CE

TPM 092/13

Revision 7
Valid from 28/1/19

EN 15650:2010-09

MANDÍK®

FIRE DAMPER

FDMD



These technical specifications state a row of manufactured sizes and models of fire dampers (further only dampers) FDMD. It is valid for production, designing, ordering, delivery, assembly and operation.

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II. GENERAL INFORMATION

1. Description

1.1. Fire dampers are shutters in duct systems 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 air duct in the points of fire separating constructions.
Dampers blade automatically closes air duct using a shutting spring or an actuating mechanism back spring. The back spring of the actuating mechanism is started when the thermoelectrical starting mechanism BAT is activated, when a reset button on BAT is pushed or when a power supply of the actuating mechanism is stopped.
The damper is sealed with a silicon packing against smoke penetration after closing the blade. At the same time, the damper blade is bedded in a material which enlarges its capacity and air proofs the air duct.
Dampers have one inspection hole, since the shutting device and the inspection hole can be set into the most advantageous position (with respect to the operation and manipulation with the control device).

Fig. 1 FDMD with mechanical control



Fig. 2 FDMD with actuating mechanism



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 120, EIS 90
- External Casing leakage class min. C, Internal leakage class 3 (D=200 mm) and class 2 (D=100 - 180 mm) 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-0089/2014
- Declaration of Perfomance No. PM/FDMD/01/16/1
- Hygienic assessment of fire dampers - Report No. 1.6/13/16/1

1.3. Working conditions

Exact damper function is provided under the following conditions:

a) Maximum air circulation speed: 12 m.s
   Maximum pressure difference: 1500 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. Damper 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



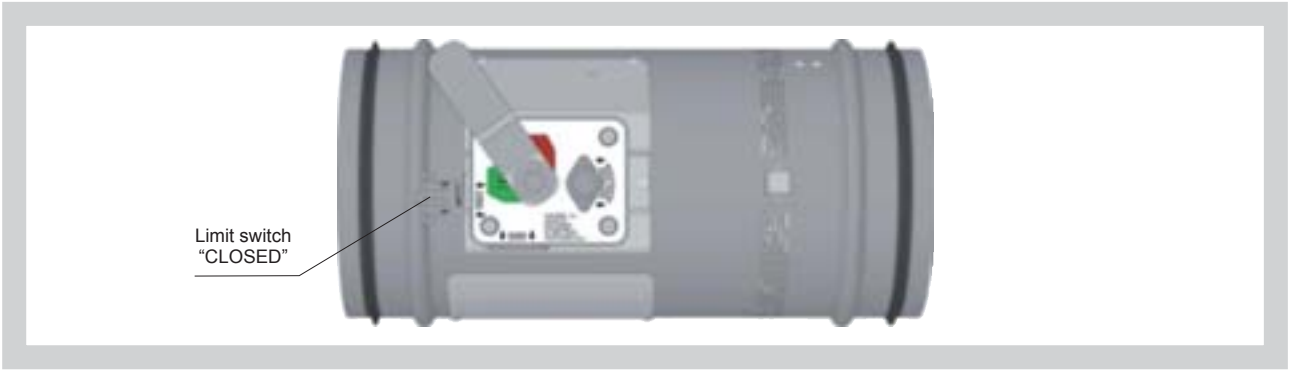
ATTENTION:

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. 4.2.1.** 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

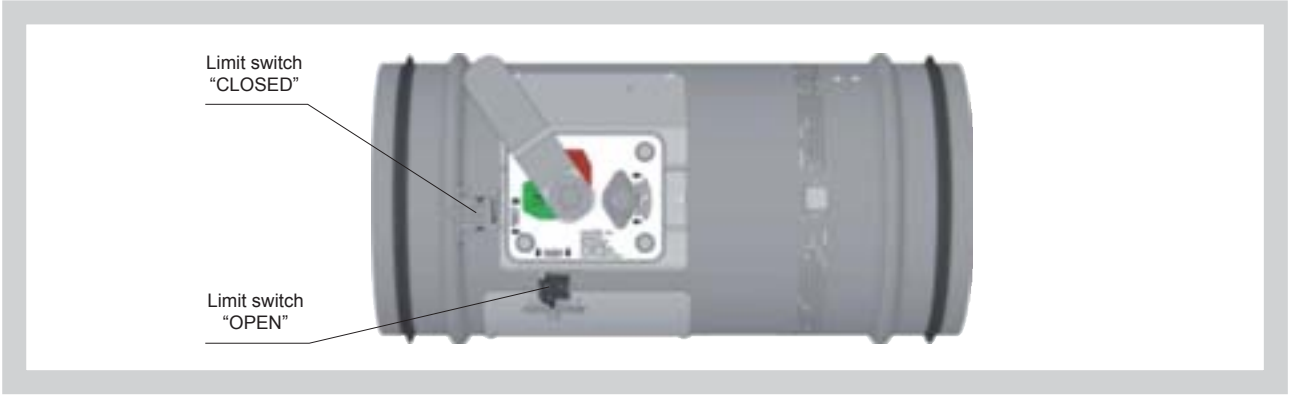
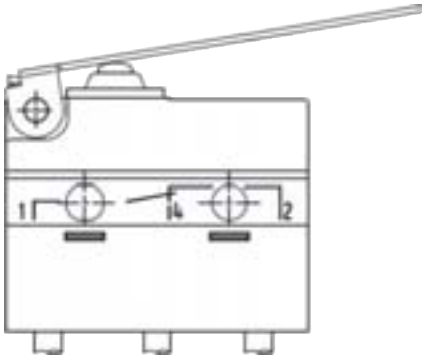
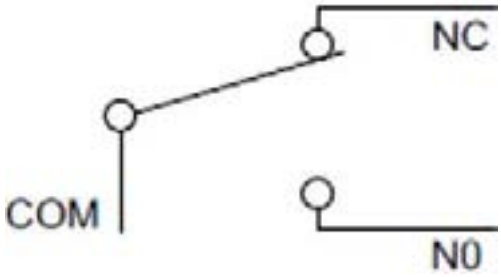


Fig. 6 Limit switch G905-300E03W1



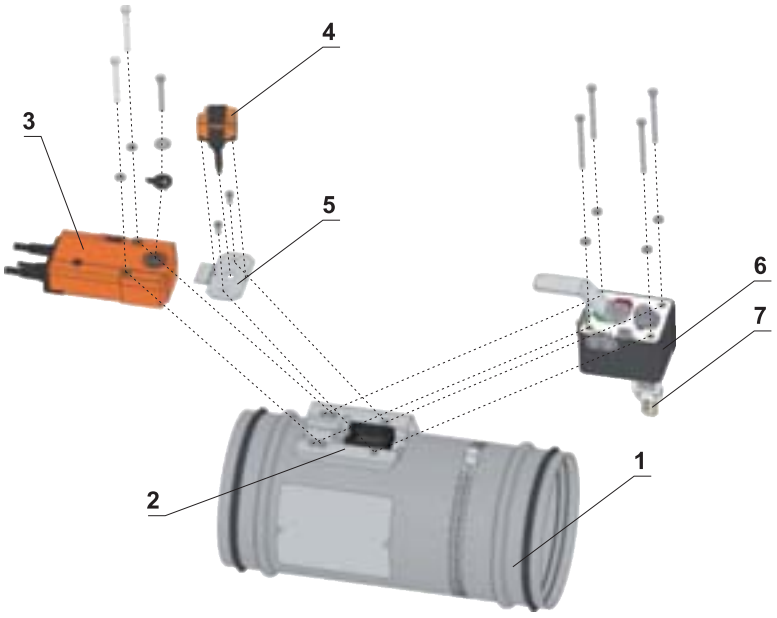


1(COM) - black wire
2(NC) - gray wire
4(NO) - blue wire

Nominal voltage and maximal current	AC 230V / 5A
Class of protection	IP 67
Working temperature	-25°C … +120°C

This limit switch is possible to connect in following two versions:
a) **CUT-OFF** if the arm is moving … connect wire 1+2
b) **SWITCH-ON** if the arm is moving … connect wire 1+4

Fig. 7 Change of mechanical design for the motorised one or vice versa



Position:
1 Damper
2 Mounting plate
3 Actuator
4 Temperature sensor
5 Mounting plate
6 Mechanics
7 Thermal fuse

2.2. Design with actuating mechanism

Design .40, .50

FDMB is always equipped by electric actuating mechanism BFL, BFN, BF 230-TN or BFL, BFN, BF 230-TN (further only "actuating mechanism"). After being connected to power supply AC/DC 24V or 230V, the actuating mechanism displaces the damper blade into operation position "OPEN" and at the same time it pre-stretches its back spring. When the actuating mechanism is under voltage, the damper blade is in the position "OPEN" and the back spring is pre-stretched. Time needed for full opening of the flap blade from the position "CLOSED" to the position "OPEN" is maximum 140 sec. If the actuating power supply is cut off (due to loss of supply voltage, or pushing the reset button on the thermoelectrical starting mechanism BAT), the back spring displaces the damper blade into the breakdown position "CLOSED". The time of displacing the blade from the position "OPEN" to the position "CLOSED" takes maximum 20 sec. In case that the power supply is restored again (the blade can be in any position), the actuating mechanism starts to re-displace the damper blade into the position "OPEN".
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" a "CLOSE" is provided by two limit switches.

Fig. 8 Design .40, .50

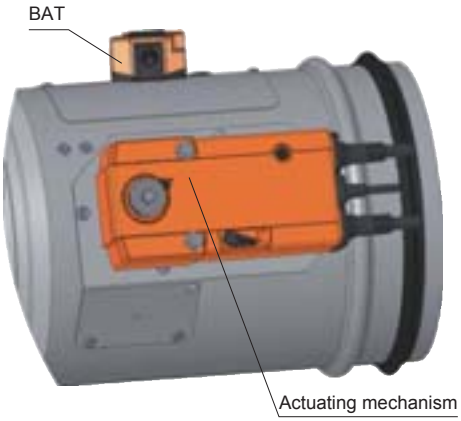


Fig. 9 Actuating mechanism BELIMO BFL (BFN) 230-T

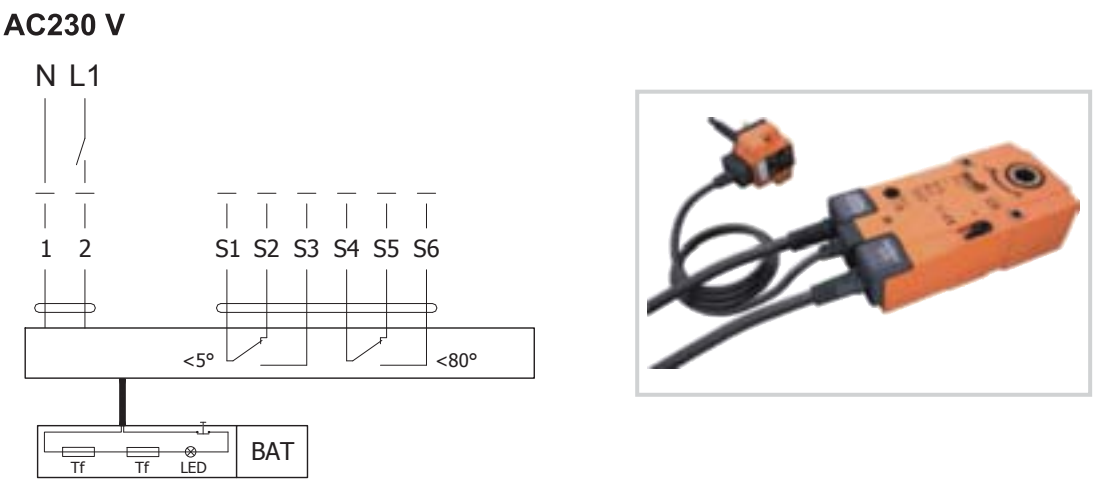
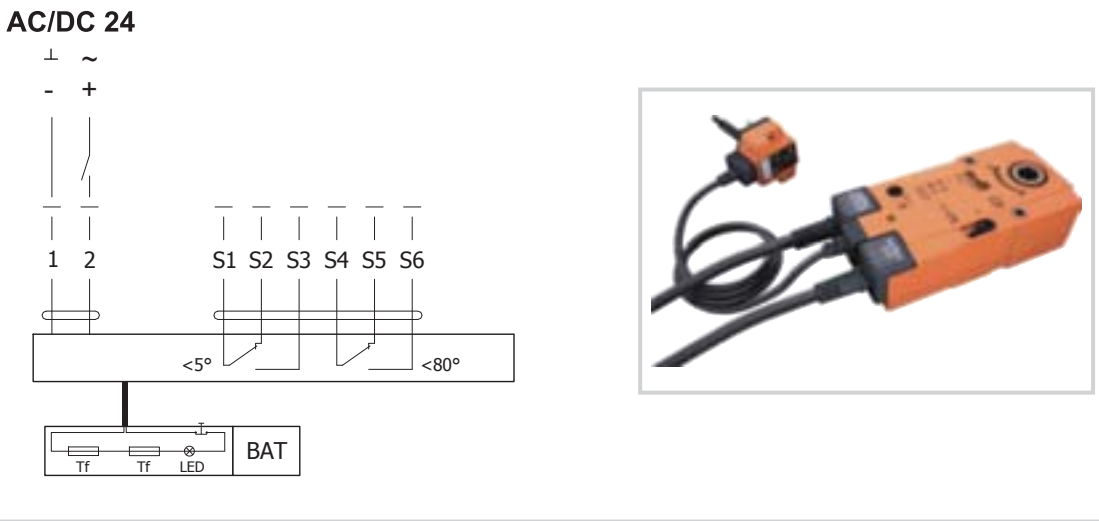


Fig. 10 Actuating mechanism BELIMO (BFN) 24-T(-ST)



Tab. 2.2.1. Actuating mechanism BELIMO BFL24-T(-ST), BFN 24-T(-ST), BFL 230-T a BFN 230-T

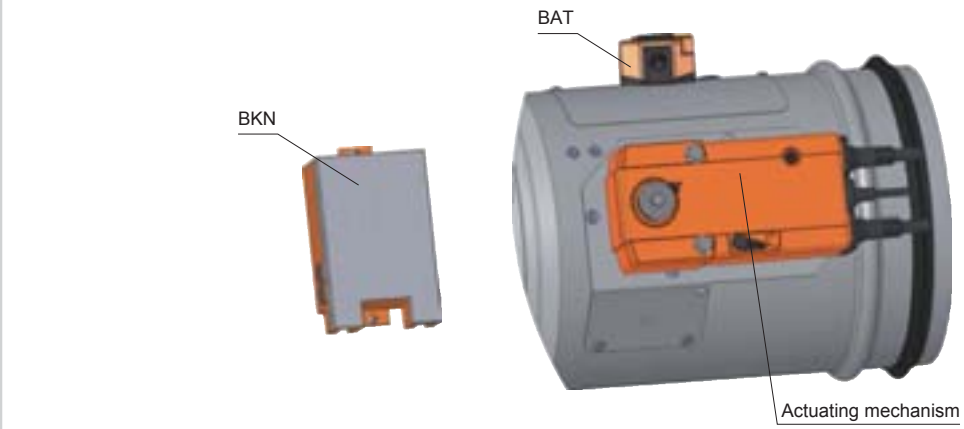
Actuating mechanism BELIMO	BFL, BFN 230-T	BFL, BFN 24-T(-ST)
Nominal voltage	AC 230 V 50/60 Hz	AC 24 V 50/60 Hz DC 24 V
Power consumption - motoring - holding	3,5/5 W 1,1/2,1 W	2,5/4 W 0,8/1,4 W
Dimensioning	6,5/10 VA (Imax 4 A @ 5 ms)	4/6 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	<60 s ~ 20 s	
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 mm² (BFL/BFN 24-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm² (BFL/BFN 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-ST. It simplifies electrical wiring and interconnection of fire damper. 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-ST with a spring back drive on one hand and on the other hand it transmits the signal information about the fire damper 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-ST 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 fire damper position will be "FAILURE".
Communication and supply device BKN 230-24 has to be placed near the damper. It is necessary for easy connection of actuating system equipped by BKN 230-24 device.

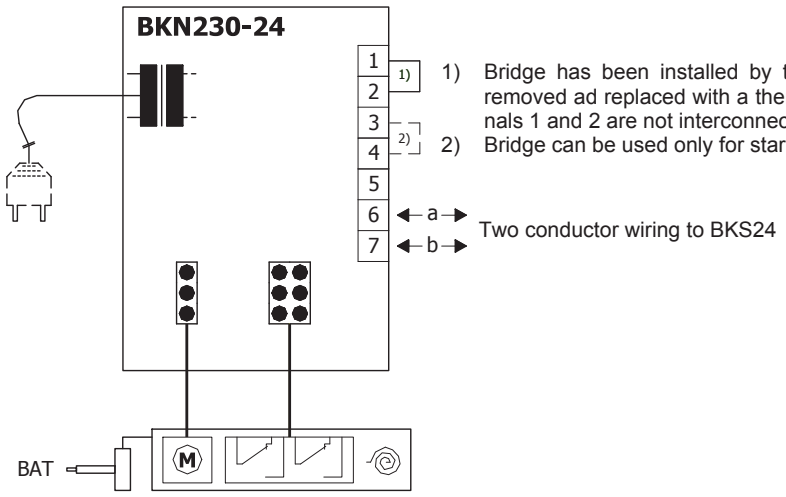
Fig. 11 Design .60



Tab. 2.3.1. Communication and Supply Device BKN 230-24

Communication and Supply Device	BKN 230-24
Nominal voltage	AC 230V 50/60Hz
Power consumption	3,5 W (operating position)
Dimensioning	11 VA (including actuating mechanism)
Protection Class	II
Degree of protection	IP 42
Ambient Temperature Storage Temperature	-30°C … +50°C -40°C … +50°C
Connection - mains - drive - terminal board	Cable 0,9 m with EURO plug of 26 type 6 pole plug, 3 pole plug screw terminals for conductor 2x1,5 mm²

Fig. 12 Communication and Supply Device BKN 230-24 with actu. mechanism BF 24-TN-ST (BFL 24-T-ST, BFN 24-T-ST)



1) Bridge has been installed by the manufacturer. If needed, it can be removed ad replaced with a thermoelectric starting mechanism. If terminals 1 and 2 are not interconnected, safety function is initiated.
2) Bridge can be used only for starting and without BKS24… !

Two conductor wiring to BKS24

3. Communication and control devices

3.1. 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 dampers 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 dampers 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 lights up shines (the failure is saved in memory).
K2 - the auxiliary contact - is used for signalisation of the flap position to the master device. Function of this auxiliary contact can be programmed through the terminal 14 according to the Tab. 3.1.1.

Tab. 3.1.1. BKS 24 -9A contacts K1 and K2

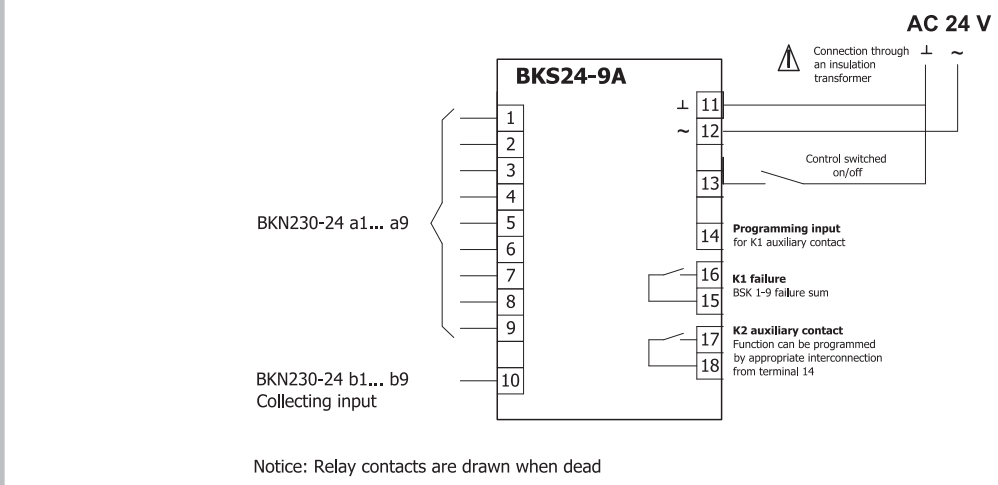
K1 Function Contact		Programming K2 Auxiliary Contact		
Situation	**State**	**Function**	**Interconnection**	**State**
Current Failure	15 — 16	K2 contact is on if all the dampers are open	14 — 11	17 — 18
No Failure	15 — 16	K2 contact is on if the damper No. 1 is open	14 — 12	
		K2 contact is on if all the dampers are closed	14 open	

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".

Tab. 3.1.2. 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 (operating position)
Dimensioning	5,5 VA
Protection Class	III (safe small voltage)
Degree of protection	IP 30
Ambient Temperature	0 … +50°C
Connection	Terminals for conductor 2 x 1,5 mm²

Fig. 13 Communication and Control Device BKS 24-9A

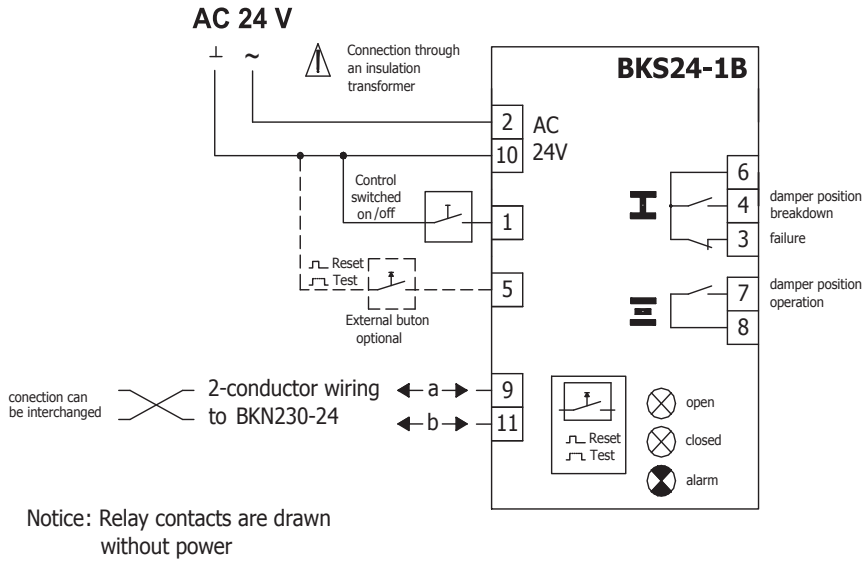


3.2. BKS 24-1B communication and control device is used for control and checks of fire dampers with the BFL 24-T-ST actuating mechanism in conjunction with the BKN 230-24 supply and communication device. BKS 24-1B receives information about the situation of the fire damper through the BKN 230-24 supply 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 indicates the operating situations of the damper and breakdowns of the whole system. Nonpotential auxiliary contacts enable connection to the master control system (indication of the damper position, failure reports, release of the ventilators etc.).
While a flashing green LED pilot light signalises flap blade motion towards the given position, the same pilot light reports reaching the required position when shining constantly. If the damper, 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.

Tab. 3.2.1. 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 (safe small voltage)
Degree of protection	IP 30
Ambient Temperature	0 … +50°C
Connection	Into ZSO-11 connector which is not a part of BKS 24-1B. ZSO-11 connector has screw terminals 11 x 1,5 mm²

Fig. 14 Communication and control device BKS 24-1B

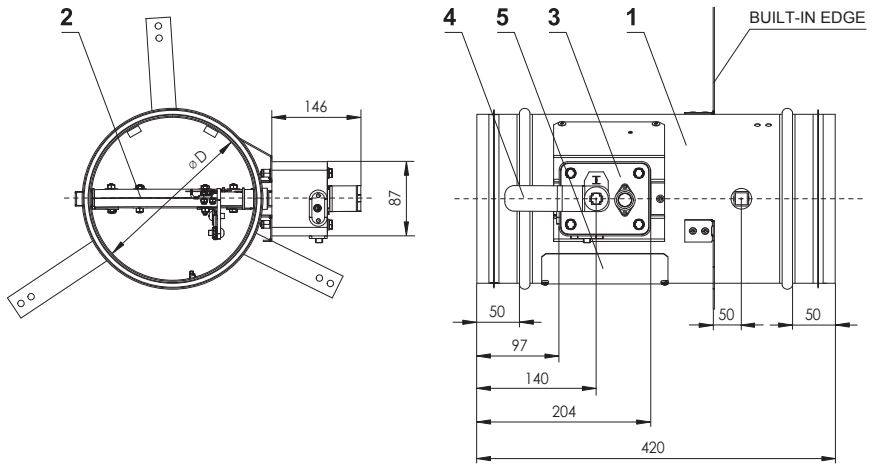


Signals and diagnosis				
light diodes			contacts	Description
⊗ open	⊗ closed	⊗ alarm	state	Cause/Course
⊗ closed	⊗ closed	⊗ closed	6–3	**Power supply AC 24V** not available
☼ open	☼ open	☼ open	6–3	**Check test cca 35sec**, starting with switching AC 24 on or pressing «Reset/Test» button
⊗ closed	⊗ closed	☼ flashing	6–3	**Current failure,** 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	**Failure saved in memory** • Fault in system signalled, system check should be done
⊗ closed	☼ flashing	⊗ closed	6–4	Damper (drive) turning into **the direction** of breakdown position
⊗ closed	☼ open	⊗ closed	6–4	Damper (drive) in **breakdown position** ⌶
☼ flashing	⊗ closed	⊗ closed	6–7	Damper (drive) turning into **the direction** of operating position
☼ open	⊗ closed	⊗ closed	6–7	Damper (drive) in **operating position** ≡

4. Dimensions, weights

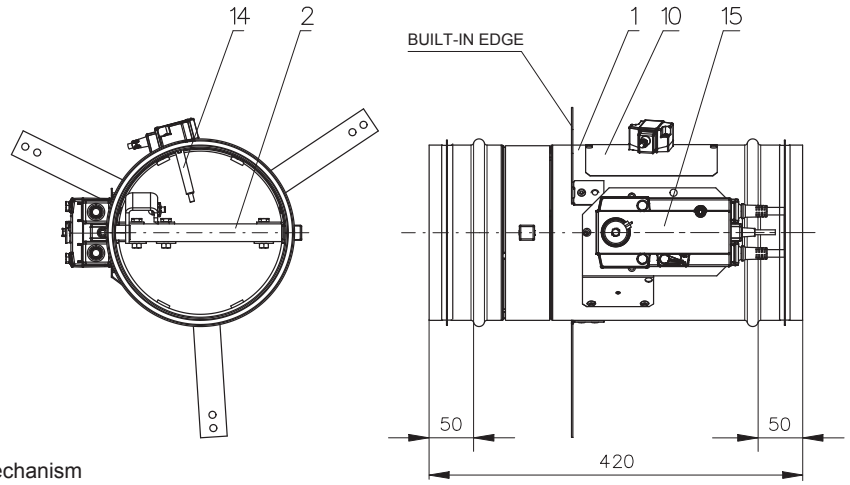
4.1. Dimensions

Fig. 15 FDMD - with mechanical control



Position:
1 Damper casing
2 Damper blade
3 Mechanics
4 Control lever
5 Inspection hole covering

Fig. 16 FDMD - with actuating mechanism



Position:
1 Damper casing
2 Damper blade
10 Inspection hole covering
14 BAT thermoelectrical starting mechanism
15 Actuating mechanism

4.2. Weights and effective area

Tab. 4.2.1. Weights and effective area

Size øD	Weight [kg]			Effective area S_{ef} [m²]	Actuating mechanism	Mechanical control
	Mechanical control		Actuating mechanism			
	Design					
	.01	.01v2				
100	1,3	2,5	2,7	0,0032	BFL	M1
125	1,6	2,9	3,1	0,0063	BFL	M1
140	1,8	3,1	3,3	0,0086	BFL	M1
150	1,9	3,3	3,4	0,0102	BFL	M1
160	2,1	3,4	3,5	0,0122	BFL	M1
180	2,3	3,7	3,9	0,0164	BFL	M1
200	2,6	4	4,2	0,0213	BFL	M1

Listed weights are without ratchets, ratchet Kit weighs 0,11 kg.

5. Placement and Assembly

5.1. Fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating constructions. 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. Installation gap must be filled by approved material perfectly in all the installation space volume (installation gap).

To provide needed access space to the control device, all other objects must be situated at least 350 mm from the control parts of the damper. Inspection hole must be accessible.

Damper blade has to be inside of construction (labelled with BUILD IN EDGE on the damper body) after installation. The fire damper can also be installed outside the wall construction. Duct and the damper part between the wall construction and the damper blade (labelled with BUILD IN EDGE on the protective covering) must be protected with firefighting insulation.

The distance between the fire damper and the construction (wall, ceiling) must be minimum 75 mm. In case that two or more dampers are supposed to be installed in one fire separating construction, the distance between the adjacent dampers must be at least 200 mm according to EN 1366-2 paragraph 13.5.
Exceptions are given in chapter 6.

Fig. 17 Construction

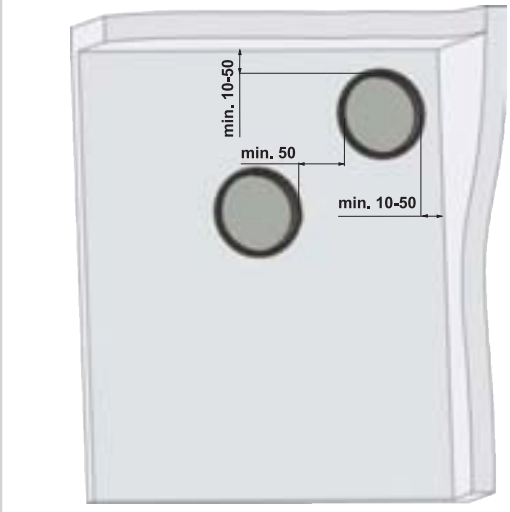
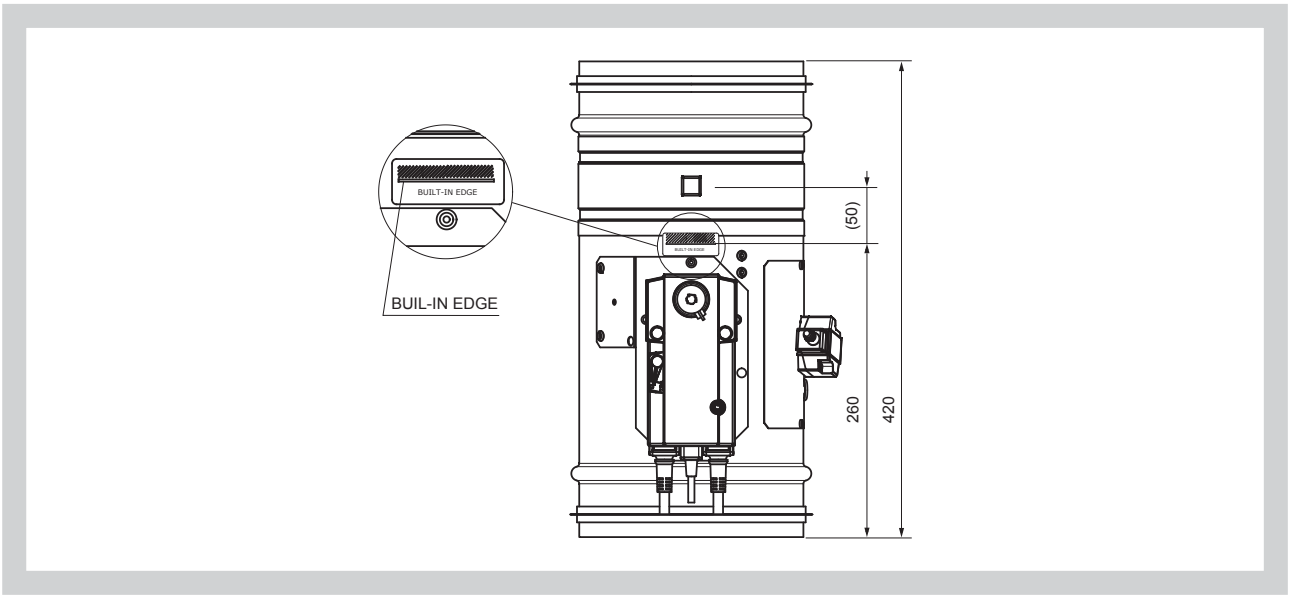


Fig. 18 Built-in edge - design with outer mechanical control or actuating mechanism



5.2. The control mechanism has to be protected (covered) against damage and pollution during installation process. All fire dampers has to be closed during installation process. The damper body should not be deformed in the course of bricking in. Once the damper is built in, its blade should not grind on the damper body during opening or closing.

5.3. Installation opening dimensions

Fig. 19 Installation opening

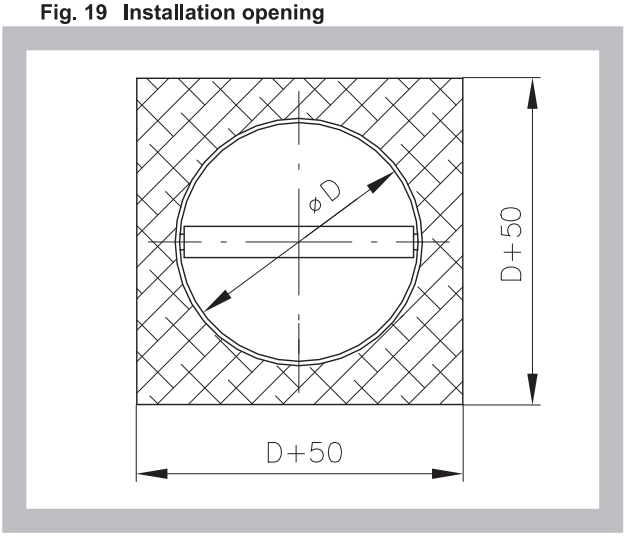


Fig. 20 Installation opening

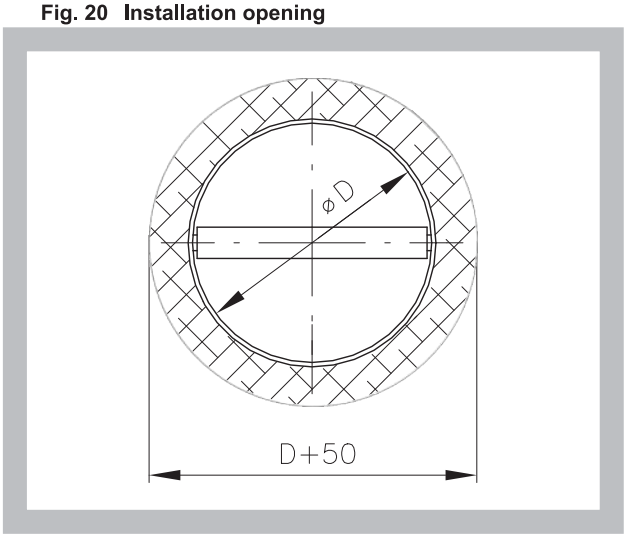
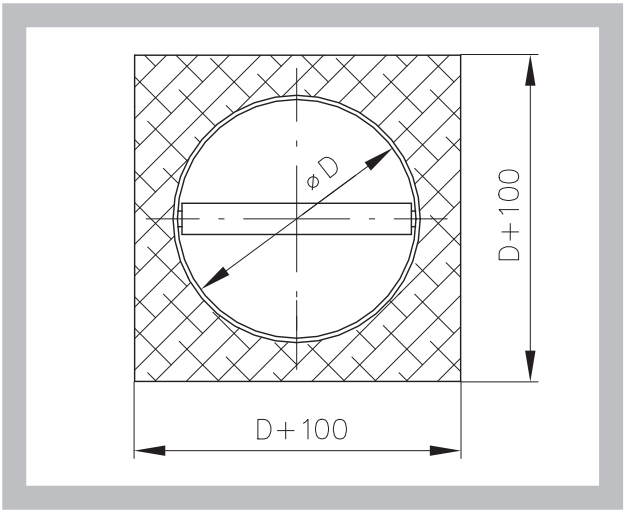


Fig. 21 Installation opening - Weichschott system



5.4. The control mechanism has to be protected (covered) against damage and pollution during installation process.

All fire dampers has to be closed during installation process. The damper body should not be deformed in the course of bricking in. Once the damper is built in, its blade should not grind on the damper body during opening or closing.

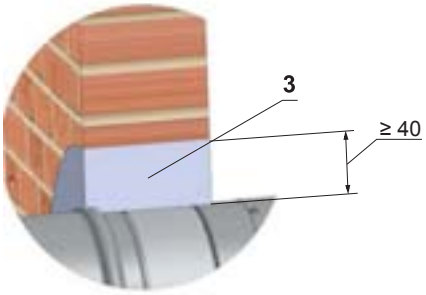
6. Statement of installations

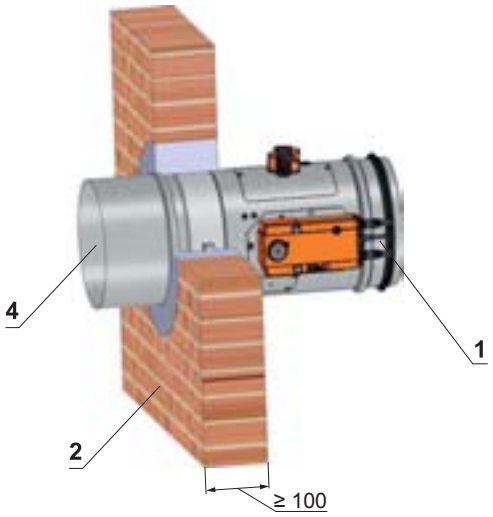
6.1. Statement of installations the fire dampers FDMD and their fire resistance Tab. 6.1.1.

Tab. 6.1.1. Statement of installations

Fire separating construction	Wall/Ceiling Min. thickness [mm]	Installation	Fire resistance	Page
Solid wall construction	100	Mortar or gypsum	EIS 120 EIS 90	16
	100	Stuffing box with fire protection mastic	EIS 90	16
	100	Battery installation - Mortar or gypsum	EIS 90	17
	100	Installation frame D1, D2, D3, D4, D5	EIS 90	18
	100	Weichschott	EIS 90	18
	100	Installation next to wall - mortar or gypsum and mineral wool	EIS 90	19
	100	Installation next to wall - Installation frame D1, D2, D3, D4 and mineral wool	EIS 90	20
	100	Installation next to wall - Installation frame D5	EIS 90	21
	100	Battery installation - Installation frame D1	EIS 90	22
	100	Fire resistant foam covered by stucco plaster	EIS 60 EIS 45 EIS 30	45
Solid ceiling construction	110	Mortar or gypsum	EIS 120 EIS 90	23
	110	Stuffing box with fire protection mastic	EIS 90	23
	110	Battery installation - Mortar or gypsum	EIS 90	24
	110	Installation frame D1, D2, D3, D4, D5	EIS 90	25
	110	Weichschott	EIS 90	25
	110	Battery installation - Installation frame D2	EIS 90	26
Gypsum wall construction	100	Mortar or gypsum	EIS 120 EIS 90	28
	100	Stuffing box with fire protection mastic	EIS 90	28
	100	Battery installation - Mortar or gypsum	EIS 90	29
	100	Installation frame D1, D2, D3, D4, D5	EIS 90	30
	100	Weichschott	EIS 90	30
	100	Installation next to wall - mortar or gypsum and mineral wool	EIS 90	31
	100	Installation next to wall - Installation frame D1, D2, D5 and mineral wool	EIS 90	32
	100	Movable ceiling - Installation frame D7	EIS 90	33
	100	Battery installation - Installation frame D1	EIS 90	34
	100	Fire resistant foam covered by stucco plaster	EIS 60 EIS 45 EIS 30	45
Thin shaft wall	100	Mortar or gypsum	EIS 90	43
	100	Installation frame D1	EIS 90	44
Outside solid wall construction	100	Insulating with cement lime plates Installation frame D6	EIS 90	21
	100	Insulating mineral wool	EIS 45	46
Outside gypsum wall construction	100	Insulating mineral wool	EIS 45	47
Outside solid ceiling construction	110	Concrete	EIS 90	27
	110	Concrete with installation frame D5	EIS 90	27
	110	Insulating with cement lime plates Installation frame D6	EIS 90	27
On solid wall construction	100	Installation frame D5	EIS 90	39
On solid ceiling construction	110	Installation frame D5	EIS 90	39
On gypsum wall construction	100	Installation frame D5	EIS 90	39

Fig. 22 Solid wall construction - mortar or gypsum





POSITION:

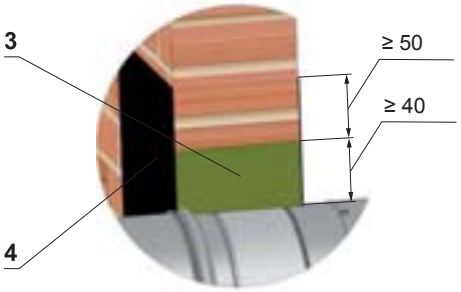
1 Fire damper FDMD

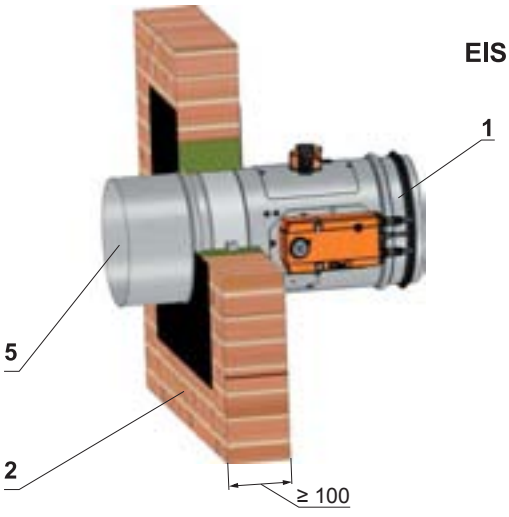
2 Solid wall construction

3 Mortar or gypsum

4 Duct

Fig. 23 Solid wall construction - stuffing box and fire protection mastic





POSITION:

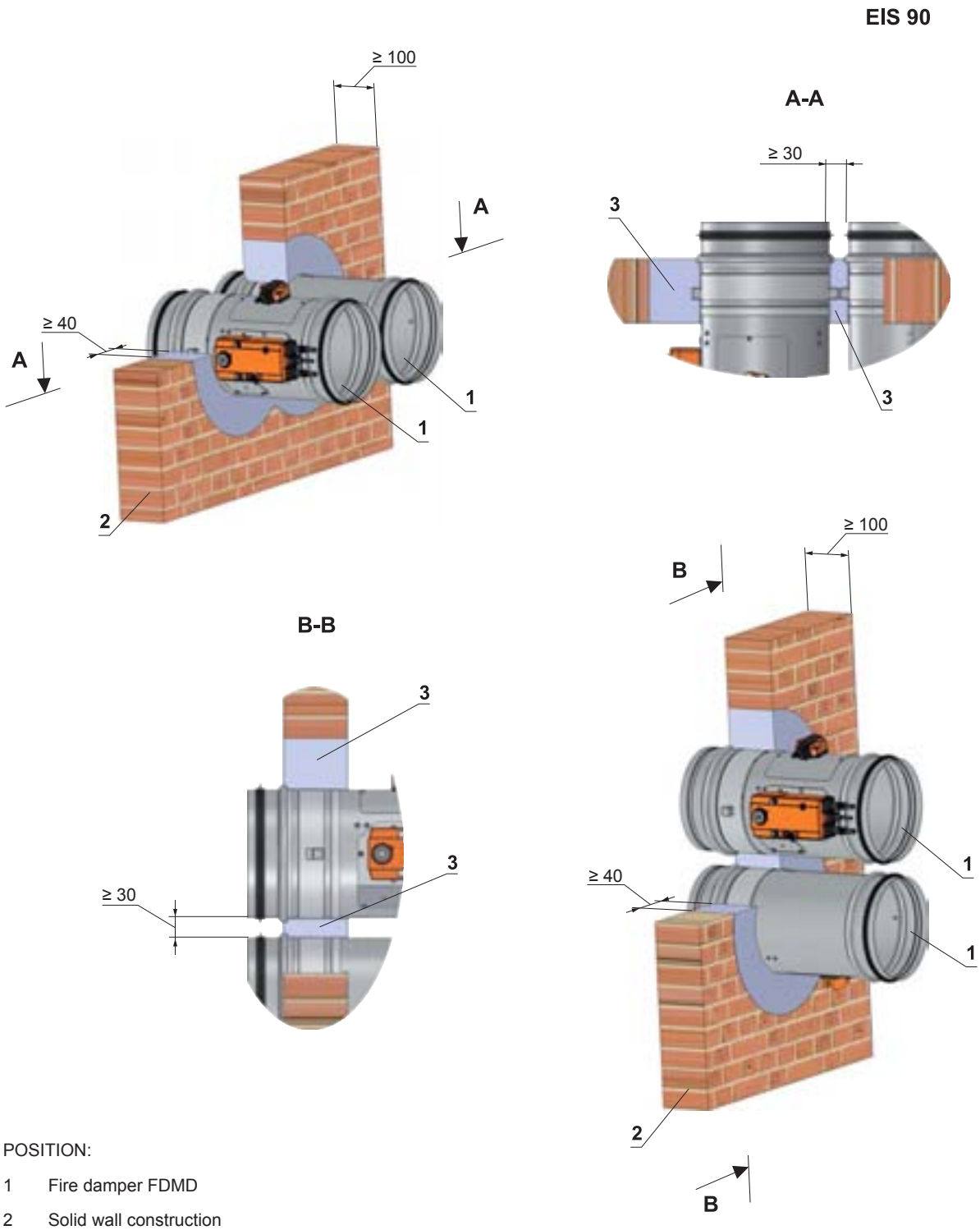
1 Fire damper FDMD
2 Solid wall construction
3 Mineral stone wool min. density 140 kg/m^3
4 Fire protection mastic min. thickness 1 mm
5 Duct

Used materials - example*:

3 - Promapyr, Rockwool Steprock HD
4 - Promastop - P, K

* Stuffing box and fire protection mastic can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 24 Solid wall construction - flange an flange - mortar or gypsum



POSITION:

1 Fire damper FDMD

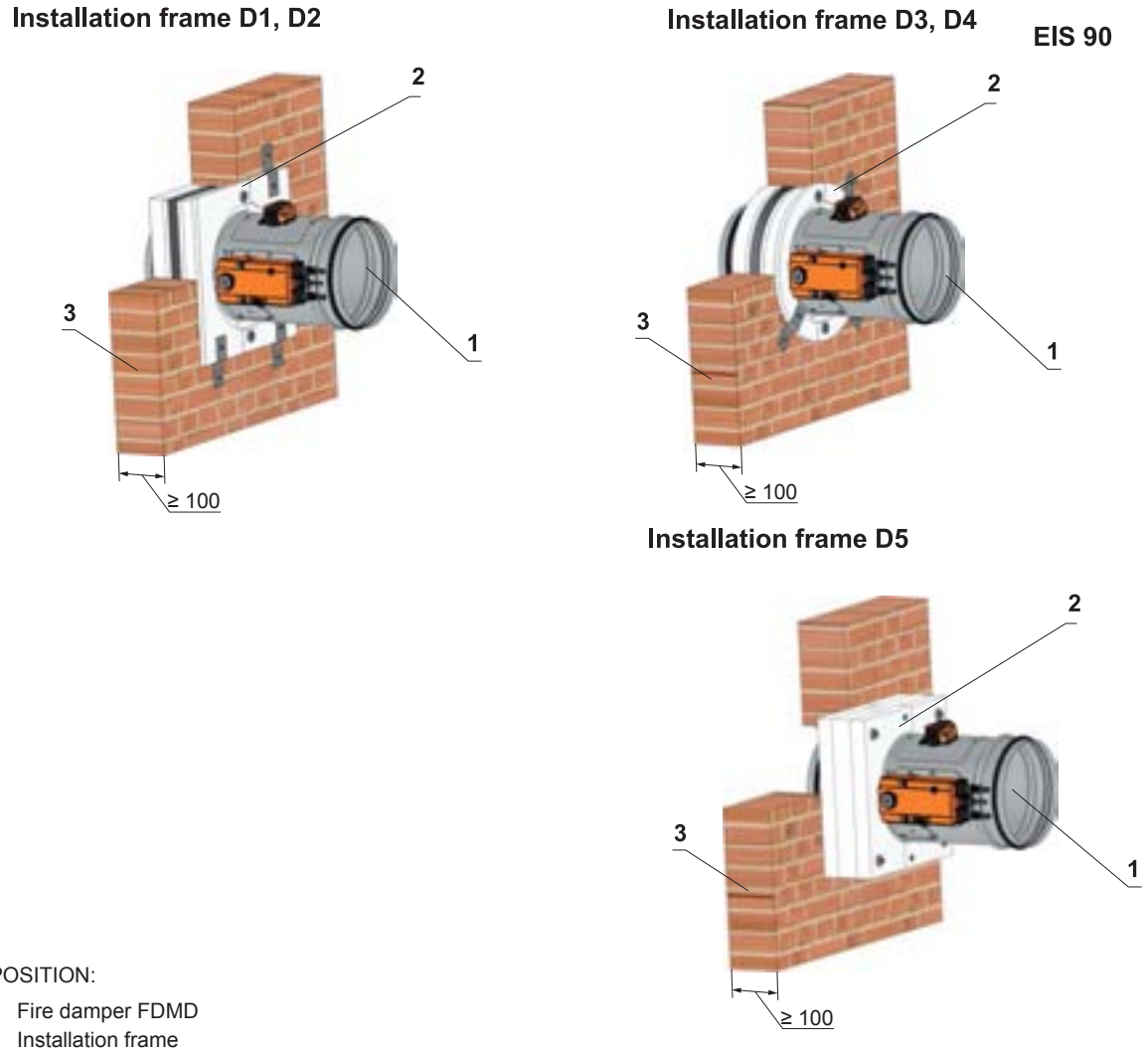
2 Solid wall construction

3 Mortar or gypsum

Notice:

- Fire damper FDMD - installation opening for each damper has minimal dimensions D+80 mm (D+160 mm for dampers with flanges)
- Gap between damper and construction is filled by mortar or gypsum
- Fire damper FDMD - distance between dampers 30 mm
- Flange to flange connection - Up to four dampers can be installed

Fig. 25 Solid wall construction - installation frames D1, D2, D3, D4, D5



POSITION:

1 Fire damper FDMD
2 Installation frame
3 Solid wall construction

Installation details see chapter 7

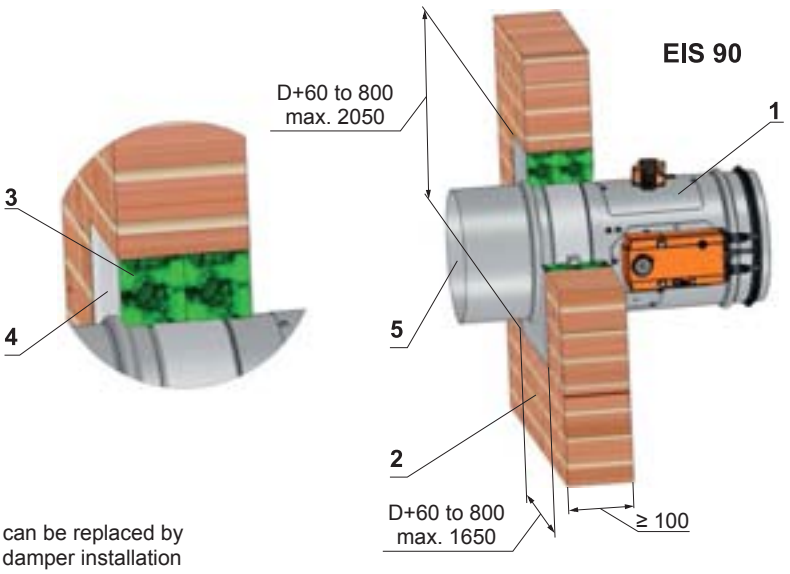
Fig. 26 Solid wall construction - Weichschott

POSITION:

1 Fire damper FDMD
2 Solid wall construction
3 Fire resistant board
4 Fire stop coating thickness 1 mm
5 Duct

Used materials - example*:

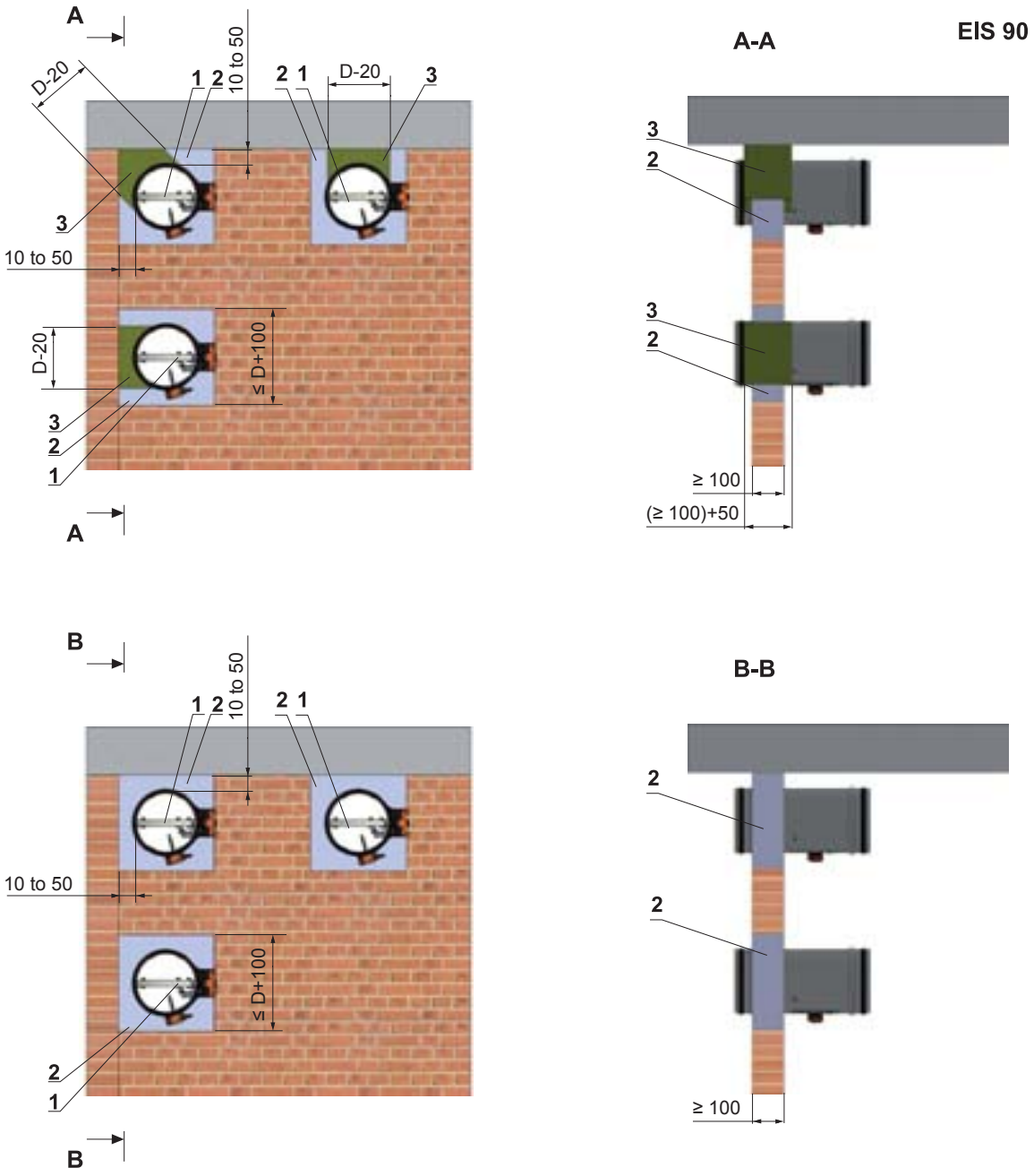
3 - Hilti CFS-CT B 1S 140/50
4 - Hilti CFS-CT



Notice:

* Fire resistant board and fire stop coating can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 27 Solid wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool



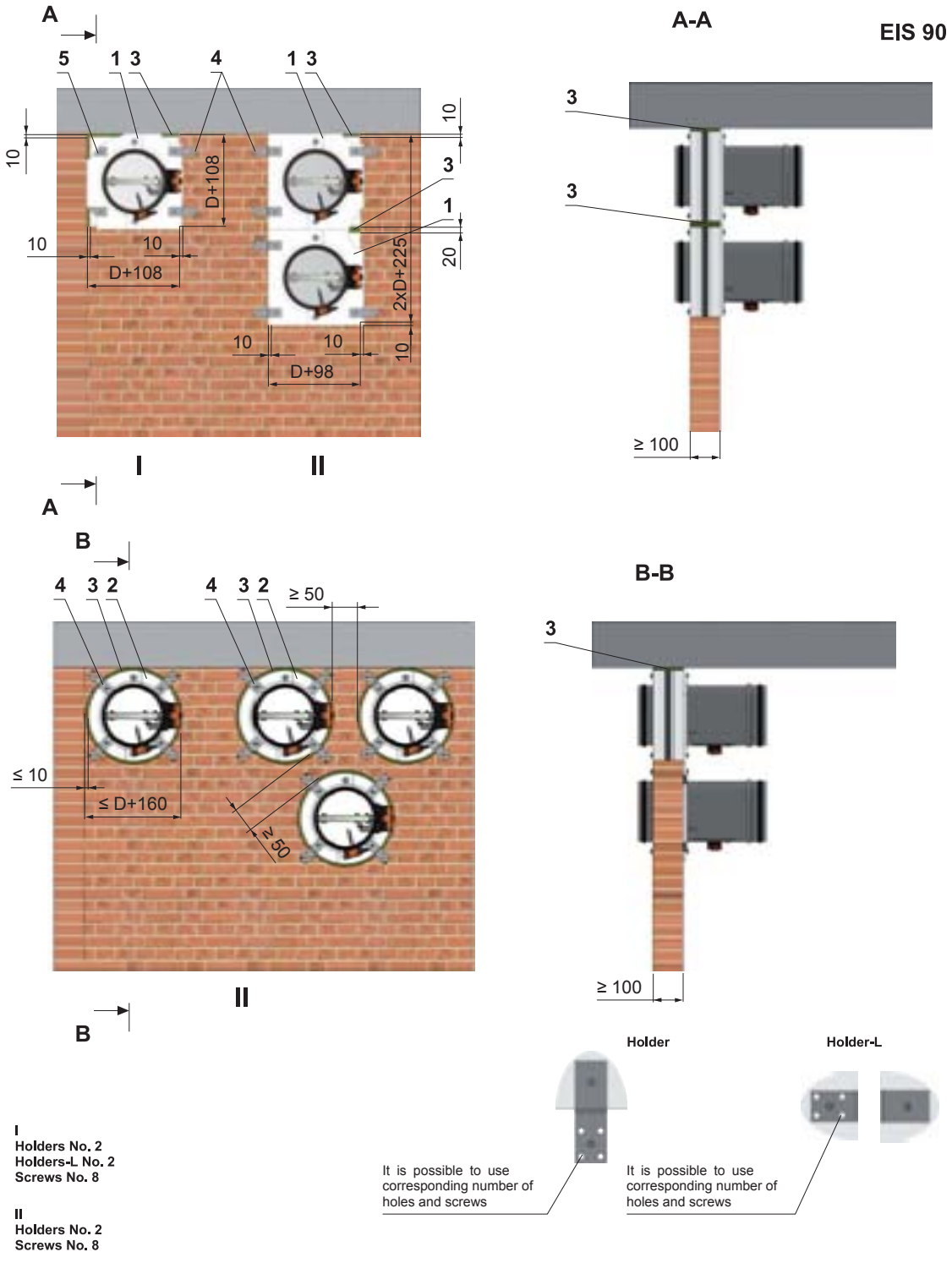
POSITION:

1 Fire damper FDMD
2 Mortar or gypsum
3 Mineral stone wool min. density 140 kg/m^3

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 + 50 mm
- Installation is valid for ceiling construction

Fig. 28 Solid wall construction - installation next to wall, ceiling - installation frame D1, D2, D3, D4 and mineral wool



I
Holders No. 2
Holders-L No. 2
Screws No. 8

II
Holders No. 2
Screws No. 8

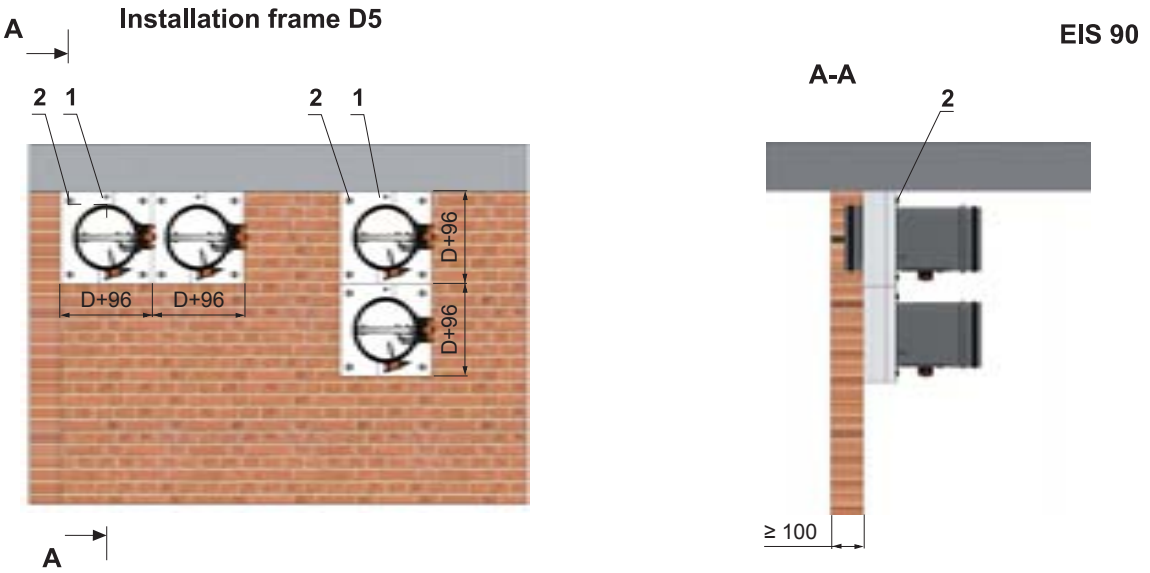
POSITION:

1 Fire damper FDMD with installation frame D1, D2
2 Fire damper FDMD with installation frame D3, D4
4 Mineralsteinwolle mit Volumengewicht von 140 kg/m^3
5 Holder
6 Holder-L

Notice:

- Gap between frame and damper body must be filled by glue (PROMAT K84).
- Wool is fixed to installation frame and construction by fire protection mastic.
- Installation is valid for ceiling construction

Fig. 29 Solid wall construction - installation next to wall, ceiling - installation frame D5



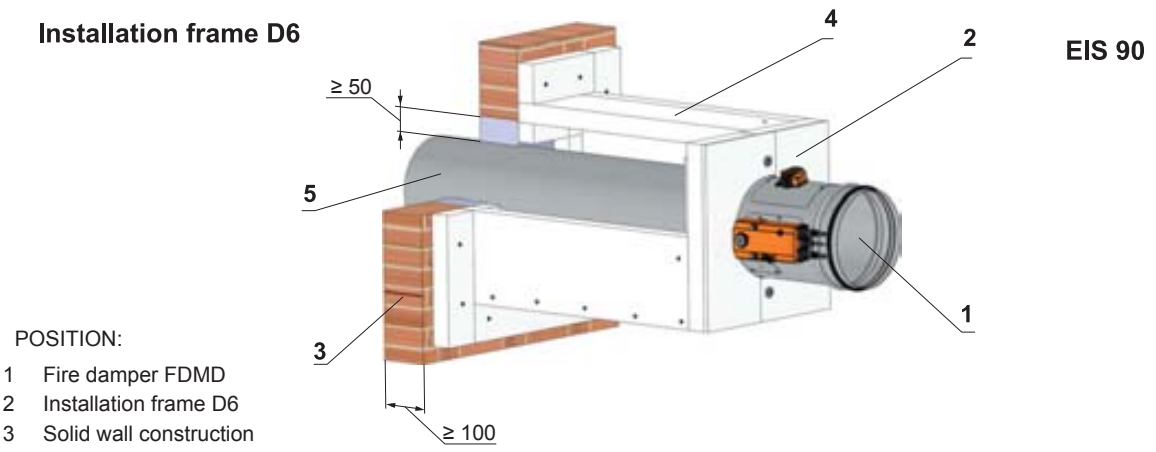
POSITION:

1 Fire damper FDMD with installation frame D5
2 Fitting with threaded rods or steel bracket

Notice:

- Installation is valid for ceiling construction

Fig. 30 Outside solid wall construction - installation frame D6 with cement lime plates



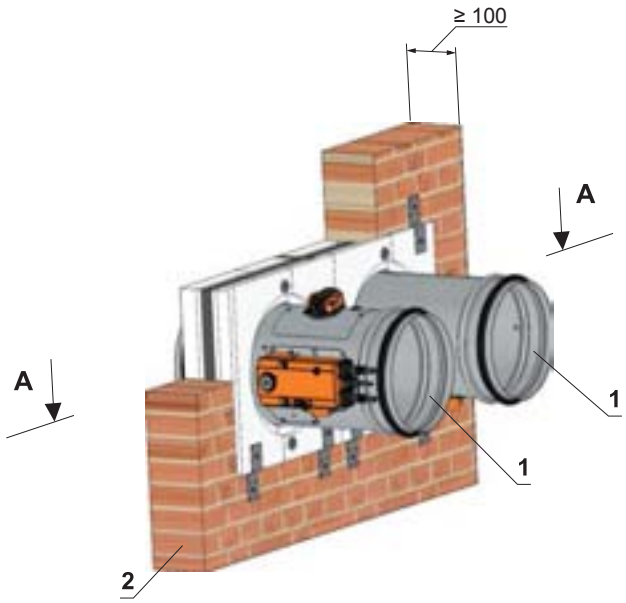
POSITION:

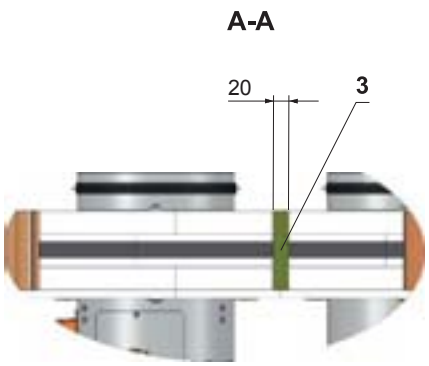
1 Fire damper FDMD
2 Installation frame D6
3 Solid wall construction
4 Cement lime plate
5 Duct

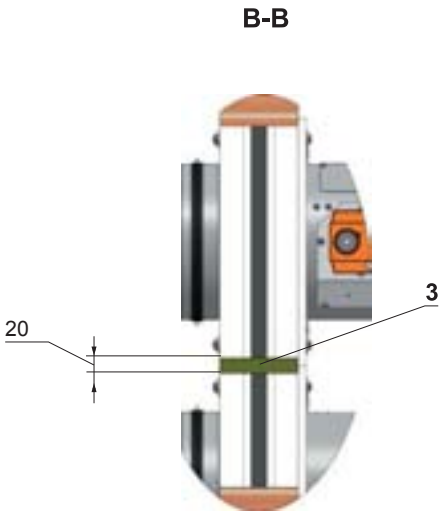
Installation details see chapter 7

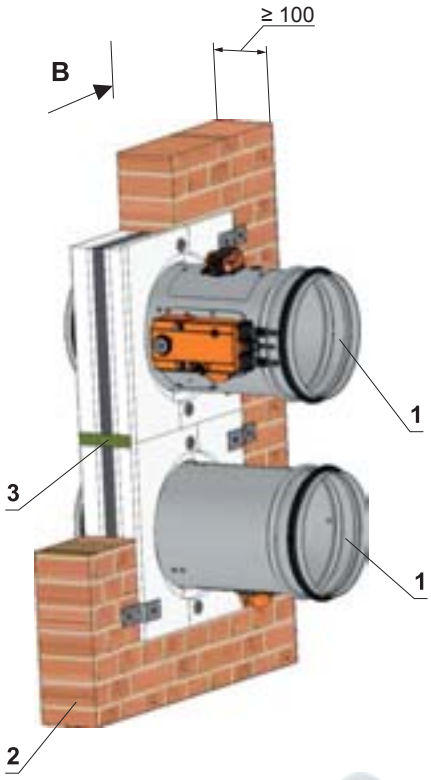
Fig. 31 Solid wall construction - flange an flange - installation frame D1

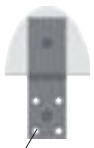
EIS 90











It is possible to use corresponding number of holes and screws

POSITION:

1 Fire damper FDMD with installation frame D1

2 Solid wall construction

3 Mineral stone wool min. density 140 kg/m³

Holders No. X = (2xZB1) + (2xZH1)
Screws No.Y = 2xX

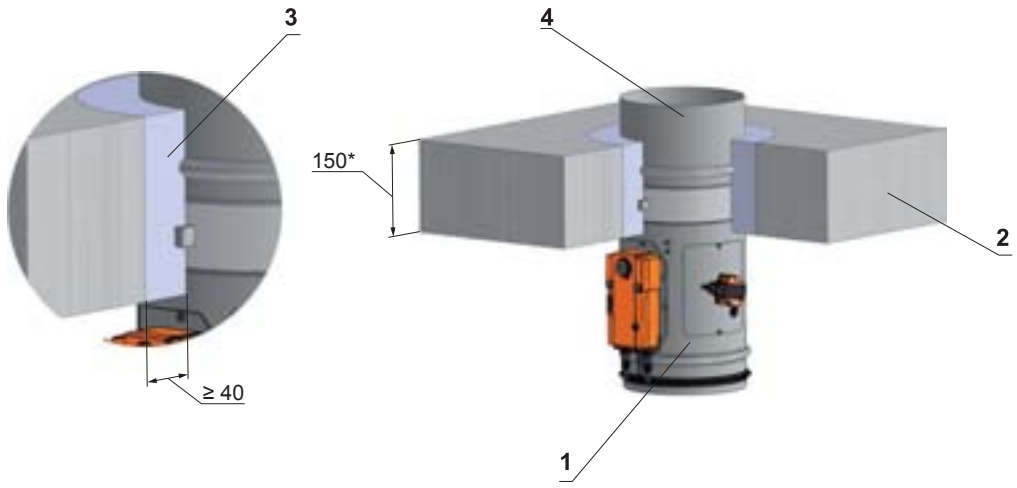
Dimension	Number ZB1	Number ZH1
D1 ≤ 400	1	1
400 < D1 ≤ 800	2	2

D1 = D or D1 = 2xD

Notice:

- Fire damper FDMD - nstallation opening dimensions
  = a x b = (D + 97⁺³mm) + 20 mm x (D + 97⁺³mm)
  or a x b = (D + 97⁺³mm) x (D + 97⁺³mm) + 20 mm
- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84)
- Fire damper FDMD - distance between dampers 116 mm
- Flange to flange connection - Up to four dampers can be installed

Fig. 32 Solid ceiling construction - mortar or gypsum

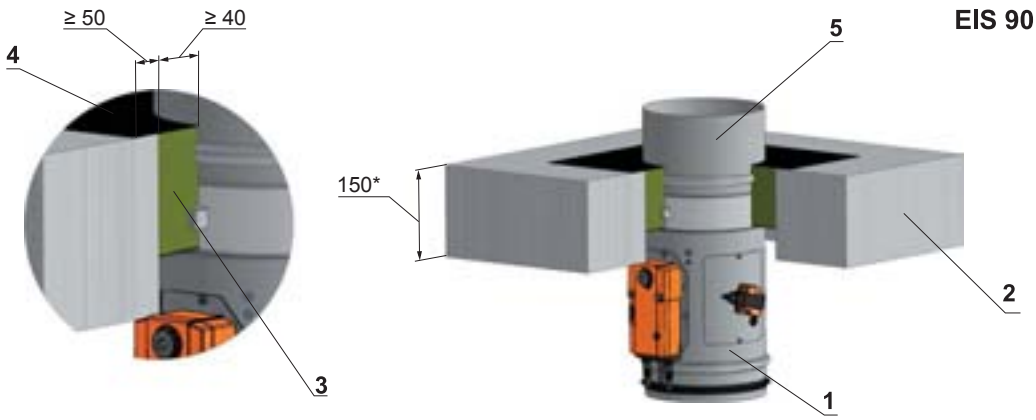


POSITION:

1 Fire damper FDMD
2 Solid ceiling construction
3 Mortar or gypsum
4 Duct

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

Fig. 33 Solid ceiling construction - stuffing box and fire protection mastic



POSITION:

1 Fire damper FDMD
2 Solid ceiling construction
3 Mineral stone wool min. density 140 kg/m^3
4 Fire protection mastic min. thickness 1 mm
5 Duct

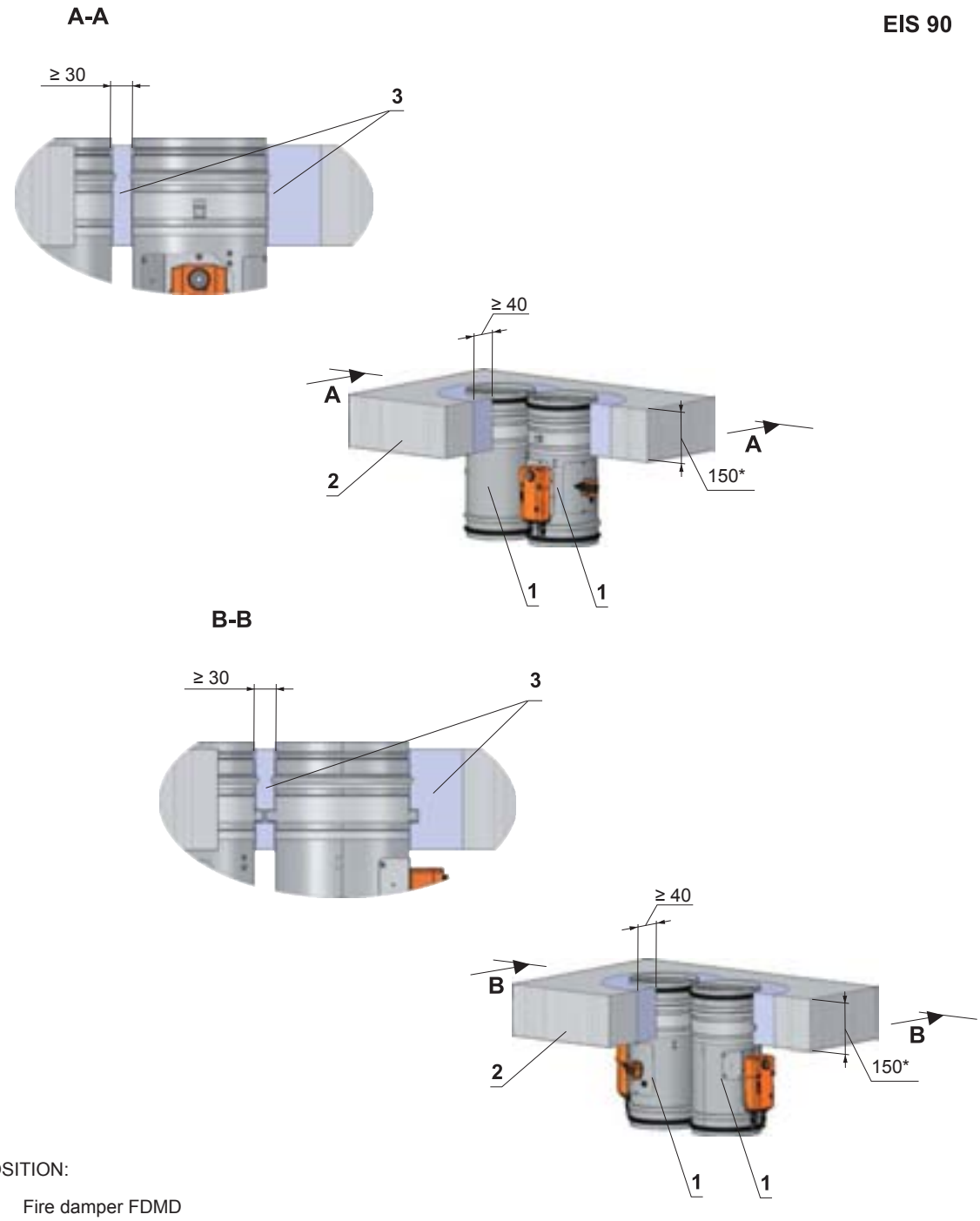
* min. 110 - Concrete/ min. 125 - Aerated concrete

Used materials - example**:

2 - Promapyr, Rockwool Steprock HD
3 - Promastop - P, K

** Stuffing box and fire protection mastic can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 34 Solid ceiling construction - flange an flange - mortar or gypsum



POSITION:

1 Fire damper FDMD

2 Solid ceiling construction

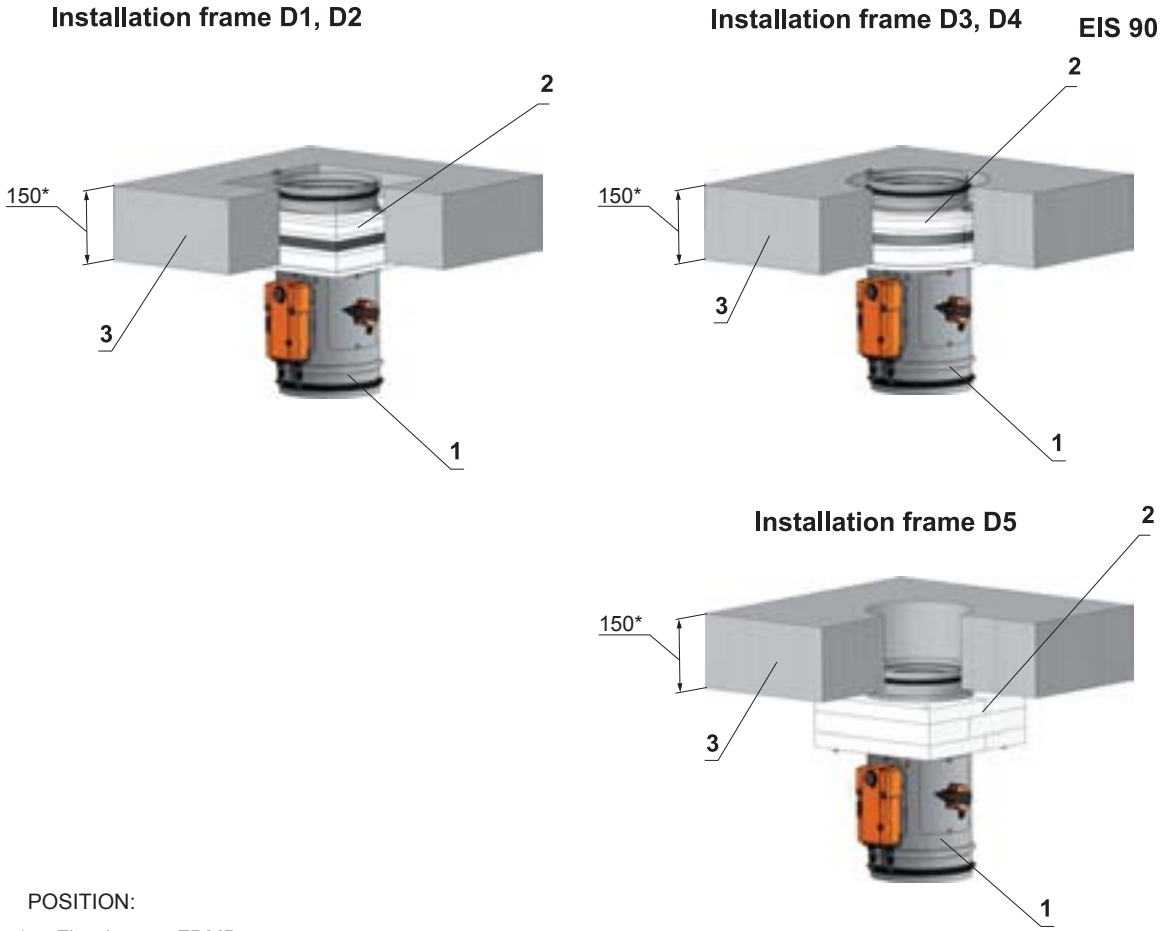
3 Mortar or gypsum

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

Notice:

- Fire damper FDMD - installation opening for each damper has minimal dimensions D+80 mm (D+160 mm for dampers with flanges)
- Gap between damper and construction is filled by mortar or gypsum
- Fire damper FDMD - distance between dampers 30 mm
- Flange to flange connection - Up to four dampers can be installed

Fig. 35 Solid ceiling construction - installation frames D1, D2, D3, D4, D5



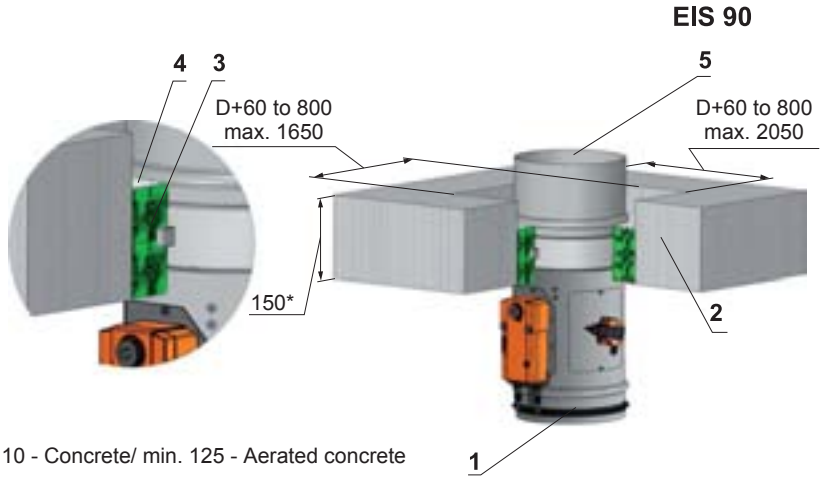
POSITION:

1 Fire damper FDMD
2 Installation frame
3 Solid ceiling construction

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

Installation details see chapter 7

Fig. 36 Solid ceiling construction - Weichschott



POSITION:

1 Fire damper FDMD
2 Solid ceiling construction
3 Fire resistant board
4 Fire stop coating thickness 1 mm
5 Duct

Used materials - example**:

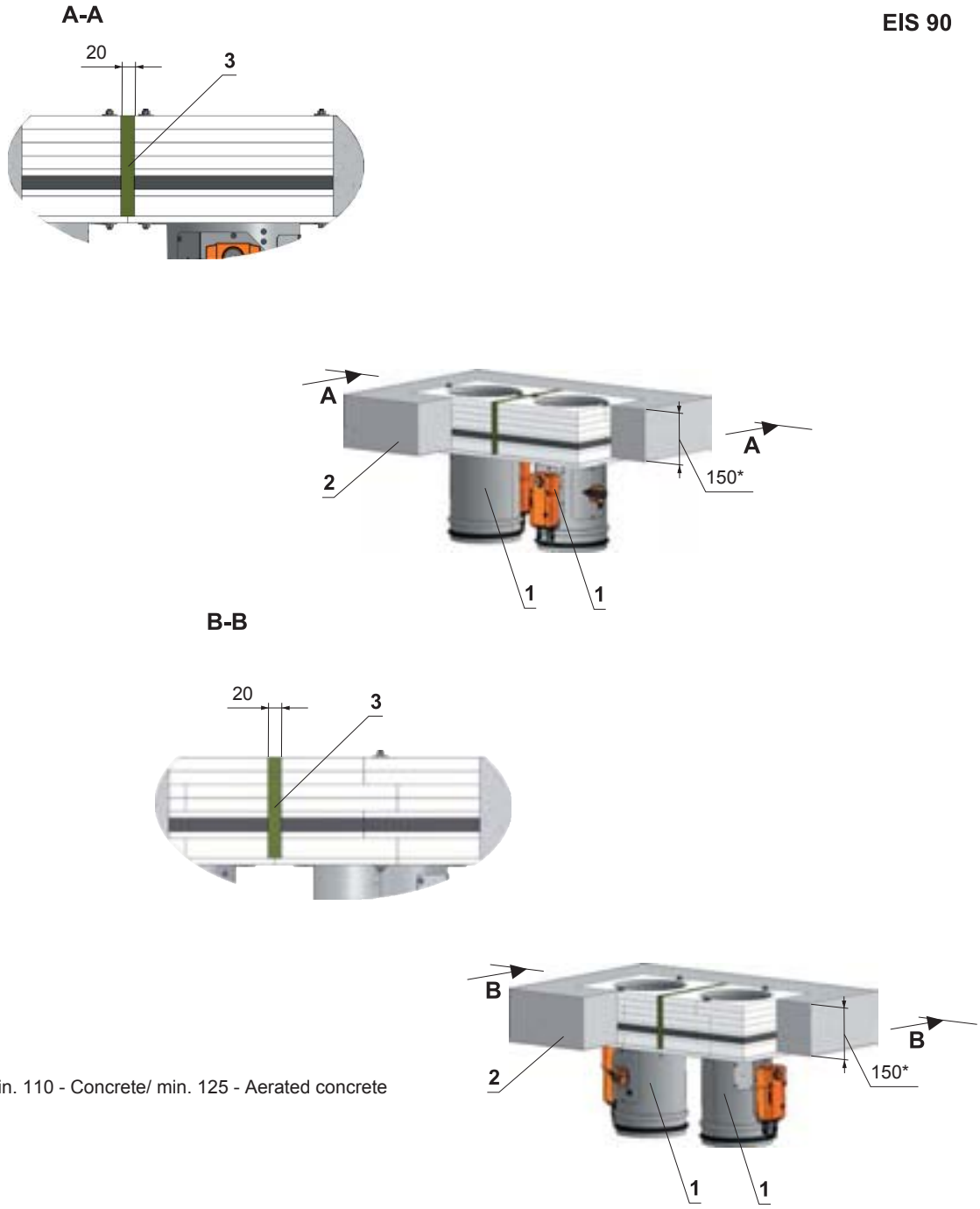
2 - Hilti CFS-CT B 1S 140/50
3 - Hilti CFS-CT

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

Poznámka

** Fire resistant board and fire stop coating can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 37 Solid ceiling construction - flange an - installation frame D2



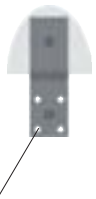
* min. 110 - Concrete/ min. 125 - Aerated concrete

POSITION:

1 Fire damper FDMD with installation frame D2

2 Solid wall construction

3 Mineral stone wool min. density 140 kg/m³



It is possible to use corresponding number of holes and screws

Holders No. X = (2xZB1) + (2xZH1)
Screws No.Y = 2xX

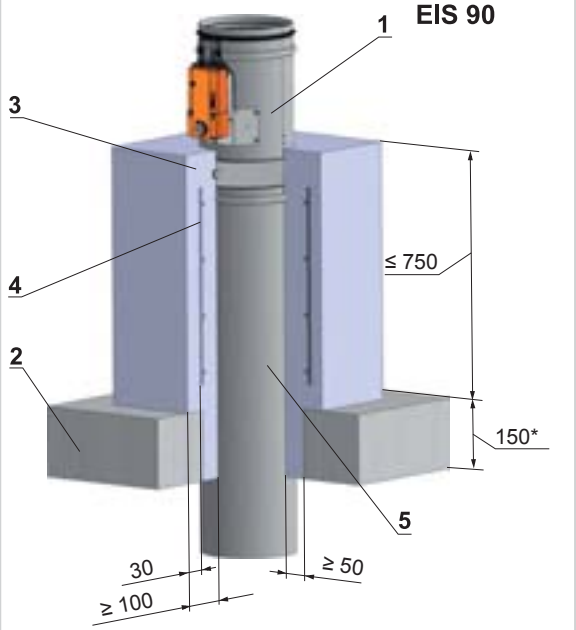
Dimension	Number ZB1	Number ZH1
D1 ≤ 400	1	1
400 < D1 ≤ 800	2	2

D1 = D or D1 = 2xD

Notice:

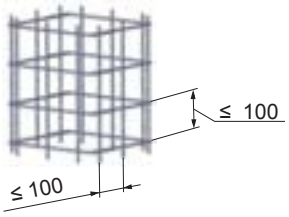
- Fire damper FDMD - installation opening dimensions
  = a x b = (D + 97⁺³mm) + 20 mm x (D + 97⁺³mm)
  or a x b = (D + 97⁺³mm) x (D + 97⁺³mm) + 20 mm
- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84)
- Fire damper FDMD - distance between dampers 116 mm
- Flange to flange connection - Up to four dampers can be installed

Fig. 38 **Outside solid ceiling construction - concrete**



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

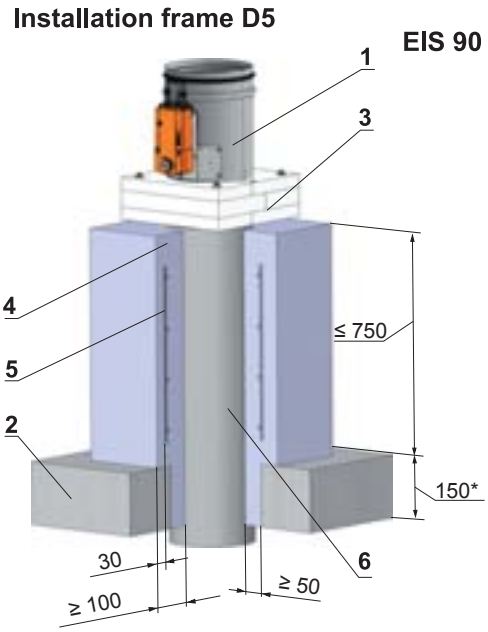
Rebar - Steel wire Ø 6 mm



POSITION:

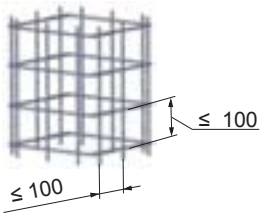
1 Fire damper FDMD
2 Solid ceiling construction
3 Beton B20
4 Rebar
5 Duct

Fig. 39 **Outside solid ceiling construction - concrete and installation frame D5**



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

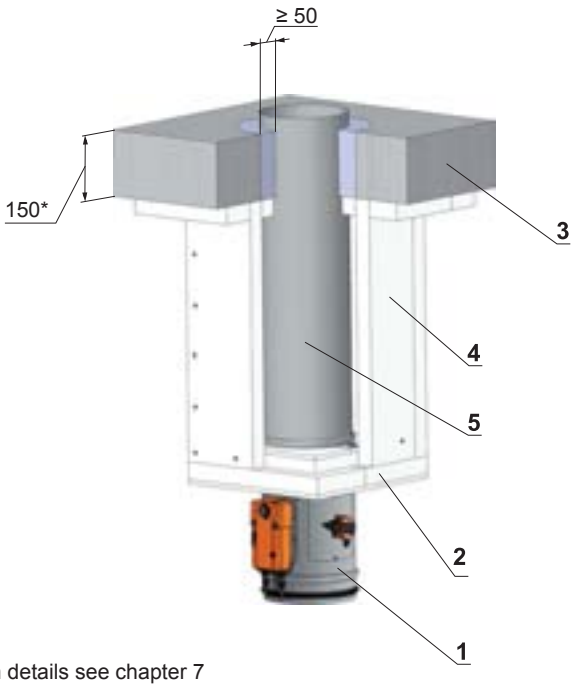
Rebar - Steel wire Ø 6 mm



POSITION:

1 Fire damper FDMD
2 Solid ceiling construction
3 Installation frame
4 Beton B20
5 Rebar
6 Duct

Fig. 40 **Outside solid ceiling construction - installation frame with cement lime plates**



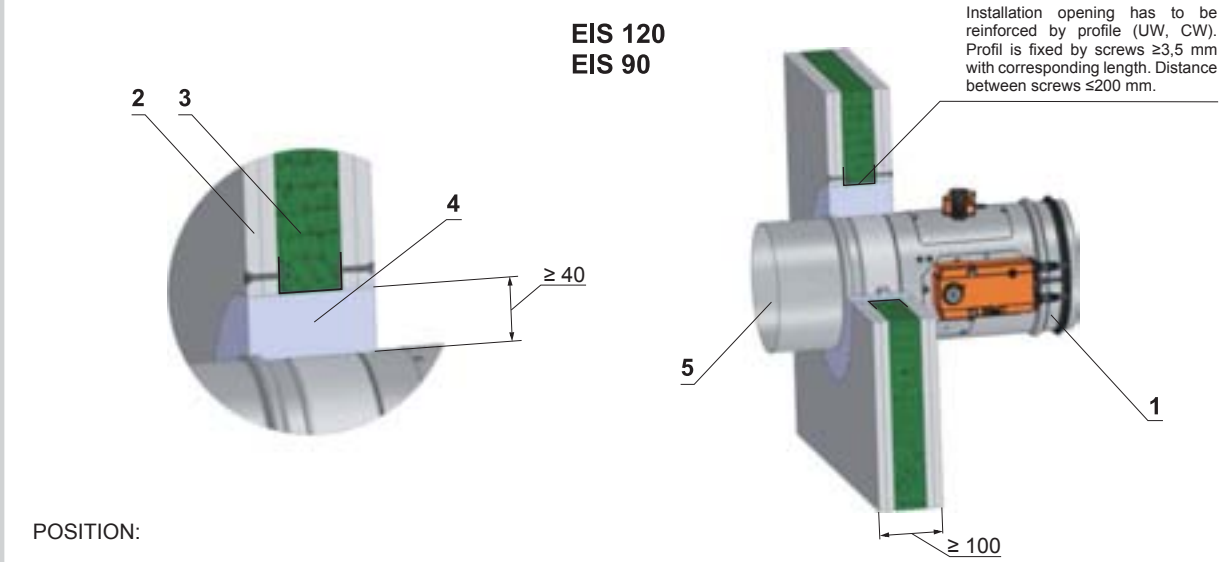
* min. 110 - Concrete/ min. 125 - Aerated concrete

POSITION:

1 Fire damper FDMD
2 Installation frame
3 Solid ceiling construction
4 Cement lime plate
5 Duct

Installation details see chapter 7

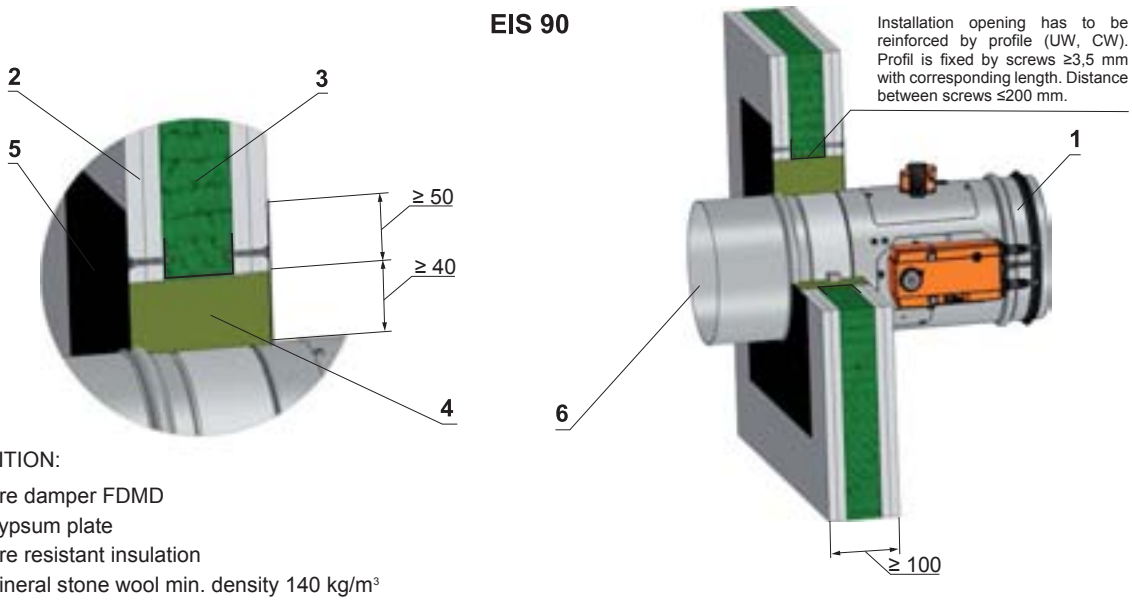
Fig. 41 Gypsum wall construction - mortar or gypsum



POSITION:

1 Fire damper FDMD
2 Gypsum plate
3 Fire resistant insulation
4 Mortar or gypsum
5 Duct

Fig. 42 Gypsum wall construction - stuffing box and fire protection mastic



POSITION:

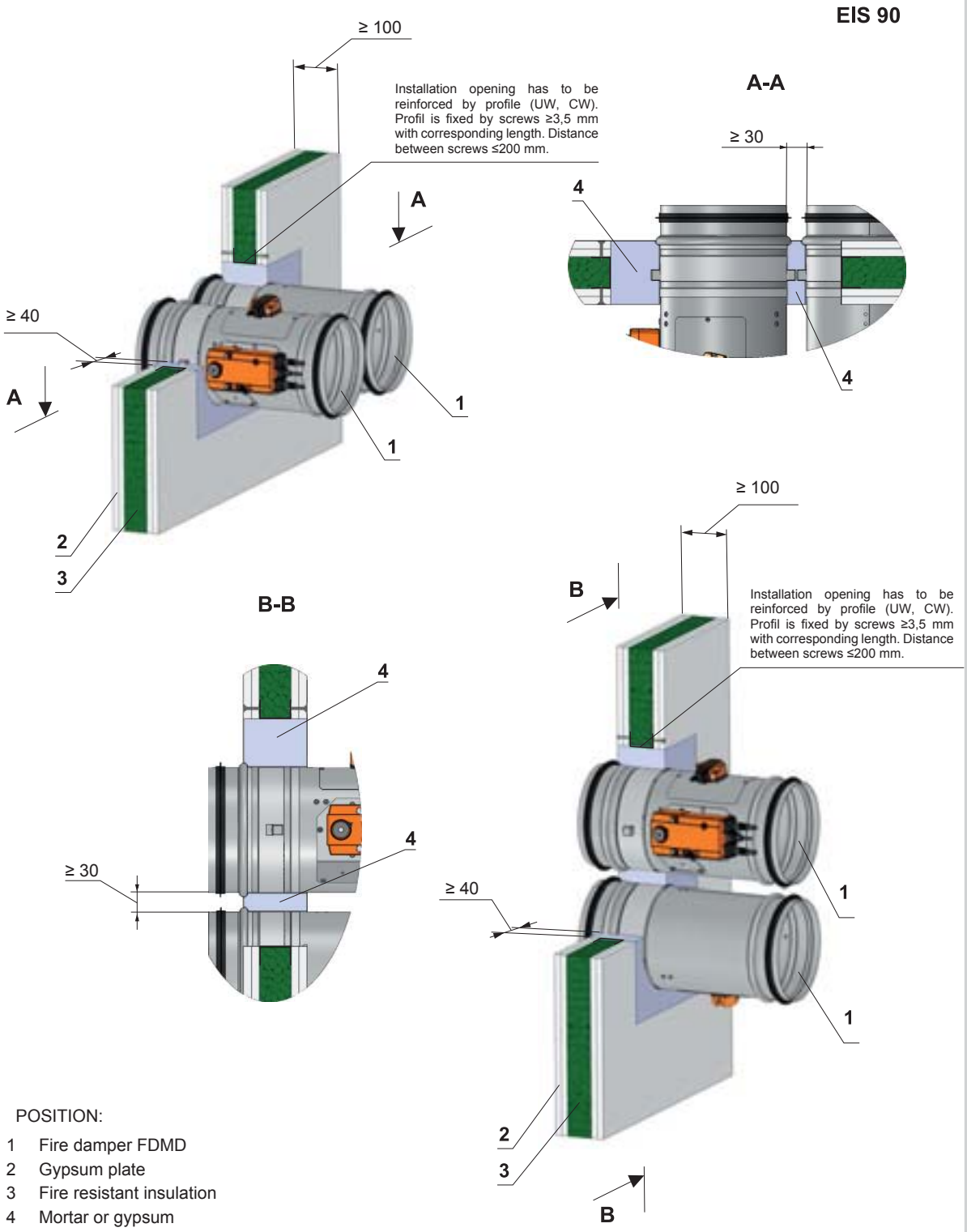
1 Fire damper FDMD
2 Gypsum plate
3 Fire resistant insulation
4 Mineral stone wool min. density 140 kg/m^3
5 Fire protection mastic min. thickness 1 mm 1 mm
6 Duct

Used materials - example*:

4 - Promapyr, Rockwool Steprock HD
5 - Promastop - P, K

* Stuffing box and fire protection mastic can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 43 Gypsum wall construction - flange an flanger - mortar or gypsum



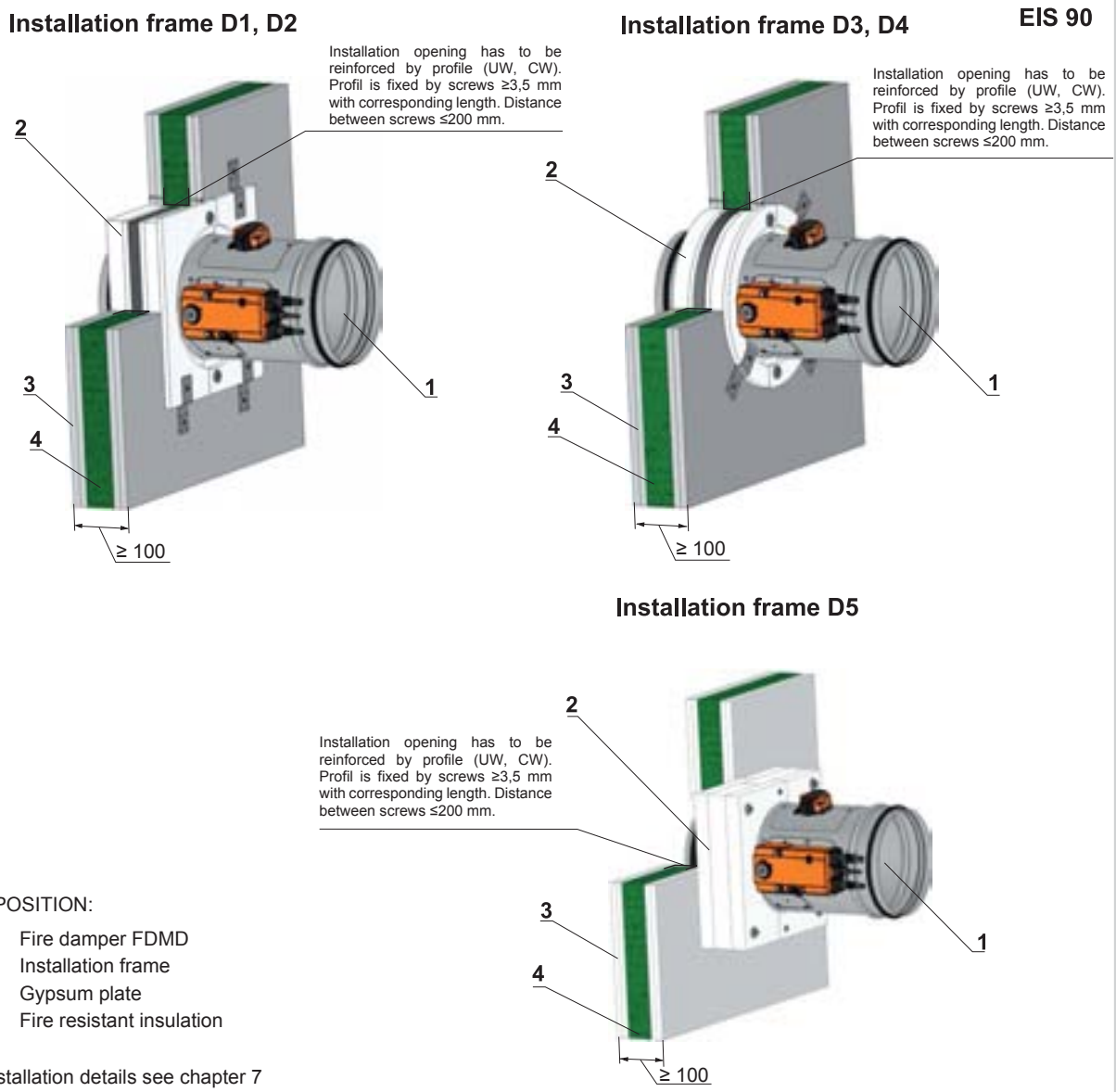
POSITION:

1 Fire damper FDMD
2 Gypsum plate
3 Fire resistant insulation
4 Mortar or gypsum

Notice:

- Fire damper FDMD - installation opening for each damper has minimal dimensions (D+80) x (D+55) mm (or (D+160) x (D+95) mm for dampers with flanges)
- Gap between damper and construction is filled by mortar or gypsum
- Fire damper FDMD - distance between dampers 30 mm
- Flange to flange connection - Up to four dampers can be installed

Fig. 44 Gypsum wall construction - installation frame D1, D2, D3, D4, D5



POSITION:

1 Fire damper FDMD
2 Installation frame
3 Gypsum plate
4 Fire resistant insulation

Installation details see chapter 7

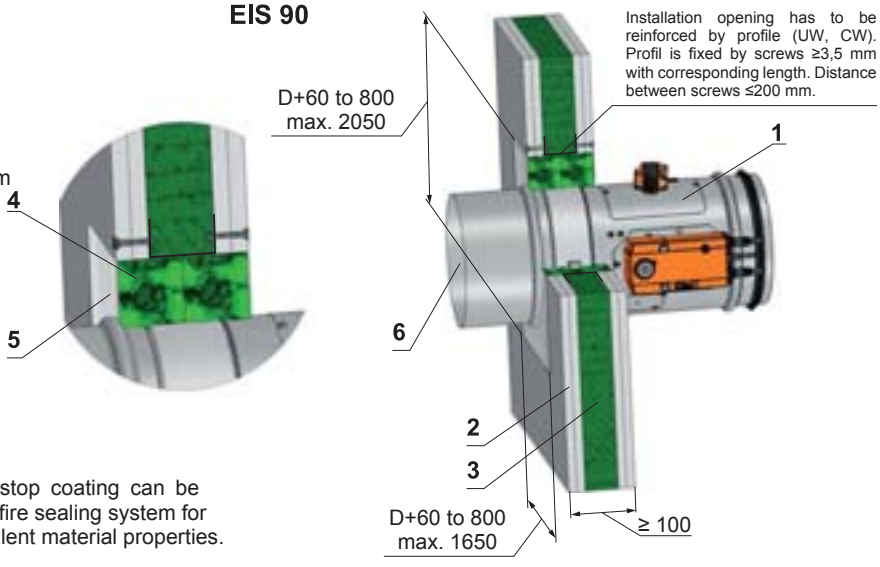
Fig. 45 Gypsum wall construction - Weichschott

POSITION:

1 Fire damper FDMD
2 Gypsum plate
3 Fire resistant insulation
4 Fire resistant board
5 Fire stop coating thickness 1 mm
6 Duct

Used materials - example*:

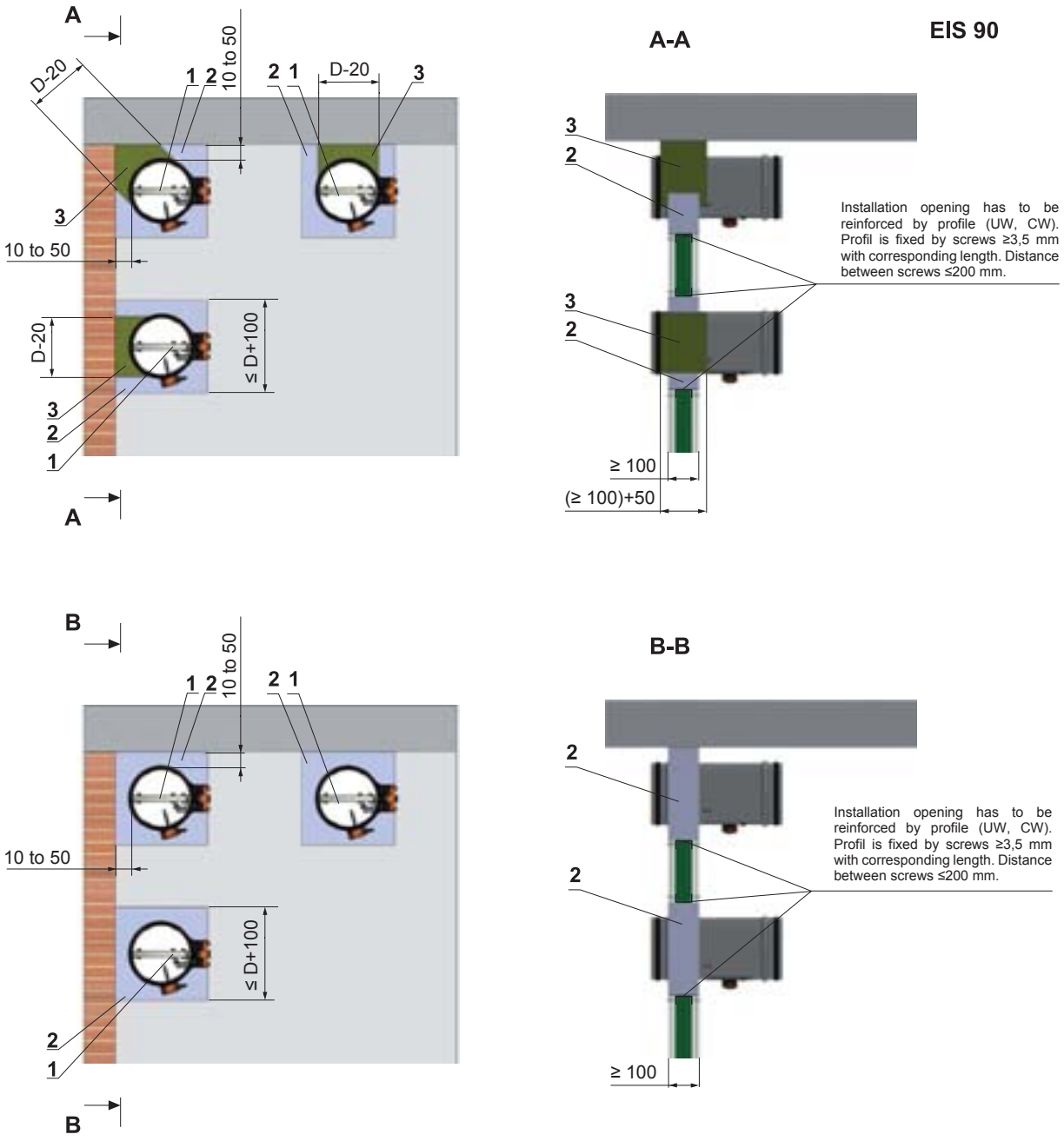
4 - Hilti CFS-CT B 1S 140/50
5 - Hilti CFS-CT



Notice:

* Fire resistant board and fire stop coating can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

Fig. 46 Gypsum wall construction - installation next to wall, ceiling - mortar or gypsum and mineral wool



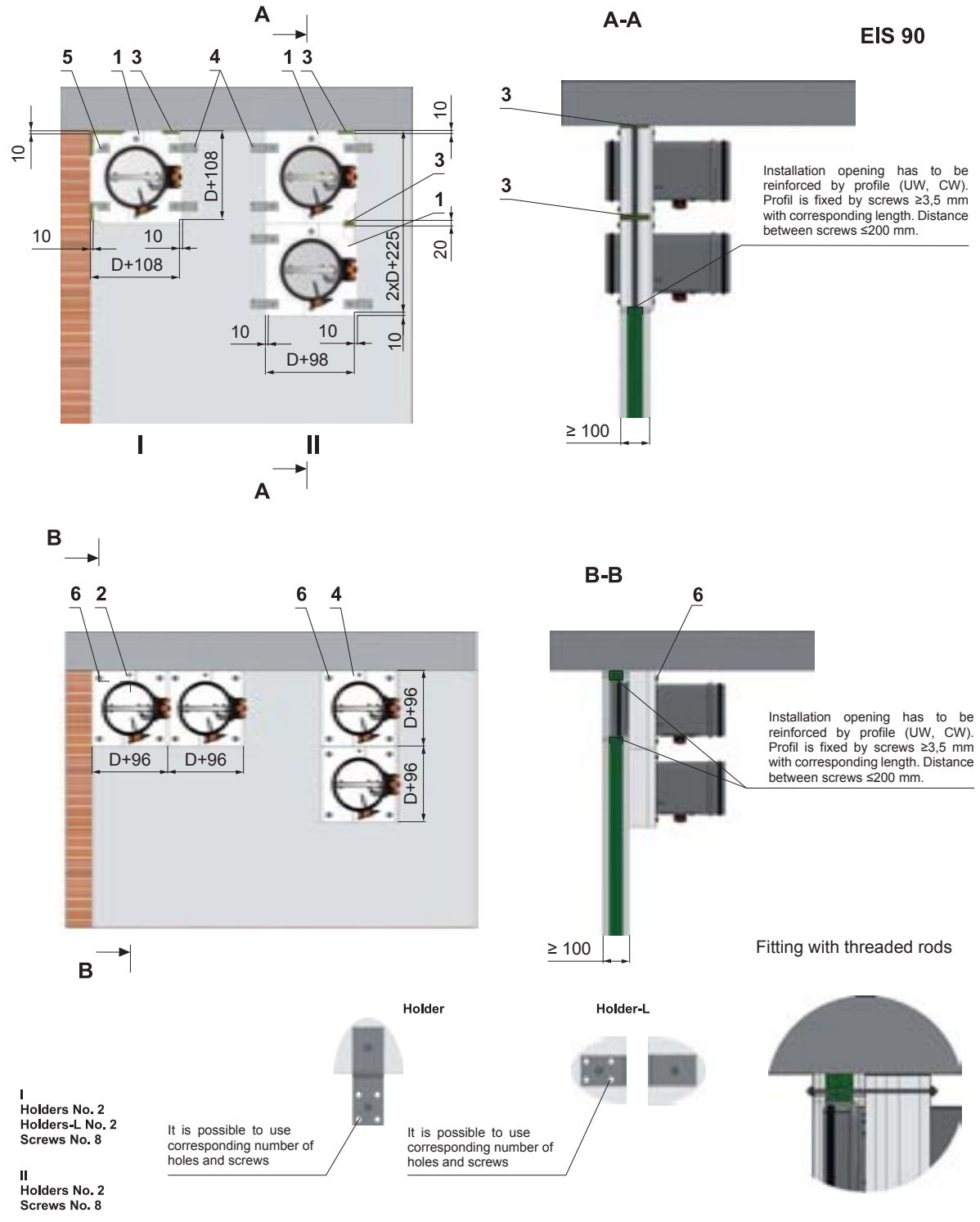
POSITION:

1 Fire damper FDMD
2 Mortar or gypsum
3 Mineral stone wool min. density 140 kg/m^3

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 + 50 mm
- Installation is valid for ceiling construction

Fig. 47 Gypsum wall construction - installation next to wall, ceiling - installation frame and mineral wool



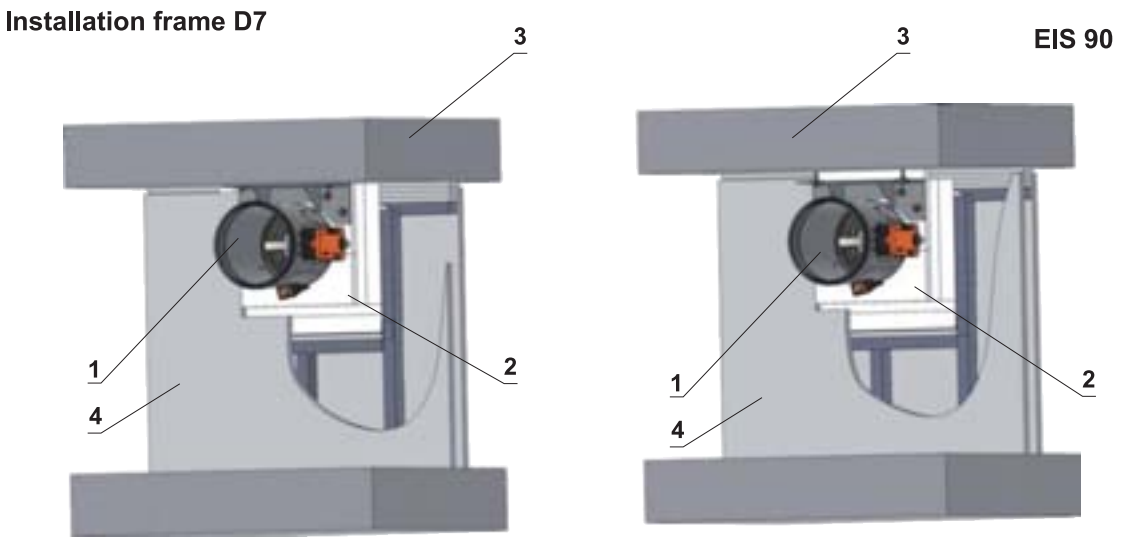
POSITION:

1 Fire damper FDMD with installation frame D1, D2
2 Fire damper FDMD with installation frame D5
3 Mineral stone wool min. density 140 kg/m³
4 Holder
5 Holder-L
6 Fitting with threaded rods

Notice:

- Gap between frame and damper body must be filled by glue (PROMAT K84).

Fig. 48 Gypsum wall construction - flexible ceiling (with possibility to move/to sag) - installation frame D7

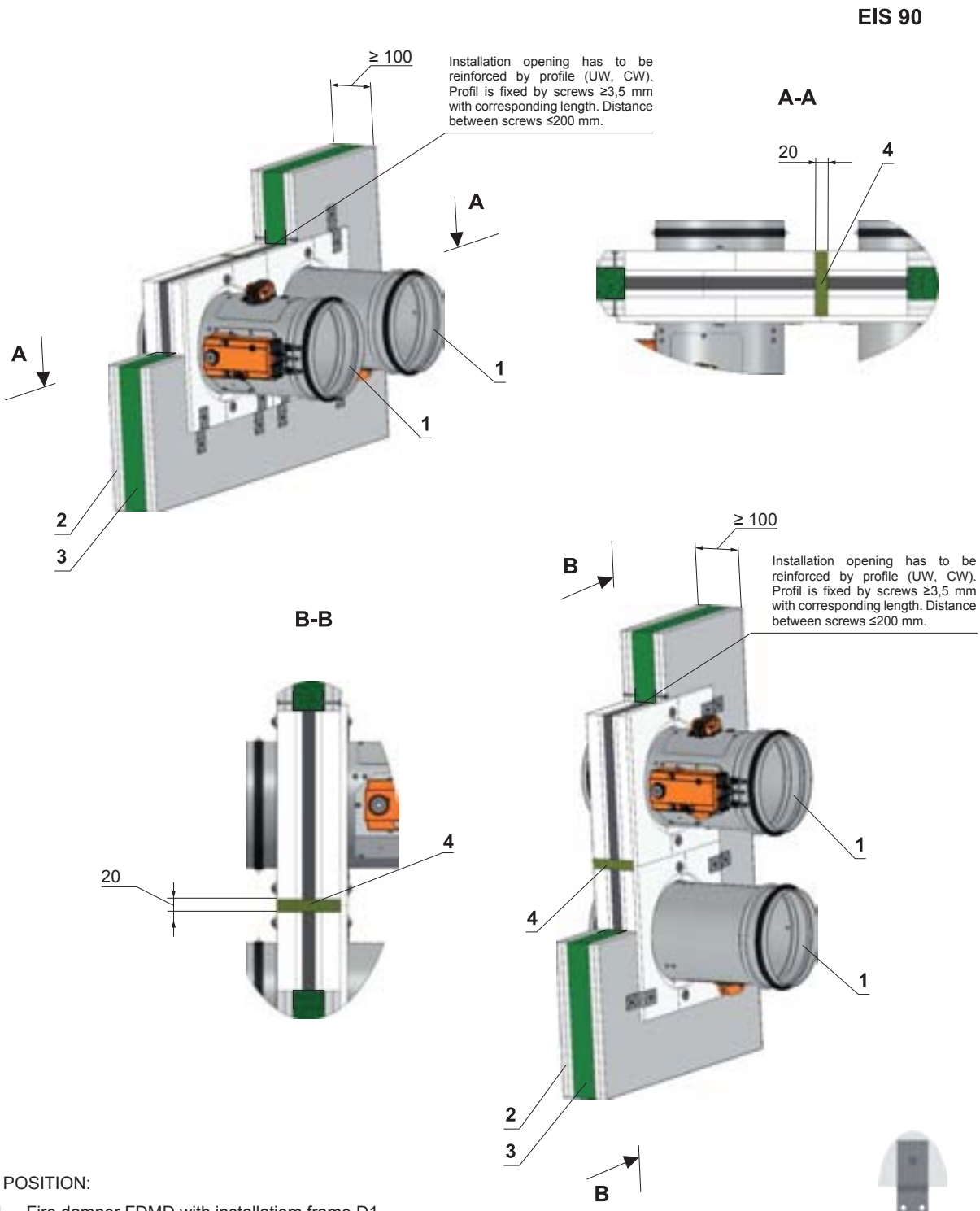


POSITION:

1 Fire damper FDMD
2 Installation frame
3 Solid ceiling construction
4 Wall with possibility of ceiling movement

Installation details see chapter 7

Fig. 49 Gypsum wall construction - battery - Installation frame D1



POSITION:

1 Fire damper FDMD with installatiom frame D1
2 Gypsum plate
3 Fire resistant insulation
4 Mineral stone wool min. density 140 kg/m^3

Holders No. X = (2xZB1) + (2xZH1)
Screws No.Y = 2xX

Dimension	Number ZB1	Number ZH1
D1 ≤ 400	1	1
400 < D1 ≤ 800	2	2

D1 = D or D1 = 2xD

Notice:

- Fire damper FDMD - installation opening dimensions
  = a x b = (D + 97^{+3}mm) + 20 mm x (D + 97^{+3}mm)
  or a x b = (D + 97^{+3}mm) x (D + 97^{+3}mm) + 20 mm
- Gap between frame and damper body and frame and construction must be filled by glue (PROMAT K84)
- Fire damper FDMD - distance between dampers 116 mm
- Flange to flange connection - Up to four dampers can be installed

7. Installation frames

Tab. 7.1.1.

Installation frame											
Type	Material	Installation type									
		Solid wall constr.	Th. [mm]	Solid ceiling const.	Th. [mm]	Gypsum wall constr.	Th. [mm]	Outside solid wall con./solid ceiling con.	Th. [mm]	On solid wall constr./Solid ceiling constr.	Th. [mm]
D1	Cement lime	√	≥100	√	≥150	√	≥100	-	-	-	-
D2	Cement lime	√	≥150	√	≥150	√	≥100	-	-	-	-
D3	Cement lime	√	≥100	√	≥150	√	≥100	-	-	-	-
D4	Cement lime	√	≥150	√	≥150	√	≥100	-	-	-	-
D5	Cement lime	-	-	-	-	-	-	Solid ceiling construction *)	≥150	√	≥100
D6	Cement lime	-	-	-	-	-	-	√	≥100/ ≥150	-	-
D7	Cement lime	-	-	-	-	√ **)	≥100	-	-	-	-

* With concrete
** Ceiling with movement possibility

Fig. 50

Installation frame D1



Installation frame D2



Installation frame D3

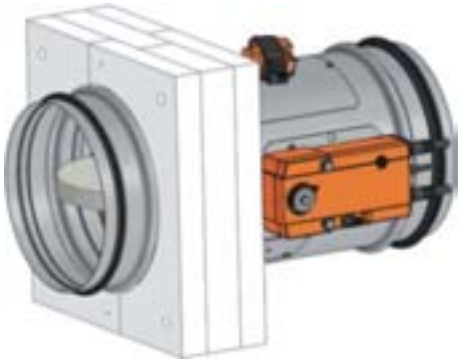


Installation frame D4



Fig. 51

Installation frame D5



Installation frame D6



Installation frame D7



Installation frame can be delivered mounted on the damper body or separately.

Installation frame D1, D2

Installation frames D1, D2 are suitable for:
- Solid wall construction
- Gypsum wall construction
- Solid ceiling construction

On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

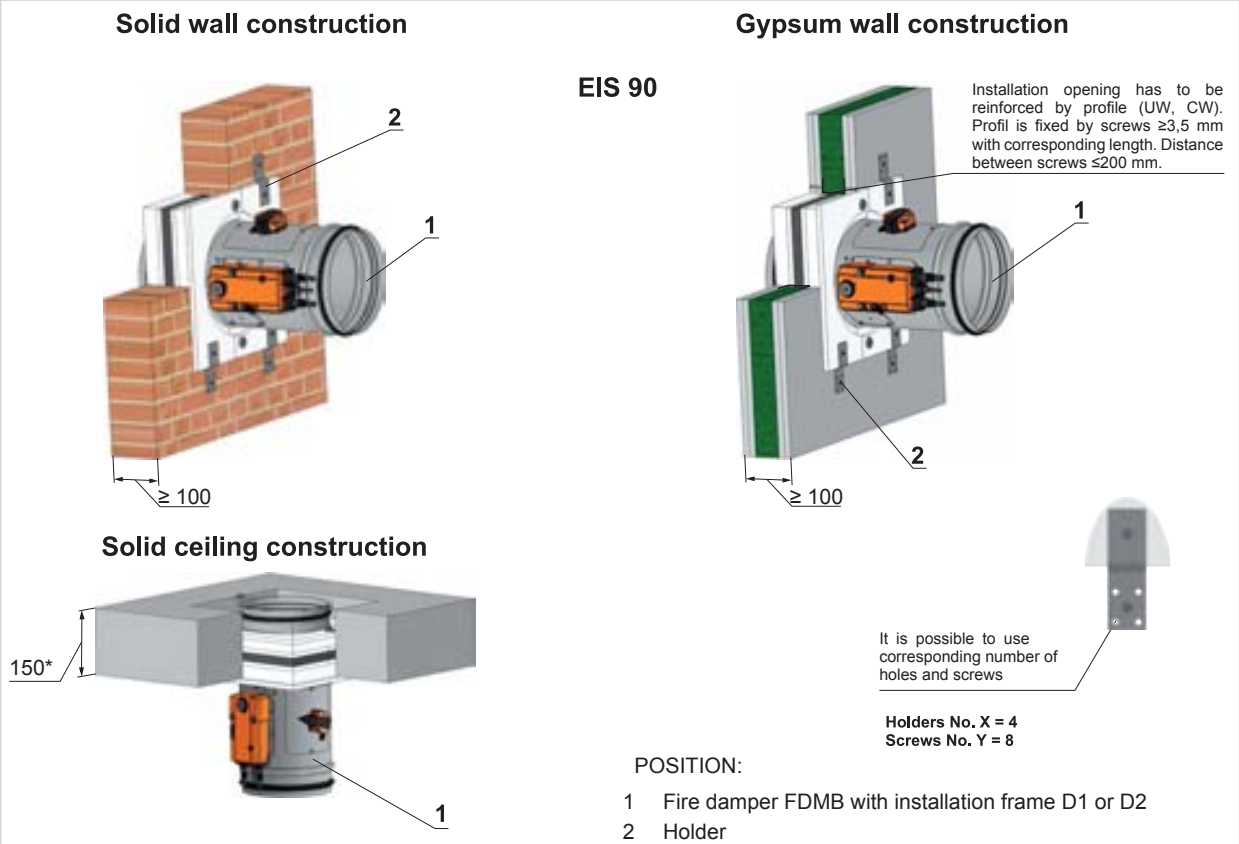
Installation frame D1 - solid wall/gypsum wall th. 100mm or solid ceiling th. 150 mm
Installation frame D2 - solid wall/gypsum wall th. 150mm or solid ceiling th. 150 mm

Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:
- a x b = (D + 97 $^{+3}$ mm) x (D + 97 $^{+3}$ mm)

Fig. 52 Installation frame D1, D2



Notice: Gap between frame end damper body and frame and solid (gypsum) wall construction must be filled by glue (PROMAT K84).
Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame D3, D4

Installation frames D3, D4 are suitable for:
- Solid wall construction
- Gypsum wall construction
- Solid ceiling construction

On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

Installation frame D3 - solid wall/gypsum wall th. 100mm or solid ceiling th. 150 mm
Installation frame D4 - solid wall/gypsum wall th. 150mm or solid ceiling th. 150 mm

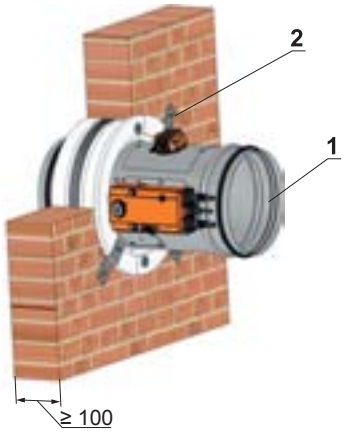
Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:
- d = (D + 81 $^{+3}$ mm)

Fig. 53 Installation frame D3, D4

Solid wall construction



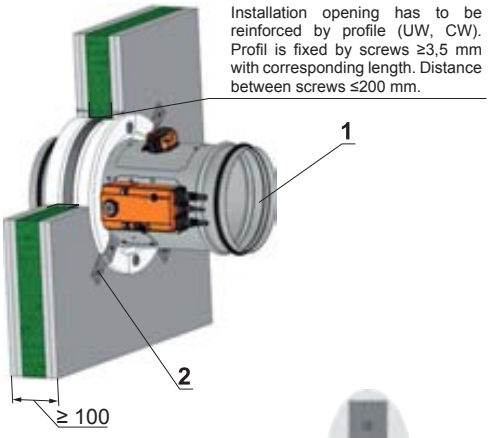
Solid ceiling construction

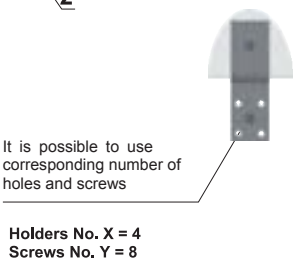


* min. 110 - Concrete/ min. 125 - Aerated concrete

EIS 90

Gypsum wall construction





POSITION:
1 Fire damper FDMB with installation frame D3 or D4
2 Holder

Notice: Gap between frame end damper body and frame and solid (gypsum) wall construction must be filled by glue (PROMAT K84).
Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame D5

Installation frame D5 is suitable for:
- Installation on solid wall construction / ceiling wall construction / gypsum wall construction
- Installation outside solid ceiling constructions with concrete

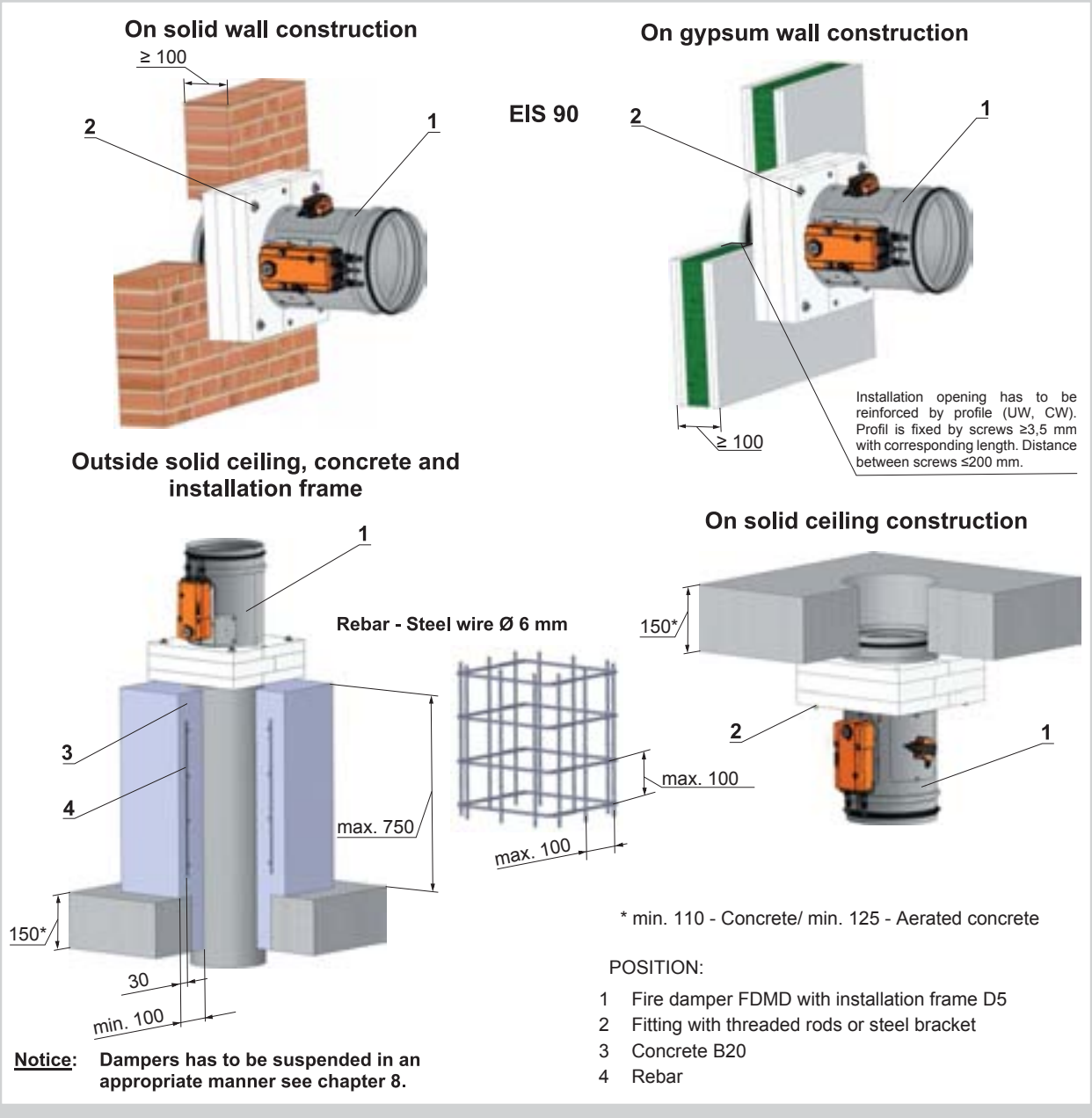
On the inside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between installation frame and damper body.

Installation:
- Gypsum wall construction has to be installed according manufacture requirements.

Material:
- Installation frame: cement lime plates and galvanized plate
- Fasteners: galvanized plate

Installation opening:
- d = (D + 10^{+3} mm)
- d = (D + 100^{+3} mm) installation with concrete

Fig. 54 Installation frame D5



Notice: Dampers has to be suspended in an appropriate manner see chapter 8.

Installation frame D6

Installation frame D6 is suitable for:

- Installation outside solid wall/ceiling construction with cement lime plates

On the inside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between installation frame and damper body.

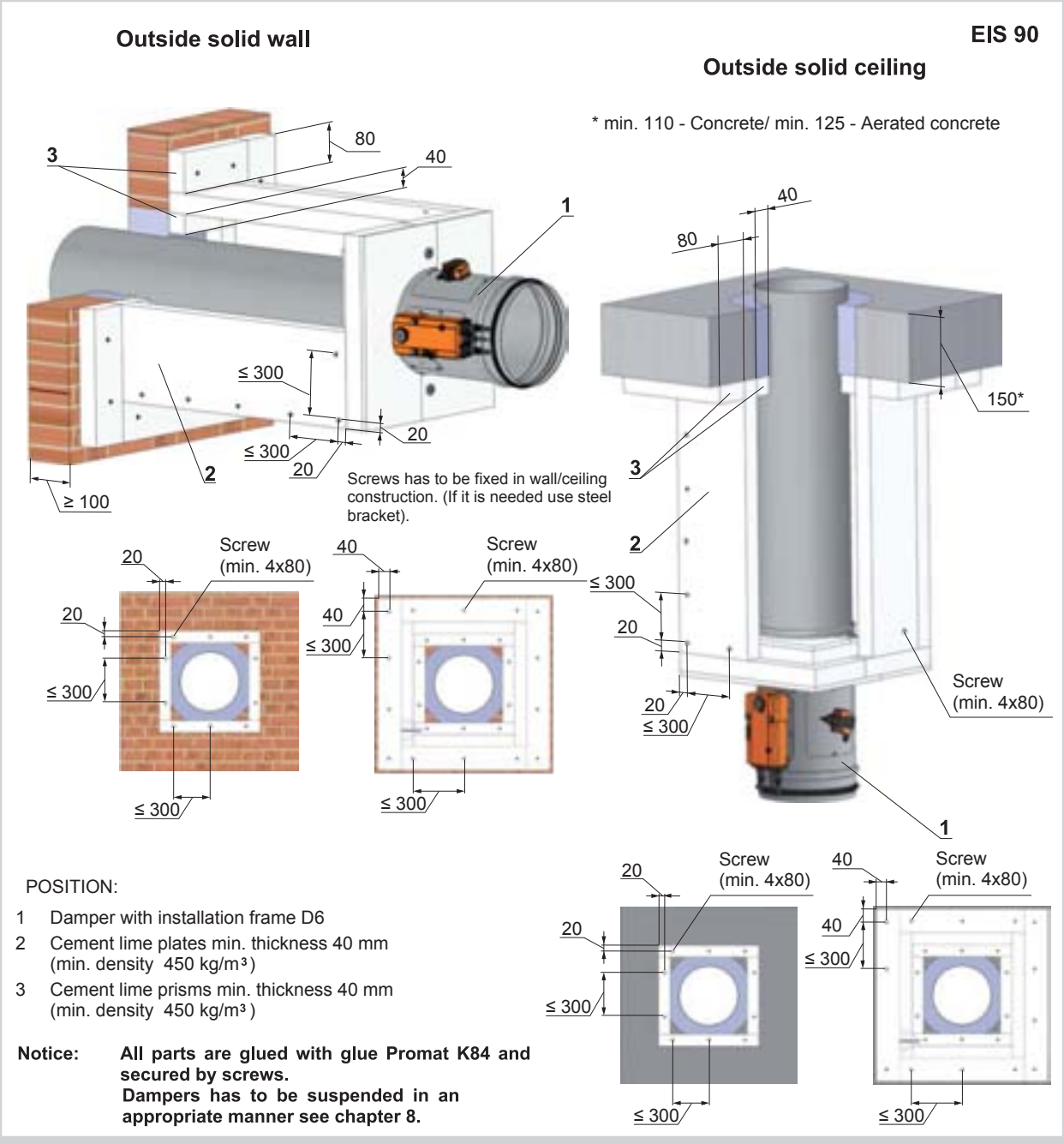
Material:

- Installation frame: cement lime plates
- Fasteners: galvanized plate

Installation opening:

- d = (D +100^{+3} mm)

Fig. 55 Installation frame D6



Installation frame D7

Installation frame D7 is suitable for gypsum wall construction with ceiling movement possibility. Distance of movement “x”.
On the inside and outside is installation frame equipped by intumescent sealing. It enlarges its capacity and air proofs the gap between damper body and installation frame and between installation frame and wall construction.

Installation:

Damper position:

- Directly on the ceiling
- In distance from ceiling max. 80 mm

Material:

- Installation frame: cement lime plates
- Fasteners: galvanized plate

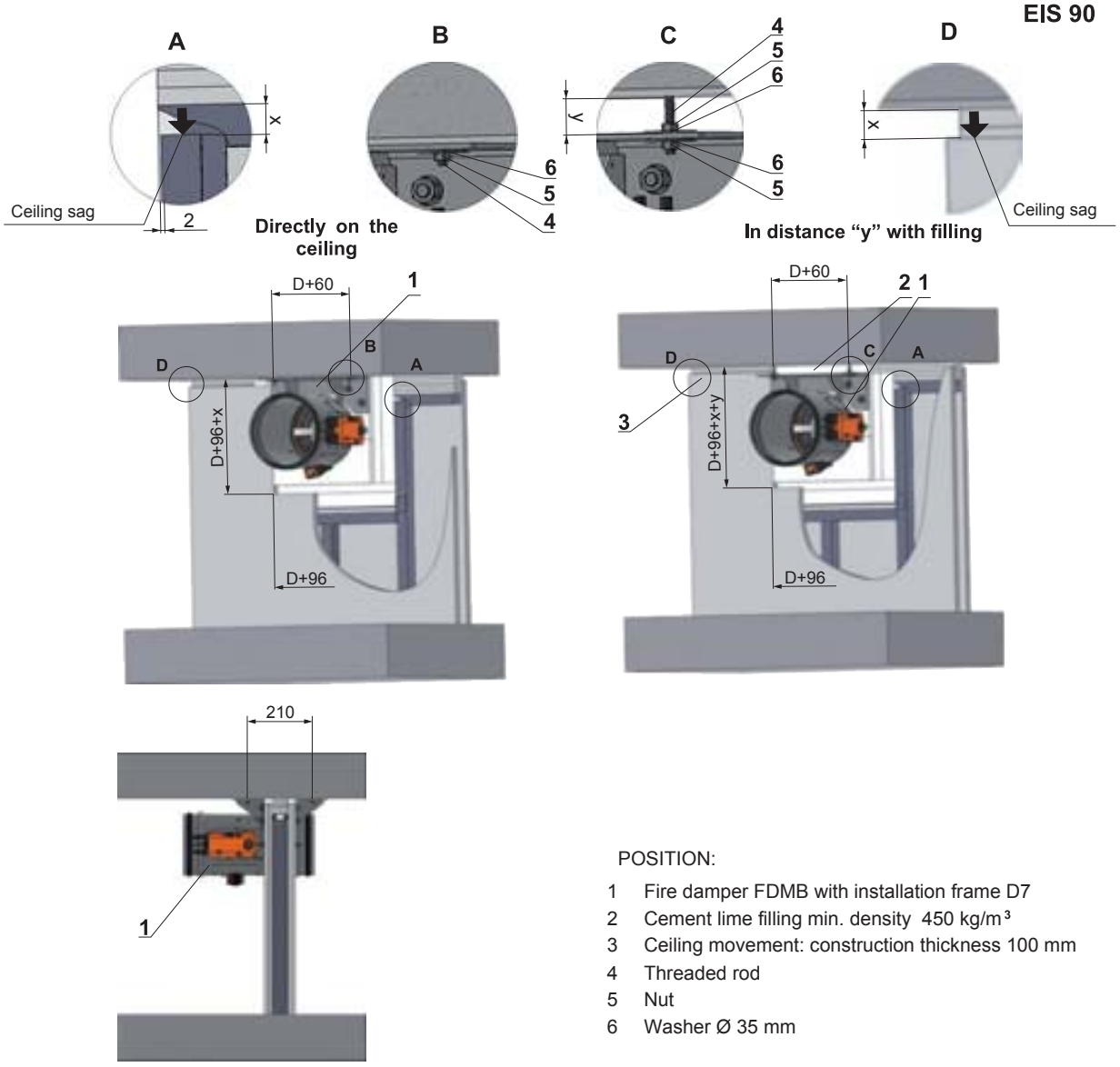
Notice:

- For ceiling movement ≥10 mm

Fig. 56 Installation frame D7

Gypsum wall construction with flexible ceiling (with possibility to move/to sag)

EIS 90



POSITION:

1 Fire damper FDMB with installation frame D7
2 Cement lime filling min. density 450 kg/m³
3 Ceiling movement: construction thickness 100 mm
4 Threaded rod
5 Nut
6 Washer Ø 35 mm

Notice: Fitting with threaded rods or steel bracket.

X = Ceiling movement (max. 40 mm)
Y = Distance of movement (max. 80 mm)

8. Thin shaft walls

Thin shaft wall description

Shaft wall is a vertical, non-bearing partition construction meeting the double-sided fire requirements. The shaft wall can be mounted only from one side. No mineral insulation is used in the construction.

First of all, the shaft wall structure must be laid out. Apart from other vertical constructions, the perimeter sections must be fitted with connection sealing made from A1 or A2 fire reaction materials (for instance floor strips Orsil N/PP). The perimeter sections must be anchored using steel plugs Ø 6 mm (for example DN6 or ZHOP) with 500 mm span.

Sheathing is carried out using two layers of Glasroc F boards Ridurit with 20 mm thickness, the boards are oriented horizontally. First sheathing layer is fixed with TN 212 screws in spacing 200mm to the support structure. The boards are mounted to tight butt joints without need of cementing. The second sheathing layer is screwed to the first sheathing layer using screws Rodurit in square net 250 mm. Reset of joints of the first and second layer of Ridurit sheathing is set to 600 mm vertically and 300 mm horizontally.

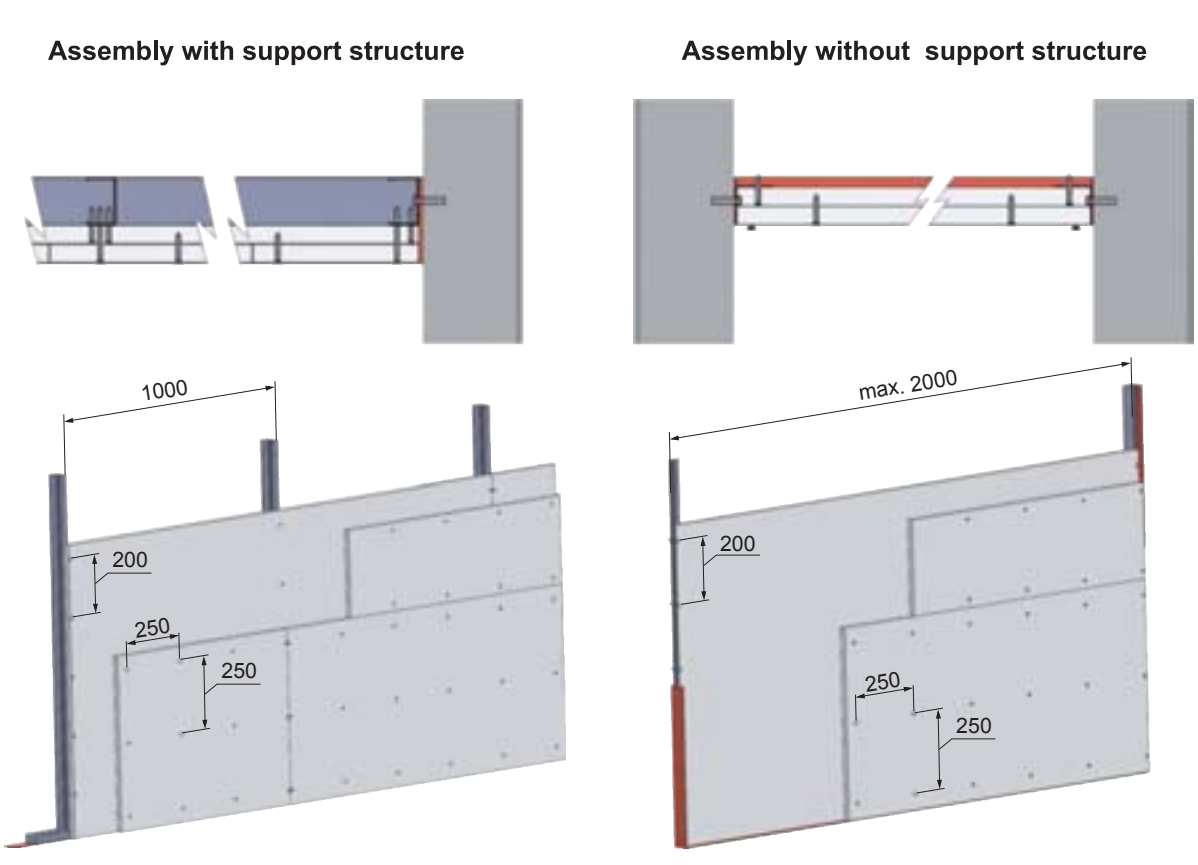
Assembly with support structure

Vertical intermediate R-CW sections are fixed in 1000 mm layout spacing between R-UW sections and vertical perimeter R-CW sections.

Assembly without support structure

Maximum width of the shaft wall is 2 metres in this case (board length). Steel squares made from steel galvanized plate metal 40/20/1 mm are used as perimeter sections, they are anchored to bearing wall using Ø 6 mm steel plugs (for example DN6 or ZHOP) with 500 mm spacing.

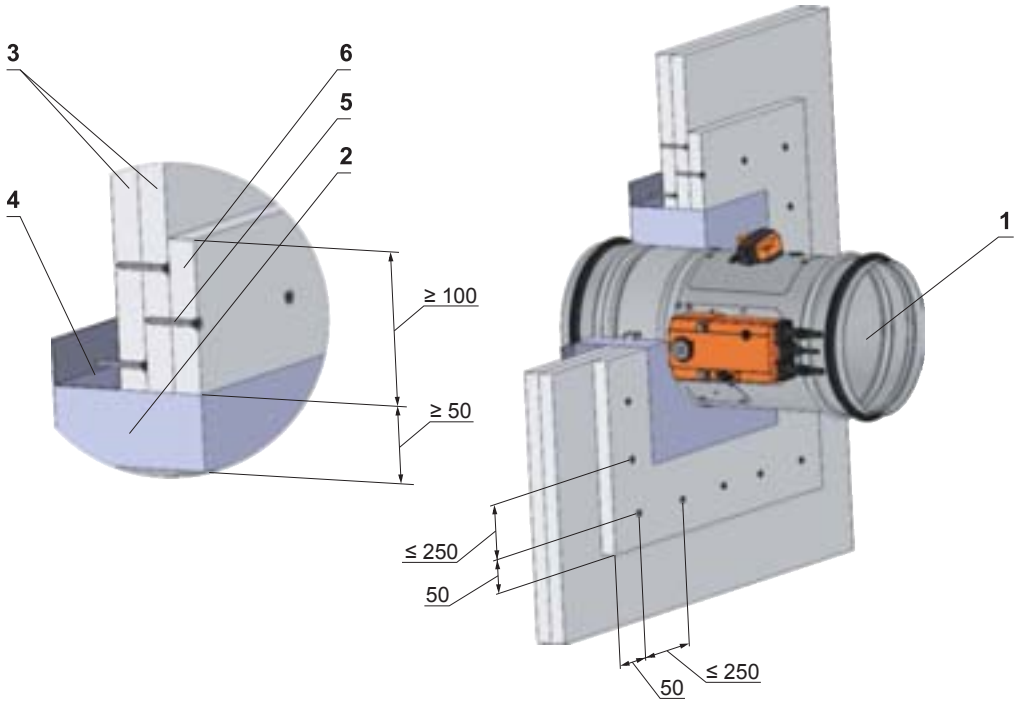
Fig. 57

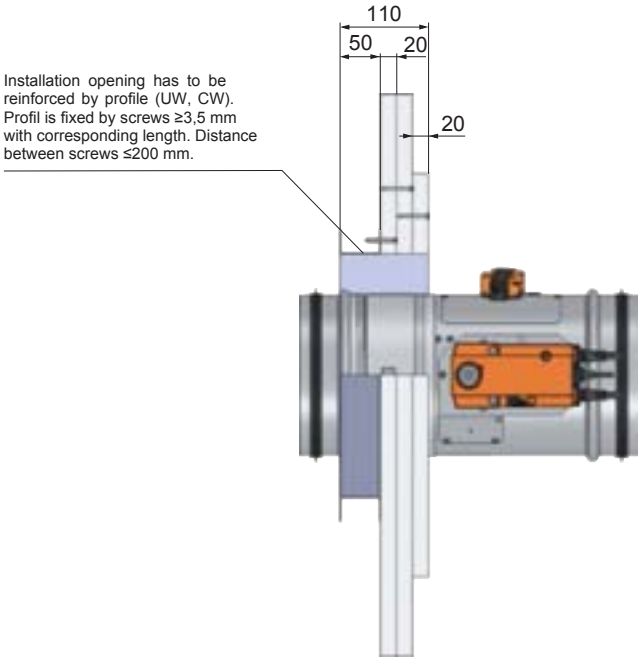


Notice: Rigips solution is shown here as an example. Alternatively it is possible to apply the solution from Knauf or Promat. In such a case follow the instructions of the producer.

Fig. 58 Shaft construction - mortar or gypsum

EIS 90

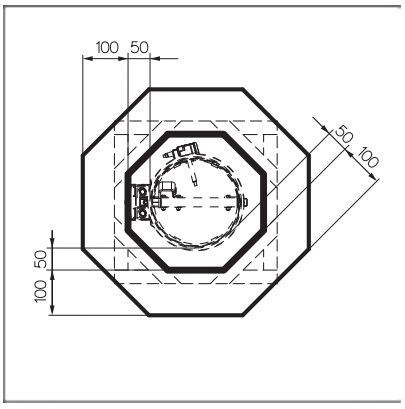




Installation opening:

a x b = (D + 100) x (D + 100)

Alternatively solution of installation opening



POSITION:

1 Fire damper FDMD
2 Mortar or gypsum
3 Fire resistant board
4 Profile 50 UW or 50 CW
5 Screw
6 Additional fire resistant board

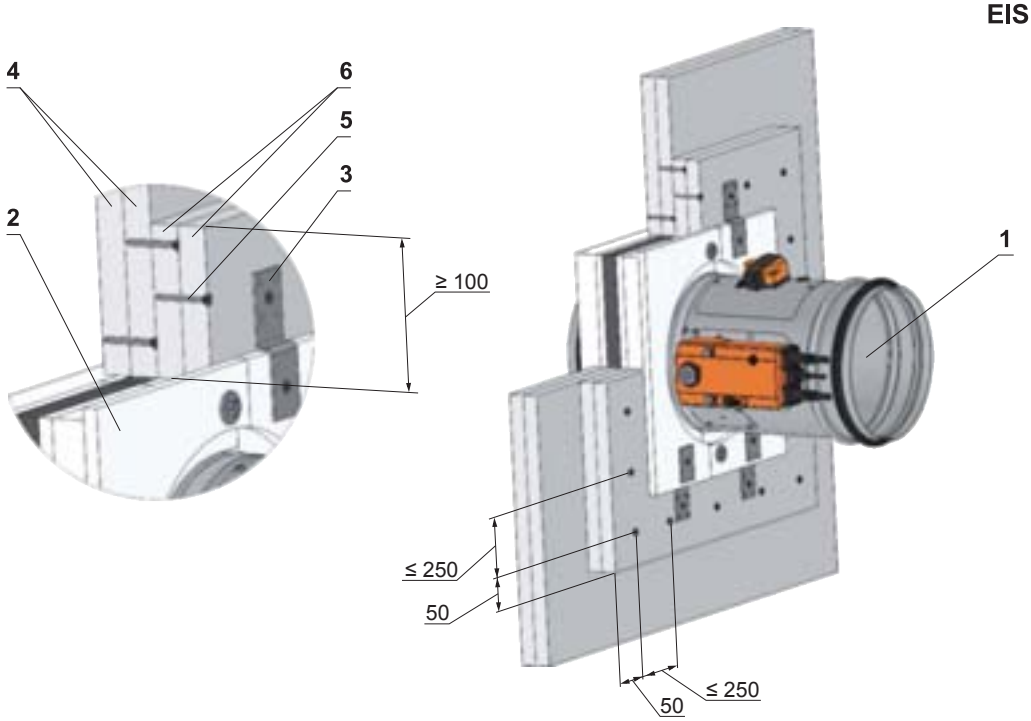
Used materials - example*:

3 - Glasroc F Ridurit tl. 20 mm
4 - R-CW
5 - Screw Ridurit
6 - Glasroc F Ridurit tl. 20 mm

* It is alternatively possible to use Knauf or Promat solution.

Fig. 59 Shaft construction - installation frame D1

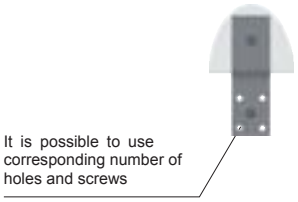
EIS 90





Installation opening:

a x b = (D + 97^{+3}) x (D + 97^{+3})



Holders No. X = 4
Screws No. Y = 8

POSITION:

1 Fire damper FDMD
2 Installation frame D1
3 Holder (including in installation frame D1 packing)
4 Fire resistant board
5 Screw
6 Additional fire resistant board

Used materials - example*:

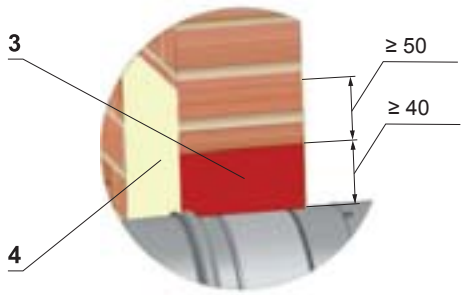
4 - Glasroc F Ridurit tl. 20 mm
5 - Screw Ridurit
6 - Glasroc F Ridurit tl. 20 mm

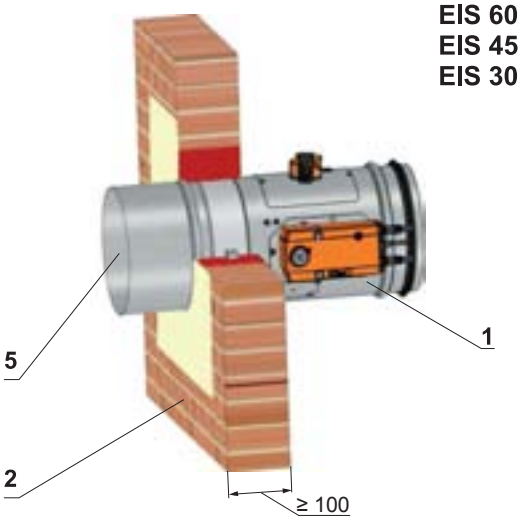
* Alternativně je možno použít řešení od firem Knauf nebo Promat.

Notice: Gap between frame and thin shaft wall construction must be filled by glue (PROMAT K84).
Dampers has to be suspended in an appropriate manner see chapter 11.

9. Installation in Fire resistant foam

Fig. 60 Solid wall construction - Fire resistant foam covered by stucco plaster





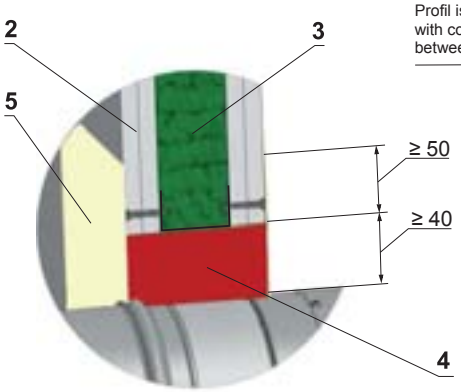
POSITION:

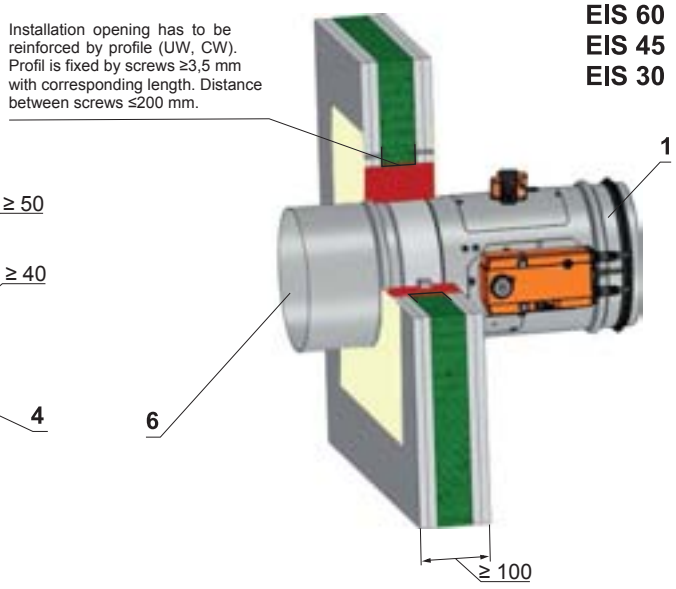
1 Fire damper FDMD
2 Solid wall
3 Fire resistant foam
4 Stucco plaster
5 Duct

Used materials - example*:

3 - HILTI CFS-F FX - EIS 60
PROMAFOAM-C - EIS 45
SOUDAL, Soudafoam FR-B1 - EIS 30
DenBraven, Fire resistant foam PUR - EIS 30

Fig. 61 Gypsum wall construction - Fire resistant foam covered by stucco plaster





POSITION:

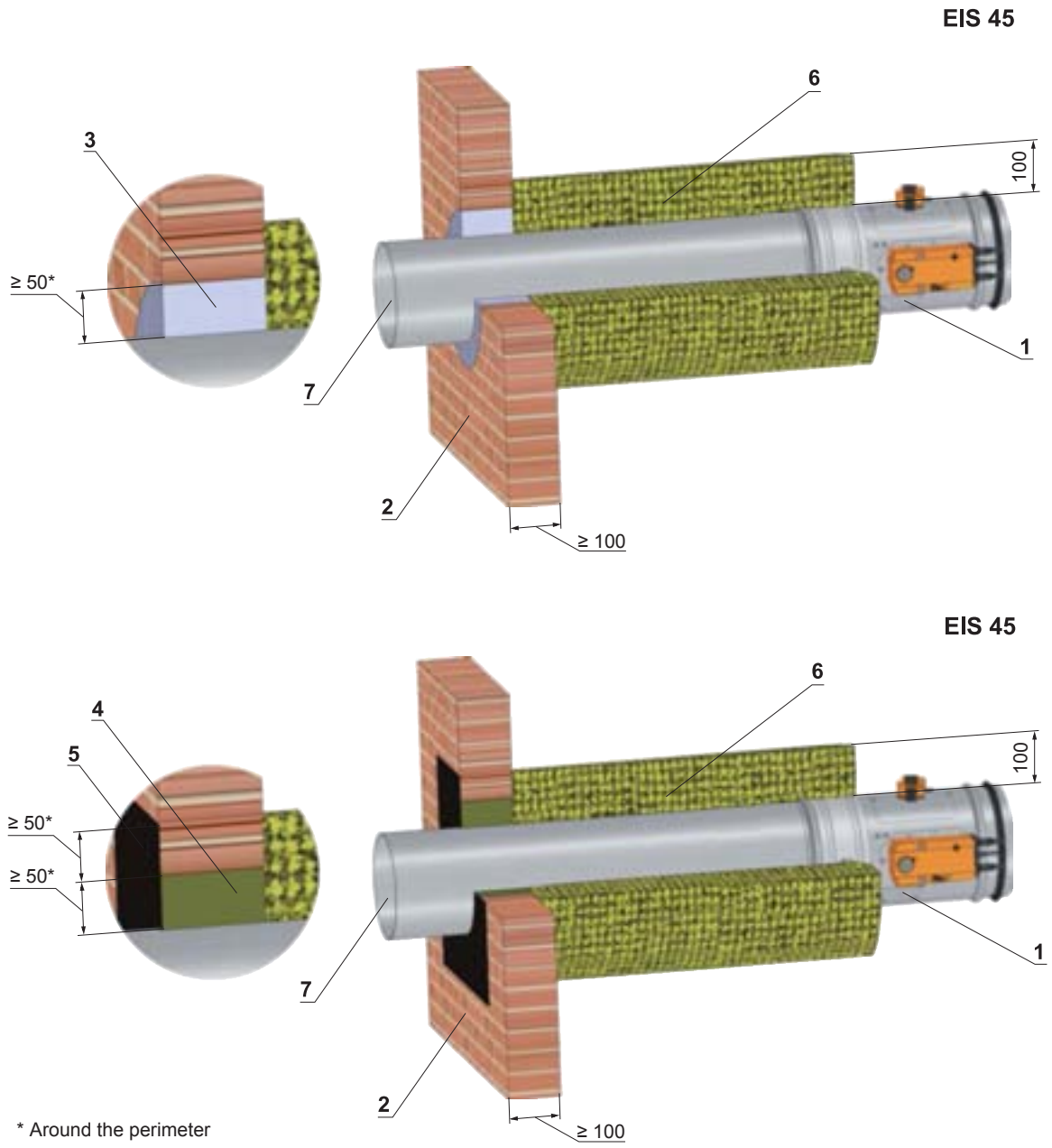
1 Fire damper FDMD
2 Gypsum plate
3 Fire resistant insulation
4 Fire resistant foam
5 Stucco plaster
6 Duct

Used materials - example*:

3 - HILTI CFS-F FX - EIS 60
PROMAFOAM-C - EIS 45
SOUDAL, Soudafoam FR-B1 - EIS 30
DenBraven, Fire resistant foam PUR - EIS 30

10. Installation outside of wall construction EIS45

Fig. 62 Installation outside of solid wall construction - mineral wool



* Around the perimeter

POSITION:

1 Fire damper FDMB
2 Solid wall
3 Mortar or gypsum
4 Stuffing box (mineral stone wool min. density 140 kg/m^3)
5 Fire protection mastic min. thickness 1 mm
6 Stone wool with fire resistance EI 60, (min. density 66 kg/m^3), thickness 100 mm
7 Duct

Used materials - example**:

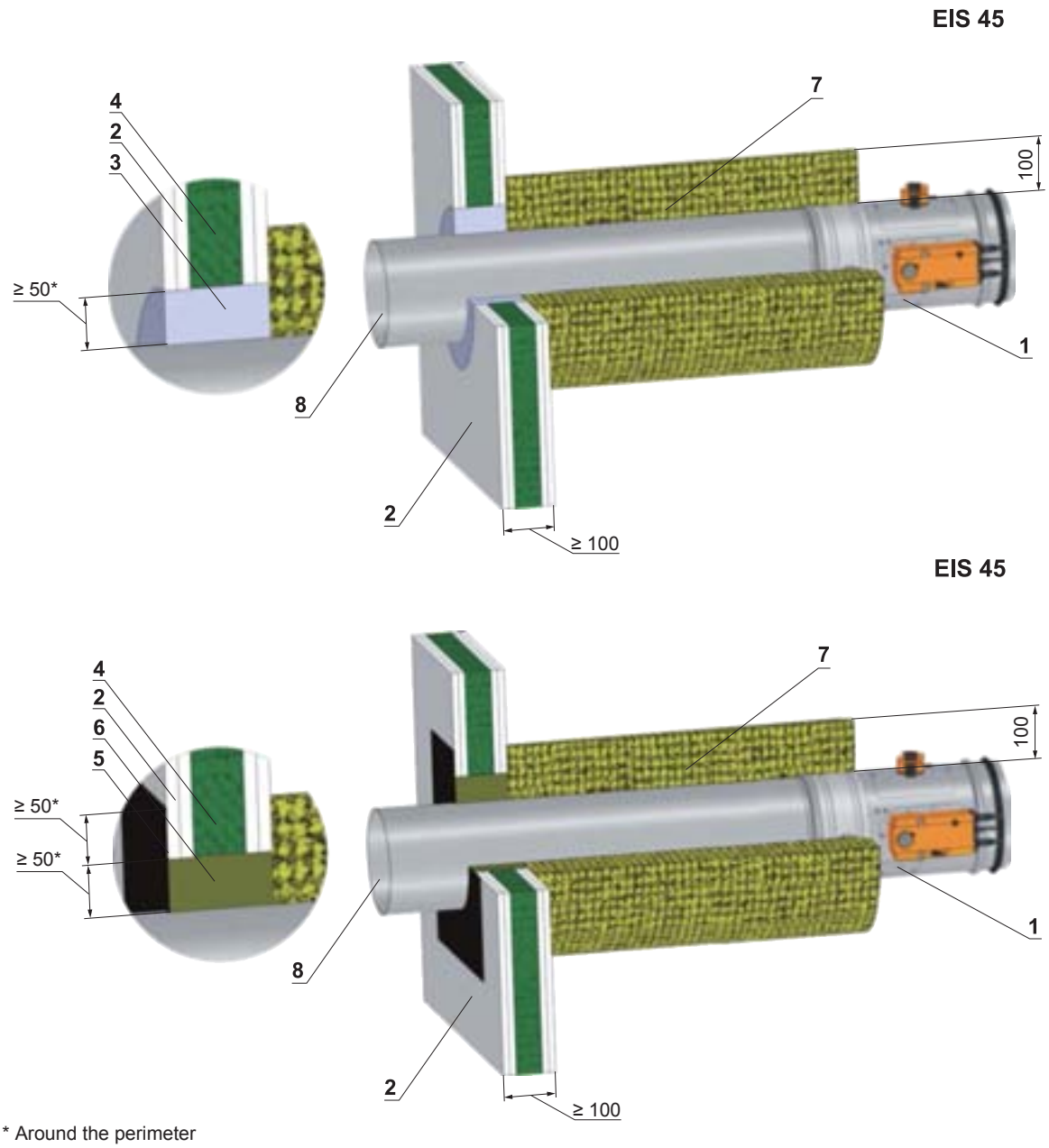
4 - Promapyr, Rockwool Steprock HD
5 - Promastop - P, K
6 - Isover Ultimate Protect Wired MAT 4.0, th. 100 mm ALU1

Notice:

** 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.

The maximum distance from the construction of fire dampers is not limited and according to EN 15882-2 must use the required number of hinges according to EN 13366-1:2014.

Fig. 63 Installation outside of gypsum wall construction - mineral wool



* Around the perimeter

POSITION:

1 Fire damper FDMB
2 Gypsum plate
3 Mortar or gypsum
4 Fire resistant insulation
5 Fire protection mastic min. thickness 1 mm
6 Stuffing box (mineral stone wool min. density 140 kg/m^3)
7 Stone wool with fire resistance EI 60, (min. density 66 kg/m^3), thickness 100 mm
8 Duct

Used materials - example**:

5 - Promastop - P, K
6 - Promapyr, Rockwool Steprock HD
7 - Isover Ultimate Protect Wired MAT 4.0, th. 100 mm ALU1

Notice:

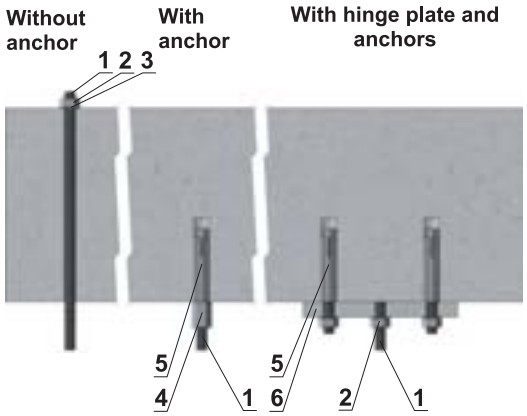
** Stuffing box, fire protection mastic, cement lime plate and insulation materials can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

The maximum distance from the construction of fire dampers is not limited and according to EN 15882-2 must use the required number of hinges according to EN 13366-1:2014.

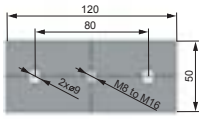
11. Suspension systems

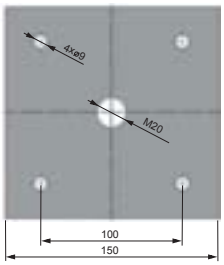
11.1. Mounting to the ceiling wall

Fig. 64 Mounting to the ceiling wall



Hinge plates





Position:

1 Threaded rod M8 – M20
2 Nut
3 Washer
4 Coupling Nut
5 Anchor
6 Hinge plate - min. thickness 10 mm

Load capacities of threaded hanger rods F [N] at the required fire resistance 90 minutes

Size	A_s [mm^2]	Weight G [kg]	
		for 1 piece	for 1 pair
M8	36,6	22	44
M10	58,0	35	70
M12	84,3	52	104
M14	115,0	70	140
M16	157,0	96	192
M18	192,0	117	234
M20	245,0	150	300

11.2. Horizontal installation

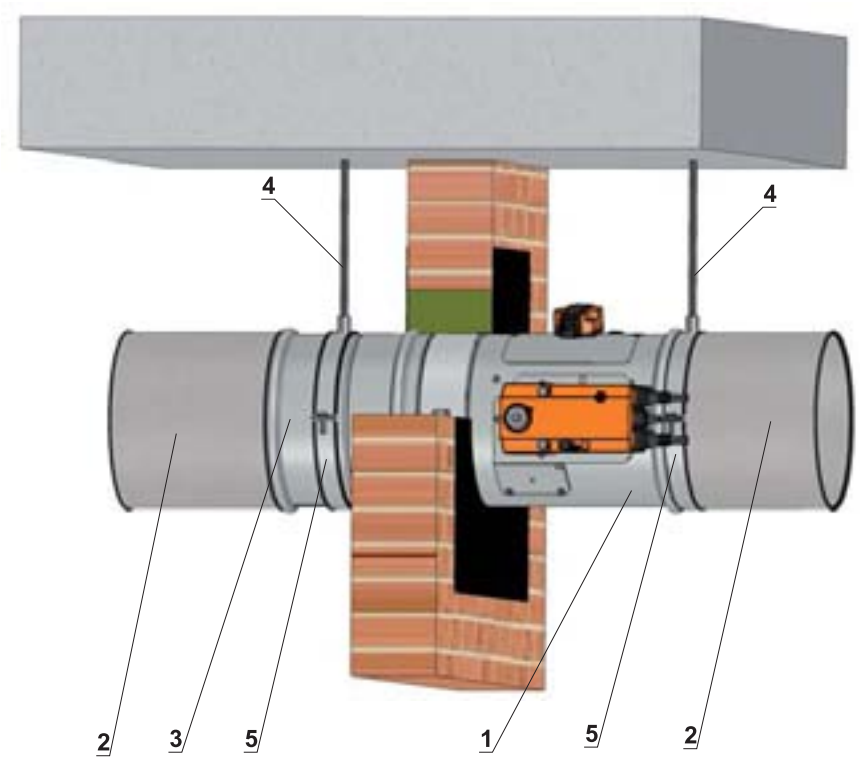
Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

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. 64

Fig. 65 Suspension - horizontal duct



Position:

1 Fire damper
2 Damping pad
3 Extension piece
4 Threaded rod
5 Suspension ring

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

11.3. Vertical installation

Fire dampers can be suspended by using threaded rods and a mounting profiles. Load the suspension system depend on weight of the fire damper.

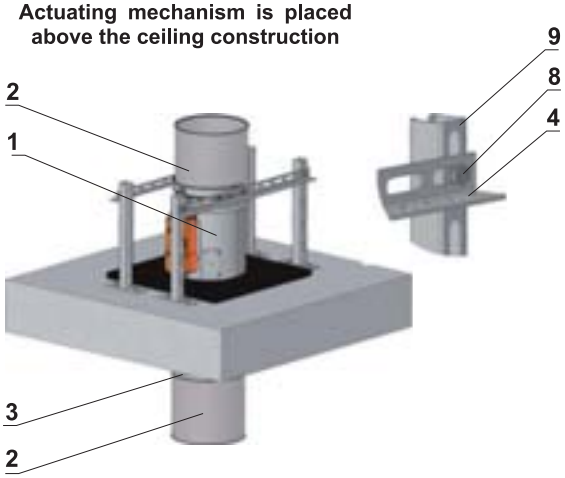
Damper can be suspended from the ceiling construction or supported above the ceiling construction. Damper assembly procedures must be done so as all load transfer from the fire separating constructions to the damper body is absolutely excluded. Back-to-back air-conditioning piping must be hung or supported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

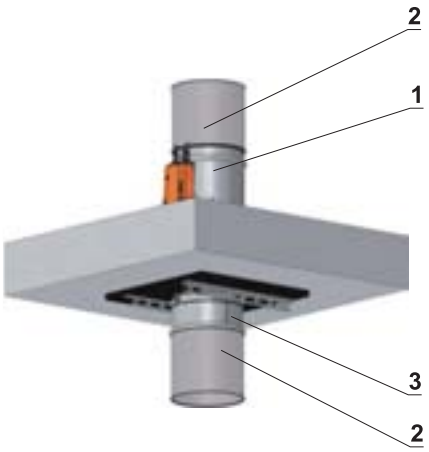
Threaded rods longer than 1,5 m require fire-resistant insulation.

Threaded rod fixing to the ceiling construction - see fig. 64

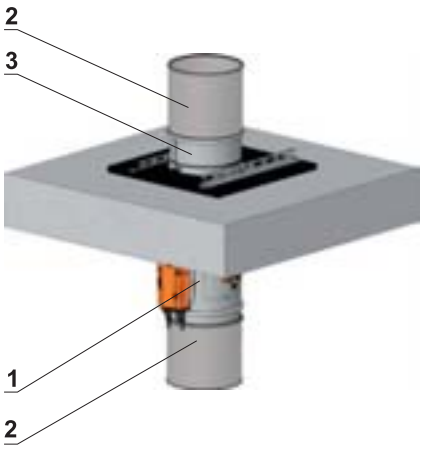
Fig. 66 Suspension - vertical duct

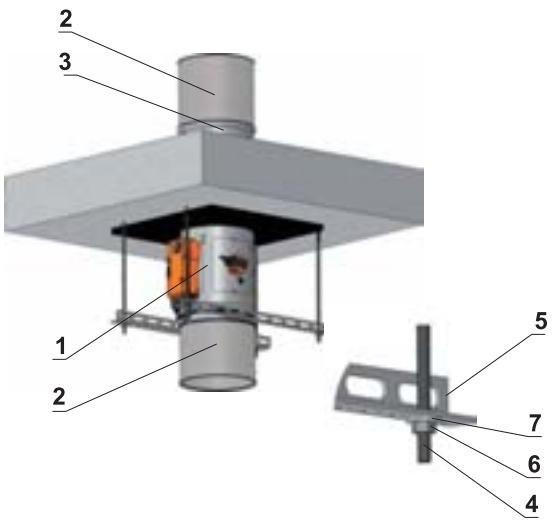
Actuating mechanism is placed above the ceiling construction





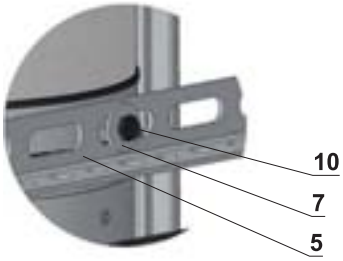
Actuating mechanism is placed under the ceiling construction



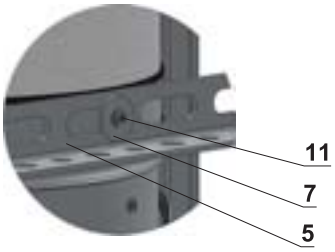


Notice: Damper must be firmly connected with extension piece by screws or rivets.

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

III. TECHNICAL DATA

12. Pressure loss

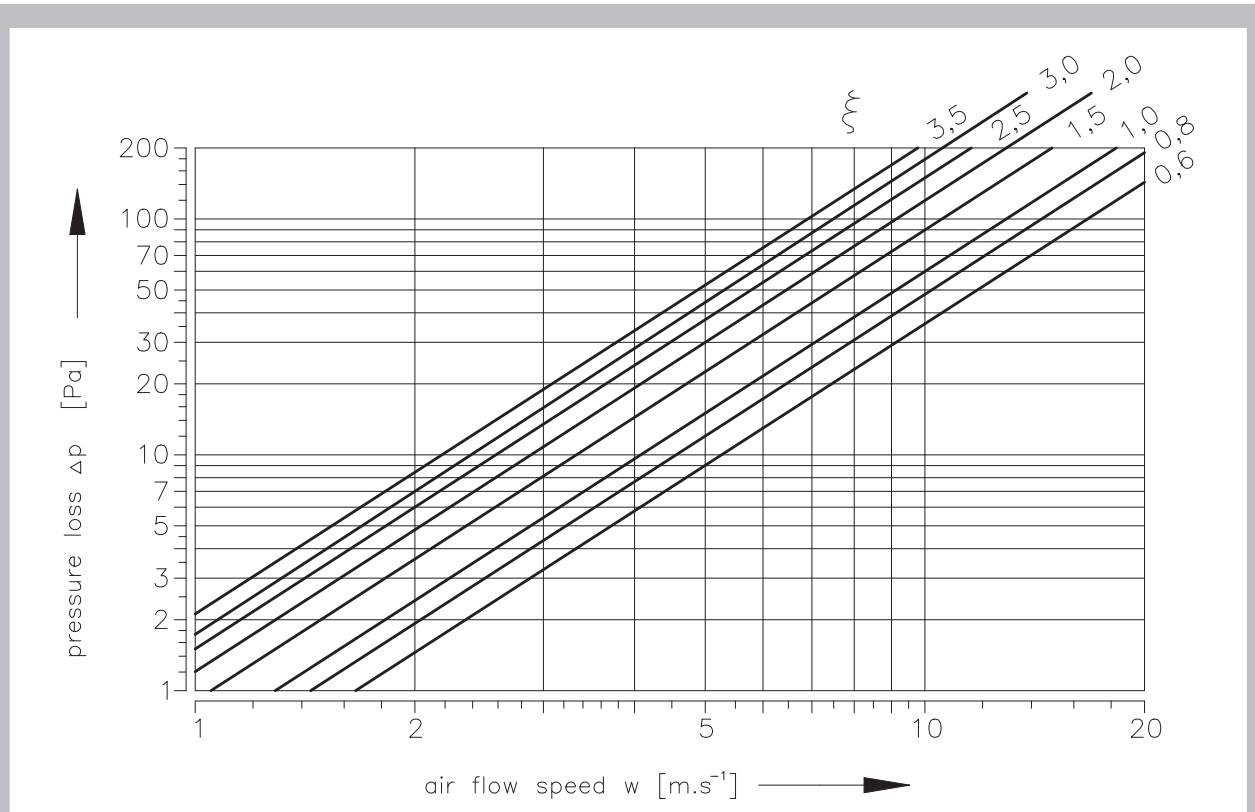
12.1. Pressure loss calculation

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

Δp	[Pa]	pressure loss
w	[m.s^{-1}]	air flow speed in nominal damper section
ρ	[kg.m^{-3}]	air density
ξ	[-]	coefficient of local pressure loss for the nominal damper section (see Tab. 13.1.1.)

12.2. Determination of pressure loss by using diagram 12.2.1. ρ = 1,2 kg.m^{-3}

Diagram 12.2.1. **Pressure losses for air density ρ =1,2 kg.m^{-3}**



13. Coefficient of local pressure loss

13.1. Coefficient of local pressure loss ξ (-)

Tab. 13.1.1. **Coefficient of local pressure loss**

D	100	125	140	150	160	180	200
ξ	2,736	2,099	1,781	1,527	1,272	0,929	0,636

14. Noise data

14.1. 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 m² section (see Tab. 14.3.1.)
S	[m²]	duct cross section
K_A	[dB]	correction to the weight filter A (see Tab. 14.3.2.)

14.2. 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 m² section (see Tab. 14.3.1.)
S	[m²]	duct cross section
L_{rel}	[dB]	relative level expressing the shape of the spectrum (see Tab. 14.3.3.)

14.3. Table of acoustics values

Tab. 14.3.1. Level of acoustic output L_{W1} related to the 1 m² section

	ξ [-]											
w [m.s⁻¹]	**0,1**	**0,2**	**0,3**	**0,4**	**0,6**	**0,8**	**1**	**1,5**	**2**	**2,5**	**3**	**3,5**
2	9,0	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	40,0	41,7	43,2	44,4
4	24,2	29,6	32,8	35,0	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	44,0	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	51,0	52,7	55,8	58,1	59,8	61,2	62,4
7	38,8	44,2	47,3	49,6	52,7	55,0	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	73,0
10	48,1	53,5	56,6	58,9	62,0	64,3	66,0	69,1	71,4	73,1	74,5	75,7
11	50,6	56,0	59,1	61,4	64,5	66,7	68,5	71,6	73,9	75,6	77,0	78,2
12	52,8	58,2	61,4	63,6	66,8	69,0	70,7	73,9	76,1	77,9	79,3	80,5

Tab. 14.3.2. Correction to the weight filter A

w [m.s⁻¹]	**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. 14.3.3. Relative level expressing the shape of the spectrum L_{rel}

	f [Hz]							
w [m.s^{-1}]	**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	-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

Calculation example

Given data	Fire damper FDMD 200
	$\dot{V}$ = 600 m^3.h^{-1}
	ρ = 1,2 kg.m^{-3}
	Octave range 1000 Hz
Tab. 4.3.1.	S_{ef} = 0,0213 m^2
Calculation:	w [m.s^{-1}] = ($\dot{V}$ [m^3.h^{-1}] / 3600) / S_{ef} [m^2]
	w = 7,83 m.s^{-1}
Tab. 13.1.1.	ξ = 0,636
Calculation:	$\Delta p = \xi . \rho . (w^2/2) = 0,636 . 1,2 . (7,83^2/2) = 23,4$ Pa
Tab. 14.3.1., Tab. 14.3.2. and Tab. 14.3.3.	L_{W1} = 56,5 dB
	K_A = -5,5 dB
	L_{rel} = -10,7 dB (for 1000 Hz)
Calculation:	$L_{WA} = L_{W1} + 10 \log(S_{ef}) + K_A = 56,5 + 10 \log(0,0213) - 5,5 = 34,3$ dB
	$L_{Woct} = L_{W1} + 10 \log(S_{ef}) + L_{rel} = 56,5 + 10 \log(0,0213) - 10,7 = 29,1$ dB

IV. MATERIAL, FINISHING

15. Material

15.1. 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. Fasteners is galvanized.

15.2. According to the customer's requirements, damper body, control, springs and jointing material can be made of stainless material.

V. INSPECTION, TESTING

16. Inspection, testing

16.1. The appliance is constructed and preset by the manufacturer, its operation is dependent on proper installation and adjustment.

VI. TRANSPORTATION AND STORAGE

17. Logistic terms

17.1. Dampers are transported by box freight vehicles without direct weather impact, there must not occur any sharp shocks and ambient temperature must not exceed +40°C. Dampers must be protected against mechanic damages when transported and manipulated. During transportation, the damper blade must be in the "CLOSED" position.

17.2. Dampers are stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -30°C to +40°C and maximum relative humidity 95 % (avoid condensation on the damper body). Dampers must be protected against mechanic damages when transported and manipulated.

VII. ASSEMBLY, ATTENDANCE, MAINTENANCE AND REVISIONS

18. Assembly

18.1. Assembly, maintenance and damper function check can be done only by qualified and trained person, i.e. “AUTHORIZED PERSON” according to the manufacturer documentation. All works done on the fire dampers must be done according international and local norms and laws.

18.2. All effective safety standards and directives must be observed during fire damper assembly.

18.3. To ensure reliable fire damper function it is necessary to avoid blocking the closing mechanism and contact surfaces with collected dust, fibre and sticky materials and solvents.

19. Entry into service and revisions

19.1. 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.

Inspection hole disassembly: release the covering lid by removing the two screws in the corners of inspection hole. Then remove lid from its original position.

19.2. Before entering the dampers with manual control (design .01, .11, .80) into operation after their assembly and by sequential checks, checks according 16.1. and following checks must be carried out.

Verification of closing device and thermal fuse:

When you verify functionality of mechanism, follow these steps:

Adjustment of damper blade in position "CLOSED" shall be made following:

- Damper is in „CLOSED“ position.
- By pressing control button mechanism, you close damper in "CLOSED" position.
- Check damper blade adjustment in "CLOSED" position.
- Closing must be strong and control lever must be in "CLOSED" position.
- If closing is not sufficiently strong and damper control lever is not in "CLOSED" position, you must contact manufacturer and order new mechanism.
- Mechanism dimension is marked M1 to M4, according to internal forces of spring.

Adjustment of damper blade in position "OPEN" shall be made following:

- Rotate control lever by 90°.
- Lever get fasten automatically in “OPEN” position.
- Check damper blade adjustment in "OPEN" position.

Checking function and the status of the thermal fuse shall be made following:

- To check the function and the status of the fuse is possible to remove whole mechanism from the body of fire damper - mechanism is attached to the dampers body with four screws M6.
- Removing the thermal fuse from the fuse holder of initiation device, check its correct functionality.
- There must be a release lever, which releases initiation lever of control and mechanism will displace to "CLOSED" position.
- If not, you need to contact the manufacturer and order new mechanism.
- Mechanism dimension is marked M1 to M4, according to internal forces of spring.

19.3. Before entering the dampers with actuating mechanism into operation after their assembly and by sequential checks, checks according 19.1. and following checks must be carried out.

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).

19.4. Manual operation

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.

19.5. It is recommended to provide periodical checks, maintenance and service actions on Fire Equipment by Authorized persons schooled by Producer.

19.6. All effective safety standards and directives must be observed during fire damper assembly.

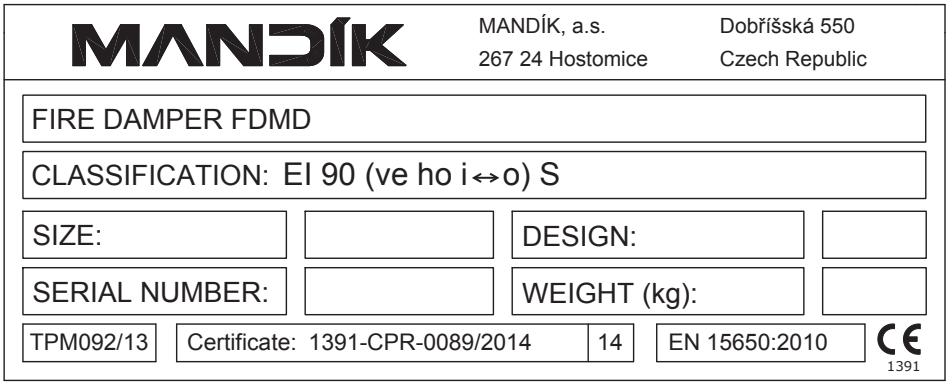
19.7. Dampers could be displaced into position “CLOSED” only in case that ventilator, or Air Handling Unit is switched off. The goal is the securing of proper closing and safe function of Fire Damper in case of Fire.

VIII. DATA OF THE PRODUCT

20. Data label

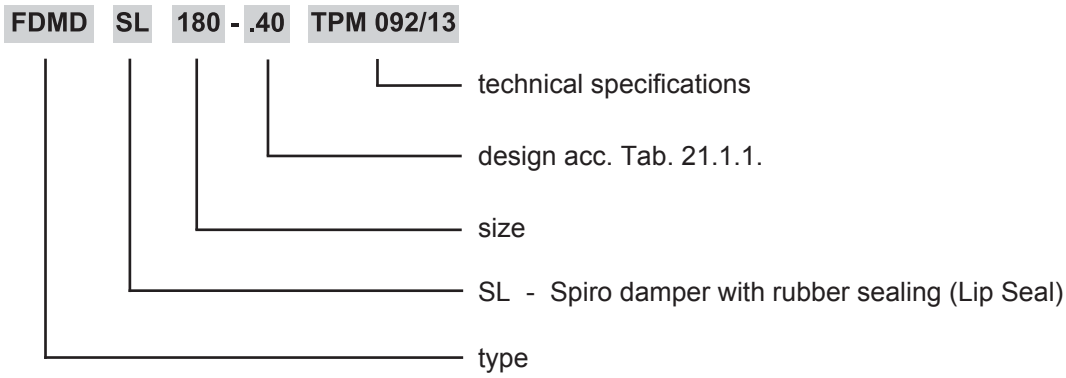
20.1. Data label is placed on the casing of fire damper.

Fig. 67 Data label



IX. ORDERING INFORMATION

21. Ordering key



If are requested installation holders or installation frame, it has to be mentioned separately in the order. Installation frame could be fixed to the damper body or supplied separately.

Tab. 21.1.1. Dampers design

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

*** communication and supply device BKN 230-24 has to be placed near the damper. It is necessary for easy connection of actuating system equipped by BKN 230-24 device.**

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