

CE

NORDfire

SEDM Smoke Extraction Damper

Square smoke extraction damper from 180×180 mm to 1600×1000 mm

CE certified acc. to EN 12101-8

Tested in accordance with EN 1366-10

Classified acc. to EN 13501-4+A1

External Casing leakage class C, Internal leakage min. class 2 acc. to EN 1751

Cycling test in class C_{mod} acc. to EN 12101-8

Damper actuating by electrical actuator

Max. air velocity 15 m/s, overpressure max. 500 Pa or underpressure max. 1500 Pa

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General information

1. Description

Smoke extraction dampers - multi are shutters in the smoke exhaust piping systems. The dampers are designed to remove heat and combustible products (e.g. smoke) from effected fire compartments. In the event of fire the Smoke and Fire ventilation system opens the damper in the affected section and removes combustion products and heat from this section.

The damper blade is controlled by electrical actuating mechanism. Dampers are fire resistant and are intended for systems with manual or automatic activation. Dampers are designed for using in fire compartments that can be connected to the smoke exhaust ducts (tested according to EN 1366-8) or they can be installed in or on the construction of the fire compartment. Dampers can be delivered with or without flanges.

1.1 Damper characteristics

- CE certified acc. to EN 12101-8
- Tested in accordance with EN 1366-10
- Classified acc. to EN 13501-4+A1
- Fire resistance according Tab. 1.2.1
- External Casing leakage class C, Internal leakage min. class 2 acc. to EN 1751
- Cycling test in class Cmod acc. to EN 12101-8
- Certificate of constancy of performance No. 1391-CPR-2021/0130
- Declaration of Performance No. PM/SEDM/01/22/3
- Hygienic assessment of smoke control dampers - Report No. 1.6/pos/19/19c

Tabel 1. Classification of dampers

| Supporting construction | Classification |
|--|--|
| Vertical duct system | EI 120 (h _{od} - i↔o) S1000C _{mod} HOT 400/30MAmulti |
| | EI 120 (h _{od} - i↔o) S1000C _{mod} HOT 400/30AAmulti |
| Horizontal duct system | EI 120 (v _{ed} - i↔o) S1000C _{mod} HOT 400/30MAmulti |
| | EI 120 (v _{ed} - i↔o) S1000C _{mod} HOT 400/30AAmulti |
| Aerated concrete ceiling construction* | EI 90 (h _{ow} - i↔o) S1000C _{mod} HOT 400/30MAmulti |
| | EI 120 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30AAmulti |
| | EI 120 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30MAmulti |
| Aerated concrete wall construction* | EI 120 (v _{ew} - i↔o) S1000C _{mod} HOT 400/30AAmulti |
| Gypsum wall construction* | EI 90 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30AAmulti |
| | EI 90 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30MAmulti |
| | EI 120 (v _{ew} - i↔o) S1000C _{mod} HOT 400/30AAmulti |
| | EI 120 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30AAmulti |

* In practice dampers are not in the open position at the beginning of smoke threat.

1.2 Working conditions

Exact damper function is provided under the following conditions:

- maximum air velocity 15 m/s
- underpressure max. -1500 Pa or overpressure max. 500 Pa.

Dampers can be installed in arbitrary position (horizontal or vertical blade axis).

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.

The duct can be ended by KMM (TPM 002/96) grilles. During grilles installation blade overlaps has to be respected see page 10.

2. Design

2.1 Design with actuating mechanism

Design .44 and .54

Belimo actuators are used for dampers, series BEN, BEE, BE for 230V AC resp. 24 V AC/DC, Schischek InMax 50.75-S actuators (universal 24V or 230V supply) are used for large size of dampers.

After connection to the power supply voltage, the actuator moves the damper blade to the "OPEN" position or "CLOSED" (according to the corresponding connection, see wiring diagram). If the power supply is interrupted, the actuator stops at the current position. The signalling of the "OPEN" and "CLOSED" damper blade positions is ensured by two built-in fixed "potential-free" end- limit switches.

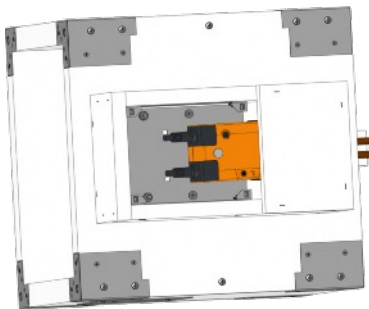
The actuator for operating the damper blade is mounted in an insulated cover/box. It is accessible after removing the cover lid. The electrical connection of the actuator is made with a nonflammable cable (or a cable located in the adjoining cable duct), which passes through an opening made in the wall of the insulated cover/box when installing the damper or when connecting the actuator power cable. The cable entry must meet a minimum fire resistance of 30 minutes.

Design .65

Belimo modulating actuators, BEN (BEE)-SR series for 24V AC/DC are specially designed for remote control of smoke control dampers. The position of the damper blade is adjustable by means of control voltage 0 (2)...10V DC. The signalling of the "OPEN" and "CLOSED" damper blade positions is ensured by two built-in fixed "potential-free" limit switches.

The actuator for operating the damper blade is mounted in an insulated cover/box. It is accessible after removing the cover lid. The electrical connection of the actuator is made with non-flammable cables (or cables located in the adjoining cable duct), which pass through an opening made in the wall of the insulated cover when installing the damper or when connecting the power cables of the actuator. The cable entry must meet a minimum fire resistance of 30 minutes.

Fig. 1. Damper with actuating mechanism



Tabel 2. Actuator Belimo BEN 24(-ST), BEN 24-SR, BEN 230

| Actuator BELIMO - 15 Nm | BEN 24(-ST) | BEN 24-SR | BEN 230 |
|-------------------------|--|--|-------------------------------------|
| | | | |
| Power voltage | AC/DC 24 V 50/60 Hz | AC/DC 24V 50/60 Hz | AC 230 V 50/60 Hz |
| Power consumption | | | |
| – in operation | 3 W | 3 W | 4 W |
| – in the end position | 0,1 W | 0,3 W | 0,4 W |
| Dimensioning | 6 VA (I _{max} 8,2 A @ 5 ms) | 6,5 VA (I _{max} 8,2 A @ 5 ms) | 7 VA (I _{max} 4 A @ 5 ms) |
| Protection class | III | III | II |
| Degree of protection | | IP 54 | |
| Adjustment time for 95° | | < 30 s | |
| Ambient temperature | | -30 °C ... +50 °C | |
| Storage temperature | | -40 °C ... +80 °C | |
| Connection | | | |
| – drive | Cable 1 m, 3 × 0,75 mm ² | Cable 1 m, 4 × 0,75 mm ² | Cable 1 m, 3 × 0,75 mm ² |
| – auxiliary switch | Cable 1 m, 6 × 0,75 mm ² (BEN 24-ST) with plug connectors | Cable 1 m, 6 × 0,75 mm ² | Cable 1 m, 6 × 0,75 mm ² |

Fig. 2. Actuator Belimo BEN 24(-ST)

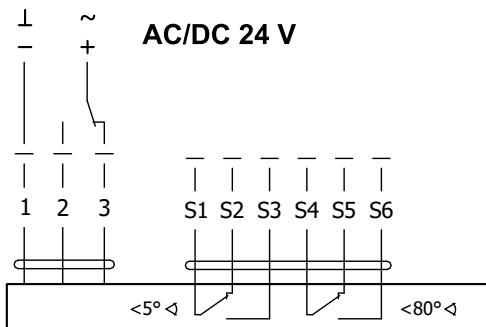


Fig. 3. Actuator Belimo BEN 24-SR

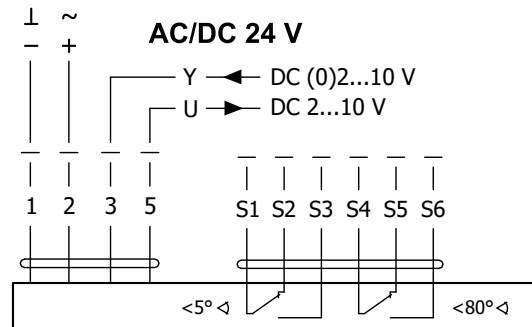
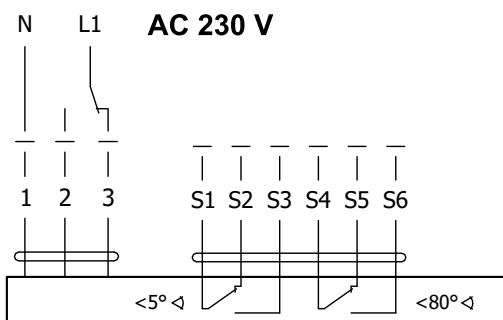


Fig. 4. Actuator Belimo BEN 230



Tabel 3. Actuator Belimo BEE 24(-ST), BEE 24-SR, BEE 230

| Actuator Belimo - 25 Nm | BEE 24(-ST) | BEE 24-SR | BEE 230 |
|-------------------------|--|--|-------------------------------------|
| | | | |
| Power voltage | AC/DC 24 V 50/60 Hz | AC/DC 24V 50/60 Hz | AC 230 V 50/60 Hz |
| Power consumption | | | |
| – in operation | 2,5 W | 3 W | 3,5 W |
| – in the end position | 0,1 W | 0,3 W | 0,4 W |
| Dimensioning | 5 VA (I _{max} 8,2 A @ 5 ms) | 5,5 VA (I _{max} 8,2 A @ 5 ms) | 6 VA (I _{max} 4 A @ 5 ms) |
| Protection class | III | III | II |
| Degree of protection | | IP 54 | |
| Adjustment time for 95° | | < 60 s | |
| Ambient temperature | | -30 °C ... +55 °C | |
| Storage temperature | | -40 °C ... +80 °C | |
| Connection | | | |
| – drive | Cable 1 m, 3 × 0,75 mm ² | Cable 1 m, 4 × 0,75 mm ² | Cable 1 m, 3 × 0,75 mm ² |
| – auxiliary switch | Cable 1 m, 6 × 0,75 mm ² (BEE 24-ST) with plug connectors | Cable 1 m, 6 × 0,75 mm ² | Cable 1 m, 6 × 0,75 mm ² |

Fig. 5. Actuator Belimo BEE 24(-ST)

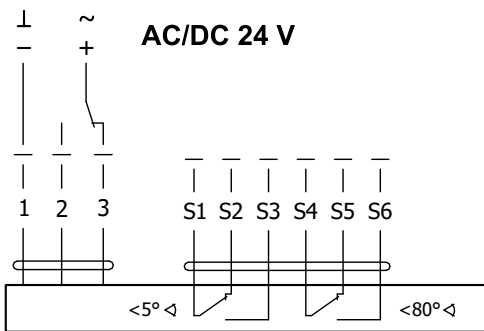


Fig. 6. Actuator Belimo BEE 24-SR

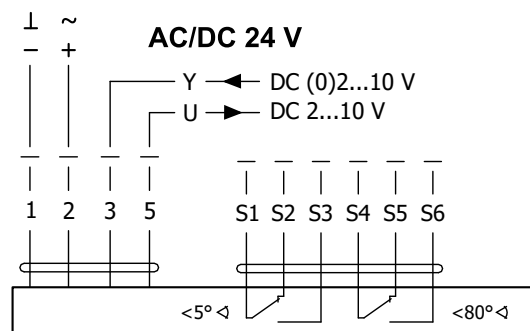
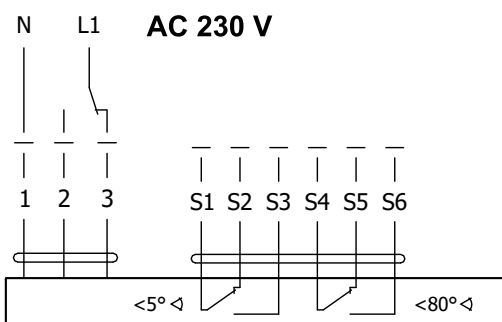


Fig. 7. Actuator Belimo BEE 230



Tabel 4. Actuator Belimo BE 24-12(-ST), BE 230-12

| Actuator Belimo - 40 Nm | BE 24-12 (-ST) | BE 230-12 |
|-------------------------|--|---------------------------------------|
| | | |
| Power voltage | AC/DC 24 V 50/60 Hz | AC 230 V 50/60 Hz |
| Power consumption | | |
| – in operation | 12 W | 8 W |
| – in the end position | 0,5 W | 0,5 W |
| Dimensioning | 18 VA (I _{max} 8,2 A @ 5 ms) | 15 VA (I _{max} 7,9 A @ 5 ms) |
| Protection class | III | II |
| Degree of protection | IP 54 | |
| Adjustment time for 95° | < 60 s | |
| Ambient temperature | -30 °C ... +50 °C | |
| Storage temperature | -40 °C ... +80 °C | |
| Connection | | |
| – drive | Cable 1 m, 3 × 0,75 mm ² | |
| – auxiliary switch | Cable 1 m, 6 × 0,75 mm ² (BE 24-ST) with plug connectors | |

Fig. 8. Actuator Belimo BE 24-12

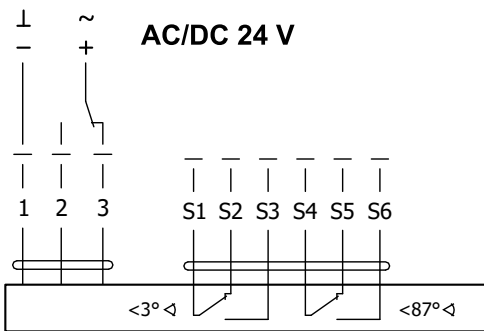
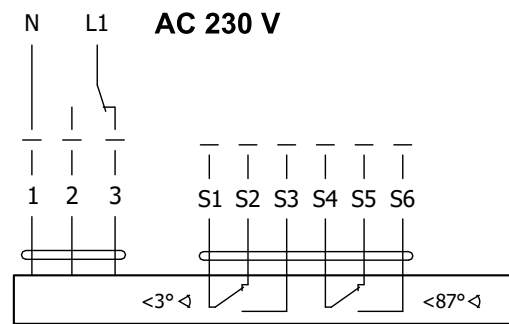


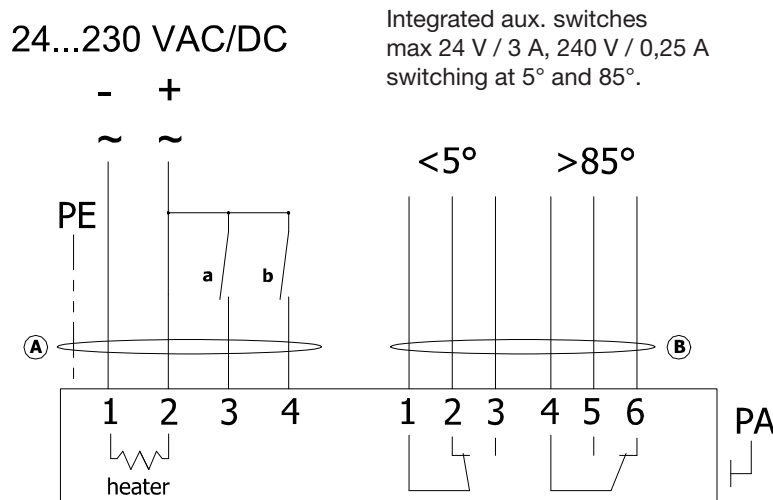
Fig. 9. Actuator Belimo BE 230-12



Tabel 5. Actuating mechanism Schischek InMax 50.75-S

| Actuating mechanism Schischek | InMax 50.75-S |
|-------------------------------|--------------------------------|
| Nominal voltage | 24–240 VAC/DC 50/60 Hz |
| Power consumption | |
| – motoring | 10 W |
| – heating | 16 W (start at –20 °C) |
| Protection class | I |
| Degree of protection | IP 66 |
| Running time for 95° | < 60 s |
| Ambient temperature range | –40 °C ... +50 °C |
| Non-operating temperature | –40 °C ... +70 °C |
| Connecting | Cabel 1 m, 0,5 mm ² |

Fig. 10. Actuating mechanism Schischek InMax 50.75-S



2.2 Design with the communication and supply device BKNE 230-24

Design .66

Design with communication and power supply device BKNE 230-24 and with actuator BEN (BEE, BE)-ST for 24V. The BKNE 230-24 serves on the one hand as a decentralized network device for powering the actuator and on the other hand transmits the signal of the communication and control device BKSE 24-6.

It simplifies electrical installation and connection of dampers. In the meantime, it facilitates “on-site inspection” and allows central control and inspection of dampers using a simple 2-wire line.

The BKNE 230-24 transmits the "OPEN" / "CLOSED" damper position (switches in the actuator) and fault messages to the BKSE 24-6. It also receives commands from the control device and controls the adjustment of the actuator to the desired position. The last control command will be retained even after a temporary network failure.

The BKNE 230-24 controls the switching position of the actuator, its adjustment time and the data exchange with the BKSE 24-6. In addition, it controls the actuator current (actuator connection) and the power supply.

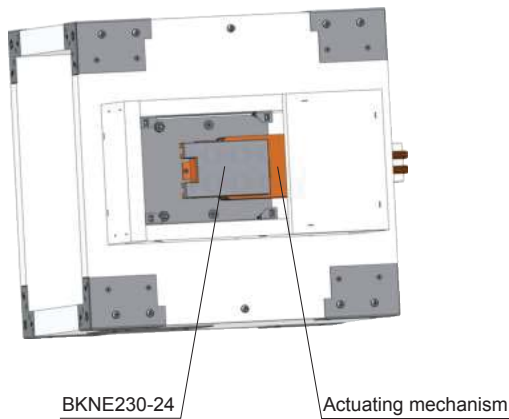
To simplify the connection, the actuator is equipped with plug connectors that plug directly into the BKNE 230-24.

The actuator, communication and power supply device BKNE 230-24 are mounted in an insulated cover, they are accessible after removing the cover. The electrical connection of the actuator and the BKNE 230-24 communication and power supply device is made with a non-flammable cable (or a cable located in an adjoining cable duct), the two-wire BKNE 230-24 cable should be connected to terminals 6 and 7. It is also recommended to use cable, which is used for fire signalling network. The cables pass through an opening made in the wall of the insulated cover when installing the damper or when connecting the actuator power cable. The cable entry must meet a minimum fire resistance of 30 minutes.

For more information on actuators and devices, see the Belimo catalogue.

This variant is not available for dampers with Schischek InMax 50.75-S actuator.

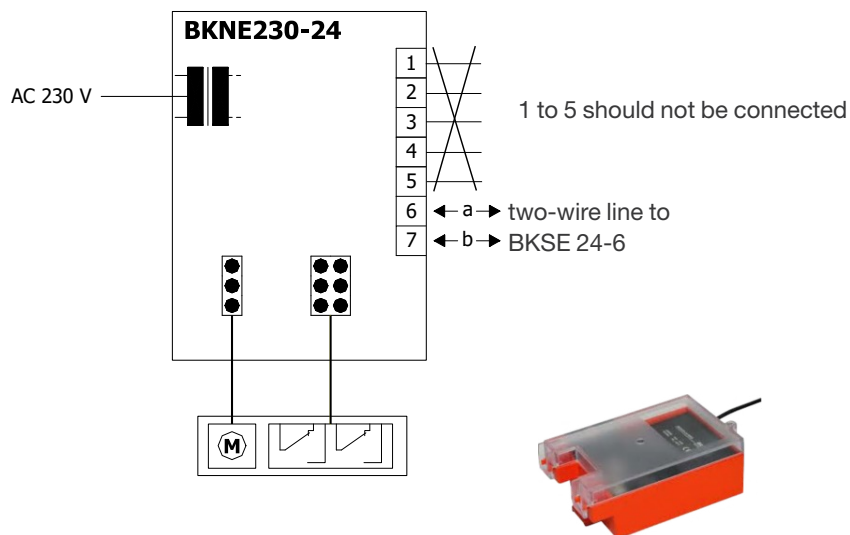
Fig. 11. Damper with actuating mech. and BKNE230-24



Tabel 6. Communication and power supply device BKNE 230-24

| Communication and power supply device | BKNE 230-24 |
|---------------------------------------|---|
| Power voltage | AC 230 V 50/60 Hz |
| Power consumption | 10 W (including actuator) |
| Dimensioning | 19 VA (including actuator) |
| Protection class | II |
| Ambient operation temperature | -30 °C ... +50 °C |
| Storage temperature | -40 °C ... +80 °C |
| Connection | |
| - network | cable 1 m without plug |
| - drive | 6-pin plug, 3-pin plug |
| - terminal blocks | screw terminals for 2x1,5 mm ² conductor |

Fig. 12. Communication and power supply device BKNE 230-24



Signaling

| LED | State | Function |
|-----------------|------------------------|---------------------------------------|
| yellow | flashing | damper rotates to the open position |
| yellow | lit-up | damper is open |
| green | flashing | damper rotates to the closed position |
| green | lit-up | damper is closed |
| yellow or green | flashes twice as often | fault |
| yellow + green | dark | network outage |

2.3 Communication and control devices

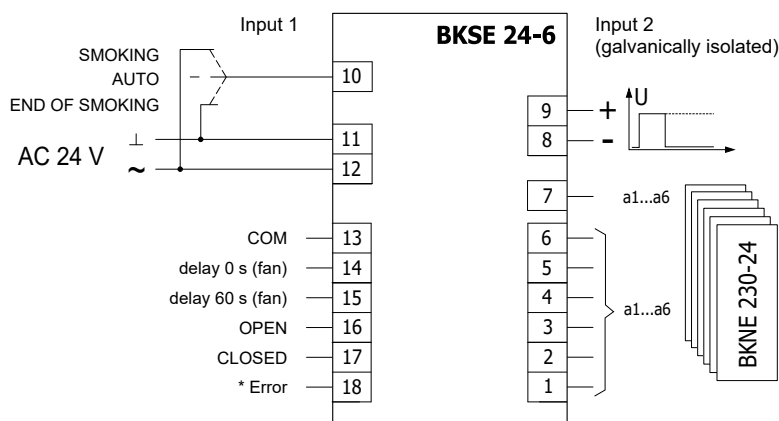
BKSE 24-6 indicates operating condition and faults of flue dampers. These conditions can be signalled or transmitted to the higher-level control system via the auxiliary built-in contacts. Signals from individual BKNE 230-24 are evaluated separately. All BKNE 230-24 are controlled simultaneously. A maximum of 6 BKNE 230-24 can be connected to the BKSE 24-6.

Damper control is ensured with a simple 2-wire line. The damper's correct function is indicated by two LEDs. The operating status of the entire control system and any errors are indicated by these LEDs and the corresponding error LED. Mounting and connection of BKSE 24-6 can be done on a 35mm DIN rail. It's connected using two 9-pin terminal blocks (plug connectors).

Table 7. Communication and control device BKSE 24-6

| Communication and control device | BKSE 24-6 |
|----------------------------------|---|
| Power voltage | AC 24 V 50/60Hz |
| Power consumption | 3,5 W (operating position) |
| Dimensioning | 5,5 VA 18 VA (I _{max} 6.4 A @ 2.5 ms) |
| Protection class | III (low voltage) |
| Degree of protection | IP 20 |
| Ambient operation temperature | 0 ... +50°C |
| Connection | screw terminals for 2x1.5 mm ² conductor |

Fig. 13. Communication and control device BKSE 24-6



3. Dimensions and weights

Fig. 14. Smoke extraction damper - multi - without flanges

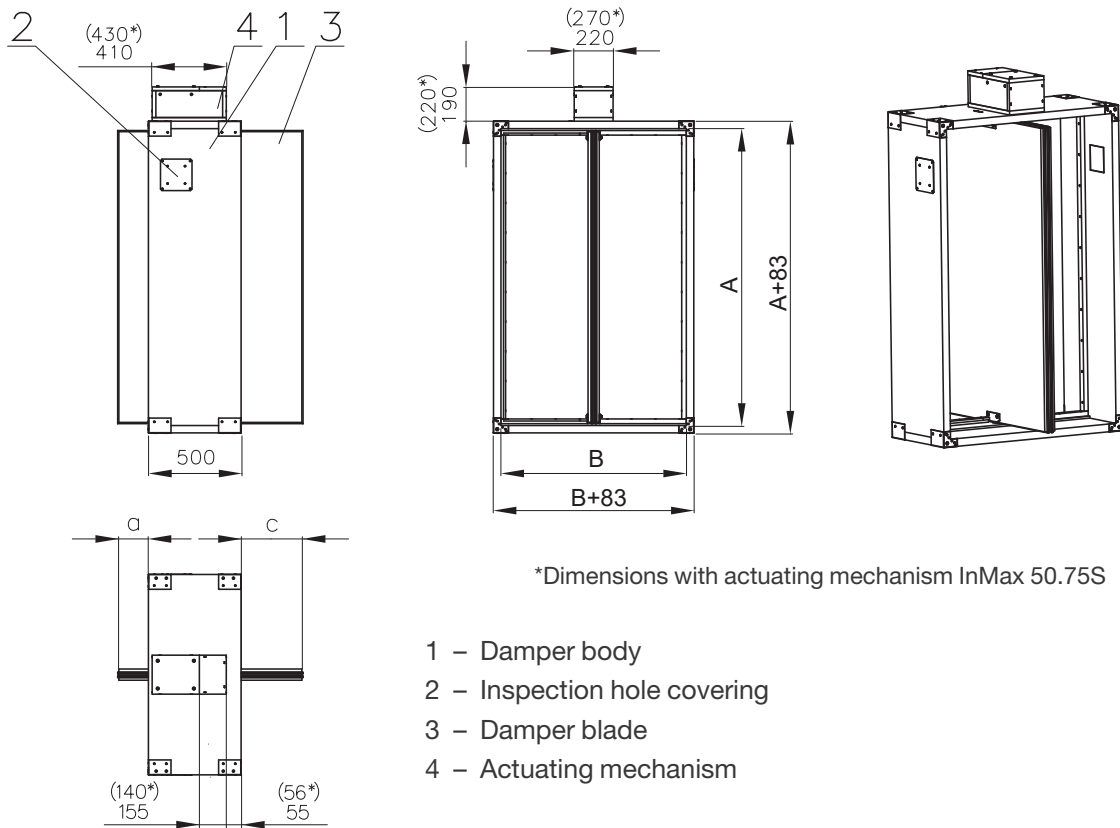
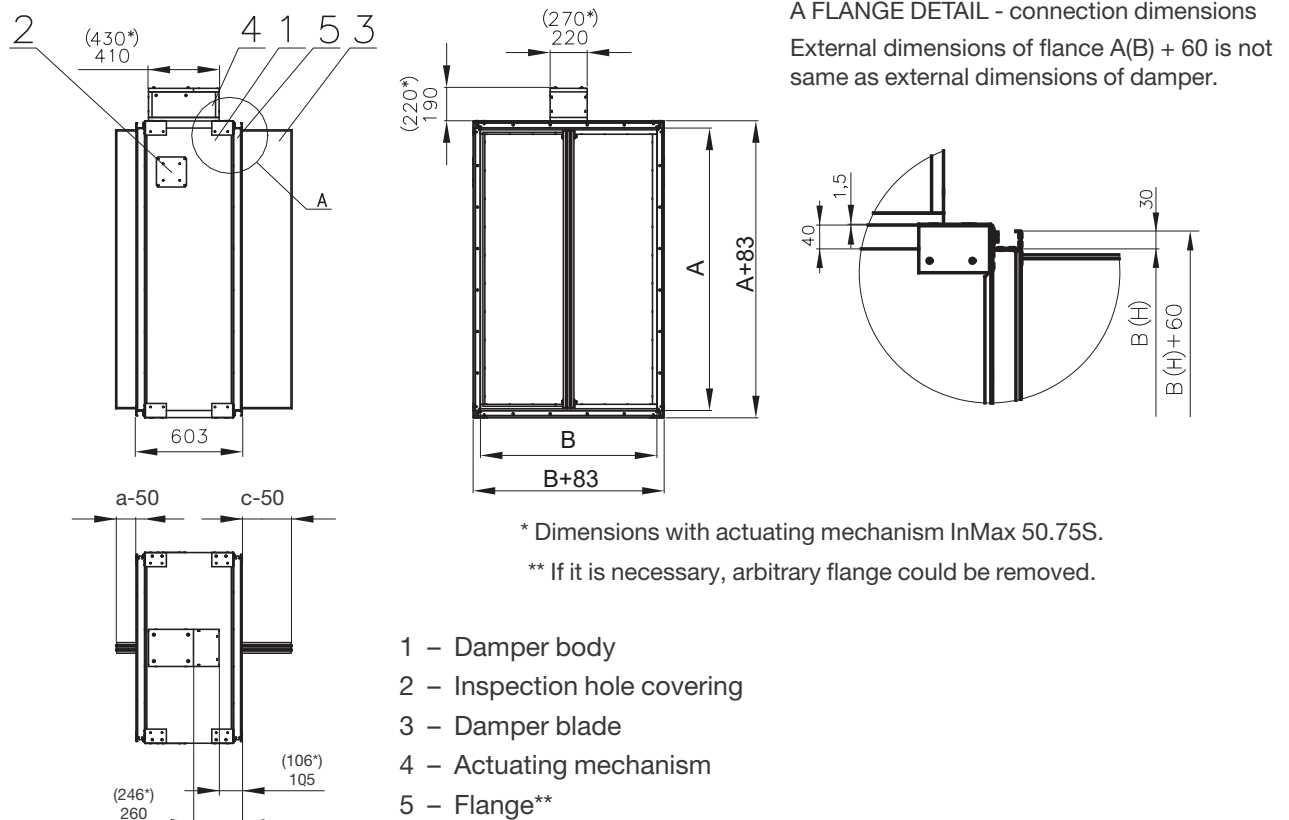


Fig. 15. Smoke extraction dampers - multi with flanges



| A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type | A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type |
|-----|------|-----|-----|-------------|---|--------------------------|-----|------|-----|-----|-------------|---|--------------------------|
| 180 | 180 | - | - | 38,3 | 0,0077 | BELIMO BEN (15 N.m) | 225 | 500 | - | 79 | 62,1 | 0,0605 | BELIMO BEN (15 N.m) |
| 180 | 200 | - | - | 39,6 | 0,0099 | BELIMO BEN (15 N.m) | 225 | 550 | - | 104 | 65,3 | 0,0682 | BELIMO BEN (15 N.m) |
| 180 | 225 | - | - | 41,2 | 0,0127 | BELIMO BEN (15 N.m) | 225 | 560 | - | 109 | 66,0 | 0,0698 | BELIMO BEN (15 N.m) |
| 180 | 250 | - | - | 42,8 | 0,0154 | BELIMO BEN (15 N.m) | 225 | 600 | - | 129 | 68,7 | 0,0760 | BELIMO BEN (15 N.m) |
| 180 | 280 | - | - | 44,6 | 0,0187 | BELIMO BEN (15 N.m) | 225 | 630 | - | 144 | 70,6 | 0,0806 | BELIMO BEN (15 N.m) |
| 180 | 300 | - | - | 45,9 | 0,0209 | BELIMO BEN (15 N.m) | 225 | 650 | - | 154 | 72,0 | 0,0837 | BELIMO BEN (15 N.m) |
| 180 | 315 | - | - | 46,8 | 0,0226 | BELIMO BEN (15 N.m) | 225 | 700 | 11 | 179 | 75,2 | 0,0915 | BELIMO BEN (15 N.m) |
| 180 | 355 | - | 6,5 | 49,3 | 0,0270 | BELIMO BEN (15 N.m) | 225 | 710 | 16 | 184 | 75,9 | 0,0930 | BELIMO BEN (15 N.m) |
| 180 | 400 | - | 29 | 52,1 | 0,0319 | BELIMO BEN (15 N.m) | 225 | 750 | 36 | 204 | 78,6 | 0,0992 | BELIMO BEN (15 N.m) |
| 180 | 450 | - | 54 | 55,2 | 0,0374 | BELIMO BEN (15 N.m) | 225 | 800 | 61 | 229 | 81,8 | 0,1070 | BELIMO BEE (25 N.m) |
| 180 | 500 | - | 79 | 58,3 | 0,0429 | BELIMO BEN (15 N.m) | 225 | 900 | 111 | 279 | 88,4 | 0,1225 | BELIMO BEE (25 N.m) |
| 180 | 550 | - | 104 | 61,4 | 0,0484 | BELIMO BEN (15 N.m) | 225 | 1000 | 161 | 329 | 94,9 | 0,1380 | BELIMO BEE (25 N.m) |
| 180 | 560 | - | 109 | 62,1 | 0,0495 | BELIMO BEN (15 N.m) | 250 | 180 | - | - | 42,5 | 0,0126 | BELIMO BEN (15 N.m) |
| 180 | 600 | - | 129 | 64,7 | 0,0539 | BELIMO BEN (15 N.m) | 250 | 200 | - | - | 43,9 | 0,0162 | BELIMO BEN (15 N.m) |
| 180 | 630 | - | 144 | 66,6 | 0,0572 | BELIMO BEN (15 N.m) | 250 | 225 | - | - | 45,6 | 0,0207 | BELIMO BEN (15 N.m) |
| 180 | 650 | - | 154 | 67,8 | 0,0594 | BELIMO BEN (15 N.m) | 250 | 250 | - | - | 47,3 | 0,0252 | BELIMO BEN (15 N.m) |
| 180 | 700 | 11 | 179 | 70,9 | 0,0649 | BELIMO BEN (15 N.m) | 250 | 280 | - | - | 49,3 | 0,0306 | BELIMO BEN (15 N.m) |
| 180 | 710 | 16 | 184 | 71,6 | 0,0660 | BELIMO BEN (15 N.m) | 250 | 300 | - | - | 50,6 | 0,0342 | BELIMO BEN (15 N.m) |
| 180 | 750 | 36 | 204 | 74,0 | 0,0704 | BELIMO BEN (15 N.m) | 250 | 315 | - | - | 51,7 | 0,0369 | BELIMO BEN (15 N.m) |
| 180 | 800 | 61 | 229 | 77,1 | 0,0759 | BELIMO BEE (25 N.m) | 250 | 355 | - | 6,5 | 54,4 | 0,0441 | BELIMO BEN (15 N.m) |
| 180 | 900 | 111 | 279 | 83,4 | 0,0869 | BELIMO BEE (25 N.m) | 250 | 400 | - | 29 | 57,4 | 0,0522 | BELIMO BEN (15 N.m) |
| 180 | 1000 | 161 | 329 | 89,6 | 0,0979 | BELIMO BEE (25 N.m) | 250 | 450 | - | 54 | 60,8 | 0,0612 | BELIMO BEN (15 N.m) |
| 200 | 180 | - | - | 39,6 | 0,0091 | BELIMO BEN (15 N.m) | 250 | 500 | - | 79 | 64,1 | 0,0702 | BELIMO BEN (15 N.m) |
| 200 | 200 | - | - | 40,9 | 0,0117 | BELIMO BEN (15 N.m) | 250 | 550 | - | 104 | 67,5 | 0,0792 | BELIMO BEN (15 N.m) |
| 200 | 225 | - | - | 42,4 | 0,0150 | BELIMO BEN (15 N.m) | 250 | 560 | - | 109 | 68,2 | 0,0810 | BELIMO BEN (15 N.m) |
| 200 | 250 | - | - | 44,0 | 0,0182 | BELIMO BEN (15 N.m) | 250 | 600 | - | 129 | 70,9 | 0,0882 | BELIMO BEN (15 N.m) |
| 200 | 280 | - | - | 45,9 | 0,0221 | BELIMO BEN (15 N.m) | 250 | 630 | - | 144 | 72,9 | 0,0936 | BELIMO BEN (15 N.m) |
| 200 | 300 | - | - | 47,3 | 0,0247 | BELIMO BEN (15 N.m) | 250 | 650 | - | 154 | 74,3 | 0,0972 | BELIMO BEN (15 N.m) |
| 200 | 315 | - | - | 48,2 | 0,0267 | BELIMO BEN (15 N.m) | 250 | 700 | 11 | 179 | 77,6 | 0,1062 | BELIMO BEN (15 N.m) |
| 200 | 355 | - | 6,5 | 50,8 | 0,0319 | BELIMO BEN (15 N.m) | 250 | 710 | 16 | 184 | 78,3 | 0,1080 | BELIMO BEN (15 N.m) |
| 200 | 400 | - | 29 | 53,6 | 0,0377 | BELIMO BEN (15 N.m) | 250 | 750 | 36 | 204 | 81,0 | 0,1152 | BELIMO BEN (15 N.m) |
| 200 | 450 | - | 54 | 56,8 | 0,0442 | BELIMO BEN (15 N.m) | 250 | 800 | 61 | 229 | 84,4 | 0,1242 | BELIMO BEE (25 N.m) |
| 200 | 500 | - | 79 | 60,1 | 0,0507 | BELIMO BEN (15 N.m) | 250 | 900 | 111 | 279 | 91,1 | 0,1422 | BELIMO BEE (25 N.m) |
| 200 | 550 | - | 104 | 63,2 | 0,0572 | BELIMO BEN (15 N.m) | 250 | 1000 | 161 | 329 | 97,9 | 0,1602 | BELIMO BEE (25 N.m) |
| 200 | 560 | - | 109 | 63,9 | 0,0585 | BELIMO BEN (15 N.m) | 280 | 180 | - | - | 42,8 | 0,0147 | BELIMO BEN (15 N.m) |
| 200 | 600 | - | 129 | 66,4 | 0,0637 | BELIMO BEN (15 N.m) | 280 | 200 | - | - | 44,1 | 0,0189 | BELIMO BEN (15 N.m) |
| 200 | 630 | - | 144 | 68,3 | 0,0676 | BELIMO BEN (15 N.m) | 280 | 225 | - | - | 45,8 | 0,0242 | BELIMO BEN (15 N.m) |
| 200 | 650 | - | 154 | 69,7 | 0,0702 | BELIMO BEN (15 N.m) | 280 | 250 | - | - | 47,5 | 0,0294 | BELIMO BEN (15 N.m) |
| 200 | 700 | 11 | 179 | 72,8 | 0,0767 | BELIMO BEN (15 N.m) | 280 | 280 | - | - | 49,4 | 0,0357 | BELIMO BEN (15 N.m) |
| 200 | 710 | 16 | 184 | 73,4 | 0,0780 | BELIMO BEN (15 N.m) | 280 | 300 | - | - | 50,8 | 0,0399 | BELIMO BEN (15 N.m) |
| 200 | 750 | 36 | 204 | 76,0 | 0,0832 | BELIMO BEN (15 N.m) | 280 | 315 | - | - | 51,7 | 0,0431 | BELIMO BEN (15 N.m) |
| 200 | 800 | 61 | 229 | 79,2 | 0,0897 | BELIMO BEE (25 N.m) | 280 | 355 | - | 6,5 | 54,5 | 0,0515 | BELIMO BEN (15 N.m) |
| 200 | 900 | 111 | 279 | 85,6 | 0,1027 | BELIMO BEE (25 N.m) | 280 | 400 | - | 29 | 57,5 | 0,0609 | BELIMO BEN (15 N.m) |
| 200 | 1000 | 161 | 329 | 91,9 | 0,1157 | BELIMO BEE (25 N.m) | 280 | 450 | - | 54 | 60,8 | 0,0714 | BELIMO BEN (15 N.m) |
| 225 | 180 | - | - | 41,0 | 0,0109 | BELIMO BEN (15 N.m) | 280 | 500 | - | 79 | 64,2 | 0,0819 | BELIMO BEN (15 N.m) |
| 225 | 200 | - | - | 42,4 | 0,0140 | BELIMO BEN (15 N.m) | 280 | 550 | - | 104 | 67,5 | 0,0924 | BELIMO BEN (15 N.m) |
| 225 | 225 | - | - | 44 | 0,0178 | BELIMO BEN (15 N.m) | 280 | 560 | - | 109 | 68,3 | 0,0945 | BELIMO BEN (15 N.m) |
| 225 | 250 | - | - | 45,6 | 0,0217 | BELIMO BEN (15 N.m) | 280 | 600 | - | 129 | 70,9 | 0,1029 | BELIMO BEN (15 N.m) |
| 225 | 280 | - | - | 47,7 | 0,0264 | BELIMO BEN (15 N.m) | 280 | 630 | - | 144 | 72,9 | 0,1092 | BELIMO BEN (15 N.m) |
| 225 | 300 | - | - | 49,0 | 0,0295 | BELIMO BEN (15 N.m) | 280 | 650 | - | 154 | 74,2 | 0,1134 | BELIMO BEN (15 N.m) |
| 225 | 315 | - | - | 50,0 | 0,0318 | BELIMO BEN (15 N.m) | 280 | 700 | 11 | 179 | 77,6 | 0,1239 | BELIMO BEN (15 N.m) |
| 225 | 355 | - | 6,5 | 52,5 | 0,0380 | BELIMO BEN (15 N.m) | 280 | 710 | 16 | 184 | 78,3 | 0,1260 | BELIMO BEN (15 N.m) |
| 225 | 400 | - | 29 | 55,5 | 0,0450 | BELIMO BEN (15 N.m) | 280 | 750 | 36 | 204 | 80,9 | 0,1344 | BELIMO BEN (15 N.m) |
| 225 | 450 | - | 54 | 58,9 | 0,0527 | BELIMO BEN (15 N.m) | 280 | 800 | 61 | 229 | 84,2 | 0,1449 | BELIMO BEE (25 N.m) |

| A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type | A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type |
|-----|------|-----|-----|-------------|---|--------------------------|-----|------|-----|-----|-------------|---|--------------------------|
| 280 | 900 | 111 | 279 | 91,0 | 0,1659 | BELIMO BEE (25 N.m) | 355 | 400 | - | 29 | 62,0 | 0,0827 | BELIMO BEN (15 N.m) |
| 280 | 1000 | 161 | 329 | 97,6 | 0,1869 | BELIMO BEE (25 N.m) | 355 | 450 | - | 54 | 65,5 | 0,0969 | BELIMO BEN (15 N.m) |
| 300 | 180 | - | - | 43,9 | 0,0161 | BELIMO BEN (15 N.m) | 355 | 500 | - | 79 | 69,1 | 0,1112 | BELIMO BEN (15 N.m) |
| 300 | 200 | - | - | 45,2 | 0,0207 | BELIMO BEN (15 N.m) | 355 | 550 | - | 104 | 72,6 | 0,1254 | BELIMO BEN (15 N.m) |
| 300 | 225 | - | - | 46,9 | 0,0265 | BELIMO BEN (15 N.m) | 355 | 560 | - | 109 | 73,3 | 0,1283 | BELIMO BEN (15 N.m) |
| 300 | 250 | - | - | 48,8 | 0,0322 | BELIMO BEN (15 N.m) | 355 | 600 | - | 129 | 76,2 | 0,1397 | BELIMO BEN (15 N.m) |
| 300 | 280 | - | - | 50,7 | 0,0391 | BELIMO BEN (15 N.m) | 355 | 630 | - | 144 | 78,3 | 0,1482 | BELIMO BEN (15 N.m) |
| 300 | 300 | - | - | 52,1 | 0,0437 | BELIMO BEN (15 N.m) | 355 | 650 | - | 154 | 79,7 | 0,1539 | BELIMO BEN (15 N.m) |
| 300 | 315 | - | - | 53,2 | 0,0472 | BELIMO BEN (15 N.m) | 355 | 700 | 11 | 179 | 83,3 | 0,1682 | BELIMO BEN (15 N.m) |
| 300 | 355 | - | 6,5 | 55,9 | 0,0564 | BELIMO BEN (15 N.m) | 355 | 710 | 16 | 184 | 84,0 | 0,1710 | BELIMO BEN (15 N.m) |
| 300 | 400 | - | 29 | 58,9 | 0,0667 | BELIMO BEN (15 N.m) | 355 | 750 | 36 | 204 | 86,8 | 0,1824 | BELIMO BEN (15 N.m) |
| 300 | 450 | - | 54 | 62,4 | 0,0782 | BELIMO BEN (15 N.m) | 355 | 800 | 61 | 229 | 90,4 | 0,1967 | BELIMO BEN (15 N.m) |
| 300 | 500 | - | 79 | 65,8 | 0,0897 | BELIMO BEN (15 N.m) | 355 | 900 | 111 | 279 | 97,4 | 0,2252 | BELIMO BEN (15 N.m) |
| 300 | 550 | - | 104 | 69,2 | 0,1012 | BELIMO BEN (15 N.m) | 355 | 1000 | 161 | 329 | 104,6 | 0,2537 | BELIMO BEN (15 N.m) |
| 300 | 560 | - | 109 | 69,8 | 0,1035 | BELIMO BEN (15 N.m) | 400 | 180 | - | - | 49,7 | 0,0231 | BELIMO BEN (15 N.m) |
| 300 | 600 | - | 129 | 72,5 | 0,1127 | BELIMO BEN (15 N.m) | 400 | 200 | - | - | 51,2 | 0,0297 | BELIMO BEN (15 N.m) |
| 300 | 630 | - | 144 | 74,6 | 0,1196 | BELIMO BEN (15 N.m) | 400 | 225 | - | - | 53,0 | 0,0380 | BELIMO BEN (15 N.m) |
| 300 | 650 | - | 154 | 76,1 | 0,1242 | BELIMO BEN (15 N.m) | 400 | 250 | - | - | 55,0 | 0,0462 | BELIMO BEN (15 N.m) |
| 300 | 700 | 11 | 179 | 79,4 | 0,1357 | BELIMO BEN (15 N.m) | 400 | 280 | - | - | 57,2 | 0,0561 | BELIMO BEE (25 N.m) |
| 300 | 710 | 16 | 184 | 80,1 | 0,1380 | BELIMO BEN (15 N.m) | 400 | 300 | - | - | 58,8 | 0,0627 | BELIMO BEE (25 N.m) |
| 300 | 750 | 36 | 204 | 82,8 | 0,1472 | BELIMO BEN (15 N.m) | 400 | 315 | - | - | 59,8 | 0,0677 | BELIMO BEE (25 N.m) |
| 300 | 800 | 61 | 229 | 86,3 | 0,1587 | BELIMO BEE (25 N.m) | 400 | 355 | - | 6,5 | 62,9 | 0,0809 | BELIMO BEN (15 N.m) |
| 300 | 900 | 111 | 279 | 93,1 | 0,1817 | BELIMO BEE (25 N.m) | 400 | 400 | - | 29 | 66,2 | 0,0957 | BELIMO BEN (15 N.m) |
| 300 | 1000 | 161 | 329 | 100 | 0,2047 | BELIMO BEE (25 N.m) | 400 | 450 | - | 54 | 69,9 | 0,1122 | BELIMO BEN (15 N.m) |
| 315 | 180 | - | - | 44,7 | 0,0172 | BELIMO BEN (15 N.m) | 400 | 500 | - | 79 | 73,7 | 0,1287 | BELIMO BEN (15 N.m) |
| 315 | 200 | - | - | 46,2 | 0,0221 | BELIMO BEN (15 N.m) | 400 | 550 | - | 104 | 77,5 | 0,1452 | BELIMO BEN (15 N.m) |
| 315 | 225 | - | - | 47,8 | 0,0282 | BELIMO BEN (15 N.m) | 400 | 560 | - | 109 | 78,3 | 0,1485 | BELIMO BEN (15 N.m) |
| 315 | 250 | - | - | 49,7 | 0,0343 | BELIMO BEN (15 N.m) | 400 | 600 | - | 129 | 81,3 | 0,1617 | BELIMO BEN (15 N.m) |
| 315 | 280 | - | - | 51,7 | 0,0417 | BELIMO BEN (15 N.m) | 400 | 630 | - | 144 | 83,5 | 0,1716 | BELIMO BEN (15 N.m) |
| 315 | 300 | - | - | 53 | 0,0466 | BELIMO BEN (15 N.m) | 400 | 650 | - | 154 | 85,0 | 0,1782 | BELIMO BEN (15 N.m) |
| 315 | 315 | - | - | 54,1 | 0,0502 | BELIMO BEN (15 N.m) | 400 | 700 | 11 | 179 | 88,8 | 0,1947 | BELIMO BEN (15 N.m) |
| 315 | 355 | - | 6,5 | 56,9 | 0,0600 | BELIMO BEN (15 N.m) | 400 | 710 | 16 | 184 | 89,6 | 0,1980 | BELIMO BEN (15 N.m) |
| 315 | 400 | - | 29 | 60,1 | 0,0711 | BELIMO BEN (15 N.m) | 400 | 750 | 36 | 204 | 92,6 | 0,2112 | BELIMO BEN (15 N.m) |
| 315 | 450 | - | 54 | 63,4 | 0,0833 | BELIMO BEN (15 N.m) | 400 | 800 | 61 | 229 | 96,3 | 0,2277 | BELIMO BEN (15 N.m) |
| 315 | 500 | - | 79 | 67,0 | 0,0956 | BELIMO BEN (15 N.m) | 400 | 900 | 111 | 279 | 103,7 | 0,2607 | BELIMO BEN (15 N.m) |
| 315 | 550 | - | 104 | 70,5 | 0,1078 | BELIMO BEN (15 N.m) | 400 | 1000 | 161 | 329 | 111,3 | 0,2937 | BELIMO BEN (15 N.m) |
| 315 | 560 | - | 109 | 71,1 | 0,1103 | BELIMO BEN (15 N.m) | 450 | 180 | - | - | 52,7 | 0,0266 | BELIMO BEN (15 N.m) |
| 315 | 600 | - | 129 | 73,8 | 0,1201 | BELIMO BEN (15 N.m) | 450 | 200 | - | - | 54,2 | 0,0342 | BELIMO BEN (15 N.m) |
| 315 | 630 | - | 144 | 75,9 | 0,1274 | BELIMO BEN (15 N.m) | 450 | 225 | - | - | 56,2 | 0,0437 | BELIMO BEN (15 N.m) |
| 315 | 650 | - | 154 | 77,4 | 0,1323 | BELIMO BEN (15 N.m) | 450 | 250 | - | - | 58,1 | 0,0532 | BELIMO BEN (15 N.m) |
| 315 | 700 | 11 | 179 | 80,9 | 0,1446 | BELIMO BEN (15 N.m) | 450 | 280 | - | - | 60,5 | 0,0646 | BELIMO BEE (25 N.m) |
| 315 | 710 | 16 | 184 | 81,5 | 0,1470 | BELIMO BEN (15 N.m) | 450 | 300 | - | - | 62,0 | 0,0722 | BELIMO BEE (25 N.m) |
| 315 | 750 | 36 | 204 | 84,2 | 0,1568 | BELIMO BEN (15 N.m) | 450 | 315 | - | - | 63,2 | 0,0779 | BELIMO BEE (25 N.m) |
| 315 | 800 | 61 | 229 | 87,8 | 0,1691 | BELIMO BEE (25 N.m) | 450 | 355 | - | 6,5 | 66,3 | 0,0931 | BELIMO BEN (15 N.m) |
| 315 | 900 | 111 | 279 | 94,6 | 0,1936 | BELIMO BEE (25 N.m) | 450 | 400 | - | 29 | 69,9 | 0,1102 | BELIMO BEN (15 N.m) |
| 315 | 1000 | 161 | 329 | 101,7 | 0,2181 | BELIMO BEE (25 N.m) | 450 | 450 | - | 54 | 73,8 | 0,1292 | BELIMO BEN (15 N.m) |
| 355 | 180 | - | - | 46,3 | 0,0200 | BELIMO BEN (15 N.m) | 450 | 500 | - | 79 | 77,7 | 0,1482 | BELIMO BEN (15 N.m) |
| 355 | 200 | - | - | 47,7 | 0,0257 | BELIMO BEN (15 N.m) | 450 | 550 | - | 104 | 81,6 | 0,1672 | BELIMO BEN (15 N.m) |
| 355 | 225 | - | - | 49,5 | 0,0328 | BELIMO BEN (15 N.m) | 450 | 560 | - | 109 | 82,4 | 0,1710 | BELIMO BEN (15 N.m) |
| 355 | 250 | - | - | 51,3 | 0,0399 | BELIMO BEN (15 N.m) | 450 | 600 | - | 129 | 85,5 | 0,1862 | BELIMO BEN (15 N.m) |
| 355 | 280 | - | - | 53,5 | 0,0485 | BELIMO BEE (25 N.m) | 450 | 630 | - | 144 | 87,9 | 0,1976 | BELIMO BEN (15 N.m) |
| 355 | 300 | - | - | 54,9 | 0,0542 | BELIMO BEE (25 N.m) | 450 | 650 | - | 154 | 89,4 | 0,2052 | BELIMO BEN (15 N.m) |
| 355 | 315 | - | - | 55,9 | 0,0584 | BELIMO BEE (25 N.m) | 450 | 700 | 11 | 179 | 93,5 | 0,2242 | BELIMO BEN (15 N.m) |
| 355 | 355 | - | 6,5 | 58,8 | 0,0698 | BELIMO BEN (15 N.m) | 450 | 710 | 16 | 184 | 94,3 | 0,2280 | BELIMO BEN (15 N.m) |

| A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type | A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type |
|-----|------|-----|-----|-------------|---|--------------------------|-----|------|-----|-----|-------------|---|--------------------------|
| 450 | 750 | 36 | 204 | 97,4 | 0,2432 | BELIMO BEN (15 N.m) | 560 | 315 | - | - | 67,9 | 0,1005 | BELIMO BEN (15 N.m) |
| 450 | 800 | 61 | 229 | 101,3 | 0,2622 | BELIMO BEE (25 N.m) | 560 | 355 | - | 6,5 | 71,3 | 0,1201 | BELIMO BEN (15 N.m) |
| 450 | 900 | 111 | 279 | 109,1 | 0,3002 | BELIMO BEE (25 N.m) | 560 | 400 | - | 29 | 74,9 | 0,1421 | BELIMO BEN (15 N.m) |
| 450 | 1000 | 161 | 329 | 118,3 | 0,3382 | BELIMO BEE (25 N.m) | 560 | 450 | - | 54 | 79,0 | 0,1666 | BELIMO BEN (15 N.m) |
| 500 | 180 | - | - | 53,4 | 0,0301 | BELIMO BEN (15 N.m) | 560 | 500 | - | 79 | 83,1 | 0,1911 | BELIMO BEN (15 N.m) |
| 500 | 200 | - | - | 55,0 | 0,0387 | BELIMO BEN (15 N.m) | 560 | 550 | - | 104 | 87,3 | 0,2156 | BELIMO BEN (15 N.m) |
| 500 | 225 | - | - | 56,9 | 0,0495 | BELIMO BEN (15 N.m) | 560 | 560 | - | 109 | 88,1 | 0,2205 | BELIMO BEN (15 N.m) |
| 500 | 250 | - | - | 58,9 | 0,0602 | BELIMO BEN (15 N.m) | 560 | 600 | - | 129 | 91,5 | 0,2401 | BELIMO BEN (15 N.m) |
| 500 | 280 | - | - | 61,3 | 0,0731 | BELIMO BEN (15 N.m) | 560 | 630 | - | 144 | 93,9 | 0,2548 | BELIMO BEN (15 N.m) |
| 500 | 300 | - | - | 62,9 | 0,0817 | BELIMO BEN (15 N.m) | 560 | 650 | - | 154 | 95,6 | 0,2646 | BELIMO BEN (15 N.m) |
| 500 | 315 | - | - | 64,0 | 0,0882 | BELIMO BEN (15 N.m) | 560 | 700 | 11 | 179 | 99,8 | 0,2891 | BELIMO BEN (15 N.m) |
| 500 | 355 | - | 6,5 | 67,1 | 0,1054 | BELIMO BEN (15 N.m) | 560 | 710 | 16 | 184 | 100,5 | 0,2940 | BELIMO BEN (15 N.m) |
| 500 | 400 | - | 29 | 70,8 | 0,1247 | BELIMO BEN (15 N.m) | 560 | 750 | 36 | 204 | 103,9 | 0,3136 | BELIMO BEE (25 N.m) |
| 500 | 450 | - | 54 | 74,6 | 0,1462 | BELIMO BEN (15 N.m) | 560 | 800 | 61 | 229 | 108,0 | 0,3381 | BELIMO BEE (25 N.m) |
| 500 | 500 | - | 79 | 78,6 | 0,1677 | BELIMO BEN (15 N.m) | 560 | 900 | 111 | 279 | 117,5 | 0,3871 | BELIMO BEE (25 N.m) |
| 500 | 550 | - | 104 | 82,5 | 0,1892 | BELIMO BEN (15 N.m) | 560 | 1000 | 161 | 329 | 125,8 | 0,4361 | BELIMO BE (40 N.m) |
| 500 | 560 | - | 109 | 83,3 | 0,1935 | BELIMO BEN (15 N.m) | 600 | 180 | - | - | 59,0 | 0,0371 | BELIMO BEN (15 N.m) |
| 500 | 600 | - | 129 | 86,5 | 0,2107 | BELIMO BEN (15 N.m) | 600 | 200 | - | - | 60,6 | 0,0477 | BELIMO BEN (15 N.m) |
| 500 | 630 | - | 144 | 88,8 | 0,2236 | BELIMO BEN (15 N.m) | 600 | 225 | - | - | 62,8 | 0,0610 | BELIMO BEN (15 N.m) |
| 500 | 650 | - | 154 | 90,4 | 0,2322 | BELIMO BEN (15 N.m) | 600 | 250 | - | - | 65,0 | 0,0742 | BELIMO BEN (15 N.m) |
| 500 | 700 | 11 | 179 | 94,4 | 0,2537 | BELIMO BEN (15 N.m) | 600 | 280 | - | - | 67,5 | 0,0901 | BELIMO BEN (15 N.m) |
| 500 | 710 | 16 | 184 | 95,1 | 0,2580 | BELIMO BEN (15 N.m) | 600 | 300 | - | - | 69,3 | 0,1007 | BELIMO BEN (15 N.m) |
| 500 | 750 | 36 | 204 | 98,3 | 0,2752 | BELIMO BEN (15 N.m) | 600 | 315 | - | - | 70,5 | 0,1087 | BELIMO BEN (15 N.m) |
| 500 | 800 | 61 | 229 | 102,3 | 0,2967 | BELIMO BEE (25 N.m) | 600 | 355 | - | 6,5 | 73,9 | 0,1299 | BELIMO BEN (15 N.m) |
| 500 | 900 | 111 | 279 | 110,0 | 0,3397 | BELIMO BEE (25 N.m) | 600 | 400 | - | 29 | 77,8 | 0,1537 | BELIMO BEN (15 N.m) |
| 500 | 1000 | 161 | 329 | 119,3 | 0,3827 | BELIMO BEE (25 N.m) | 600 | 450 | - | 54 | 82,0 | 0,1802 | BELIMO BEN (15 N.m) |
| 550 | 180 | - | - | 56,1 | 0,0336 | BELIMO BEN (15 N.m) | 600 | 500 | - | 79 | 86,3 | 0,2067 | BELIMO BEN (15 N.m) |
| 550 | 200 | - | - | 57,9 | 0,0432 | BELIMO BEN (15 N.m) | 600 | 550 | - | 104 | 90,5 | 0,2332 | BELIMO BEN (15 N.m) |
| 550 | 225 | - | - | 59,9 | 0,0552 | BELIMO BEN (15 N.m) | 600 | 560 | - | 109 | 91,4 | 0,2385 | BELIMO BEN (15 N.m) |
| 550 | 250 | - | - | 61,9 | 0,0672 | BELIMO BEN (15 N.m) | 600 | 600 | - | 129 | 94,8 | 0,2597 | BELIMO BEN (15 N.m) |
| 550 | 280 | - | - | 64,4 | 0,0816 | BELIMO BEN (15 N.m) | 600 | 630 | - | 144 | 97,4 | 0,2756 | BELIMO BEN (15 N.m) |
| 550 | 300 | - | - | 66,0 | 0,0912 | BELIMO BEN (15 N.m) | 600 | 650 | - | 154 | 99,0 | 0,2862 | BELIMO BEN (15 N.m) |
| 550 | 315 | - | - | 67,3 | 0,0984 | BELIMO BEN (15 N.m) | 600 | 700 | 11 | 179 | 103,3 | 0,3127 | BELIMO BEN (15 N.m) |
| 550 | 355 | - | 6,5 | 70,5 | 0,1176 | BELIMO BEN (15 N.m) | 600 | 710 | 16 | 184 | 104,1 | 0,3180 | BELIMO BEN (15 N.m) |
| 550 | 400 | - | 29 | 74,3 | 0,1392 | BELIMO BEN (15 N.m) | 600 | 750 | 36 | 204 | 107,5 | 0,3392 | BELIMO BEE (25 N.m) |
| 550 | 450 | - | 54 | 78,3 | 0,1632 | BELIMO BEN (15 N.m) | 600 | 800 | 61 | 229 | 111,8 | 0,3657 | BELIMO BEE (25 N.m) |
| 550 | 500 | - | 79 | 82,4 | 0,1872 | BELIMO BEN (15 N.m) | 600 | 900 | 111 | 279 | 121,6 | 0,4187 | BELIMO BEE (25 N.m) |
| 550 | 550 | - | 104 | 86,5 | 0,2112 | BELIMO BEN (15 N.m) | 600 | 1000 | 161 | 329 | 130,1 | 0,4717 | BELIMO BE (40 N.m) |
| 550 | 560 | - | 109 | 87,4 | 0,2160 | BELIMO BEN (15 N.m) | 630 | 180 | - | - | 60,6 | 0,0392 | BELIMO BEN (15 N.m) |
| 550 | 600 | - | 129 | 90,6 | 0,2352 | BELIMO BEN (15 N.m) | 630 | 200 | - | - | 62,4 | 0,0504 | BELIMO BEN (15 N.m) |
| 550 | 630 | - | 144 | 93,1 | 0,2496 | BELIMO BEN (15 N.m) | 630 | 225 | - | - | 64,6 | 0,0644 | BELIMO BEN (15 N.m) |
| 550 | 650 | - | 154 | 94,8 | 0,2592 | BELIMO BEN (15 N.m) | 630 | 250 | - | - | 66,8 | 0,0784 | BELIMO BEN (15 N.m) |
| 550 | 700 | 11 | 179 | 98,8 | 0,2832 | BELIMO BEN (15 N.m) | 630 | 280 | - | - | 69,4 | 0,0952 | BELIMO BEN (15 N.m) |
| 550 | 710 | 16 | 184 | 99,6 | 0,2880 | BELIMO BEN (15 N.m) | 630 | 300 | - | - | 71,1 | 0,1064 | BELIMO BEN (15 N.m) |
| 550 | 750 | 36 | 204 | 102,9 | 0,3072 | BELIMO BEE (25 N.m) | 630 | 315 | - | - | 72,4 | 0,1148 | BELIMO BEN (15 N.m) |
| 550 | 800 | 61 | 229 | 107 | 0,3312 | BELIMO BEE (25 N.m) | 630 | 355 | - | 6,5 | 75,9 | 0,1372 | BELIMO BEN (15 N.m) |
| 550 | 900 | 111 | 279 | 116,5 | 0,3792 | BELIMO BEE (25 N.m) | 630 | 400 | - | 29 | 79,9 | 0,1624 | BELIMO BEN (15 N.m) |
| 550 | 1000 | 161 | 329 | 124,6 | 0,4272 | BELIMO BE (40 N.m) | 630 | 450 | - | 54 | 84,1 | 0,1904 | BELIMO BEN (15 N.m) |
| 560 | 180 | - | - | 56,8 | 0,0343 | BELIMO BEN (15 N.m) | 630 | 500 | - | 79 | 88,5 | 0,2184 | BELIMO BEN (15 N.m) |
| 560 | 200 | - | - | 58,4 | 0,0441 | BELIMO BEN (15 N.m) | 630 | 550 | - | 104 | 92,9 | 0,2464 | BELIMO BEN (15 N.m) |
| 560 | 225 | - | - | 60,5 | 0,0564 | BELIMO BEN (15 N.m) | 630 | 560 | - | 109 | 93,8 | 0,2520 | BELIMO BEN (15 N.m) |
| 560 | 250 | - | - | 62,5 | 0,0686 | BELIMO BEN (15 N.m) | 630 | 600 | - | 129 | 97,3 | 0,2744 | BELIMO BEN (15 N.m) |
| 560 | 280 | - | - | 65,0 | 0,0833 | BELIMO BEN (15 N.m) | 630 | 630 | - | 144 | 99,9 | 0,2912 | BELIMO BEN (15 N.m) |
| 560 | 300 | - | - | 66,6 | 0,0931 | BELIMO BEN (15 N.m) | 630 | 650 | - | 154 | 101,6 | 0,3024 | BELIMO BEN (15 N.m) |

| A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type | A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type |
|-----|------|-----|-----|-------------|---|--------------------------|-----|------|-----|-----|-------------|---|--------------------------|
| 630 | 700 | 11 | 179 | 106 | 0,3304 | BELIMO BEN (15 N.m) | 710 | 280 | - | - | 59,5 | 0,1088 | BELIMO BEN (15 N.m) |
| 630 | 710 | 16 | 184 | 106,9 | 0,3360 | BELIMO BEN (15 N.m) | 710 | 300 | - | - | 61,0 | 0,1216 | BELIMO BEN (15 N.m) |
| 630 | 750 | 36 | 204 | 110,4 | 0,3584 | BELIMO BEE (25 N.m) | 710 | 315 | - | - | 62,1 | 0,1312 | BELIMO BEN (15 N.m) |
| 630 | 800 | 61 | 229 | 114,8 | 0,3864 | BELIMO BEE (25 N.m) | 710 | 355 | - | 6,5 | 65,0 | 0,1568 | BELIMO BEN (15 N.m) |
| 630 | 900 | 111 | 279 | 124,6 | 0,4424 | BELIMO BEE (25 N.m) | 710 | 400 | - | 29 | 68,4 | 0,1856 | BELIMO BEN (15 N.m) |
| 630 | 1000 | 161 | 329 | 133,4 | 0,4984 | BELIMO BE (40 N.m) | 710 | 450 | - | 54 | 72,0 | 0,2176 | BELIMO BEN (15 N.m) |
| 650 | 180 | - | - | 61,8 | 0,0406 | BELIMO BEN (15 N.m) | 710 | 500 | - | 79 | 75,7 | 0,2496 | BELIMO BEN (15 N.m) |
| 650 | 200 | - | - | 63,5 | 0,0522 | BELIMO BEN (15 N.m) | 710 | 550 | - | 104 | 79,4 | 0,2816 | BELIMO BEN (15 N.m) |
| 650 | 225 | - | - | 65,8 | 0,0667 | BELIMO BEN (15 N.m) | 710 | 560 | - | 109 | 80,2 | 0,2880 | BELIMO BEN (15 N.m) |
| 650 | 250 | - | - | 68,0 | 0,0812 | BELIMO BEN (15 N.m) | 710 | 600 | - | 129 | 83,1 | 0,3136 | BELIMO BEN (15 N.m) |
| 650 | 280 | - | - | 70,6 | 0,0986 | BELIMO BEN (15 N.m) | 710 | 630 | - | 144 | 85,3 | 0,3328 | BELIMO BEE (25 N.m) |
| 650 | 300 | - | - | 72,4 | 0,1102 | BELIMO BEN (15 N.m) | 710 | 650 | - | 154 | 86,8 | 0,3456 | BELIMO BEE (25 N.m) |
| 650 | 315 | - | - | 73,8 | 0,1189 | BELIMO BEN (15 N.m) | 710 | 700 | 11 | 179 | 90,5 | 0,3776 | BELIMO BEE (25 N.m) |
| 650 | 355 | - | 6,5 | 77,3 | 0,1421 | BELIMO BEN (15 N.m) | 710 | 710 | 16 | 184 | 91,3 | 0,3840 | BELIMO BEE (25 N.m) |
| 650 | 400 | - | 29 | 81,3 | 0,1682 | BELIMO BEN (15 N.m) | 710 | 750 | 36 | 204 | 94,2 | 0,4096 | BELIMO BEE (25 N.m) |
| 650 | 450 | - | 54 | 85,6 | 0,1972 | BELIMO BEN (15 N.m) | 710 | 800 | 61 | 229 | 98,9 | 0,4416 | BELIMO BEE (25 N.m) |
| 650 | 500 | - | 79 | 90,1 | 0,2262 | BELIMO BEN (15 N.m) | 710 | 900 | 111 | 279 | 106,3 | 0,5056 | BELIMO BE (40 N.m) |
| 650 | 550 | - | 104 | 94,5 | 0,2552 | BELIMO BEN (15 N.m) | 710 | 1000 | 161 | 329 | 113,7 | 0,5696 | BELIMO BE (40 N.m) |
| 650 | 560 | - | 109 | 95,4 | 0,2610 | BELIMO BEN (15 N.m) | 750 | 180 | - | - | 53,9 | 0,0476 | BELIMO BEN (15 N.m) |
| 650 | 600 | - | 129 | 98,9 | 0,2842 | BELIMO BEN (15 N.m) | 750 | 200 | - | - | 55,4 | 0,0612 | BELIMO BEN (15 N.m) |
| 650 | 630 | - | 144 | 101,6 | 0,3016 | BELIMO BEN (15 N.m) | 750 | 225 | - | - | 57,3 | 0,0782 | BELIMO BEN (15 N.m) |
| 650 | 650 | - | 154 | 103,4 | 0,3132 | BELIMO BEN (15 N.m) | 750 | 250 | - | - | 59,2 | 0,0952 | BELIMO BEN (15 N.m) |
| 650 | 700 | 11 | 179 | 107,8 | 0,3422 | BELIMO BEN (15 N.m) | 750 | 280 | - | - | 61,5 | 0,1156 | BELIMO BEN (15 N.m) |
| 650 | 710 | 16 | 184 | 108,6 | 0,3480 | BELIMO BEN (15 N.m) | 750 | 300 | - | - | 63,0 | 0,1292 | BELIMO BEN (15 N.m) |
| 650 | 750 | 36 | 204 | 112,3 | 0,3712 | BELIMO BEE (25 N.m) | 750 | 315 | - | - | 64,1 | 0,1394 | BELIMO BEN (15 N.m) |
| 650 | 800 | 61 | 229 | 117,9 | 0,4002 | BELIMO BEE (25 N.m) | 750 | 355 | - | 6,5 | 67,2 | 0,1666 | BELIMO BEN (15 N.m) |
| 650 | 900 | 111 | 279 | 126,8 | 0,4582 | BELIMO BE (40 N.m) | 750 | 400 | - | 29 | 70,6 | 0,1972 | BELIMO BEN (15 N.m) |
| 650 | 1000 | 161 | 329 | 135,6 | 0,5162 | BELIMO BE (40 N.m) | 750 | 450 | - | 54 | 74,4 | 0,2312 | BELIMO BEN (15 N.m) |
| 700 | 180 | - | - | 64,5 | 0,0441 | BELIMO BEN (15 N.m) | 750 | 500 | - | 79 | 78,2 | 0,2652 | BELIMO BEN (15 N.m) |
| 700 | 200 | - | - | 66,4 | 0,0567 | BELIMO BEN (15 N.m) | 750 | 550 | - | 104 | 82,0 | 0,2992 | BELIMO BEN (15 N.m) |
| 700 | 225 | - | - | 68,8 | 0,0725 | BELIMO BEN (15 N.m) | 750 | 560 | - | 109 | 82,8 | 0,3060 | BELIMO BEN (15 N.m) |
| 700 | 250 | - | - | 71,0 | 0,0882 | BELIMO BEN (15 N.m) | 750 | 600 | - | 129 | 103 | 0,3332 | BELIMO BEN (15 N.m) |
| 700 | 280 | - | - | 73,8 | 0,1071 | BELIMO BEN (15 N.m) | 750 | 630 | - | 144 | 105,7 | 0,3536 | BELIMO BEE (25 N.m) |
| 700 | 300 | - | - | 75,6 | 0,1197 | BELIMO BEN (15 N.m) | 750 | 650 | - | 154 | 107,5 | 0,3672 | BELIMO BEE (25 N.m) |
| 700 | 315 | - | - | 61,6 | 0,1292 | BELIMO BEN (15 N.m) | 750 | 700 | 11 | 179 | 112,1 | 0,4012 | BELIMO BEE (25 N.m) |
| 700 | 355 | - | 6,5 | 64,5 | 0,1544 | BELIMO BEN (15 N.m) | 750 | 710 | 16 | 184 | 113,0 | 0,4080 | BELIMO BEE (25 N.m) |
| 700 | 400 | - | 29 | 67,8 | 0,1827 | BELIMO BEN (15 N.m) | 750 | 750 | 36 | 204 | 117,8 | 0,4352 | BELIMO BEE (25 N.m) |
| 700 | 450 | - | 54 | 71,5 | 0,2142 | BELIMO BEN (15 N.m) | 750 | 800 | 61 | 229 | 122,4 | 0,4692 | BELIMO BE (40 N.m) |
| 700 | 500 | - | 79 | 75,1 | 0,2457 | BELIMO BEN (15 N.m) | 750 | 900 | 111 | 279 | 131,5 | 0,5372 | BELIMO BE (40 N.m) |
| 700 | 550 | - | 104 | 78,8 | 0,2772 | BELIMO BEN (15 N.m) | 750 | 1000 | 161 | 329 | 143,0 | 0,6052 | BELIMO BE (40 N.m) |
| 700 | 560 | - | 109 | 79,5 | 0,2835 | BELIMO BEN (15 N.m) | 800 | 180 | - | - | 68,4 | 0,0511 | BELIMO BEN (15 N.m) |
| 700 | 600 | - | 129 | 82,5 | 0,3087 | BELIMO BEN (15 N.m) | 800 | 200 | - | - | 70,4 | 0,0657 | BELIMO BEN (15 N.m) |
| 700 | 630 | - | 144 | 84,7 | 0,3276 | BELIMO BEE (25 N.m) | 800 | 225 | - | - | 72,8 | 0,0840 | BELIMO BEN (15 N.m) |
| 700 | 650 | - | 154 | 86,1 | 0,3402 | BELIMO BEE (25 N.m) | 800 | 250 | - | - | 75,2 | 0,1022 | BELIMO BEN (15 N.m) |
| 700 | 700 | 11 | 179 | 89,8 | 0,3717 | BELIMO BEE (25 N.m) | 800 | 280 | - | - | 78,1 | 0,1241 | BELIMO BEN (15 N.m) |
| 700 | 710 | 16 | 184 | 90,5 | 0,3780 | BELIMO BEE (25 N.m) | 800 | 300 | - | - | 79,9 | 0,1387 | BELIMO BEN (15 N.m) |
| 700 | 750 | 36 | 204 | 93,5 | 0,4032 | BELIMO BEE (25 N.m) | 800 | 315 | - | - | 81,4 | 0,1497 | BELIMO BEN (15 N.m) |
| 700 | 800 | 61 | 229 | 98,2 | 0,4347 | BELIMO BEE (25 N.m) | 800 | 355 | - | 6,5 | 85,3 | 0,1789 | BELIMO BEN (15 N.m) |
| 700 | 900 | 111 | 279 | 105,5 | 0,4977 | BELIMO BE (40 N.m) | 800 | 400 | - | 29 | 89,5 | 0,2117 | BELIMO BEN (15 N.m) |
| 700 | 1000 | 161 | 329 | 112,8 | 0,5607 | BELIMO BE (40 N.m) | 800 | 450 | - | 54 | 94,3 | 0,2482 | BELIMO BEN (15 N.m) |
| 710 | 180 | - | - | 52,1 | 0,0448 | BELIMO BEN (15 N.m) | 800 | 500 | - | 79 | 99,2 | 0,2847 | BELIMO BEN (15 N.m) |
| 710 | 200 | - | - | 53,6 | 0,0576 | BELIMO BEN (15 N.m) | 800 | 550 | - | 104 | 103,9 | 0,3212 | BELIMO BEN (15 N.m) |
| 710 | 225 | - | - | 55,4 | 0,0736 | BELIMO BEN (15 N.m) | 800 | 560 | - | 109 | 104,9 | 0,3285 | BELIMO BEN (15 N.m) |
| 710 | 250 | - | - | 57,3 | 0,0896 | BELIMO BEN (15 N.m) | 800 | 600 | - | 129 | 108,7 | 0,3577 | BELIMO BEE (25 N.m) |

| A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type | A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type |
|------|------|-----|-----|-------------|---|--------------------------|------|------|-----|-----|-------------|---|--------------------------------|
| 800 | 630 | - | 144 | 111,6 | 0,3796 | BELIMO BEE (25 N.m) | 1100 | 225 | - | - | 88,6 | 0,1185 | BELIMO BEN (15 N.m) |
| 800 | 650 | - | 154 | 113,6 | 0,3942 | BELIMO BEE (25 N.m) | 1100 | 250 | - | - | 91,3 | 0,1442 | BELIMO BEN (15 N.m) |
| 800 | 700 | 11 | 179 | 118,3 | 0,4307 | BELIMO BEE (25 N.m) | 1100 | 280 | - | - | 94,7 | 0,1751 | BELIMO BEN (15 N.m) |
| 800 | 710 | 16 | 184 | 119,3 | 0,4380 | BELIMO BEE (25 N.m) | 1100 | 300 | - | - | 97,0 | 0,1957 | BELIMO BEN (15 N.m) |
| 800 | 750 | 36 | 204 | 124,3 | 0,4672 | BELIMO BE (40 N.m) | 1100 | 315 | - | - | 98,6 | 0,2112 | BELIMO BEN (15 N.m) |
| 800 | 800 | 61 | 229 | 129,2 | 0,5037 | BELIMO BE (40 N.m) | 1100 | 355 | - | 6,5 | 103,2 | 0,2524 | BELIMO BEN (15 N.m) |
| 800 | 900 | 111 | 279 | 138,7 | 0,5767 | BELIMO BE (40 N.m) | 1100 | 400 | - | 29 | 108,2 | 0,2987 | BELIMO BEE (25 N.m) |
| 800 | 1000 | 161 | 329 | 148,4 | 0,6497 | BELIMO BE (40 N.m) | 1100 | 450 | - | 54 | 114,0 | 0,3502 | BELIMO BEE (25 N.m) |
| 900 | 180 | - | - | 72,7 | 0,0581 | BELIMO BEN (15 N.m) | 1100 | 500 | - | 79 | 119,6 | 0,4017 | BELIMO BEE (25 N.m) |
| 900 | 200 | - | - | 74,8 | 0,0747 | BELIMO BEN (15 N.m) | 1100 | 550 | - | 104 | 125,3 | 0,4532 | BELIMO BEE (25 N.m) |
| 900 | 225 | - | - | 77,3 | 0,0955 | BELIMO BEN (15 N.m) | 1100 | 560 | - | 109 | 126,4 | 0,4635 | BELIMO BEE (25 N.m) |
| 900 | 250 | - | - | 79,8 | 0,1162 | BELIMO BEN (15 N.m) | 1100 | 600 | - | 129 | 130,9 | 0,5047 | BELIMO BEE (25 N.m) |
| 900 | 280 | - | - | 82,8 | 0,1411 | BELIMO BEN (15 N.m) | 1100 | 630 | - | 144 | 135,5 | 0,5356 | BELIMO BE (40 N.m) |
| 900 | 300 | - | - | 84,7 | 0,1577 | BELIMO BEN (15 N.m) | 1100 | 650 | - | 154 | 137,8 | 0,5562 | BELIMO BE (40 N.m) |
| 900 | 315 | - | - | 86,3 | 0,1702 | BELIMO BEN (15 N.m) | 1100 | 700 | 11 | 179 | 143,4 | 0,6077 | BELIMO BE (40 N.m) |
| 900 | 355 | - | 6,5 | 90,2 | 0,2034 | BELIMO BEN (15 N.m) | 1100 | 710 | 16 | 184 | 144,6 | 0,6180 | BELIMO BE (40 N.m) |
| 900 | 400 | - | 29 | 94,8 | 0,2407 | BELIMO BEN (15 N.m) | 1100 | 750 | 36 | 204 | 149,0 | 0,6592 | BELIMO BE (40 N.m) |
| 900 | 450 | - | 54 | 99,8 | 0,2822 | BELIMO BEN (15 N.m) | 1100 | 800 | 61 | 229 | 154,7 | 0,7107 | BELIMO BE (40 N.m) |
| 900 | 500 | - | 79 | 104,9 | 0,3237 | BELIMO BEE (25 N.m) | 1100 | 900 | 111 | 279 | 166,1 | 0,8137 | BELIMO BE (40 N.m) |
| 900 | 550 | - | 104 | 109,9 | 0,3652 | BELIMO BEE (25 N.m) | 1100 | 1000 | 161 | 329 | 177,4 | 0,9167 | BELIMO BE (40 N.m) |
| 900 | 560 | - | 109 | 110,9 | 0,3735 | BELIMO BEE (25 N.m) | 1250 | 180 | - | - | 91,4 | 0,0826 | BELIMO BEN (15 N.m) |
| 900 | 600 | - | 129 | 115,0 | 0,4067 | BELIMO BEE (25 N.m) | 1250 | 200 | - | - | 94,0 | 0,1062 | BELIMO BEN (15 N.m) |
| 900 | 630 | - | 144 | 118,0 | 0,4316 | BELIMO BEE (25 N.m) | 1250 | 225 | - | - | 97,0 | 0,1357 | BELIMO BEN (15 N.m) |
| 900 | 650 | - | 154 | 120,0 | 0,4482 | BELIMO BEE (25 N.m) | 1250 | 250 | - | - | 100,1 | 0,1652 | BELIMO BEN (15 N.m) |
| 900 | 700 | 11 | 179 | 126,2 | 0,4897 | BELIMO BE (40 N.m) | 1250 | 280 | - | - | 103,7 | 0,2006 | BELIMO BEN (15 N.m) |
| 900 | 710 | 16 | 184 | 127,2 | 0,4980 | BELIMO BE (40 N.m) | 1250 | 300 | - | - | 106,2 | 0,2242 | BELIMO BEN (15 N.m) |
| 900 | 750 | 36 | 204 | 131,3 | 0,5312 | BELIMO BE (40 N.m) | 1250 | 315 | - | - | 108,0 | 0,2419 | BELIMO BEN (15 N.m) |
| 900 | 800 | 61 | 229 | 136,3 | 0,5727 | BELIMO BE (40 N.m) | 1250 | 355 | - | 6,5 | 112,9 | 0,2891 | BELIMO BEE (25 N.m) |
| 900 | 900 | 111 | 279 | 146,3 | 0,6557 | BELIMO BE (40 N.m) | 1250 | 400 | - | 29 | 118,4 | 0,3422 | BELIMO BEE (25 N.m) |
| 900 | 1000 | 161 | 329 | 156,4 | 0,7387 | BELIMO BE (40 N.m) | 1250 | 450 | - | 54 | 124,6 | 0,4012 | BELIMO BEE (25 N.m) |
| 1000 | 180 | - | - | 78,1 | 0,0651 | BELIMO BEN (15 N.m) | 1250 | 500 | - | 79 | 130,7 | 0,4602 | BELIMO BEE (25 N.m) |
| 1000 | 200 | - | - | 80,2 | 0,0837 | BELIMO BEN (15 N.m) | 1250 | 550 | - | 104 | 136,8 | 0,5192 | BELIMO BEE (25 N.m) |
| 1000 | 225 | - | - | 82,9 | 0,1070 | BELIMO BEN (15 N.m) | 1250 | 560 | - | 109 | 138,0 | 0,5310 | BELIMO BEE (25 N.m) |
| 1000 | 250 | - | - | 85,6 | 0,1302 | BELIMO BEN (15 N.m) | 1250 | 600 | - | 129 | 144,1 | 0,5782 | BELIMO BE (40 N.m) |
| 1000 | 280 | - | - | 88,8 | 0,1581 | BELIMO BEN (15 N.m) | 1250 | 630 | - | 144 | 147,7 | 0,6136 | BELIMO BE (40 N.m) |
| 1000 | 300 | - | - | 90,8 | 0,1767 | BELIMO BEN (15 N.m) | 1250 | 650 | - | 154 | 150,2 | 0,6372 | BELIMO BE (40 N.m) |
| 1000 | 315 | - | - | 92,5 | 0,1907 | BELIMO BEN (15 N.m) | 1250 | 700 | 11 | 179 | 156,4 | 0,6962 | BELIMO BE (40 N.m) |
| 1000 | 355 | - | 6,5 | 96,7 | 0,2279 | BELIMO BEN (15 N.m) | 1250 | 710 | 16 | 184 | 157,6 | 0,7080 | BELIMO BE (40 N.m) |
| 1000 | 400 | - | 29 | 101,5 | 0,2697 | BELIMO BEN (15 N.m) | 1250 | 750 | 36 | 204 | 162,5 | 0,7552 | BELIMO BE (40 N.m) |
| 1000 | 450 | - | 54 | 106,9 | 0,3162 | BELIMO BEE (25 N.m) | 1250 | 800 | 61 | 229 | 168,6 | 0,8142 | BELIMO BE (40 N.m) |
| 1000 | 500 | - | 79 | 112,2 | 0,3627 | BELIMO BEE (25 N.m) | 1250 | 900 | 111 | 279 | 180,8 | 0,9322 | BELIMO BE (40 N.m) |
| 1000 | 550 | - | 104 | 117,6 | 0,4092 | BELIMO BEE (25 N.m) | 1250 | 1000 | 161 | 329 | 192,9 | 1,0502 | SCHISCHEK InMax 50.75 (75 N.m) |
| 1000 | 560 | - | 109 | 118,7 | 0,4185 | BELIMO BEE (25 N.m) | 1400 | 180 | - | - | 95,3 | 0,0931 | BELIMO BEN (15 N.m) |
| 1000 | 600 | - | 129 | 122,9 | 0,4557 | BELIMO BEE (25 N.m) | 1400 | 200 | - | - | 97,9 | 0,1197 | BELIMO BEN (15 N.m) |
| 1000 | 630 | - | 144 | 126,1 | 0,4836 | BELIMO BEE (25 N.m) | 1400 | 225 | - | - | 101,1 | 0,1530 | BELIMO BEN (15 N.m) |
| 1000 | 650 | - | 154 | 129,5 | 0,5022 | BELIMO BEE (25 N.m) | 1400 | 250 | - | - | 104,2 | 0,1862 | BELIMO BEN (15 N.m) |
| 1000 | 700 | 11 | 179 | 134,8 | 0,5487 | BELIMO BE (40 N.m) | 1400 | 280 | - | - | 108,0 | 0,2261 | BELIMO BEN (15 N.m) |
| 1000 | 710 | 16 | 184 | 135,8 | 0,5580 | BELIMO BE (40 N.m) | 1400 | 300 | - | - | 110,5 | 0,2527 | BELIMO BEN (15 N.m) |
| 1000 | 750 | 36 | 204 | 140,2 | 0,5952 | BELIMO BE (40 N.m) | 1400 | 315 | - | - | 112,5 | 0,2727 | BELIMO BEN (15 N.m) |
| 1000 | 800 | 61 | 229 | 145,4 | 0,6417 | BELIMO BE (40 N.m) | 1400 | 355 | - | 6,5 | 117,4 | 0,3259 | BELIMO BEE (25 N.m) |
| 1000 | 900 | 111 | 279 | 156,1 | 0,7347 | BELIMO BE (40 N.m) | 1400 | 400 | - | 29 | 123,2 | 0,3857 | BELIMO BEE (25 N.m) |
| 1000 | 1000 | 161 | 329 | 166,8 | 0,8277 | BELIMO BE (40 N.m) | 1400 | 450 | - | 54 | 129,5 | 0,4522 | BELIMO BEE (25 N.m) |
| 1100 | 180 | - | - | 83,4 | 0,0721 | BELIMO BEN (15 N.m) | 1400 | 500 | - | 79 | 135,8 | 0,5187 | BELIMO BEE (25 N.m) |
| 1100 | 200 | - | - | 85,7 | 0,0927 | BELIMO BEN (15 N.m) | | | | | | | |

| A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type |
|------|------|-----|-----|-------------|---|--------------------------------|
| 1400 | 550 | - | 104 | 143,3 | 0,5852 | BELIMO BEE (25 N.m) |
| 1400 | 560 | - | 109 | 144,6 | 0,5985 | BELIMO BE (40 N.m) |
| 1400 | 600 | - | 129 | 149,6 | 0,6517 | BELIMO BE (40 N.m) |
| 1400 | 630 | - | 144 | 153,4 | 0,6916 | BELIMO BE (40 N.m) |
| 1400 | 650 | - | 154 | 155,9 | 0,7182 | BELIMO BE (40 N.m) |
| 1400 | 700 | 11 | 179 | 162,2 | 0,7847 | BELIMO BE (40 N.m) |
| 1400 | 710 | 16 | 184 | 163,4 | 0,7980 | BELIMO BE (40 N.m) |
| 1400 | 750 | 36 | 204 | 168,5 | 0,8512 | BELIMO BE (40 N.m) |
| 1400 | 800 | 61 | 229 | 174,8 | 0,9177 | BELIMO BE (40 N.m) |
| 1400 | 900 | 111 | 279 | 195,3 | 1,0507 | SCHISCHEK InMax 50.75 (75 N.m) |
| 1400 | 1000 | 161 | 329 | 207,9 | 1,1837 | SCHISCHEK InMax 50.75 (75 N.m) |
| 1500 | 180 | - | - | 100,5 | 0,1001 | BELIMO BEN (15 N.m) |
| 1500 | 200 | - | - | 103,2 | 0,1287 | BELIMO BEN (15 N.m) |
| 1500 | 225 | - | - | 106,5 | 0,1645 | BELIMO BEN (15 N.m) |
| 1500 | 250 | - | - | 109,8 | 0,2002 | BELIMO BEN (15 N.m) |
| 1500 | 280 | - | - | 113,7 | 0,2431 | BELIMO BEN (15 N.m) |
| 1500 | 300 | - | - | 116,4 | 0,2717 | BELIMO BEN (15 N.m) |
| 1500 | 315 | - | - | 118,3 | 0,2932 | BELIMO BEE (25 N.m) |
| 1500 | 355 | - | 6,5 | 123,6 | 0,3504 | BELIMO BEE (25 N.m) |
| 1500 | 400 | - | 29 | 129,6 | 0,4147 | BELIMO BEE (25 N.m) |
| 1500 | 450 | - | 54 | 136,3 | 0,4862 | BELIMO BEE (25 N.m) |
| 1500 | 500 | - | 79 | 142,8 | 0,5577 | BELIMO BEE (25 N.m) |
| 1500 | 550 | - | 104 | 150,7 | 0,6292 | BELIMO BE (40 N.m) |
| 1500 | 560 | - | 109 | 151,9 | 0,6435 | BELIMO BE (40 N.m) |
| 1500 | 600 | - | 129 | 157,2 | 0,7007 | BELIMO BE (40 N.m) |
| 1500 | 630 | - | 144 | 161,2 | 0,7436 | BELIMO BE (40 N.m) |
| 1500 | 650 | - | 154 | 163,9 | 0,7722 | BELIMO BE (40 N.m) |
| 1500 | 700 | 11 | 179 | 170,4 | 0,8437 | BELIMO BE (40 N.m) |
| 1500 | 710 | 16 | 184 | 171,8 | 0,8580 | BELIMO BE (40 N.m) |

| A | B | a | c | Weight (kg) | Effect. area S_{ef} (m ²) | Actuating mechanism type |
|------|------|-----|-----|-------------|---|--------------------------------|
| 1500 | 750 | 36 | 204 | 177,1 | 0,9152 | BELIMO BE (40 N.m) |
| 1500 | 800 | 61 | 229 | 183,7 | 0,9867 | BELIMO BE (40 N.m) |
| 1500 | 900 | 111 | 279 | 204,7 | 1,1297 | SCHISCHEK InMax 50.75 (75 N.m) |
| 1500 | 1000 | 161 | 329 | 217,9 | 1,2727 | SCHISCHEK InMax 50.75 (75 N.m) |
| 1600 | 180 | - | - | 105,7 | 0,1071 | BELIMO BEN (15 N.m) |
| 1600 | 200 | - | - | 108,4 | 0,1377 | BELIMO BEN (15 N.m) |
| 1600 | 225 | - | - | 111,9 | 0,1760 | BELIMO BEN (15 N.m) |
| 1600 | 250 | - | - | 115,3 | 0,2142 | BELIMO BEN (15 N.m) |
| 1600 | 280 | - | - | 119,5 | 0,2601 | BELIMO BEN (15 N.m) |
| 1600 | 300 | - | - | 122,2 | 0,2907 | BELIMO BEE (25 N.m) |
| 1600 | 315 | - | - | 124,3 | 0,3137 | BELIMO BEE (25 N.m) |
| 1600 | 355 | - | 6,5 | 129,8 | 0,3749 | BELIMO BEE (25 N.m) |
| 1600 | 400 | - | 29 | 136,0 | 0,4437 | BELIMO BEE (25 N.m) |
| 1600 | 450 | - | 54 | 142,9 | 0,5202 | BELIMO BEE (25 N.m) |
| 1600 | 500 | - | 79 | 149,8 | 0,5967 | BELIMO BEE (25 N.m) |
| 1600 | 550 | - | 104 | 158,0 | 0,6732 | BELIMO BE (40 N.m) |
| 1600 | 560 | - | 109 | 159,4 | 0,6885 | BELIMO BE (40 N.m) |
| 1600 | 600 | - | 129 | 164,9 | 0,7497 | BELIMO BE (40 N.m) |
| 1600 | 630 | - | 144 | 169,1 | 0,7956 | BELIMO BE (40 N.m) |
| 1600 | 650 | - | 154 | 171,8 | 0,8262 | BELIMO BE (40 N.m) |
| 1600 | 700 | 11 | 179 | 178,7 | 0,9027 | BELIMO BE (40 N.m) |
| 1600 | 710 | 16 | 184 | 180,1 | 0,9180 | BELIMO BE (40 N.m) |
| 1600 | 750 | 36 | 204 | 185,6 | 0,9792 | BELIMO BE (40 N.m) |
| 1600 | 800 | 61 | 229 | 192,5 | 1,0557 | BELIMO BE (40 N.m) |
| 1600 | 900 | 111 | 279 | 214,1 | 1,2087 | SCHISCHEK InMax 50.75 (75 N.m) |
| 1600 | 1000 | 161 | 329 | 228,0 | 1,3617 | SCHISCHEK InMax 50.75 (75 N.m) |

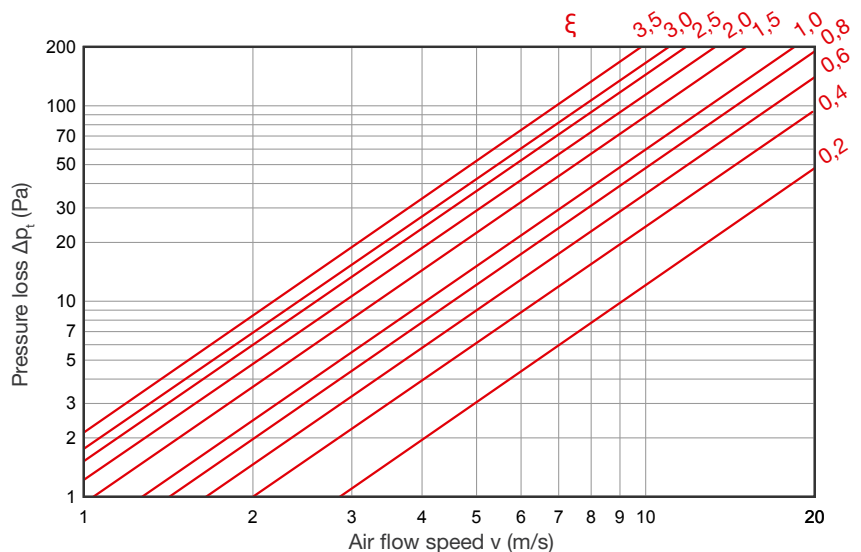
If is used the communication and supply device BKNE230-24, the weight is higher by 0,68 kg.

4. Technical data

4.1 Pressure loss calculation

$$\Delta p = \xi * \rho * (v^2 / 2)$$

- Δp – pressure loss (Pa)
- ξ – coefficient of local pressure loss
- ρ – air density (kg/m³)
- v – air flow speed (m/s)



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

4.2 Coefficient of local pressure loss

Tabel 8. Coefficient of local pressure loss

| Coefficient of local pressure loss ξ (-) | | | | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| A | B | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 |
| 180 | 3,1433 | 2,5092 | 2,0162 | 1,6711 | 1,4773 | 1,3192 | 1,1951 | 1,0336 | 0,9095 | 0,8126 | 0,7429 |
| 200 | 2,9529 | 2,3545 | 1,9584 | 1,5657 | 1,3991 | 1,2512 | 1,1186 | 0,9673 | 0,8500 | 0,7582 | 0,6919 |
| 225 | 2,7795 | 2,2032 | 1,8326 | 1,4909 | 1,3226 | 1,1594 | 1,0438 | 0,9231 | 0,8143 | 0,7157 | 0,6562 |
| 250 | 2,6401 | 2,1012 | 1,7204 | 1,3923 | 1,2172 | 1,0795 | 0,9911 | 0,8568 | 0,7514 | 0,6698 | 0,6120 |
| 280 | 2,5721 | 2,0417 | 1,6677 | 1,3413 | 1,1577 | 1,0506 | 0,9333 | 0,8313 | 0,7242 | 0,6375 | 0,5984 |
| 300 | 2,5075 | 1,9822 | 1,5725 | 1,2784 | 1,1373 | 1,0081 | 0,9078 | 0,8075 | 0,7055 | 0,6239 | 0,5627 |
| 315 | 2,4055 | 1,9108 | 1,5283 | 1,2376 | 1,0897 | 0,9843 | 0,8806 | 0,7752 | 0,6800 | 0,6052 | 0,5525 |
| 355 | 2,3103 | 1,8343 | 1,4552 | 1,2121 | 1,0676 | 0,9265 | 0,8602 | 0,7412 | 0,6511 | 0,5797 | 0,5287 |
| 400 | 2,2304 | 1,7697 | 1,3787 | 1,1679 | 1,0217 | 0,9044 | 0,8279 | 0,7140 | 0,6256 | 0,5576 | 0,5083 |
| 450 | 2,1607 | 1,7153 | 1,3413 | 1,1305 | 1,0013 | 0,8823 | 0,8007 | 0,6902 | 0,6052 | 0,5389 | 0,4913 |
| 500 | 2,1080 | 1,6711 | 1,3362 | 1,1016 | 0,9452 | 0,8483 | 0,7633 | 0,6715 | 0,5882 | 0,5236 | 0,4777 |
| 550 | 2,0723 | 1,6507 | 1,2971 | 1,0829 | 0,9231 | 0,8194 | 0,7514 | 0,6613 | 0,5797 | 0,5185 | 0,4726 |
| 560 | 2,0587 | 1,6320 | 1,2886 | 1,0744 | 0,9061 | 0,8211 | 0,7429 | 0,6545 | 0,5729 | 0,5100 | 0,4658 |
| 600 | 2,0247 | 1,6116 | 1,2801 | 1,0659 | 0,8959 | 0,8041 | 0,7327 | 0,6443 | 0,5627 | 0,5066 | 0,4590 |
| 630 | 2,0128 | 1,5946 | 1,2733 | 1,0489 | 0,8857 | 0,7871 | 0,7259 | 0,6392 | 0,5593 | 0,4981 | 0,4539 |
| 650 | 2,0043 | 1,5742 | 1,2546 | 1,0421 | 0,8687 | 0,7786 | 0,7225 | 0,6324 | 0,5559 | 0,4947 | 0,4505 |
| 700 | 1,9873 | 1,5674 | 1,2512 | 1,0319 | 0,8517 | 0,7701 | 0,7157 | 0,6290 | 0,5508 | 0,4913 | 0,4471 |
| 710 | 1,9720 | 1,5623 | 1,2274 | 1,0268 | 0,8534 | 0,7548 | 0,7089 | 0,6256 | 0,5474 | 0,4879 | 0,4437 |
| 750 | 1,9567 | 1,5419 | 1,2172 | 1,0183 | 0,8483 | 0,7497 | 0,6987 | 0,6188 | 0,5406 | 0,4845 | 0,4386 |
| 800 | 1,9380 | 1,5351 | 1,2087 | 1,0081 | 0,8432 | 0,7446 | 0,6953 | 0,6137 | 0,5372 | 0,4777 | 0,4352 |
| 900 | 1,9074 | 1,5096 | 1,2053 | 0,9911 | 0,8228 | 0,7259 | 0,6834 | 0,6035 | 0,5270 | 0,4692 | 0,4284 |
| 1000 | 1,8836 | 1,4909 | 1,2002 | 0,9792 | 0,7939 | 0,7106 | 0,6749 | 0,5950 | 0,5202 | 0,4641 | 0,4216 |
| 1100 | 1,8615 | 1,4739 | 1,1917 | 0,9673 | 0,7752 | 0,7004 | 0,6664 | 0,5865 | 0,5134 | 0,4573 | 0,4165 |
| 1250 | 1,8428 | 1,4569 | 1,1781 | 0,9554 | 0,7735 | 0,6987 | 0,6579 | 0,5814 | 0,5083 | 0,4522 | 0,4114 |
| 1400 | 1,8241 | 1,4433 | 1,1696 | 0,9469 | 0,7718 | 0,6970 | 0,6511 | 0,5746 | 0,5032 | 0,4471 | 0,4080 |
| 1500 | 1,8139 | 1,4348 | 1,1611 | 0,9418 | 0,7684 | 0,6936 | 0,6477 | 0,5712 | 0,4998 | 0,4454 | 0,4046 |
| 1600 | 1,8054 | 1,4280 | 1,1169 | 0,9367 | 0,7667 | 0,6902 | 0,6443 | 0,5678 | 0,4981 | 0,4420 | 0,4029 |

| Coefficient of local pressure loss ξ (-) | | | | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| A | B | | | | | | | | | | |
| | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 180 | 0,6987 | 0,6800 | 0,6477 | 0,6273 | 0,5984 | 0,5933 | 0,5831 | 0,5627 | 0,5474 | 0,5168 | 0,4947 |
| 200 | 0,6545 | 0,6341 | 0,6052 | 0,5848 | 0,5627 | 0,5525 | 0,5440 | 0,5304 | 0,5100 | 0,4828 | 0,4607 |
| 225 | 0,6188 | 0,5916 | 0,5712 | 0,5559 | 0,5355 | 0,5287 | 0,5134 | 0,5032 | 0,4777 | 0,4556 | 0,4318 |
| 250 | 0,5882 | 0,5610 | 0,5372 | 0,5168 | 0,4998 | 0,4913 | 0,4862 | 0,4726 | 0,4488 | 0,4335 | 0,4063 |
| 280 | 0,5559 | 0,5304 | 0,5151 | 0,4947 | 0,4828 | 0,4794 | 0,4726 | 0,4471 | 0,4301 | 0,4216 | 0,3927 |
| 300 | 0,5321 | 0,5202 | 0,4947 | 0,4743 | 0,4675 | 0,4624 | 0,4573 | 0,4267 | 0,4182 | 0,4029 | 0,3808 |
| 315 | 0,5134 | 0,5049 | 0,4692 | 0,4658 | 0,4471 | 0,4386 | 0,4318 | 0,4097 | 0,4046 | 0,3825 | 0,3655 |
| 355 | 0,4896 | 0,4828 | 0,4556 | 0,4454 | 0,4318 | 0,4216 | 0,4131 | 0,3961 | 0,3876 | 0,3655 | 0,3485 |
| 400 | 0,4743 | 0,4641 | 0,4471 | 0,4284 | 0,4182 | 0,4097 | 0,3978 | 0,3842 | 0,3723 | 0,3519 | 0,3349 |
| 450 | 0,4556 | 0,4488 | 0,4352 | 0,4131 | 0,4046 | 0,3927 | 0,3842 | 0,3757 | 0,3587 | 0,3383 | 0,3230 |
| 500 | 0,4505 | 0,4369 | 0,4182 | 0,4012 | 0,3876 | 0,3791 | 0,3723 | 0,3587 | 0,3485 | 0,3298 | 0,3145 |
| 550 | 0,4437 | 0,4267 | 0,4148 | 0,3978 | 0,3808 | 0,3757 | 0,3655 | 0,3519 | 0,3451 | 0,3247 | 0,3111 |
| 560 | 0,4386 | 0,4250 | 0,4097 | 0,3910 | 0,3757 | 0,3723 | 0,3638 | 0,3451 | 0,3400 | 0,3213 | 0,3060 |
| 600 | 0,4369 | 0,4199 | 0,3978 | 0,3876 | 0,3672 | 0,3638 | 0,3587 | 0,3434 | 0,3366 | 0,3162 | 0,3026 |
| 630 | 0,4301 | 0,4148 | 0,3927 | 0,3825 | 0,3621 | 0,3570 | 0,3536 | 0,3417 | 0,3315 | 0,3128 | 0,2992 |
| 650 | 0,4267 | 0,4097 | 0,3927 | 0,3808 | 0,3604 | 0,3553 | 0,3502 | 0,3400 | 0,3298 | 0,3111 | 0,2975 |
| 700 | 0,4250 | 0,4080 | 0,3859 | 0,3791 | 0,3587 | 0,3536 | 0,3485 | 0,3383 | 0,3281 | 0,3077 | 0,2941 |
| 710 | 0,4216 | 0,4063 | 0,3808 | 0,3740 | 0,3570 | 0,3502 | 0,3468 | 0,3349 | 0,3247 | 0,3060 | 0,2924 |

| Coefficient of local pressure loss ξ (-) | | | | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| A | B | | | | | | | | | | |
| | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 750 | 0,4199 | 0,4029 | 0,3757 | 0,3706 | 0,3553 | 0,3468 | 0,3434 | 0,3315 | 0,3213 | 0,3026 | 0,2873 |
| 800 | 0,4182 | 0,3978 | 0,3757 | 0,3655 | 0,3536 | 0,3451 | 0,3400 | 0,3281 | 0,3179 | 0,2992 | 0,2856 |
| 900 | 0,4148 | 0,3910 | 0,3757 | 0,3604 | 0,3519 | 0,3417 | 0,3332 | 0,3179 | 0,3128 | 0,2941 | 0,2805 |
| 1000 | 0,4012 | 0,3859 | 0,3706 | 0,3553 | 0,3502 | 0,3349 | 0,3281 | 0,3145 | 0,3077 | 0,2907 | 0,2771 |
| 1100 | 0,3927 | 0,3808 | 0,3587 | 0,3502 | 0,3417 | 0,3298 | 0,3247 | 0,3094 | 0,3043 | 0,2856 | 0,2737 |
| 1250 | 0,3876 | 0,3757 | 0,3536 | 0,3451 | 0,3383 | 0,3281 | 0,3213 | 0,3077 | 0,2992 | 0,2822 | 0,2703 |
| 1400 | 0,3825 | 0,3723 | 0,3502 | 0,3417 | 0,3332 | 0,3264 | 0,3179 | 0,3043 | 0,2975 | 0,2805 | 0,2669 |
| 1500 | 0,3791 | 0,3706 | 0,3485 | 0,3400 | 0,3298 | 0,3247 | 0,3162 | 0,3026 | 0,2958 | 0,2788 | 0,2652 |
| 1600 | 0,3774 | 0,3672 | 0,3451 | 0,3383 | 0,3264 | 0,3230 | 0,3145 | 0,2992 | 0,2941 | 0,2771 | 0,2635 |

4.3 Noise data

Tabel 9. Level of acoustic output corrected with filter A

| Air velocity 4 m/s | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 180 | 56 | 49 | 48 | 46 | 44 | 42 | 41 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 38 | 38 | 37 | 38 | 38 |
| 200 | 52 | 48 | 45 | 44 | 41 | 41 | 41 | 41 | 40 | 40 | 39 | 39 | 39 | 38 | 38 | 38 | 37 | 37 | 37 | 36 | 37 | 37 |
| 225 | 50 | 47 | 45 | 40 | 40 | 40 | 41 | 40 | 39 | 39 | 39 | 38 | 38 | 36 | 36 | 37 | 37 | 36 | 36 | 36 | 36 | 36 |
| 250 | 49 | 45 | 44 | 42 | 40 | 40 | 40 | 39 | 38 | 38 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 36 | 36 | 36 |
| 280 | 47 | 45 | 40 | 40 | 40 | 39 | 38 | 37 | 37 | 37 | 37 | 37 | 37 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 35 | 35 |
| 300 | 47 | 44 | 40 | 40 | 39 | 39 | 39 | 37 | 36 | 37 | 37 | 37 | 37 | 35 | 35 | 35 | 35 | 35 | 36 | 36 | 36 | 35 |
| 315 | 47 | 44 | 40 | 40 | 39 | 39 | 37 | 37 | 37 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 35 | 35 | 35 | 34 | 34 |
| 355 | 46 | 43 | 40 | 39 | 39 | 37 | 37 | 36 | 36 | 36 | 36 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 33 | 34 | 35 | 35 |
| 400 | 47 | 42 | 40 | 39 | 37 | 37 | 36 | 36 | 36 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 34 | 34 | 34 | 34 | 33 | 33 |
| 450 | 45 | 42 | 40 | 39 | 37 | 37 | 37 | 36 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 34 | 34 | 34 | 34 |
| 500 | 45 | 40 | 39 | 38 | 37 | 36 | 36 | 36 | 35 | 35 | 35 | 34 | 34 | 33 | 33 | 34 | 34 | 34 | 33 | 33 | 33 | 33 |
| 550 | 44 | 40 | 40 | 38 | 37 | 37 | 36 | 36 | 35 | 35 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 560 | 44 | 40 | 40 | 38 | 37 | 37 | 36 | 35 | 35 | 35 | 34 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 |
| 600 | 44 | 40 | 38 | 36 | 36 | 36 | 36 | 36 | 35 | 35 | 35 | 35 | 35 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 | 32 |
| 630 | 44 | 40 | 38 | 37 | 36 | 36 | 36 | 35 | 35 | 35 | 34 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 32 | 32 |
| 650 | 44 | 40 | 38 | 37 | 36 | 36 | 36 | 35 | 35 | 35 | 34 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 |
| 700 | 43 | 39 | 38 | 38 | 36 | 36 | 36 | 37 | 35 | 36 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 710 | 43 | 39 | 38 | 38 | 36 | 36 | 36 | 37 | 35 | 36 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 750 | 43 | 40 | 38 | 37 | 36 | 35 | 35 | 34 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 800 | 43 | 40 | 37 | 37 | 36 | 36 | 35 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 900 | 43 | 40 | 37 | 36 | 36 | 36 | 35 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 1000 | 43 | 39 | 37 | 37 | 37 | 36 | 35 | 35 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| 1100 | 42 | 39 | 37 | 37 | 37 | 35 | 35 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 |
| 1250 | 42 | 39 | 37 | 37 | 37 | 35 | 35 | 34 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 32 |
| 1400 | 42 | 39 | 37 | 37 | 37 | 35 | 35 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 31 |
| 1500 | 42 | 39 | 37 | 37 | 37 | 35 | 35 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 31 |
| 1600 | 42 | 39 | 37 | 37 | 37 | 35 | 35 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 32 | 32 | 32 | 31 |

Tabel 10. Level of acoustic output corrected with filter A

| Air velocity 5 m/s | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 180 | >55 | 55 | 53 | 52 | 49 | 47 | 48 | 47 | 47 | 47 | 46 | 46 | 46 | 46 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| 200 | >55 | 55 | 52 | 49 | 48 | 48 | 47 | 47 | 47 | 45 | 45 | 45 | 44 | 44 | 44 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| 225 | >55 | 54 | 50 | 48 | 47 | 47 | 47 | 45 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 43 |
| 250 | >55 | 52 | 49 | 48 | 47 | 46 | 46 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 |
| 280 | 54 | 50 | 49 | 47 | 46 | 45 | 45 | 44 | 44 | 44 | 43 | 43 | 43 | 43 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 |
| 300 | 54 | 49 | 47 | 46 | 45 | 45 | 44 | 44 | 43 | 43 | 43 | 43 | 43 | 42 | 42 | 42 | 42 | 41 | 42 | 42 | 42 | 41 |
| 315 | 54 | 51 | 48 | 47 | 45 | 45 | 44 | 44 | 44 | 43 | 43 | 42 | 42 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 |
| 355 | 54 | 50 | 48 | 45 | 44 | 43 | 43 | 43 | 42 | 42 | 42 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 40 | 40 |
| 400 | 54 | 49 | 46 | 45 | 43 | 43 | 43 | 43 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| 450 | 52 | 47 | 46 | 43 | 42 | 42 | 42 | 41 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 |
| 500 | 51 | 48 | 46 | 44 | 43 | 43 | 43 | 41 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 |
| 550 | 49 | 47 | 46 | 44 | 43 | 43 | 42 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 38 |
| 560 | 49 | 47 | 46 | 44 | 43 | 43 | 42 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 39 | 39 | 38 |
| 600 | 50 | 47 | 45 | 43 | 43 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 38 | 38 | 38 |
| 630 | 50 | 48 | 45 | 43 | 43 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 38 | 38 | 38 | 38 |
| 650 | 50 | 48 | 45 | 43 | 42 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 |
| 700 | 50 | 48 | 45 | 42 | 42 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 |
| 710 | 50 | 48 | 45 | 42 | 42 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 |
| 750 | 50 | 47 | 45 | 42 | 42 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 |
| 800 | 50 | 47 | 45 | 42 | 42 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 |
| 900 | 49 | 47 | 44 | 42 | 42 | 42 | 41 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 | 38 |
| 1000 | 49 | 47 | 43 | 42 | 42 | 42 | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| 1100 | 49 | 47 | 43 | 42 | 42 | 42 | 40 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| 1250 | 49 | 47 | 43 | 42 | 42 | 42 | 40 | 40 | 40 | 40 | 39 | 39 | 39 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| 1400 | 48 | 46 | 43 | 42 | 42 | 41 | 40 | 40 | 40 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 37 |
| 1500 | 48 | 46 | 43 | 42 | 41 | 41 | 40 | 40 | 40 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 37 |
| 1600 | 48 | 46 | 43 | 42 | 41 | 41 | 40 | 40 | 40 | 39 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 38 | 37 |

Tabel 11. Level of acoustic output corrected with filter A

| Air velocity 6 m/s | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 180 | >55 | >55 | >55 | >55 | 55 | 54 | 54 | 54 | 54 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 51 | 51 | 51 | 51 | 51 |
| 200 | >55 | >55 | >55 | 55 | 54 | 54 | 53 | 53 | 52 | 51 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 48 |
| 225 | >55 | >55 | >55 | 54 | 52 | 52 | 52 | 51 | 50 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 47 | 47 |
| 250 | >55 | >55 | 55 | 53 | 52 | 52 | 51 | 50 | 50 | 49 | 48 | 48 | 48 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 |
| 280 | >55 | >55 | 54 | 52 | 51 | 50 | 50 | 49 | 48 | 48 | 48 | 47 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 |
| 300 | >55 | >55 | 54 | 52 | 50 | 50 | 50 | 48 | 47 | 47 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 47 | 45 |
| 315 | >55 | 55 | 53 | 52 | 50 | 49 | 50 | 48 | 47 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 47 | 47 | 46 | 46 |
| 355 | >55 | 55 | 53 | 51 | 50 | 49 | 48 | 47 | 47 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 | 46 |
| 400 | >55 | 54 | 52 | 50 | 49 | 48 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| 450 | >55 | 54 | 51 | 50 | 48 | 48 | 47 | 46 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| 500 | 55 | 54 | 51 | 49 | 48 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 43 | 43 |
| 550 | 55 | 53 | 50 | 50 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 |
| 560 | 55 | 53 | 50 | 50 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 |
| 600 | 55 | 53 | 50 | 50 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 |
| 630 | 55 | 53 | 50 | 49 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 |
| 650 | 55 | 52 | 50 | 49 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 44 | 44 | 44 | 43 | 43 | 43 | 43 |

| Air velocity 6 m/s | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 |
| 700 | 55 | 52 | 50 | 48 | 48 | 46 | 46 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 44 | 44 | 44 | 43 | 43 | 43 | 43 |
| 710 | 55 | 52 | 50 | 48 | 48 | 46 | 46 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 44 | 44 | 44 | 43 | 43 | 43 | 43 |
| 750 | 55 | 52 | 50 | 48 | 48 | 46 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 44 | 44 | 44 | 43 | 43 | 43 | 43 |
| 800 | 55 | 52 | 50 | 48 | 48 | 46 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 44 | 43 | 43 | 43 | 43 | 43 | 43 |
| 900 | 55 | 52 | 49 | 48 | 47 | 45 | 45 | 45 | 45 | 45 | 44 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 |
| 1000 | 55 | 52 | 49 | 48 | 47 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 |
| 1100 | 54 | 52 | 49 | 48 | 46 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 |
| 1250 | 54 | 52 | 49 | 47 | 45 | 45 | 45 | 45 | 45 | 44 | 44 | 44 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 |
| 1400 | 54 | 52 | 48 | 48 | 46 | 44 | 44 | 44 | 45 | 44 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 42 |
| 1500 | 54 | 52 | 48 | 48 | 45 | 44 | 44 | 44 | 45 | 44 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 42 |
| 1600 | 54 | 52 | 48 | 48 | 45 | 44 | 44 | 45 | 45 | 45 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 43 | 42 | 42 |

Table 12. Level of acoustic output corrected with filter A

| Air velocity 7 m/s | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 |
| 180 | >61 | >61 | >61 | >61 | 61 | 60 | 60 | 58 | 58 | 57 | 56 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 56 | 55 | 55 |
| 200 | >61 | >61 | >61 | >61 | 59 | 58 | 58 | 57 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 54 | 54 | 54 |
| 225 | >61 | >61 | >61 | 60 | 57 | 56 | 56 | 55 | 55 | 55 | 54 | 54 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| 250 | >61 | >61 | >61 | 58 | 56 | 56 | 56 | 55 | 54 | 53 | 53 | 53 | 53 | 52 | 52 | 52 | 52 | 52 | 53 | 52 | 52 |
| 280 | >61 | >61 | 60 | 57 | 56 | 55 | 55 | 54 | 53 | 52 | 52 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 50 | 50 |
| 300 | >61 | 61 | 58 | 57 | 55 | 54 | 54 | 53 | 53 | 52 | 52 | 52 | 52 | 52 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 315 | >61 | 61 | 57 | 56 | 55 | 55 | 54 | 53 | 52 | 52 | 51 | 51 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 49 | 49 |
| 355 | >61 | 61 | 57 | 55 | 54 | 53 | 53 | 52 | 52 | 52 | 51 | 50 | 50 | 50 | 50 | 49 | 49 | 49 | 48 | 48 | 48 |
| 400 | >61 | 60 | 57 | 55 | 53 | 53 | 53 | 52 | 51 | 51 | 49 | 49 | 49 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 450 | >61 | 59 | 56 | 54 | 52 | 52 | 52 | 51 | 50 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 500 | 60 | 58 | 55 | 54 | 53 | 52 | 52 | 50 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 550 | 60 | 58 | 55 | 54 | 53 | 52 | 52 | 50 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 560 | 60 | 58 | 55 | 54 | 53 | 52 | 52 | 50 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 600 | 60 | 58 | 55 | 54 | 52 | 52 | 51 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 630 | 60 | 58 | 55 | 53 | 51 | 51 | 51 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 650 | 60 | 58 | 55 | 53 | 52 | 51 | 51 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 700 | 59 | 58 | 55 | 53 | 52 | 51 | 51 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 710 | 59 | 58 | 55 | 53 | 52 | 51 | 51 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 750 | 59 | 58 | 55 | 53 | 52 | 51 | 51 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 800 | 59 | 58 | 55 | 53 | 52 | 51 | 51 | 50 | 49 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| 900 | 58 | 56 | 53 | 53 | 52 | 50 | 50 | 48 | 48 | 47 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 47 | 47 |
| 1000 | 58 | 56 | 53 | 53 | 51 | 50 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 47 | 47 |
| 1100 | 58 | 56 | 53 | 53 | 51 | 50 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 47 | 47 | 47 |
| 1250 | 58 | 56 | 53 | 53 | 51 | 50 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 47 | 47 | 47 |
| 1400 | 58 | 56 | 53 | 52 | 51 | 50 | 48 | 48 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 46 |
| 1500 | 58 | 56 | 53 | 52 | 51 | 50 | 50 | 48 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 46 |
| 1600 | 58 | 56 | 53 | 52 | 51 | 50 | 50 | 48 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 47 | 46 |

Tabel 13. Level of acoustic output corrected with filter A

| Air velocity 8 m/s | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 180 | >63 | >63 | >63 | >63 | >63 | >63 | >63 | 63 | 62 | 61 | 61 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 59 |
| 200 | >63 | >63 | >63 | >63 | >63 | 62 | 62 | 61 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 59 | 59 | 59 | 58 |
| 225 | >63 | >63 | >63 | >63 | >63 | 61 | 61 | 60 | 60 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 57 | 57 | 57 |
| 250 | >63 | >63 | >63 | >63 | 61 | 60 | 60 | 59 | 58 | 58 | 57 | 57 | 57 | 57 | 57 | 57 | 57 | 57 | 56 | 56 | 56 | 56 |
| 280 | >63 | >63 | >63 | >63 | 59 | 59 | 59 | 58 | 58 | 57 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 | 54 | 54 |
| 300 | >63 | >63 | 62 | 61 | 59 | 59 | 59 | 58 | 57 | 56 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 54 | 54 | 54 |
| 315 | >63 | >63 | 62 | 61 | 59 | 59 | 58 | 57 | 57 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 54 | 54 |
| 355 | >63 | >63 | 63 | 59 | 58 | 58 | 57 | 56 | 55 | 55 | 54 | 54 | 54 | 54 | 54 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| 400 | >63 | 63 | 62 | 60 | 58 | 57 | 56 | 56 | 55 | 54 | 54 | 54 | 54 | 54 | 54 | 53 | 53 | 53 | 53 | 53 | 52 | 52 |
| 450 | >63 | 63 | 60 | 58 | 57 | 56 | 56 | 55 | 55 | 54 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 52 | 52 |
| 500 | >63 | 62 | 60 | 58 | 56 | 55 | 55 | 54 | 54 | 54 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 52 | 51 | 51 |
| 550 | >63 | 62 | 59 | 58 | 56 | 56 | 55 | 55 | 54 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 52 | 52 | 51 | 51 |
| 560 | >63 | 62 | 59 | 58 | 56 | 56 | 55 | 55 | 54 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 52 | 52 | 51 | 51 |
| 600 | >63 | 62 | 59 | 58 | 56 | 55 | 55 | 54 | 54 | 53 | 53 | 53 | 53 | 53 | 52 | 52 | 52 | 51 | 51 | 51 | 50 | 50 |
| 630 | >63 | 62 | 59 | 58 | 56 | 55 | 55 | 54 | 54 | 53 | 53 | 53 | 53 | 53 | 52 | 52 | 52 | 51 | 50 | 50 | 50 | 50 |
| 650 | >63 | 61 | 59 | 58 | 56 | 55 | 55 | 54 | 54 | 53 | 53 | 53 | 52 | 51 | 51 | 51 | 51 | 51 | 50 | 50 | 50 | 50 |
| 700 | 63 | 62 | 59 | 57 | 56 | 55 | 55 | 54 | 54 | 53 | 53 | 53 | 52 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 49 | 49 |
| 710 | 63 | 62 | 59 | 57 | 56 | 55 | 55 | 54 | 54 | 53 | 53 | 53 | 52 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 49 | 49 |
| 750 | 63 | 62 | 59 | 57 | 56 | 55 | 55 | 54 | 54 | 53 | 52 | 52 | 52 | 51 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 49 |
| 800 | 62 | 60 | 57 | 57 | 56 | 55 | 54 | 54 | 54 | 52 | 52 | 52 | 52 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 50 | 49 |
| 900 | 62 | 60 | 57 | 56 | 55 | 55 | 54 | 53 | 53 | 52 | 52 | 51 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 1000 | 62 | 60 | 57 | 56 | 56 | 55 | 54 | 53 | 53 | 52 | 52 | 51 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 1100 | 62 | 60 | 57 | 56 | 56 | 55 | 54 | 53 | 53 | 52 | 51 | 51 | 51 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 1250 | 62 | 61 | 58 | 56 | 56 | 54 | 54 | 53 | 53 | 52 | 50 | 50 | 50 | 50 | 50 | 50 | 49 | 49 | 49 | 49 | 49 | 49 |
| 1400 | 62 | 61 | 57 | 56 | 56 | 53 | 54 | 53 | 53 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 49 | 49 | 49 | 49 | 49 | 49 |
| 1500 | 62 | 61 | 57 | 56 | 56 | 54 | 54 | 53 | 52 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 49 | 49 | 49 | 49 | 49 | 49 |
| 1600 | 62 | 61 | 57 | 56 | 56 | 54 | 54 | 53 | 52 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 49 | 49 | 49 | 49 | 49 | 49 |

Tabel 14. Level of acoustic output corrected with filter A

| Air velocity 9 m/s | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 180 | >65 | >65 | >65 | >65 | >65 | >65 | >65 | >65 | >65 | 65 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 64 | 63 | 63 | 63 | 63 |
| 200 | >65 | >65 | >65 | >65 | >65 | >65 | >65 | 65 | 64 | 64 | 63 | 63 | 63 | 62 | 62 | 62 | 62 | 62 | 62 | 61 | 61 | 61 |
| 225 | >65 | >65 | >65 | >65 | >65 | >65 | 65 | 63 | 63 | 62 | 61 | 61 | 61 | 61 | 61 | 61 | 61 | 61 | 61 | 60 | 60 | 60 |
| 250 | >65 | >65 | >65 | >65 | >65 | 65 | 65 | 63 | 62 | 61 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| 280 | >65 | >65 | >65 | >65 | 64 | 63 | 62 | 61 | 61 | 60 | 60 | 60 | 60 | 59 | 59 | 59 | 59 | 59 | 59 | 58 | 58 | 58 |
| 300 | >65 | >65 | >65 | 65 | 63 | 62 | 62 | 61 | 60 | 60 | 60 | 60 | 60 | 60 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 |
| 315 | >65 | >65 | >65 | 64 | 63 | 62 | 61 | 61 | 60 | 60 | 60 | 60 | 60 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 58 |
| 355 | >65 | >65 | >65 | 64 | 62 | 61 | 60 | 60 | 60 | 60 | 60 | 59 | 59 | 59 | 59 | 58 | 58 | 58 | 58 | 58 | 58 | 58 |
| 400 | >65 | >65 | >65 | 63 | 61 | 60 | 60 | 59 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 57 | 57 | 57 |
| 450 | >65 | >65 | 65 | 63 | 60 | 60 | 60 | 59 | 58 | 58 | 58 | 57 | 57 | 57 | 57 | 57 | 57 | 57 | 57 | 56 | 56 | 56 |
| 500 | >65 | >65 | 64 | 61 | 60 | 60 | 60 | 59 | 58 | 57 | 57 | 57 | 57 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 |
| 550 | >65 | >65 | 62 | 62 | 60 | 60 | 58 | 57 | 58 | 58 | 57 | 57 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 |
| 560 | >65 | >65 | 62 | 62 | 60 | 60 | 58 | 57 | 58 | 58 | 57 | 57 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 |
| 600 | >65 | >65 | 62 | 62 | 60 | 59 | 58 | 58 | 58 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 | 55 | 55 | 55 | 55 |
| 630 | >65 | >65 | 62 | 62 | 60 | 59 | 58 | 58 | 58 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 | 55 | 55 | 55 | 55 |
| 650 | >65 | >65 | 62 | 62 | 59 | 59 | 58 | 58 | 58 | 57 | 56 | 56 | 56 | 56 | 56 | 56 | 55 | 55 | 55 | 55 | 55 | 55 |

| Air velocity 9 m/s | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Level of acoustic output (dB) | | | | | | | | | | | | | | | | | | | | | | |
| A | B | | | | | | | | | | | | | | | | | | | | | |
| | 180 | 200 | 225 | 250 | 280 | 300 | 315 | 355 | 400 | 450 | 500 | 550 | 560 | 600 | 630 | 650 | 700 | 710 | 750 | 800 | 900 | 1000 |
| 700 | >65 | >65 | 62 | 61 | 59 | 59 | 58 | 58 | 57 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 |
| 710 | >65 | >65 | 62 | 61 | 59 | 59 | 58 | 58 | 57 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 |
| 750 | >65 | >65 | 62 | 61 | 59 | 59 | 58 | 57 | 57 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| 800 | >65 | 64 | 62 | 61 | 59 | 59 | 58 | 57 | 57 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 54 |
| 900 | >65 | 64 | 62 | 60 | 60 | 59 | 58 | 57 | 57 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 55 | 55 | 55 | 55 | 54 | 54 |
| 1000 | >65 | 64 | 60 | 60 | 58 | 58 | 58 | 57 | 57 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 54 |
| 1100 | >65 | 64 | 60 | 59 | 58 | 58 | 57 | 57 | 57 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 54 | 54 |
| 1250 | >65 | 64 | 60 | 59 | 58 | 58 | 57 | 57 | 56 | 55 | 55 | 55 | 55 | 54 | 54 | 54 | 54 | 54 | 54 | 54 | 54 | 53 |
| 1400 | >65 | 64 | 61 | 60 | 58 | 58 | 57 | 57 | 56 | 56 | 55 | 55 | 55 | 55 | 54 | 54 | 54 | 54 | 54 | 54 | 53 | 53 |
| 1500 | >65 | 64 | 60 | 60 | 58 | 58 | 56 | 56 | 56 | 56 | 55 | 55 | 55 | 55 | 54 | 54 | 54 | 53 | 53 | 53 | 53 | 53 |
| 1600 | >65 | 64 | 60 | 60 | 58 | 58 | 56 | 56 | 56 | 56 | 55 | 55 | 55 | 55 | 54 | 54 | 54 | 53 | 53 | 53 | 53 | 53 |

5. Product marking

SEDM - AxB - .44

Type

SEDM - Smoke extraction damper, multi

Nominal size

Toruühenduse mõõt A x B (mm)

Design

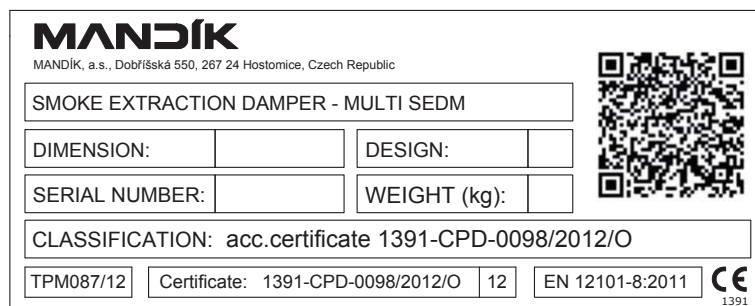
- .44 - with actuating mechanism BEN, BEE, BE, InMax 50.75-S for 230V
- .54 - with actuating mechanism BEN, BEE, BE, InMax 50.75-S for 24V
- .65* - with actuating mechanism BEN (BEE)-SR for 24V
- .66** - with the communication and supply device BKNE 230-24 and actuating mechanism BEN (BEE, BE)-ST for 24V

* Design .65 is not available by using actuating mechanism BE, InMax 50.75-S

** Design .66 is not available by using actuating mechanism InMax 50.75-S

Example: SEDM 180x355-.44

Data label is placed on the damper body.



6. Placement and assembly

Smoke extraction dampers - multi are designed to remove heat and combustion products (e.g. smoke) from fire compartments according EN 1366-8.

Smoke extraction dampers - multi are designed to horizontal or vertical installation with arbitrary blade axis position.

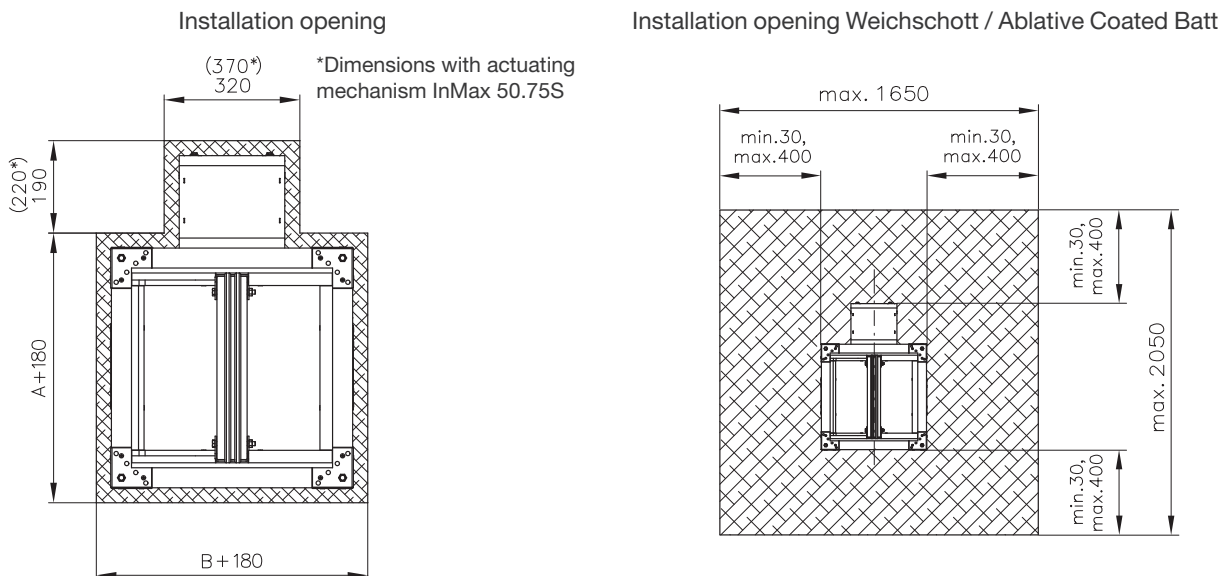
To provide needed access space to the control device, all other objects must be situated at least 350 mm from the control parts of the damper.

The distance between the smoke damper:

- distance 200 mm between dampers installed in the duct;
- distance 75 mm between damper and construction (wall/ceiling).

During installation the damper blade must be in position "CLOSED". The damper body should not be deformed in the course of installation. Once the damper built in, its blade should not grind on the damper casing during opening or closing.

Fig. 16. Installation opening



For damper without flanges (Fig. 8) the open damper blade overlaps the damper body from dimension $B = 250$ by the value "c" or "a" and "c". These values are specified in the Tab. on pages 12 to 17.

For damper with flanges (Fig. 8) the open damper blade overlaps the damper body from dimension $B = 355$ by the value "a-50" and "c-50".

Fig. 17. Flanges

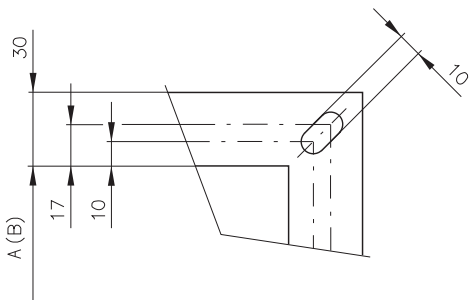
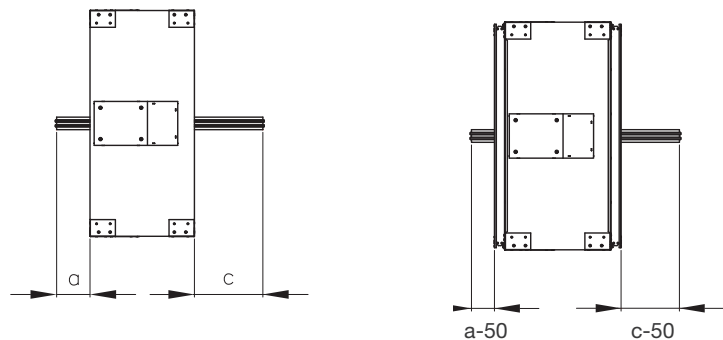


Fig. 18. Values „a”, „c”, „a-50” and „c-50”



7. Installation overview

| Placement | Wall / ceiling | | Filling of space between damper and wall | Fire resistance | Page |
|-------------------------------|--|---|--|-----------------|------|
| | Min. thickness (mm) | | | | |
| In solid wall construction | 100 | Stuffing box, fire protection mastic and calcium silicate plate | EI 120 (v _{ew} - i↔o) S1000C _{mod} HOT 400/30AAmulti | 26 | |
| | | Mortar or gypsum | EI 90 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30MAmulti EI 120 (v _{ew} - i↔o) S1000C _{mod} HOT 400/30AAmulti | 27 | |
| | | Ablative Coated Batt | EI 90 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30AAmulti EI 120 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30MAmulti | 28 | |
| In gypsum wall construction | 100 | Stuffing box, fire protection mastic and calcium silicate plate | EI 90 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30MAmulti EI 120 (v _{ew} - i↔o) S1000C _{mod} HOT 400/30AAmulti | 32 | |
| | | Mortar or gypsum | | 32 | |
| | | Ablative Coated Batt | EI 90 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30AAmulti EI 120 (v _{ew} - i↔o) S1500C _{mod} HOT 400/30MAmulti | 33 | |
| In solid ceiling construction | 110 - Concrete 125 - Aerated concrete | Stuffing box, fire protection mastic and calcium silicate plate | EI 90 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30MAmulti EI 90 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30AAmulti | 29 | |
| | | Mortar or gypsum | | 30 | |
| | | Ablative Coated Batt | EI 90 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30AAmulti | 31 | |
| | 150 - Concrete 125 - Aerated concrete | Stuffing box, fire protection mastic and calcium silicate plate | EI 120 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30MAmulti EI 120 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30AAmulti | 29 | |
| | | Mortar or gypsum | | 30 | |
| | | Ablative Coated Batt | EI 120 (h _{ow} - i↔o) S1500C _{mod} HOT 400/30AAmulti | 31 | |
| On solid wall construction | 100 | - | EI 120 (v _{ew} - i↔o) S1000C _{mod} HOT 400/30AAmulti | 34 | |
| On solid ceiling construction | 110 - Concrete 125 - Aerated concrete | - | EI 90 (h _{ow} - i↔o) S1000C _{mod} HOT 400/30AAmulti | 35 | |
| Vertical duct installation | - | - | EI 120 (h _{od} - i↔o) S1000C _{mod} HOT 400/30MAmulti EI 120 (h _{od} - i↔o) S1000C _{mod} HOT 400/30AAmulti | 36 | |
| Horizontal duct installation | - | - | EI 120 (v _{ed} - i↔o) S1000C _{mod} HOT 400/30MAmulti EI 120 (v _{ed} - i↔o) S1000C _{mod} HOT 400/30AAmulti | 37 | |

7.1 Installation in solid wall or ceiling construction of fire compartment

Fig. 19. Example of installation in solid wall construction of fire compartment - vertical blade axis position

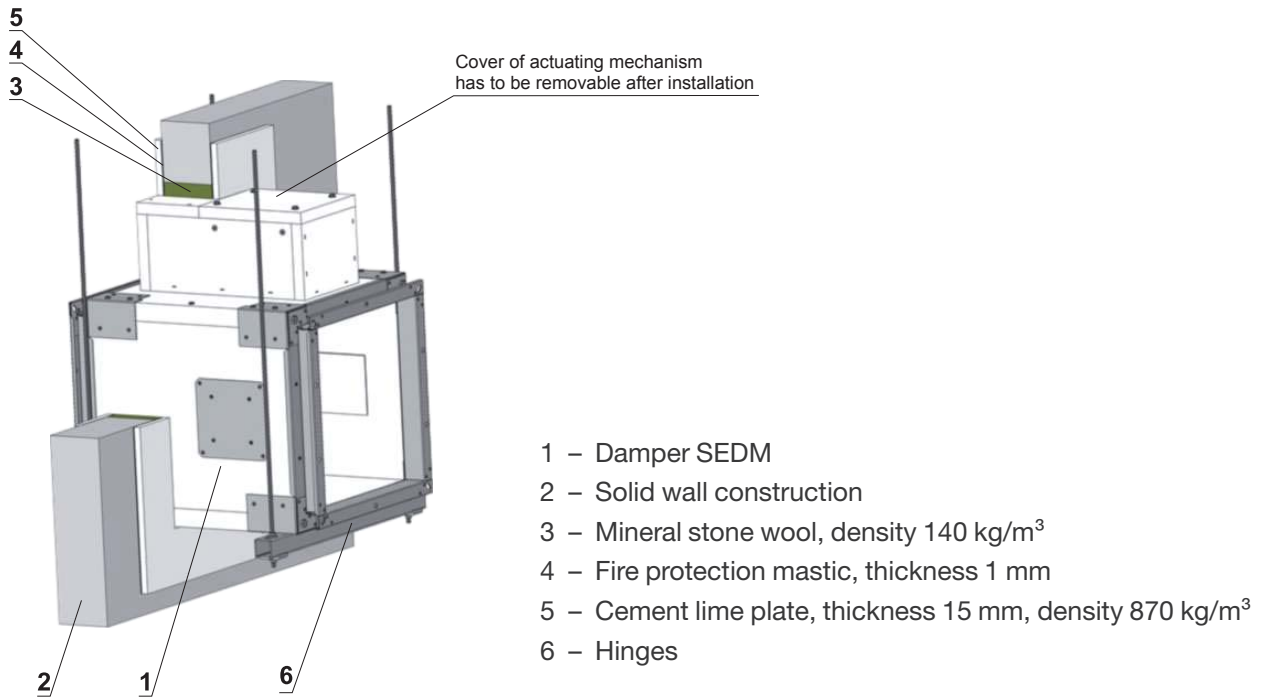


Fig. 20. Example of installation in solid wall construction of fire compartment - horizontal blade axis position

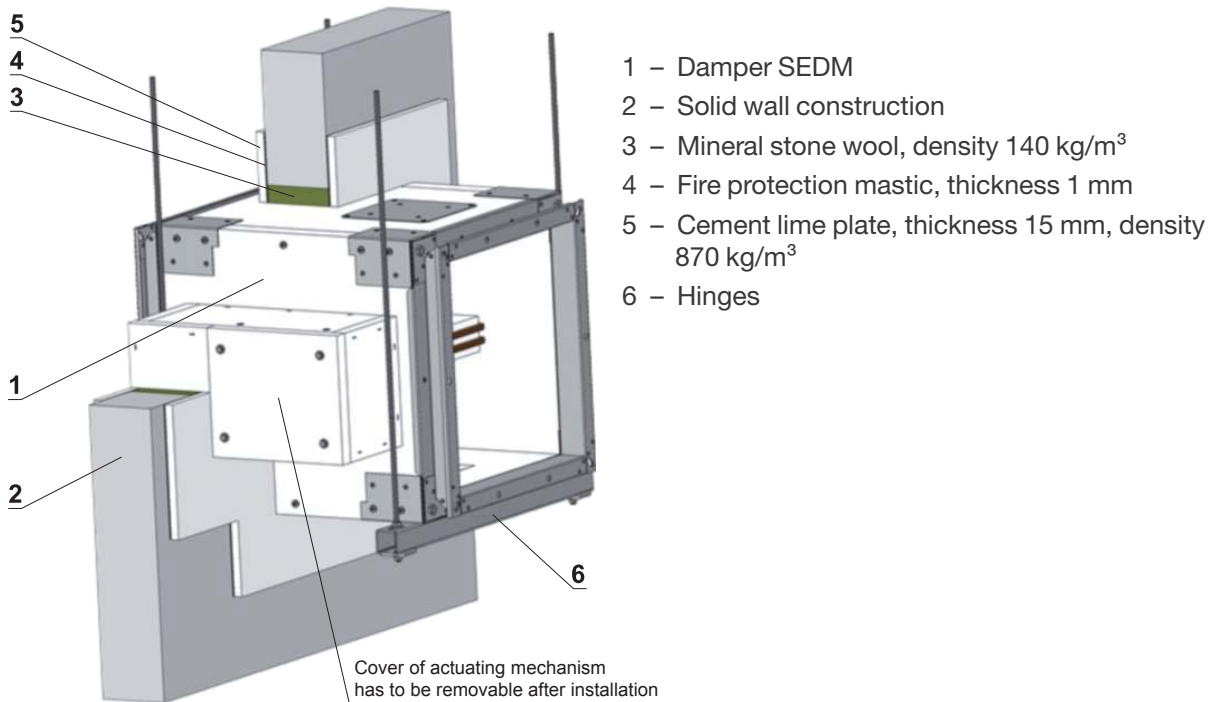


Fig. 21. Example of installation in solid wall construction of fire compartment - vertical blade axis position

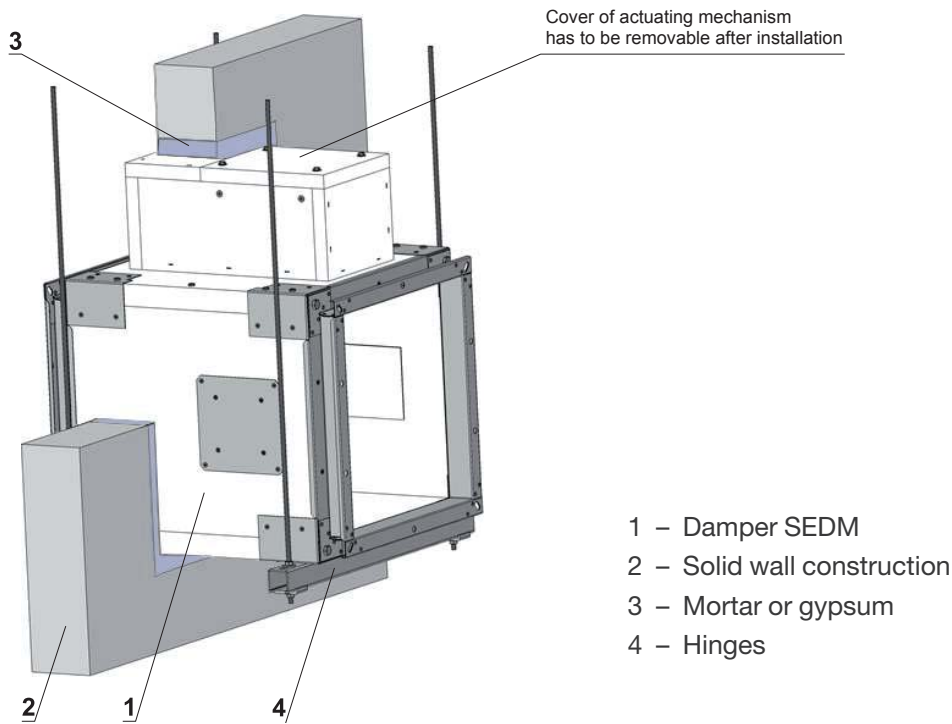


Fig. 22. Example of installation in solid wall construction of fire compartment - horizontal blade axis position

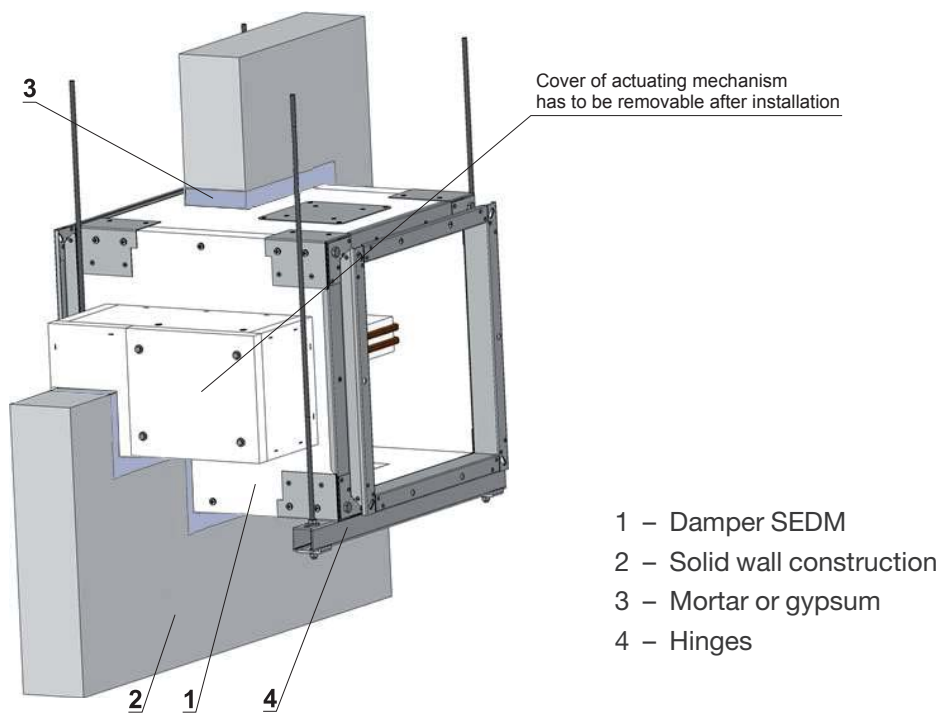


Fig. 23. Example of installation in solid wall construction of fire compartment - vertical blade axis position

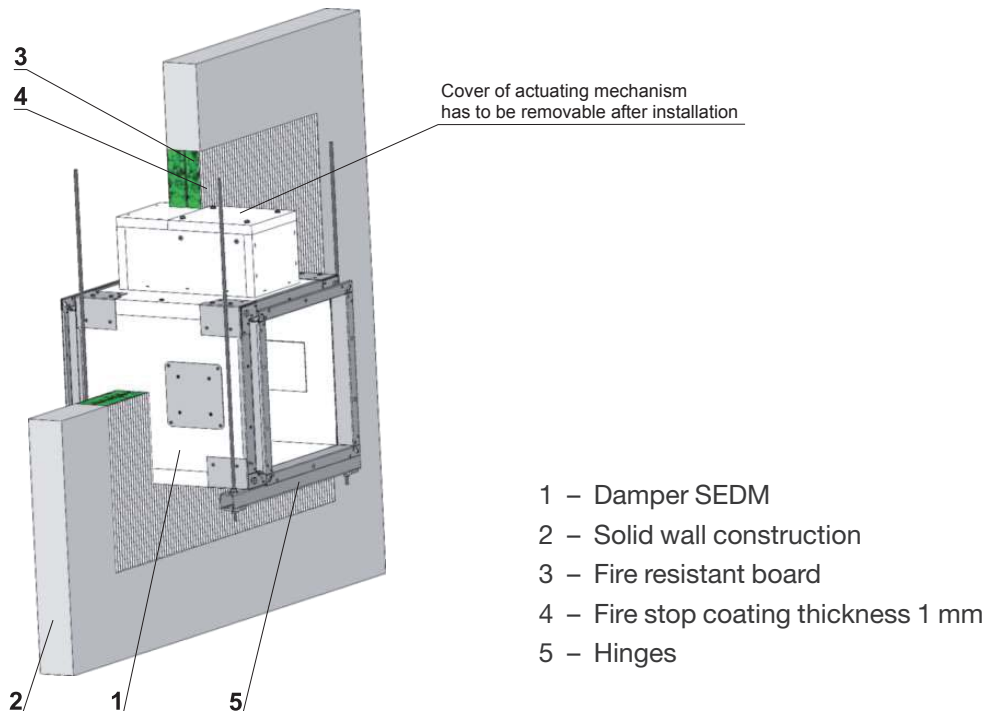


Fig. 24. Example of installation in solid wall construction of fire compartment - horizontal blade axis position

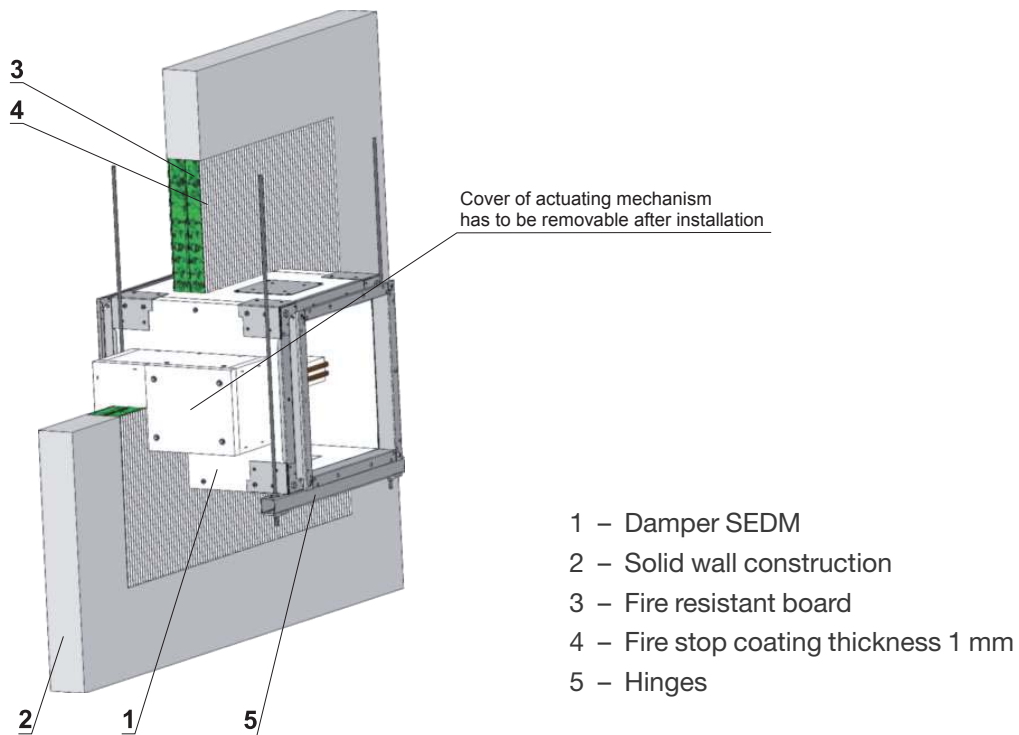
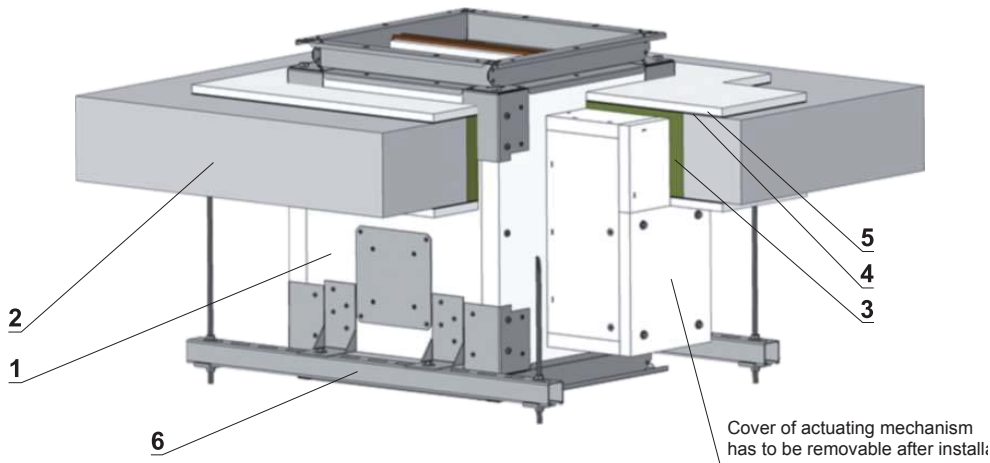


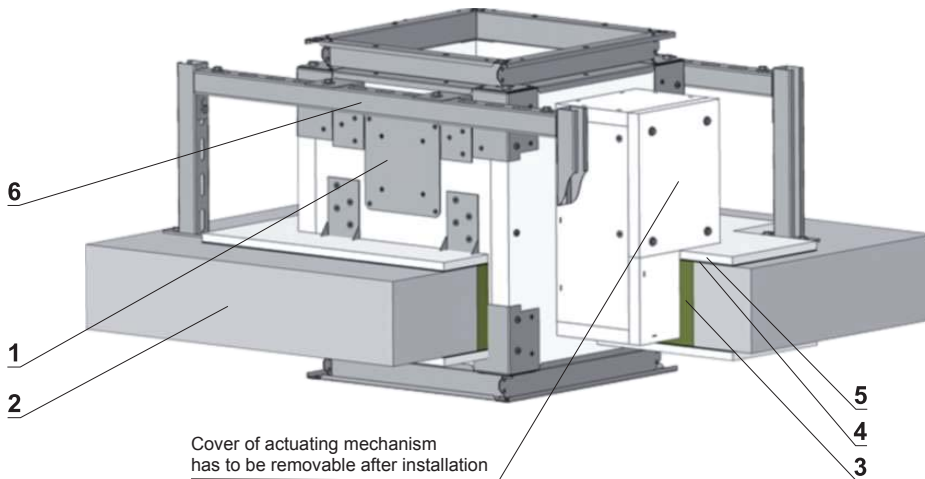
Fig. 25. Example of installation in solid ceiling construction of fire compartment - actuating mechanism below



| Number of holders $X=(2 \times ZA)+(2 \times ZB)$ | | | |
|---|-----------|---------------------|-----------|
| Dimension A | Number ZA | Dimension B | Number ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Mineral stone wool, density 140 kg/m³
- 4 – Fire protection mastic, thickness 1 mm
- 5 – Cement lime plate, thickness 15 mm, density 870 kg/m³
- 6 – Hinges

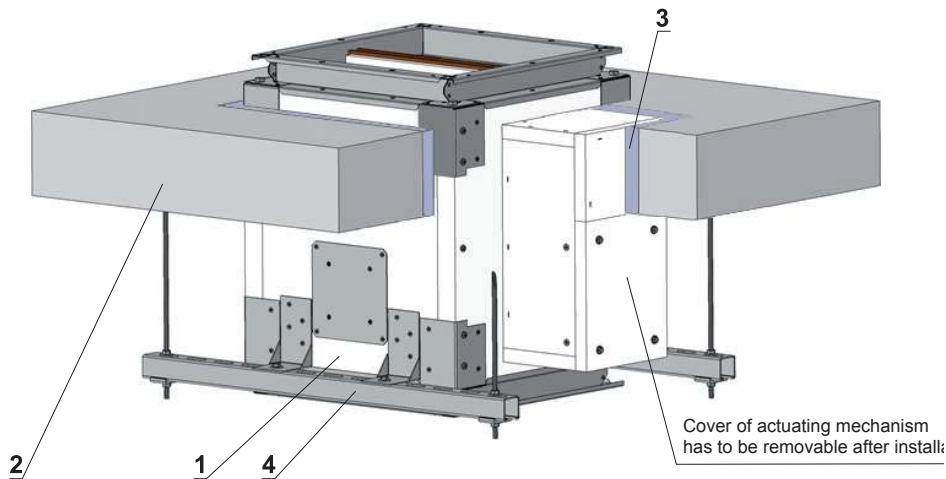
Fig. 26. Example of installation in solid ceiling construction of fire compartment - actuating mechanism above



| Number of holders $X= 2*((2 \times ZA)+(2 \times ZB))$ | | | |
|--|-----------|---------------------|-----------|
| Dimension A | Number ZA | Dimension B | Number ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Mineral stone wool, density 140 kg/m³
- 4 – Fire protection mastic, thickness 1 mm
- 5 – Cement lime plate, thickness 15 mm, density 870 kg/m³
- 6 – Hinges

Fig. 27. Example of installation in solid ceiling construction of fire compartment - actuating mechanism below

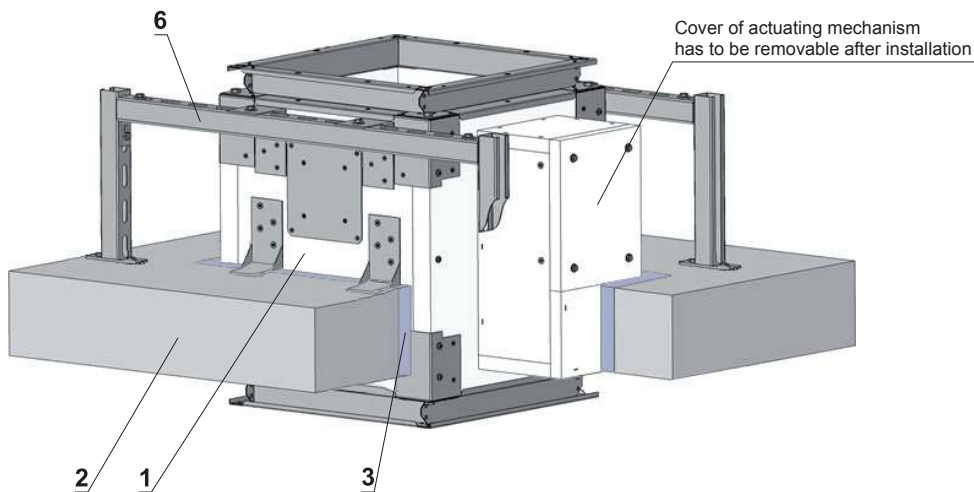


Number of holders $X=(2 \times ZA)+(2 \times ZB)$

| Dimension A | Number ZA | Dimension B | Number ZB |
|----------------------|-----------|---------------------|-----------|
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Mortar or gypsum
- 4 – Hinges

Fig. 28. Example of installation in solid ceiling construction of fire compartment - actuating mechanism above

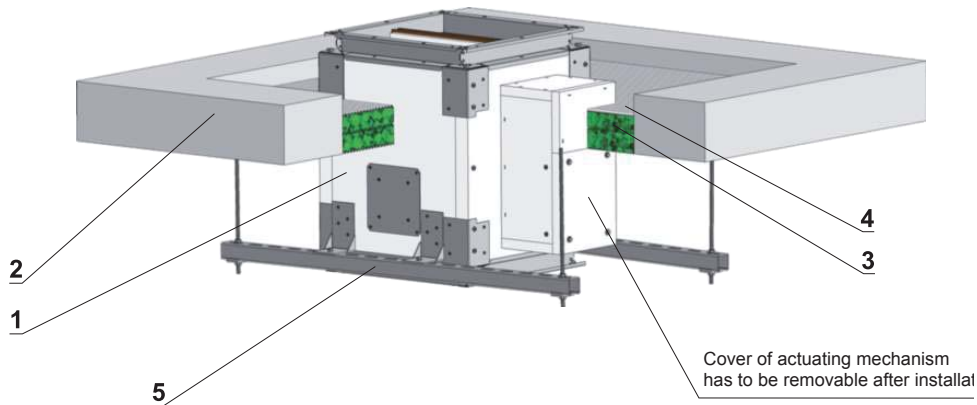


Number of holders $X=2 \cdot ((2 \times ZA)+(2 \times ZB))$

| Dimension A | Number ZA | Dimension B | Number ZB |
|----------------------|-----------|---------------------|-----------|
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Mortar or gypsum
- 4 – Hinges

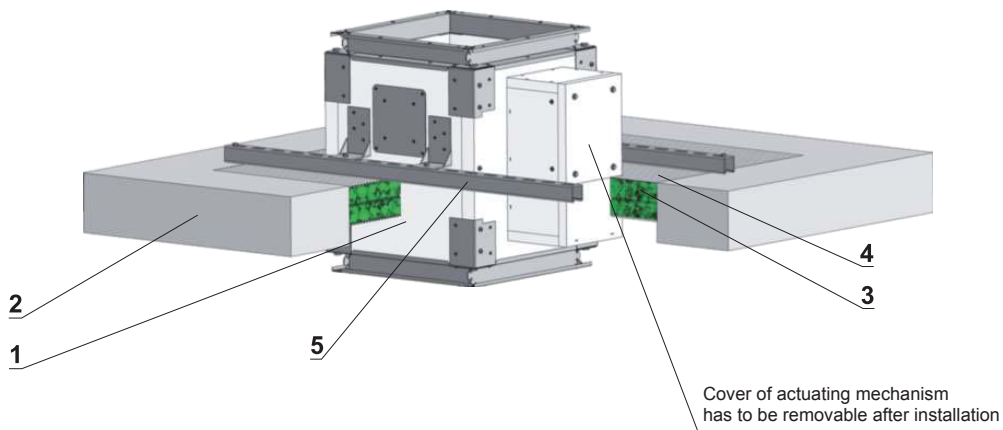
Fig. 29. Example of installation in solid ceiling construction of fire compartment - actuating mechanism below



| Number of holders $X=(2 \times ZA) + (2 \times ZB)$ | | | |
|---|-----------|---------------------|-----------|
| Dimension A | Number ZA | Dimension B | Number ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Fire resistant board
- 4 – Fire stop coating thickness 1 mm
- 5 – Hinges

Fig. 30. Example of installation in solid ceiling construction of fire compartment - actuating mechanism above



| Number of holders $X=(2 \times ZA) + (2 \times ZB)$ | | | |
|---|----------|---------------------|----------|
| Mõõt A | Kogus ZA | Mõõt B | Kogus ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < A \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < A \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Fire resistant board
- 4 – Fire stop coating thickness 1 mm
- 5 – Hinges

7.2 Installation in gypsum wall construction of fire compartment

Fig. 31. Example of installation in gypsum wall construction of fire compartment

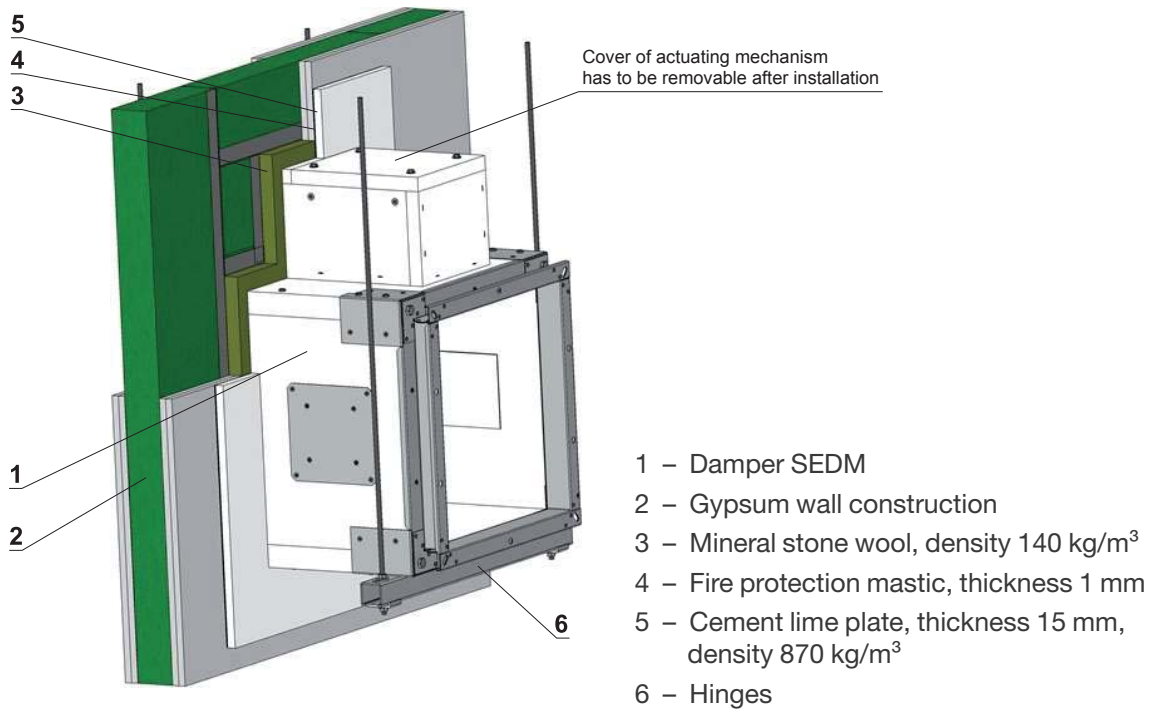


Fig. 32. Example of installation in gypsum wall construction of fire compartment

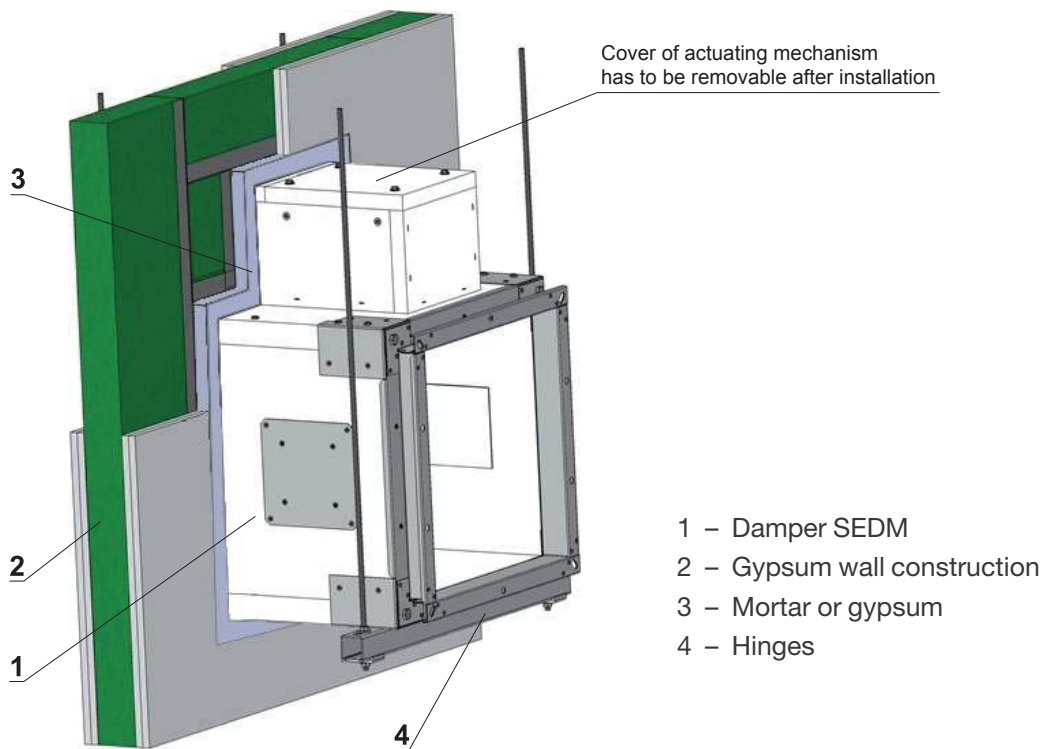


Fig. 33. Example of installation in gypsum wall construction of fire compartment - vertical blade axis position

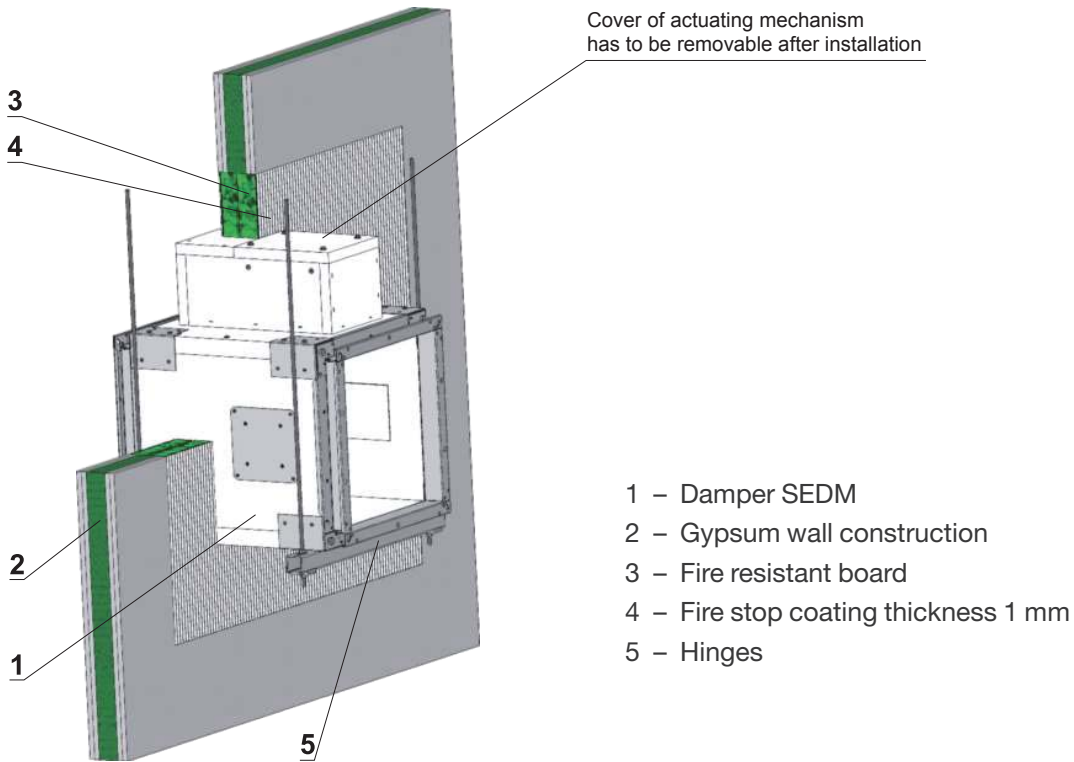
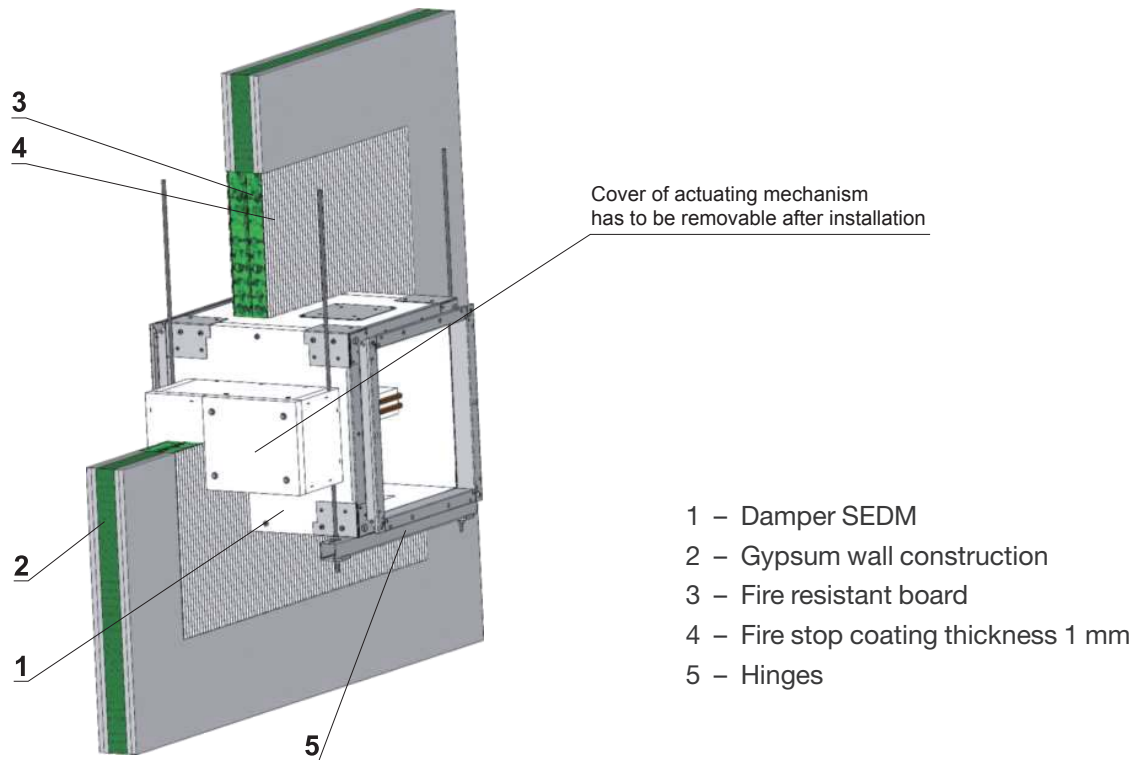
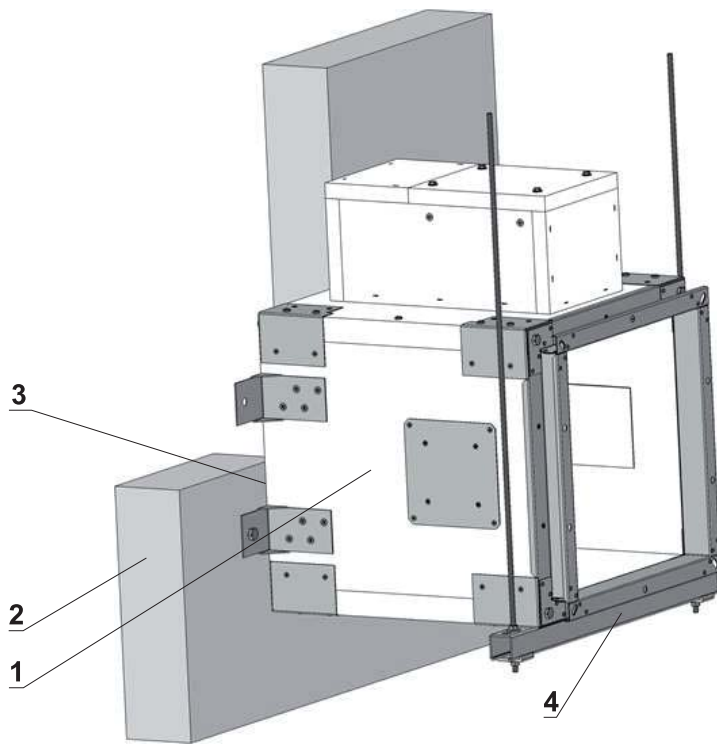


Fig. 34. Example of installation in gypsum wall construction of fire compartment - horizontal blade axis position



7.3 Installation on solid wall or ceiling construction of fire compartment

Fig. 35. Example of installation on solid wall construction of fire compartment - vertical blade axis position

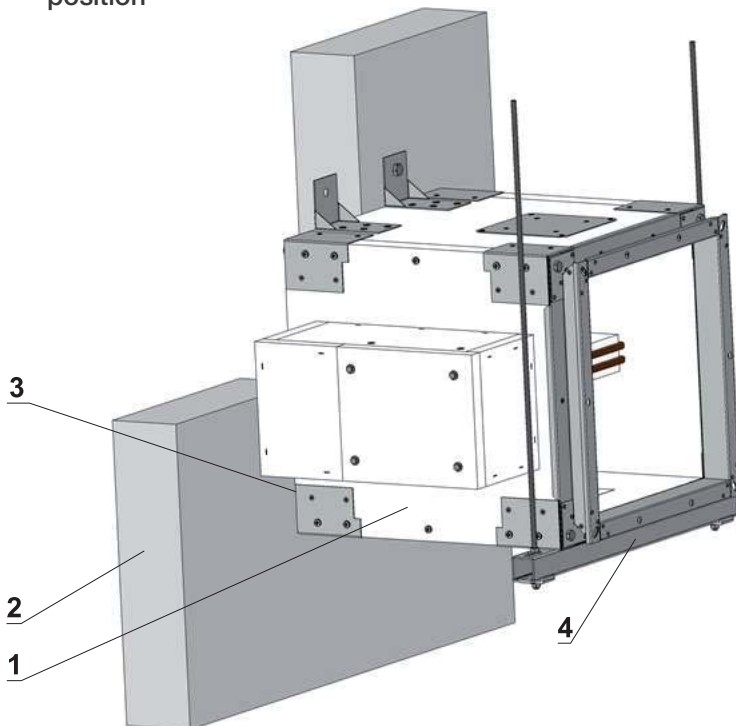


| Number of holders $X=(2 \times ZA)+(2 \times ZB)$ | | | |
|---|-----------|---------------------|-----------|
| Dimension A | Number ZA | Dimension B | Number ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid wall construction
- 3 – Ceramic paper*
- 4 – Hinges

* Ceramic paper is placed between damper and solid wall construction

Fig. 36. Example of installation on solid wall construction of fire compartment - horizontal blade axis position

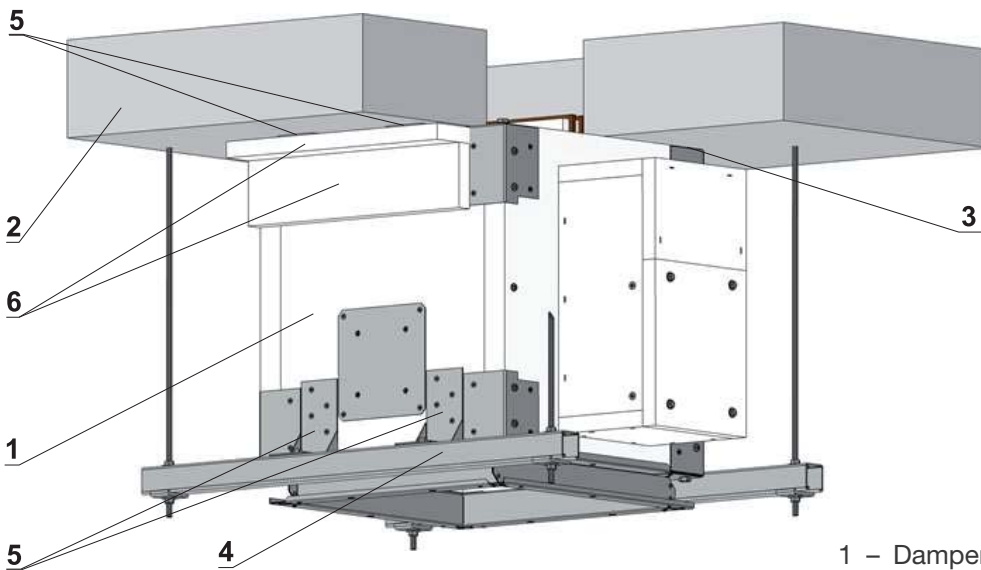


| Number of holders $X=(2 \times ZA)+(2 \times ZB)$ | | | |
|---|-----------|---------------------|-----------|
| Dimension A | Number ZA | Dimension B | Number ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid wall construction
- 3 – Ceramic paper*
- 4 – Hinges

* Ceramic paper is placed between damper and solid wall construction

Fig. 37. Example of installation on solid ceiling construction of fire compartment - suspension

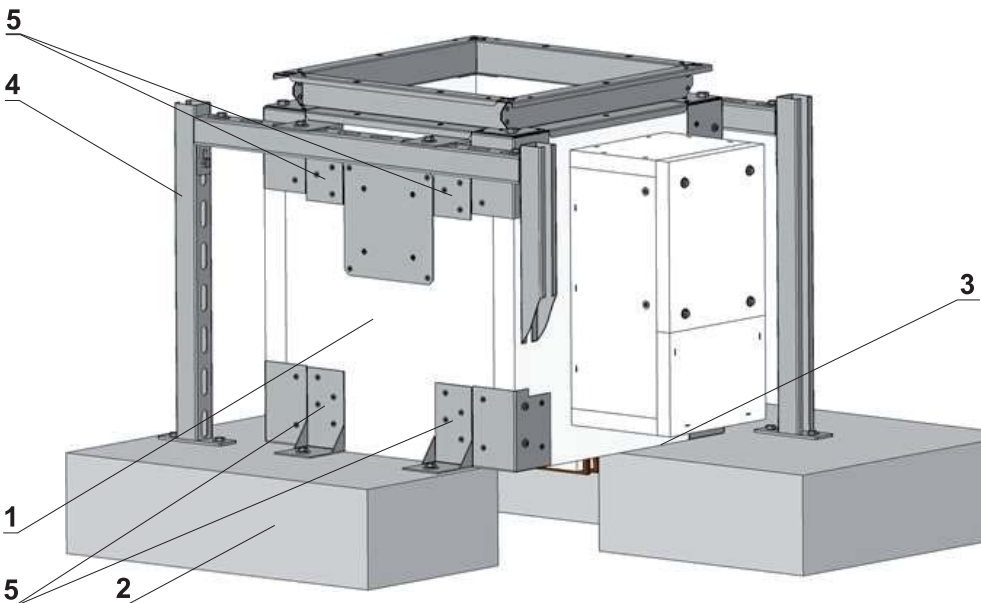


| Number of holders $X=2*((2 \times ZA)+(2 \times ZB))$ | | | |
|---|-----------|---------------------|-----------|
| Dimension A | Number ZA | Dimension B | Number ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Ceramic paper*
- 4 – Hinges
- 5 – Holder L
- 6 – Cement lime plate

*Ceramic paper is placed between damper and solid wall construction

Fig. 38. Example of installation on solid ceiling construction of fire compartment - above installation



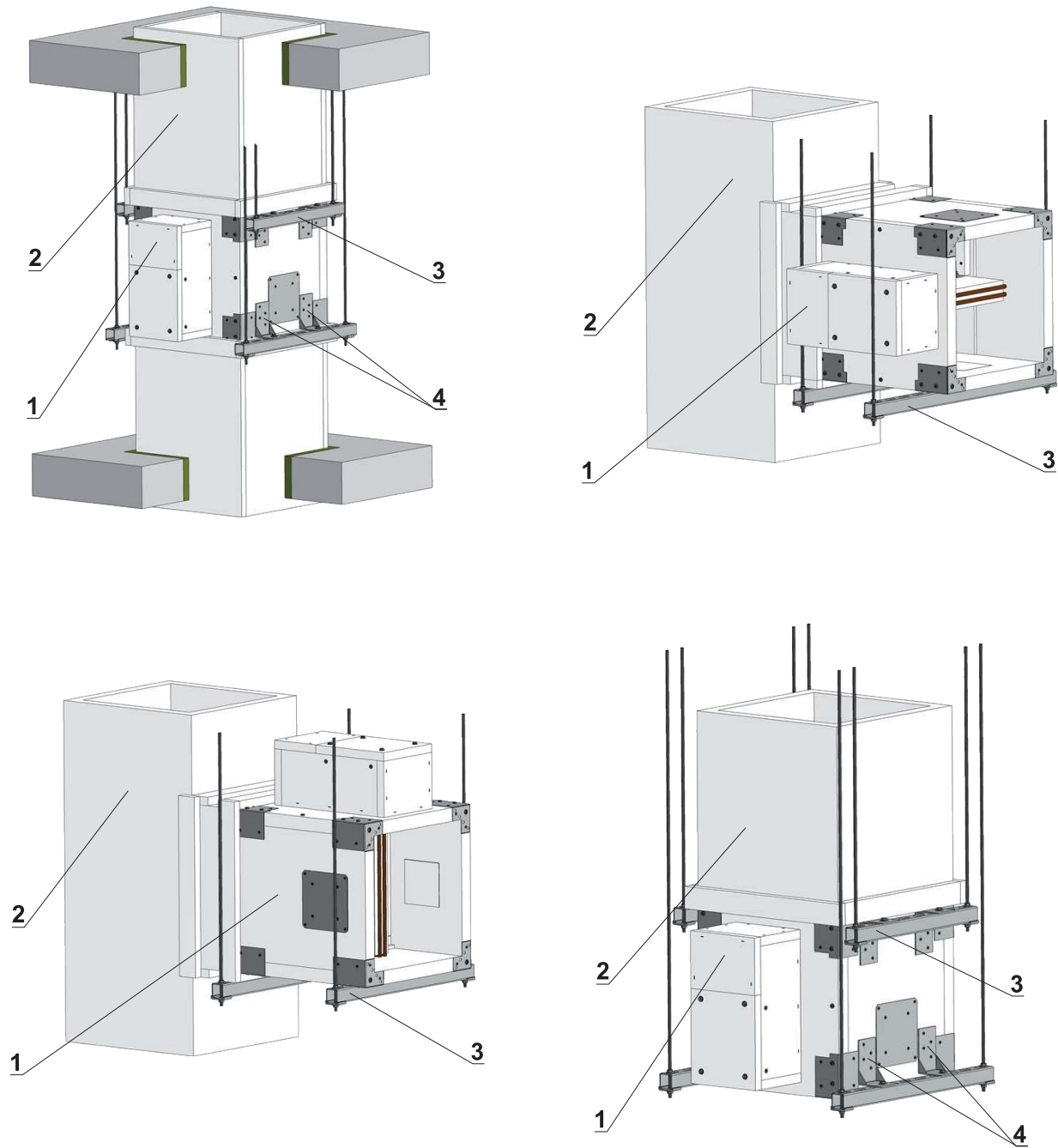
| Number of holders $X=2*((2 \times ZA)+(2 \times ZB))$ | | | |
|---|-----------|---------------------|-----------|
| Dimension A | Number ZA | Dimension B | Number ZB |
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < A \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < A \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Solid ceiling construction
- 3 – Ceramic paper*
- 4 – Hinges
- 5 – Holder L

* Ceramic paper is placed between damper and solid wall construction.

7.4 Installation in smoke exhaust duct

Fig. 39. Example of installation in vertical smoke exhaust duct

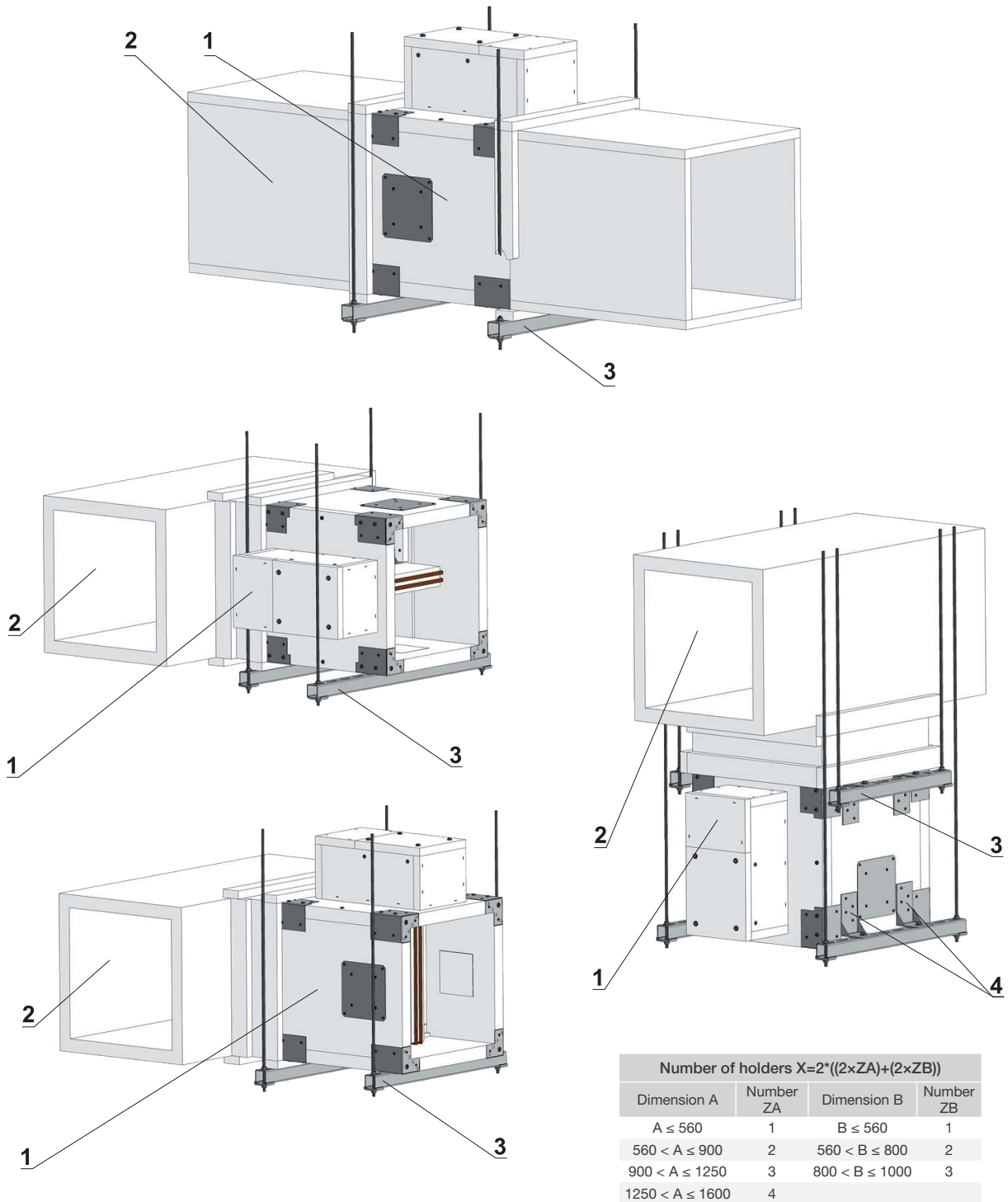


Number of holders $X=2*((2 \times ZA)+(2 \times ZB))$

| Dimension A | Number ZA | Dimension B | Number ZB |
|----------------------|-----------|---------------------|-----------|
| $A \leq 560$ | 1 | $B \leq 560$ | 1 |
| $560 < A \leq 900$ | 2 | $560 < B \leq 800$ | 2 |
| $900 < A \leq 1250$ | 3 | $800 < B \leq 1000$ | 3 |
| $1250 < A \leq 1600$ | 4 | | |

- 1 – Damper SEDM
- 2 – Duct
- 3 – Hinges
- 4 – Holder L

Fig. 40. Example of installation in horizontal smoke exhaust duct

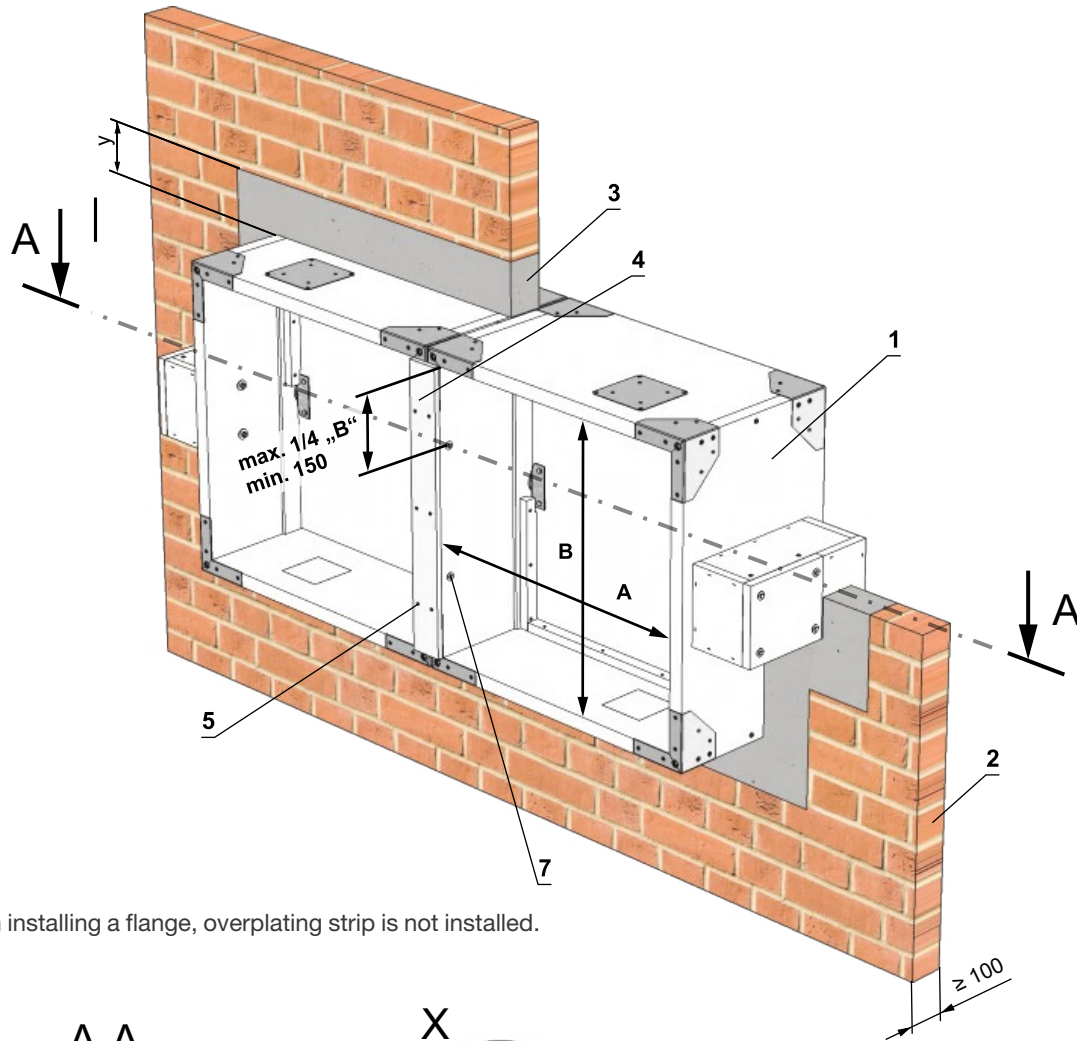


- 1 – Damper SEDM
- 2 – Duct
- 3 – Hinges
- 4 – Holder L

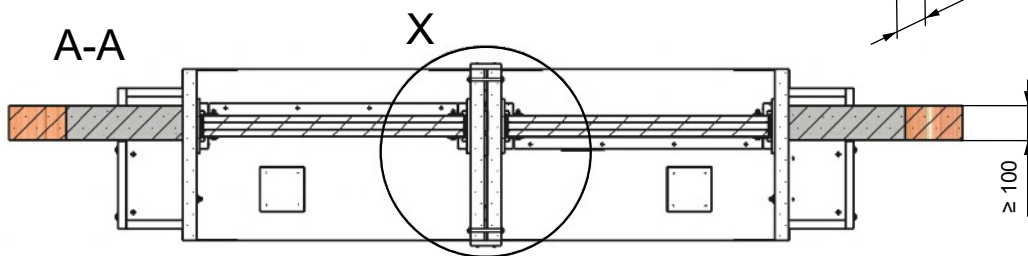
7.5 Installation in battery

Fig. 41. 2 dampers side by side - solid wall construction - mortar or gypsum

EIS 90



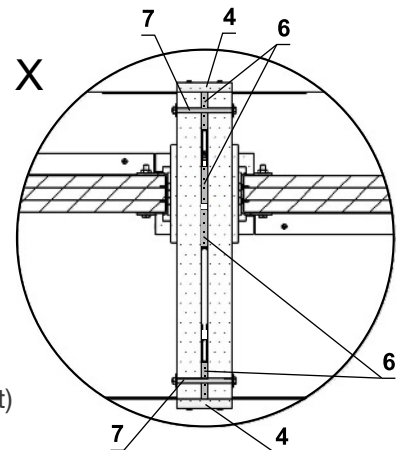
** When installing a flange, overplating strip is not installed.



*** RESPECT JOINT POSITION!**

Bolts and nuts shall not prevent free rotation on the blades.

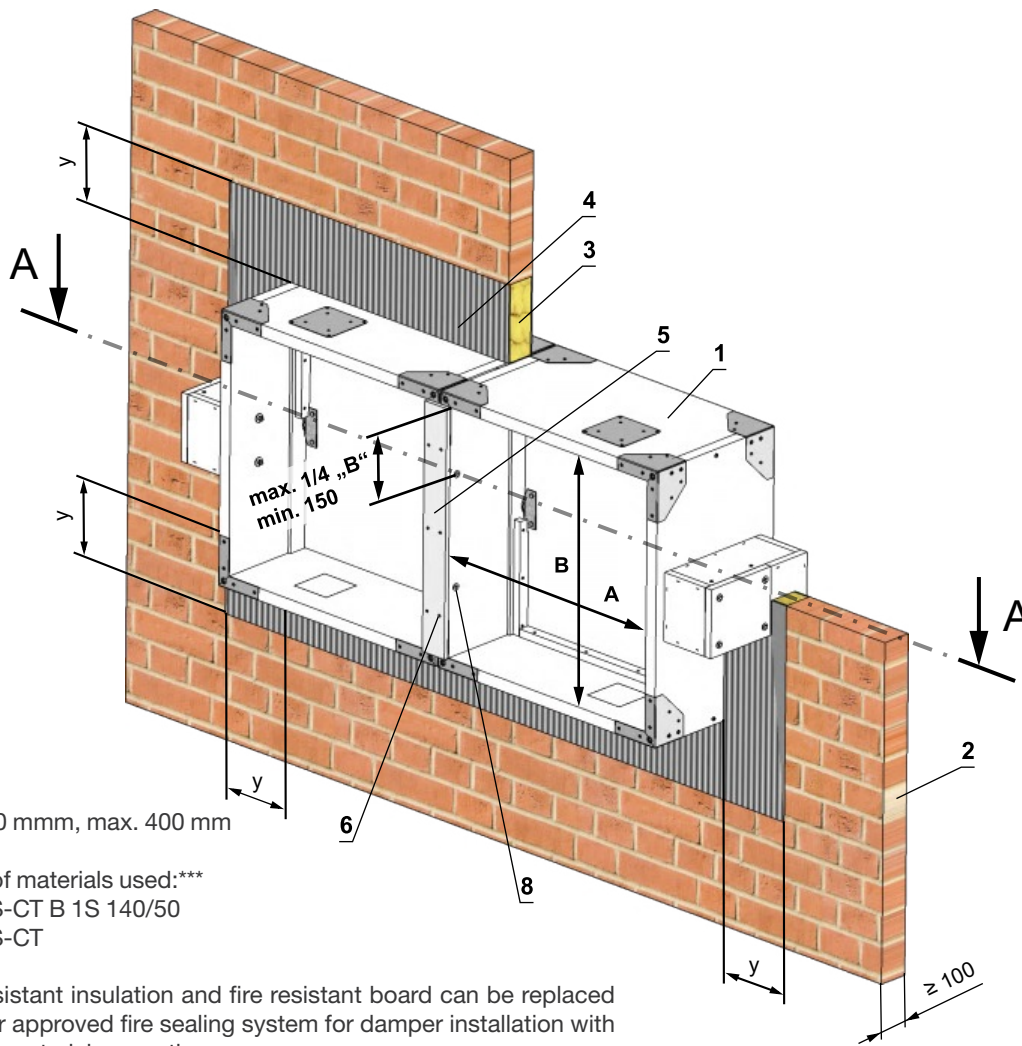
- 1 – SEDM
- 2 – Solid wall construction
- 3 – Mortar or gypsum
- 4 – Overplating strip (e.g. Promatect-H, th. 15 mm) **
- 5 – Screw 4x40 (span 200 to 250 mm)
- 6 – Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 7 – M8 bolt assembly on damper side „B“ (bolt, 2 pcs large washer, nut) distance from edge see fig. *



Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 42. 2 dampers side by side - solid wall construction - Weichschott (Ablative Coated Batt)

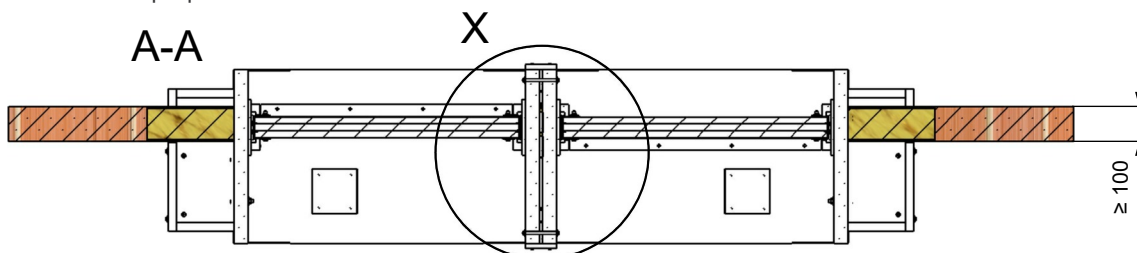
EIS 120



y = min. 30 mm, max. 400 mm

Example of materials used:***
 3 Hilti CFS-CT B 1S 140/50
 4 Hilti CFS-CT

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

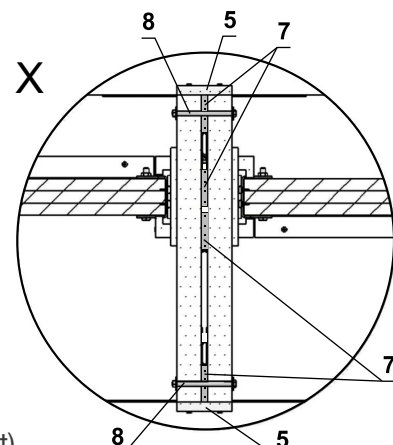


*** RESPECT JOINT POSITION!**

Bolts and nuts shall not prevent free rotation on the blades.

** When installing a flange, overplating strip is not installed.

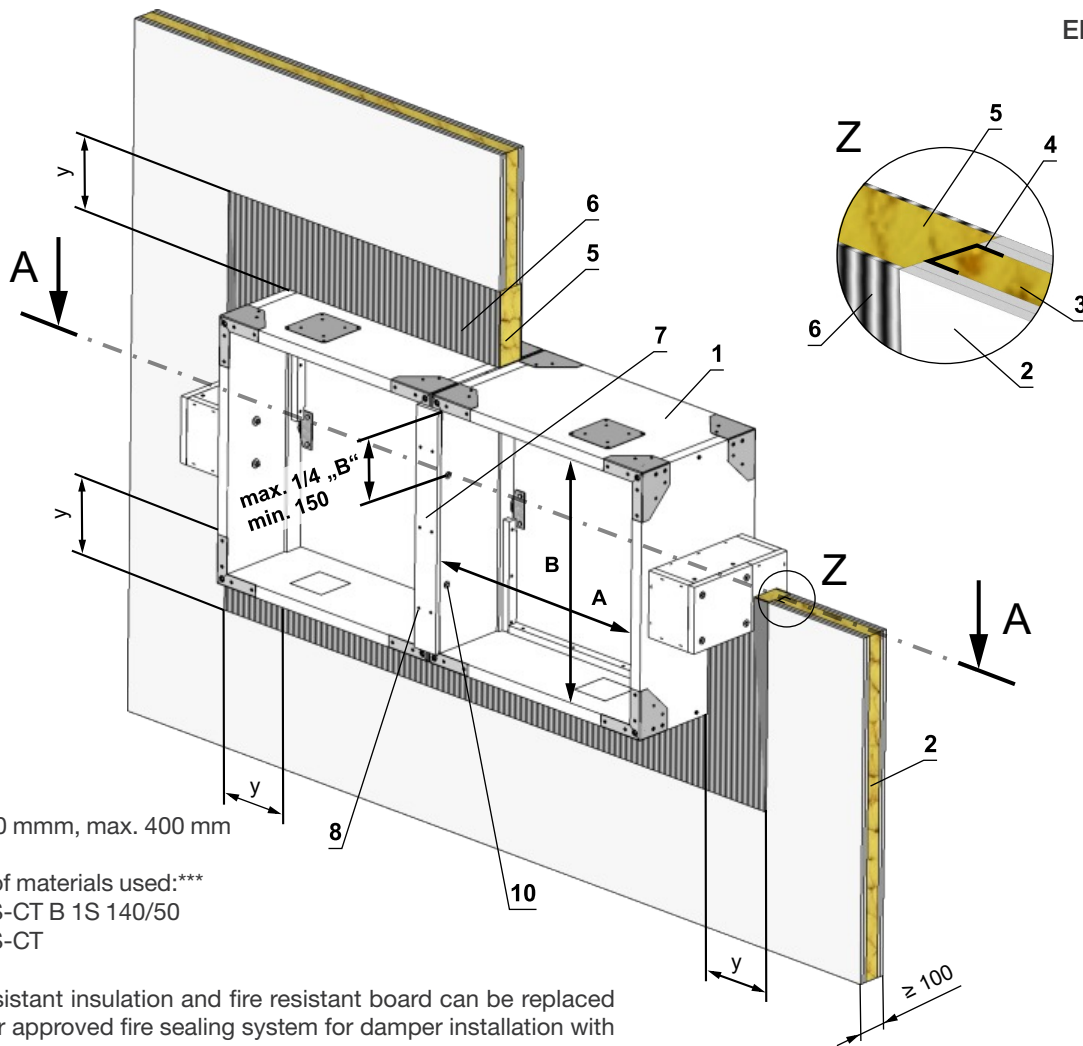
- 1 – SEDM
- 2 – Solid wall construction
- 3 – Fire board
- 4 – Fire coating th. 1 mm
- 5 – Overplating strip (e.g. Promatect-H, th. 15 mm) **
- 6 – Screw 4x40 (span 200 to 250 mm)
- 7 – Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 8 – M8 bolt assembly on damper side „B“ (bolt, 2 pcs large washer, nut) distance from edge see fig. *



Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 43. 2 dampers side by side - gypsum wall construction - Weichschott (Ablative Coated Batt)

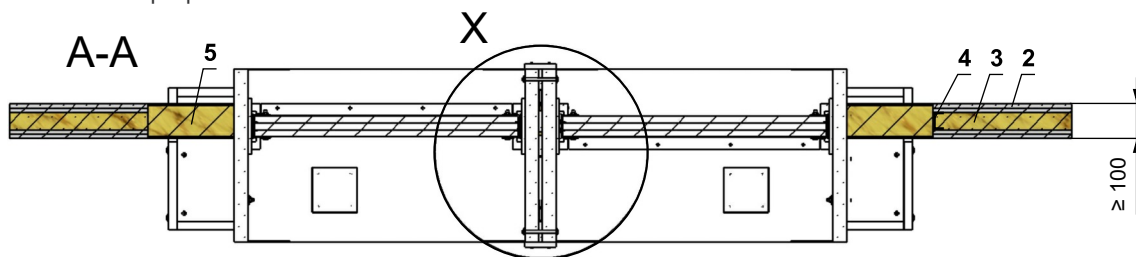
EIS 120



y = min. 30 mm, max. 400 mm

Example of materials used:***
 5 Hilti CFS-CT B 1S 140/50
 6 Hilti CFS-CT

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

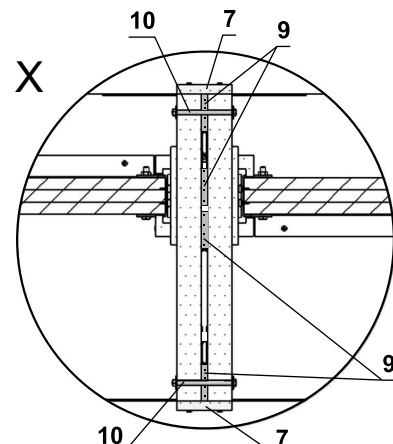


*** RESPECT JOINT POSITION!**

Bolts and nuts shall not prevent free rotation on the blades.

** When installing a flange, overplating strip is not installed.

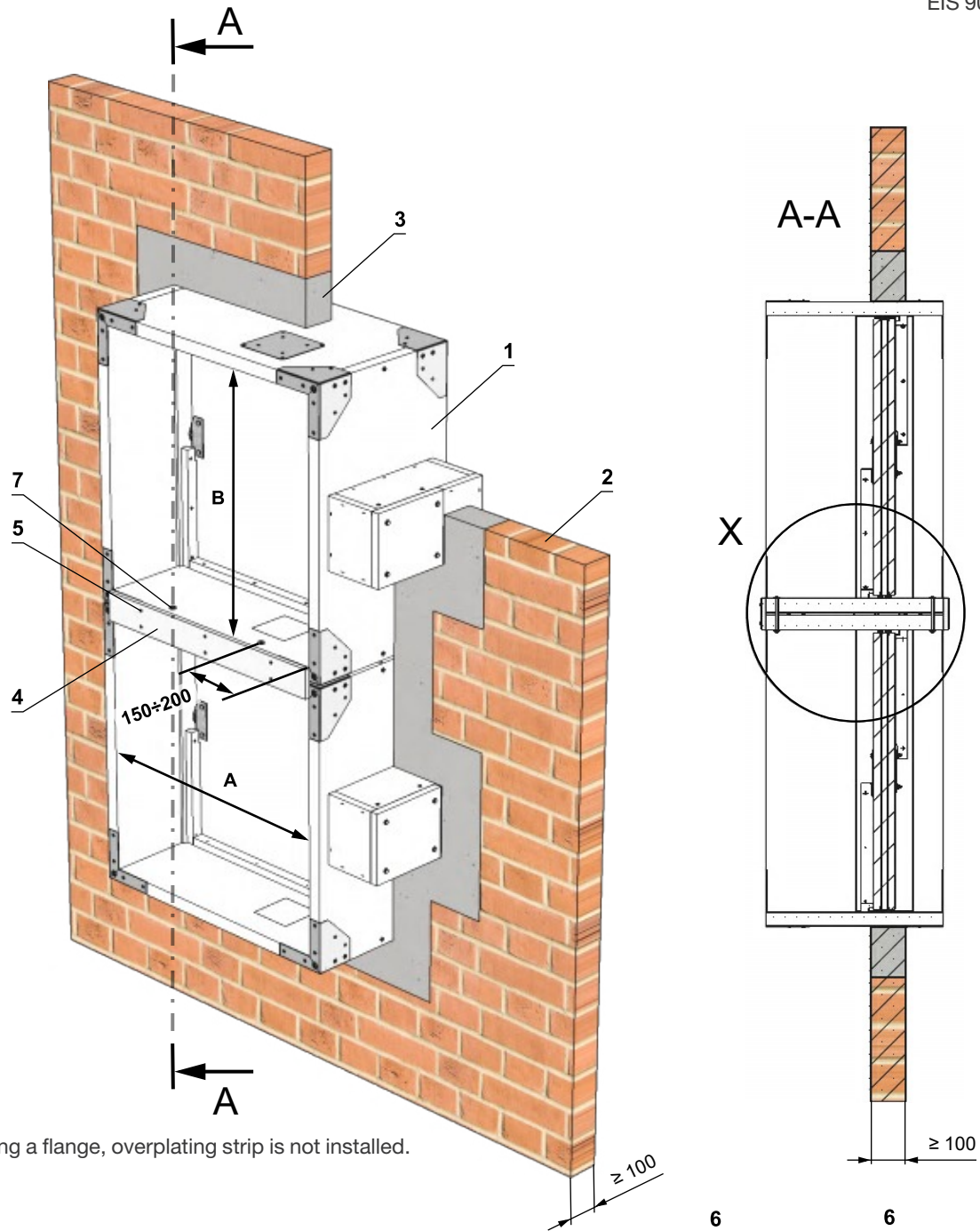
- 1 - SEDM
- 2 - Gypsum wall construction
- 3 - Mineral wool (type depending on the type of construction)
- 4 - Steel profile for plasterboard constructions
- 5 - Fire board
- 6 - Fire coating th. 1 mm
- 7 - Overplating strip (e.g. Promatect-H, th. 15 mm) **
- 8 - Screw 4x40 (span 200 to 250 mm)
- 9 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 10 - M8 bolt assembly on damper side „B“ (bolt, 2 pcs large washer, nut) distance from edge see fig. *



Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 44. 2 dampers on top of each other - solid wall construction - mortar or gypsum

EIS 90

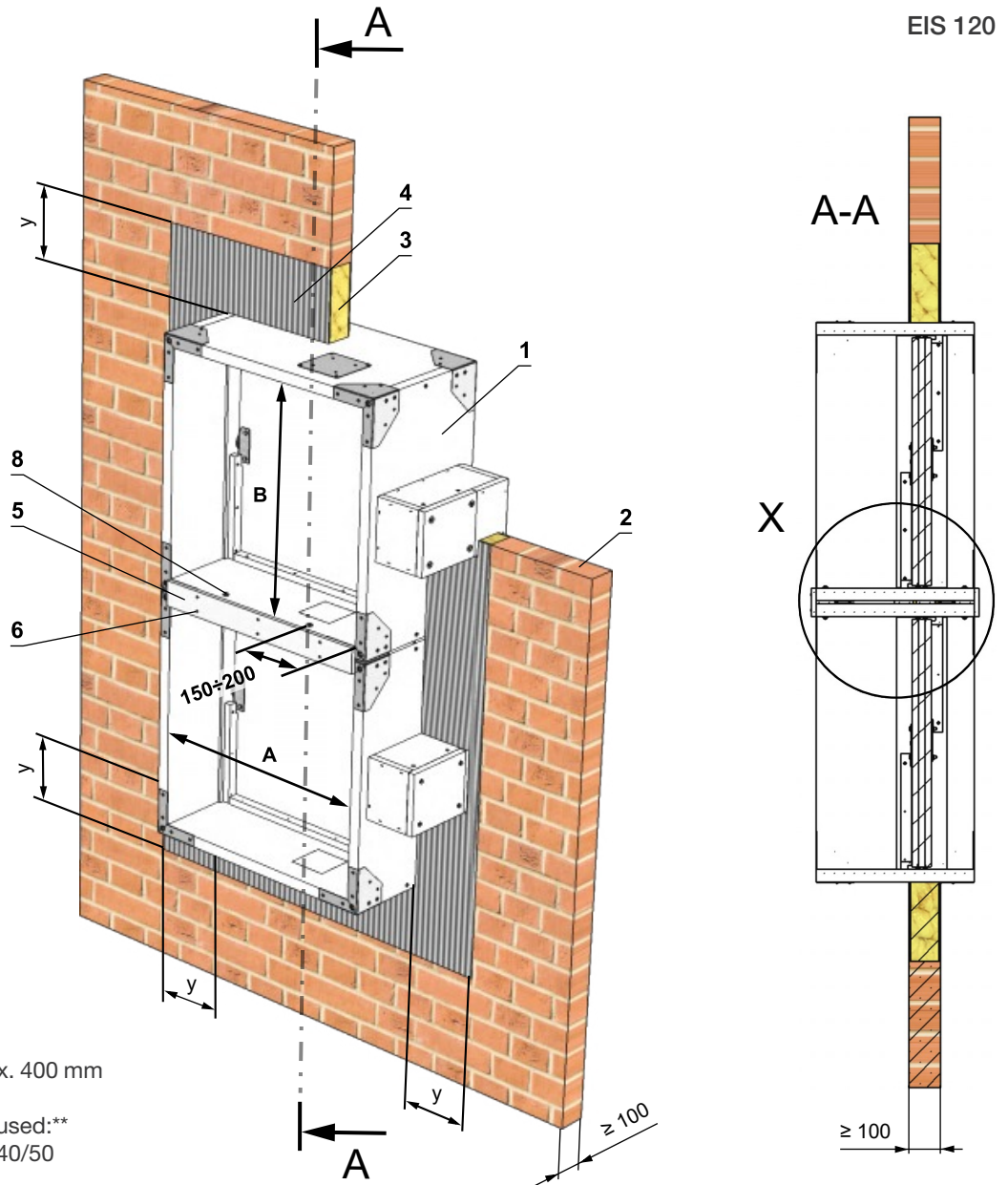


* When installing a flange, overplating strip is not installed.

- 1 – SEDM
- 2 – Solid wall construction
- 3 – Mortar or gypsum
- 4 – Overplating strip (e.g. Promatect-H, th. 15 mm) *
- 5 – Screw 4x40 (span 200 to 250 mm)
- 6 – Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 7 – M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 45. 2 dampers on top of each other - solid wall construction - Weichschott (Ablative Coated Batt)



y = min. 30 mm, max. 400 mm

Example of materials used:**
 3 Hilti CFS-CT B 1S 140/50
 4 Hilti CFS-CT

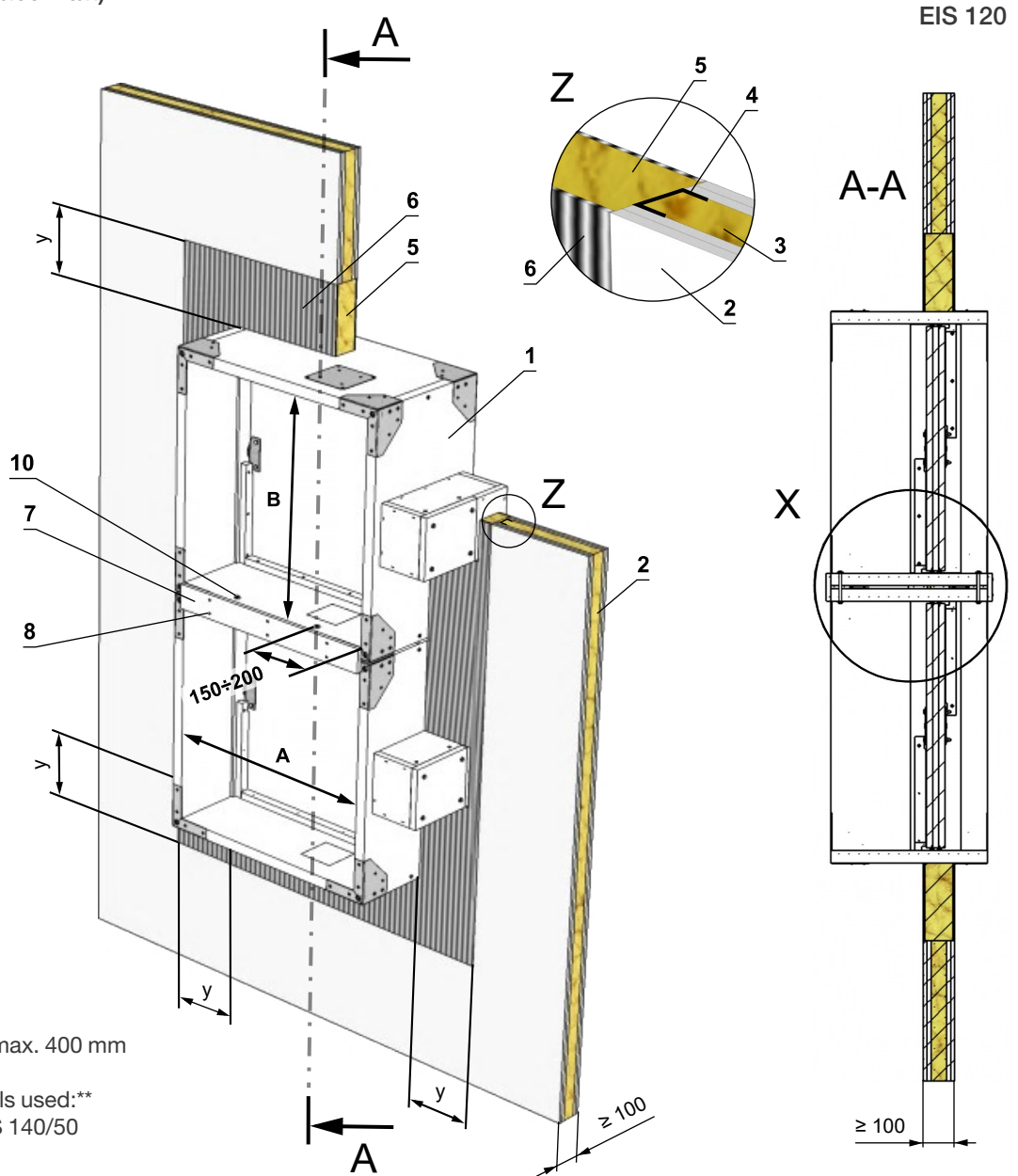
** Fire resistant insulation and fire resistant board can be replaced by another approved fire sealing system for damper installation with equivalent material properties.

* When installing a flange, overplating strip is not installed.

- 1 - SEDM
- 2 - Solid wall construction
- 3 - Fire board
- 4 - Fire coating th. 1 mm
- 5 - Overplating strip (e.g. Promatect-H, th. 15 mm) *
- 6 - Screw 4x40 (span 200 to 250 mm)
- 7 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 8 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 46. 2 dampers on top of each other - gypsum wall construction - Weichschott (Ablative Coated Batt)



y = min. 30 mmm, max. 400 mm

Example of materials used:**
 5 Hilti CFS-CT B 1S 140/50
 6 Hilti CFS-CT

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

* When installing a flange, overplating strip is not installed.

- 1 - SEDM
- 2 - Gypsum wall construction
- 3 - Mineral wool (type depending on the type of construction)
- 4 - Steel profile for plasterboard constructions
- 5 - Fire board
- 6 - Fire coating th. 1 mm
- 7 - Overplating strip (e.g. Promatect-H, th. 15 mm) *
- 8 - Screw 4x40 (span 200 to 250 mm)
- 9 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 10 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

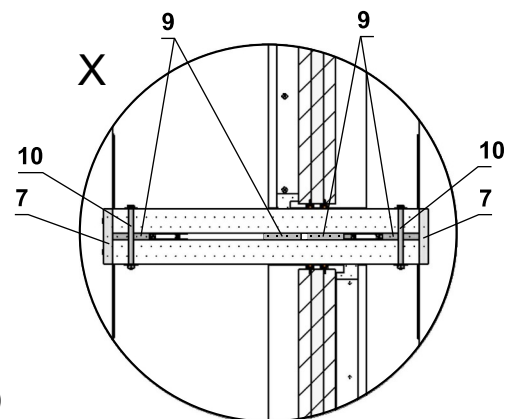
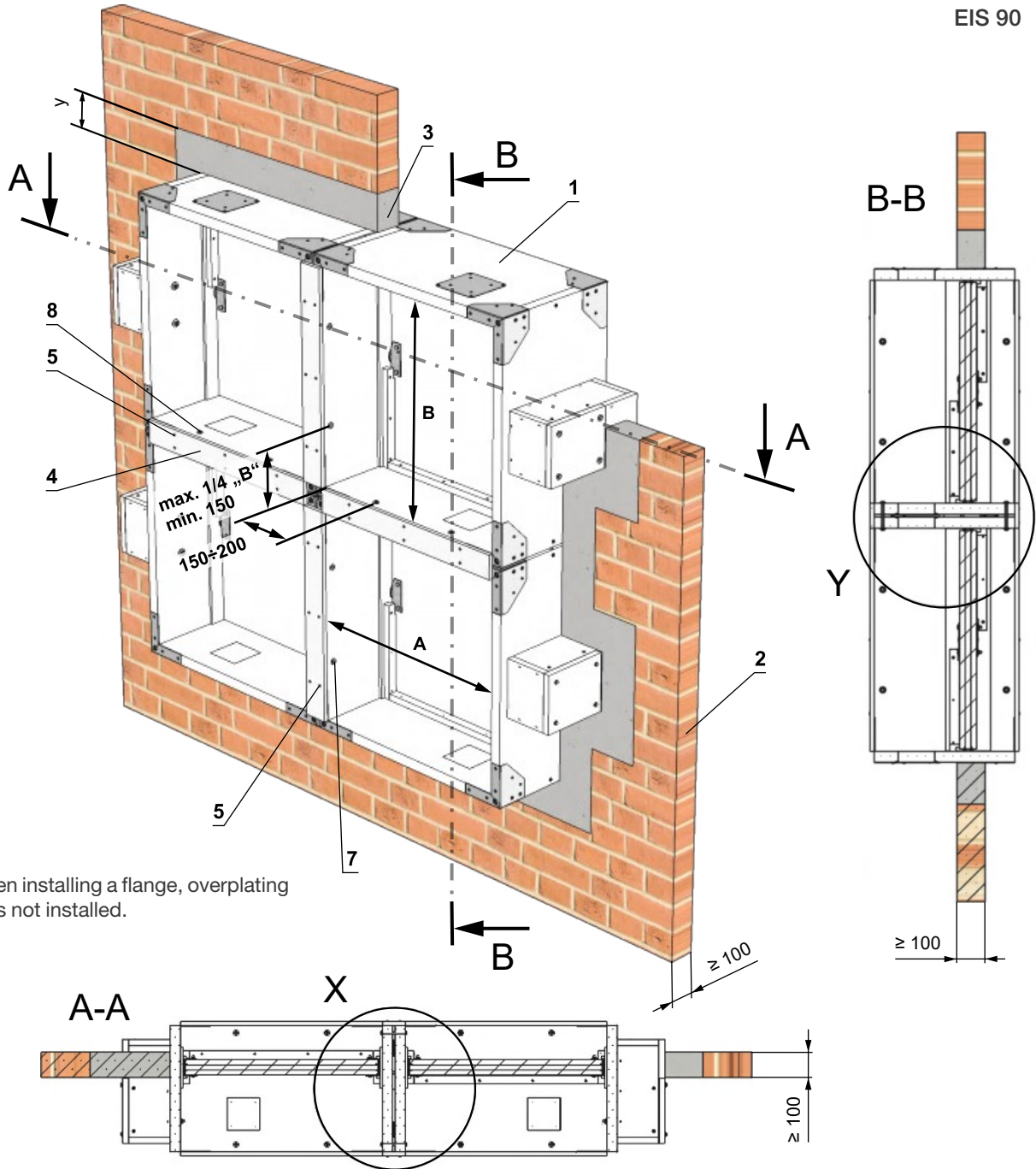


Fig. 47. 4 dampers - solid wall construction - mortar or gypsum

EIS 90



** When installing a flange, overplating strip is not installed.

*** Respect joint position!**

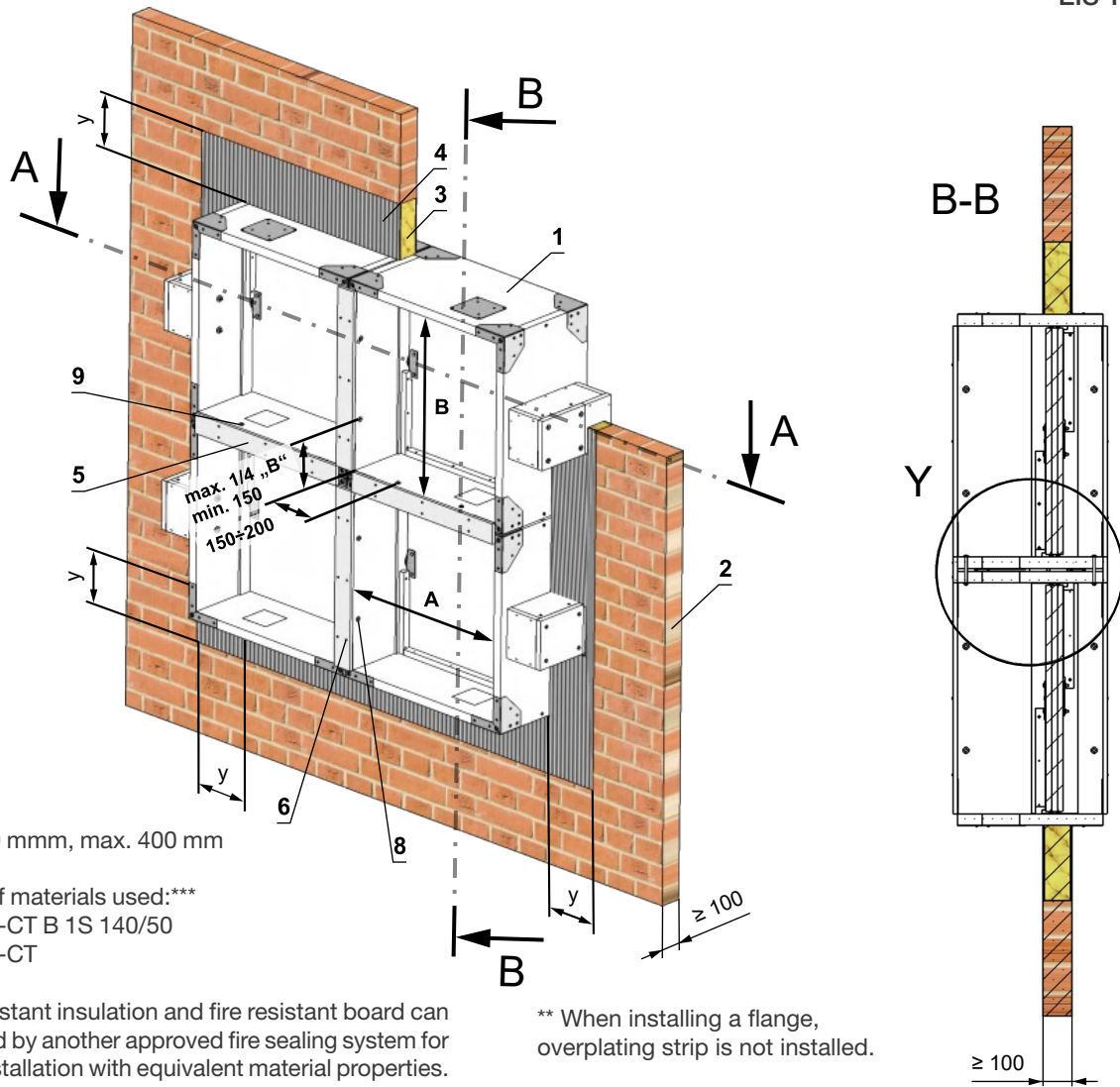
Bolts and nuts shall not prevent free rotation on the blades.

- 1 - SEDM
- 2 - Solid wall construction
- 3 - Mortar or gypsum
- 4 - Overplating strip (e.g. Promatect-H, th. 15 mm)**
- 5 - Screw 4x40 (span 200 to 250 mm)
- 6 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 7 - M8 bolt assembly on damper side „B“ (bolt, 2 pcs large washer, nut) distance from edge see fig. *
- 8 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 48. 4 dampers - solid wall construction - Weichschott (Ablative Coated Batt)

EIS 120

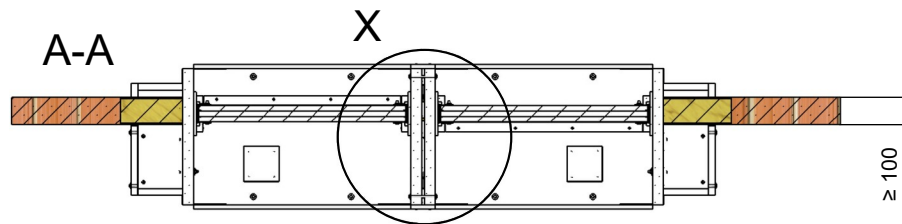


y = min. 30 mm, max. 400 mm

Example of materials used:***
 5 Hilti CFS-CT B 1S 140/50
 6 Hilti CFS-CT

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

** When installing a flange, overplating strip is not installed.



* Respect joint position!

Bolts and nuts shall not prevent free rotation on the blades.

- 1 - SEDM
- 2 - Solid wall construction
- 3 - Fire board
- 4 - Fire coating th. 1 mm
- 5 - Overplating strip (e.g. Promatect-H, th. 15 mm)**
- 6 - Screw 4x40 (span 200 to 250 mm)
- 7 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 8 - M8 bolt assembly on damper side „B“ (bolt, 2 pcs large washer, nut) distance from edge see fig. *
- 9 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

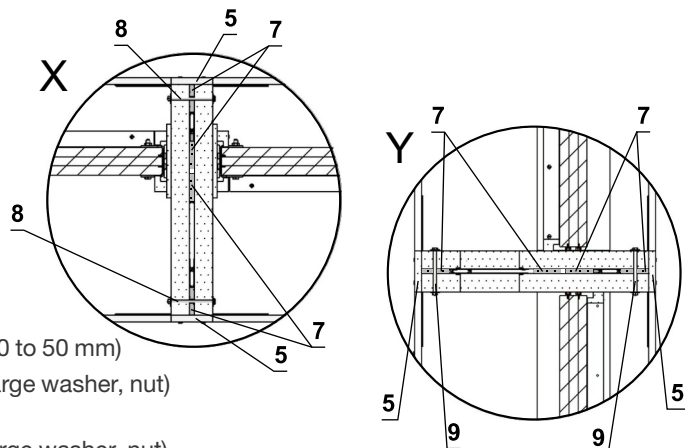
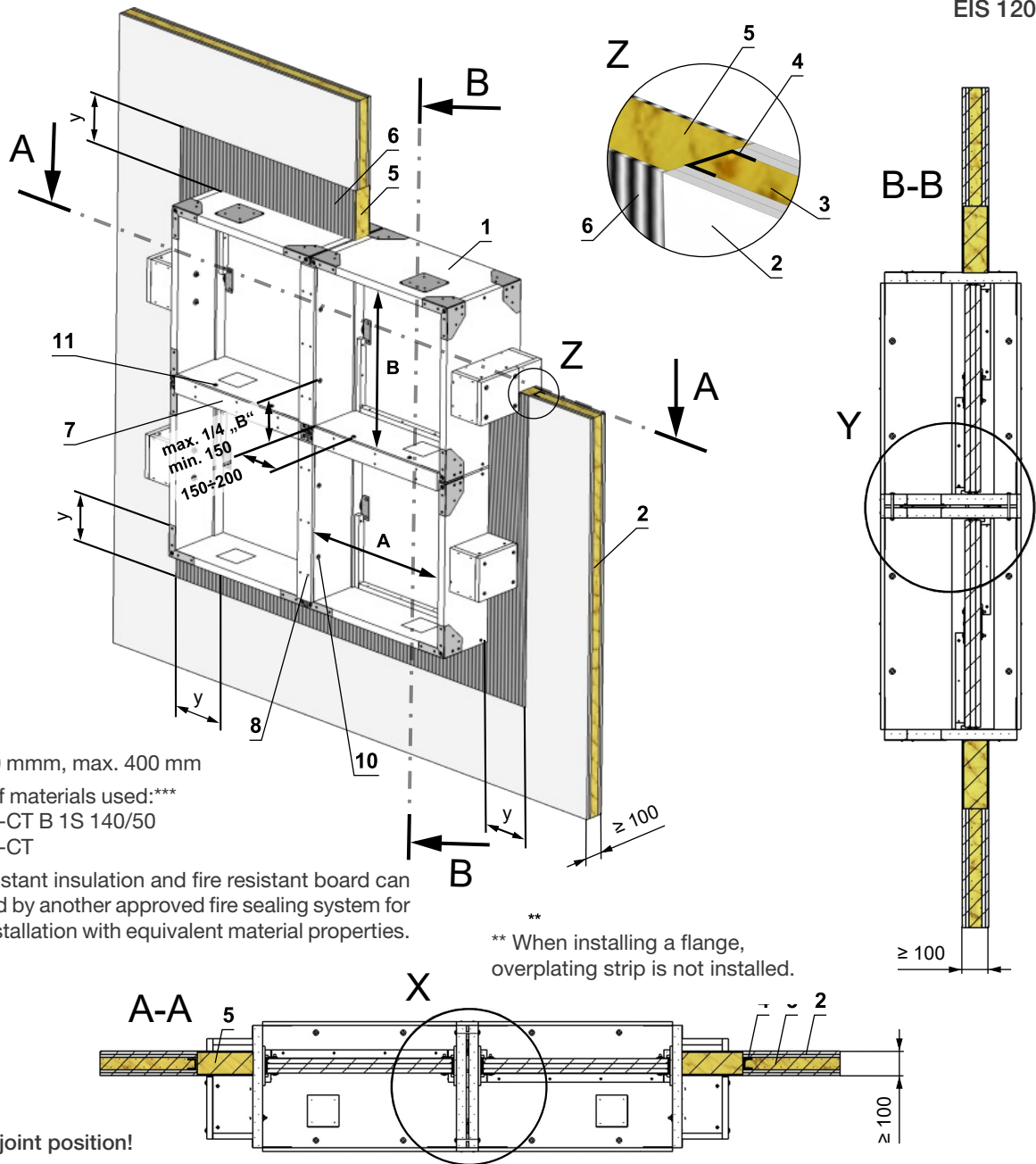


Fig. 49. 4 dampers - gypsum wall construction - Weichschott (Ablative Coated Batt)

EIS 120



y = min. 30 mm, max. 400 mm

Example of materials used:***

5 Hilti CFS-CT B 1S 140/50

6 Hilti CFS-CT

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

** When installing a flange, overplating strip is not installed.

* Respect joint position!

Bolts and nuts shall not prevent free rotation on the blades.

1 - SEDM

2 - Gypsum wall construction

3 - Mineral wool

(type depending on the type of construction)

4 - Steel profile for plasterboard constructions

5 - Fire board

6 - Fire coating th. 1 mm

7 - Overplating strip (e.g. Promatect-H, th. 15 mm)**

8 - Screw 4x40 (span 200 to 250 mm)

9 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)

10 - M8 bolt assembly on damper side „B“

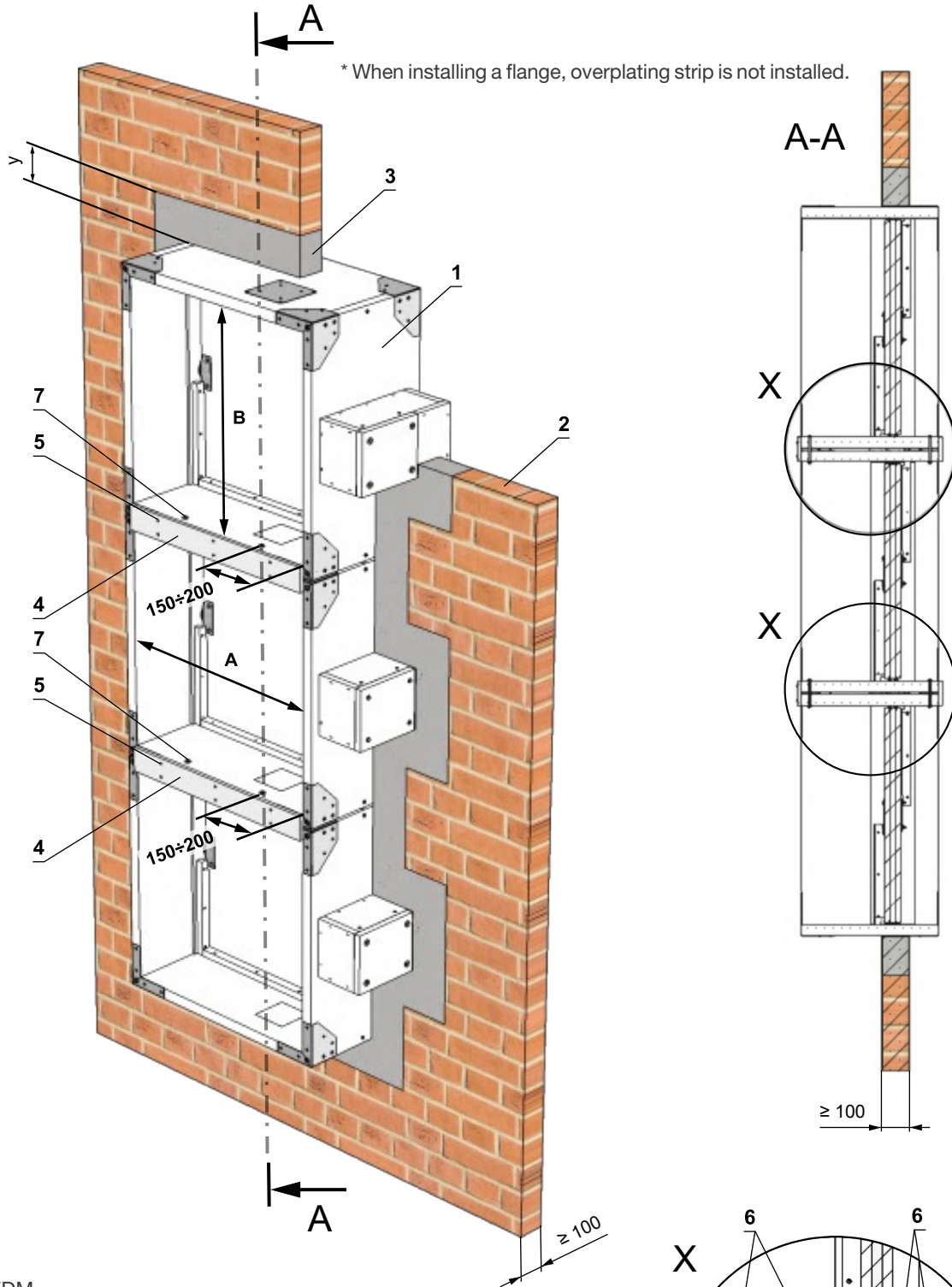
(bolt, 2 pcs large washer, nut) distance from edge see fig. *

11 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 50. 3 dampers on top of each other - solid wall construction - mortar or gypsum

EIS 90

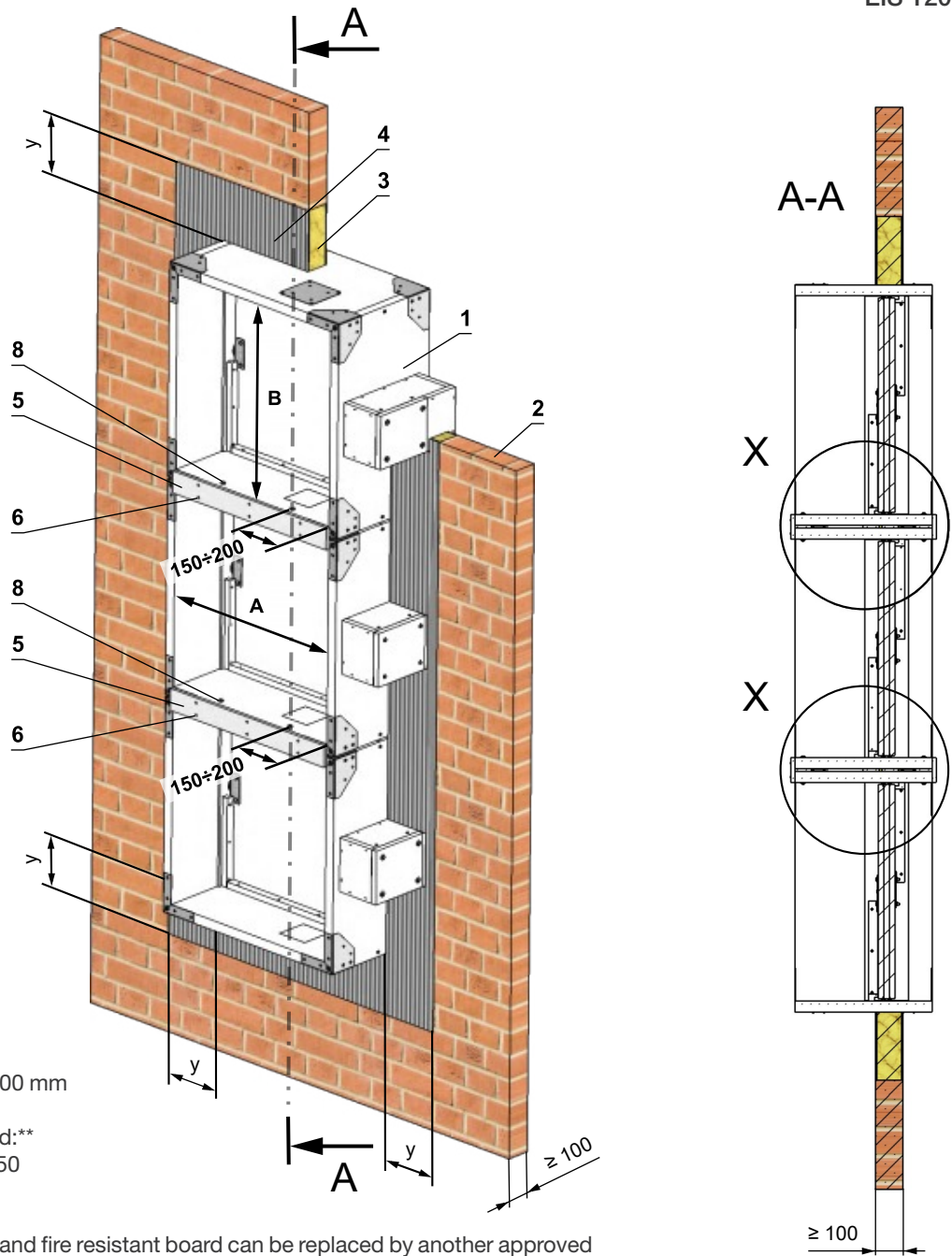


- 1 - SEDM
- 2 - Solid wall construction
- 3 - Mortar or gypsum
- 4 - Overplating strip (e.g. Promatect-H, th. 15 mm) *
- 5 - Screw 4x40 (span 200 to 250 mm)
- 6 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 7 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

Fig. 51. 3 dampers on top of each other - solid wall construction - mortar or gypsum

EIS 120



y = min. 30 mm, max. 400 mm

Example of materials used:**

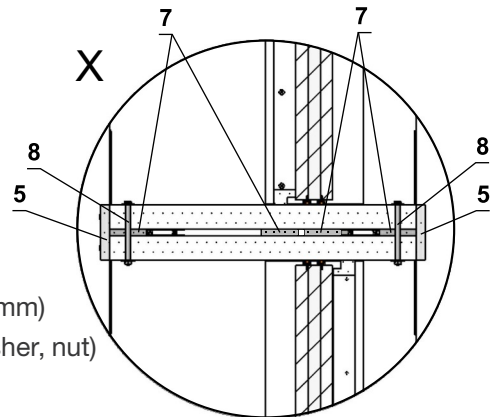
3 Hilti CFS-CT B 1S 140/50

4 Hilti CFS-CT

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

* When installing a flange, overplating strip is not installed.

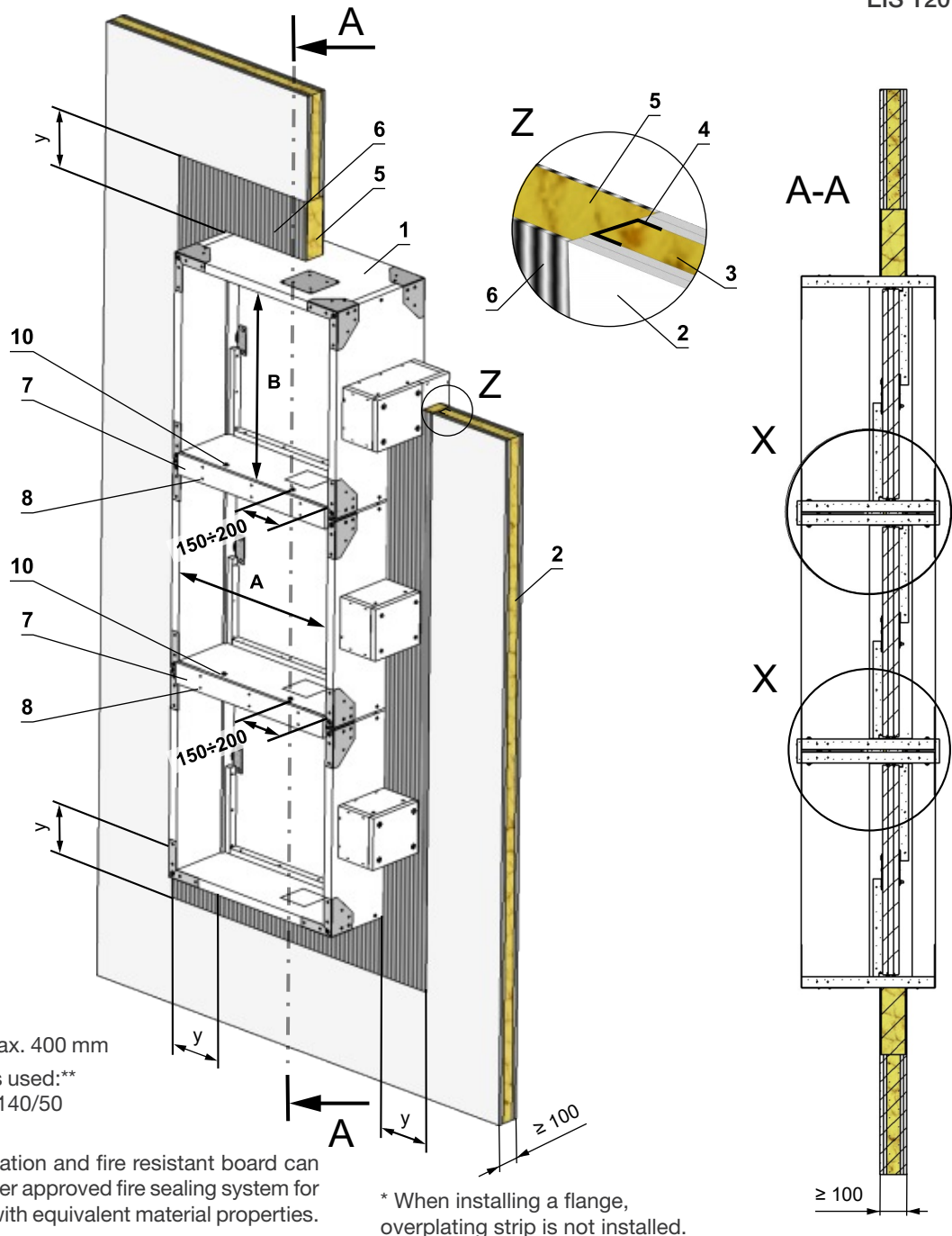
- 1 - SEDM
- 2 - Solid wall construction
- 3 - Fire board
- 4 - Fire coating th. 1 mm
- 5 - Overplating strip (e.g. Promatect-H, th. 15 mm) *
- 6 - Screw 4x40 (span 200 to 250 mm)
- 7 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 8 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm



Connecting straps, spacer straps, screws and screw connections are not included in the delivery!

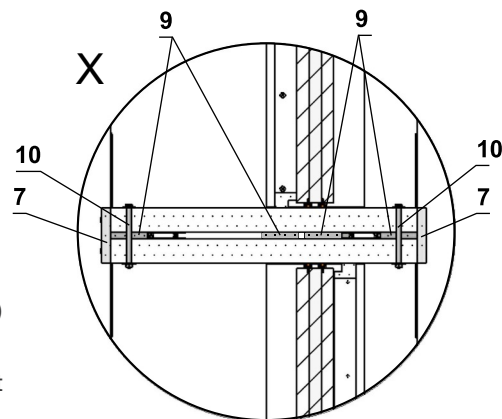
Fig. 52. 3 dampers on top of each other - gypsum wall construction - Weichschott (Ablative Coated Batt)

EIS 120



- 1 - SEDM
- 2 - Gypsum wall construction
- 3 - Mineral wool (type depending on the type of construction)
- 4 - Steel profile for plasterboard constructions
- 5 - Fire board
- 6 - Fire coating th. 1 mm
- 7 - Overplating strip (e.g. Promatect-H, th. 15 mm) *
- 8 - Screw 4x40 (span 200 to 250 mm)
- 9 - Spacing strip (e.g. Promatect-H, th. 10 mm, width 40 to 50 mm)
- 10 - M8 bolt assembly on damper side „A“ (bolt, 2 pcs large washer, nut) distance from edge see fig., span max. 400 mm

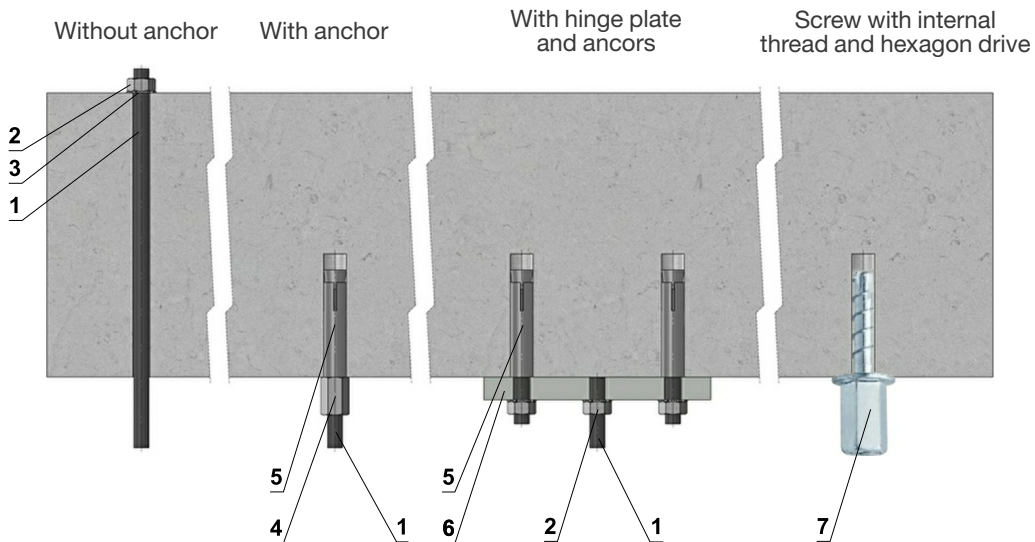
Connecting straps, spacer straps, screws and screw connections are not included in the delivery!



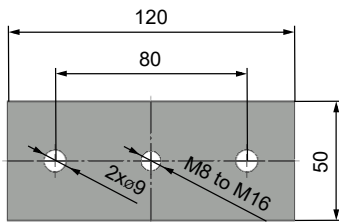
8. Suspension systems

8.1 Mounting to the ceiling wall

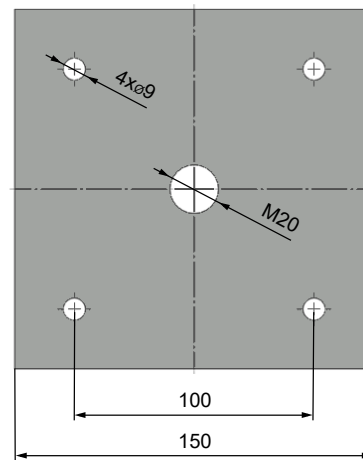
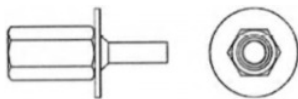
Anchoring possible after national standards



Hinge plates



Screw with internal thread and hexagon drive



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 | 35 | 70 |
| M12 | 84,3 | 52 | 104 |
| M14 | 115 | 70 | 140 |
| M16 | 157 | 96 | 192 |
| M18 | 192 | 117 | 234 |
| M20 | 245 | 150 | 300 |

- 1 – Threaded rod M8 – M20
- 2 – Nut
- 3 – Washer
- 4 – Coupling Nut
- 5 – Anchor
- 6 – Hinge plate - min. thickness 10 mm
- 7 – Concrete screw tested for fire resistance R30-R90, max. Tension up to 0.75 KN (length 35 mm)

8.2 Examples of fixing

Dampers can be suspended by using of threaded rods and fixing rails. Threaded rods has to be designed depend on damper weight.

Damper suspension has to be solve separately. Back-to-back smoke exhaust duct has to be hung or supported so as all load transfer from the back-to-back smoke exhaust duct to the damper is absolutely excluded. Exhaust duct suspension has to be made according to recommendation of exhaust duct supplier.

Threaded rods longer than 1,5 m has to be protected by fire resistant insulation.

For fixing suspension system to solid ceiling has to be used only steel anchors with appropriate fire resistance or other suitable system.

Fig. 53. Examples of hinges fixing

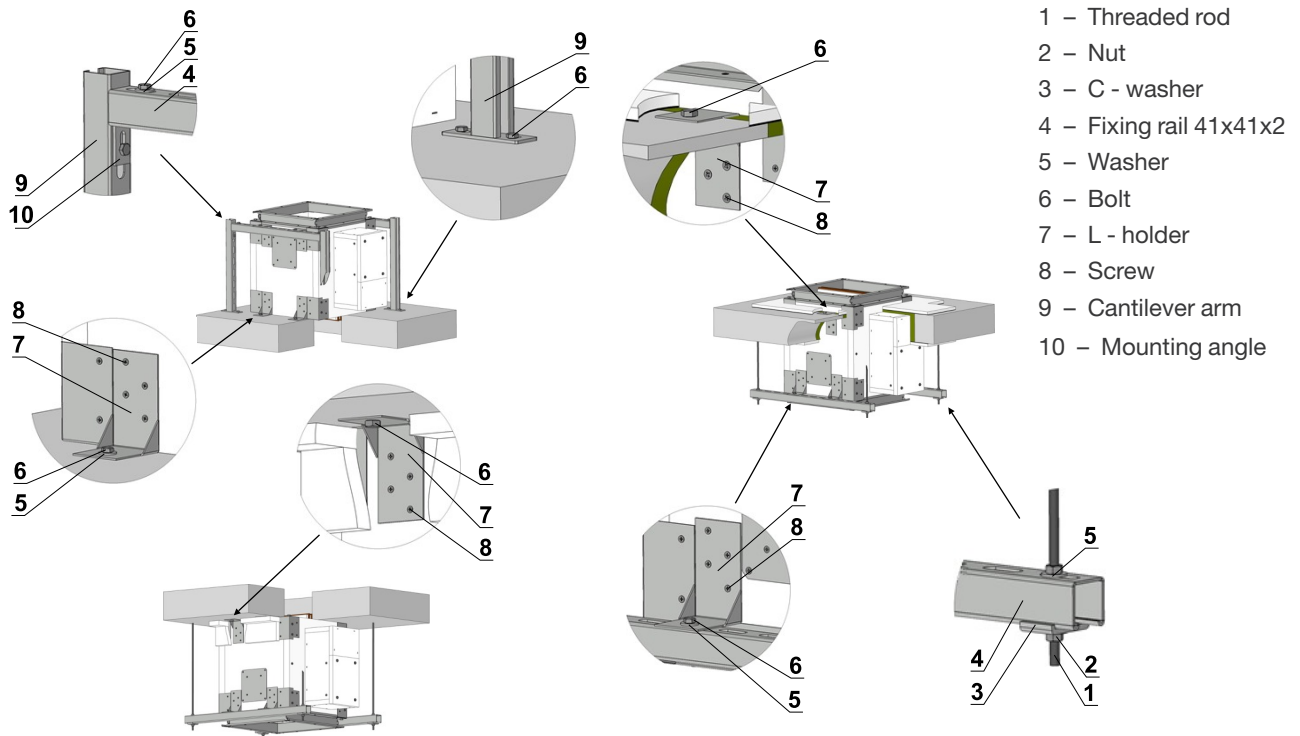
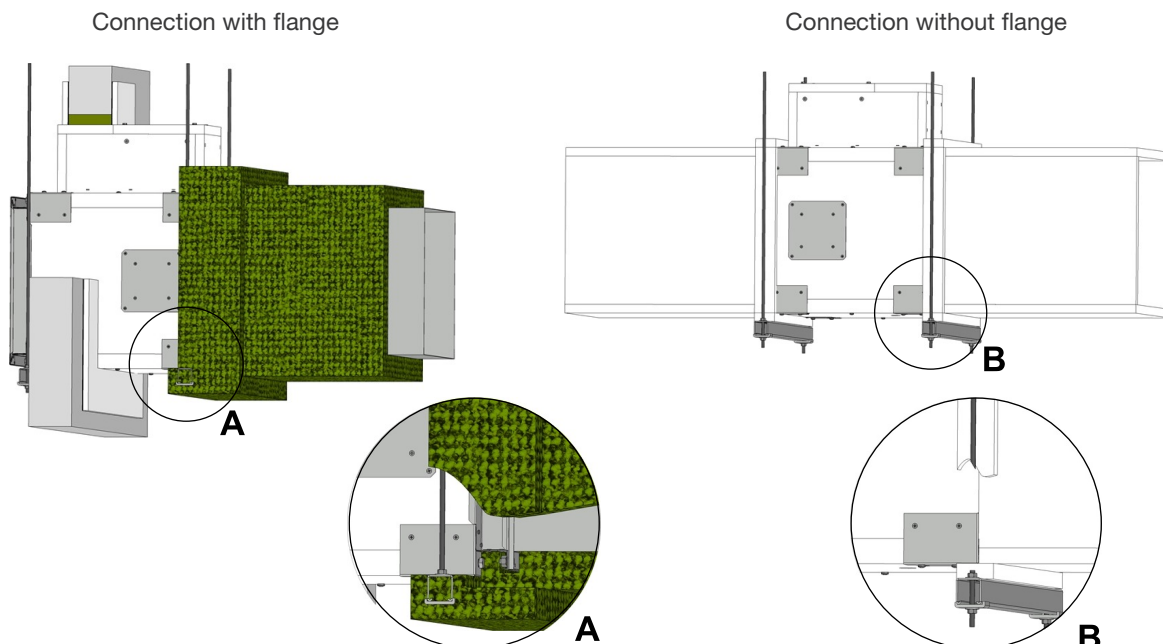


Fig. 54. Examples of damper connection to the duct

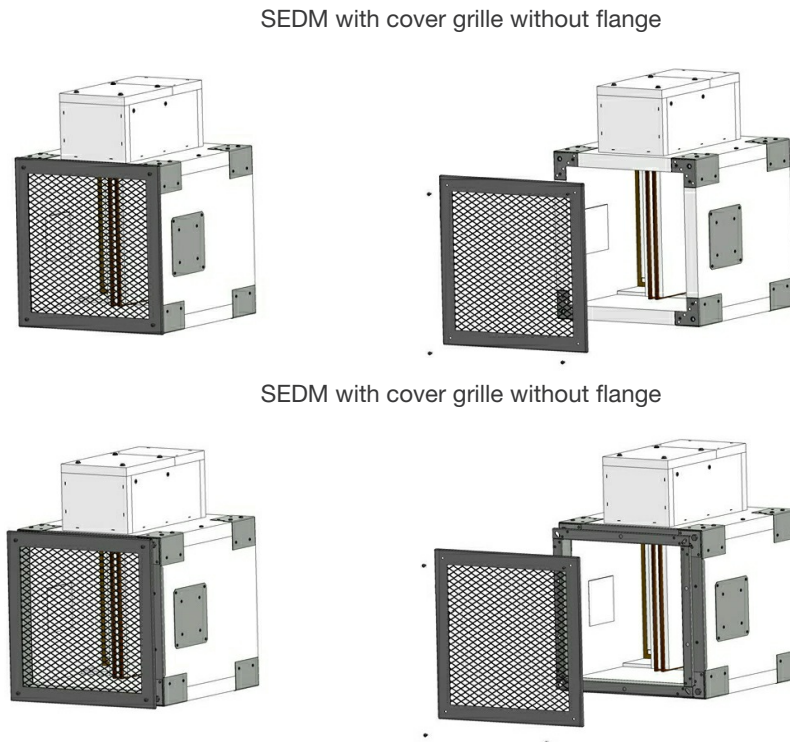


9. Accessories

9.1 Cover grille

The grilles type KMM can be used to close smoke control dampers. These grilles are available in all sizes of the smoke control dampers.

Fig. 55. Cover grille KMM



10. Material

Damper casings and blades are made of fire resistant asbestos free boards made of mineral fibres. Fasteners are galvanized.

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 – EN 17240)
- Class A4 – Chemistry-grade stainless steel (AISI 316, 316L – EN 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 galvanized 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 three Promatect-H sheets, thickness 20 mm, connected with galvanised nailed "U" connectors which are sealed with Promat K84 from the outside.

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.

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.

11. Inspection, testing

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

12. Logistic terms

Dampers are delivered on a pallets. Another required packaging system should be approved and agreed by manufacturer. Packaging material is not returnable in case that another packaging system (material) is required and used and it is not included into final price of damper.

For unloading and further manipulation with the damper is necessary to use appropriate tooling (forklifts) due to damper weight. Dampers are fragile.

Dampers are transported by box freight vehicles without direct weather impact, there must not occur any shocks and ambient temperature must not exceed +50°C. Dampers must be protected against mechanic damages when transported and manipulated. During transportation, the damper blade must be in the "CLOSED" position.

Dampers are stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -30°C to +50°C and maximum relative humidity 95% (avoid condensation on the damper body). Dampers must be protected against mechanic damages when transported and manipulated.

13. Assembly

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 smoke control dampers must be done according international and local norms and laws.

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

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

Manual operation

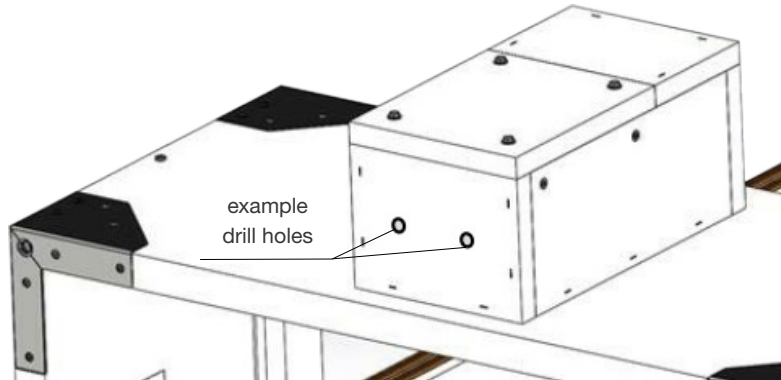
Without power supply, the damper can be operated manually and fixed in any required position.

Electrical connection of the actuator in protection box

Protection box without slot or predrilled holes

Drill two holes into the protection box (from outside to inside) and pull through field wiring cables (fire resistant cables) to connect actuator trailing lead. Protection box is made of calcium silicate plates.

Fig. 56. Example of position of holes in the wall of the box, without pre-manufactured slot

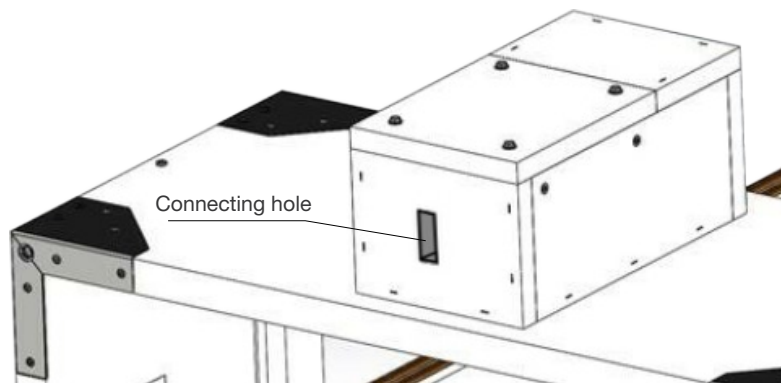


Procedure:

- Use drill (drill size acc. To suit connecting cable $\varnothing + 2$ mm for seal up by mastic) and make two holes (see fig. 42). It is possible to drill holes in any side of the housing.
- Pull the heat resistant cable through the calcium silicate plate (wall) and connect with cables from actuator acc. to above mentioned electrical diagram.
- Seal up the space around cable with fire resistant mastic (HILTI CFS-S ACR, PROMASTOP) or equivalent.
- Let the mastic harden.

Protection box with slot including intumescent tapes

Fig. 57. Example of pre-manufactured slot in the insulating box, with intumescent tape inside slot



To connect the actuator, use the prepared hole in the box, which is equipped with intumescent tape. If necessary, the hole can be additionally filled with fire-resistant sealant.

14. Entry into service and revision

Before entering the dampers into operation after assembly and after sequential revisions, checks and functionality tests of all designs including operation of the electrical components must be successfully provided and finished. After entering into operation, these revisions must be done according to requirement set by national regulations.

In case that dampers are found unable to serve for their function for any cause, it must be clearly marked. The operator is obliged to ensure that the damper is put into condition in which it is ready for function and meanwhile he is obliged to provide the fire protection by another appropriate way.

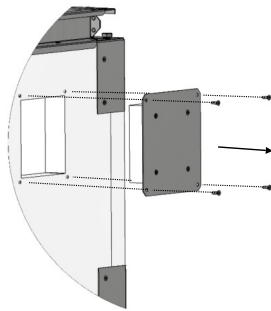
Results of regular checks, imperfections found and all-important facts connected with the damper function must be recorded in the "FIRE BOOK" and immediately reported to the operator.

Before entering the dampers into operation after their assembly and by sequential checks, the following checks must be carried out for all designs.

Visual inspection of proper damper integration, inside damper area, damper blade, contact surfaces and silicon sealing.

Inspection hole disassembly: release the covering lid by unscrewing four outer screws than remove it from its original position.

Fig. 58. Inspection hole detail



Check of damper blade displacement can be realized after actuating mechanism supply connection or signal connection from higher level control systems. Blade displacement from position "OPEN" to position "CLOSED" and return displacement is checked.

15. Spare parts

Spare parts are supplied only on basis of an order.



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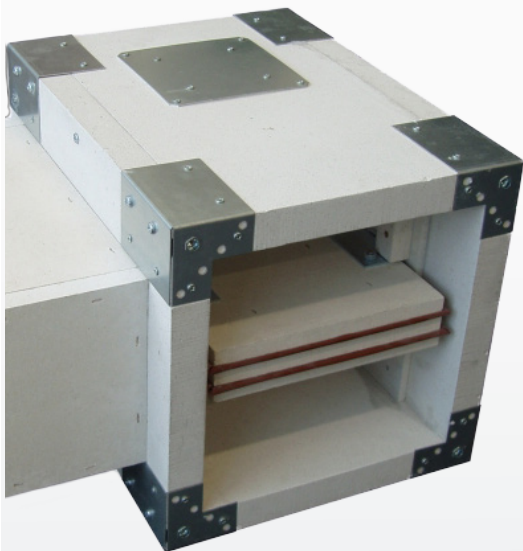
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