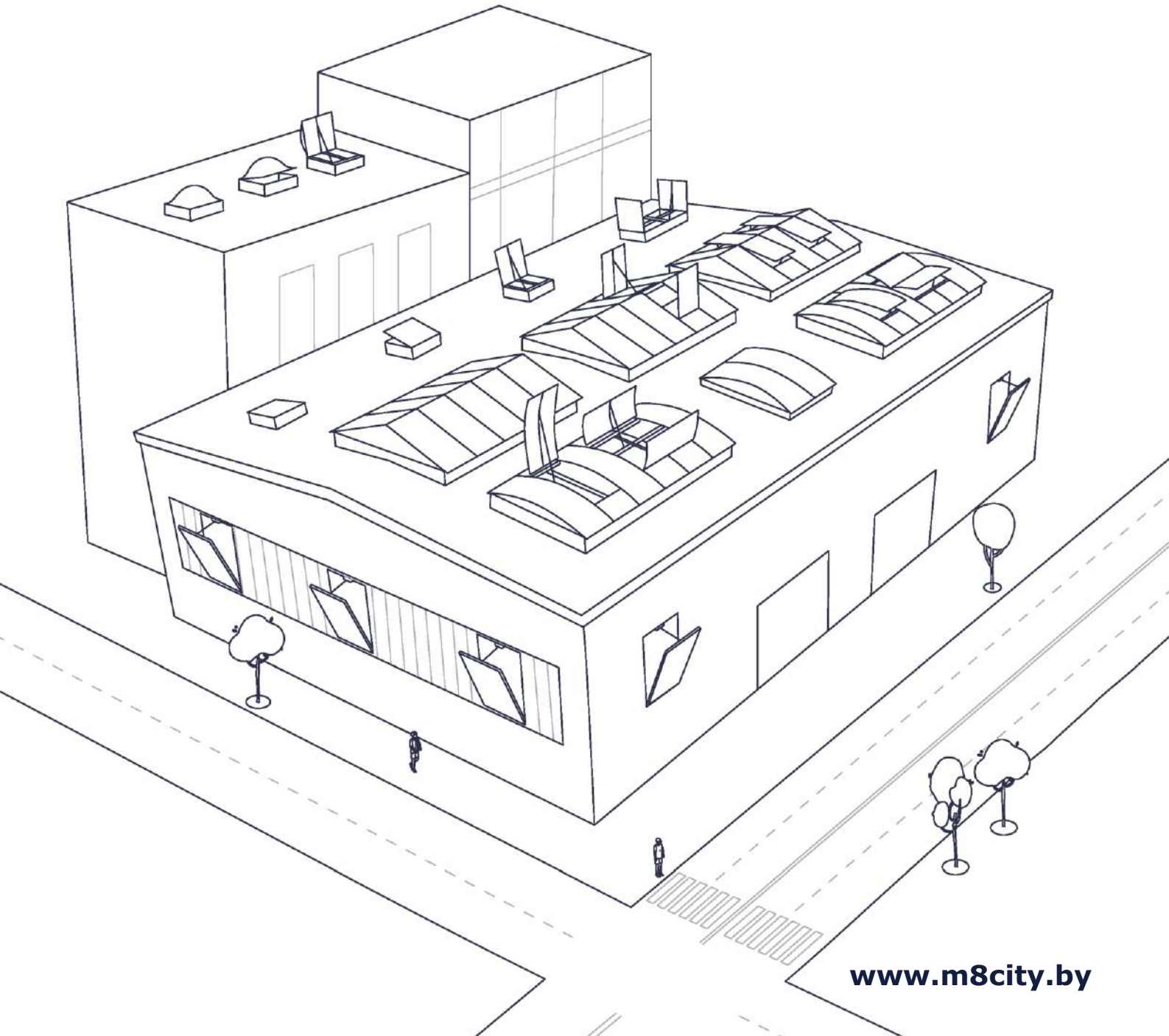
m8 city

Skylights

Smoke hatches

Ventilating bar



www.m8city.by

Content

1. About us

M8 City company is a leading Belarusian producer of skylights and smoke hatches.

M8 City offers skylights of two design versions: standard **M8CITY st** and premium **M8CITY Pro.**

Relying on our knowledge and experience, we offer a modern product providing roofing daylight, ventilation and smoke exhaust, created by unique new technology.
All products are executed based on the individual requirements of each customer with our own developments and of high-tech materials.

M8 City — a reliable partner:

- **Own production —**
  german precision equipment and highly qualified staff.
- **Complex approach —**
  design, production, assembly, service maintenance.
- **Innovative solutions —**
  unique proprietary profile system, reinforced construction of products.
- **Competency —**
  certificates confirming the consistent high quality of products
- **Guarantee —**
  5 year guarantee on all products.


СИСТЕМА СЕРТИФИКАЦИИ ГОСТ Р
СЕРТИФИКАТ СООТВЕТСТВИЯ


СЕРТИФИКАТ СООТВЕТСТВИЯ


МИНИСТЕРСТВО АРХИТЕКТУРЫ И СТРОИТЕЛЬСТВА РЕСПУБЛИКИ БЕЛАРУСЬ
РУП «БЕЛСТРОЙЦЕНТР»
СВИДЕТЕЛЬСТВО
О ТЕХНИЧЕСКОЙ КОМПЕТЕНТНОСТИ


СЕРТИФИКАТ

Welcome to cooperate!

You can receive competent technical and commercial advice
by calling our specialists:

Sales Office for Belarus
tel.: +375 17 311 09 02 www.m8city.by

Sales Office for Russian and Kazakhstan
tel.: +7 495 946 99 02 www.m8city.ru

2. Skylights and smoke hatches

Skylights is a translucent part of the roof construction, manufactured on a production side or directly on the roof using metal components and translucent filling purposed for daylighting and aeration of premises inside buildings and constructions.

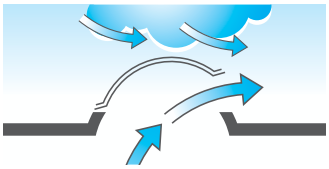
Fields of application: industrial, public, sports buildings and facilities, shopping centers, warehouses, logistics centers, airports, train stations.

2.1. Functions

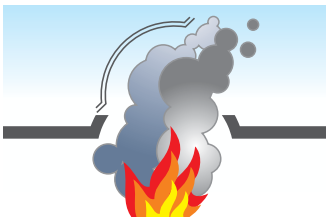
Daylight system provides effective management of energy consumption in buildings, which greatly improves the microclimate and working conditions, reduces the operating costs of the facility.

The benefits of using skylights and smoke hatches:

- **Effective and even illumination**
  The roof light gives twice as much illumination as the sidelight. As daylight gets into the premises not only 5-7 meters far from the window, but spreads over almost each square meter of the floor space, the lighting costs reduce. Also, the daylight is important for health and working efficiency improvement.



- **Natural ventilation**
  Due to the fresh air inflow from the outside, the temperature inside the premises remains comfortable. It reduces the costs of forced ventilation. If necessary, a hatch to be used as an access door to the roof.



- **Smoke exhaust**
  Removal of smoke and heat in case of fire allows to use evacuation ways and for fire service to work effectively.
  It keeps life of people, property and the building from an overheat and, as a result, a collapse.

- **Opportunity to simplify engineering systems of large buildings**
  Obtaining cost decrease by excluding is air ducts constructions.

- **Can be applied as blast-relief structures on explosive categories of buildings**

2.2. Types

M8 City offers the following types of skylights M8CITY pro:

1. **Construction types:** flat, continuous.
2. **Dome shapes:** arched, gabled (triangular), flat.
3. **Functions:** with smoke exhaust flaps, with ventilation flaps, without flaps.
4. **Opening type:** manual, pneumatic, electric.
5. **Filling type:** polycarbonate, energy-saving glazing.

BY **PRODUCION OF BY REPUBLIC OF BELARUS**

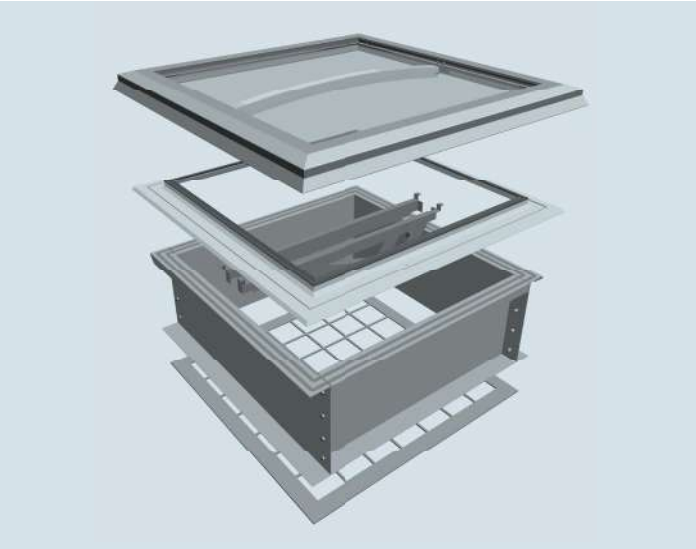
INDIVIDUAL DESIGN

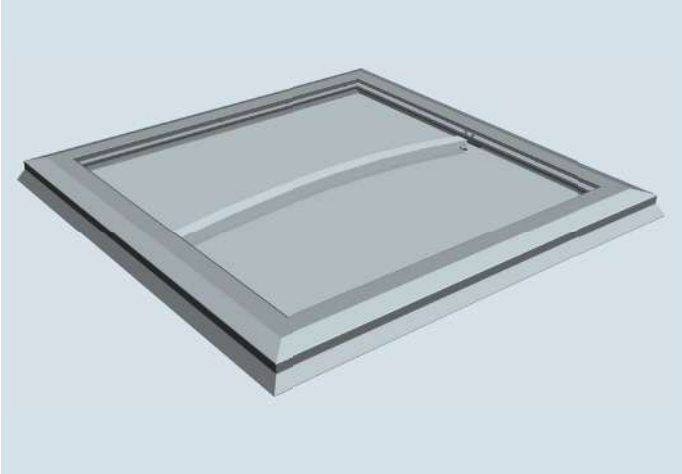
M8CITY pro — unique in detail

- **The best solution for the harsh climatic conditions of CIS** due to specially designed aluminum profile system
- **Maximum frost and moisture ingress protection** due to the double seal loop
- **Continuous operation at high wind and snow loads** due to the reinforced construction
- **High fire resistance and durability** due to the lack of plastic elements in the frame
- **Improved heat insulation** by filling the flap with polycarbonate up to 25 mm thick or an energy-saving glazing

2.3. Basic elements of skylights and smoke hatches.

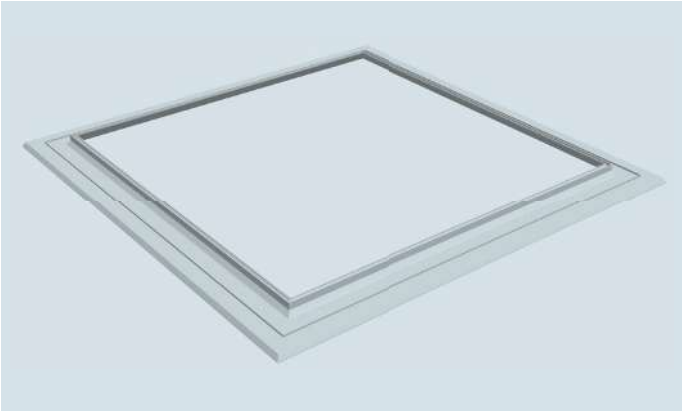
Components of a flat skylight M8CITY pro.





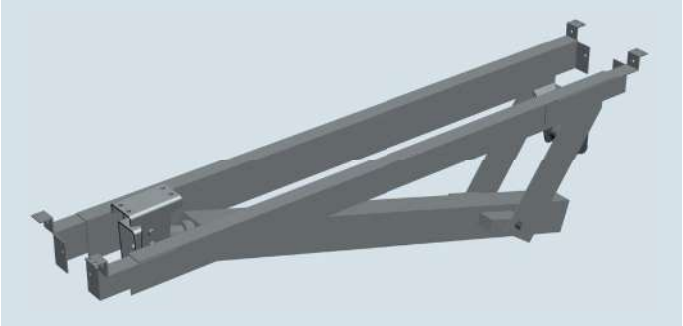
- **Flap**

Made of aluminum profiles of own design that provides lightness and durability of construction. Hollow polycarbonate of 16, 20 or 25 mm thick or an energy-saving glazing is used as a filling. The flap is equipped with a sealling loop.



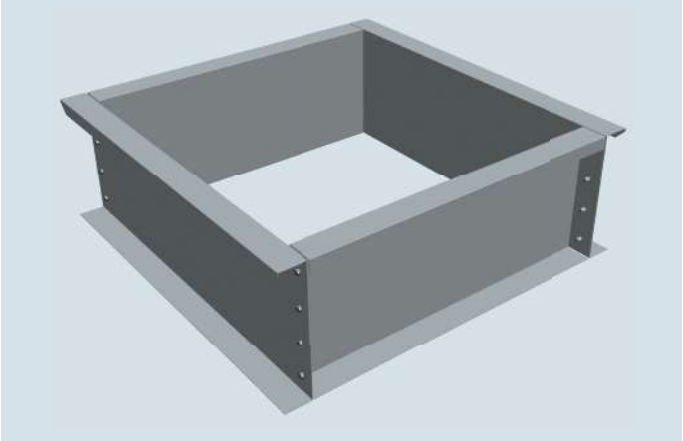
- **Underframe**

Made of aluminum profiles of own design with two protective bounds against moisture penetration. Completely eliminates leaks and significantly resists heat loss.
The structure of the underframe provides a seal loop and thermal break.



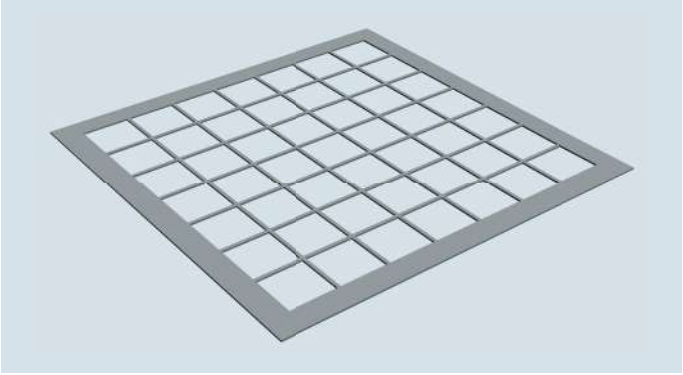
- **Opening mechanism**

Manual (ventilation function).
Pneumatic (smoke exhaust and ventilation function).
Electric (smoke exhaust and ventilation function).



- **Base**

Standart height — 450 mm. Available two types of bases – diagonal and straight.
Is made of stainless steel or galvanized steel sheet thickness 1.5 - 2.0 mm. The connection elements is carried out in bolts. Supplied in single layer without thermal insulation.



- **Additional options**

- protective grid.
- protective net (for glazing).
Provides protection from falling or penetration into the room through an opening. They prevent accidents on flat roofs. Is made of galvanized steel rods. Can be installed together with the basis, or separately for retrofitting.

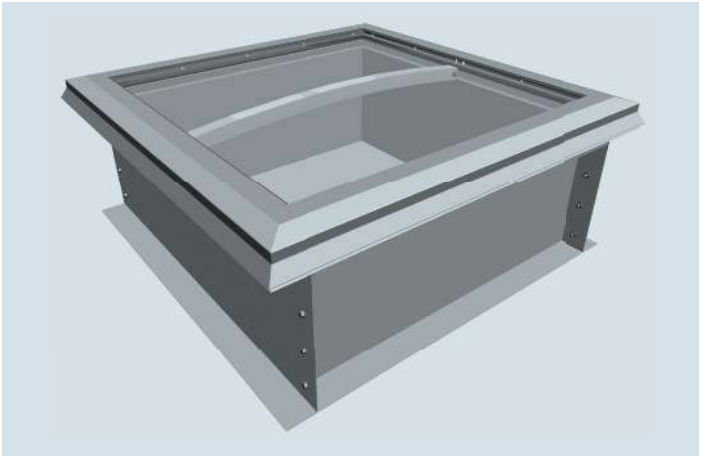
Skylights are made on the basis of industrial standard BY 191302027.001 TU - 2011, TU BY 191302027.002 - 2013, conform to safety requirements of technical regulations of TP 2009/013/BY and the technical certificate of the Ministry of Architecture of Republic of Belarus No. 01.2120.14.

Characteristics of M8CITY pro:
- Heat transfer coefficient:
Continuous skylights - 1,21 ² * °C/W, flat skylights - 1,27 m² * °C/W;
- Fire hazard class Broof (t1);
- Limit of fire resistance of E15 (double-glazed filling).

3. Flat skylights

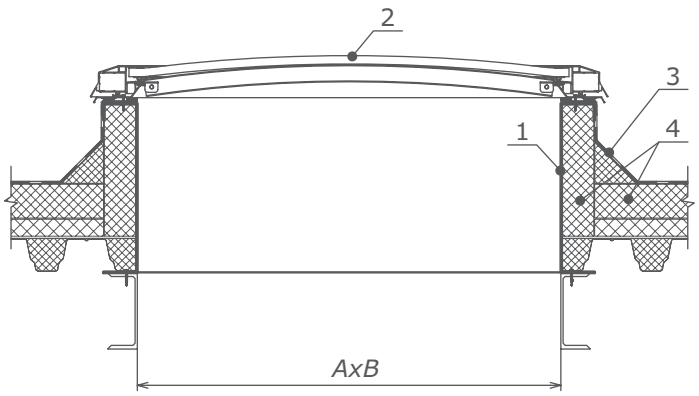
Skylights M8CITY pro have different shapes of the dome and functionality depending on purpose. Flat skylights are used for spotlighting of premises that are located almost under any site of a roof.

3.1. Non-opening skylights



Typical dimensions of skylights

Type	Aperture dimensions, AxB, mm	Area, m²	Weight, kg
Non-opening	1000x1000	1,0	78,1
	1200x1200	1,44	81,7
	1300x1300	1,69	87,5
	1500x1500	2,25	91,0
	1800x1800	3,24	100,3
	2000x2000	4,0	103,9



1. Skylight base — galvanized steel
2. Light transmitting filling — polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation*

* — not included in scope of supply

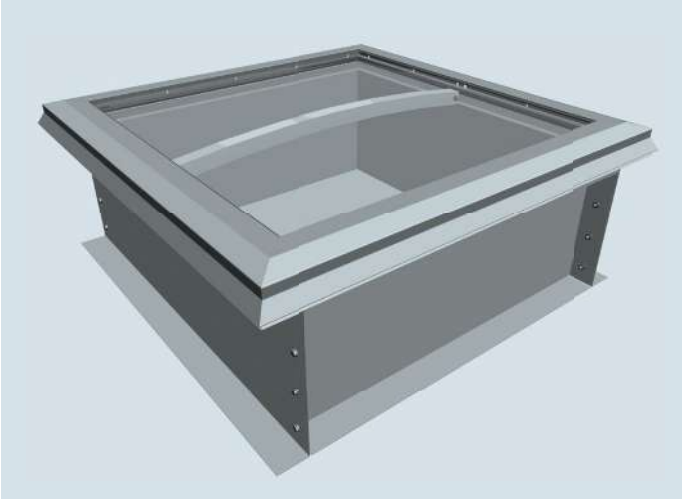
3.2. Operable skylights

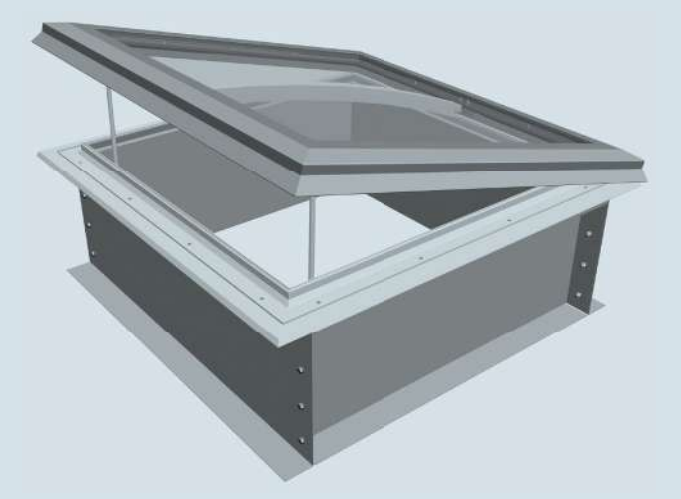
Typical dimensions of flat skylights

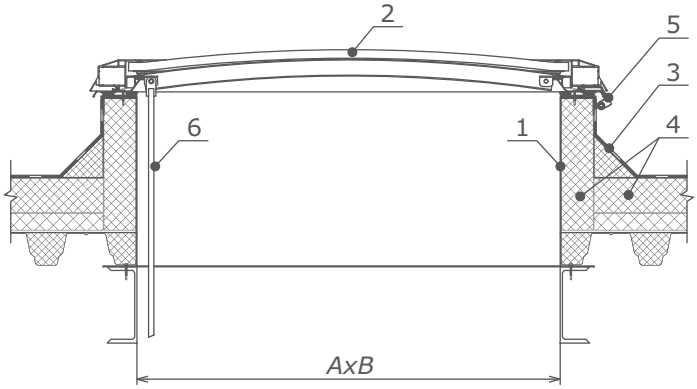
Type	Aperture dimensions, AxB, mm	Area, m²	Current area of smoke exhaust, m²	Weight, kg
operable	1000x1000	1,0	0,65	78,1
	1200x1200	1,44	0,94	81,7
	1300x1300	1,69	1,10	87,5
	1500x1500	2,25	1,47	91,0
	1800x1800	3,24	2,11	100,3
	2000x2000	4,0	2,61	103,9

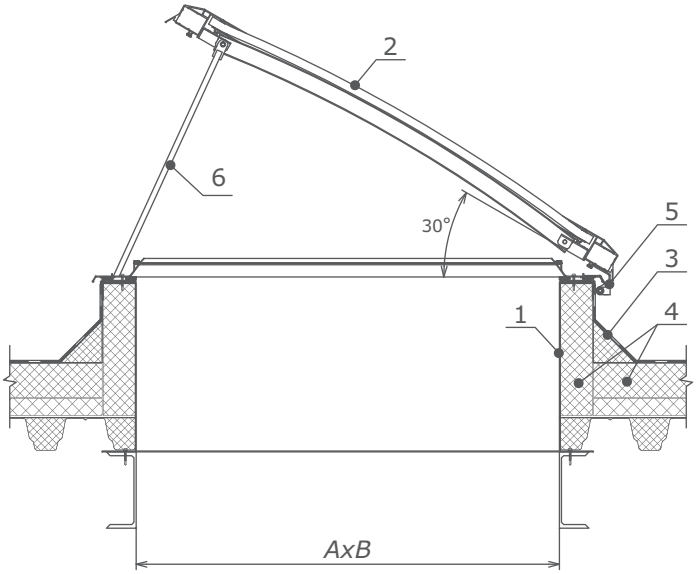
Skylights production of other sizes and also with a rectangular shape of the basis is possible.
For intermediate values of aperture sizes the operating area of smoke removal is defined by method of linear interpolation.
Weight is specified for the standard height of the basis (450 mm) and is calculated considering the filling of a flap with 20 mm hollow polycarbonate.

3.2.1. Manual opening hatches





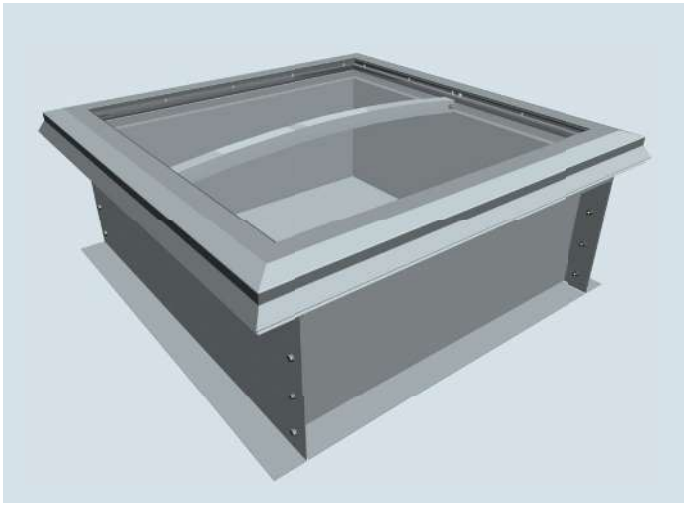


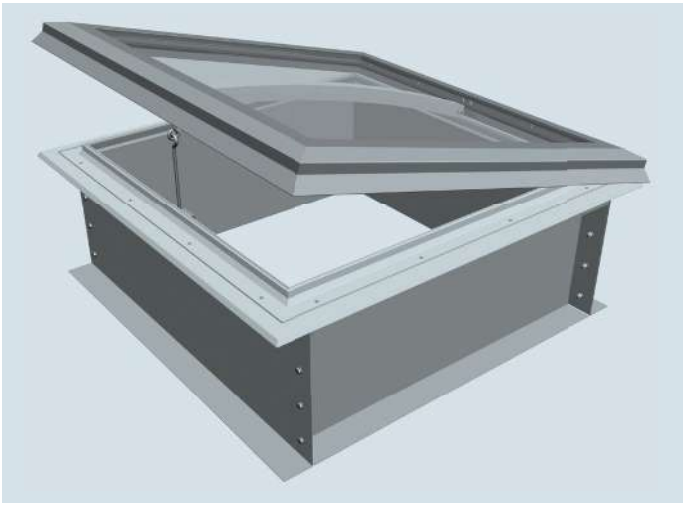


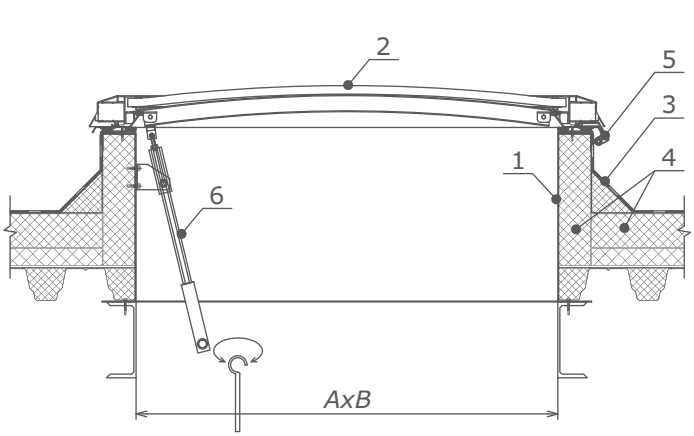
1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation *
5. Secret from stainless steel loop
6. Complete support

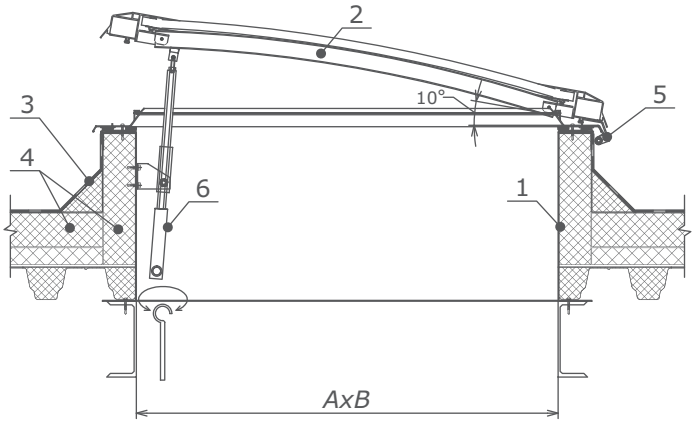
* — not included in scope of supply

3.2.2. Mechanical opening hatches





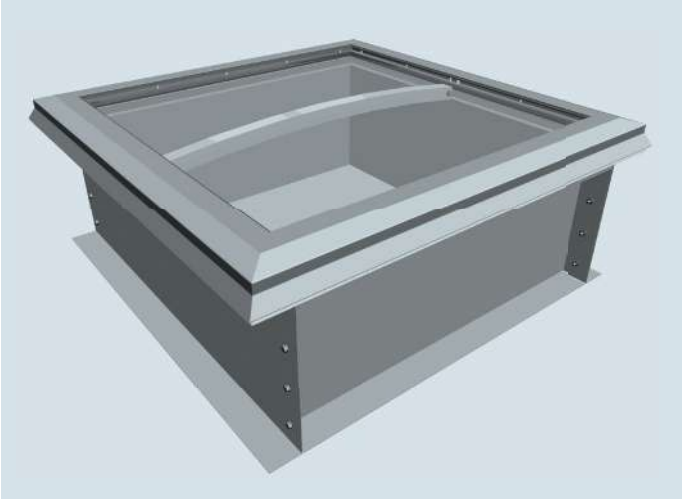


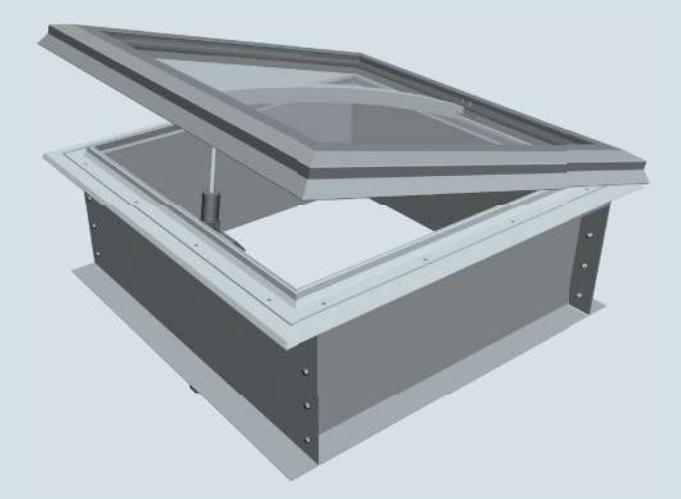


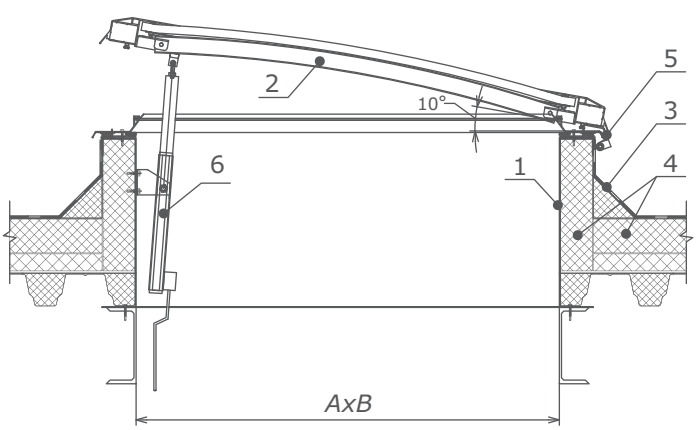
1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation *
5. Secret from stainless steel loop
6. Manual actuator

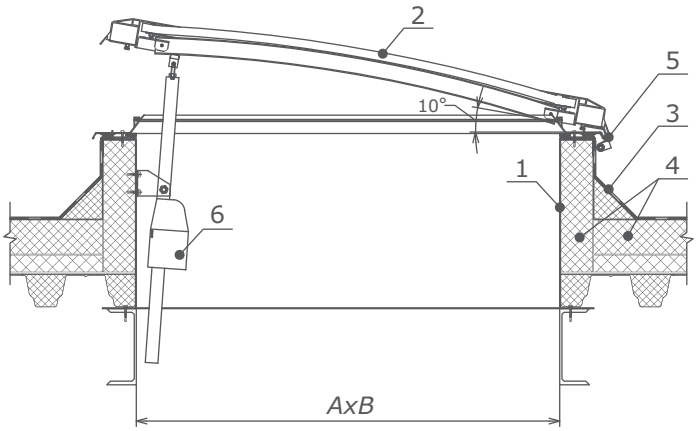
* — not included in scope of supply

3.2.3. | Electric and pneumatic opening hatches





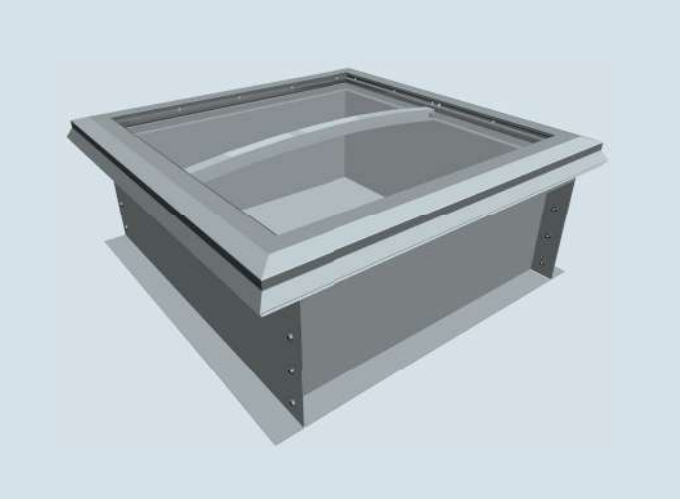




1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation *
5. Secret stainless steel loop
6. Electric or pneumatic actuator

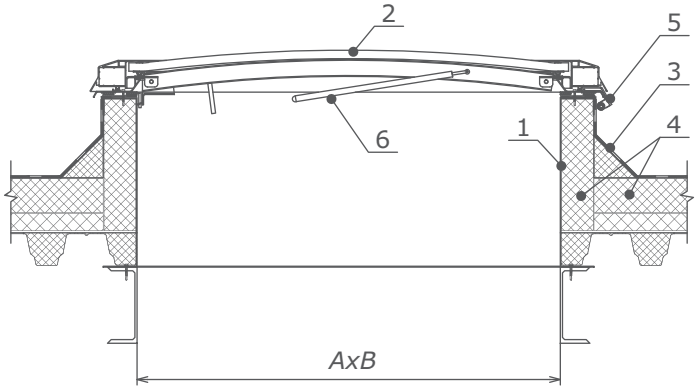
* — not included in scope of supply

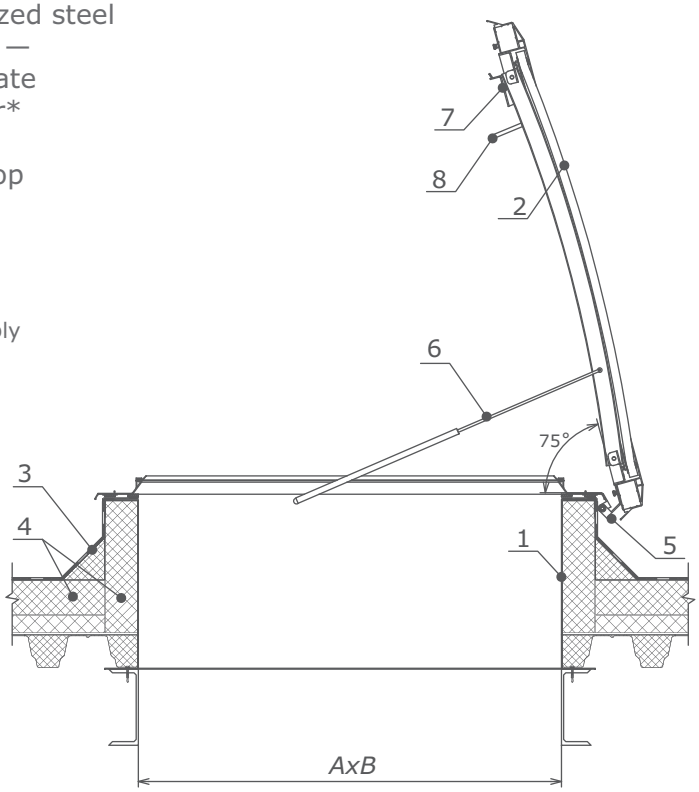
3.2.4. | Access hatches



1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation*
5. Secret stainless steel loop
6. Gas spring
7. Locking device
8. Handle

* — not included in scope of supply





Typical dimensions of access hatches.

Type	Aperture dimensions AxB, mm	Area, m^2	Weight, kg
Access hatch with manual opening	800x800	0,64	63,6
	1000x1000	1,0	69,1
	1200x1200	1,44	72,7
	1300x1300	1,69	74,5
	1500x1500	2,25	78,0
	1800x1800	3,24	83,3
	2000x2000	4,0	86,9

Production of other size hatches is possible.
For intermediate values of aperture sizes the operating area of smoke removal is defined by method of linear interpolation.
Weight is calculated considering the filling of a flap with 20 mm hollow polycarbonate.

4. Continuous skylights

Mounted on the roof to provide additional daylight on large facilities, such as factory floors, warehouses, shopping centers.

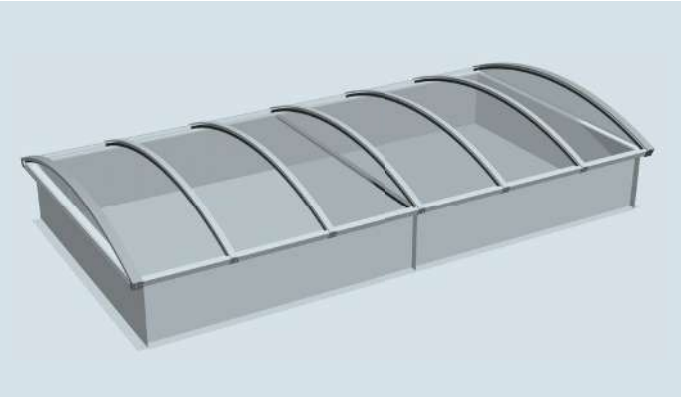
Available width ranges: from 1000 to 8000 mm at unlimited length.

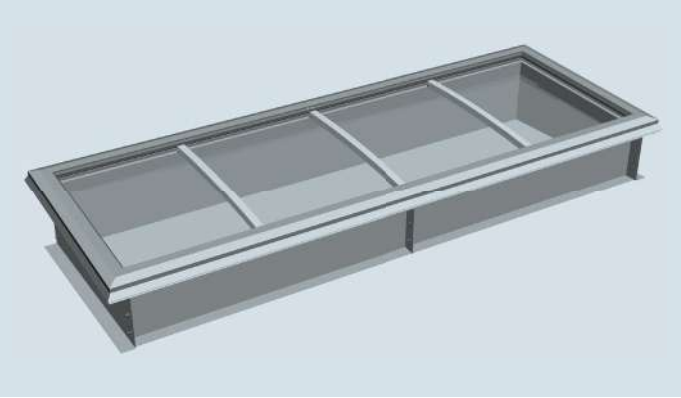
For skylights with wide bases a rigid connection of pipes for overlap is provided every 2500-3000 mm.

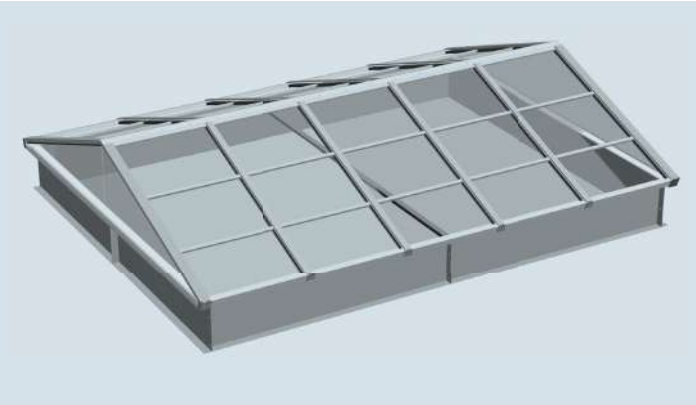
In skylights of M8CITY pro series smoke removal and ventilation flaps can be installed.

4.1. Non-opening skylights

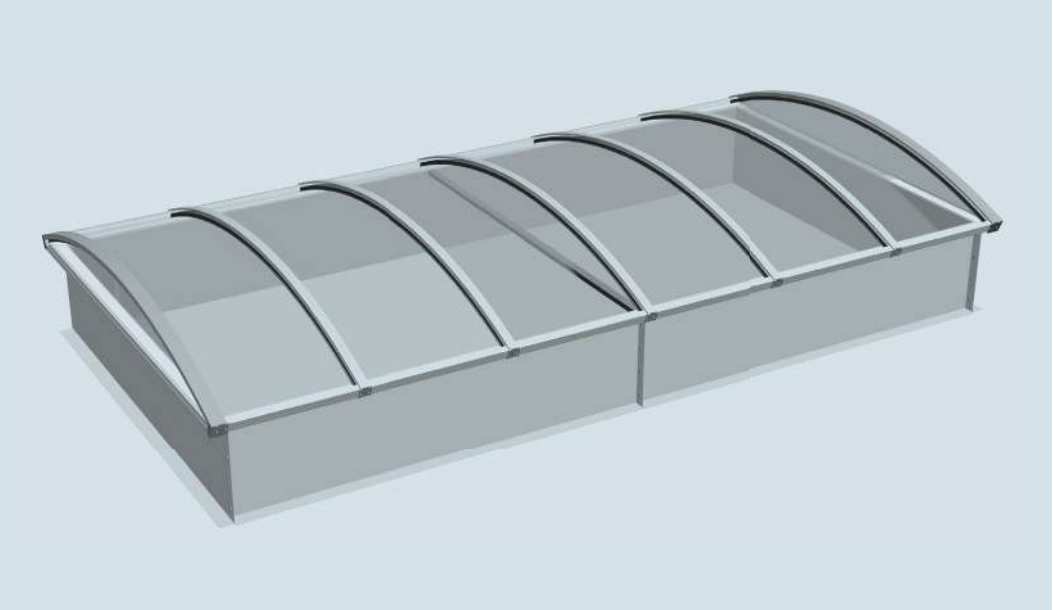
Daylight system via skylights not only provides a comfortable working environment in the room, but also an effective management of energy consumption in the building due to the extension of the natural daylight.
Available width ranges: from 1000 to 8000 mm at unlimited length.

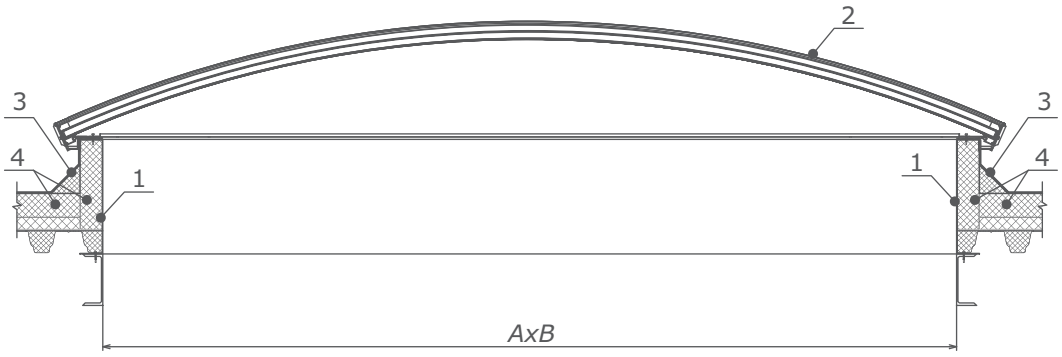






4.1.1. Non-opening skylight with arched dome

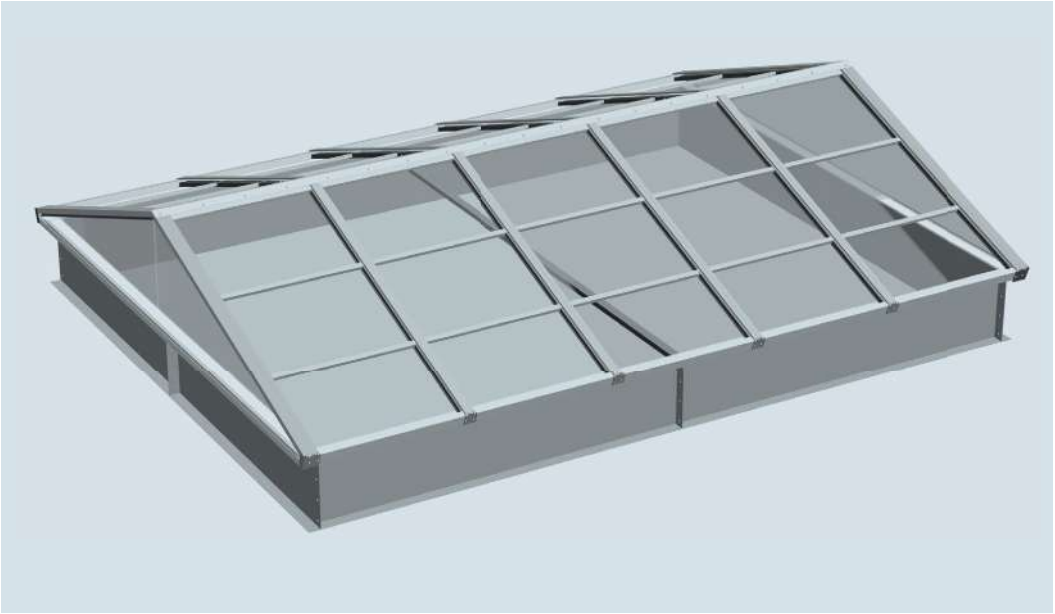


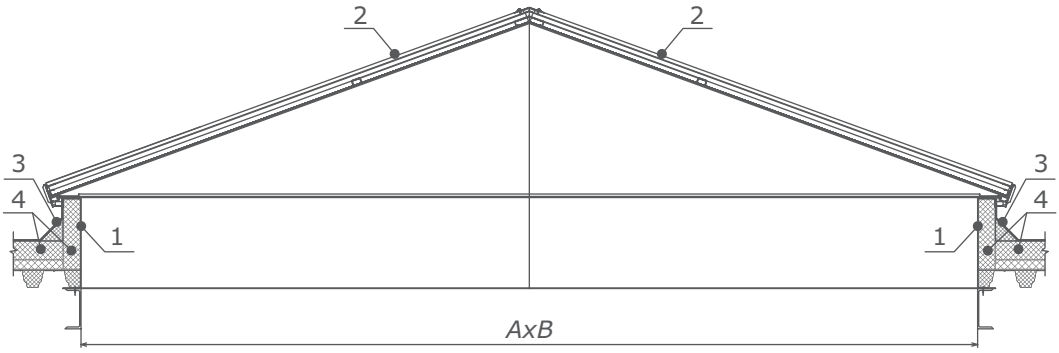


1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation*

* — not included in scope of supply

4.1.2. Non-opening skylights with gabled (triangular) dome





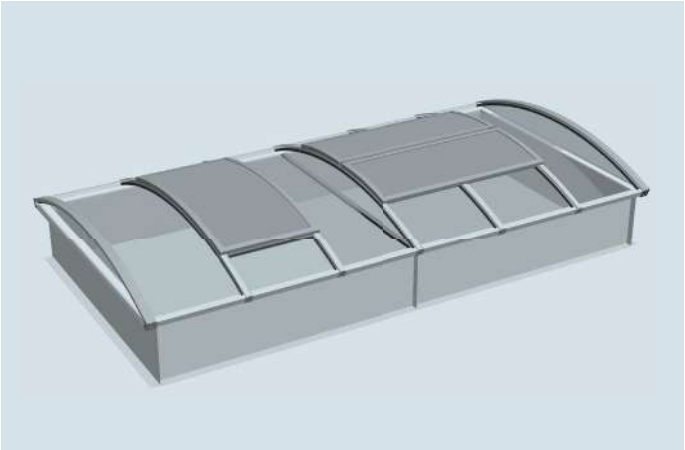
1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation*

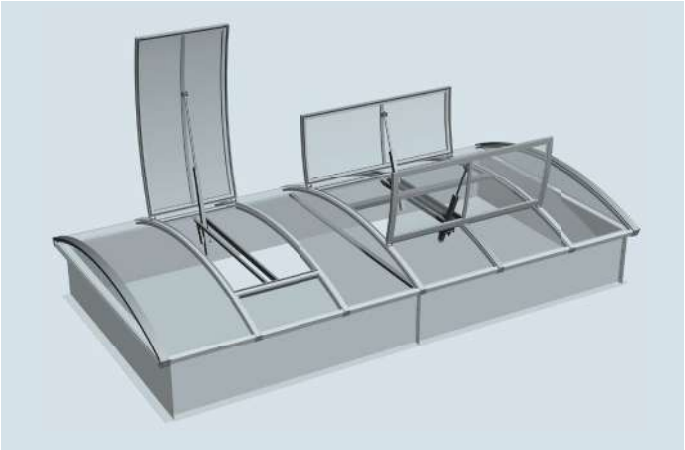
* — not included in scope of supply

4.2.1. Arched dome skylights with smoke flaps

Smoke hatch as part of skylight ensures the smoke and heat removal in case of fire. Alternatively can be supplied with an electric actuator for daily aeration and ventilation.

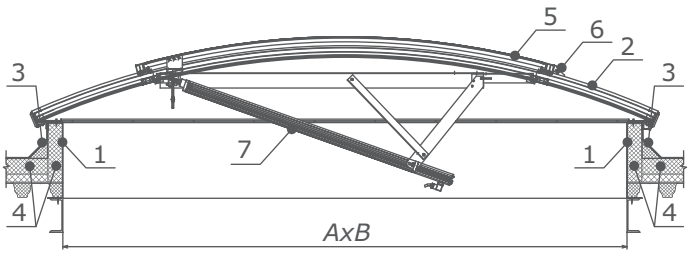
Available width ranges: from 1000 to 8000 mm at unlimited length.

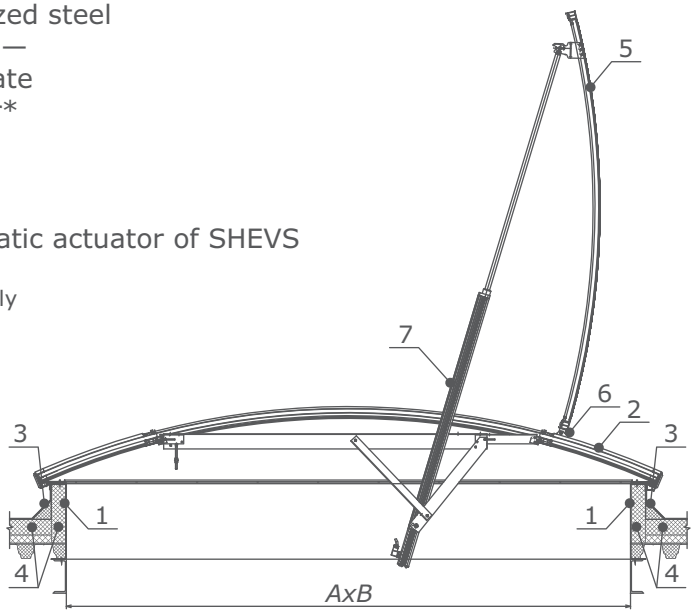




1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation*
5. Operable flap
6. Hinges - Stainless Steel
7. Electric 24 W or pneumatic actuator of SHEVS

* — not included in scope of supply





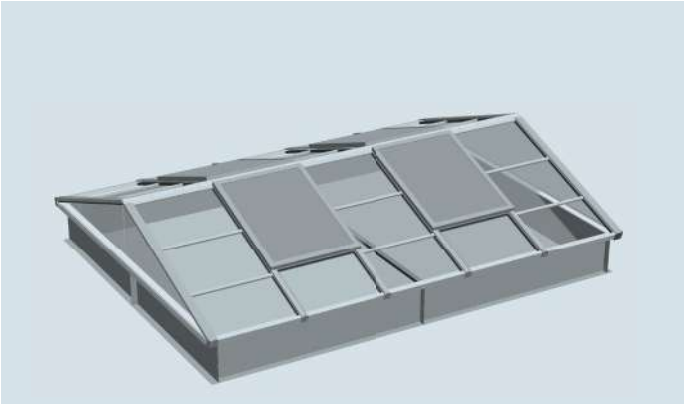
Typical dimensions of flaps in skylights with arched dome

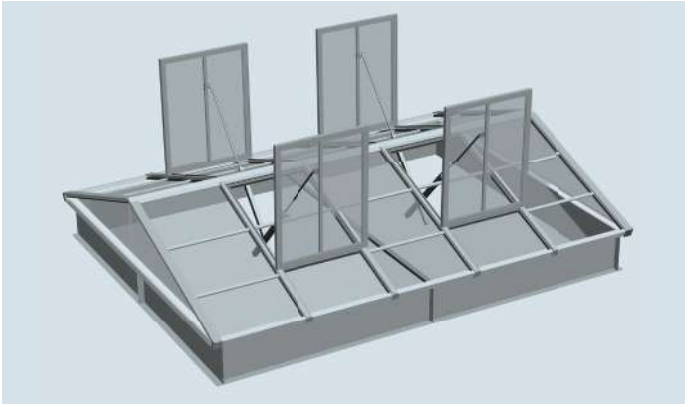
Type of flap	Flap dimensions, AxB, mm	The current area of smoke exhaust, m²	The effective area of the flap in the skylight, m²	Weight, kg
Single-flap	1000x1000	0,65	0,70	36,30
	1000x1200	0,78	0,84	43,56
	1000x1400	0,91	0,98	50,82
	1000x1600	1,04	1,12	58,08
	1000x1800	1,17	1,26	65,34
	1000x2000	1,31	1,40	72,60
	1200x1200	0,94	1,01	52,27
	1200x1600	1,25	1,34	69,70
	1200x1800	1,41	1,51	78,41
	1200x2000	1,57	1,68	87,12
	1500x1500	1,47	1,58	81,68
	1500x1800	1,76	1,89	98,01
	1500x2000	1,96	2,10	108,90
	1800x1800	2,11	2,27	117,61
	1800x2000	2,35	2,52	130,68
	2000x2000	2,61	2,80	145,20
Double-flap	1000x1500	0,98	1,05	70,80
	1000x2500	1,63	1,75	118,00
	1200x1200	0,94	1,01	67,97
	1200x2100	1,64	1,76	118,94
	1500x1500	1,47	1,58	106,20
	1500x2100	2,06	2,21	148,68
	1500x2500	2,45	2,63	177,00
	1800x2100	2,47	2,65	178,42
	2000x2100	2,74	2,94	198,24
	2000x2500	3,26	3,50	236,00

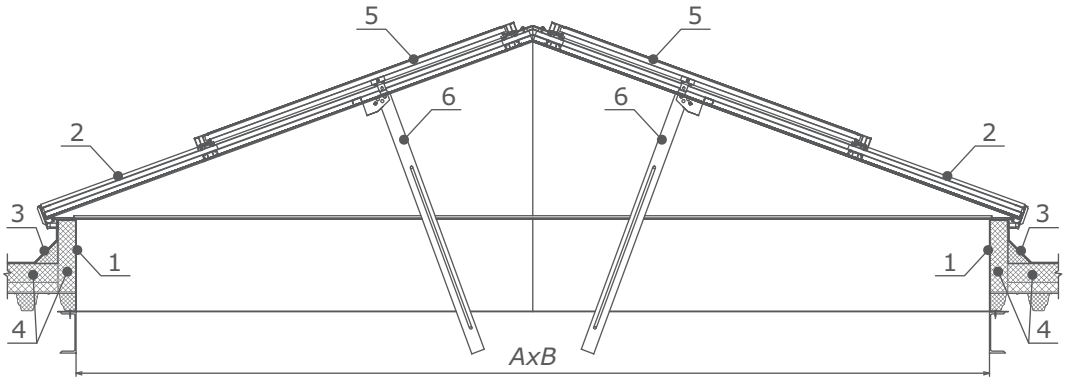
Hatches production of other sizes is possible.
For intermediate values of aperture sizes the operating area of smoke removal is defined by method of linear interpolation.

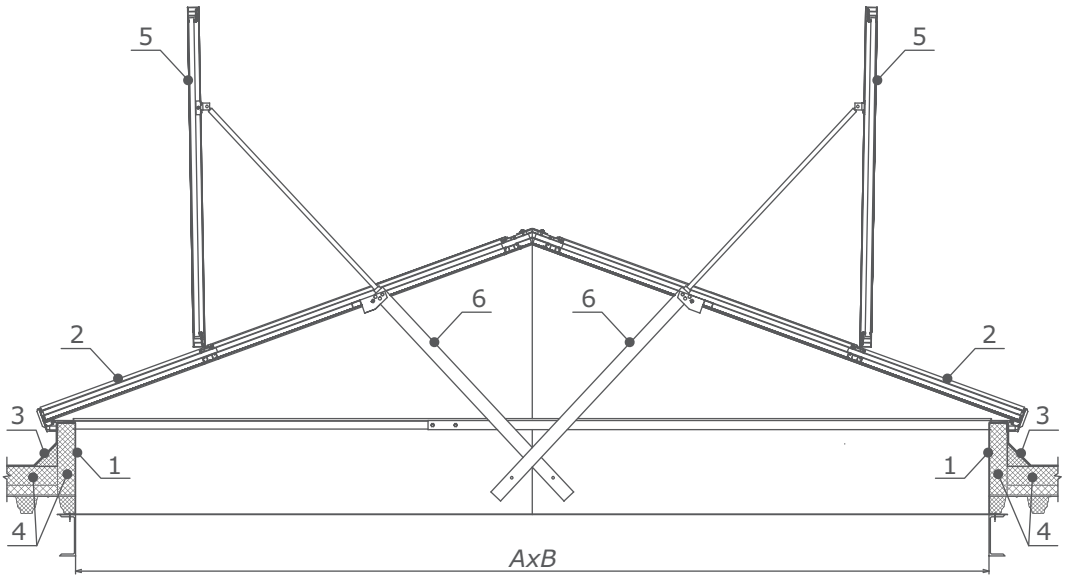
Weight is calculated considering the filling of a flap with 20 mm hollow polycarbonate.

4.2.2. Gabled dome skylights with smoke flaps









1. Skylight bases — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation*
5. Operable flap
6. Electric 24 V or pneumatic actuator of SHEVS

* — not included in scope of supply

Typical dimensions of flaps in skylights with gabled dome

Type of flap	Flap dimensions, AxB, mm	The current area of smoke exhaust, m²	The effective area of the flap in the skylight, m²	Weight, kg
Single-flap	1000x1000	0,68	0,70	36,30
	1000x1200	0,82	0,84	43,56
	1000x1400	0,95	0,98	50,82
	1000x1600	1,09	1,12	58,08
	1000x1800	1,22	1,26	65,34
	1000x2000	1,36	1,40	72,60
	1200x1200	0,98	1,01	52,27
	1200x1600	1,31	1,34	69,70
	1200x1800	1,47	1,51	78,41
	1200x2000	1,63	1,68	87,12
	1500x1500	1,53	1,58	81,68
	1500x1800	1,84	1,89	98,01
	1500x2000	2,04	2,10	108,90
	1800x1800	2,20	2,27	117,61
	1800x2000	2,45	2,52	130,68
	2000x2000	2,72	2,80	145,20

For calculation of a double-flap skylight the data indicated in the table is multiplied by 2. The production of alternative size skylights with different numbers of flaps is available.

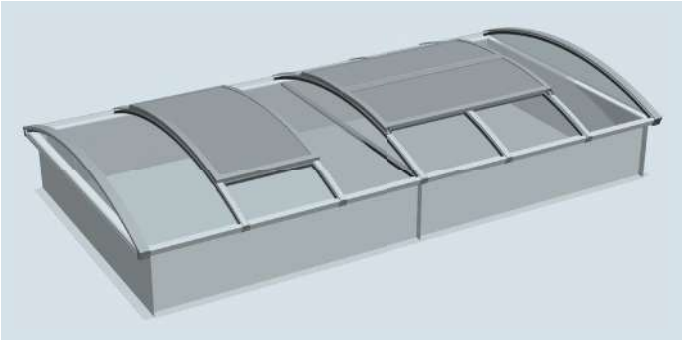
For intermediate values of aperture sizes the operating area of smoke removal is defined by method of linear interpolation.

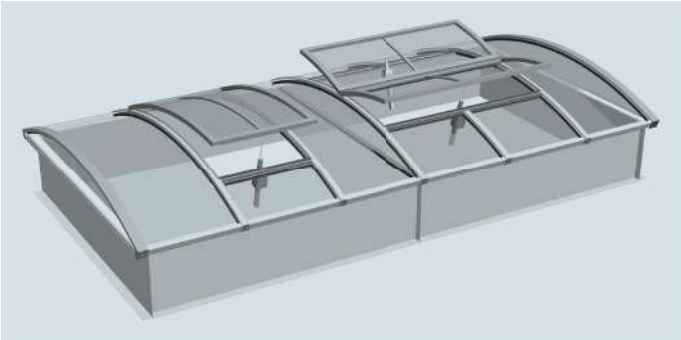
Weight is calculated considering the filling of a flap with 20 mm hollow polycarbonate.

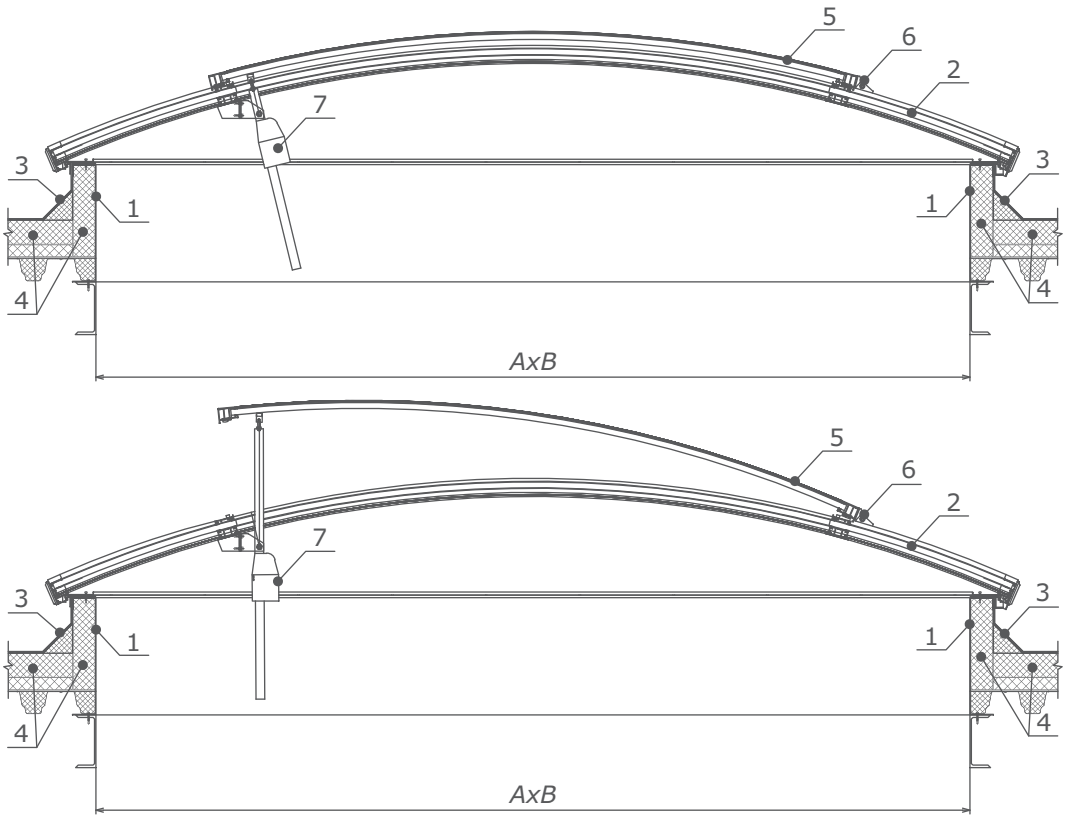
4.3. Skylights with ventilation flaps

The ventilation flaps of continuous skylight are installed for ventilation and air extraction, is indispensable to ensure a favorable microclimate in the premises.

Available width ranges: from 1000 to 8000 mm at length unlimited







1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation*
5. Operable flap
6. Hinges - stainless steel
7. 220V actuator for ventilation

* — not included in scope of supply

5. Smoke hatches

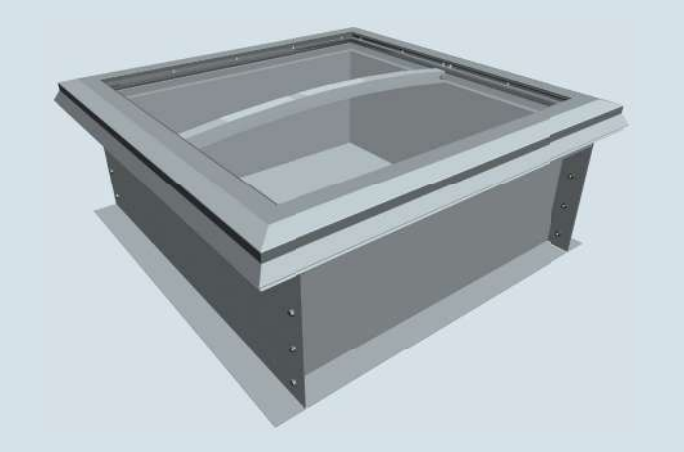
Typical dimensions of smoke hatches

Type	Aperture dimensions, AxB, mm	Area, m^2	The current area of smoke exhaust , m^2	Weight, kg
Flat single-flap	1000x1000	1,0	0,65	78,1
	1200x1200	1,44	0,94	81,7
	1300x1300	1,69	1,10	87,5
	1500x1500	2,25	1,47	91,0
	1800x1800	3,24	2,11	100,3
	2000x2000	3,24	2,61	103,9
Flat double-flap	1600x1600	2,16	1,30	117,8
	1800x1800	2,79	1,67	121,3
	2000x2000	3,5	2,10	124,9
	1200x2500	2,37	1,42	122,8
	1200x3000	2,85	1,71	127,3
	1500x2000	2,5	1,50	120,3
	1500x3000	3,75	2,25	129,9
	1600x1800	2,44	1,46	119,6
	1600x2000	2,8	1,68	124,5
	1600x2500	3,6	2,16	126,1
	1600x3000	4,4	2,64	130,8
	1800x2500	4,0	2,40	127,8
	1800x2800	4,54	2,72	130,6
	1800x3000	4,9	2,94	132,6
	2000x2400	4,3	2,58	128,6
	2000x2500	4,5	2,70	134,3
	2000x2800	5,1	3,06	137,6
	2000x3000	5,5	3,30	140,2

Production of other size hatches is possible.
For intermediate values of aperture sizes the operating area of smoke removal is defined by method of linear interpolation.

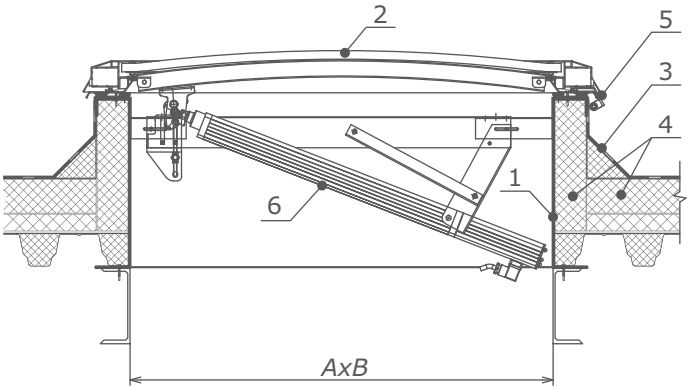
Weight is calculated considering the standard base (450mm) and filling of a flap with 20 mm hollow polycarbonate.

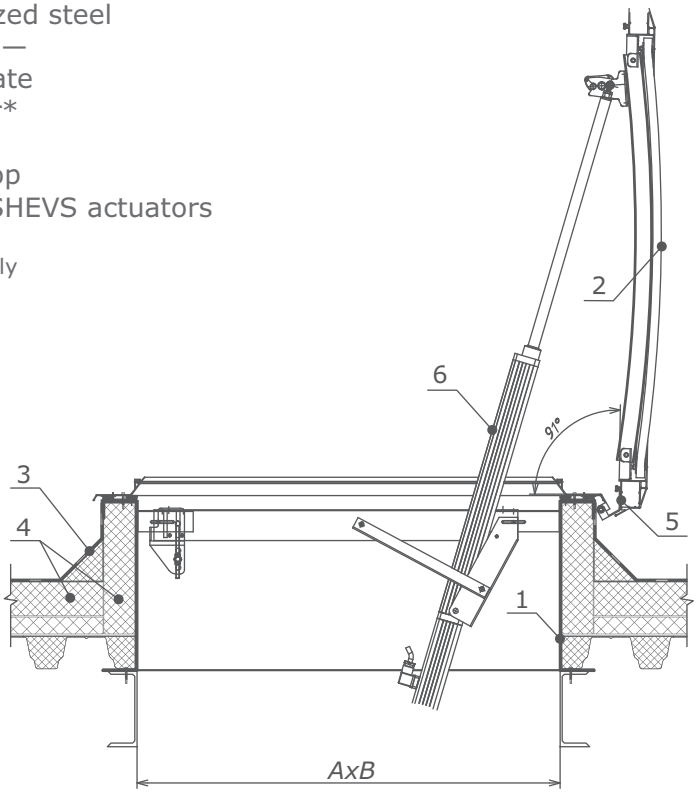
5.1. Single-flap smoke hatches



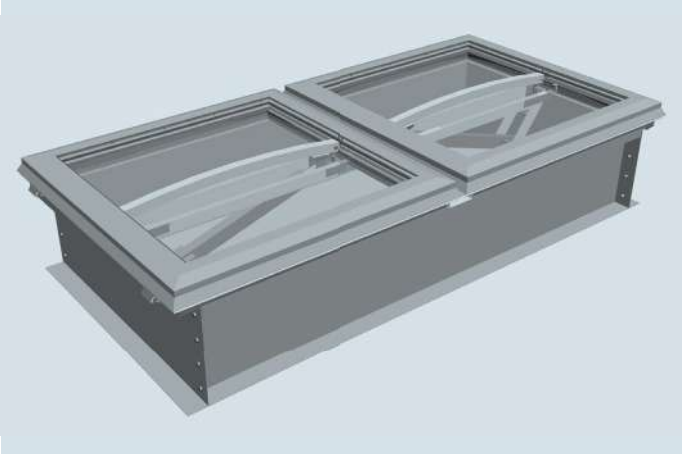
1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation *
5. Secret stainless steel loop
6. Electric and pneumatic SHEVS actuators

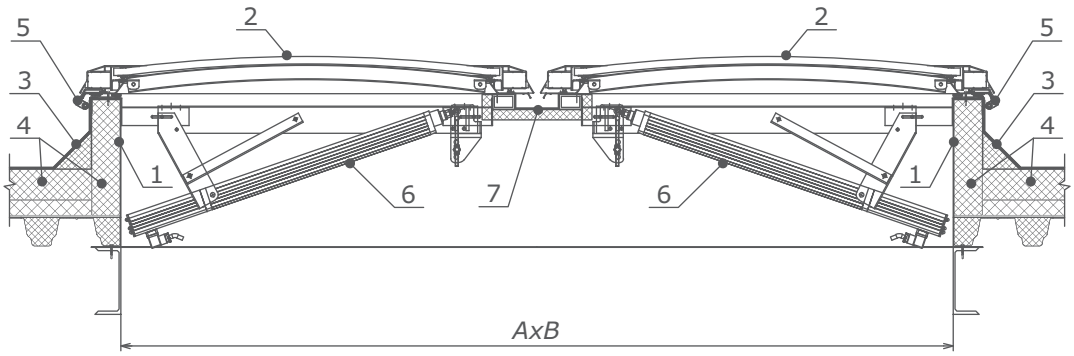
* — not included in scope of supply





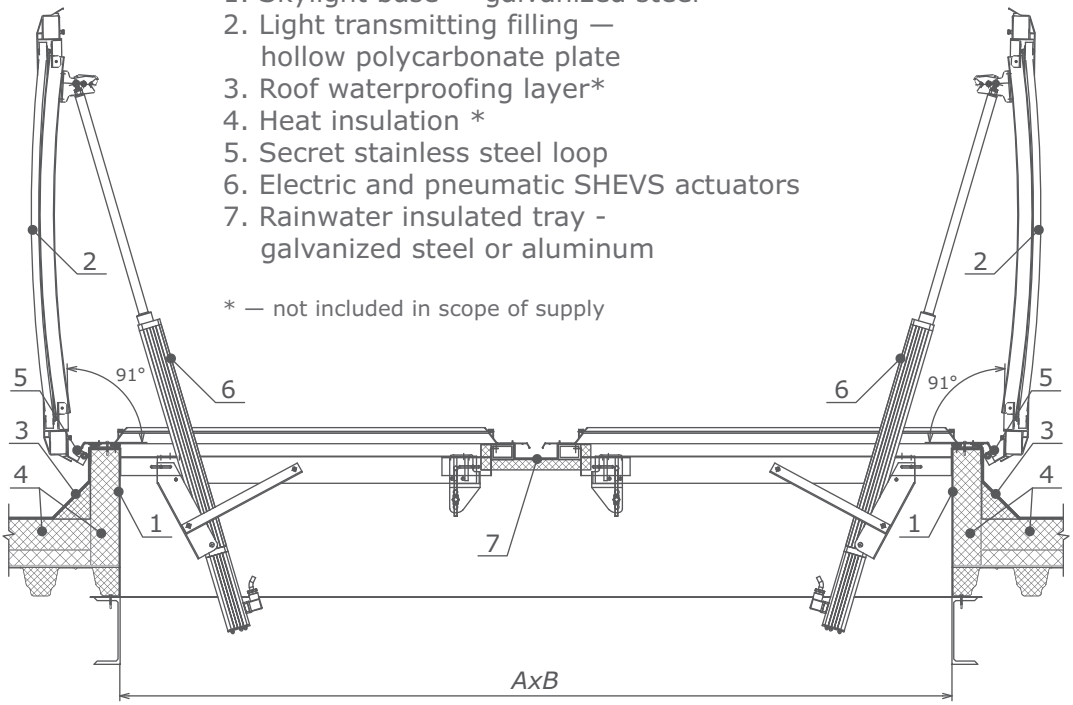
5.2. Double-flap smoke hatches





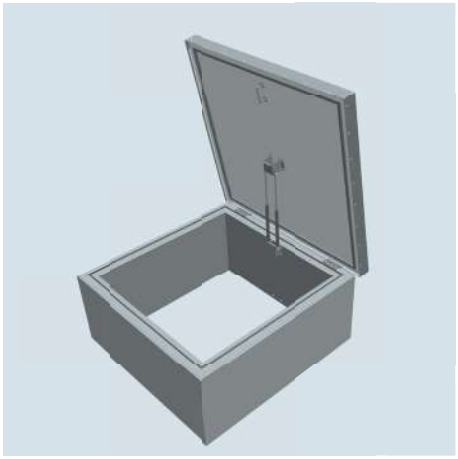
1. Skylight base — galvanized steel
2. Light transmitting filling — hollow polycarbonate plate
3. Roof waterproofing layer*
4. Heat insulation *
5. Secret stainless steel loop
6. Electric and pneumatic SHEVS actuators
7. Rainwater insulated tray - galvanized steel or aluminum

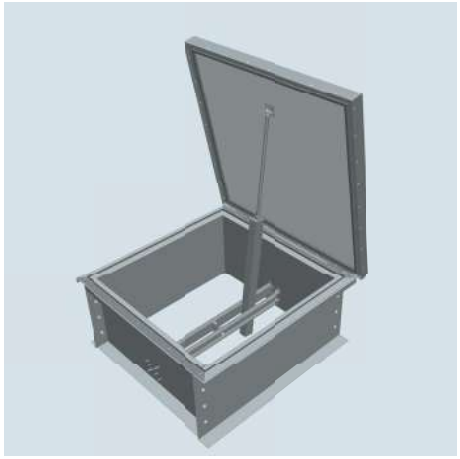
* — not included in scope of supply

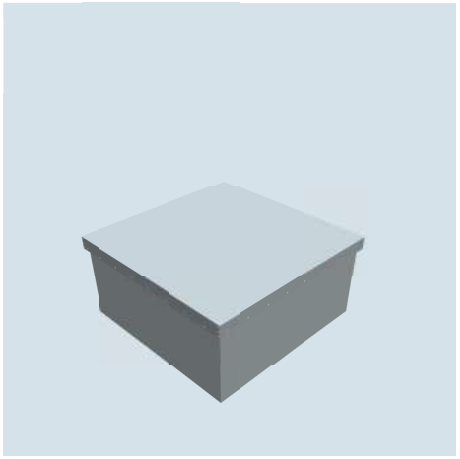


5.3. Fire hatches for access to the roof

Fire hatches for access to the roof are designed to evacuate staff from upper floors of multi-storey buildings and structures in case of such emergencies as fires, smoke, floods, etc. Moreover, a fire hatch prevents spreading of smoke and fire and creates an artificial and reliable barrier.

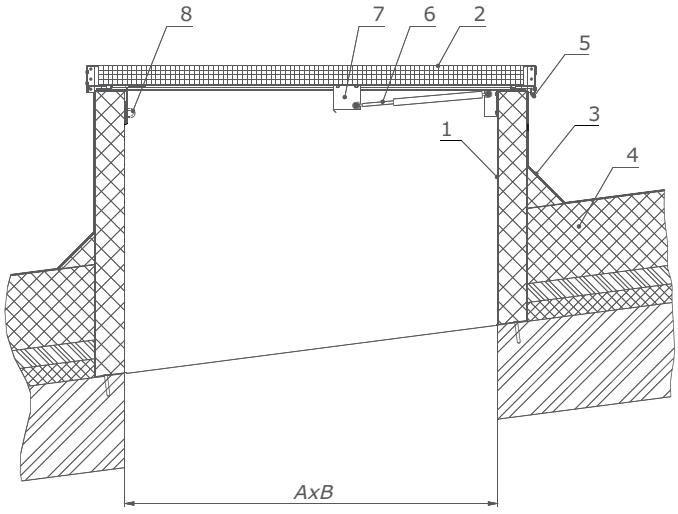


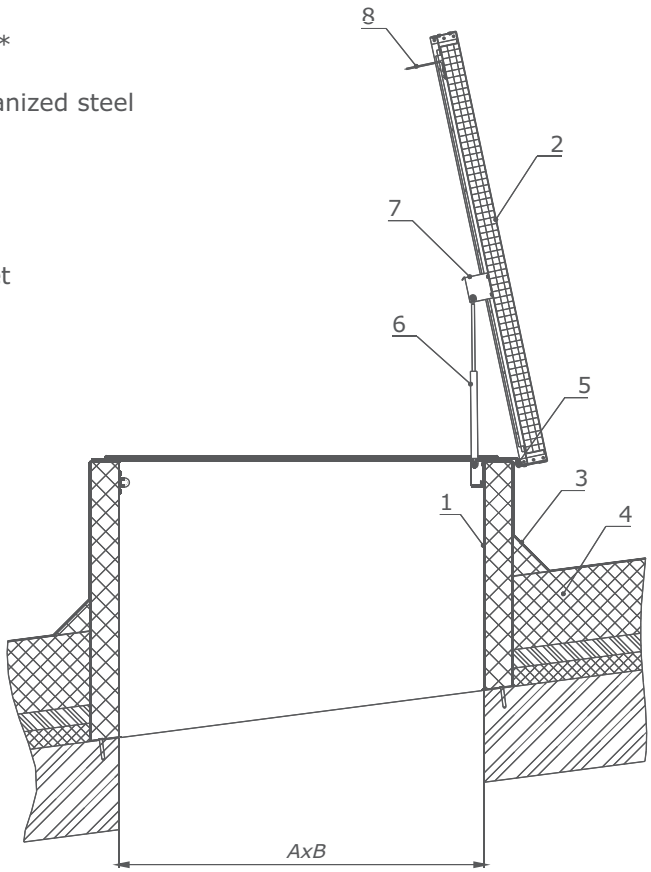




1. Foundation of hatch – galvanized steel
2. A fire hatch's access door
3. Water isolation – roof cladding*
4. Thermal insulation*
5. Concealed hinge made of galvanized steel
6. Gas spring
7. Attachment forging-handle
8. Closure mechanism

* — is not included in a supply set





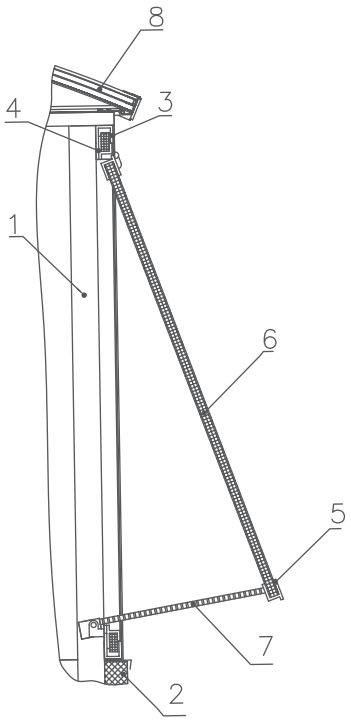
Normal sizes of fire hatches for access to the roof

Type of hatch	Aperture dimension, AxB, mm	Area, sq.m.	Weight of hatch, kg
Double-leaved with manual opening	650x900	0,59	28
	750x900	0,68	31
	600x800	0,48	25
	800x800	0,64	30
	850x800	0,68	31
	900x900	0,81	34
	950x900	0,86	37
	950x950	0,90	38
	800x1000	0,80	35
	900x1000	0,90	38
	1000x1000	1,00	41
	1000x1100	1,10	45
	1000x1200	1,20	48
	1000x1300	1,30	51

It is possible to produce fire hatches for access to the roof of intermediate sizes.
The weight is calculated with account for filling the door with 50 mm thick insulant.

6. Ventilating skylights with vertical doors

The difference between ventilating skylights with vertical doors and flat skylights with a horizontal dome involves slight insolation, scattered light and low level of dirt retention of vertical polycarbonate stained glass. This construction of skylights is more waterproof, it is always free of snow and convenient for executing cleaning and maintenance. Such skylights comprise simple device and are reliable in operation. In addition, only ventilating skylights with vertical doors allow to ventilate a room regardless of precipitation.
Ventilating skylights can be equipped with ventilation or smoke extraction doors.



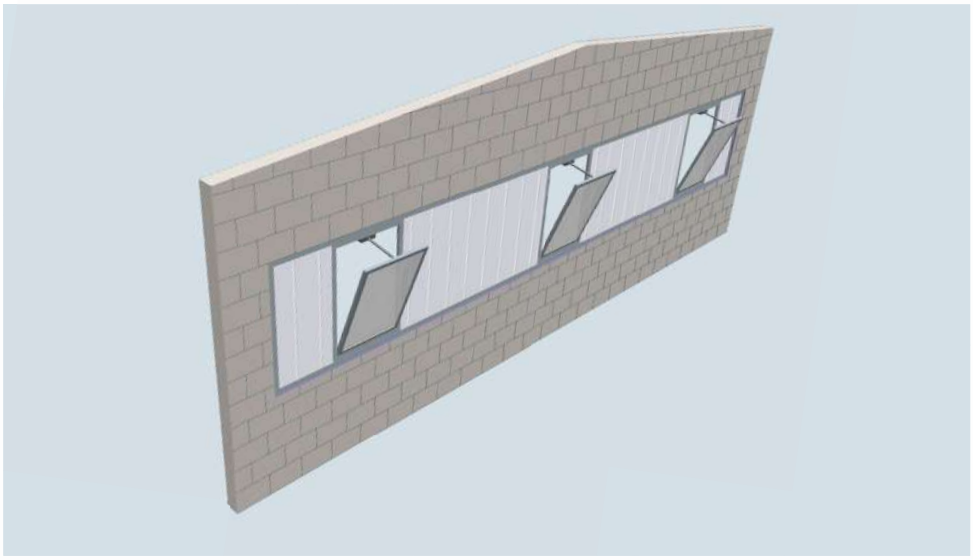
1. Structural frame
2. Heat insulated foundation
3. U – shaped structural shape of a vertical stained glass's frame
4. A door's complementary structural shape
5. A door's structural shape
6. A door's filling with cellular polycarbonate
7. Ventilation / smoke extraction drive
8. A skylight's dome

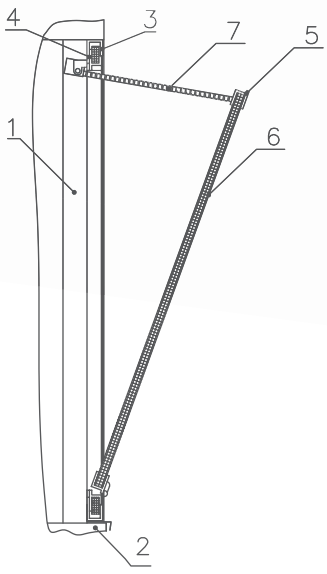
Normal sizes of ventilating skylights with vertical doors
A stained glass's height:
from 1750 mm to 2500 mm – single stage door;
from 1200 mm to 1500 mm – double stage door;
A skylight's width: 6000 mm and 12000 mm*
A skylight's length: from 6000 mm to 84000 mm*
(*) – this type of skylights is manufactured from 6-meters long modules similar to Series no. 1.464.3-22.

It is possible to produce ventilating skylights of intermediate sizes.

7. Vertical ventilating bar

Vertical ventilating bars are designed to create natural light inside the buildings where there are no flat skylights or the building itself has several levels or floors. Ventilating bars possess slight insolation, scattered light and low level of dirt retention.
Vertical ventilating bars can be dumb or can comprise ventilation or smoke extraction doors. The most effective ventilation of rooms can be achieved by using together flat skylights and ventilating bars with integrated doors. In this case, the doors of ventilating bars will serve as supply ventilation. In addition, vertical doors allow to ventilate a room regardless of precipitation.





1. A wall's metal trimming joist
2. Elements of a building's wall
3. U – shaped structural shape of a vertical stained glass's frame
4. A door's complementary structural shape
5. A door's structural shape
6. A door's filling with cellular polycarbonate
7. Ventilation / smoke extraction drive

Normal sizes of vertical ventilating bars

A stained glass's height:
from 1200 mm to 6000 mm.
A stained glass's length: not limited.

It is possible to produce ventilating bars of unique typical sizes.

8. Control systems for smoke hatches

To control the flaps of skylights and smoke hatches a special control system is used.

Data for assignment control systems may be of three types:
- ventilation control system
- smoke exhaust control system
- mixed system

Besides the executive mechanisms are divided by type of management:
- pneumatic system
- electric system
- combined pneumatic-electric system

Smoke exhaust control system is activated automatically, by a special sensor that detects the appearance of smoke or an increase in temperature, and together with the hatch make up an automatic smoke exhaust system. If required control system in addition to the automatic start-up can be equipped with other options: remote, manual activation and activation via the main fire alarm system.
Due to this, the synchronic operation of smoke exhaust system with the action of sprinkler systems, smoke and fire curtains, fire protection barriers, action or forced ventilation system, a managing influence of aeration holes is possible. The SHEV system can be additionally equipped with the necessary sensors and weather-control station, which opens hatches for ventilation, closes in rain or strong wind.

Automatic smoke exhaust devices are used to remove from the closed premises (production halls, warehouses, public buildings, etc.) smoke, fire gases and heat to the outside of the facility, contributing to the preservation of life and property.

8.1. Electric control system for smoke exhaust and ventilation

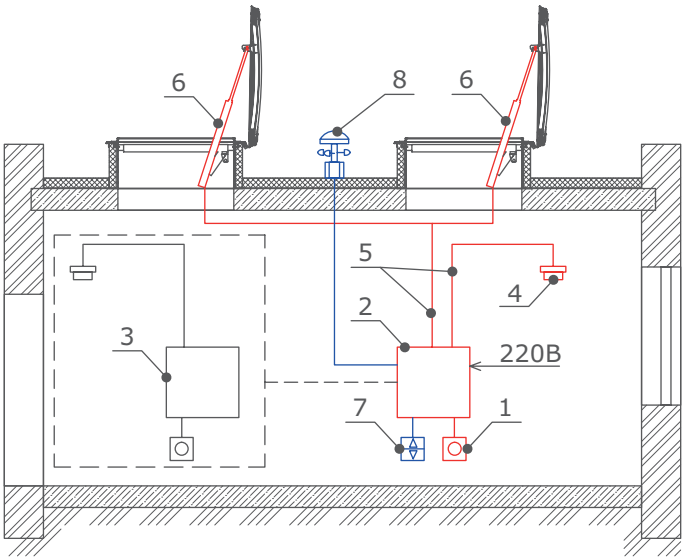
It is important in the design of the smoke protection systems to select equipment options ensuring their efficient operation in case of fire.

Electrical system is the most popular for smoke hatches opening. Power element of this system is electrically operated. In case the sensors detect combustion products the signal is transmitted to the control center and/or to the main fire control panel. The mechanism is connected electrically to a central control panel, which activates the lift mechanism. The flap opening of the smoke hatch takes place. A backup battery provides 72 hours of continuous operation in case of power failure.

Activation of the system can be performed:
- automatically by a smoke and/or heat detector;
- manually by pressing the alarm button.

When using an electric smoke system, an additional function of natural ventilation can be provided. It is also possible to equip a smoke hatch with a weather control system.

This system works on both opening and closure.
Hatches open in groups arranged by fire zones, which determine a number of groups attached to the panel. At facilities with increased fire safety requirements there are several control panels installed. Emergency buttons are located on the control panel, installed on the ways of fire attack, and where the scheme of smoke exhaust can be found.



The electric system contains the following elements:

1. Alarm button
2. Control center
3. Possibility to connect via main fire control panel
4. Smoke detectors
5. The wire with the appropriate class of fire-resistance
6. Electric actuator
7. Ventilation button
8. Wind/rain sensors

The basic elements of electric control system

1. Ventilation button

- operating voltage 230 V~
- current 0,1 A

2. Electric actuator

- operating voltage 24 V–
- rated current 2,0 – 8,0 A
- tensile force 650 – 5660 N

3. Emergency button

- operating voltage 24 V–
- current min.
  3,9 mA – 24 mA
- working temperature:
-10°C to +55°C

4. Smoke detector RM 2-O

- operating voltage 12/24 V–
- current min. 40 µA
- working temperature:
-20°C to +60°C

5. Wind / rain sensor CDW

- operating voltage
24-30 V ~

6. Ventilation control center WRS 2

- power supply 230V~
- current 0,09 A
- operating voltage 24-30 V–

7. Control center

- power supply 230 V~
- operating voltage 24 V–
- rated current (demends on the model) 2 – 8 A
- working temperature: -10°C to +55°C

Control center is equipped with batteries for backup power supply of the system for 3 days, in case of the main power electrical system of the building is shut down.

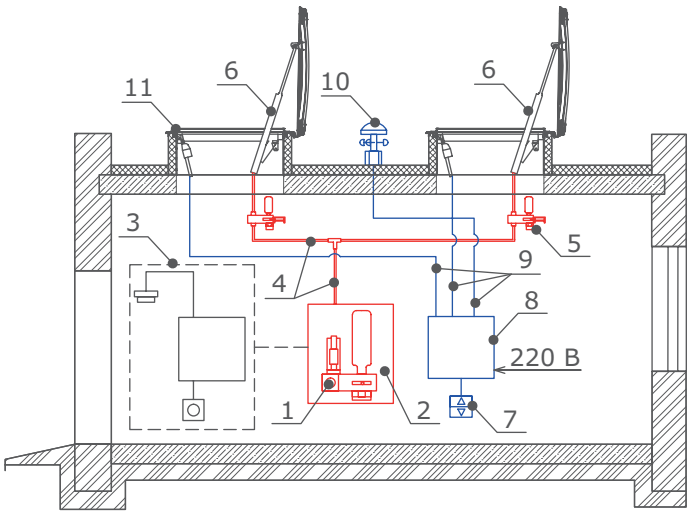
8. Electric actuator E-xxx-230

- operating voltage 230 V~
- rated current 0,1 A
- tensile force 500 H
- stroke 300, 500, 750 mm

8.2. Pneumatic control system for smoke exhaust and ventilation

Pneumatic control system includes a pneumatic actuator, a control panel with a start button and a backup unit (gas flow controller). The option to connect to the central fire alarm panel of the building is provided in the pneumatic control system of smoke hatches. For installing the pneumatic control system a copper/steel tubes of 6-8 mm in diameter are used. To provide additional ventilation function the system can be modified by adding addition electric actuators, ventilation control unit, ventilation buttons and weather control unit.

Activation of the system is performed in case of fire:
- automatically after the alarm triggers from the main fire control panel;
- automatically in case of backup unit activation;
- manually (by pressing the manual alarm button)



The pneumatic control system contains following elements:

1. Activation button
2. Control center
3. Main fire control panel of the building
4. Copper/steel tubes of the pneumatic system
5. Backup unit (gas flow controller)
6. Pneumatic actuators
7. Ventilation buttons
8. Ventilation control center
9. Electrical wiring
10. Weather control unit (wind/rain sensor)
11. Electric actuators for ventilation function (220V)

Basic elements of the pneumatic system

1. Gas flow controllers

Flow control with a thermal fuse, also named a thermal disconnecting device or thermal release, assigned to supply CO_2 to the pneumatic servo motor from CO_2 cylinder or unit. The drainage of CO_2 gas cylinder, fitted in the controller, starts at exceeding the temperature at which the thermal fuse the alcohol ampoule is activated. After the ampoule bursts the shock needle punctures the CO_2 cylinder. The released gas flows in the actuator.

There are 2 versions of the controller:
- with "opening only" function: local and remote opening of the valve for the purpose of smoke exhaust;
- with function "opening and remote closure": local and remote opening of the hatch for the purpose of smoke exhaust and hatch closing.

2. Pneumatic actuator

The pneumatic actuator is provided for hatch flaps opening in order to fulfill the functions of ventilation and / or smoke exhaust. The actuator is produced in anodized aluminum case, stainless steel housing with protection against dust contamination, recommended working pressure is: 0.6 ... 1 MPa, a maximum continuous operating pressure of 6 MPa, the lock at full extension - there may be other options, the maximum axial force transmitted bolt: 8000N, with an option to release the lock manually.

3. Control panel.

Fire control panel is provided for or remote opening of the hatches by means of compressed CO2 gas contained in the cylinder intigrated into the panel. The gas release occurs after pressing the designated lever, causing shock needle to launch, puncturing CO2 cylinder, and a gas passage into the unit. As a rule, it is - a metal box of red color similar to RAL 3000, equipped with doors with the possibility of closing, opened to the right side or the lockable lid. The remote has a window, a lever or button, controlling the signal opening with the index action visible through a window.

4. Ventilation control.

Designed for actuators remote control, opening and closing the hatches for the purpose of ventilation. The consoles include the valves that control the opening and closing of hatches, and the system of air treatment. As a rule, a steel box of blue color according to RAL 5012, equipped with doors with the possibility of closing, opened to the right side and a window. Valves control with a lever inside the panel. Optional features to work with control panel for opening and closing, a weather control unit to control the automatic closing of the hatches in case of rain and strong winds; optional remote opening and closing controlled electrically or pneumatically.

9. Calculation of the smoke exhaust system parameters, atmospheric loads calculation.

Calculation of the smoke exhaust system parameters

Smoke exhaust system with unconstrained or forced actuation is a complex of engineering and technical solutions aimed to protect evacuation routs of the premises from smoke during fire, as well as to reduce the smokiness of the building. Requirements for the execution of the smoke protection systems in case of fire are stated in the TST 45-4.02-273-2012 "The smoke suppressant system of buildings and structures in case of fire. Ventilation systems. ", according to which, the required number of smoke hatches is determined by calculation of the cross-section area of smoke shafts.

- The cross-sectional area of the smoke shafts or opening flaps and windows and skylights, determined by the formula, m²,

$$A_s = G/G_s,$$

where G — calculated smoke flow, kg/h, for buildings, smoke reservoirs and smoke areas of 3000 m² and less;
Gs — smoke flow for 1 m² of the smoke shaft cross-section or the total area of skylights flaps or windows, kg / (m² × h).

- Discharge of combustion products G, kg / h, around the perimeter of the fire in the premises up to 3,000 square meters should be determined by the formula:

$$G = 676{,}8P_f Y^{1,5} K_S,$$

where P_f - the perimeter of the fire in the initial step m; shall be equal to the greatest of perimeters of open or not sealed reservoirs of flammable substances or storage places for flammable or non-flamable materials (parts) in combust packing.
Y - the distance from the lower boundary of smoked area to the floor, m, taken for the premises 2.5 meters, or from the lower edge of the screen, that forms smoke reservoir, to the floor;
Ks - coefficient equal to 1.0, and for systems with unconstrained actuation, and sprinkler fire extinguishing systems at the same time – 1.2.
For premises equipped with sprinkler systems P_f = 12m.

If the perimeter of the fire is impossible to determine, it may be determined by the formula:

$$4 \le P_f = 0{,}38A^{0,5} \le 12,$$

where A - area of the premises or smoke reservoir, m²

- Specific Gs consumption, kg / (m² × h), the products of combustion of 1 m² cross-section area of smoke shafts with deflectors for all localities and the areas of opening transoms, flaps of skylights and windows in the exterior walls of buildings for points with a design wind speed Vv ≤ 1 m / s should be determined in table 4 of **TKP45-4.02-273- 2012** or by the formula:

$$G_s = K_s \times (P_s \rho)^{0,5},$$

where K_s - coefficient equal to:
4175 - for the shafts with smoke deflectors;
1730 - for top transoms in single glazing for 30° continous opening;
2340 - the same with the opening for 45 °;
2850 - the same with the opening for 60 °;
2290 - for square and rectangular transoms with sides of 1/1.5 with a separate open for 30 °;
2850 - the same with the openings 45 °;
3210 - the same with the opening 60 °.

- P_s - calculated pressure generated by the difference in specific gravities of outside air and smoke, at height H_s is calculated by formula:

$$P_s = (\rho_o - \rho) \times H_s,$$

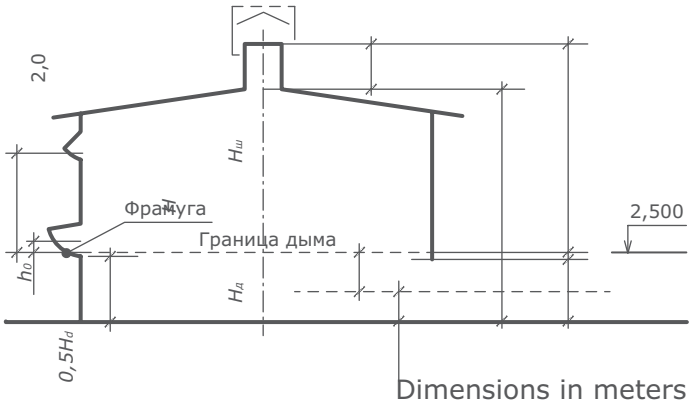
where H_s — height if the shaft, m;

- ρ — smoke density, kg/m³; calculated by formula:

$$\rho = \gamma/9{,}81$$

ρ_o — density of outside air, kg/m³;
γ — he average specific weight of the smoke when you remove it from the premises of 10 thousand m³ or less.

The scheme for calculating the smoke flow and smoke shafts



Dimensions in meters

h_0 — estimated distance, smoke from the border axis door emergency exit;
H_d — door height;
H — building height;
2,2 — minimum height of lowest frame edge.

The range of facilities and building, subject to equipping suppressant systems and their composition are shown in TAP 45-2.02-142-2011 "Buildings, constructions, materials and products. Rules fire technical classification. "

Calculation of smoke suppressant elements of buildings case of fire is performed by design organizations in accordance with the requirements of the current local regulations. All the above information is given for the reference only.

Atmospheric loads calculation.

Company M8 City is a leading manufacturer of skylights in Belarus with advanced production and design base, providing the manufacture of products considering individual requirements of customer. Each facility is unique to us.
Individually are worked our abutment details to the Customer base, the calculation of structural elements of skylights based on the location of the facility, as well as taking into account the most unfavorable combination of loads and their corresponding conductive intensions.
These combinations are established from the analysis of real varieties of simultaneous action of different loads (permanent, long-term and short-term) for the given stage of skylight construction.

Construction of skylights produced by M8 City is designed and tested in the prescribed order:
- On basic load combinations, consisting of a permanent (own weight of bearing and protecting constructions of skylights), long-term (equipment weight) and short-term (snow, wind and icing).
- Special load combinations, consisting of a permanent (own weight of bearing and protecting constructions of skylights), long-term (equipment weight) and short-term (snow, wind and icing) and one of the special loads (explosive impact).

General load on the construction of the skylight is picked taking into consideration the requirements of SNIP II-23-81 * "Steel structures", SNIP 2.01.07-85 "Load and impact" with the corresponding coefficients combinations, coefficients of working conditions, factors considering conductive blow-off and transfer of the snow, etc.

Mechanical loads act constantly on the roof of the building in general, and particularly on skylights. Properly designed skylights in accordance with the requirements of SNIP II-23-81 *, 1967-2009 STB, STB 1762-2007, 1961-2009, STB EN 13501-5, STB II 2007-2009, GOST 26433.0, TAP EN 1999-1-1-2009, production of company M8 CITY TC BY 191302027.002-2013, ensures complete perception of these loads without deformation and disruption of the construction.

10. Practical recommendations for the of smoke hatches and skylights placement.

Constructive solutions of skylights allow to achieve the desired level and the uniformity of the natural daylighting of premises with a relatively small area of light apertures.

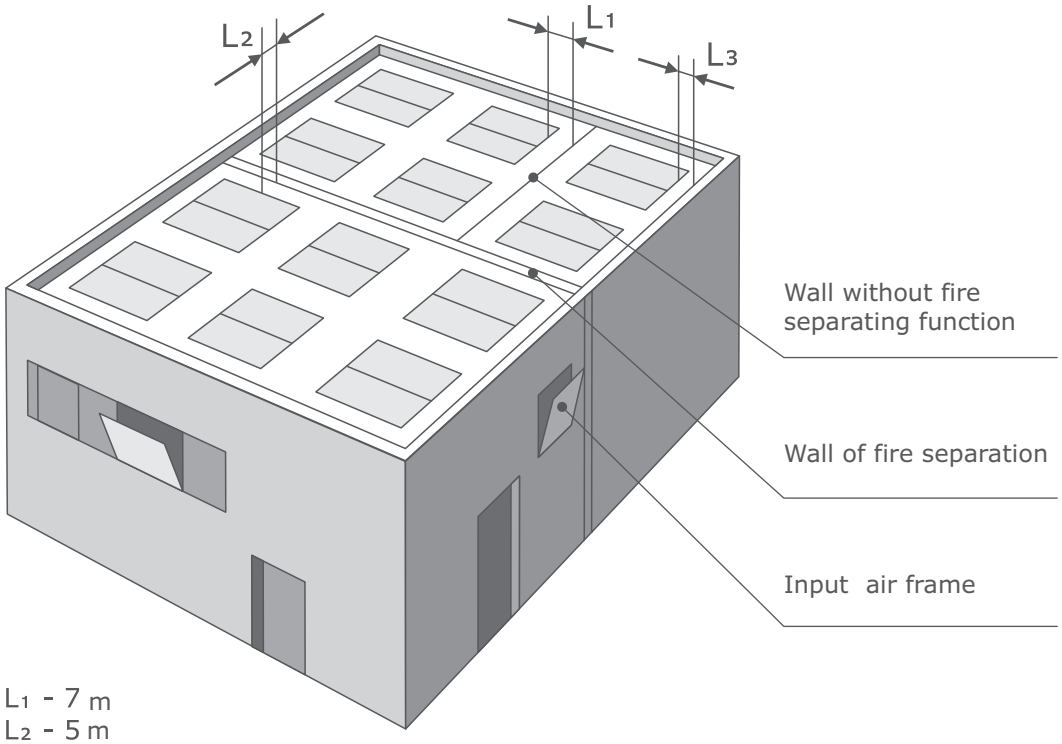
Smoke hatches should be placed evenly on the roof. If the materials of different speed and intensity of burning are in the premises, smoke hatches can be placed unevenly. If the flammable materials are concentrated on a small area of the room, then the hatches can be placed just above this surface.

The maximum distance from the hatch edge of a building can`t be more than 10 meters inclined roof <12 degrees, and 20 meters> 12 degrees.

The distance between the hatches can be:
- Less than the sum of the long sides and diagonals of the two hatches;
- More than 20 meters.

• Number of hatches.
In order to remove smoke and gases quickly into the atmosphere, would be more efficient to use larger numbers of small hatches than fewer large ones. Each area is separated by a curtain smoke howling, must have at least one hatch. On the roof with a slope of <12 degrees must be set at least one hatch on 200 square meters, for the slope> 12 degrees for every 400 sq. m.

The maximum distance between the smoke hatches and walls



L_1 - 7 m
L_2 - 5 m
L_3 - 2,5 m

Special requirements

• Elevator shaft
The current area of smoke in the elevator shaft should be at least 2.5% of the area of the shaft floor.

• Horizontal escape routes
At least one hatch per 10m path length must be provided. The current area should not be less than 0.9 square meters.

• Crowded premises
Smoke extraction surface in the area of mass crowded spaces (theater, exhibition halls, lobbies, restaurants, gyms, etc.) should not be less than 3% of the floor area.

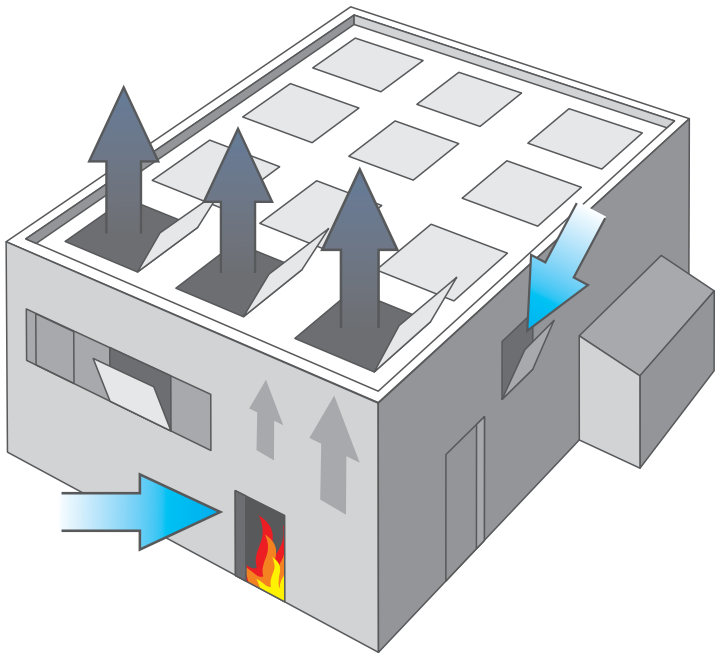
• Theater scene
Smoke exhaust area for scenes up to 150 m² should be at least 3% of the scene surface. When the stage surface exceeds 150 m², the area is calculated by the following formula:
$A = 0,5 \sqrt{2F-100}$
where F - the stage floor space in m².

• High storage warehouses
The current area should not be less than
3% of the surface of the floor of the warehouse.

• Air intake
For full use of the existing smoke extraction space, you need to provide a source of fresh air. These are the openings at the bottom of the hatch.
The geometric area of the apertures for air intake should be at least 30% more than the geometric area of all smoke hatches in the biggest smoke zone.

Air inlets are:
- Windows that are on the ground floor and can be opened or broken from the outside;
- Doors;
- Entrance gate.

In case of smoke ventilation systems with unconstrained activation, different arrangements of openings are selected according to the expected heat load in the room. This dependence is usually taken into account in determining the required ventilation rate in smoke ventilation systems ща forced actuation. Thus, it is necessary to take into account the thermal load when determining the ventilation rate. In areas with possibility of
high opacity materials ignition (rubber, resins and plastics), should be increased multiplicity of air impact.
If it is impossible to install windows of smoke exhaust system, or unable to provide air flow through the entrance and window openings, the air intake must be provided with a forced fresh air ventilation system.

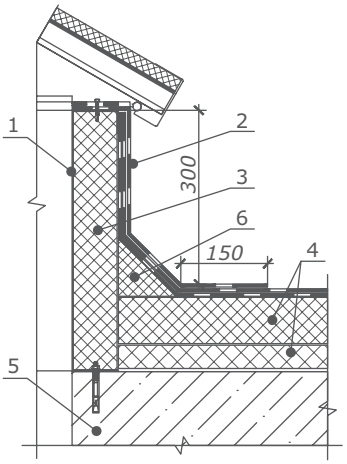


11. Roof preparation and assembly

Skylights and smoke hatches can be installed on flat and pitched roofs. The composition of the roof can be, for example, a membrane with a ituminous coating, monolithic reinforced concrete, with steel profiled decking. Placing the translucent constructions to be taken into account the calculated location scheme and loads. Incorrect positioning can cause overheating of premises in summer and undercooling in winter.

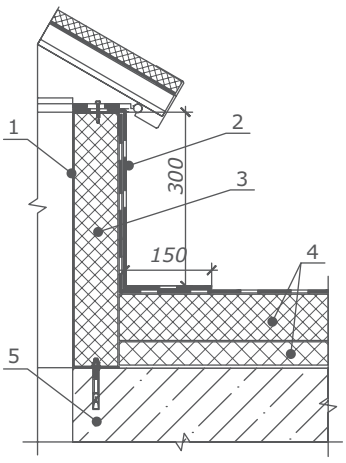
The sides of the base are isolated by thermal insulation materials. It is especially important to provide the correct technique of adjusting to various roof coverings for technically competent compound of this material. Because only sealed roof is saving roof!

11.1. Steel bases on concrete slab



**Covering —
bitumen-polymer material**

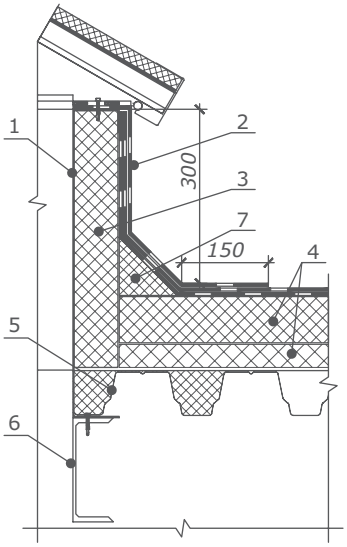
11. Steel bases
2. Roof covering — bitumen-polymer matereal acc. STB 1711-98
3. Bases insulation
4. Roof term isolation
5. Concrete slab
6. Inclined skirting 100x100 мм



**Covering —
PVC membrane**

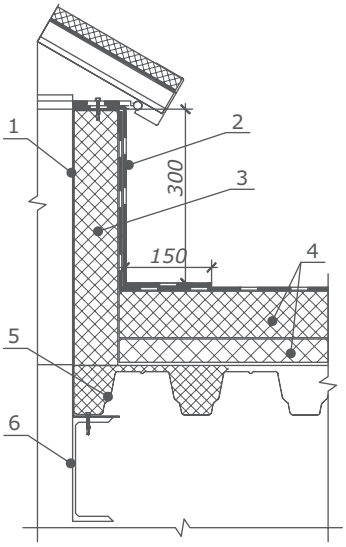
1. Steel bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof term isolation
5. Concrete slab

11.2. Steel bases on steel construction



**Covering —
bitumen-polymer material**

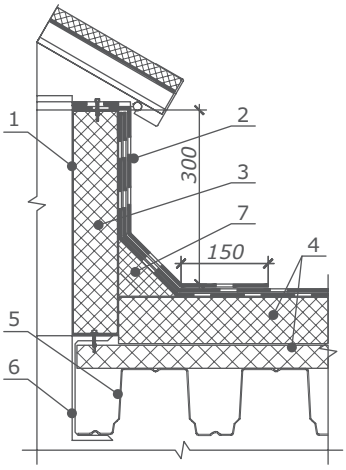
1. Steel bases
2. Roof covering — bitumen-polymer material acc. STB 1107-98
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Steel carrier (beam)
7. Inclined skirting 100x100 мм



**Covering —
PVC membrane**

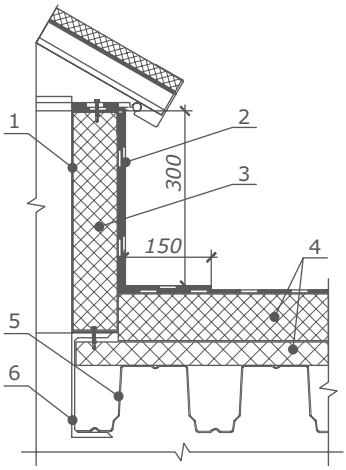
1. Steel bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Steel carrier (beam)

11.3. Steel bases on steel construction



**Covering —
bitumen-polymer material**

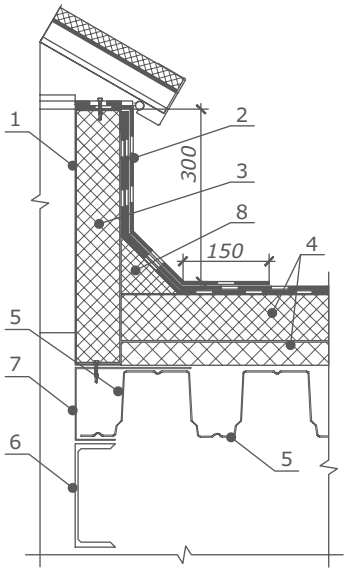
1. Steel bases
2. Roof covering — bitumen-polymer material acc. STB 1107-98
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Steel carrier (beam)
7. Inclined skirting 100x100 мм



**Covering —
PVC membrane**

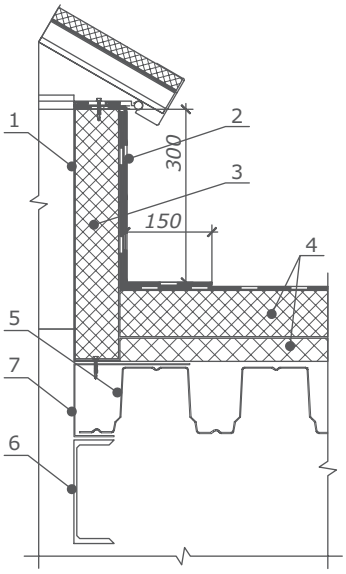
1. Steel bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Steel carrier (beam)

11.4. Steel bases on steel construction



**Covering —
bitumen-polymer material**

1. Steel bases
2. Roof covering — bitumen-polymer material acc. STB 1107-98
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Steel carrier (beam)
7. Additional roof treatment
8. Inclined skirting 100x100 мм

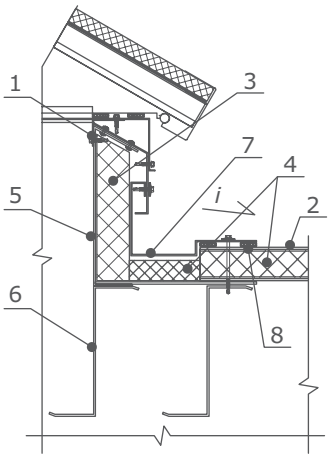


**Covering —
PVC membrane**

1. Steel bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Steel carrier (beam)
7. Additional roof treatment

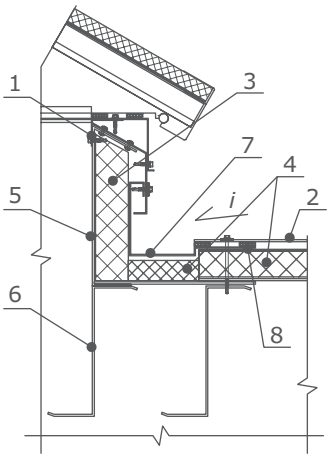
11.5. Steel bases on existing steel base

System roof - aluminum processing on the roof of trapezoidal steel sheets.



Cross-section of the base in a direction parallel to the wave of cover, the roof slope (i) from the hatch

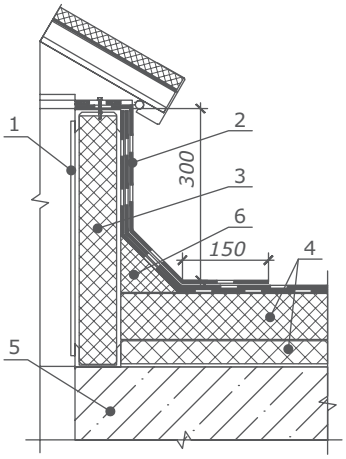
1. Steel anex on existing bases
2. Roof covering — profiled sheet with a trapezoidal shape corrugation
3. Bases insulation
4. Roof insulation
5. Existing skylight bases
6. Steel carrier (beam)
7. System aluminum batten
8. System sealing



Cross-section of the base in a direction parallel to the wave of cover, the roof slope (i) from the hatch

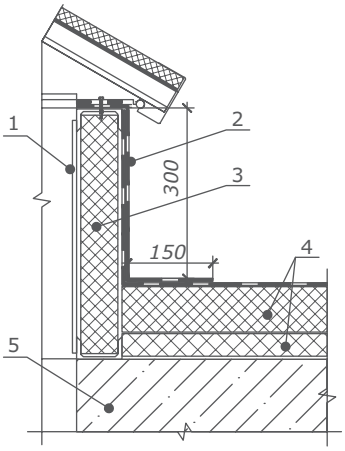
1. Steel anex on existing bases
2. Roof covering — profiled sheet with a trapezoidal shape corrugation
3. Bases insulation
4. Roof insulation
5. Existing skylight bases
6. Steel carrier (beam)
7. System aluminum batten
8. System sealing

11.6. Steel bases on existing steel base



Covering — bitumen-polymer material

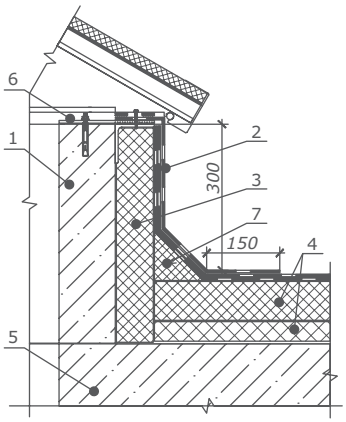
1. Existing steel bases
2. Roof covering — bitumen-polymer material acc. STB 1711-98
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab
6. Inclined skirting 100x100 мм



Covering — PVC membrane

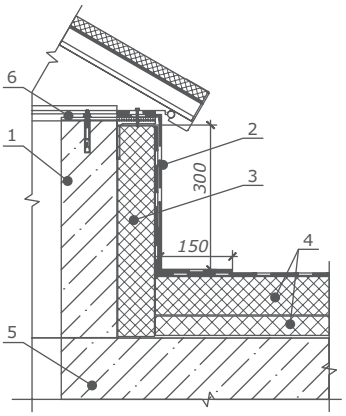
1. Existing steel bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab

11.7. Existing reinforced concrete bases on concrete slab



Covering — bitumen-polymer material

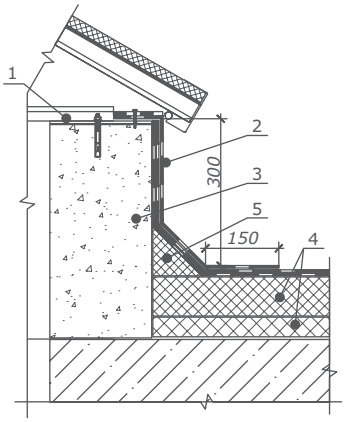
1. Existing reinforced concrete bases
2. Roof covering — bitumen-polymer material acc. STB 1711-98
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab
6. Steel annex on existing base of skylight
7. Inclined skirting 100x100 мм



Covering — PVC membrane

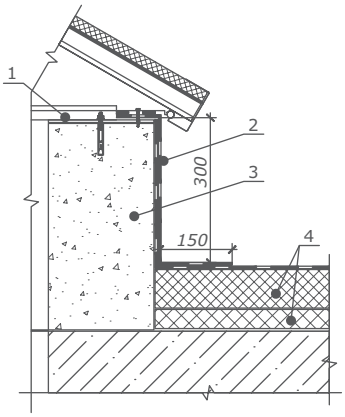
1. Existing reinforced concrete bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab
6. Steel annex on existing base of skylight

11.8. Existing hollow concrete bases on concrete slab



Covering — bitumen-polymer material

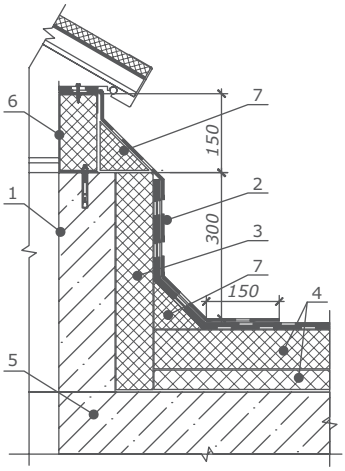
1. Steel annex on existing base of skylight
2. Roof covering — bitumen-polymer material acc. STB 1107-98
3. Existing skylight bases of hollow concrete blocks
4. Roof insulation
5. Inclined skirting 100x100 mm



Covering — PVC membrane

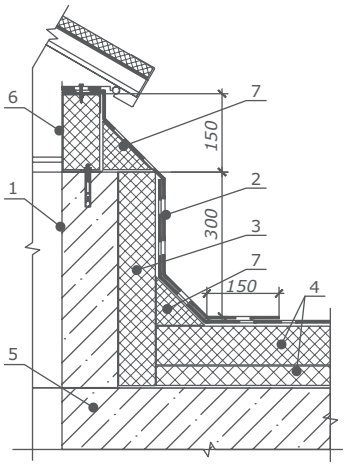
1. Steel annex on existing base of skylight
2. Roof covering — PVC membrane
3. Existing skylight bases of hollow concrete blocks
4. Roof insulation

11.9. Additional bases on the existing base (renovation)



Covering — bitumen-polymer material

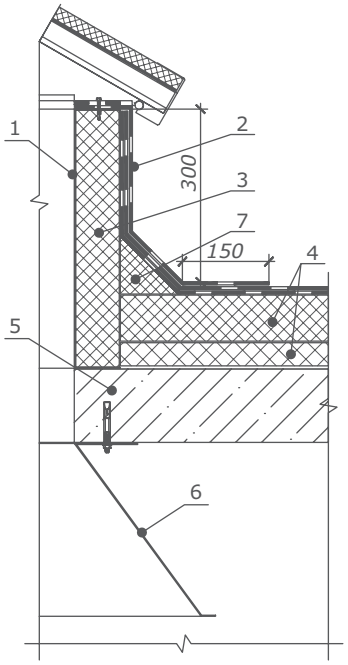
1. Existing concrete (steel, of hollow concrete blocks) bases
2. Roof covering — bitumen-polymer material acc. STB 1711-98
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab
6. Anex bases on existing base (concrete, steel, of hollow concrete blocks etc.)
7. Inclined skirting 100x100 mm



Covering — PVC membrane

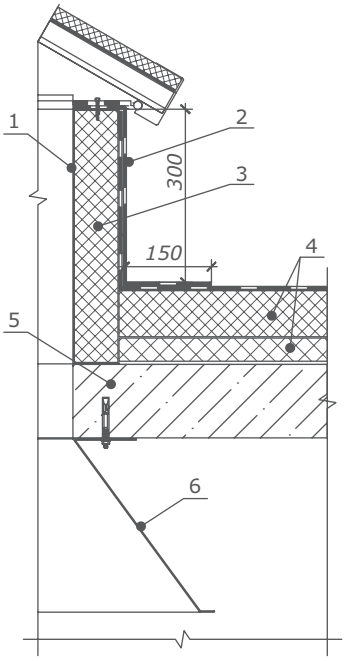
1. Existing concrete (steel, of hollow concrete blocks) bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab
6. Anex bases on existing base (concrete, steel, of hollow concrete blocks etc.)
7. Inclined skirting 100x100 mm

11.10. Steel bases with a nozzle suspension on concrete slab



Covering — bitumen-polymer material

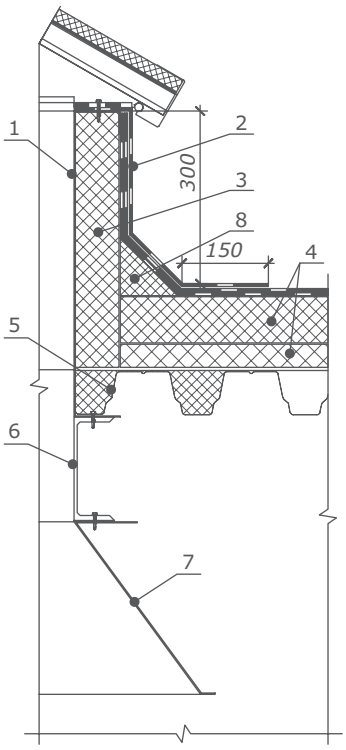
1. Steel bases of skylight
2. Roof covering — bitumen-polymer material acc. STB 1711-98
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab
6. Guiding nozzle
7. Inclined skirting 100x100 mm



Covering — PVC membrane

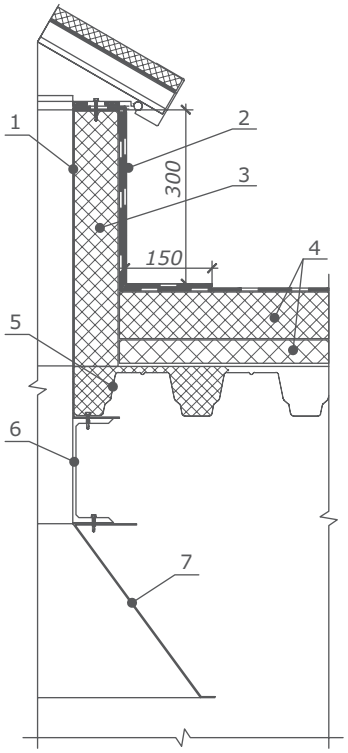
1. Steel bases
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Reinforced concrete slab
6. Guiding nozzle

11.11. Steel basesc with a nozzle suspension on steel construction



Covering — bitumen-polymer material

1. The existing reinforced concrete base (steel, hollow concrete blocks etc.)
2. Roof covering — bitumen-polymer material acc. STB 1711-98
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Anex bases on existing base (concrete, steel, of hollow concrete blocks etc.)
7. Nozzle
8. Inclined skirting 100x100 mm



Covering — PVC membrane

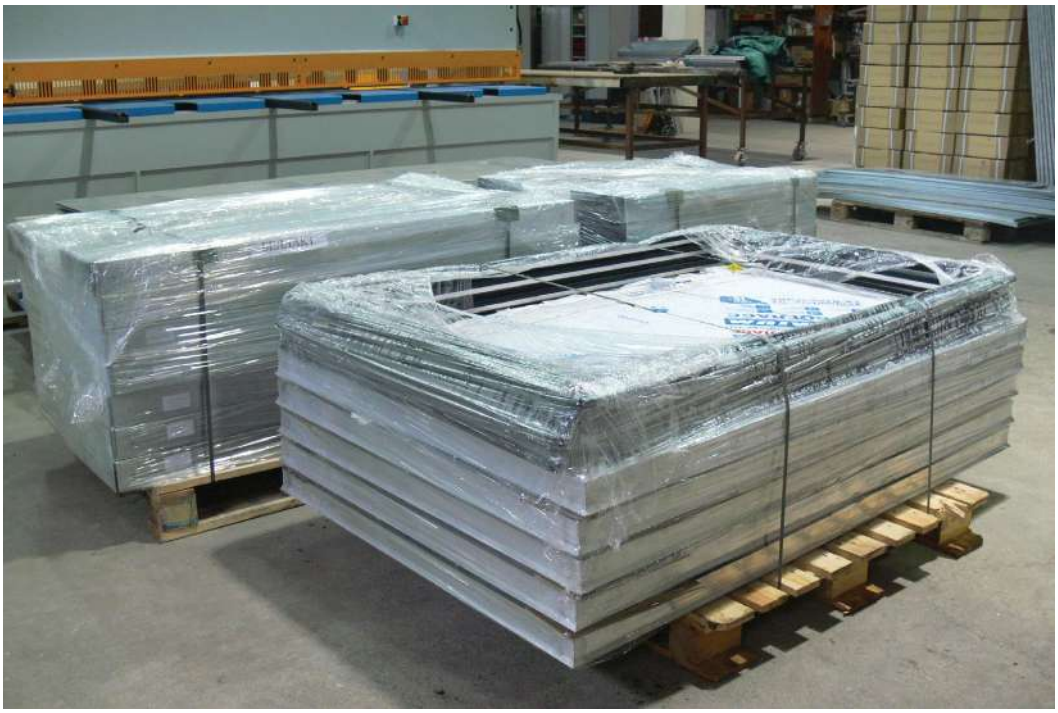
1. The existing reinforced concrete base (steel, hollow concrete blocks etc.)
2. Roof covering — PVC membrane
3. Bases insulation
4. Roof insulation
5. Profiled sheet with a trapezoidal shape corrugation
6. Anex bases on existing base (concrete, steel, of hollow concrete blocks etc.)
7. Nozzle

12. Transportation and storage

Elements of skylights and fasteners can be transported by any means of transport in accordance with goods transportation rules, actions for specific types of transport. Skylights elements should be stored in specially equipped warehouses, sorted by type and brand. Storage conditions should exclude the possibility of elements deformation.
Wherein the visibility of the marking and the ability to capture each package separately and to load onto a vehicle should be ensured. Loading and unloading of packages and boxes should be carried out by means eliminating damage of elements and their protective coating.

It must be ensured that during the storage a stable position of packages and boxes is provided, avoiding their possible contact with the ground, should also all be arranged so that accumulation of atmospheric moisture on skylights and elements inside them is prevented.

Dimensions of gangways and passages between packages must comply with building codes and safety regulations. Storage life without conservation - not more than one month.



13. Maitainance

Installation and operation of the skylights should be carried out in accordance with documentation issued by the project organization or manufacturer.

Conservation must provide protection against corrosion during transportation, storage and installation for at least 6 months from the date of shipment by the manufacturer. Conservation must be carried out in accordance with the requirements of GOST 9,014.

To avoid damage to the coating and construction of skylights, as well as to maintain a constant flow of light transmission the producer strongly recommends to clean the skylights from snow and frost regularly in the periods of heavy precipitation - in the winter, and during the summer period — the skylights polycarbonate filling is recommended to be washed periodically with a soft sponge / rag / brush and warm soap water.

Any detergents and window cleaners can be used with the content of alcohol (but not containing acetone, ammonia), be sure to wash away the soap so that there are no spots and stains (divorces). It is forbidden to apply scrapers, knives and other sharp objects, and also to apply the agents containing acetone, ammonia air, esters.

M8CITY pro — is the right choice!

Wide range of sizes and dome shapes

Minimized production and delivery terms

The best ratio of price and quality on market

5 year guarantee on all products

Gable ridge flat skylights on standard 1,5 x 12,0 m and translucent 6,0 x 12,0 m foundation with ventilating doors

Gable ridge flat skylights 6,14 x 48,0 m with smoke extraction and ventilation doors, 20 items (total area of the skylights is 2 650 sq.m.)

Ribbon window

Isolated flat skylights 1,5 x 1,7 m with multiple glazing

Isolated flat skylights 1,5 x 1,5 m

Gable ridge flat skylight 6,0 x 53,8 m with smoke extraction and ventilation doors

Gable ridge flat skylights 3,0 x 18,0 m, 4,0 x 18,0 m, 4,0 x 46,0 m
(total area of the skylights is 6 516,5 sq.m.)

Gable ridge flat skylights 4,0 x 24,0 m
with smoke extraction and ventilation doors

WELCOME TO COOPERATE

Own production —
german precision equipment and highly qualified staff

Complex approach —
design, production, assembly, service maintenance

Innovative solutions —
unique proprietary profile system, reinforced construction of products

Competency —
certificates, confirming the consistent high quality of products

Guarantee —
5 year guarantee for all products

Factory M8 City Ltd.
14 B Tsentralnaya Street, Khatezhino, Minsk District, Republic of Belarus
e-mail: info@m8city.by

Sales Office for Belarus

tel.: +375 17 388 44 32
www.m8city.by

Sales Office for Russian and Kazakhstan

tel.: +7 495 946 99 02
www.m8city.ru