

EN 15650:2010-09

# MANDÍK<sup>®</sup>

## FIRE DAMPER

### FDMR 60



These Technical Specifications define the range of the manufactured sizes and models, the main dimensions and the scope of use of the FDMR 60 fire dampers (hereinafter referred to only as the "fire dampers"). They are binding for production, designing, ordering, delivery, storage, assembly, operation, maintenance and operability inspections.

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## II. GENERAL INFORMATION

### 1. Description

- 1.1.** Fire dampers are shutters in ducts of air-conditioning devices that prevent spreading the fire and combustion products from one fire segment to the other one by means of closing the duct in the points of fire separating constructions.

The damper blade automatically closes the air duct using a shutting spring or an actuating mechanism of back spring. The shutting spring is activated by pressing the start button or by the impulse from the thermal fuse. The back spring of the actuating mechanism is started when the thermoelectric starting mechanism BAT is activated, when the reset button on BAT is pressed or when the power supply to the actuating mechanism is stopped.

After closing the blade, the damper is sealed with a silicon packing against smoke penetration. The damper can be delivered with a seal without silicone at the customer's wish. At the same time, the damper blade is embedded in a material which enlarges its volume due to increasing temperature and hermetically seals the air duct.

The dampers have one inspection hole, as the shutting device and the inspection hole can be set to the most advantageous position with respect to operation and handling of the control device by turning the damper a little in case of the spiro model of the dampers.

**Fig. 1** FDMR 60 with actuating mechanism



**Fig. 2** FDMR 60 with mechanical control



- 1.2.** Damper characteristics

- CE certified acc. to EN 15650
- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3+A1
- Fire resistance EIS 60
- External Casing leakage class C, Internal leakage class 3 acc. to EN 1751
- Cycling test in class C 10000 acc. to EN 15650
- Corrosion resistant acc. to EN 15650
- ES Certificate of conformity No. 1391-CPR-2019/0161/O1
- Declaration of Performance No. PM/FDMR60/01/20/1
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

- 1.3.** Working conditions

Right damper function is secured under the following conditions:

- a) Maximum air circulation speed: 12 m/s  
Maximum pressure difference: 1200 Pa
- b) The air circulation in the whole damper section must be secured as steady on whole surface.

Operation of the dampers does not depend on the direction of air circulation. The dampers can be located in an arbitrary position.

Dampers are suitable for systems without abrasive, chemical and adhesive particles.

Dampers are designed for macroclimatic areas with mild climate according to EN 60 721-3-3.

Temperature in the place of installation is permitted to range from -30°C to +50°C.

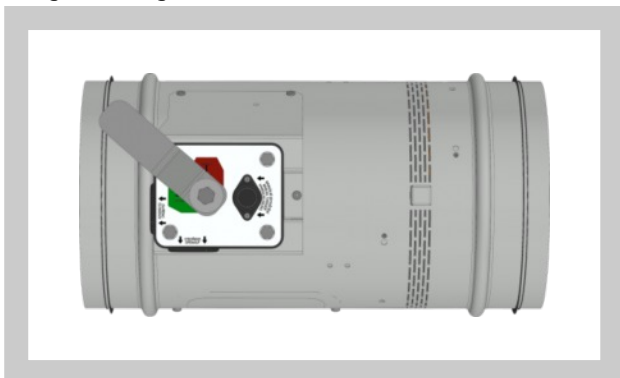
2. Design

2.1. Design with mechanical control

Design .01

Design with mechanical control with a thermal protective fuse which actuates the shutting device, after the nominal start temperature 72°C has been reached. Automatic initiation of the shutting device is not activated if the temperature does not exceed 70°C. In case that other start temperatures are required, thermal fuses with nominal start temperature +104°C or +147°C can be supplied (this requirement must be specified in the order).

Fig. 3 Design .01



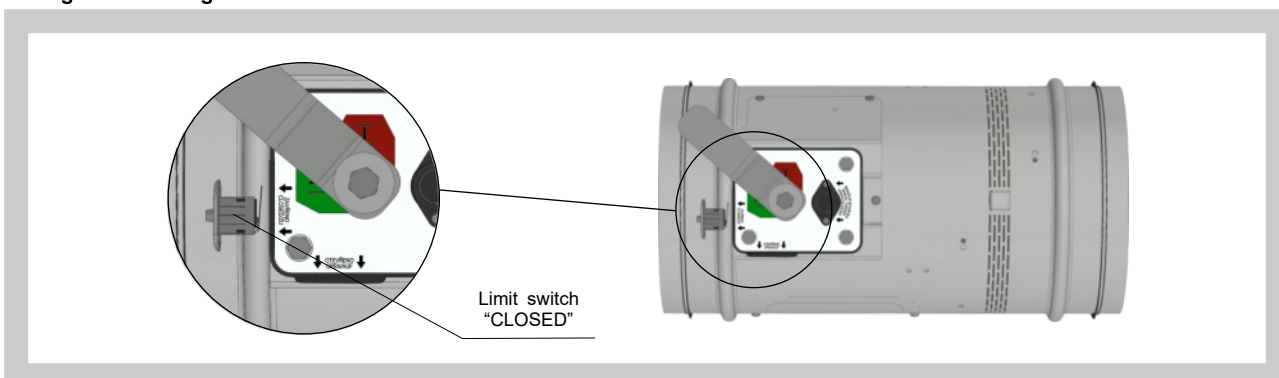
**ATTENTION:**

Mechanisms are produced in four designs **M1** to **M4**, difference is only in size of inner spring, which closes the fire damper. For the size of fire dampers is always assigned the size of mechanism - **Tab 4.1.1**. It is not recommended to use different size of mechanism, than given by the manufacturer, otherwise, there is a risk of fire damper destruction.

Design .11

Design .01 with mechanical control can be complemented with a limit switch signalling of the damper blade position "CLOSED". Cable is connected directly to limit switch.

Fig. 4 Design .11



Design .80

Design .01 with mechanical control can be complemented with a terminal switches signaling of the damper blade position "CLOSED" and "OPEN". Limit switches are connected via damper casing, cables are connected directly to limit switches.

Fig. 5 Design .80

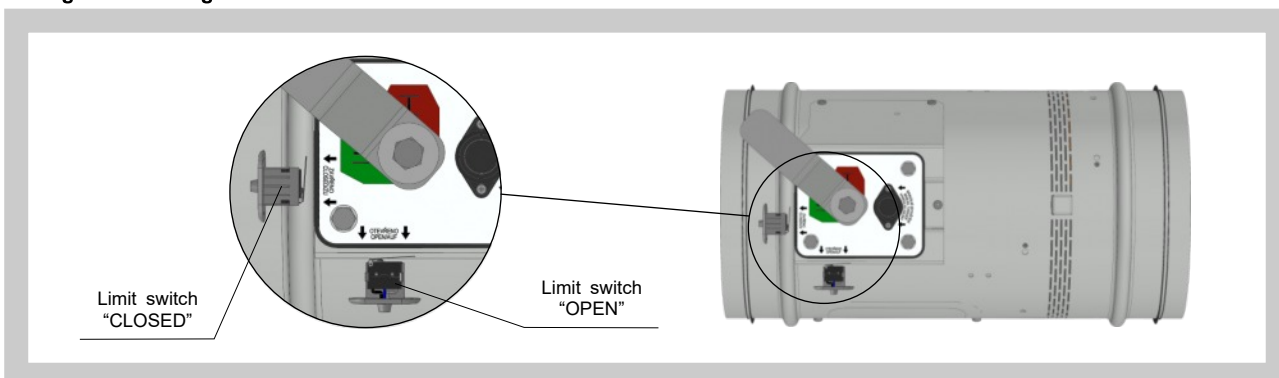
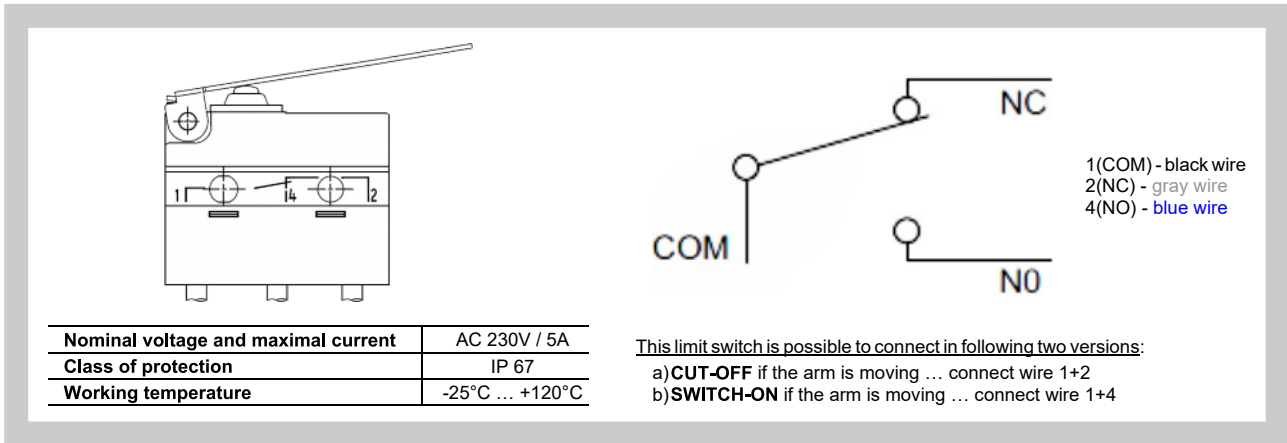


Fig. 6 Limit switch G905-300E03W1



2.2. Design with actuating mechanism

**Design .40, .50**

The dampers are equipped with Belimo actuating mechanisms with back spring and thermoelectric actuating device, of range BFL (hereinafter referred to only as the "actuating mechanism"). After being connected to power supply AC/DC 24V or AC 230V, respectively, the actuating mechanism moves the damper blade to "OPEN" operation position and at the same time pre-stretches its back spring. While the actuating mechanism is under voltage, the damper blade is in the "OPEN" position and the back spring is pre-stretched. The time needed for full opening of the damper blade from "CLOSED" position to "OPEN" position is 60 seconds at the maximum. If the power supply to the actuating mechanism is cut off (due to loss of power supply or by pressing the reset button on the BAT thermoelectric starting mechanism), the back spring will move the damper blade to "CLOSED" failure position. The time of moving the blade from "OPEN" position to "CLOSED" position takes 20 seconds at the maximum. If the power supply is restored (the blade can be in any position), the actuating mechanism starts to move the damper blade to "OPEN" position again.

A thermoelectrical starting mechanism BAT, which contains two thermal fuses Tf1 and Tf2, is a part of the actuating mechanism. These fuses are activated when temperature +72°C has been exceeded (the fuse Tf1 when the temperature around the damper and the fuses Tf2 when the temperature inside the air-conditioning piping has been exceeded). After the thermal fuse Tf1 or Tf2 has been activated, the power supply is permanently and irreversibly cut off and the actuating mechanism, by means of the pre-stretched spring, displaces the damper blade into the breakdown position "CLOSED".

Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two limit switches.

Fig. 7 Design .40, .50

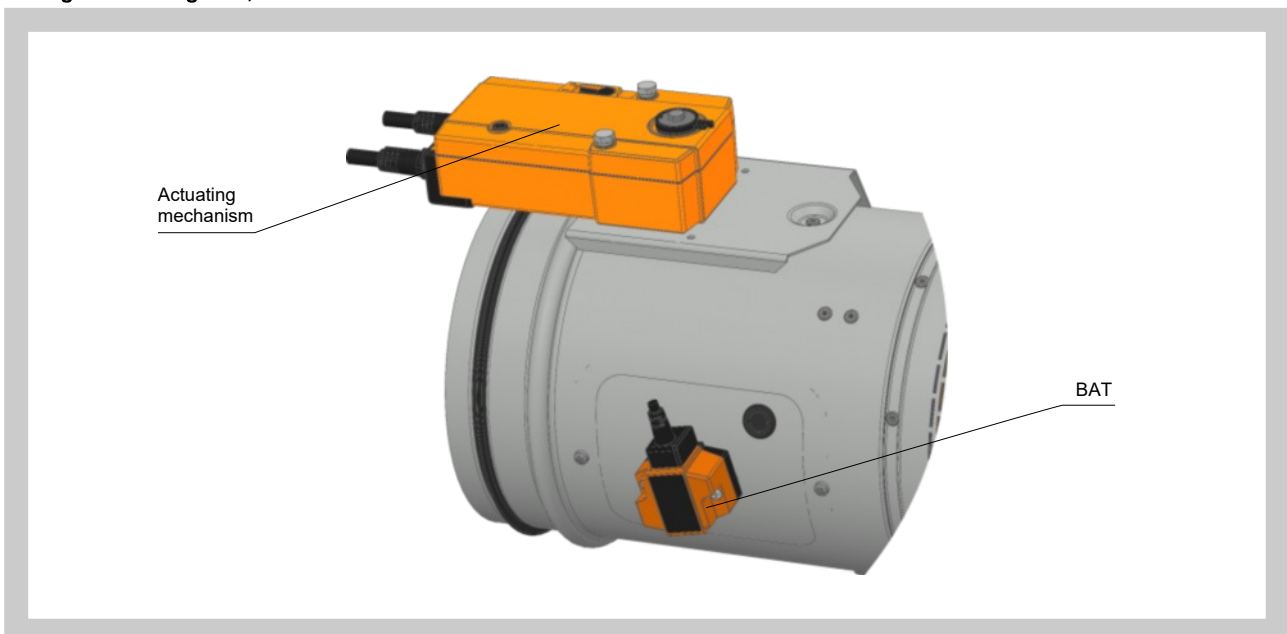


Fig. 8 Actuating mechanism BELIMO BFL 230-T

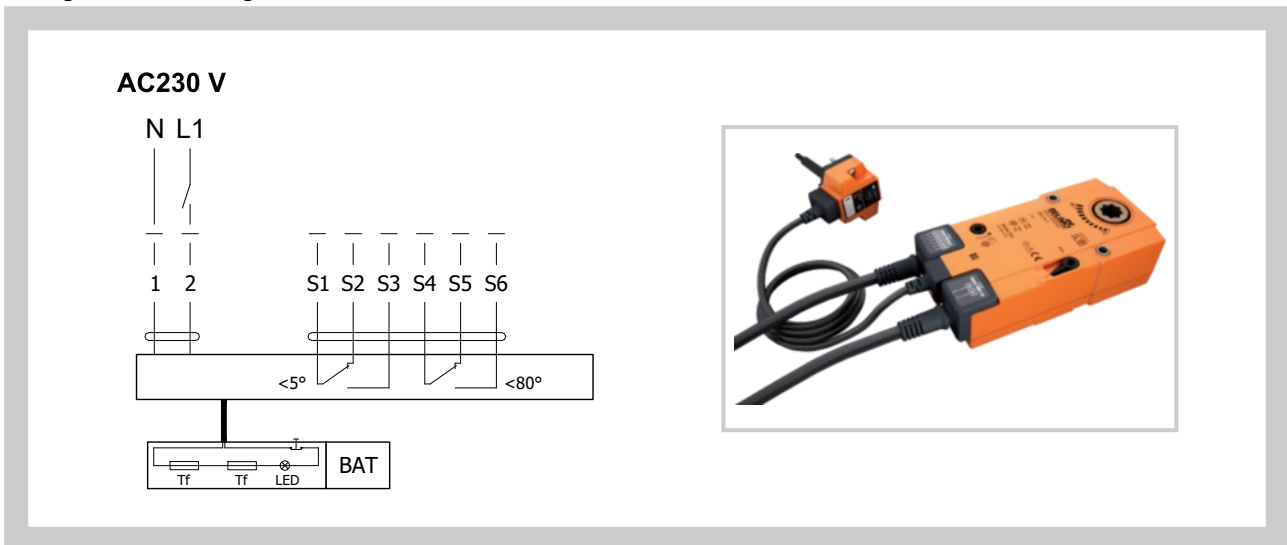
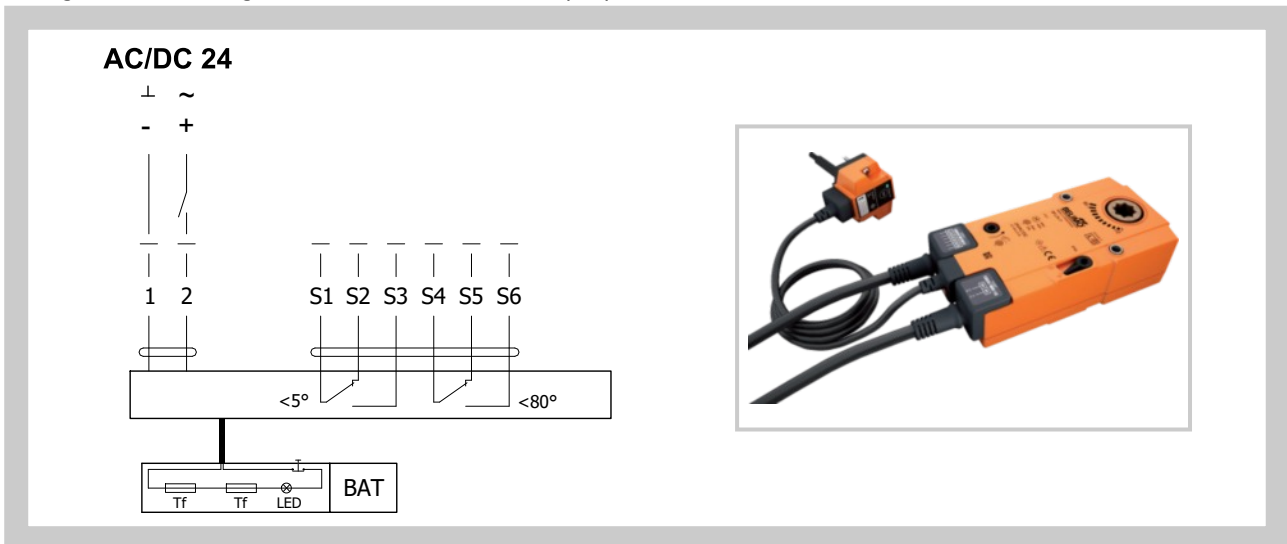


Fig. 9 Actuating mechanism BELIMO BFL 24-T(-ST)



Tab. 2.2.1. Actuating mechanism BELIMO BFL 24-T(-ST), BFL 230-T

Actuating mechanism BELIMO	BFL 230-T	BFL 24-T(-ST)
Nominal voltage	AC 230 V 50/60 Hz	AC 24 V 50/60 Hz DC 24 V
Power consumption - motoring - holding	3,5/5 W 1,1/2,1 W	2,5/4 W 0,8/1,4 W
Dimensioning	6,5/10 VA (I <sub>max</sub> 4 A @ 5 ms)	4/6 VA (I <sub>max</sub> 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	<math><60\text{ s}</math> <math>\sim 20\text{ s}</math>	
Ambient temperature - normal duty - safety duty - non-operating temperature	- 30°C ... +55°C The safe position will be attained up to max. +75°C - 40°C ... +55°C	
Connecting - motor - auxiliary switch	cable 1 m, 2 x 0,75 mm <sup>2</sup> (BFL 24-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm <sup>2</sup> (BFL 24-T-ST) with 6-pin plug-in connectors	
Thermal trips	duct outside temperature +72°C duct inside temperature +72°C	

### 2.3. Design with the communication and supply device

#### Design .60

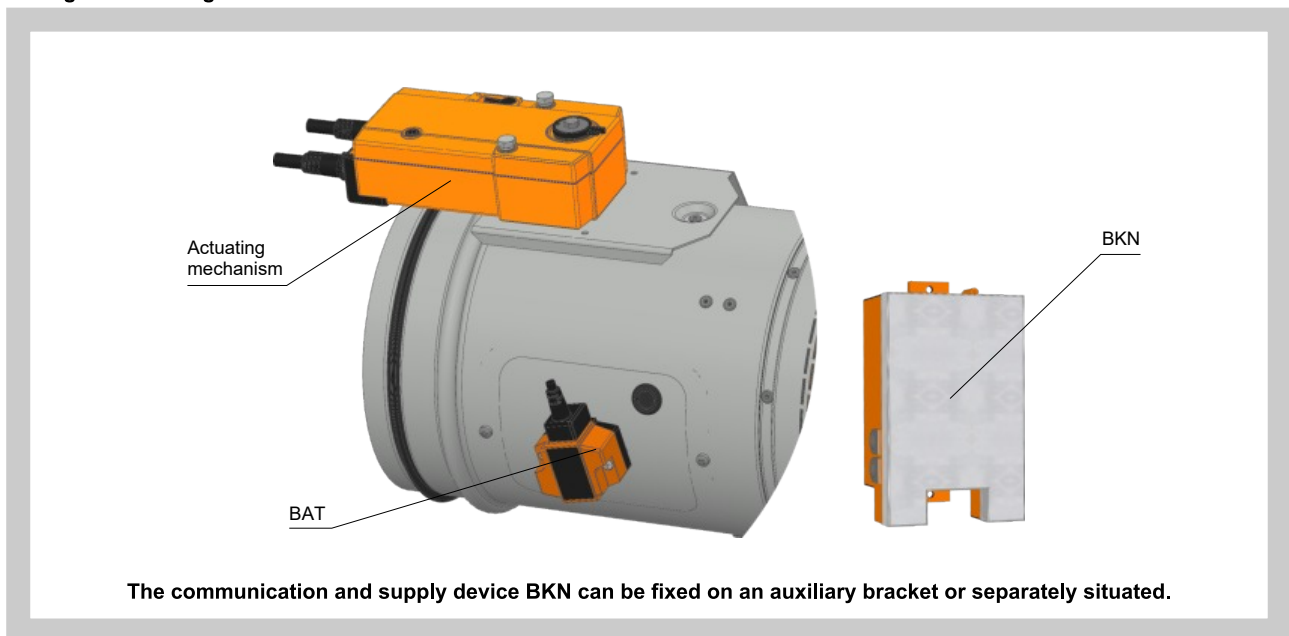
Design with the communication and supply device BKN 230-24 and the actuating mechanism BFL 24-T. It simplifies electrical wiring and interconnection of fire flap valves. It facilitates on site check and enables central control and checks of fire damper by means of a simple 2-conductor wiring.

BKN 230-24 functions as a decentralized network device for supplying the actuating mechanism BFL 24-T with a spring back drive on one hand and on the other hand it transmits the signal informing about the flap valve position OPERATION and FAILURE through 2-conductor wiring to the central. Control command SWITCHED ON - SWITCHED OFF from the central through BKN 230-24 goes through the same wiring to the actuating mechanism.

To simplify the connection, the actuating mechanism BFL 24-T is equipped with connecting plugs that are inserted directly to BKN 230-24. BKN 230-24 is supplied with a conductor and an EURO plug to be connected to the 230V mains. 2-conductor wiring is connected to BKN 230-24 by means of terminals 6 and 7. If the drive is supposed to be controlled without any signal from the central, it can be switched on by means of a bridge between the terminals 3 and 4. A green LED pilot light on BKN 230-24 is on when voltage is present in the drive (AC 24V).

If the button on BAT is switched on or if the power supply (e.g. by a signal from ELECTRICAL FIRE SIGNALISATION ) is disconnected, the damper position will be "FAILURE".

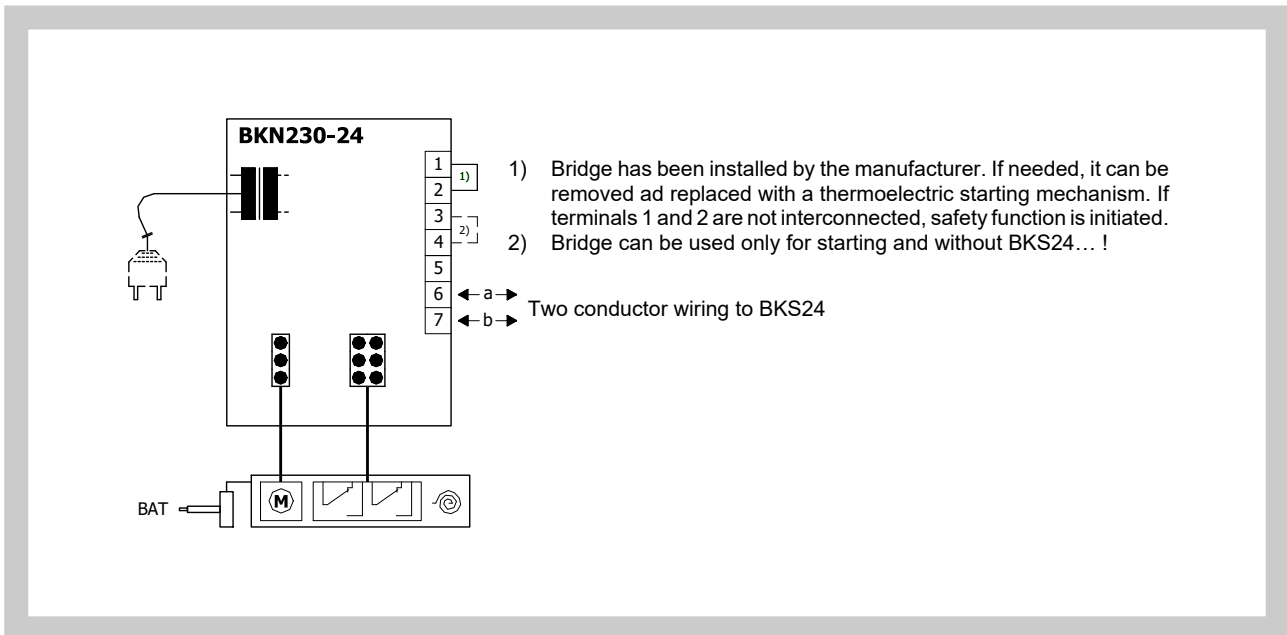
Fig. 10 Design .60



Tab. 2.3.1. Communication and supply device BKN 230-24

Communication and supply device	BKN 230-24
Nominal voltage	AC 230 V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	11 VA (including actuating mechanism with spring return)
Protection Class	II
Degree of protection	IP 40
Ambient temperature Non-operating temperature	-20°C ... +50°C -40°C ... +80°C
Connection - net - motor - terminal board	cable 0,9 m with EURO plug type 26 6-pole connector, 3-pole connector screw terminals for cable 2x1,5 mm <sup>2</sup>

Fig. 11 Communication and supply device BKN 230-24, with act. mechanism BFL 24-T-ST

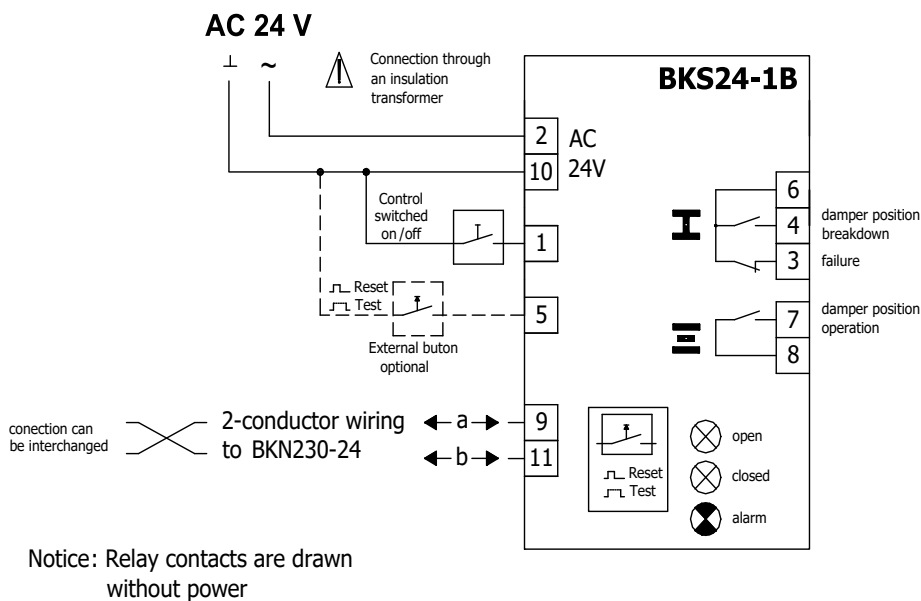




3. Communication and control devices

3.1. BKS 24-1B communication and control device is used for control and checks of fire dampers with the BFL 24-T-ST actuating mechanism in conjunction with the BKN 230-24 supply and communication device. BKS 24-1B receives information about the situation of the fire damper through the BKN 230-24 supply and communication device and issues controlling commands. The device is intended for building in into the distribution board. Light diodes on the front side of the device signalise the operating situations of the damper and breakdowns of the whole system. Potentialless auxiliary contacts enable connection to the master control system (signaling of the damper position, failure reports, release of the ventilators etc.). While a flashing green LED pilot light signalises damper blade motion towards the given position, the same pilot light reports reaching the required position when shining constantly. If the flap blade, with respect to the given time, does not reach the required position, then a red LED pilot light starts to flash and at the same time, the failure contact is active. Once the damper blade reaches the given position, this contact is deactivated. The LED pilot light keeps flashing unless the failure is unblocked by means of the RESET button. Except for reporting failures, other three auxiliary contacts are available. Contacts showing operating and failure position of the damper are active when the damper is in the given position. Function check can be done by pressing and holding the button "RESET/TEST" for longer time. While holding the button, the damper blade moves in the direction of the failure position. Fault function is indicated by the LED pilot light. BKS 24-1B can be connected by means of ZSO-11 11 pole connector for DIN 35 mm panel.

Fig. 12 Communication and control device BKS 24-1B



light diodes			contacts	Description
open	closed	alarm	state	Cause/Course
⊗ closed	⊗ closed	⊙ closed	[6] — [3]	<b>Power supply AC 24V</b> not available
⊗ open	⊗ open	⊗ open	[6] — [3]	<b>Check test cca 35sec</b> , starting with switching AC 24 on or pressing «Reset/Test» button
⊗ closed	⊗ closed	⊗ flashing	[6] — [3]	<b>Current failure</b> , possible cause: • short circuit or interruption of 2-conductor wiring or damper failure (at BKN..) • Power supply AC 230V missing • defective thermoelectrical starting • smoke detector activated • exceeded operation time • damper blocked
⊗ closed	⊗ closed	⊗ open	[6] — [3]	<b>Failure saved in memory</b> • Fault in system signalled, system check should be done
⊗ closed	⊗ flashing	⊙ closed	[6] — [4]	Damper (drive) turning into <b>the direction</b> of breakdown position
⊗ closed	⊗ open	⊙ closed	[6] — [4]	Damper (drive) in <b>breakdown position</b> I
⊗ flashing	⊗ closed	⊙ closed	[6] — [7]	Damper (drive) turning into <b>the direction</b> of operating position
⊗ open	⊗ closed	⊙ closed	[6] — [7]	Damper (drive) in <b>operating position</b> II

Tab. 3.1.1. Communication and control device BKS 24-1B


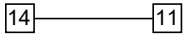


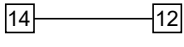
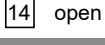
Communication and control device	BKS 24-1B
Nominal voltage	AC 24 V 50/60Hz
Power consumption	2,5 W (operating position)
Dimensioning	5 VA
Protection Class	III
Degree of protection	IP 30
Ambient temperature	0 ... +50°C
Connection	11-pole connector ZSO-11, it is not part of BKS24-1B, ZSO-11 is 11-pole screw terminal 11 x 1,5 mm <sup>2</sup>

3.2. BKS 24-9A communication and control device is used for group control and checks of 1 to 9 fire dampers with the actuating mechanism BFL 24-T-ST in connection with the supply and communication device BKN 230-24. Signalisation of the damper position is individual; the damper can be controlled and tested only as a group. BKS 24-9A is intended for use in the distribution board and displays the operation situations and failure reports of the connected fire dampers. It is possible to signalise functions such as the damper position and failure reports or to transmit them further to the system by means of integrated auxiliary switches. BKS 24-9A receives signals from BKN 230-24 through the two-conductor wiring and issues control commands. Proper damper operation is indicated by two light LED diodes:

Control ON = position OPERATION  
 Control OFF = position FAILURE

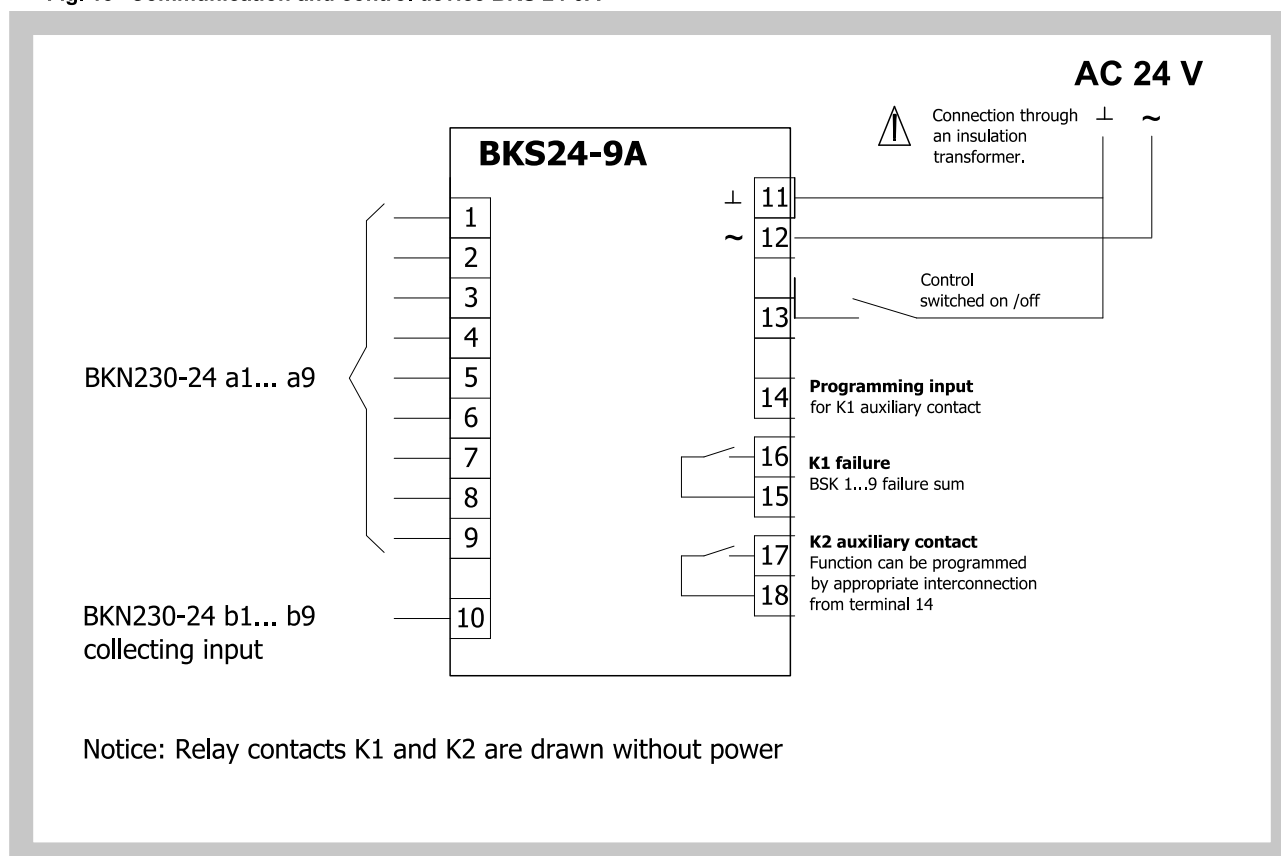
If the fire damper do not reach the given position in time tolerable for displacing, the appropriate light diode FAILURE starts to flash and K1 contact is opened (current failure). In case that the faulty damper finally reaches its given position, K1 is closed and the failure report light shines (the failure is saved in memory). K2 - the auxiliary contact - is used for signaling of the flap position to the master device. Function of this auxiliary contact can be programmed through the terminal 14 according to the Tab. 3.2.1.

Tab. 3.2.1. BKS 24 -9A contacts K1 and K2

Function contact K1		Programming K2 Auxiliary Contact		
situation	state	function	interconnection	state
current failure	15  16	K2 contact is on if all the flaps are open		17  18
no failure	15  16	K2 contact is on if the flap No. 1 is open		
		K2 contact is on if all the flaps are closed		

Function check can be done in the position OPERATION by means of pushing the TEST button. While the button is pushed, the flap blade is turning into the position FAILURE. Fault function is indicated by a report "FAILURE". Assembly and connection BKS 24 - 9A can be made by DIN 35 mm panel. It is connected by two 9-pole plug-in connectors.

Fig. 13 Communication and control device BKS 24-9A



Tab. 3.2.2. Communication and control device BKS 24-9A

Communication and control device	BKS 24-9A
Nominal voltage	AC 24 V 50/60Hz
Power consumption	3,5 W
Dimensioning	5,5 VA
Protection Class	III
Degree of protection	IP 30
Ambient temperature	0 ... +50°C
Connection	terminal 2 x 1,5 mm <sup>2</sup>

**4. Dimensions, weights and effective area**

**4.1. Dimensions, weights and effective area**

Tab. 4.1.1. Dimensions, weights and effective area

Nominal size øD [mm]	a [mm]	Weight *		Effective area S <sub>ef</sub> [m <sup>2</sup> ]	Leaf th. [mm]	Actuating mechani.	Mechan. control
		design					
		manual [kg]	act. mech. [kg]				
100	-	2,9	2,8	0,0031	15	BFL	M1
125	-	3,2	3,1	0,0062	15	BFL	M1
140	-	3,3	3,2	0,0085	15	BFL	M1
150	-	3,4	3,3	0,0103	15	BFL	M1
160	-	3,5	3,5	0,0123	15	BFL	M1
180	-	3,9	3,8	0,0166	15	BFL	M1
200	-	4,2	4,1	0,0215	15	BFL	M1
225	-	4,5	4,5	0,0275	15	BFL	M1
250	8	4,8	4,7	0,0354	15	BFL	M2
280	23	5,3	5,2	0,0462	15	BFL	M2
315	40,5	5,9	5,8	0,0606	15	BFL	M2
355	60,4	7,2	6,4	0,0776	15	BFL	M2
400	83	8,0	7,3	0,1015	15	BFL	M2

\* The weight of the anchor is 0,04 kg.

Fig. 14 Design with mechanical control

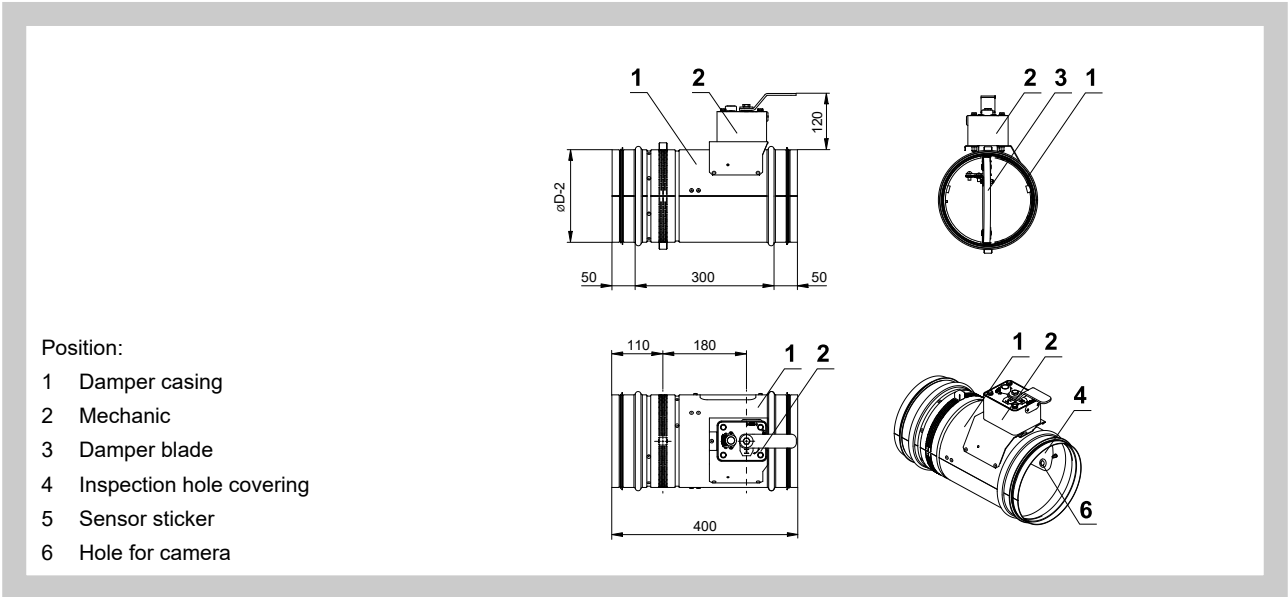


Fig. 15 Design with actuating mechanism

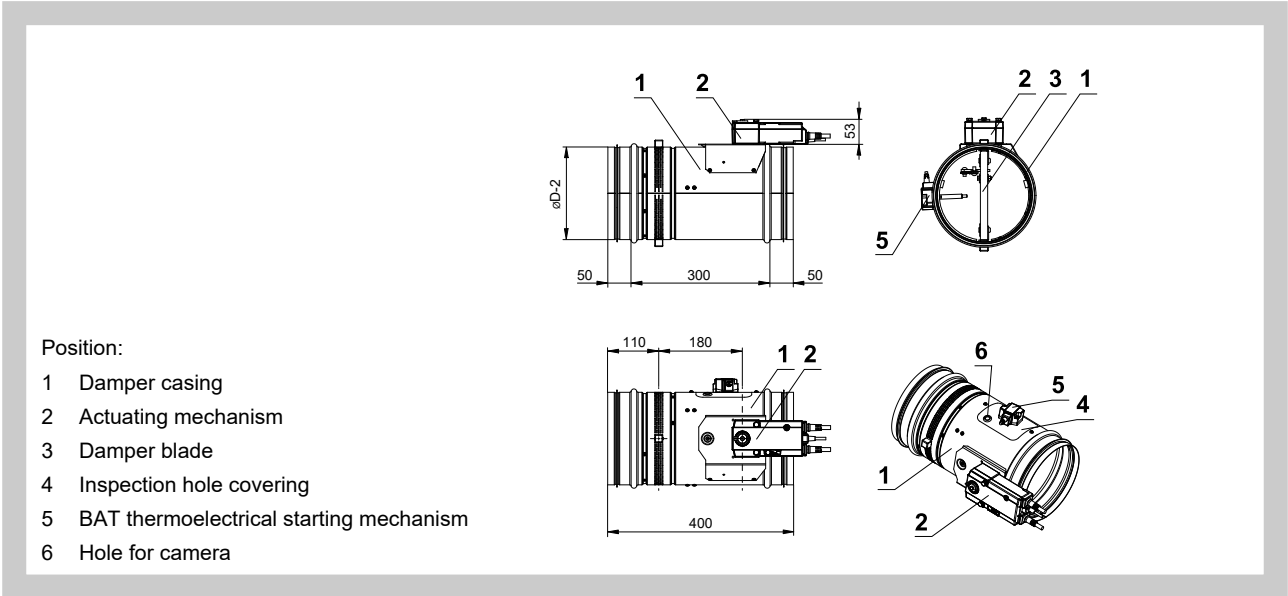
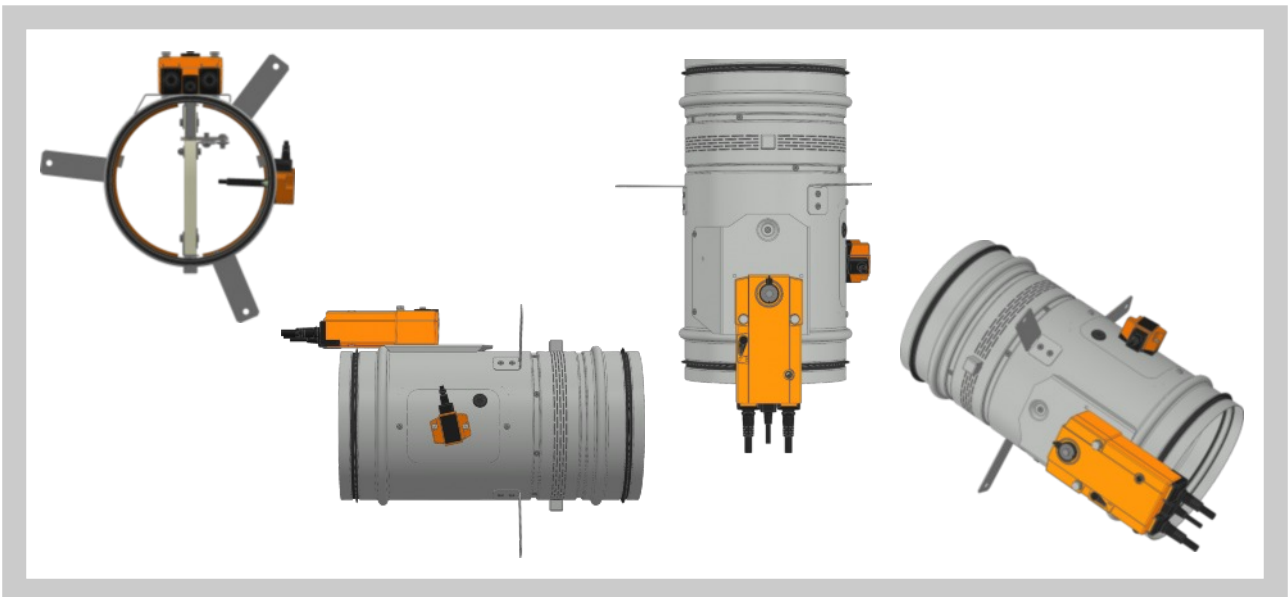


Fig. 16 Fire damper with installation holders



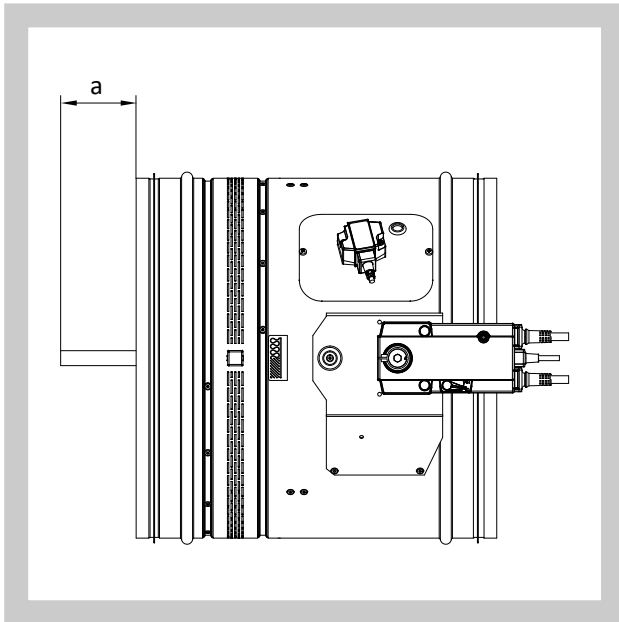
4.2. Blades overlaps

Tab. 4.2.1 Blades overlaps

Blades overlaps		Dimension	Overlaps
FDMR 60 Fig. 17	Side without act. mechanism	"a"	Tab. 4.1.1

These values has to be respected when projecting related air-conditioning ducts.

Fig. 17 Blade overlaps



4.3. For the design .60 (with BKN supply and communication device) add to weight of the damper with an actuating mechanism (from the Tab 4.4.1.) the weight of BKN (0.5 kg).

**5. Placement and Assembly**

**5.1.** The fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating structures. The damper assembly procedures must be done so that all load transfer from the fire separating constructions to the damper body is absolutely excluded. The back-to-back air-conditioning piping must be suspended or supported so that all load transfer from the back-to-back piping to the damper flanges is absolutely excluded. The gap between the installed damper and the building structure must be perfectly filled with approved material all over its volume.

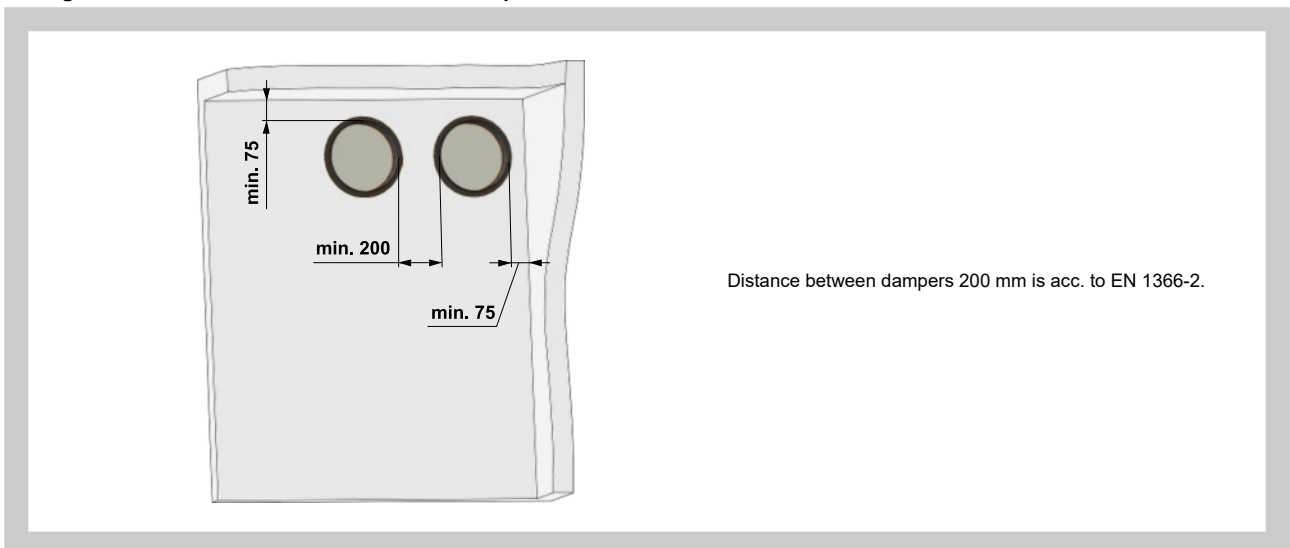
To provide the necessary space for access to the control device, all other items must be situated at least 350 mm from the control parts of the damper. At least one inspection hole must be accessible.

The damper must be installed so that the damper blade (in closed position) is situated in the fire separating structure - marked by the label BUILD-IN EDGE on the damper body. If such solution is not possible, the piping between the fire separating structure and the damper blade must be protected according to the certified installation method, see [Section 6](#).

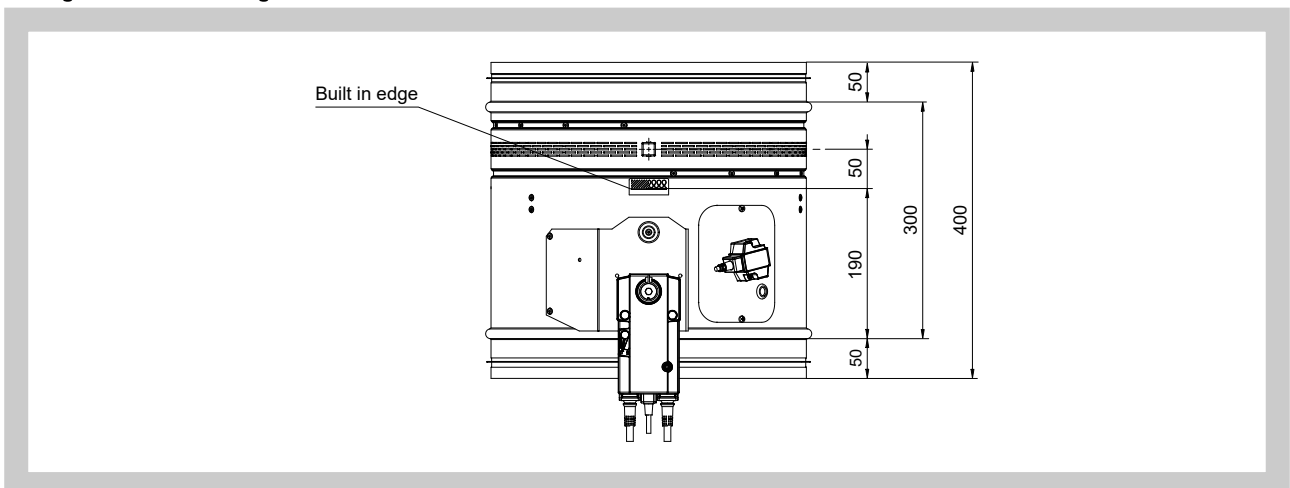
During the installation and plastering process, the control mechanism must be protected (covered) against damage and pollution. The damper body should not be deformed during bricking in. Once the damper is built in, the damper blade should not grind on the damper body during opening or closing.

The distance between the fire damper and the structure (wall, ceiling) must be 75 mm at the minimum. If two or more dampers are to be installed in one fire separating structure, the distance between adjacent dampers must be 200 mm at the minimum, according to EN 1366-2 paragraph 13.5. For admissible exceptions see [Section 6](#).

**Fig. 18** The distance between the fire damper and the construction



**Fig. 19** Built in edge



"Wall edge sticker" indicates the recommended edge of installation of fire damper into the fire partition structure (wall). The damper must be installed so that the entire damper blade - in the closed position - is located inside the fire separating structure (wall) and at the same time the control mechanism and inspection openings are freely accessible.

## 5.2. Examples of fire damper installing

The fire damper can be integrated into a solid wall construction made e.g. of normal concrete/ masonry, porous concrete with minimum thickness 100 mm or into solid ceiling construction made e.g. of normal concrete with minimum thickness 110 mm or porous concrete with minimum thickness 125 mm.

The fire damper can be integrated into a gypsum wall construction with fire classification EI 120 or EI 90.



## 6 Statement of installations

### 6.1. Installation method list

Tab. 6.1.1. Installation method list

Fire separating constr.	Wall/Ceiling	Installation	Fire resist.	Page	
	Min. thickness [mm]				
Solid wall construction	100	Mortar or gypsum	EIS 60	18	
	100	Stuffing box and fire protection mastic		18	
	100	Installation next to wall - mortar or gypsum and mineral wool		19	
Outside solid wall construction	100	Mineral wool - stuffing box and fire protection mastic - ISOVER_ULTIMATE PROTECT		20	
Gypsum wall construction	100	Mortar or gypsum		21	
	100	Stuffing box and fire protection mastic		21	
	100	Installation next to wall - mortar or gypsum and mineral wool		22	
Outside gypsum wall construction	100	Mineral wool - stuffing box and fire protection mastic - ISOVER_ULTIMATE PROTECT		23	
Solid ceiling construction	110 - Concrete 125 - Aerated concrete	Mortar or gypsum		24	
		Stuffing box and fire protection mastic		24	
Outside solid ceiling construction		Mineral wool - mortar or gypsum - ISOVER_ULTIMATE PROTECT		25	
Sandwich wall construction		100		Stuffing box and fire protection mastic, coating and cement lime plate	26
Outside sandwich wall construction		100		Mineral wool - stuffing box and fire protection mastic, coating and cement lime plate	27
Solid shaft construction	100	Mortar or gypsum		28	
Gypsum shaft construction	100	Gypsum wall-mounted shaft construction on one side - stuffing box and fire protection mastic		29	
	100	Stuffing box and fire protection mastic	29		

6.2. Installation in solid wall construction

Fig. 20 Solid wall construction - mortar or gypsum

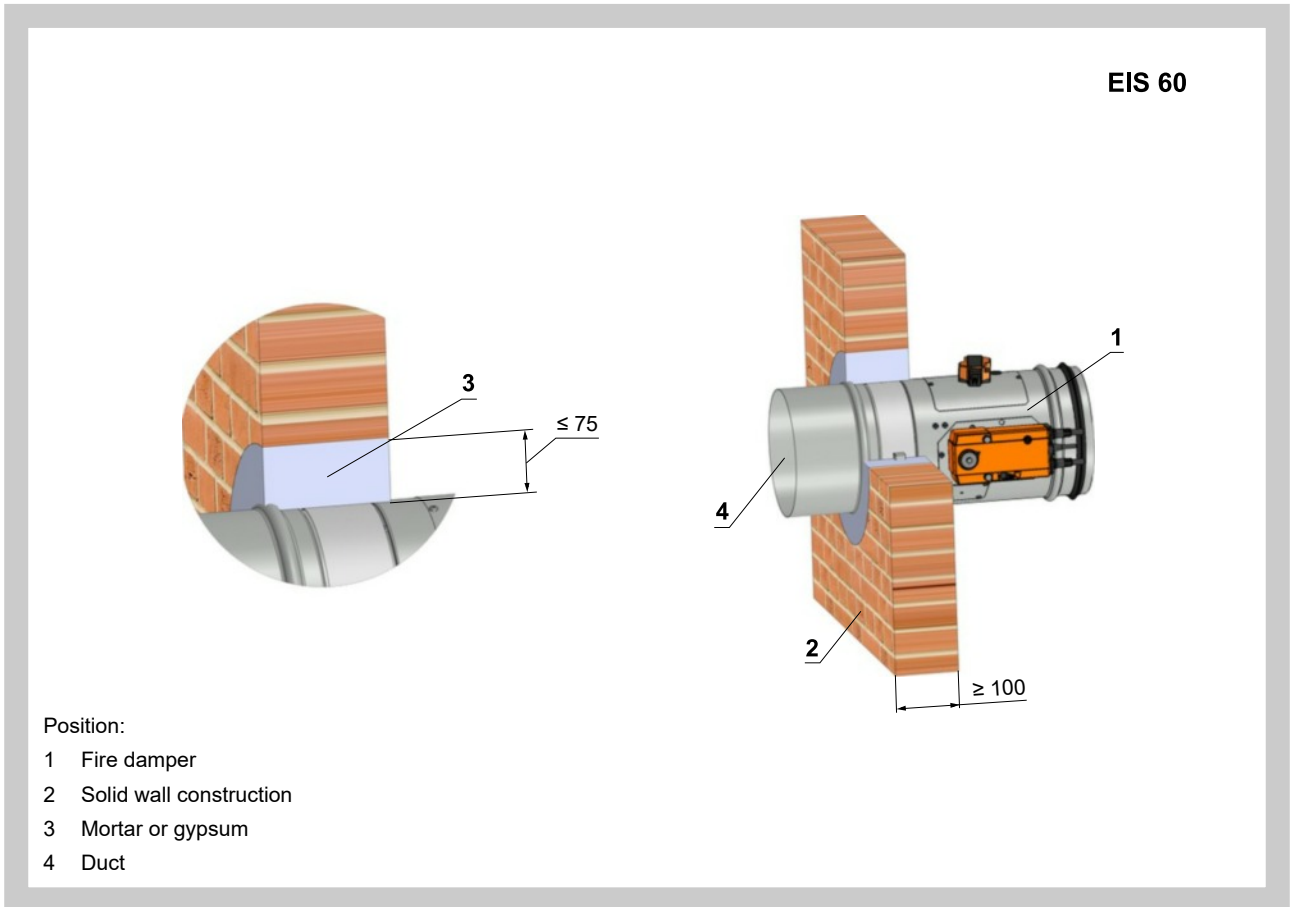


Fig. 21 Solid wall construction - stuffing box and fire protection mastic

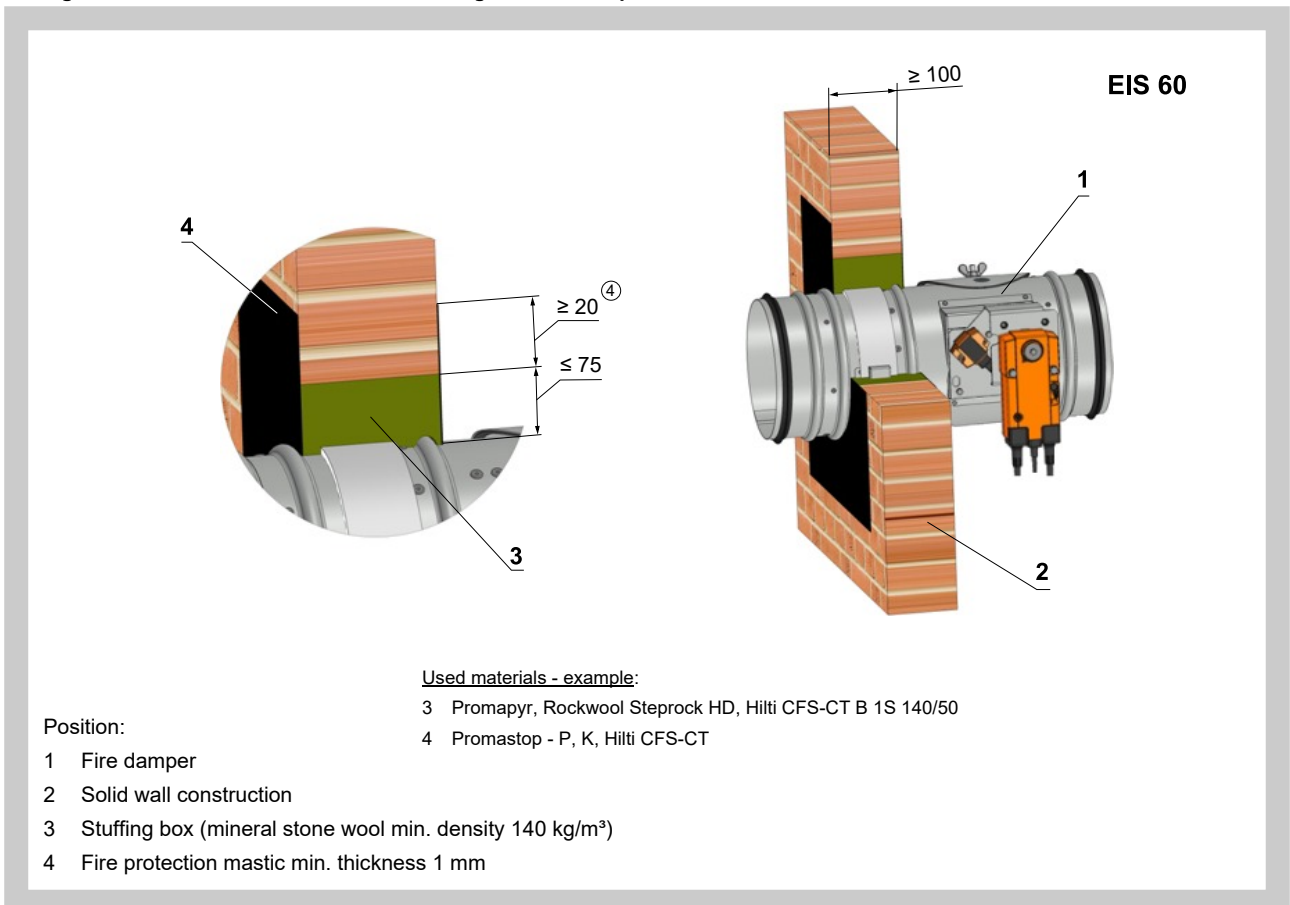
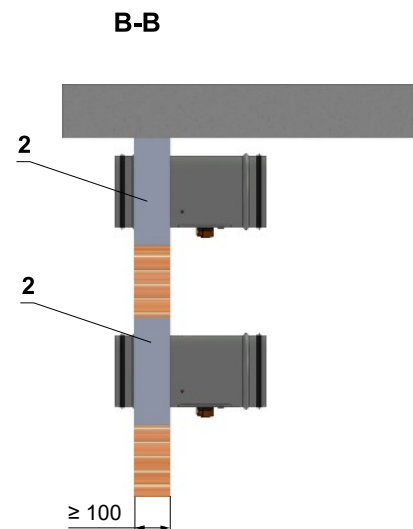
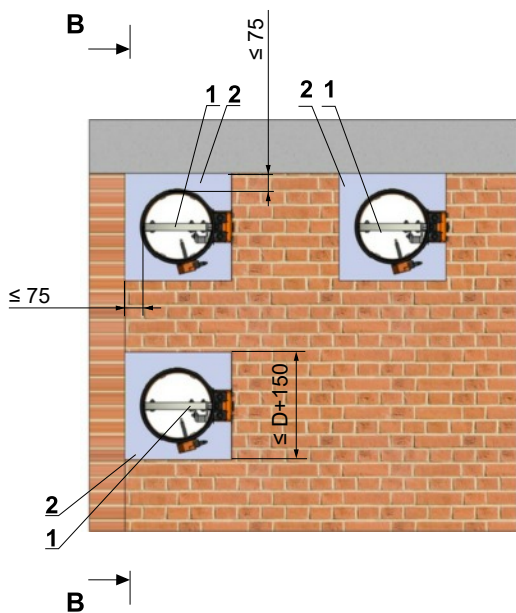
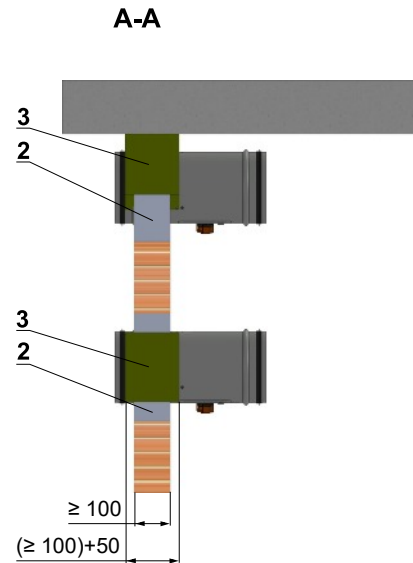
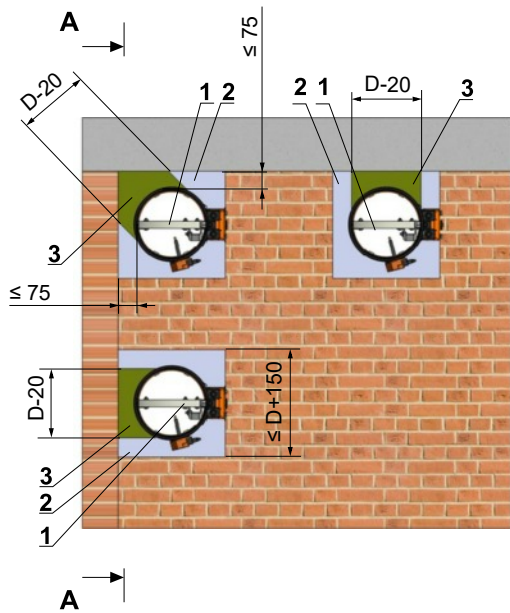


Fig. 22 Solid wall construction - installation next to wall - mortar or gypsum and mineral wool

EIS 60



Position:

- 1 Fire damper
- 2 Mortar or gypsum
- 3 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)

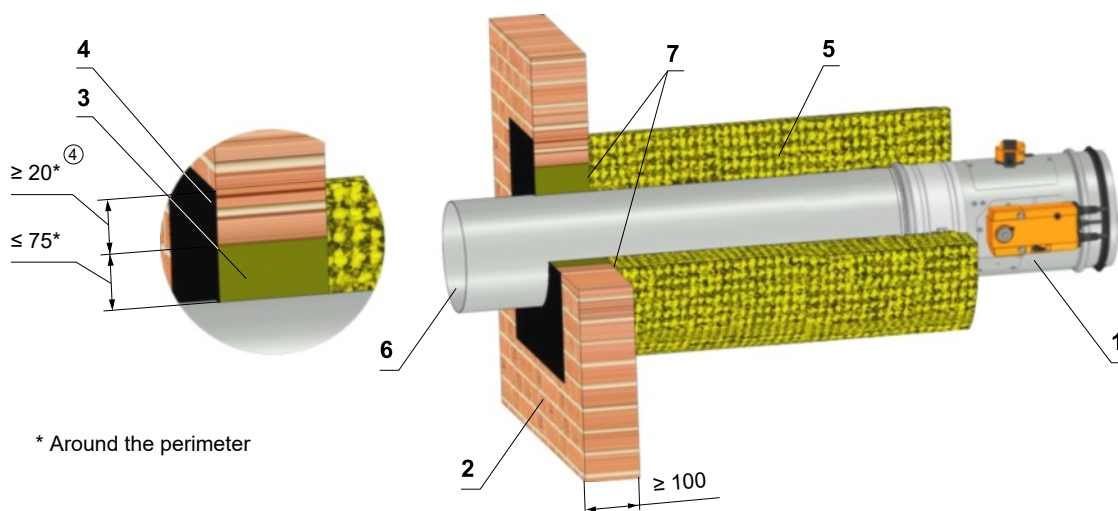
**Notice:**

- Gap between damper and construction is filled by mortar or gypsum and mineral wool
- Wool is fixed to damper body and construction by fire protection mastic.
- Mineral wool thickness = construction thickness + 20 mm or 50 mm
- Installation is valid for ceiling construction

6.3. Installation outside solid wall construction

Fig. 23 Outside solid wall construction - mineral wool - stuffing box and fire protection mastic

**EIS 60**  
**Minimum and maximum distance between the wall and fire damper when installation remote from the wall is unlimited.**



\* Around the perimeter

Position:

- 1 Fire damper
- 2 Solid wall construction
- 3 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 4 Fire protection mastic min. thickness 1 mm
- 5 Stone wool with wired mat on one side, density 66 kg/m<sup>3</sup>
- 6 Duct
- 7 Apply ISOVER Protect BSK glue on the insulation and stick it to the fire separation construction \*\*\*

Used materials - example:\*\*

- 3 Promapyr, Rockwool Steprock HD, Hilti CFS-CT B 1S 140/50
- 4 Promastop - P, K, Hilti CFS-CT
- 5 System ISOVER\_ULTIMATE PROTECT, th. 100 mm

\*\* Insulation materials can be replaced by another approved fire sealing system with equivalent properties.  
 The maximum distance of the fire damper from the structure is not limited.

\*\*\* When installing the insulation, follow the ISOVER manufacturer's instructions.

The duct at the point of penetration must be anchored to the fire wall construction, see chapter 7.

6.4. Installation in in gypsum shaft construction

Fig. 24 Gypsum wall construction - mortar or gypsum

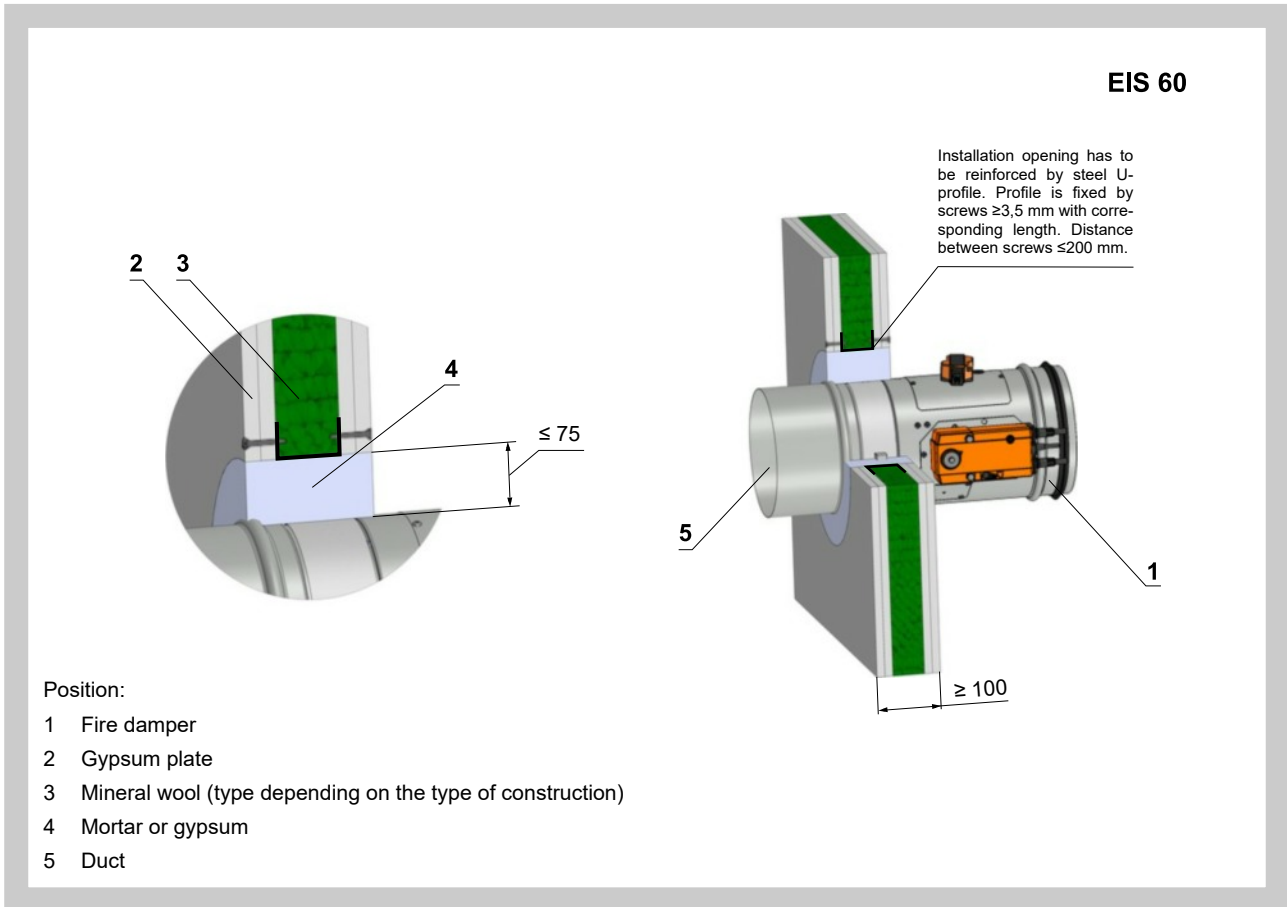


Fig. 25 Gypsum wall construction - stuffing box and fire protection mastic

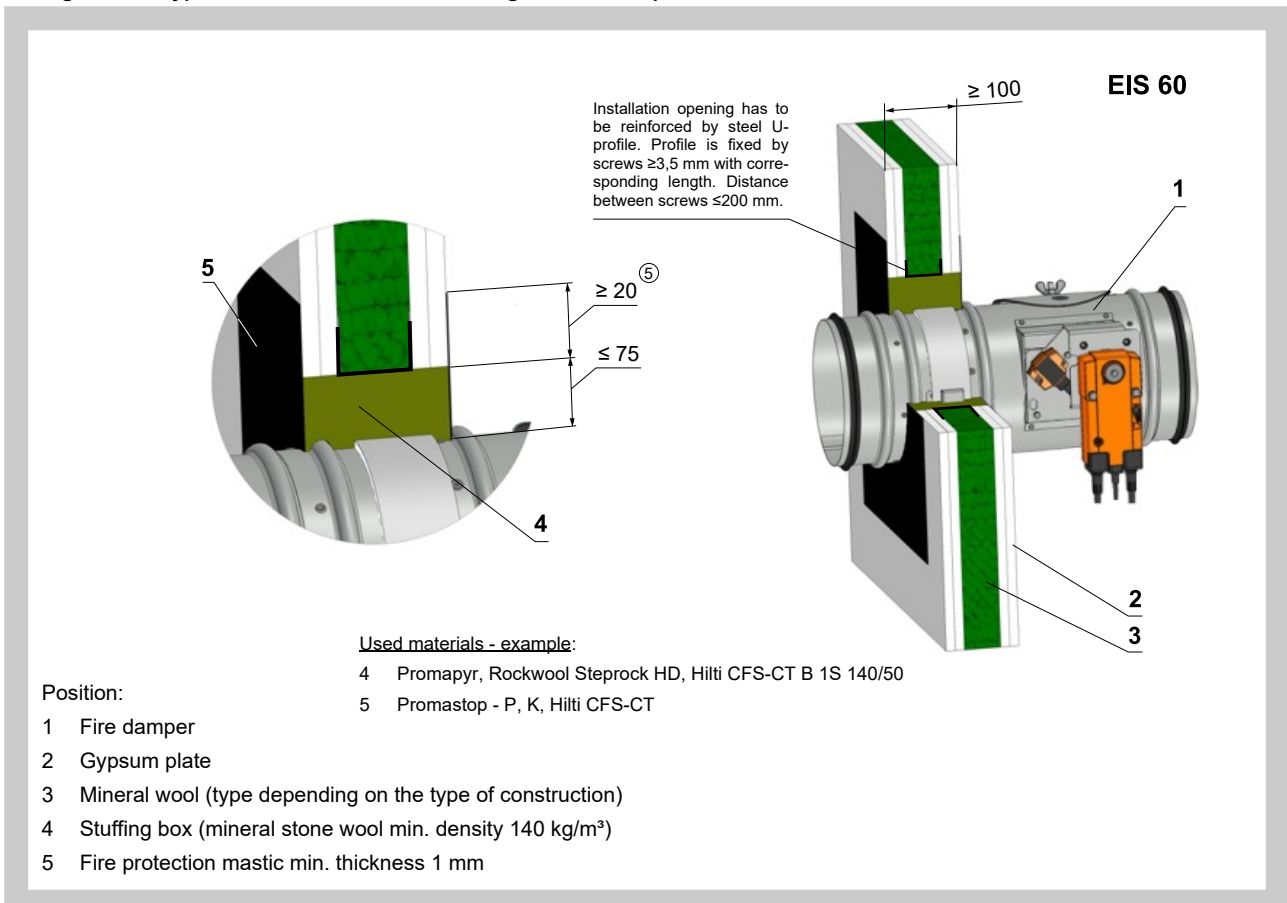
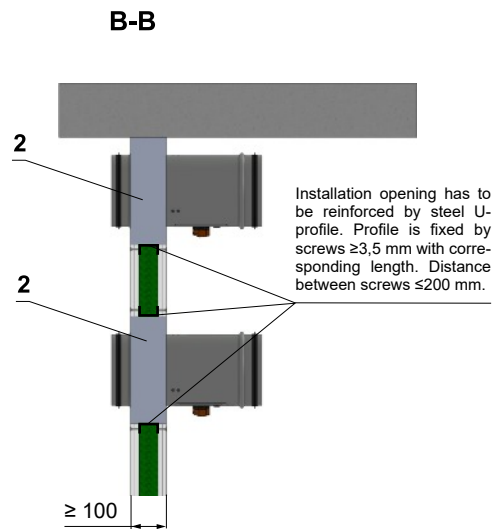
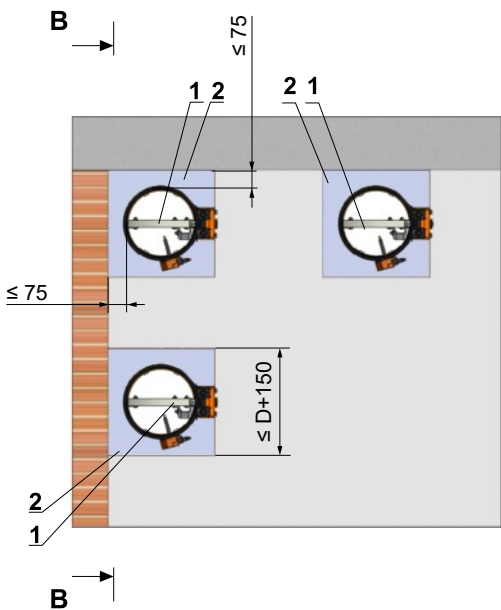
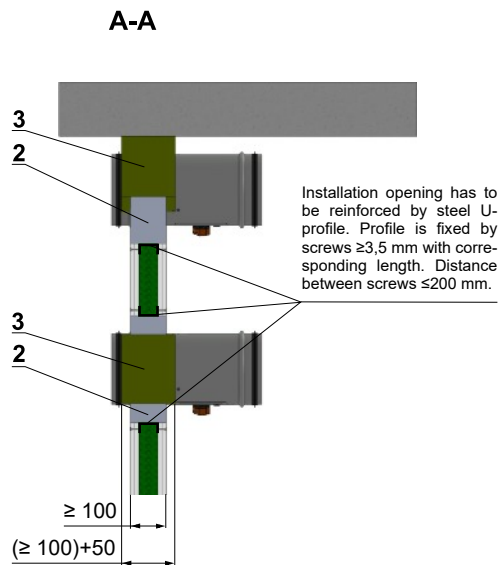
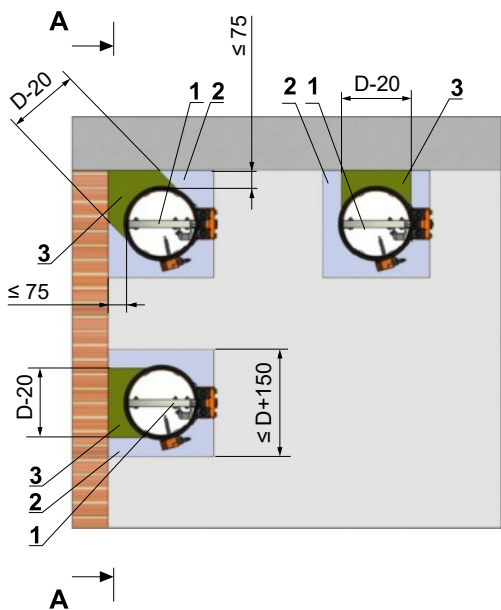


Fig. 26 Gypsum wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool

EIS 60



Position:

- 1 Fire damper
- 2 Mortar or gypsum
- 3 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)

**Notice:**

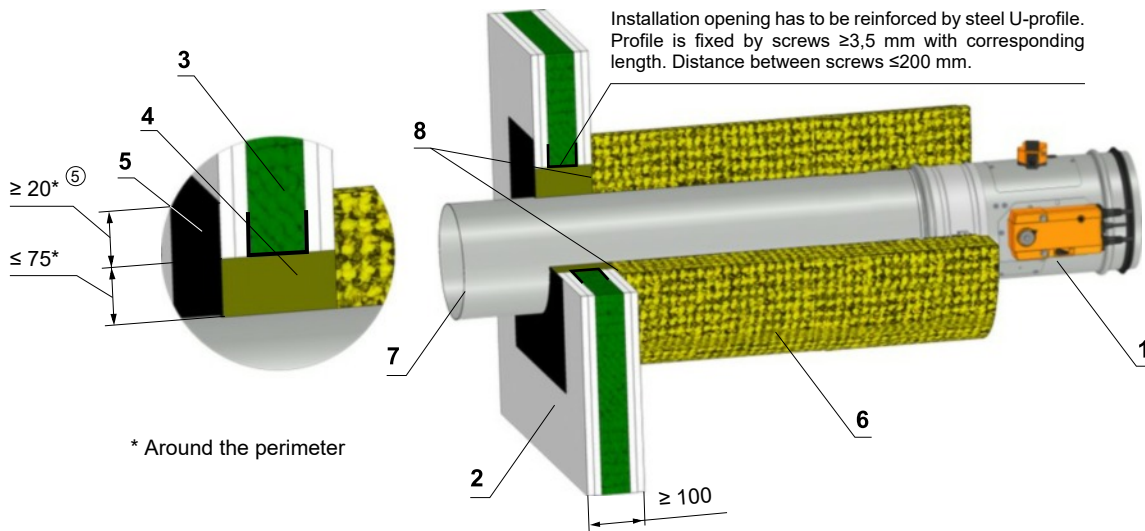
- Gap between damper and construction is filled by mortar or gypsum and mineral wool
- Wool is fixed to damper body and construction by fire protection mastic.
- Mineral wool thickness = construction thickness + 20 mm or 50 mm
- Installation is valid for ceiling construction

6.5. Installation outside gypsum wall construction

Fig. 27 Outside gypsum wall construction - mineral wool - stuffing box and fire protection mastic

Minimum and maximum distance between the wall and fire damper when installation remote from the wall is unlimited.

EIS 60



\* Around the perimeter

Position:

- 1 Fire damper
- 2 Gypsum plate
- 3 Mineral wool (type depending on the type of construction)
- 4 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 5 Fire protection mastic min. thickness 1 mm
- 6 Stone wool with wired mat on one side, density 66 kg/m<sup>3</sup>
- 7 Duct
- 8 Apply ISOVER Protect BSK glue on the insulation and stick it to the fire separation construction \*\*\*

Used materials - example:\*\*

- 4 Promapyr, Rockwool Steprock HD, Hilti CFS-CT B 1S 140/50
- 5 Promastop - P, K, Hilti CFS-CT
- 6 System ISOVER\_ULTIMATE PROTECT, th. 100 mm

\*\* Insulation materials can be replaced by another approved fire sealing system with equivalent properties.  
The maximum distance of the fire damper from the structure is not limited.

\*\*\* When installing the insulation, follow the ISOVER manufacturer's instructions.

The duct at the point of penetration must be anchored to the fire wall construction, see chapter 7.



6.6. Installation in solid ceiling construction

Fig. 28 Solid ceiling construction - mortar or gypsum

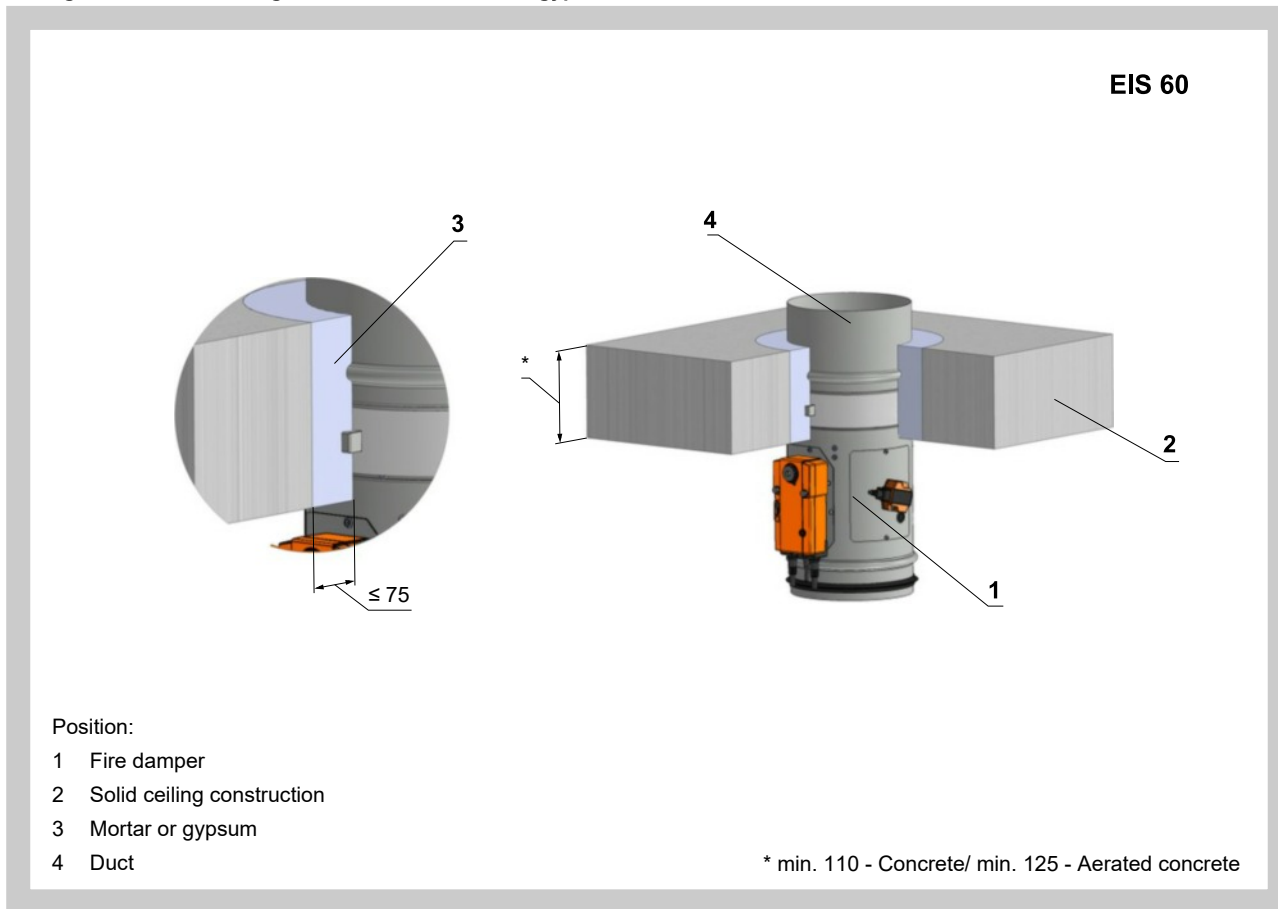
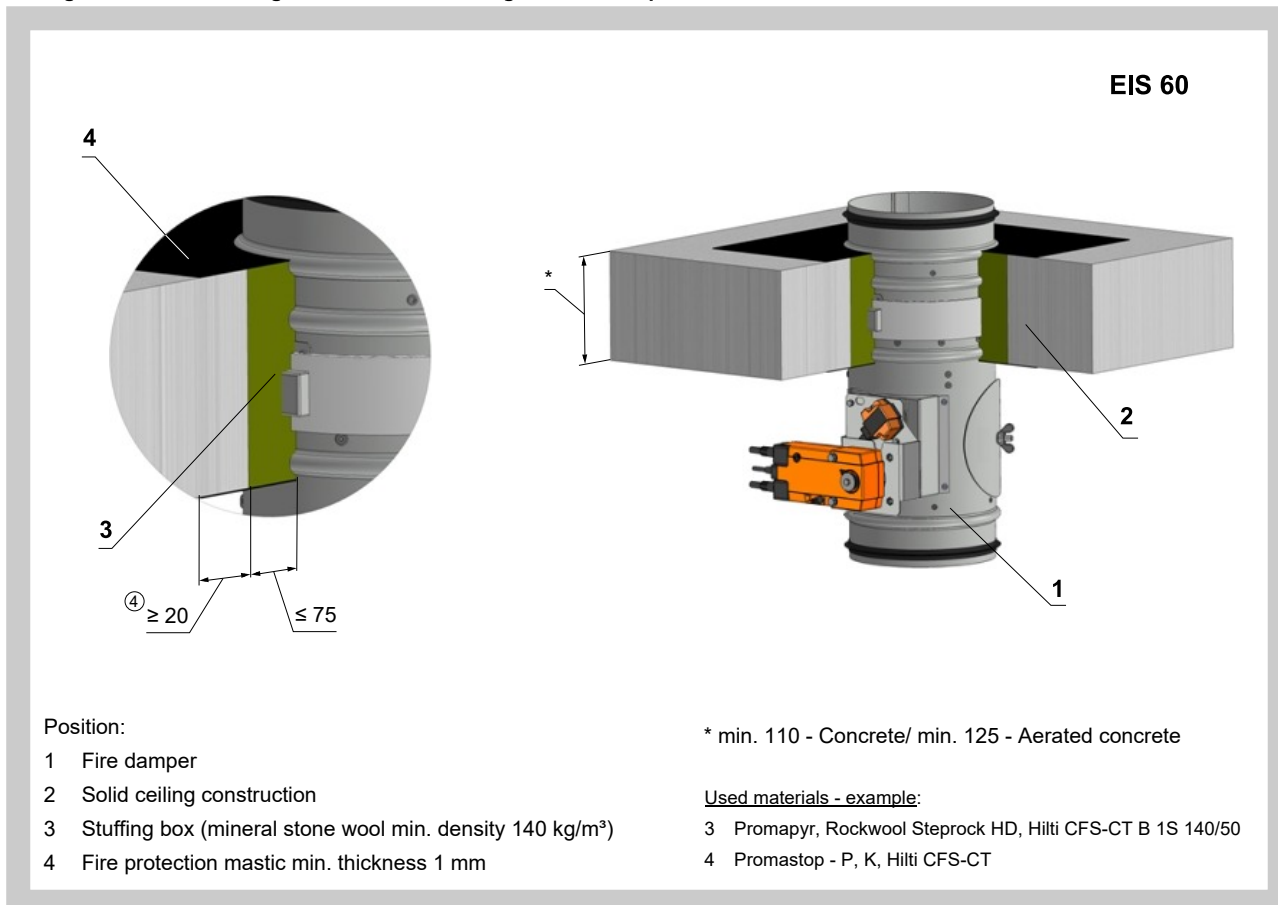


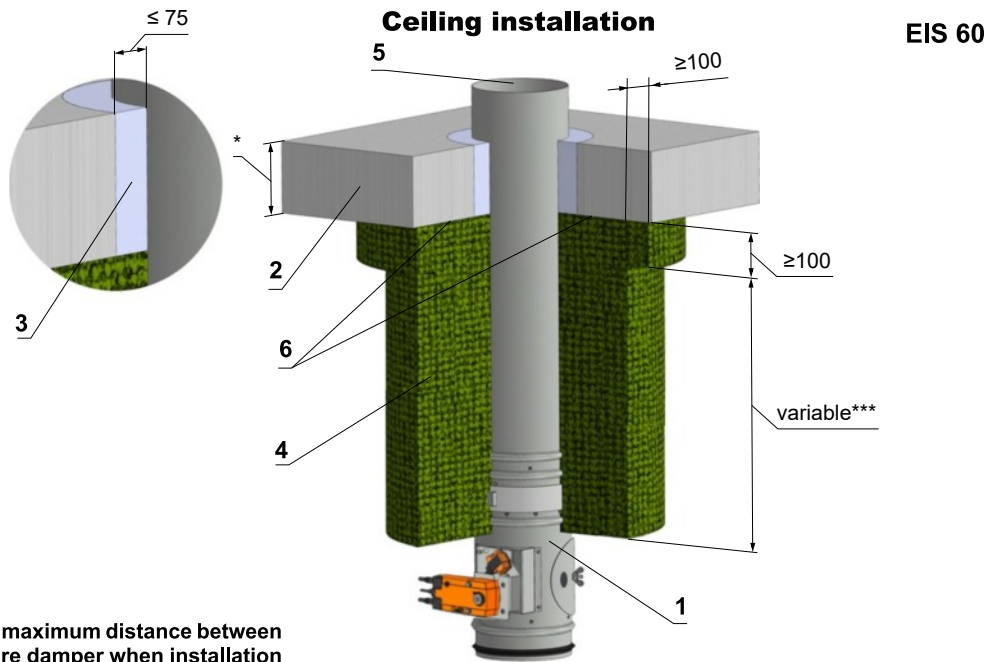
Fig. 29 Solid ceiling construction - stuffing box and fire protection mastic





6.7. Installation outside solid ceiling construction

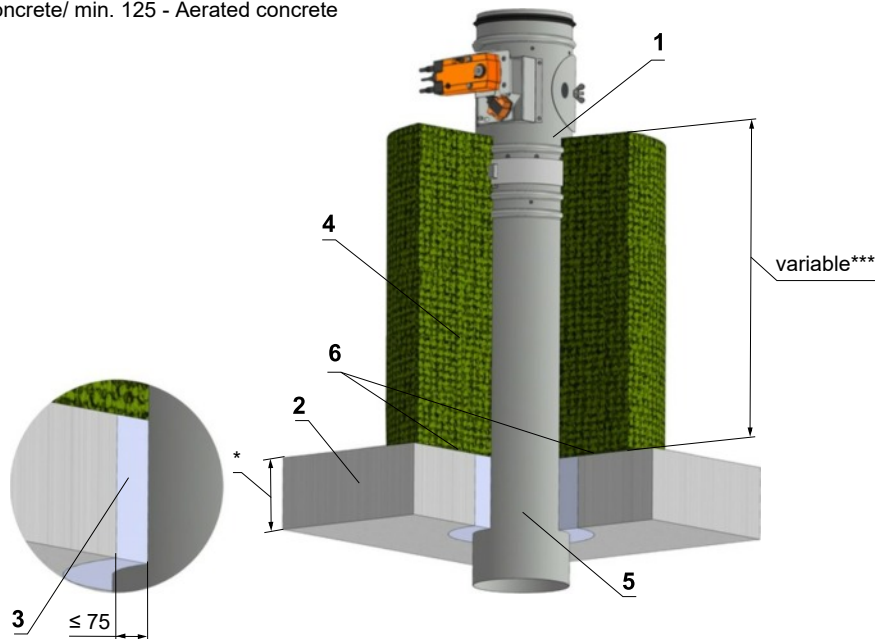
Fig. 30 Outside solid ceiling construction - mineral wool - mortar or gypsum



Minimum and maximum distance between the wall and fire damper when installation remote from the wall is unlimited.

\* min. 110 - Concrete/ min. 125 - Aerated concrete

**Floor installation**



Position:

- 1 Fire damper
- 2 Solid ceiling construction
- 3 Mortar or gypsum
- 4 Stone wool with wired mat on one side, density 66 kg/m<sup>3</sup>
- 5 Duct
- 6 Apply Rockwool Firepro glue on the insulation and stick it to the fire separation construction \*\*\*\*

Used materials - example:\*\*

- 4 System ISOVER\_ULTIMATE PROTECT, th. 100 mm

\*\* Stuffing box, fire protection mastic, cement lime plate and insulation materials can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

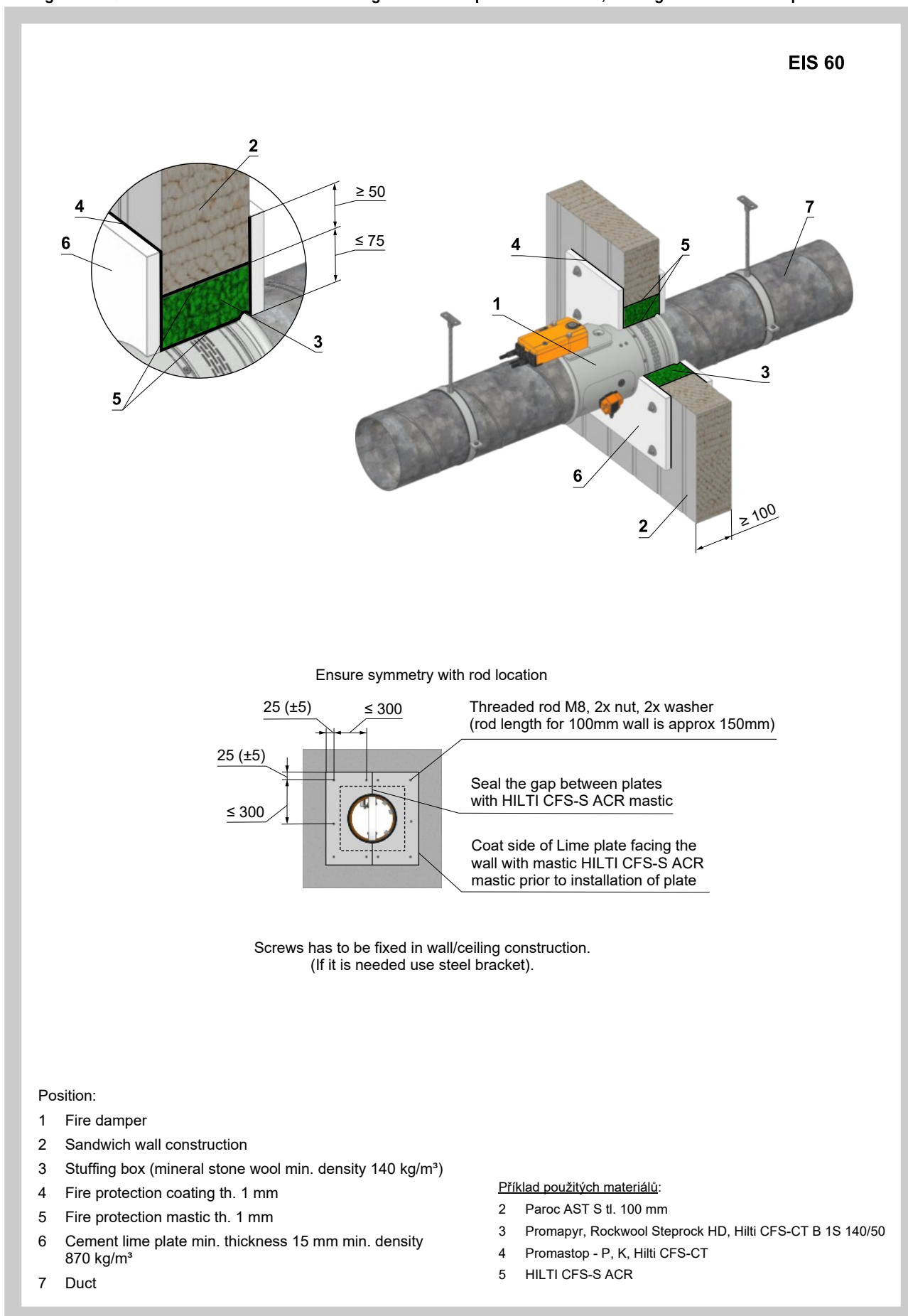
\*\*\* Depends on the distance of the flap from the construction, when the maximum distance from the construct is not limited and according to EN 15882-2 must use the required number of hinges according to EN 13366-1:2014.

\*\*\*\* When installing the insulation, follow the Rockwool manufacturer's instructions.

The duct at the point of penetration does not have to be anchored to the fire wall construction, see chapter 7.

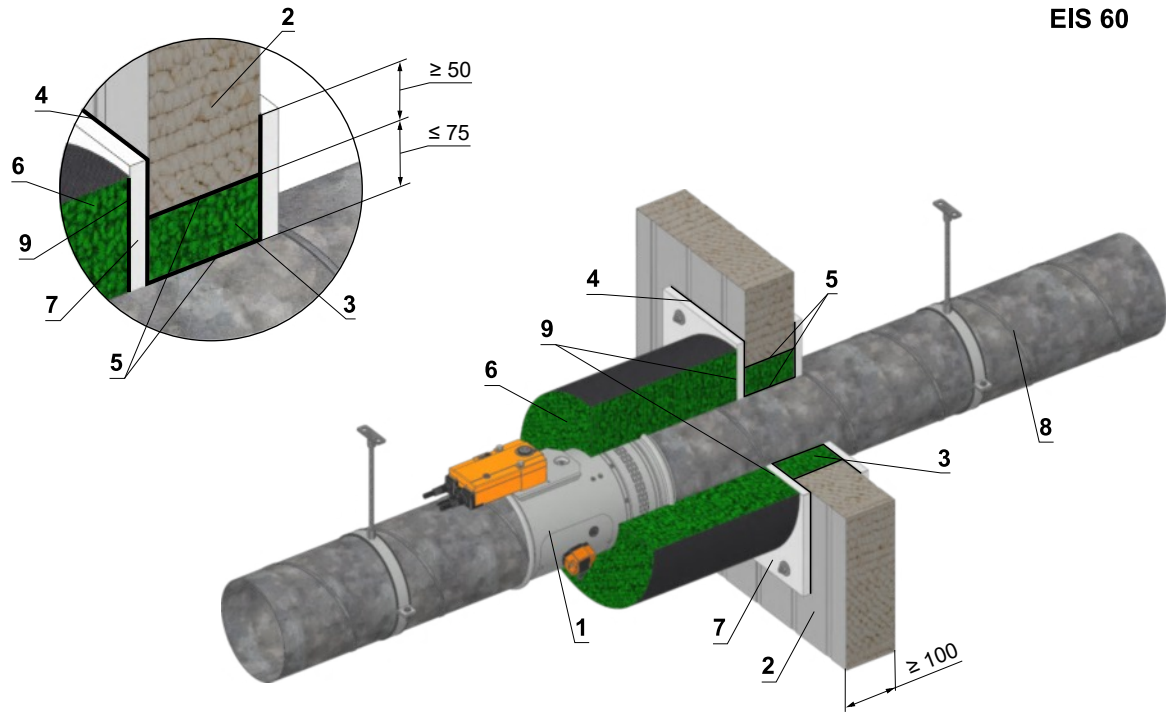
6.8. Installation in sandwich wall construction

Fig. 31 Sandwich wall construction - stuffing box and fire protection mastic, coating and cement lime plate



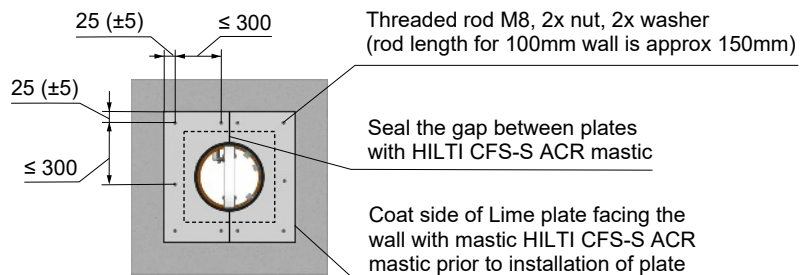
6.9. Installation outside the sandwich wall construction

Fig. 32 Outside sandwich wall construction - mineral wool insulation - fire protection mastic, coating and cement lime plate



EIS 60

Ensure symmetry with rod location



Screws has to be fixed in wall/ceiling construction.  
(If it is needed use steel bracket).

Position:

- 1 Fire damper
- 2 Sandwich wall construction
- 3 Stuffing box (mineral stone wool min. density 140 kg/m<sup>3</sup>)
- 4 Fire protection coating th. 1 mm
- 5 Fire protection mastic th. 1 mm
- 6 Stone wool with wired mat on one side, density 66 kg/m<sup>3</sup>
- 7 Cement lime plate min. thickness 15 mm min. density 870 kg/m<sup>3</sup>
- 8 Duct
- 9 Apply ISOVER Protect BSK glue on the insulation and stick it to the fire separation construction \*

Used materials - example:

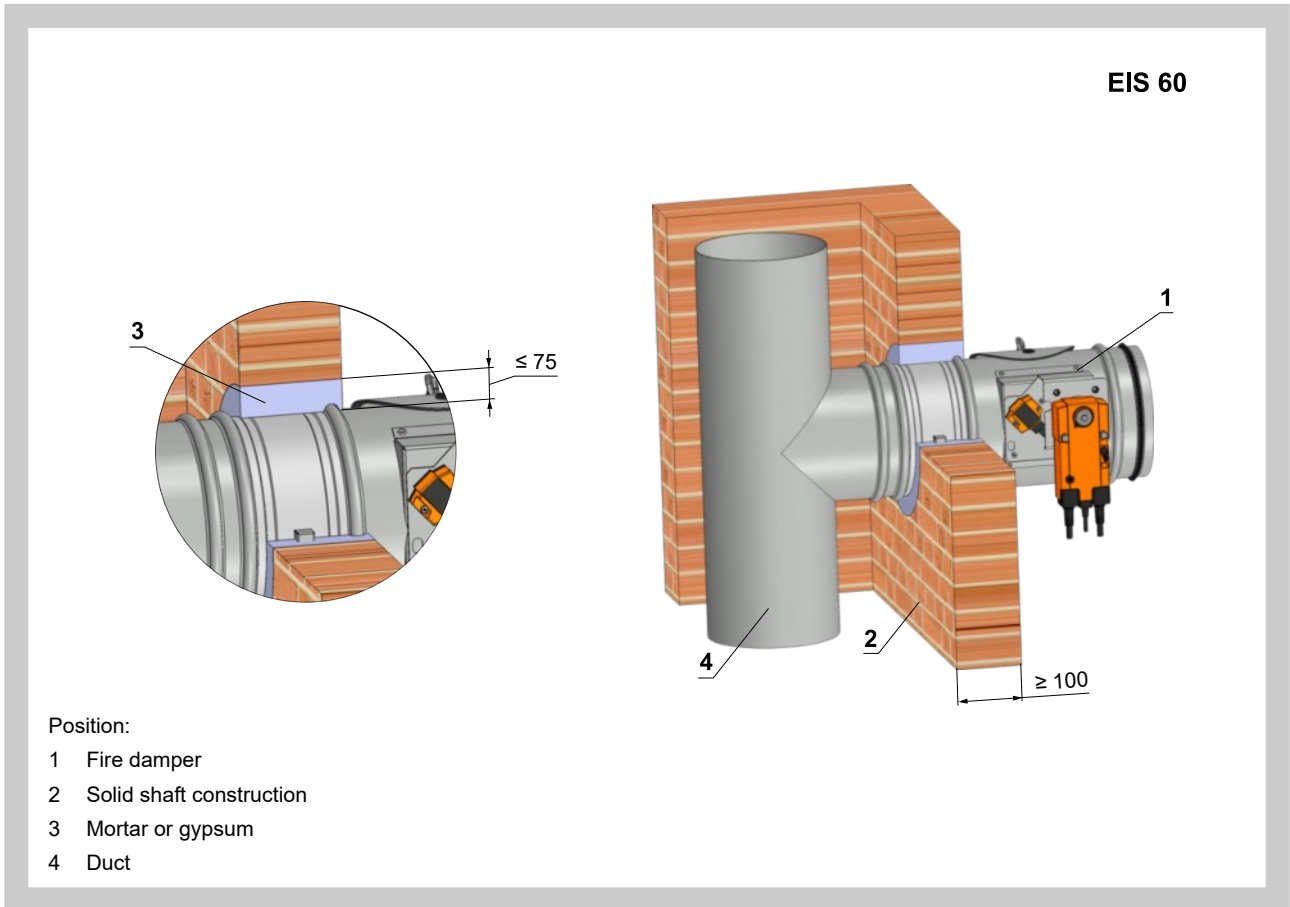
- 2 Paroc AST S tl. 100 mm
- 3 Promapyr, Rockwool Steprock HD, Hilti CFS-CT B 1S 140/50
- 4 Promastop - P, K, Hilti CFS-CT
- 5 HILTI CFS-S ACR
- 6 System ISOVER\_ULTIMATE PROTECT, th. 100 mm

\* When installing the insulation, follow the ISOVER manufacturer's instructions.

The duct at the point of penetration must be anchored to the fire wall construction, see chapter 7.

6.10. Installation in solid shaft construction

Fig. 33 Solid shaft construction - mortar or gypsum



6.11. Installation in gypsum shaft construction

Fig. 34 Gypsum wall-mounted shaft construction on one side - stuffing box and fire protection mastic

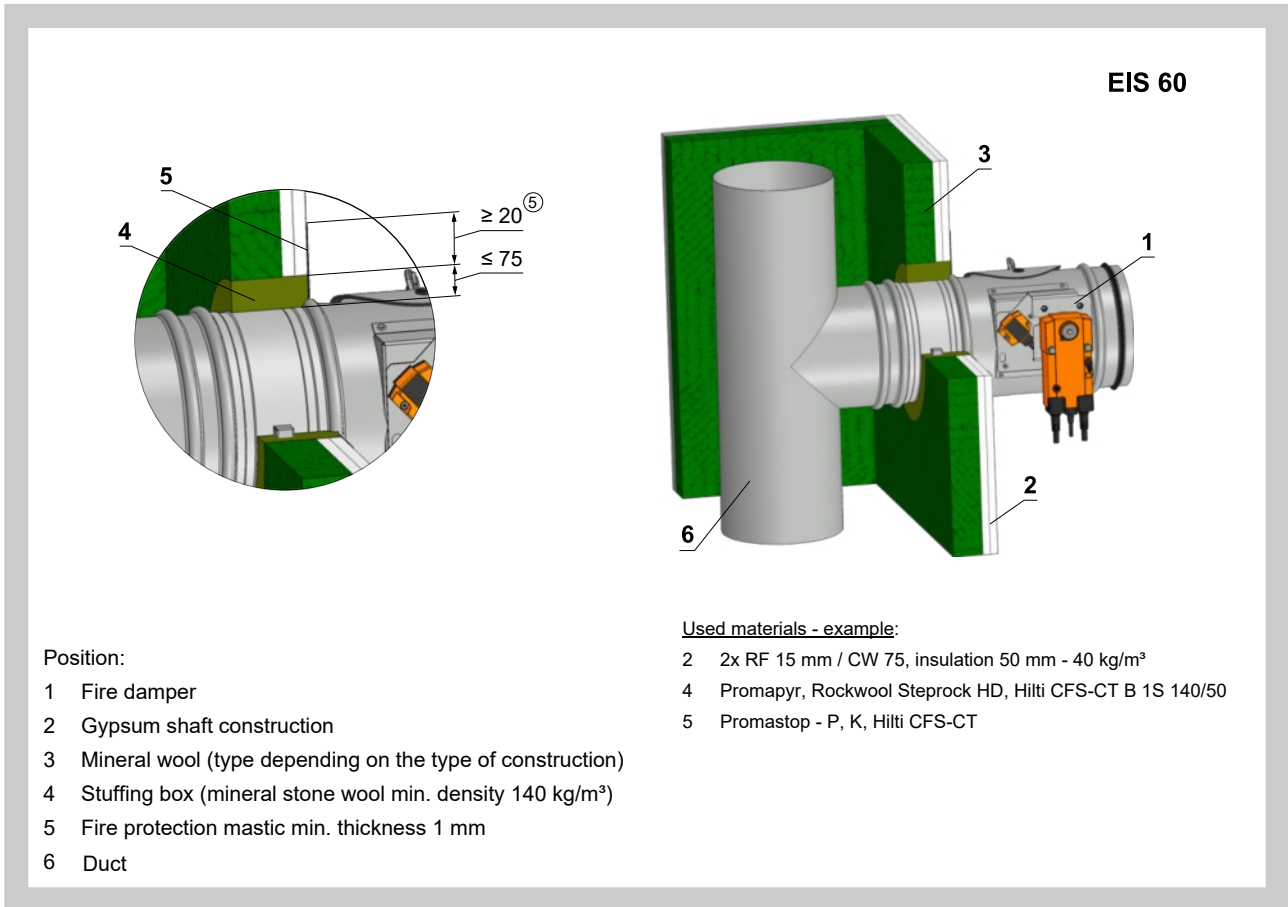
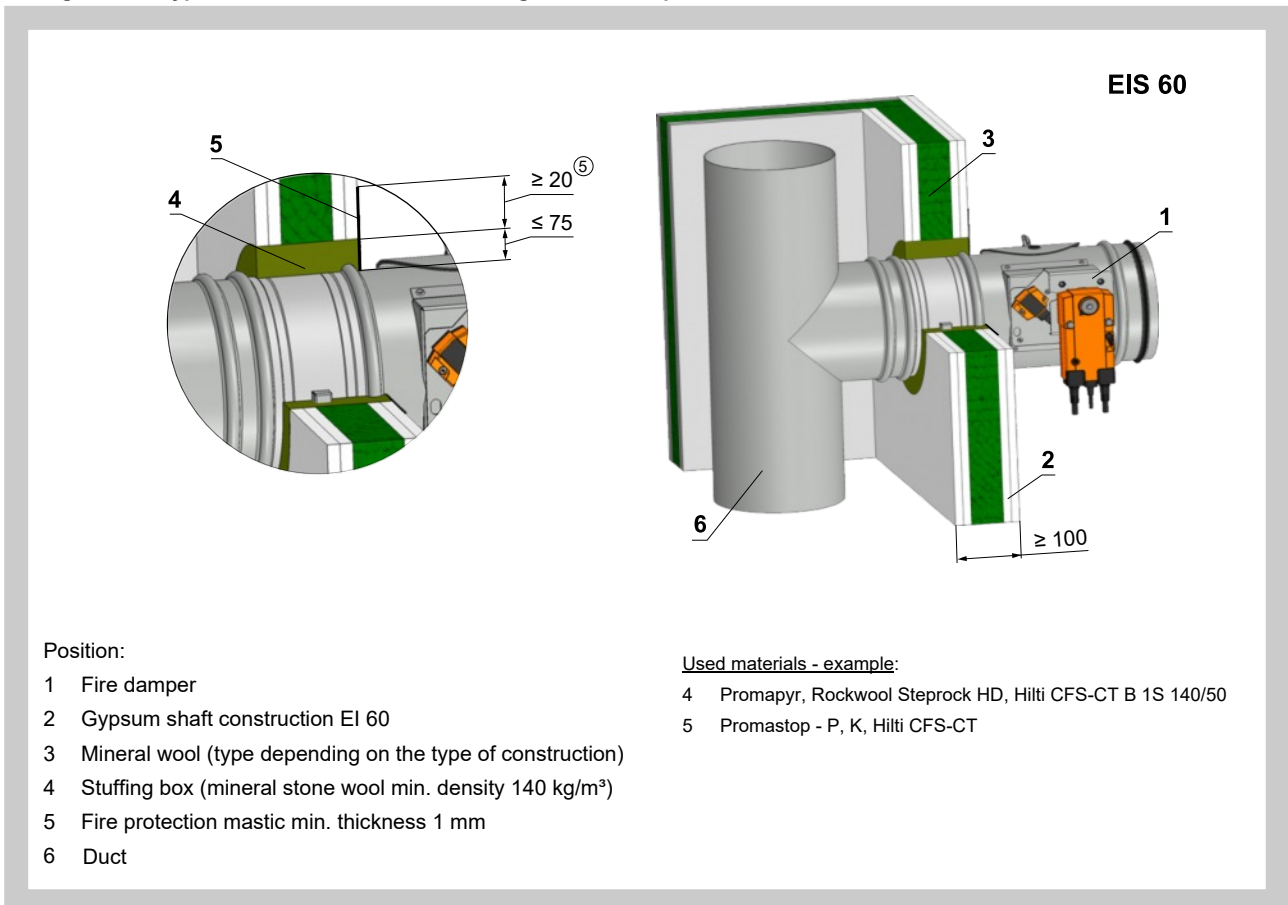


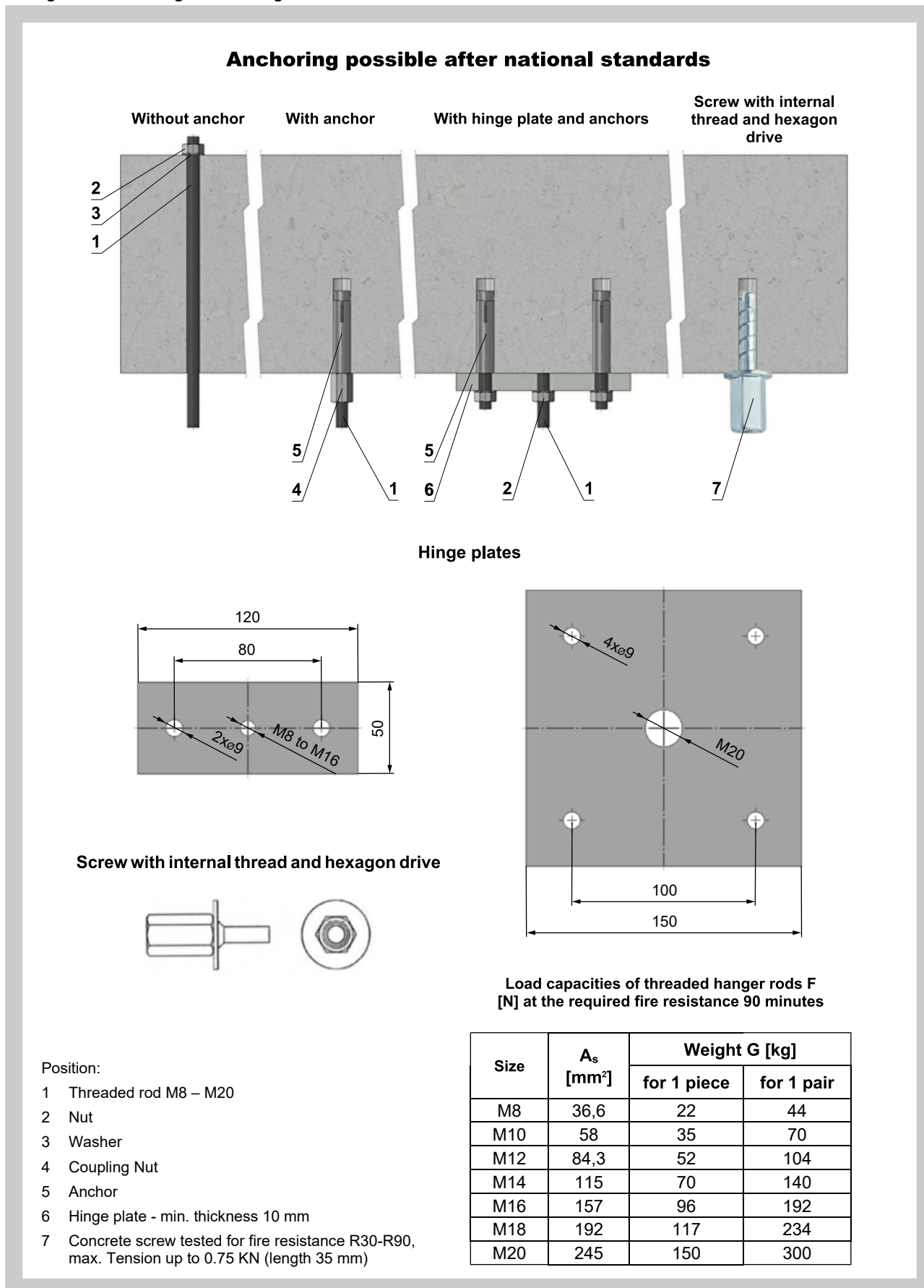
Fig. 35 Gypsum shaft construction - stuffing box and fire protection mastic



7. Suspension system

7.1. Mounting to the ceiling wall

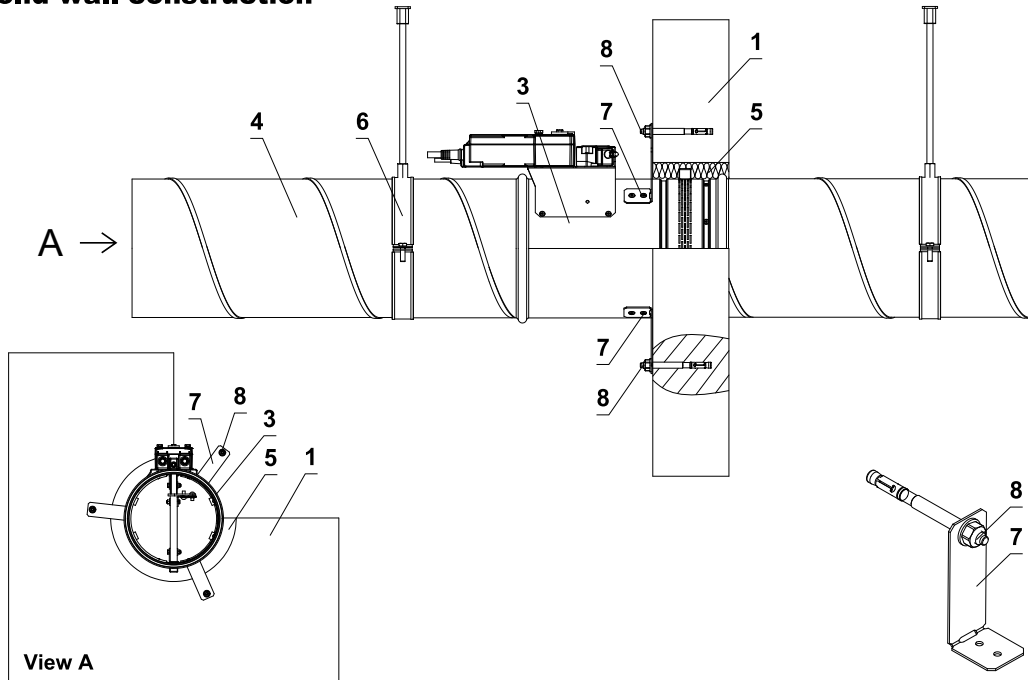
Fig. 36 Mounting to the ceiling wall



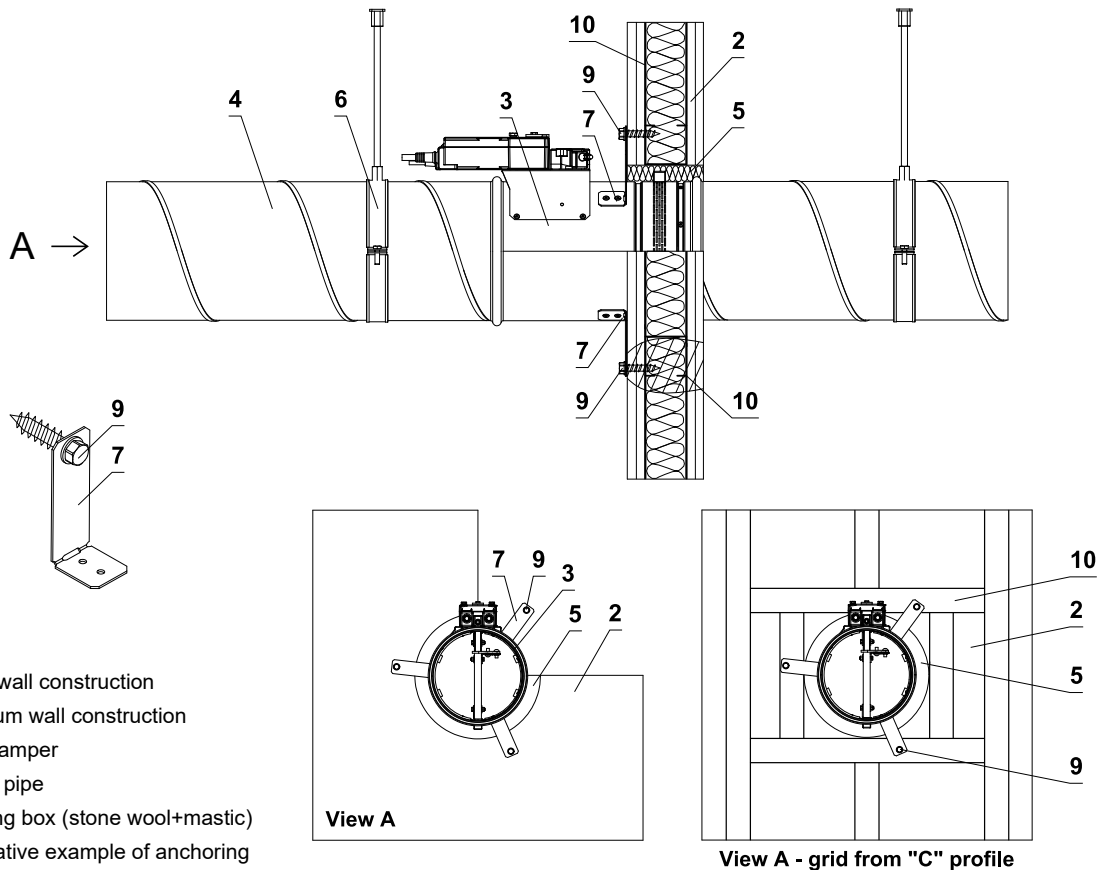
7.2. Fixing fire damper to the wall with stuffing box (stone wool + mastic)

Fig. 37 Fixing fire damper to the wall with stuffing box (stone wool + mastic)

**In solid wall construction**



**In gypsum wall construction**



Position:

- 1 Solid wall construction
- 2 Gypsum wall construction
- 3 Fire damper
- 4 Spiral pipe
- 5 Stuffing box (stone wool+mastic)
- 6 Illustrative example of anchoring
- 7 Damper bracket
- 8 Nut M8 with anchor
- 9 Screw with hexagon head
- 10 Gypsum grid from "C" profile

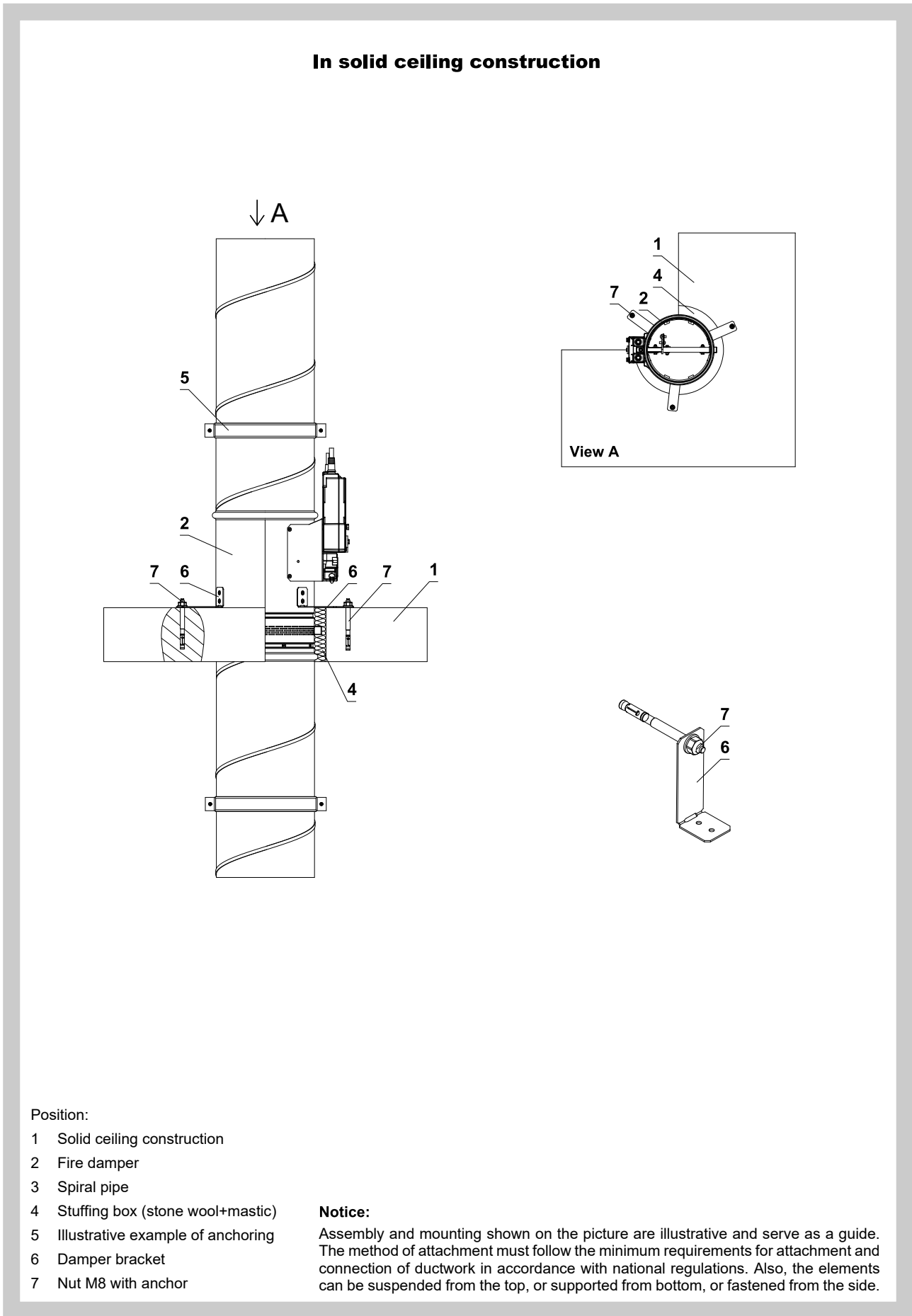
**Notice:**

Assembly and mounting shown on the picture are illustrative and serve as a guide. The method of attachment must follow the minimum requirements for attachment and connection of ductwork in accordance with national regulations. Also, the elements can be suspended from the top, or supported from bottom, or fastened from the side.



7.3. Fixing fire damper to the ceiling with stuffing box (stone wool + mastic)

Fig. 38 Fixing fire damper to the ceiling with stuffing box (stone wool + mastic)

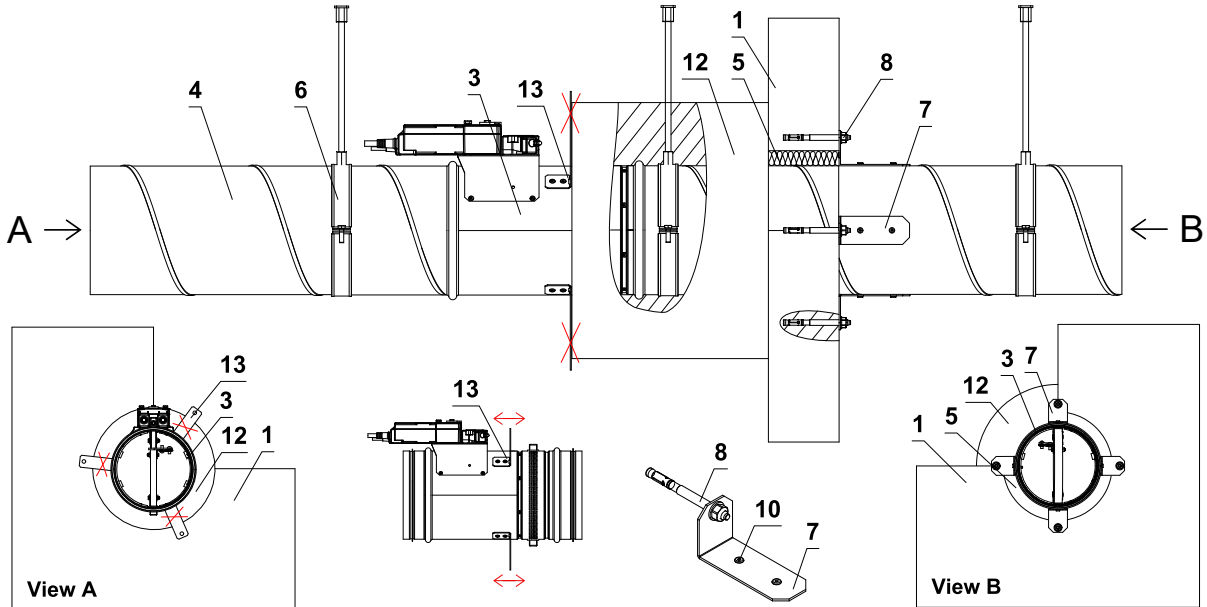




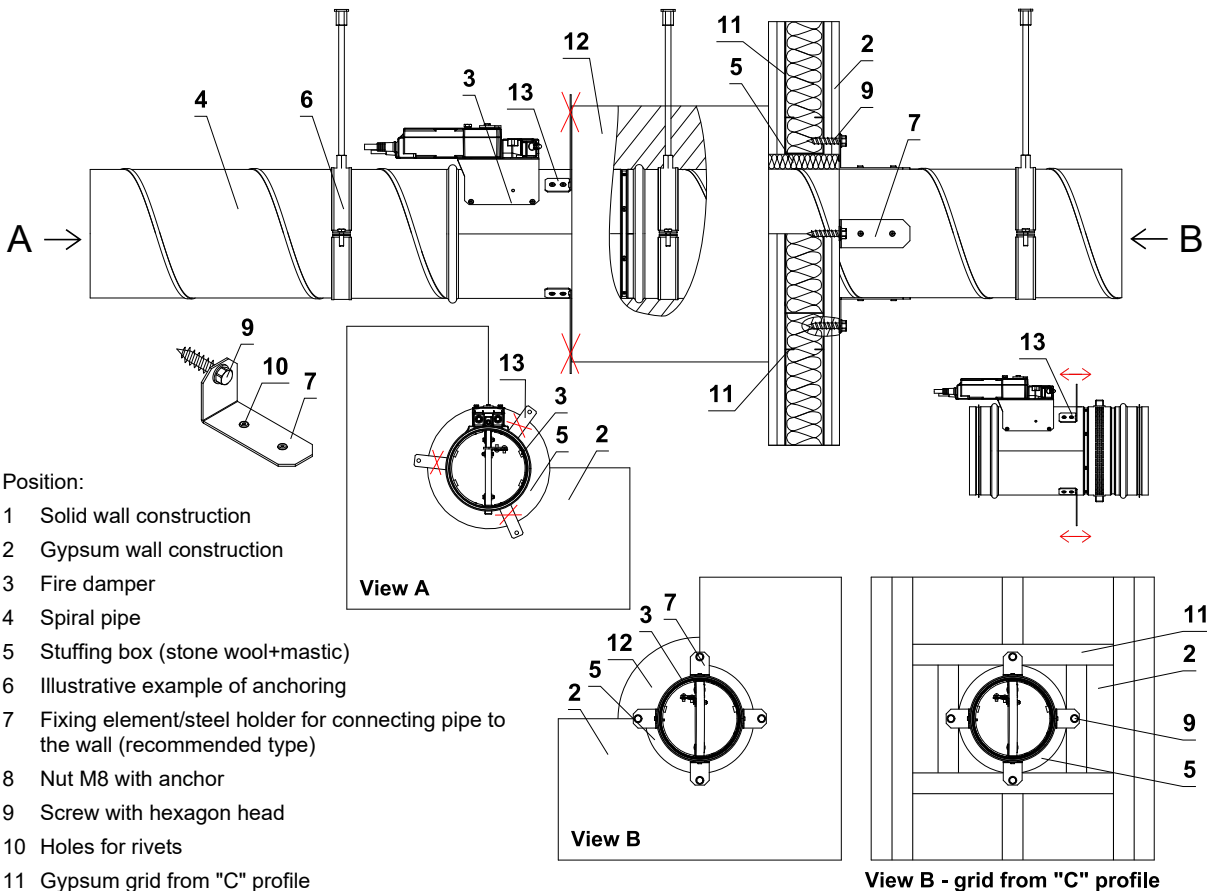
7.4. Fixing fire damper and pipe, outside wall with insulation, stuffing box (stone wool + mastic)

Fig. 39 Fixing fire damper and pipe, outside wall with insulation, stuffing box (stone wool + mastic)

**Outside solid wall construction**



**Outside gypsum wall construction**



Position:

- 1 Solid wall construction
- 2 Gypsum wall construction
- 3 Fire damper
- 4 Spiral pipe
- 5 Stuffing box (stone wool+mastic)
- 6 Illustrative example of anchoring
- 7 Fixing element/steel holder for connecting pipe to the wall (recommended type)
- 8 Nut M8 with anchor
- 9 Screw with hexagon head
- 10 Holes for rivets
- 11 Gypsum grid from "C" profile
- 12 Pipe insulation
- 13 The brackets determine the min. length of insulation to keep the blade under insulated part. Turn the brackets by 90 degrees. In case of longer insulation than position of brackets, break off the brackets by tilting.

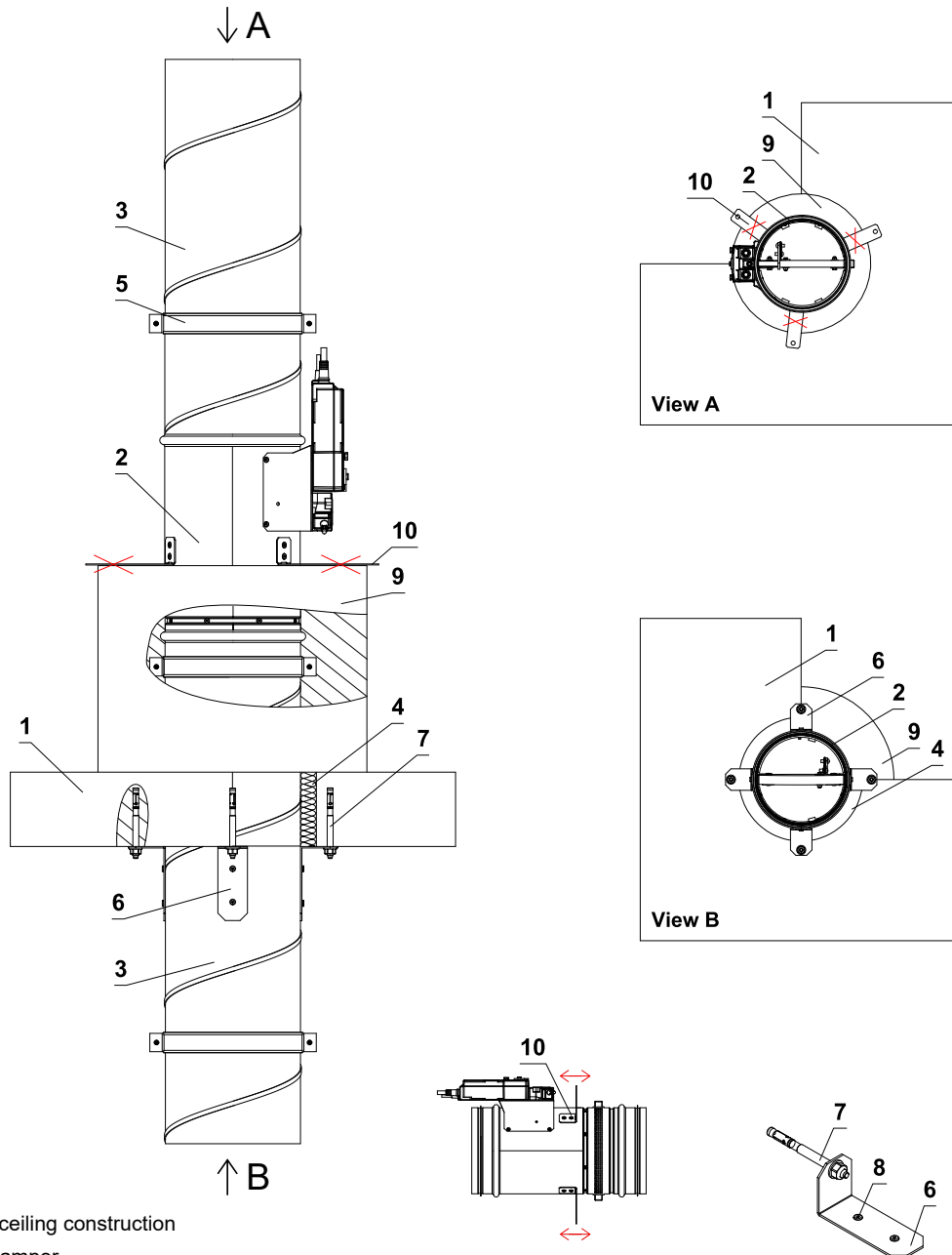
**Notice:**

Assembly and mounting shown on the picture are illustrative and serve as a guide. The method of attachment must follow the minimum requirements for attachment and connection of ductwork in accordance with national regulations. Also, the elements can be suspended from the top, or supported from bottom, or fastened from the side.

7.5. Fixing fire damper and pipe, outside ceiling with insulation, stuffing box (stone wool + mastic)

Fig. 40 Fixing fire damper and pipe, outside ceiling with insulation, stuffing box (stone wool + mastic)

Outside solid ceiling construction



Position:

- 1 Solid ceiling construction
- 2 Fire damper
- 3 Spiral pipe
- 4 Stuffing box (stone wool+mastic)
- 5 Illustrative example of anchoring
- 6 Fixing element/steel holder for connecting pipe to the ceiling (recommended type)
- 7 Nut M8 with anchor
- 8 Holes for rivets
- 9 Pipe insulation
- 10 The brackets determine the min. length of insulation to keep the blade under insulated part. Turn the brackets by 90 degrees. In case of longer insulation than position of brackets, break off the brackets by tilting.

Notice:

Assembly and mounting shown on the picture are illustrative and serve as a guide. The method of attachment must follow the minimum requirements for attachment and connection of ductwork in accordance with national regulations. Also, the elements can be suspended from the top, or supported from bottom, or fastened from the side.

## 7.6. Horizontal installation

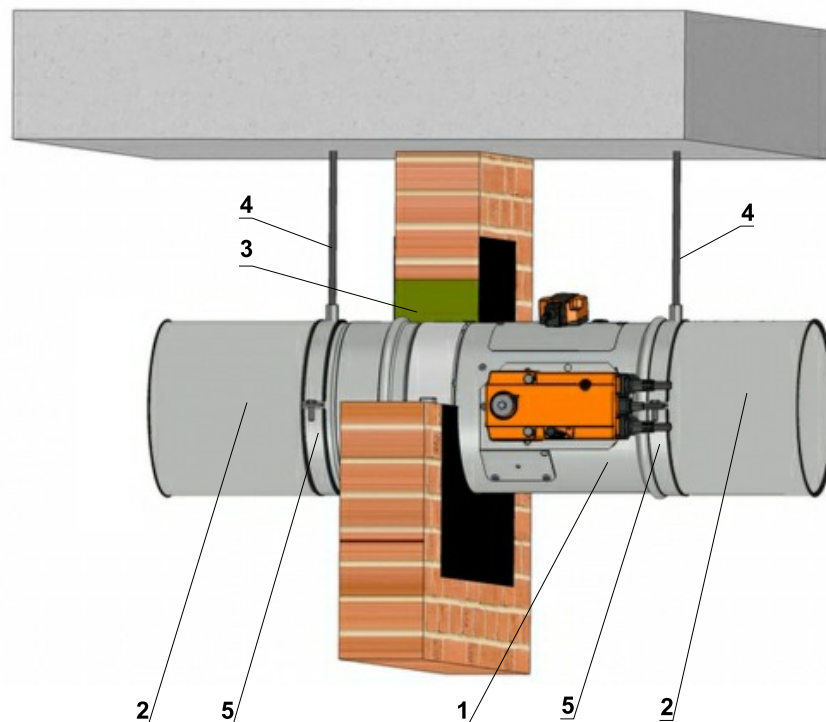
Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

On Fig. 41 is typical mounting situation as an example.

Threaded rods longer than 1,5 m require fire-resistant insulation.

Threaded rod fixing to the ceiling construction - see fig. 36

Fig. 41 Suspension - horizontal duct (soft padding - mineral wool + fire boards)



Position:

- 1 Fire damper
- 2 Duct
- 3 Mineral wool
- 4 Threaded rod
- 5 Suspension ring

## 7.7. Vertical installation

The damper must not be suspended or anchored. The duct must be anchored after national rules, like in fig. 42 - as an example. It can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

Damper can be suspended from the ceiling construction or supported above the ceiling construction.

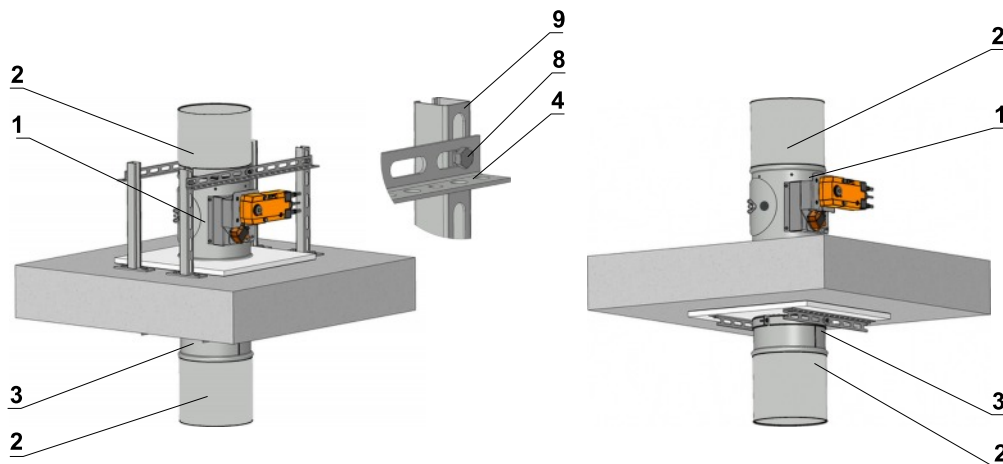
Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

Threaded rods longer than 1,5 m require fire-resistant insulation.

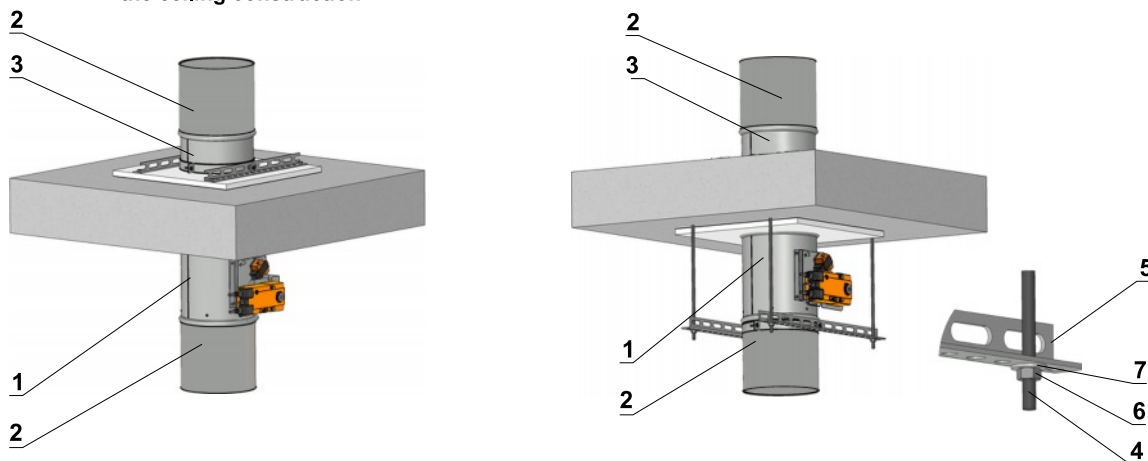
Threaded rod fixing to the ceiling construction - see fig. 36

Fig. 42 Suspension - vertical duct

Actuating mechanism is placed above the ceiling construction

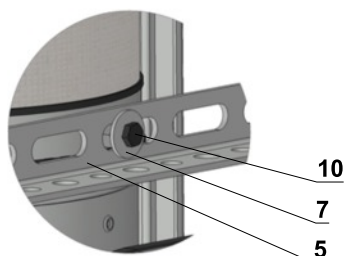


Actuating mechanism is placed under the ceiling construction

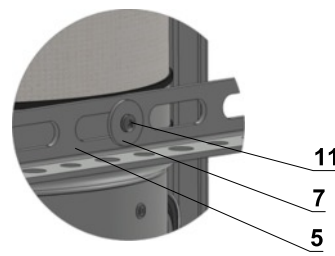


**Notice:** Damper must be firmly connected with extension piece by screws or rivets.

Suspension ring and mounting rail connected by bolt



Suspension ring and mounting rail connected by screw or rivet



Position:

- 1 Fire damper
- 2 Damping pad
- 3 Extension piece
- 4 Threaded rod
- 5 Mounting rail
- 6 Nut
- 7 Washer
- 8 Screw connection
- 9 Mounting profile
- 10 Bolt
- 11 Screw or rivet

Examples of using materials: HILTI, SIKLA, MÜPRO etc.

### 7.8. Rectangular fire damper suspension remote from the wall - horizontal installation

Fire dampers installed remote from the wall must be suspended.  
The duct must be suspended on both sides of damper after national rules.

Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another anchoring system according national standards. Load the suspension system depend on weight of the fire damper and duct system.

Max. length between two suspension systems is 1500 mm.

Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported so as all load transfer from the back-to-back piping to the damper is absolutely excluded.

Threaded rods longer than 1,5 m require fire-resistant insulation.

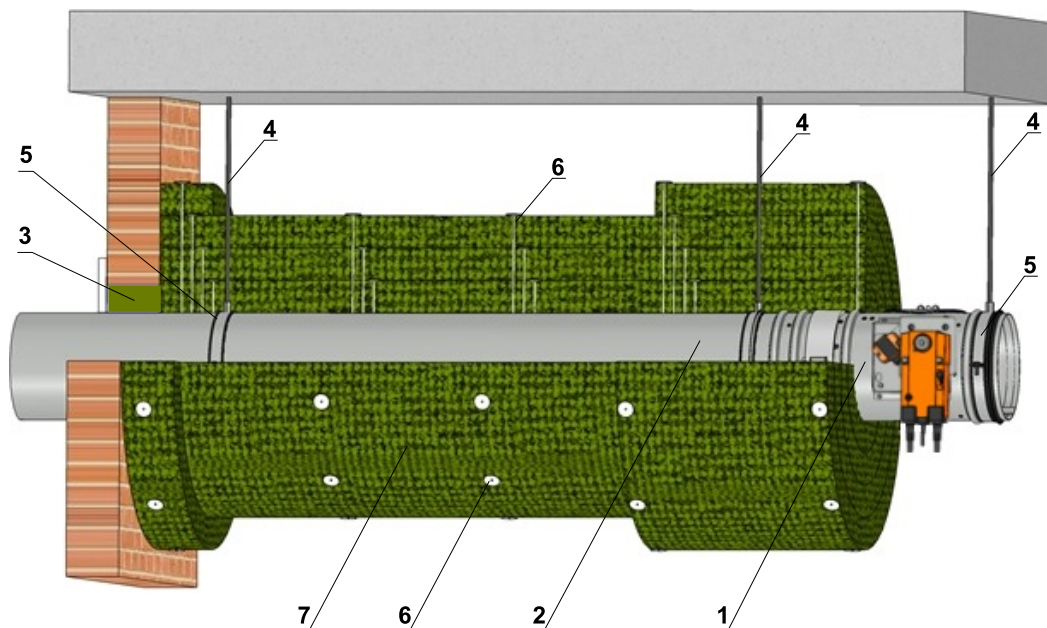
If the threaded rod is located inside the duct insulation, distance between threaded rod and duct is max 30 mm. If the treaded rod is located outside the duct isolation, distance between threaded rod and isolation is max. 40 mm. Thickness of the insulation under mounting profile must be min. 30 mm.

Threaded rod fixing to the ceiling construction - see fig. 36

The insulation boards are fastened to the duct.

For more information see documentation of insulation manufacturer.

Fig. 43 Suspension remote from the wall - horizontal installation



Position:

- 1 Fire damper
- 2 Duct
- 3 Soft padding (stone wool + fire board)
- 4 Threaded rod
- 5 Suspension ring
- 6 Weld pin
- 7 Insulation\*

\* Fixing the insulation to duct acc. to fire insulation supplier's instructions.

III. TECHNICAL DATA

8. Pressure loss

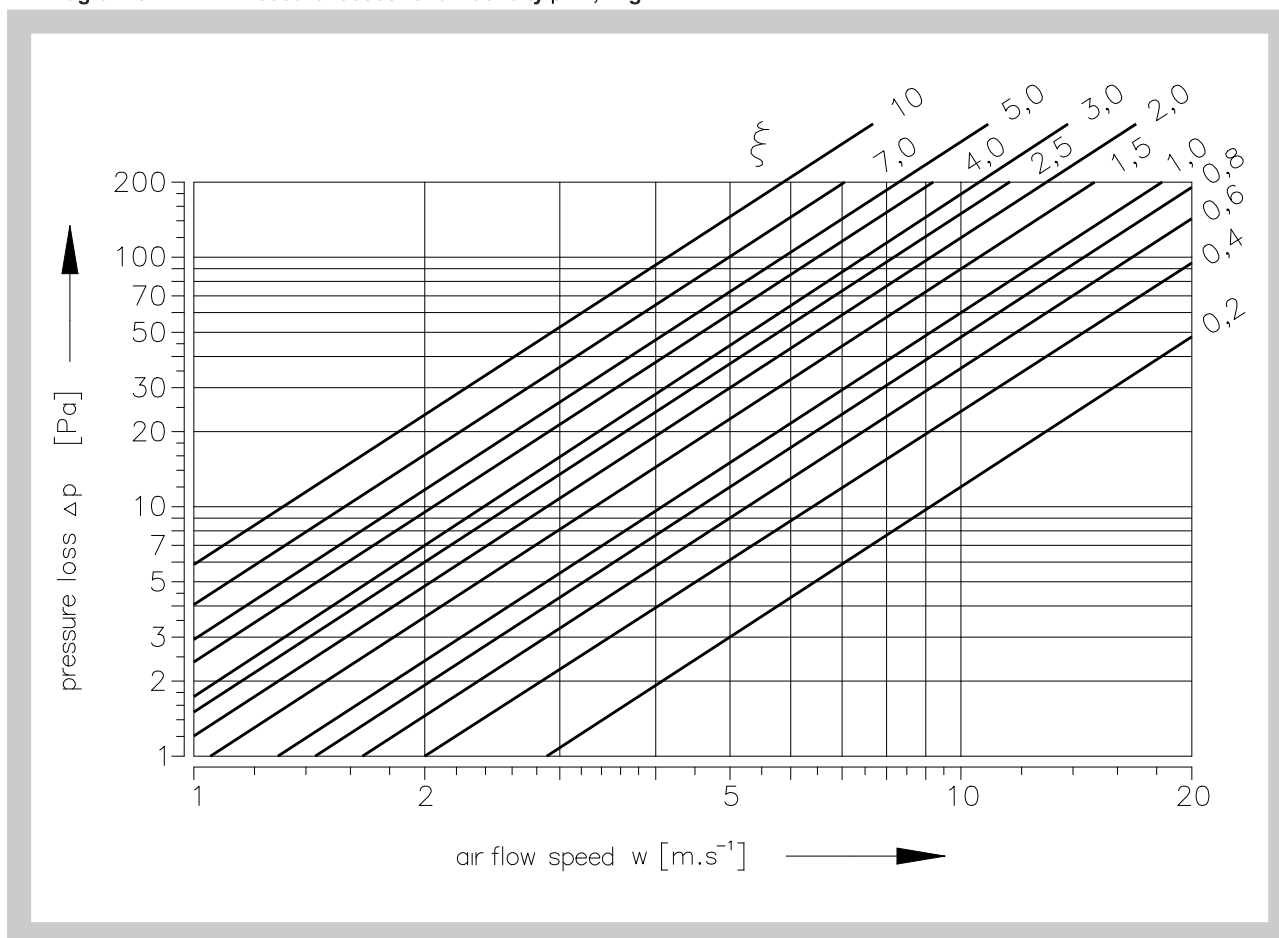
8.1. Pressure loss calculation

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

$\Delta p$	[Pa]	pressure loss
$w$	[m.s <sup>-1</sup> ]	air flow speed in nominal damper section
$\rho$	[kg.m <sup>3</sup> ]	air density
$\xi$	[-]	coefficient of local pressure loss for the nominal damper section (see Tab. 9.1.1.)

8.2. Determination of pressure loss by using diagram  $\rho = 1,2 \text{ kg.m}^3$

Diagram 8.2.1. Pressure losses for air density  $\rho = 1,2 \text{ kg.m}^3$



## 9. Coefficient of local pressure loss

### 9.1. Coefficient of local pressure loss $\xi$ (-)

Tab. 9.1.1. Coefficient of local pressure loss

D	100	125	140	150	160	180	200	225	250	280
$\xi$	2,736	2,099	1,781	1,527	1,272	0,929	0,636	0,892	0,747	0,627
D	315	355	400	450	500	560	630	710	800	
$\xi$	0,531	0,455	0,393	0,344	0,307	0,273	0,243	0,111	0,099	

## 10. Noise data

### 10.1. Level of acoustic output corrected with filter A.

$$L_{WA} = L_{W1} + 10 \log(S) + K_A$$

$L_{WA}$  [dB(A)] level of acoustic output corrected with filter A.

$L_{W1}$  [dB] level of acoustic output  $L_{W1}$  related to the 1 m<sup>2</sup> section (see Tab. 10.3.1.)

S [m<sup>2</sup>] duct cross section

$K_A$  [dB] correction to the weight filter A (see Tab. 10.3.2.)

### 10.2. Level of acoustic output in octave ranges.

$$L_{Woct} = L_{W1} + 10 \log(S) + L_{rel}$$

$L_{Woct}$  [dB] spectrum of acoustic output in octave range

$L_{W1}$  [dB] level of acoustic output  $L_{W1}$  related to the 1 m<sup>2</sup> section (see Tab. 10.3.1.)

S [m<sup>2</sup>] duct cross section

$L_{rel}$  [dB] relative level expressing the shape of the spectrum (see Tab. 10.3.3.)

10.3. Table of acoustics values

Tab. 10.3.1. Level of acoustic output  $L_{w1}$ [dB] related to the 1 m<sup>2</sup> section

w [m.s <sup>-1</sup> ]	$\xi$ [-]											
	0,1	0,2	0,3	0,4	0,6	0,8	1	1,5	2	2,5	3	3,5
2	9	11,5	14,7	16,9	20,1	22,3	24,1	27,2	29,4	31,2	32,6	33,8
3	16,7	22,1	25,3	27,5	30,7	32,9	34,6	37,8	40	41,7	43,2	44,4
4	24,2	29,6	32,8	35	38,1	40,4	42,1	45,3	47,5	49,2	50,7	51,9
5	30,0	35,4	38,6	40,8	44	46,2	47,9	51,1	53,3	55,1	56,5	57,7
6	34,8	40,2	43,3	45,6	48,7	51	52,7	55,8	58,1	59,8	61,2	62,4
7	38,8	44,2	47,3	49,6	52,7	55	56,7	59,9	62,1	63,8	65,2	66,4
8	42,3	47,7	50,8	53,1	56,2	58,4	60,2	63,3	65,6	67,3	68,7	69,9
9	45,4	50,7	53,9	56,1	59,3	61,5	63,3	66,4	68,6	70,4	71,8	73
10	48,1	53,5	56,6	58,9	62	64,3	66	69,1	71,4	73,1	74,5	75,7
11	50,6	56	59,1	61,4	64,5	66,7	68,5	71,6	73,9	75,6	77	78,2
12	52,8	58,2	61,4	63,6	66,8	69	70,7	73,9	76,1	77,9	79,3	80,5

Tab. 10.3.2. Correction to the weight filter A

w [m.s <sup>-1</sup> ]	2	3	4	5	6	7	8	9	10	11	12
$K_A$ [dB]	-15,0	-11,8	-9,8	-8,4	-7,3	-6,4	-5,7	-5,0	-4,5	-4,0	-3,6

Tab. 10.3.3. Relative level expressing the shape of the spectrum  $L_{rel}$

w [m.s <sup>-1</sup> ]	f [Hz]							
	63	125	250	500	1000	2000	4000	8000
2	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9	-56,4
3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4	-48,9
4	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2	-43,9
5	-4,0	-4,1	-5,9	-9,4	-14,6	-21,5	-30	-40,3
6	-4,2	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6	-37,4
7	-4,5	-3,9	-4,9	-7,5	-11,9	-17,9	-25,7	-35,1
8	-4,9	-3,9	-4,5	-6,9	-10,9	-16,7	-24,1	-33,2
9	-5,2	-3,9	-4,3	-6,4	-10,1	-15,6	-22,7	-31,5
10	-5,5	-4	-4,1	-5,9	-9,4	-14,6	-21,5	-30
11	-5,9	-4,1	-4	-5,6	-8,9	-13,8	-20,4	-28,8
12	-6,2	-4,3	-3,9	-5,3	-8,4	-13,1	-19,5	-27,6



## IV. MATERIAL, FINISHING

### 11. Material

- 11.1.** Damper bodies are supplied in the design made of galvanized plate without any other surface finishing.

Damper blades are made of fire resistant asbestos free boards made of mineral fibres.

Control devices of dampers has cover from mechanically resistant and standing plastic and rest of the parts is galvanised without further surface treatment.

Springs are galvanized.

Thermal protective fuses are made of sheet brass, thickness = 0.5 mm.

Fasteners is galvanized

- 11.2.** According to the customer's requirements, damper can be made of stainless material.

Specifications for stainless-steel models – classification of stainless steel:

- Class A2 – Food-grade stainless steel (AISI 304 – ČSN 17240)
- Class A4 – Chemistry-grade stainless steel (AISI 316, 316L – ČSN 17346, 17349)

The respective stainless steel is the material for all components present or accessing the damper interior; components outside the damper body are typically from galvanised sheet metal (fasteners for mounting the servo drive or mechanics, mechanics components except Item 4), frame components.

The following components, including the fasteners, are made from stainless steel at all times:

- 1) Damper body and all components permanently attached
- 2) Leaf holders, including pins, metal parts of leaf
- 3) Control components inside the damper (leaf angle selector, pin with lever)
- 4) Mechanical components entering the interior of damper body (lower sheet of mechanics, lock holder "1", lock lever "2", lock spring, 8 dia. stopper pin, mechanics pin)
- 5) Inspection hole cover including the clip and fasteners (if they are parts of the cover)
- 6) Bearing for torque transfer from the lever with pin on the angle selector at the leaf (made from AISI 440C)

The leaf of the damper is made from a single piece of homogeneous material Promatect-H, thickness 15 mm.

Plastic, rubber and silicon components, sealants, foaming bands, glass-ceramic seals, housings, brass bearings of the leaf, servo drives, and end switches are identical for all material variants of the dampers.

The thermal fuse is identical for all material variants of the dampers. At customer's wish, the thermal fuse can be made of stainless metal sheet, mat. A4.

The temperature-dependent initiator of the servo drive (sensor) is modified for stainless-steel variants of the dampers; the standard galvanised screws are replaced with stainless-steel M4 screws of corresponding class the counterpart has stainless-steel riveting M4 nuts.

Some fasteners and components are available in one class of stainless steel; the type will be used in all stainless-steel variants.

The leaf in the variants for chemical environments (Class A4) is always treated with a coating of chemically resistant Promat SR.

Any other requirements for the design shall be considered atypical and shall be addressed on an individual basis.

## V. INSPECTION, TESTING

### 12. Inspection

- 12.1. Sizes are checked by common measuring instruments according to the standard of non-tolerated sizes, used in air conditioning industry.

Interoperational checks of components and main sizes are carried out according to drawing documentation.

### 13. Testing

- 13.1. After workshop installation, a 100% check of function of closing mechanism and electric components is carried out.

## VI. TRANSPORTATION AND STORAGE

### 14. Logistic terms

- 14.1. The dampers are delivered as bulk cargo. Any other packing methods must be agreed with the manufacturer in advance. The potential packages will be considered non-returnable and their price will not be included in the product price.

The dampers are transported by box freight vehicles; no sharp shocks must occur and the ambient temperature must not exceed +40°C. For handling during transport, the dampers must be protected against mechanical damages and weather impact. If the customer wishes it, the dampers can be transported on pallets. During transport, the damper blade must be in the "CLOSED" position.

Unless another method of reception is specified in the purchase order, the handover of the dampers to the forwarder shall be understood as reception.

- 14.2. The dampers must be stored in covered buildings, in an environment without aggressive vapours, gases and dust. A temperature in a range of -5°C and +40°C and a relative humidity of max. 80% must be maintained in the buildings.  
For handling during storage, the dampers must be protected against mechanical damage.

- 14.3. The delivery includes the complete damper and the delivery note.

### 15. Warranty

- 15.1. The manufacturer provides a warranty of 24 months from the date of dispatch for the dampers.

The warranty for fire dampers, provided by the manufacturer, shall become completely null and void if the starting, closing and control devices are unprofessionally handled by untrained workers or if electric components, i.e. limit switches, actuating mechanisms, communication and supply devices and thermoelectric starting mechanisms are dismantled (see Art. 16.1 of the technical conditions). The warranty shall also become null and void if the dampers are used for other purposes, devices and working conditions than those allowed by these technical conditions or if the dampers are mechanically damaged during handling.

- 15.2. If the dampers are damaged by transport, a record must be written down with the forwarder at reception for later complaint.

## VII. ASSEMBLY, ATTENDANCE, MAINTENANCE AND REVISIONS

### 16. Assembly

- 16.1.** The assembly of the dampers must be carried out while observing all applicable safety standards and regulations.
- 16.2.** All flange and screw joints must be conductively connected during the assembly to provide protection against dangerous contact. 2 fan-shaped washers in galvanized version are to be used for conductive connection; they are to be situated under the head of one bolt and under the screwed nut.
- 16.3.** If the damper is equipped with limit switches and the said devices are not used during operation (e.g. because of a project change), they can be left on the damper and not connected (they need not be dismantled). On the other hand, if a limit switch is to be added to the damper design, the change can be implemented by adding the required device to the base plate of the damper. The said facts must be recorded in the respective operation documentation of the damper (record books of the damper, fire logs, etc.) and subsequently, adequate function checks must be carried out.
- 16.4.** For a reliable function of the dampers, their closing mechanism and the seating faces of the blade must be protected from dust, fibrous or adhesive masses and solvents.
- 16.5.** Control of actuating mechanism without electric voltage:  
You can set the damper blade in any position with the help of a special wrench (included in the delivery of the actuating mechanism). By turning the wrench in the direction of the arrow, the damper blade will move to the open position. By stopping the damper blade in any position, the actuating mechanism will be locked according to the instructions on the actuating mechanism. The mechanism can be unlocked manually according to the instructions on the mechanism or by means of supply voltage.

#### **WARNING!**

**If the actuating mechanism is manually locked, the damper blade will not close in case of fire after activation of the thermoelectric starting mechanism BAT. To restore the correct function of the damper, the actuating mechanism must be unlocked (manually or by means of supply voltage).**

### 17. Entry into service and revisions

- 17.1.** Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out. Visual inspection of proper damper integration, inside damper area, damper blade, contact surfaces and silicon sealing. Check of thermal protective fuse and closing mechanism. Check the closing function of the damper blade. This can be done by removing of thermal fuse from damper body.

Before entering the dampers with actuating mechanism into operation after their assembly and by sequential checks. Check of blade displacement into the breakdown position "CLOSED" can be done after cutting off the actuating mechanism supply (e.g. by pressing the RESET button at the thermoelectrical starting mechanism BAT or cutting off the supply from ELECTRICAL FIRE SIGNALISATION). Check of blade displacement back into the "OPEN" position can be done after restoration of power supply (e.g. by releasing the RESET button or restoration of supply from ELECTRICAL FIRE SIGNALISATION). Without power supply, the damper can be operated manually and fixed in any required position. Release of the locking mechanism can be achieved manually or automatically by applying the supply voltage. It is recommended to provide periodical checks, maintenance and service actions on Fire Equipment by Authorized persons. The authorized persons can be trained by Producer, or by authorized Distributor. All effective safety standards and directives must be observed during fire damper assembly.

For regular or exceptional inspection of interior of fire damper, micro-camera device can be used. On each fire damper is inspection hole. In the case of inspection by camera, take out the black rubber cap, insert the camera inside the damper, check interior and at the end of inspection, put the rubber cap back tightly to cover the empty hole.

- 17.2.** Before putting the dampers into operation and during subsequent function checks, the following checks must be carried out for all designs:
- Visual check of correct installation of the damper, of the damper interior, of the damper blade, of the seating faces of the blade and of the silicone seal.
- Disassembly of inspection hole cover: Remove the button-headed screws (2) and tilt the cover to take it out.
- 17.3.** For dampers with mechanical control (designs .01, .11, .80), the following checks must be carried out:
- Check of closing mechanism and thermal fuse**
- To check the function of the mechanism proceed as follows:**
- Move the damper blade to "CLOSED" position as follows:
- The damper is in "OPEN" position.
  - Press the control button of the mechanism to move the damper to "CLOSED" position.
  - Check the damper blade shift to "CLOSED" position.
  - The closing must be brisk; the control lever and the blade in the damper must be in "CLOSED" position.
- Move the damper blade to "OPEN" position as follows:
- Turn the control lever by 90°.
  - The lever will automatically lock in "OPEN" position.
  - Check the damper blade shift to "OPEN" position.
- Check of function and condition of the thermal fuse:**
- To check the function and the condition of the thermal fuse, you can dismount the whole mechanism from the fire damper body - the mechanism is fixed to the damper body with four M6 screws.
  - By removing the thermal fuse from the holder of the fuse of the starting mechanism, check its correct function.
  - The mechanism size is marked with M1 to M4, according to the strength of the closing spring.
- 17.4.** For the designs with actuating mechanisms, the following checks must be carried out:
- Check the shift of the blade to "CLOSED" failure position after cutting off the power supply to the actuating mechanism (e.g. by pressing the reset button on the thermoelectric starting mechanism BAT, by cutting off the power supply from electrical fire signalization). Check the shift of the blade back to "OPEN" position by restoring the power supply to the actuating mechanism (e.g. by releasing the reset button, by restoring the power supply from electrical fire signalization).
- 17.5.** The check of function of the damper with actuating mechanism can be carried out as follows:
- a) by cutting off and restoring the power supply, e.g. by a signal from electrical fire signalization
  - b) directly on the installed damper, with the help of the button on the thermoelectric starting mechanism BAT (simulating fuse tripping).
- 17.6.** Before putting the dampers into operation and during subsequent function checks, the following checks must be carried out for dampers with optical smoke detector, see section 17.1.:
- The function checks of the optical smoke detector are to be carried out by employees of an authorized organization who have corresponding electrotechnical qualification and have been provably trained by the manufacturer. The function checks are to be carried out as a part of function checks of the fire dampers, at least 1x a year.
- 17.7.** For the function checks, the dampers should be moved to "CLOSED" position with the fan off or with closed regulation valve situated between the fan and the fire damper.

**18. Spare parts**

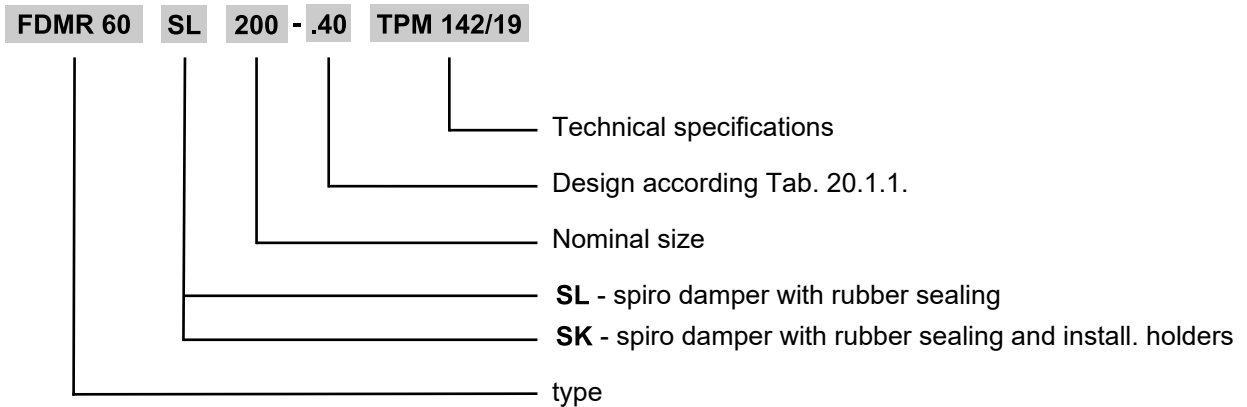
18.1. Spare parts are supplied only on basis of an order.

**19. Restore function of actuating mechanism after fuses initiation**

- 19.1. If tripping of the thermal fuse Tf1 occurs (due to temperature around the fire damper), the actuating mechanism including the thermoelectric starting mechanism must be changed.
- 19.2. If tripping of the thermal fuse Tf2 occurs (due to temperature inside the piping), the self-standing spare part ZBAT72 or ZBAT95, respectively (according to actuating temperature), must be changed.

**VIII. ORDERING INFORMATION**

**20. Ordering key**



Tab. 20.1.1. Dampers design

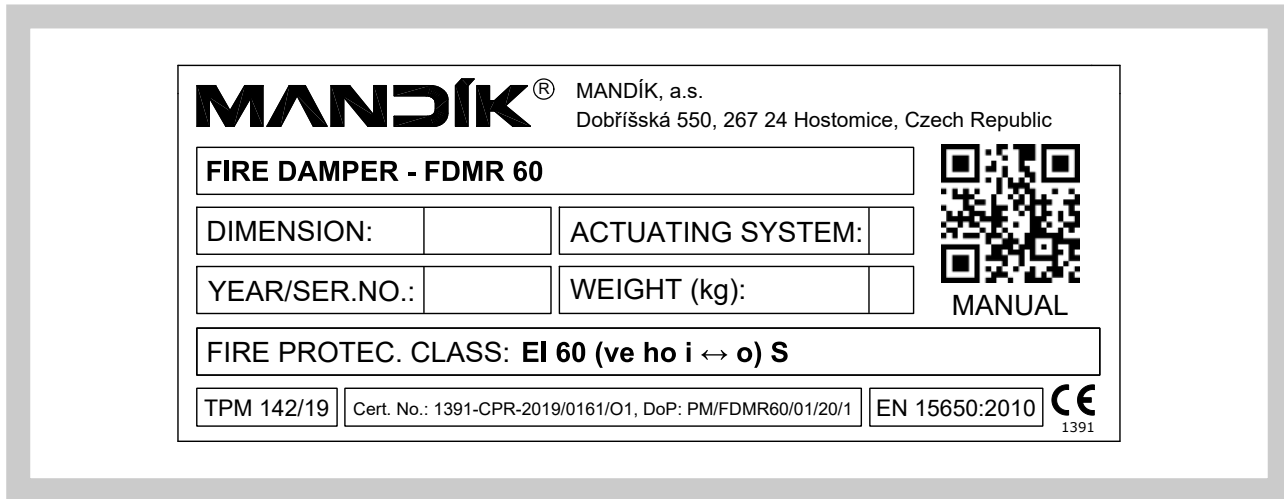
Dampers design	Additional digit
Manual and thermal	.01
Manual and thermal with a terminal switch („CLOSED“)	.11
With actuating mechanism BFL 230-T - voltage AC 230 V	.40
With actuating mechanism BFL 24-T - voltage AC/DC 24 V	.50
With communication and supply device BKN 230-24 and actuating mechanism BFL 24-T-ST	.60
Manual and thermal with two terminal switches („OPEN“, „CLOSED“)	.80

**IX. PRODUCT DATA**

**21. Data label**

21.1. Data label is placed on the damper body.

Fig. 44 Data label



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The producer reserves the right for innovations of the product. For actual product information see [www.mandik.com](http://www.mandik.com)