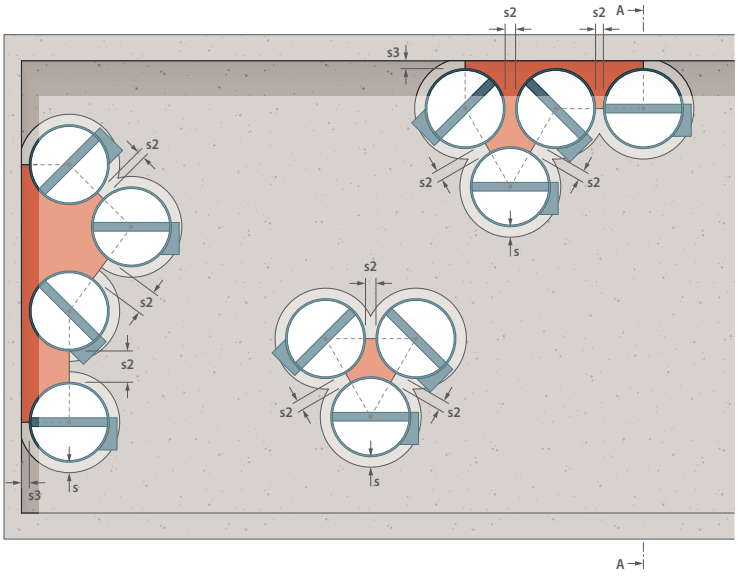
Sealing according to pre-existing solutions

s Sparing
① E.g. mortar, gypsum or fire batts. Also applicable for (see also illustration below): 2 dampers placed between 30 and 200mm apart but more than 75mm away from a construction part or one fire damper placed between 30 and 75mm from a (load-bearing) construction. (C.x)

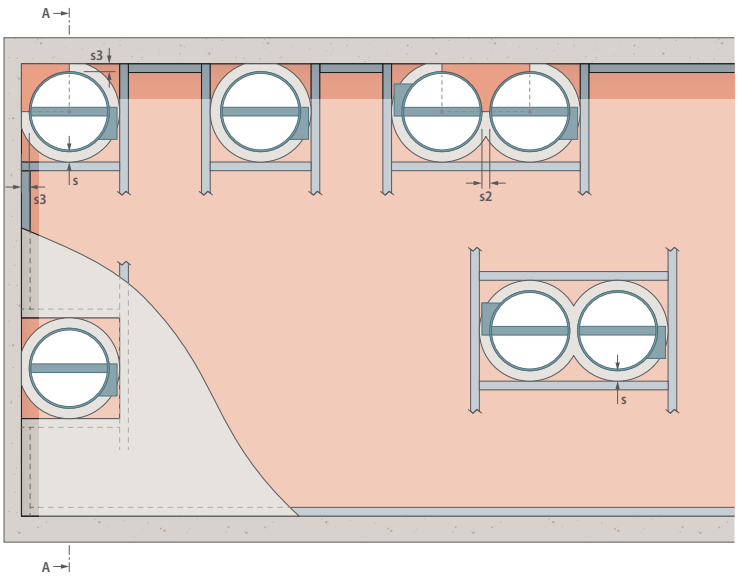
[*]For a wall thickness of > 250 mm, stone wool should be applied over a depth of > 400 mm until the entire wall thickness is filled.



- The minimal distance is calculated to the tunnel wall of the fire damper.
- The axis direction of the damper blade is indicated in the installation instructions.
- A maximum of 3 circular dampers may be installed next to each other at a minimal distance, both vertically and horizontally, with a cluster of a maximum of 4 dampers.
- The operating mechanism must remain accessible at all times for inspection and/or servicing.



When installing Rf-t fire dampers at minimal distance in a lightweight partition wall, no metal profiles should be placed between the fire damper and the (load-bearing) structure or between the fire dampers themselves.



Information on each wall/sealing combination is further detailed in this manual.

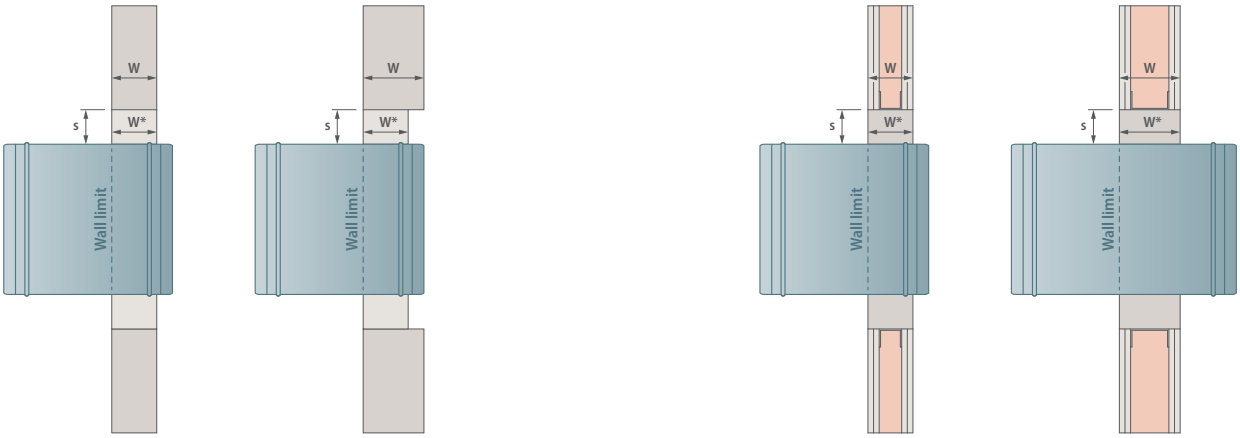
3.2 SEALING AND INSTALLATION MATERIALS

3.2.1 SEALINGS AND DIMENSIONS

The size of the sealing is determined by the minimum sealing depth/length (w*) and the sealing width (s).

For rigid walls, rigid floors and plaster block walls, the minimum wall thickness (w) and minimum sealing depth (w*) can be different. For example, if a rigid (load-bearing) structure is at least 100 mm thick with a sealing depth of at least 100 mm, then e.g. w = 200 mm and w* ≥ 100 mm provided that the sealing is realised at the height of the damper blade (the position of the damper blade is indicated by the 'wall limit' marking or the recessed stops).

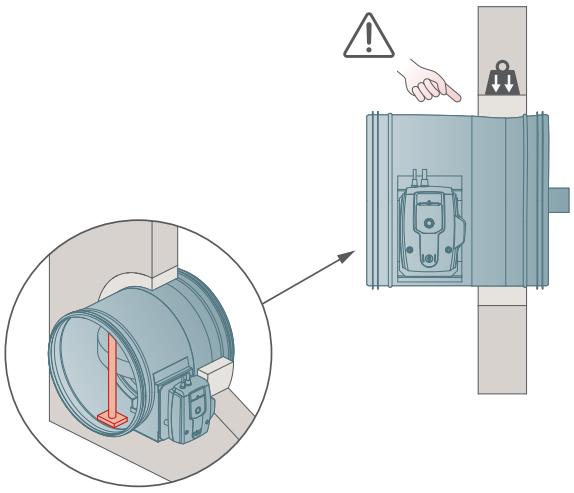
For flexible walls and sandwich panel system walls, the minimum wall thickness (w) and the minimum sealing depth (w*) are always the same.



If the opening around the fire damper is larger than stated in the technical data sheet, the following options are available: reduce the opening in the wall using the same material as the wall; apply a different sealing system; seek alternative advice from a competent local authority (possibly in consultation with Rf-t). Always take into account the stability of the wall and the proper functioning of the fire damper.

When using a wet sealing method (mortar or gypsum), deformation of the fire damper must be avoided due to excessive stress on the fire damper. If necessary, precautions should be provided at wall level. A temporary (wooden) brace can also help to prevent deformation of the fire damper during installation.

If a wet sealing method is used, Rf-t recommends protecting the fire damper (actuator and damper blade) during installation to prevent sealing material from compromising the correct operation of the damper.

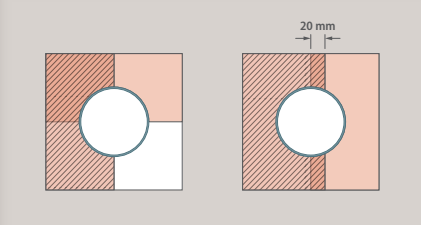


w	wall thickness	minimum thickness of the (load-bearing) construction
w*	sealing depth	minimum sealing depth in the (load-bearing) construction
s	general clearance	The width of the sealing recess 's' is determined by the tested distance during official fire tests. If the recess around the fire damper is larger than stated in the technical data sheet, the following options are available: reduce the opening in the wall with the same material as the wall; apply a different sealing system; seek alternative advice from a competent local authority (possibly in consultation with Rf-t). Always take into account the stability of the wall and the proper functioning of the fire damper.
s2	s2 min distance	minimal distance between two fire dampers
s3	s3 min distance	minimal distance between fire damper and (load-bearing) construction

3.2.2 OVERVIEW OF SEALING SYSTEMS

Below is an overview of the different systems and sealing materials that can be used when installing our fire dampers. Each system is linked to a code starting with the letter C. In the installation details later in this document, you will always find the reference to this code with a short description of the system concerned. Below, and also in the legend at the back of this document, you will find full details relating to the various systems and specific instructions on how to apply them.

Standard sealing

C.01	Mortar	Mortar according to EN 998-2: class M2.5 to M10 or fire-resistant mortar class M2.5 to M10. Mortar according to DIN 1053: groups II, IIa, III, IIIa or fire-resistant mortar groups II,III. Equivalent mortars, gypsum mortar or concrete
C.02	Gypsum	Gypsum mortar
C.03	Block glue	Gypsum-based block glue
C.23	Cover plates	Type A or type F plasterboard (according to EN 520) as indicated in the declaration of performance. The cover plates follow the contours of the fire damper and shall be provided with recesses around the mechanism where necessary. Spacing between fire damper and cover plate ≤ 5mm.
C.31	Fire batt 2 x 50 mm	Single-sided coated stone wool (3.6) 2 x 50 mm When sealing with coated fire batt sheets, the saw cuts of the sheets must not coincide: the sheets are therefore installed (min 20 mm) angled to promote strength. 

Generic sealing for installation at minimal distance

C.10	Stone wool 150 kg/m³	Stone wool ≥ 150 kg/m³ over a depth of 400 mm, including 150 mm on the mechanism side of the wall. For a wall thickness of > 250 mm, the stone wool slab should be applied over a depth of > 400 mm until the entire wall thickness is filled. For rectangular fire dampers, flat stone wool slabs can be used. For round fire dampers, 50 mm thick shaped pieces can be cut to fit between the dampers (s2) and/or the wall construction (s3). By combining multiple layers of 50 mm, 150 mm (3 x 50 mm) sealing can be achieved on the mechanism side and 250 mm (5 x 50 mm) in the wall and on the non-mechanism side (depending on the thickness of the wall). The stone wool has a layer thickness of 50 mm, density of 150kg/m³, thermal conductivity of l = 0.041 W/mK at 50 °C, water vapour absorption 0.02 %, Euro class A1)

3.3 INSTALLATION METHODS

This section provides an overview of our certified installation methods. A correct installation, meeting the required fire resistance, can only be achieved if the fire damper, the (load-bearing) construction and the sealing system are well matched.

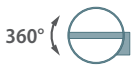
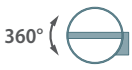
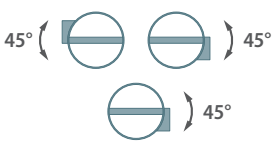
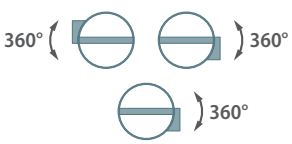
In the overview table below, you can quickly find which installation methods are suitable for your specific application depending on the required fire resistance (classification) and the type and thickness of the (load-bearing) construction.

The installation drawings later in this chapter provide a clear picture of the finished installation, both for a single installation, and for installation with multiple fire dampers next to each other. For installation drawings showing the sequence of installation in different steps, please refer to our technical product sheets.

After installation, the correct operation of the fire damper (opening and closing of the damper blade) should always be checked immediately.

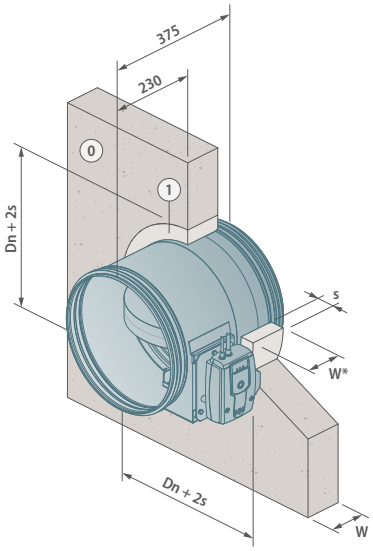
Overview of installation details

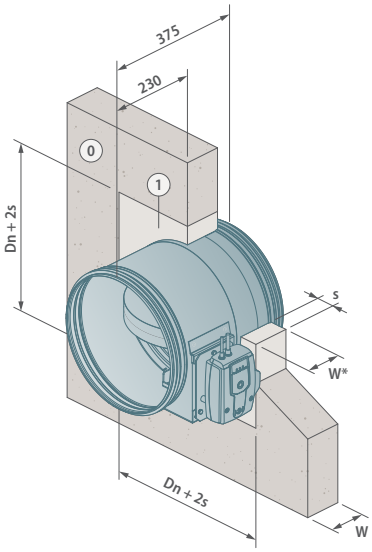
(LOAD-BEARING) CONSTRUCTION	INSTALLATION WITH	WALL THICKNESS	CLASSIFICATION	BLZ
Rigid wall	mortar	≥ 100 mm	EI120S	33
	gypsum	≥ 100 mm	EI120S	34
	fire batt	≥ 100 mm	EI60S / EI90S / EI120S	35
Rigid floor	mortar	≥ 150 mm	EI120S	36
	mortar	≥ 125 mm	EI90S	37
	fired batt	≥ 150 mm	EI120S	38
Flexible wall	mortar	≥ 100 mm	EI90S	39
	gypsum	≥ 100 mm	EI60S / EI120S	40
	fired batt	≥ 100 mm	EI60S / EI90S / EI120S	41
	Stone wool + cover plates	≥ 100 mm	EI60S / EI90S	42
Gypsum block wall	Gypsum-based block glue	≥ 70 mm	EI120S	43
Sandwich panel system	Fire batt	≥ 100 mm	EI120S	44

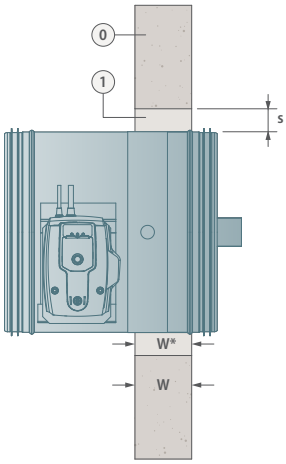
		I	II	III	IV
Axis orientation	Standard installation				
	Minimum distance				

3.3.1 RIGID WALL - MORTAR

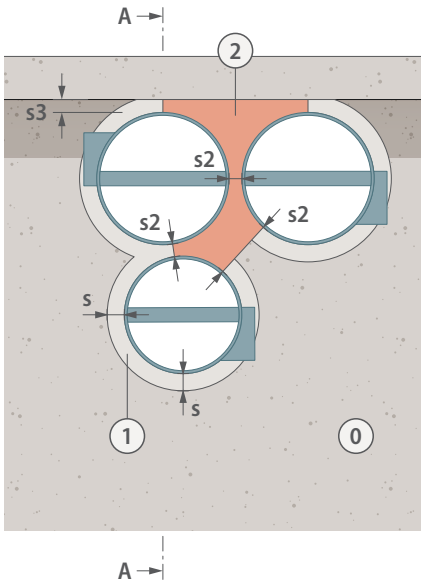
Ø 200-630 mm	w ≥ 100, w* ≥ 100	EI120 (v_e i ↔ o)S	I

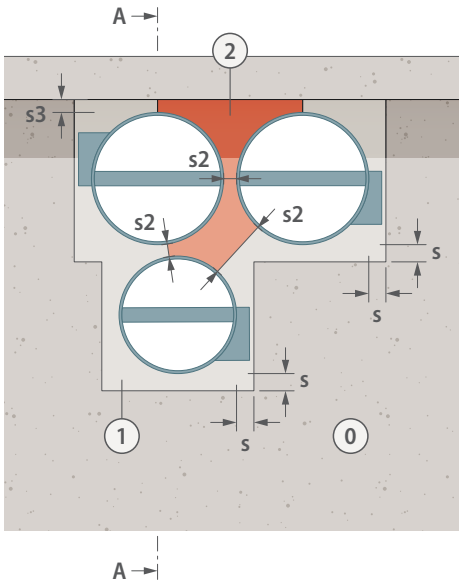


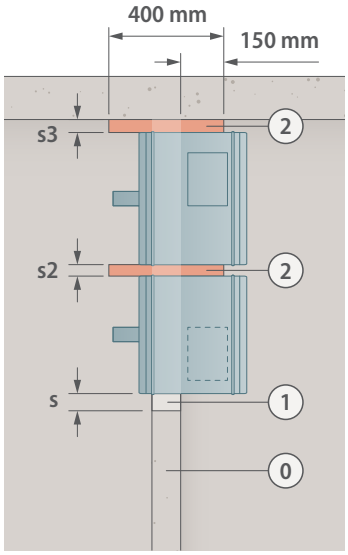




Minimal distance



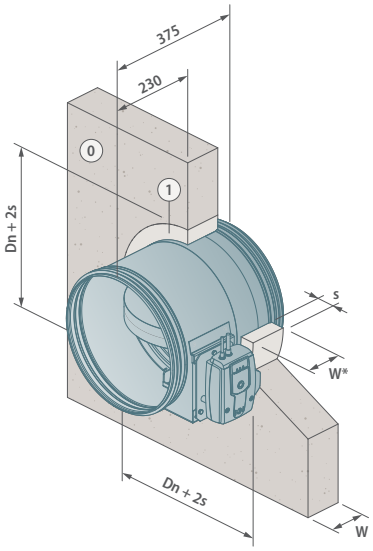


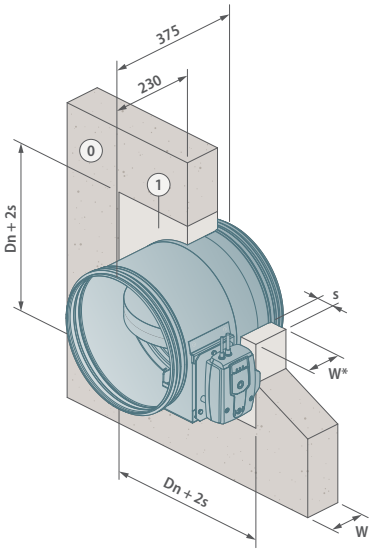


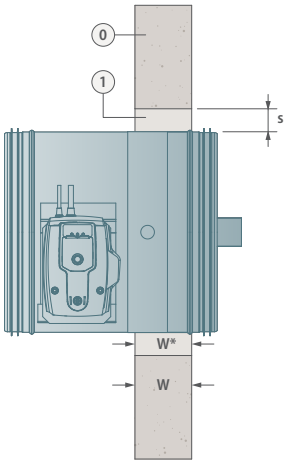
⓪	A.4	Rigid wall		
①	C.01	Mortar	20 ≤ s ≤ 50	
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

3.3.2 RIGID WALL - GYPSUM

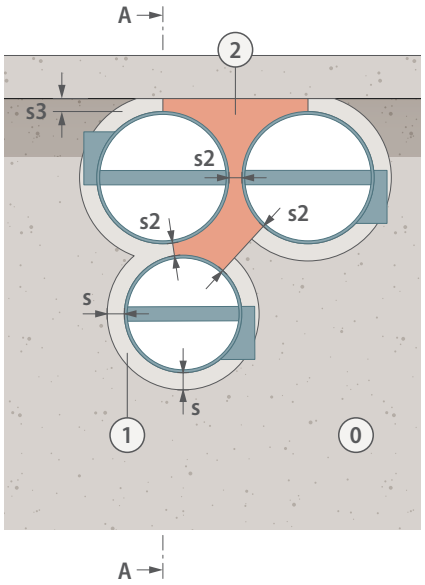
Ø 200-630 mm	w ≥ 100, w* ≥ 100	EI120 (v_e i ↔ o)S	I

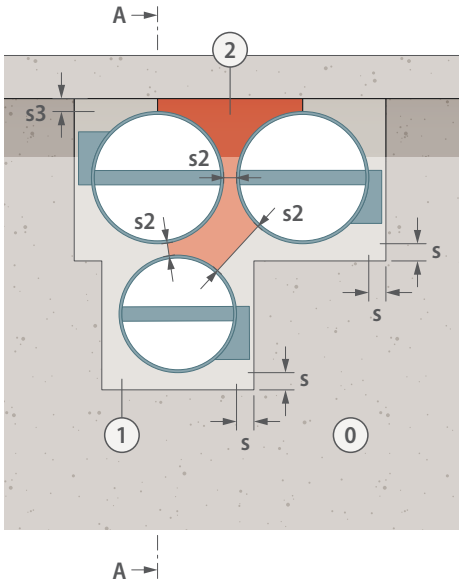


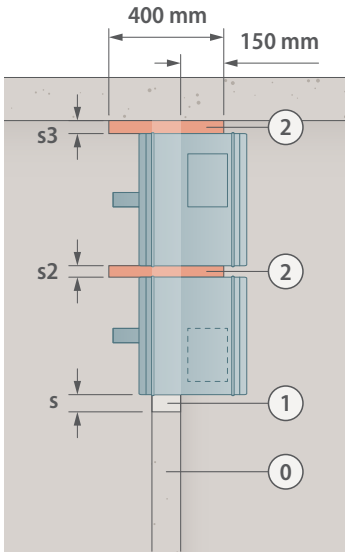




Minimal distance



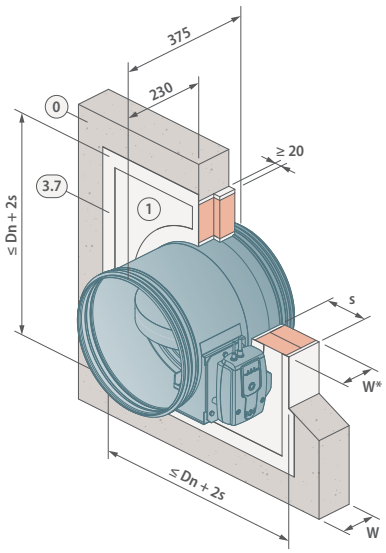


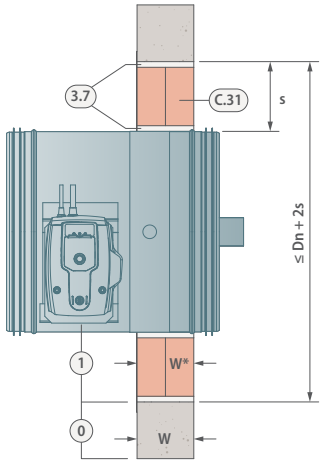


⓪	A.4	Rigid wall		
①	C.02	Gypsum	20 ≤ s ≤ 50	
②	C.10	Stone wool 150 kg/m^3	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

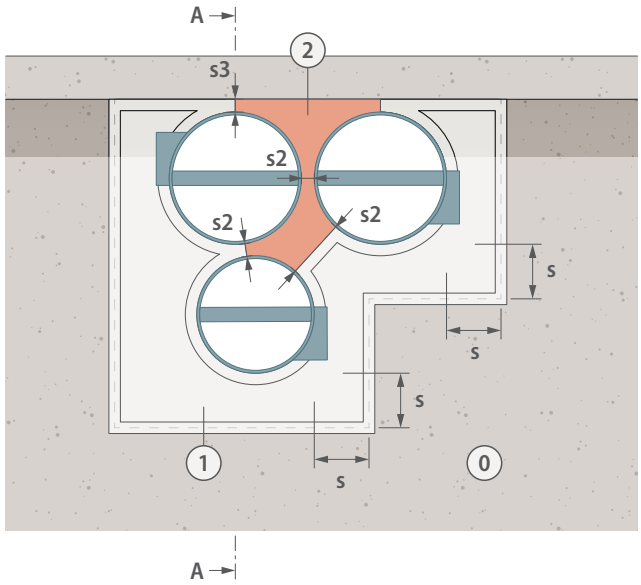
3.3.3 RIGID WALL - FIRE BATT

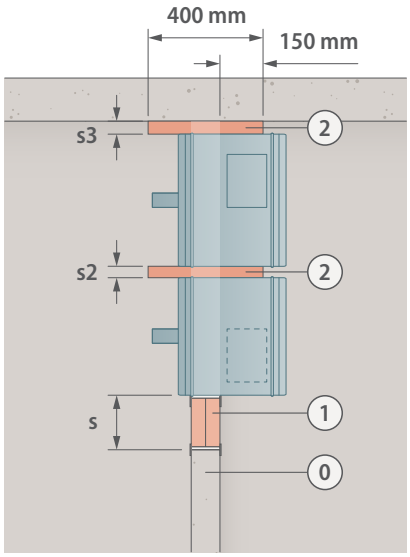
Ø 200-630 mm	w ≥ 100, w* ≥ 100	EI120 (v_e i ↔ o)S	II	SVT
Ø 200-630 mm	w ≥ 100, w* ≥ 100	EI90 (v_e i ↔ o)S	I	Promat, Hilti
Ø 200-630 mm	w ≥ 100, w* ≥ 100	EI60 (v_e i ↔ o)S	II	Mulcol





Minimal distance

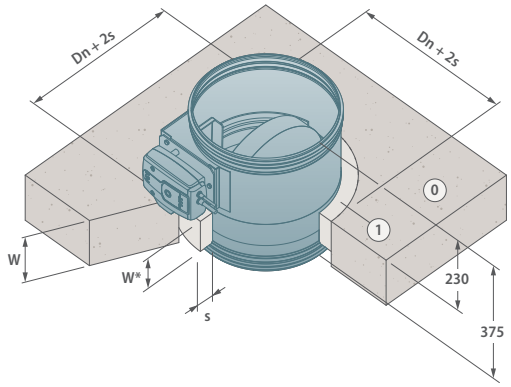


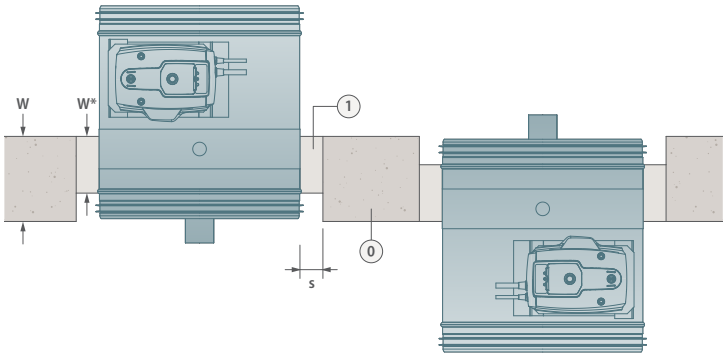


⓪	A.4	Rigid wall		
①	C.31	Fire batt 2 x 50 mm (installation minimal distance: only with Promat or Hilti)	20 ≤ s ≤ 400	
	3.7	Coating of end edges and seams		
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

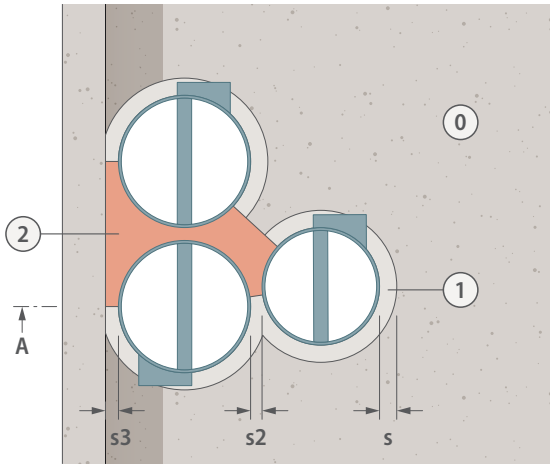
3.3.4 RIGID FLOOR - MORTAR

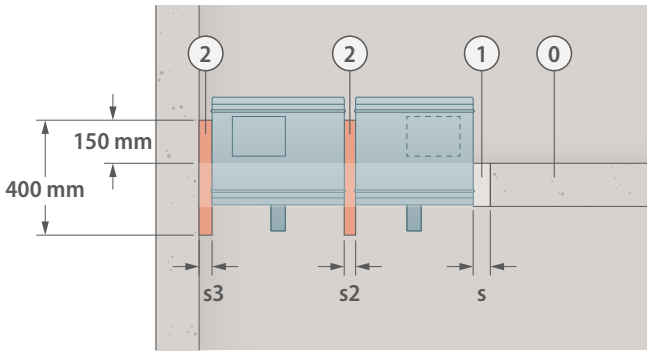
Ø 200-630 mm	w ≥ 150, w* ≥ 100	EI120 (h_o i ↔ o)S	III





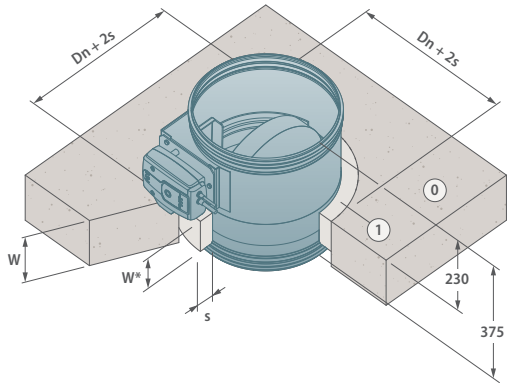
Minimal distance

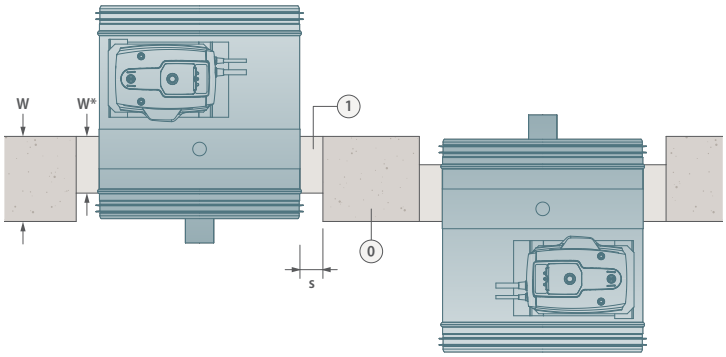




⓪	A.7	Rigid floor		
①	C.01	Mortar	20 ≤ s ≤ 40	
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall)

Ø 200-630 mm	w ≥ 125, w* ≥ 125	EI90 (h_o i ↔ o)S	II

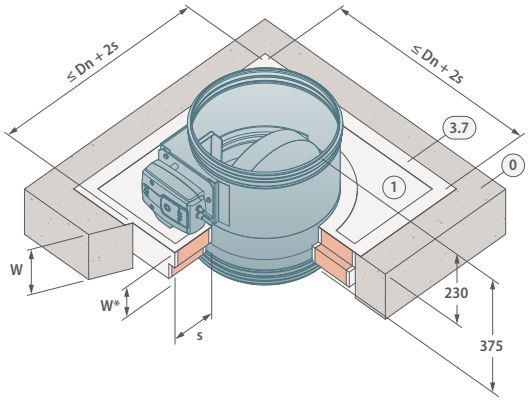


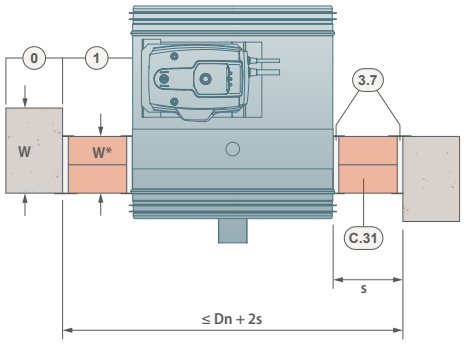


⓪	A.7	Rigid floor	
①	C.01	Mortar	20 ≤ s ≤ 60

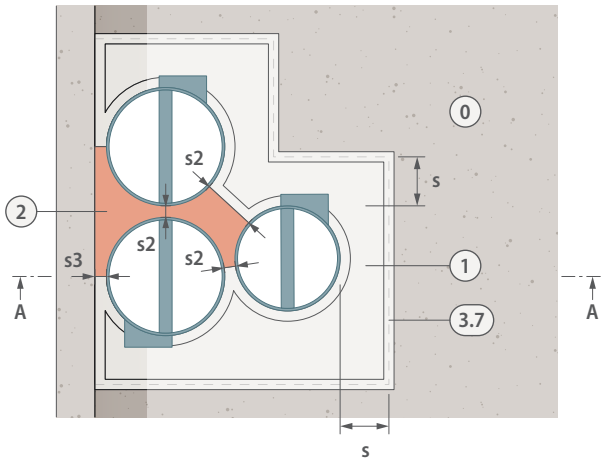
3.3.5 RIGID FLOOR - FIRE BATT

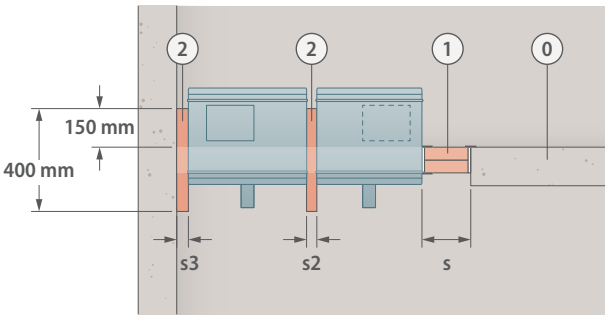
Ø 200-630 mm	w ≥ 150, w* ≥ 100	EI120 (h_o i ↔ o)S	III





Minimal distance

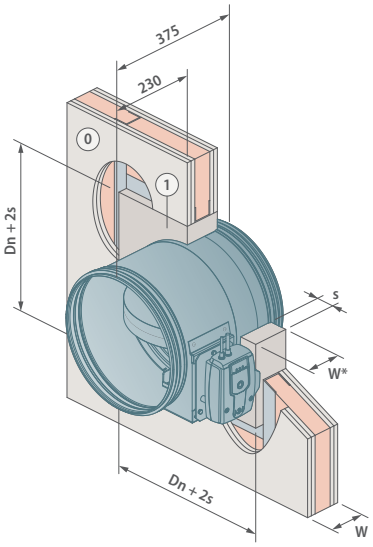


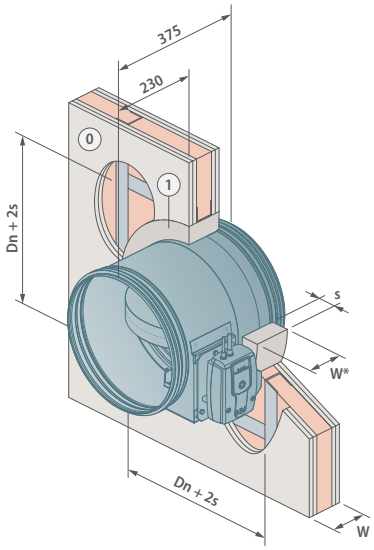


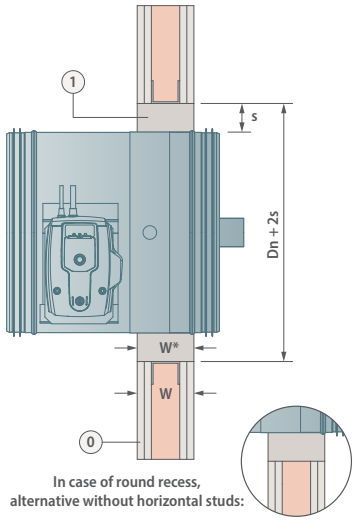
⓪	A.7	Rigid floor		
①	C.31	Fire batt 2 x 50 mm (Promat or Hilti)	20 ≤ s ≤ 400	
	3.7	Coating of end edges and seams		
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall)

3.3.6 FLEXIBLE WALL - MORTAR

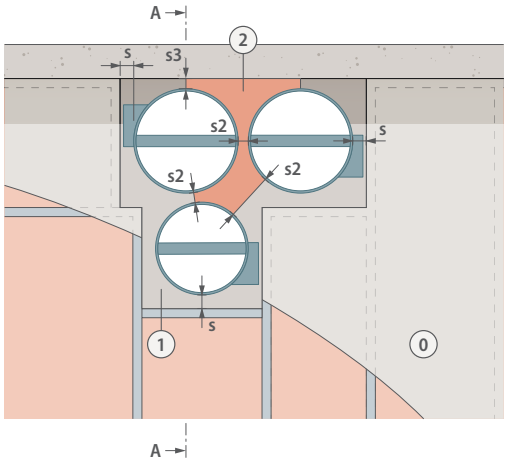
Ø 200-630 mm	A.2 Type F	w ≥ 100, w* = w	EI90 (v_e i ↔ o)S	I

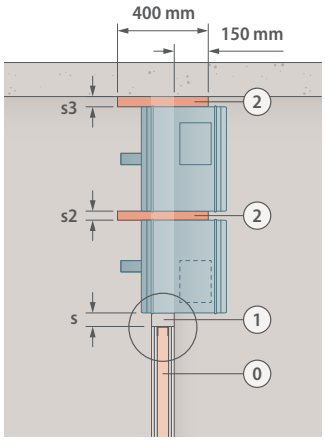


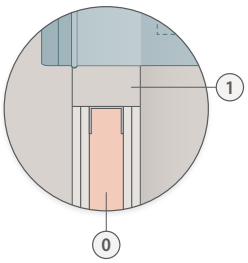




Minimal distance





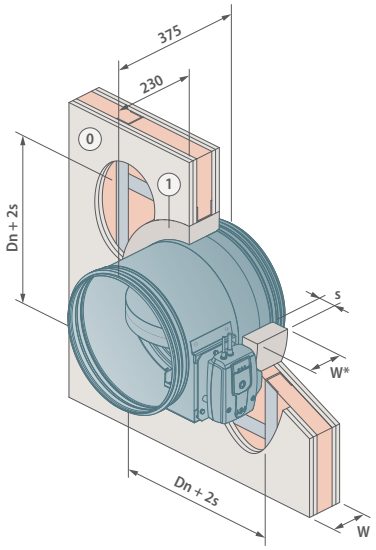


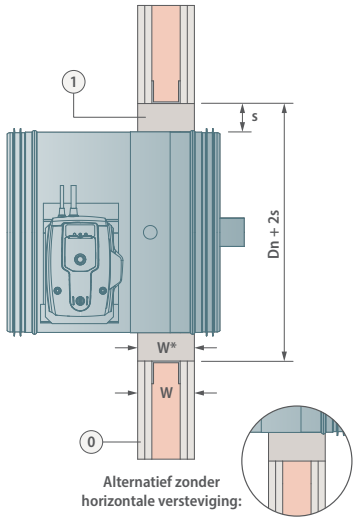
⓪	A.2	Flexible wall		
①	C.01	Mortar	20 ≤ s ≤ 50 (☐ recess)	20 ≤ s ≤ 40 (○ recess)
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

- It is allowed to provide (single or double) plating on the day edges, but not required. In this case, the plasterboards should be fixed to the metal profiles by screws.
- Anchoring the mortar seal by means of anchor points is allowed, but not required to meet the intended fire resistance.

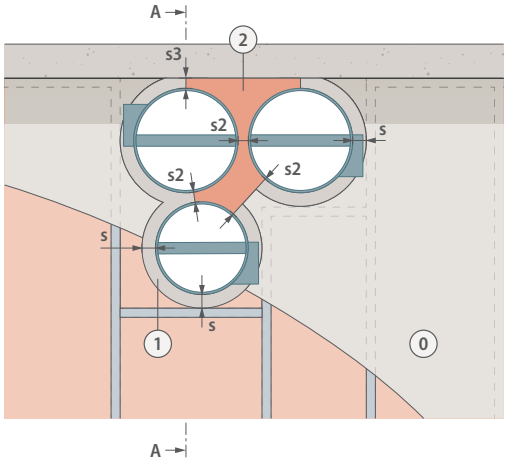
3.3.7 FLEXIBLE WALL - GYPSUM

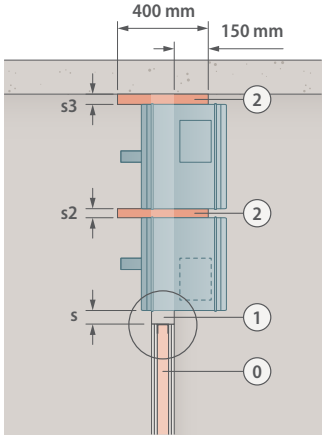
Ø 200-630 mm	A.2 Type F	w ≥ 100, w* = w	EI120 (v_e i ↔ o)S	I
Ø 200-630 mm	A.1 Type A	w ≥ 100, w* = w	EI60 (v_e i ↔ o)S	I

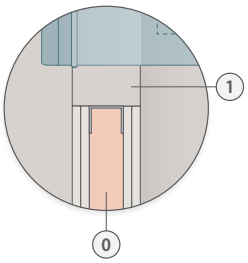




Minimal distance



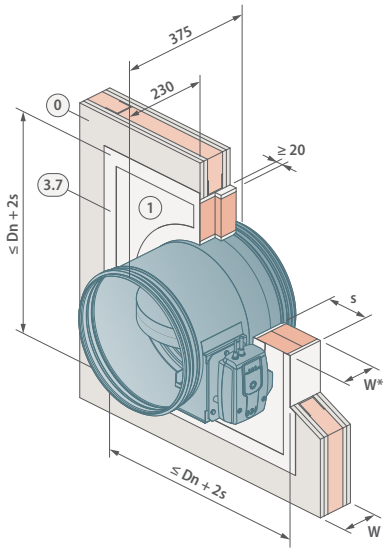


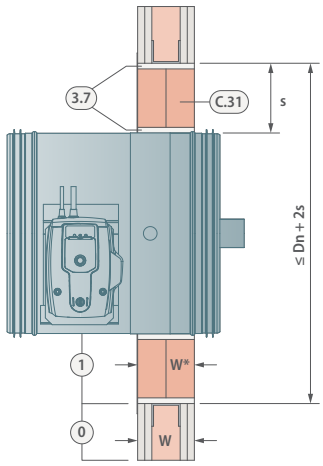


⓪	A.1/A.2	Flexible wall		
①	C.02	Gypsum	20 ≤ s ≤ 40	
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

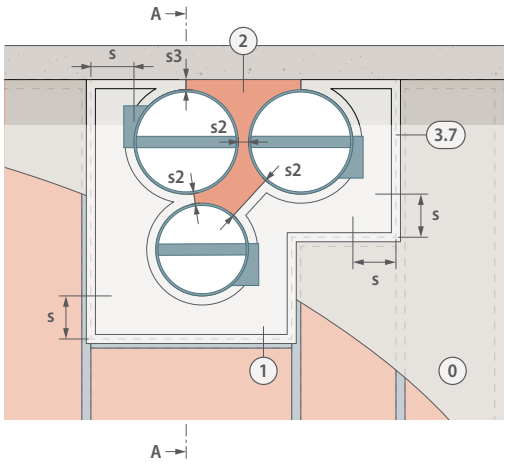
3.3.8 FLEXIBLE WALL - FIRE BATT

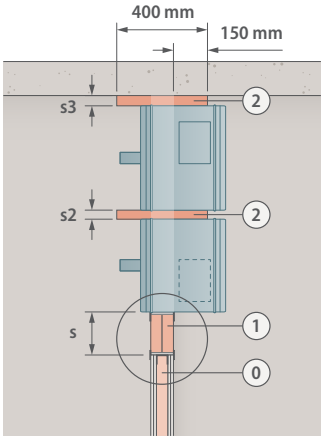
Ø 200-630 mm	A.2 Type F	w ≥ 100, w* = w	EI120 (v_e i ↔ o)S	II	SVT
Ø 200-630 mm	A.2 Type F	w ≥ 100, w* = w	EI90 (v_e i ↔ o)S	I	Promat, Hilti
Ø 200-630 mm	A.2 Type F	w ≥ 100, w* = w	EI60 (v_e i ↔ o)S	II	Mulcol
Ø 200-630 mm	A.1 Type A	w ≥ 100, w* = w	EI60 (v_e i ↔ o)S	I	Promat, Hilti
Ø 200-630 mm	A.1 Type A	w ≥ 100, w* = w	EI60 (v_e i ↔ o)S	II	SVT, Mulcol

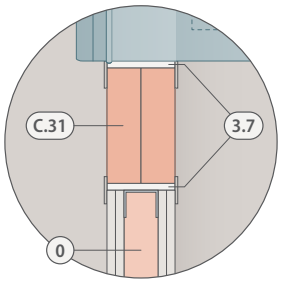




Minimal distance



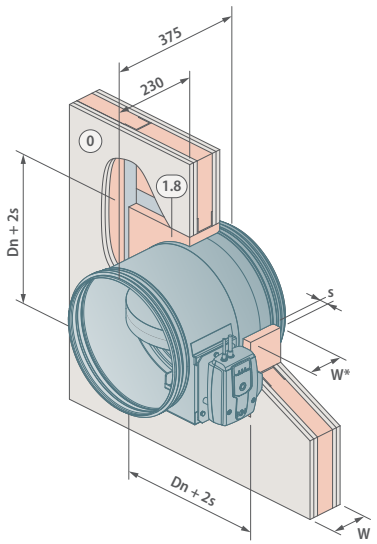


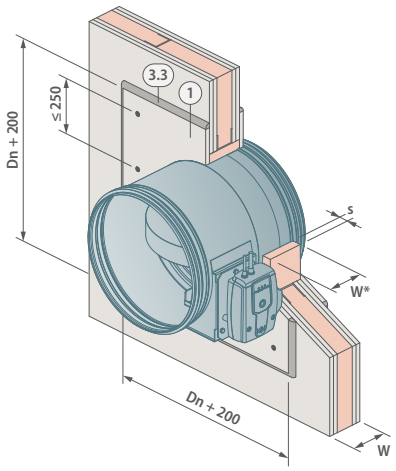


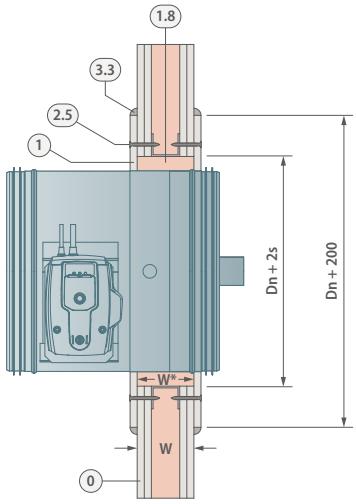
⓪	A.1/A.2	Flexible wall		
①	C.31	Fire batt 2 x 50 mm (installation minimal distance: only with Promat or Hilti)	20 ≤ s ≤ 400	
	3.7	Coating of end edges and seams		
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

3.3.9 FLEXIBLE PARTITION - STONE WOOL & COVER PLATES

Ø 200-630 mm	A.2 Type F	w ≥ 100, w* =w	EI90 (v_e i ↔ o)S	I
Ø 200-630 mm	A.1 Type A	w ≥ 100, w* =w	EI60 (v_e i ↔ o)S	I







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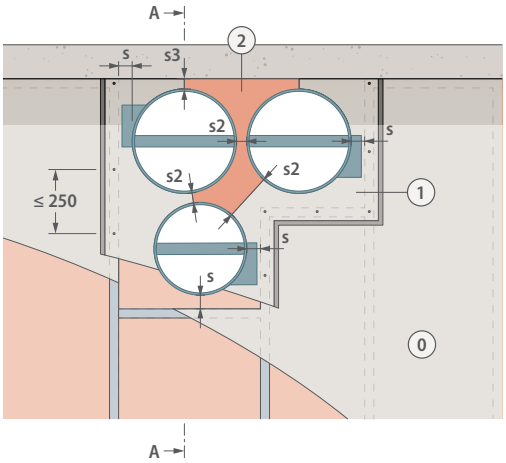
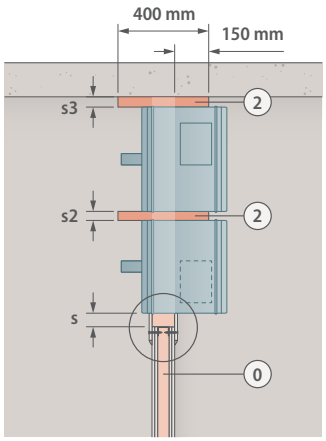
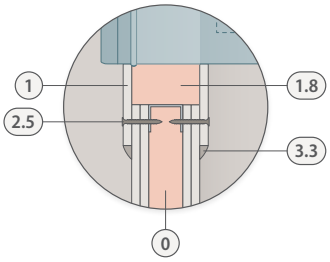


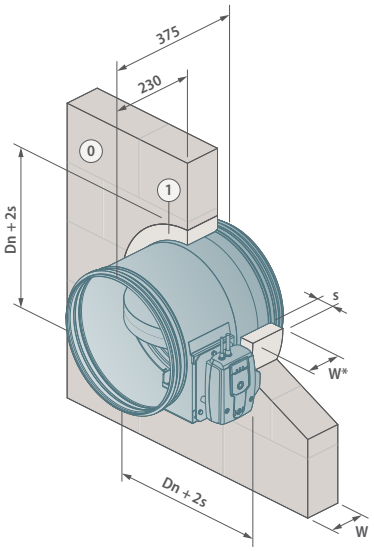


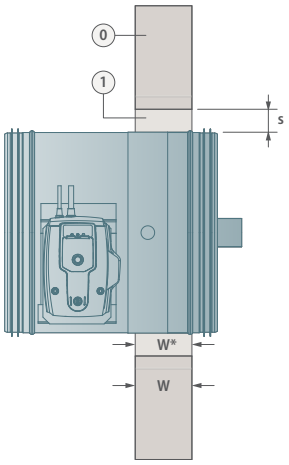


⓪	A.1/A.2	Flexible wall		
①	C.23	Cover plates		
	1.8	Stone wool 40 kg/m³	20 ≤ s ≤ 25	
	3.3	Joint filler		
	2.5	Universal screw 6 x 50 mm (fix into the metal stud frame)		
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

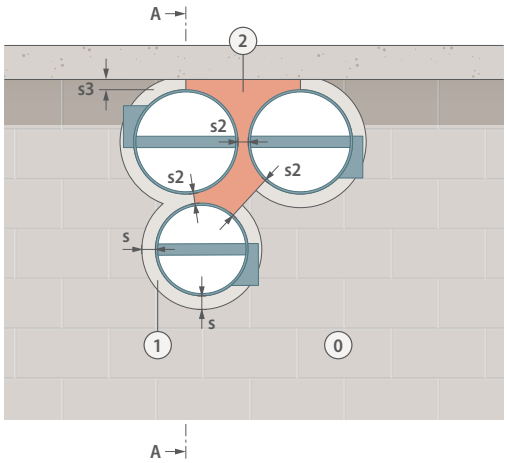
3.3.10 GYPSUM BLOCK WALL - BLOCK GLUE

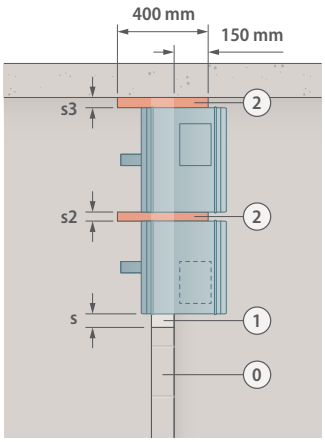
Ø 200-630 mm	w ≥ 70, w* ≥ 70	EI120 (v_e i ↔ o)S	I





Minimal distance

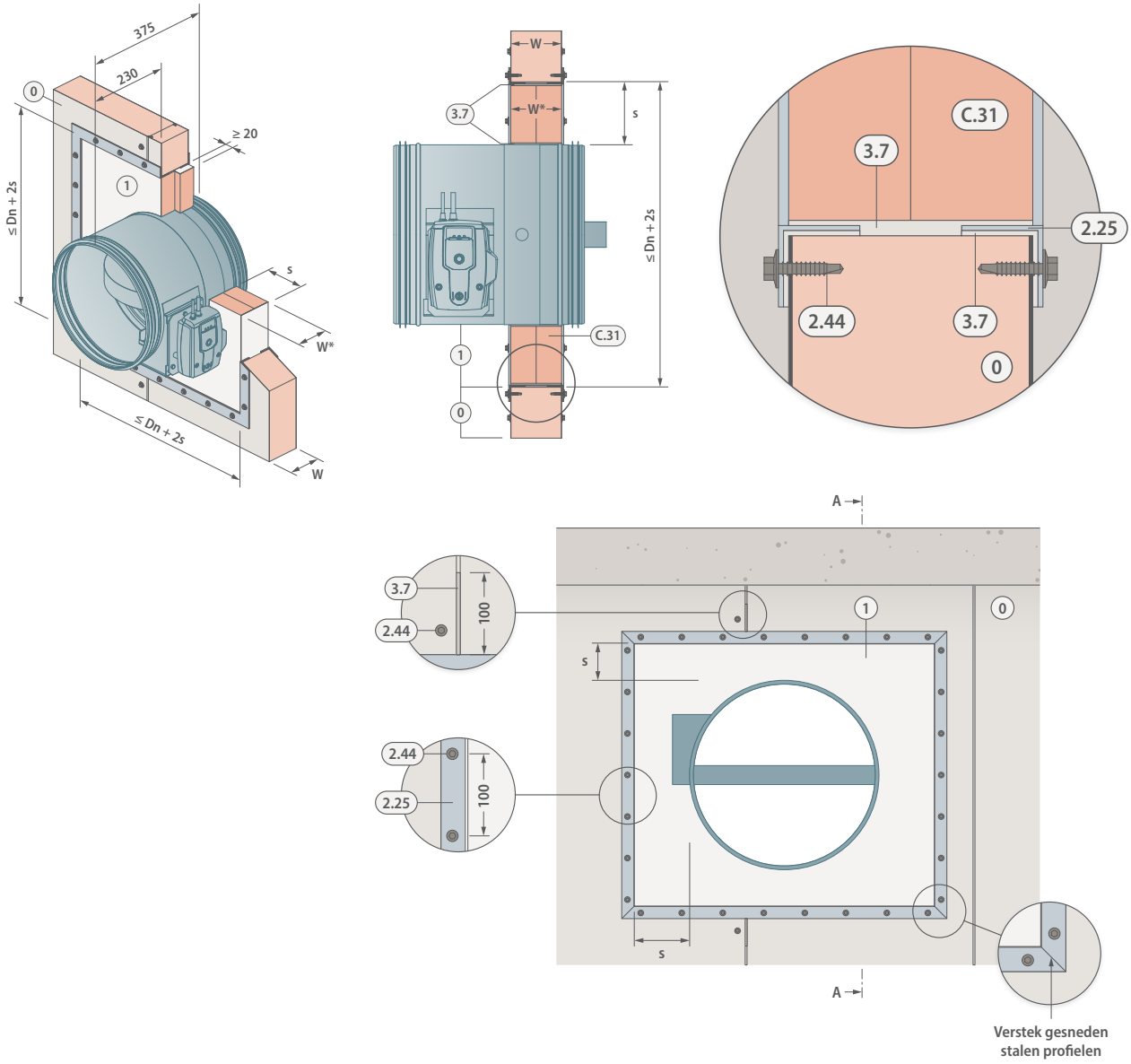




⓪	A.3	Gypsum block wall		
①	C.03	Block glue	20 ≤ s ≤ 40	
②	C.10	Stone wool 150 kg/m³	30 ≤ s2 < 200	30 ≤ s3 < 75 (to wall/ceiling)

3.3.11 SANDWICH PANEL SYSTEM - FIRE BATT

Ø 200-630 mm	w ≥ 100, w* = w	EI120 (v_e i ↔ o)S	IV



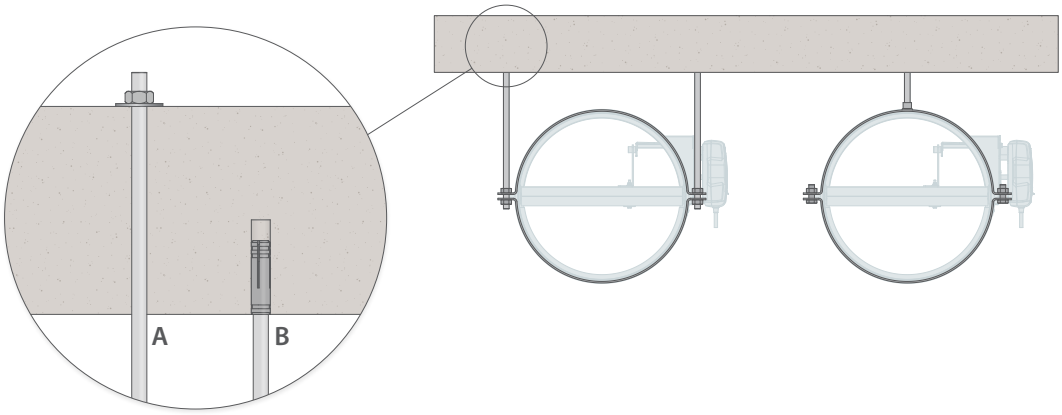
⓪	A.9	Sandwich panel system Paroc AST	
①	C.31	Hilti fire batt 2 x 50 mm CFS-CT W	20 ≤ s ≤ 50 (max EI90S : 20 ≤ s ≤ 75)
	2.25	L-profile 30 x 30 x 2	
	2.44	Hilti S-MD01Z- 4.8 x 19	
	3.7	Hilti coating CFS-S ACR	

3.4 SUSPENSION OF THE FIRE DAMPER

3.4.1 SUSPENSION OF THE FIRE DAMPER IN A VERTICAL (LOAD-BEARING) CONSTRUCTION

Rf-Technologies' fire dampers are usually tested in a vertical (load-bearing) construction (wall) without suspension. An exception to this are fire dampers located outside the wall, installation in Paroc Sandwich panel system or with sliding ceiling connection, technical details of suspension in these situations are documented in the relevant installation sheet.

In some regions, when connecting a ventilation duct to the fire damper, it must be avoided that this duct exerts forces on the fire damper that prevent proper operation. In case of fire, under the influence of heat, duct dilation, or duct sag, or wall deflection may impact the installation of the fire damper in a flexible wall or when sealing with coated fire batts. According to local regulations or customs, it may be appropriate or mandatory to provide elastic or combustible duct connections between the fire damper and the ventilation duct, or to work with flexible ventilation ducts, thus avoiding possible forces on the fire damper. The fire damper is then supported independently of the ventilation duct. Ventilation ducts, suspension structures or fixings must be made according to the manufacturer's guidelines.

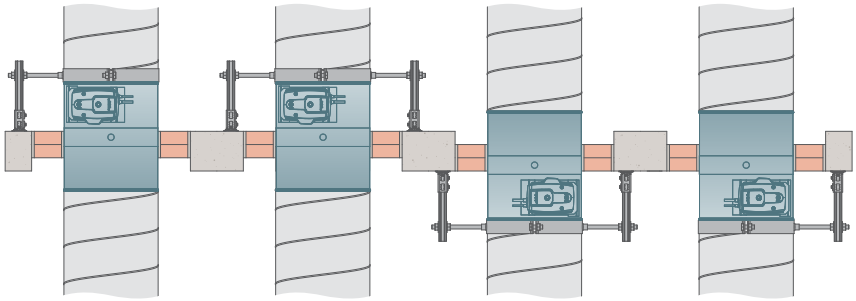


If it is opted to support the fire dampers, the dimensioned threaded rods of the suspensions can be fixed through the floor on the one hand (A). On the other hand, the threaded rods can be fixed in the ceiling with impact sleeves or screws (W) according to the manufacturer's specifications and taking into account fire protection requirements.

The support of fire dampers is possible with different materials (some examples image) applied according to the manufacturer's specifications.

3.4.2 SUSPENSION OF THE FIRE DAMPER IN A HORIZONTAL (LOAD-BEARING) CONSTRUCTION, SEALED WITH FIRE BATTS.

The ventilation ducts are supported according to the rules of good craftsmanship in accordance with the instructions provided by the manufacturers of the fastening materials.



3.5 VENTILATION DUCT CONNECTION

The flange of the fire damper is equiped with a sealing ring over which the ventilation duct is slid.

Flexible connections may be used, e.g. based on local or regional regulations or guidelines (e.g. M-LüAR, DW145). In accordance with the requirements, the designer and/or installer of the ventilation ducts determines how these flexible connections are realised and where they are applied. Both elastic connections and flexible ventilation ducts are possible to avoid possible forces on the installed fire damper. The ventilation ducts are then suspended independently of the fire damper. Take earthing into account and provide an equipotential connection where necessary.

Connected ventilation ducts must be installed according to the rules of good workmanship, in compliance with local regulations and with attention to an airtight finish. The ventilation duct suspension elements are made of steel and are dimensioned according to the values in the table below (source: EN 1366-1 §13.6.1 - Table 7). The table only takes into account the static load and not the stress of the installation.

	Maximum stress (N/mm2)	
Type of load	t < 60 min	60 min < t < 120 min
Tensile stress in all vertically oriented components	9	6
Shear stress in screws of property class 4.6 according to EN 20898-1	15	10

Fixing materials are used as described in the manufacturer's documentation. Different installation is possible subject to acceptance by an accredited test institute or an inspection body. Extension of suspensions in case of fire and stress levels can be calculated. Suspensions longer than 1.5m must be protected from fire in accordance with EXAP rules EN 15882-1 and in accordance with the instructions of the manufacturer of the relevant system.

3.6 COMBINED PENETRATIONS

Mixed penetrations are referred to when techniques evaluated according to different test standards pass through the same recess in the (load-bearing) construction and are sealed in the same way. Fire dampers are tested according to EN 1366-2 and are usually given an EIS classification. Fire dampers are subjected to high pressure differentials during fire tests, which include checking the damper's smoke resistance.

Techniques tested according to EN 1366-3 (including combustible ducts, non-combustible ducts and electrical cables) are usually assigned an EI classification. The scope of test standard EN 1366-3 explicitly excludes the testing of ventilation applications.

An EXAP standard (Extended application of results from fire resistance tests) has recently been released that covers this domain (EN 15882-5). One can expect tested solutions according to this standard to be added to the classifications in the near future.

Please consult Rf-Technologies for more information on this.

3.7 DISCLAIMER

RF-Technologies has prepared this document with due care. However, it is up to the installer to comply with project-specific and regulatory requirements. RF-Technologies cannot be held responsible for design errors. RF-Technologies is not liable for errors in the use of the products and for the consequences thereof. RF-Technologies assumes no liability for clerical errors and reserves the right to change information without notice. This document does not create, specify, modify or replace any new or existing contractual obligations agreed in writing between RF-Technologies and the user.

3.8 OVERVIEW LEGEND

(LOAD-BEARING) CONSTRUCTIONS		
A.1	Flexible wall type A	Flexible walls type A are constructed with metal studs as specified in European standard EN 13501-2. The walls are constructed according to the manufacturer's guidelines or standards in force locally. The wall thickness is 98 mm minimum, with 2 x 12.5 mm double-sided gypsum plasterboard, namely gypsum (cardboard) boards type A according to EN520 (GKB according to DIN 18180). The internal cavity ≥ 48 mm is filled with stone wool ≥ 40 mm of 40 kg/m^2. Sometimes this type of wall is referred to as 'D 98/48 type of wall'. According to EN1366-2, the insulation of the flexible wall may be omitted. Addition of additional layers use of thicker boards and wider metal studs is allowed. The horizontal metal profiles are at least 0.6mm thick galvanised steel and are fixed every ≤ 800 mm by Ø 6 mm steel screws and Ø 6mm anchors to the rigid (load-bearing) construction. The vertical metal profiles are at least 0.6mm thick galvanised steel and are placed centre to centre ≤ 625mm apart. A clearance of 5mm accommodates thermal expansion. The profiles conform to EN 14195. The profiles are attached to each other with Ø 3.5mm screws, with rivets or with metal stud fixing pliers. The cladding is fixed to the metal profiles with Ø 3.5 mm screws. The visible joints and the connection with the (load-bearing) construction are finished with covering tape and joint filler, as specified by the manufacturer. The screw heads are smeared. A reinforcement of metal horizontal and vertical profiles is provided around the damper, which is fixed to the metal framework of the wall construction (unless otherwise specified). These profiles are spaced 's' around the fire damper, which is the gap to be provided for sealing the fire damper. If the distance between fire damper and (load-bearing) construction on the one hand or between fire damper and a second fire damper on the other hand is less than 75 and 200 mm respectively as prescribed by the standard, it is not required to provide a profile at this location (see 'Placement at minimal distance'). The solutions in flexible wall constructions also apply to rigid walls. Flexible walls type A are usually applied in installation methods for a fire resistance of 60 minutes.
A.2	Flexible wall type F	Flexible walls type F are constructed using metal studs as specified in European standard EN 13501-2. The walls shall be constructed according to the manufacturer's guidelines or standards in force locally. The wall thickness is 98 mm minimum, with 2 x 12.5 mm double-sided gypsum plasterboard, namely gypsum (cardboard) boards type F according to EN520 (GKF according to DIN 18180). The internal cavity ≥ 48 mm is filled with stone wool ≥ 40 mm of 40 kg/m^2. Sometimes this type of wall is referred to as 'D 98/48 type of wall'. According to EN1366-2, the insulation of the flexible wall may be omitted. Addition of additional layers use of thicker boards and wider metal studs are allowed. The horizontal metal profiles consist of at least 0.6 mm thick galvanised steel and are fixed every ≤ 800 mm by Ø 6 mm steel screws and 6 mm anchors to the rigid (load-bearing) construction. The vertical metal profiles are at least 0.6 mm thick galvanised steel and are placed centre-to-centre at maximum 625 mm apart. A clearance of 5 mm accommodates thermal expansion. The profiles conform to EN 14195. The profiles are attached to each other with Ø 3.5 mm screws, with pop rivets or with metal stud fixing pliers. The cladding is fixed to the metal profiles with screws Ø 3.5 mm. The visible joints and the connection with the supporting structure are finished with cover tape and joint filler, as specified by the manufacturer. The screw heads are smeared. A reinforcement of metal horizontal and vertical profiles is provided around the damper, which is fixed to the metal framework of the wall construction (unless otherwise specified). These profiles are spaced 's' around the fire damper, which is the gap to be provided for sealing the fire damper. If the distance between fire damper and (load-bearing) construction on the one hand or between fire damper and a second fire damper on the other hand is less than 75 and 200 mm respectively as prescribed by the standard, it is not required to provide a profile at this location (see 'Placement at minimal distance'). The solutions in flexible wall constructions also apply to rigid walls. Flexible walls type F are usually applied in installation methods for fire resistance of 90 or 120 minutes.
A.3	Gypsum block wall	A gypsum block wall is a non-load-bearing partition wall made of prefabricated gypsum tiles with a density ≥ 850 kg/m^3 (EN 12859). The tiles are lined up (half-brick bond) with block glue. The joint thickness is approximately 2 mm, larger gaps can be sealed with block glue according to the manufacturer's specifications.

A.4	Rigid wall	Rigid walls are walls made of cellular concrete, concrete or masonry with a minimum specific gravity of 650 ± 200 kg/m^3 (EN 1363-1) and can also be applied to rigid walls made of hollow blocks. Any hollow spaces around the fire damper should be filled. The solutions in flexible wall constructions are also applicable to rigid walls.
A.7	Rigid floor	Rigid floors are cellular concrete or concrete floors with a specific gravity of 650 ± 200 kg/m^3 (EN 1363-1). Any voids around the fire damper should be filled.
A.9	Sandwich panel system	Paroc panels with thickness ≥ 100 mm, type: AST S, AST S+, AST F, AST F+, AST E; metal shell 0.6/0.6. For full information regarding the construction of this type of wall, please refer to Paroc's installation details.

DISTANCES		
w	Wall thickness	Minimum thickness of (load-bearing) construction
w*	Sealing depth	Minimum sealing depth in the (load-bearing) construction
s	General clearance	The width of the sealing recess 's' is determined by the tested distance during official fire tests. If the gap around the fire damper is larger than stated in the technical data sheet, the following options are available: reduce the gap in the wall with the same material as the wall; apply a different sealing system; seek alternative advice from a competent local authority (possibly in consultation with Rf-t). Always take into account the stability of the wall and the proper functioning of the fire damper.
s2	s2 min distance	Minimal distance between two fire dampers
s3	s3 min distance	Minimum distance between fire damper and (load-bearing) construction

SEALING SYSTEMS		
C.01	Mortar	Mortar according to EN 998-2: class M2.5 to M10 or fire-resistant mortar class M2.5 to M10. Mortar according to DIN 1053: groups II, IIa, III, IIIa or fire-resistant mortar groups II,III. Equivalent mortars, gypsum mortar or concrete
C.02	Gypsum	Gypsum mortar
C.03	Block glue	Block glue
C.10	Stone wool 150 kg/m^3	Stone wool ≥ 150 kg/m^3 over a depth of 400 mm, including 150#mm on the mechanism side of the wall. For a wall thickness of > 250 mm, the stone wool slab should be applied over a depth of > 400 mm until the entire wall thickness is filled. For rectangular fire dampers, flat stone wool slabs can be used. For round fire dampers, 50 mm thick shaped pieces can be cut to fit between the dampers (s2) and/or the wall construction (s3). By combining multiple layers of 50 mm, 150 mm (3 x 50 mm) sealing can be achieved on the mechanism side and 250 mm (5 x 50 mm) in the wall and on the non-mechanism side (depending on the thickness of the wall). The stone wool has a layer thickness of 50 mm, a density of 150kg/m^3, thermal conductivity of l = 0.041 W/mK at 50 °C, water vapour absorption 0.02 %, Euro class A1)
C.23	Cover plates	Type A or type F plasterboard (according to EN 520) as indicated in the declaration of performance. The cover plates follow the contours of the fire damper and shall be provided with recesses around the mechanism where necessary. Spacing between fire damper and cover plate ≤ 5mm.
C.31	Fire batt 2 x 50 mm	Single-sided Fire batt (3.6) 2 x 50 mm When sealing with coated fire batts, the saw cuts of the boards must not coincide: the boards are therefore installed (min 20 mm) angled to promote rigidity.

ACCESSORIES		
1.1	Horizontal profile	

1.2	Vertical profile
1.31	Plasterboard 12.5 mm type F
1.32	Plasterboard 12.5#mm type A
1.8	Stone wool 40 kg/m^3
2.1	Mounting screws Ø6mm (anchored to (load-bearing) construction)
2.2	Mounting screws Ø3.5mm
2.5	Universal screw ø 6 x 50 mm
2.25	Steel L-profile 30 x 30 x 2 (galvanised)
2.44	Hilti S-MD01Z 4.8 x 19
3.3	Jointfiller
3.6	Single-sided fire batt ≥ 140kg/m^3 - the rigid stone wool boards are coated on one side with 1mm fire-resistant coating and are installed ≥ 20mm bevelled. The coated side is always installed as the visible side. **Fire batt types:** Promastop-CB 50 (CC); Hilti CFS-CT W; Mulcol Multimastic FB1; SVT PYRO-SAFE® Flammotect-A (MFP). * Hilti: Flumroc (Flumroc 341), Isover (Fireprotect 150, Orsil Pyro, Orsil S, Orsil T, Protect BSP 150, Stropoterm), Knauf (Heralan BS-15, Heralan DDP-S, Heralan DP-15), Paroc (FPS 14, FPS 17, Pyrotech Slab 140, Pyrotech Slab 160), Rockwool (Hardrock II, RP-XV, RPB-15; * Promat: Rockwool (RP-XV, Hardrock 040/ Hardrock II, Rockwool 360, Taurox D-C, Taurox Duo NP, Rockwool Panel 755), Knauf (DP-15, FDB D150), Paroc OY AB (Pyrotech Slab 140-180, Paroc Pro Roof Slab), Isover (Orsil T-N). * Mulcol: Isover (BSP). Sealing with Mulcol's fire batt is attested in rigid and flexible wall. Not for minimal distances, fire dampers out of wall or fire dampers sealed in rigid floor. * SVT: Sealing with SVT fire batt is attested in rigid and flexible wall. Not for minimal distances, fire dampers from wall or fire dampers sealed in rigid floor.
3.7	Coating on end faces (Promastop E/CC, Hilti CFS-S ACR, Mulcol Multimastic SP, PYRO-SAFE® FLAMMOTECT-A), around the seams on the visible sides with an overlap on the wall and around the tunnel. The maximum thickness of Mulcol Multimastic SP is 15mm, joints are finished with a layer of Multimastic C with an overlap on the wall of 25mm.