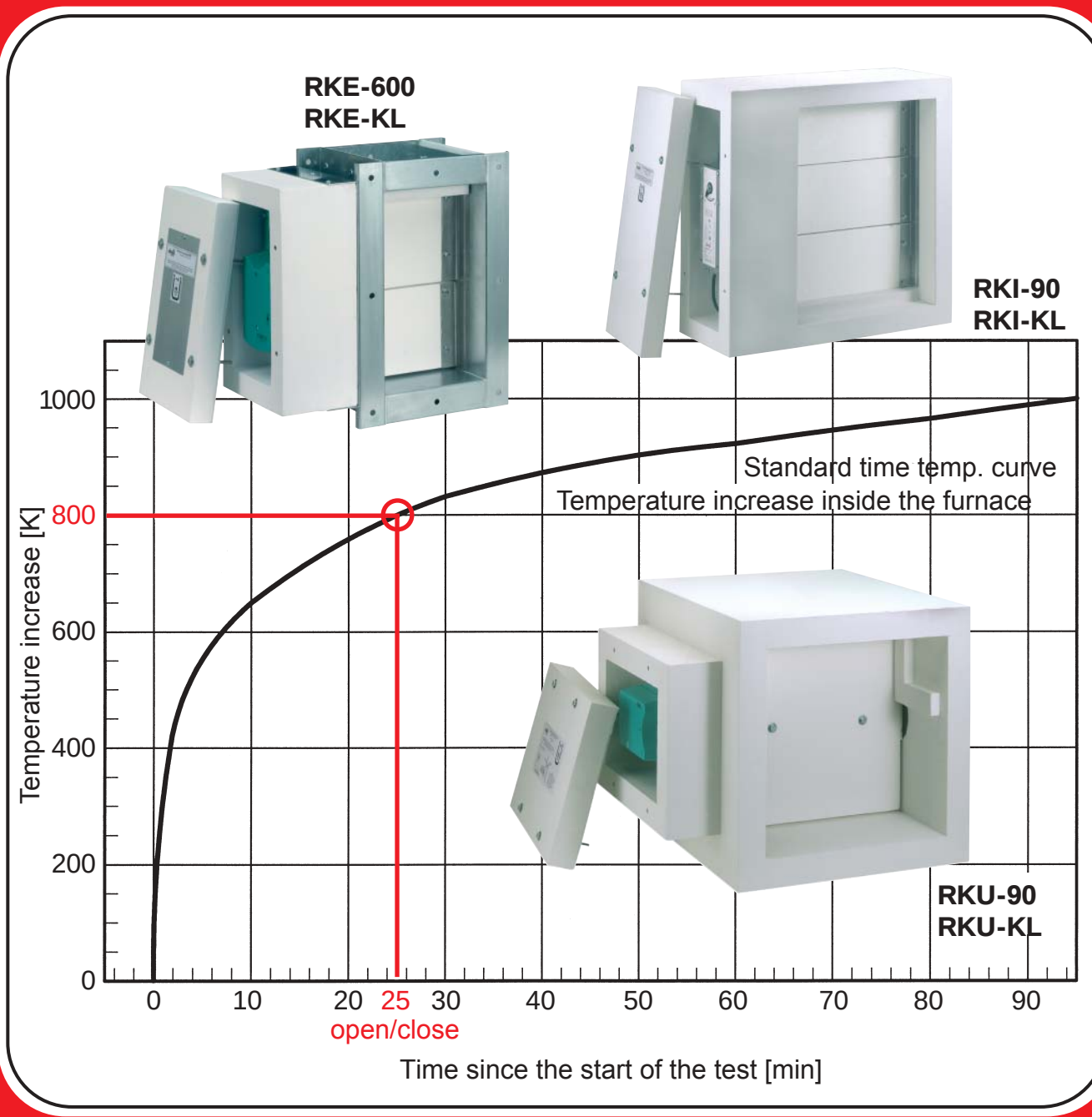
strulik gmbh

Fire Prevention

Smoke exhaust systems

Part III – 03/2007



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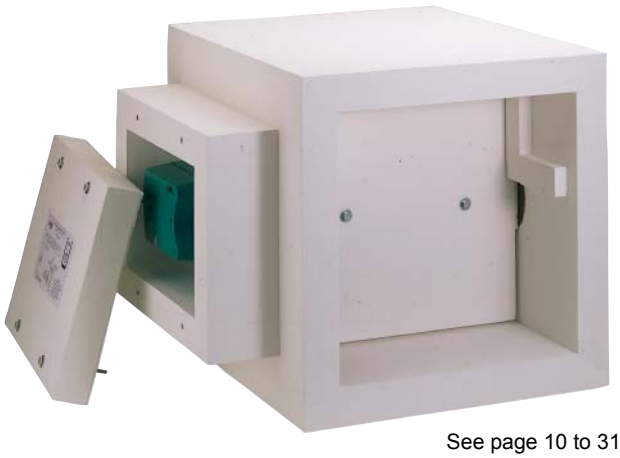
Contents illustrated in photos

RKU-90/Z-78.2-12
RKU-90-KL/Z-78.3-78



See page 10 to 31

Fire resistance class EK-90/fire resistance time of 90 min.

RKE/Z-78.2-47
RKE-KL/Z-78.3-109

See page 47 to 58

Functional endurance of 60 min. at 600 °C or 120 min. at 400 °C within smoke extraction ducts of sheet steel

RKI-90/Z-78.2-11
RKI-90-KL (the test certificate has been applied for)

See page 32 to 46

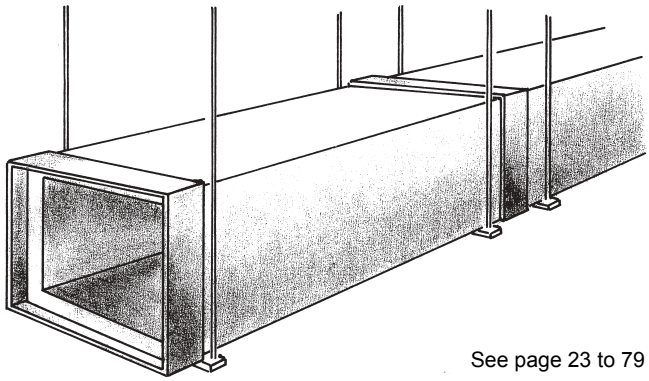
Fire resistance class EK-90 within smoke extraction ducts with a fire resistance time of 90 min.

WSK-600/P-TUM-411 or P-3464/5595-MPA BS and P-3469/5645-MPA BS

See page 59 to 63

Functional endurance of 120 min. at 600 °C within smoke extraction ducts of sheet steel

L90/P-TUM-405/P-TUM-406 smoke extraction duct



See page 23 to 79

Independent fire resistant smoke extraction duct

Smoke extraction duct of sheet steel/P-TUM-411 or P-3464/5595-MPA BS and P-3469/5645-MPA BS

Functional endurance of 120 min. at 600 °C within the smoke exhaust zone (without fire resistance class)

See page 64 to 69

Smoke exhaust systems

Natural and mechanical smoke extraction

General information

1 Fire zone, e.g. hall

2 Smoke exhaust zone, separated by smoke curtains

3 Natural smoke and heat exhaust vent

4* Air inlet opening or wake max. 3 m/s (recommended 1,5 m/s) (symbol *)

5 Smoke curtain

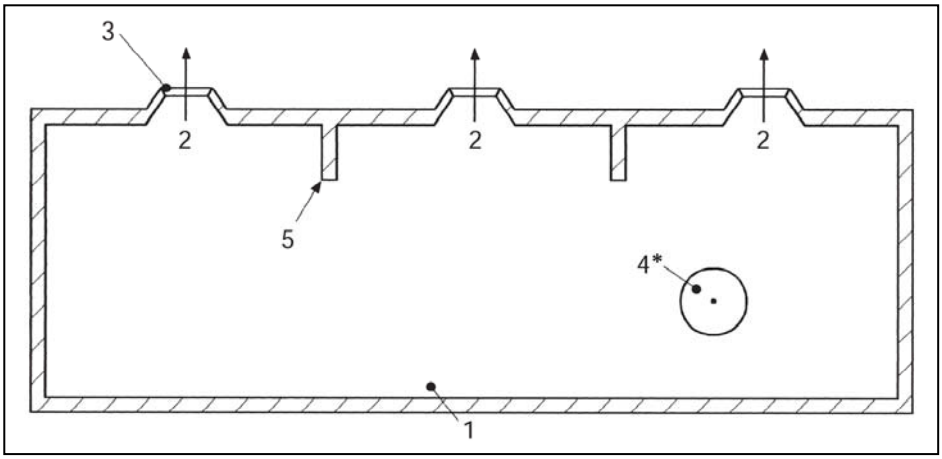
6 Smoke exhaust ventilator

7 RKE smoke control damper (uninsulated)
400 °C temperature stress at 400 °C for 120 min. or 600 °C for 60 min.

8 Smoke extraction duct (uninsulated)
600 °C temperature stress for 120 min.

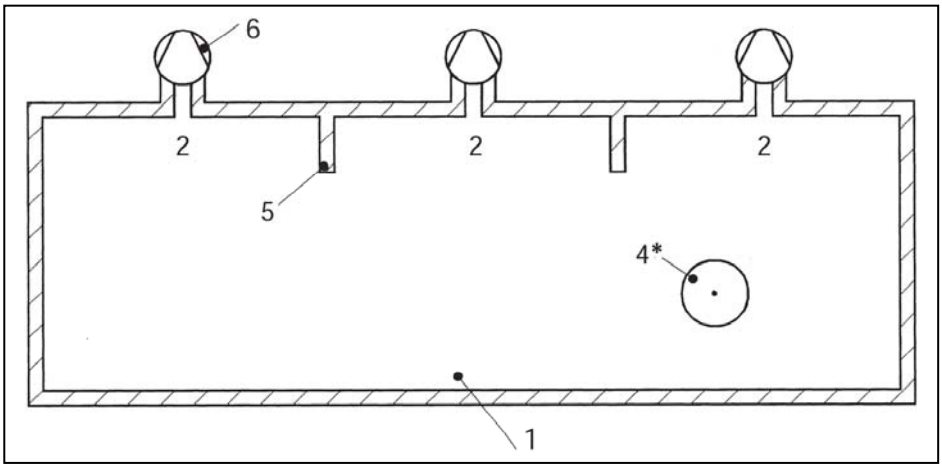
Natural smoke exhaust system with smoke and heat exhaust vents

Drawing of a common fire compartment (hall) with different smoke zones, separated by smoke curtains and individual opening of smoke and heat exhaust vents.



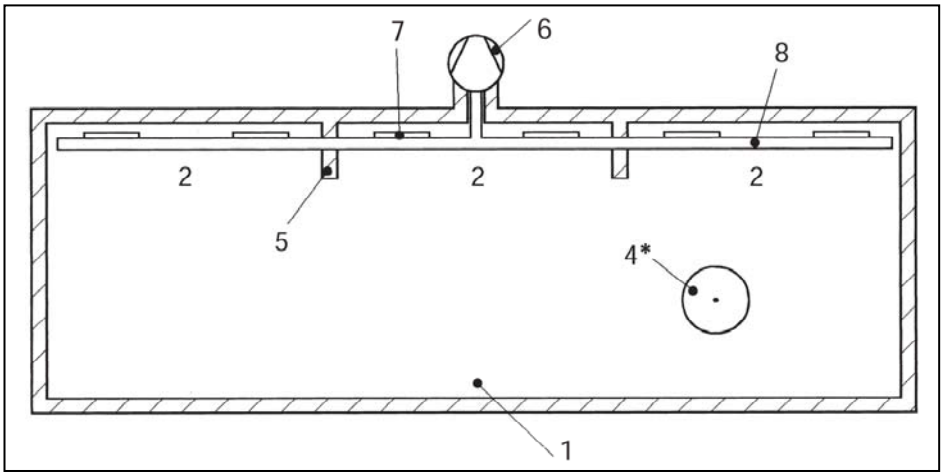
Mechanical smoke exhaust system with smoke exhaust ventilators

Drawing of a common fire compartment (hall) with different smoke zones, separated by smoke curtains and individually controlled smoke exhaust ventilators.



Mechanical smoke exhaust system with one smoke exhaust ventilator

Drawing of a common fire compartment (hall) with different smoke zones, separated by smoke curtains, continuous smoke extraction duct (uninsulated) ⑧, individually controlled smoke control dampers ⑦ (uninsulated) in combination with the smoke exhaust ventilator.



Smoke exhaust system example with several fire zones lying one upon the other or next to each other

1 Separate fire or smoke exhaust zones, e.g. halls or stores

2 Smoke exhaust zones within separated fire zones or separated by smoke curtains

4* Air inlet opening or wake max. 3 m/s (recommended 1,5 m/s) (symbol *)

5 Smoke curtain

6 Smoke exhaust ventilator

7 RKE smoke control damper (uninsulated)
test certificate Z-78.2-47
400 °C temperature stress at 400 °C for 120 min. or 600 °C for 60 min.

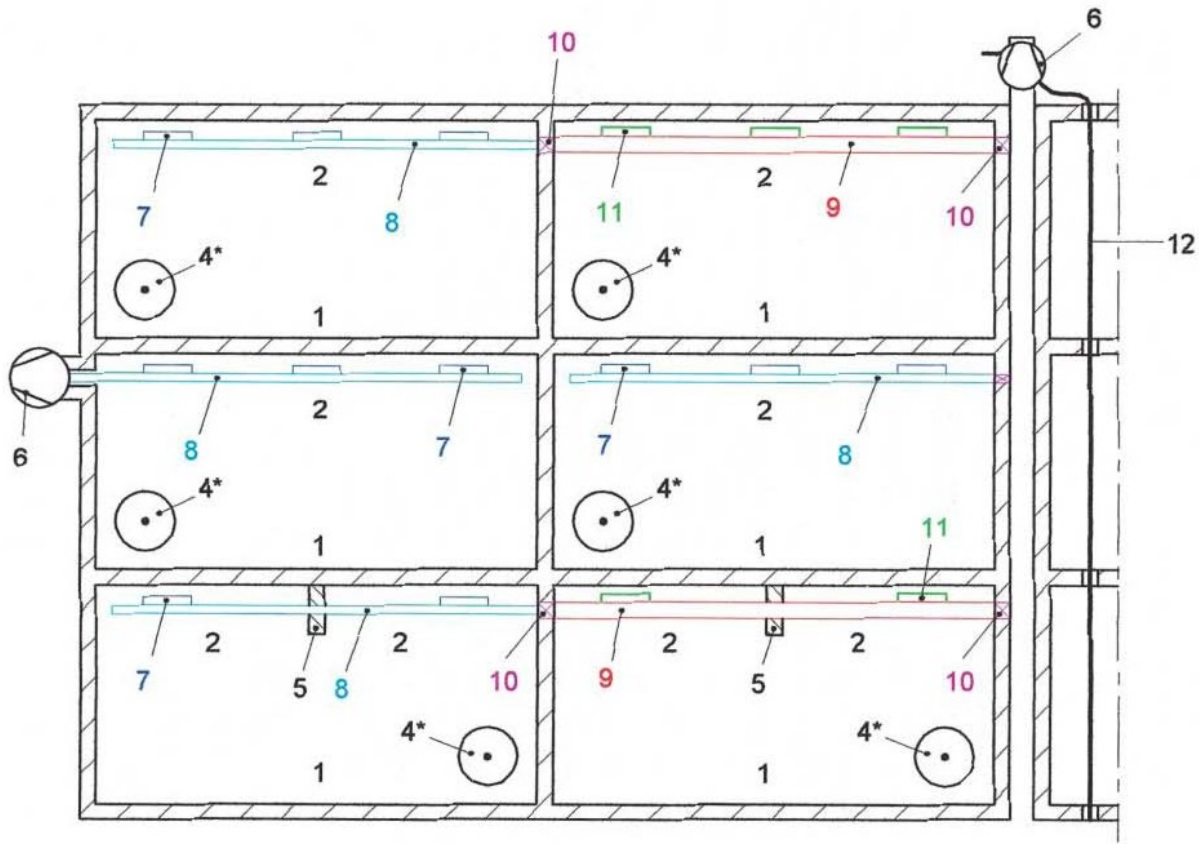
8 Smoke extraction duct (uninsulated)
600 °C temperature stress for 120 min.

9 Fire resistant smoke extraction duct (e.g. WAKOFIX-F L90), tested in accordance with DIN 4102-4 and DIN 18232-6 (pre-standard) with fire resistance class L90 (test temperature: standard time temperature curve)

10 RKU-90 smoke control damper, test certificate Z-78.2-12, fire resistance class EK90 and fire resistant K90-4102-6 property

11 RKI-90 smoke control damper, test certificate Z-78.2-11, fire resistance class EK90 within smoke extraction ducts with a fire resistance time of 90 min.

12 Electric connection of at least E30 in accordance with DIN 4102-12 via separate house connection or emergency power supply



System differences
Smoke exhaust systems

Installation guidelines, repair, maintenance

See our separate operating manual

The test certificate requires that smoke control dampers are only used for the extraction of smoke by means of smoke exhaust systems and for the inlet of supply air for smoke exhaust systems.

In principle, smoke control dampers are fitted with electric motors that are L90-enclosed. The specified manual release for opening and closing the smoke control damper within the scenario shall be guaranteed by a manual switch (by the installer). The smoke control damper motors, smoke detectors and smoke control dampers are connected to the controller, as described in the test certificates of the smoke control dampers.

When the smoke detectors detect smoke, the smoke control damper motor shall open the smoke control damper and control the smoke exhaust ventilator, and this is the automatic function.

New is the use of smoke control dampers (RKU-90-KL) for smoke exhaust systems and the additional application in the ventilation mode. These systems shall meet the requirements for smoke exhaust systems, e.g. smoke extraction ducts with a 90 min. fire resistance time (no ventilation ducts of sheet metal).

The RKU-90-KL is controlled by an electrical actuator (SEL 1.90 SLC/AKO) with an additional energy storage (accumulator), which closes the smoke control damper in the ventilation mode in case of cable brake, short circuit or communication failure. Thus the fire safety in buildings is guaranteed.

Mechanical smoke exhaust systems require in the event of a fire a reliable power supply. The ensuring of the power supply by generating sets (alternative power supply), in addition to the public power supply, is dependent upon the requirements under public law.

Smoke exhaust systems without fire detection systems and without a building automation

The smoke exhaust zone shall be controlled by appropriate smoke detectors in accordance with the VdS regulations.

A control unit for the power supply of the smoke detectors, smoke control dampers and the control for the smoke exhaust ventilator shall be installed (the maximum plating of the control unit shall be considered), in the course of which the smoke exhaust plan shall be considered.

Smoke exhaust systems with fire detection systems and without a building automation

The fire detection system shall be integrated with the relevant smoke exhaust systems, so as to ensure that the smoke detectors within the smoke zone will actuate the appropriate smoke exhaust system.

An adequate power supply shall exist for the smoke control dampers and smoke exhaust ventilators, so as to maintain the function of the smoke control damper (electric wiring at least E30 in accordance with DIN 4102-12).

Smoke exhaust systems with fire detection systems and with a building automation

The fire detection system shall be integrated with the relevant smoke exhaust systems, so as to ensure that the smoke detectors within the smoke zone will actuate the appropriate smoke exhaust system.

An adequate power supply shall exist for the smoke control dampers and smoke exhaust ventilators, so as to maintain the function of the smoke control damper (electric wiring at least E30 in accordance with DIN 4102-12)

In addition, by means of the building automation it is possible to perform the required functional test (twice a year) and test the interaction between the different system components (once a year).

In principle, the maintenance intervals of the individual components shall be followed in accordance with the test certificates.

Classification and requirements of smoke control dampers with test certificate

Requirements for smoke control dampers, tested in accordance with the principles of testing (edition July 1998), pursuant to DIN 18232-6 (pre-standard of October 1997) and fire resistance time of 90 min. in accordance with DIN 4102-6.

Classification of smoke control dampers for mechanical smoke extraction

There are three different types:

1. Smoke control dampers for several fire zones, which in the case of smoke extraction have the safety position »OPEN« and in all fire zones that do not have to be exhausted the safety position »CLOSED« with the fire resistant property K90 in accordance with DIN 4102-6 (see **RKU-90** on page 10 and **RKU-90-KL** on page 29).
   The functional endurance of 90 min. in the event of a fire refers to 600 °C and the standard time temperature curve, depending on the smoke exhaust system.

2. Smoke control dampers for the installation into smoke extraction ducts of board materials within individual fire zones, which have the safety position »OPEN« in the case of smoke extraction and »CLOSED« in all other smoke zones of the same fire zone, which shall maintain their functioning over 30, 60 or 90 min. related to a temperature stress of 600 °C and the standard time temperature curve (see **RKI-90** on page 32 and **RKI-90-KL** on page 45).

3. Smoke control dampers, on which no requirements have been placed, shall only be used for the extraction of smoke within the smoke/fire zone. Functional endurance 60 min. at 600 °C or 120 min. at 400 °C (see **RKE** on page 47 and **RKE-KL** on page 57).

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General

The components of smoke control dampers shall essentially consist of class A building materials in accordance with DIN 4102-1
The clear dimensions of smoke control dampers in the open position shall at no point be reduced by more than 10 % (maintenance of cross-section in the event of a fire).

Electric Motors

Smoke control dampers are fitted with electric motors (230 V~/24 V~) and have the two safety positions »OPEN« and »CLOSED«. The position »OPEN« is intended for smoke extraction, the position »CLOSED« prevents the spread of fire into the individual fire zones and smoke zones.

The electrical circuit shall be in accordance with DIN 4102-12 for a functional endurance of at least 30 min. (E30-E90) or shall be laid in a protected manner.

The engine torque shall be at least 36 Nm, the opening and closing time of the electric motor is ≤ 60 s.

L90 encasing of the electric motors

The L90 encasing of the electric motors (in connection with the E30 or E90 cable connection) guarantees after at least 25 min. after the initial ignition of a fully developed fire (in accordance with the standard time temperature curve this is equivalent to a temperature of ca. 800 °C) an »opening« or »closing« of the smoke control dampers by the fire brigade.

Leakage requirement

High leakage requirements are set on smoke control dampers. The maximum leakage shall not exceed 200 m^3/h per m^2 cross-sectional area related to an underpressure of 1500 Pa in cold condition and 500 Pa in hot condition (standard time temperature curve).

Actuating and evaluating unit

Optical smoke detector

Manual alarm box

Actuating and evaluating unit

Type: EKS

Optical smoke detector with service alarm

Type: ST-P-DA-STB

Manual alarm box

Type: DKM

EKS actuating and evaluating unit

For the control of smoke exhaust ventilators and smoke control dampers with test certificate for individual or several smoke zones and fire compartments.

The actuating and evaluating unit is used in combination with smoke detectors that have been tested in accordance with EN 54-7 for the control of smoke control dampers and smoke exhaust ventilators.

The actuating and evaluating unit consists of the power supply unit, control unit of the ABAV-S smoke detector, manual release and BLS control unit (depending on the number of smoke control dampers). All necessary components of the smoke exhaust system, e.g. smoke detector for automatic activation, manual alarm box for manual activation, the smoke exhaust ventilators and smoke control dampers, are connected to the actuating and evaluating unit. If the system is activated by manual control at the manual control box or smoke is detected by the smoke detectors, then the smoke control damper and/or smoke exhaust ventilator are controlled so that the produced smoke can be extracted from the relevant smoke zone.

The EKS activating and evaluating unit is suitable for controlling smoke control dampers with a working voltage of 24 V~ or 24 V– and smoke exhaust ventilators with a working voltage of 230 V– and 400 V– (separate power element).

The EKS activating and evaluating unit shall reliably and immediately put the smoke exhaust systems or individual smoke exhaust ventilators into operation after the smoke detector has actuated or the manual release box has been actuated.

The basic unit is designed for one smoke zone with at the most ten smoke controllers in line and one smoke control damper with an electric drive.

In case of smoke alarm at one or more smoke detectors, the smoke control dampers move into the open position, the smoke exhaust ventilator starts to work immediately, the red LED »activated« at the manual alarm box signals, when the dampers are open. In the smoke detector control unit the red and yellow LEDs signal »smoke alarm« and the device locks and switches to self-preservation. It can only be unlocked, when the smoke alarm is over and the unlocking key has been pushed. Then all components return to »normal operation«. The smoke detectors have a service signal, which gives a trouble tone at 70 % soiling. The yellow LED (service alarm) signals within the control unit of the smoke detector, the alternating LED within the relevant smoke detector signals green. The relevant smoke detector shall then be exchanged.

The smoke detector signals the following:

Green - ready for operation
Yellow - service alarm, the smoke detector is dirty
Red - smoke alarm, the smoke control dampers are automatically opened and locked in position

The control units control the drive mechanism of the smoke control dampers. In each case, one LED signals the position (OPEN, CLOSED). The control of the motor between the control unit and the electric motor is indicated by the following signals:

- control signal OPEN-CLOSED
- answer-back-signal OPEN-CLOSED-fault

The cause for faults can be:

- cable brake
- damper is blocked
- short circuit
- service life exceeded

The smoke exhaust ventilators are controlled by the activating and evaluating unit, e.g. with terminals 24 and 25.

EKS control for smoke exhaust systems

Activating and evaluating unit Basic unit, one smoke zone, two smoke control dampers

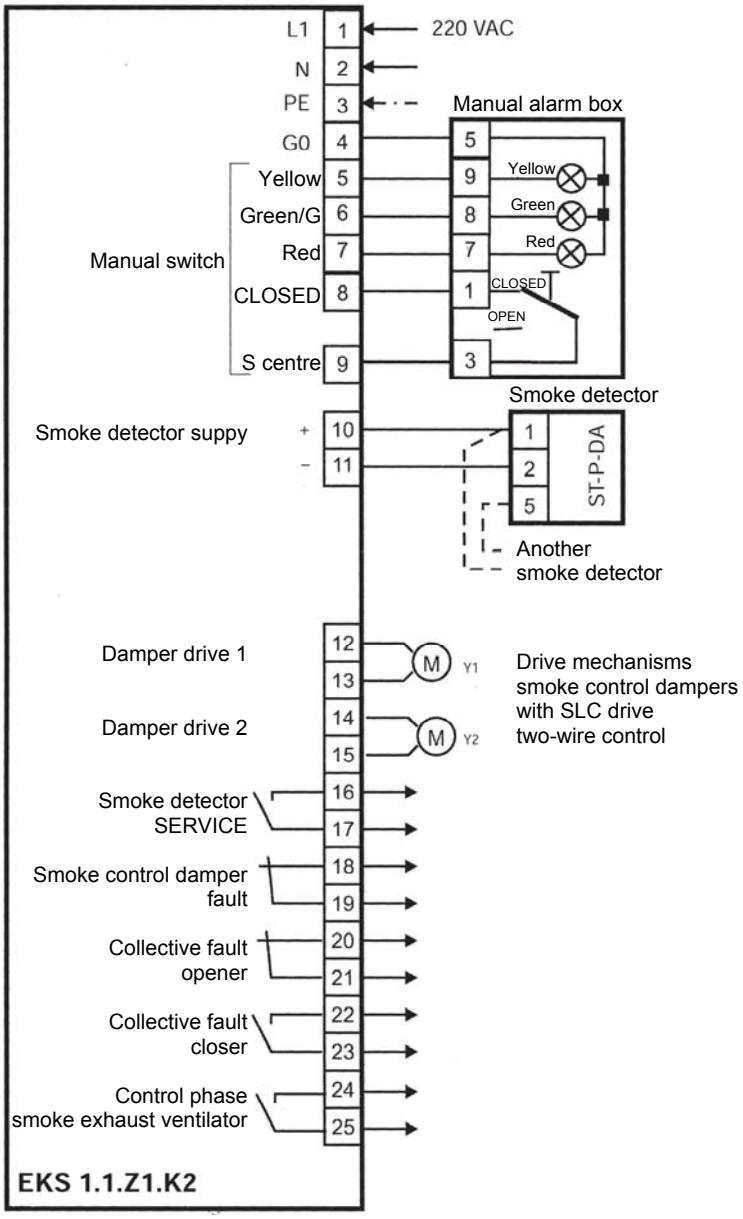
The drawings (example) suits EKS for two smoke control dampers

Individual planning according to the construction and function of the smoke exhaust system on request.

Technical data

Housing:	Wall housing of sheet steel
Type of safety:	IP 65
Cable lead:	Via bolted PG joint with traction relief, optionally at the top or at the bottom
Ambient temperature:	-10 °C up to 50 °C
Ambient humidity:	5 to 95 % rF
Dimensions:	As required
Power supply:	230 V ± 10 %
Rated frequency:	50 – 60 Hz

EKS allocation scheme (example)



Optical smoke detector with service alarm
Type: ST-P-DA-STB

Please note: Only to be used in combination with the EKS (SLC)

Technical data

Functioning principle:	Scattered light (Tyndall effect)
Test as in EN-54/7:	LPCB (Great Britain)
Smoke signal part:	VdS G298064
Working voltage:	16 – 30 V DC
Working current:	ca. 0,04 mA
Service alarm current:	ca. 13 mA
Alarm current:	ca. 55 mA
Operating temperature:	-10 °C to +50 °C
Maximum humidity:	99 % rF
Detector housing:	White polycarbonate with a grille against insects
Base:	White polycarbonate
Weight:	ca. 180 kg
Service alarm display:	Green LED
Smoke alarm display:	Red LED

Planning guidelines for the arrangement of smoke controller (smoke detectors), see DIN VDE 0833-2

A sufficient number of smoke controllers shall be installed according to the geometry of the room, so that the parameter of temperature, to which the detector shall respond, can reach the detector.

Each room that shall be cleared from smoke by means of a mechanical smoke exhaust system shall have at least one detector. The smoke detector shall be mounted onto the ceiling of a hall or room.

The area to be monitored by one smoke detector is 60 m^2, up to a room height of 6 m. For room heights that exceed 6 m, the area to be monitored is 80 m^2.

If beams divide the ceiling of a room into coffers, each coffer exceeding 30 m^2 shall be fitted with one smoke controller. If the individual coffer formed by beams is smaller than 30 m^2, then one detector within every second coffer is sufficient.

The distances between the detectors and the walls or beams shall not be less than 0,5 m. If e.g. ventilation ducts are running closer than 15 cm underneath the ceiling, then the lateral distance to these shall also be at least 0,5 m.

General information

The optical smoke detector detects developing fires with smoke generation early, especially smoldering fires.

The detecting section has one light emitter and receiver. Normally the pulsed light beam from the emitter does not reach the receiver.

If the smoke particles get into the detecting section, then a part of the light to the receiver is reflected, so that an alarm is actuated. A red LED signals alarm. The alarm status remains until a manual reset is made at the control unit.

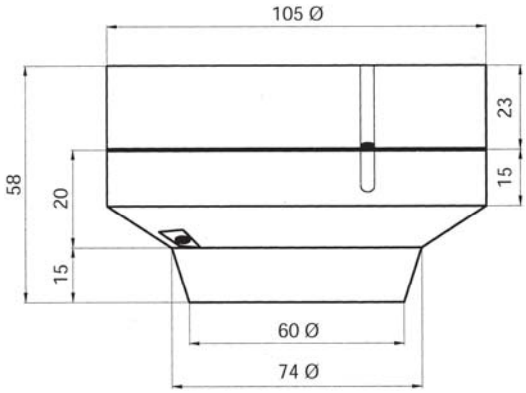
During normal operation, the light emitter pulsates every 8 s, to guarantee a low control current.

The detector design guarantees a high immunity from disturbances against air velocities, soiling and electromagnetic forces.

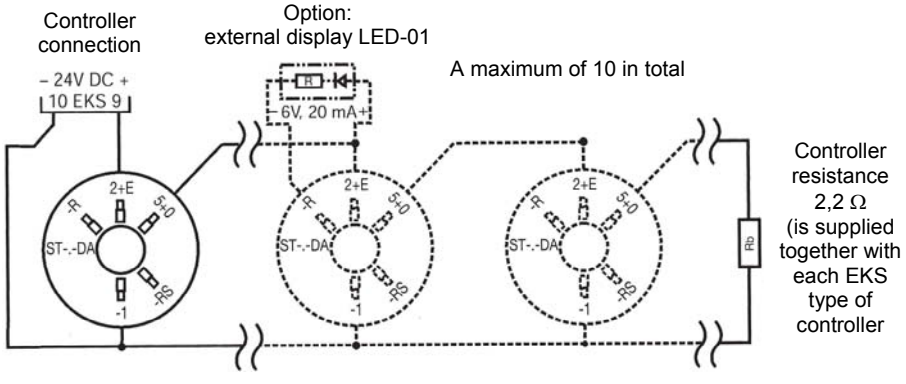
The detector module is mounted by bayonet principle onto the base; thus easy handling of the detector.

If the detector is dirty, then it reaches the alarm threshold stepwise. In order to prevent false alarms, the sensor is provided with an early alarm and a service alarm (green LED). This indicates that the detector has to be cleaned or exchanged.

Dimensions



Wiring diagram



Manual alarm box monitored for cable break and short circuit
Type: DKM

Technical data

Field of application:	The control of mechanical smoke ventilation systems with/without smoke control dampers
Display:	Green LED »operating lamp« Red LED »smoke alarm« Yellow LED »collective fault«
Working voltage:	24 V AC ± 10 %
Button pressed:	»Smoke control damper open« »Smoke exhaust ventilator on«
Button unlocked:	Automatic
Unblocking potential:	24 V AC/DC
Current on contact:	1 A
Releasing resistance:	1,5 kΩ
Terminal resistance:	1 kΩ
Terminal S1:	max. 24 V
Type of safety:	IP 54
Terminals:	max. 1,5 mm^2
Cable inlet at the top and at the bottom:	M 20 x 1,5
Installation:	Surface mounting
Relative humidity:	max. 95 %
Ambient temperature:	-20 to +60 °C

Please note: Only to be used in combination with the EKS (SLC)

Dimensions

Length = 125 mm
Width = 125 mm
Height = 34 mm

Connection

Via twist nipple, Ø 9 to 13 mm

Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Ordering example / dimensions

Available standard sizes in mm

Width	Height	Length
B	H	L
201	201	530
227	227	
252	252	
283	283	
318	318	
357	357	
400	400	
449	449	630
503	503	
565	565	
634	634	
711	711	700
797	797	800
894		
1003		
1125		
1262		
1416		
1500		

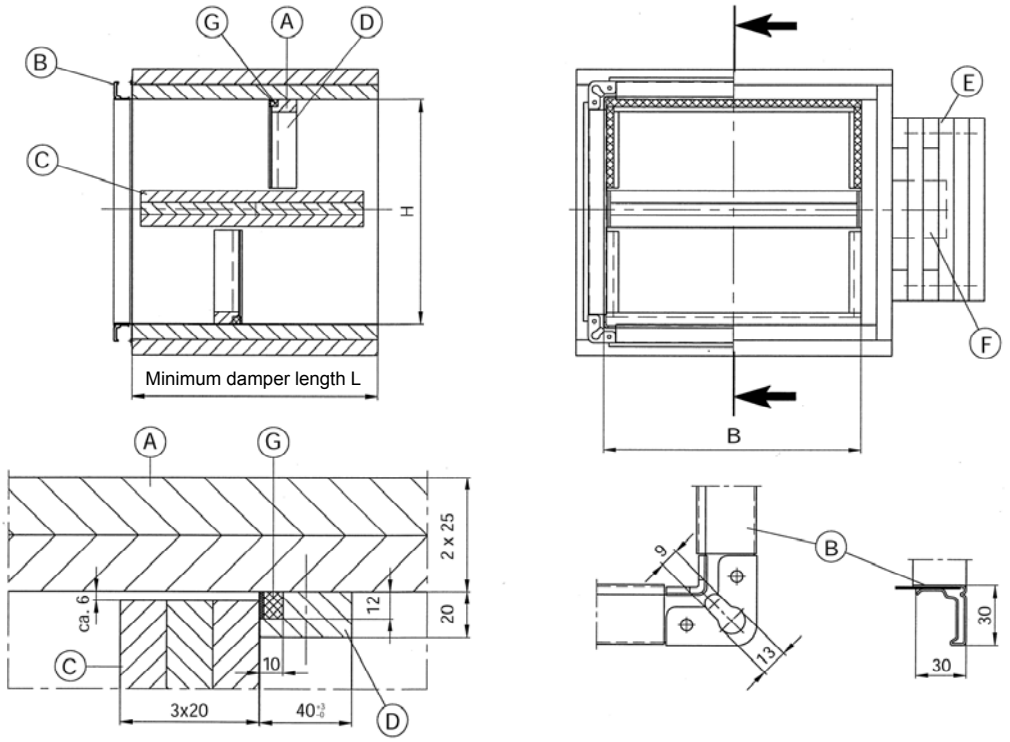
The minimum damper length H depends on the dimension H

Ordering example:

RKU-90 / SEL 1.90 / B x H x L

- The length of the RKU depends on the dimension H (see page 11)
- Dimensions B (width) x H (height) in mm (side H = operating side)
- Electric motor design (see page 25)
  - SEL 1.90 – 24 V⎓
  - SEL 2.90 – 230 V~
  - SEL 1.90 SLC – (two-wire technique)
- RKU-90 smoke control damper, smooth on both sides, including electric motor and its L90 covering

Please note: If a duct connecting profile is desired, as e.g. one-sided (operating side BS or wall side MS) or two-sided, then please state this separately.



Ⓐ RKU-90 housing, made of 2 x 25 mm calcium silicate boards
Ⓑ Duct connecting profile (if required)
Ⓒ Damper blade, made of 3 x 20 mm calcium silicate boards
Ⓓ Stop, 40 x 20 mm, with milled slot for the sealing
Ⓔ L90 motor covering including an inspection cover
Ⓕ Electric motor
Ⓖ Sealing of the stop to meet the leakage requirements under cold and hot conditions

Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Dimensions

State regulations, published in the appropriate law and official gazettes, set out the rules for the testing of building installations and systems, to which fire dampers also belong. The tests shall be performed in accordance with the effective state building regulations. These tests do not replace the hereinafter described procedures.

In principle, dampers have to be mounted such that they are accessible.

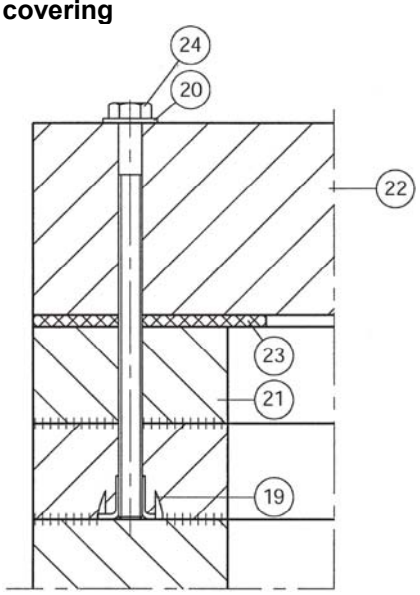
Drawing of the RKU without a duct connecting profile

Standard horizontal attachment of the motor as shown; vertical design is possible on request.

(1) RKU housing
Drawing on both sides smooth

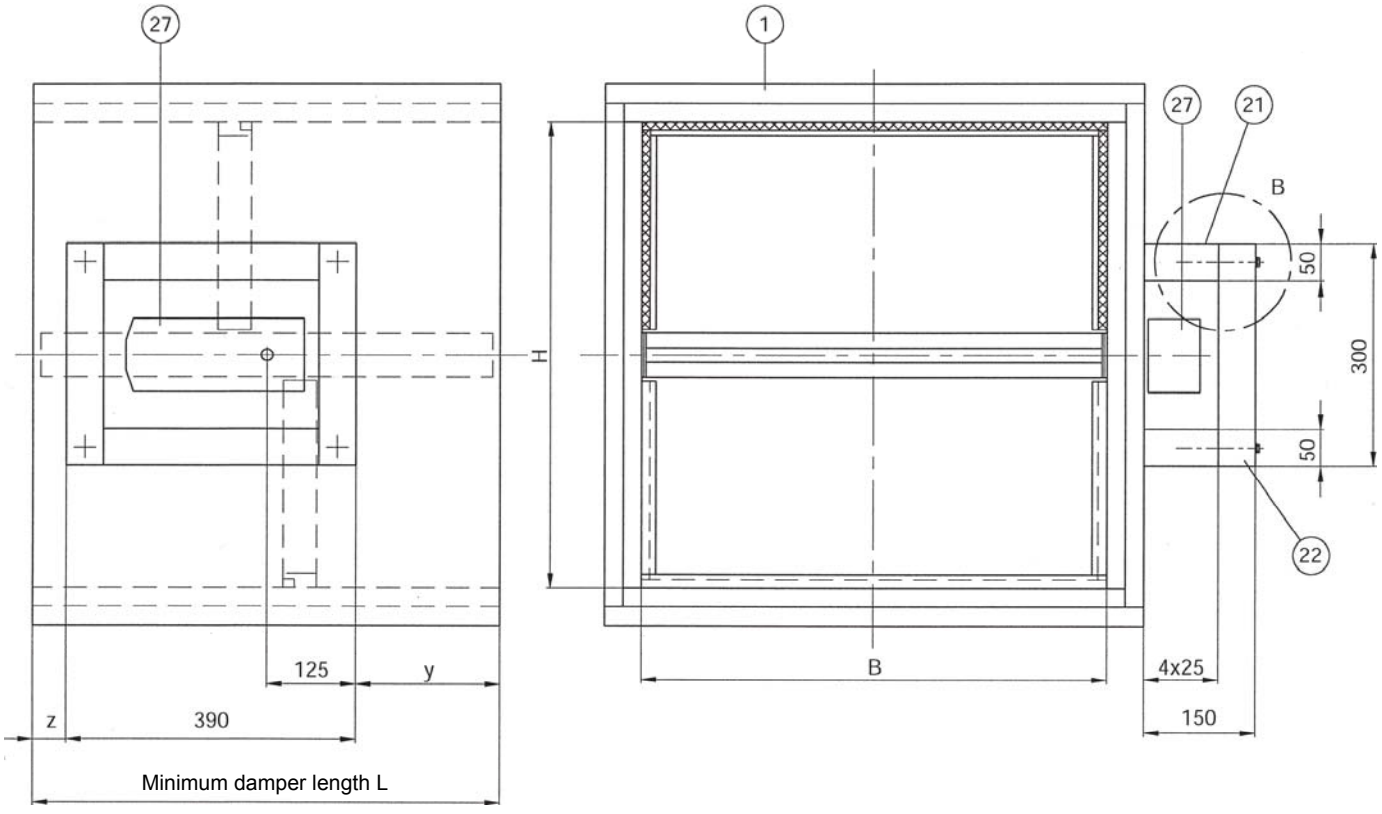
(27) Electric motor

Detail B of the L90V motor covering



(21)(22)(23) Motor covering, type L90 V, consisting of the motor covering and the inspection cover a CARBOWOOL sealing

(19)(20)(24) Mounting material for the inspection of the electric motor (by loosening four hexagon screws, M6 x 100 mm long)



Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Fitting positions

DEUTSCHES INSTITUT FÜR BAUTECHNIK

Anstalt des öffentlichen Rechts

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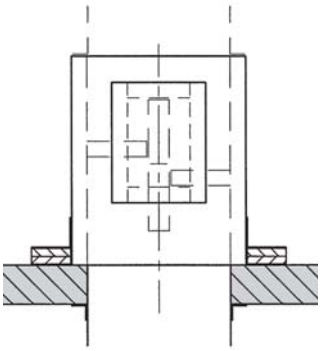
Geschäftszeichen: III 13-1.78.2-12/98

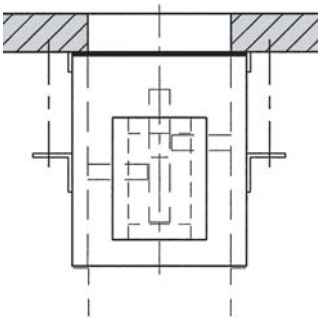
Allgemeine bauaufsichtliche Zulassung

Zulassungsnummer:	Z-78.2-12
Antragsteller:	Strulik GmbH Neesbacher Straße 13 65597 Hünfelden-Dauborn
Zulassungsgegenstand:	Entrauchungsklappen zur Ableitung von Rauch über Entrauchungsanlagen, Typ RKU 90
Geltungsdauer bis:	28. Februar 2009

Der obengenannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.
Diese allgemeine bauaufsichtliche Zulassung umfaßt neun Seiten und 16 Anlagen.

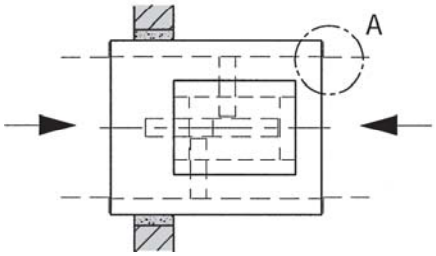
Standing on the floor



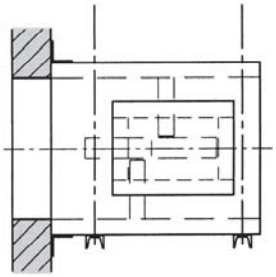


Hanging beneath the floor

Within Walls

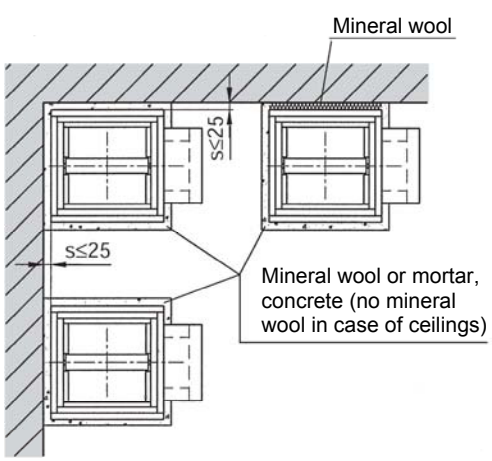


Directly in front of solid walls

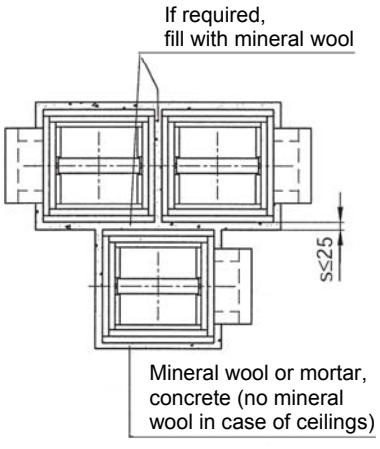


Alternative arrangement in front of concrete walls, see page 16

Mounting into not easily accessible installation openings

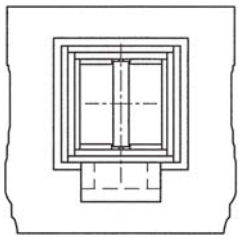


Flange-to-flange mounting

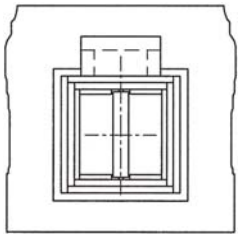


- Gap »s« shall be filled with group II or III mortar in accordance with DIN 1053 or with gypsum mortar, alternatively with mineral wool, building material class A, DIN 4102, melting point ≥ 1000 °C within
- one-sided or two-sided walls
- one-sided or two-sided floors and only in case of not easily accessible installation openings and for flange-to-flange mounting (the load-bearing capacity shall be considered)

Operation at the bottom



Vertical axis



Operation at the top

Smoke control damper RKU-90

Test certificate Z-78.2-12

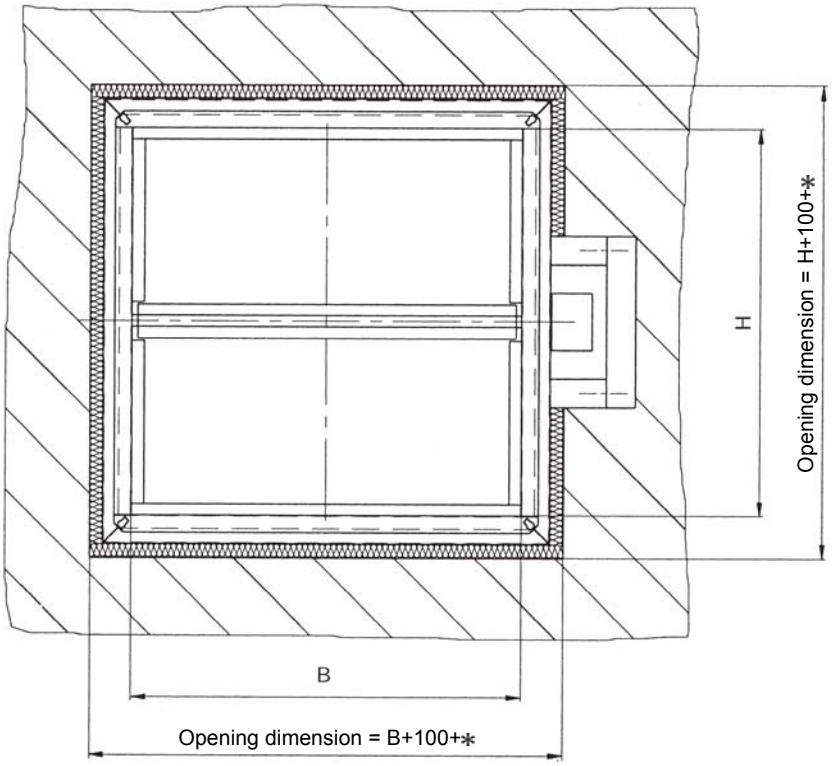
Resistance class EK90
Fire resistance time of 90 min

Installation into solid walls and floors

The RKU-90 smoke control damper can be built into walls of brickwork, concrete wall panels, gas concrete or gypsum and into corresponding shaft walls.

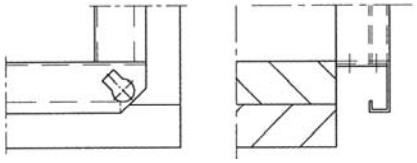
* Surrounding gap ca. 25 mm, to be filled with mineral wool (A1 DIN 4102)
* Surrounding gap, to be filled with group II and III mortar in accordance with DIN 1053 (≤ 80 mm)

Installation opening are not required, if the smoke control damper is mounted together with the wall or floor.



Installation example with duct connecting profile for the connection with an extended smoke extraction duct of sheet metal for use in the fire compartment that shall be cleared from smoke.

Detail A
Duct connecting profile

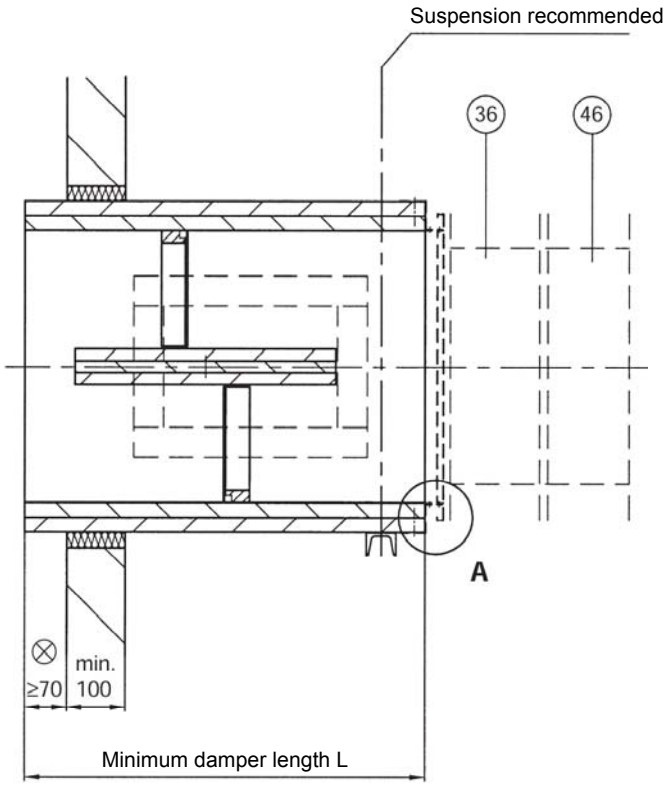


(36) WSK compensator with a flange reinforcement and screw bolt. Unaffected by changes of temperature up to 1000 °C, tested in accordance with DIN 18232-6 (pre-standard). For the installation into smoke extraction ducts of sheet steel or for the direct connection with smoke control dampers (see page 59 – 63).

(46) Smoke extraction duct of sheet steel with test certificate (see page 64 – 69).

⊗ The possible projection of at least 70 mm is not required, if the RKU has been embedded with mortar.

Installation into solid walls without suspension



Please note: If H ≤ 400 mm, then the housing shall be lengthened for this arrangement.

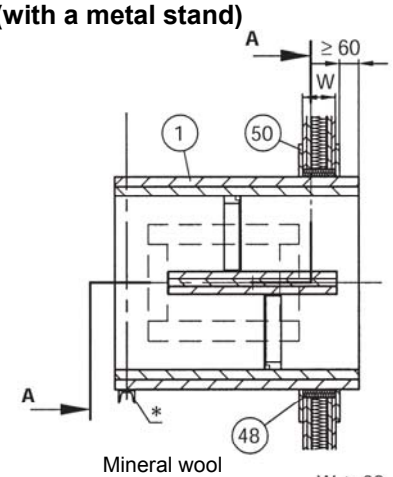
Smoke control damper RKU-90

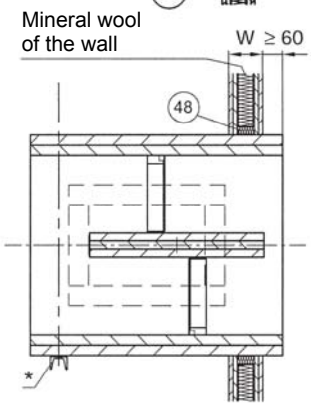
Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

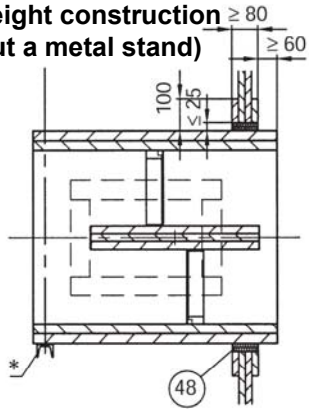
Installation into walls of lightweight construction

Installation into walls of lightweight construction (with a metal stand)





Installation into walls of lightweight construction (without a metal stand)



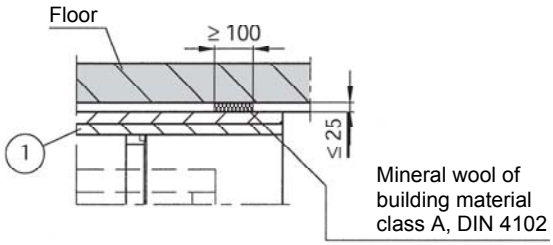
Installation into mounting walls of lightweight construction, with and without a metal stand (in accordance with the test certificates)

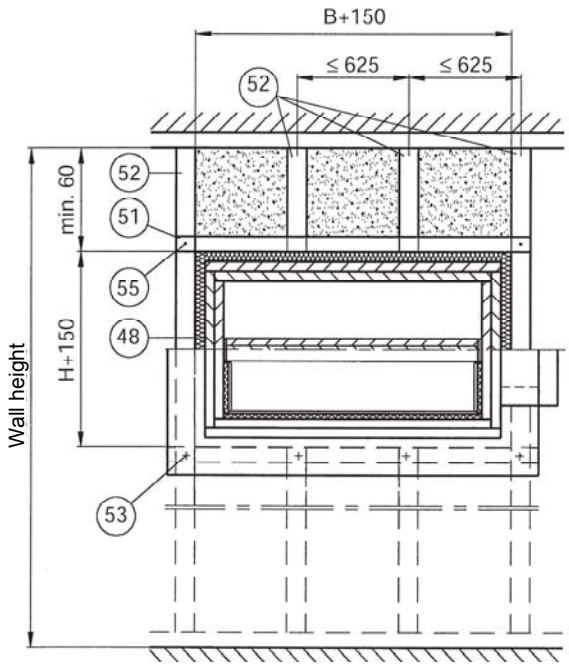
Example:
Fire resistance class – classification
dependent on the minimum wall thicknesses W (dimensions in mm)

Fire resistance class of the wall Fire resistance class of the smoke control damper	F30 EK30	F90 EK90	Permissible wall height up to
Mounting walls with a metal stand and plating **Walls with a metal stand and plating of**			
– Plasterboards	75	100	6 m
– Plasterboards in accordance with the test certificates	–	200	9 m
	–	175	8 m
– Fleece plasterboards in accordance with the test certificate	–	200	7 m
	–	250	9 m
– Calcium silicate building boards in accordance with the test certificate	70	84	6 m
– House building plasterboards in accordance with the test certificate	90	–	3,5 m
	–	110	3,75 m
– FIREBOARD wall in accordance with the test certificate	–	140	9 m
Walls without a metal stand of			
– Calcium silicate building boards in accordance with the test certificate, if the wall thickness is ≤ 2,2 m	40	40	3 m
	40	40	5 m
– VERMICULITE building boards in accordance with the test certificate	–	70	5 m

(1) RKU housing (50 mm thick)
(48) A DIN 4102 mineral wool
(50) Doubling of plasterboards, 100 x 12,5 mm
(51) Wall profile in galvanized steel, type UW 50 (horizontal profile)
(52) Wall profile in galvanized steel
(53) Screw for quick mounting in zinc-plated steel, 3,5 x 35 mm, to fasten the doubling (50) Rim distance 50 mm, all other distances ≤ 300 mm
(55) Fastening pin in zinc-plated steel, 3 x 6 mm

Connection directly beneath solid floors





Note:
For the installation the inspection cover of the motor has to be easy to access.

For the installation to plate ducts the connections shall be made in the same manner as for the ducts.

The minimum distance between two smoke control dampers is 120 mm.

Wall thickness W ≥ 100, wall height in accordance with the test certificate of the wall.

* Suspension, dimensioning in accordance with DIN 4102-4 (see page 21 to 24)

Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Installation onto the face of solid walls

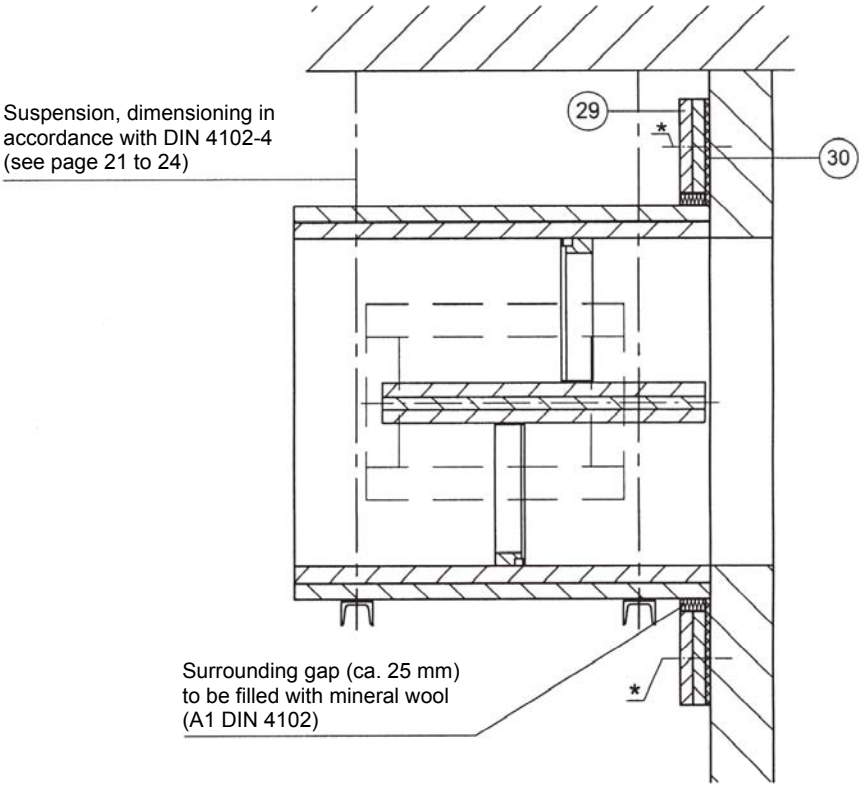
(29) Wall frame of calcium-silicate boards, type PR, 2 x 20 x 150 mm wide

(30) CARBOWOOL sealing attached to the wall frame, 150 x ca. 10 mm thick

(31) Frame profile, zinc-plated steel, type WP, 70 x 70 x 1,5 mm thick

(32) Intumescent material, 50 x 10 mm, glued with a water-based adhesive to the front side of the RKU

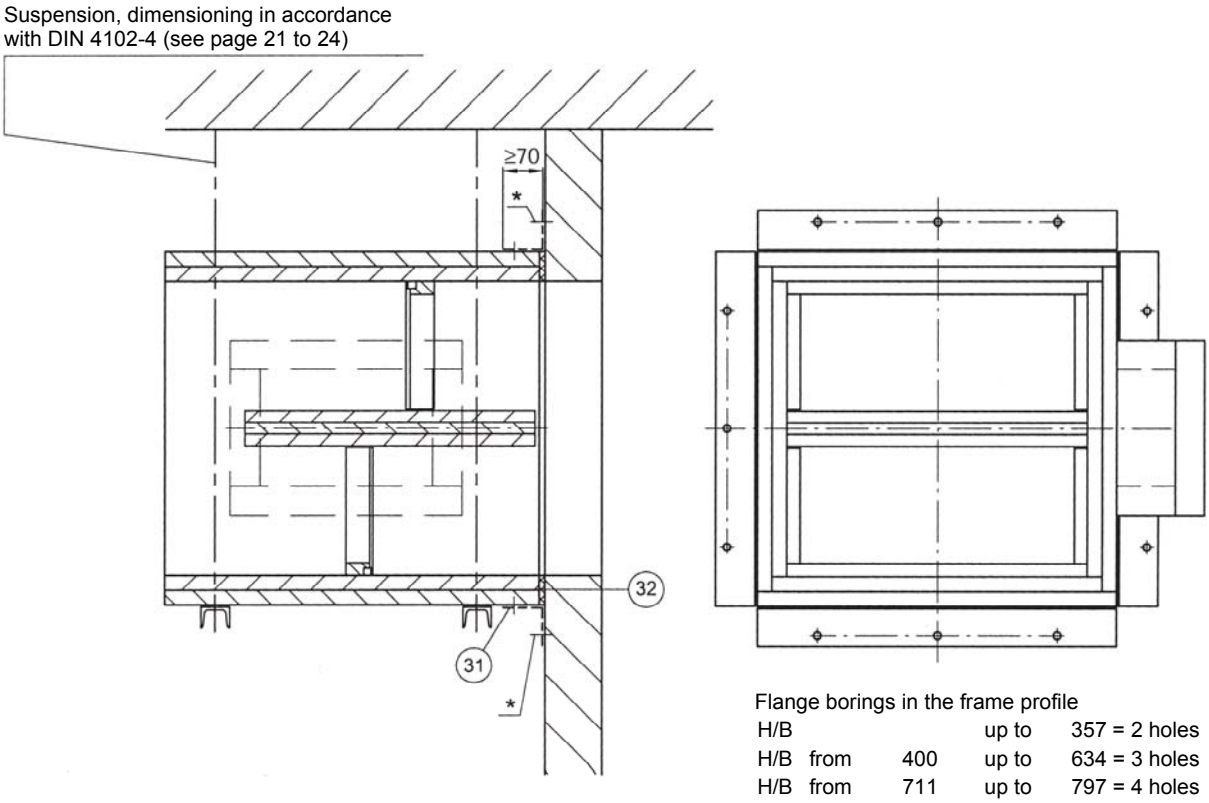
Damper on the face of the wall in combination with a PROMATECT wall frame, type PR



* Steel dowel (by the installer)

Alternative arrangement onto the face of concrete walls, see page 16

Damper on the face of the wall in combination with an Intumescent material and a frame profile, type WP



* Steel dowel (by the installer)

Alternative arrangement onto the face of concrete walls, see page 16

Flange borings in the frame profile

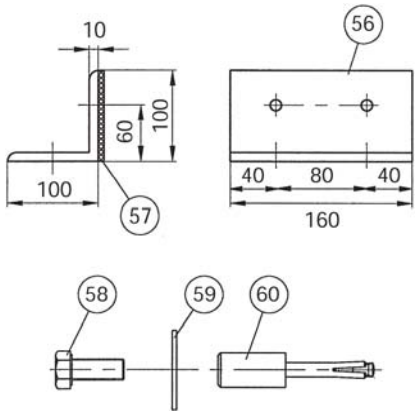
H/B			up to	357 = 2 holes
H/B	from	400	up to	634 = 3 holes
H/B	from	711	up to	797 = 4 holes
B	from	894	up to	1262 = 5 holes
B	from	1416	up to	1500 = 6 holes

Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Installation onto the face of concrete walls



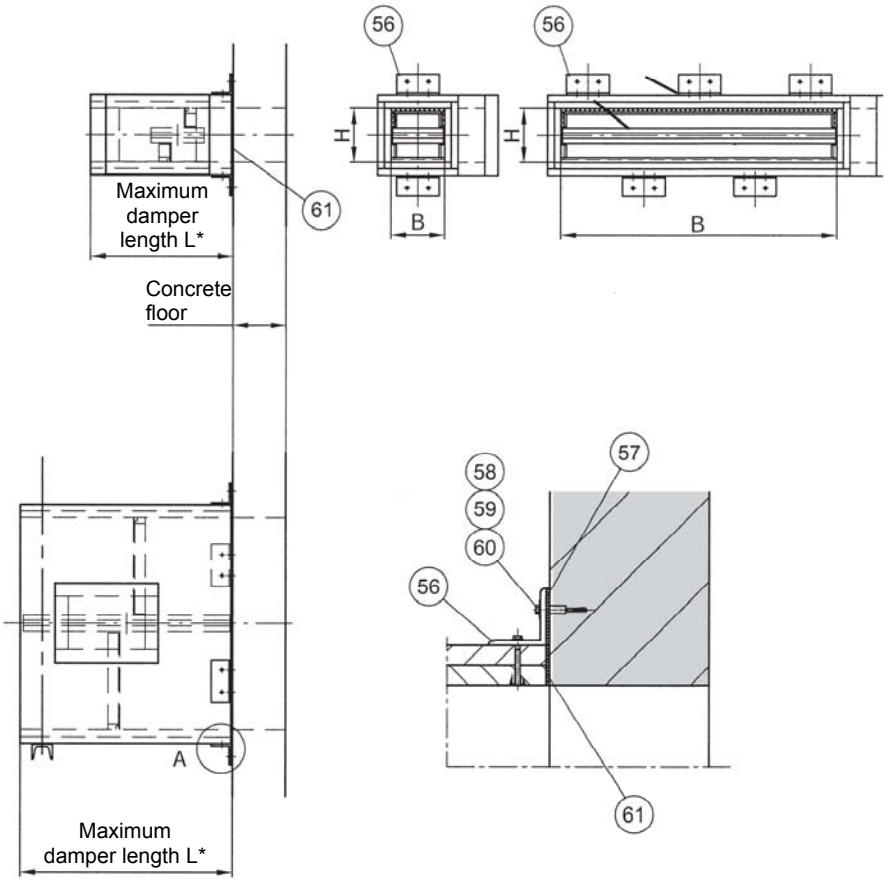
Fitting proposal: Installation of the RKU onto the face of a concrete wall. The angles are affixed to the concrete wall by means of fire safety dowels.

***) Up L ≤ 530 mm the RKU is only supported by the WE angle brackets**

From L ≥ 531 mm to 800 mm an additional U-traverse is required

Installation onto the face of concrete walls

Drawing of the smoke control damper without a duct connecting profile



Please note:
The STRULIK company will specify the exact dimensioning and number of WE angle brackets depending on the RKU dimensions!

(56) Angle bracket, type WE, zinc-plated steel, 80 x 80 x 160 mm

(57) CARBOWOOL sealing (bonded), 80 x 160 x 5 mm thick

(58) Hexagon head screw in accordance with DIN 931, M 10 x 30 mm

(59) DIN 125-A washer

(60) KMU-F10 fire safety dowel

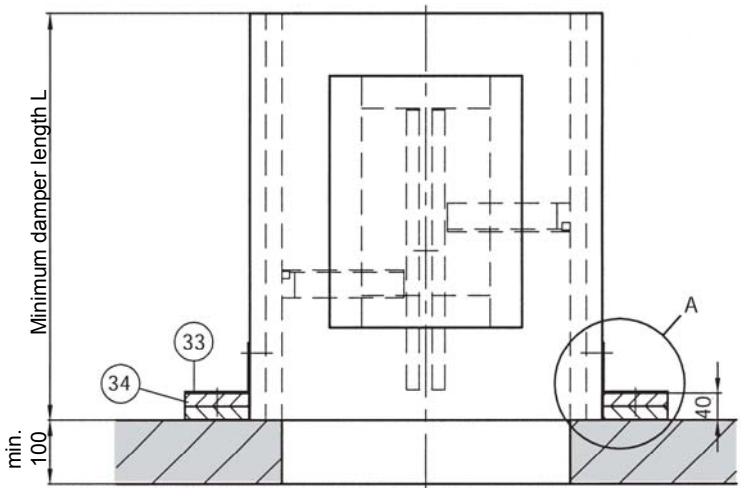
(61) Sealing bonded to the RKU, front side in direction of the CARBOWOOL wall, 50 x 5 mm thick

Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Standing on the floor



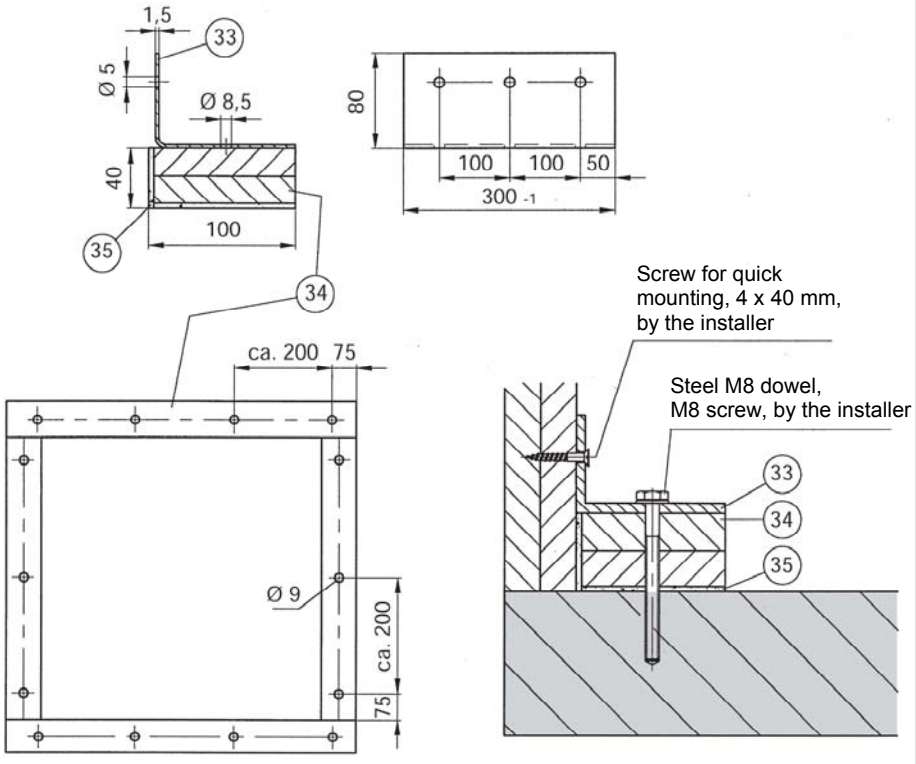
Frame for floors, type DR, consisting of:

(33) Angle bracket, zinc-plated steel, 80 x 80 x 1,5 mm thick, only necessary for smoke control dampers having housing dimensions of ≤ 503 related to the H and B side (affixed with screws for quick mounting 4 x 40 mm by the installer)

(34) Calcium silicate frame for floors, 100 x 40 mm thick, pressed tight against the surround of the RKU and screwed together with the concrete floor (steel dowel and M8 screw by the installer)

(35) CARBOWOOL sealing, ca. 3 mm thick

Detail A
Two support brackets up to a size of B = 503 x H = 503 are required

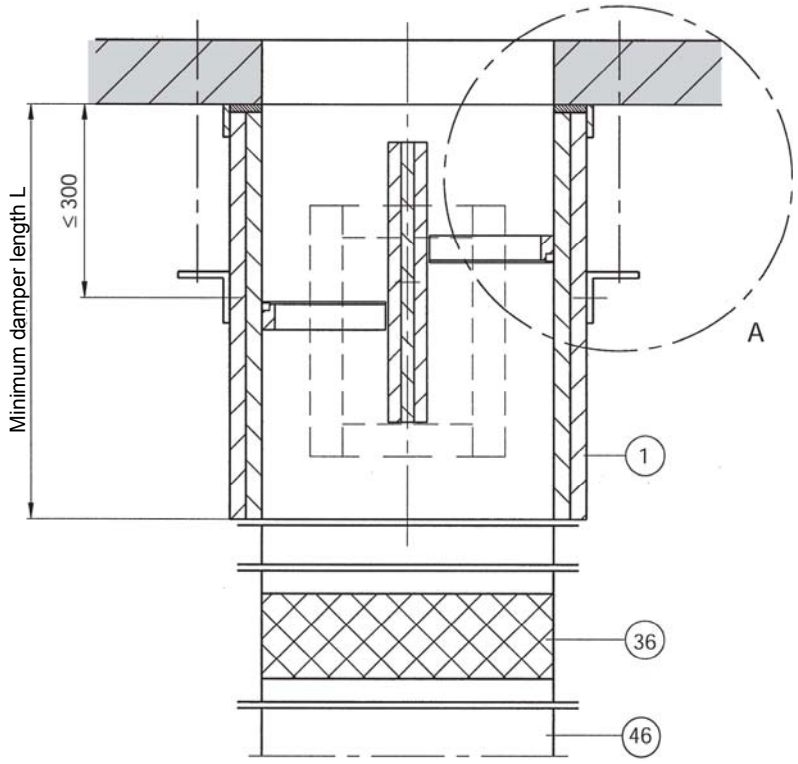


Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Standing on the floor



(37) Intumescent material, type PX, 50 x 10 mm thick, to level out roughness underneath the concrete floor and to compensate for the linear expansion of the threaded rods in case of fire exposure.

(38) Suspension angle, type WE (the number of angles depends on the RKU weight). For dimensioning, see page 21.

(39)(44)(45) Fastening material for the WE suspension angle, consisting of the M10 driving-in nut, washer and hexagon head screw, M 10 x 50 mm long (fastening to the RKU by the STRULIK company.)

(40) Surrounding calcium silicate frame, 50 x 10 mm thick.

(41)(42)(43) Threaded rod, nut and washer according to the dimensioning, see page 20 and 21.

Provisions for the connection with smoke extraction ducts of sheet metal

(Usage only inside the fire compartment that shall be cleared from smoke)

(36) Compensator, type WSK, with a flange reinforcement and screw bolt. Unaffected by changes of temperature up to min. 600 °C, with test certificate, see page 59 to 63. For the installation between smoke extraction ducts or the direct connection with smoke control dampers.

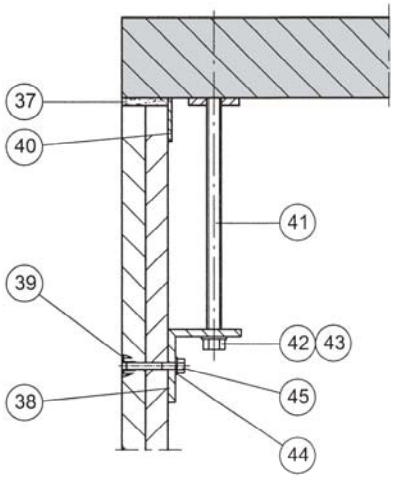
(46) Smoke extraction duct of sheet metal (B x H max. 1250 x 1000 mm), with test certificate, see page 64 to 69.

☒ For the suspension and dimensioning, see page 21 and 22

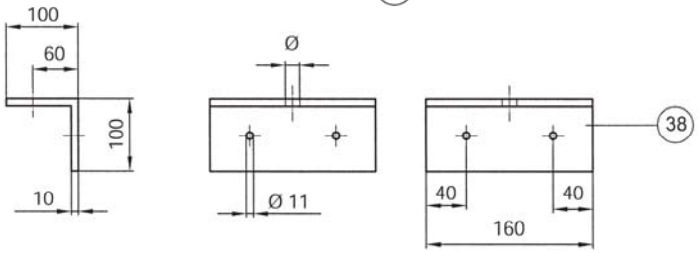
Ø depends on the thread dimensioning

Up to B = 503 / two angles
From B = 565 upwards / four angles

Detail A



Detail (38)



Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Connection with ducts

Provisions for the connection with smoke extraction ducts of sheet metal

(Usage only inside the fire compartment that shall be cleared from smoke)

(36) Compensator, type WSK, with a flange reinforcement and screw bolt. Unaffected by changes of temperature up to min. 600 °C, with test certificate, see page 59 to 63.

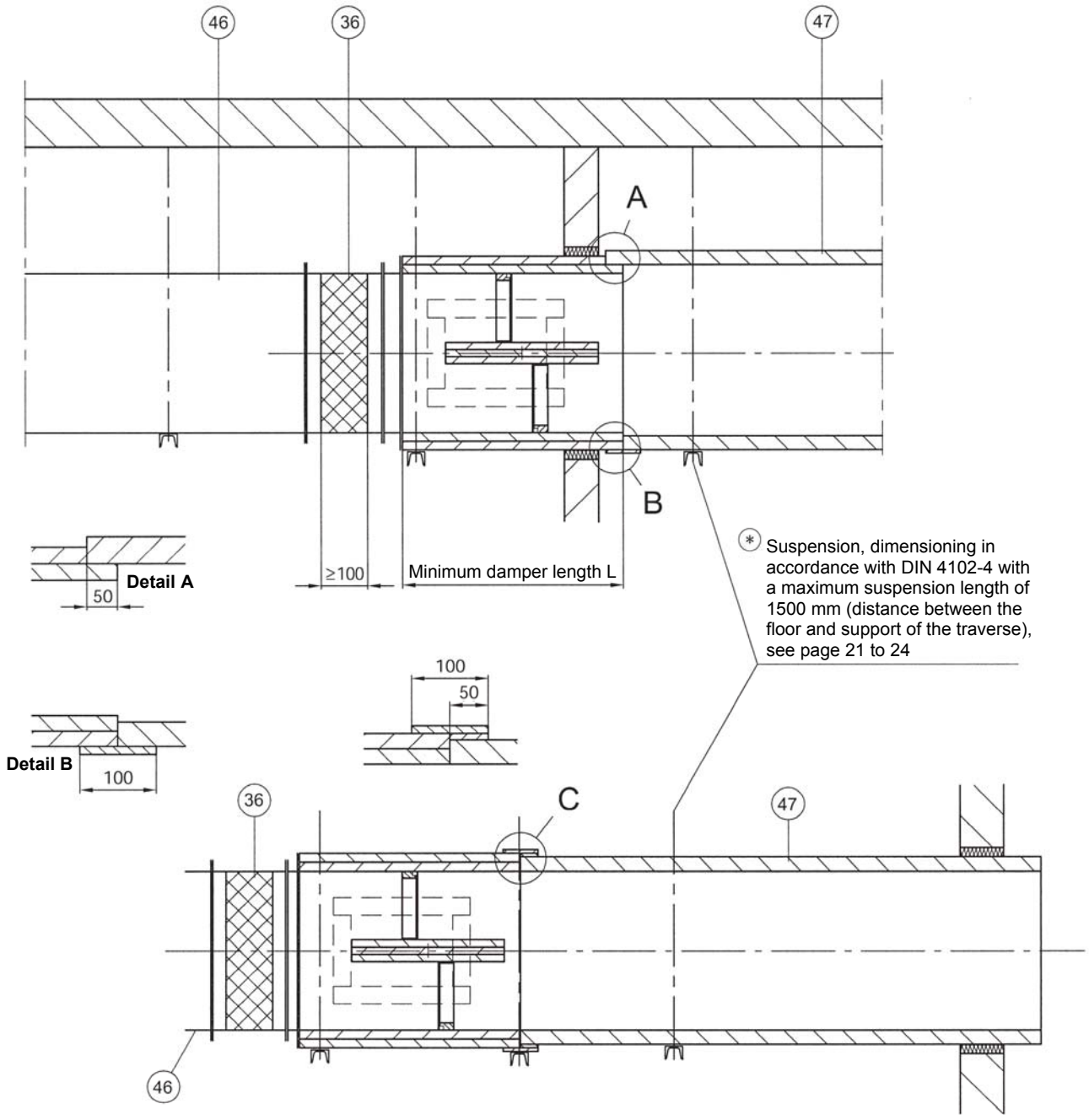
For the installation between smoke extraction ducts or the direct connection with smoke control dampers.

(46) Smoke extraction duct of sheet metal, with test certificate, see page 64 to 69.

(47) Fire resistant smoke extraction duct with test certificate.

(*) For suspension and dimensioning, see page 21 and 22.

Please comply with the provisions of the relevant test certificate for the suspension of fire resistant smoke extraction ducts.



Smoke control damper RKU-90

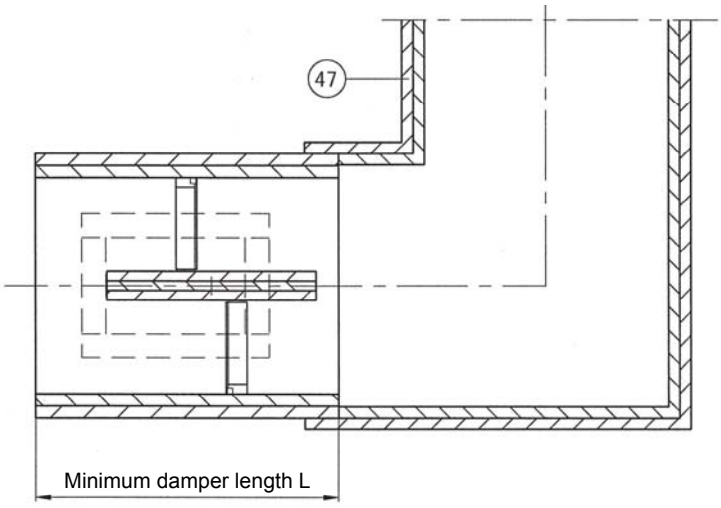
Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

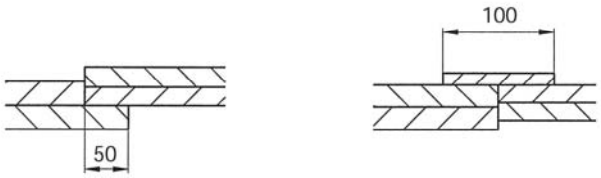
Connection with ducts

(47) Fire resistant smoke extraction duct with test certificate

Connection with ducts

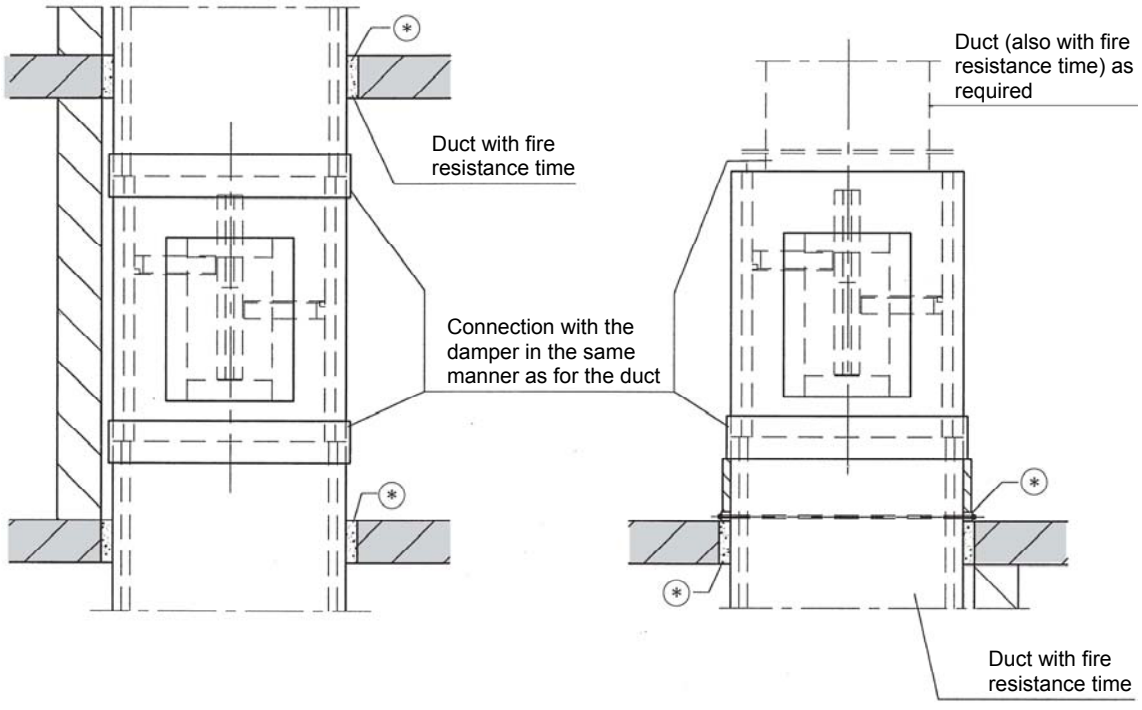


Possibilities to connection with classified smoke extraction ducts



(Drawing without suspension)

Standing (the approved duct in plate construction is also suitable for the vertical installation)



(*) Floor penetration and load suspension in accordance with the test certificate of the smoke extraction duct

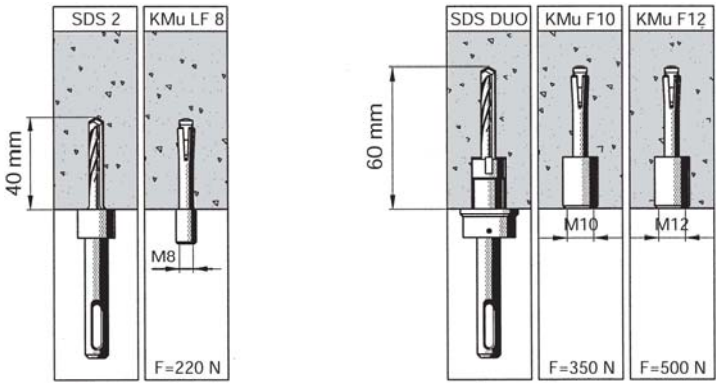
Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Suspension

Fire safety dowels for the suspension of smoke control dampers with an European test certificate ETA-04/2006 from M8 to M12

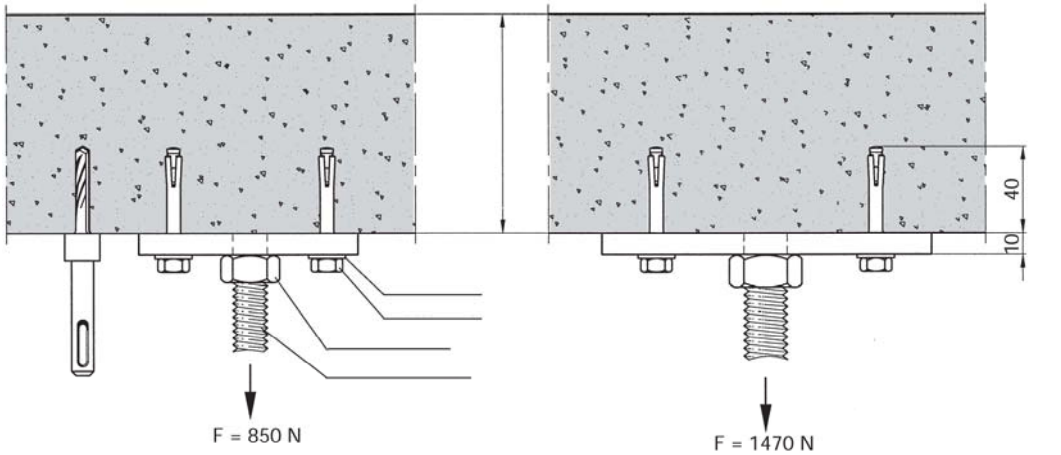


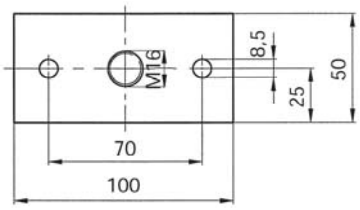
Fire safety dowels for the suspension of smoke control dampers with an European test certificate ETA-04/2006 for M16 and M20

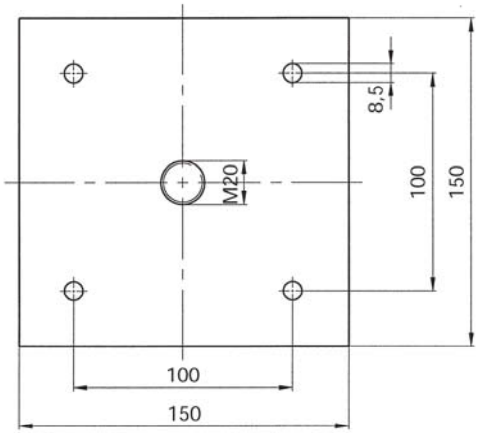
The core diameter is always 6 mm

It is recommended that the threaded rods, which are screwed into the threaded sleeve, are secured with counter nuts

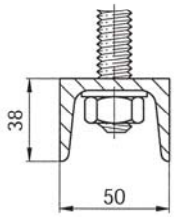
Type: **SDS 2** **Group of two P-K6L** **Group of four PQ-K6L**





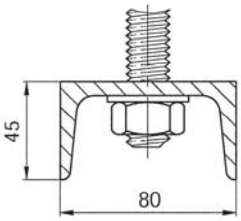


Up to M16



Weight of the U: 5,8 kg/m

For M20



Weight of the U: 8,9 kg/m

Smoke control damper RKU-90

Test certificate Z-78.2-12

Resistance class EK90
Fire resistance time of 90 min

Suspension / weight

The undressed threaded rods shall be dimensioned such that the calculated tension of 6 Nmm^2 is not exceeded (this refers to a maximum length of 1,5 m).
The hangers shall be lead around the duct in U-form (see DIN EN 1366-1).

* Sections of tension of the threaded rods with a metrical ISO thread in accordance with DIN 13 Part 28.

Information on the steel dowels with test certificate

The hangers shall be affixed with straddling steel dowels ≥ M8. The dowels shall be in accordance with the effective test certificate of the "Deutsches Institut für Bautechnik" and moreover be mounted twice as deep as the test certificate requires, if the test certificate does not state otherwise; the calculated tensile load of 500 N per dowel shall not be exceeded. Special dowels with a maximum tensile load of 700 N can also be used.

Suspension of the smoke control damper with fire safety dowels

Nominal dimension	Weight of the rod in kg/m	*Section of tension in mm^2	Load at 6 N/mm^2 per threaded rod	
			N	KP
M 6	0,18	20,1	120,6	12,29
M 8	0,32	36,6	219,6	22,38
M 10	0,50	58,0	348,0	35,47
M 12	0,73	84,3	505,8	51,55
M 14	0,97	115,0	690,0	70,33
M 16	1,35	157,0	942,0	96,02
M 20	2,08	245,0	1470,0	149,84
M 24	3,00	353,0	2118,0	215,90
M 30	4,75	561,0	3366,0	343,11

Weight of the RKU-90 smoke control dampers in kg

Height H (mm)	Width B (mm)																	Height H (mm)
	201	252	318	357	400	449	503	565	634	711	797	894	1003	1125	1262	1416	1500	
201	44	48	52	54	57	60	64	69	73	78	84	89	96	105	114	124	129	201
252	47	50	55	58	61	65	69	72	77	82	88	95	102	111	120	130	137	252
318	52	55	60	64	66	70	73	78	83	88	94	102	109	119	128	139	145	318
357	54	58	64	66	70	73	77	81	87	92	99	106	113	123	133	145	151	357
400	58	61	66	70	72	78	81	85	90	96	102	111	118	128	138	150	157	400
449	67	72	77	80	84	88	94	99	105	111	117	128	137	148	160	173	181	449
503	71	75	82	85	89	94	98	106	110	117	125	134	143	154	166	181	189	503
565	75	80	86	90	94	99	104	110	116	123	130	140	151	163	175	189	197	565
634	81	87	93	96	101	105	110	116	123	131	139	148	158	170	183	199	207	634
711	93	98	105	110	114	119	125	132	139	148	157	167	179	192	207	223	232	711
797	109	115	123	128	133	139	145	153	161	171	181	193	206	220	237	256	266	797

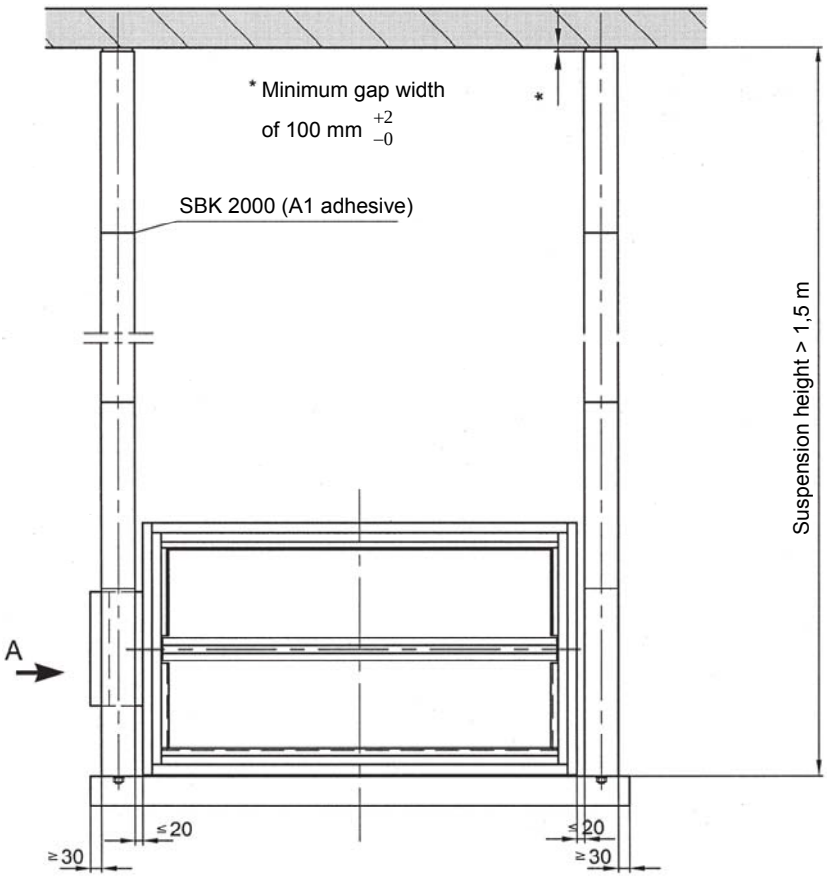
Smoke control damper RKU-90

Test certificate Z-78.2-12
Resistance class EK90
Fire resistance time of 90 min

Covered hangers
Suspension height > 1,5 m
up to ≤ M 12

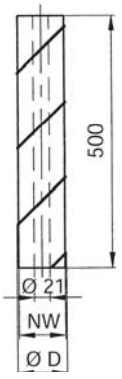
Covered hangers

The undressed threaded rods shall be dimensioned such that the calculated tension of 6 Nmm^2 is not exceeded (this refers to a maximum length of 1,5 m).
The maximum elongation is 40 mm at temperatures in accordance with the standard time temperature curve (ca. 1000 °C) for 90 min referring to threaded rods that are 1,5 m long.
Hangers that are longer than 1,5 m shall be treated with a fireproofing covering due to their significant elongation.
Reference: DIN EN 1366-1



Dimensions of the hanger covering

Nominal dimension	Outer dimension
Ød	ØD
71	75
80	85
90	95



All dimensions in mm

Field of application

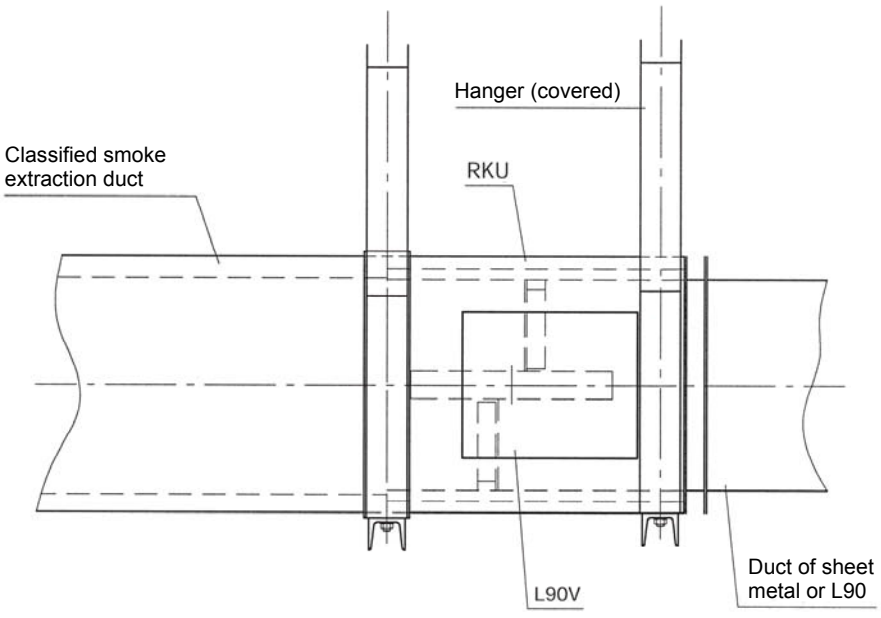
NW 71 = up to a max. suspension height of 2,5 m
NW 80 = up to a max. suspension height of 3 m
NW 90 = up to a max. suspension height of

Weight of the hanger covering per 0,5 m

NW 71 = ca. 3,6 kg
NW 80 = ca. 4,9 kg
NW 90 = ca. 5,9 kg

Please note:
The weight of the hanger covering shall be added to the weight of the RKU, the traverse and the threaded rods.

View A



Smoke control damper RKU-90

Test certificate Z-78.2-12
Resistance class EK90
Fire resistance time of 90 min

Covered hangers
Suspension height > 1,5 m
from M 14 to M 20

Mounting instructions

The hanger coverings consist of steel ductwork with an internal fireproof casing. A borehole of min. 21 mm is located at central position in order to hold the threaded rod. From a hanger of M 14 upwards the connecting box for two threaded rods cannot be attached within the range of the suspension covering. Therefore, as shown in the accompanying picture, a covering for the connecting box has to be installed.

Dimensioning example

Given: RKU-90 with the dimensions
B = 797 mm
H = 400 mm
Suspension height = 4 m

Following weights shall be added:

RKU according to the table on page 18	102 kg
U-traverse (U80) See page 21	12 kg
Threaded rod M20 2 x (L = 4 m) See page 22	33,5 kg
Covering Ø 90 16 x 5,9 kg See page 23	94,5 kg
	242kg : 2 = 121 kg

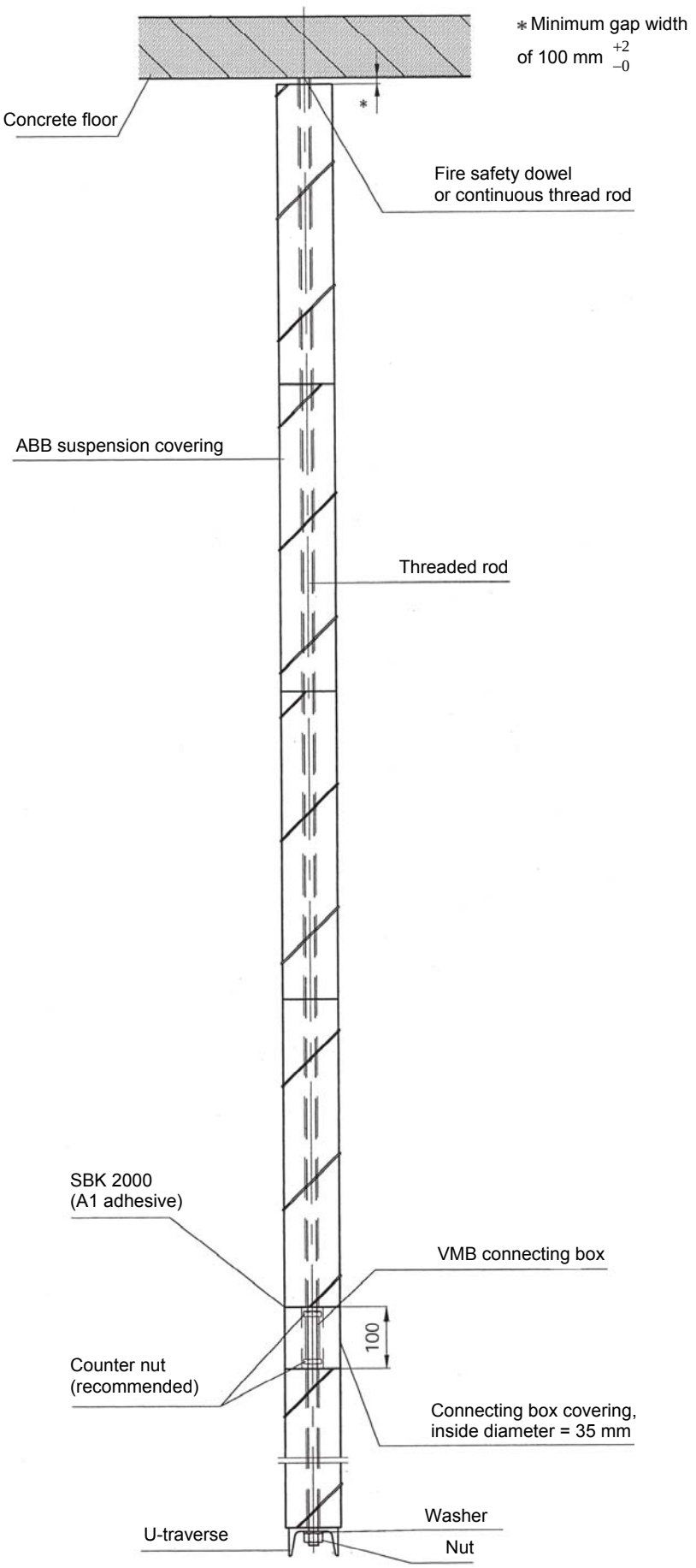
= M20 according to the table on page 22

Ordering example

(Accessories only for the covering)

16 pieces of suspension covering NW 90
L = 0,5 m

2 pieces of connecting box covering
(are subject to the dimensions of the threaded rods used by the installer)



Smoke control damper RKU-90

Test certificate Z-78.2-12
Fire resistance class EK90
Fire resistance time of 90 min

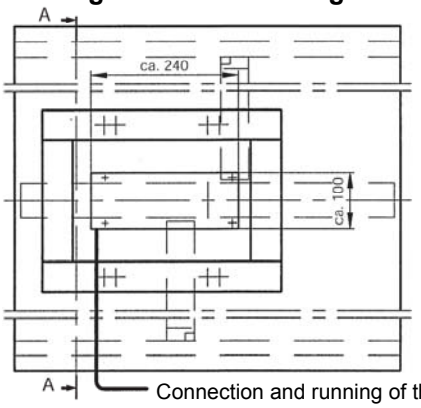
Technical data of the electric motor

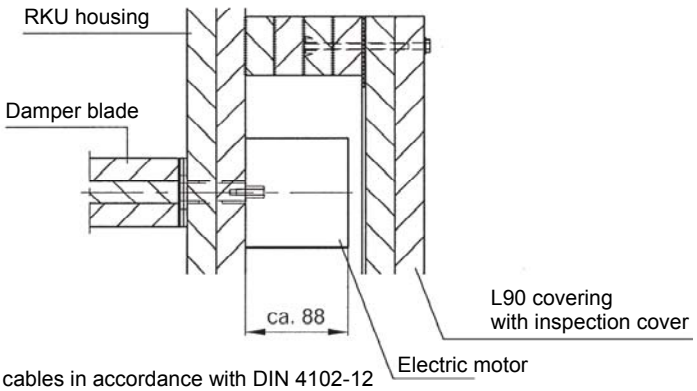
The BE24, BE230, SEL 2.90 and SEL 1.90 motors are controlled via two-point (see wiring diagram).
The SEL 1.90 SLC motor is connected via two-wire technique; appropriate means of communication (SPMa-1SR or SPLM-4S OSD Mod.) can be used to receive data such as signaling of end positions, time interval (< 60 s) and monitoring of the torque. Please order separately.
Contrary to the below wiring diagrams, terminal ③ is not used.

Please note: All electric connections between the motor and power supply shall be performed in accordance with the valid VDE guidelines.

Technical data	BE24 Wiring diagram on request	BE230 Wiring diagram on request	SEL 2.90	SEL 1.90	SEL 1.90 SLC
Nominal voltage	24 V ≃	230 V ~	230 V ~	24 V ≃	In combination with SPMa or SPLM
Power consumption when in operation	12 W	8 W	12 W	7 W	
In end positions	0,5 W		3,7 W	0,7 W	
Dimensioning	18 VA	15 VA	13 VA		8 VA
Type of safety	IP 54		IP 54		
Safety class	III	II	II		
Torque min.	40 Nm		40 Nm		
Running time	< 60 s		< 60 s		
Noise level	max. 62 dB (A)		ca. 50 dB (A)		
Rotation angle	100°		93°		
Contact rating of the auxiliary switch	2 x EPU 6 (3) A AC 250 V		3 (1,5 A) 230 V		Not applicable SLC
Maintenance	Maintenance-free		Maintenance-free		
Weight	~ 2,7 kg		~ 2,7 kg	~ 2,6 kg	

Motor arrangement and running of the cables



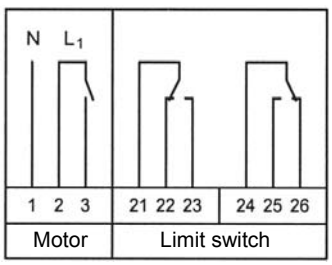


Connection and running of the E90 or E30 cables in accordance with DIN 4102-12

Wiring diagram for SEL 2.90 and SEL 1.90 motors two-point or one-wire control (seven core)

"Drawing OPEN"

24 VAC ± 20% ⊥ ~
24 VDC ± 10% - +
230 VAC ± 10% N L_1



Wiring diagram for SEL 1.90 SLC motor two-wire technique (two core)

Via safety communication module Power-Line-System SLC, type SPMa-1SR or SPLM-4S OSD Mod.

See our separate brochure
skom

Smoke control damper RKU-90

Test certificate Z-78.2-12
Resistance class EK90
Fire resistance time of 90 min

Technical data

H \ B	201	252	318	357	400	449	503	565	634	711	797	894	1003	1125	1262	1416	1500	
201	0,016	0,021	0,028	0,032	0,036	0,041	0,047	0,053	0,060	0,068	0,076	0,086	0,097	0,110	0,123	0,139	0,147	SE
	1,200	1,090	1,020	0,960	0,900	0,810	0,750	0,700	0,660	0,600	0,560	0,530	0,500	0,480	0,460	0,420	0,400	ζ
	0,040	0,056	0,064	0,072	0,080	0,090	0,101	0,113	0,127	0,142	0,160	0,179	0,201	0,226	0,253	0,284	0,301	SK
252	0,024	0,032	0,042	0,048	0,055	0,062	0,070	0,080	0,090	0,102	0,115	0,130	0,146	0,165	0,186	0,209	0,222	SE
	1,070	0,960	0,800	0,740	0,670	0,650	0,600	0,560	0,540	0,490	0,460	0,430	0,400	0,380	0,360	0,330	0,320	ζ
	0,056	0,063	0,080	0,090	0,100	0,113	0,126	0,142	0,159	0,179	0,200	0,225	0,252	0,283	0,318	0,356	0,378	SK
318	0,035	0,046	0,061	0,069	0,078	0,089	0,101	0,114	0,129	0,146	0,165	0,186	0,210	0,237	0,266	0,300	0,318	SE
	0,890	0,760	0,650	0,600	0,580	0,540	0,490	0,460	0,420	0,400	0,400	0,380	0,330	0,300	0,290	0,260	0,250	ζ
	0,064	0,080	0,101	0,113	0,127	0,142	0,160	0,179	0,201	0,226	0,253	0,284	0,319	0,357	0,401	0,450	0,477	SK
357	0,041	0,054	0,071	0,081	0,093	0,105	0,119	0,135	0,153	0,172	0,195	0,219	0,247	0,279	0,314	0,354	0,375	SE
	0,810	0,700	0,600	0,560	0,510	0,490	0,440	0,410	0,380	0,360	0,330	0,310	0,300	0,270	0,260	0,240	0,220	ζ
	0,072	0,090	0,113	0,127	0,142	0,160	0,179	0,201	0,226	0,253	0,284	0,319	0,357	0,401	0,450	0,505	0,535	SK
400	0,048	0,064	0,083	0,095	0,108	0,123	0,139	0,158	0,178	0,201	0,227	0,256	0,289	0,326	0,367	0,413	0,438	SE
	0,740	0,630	0,530	0,510	0,480	0,420	0,400	0,370	0,350	0,330	0,310	0,290	0,260	0,250	0,240	0,220	0,210	ζ
	0,080	0,100	0,127	0,142	0,160	0,179	0,201	0,226	0,253	0,284	0,318	0,357	0,401	0,450	0,505	0,567	0,600	SK
449	0,056	0,074	0,097	0,111	0,126	0,143	0,162	0,183	0,207	0,234	0,264	0,298	0,336	0,379	0,427	0,480	0,510	SE
	0,670	0,570	0,500	0,460	0,430	0,400	0,380	0,340	0,330	0,300	0,280	0,260	0,250	0,230	0,210	0,190	0,190	ζ
	0,090	0,113	0,142	0,160	0,179	0,201	0,226	0,253	0,284	0,319	0,357	0,401	0,450	0,505	0,567	0,635	0,673	SK
503	0,065	0,085	0,112	0,128	0,145	0,165	0,187	0,212	0,239	0,270	0,305	0,344	0,388	0,437	0,493	0,555	0,588	SE
	0,620	0,540	0,470	0,420	0,380	0,370	0,360	0,320	0,300	0,280	0,260	0,250	0,220	0,210	0,210	0,190	0,180	ζ
	0,101	0,126	0,160	0,179	0,201	0,226	0,253	0,284	0,319	0,357	0,401	0,450	0,505	0,567	0,635	0,712	0,754	SK
565	0,075	0,099	0,129	0,147	0,167	0,190	0,215	0,244	0,276	0,312	0,352	0,397	0,448	0,505	0,568	0,640	0,679	SE
	0,510	0,500	0,420	0,400	0,370	0,340	0,310	0,300	0,280	0,260	0,250	0,220	0,200	0,200	0,190	0,180	0,160	ζ
	0,113	0,142	0,179	0,201	0,226	0,253	0,284	0,319	0,357	0,401	0,450	0,505	0,566	0,635	0,713	0,800	0,847	SK
634	0,086	0,113	0,148	0,169	0,192	0,218	0,247	0,280	0,317	0,358	0,404	0,456	0,514	0,579	0,653	0,735	0,780	SE
	0,530	0,460	0,390	0,350	0,320	0,280	0,270	0,260	0,250	0,230	0,220	0,200	0,190	0,190	0,180	0,160	0,150	ζ
	0,127	0,159	0,201	0,226	0,253	0,284	0,319	0,357	0,401	0,450	0,505	0,566	0,635	0,713	0,800	0,897	0,951	SK
711	0,098	0,130	0,170	0,194	0,220	0,250	0,283	0,321	0,363	0,410	0,463	0,522	0,588	0,663	0,747	0,841	0,892	SE
	0,510	0,430	0,360	0,330	0,300	0,290	0,260	0,250	0,230	0,220	0,200	0,190	0,180	0,160	0,150	0,150	0,140	ζ
	0,142	0,179	0,226	0,253	0,284	0,319	0,357	0,401	0,450	0,505	0,566	0,635	0,713	0,800	0,897	1,006	1,066	SK
797	0,112	0,148	0,194	0,221	0,251	0,285	0,323	0,366	0,414	0,468	0,528	0,595	0,671	0,756	0,852	0,959	1,018	SE
	0,460	0,440	0,340	0,300	0,290	0,270	0,240	0,230	0,220	0,200	0,190	0,160	0,150	0,150	0,150	0,150	0,120	ζ
	0,160	0,200	0,253	0,284	0,319	0,357	0,401	0,450	0,505	0,566	0,635	0,713	0,800	0,897	1,006	1,128	1,195	SK

Explanation

B	[mm]	width
H	[mm]	height
S_E	**[m^2]**	**smallest cross-section of flow inside the smoke control damper**
S_K	[m^2]	cross-section of the duct connection
qv	[m^3/h]	volume flow
V_E	[m/s]	air velocity
Δpt	[Pa]	pressure difference (duct installation)
ς		resistance coefficient (duct installation)
L_{WA}	[dB (A)]	evaluated noise level (within the duct)
L_{WO}	[dB]	acoustic power per octave
K_O	[dB]	octave correction factor (see table for measured average)

Calculation example for RKU

Given: B = 894, H = 400, qv = 6000 m^3/h
Searched: Δpt, L_{WA}, L_{WO}
Solution: from the dimensional table S_E = 0,256 m^2
ς = 0,29
from the diagram V_E = 6,4 m/s
Δpt = 6,8 Pa
L_{WA} = 41 dB (A)

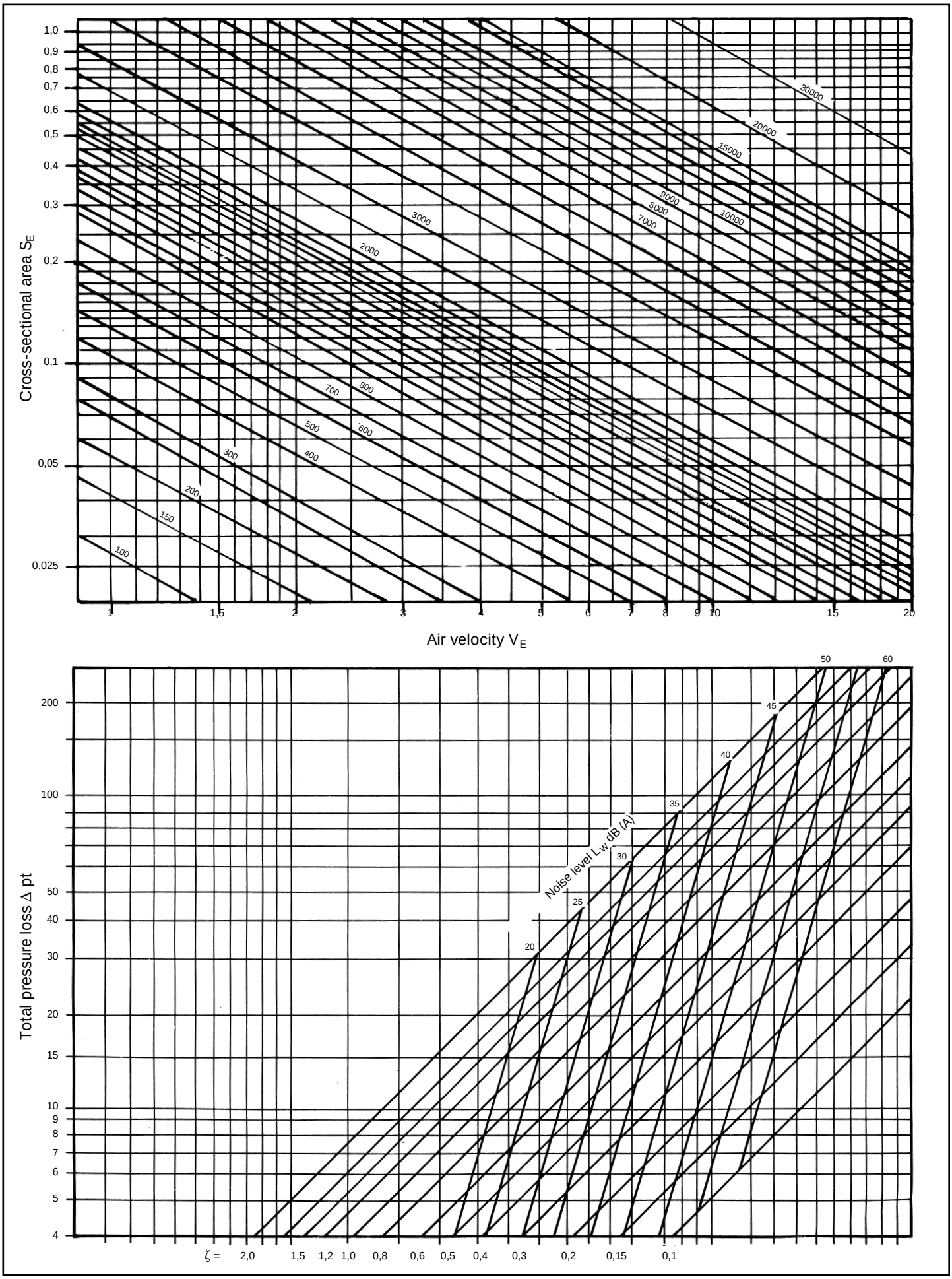
Correction table for octave evaluation [dB/Oct]

F	63	125	250	500	1000	2000	4000	8000	[Hz]
Ko	-4	-2	0	-1	-4	-9	-15	-21	[dB]

Acoustic power per octave $L_{WO} = L_{WA} - K_O$

Oct. [Hz]	63	125	250	500	1000	2000	4000	8000
L_{WO} [dB]	37	39	41	40	37	33	26	20

Noise level dB (A) – Total pressure loss ∆ pt for type RKU-90



Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Smoke control damper with test certificate Z-78.2-12 for an EK90 fire resistance class and a fire resistance time of 90 min. For the universal installation into walls of brickwork in accordance with DIN 1053, into light partition walls, into walls and floors of concrete, directly in front or outside of walls, standing on the floor or hanging beneath the floor, independent of the flow direction and fitting position. Housing (50 mm thick), damper blade (60 mm thick) and stops of asbestos-free fireproofing boards; the damper blade axis of stainless steel is supported in bronze sleeves. Control via actuating drive Open/Closed 24 V or 230 V for two-point control or SLC technique (two-wire control), with L90 encasing for the protection of the actuating drive with inspection cover. Manufacturer: **Strulik** Type: **RKU-90** Dimensions: B: _____ mm H: _____ mm L: _____ mm			

Smoke control damper RKU-90-KL

Product group 7/3

Test certificate Z-78.3-78
Resistance class EK90
Fire resistance time of 90 min

For more information, see page 31

Smoke control damper for smoke exhaust systems and for the additional usage in the ventilation mode.

Control via electric actuating drive **(SEL 1.90 SLC/AKO)** with an additional energy storage (accumulator), this closes the smoke control damper in the ventilation mode in case of power failure. Therefore fire safety is guaranteed.

Drive with L90 encasing and inspection cover.

Power supply and control only with SLC-BUS (two-wire control) via appropriate control modules.

Please note:

Same installation examples and dimensions as for RKU-90

See page 10 to 27

Ordering example:

RKU-90-KL / SEL 1.90 SLC/AKO / B x H x L

- **B x H x L**: The length of the RKU-90-KL depends on the dimension H (see page 11)
- **B x H x L**: Dimensions B (width) x H (height) in mm (side H = operating side)
- **SEL 1.90 SLC/AKO**: Motor design in accordance with the below table
- **RKU-90-KL**: RKU-90-KL smoke control damper, smooth on both sides, including electric motor and its L90 covering

Please note: If a duct connecting profile is desired, as e.g. one-sided (operating side BS or wall side MS) or two-sided, then please state this separately.

The required safety communication modules (Power-Line System SLC), e.g. SPMa-1KR (for one RKU-90-KL) or SPLM-4K OSD Mod (for four RKU-90-KL) are listed in our separate brochure

skom

EKS control on request

Technical data for the SEL 1.90 SLC/AKO damper drive

Nominal voltage	24 VAC	
Frequency	50/60 Hz	
Power consumption	13 VA	
	Minimum	Maximum
Supply voltage	23 VDC	36 VDC
Supply current	ca. 100 mA	400 mA
Torque	16 Nm	52 Nm
External resistance	0 Ohm	11 Ohm
Velocity	58 s	60 s
Back-up energy (back-up accumulator)	6,6 V	9,5 V
Number of cycles	2	4
Charging period	ca. 1 h 15 min	9 h
Accumulator durability		ca. 3 years
Time ambient temperature	0 °C	+45 °C
Short ambient time	-5 °C	+55 °C
Ambient humidity	30 % rF	95 % rF

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Smoke control dampers for smoke exhaust systems and for the additional usage in the ventilation mode with test certificate Z-78.3-78 for an EK90 fire resistance class and a fire resistance time of 90 min. For the universal installation into walls of brickwork in accordance with DIN 1053, into light partition walls, into walls and floors of concrete, directly in front or outside of walls, standing on the floor or hanging beneath the floor, independent of the flow direction and fitting position. Housing (50 mm thick), damper blade (60 mm thick) and stops of asbestos-free fireproofing boards; the damper blade axis of stainless steel is supported in bronze sleeves. Control via electrical actuating drive with an additional energy storage (accumulator), which closes the smoke control damper in the ventilation mode in case of a power failure. Therefore fire safety is guaranteed. Drive with L90 encasing and inspection cover. Power supply and control only with SLC technique (two-wire control) via appropriate control modules. Manufacturer: **Strulik** Type: **RKU-90-KL** Dimensions: B: _____ mm H: _____ mm L: _____ mm **Required accessory:** Communication device for SLC technique Type: **SPMa-1KR**			

Information on smoke control dampers for the additional usage in the ventilation mode

RKU-KL/RKI-KL/RKE-KL

Why also use smoke control dampers in the ventilation mode?

The so far available fire and smoke control dampers did not allow the combined usage as a fire and smoke control damper due to their design and test certificate.
Fire dampers have the fire position »closed«. They are fitted with a fusible link and drive »deenergized closed«. After activation the fire dampers close by means of spring tension via fusible link or via external smoke detector and shall afterwards not be reopened. The usage as a smoke control damper is also excluded due to the missing functional endurance for the extraction of hot flue gases. Smoke control dampers have the required functional endurance for the extraction of hot flue gases due to the materials used. They are fitted with a L90 enclosed and reversible drive, which mechanically locks the damper blade in both the »OPEN« and »CLOSED« position. The drive torque is with min. 36 Nm considerably higher than the drive torque of a fire damper. Due to the reversibility, such drives have neither a spring return nor a fusible link. If the power supply is interrupted, then the damper remains in its last condition. Depending on the application, smoke control dampers have **two** safety positions (OPEN and CLOSED) within the smoke exhaust scenario. Due to the lack of a fusible link or spring return, the usage of smoke control dampers as fire dampers is not permitted.
A damper that shall combine both functions shall meet the fire safety requirements and have the required functional endurance for the extraction of hot flue gases. The housing and sealing materials shall therefore be the same as for smoke control dampers. The drive shall have the reversibility that is required for the smoke exhaust mode, without having to dispense with the safety function of closing the damper in case of power failure.

New are therefore the drive and its control

Smoke control dampers that also have a ventilation function are fitted with a special SLC drive. The drive is fitted with an accumulator. An intelligent electronic motor system constantly monitors the condition of the accumulator. Accumulator faults are immediately detected and transmitted to a control and tell-tale module. The drive is controlled by a control and communication module that is fitted into the control cabinet (see separate brochure) and that makes it possible to connect the damper with the control. An invert-safe two-wire cable, via which both the power supply and data transfer is performed, connects the control module with the drive.
The control module has a manual operation mode which allows the opening and closing of the damper for test purposes and which signalizes the state of the damper (Open, Closed, Fault) on a LED display. Depending on the control module used, the module is connected with the control via relay contacts or a RS-485 interface with Modbus-RTU protocol.

Functioning

The damper is in the open position for the ventilation mode. If in the ventilation mode one of the following faults:

- cable break,
- short circuit,
- communication failure between control module and drive,

occurs, then the accumulator that is built into the drive closes the damper after a waiting period of 60 s, in order to guarantee fire safety.
If the damper, at the moment of occurrence of one of the above faults, has already been allotted to a smoke exhaust scenario and is therefore standing open, then the accumulator function is put out of operation. The damper remains in the »OPEN« position, smoke extraction now has priority. If the damper is closed after a smoke exhaust scenario has been activated and if one of the above faults occurs during the closing procedure, then the accumulator supports the function of closing the damper, in order to ensure the safety position of the damper within the activated scenario.
Therefore the extended function of the accumulator is only put into operation when a fault occurs.

Requirements for smoke control dampers that are also used in the ventilation mode:

- All components of the system (ducts, ventilators etc.) are suitable for the usage in a smoke exhaust system and have a test certificate.
- The system has an independent, secured power supply. Cable systems with an E30/E90 functional endurance are used.
- A central fire alarm system together with area-wide smoke detectors is available to activate of the smoke exhaust system.

Note regarding the RKE-KL

Please note that this type only has a functional endurance of 60 min at 600 °C and 120 min at 400 °C.

Smoke control damper RKI-90

Test certificate Z-78.2-11

Resistance class EK90 within smoke extraction ducts that have a fire resistance time of 90 min

Ordering example / dimensions

RKI-90 smoke control damper consisting of the housing with cut-off damper designed as a multi-blade damper and electric motor via lever system with L90 encasing. The smoke control damper has a EK30, EK60 and EK90 fire resistance class within smoke extraction ducts of calcium silicate boards with a fire resistance time of L30, L60 and L90 min.
Inside one fire compartment, the smoke control dampers are also allowed to be mounted into the walls of smoke extraction ducts that do not have a fire resistance time.
Furthermore, they may also be used for the inlet of supply air for smoke exhaust systems.

Dimensions

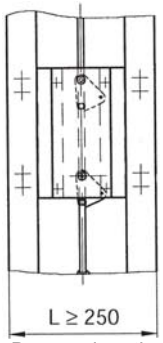
B ≥ 200 up to ≤ 1000 mm

H in mm clear	Number of lamella
340	2
505	3
670	4
835	5
1000	6

L ≥ 250 mm

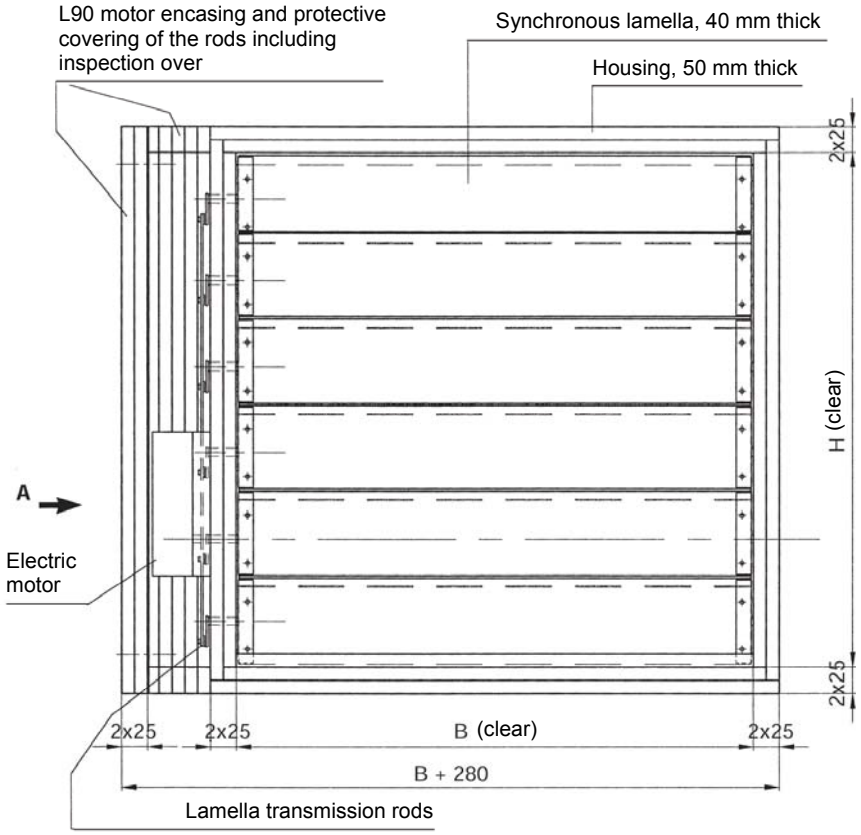
View A

(Drawing without an inspection cover)



Damper length

Smoke control damper as a synchronous multi-blade damper



DEUTSCHES INSTITUT FÜR BAUTECHNIK
Anstalt des öffentlichen Rechts

10829 Berlin, 1. März 2004
Kolonnenstraße 30 L
Telefon: 030 78730-350
Telefax: 030 78730-320
GeschAZ.: IV 57-1.78.2-28/03

Allgemeine bauaufsichtliche Zulassung

Zulassungsnummer: Z-78.2-11

Antragsteller: Strulik GmbH
Neesbacher Straße 13
65597 Hünfelden-Dauborn

Zulassungsgegenstand: Entrauchungsklappen für maschinelle Entrauchungsanlagen, Typ RKI 90

Geltungsdauer bis: 28. Februar 2009

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.
Diese allgemeine bauaufsichtliche Zulassung umfasst sieben Seiten und drei Anlagen.

Ordering example:

RKI-90 / SEL 1.90 / B x H x L

L = 250 mm (standard dimension)
On request also available in > 250 mm

Dimensions B (width) x H (height) in mm (side H = operating side)

Type of electric motor (see page 41)
SEL 1.90 – 24 V⎓
SEL 2.90 – 230 V~
SEL 1.90 SLC – (two-wire technique)

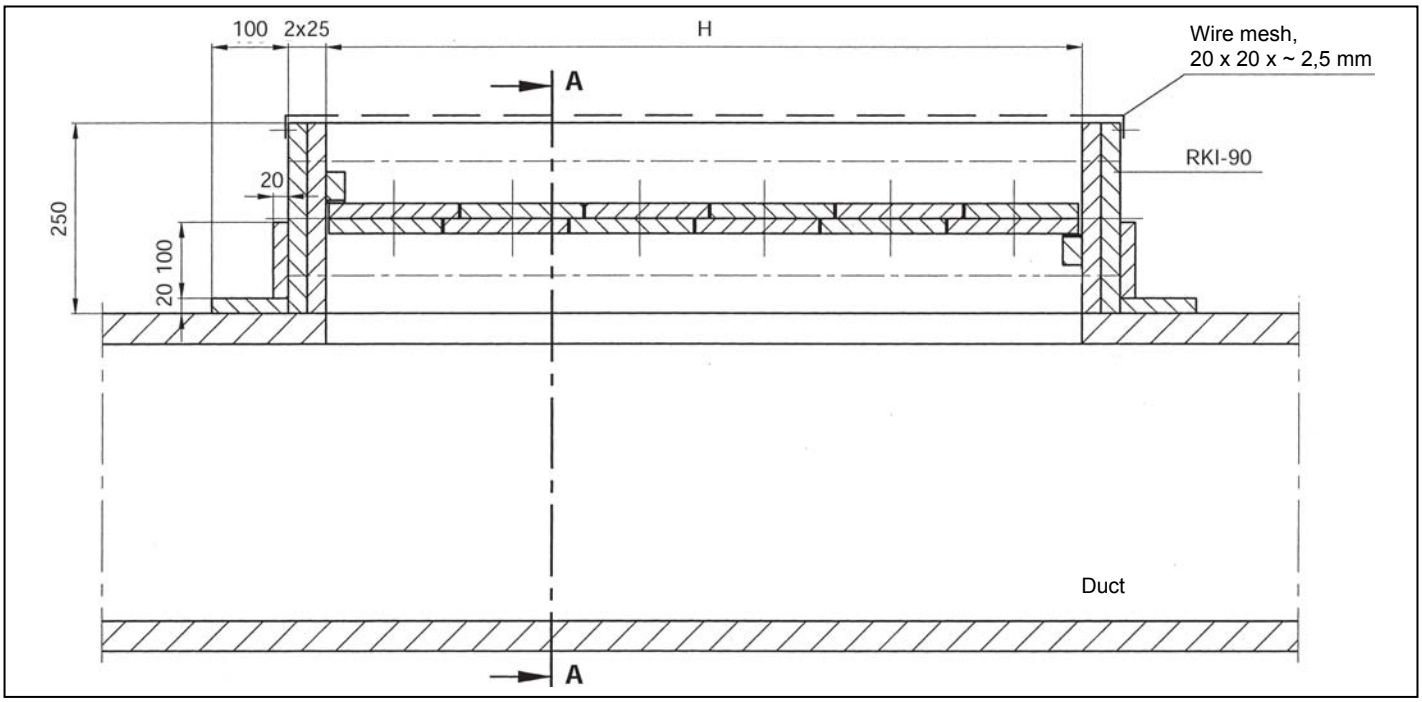
Smoke control damper designed as a multi-blade damper including electric motor, L90 rod encasing and motor and cover grille

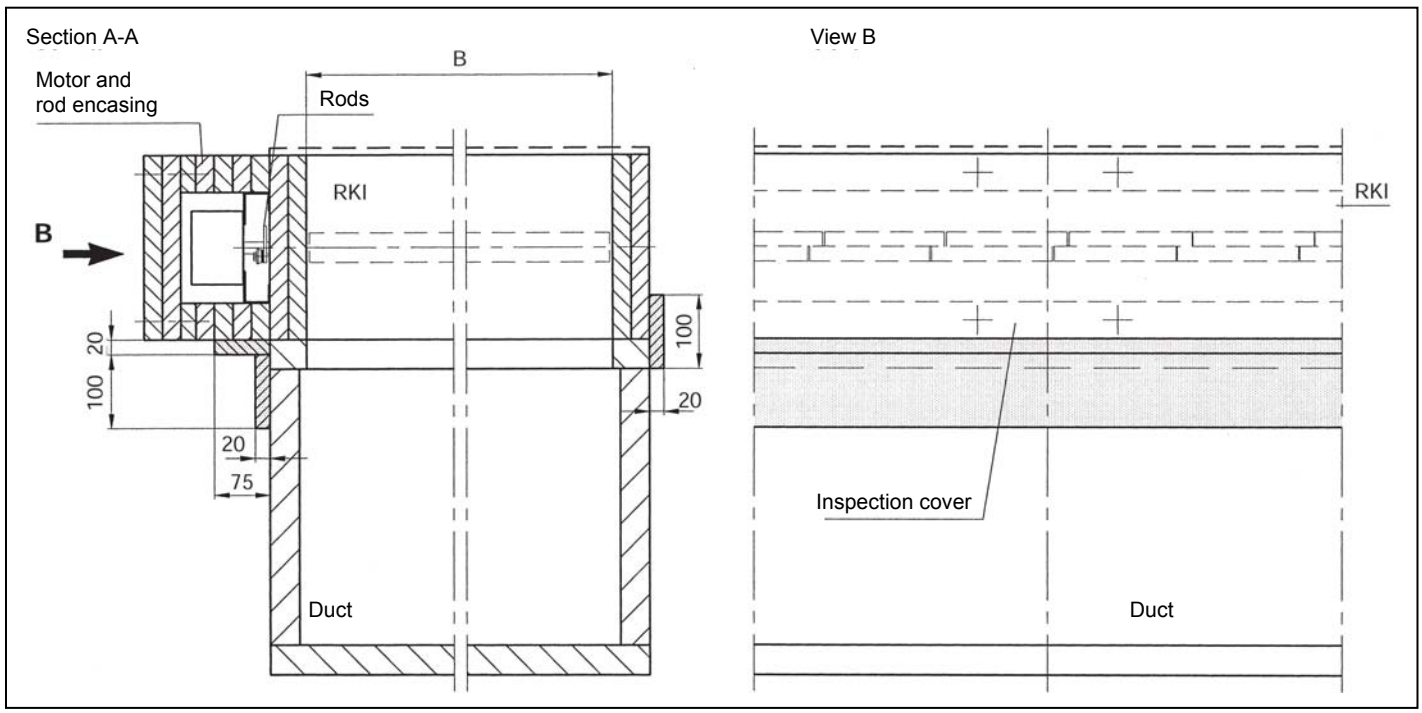
Smoke control damper RKI-90

Test certificate Z-78.2-11
Fire resistance class EK90

Examples for the installation into smoke extraction ducts that have a fire resistance time of 90 min

Example for the installation of a RKI-90 into smoke extraction ducts that have a fire resistance time, with planking at the side or a connection in duct jointing technique from calcium silicate boards.
Care shall be taken that the planking is affixed (with a water-glass adhesive and clamps or wooden screws) such that the motor and rod encasing can be inspected correctly.





Smoke control damper RKI-90

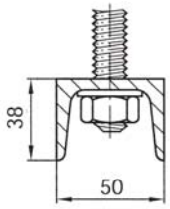
Test certificate Z-78.2-11
Fire resistance class EK90

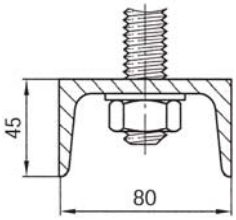
Examples for the front side installation into smoke extraction ducts that have a fire resistance time of 90 min

Example for the front side installation of the RKI-90 into smoke extraction ducts that have a fire resistance time.

Care shall be taken that the doubling is affixed with a water-glass adhesive and clamps or wooden screws.

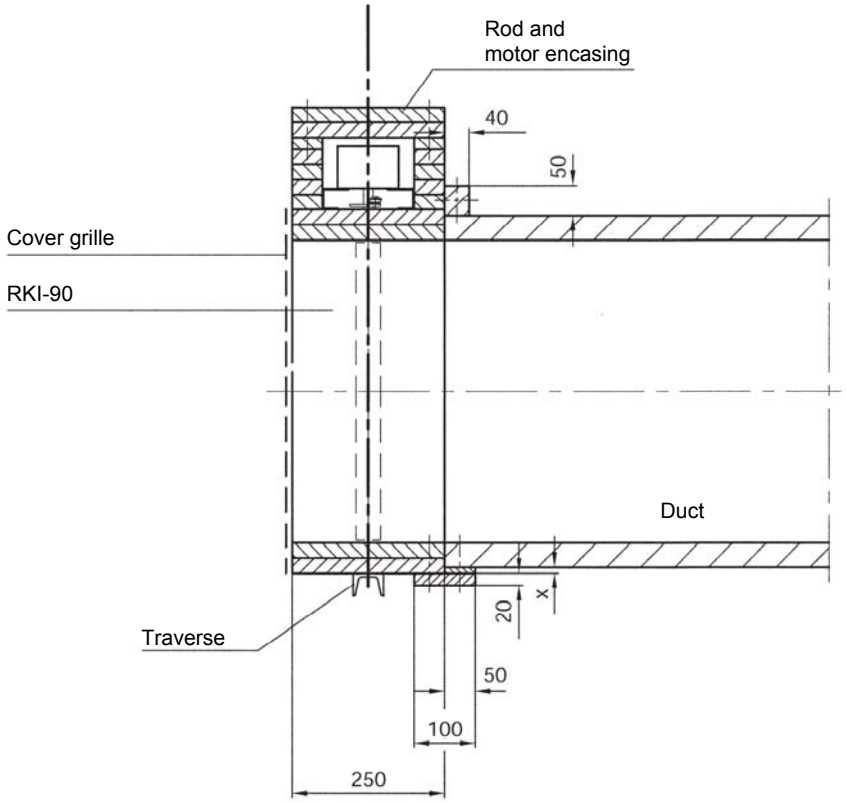
Suspension

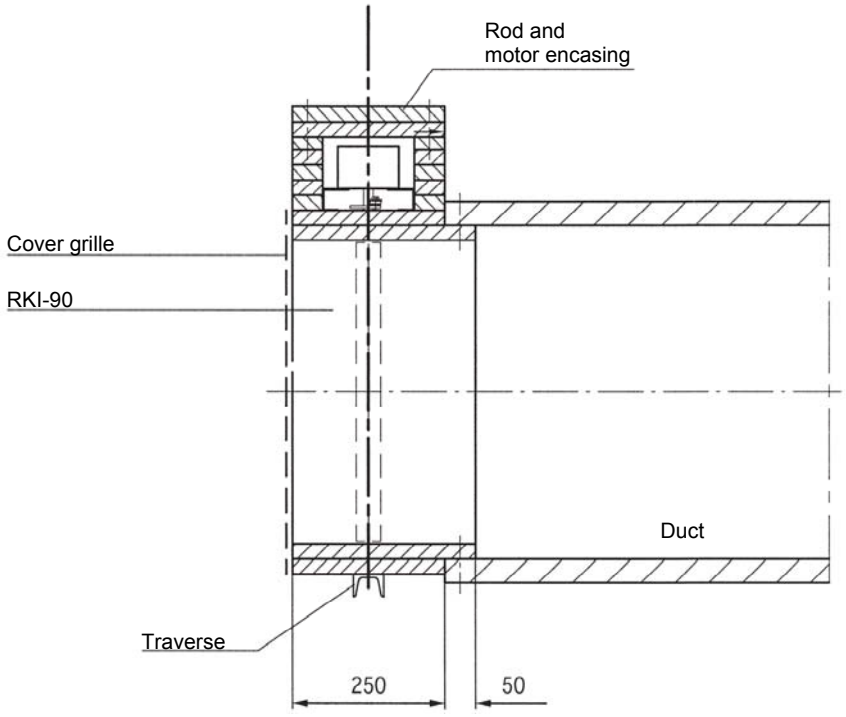




The dimensioning of the suspension shall be performed in accordance with page 42.

Front side installation



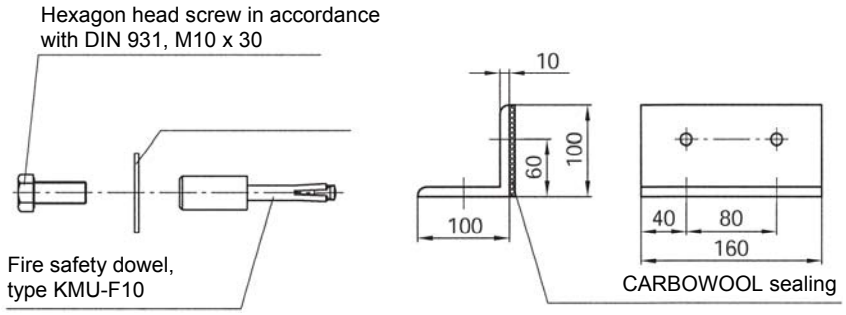


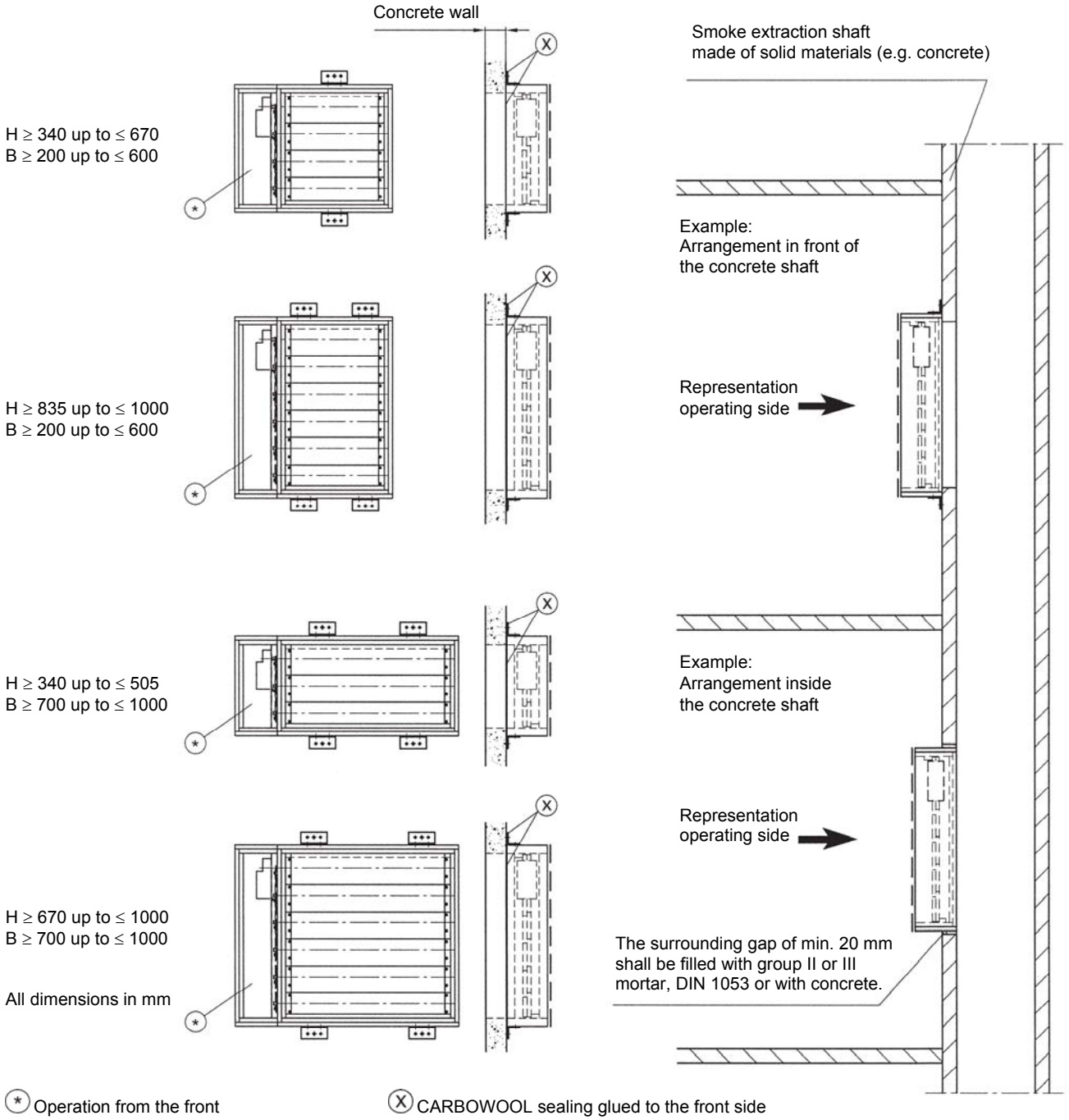
Smoke control damper RKI-90

Test certificate Z-78.2-11
Fire resistance class EK90

Examples for the installation in front of and inside of smoke extraction shafts that are made of solid materials (e.g. concrete)

The RKI-90 is affixed according to the number of WE angle brackets, as shown in the drawings. For WE angle brackets, two KMU-F-10 fire safety dowels shall be used. As shown in the drawings, the WE angle brackets shall be affixed at the top and at the bottom.

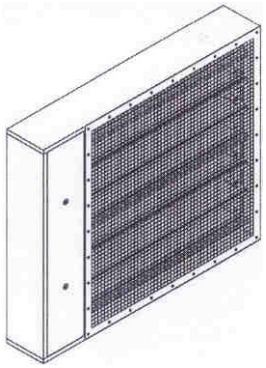




Smoke control damper RKI-90

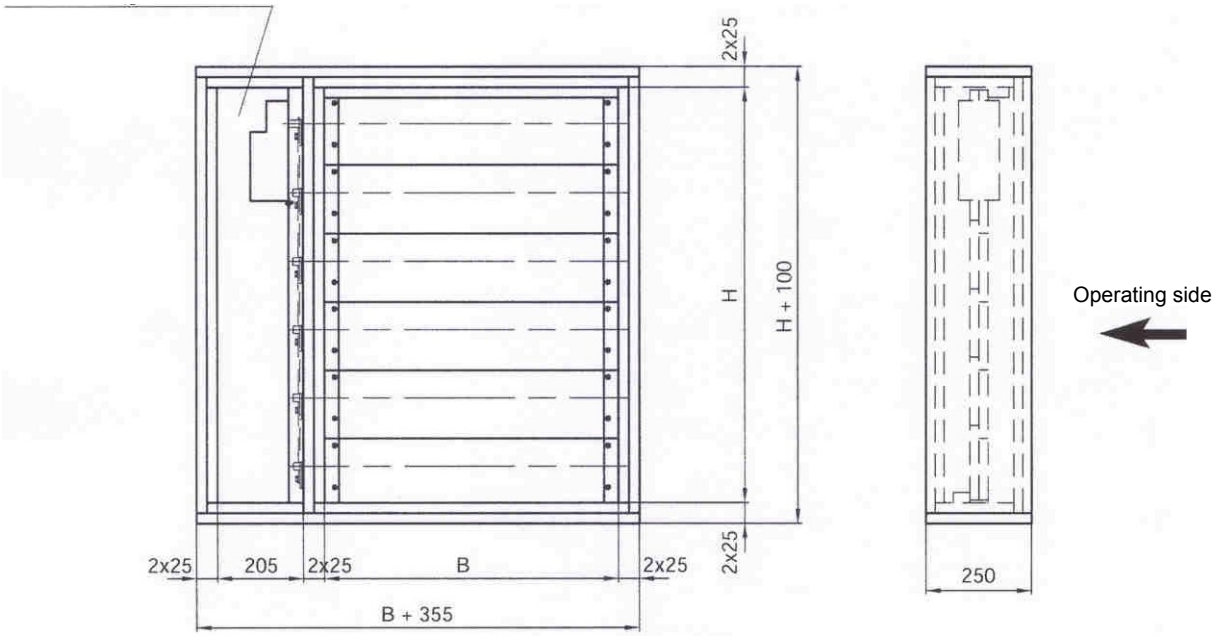
Test certificate Z-78.2-11
Fire resistance class EK90

Dimensions



Operation from the front

Shown without a cover



Smoke control damper RKI-90

Test certificate Z-78.2-11

Fire resistance class EK90 within smoke extraction ducts that have a fire resistance time of 90 min

Design diagrams and conversion factors

Table to determine the clear areas

Free area Aeff in m^2 (SE)									
Height H (mm)	Width B (mm)								
	200	300	400	500	600	700	800	900	1000
340	0,042	0,063	0,084	0,105	0,126	0,147	0,168	0,189	0,21
505	0,067	0,1005	0,134	0,1675	0,201	0,2345	0,268	0,3015	0,335
670	0,091	0,1365	0,182	0,2275	0,273	0,3185	0,364	0,4095	0,455
835	0,117	0,1755	0,234	0,2925	0,351	0,4095	0,468	0,5265	0,585
1000	0,141	0,2115	0,282	0,3525	0,423	0,4935	0,564	0,6345	0,705

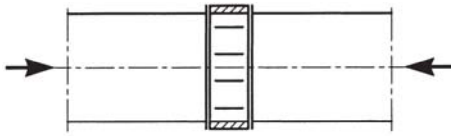
Please note:

With the required volume flow rate $\dot{V}$ in m^3/h it is possible to directly read the total pressure loss Δpt in Pa and the shaft noise level L_{wa} in dB(A) from the following diagrams for the fitting position **»free suction«** (see page 38 to 40).

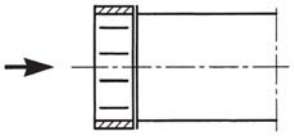
For all other fitting positions as for example
- duct connection on both sides,
- free blowout,
- free blowout and free suction,
- free suction on the shaft,
the result of the total pressure loss Δpt in Pa that has been read shall be multiplied with the opposite factors depending on the fitting position (for $\dot{V}$ = constant).

The noise level L_{WA} in dB(A) is corrected with the calculated total pressure loss Δpt in Pa by using the diagram.

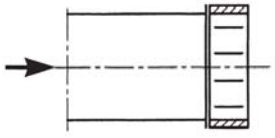
The density of the transported medium air is 1,2 kg/m^3 at 20 °C.



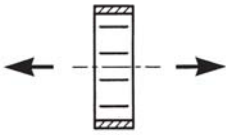
Duct connection on both sides
Correction factor: 0,68



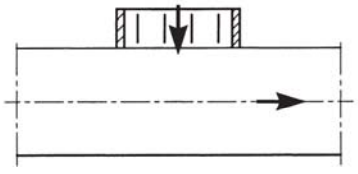
Free suction
(this arrangement can directly be read from the diagrams)



Free blowout
Correction factor: 1,59



Free blowout / free suction
Correction factor: 2,91



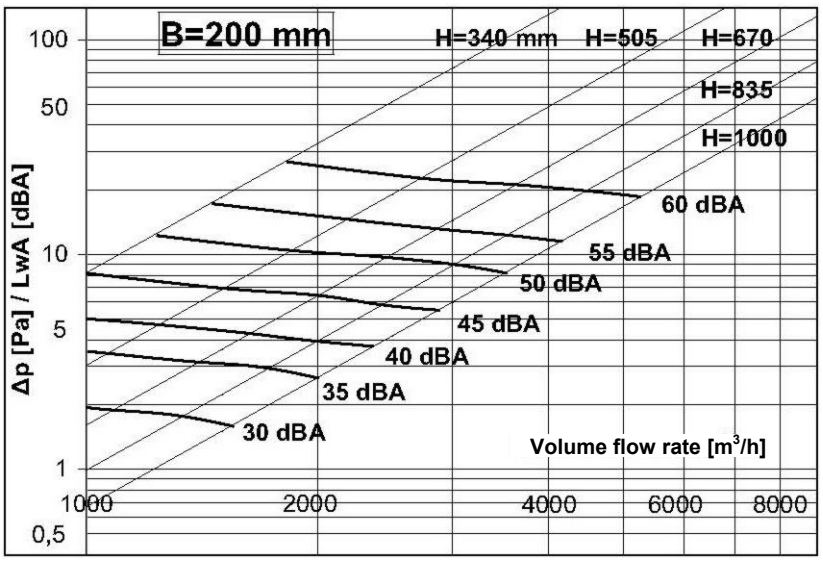
Free suction on the shaft
Correction factor: 1,59

Smoke control damper RKI-90

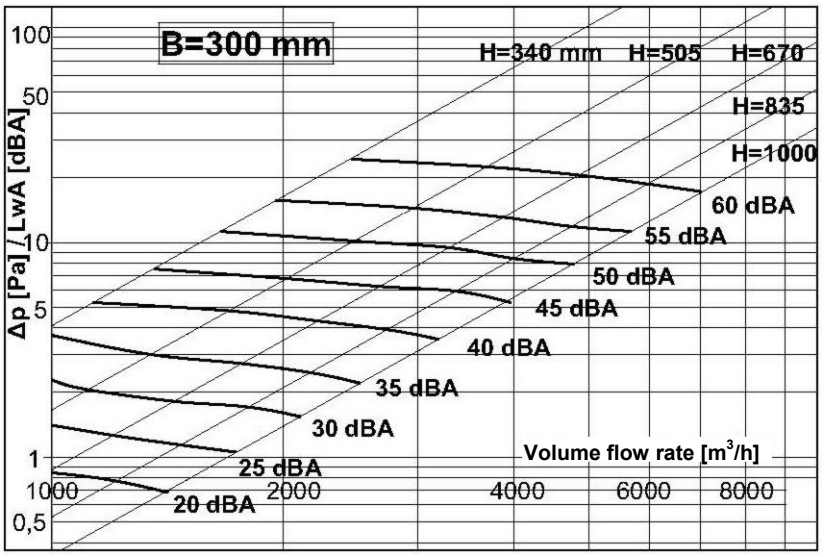
Test certificate Z-78.2-11

Design diagrams

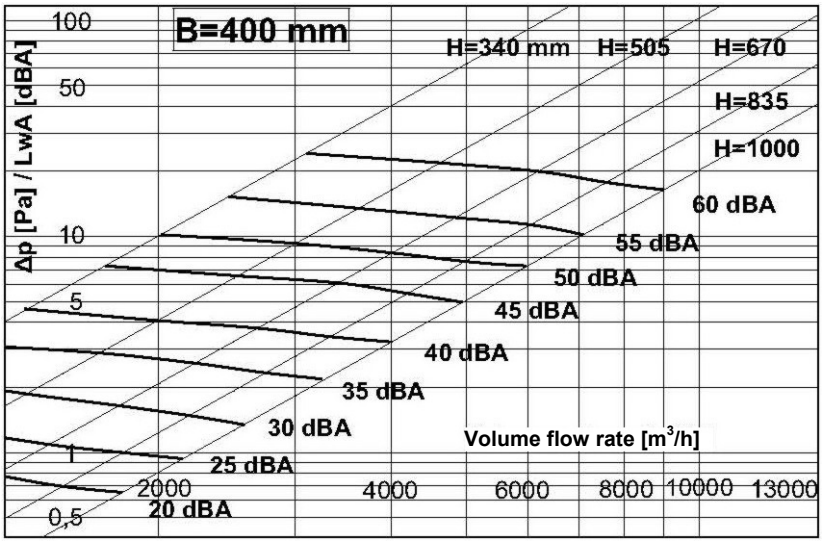
B = 200 →



B = 300 →



B = 400 →



Please note:

The diagrams are only valid for the fitting position »free suction«!

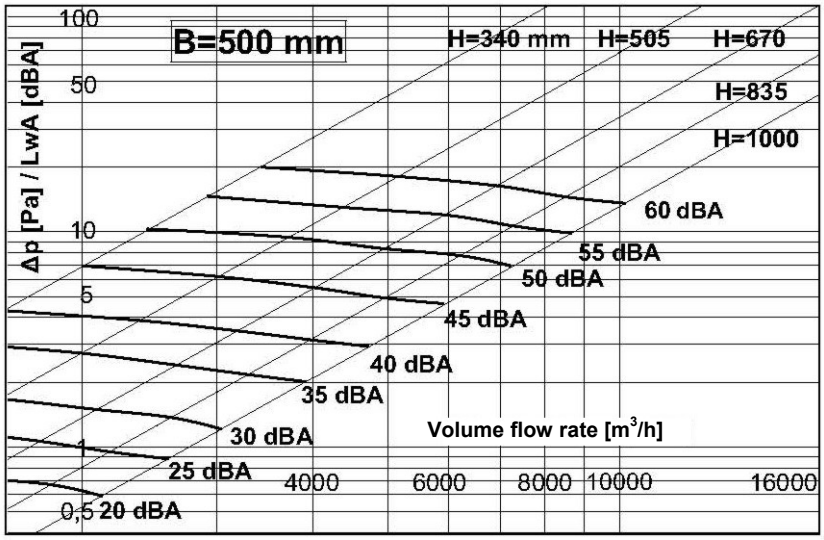
For all other cases, please read the information on page 37.

Smoke control damper RKI-90

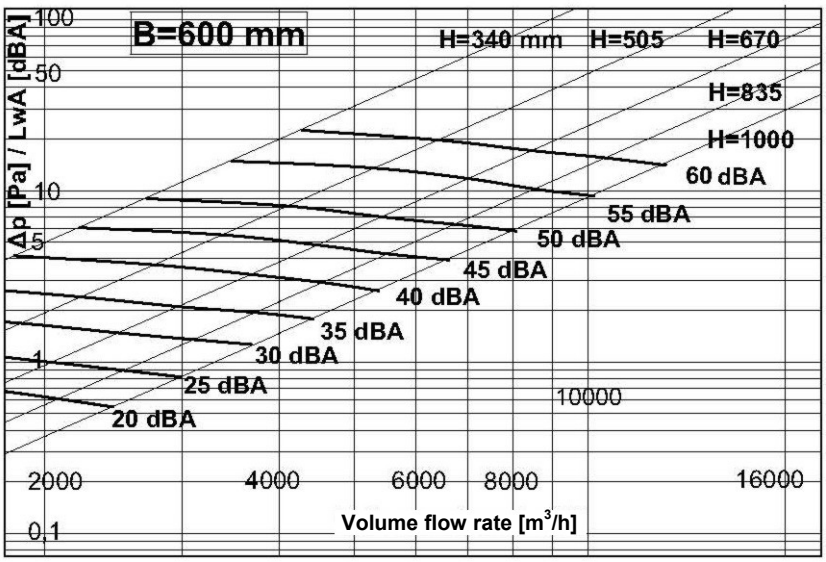
Test certificate Z-78.2-11

Design diagrams

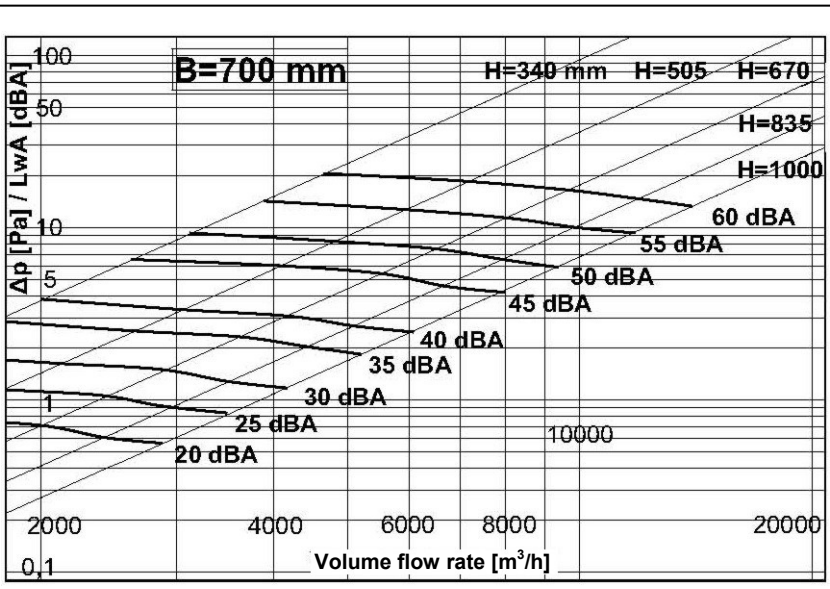
B = 500 →



B = 600 →



B = 700 →



Please note:

The diagrams are only valid for the fitting position »free suction«!

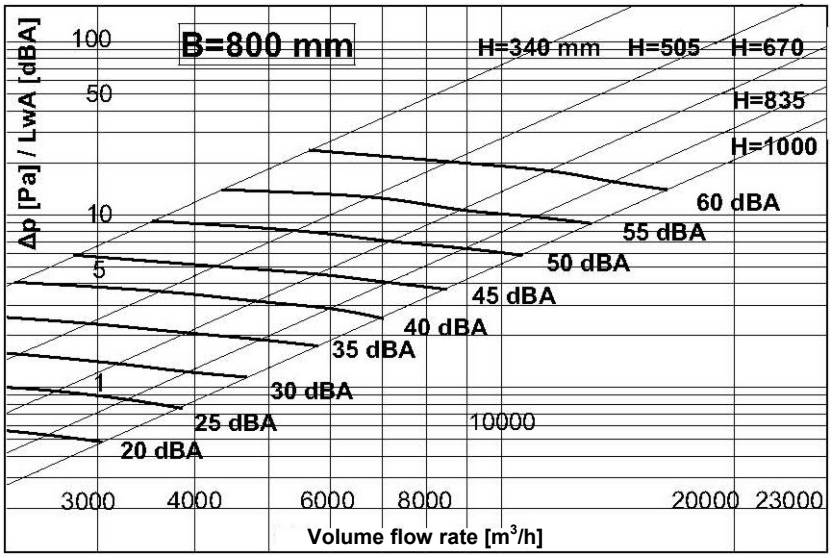
For all other cases, please read the information on page 37.

Smoke control damper RKI-90

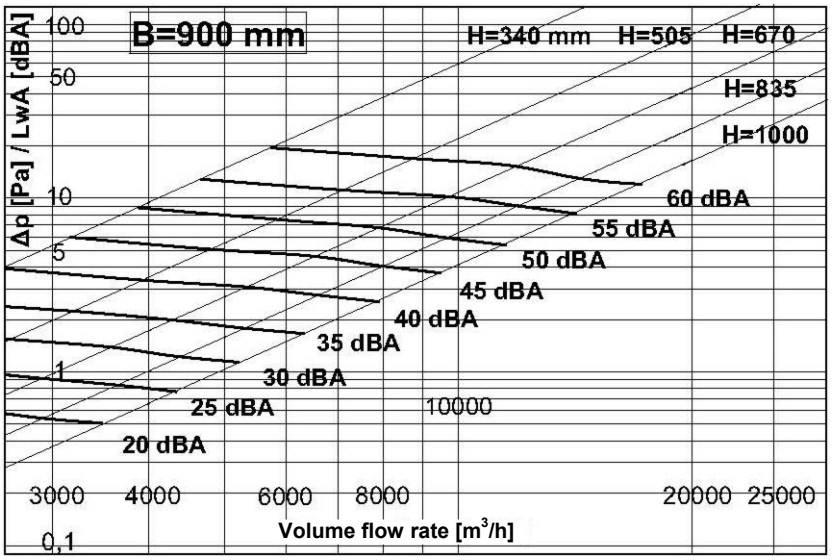
Test certificate Z-78.2-11

Design diagrams

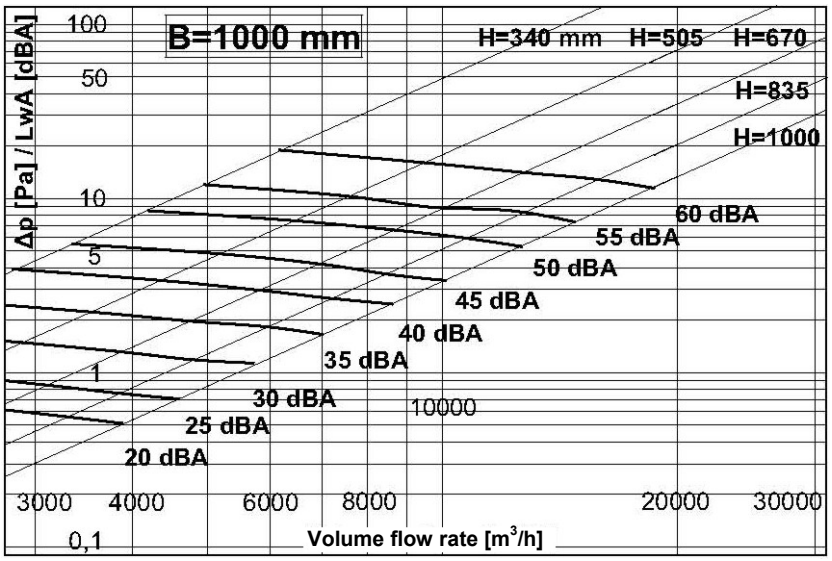
B = 800 →



B = 900 →



B = 1000 →



Please note:

The diagrams are only valid for the fitting position »free suction«!

For all other cases, please read the information on page 37.

Smoke control damper RKI-90

Test certificate Z-78.2-11

Fire resistance class EK90 within smoke extraction ducts that have a fire resistance time of 90 min

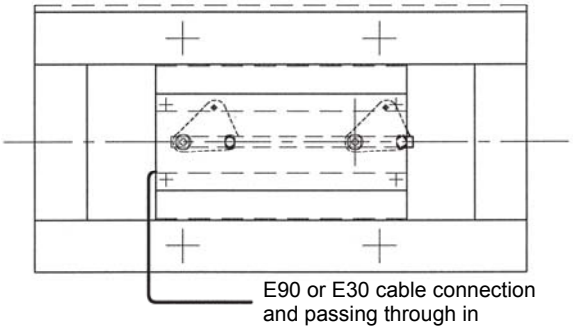
Technical data of the motor

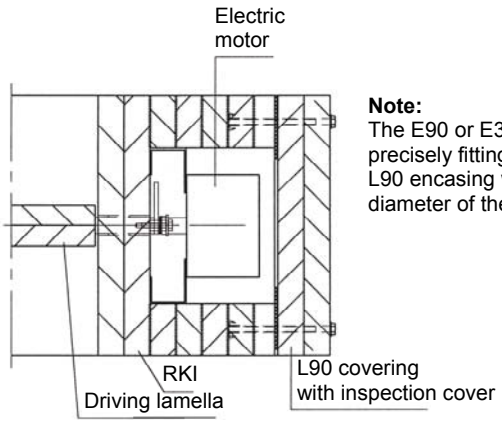
The BE24, BE230, SEL 2.90 and SEL 1.90 motors are controlled via two-point (see wiring diagram).
The SEL 1.90 SLC motor is connected via two-wire technique; appropriate means of communication (SPMa-1SR or SPLM-4S OSD Mod.) can be used to receive data such as signaling of end positions, time interval (< 60 s) and monitoring of the torque. Please order separately.
Contrary to the below wiring diagrams, terminal ③ is not used.

Please note: All electric connections between the motor and power supply shall be performed in accordance with the valid VDE guidelines.

Technical data	BE24 Wiring diagram on request	BE230 Wiring diagram on request	SEL 2.90	SEL 1.90	SEL 1.90 SLC
Nominal voltage	24 V ≃	230 V ~	230 V ~	24 V ≃	In combination with SPMa or SPLM
Power consumption when in operation	12 W	8 W	12 W	7 W	
In end positions	0,5 W		3,7 W	0,7 W	
Dimensioning	18 VA	15 VA	13 VA		8 VA
Type of safety	IP 54		IP 54		
Safety class	III	II	II		
Torque min.	40 Nm		40 Nm		
Running time	< 60 s		< 60 s		
Noise level	max. 62 dB (A)		ca. 50 dB (A)		
Rotation angle	100°		93°		
Contact rating of the auxiliary switch	2 x EPU 6 (3) A AC 250 V		3 (1,5 A) 230 V		Not applicable SLC
Maintenance	Maintenance-free		Maintenance-free		
Weight	~ 2,7 kg		~ 2,7 kg	~ 2,6 kg	

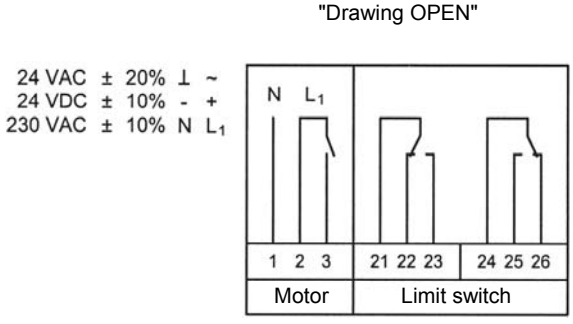
Motor arrangement and running of the cables





Note:
The E90 or E30 cable is lead through a precisely fitting borehole in the side of the L90 encasing wall (borehole = outside diameter of the E90 or E30 cable)

Wiring diagram for SEL 2.90 and SEL 1.90 motors two-point or one-wire control (seven core)



Wiring diagram for SEL 1.90 SLC motor two-wire technique (two core)

Via safety communication module Power-Line-System SLC, type SPMa-1SR or SPLM-4S OSD Mod.

See our separate brochure
skom

Smoke control damper RKI-90

Test certificate Z-78.2-11

Fire resistance class EK90 within smoke extraction ducts that have a fire resistance time of 90 min

Suspension and weight

The undressed threaded rods shall be dimensioned such that the calculated load of 6 Nmm^2 is not exceeded (this refers to a maximum length of 1,5 m).
The hangers shall be lead in U-form around the duct (see DIN EN 1366-1).

* Stress areas of the threaded rods having a metrical ISO thread in accordance with DIN 13 Part 28

Information on steel dowels with test certificate

The hangers shall be fastened with steel straddling dowels that are ≥ M8. The dowels shall be in accordance with the effective test certificate of the "Institut für Bautechnik" and moreover be mounted twice as deep as required by the test certificate, unless it states otherwise. The calculated tensile load per dowel shall not exceed 500 N. Special dowels having a maximum tensile load of 700 N can also be used.

Suspension of the RKI smoke control damper, account being taken of the fire-resistant smoke extraction duct

Nominal size	Weight of the rod in kg/m	* Stress area in mm^2	Load at 6 N/mm^2 per threaded rod	
			N	KP
M 6	0,18	20,1	120,6	12,29
M 8	0,32	36,6	219,6	22,38
M 10	0,50	58,0	348,0	35,47
M 12	0,73	84,3	505,8	51,55
M 14	0,97	115,0	690,0	70,33
M 16	1,35	157,0	942,0	96,02
M 20	2,08	245,0	1470,0	149,84
M 24	3,00	353,0	2118,0	215,90
M 30	4,75	561,0	3366,0	343,11

For the dimensioning of the suspension with threaded rods, the following shall be considered. The following weights shall be added:

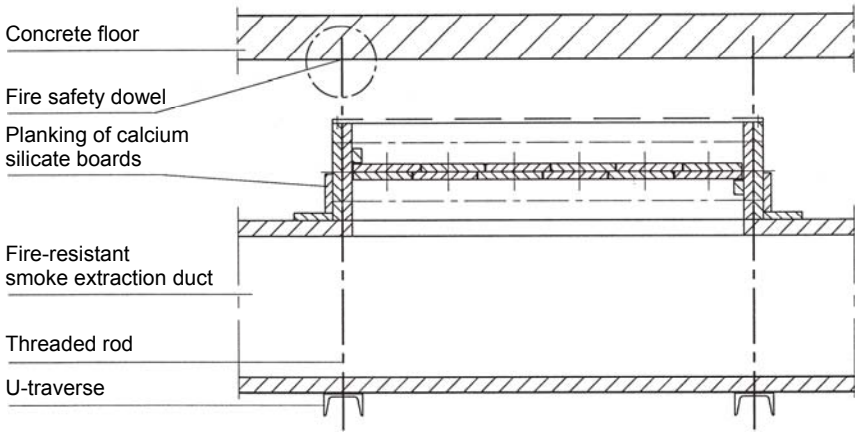
RKI-90
+ planning of calcium silicate boards
+ fire-resistant smoke extraction duct
+ threaded rod
+ U-traverse

Weight of the RKI in kg (L = 250 mm)

H \ B	200	300	400	500	600	700	800	900	1000
340	43	45	48,5	52	55,5	59	62	65	69
565	52	57	60,5	65	68,5	73	76	80,5	85
670	61,5	67	71	75,5	80	85	89,5	95	99
835	69,5	75,5	80	86	91	96,5	102	107	112
1000	77	83	88,5	95,5	100,5	107	113	119	124

* Fire safety dowel, see page 43

Please note:
The threaded rods shall be covered if the suspension height is > 1,5 m (see page 23 and 24). In addition, the hanger covering shall also be added to the weight of the threaded rods for dimensioning.



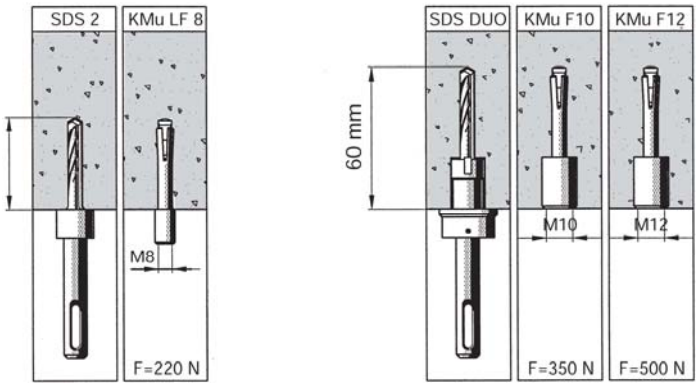
Smoke control damper RKI-90

Test certificate Z-78.2-11

Fire resistance class EK90 within smoke extraction ducts that have a fire resistance time of 90 min

Suspension

Fire safety dowels for the suspension of smoke control dampers with the European test certificate ETA-04/0026 from M8 to M12

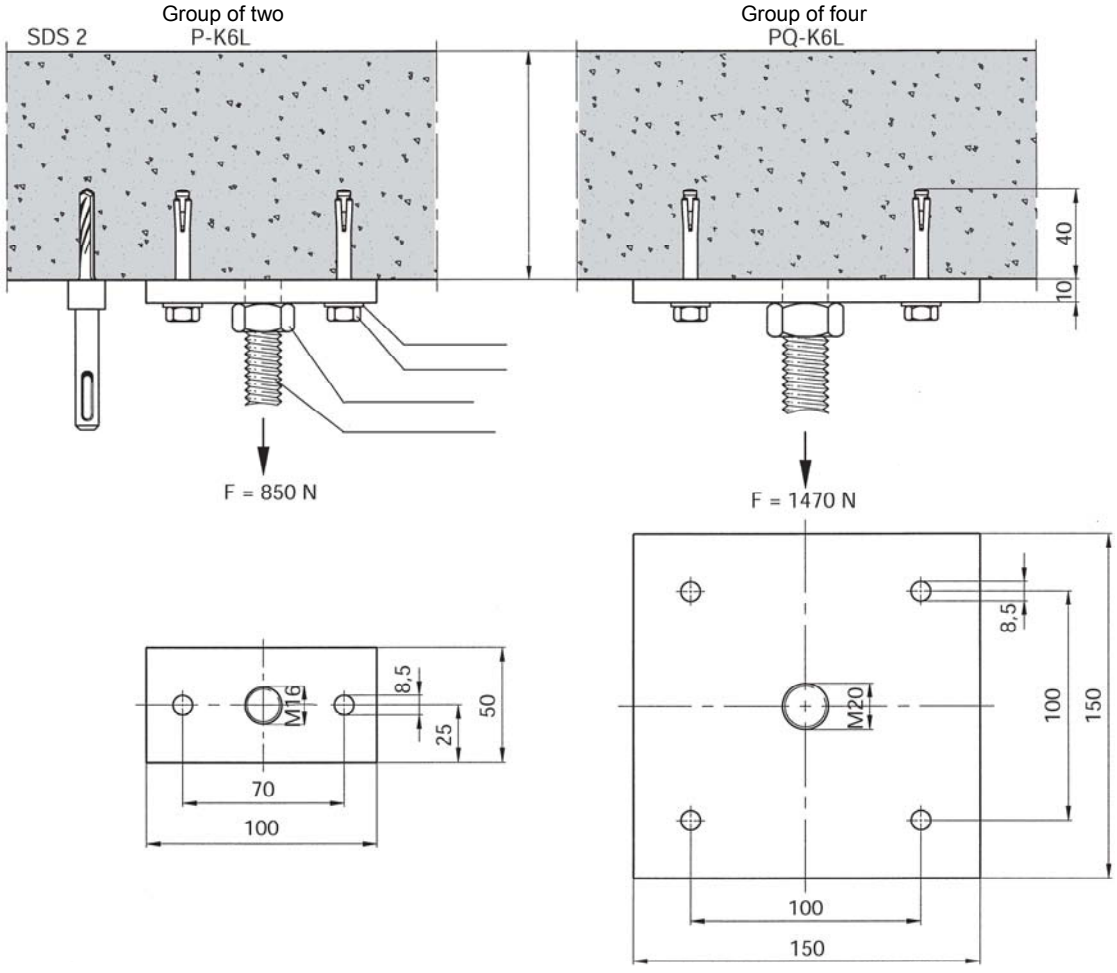


Fire safety dowels for the suspension of smoke control dampers with the European test certificate ETA-04/0025 for M16 and M20

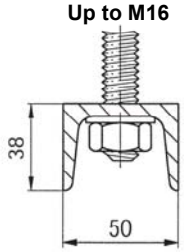
The core diameter is always 6 mm.

It is recommended that the threaded rods, which are screwed into the threaded sleeves, are secured with counter nuts.

Type:

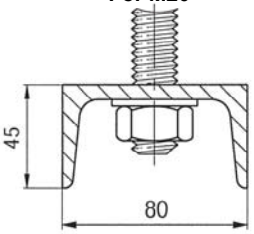


Up to M16



Weight of the U: 5,8 kg/m

For M20



Weight of the U: 8,9 kg/m

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Smoke control dampers designed as a multi-blade damper with test certificate Z-78.2-11 for an EK90 fire resistance class within smoke extraction ducts that have a fire resistance time of 90 min. Housing (50 mm thick), lamella (40 mm thick) and stops of asbestos-free fireproofing boards; the damper blade axis of stainless steel is supported in bronze sleeves. Control via actuating drive Open/Closed 24 V or 230 V for two-point control (two-wire control), with a L90 encasing to protect the actuating drive and inspection cover. Manufacturer: **Strulik** Type: **RKI-90** Dimensions: B: _____ mm H: _____ mm L: 250 mm			

Smoke control damper RKI-90-KL

Product group 7/3

A test certificate has been applied for
Resistance class EK90
Fire resistance time of 90 min
For more information, see page 31

Smoke control damper for smoke exhaust systems and for the additional usage in the ventilation mode.

Control via electric actuating drive **(SEL 1.90 SLC/AKO)** with an additional energy storage (accumulator), this closes the smoke control damper in the ventilation mode in case of power failure. Therefore fire safety is guaranteed.

Drive with L90 encasing and inspection cover.

Power supply and control only with SLC-BUS (two-wire control) via appropriate control modules.

Please note:

Same installation examples and dimensions as for RKI-90

See page 32 to 43

Ordering example:

RKI-90-KL / SEL 1.90 SLC/AKO / B x H x L

- L = 250 mm (standard dimension) On request also available in > 250 mm
- Dimensions B (width) x H (height) in mm (side H is always the operating side)
- Motor design in accordance with the table below
- Smoke control damper for the additional usage in the ventilation mode designed as a multi-blade damper, including electric motor, L90 covering of rods, motor and cover grille.

Please note: If a duct connecting profile is desired, as e.g. one-sided (operating side BS or wall side MS) or two-sided, then please state this separately.

The **required** safety communication modules (Power-Line System SLC), e.g. SPMa-1KR (for one RKI-90-KL) or SPLM-4K OSD Mod (for four RKI-90-KL) are listed in our separate brochure

skom

EKS control on request

Technical data for the SEL 1.90 SLC/AKO damper drive

Nominal voltage	24 VAC	
Frequency	50/60 Hz	
Power consumption	13 VA	
	Minimum	Maximum
Supply voltage	23 VDC	36 VDC
Supply current	ca. 100 mA	400 mA
Torque	16 Nm	52 Nm
External resistance	0 Ohm	11 Ohm
Velocity	58 s	60 s
Back-up energy (back-up accumulator)	6,6 V	9,5 V
Number of cycles	2	4
Charging period	ca. 1 h 15 min	9 h
Accumulator durability		ca. 3 years
Time ambient temperature	0 °C	+45 °C
Short ambient time	-5 °C	+55 °C
Ambient humidity	30 % rF	95 % rF

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Smoke control dampers designed as a multi-blade damper and for the additional usage in the ventilation mode for an EK90 fire resistance class within smoke extraction ducts and a fire resistance time of 90 min for the installation into shaft walls. Housing (50 mm thick), lamella (40 mm thick) and stops of asbestos-free fireproofing boards; the damper blade axis of stainless steel is supported in bronze sleeves. Control via electrical actuating drive with an additional energy storage (accumulator), which closes the smoke control damper in the ventilation mode in case of a power failure. Therefore fire safety is guaranteed. Drive with L90 encasing and inspection cover. Power supply and control only with SLC technique (two-wire control) via appropriate control modules. Manufacturer: **Strulik** Type: **RKI-90-KL** Dimensions: B: _____ mm H: _____ mm L: _____ mm **Required accessory:** Communication device for SLC technique Type: **SPMa-1KR**			

Smoke control damper RKE

Test certificate Z-78.2-47

Functional endurance of 60 min at 600 °C or 120 min at 400 °C

Ordering example / dimensions

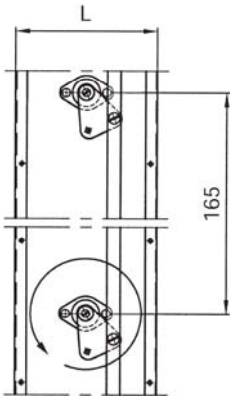
RKE smoke control damper consisting of the housing (galvanized steel) with cut-off damper designed as a multi-blade damper of calcium-silicate boards and electric motor with motor protection. The smoke control damper has a functional endurance of 60 min at 600 °C or 120 min at 400 °C.
The smoke control dampers are only allowed to be used for the extraction of smoke from the area/fire compartment that shall be cleared from smoke and onto which no fire resistance time requirements have been placed.

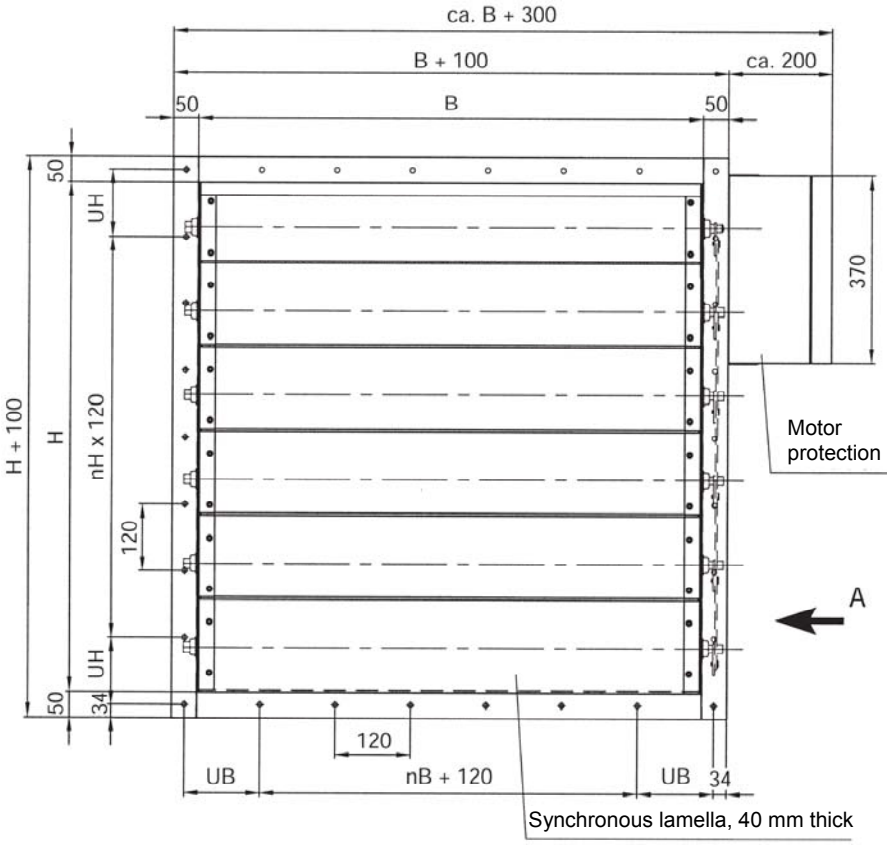
Dimensions

H in mm clear	Number of lamella
340	2
505	3
670	4
835	5
1000	6
1165	7

L = 220 mm (standard)
B-side from 200 to 1000

View A





Please note:
U_B and U_H = > 60 and ≤ 120 mm

DEUTSCHES INSTITUT FÜR BAUTECHNIK
Anstalt des öffentlichen Rechts

10829 Berlin, 14. November 2005
Kolonnenstraße 30 L
Telefon: 030 78730-350
Telefax: 030 78730-320
GeschZ.: IV 57-1.78.2-8/05

Allgemeine bauaufsichtliche Zulassung

Zulassungsnummer: Z-78.2-47

Antragsteller: Strulik GmbH
Neesbacher Straße 13
65597 Hünfelden-Dauborn

Zulassungsgegenstand: Entrauchungsklappen für maschinelle Entrauchungsanlagen, Typ RKE

Geltungsdauer bis: 13. Oktober 2010

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.
Diese allgemeine bauaufsichtliche Zulassung umfasst sieben Seiten und drei Anlagen.

Deutsches Institut für Bautechnik

Ordering example:

RKE / SEL 1.90 / B x H x L

L = 220 mm (standard dimension)

Dimensions B (width) x H (height) in mm
(side H is always the operating side)

Type of electric motor (see page 54)
SEL 1.90 – 24 V≅
SEL 2.90 – 230 V~
SEL 1.90 SLC – (two-wire technique)

Smoke control damper RKE 400 °C for 120 min or RKE 600 °C for 60 min, designed as a multi-blade damper including electric motor and motor protection.
Please note: Always delivered **without** a cover grille.

Smoke control damper RKE

Test certificate Z-78.2-47

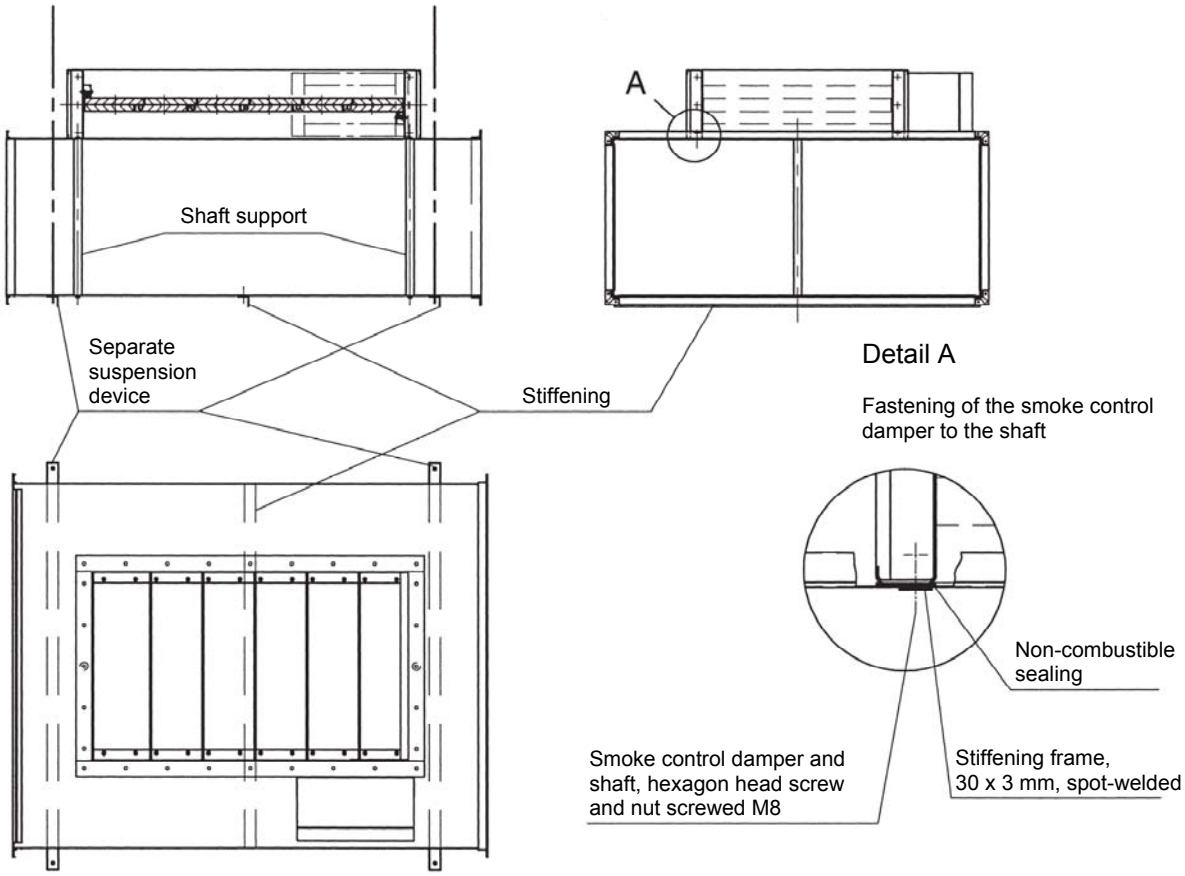
Functional endurance of 60 min at 600 °C or 120 min at 400 °C

Installation examples and directions for installing

Installation details

Installation at the top or at the bottom within tested smoke extraction ducts of sheet steel (category 2 in accordance with DIN V 18232-6).

Installation at the top or at the bottom



Suspension

The separate suspension of the RKE smoke control damper is performed by means of threaded rods that are at least M8 with a maximum loading of 20 N/mm^2 per rod.
The lateral distance of the rods to the outer shaft surface shall not exceed 50 mm.
The lengths of the rods are not limited, i.e. they do not have to have a fire safety boarding for lengths of > 1,5 m.
The steel traverses for the suspension can be made from L-profiles 35/35/4 mm or from C-profiles 30/20/1,75 mm.
Fire safety dowel at least M8 with test certificate.

Shaft details

No shaft support or stiffening is required up to a shaft width of B ≤ 630 mm. For shaft widths from B > 631 to ≤ 1250 mm the arrangement of the shaft supports shall be as shown in the drawing.
The stiffening is only required, if the distance between the shaft supports exceeds 500 mm due to the dimensions of the RKE (stiffening 30/30/3 mm spot-welded, screwed or riveted).

Mounting details

The RKE is connected to the smoke extraction duct by means of screws, nuts and washers M8 according to the given distances of the RKE, in between there shall be a non-combustible sealing to maintain the thermal stability in case of smoke extraction.

Smoke control damper RKE

Test certificate Z-78.2-47

Functional endurance of 60 min at 600 °C or 120 min at 400 °C

Installation examples and directions for installing

Installation details

Installation at the side or at the opposite side and at the front side within smoke extraction ducts of sheet steel that have been tested. (Category 2 in accordance with DIN V 18232-6)

Suspension

The individual suspension for smoke control damper type RKE is performed by means of threaded rods that are at least M8 with a maximum load per threaded rod of 20 N/mm^2.
The lateral distance between the threaded rods and the surface of the RKE shall not exceed 50 mm.
The length of the threaded rods is not limited, i.e. they do not have to have a fireproof protection for lengths of > 1,5 m.
The steel traverses of the suspension can be of 35/35/4 mm L-profiles or 30/20/1,75 mm C-profiles.
Fire safety dowels, at least M8, with a test certificate.

Note:
If for the front side arrangement of the RKE to the shaft there is a shaft suspension at a distance of ≤ 250 mm to the RKE, then this does not have to be suspended separately.

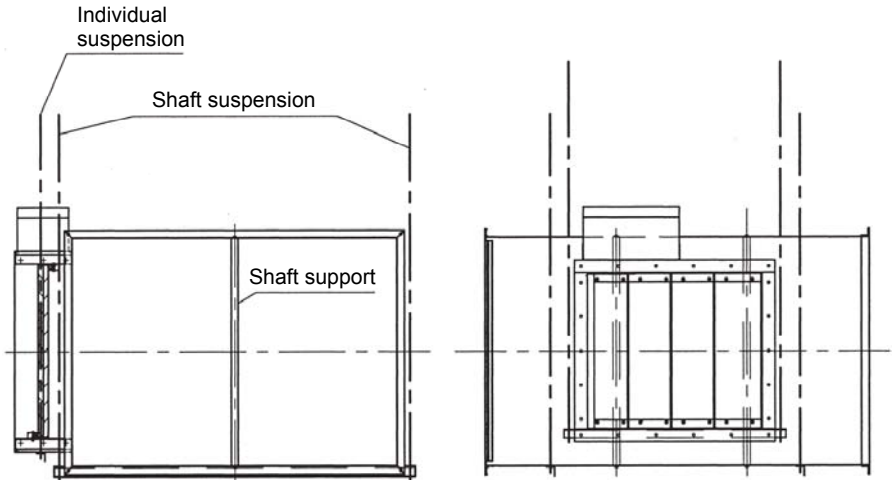
Shaft details

Up to a shaft width of B ≤ 630 mm no shaft support is required. For shaft widths from B > 631 up to ≤ 1250 mm the arrangement of the shaft supports shall be as shown in the drawing.
Stiffening is not required for the arrangement at the side and at the front face.

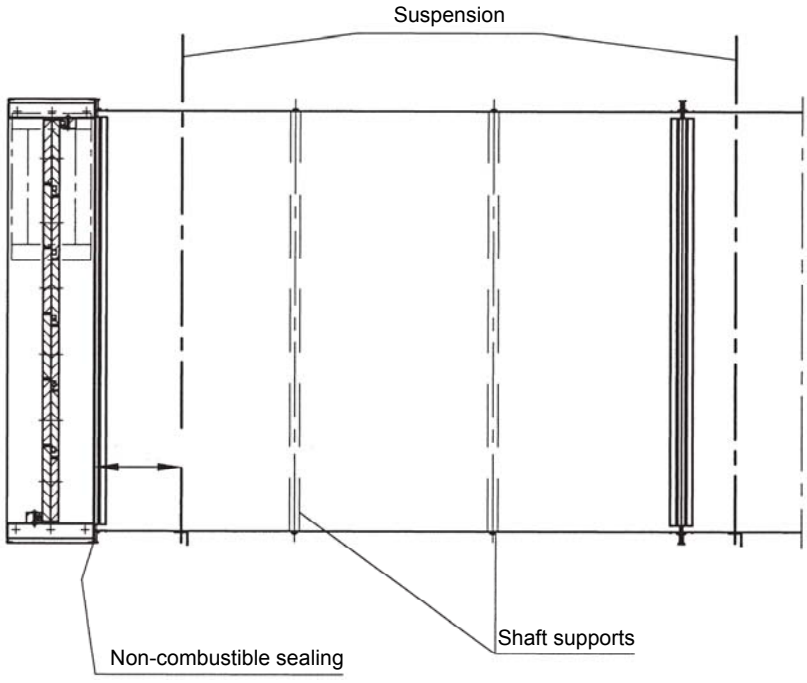
Mounting details

The connection of the RKE with the smoke extraction duct is performed by means of screws, nuts and washers M8 according to the given distances of the RKE.

Installation at the side or at the opposite side



Installation at the front side



Smoke control damper RKE

Test certificate Z-78.2-47

Functional endurance of 60 min at 600 °C or 120 min at 400 °C

Design diagrams and conversion factors

Table to determine the clear areas

Free area Aeff in m^2 (SE)									
Height H (mm)	Width B (mm)								
	200	300	400	500	600	700	800	900	1000
340	0,042	0,063	0,084	0,105	0,126	0,147	0,168	0,189	0,21
505	0,067	0,1005	0,134	0,1675	0,201	0,2345	0,268	0,3015	0,335
670	0,091	0,1365	0,182	0,2275	0,273	0,3185	0,364	0,4095	0,455
835	0,117	0,1755	0,234	0,2925	0,351	0,4095	0,468	0,5265	0,585
1000	0,141	0,2115	0,282	0,3525	0,423	0,4935	0,564	0,6345	0,705
1165	0,167	0,25	0,334	0,417	0,501	0,584	0,668	0,751	0,835

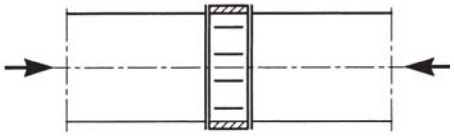
Please note:

With the required volume flow rate $\dot{V}$ in m^3/h it is possible to directly read the total pressure loss Δpt in Pa and the shaft noise level L_{wa} in dB(A) from the following diagrams for the fitting position **»free suction«** (see page 51 to 53).

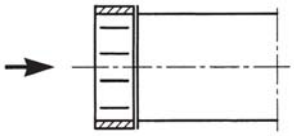
For all other fitting positions as for example
- duct connection on both sides,
- free blowout,
- free blowout and free suction,
- free suction on the shaft,
the result of the total pressure loss Δpt in Pa that has been read shall be multiplied with the opposite factors depending on the fitting position (for $\dot{V}$ = constant).

The noise level L_{WA} in dB(A) is corrected with the calculated total pressure loss Δpt in Pa by using the diagram.

The density of the transported medium air is 1,2 kg/m^3 at 20 °C.

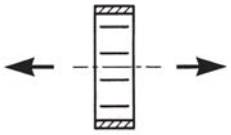


Duct connection on both sides
Correction factor: 0,68

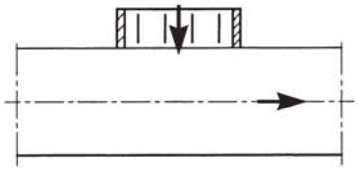


Free suction
(this arrangement can directly be read from the diagrams)

Free blowout
Correction factor: 1,59



Free blowout / free suction
Correction factor: 2,91



Free suction on the shaft
Correction factor: 1,59

Smoke control damper RKE

Test certificate Z-78.2-47

Design diagrams

B = 200 →

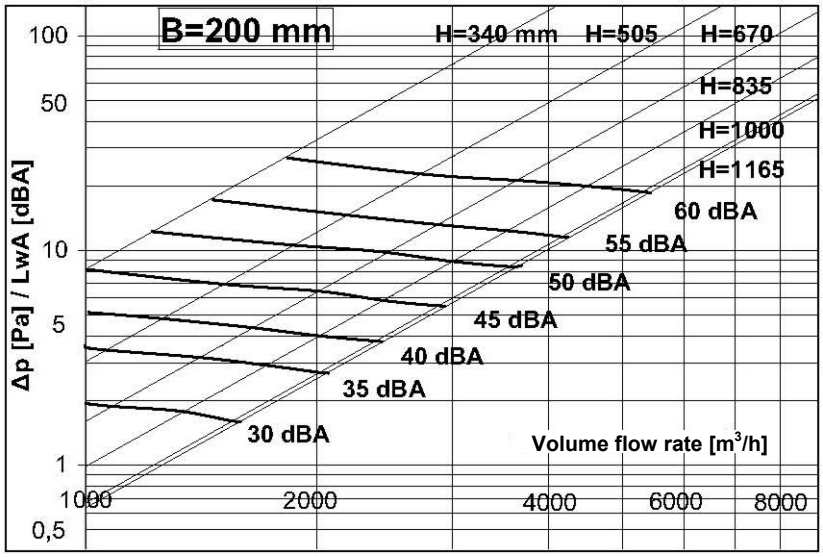
B = 300 →

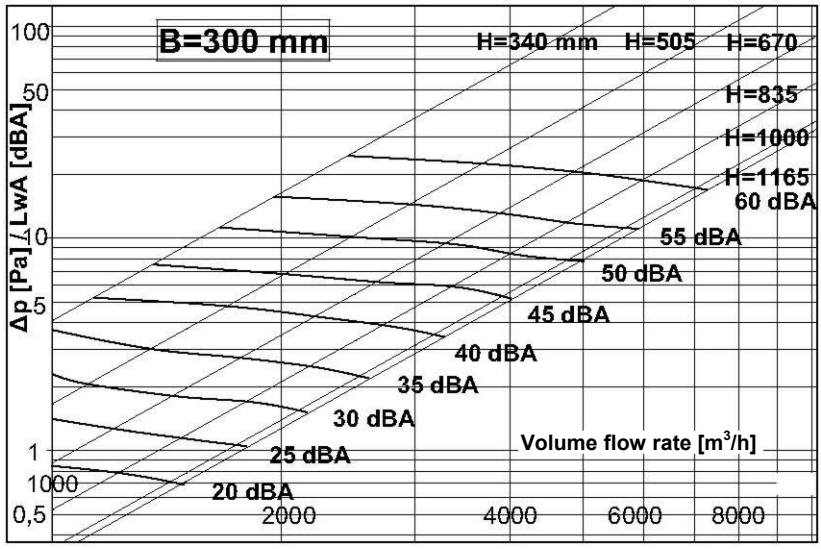
B = 400 →

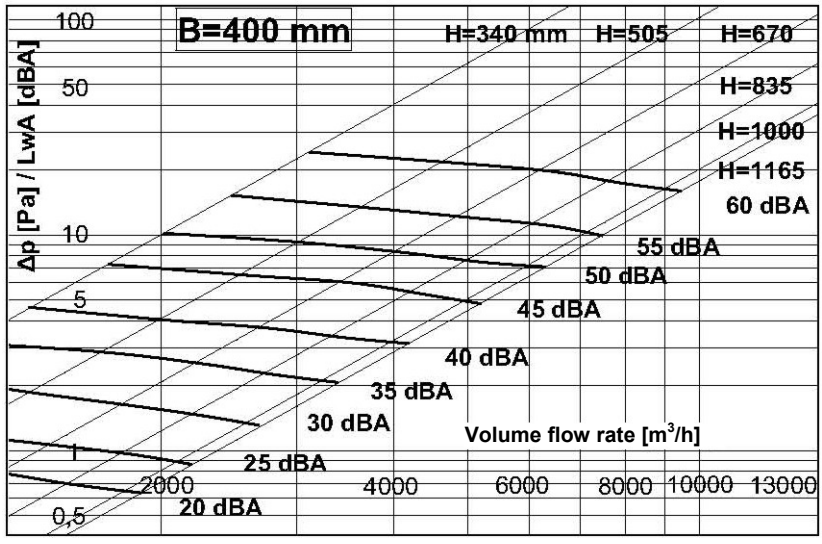
Please note:

The diagrams are only valid for the fitting position »free suction«!

For all other cases, please read the information on page 50.







Smoke control damper RKE

Test certificate Z-78.2-47

Design diagrams

B = 500 →

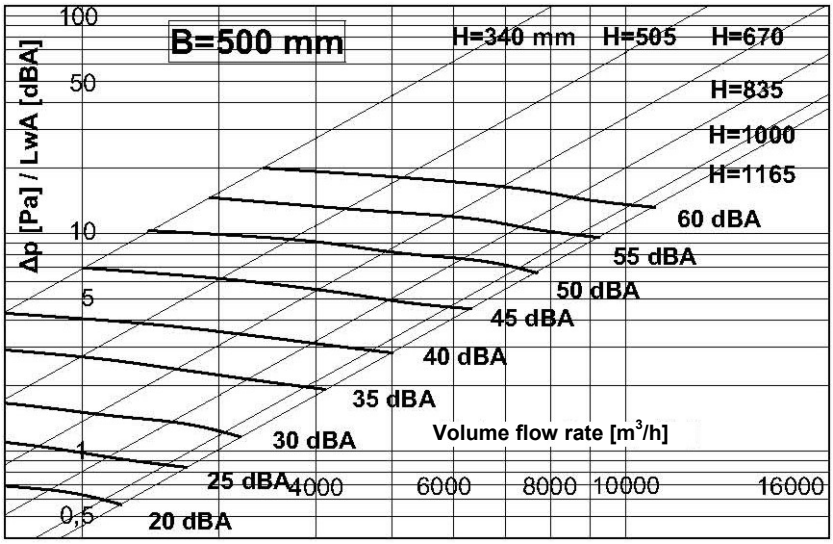
B = 600 →

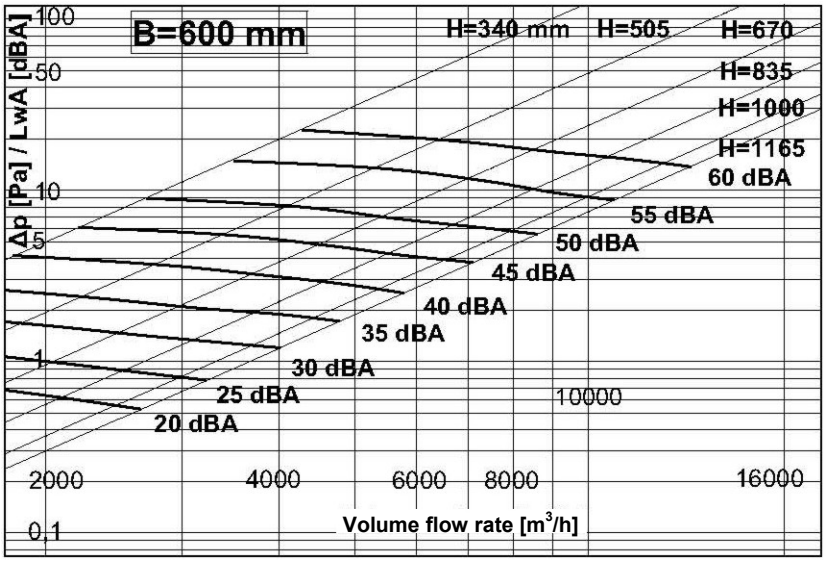
B = 700 →

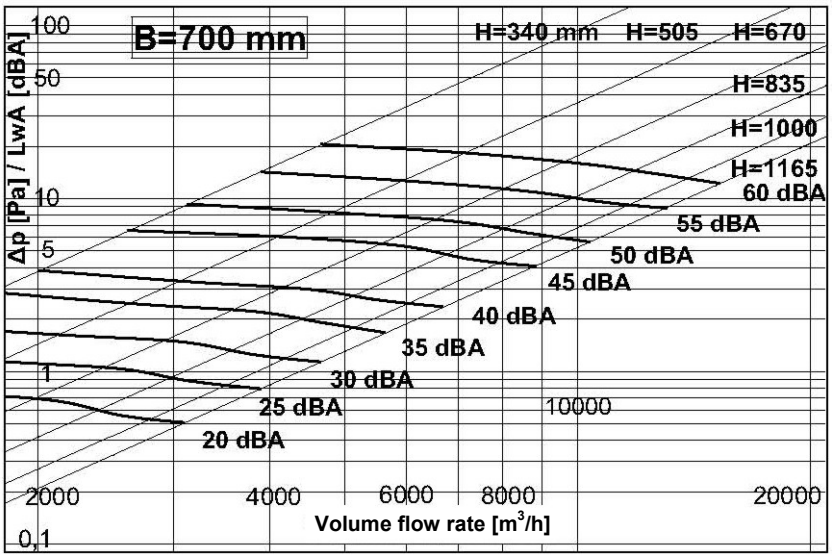
Please note:

The diagrams are only valid for the fitting position »free suction«!

For all other cases, please read the information on page 50.





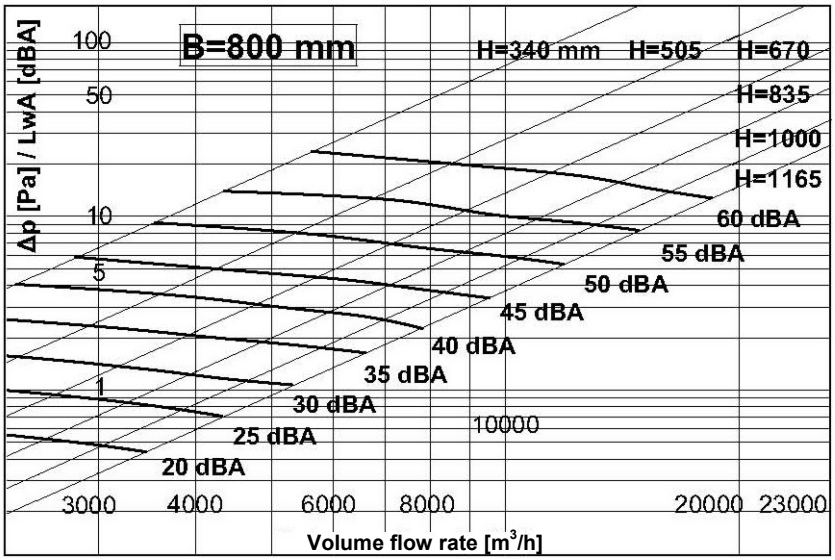


Smoke control damper RKE

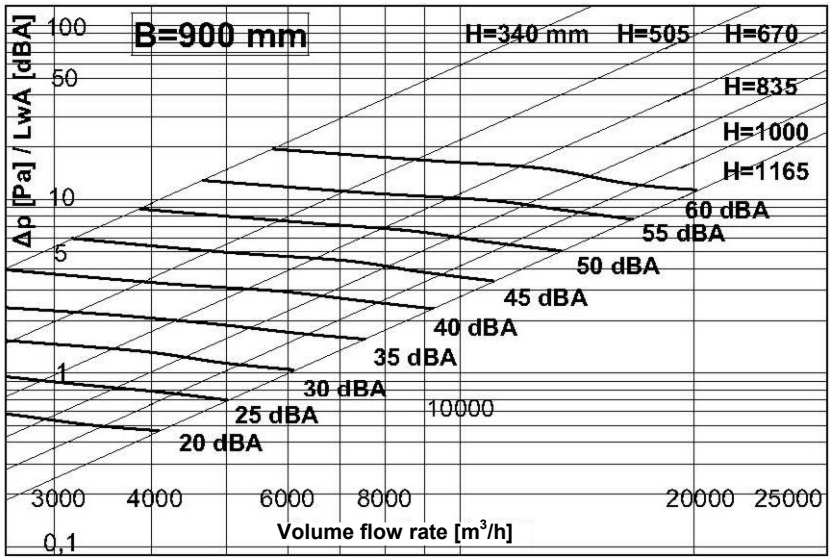
Test certificate Z-78.2-47

Design diagrams

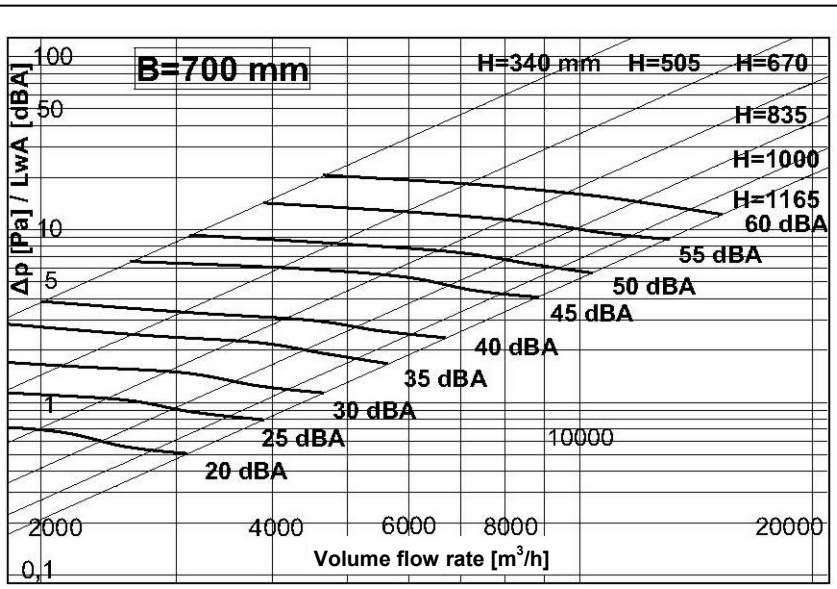
B = 800 →



B = 900 →



B = 1000 →



Please note:

The diagrams are only valid for the fitting position »free suction«!

For all other cases, please read the information on page 50.

Smoke control damper RKE

Test certificate Z-78.2-47

Functional endurance of 60 min at 600 °C or 120 min at 400 °C

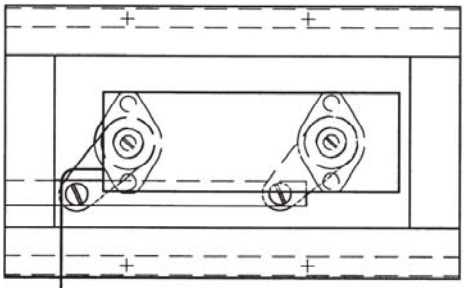
Technical data of the electric motor

The BE24, BE230, SEL 2.90 and SEL 1.90 motors are controlled via two-point (see wiring diagram).
The SEL 1.90 SLC motor is connected via two-wire technique; appropriate means of communication (SPMa-1SR or SPLM-4S OSD Mod.) can be used to receive data such as signaling of end positions, time interval (< 60 s) and monitoring of the torque. Please order separately.
Contrary to the below wiring diagrams, terminal ③ is not used.

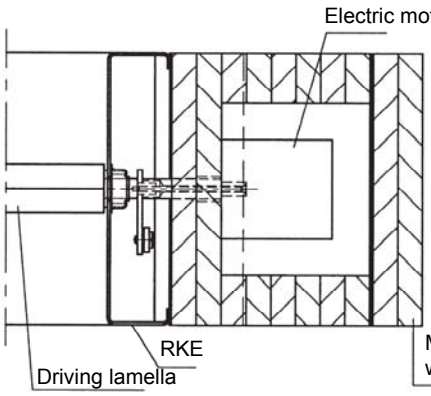
Please note: All electric connections between the motor and power supply shall be performed in accordance with the valid VDE guidelines.

Technical data	BE24 Wiring diagram on request	BE230 Wiring diagram on request	SEL 2.90	SEL 1.90	SEL 1.90 SLC
Nominal voltage	24 V ≃	230 V ~	230 V ~	24 V ≃	In combination with SPMa or SPLM
Power consumption when in operation	12 W	8 W	12 W	7 W	
In end positions	0,5 W		3,7 W	0,7 W	
Dimensioning	18 VA	15 VA	13 VA		8 VA
Type of safety	IP 54		IP 54		
Safety class	III	II	II		
Torque min.	40 Nm		40 Nm		
Running time	< 60 s		< 60 s		
Noise level	max. 62 dB (A)		ca. 50 dB (A)		
Rotation angle	100°		93°		
Contact rating of the auxiliary switch	2 x EPU 6 (3) A AC 250 V		3 (1,5 A) 230 V		Not applicable SLC
Maintenance	Maintenance-free		Maintenance-free		
Weight	~ 2,7 kg		~ 2,7 kg	~ 2,6 kg	

Motor arrangement and running of the cables



E90 or E30 cable connection and passing through in accordance with DIN 4102-12

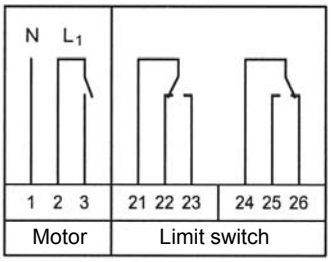


Note:
The E90 or E30 cable is lead through a precisely fitting borehole in the side of the L90 encasing wall (borehole = outside diameter of the E90 or E30 cable)

Wiring diagram for SEL 2.90 and SEL 1.90 motors two-point or one-wire control (seven core)

"Drawing OPEN"

24 VAC ± 20% ⊥ ~
24 VDC ± 10% - +
230 VAC ± 10% N L_1



Wiring diagram for SEL 1.90 SLC motor two-wire technique (two core)

Via safety communication module Power-Line-System SLC, type SPMa-1SR or SPLM-4S OSD Mod.

See our separate brochure
skom

Smoke control damper RKE

Test certificate Z-78.2-47

Functional endurance of 60 min at 600 °C or 120 min at 400 °C

Suspension and weight

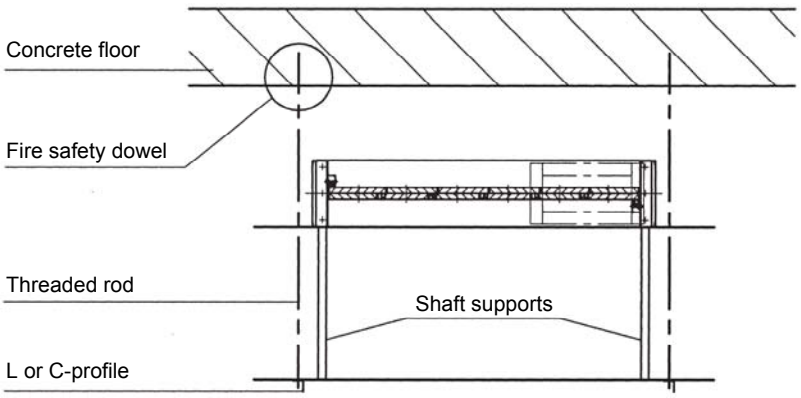
Suspension of the RKI smoke control damper

Weight of the RKE in kg (L = 220 mm)

Height H (mm)	Width B (mm)								
	200	300	400	500	600	700	800	900	1000
340	26,5	29,5	32	35	38	41	44,5	47	50
505	30,5	33,5	37	40,5	44	47,5	51,5	55	58,5
670	34,5	38,5	42	46	50,5	54,5	59	63	67
835	39	43,5	47,5	51,5	56,5	61	66,5	71	75,5
1000	43,5	48	53	58	62,5	68	73,5	79	84,5
1165	48	53	58,5	64	69	74,5	81	87	93

The undressed threaded rods shall be dimensioned such that the calculated load of 6 Nmm^2 is not exceeded (this refers to a maximum length of 1,5 m).
The hangers shall be lead in U-form around the duct (see DIN EN 1366-1).

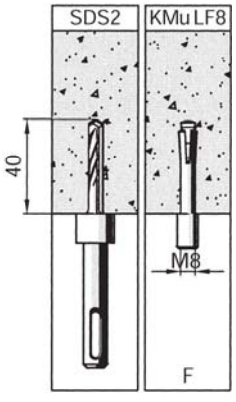
* Stress areas of the threaded rods having a metrical ISO thread in accordance with DIN 13 Part 28



Information on steel dowels with test certificate

The hangers shall be fastened with steel straddling dowels that are ≥ M8. The dowels shall be in accordance with the effective test certificate of the "Institut für Bautechnik" and moreover be mounted twice as deep as required by the test certificate, unless it states otherwise. The calculated tensile load per dowel shall not exceed 500 N. Special dowels having a maximum tensile load of 700 N can also be used.

Fire safety dowels for the suspension of smoke control dampers with test certificate Z-21.1-47 for M8



Stress areas of threaded rods with a metrical ISO thread in accordance with DIN 13, Part 28				
Nominal size	Weight of the rod in kg/m	Stress area	Load at 20 N/mm^2 per threaded rod	
			N	KP
M8	0,32	36,6	730	74,41

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Smoke control dampers designed as a multi-blade damper with test certificate Z-78.2-47. Depending on the application, the smoke control damper has a functional endurance of 60 min for a temperature exposure of up to 600 °C and a functional endurance of 120 min for a temperature exposure of up to 600 °C. Housing of galvanized steel (2 mm thick), lamella (40 mm thick) and stops of asbestos-free fireproofing boards; the damper blade axis of stainless steel is supported in bronze sleeves. Control via actuating drive Open/Closed 24 V or 230 V for two-point control or SLC technique (two-wire control), with a covering the actuating drive and inspection cover. Manufacturer: **Strulik** Type: **RKE** Dimensions: B: _____ mm H: _____ mm L: 220 mm			

Smoke control damper RKE-KL

Product group 7/3

Test certificate Z-78.3-109
Functional endurance of 60 min at 600 °C and 120 min at 400 °C

For more information, see page 31

Smoke control damper for smoke exhaust systems and for the additional usage in the ventilation mode.

Control via electric actuating drive **(SEL 1.90 SLC/AKO)** with an additional energy storage (accumulator), this closes the smoke control damper in the ventilation mode in case of power failure. Therefore fire safety is guaranteed.

Drive with L90 encasing and inspection cover.

Power supply and control only with SLC-BUS (two-wire control) via appropriate control modules.

Please note:

Same installation examples and dimensions as for RKE

See page 47 to 55

Ordering example:

RKE-KL / SEL 1.90 SLC/AKO / B x H x L

- L = 220 mm (standard dimension)
- Dimensions B (width) x H (height) in mm (side H is always the operating side)
- Motor design in accordance with the table below
- Smoke control damper for the additional usage in the ventilation mode, RKE KL 400 °C for 120 min or RKE 600 °C for 60 min, designed as a multi-blade damper, including electric motor with motor protective covering.
  Please note: Always delivered **without** a cover grille.

The **required** safety communication modules (Power-Line System SLC), e.g. SPMa-1KR (for one RKI-90-KL) or SPLM-4K OSD Mod (for four RKI-90-KL) are listed in our separate brochure

skom

EKS control on request

Technical data for the SEL 1.90 SLC/AKO damper drive

Nominal voltage	24 VAC	
Frequency	50/60 Hz	
Power consumption	13 VA	
	Minimum	Maximum
Supply voltage	23 VDC	36 VDC
Supply current	ca. 100 mA	400 mA
Torque	16 Nm	52 Nm
External resistance	0 Ohm	11 Ohm
Velocity	58 s	60 s
Back-up energy (back-up accumulator)	6,6 V	9,5 V
Number of cycles	2	4
Charging period	ca. 1 h 15 min	9 h
Accumulator durability		ca. 3 years
Time ambient temperature	0 °C	+45 °C
Short ambient time	-5 °C	+55 °C
Ambient humidity	30 % rF	95 % rF

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Smoke control dampers designed as a multi-blade damper and for the additional usage in the ventilation mode. Depending on the application, the smoke control damper has a functional endurance of 60 min for a temperature exposure of up to 600 °C and a functional endurance of 120 min for a temperature exposure of up to 400 °C, for the installation at all sides within tested smoke extraction ducts up to 600 °C. Housing of galvanized steel (2 mm thick), lamella (40 mm thick) and stops of asbestos-free fireproofing boards; the damper blade axis of stainless steel is supported in bronze sleeves. Control via electrical actuating drive with an additional energy storage (accumulator), which closes the smoke control damper in the ventilation mode in case of a power failure. Drive with motor protective covering and inspection cover. Power supply and control only with SLC technique (two-wire control) via appropriate control modules. Manufacturer: **Strulik** Type: **RKE-KL** Dimensions: B: _____ mm H: _____ mm L: 220 mm **Required accessory:** Communication device for SLC technique Type: **SPMa-1KR**			

Compensator WSK-600

Test certificate P-TUM-411 P-3464/5595-MPA BS

Functional endurance of 120 min at 600 °C

General / ordering example

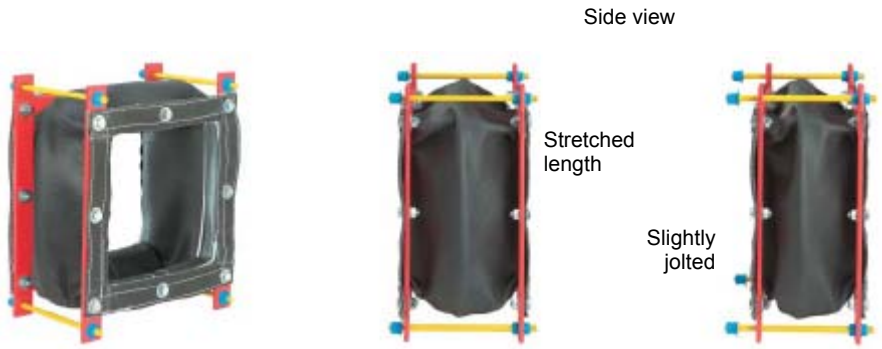
Ordering example:

WSK-600 / B x H x L = 155 mm

Dimensions B (width) x H (height) in mm (always corresponds to the clear shaft or smoke control damper dimensions)

Available clear dimensions in [mm]																
B	201	252	318	357	400	449	503	565	634	711	797	894	1003	1125	1250	1251-1500
H	201	252	318	357	400	449	503	565	634	711	797	850	900	950	1000	797
Intermediate sizes on request																

Please note:
The threaded bolts that are necessary for the guiding are on the outside due to the incorporated supporting ring, i.e. the outside dimensions of the WSK-600 are B + 60 mm and H + 120 mm. If the local conditions should not allow the dimension H + 120 mm, then the dimensions B and H can be exchanged. Please state this when ordering.

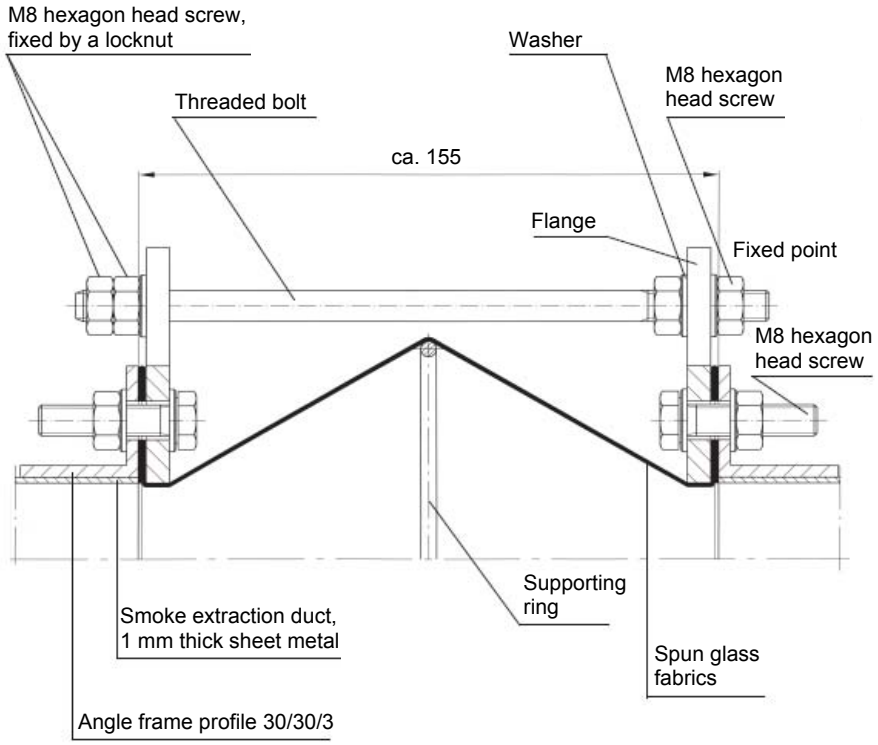


WSK-600 compensator consisting of:

Single-layer spun glass fabrics ca. 1 mm thick with a special elastomer coating and a supporting ring lying within. Stiffeners are arranged in the area of the fastening (two flanges per compensator).

The WSK-600 compensator is intended for the installation into sheet metal smoke extraction ducts that have a test certificate and it is only allowed to be used within one fire zone.
To balance out duct elongations and to prevent horizontal forces resulting from this, for horizontal ducts having a length of ≥ 5 m compensators shall be arranged between walls, which shall have a fire resistance class according to the building supervision guidelines.
The distance between two compensators shall not exceed 10 m.

Transverse section of the WSK-600 having a connection with sheet metal smoke extraction ducts on both sides



Compensator WSK-600

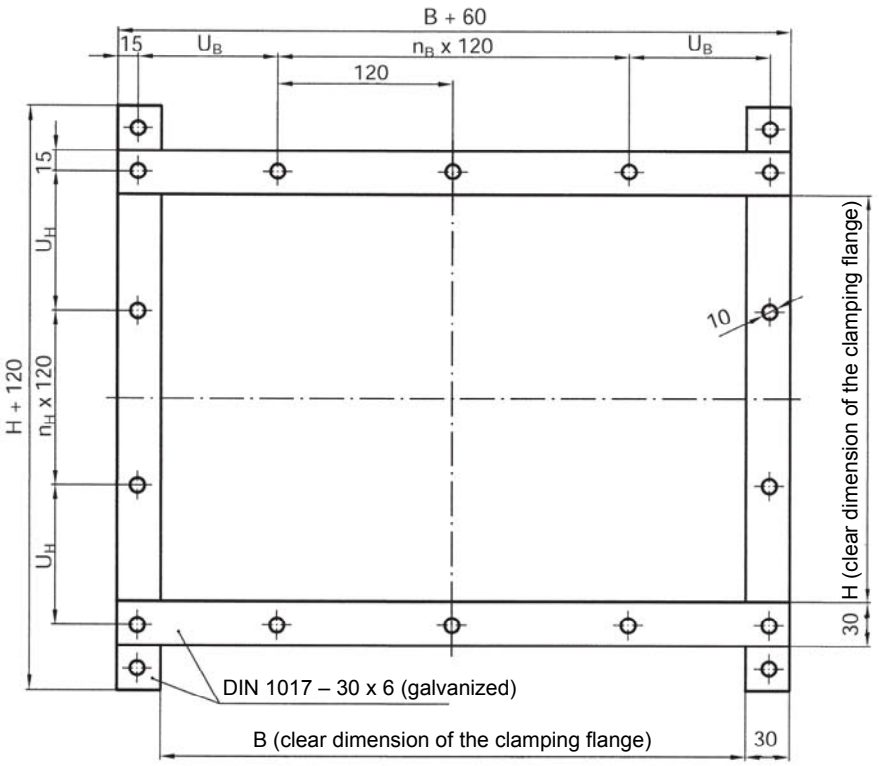
Test certificate P-TUM-411

Functional endurance of 120 min at 600 °C

Dimensions

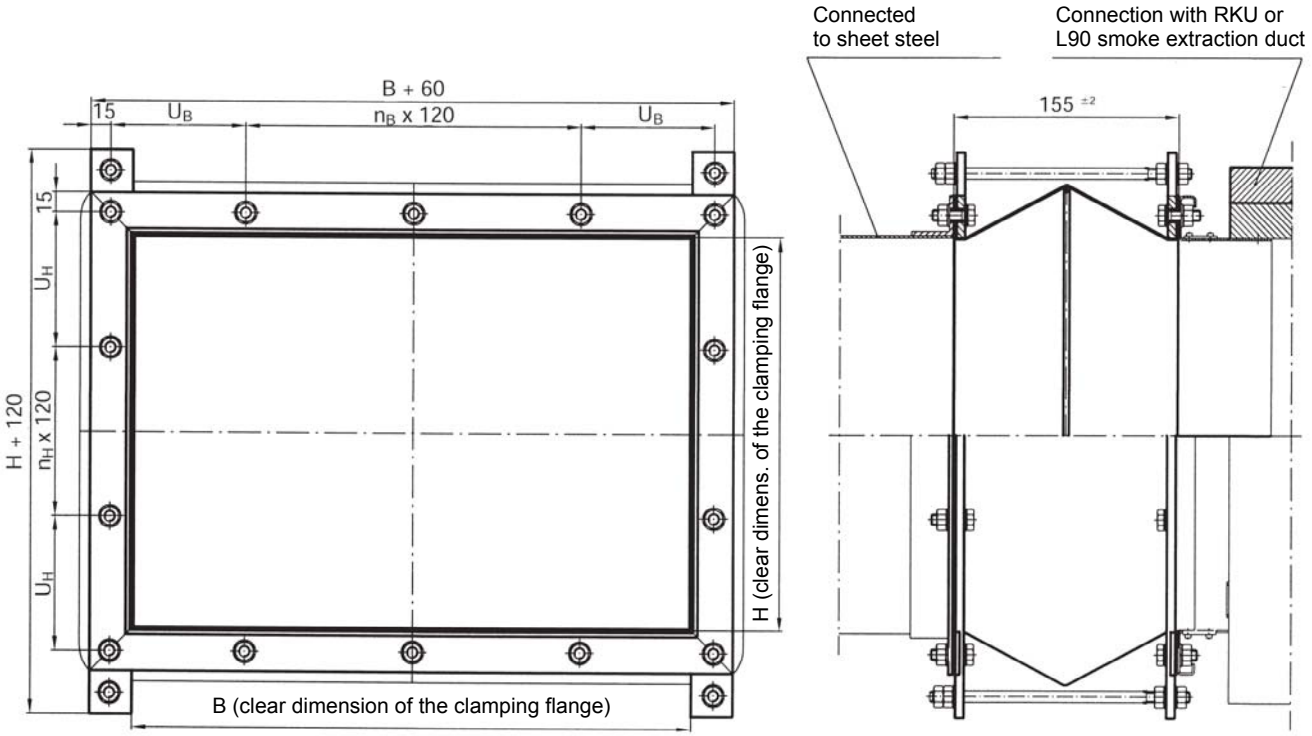
Please note:
The hole pattern of the connection flange of the WSK-600 is fixed according to the following drawing.
If the WSK-600 is directly connected to our RKU-90 smoke control dampers, then the hole pattern of the WSK-600 can be adjusted to the duct connecting profile of the RKU-90 (please state separately when ordering).
The same applies to the installation of the WSK-600 between smoke extraction ducts of sheet steel.

Flange dimensions / hole pattern



Please note: U_B and U_H are > 60 and ≤ 120

General view of the complete WSK-600 and the connection with tested smoke extraction ducts of sheet steel, L90 smoke extraction duct or RKU smoke control damper



The required installation dimension between the ducts is 155 ± 2 mm.

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Compensator (angular) 600 °C **P-TUM-411 and P3464/5595-MPA BS** Compensator tested in accordance with DIN 18232-6 (10/97). The compensator has been tested at room temperature with 1500 Pa underpressure and at 600 °C with 500 Pa underpressure for a period of 120 min. To balance out the duct elongations of the tested smoke extraction duct of sheet steel and to prevent horizontal forces resulting from this, for horizontal ducts having a length of ≥ 5 m compensators shall be arranged. The distance between two compensators shall not exceed 10 m. Maximum dimensions: B = 1250 mm, H = 1000 mm and B > 1251 mm – 1500 mm, H = 797 mm Manufacturer: **Strulik GmbH** Type: **WSK-600** Dimensions: B: _____ mm H: _____ mm L: ~ 155 mm Deliver Install			

Compensator WSK-600

Test certificate P-TUM-411
P-3464/5595-MPA BS

Functional endurance of 120 min at 600 °C

General / ordering example

WSK-R-600 compensator consisting of:

Single-layer spun glass fabrics ca. 1 mm thick with a special elastomer coating and a supporting ring lying within. Stiffeners are arranged in the area of the fastening (two flanges per compensator).

The WSK-R-600 compensator is intended for the installation into round sheet metal smoke extraction ducts that have a test certificate and it is only allowed to be used within one fire zone.
To balance out duct elongations and to prevent horizontal forces resulting from this, for horizontal ducts having a length of ≥ 5 m compensators shall be arranged between walls, which shall have a fire resistance class according to the building supervision guidelines.
The distance between two compensators shall not exceed 10 m.

Ordering example:

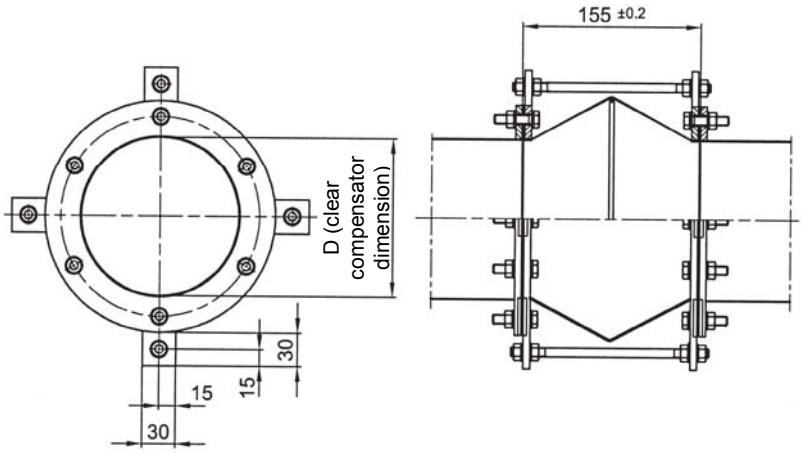
WSK-R-600 / NW x L = 155 mm

Nominal width in mm
(always corresponds to the clear duct diameter)

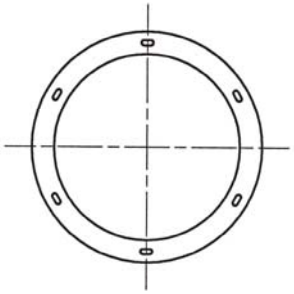
Available clear dimensions in [mm]											
100	112	125	140	150	160	180	200	224	250	280	300
315	355	400	450	500	560	600	630	710	800	900	1000

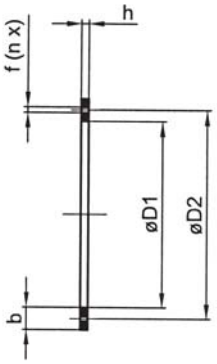
Please note:
The threaded bolts that are necessary for the guiding are on the outside due to the incorporated supporting ring. The exact dimension are given in the following drawing and table.

Compensator/round



Flange





Ø D_1			Ø D_2	f	DIN 601		
nom	mm	Tol.	mm	mm	n	dim x L	b x h
100	102	+1/-0	129	7 x 16	4	M6 x 16	25 x 3
112	114		141				
125	127		155				
140	142	+1,5/-0	176		6	M6 x 20	30 x 4
150	152		184				
160	162		194				
180	182		213				
200	203		235				
224	227		259				
250	253		286				
280	283		322	9,5 x 20	8	M8 x 20	35 x 5
300	303		341				
315	318		356				
355	358		395				
400	404		438		12		
450	454		487				
500	504		541				
560	564	+2/-0	605	11,5 x 24	16	M10 x 20	40 x 5
600	604		644				
630	634		674				
650	654		694				
710	714		751				
750	754		791				
800	804		837		24		
900	904		934				
1000	1005		1043				

The required installation dimension between the ducts is 155 ± 2 mm.

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Compensator (round) 600 °C **P3469/5645-MPA BS** Compensator tested in accordance with DIN 18232-6 (10/97). The compensator has been tested at room temperature with 1500 Pa underpressure and at 600 °C with 500 Pa underpressure for a period of 120 min. To balance out the duct elongations of the tested smoke extraction ducts of sheet steel and to prevent horizontal forces resulting from this, for horizontal ducts having a length of ≥ 5 m compensators shall be arranged. The distance between two compensators shall not exceed 10 m. Dimensions: In increments from NW (nominal width) 100 to 1000 mm. Manufacturer: **Strulik GmbH** Type: **WSK-R-600** Dimensions: NW: _____ mm L: ~ 155 mm Deliver Install			

Smoke extraction duct of sheet steel

Test certificate P-TUM-411 and P-3464/5595-MPA BS

Functional endurance of 120 min at 600 °C

General

The accessories that are available, as for example inspection openings, steel grilles, plenum boxes, ceiling diffusers, splitter attenuators, bends, tees and connecting collars, are listed in the test certificate.

Essential advantages

- Smoke extraction duct of sheet steel for the usage within the smoke exhaust zone or fire compartment, on which no fire resistance time requirements have been placed.
- Tested in accordance with DIN V 18232-6 and prEN 1366-9 600 °C – 120 min (requirement of the standard: 600 °C – 60 min or 400 °C – 120 min).
- Category 1 and 2 temperature stress in accordance with DIN V 18232-6.
- Pressure level 1 in accordance with DIN V 18232-6 for an overpressure inside the smoke extraction ducts, pressure level 3 in accordance with DIN V 18232-6 for an underpressure inside the smoke extraction ducts and pressure level 3 in accordance with DIN V 18232-6 for an overpressure or underpressure inside the air supply ducts.
- The smoke extraction ducts are suitable at ambient temperature for -1500 Pa (underpressure) and +500 Pa (overpressure).
  With temperature stress from at the most 600 °C/120 min up to -500 Pa (underpressure). For the usage as air supply duct -1500 Pa (underpressure) and +1500 Pa (overpressure).
  The leakage of the smoke extraction ducts shall not exceed the value of 3,75 m^3/h per m^2 internal surface at -1500 Pa (underpressure).
- Smoke extraction ducts of sheet steel satisfy the regulatory building products list A (edition 2001/1).
- Smoke extraction ducts and fittings of sheet steel are manufactured from galvanized sheet, grade Fe P02 G275 NA, with stiffeners. The number and location of the supports are mounted in accordance with the test certificate related to the dimensions.
  30 mm light profile frame, corners sealed against fire and smoke, longitudinal seams folded, 1 mm sheet thickness in accordance with EN 10142/10143. Light sheet arrangement in accordance with DIN 18379.

Scope of delivery and dimensions

Smoke extraction ducts of sheet steel are delivered as a complete system. This means that the adequate mounting accessories are delivered together with each duct, fitting, smoke control damper or compensator.
This consists of the hangers including fire safety dowels and threaded rods up to a length of 1,5 m, the fitting parts including corner fixings, screw-in clips and temperature-resistant, adhesive sealing tape.

Available clear dimensions in [mm]																
B	201	252	318	357	400	449	503	565	634	711	797	894	1003	1125	1250	1251-1500
H	201	252	318	357	400	449	503	565	634	711	797	850	900	950	1000	797
Intermediate sizes on request																

Smoke extraction duct of sheet steel

Test certificate P-TUM-411

Functional endurance of 120 min at 600 °C

Directions for installing and suspension

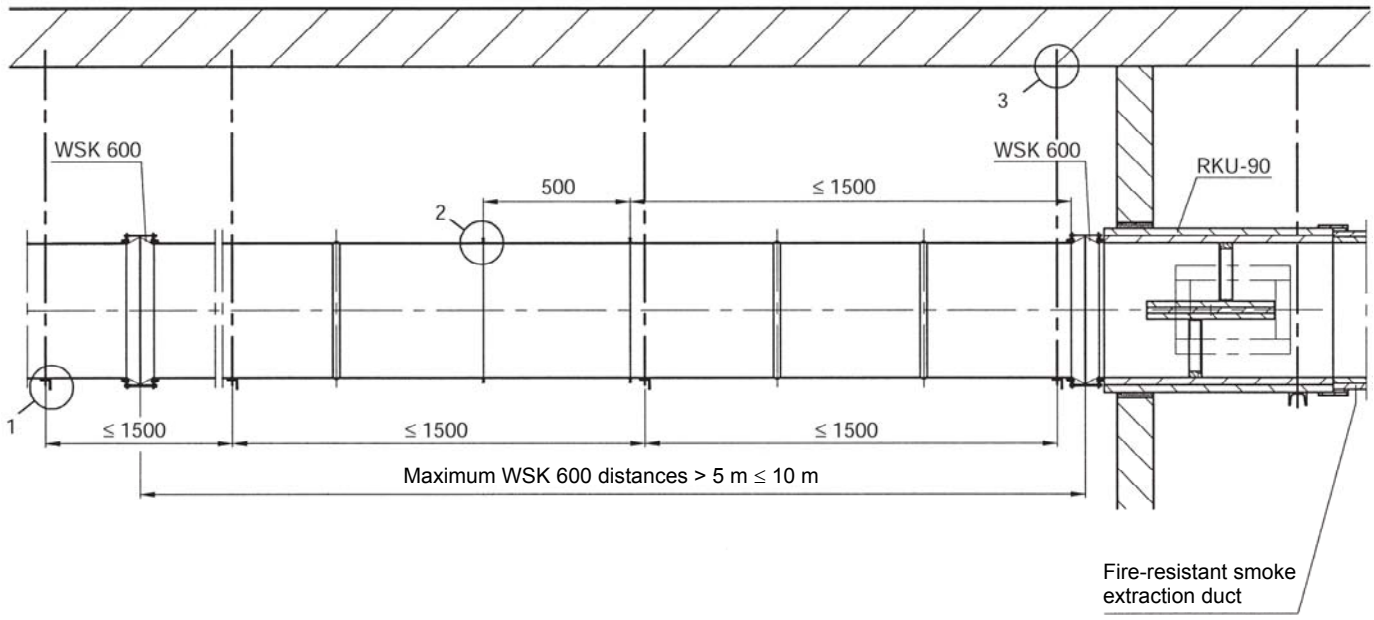
Vertical deviations
Inside the flue of horizontal smoke extraction, ducts bend fittings and vertically arranged smooth fittings are allowed to be arranged for a vertical deviation of up to 2500 mm. The vertical duct sections shall be bedded on consoles at a maximum distance of 1500 mm.

Inclined ducts
Ducts that deviate up to 10° from the vertical centre line shall be installed in the same way as vertical ducts. More inclined ducts shall be installed in the same way as horizontal ducts with vertical suspensions. Ducts that deviate over 10° from the horizontal line shall be doubled at the suspensions, such that the ducts on the traverses of the suspensions cannot shift (horizontally).

Design of bends and tee fittings
Bends and tee fittings are allowed to be manufactured in the same way as the smooth fittings (sheet steel ducts). The same limits of dimension apply as for smooth fittings; the length of the bend shall be measured in the duct axis.

Design of connecting pieces for the installation of smoke control dampers
Openings with stiffeners are allowed to be made into the smooth fittings (sheet steel ducts) to connect RKE smoke control dampers.

For further details, see the test certificate.



Only permitted for single compartments, i.e. the smoke zone and/or fire compartment with smoke extraction ducts of sheet steel are not allowed to be lead through fire-resistant walls or fire walls into other fire compartments.

①

The suspension shall be performed with L-profiles (35/35/4) or C-profiles (30/20/1,75). The maximum tensile load is 750 N ≙ 20,5 N/mm² (M8).
The threaded rods shall have a maximum lateral distance of 50 mm to the smoke extraction duct of sheet steel.

Alternatively, sliders can also be used for the suspension. Please note that in this case the maximum tensile load is only 300 N ≙ 8,2 N/mm².

②

Non-combustible sealings shall be used to interconnect the duct pieces.

The duct pieces are connected with M8 screws, washers and nuts at the four corners. Connectors are also affixed on all sides of the duct connecting profile at a distance of 200 mm.

③

M8 fire safety dowel; the maximum tensile load for L- or C-profiles is F = 750 N ≙ 20,5 N/mm²

F = max. 300 N ≙ 8,2 N/mm² when using the slider

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Smoke extraction ducts 600 °C **P-TUM-411 and P3464/5595-MPA BS** For the usage within one fire zone, consisting of galvanized sheet steel, 1,0 mm, with stiffening supports. In the normal design with a special duct connecting profile. An 30/30/3 m angle iron connection is used instead of the duct connecting profile for the connection with compensators. The duct has been tested at room temperature with 1500 Pa underpressure and at 600 °C with 500 Pa underpressure for a period of 120 min. Maximum dimensions: B = 1250 mm, H = 1000 mm and B > 1251 mm – 1500 mm, H = 797 mm Manufacturer: **Strulik GmbH** Deliver: m^2 Please note when mounting: In addition to the four corner joints, the duct connections shall also be connected by means of wedge clamps approximately every 200 mm. Strips of ceramic paper, 30 x 3 mm, shall be arranged as a temperature seal between the duct connecting profiles. The suspension of the ducts shall be performed according to fire safety engineering aspects. Tested fire safety dowels shall be used. Install: m^2			

Round smoke extraction duct of sheet steel

Test certificate
P-3469/5645-MPA BS

Functional endurance of
120 min at 600 °C

General

The accessories that are available, as for example pressed/segmental-built bends, tee pieces, crosspieces, Y fittings, nipples, bushings, connecting pieces with flange, reducers, transition pieces, terminals, steel grilles, sound absorbers, plenum boxes, ceiling diffusers and inspection openings, are listed in the test certificate.

Essential advantages

- Round smoke extraction duct of sheet steel for the usage within the smoke exhaust zone or fire compartment, on which no fire resistance time requirements have been placed.
- Tested in accordance with DIN V 18232-6 and prEN 1366-9 600 °C – 120 min (requirement of the standard: 600 °C – 60 min or 400 °C – 120 min).
- Category 1 and 2 temperature stress in accordance with DIN V 18232-6.
- Pressure level 1 in accordance with DIN V 18232-6 for an overpressure inside the smoke extraction ducts, pressure level 3 in accordance with DIN V 18232-6 for an underpressure inside the smoke extraction ducts and pressure level 3 in accordance with DIN V 18232-6 for an overpressure or underpressure inside the air supply ducts.
- The round smoke extraction ducts are suitable at ambient temperature for -1500 Pa (underpressure) and +500 Pa (overpressure).
  With temperature stress from at the most 600 °C/120 min up to -500 Pa (underpressure). For the usage as air supply duct -1500 Pa (underpressure) and +1500 Pa (overpressure).
  The leakage of the smoke extraction ducts shall not exceed the value of 3,75 m^3/h per m^2 internal surface at -1500 Pa (underpressure).
- Round smoke extraction ducts of sheet steel satisfy the regulatory building products list A (edition 2001/1).
  Round smoke extraction ducts of folded spiral-seam pipes and round folded fittings in accordance with DIN 1506 of galvanized sheet.
  These are connected by means of fittings with

Scope of delivery and dimensions

Round smoke extraction ducts of sheet steel are delivered as a complete system. This means that the adequate mounting accessories are delivered together with each duct, fitting, smoke control damper or compensator.
This consists of the clamping collars including fire safety dowels and threaded rods up to a length of 1,5 m.

Available dimensions, given in mm											
100	112	125	140	150	160	180	200	224	250	280	300
315	355	400	450	500	560	600	630	710	800	900	1000

Standard length: 3 m and 6 m

Round smoke extraction duct of sheet steel

Test certificate
P-3469/5645 MPA BS
Functional endurance of
120 min at 600 °C

Directions for installing and suspension

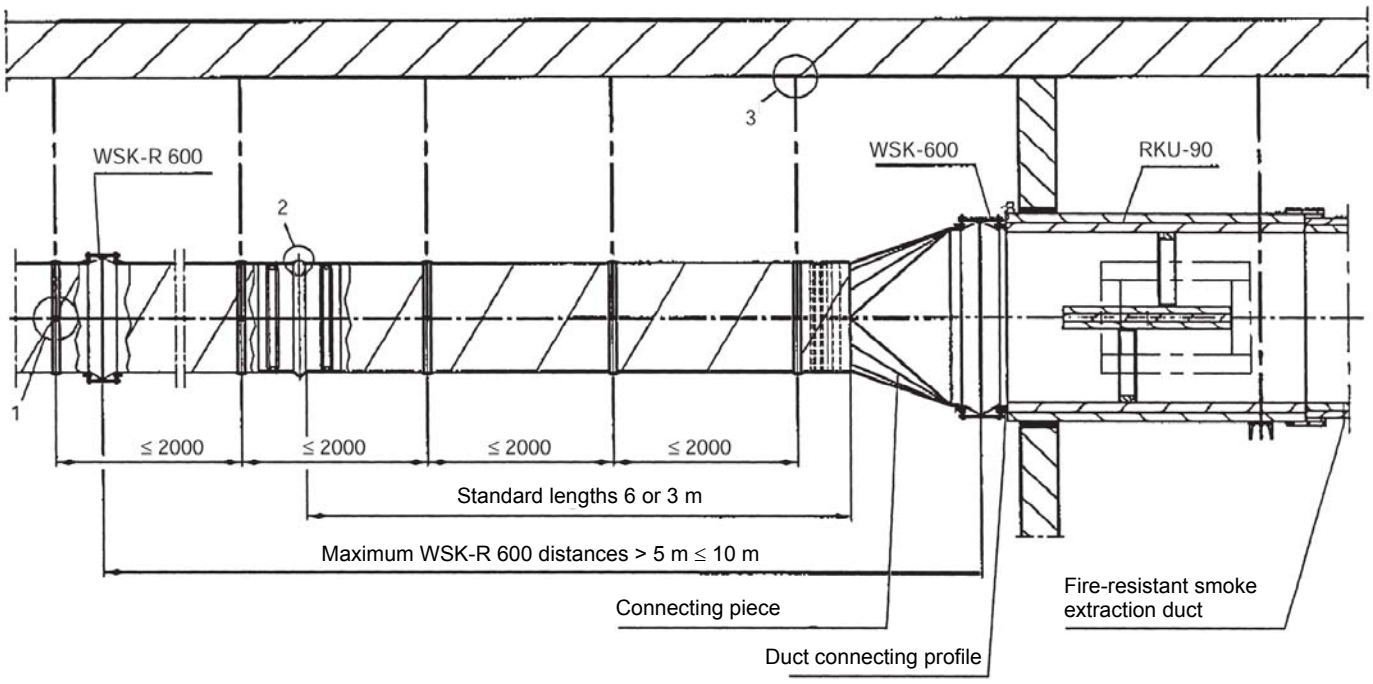
Vertical deviations
Inside the flue of horizontal smoke extraction ducts, bend fittings and vertically arranged smooth fitting are allowed to be arranged for a vertical deviation of up to 2500 mm. The vertical duct sections shall be bedded on consoles at a maximum distance of 1500 mm.

Inclined ducts
Ducts that deviate up to 10° from the vertical centre line shall be installed in the same way as vertical ducts. More inclined ducts shall be installed in the same way as horizontal ducts with vertical suspensions. Ducts that deviate over 10° from the horizontal lines shall be doubled at the suspensions, such that the ducts on the traverses of the suspensions cannot shift (horizontally).

Design of bends and tee fittings
Bends, nipples and bushings are allowed to be manufactured in the same way as the fittings in accordance with DIN EN 1506. The same limits of dimension apply as for smooth fittings; the length of the bend shall be measured in the duct axis.

Design of connecting pieces for the installation of smoke control dampers
Sections with stiffeners are allowed to be made into smooth smoke extraction ducts (folded spiral-seam pipes) to connect RKE smoke control dampers.

For further details are given in the test certificate.



Only permitted for single compartments, i.e. the smoke zone and/or fire compartment with smoke extraction ducts of sheet steel are not allowed to be lead through fire-resistant walls or fire walls into other fire compartments.

①

The suspension shall be performed with mounting clamps. The maximum tensile load is 750 N≙ 20,5 N/mm² (M8).

Alternatively, the suspension can also be performed with L-profiles (35/35/4) or C-profiles (30/20/1,75).
In this case the threaded rods shall have a maximum lateral distance of 50 mm to the smoke extraction duct.

②

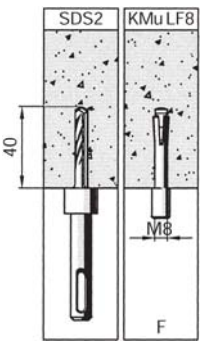
In principle, a fitting (nipple, bend, tee piece etc.) shall be used with a stop seam for the connection with the appropriate duct sections.

The number and dimensions of the fastening screws are given in the test certificate.

Alternatively, airtight steel rivets can also be used. Distance for fastening to the rim of the smoke extraction duct: ca. 10 to 15 mm.

③

M8 fire safety dowel; the maximum tensile load F = 750 N ≙ 20,5 N/mm²



Item	Description	Unit Piece	Unit price EUR	Total EUR
	Round smoke extraction ducts 600 °C with test certificate P3469/5645-MPA BS For the usage within one fire zone, consisting of galvanized sheet steel. The connections of the ducts and fittings are by means of plug-in joints fitted with factory-mounted double lip sealings of a thermo-intumescent sealing to guarantee the leak tightness in the event of a fire and shall also be secured by screws. Smoke extraction ducts, which shall be connected to round compensators, shall be fitted with a flange connection. The scope of delivery for the horizontal suspension includes two-piece clamps with a vibration-damping rubber ply, threaded rod 1 x 1,5 m and M8 fire safety dowels. The threaded M8 rods are allowed to be loaded with 750 N each. The distance between two suspensions is limited due to the load-bearing capacity of the threaded M8 rods; however, the maximum distance is 2000 mm. Strulik smoke extraction ducts meet the class C leakage requirements in accordance with DIN EN 12237. Minimum diameter: 100 mm Maximum diameter: 1000 mm Maximum length: 6000 mm Manufacturer: **Strulik GmbH** Deliver: m^2 Please note when mounting: The round smoke extraction ducts are joined together by means of nipples. The plug-in end of the duct shall be inserted up to the stop seam of the nipple. The number of sheet metal self-tapping screws (in accordance with the test certificate) shall be evenly distributed for the perimeter. The sheet metal self-tapping screws shall be mounted 10 to 15 mm from the edge of the duct, so that the rubber lip sealing is not damaged. The mounting of the compensators is performed with flange connections; die number and dimensions of the screws are given in the test certificate. The suspension of the round smoke extraction ducts shall be performed according to fire safety engineering aspects. Tested fire safety dowels shall be used. Install: m^2			

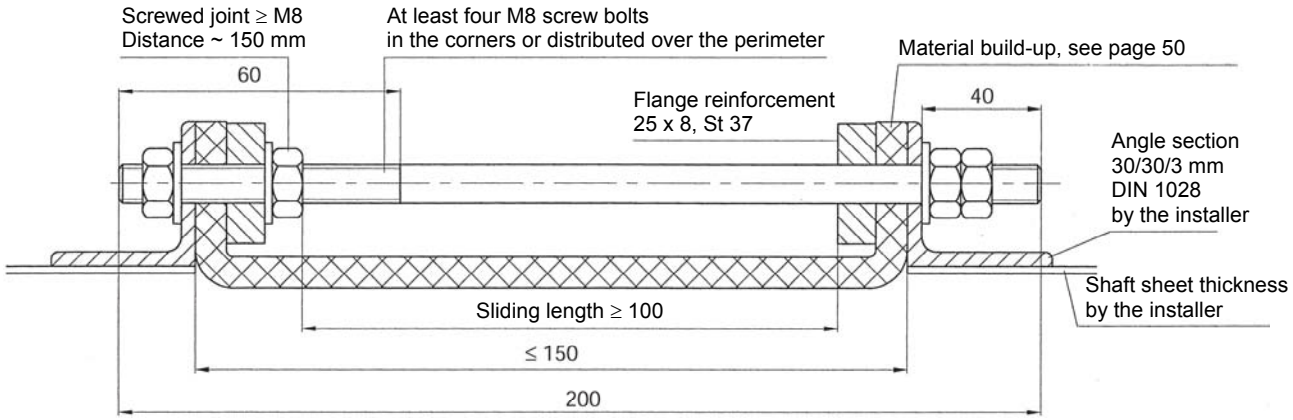
Compensator WSK

Tested in accordance with DIN 18232-6, prestandard of October 1997, unaffected by changes of temperature up to at least 1000 °C

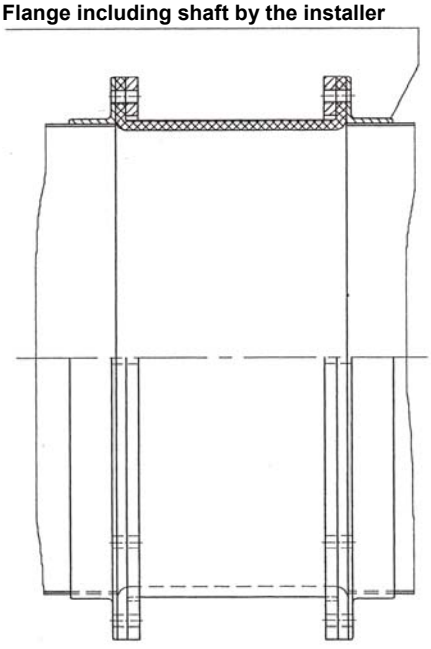
General / dimensions

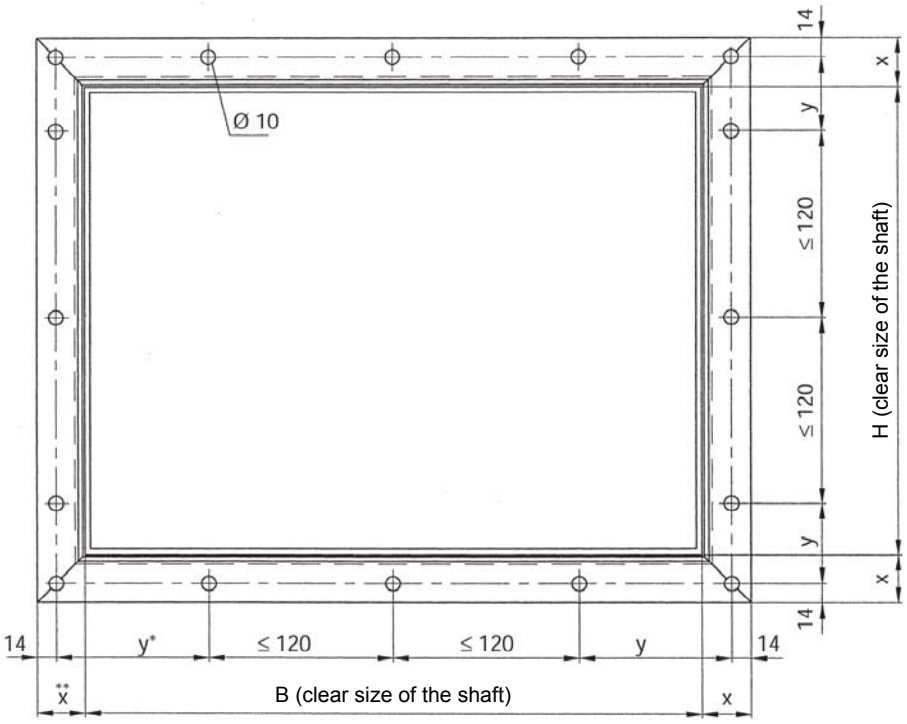
WSK compensator for the installation into smoke extraction ducts of sheet steel, for use in one fire zone.
For the compensation of duct elongations and for the prevention of hence resulting horizontal forces, compensators shall be provided in case of horizontal ducts having a length of ≥ 5 m. The distance between the compensators shall not exceed 10 m.

Please note:
The coupling flanges of the WSK already have boreholes according to the drawing below. The duct connecting profile of our RKU smoke control dampers has four keyholes. When RKU and WSK are delivered together, the duct connecting profile of the RKU is provided with suitable boreholes and WSK and RKU are screwed together. Attention, please state separately when ordering!



Flange including shaft by the installer





* Dimension y results from the absolute outside dimension, shall however not exceed 150 mm.

** Dimension x results from the width of the angle frame and the wall thickness of the shaft

Ordering details: Clear size the existing shaft; wall thickness of the existing shaft (e.g. 1 mm); angle section (existing, e.g. 30/30/3 mm)

Compensator WSK

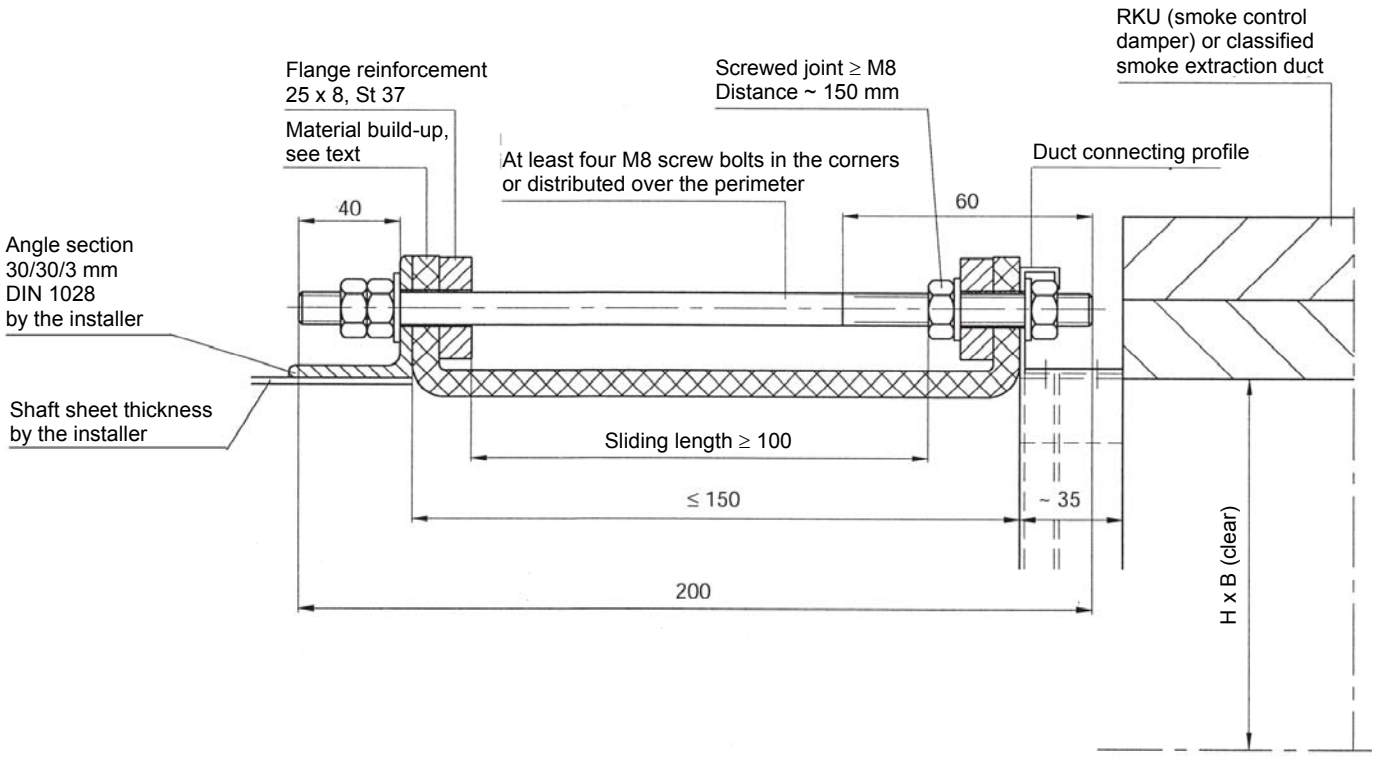
Tested in accordance with DIN 18232-6, prestandard of October 1997, unaffected by changes of temperature up to at least 1000 °C

General / dimensions

Compensator layer build-up (from the inside to the outside)

Layer	Nomenclature	Material	Thickness [mm]
1	Stainless steel wire gauze	Material no. 1.4828	0,2 Mesh size 0,8
2	Brown silicate gauze (brand »Thermogewebe B-B«)	Silicate	1,3
3	Glass fibre (brand »Thermoqua«)	Textured glass fibre	ca. 1,9
4	Stainless steel foil	Material no. 1,4541	0,1
5	The same type as layer 3		
6	Alufix 2	Glass fibre with a PU coating *on both sides*	1,2
7	Alufix 1	Glass fibre with a PU coating *on one side*	1,2

WSK installation example: Connection with a RKU and smoke extraction duct of sheet steel



Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Compensator Compensator tested in accordance with DIN 18232-6 (prestandard of October 1997). Unaffected by changes of temperature up to at least 1000 °C. For the installation between smoke extraction ducts of sheet steel or for the direct connection with smoke control dampers. The material build-up of the compensator is of six different stainless steel or aluminum wire gauzes. Steel flange reinforcement (25 x 8) and four M8 screw bolts. Manufacturer: **Strulik GmbH** Type: **WSK** Dimensions: B: _____ mm H: _____ mm L: ~ 150 mm			

Fire-resistant smoke extraction ducts and ventilation ducts

Please note: The technical data can be found in our new brochure

Ventilation ducts and smoke extractions duct

(Main catalogue, register 3)

Tender text examples can be found on pages 74 to 77

Shaft

Step

Connecting collar

Bend

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	WAKOFIX-LS L90 fireproof shaft Fire-resistant ventilation and smoke extraction duct, tested in the L90 fire resistance class in accordance with the principles of construction and testing of DIN 4102 Part 6 (version September 1977) and in the categories 3 and 4 at pressure level 3 in accordance with DIN 18232 (draft). Manufacturer: **Strulik GmbH** Type: **WAKOFIX-LS L90** Test certificate: P-TUM-405 (DIN 18232) P-MPA-E-97-006 (DIN 4102) Material: Silicate fireproofing board Wall: d = 35 mm Connection at joint: by means of 100/10 mm strips, glued and cottered Fastening: for the horizontal duct arrangement in accordance with the test certificate using straddling steel dowels, threaded rods and traverses (uncovered) or for the vertical duct arrangement by means of angle sections on the floor Calculation: in accordance with DIN 18379, VOB, Part C (newest version) Proof of delivery: Strulik GmbH WAKOFIX-LS L90 shaft, as above, deliver and install m^2 As above, however as fittings, deliver and install m^2			

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Make grille sections m^2 Establish a connection with devices, e.g. fans, fire dampers etc. pcs. Deliver and install throttle valves, up to 400/400 mm pcs. Deliver and install inspection covers, up to 400/400 mm pcs. Establish a connection with the shaft and caulking pcs. Establish a wall or floor connection with strips of fireproofing boards, 70/35 mm running m Deliver and install a steel construction for special fastenings, e.g. wall brackets, elevations etc. kg			

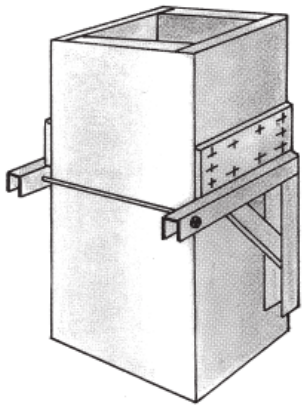
Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	WAKOFIX-F L90 fireproof shaft Fire-resistant ventilation and smoke extraction duct, tested in the L90 fire resistance class in accordance with the principles of construction and testing of DIN 4102 Part 6 (version September 1977) and in the category 3 in accordance with DIN 18232 (draft). Manufacturer: **Strulik GmbH** Type: **WAKOFIX-F L90** Test certificate: P-TUM-405 (DIN 18232) P-MPA-E-99-007 (DIN 4102) Material: Calcium-silicate boards Wall: d = 40 mm Connection at joint: by means of 100/10 mm strips, glued and cottered Fastening: for the horizontal duct arrangement in accordance with the test certificate using straddling steel dowels, threaded rods and traverses (uncovered) or for the vertical duct arrangement by means of angle sections on the floor Calculation: in accordance with DIN 18379, VOB, Part C (newest version) Proof of delivery: Strulik GmbH WAKOFIX-F L90 shaft, as above, deliver and install m^2 As above, however as fittings, deliver and install m^2			

Tender Text

Item	Description	Unit Piece	Unit price EUR	Total EUR
	Make grille sections m^2 Establish a connection with devices, e.g. fans, fire dampers etc. pcs. Deliver and install throttle valves, up to 400/400 mm pcs. Deliver and install inspection covers, up to 400/400 mm pcs. Establish a connection with the shaft and caulking pcs. Establish a wall or floor connection with strips of fireproofing boards, 70/35 mm running m Deliver and install a steel construction for special fastenings, e.g. wall brackets, elevations etc. kg			

Mounting of vertical shafts (example with WAKOFIX-LS)



1 WAKOFIX-LS L90 wall
2 Fixing arrangement for the wall
3 Strip, 100/10 mm
4 Cement mortar
5 Strip, 80/20
6 Metal dowel
7 Threaded rod = M12
8 Box section, 30/30/3
9 Solid wall = F90
10 Solid floor = F90

The WAKOFIX-LS L90 shaft can also be installed as a vertical air duct for clear floor heights of up to 15 m without an additional supporting console on each floor.

For these floor heights only uncovered fixing arrangements for the wall are required at a distance of ≤ 3 m. This does not change the design of the WAKOFIX-LS shaft.

The shaft joint is covered by the surrounding bushing. Due to the bushing, there is an air gap of approximately 10 mm between the ventilation duct and the solid wall, which remains open. The bushing shall butt firmly against the solid wall.

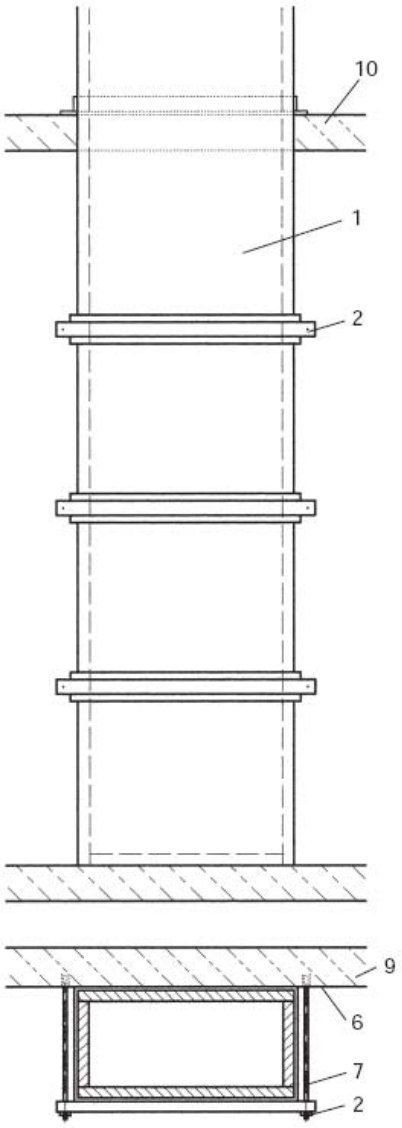
The maximum cross section of the vertical ventilation duct can measure 1200 mm x 1200 mm.

The overall height of the ventilation duct can be many time more than 15 m, if the weight of the duct is supported in each case at a distance of 15 m by a solid floor or adequately covered and dimensioned consoles.

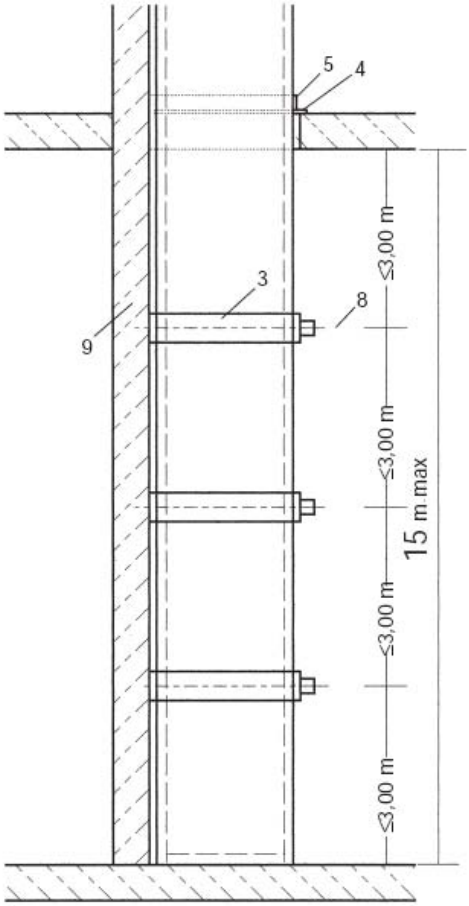
The fixing arrangement for the wall consists of angle sections and threaded pins ≥ M12. The threaded pins can be fastened to solid walls with approved metal dowels.

As an alternative to the affixing of the threaded pins to the wall by means of straddling metal dowels, a wall insert mounting is also possible.

Front view

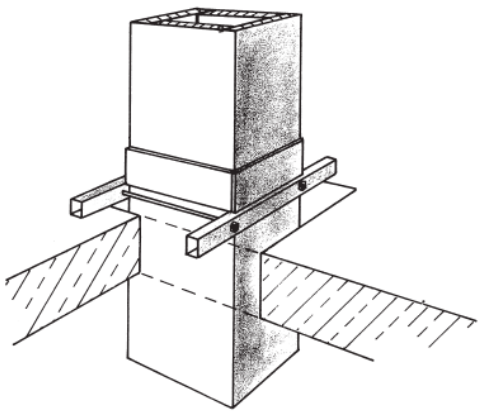


Side view



Top view

Mounting of vertical shafts

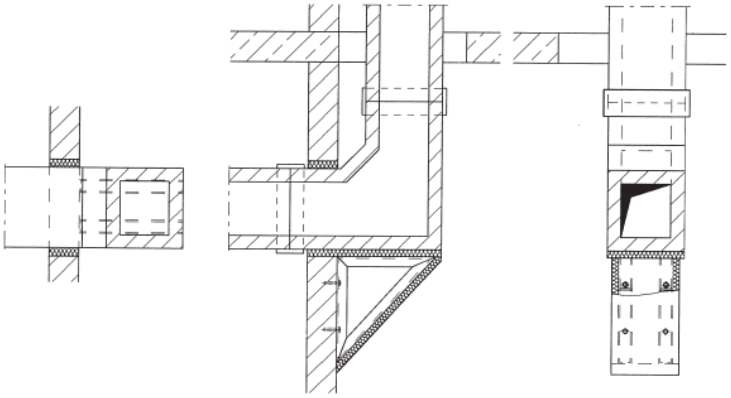


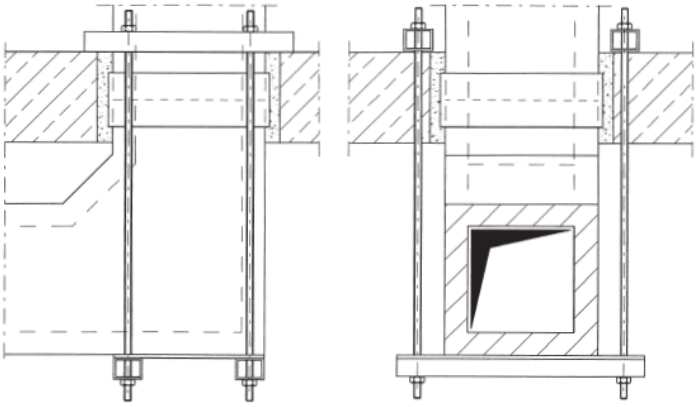
Penetration of floors

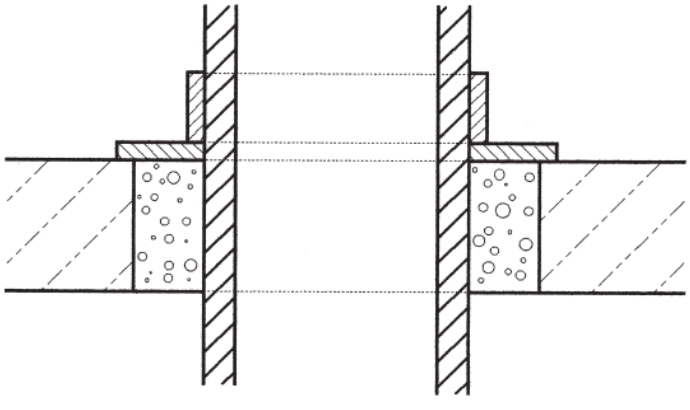
If shafts with large cross sections pass are lead through floors with fire requirements, then the following shall be considered:

For the penetration of floors, the remaining opening is skillfully filled with cement mortar. The load decrease from the shaft to the floor is performed on each floor by means of PROMATECT®-H stiffeners that are affixed above each floor penetration to the outside of the ventilation duct with screws for quick mounting or clamps.

If for vertically arranged shaft sections, the weight cannot be decreased on the floors, then appropriately dimensioned supporting constructions shall be used to stabilize their position.







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