



SPECIFICATION AND OPERATION MANUAL
SMOKE VENTS TYPE AWAK
WITH PNEUMATIC CONTROL SYSTEM

**- Buk, February 2007 -
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1. INTRODUCTION

The purpose of this Specification and Operation Manual is to provide information for the user about design, operation, conditions of use, maintenance and repair of vents with pneumatic smoke removal system that open at the angle of min. 140°.

This Manual includes information on components and devices that may be contained in the smoke removal system. Not all of the elements described herein may be present in your system. Observance of all instructions provided in this Manual is essential for correct operation of the system and safety of the system users. That is why, all persons that have access to the equipment must know design and operation principles of the system, and the user's technical staff must read carefully this Manual.

CAUTION!

Non-observance of instructions and recommendations described in this Manual will cause expiry of the warranty and release the manufacturer from any liability.

2. GENERAL

This Manual describes AWAK Smoke vents with Pneumatic Smoke Removal Control System (Fig. 1). The vents are mounted on the roofs of single-storey buildings and over the highest floor in multi-storey buildings.

Smoke vents are designed to remove smoke and heat from rooms in the event of fire. Correctly planned and installed vents perform the following functions during fire:

- facilitate evacuation through keeping lower parts of room free of smoke,
- facilitate rescue action,
- protect the building structure and its furnishing,
- reduce direct fire damages caused by emitted smoke and hot fire gases.

In condition of normal use of the building, the vents have function of the roof skylights.

3. TECHNICAL SPECIFICATION

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3.1. Marking

Each installed smoke vent is permanently marked in visible place with the use of special plate.

The plate includes the following information:

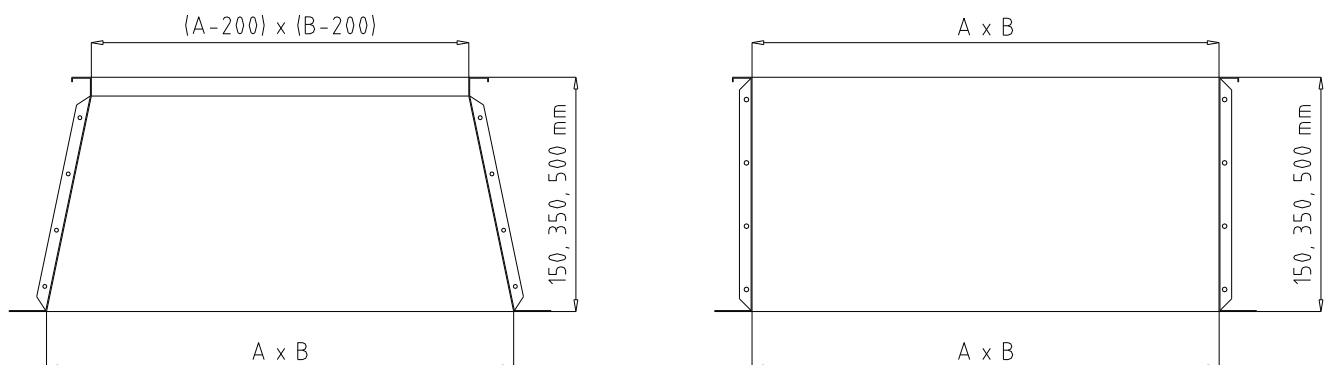
- a) mark of approval for sale and use in the building industry – “B”
- b) name and address of the manufacturer - AWAK sp. z o.o.,
- c) vent type – AWAK,
- d) product number and year of production,
- e) Technical Approval No. ITB –AT-15-6653/2005 / AT-15-5603/2002,
- f) usable vent area – depending on the vent size,
- g) certificate number – 074 /2005 / 100/2003,
- h) permissible snow load class – SL 550,
- i) high temperature resistance class – HE 300 (B 300).

3.2. Smoke Vent Design

Base

Smoke vent base (Fig. 2) may be made of:

- a) galvanized steel sheet gauge min. 1.25 mm or aluminium sheet gauge min. 2.0 mm (base requires additional insulation made of mineral wool, polystyrene foam or other thermal-insulation material gauge min. 40 mm). Steel or aluminium base may be made as: slanting (height of 350 or 500 mm), or straight (height of 350 or 500 mm). It is possible to fabricate (on the customer's request) special base of any height between 300-750 mm. Base is provided with special corner incisions that (after installation and finishing) allow easy installation of the so called, “tacking” frame made of PVC. Overall heat-transfer coefficient for the base is approx. $1.0 \text{ W/m}^2\text{K}$ (at the use of mineral wool layer of 40 mm).

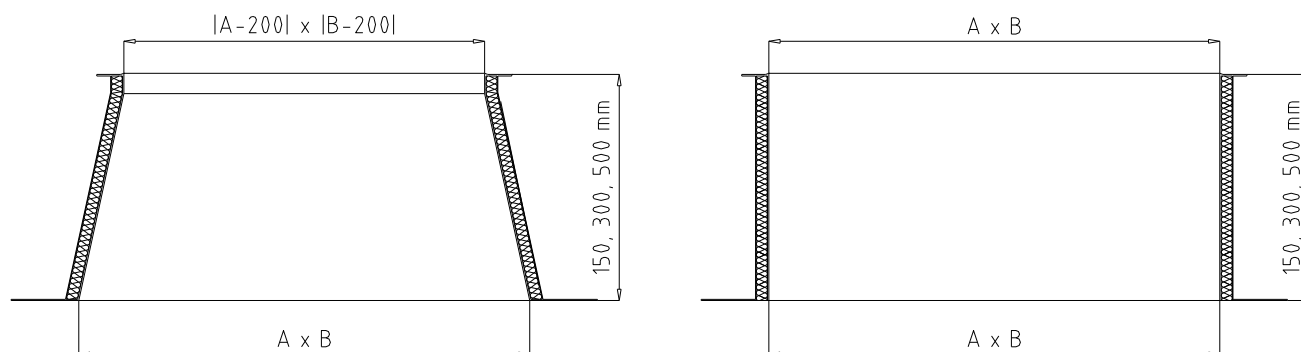


- b) fibre-glass reinforced polyester laminate. Inflammable polyurethane foam is installed between the laminate layers, gauge of 20 mm. Base may be made as slanting (height of 300 or 500 mm), or straight (height of 300 or 450 mm). It is also possible to make base with bottom flange suitable for corrugated and trapezoid plates that are installed on the roof. Overall heat-transfer coefficient for the base is approx. $0,95 \text{ W/m}^2\text{K}$,

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Supporting constructions must be installed under the skylight base around its all circumference. (it strictly applies to bases made of steel or aluminium sheet segments).

Tilting Segment

Tilting segment of smoke vents includes a frame and a dome (Fig. 2, 6, 7). The frame is made of PVC or aluminium profiles, while the dome is made acrylic material or solid polycarbonate (that is characterized by increased resistance to impacts). Acrylic domes are also made in HEATSTOP version (the dome reflects infrared radiation). In respect of the dome shape it is distinguished into oval or pyramidal. The domes are made as: single-, double- or tri-coat, in translucent or transparent (on request also in other colours). Subsequent dome layers are secured all around with seals that protect inside against getting any dirt from air. PVC/Alu frame is also protected with seals to stop water from getting inside the vent interior. The domes are attached to the frame with the use of screws (throughout spacing sleeves), on which the masking caps with AWAK logo are installed.

Openable segment is fixed to the base by corrosion resistant hinges in the number from 2 to 5 (depending on the base size). Mounting detail is showed in figure 3.

Basic specification of the vent domes is presented in the table below.

Number of Coats x Material (colour)	Light Transmittance [%]	Overall Heat-Transfer Coefficient "k" [W/m ² K]	Acoustic Insulation [dB]
1 x Acrylate transparent	92	5,2	22
1 x Acrylate translucent	79		
1 x Acrylate Heatstop	51		
1 x Polycarbonate transparent	88		
1 x Polycarbonate translucent	49		
2 x Acrylate (2 x transparent)	85	2,6	24
2 x Acrylate (2 x translucent)	59		
2 x Acrylate (translucent / transparent)	71		
2 x Acrylate (heatstop / transparent)	47		
3 x Acrylate (3 x transparent)	78	1,8	25
3 x Acrylate (2 x translucent / transparent)	56		

Table 1. Dome Technical Specification

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4. CONTROL SYSTEM

The vents are equipped with pneumatic smoke removal system that allows you to open the vents when fire starts by min. 140°.

The control system uses kinetic energy of carbon dioxide (CO₂) pressurized to about 30 bar in a cartridge of capacity 20, 40, 75, 120, 150, 300 or 500 grams. The cartridge is located in the thermal activator installed onto the vent base (automatic control) or in alarm box (manual control).

In the event of automatic control, opening of smoke vent (each one individually) is done by the thermal activator mounted on the base sidewall or on the lower rack of the vent. The activator is equipped with fuse link, container (cartridge) with CO₂ of 20 to 75 g (depending on the vent size), and mechanism with striker that punches the cartridge cap.

When the fire starts, opening of the vent is initiated by the fuse link that breaks in the temperature of 68-72° C (red link) or 88-93° C (green link), which activates the activator striker that pierces the CO₂ cartridge cover and releases the gas. Released carbon dioxide moves through piping to the actuator, which is installed under the vent, and pushes the actuator rod locking it in its extreme (maximally extended) position. (Fig. 8)

For manual control we distinguish the two basic vent opening systems:

a) System I – with the use of “pilot” box and “actual” box (Fig. 9)

The system is used in situation, when it is needed to open large group of vents at the same time. Opening of the vents is initiated by pressing the button or using the lever mounted in the “pilot” box. This enforces the striker activation that will punch the CO₂ cartridge (20 or 40 g) releasing the gas. Released carbon dioxide moves through pipeline to “actual” box. In this box, the group of cartridges with capacity of 300-500 g is punched to release large amount of gas. This gas flows to vents in particular smoke removal area to activate their opening.

b) System II – with the use of “actual” box (Fig. 9)

This system is used in situation, when it is required to open single vents or small group of vents. The vent opening is initiated by pressing button or activating the lever in “actual” box. This will result in striker movement that piercing the CO₂ cartridge (20-500 g) will release the gas from the cartridge. Released gas flows to the vent (or group of vents) through the piping to cause their opening.

Additional element of alarm boxes may be electric valve 24 V DC, with power consumption - 300 mA. The valve enables coupling of the pneumatic system with the Fire Alarm System (FAS) for automatic activation of the smoke removal system by the signal from FAS.

5. CONTROL DEVICES

Pneumatic actuators

Pneumatic actuators are made in the form of cylinders of diameter 50 or 63 mm with the rod extending length selected individually to geometrical dimensions of the smoke vents.

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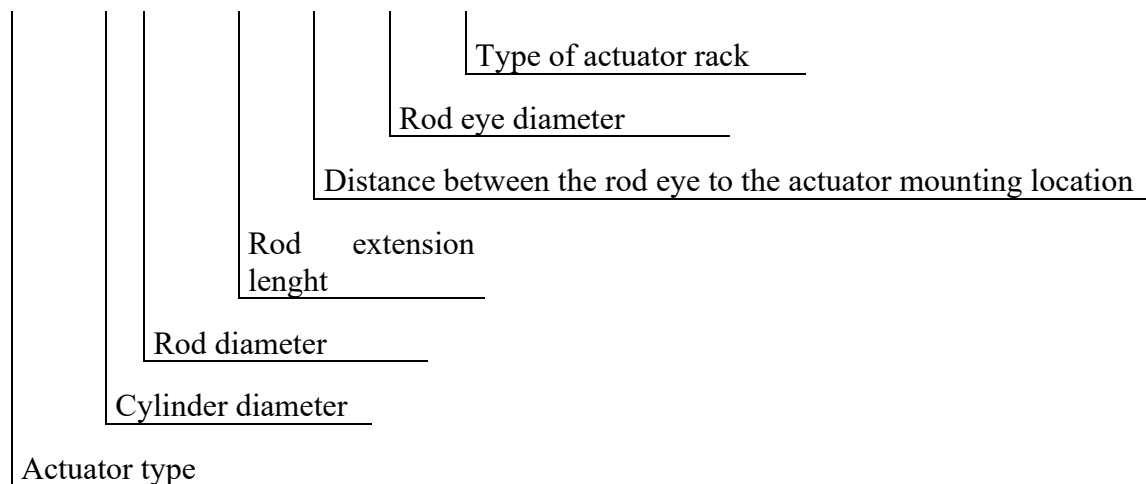
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Pneumatic actuators are mounted to the scissor rack with the use of angular brackets. The brackets also support the piping.

In upper part of the actuator there is a threaded eye bolt that allows fastening the actuator to the hook lock. This bolt may be moved out to some extent, which is especially important when you install the vent.

Pneumatic actuators have individual symbols that identify each actuator. Example of such symbol is presented below:

PMAV 63 / 16 – 1060 / 913 – 10 – BG4



Alarm Boxes

Alarm boxes are cubicoid-shaped and are made of red painted metal sheet. Front panel of the box have key-locked glassed door.

Box dimensions are presented in the table below:

Box Type	Dimensions (W x H x D)	Door Glass Dimensions (W x H)
1	2	3
AK2	230 x 270 x 125 (mm)	120 x 110 (mm)
AK3	230 x 400 x 125 (mm)	120 x 110 (mm)
AK4	300 x 500 x 125 (mm)	135 x 120 (mm)
AK5	255 x 345 x 115 (mm)	135 x 120 (mm)
AKQ500	500 x 500 x 210 (mm)	-

Table 2. Alarm box dimensions

The box houses mechanism equipped with activating devices (mechanic, electric or pneumatic), control lever or button and CO₂ cartridges. Pneumatic installation conductors are lead outside the box and terminated with couplings for connecting external pipework without the need to open the box.

6. DELIVERY

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The smoke vents and control devices are supplied to the user in the form of assemblies and subassemblies.

The elements must be secured during transport so, that they are not exposed to any damage and that road traffic safety is ensured.

They may be unloaded using general purpose reloading equipment or manually, under the supervision of authorized person.

7. INSTALLATION INSTRUCTIONS

7.1. Base Installation

- a) assemble base segments using M8x16 screws and nuts (rys 2-6),
- b) arrange the screwed base in the opening so, that the base is aligned diagonally,
- c) fasten the base to the supporting construction by means of:
 - self-drilling screws – steel support,
 - anchor bolts – concrete support,
 - wood screw – wooden support.

NOTE: Distances between the base fixation points must not bigger than 250mm and at least 3 connection points in each side must be provided.

7.2. Thermal and Anti-Damp Insulation (Fig. 3 - 6):

- a) mount 40 mm mineral wool layer around the base,
- b) mount tar board/PVC foil finish up to the all height of base flanging it onto the upper shelve.

NOTE: Tar board/ roof foil overlaps must allow easy installation of the tacking frame

7.3. Installation of Tacking Frame (Fig. 2-6):

- a) Insert the frame onto the finished base and mount it using tight steel/aluminium rivets.

NOTE: Do not rivet the hinge side – this side will be fixed together with the hinge frame

7.4. Installation of the Hinge Frame (Fig. 2, 6, 7):

- a) insert the frame so, that its axis is aligned with the base axis of symmetry,
- b) rivet the hinges to the tacking frame and base with the use of star rivets.

NOTE: When the hinge frame is mounted, check for correct opening and closing and if the frame is duly tight.

7.5. Installation of the Drive (Fig. 8):

- a) screw the hook lock to the upper cross-bar using M5 x 60 screws and nuts,
- b) align the lower rack with actuator to the base axis of symmetry, and then attach the rack to the base with the use of steel rivets/self-drilling screws,
- c) mount the actuator spindle eye in the hook lock rod,
- d) adjust the hook lock anchor so, that there is no gap between the hinge frame and the compensating frame when the vent is closed. Adjustment consists in moving the whole lock console up/down or in tightening/loosening the lock anchor,

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e) Installation of the Thermal Activator (Fig. 06)

- insert B1 coupling into the thermal activator socket “CA” with the use of open ended spanner,
- connect the activator using steel or copper pipe Ø 6 (“CA” socket) with the actuator (“^” socket),
- lower the striker by loosening the thumb screw (check if the striker is lowered),
- insert the ampoule with sharp end toward the activator body and tighten the bracket bolt,
- tension the striker spring by tightening the thumb screw,
- replace the plug with the cartridge,
- attach the activator to the inner side of base with the use of self-drilling bolts Ø 5.5x50mm so, that the cartridge points upward at the angle of 60-80°,
- connect the activator (“CA” socket) to the actuator (“^” socket) with copper or steel pipe Ø 6,
- connect the activator (“VA” socket) to the alarm box with copper pipe Ø 6.

NOTE: Check the thermal activator for correct functioning:

- lower the striker by loosening the thumb screw (make sure the striker is lowered),
- insert the ampoule with sharp end toward the activator body and tighten the bracket bolt,
- tension the striker spring by tightening the thumb screw,
- loose the ampoule by loosening the bracket screw,
- check if the striker has been “fired”.

7.6. Installation of the Dome (Fig. 7):

- a) insert and align the dome on the hinge frame,
- b) insert the spacing sleeve,
- c) tighten crosswise the fixing bolts to avoid unnecessary tension,
- d) insert the sealing caps onto the sleeves.

8. INSTALLATION CHECK-UP

Final check-up of the skylight installation is done and recorded by the representatives of the user and the manufacturer. After the check-up, each party receives one copy of the installation report.

During final control of the smoke vents, each element must be verified in respect of compliance with this manual, correct operation and use.

Correct operation of the vents means that during their trial opening they open and stay open at the angle of min. 140°.

Additionally to the final inspection report, the user will receive the following documents:

- Specification and Operation Manual and Warranty Card,
- Technical Approval,
- Certificate of Compliance.

NOTE!

If the installation is not accepted by the manufacturer's authorized technician, in case when the installation was made by the user, this Specification Manual and the Warranty and any characteristics described in the Approval are not longer valid.

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9. OPERATING INSTRUCTIONS

Automatic Opening by the Temperature Fuse

When the fire starts, there will be rapid increase of the temperature in the room. If the temperature near the smoke vents reaches ca. 68°C or 93°C (depending which fuse is installed), the fuse breaks launching the mechanism that punches the CO₂ cartridge. Pressurized CO₂ will be released automatically. Released gas moves through pipeline and gets to the actuator to extend the actuators rod. This will open the vent and lock the actuator in its extreme position (opened for min. 140°).

Closing Vents (if they were opened automatically).

To close the vents:

- remove used cartridge from the thermal activator unit,
- lower the striker by loosening the thumb screw (make sure that the striker is lowered),
- insert a new ampoule with sharp end toward the activator body and tighten the bracket screw,
- tension the striker spring by tightening the thumb screw,
- insert the cartridge,
- unlock the actuator upper lock by pulling bolts near rod toward the spindle eye,
- close the vent manually.

NOTE: When closed, make sure the vent is locked.

Emergency Manual Vent Opening

a) System with “pilot” and “actual” box

To open the vent (or group of vents) during fire you must:

- beak glass in the “pilot” box doors,
- surely pull the lever or press the button in the “pilot” box.

b) System with “actual” box

To open the vent (or group of vents) during fire you must:

- beak glass in the box doors,
- surely pull the lever or press the button in the box.

Closing Vents (if they were opened manually)

a) System with “pilot” and “actual” box

When the fire is extinguished and the risk is overwhelmed you must:

- key unlock the alarm box door,
- remove used CO₂ cartridges in both boxes,
- in “pilot” box, restore the striker to initial position by loosening (until stop) the thumb nut screw located under the lever (or button),
- unlock upper lock of the actuator by pulling the bolts near rod toward the rod eye,
- manually close the smoke vents until the pneumatic actuator is locked,
- in “pilot” box, pull the lever upward or release the button,

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- in “pilot” box, tighten (until stop) the thumb nut screw located under the lever (or button),
- insert new CO₂ cartridges in both boxes,
- replace the glass in the “pilot” box door,
- key lock the boxes doors.

NOTE: When closed, make sure the vent is locked.

b) System with „actual” box

When the fire is extinguished and the risk is overwhelmed you must:

- key unlock the alarm box door,
- remove used cartridge or cartridges in the box,
- restore the striker to initial position by loosening (until stop) the thumb nut screw located under the lever (or button),
- unlock upper lock of the actuator by pulling the bolts near rod toward the rod eye,
- manually close the smoke vents until the pneumatic actuator is locked,
- in the box, pull the lever upward or release the button,
- in the box, tighten (until stop) the thumb nut screw located under the lever (or button),
- insert new cartridge or cartridges in the box,
- replace the glass in the box door,
- key lock the box door.

NOTE: When closed, make sure the vent is locked.

10. TECHNICAL INSPECTIONS

Since the smoke vents are designed for use in fire emergency situations, no overhauls are planned, as the vents must be always in full order.

However, they require periodical inspections. Technical inspections must be done in regular periods of time, but at least once in a year.

During inspection, the smoke vent with all control system, accessories and wiring must be checked by the specialist technician for correct operation and maintenance or possible repairs.

Each inspection must be logged in the periodical inspection sheet.

Technical inspections of vents are made by AWAK Sp. z o.o. through their authorized representatives or service agents.

11. REPAIRS

Any repairs of the smoke vents may be only made by the manufacturer's service teams or other persons authorized by the manufacturer.

If any failures are found, the user must immediately notify the manufacturer about necessity to test (inspect, repair) the system in connection with the discovered malfunction or damage.

Each use of the smoke vent due to fire risk requires inspection of its condition and classification for repair or replacement.

Replacement of such vent is not covered by the warranty – vents damaged by fire will be not substituted under the warranty terms.

12. GENERAL RULES OF REPAIR

The rules determined by the manufacturer's company apply to any repairs of the vents or their control devices.

For repairs the personnel use generally available tools and standardized measurement instruments with observance of applicable safety and fire requirements.

13. GENERAL SAFETY ISSUES

Applicable safety regulations must be observed during installation, operation and repair of the smoke vents and their control devices.

In particular, the following rules must be adhered to during the use of skylights:

- all employees must be familiarized with the smoke vent design and operation of their control equipment,
- vents and their control devices must not be used in contradiction to their intended use,
- vents and their control system must be always in due order,
- when alarm box is used, the box door must be always closed,
- alarm boxes must be installed in easily accessible places,
- near the alarm boxes, you must provide information plates stating their function and the operating instructions.

14. PARTS LIST

Any parts required for repair will be supplied by the manufacturer or other person authorized by the manufacturer.

15. DRAWINGS LIST

Fig. 1 –Smoke vent type AWAK.

Fig. 2 – Connection of the vent basic elements.

Fig. 3 – Metal base mounting variants.

Fig. 4 – Laminate base mounting variants.

Fig. 5 – Tacking frame mounting.

Fig. 6 – Tacking and hinge frame mounting.

Fig. 7 – Dome and hinge frame mounting

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Fig. 8 – Vent drive

Fig. 9 – Smoke removal control

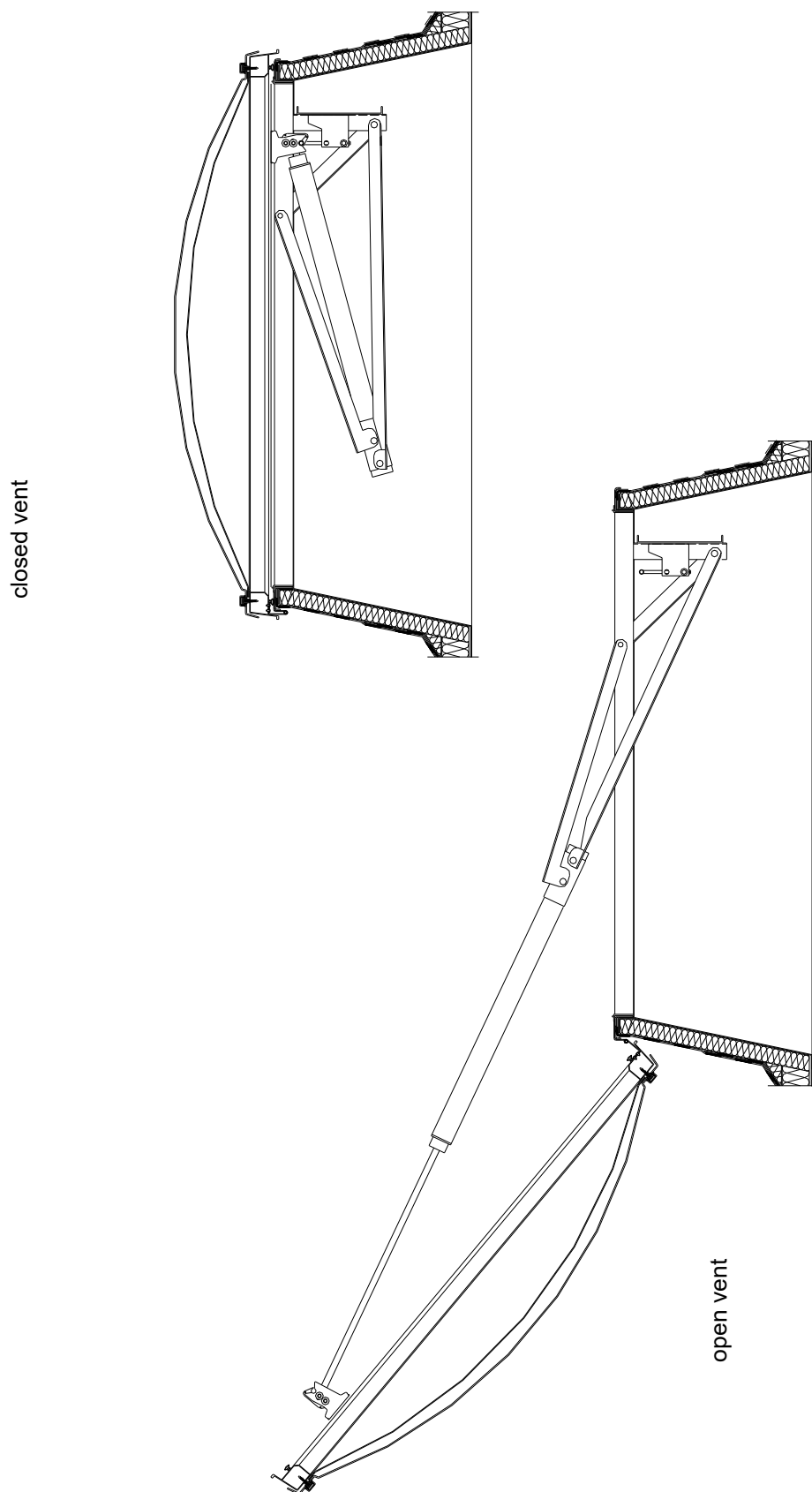


Fig. 1 – Smoke vent type AWAK with pneumatic drive

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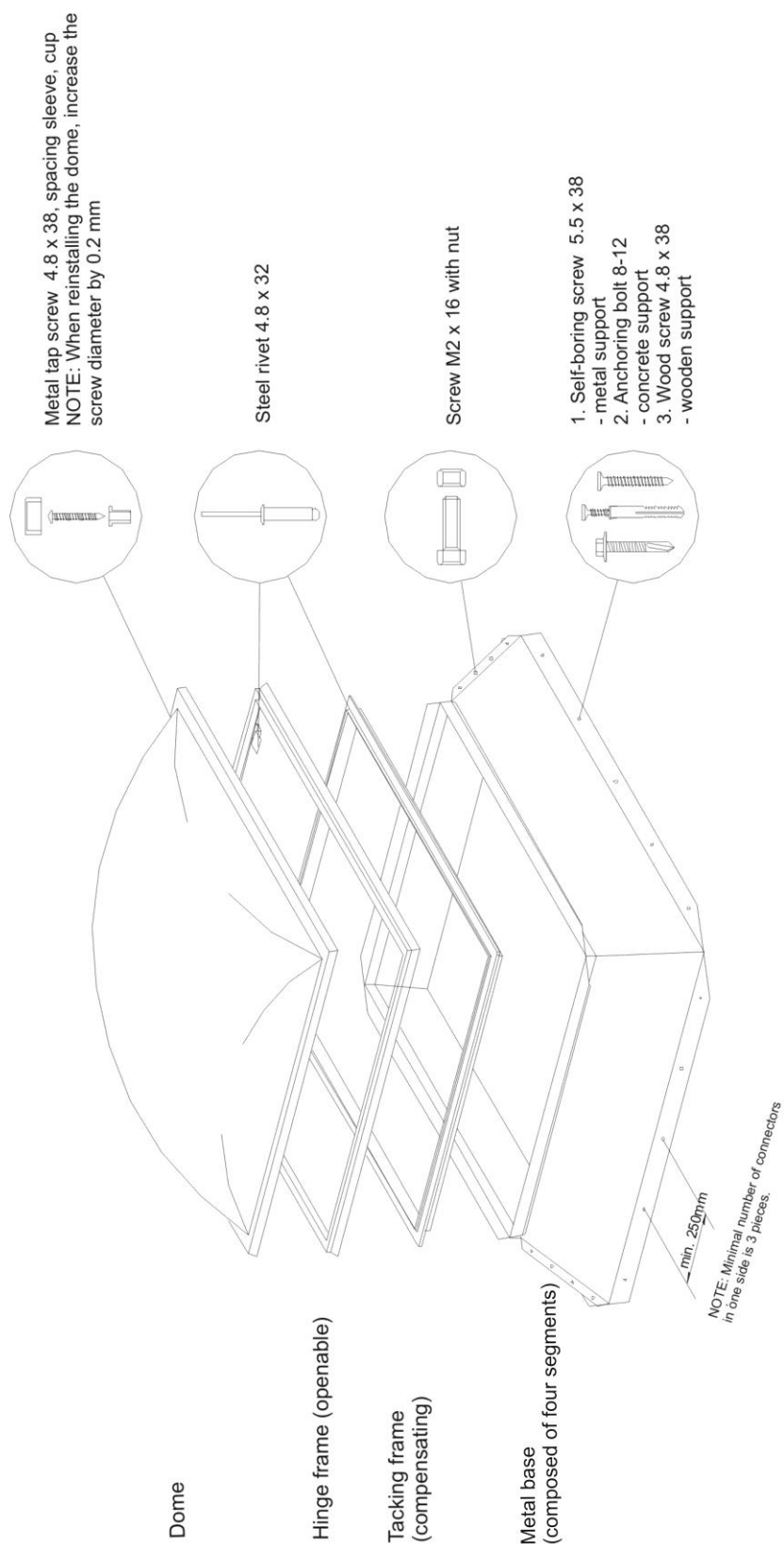
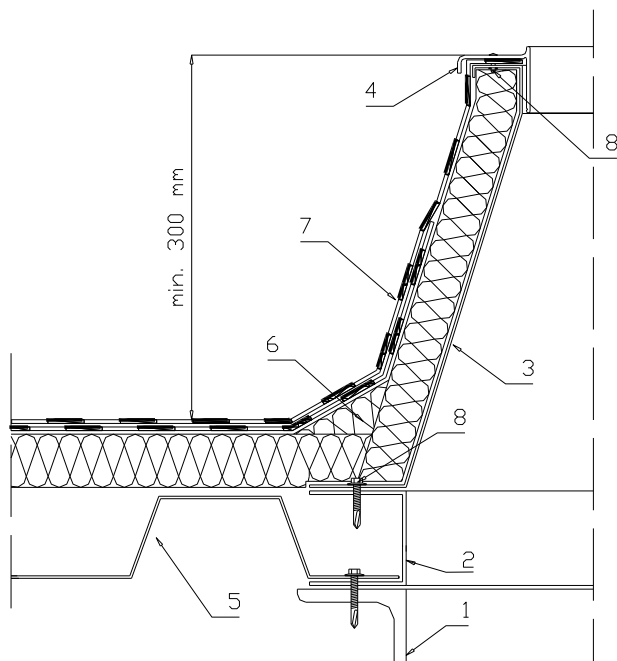


Fig. 2 – Connection of the vent basic elements.

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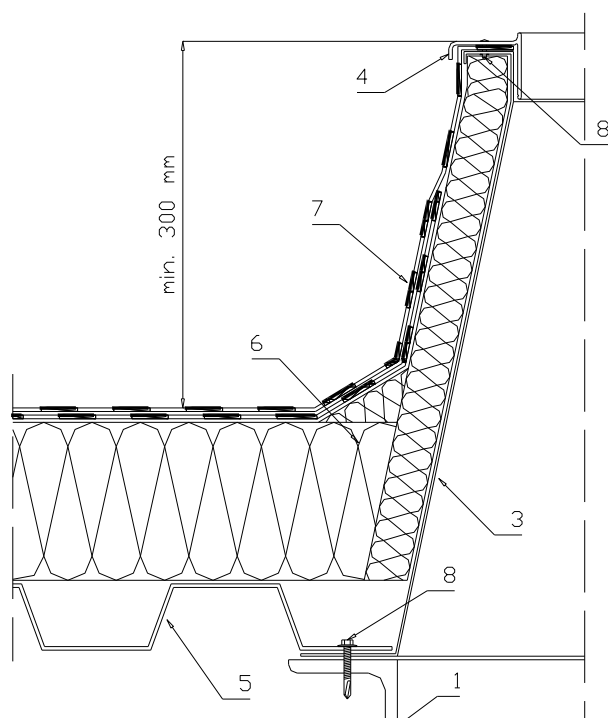
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A. Variant with the use of additional substructure

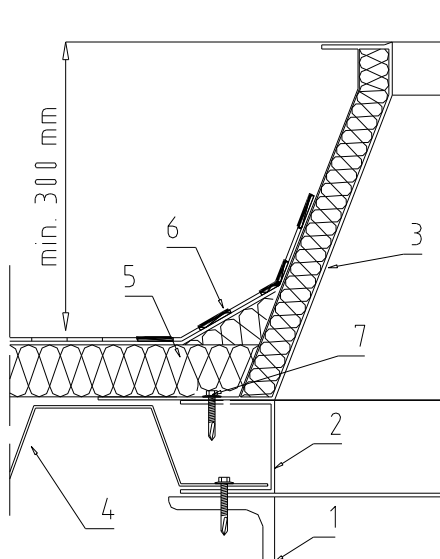
1. Supporting construction
2. Substructure
3. Steel base
4. Tacking (compensating) frame
5. Trapezoid sheet
6. Thermal insulation
7. Anti-damp layer
8. Connectors



B. Variant with mounting directly to supporting construction

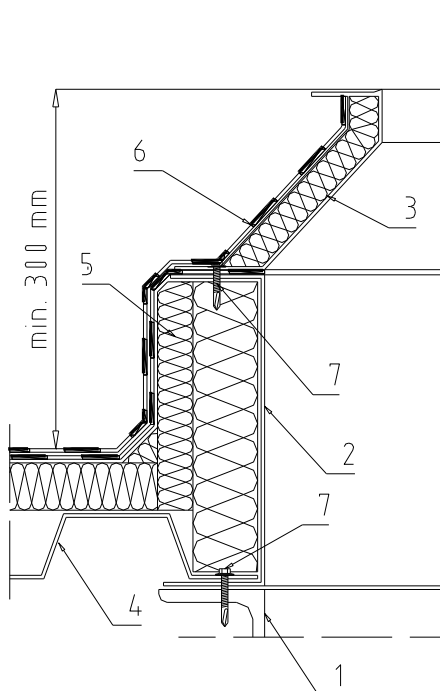
Fig. 3 – Metal base mounting variants

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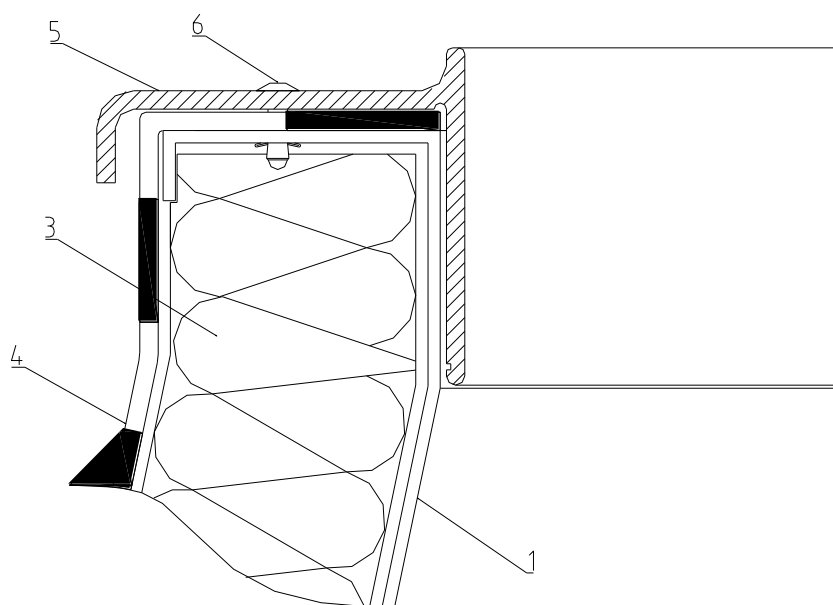
A. Mounting variant with the use of substructure

1. Supporting construction
2. Substructure
3. Laminate base
4. Trapezoid sheet
5. Thermal insulation
6. Anti-damp layer
7. Connectors

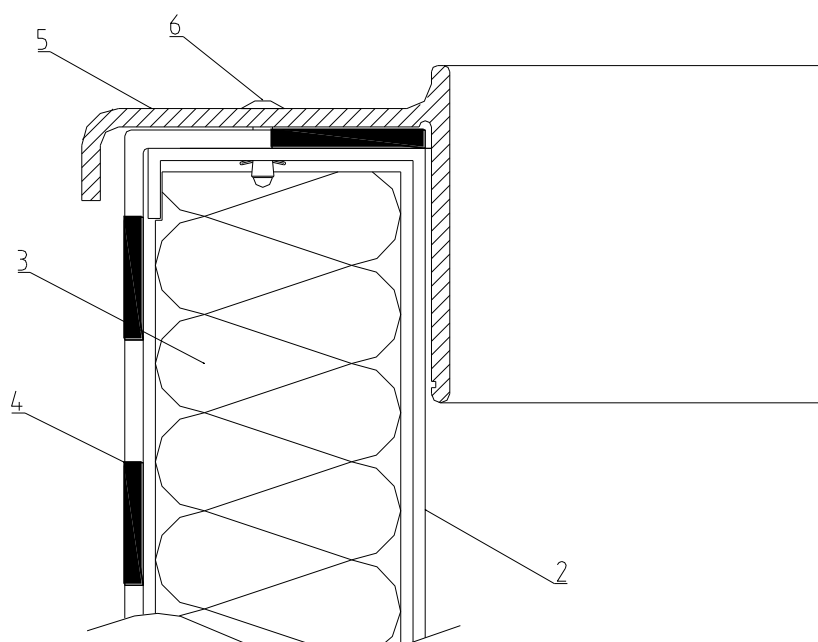


B. Mounting variant with the use of substructure (low base)

Fig. 4 – Laminate base mounting variants



A. Slant base



B. Straight flashing

1. Slant base made of galvanized steel or aluminium
2. Straight base made of galvanized steel or aluminium
3. Thermal insulation
4. Anti-damp layer
5. Tacking (compensating) frame
6. Galvanized steel rivets 4.8 x 25 (steel base)
or aluminium 4.8 x 25 (aluminium base)

Fig. 5 – Tacking frame mounting

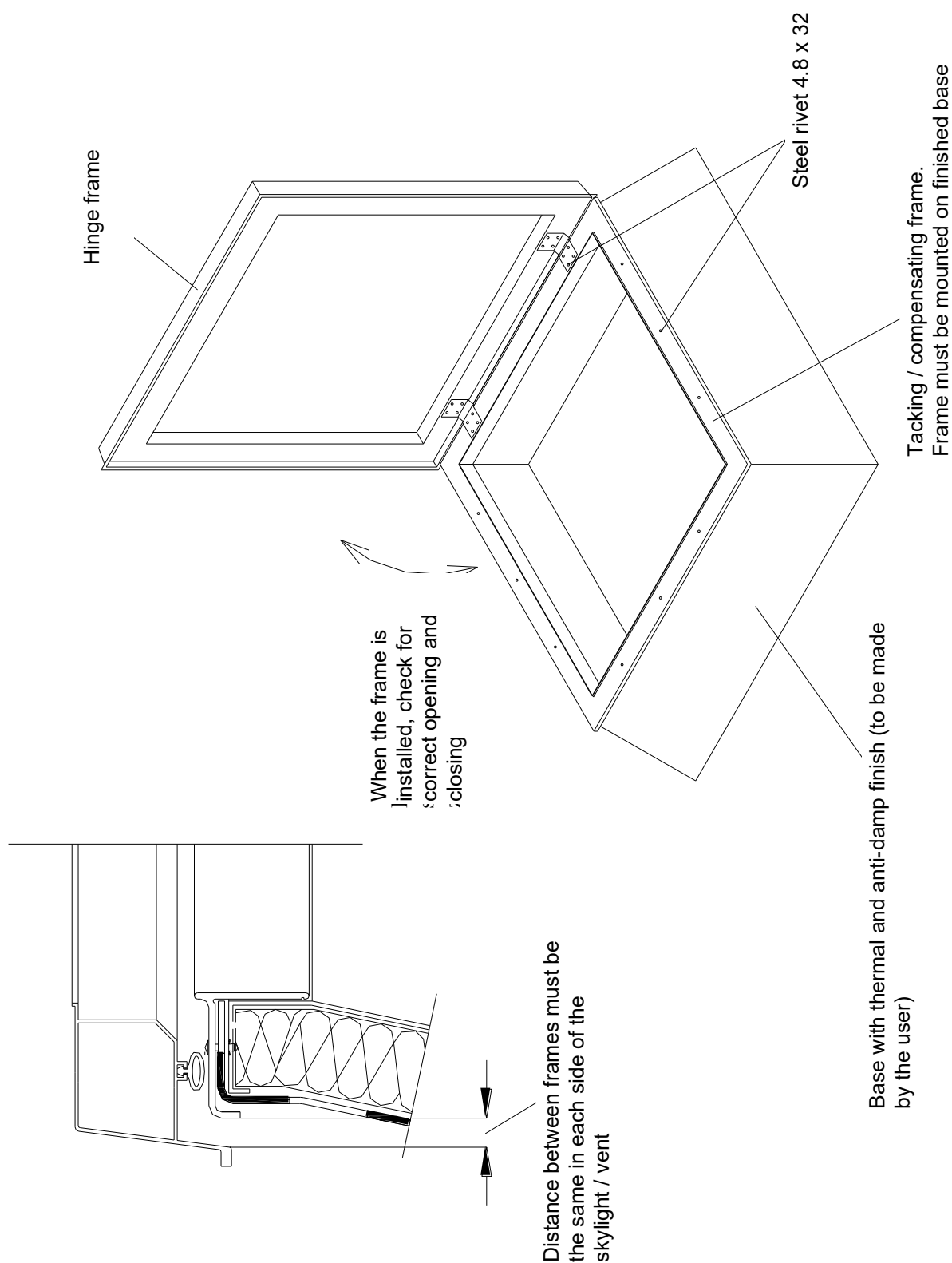


Fig. 6 – Tacking and hinge frame mounting

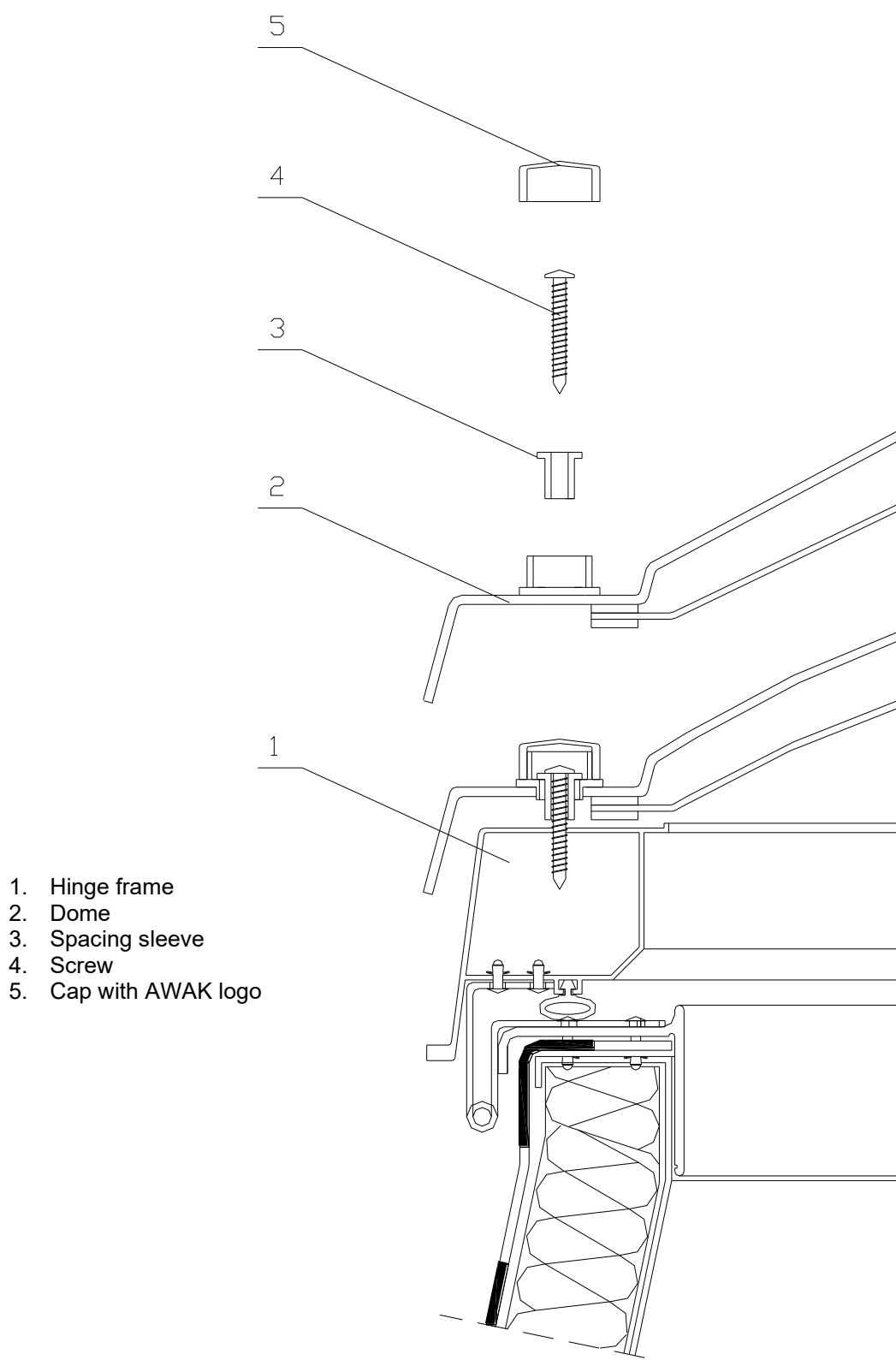


Fig. 7 – Dome and hinge frame mounting

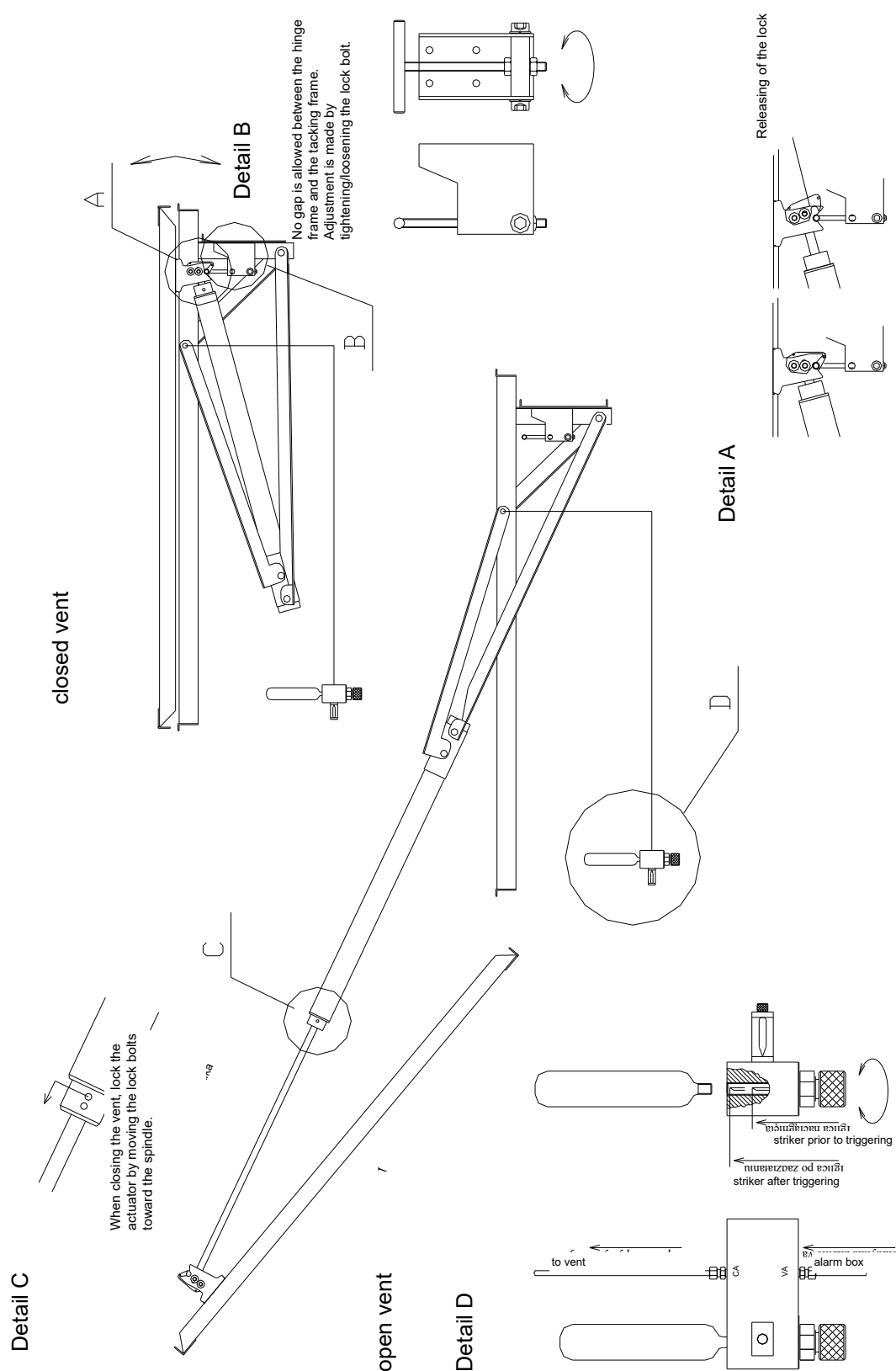


Fig. 8 – Smoke vent drive

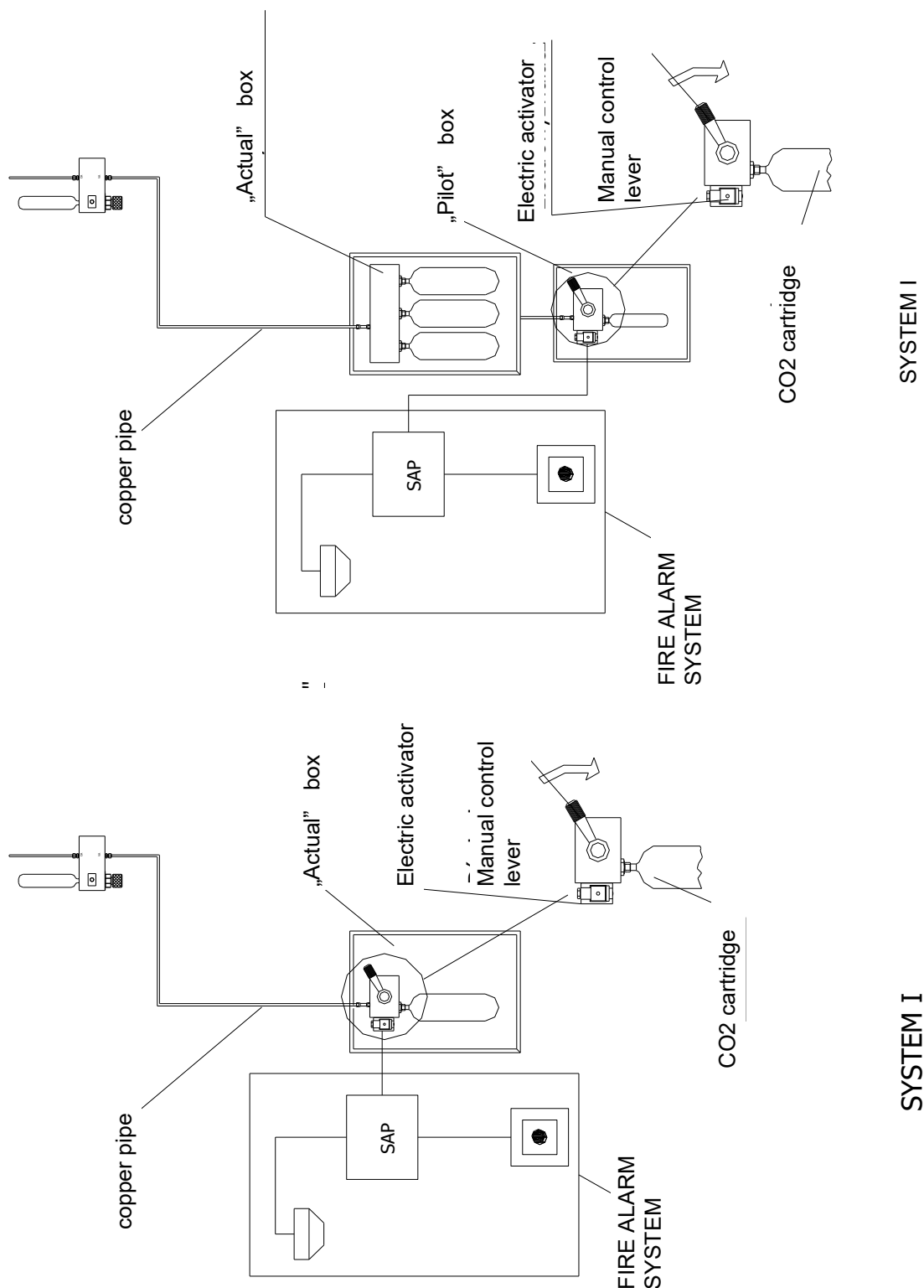


Fig. 9 – Smoke removal control