INSTALLATION MANUAL
DSMOKE DUCT SECTIONS - DSK

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1. *Scope*

The smoke duct sections are designed to remove smoke and hot gases during or after a fire. Removing smoke from the room and letting in clean air allows people to evacuate the room. Fire departments can detect the fire faster and put it out.
This DSK installation manual is used for the installation of single compartment smoke extraction ducts. The smoke duct sections are tested for up to 2 hours at a temperature of +600 ºC, when the system can have a pressure of +500 Pa or -1500 Pa. Single compartment smoke duct sections DSK can only be installed in a horizontal position with the largest dimensions up to 1250x1000 mm and 1500 mm in length. The following standard requirements apply to DSK type products:

LST EN 1366-9 Fire resistance tests for service installation – Part 9: Single compartment smoke extraction ducts.

LST EN 12101-7 Smoke and heat control systems. Part 7: Smoke duct sections.

LST EN 13501-4 Fire classification of construction products and building elements – Part 4: Classification using data from fire resistance tests on components of smoke control systems.

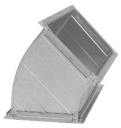
Maximum duct section width x height, mm	Standard section length, mm	Classification
≤ 1250x1000	1500	**E_{600} 120 (h_o) S1500 single**

Smoke duct sections for single compartment with a symbol at the code DSK are manufactured in accordance with the requirements of the standard LST EN 12101-7 and are classified as a single room smoke extraction system **E_{600}120 (ho) S1500** in accordance with the requirements of the LST EN 13501-4 standard.

2. *Product type, dimensions and marking*

Depending on the complexity of the systems, various parts can be produced for the installation of smoke ducts. Table 1 below shows the possible products of the smoke duct sections.

Table 1

Name of product / photo		Name of product / photo		Name of product / photo	
Smoke duct DSK-OFI		Collar DSK-FPA		Collar DSK-FBA	
Bend DSK-AF		End cover DSK-FAK		Take off DSK-FAN	
Taper DSK-FPS		End cover with mesh DSK-FAKT		Flexible connector	
Reducer DSK-FPD		S-Bend DSK-FAP			

Dimension of smoke duct section is possible to produce in dimension between WxH - 200x200 – 1250x1000 mm.

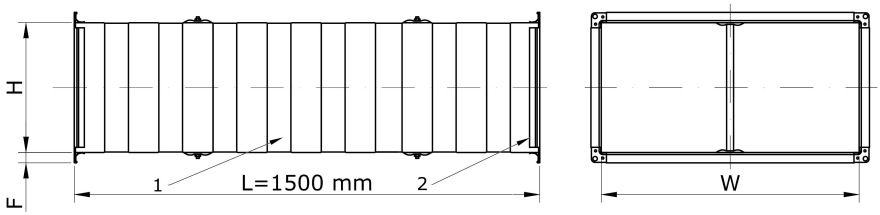
The possible minimum and maximum dimensions of the products are shown in Table 2.

Table 2

	H (height), [mm]		
W (width), [mm]	200	-	1000
200	+	+	+
-	+	+	+
1250	+	+	+

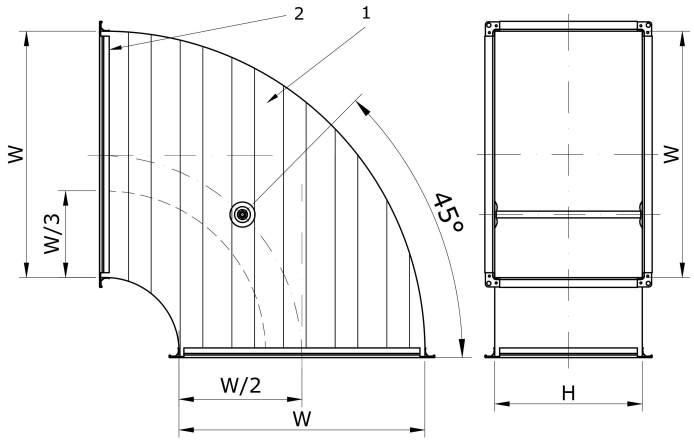
Manufactured products step size is available in 50 mm, ranging from 200x200 mm to 1250x1000 mm.

DSK product diagrams with basic materials are shown in Figures 1 and 2.



Detailing: 1 - galvanized, aluzinc or stainless steel sheet 0.9 mm thick; 2 - F30 size flange for all sizes.

Fig. 1 Rectangular smoke duct



Detailing: 1 - galvanized, aluzinc or stainless steel sheet 0.9 mm thick; 2 - F30 size flange for all sizes;

Fig. 2 Rectangular smoke section – smoke bend

3. Product storage, transportation and use

All parts of the smoke duct section are marked with the CE marking on the outside of the parts. It is recommended to transport all sections of the smoke duct with protection from the external environment.

Smoke duct sections should be kept protected from dust entering the duct and from direct rain or high humidity on the surface of the sections.

Prior to installation, make sure that the parts of the duct section are smooth, not crushed or damaged. Make sure that the sections used correspond to the classification levels selected in the project.

These smoke duct sections are certified at times with fasteners, hangers, sealing gaskets, flexible joints. All these tested items must be used without changing them to weaker ones or other compositions.

All manufactured products have a declaration signed by the manufacturer.

4. Assembly the smoke duct sections

Any installation work on the duct system must be carried out by a qualified installer. Qualified professionals are people who have sufficient professional experience and knowledge of smoke extraction duct systems, their installation, know the requirements of smoke extraction system projects and are able to work without endangering themselves or others.

Before installing the system, it is necessary to check all components to make sure they are selected correctly according to the design documentation and to make sure that they have not been damaged during transport or storage. Be careful with the products when installing systems on site so that they are undamaged and their technical properties are not altered.

Smoke duct sections may not be used as supporting elements for a building or other systems.

Flange connections 30 mm high and marked FL30 are used to connect the smoke duct sections. Kerafix2000SK 20x3 mm heat-resistant gasket is used for sealing between flange joints. The gasket is glued to one of the joints, closer to the inner edge. The gasket can be glued against each other without any visible air gap, or by placing the gasket on top of each other. In all cases, a gasket width of 20 mm must be maintained at all sealing points, with no visible gaps between the joints. The sealing of the flange connection of the smoke duct sections is shown in Figure 3.

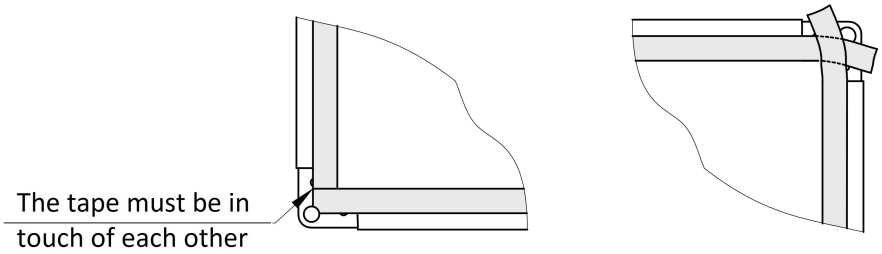
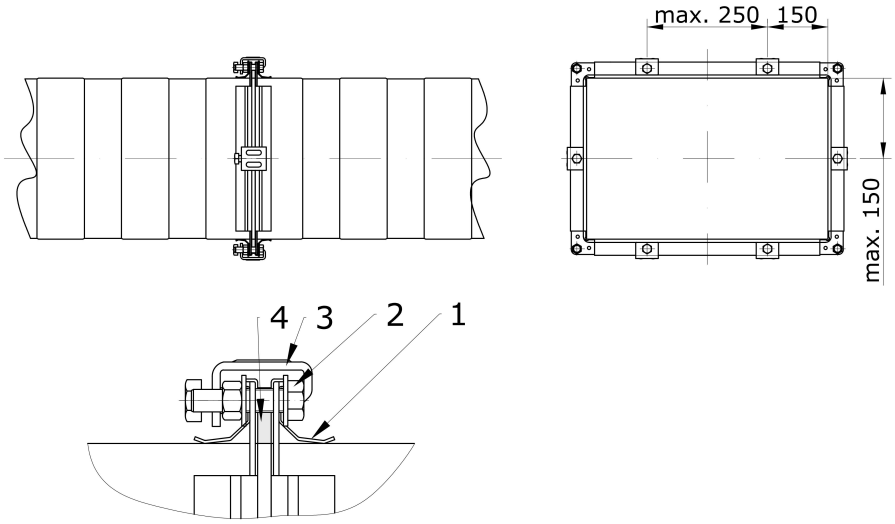


Fig. 3 Mounting scheme of the F30 flange

In all cases, universal clamps with M8 screws are used to connect the sections of the smoke ducts, mounting them in the horizontal part at intervals not exceeding 250 mm and in the vertical flange at intervals not exceeding 150 mm. The first distance from the corner shall not exceed 150 mm. In all cases, there must be at least 3 connection clamps per edge, including the screw connection.



Detailing: 1 - Flange 30 mm, 2 - Screw, nut, washers M10, 3 - Universal clamp M8, 4 - Sealing gasket Kerafix2000SK 20x3 mm.

Fig. 4 The connection between two ducts

Tables 3 and 4 below show the passage areas and weights of standard 1500 mm long elements, respectively.

Table 3

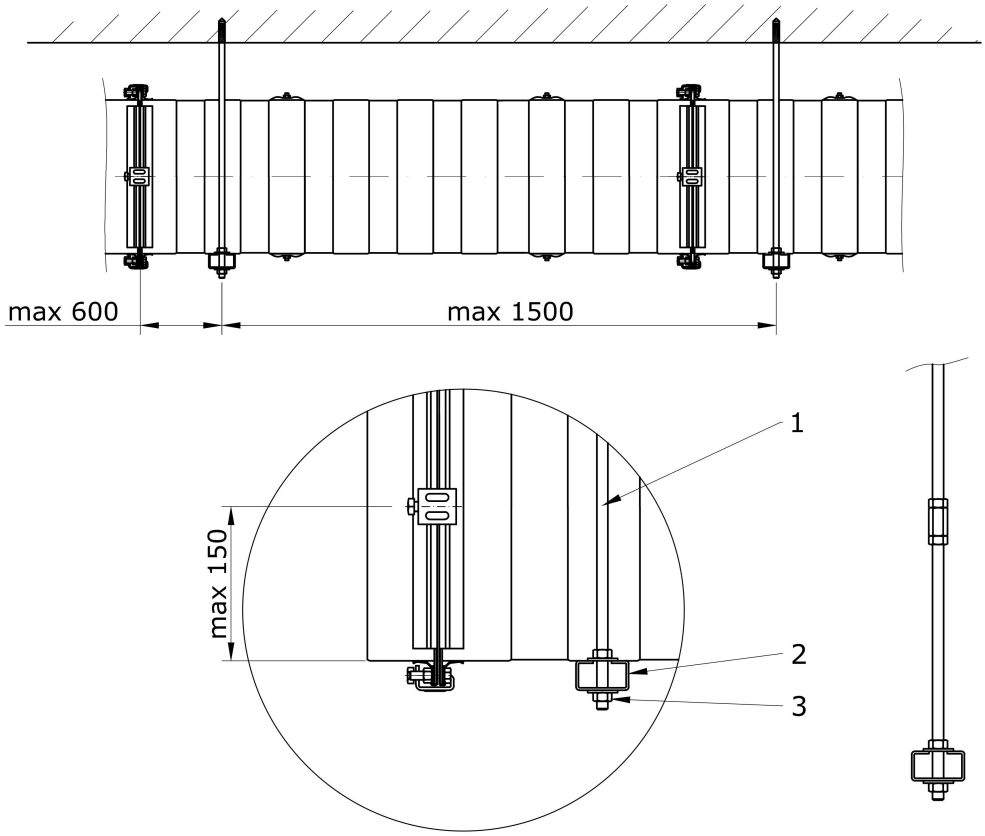
Duct, air passage cross-sectional area m2										
	H (height), [mm]									
W (width), [mm]	200	250	300	400	500	600	700	800	900	1000
200	0,04	0,05	0,06	0,08	0,1	0,12	0,14	0,16	0,18	0,2
300	0,06	0,07	0,09	0,12	0,15	0,18	0,21	0,24	0,27	0,3
400	0,08	0,1	0,12	0,16	0,2	0,24	0,28	0,32	0,36	0,4
500	0,1	0,12	0,15	0,2	0,25	0,3	0,35	0,4	0,45	0,5
600	0,12	0,15	0,18	0,24	0,3	0,36	0,42	0,48	0,54	0,6
700	0,14	0,17	0,21	0,28	0,35	0,42	0,49	0,56	0,63	0,7
800	0,16	0,2	0,24	0,32	0,4	0,48	0,56	0,64	0,72	0,8
900	0,18	0,23	0,27	0,36	0,45	0,54	0,63	0,72	0,81	0,9
1000	0,2	0,25	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1
1100	0,22	0,28	0,33	0,44	0,55	0,66	0,77	0,88	0,99	1,1
1200	0,24	0,3	0,36	0,48	0,6	0,72	0,84	0,96	1,08	1,2
1250	0,25	0,31	0,37	0,5	0,62	0,75	0,87	1	1,12	1,25

Table 4

Duct weight, [kg], duct length L-1500 mm										
	H (height), [mm]									
W (width), [mm]	200	250	300	400	500	600	700	800	900	1000
200	11	13	14	16	19	22	24	27	30	32
300	13	15	16	19	21	24	27	29	32	35
400	16	17	18	21	24	26	29	32	34	37
500	18	20	21	23	26	29	31	34	37	39
600	21	22	23	26	29	31	34	37	39	42
700	23	25	26	28	31	34	36	39	42	44
800	25	27	28	31	33	36	39	41	44	47
900	28	30	31	33	36	38	41	44	46	49
1000	30	32	33	36	38	41	44	46	49	52
1100	33	34	35	38	41	43	46	49	51	54
1200	35	37	38	41	43	46	49	51	54	57
1250	36	38	39	42	44	47	50	52	55	58

5. Requirements for suspension supports

The suspension of the smoke duct section must meet the minimum requirements of the LST EN 1366-1 standard, which states that with a fire resistance between 60 minutes and 120 minutes, the maximum permissible tensile force for the suspension element must not exceed 6 N/mm2. Depending on the dimensions of the duct, the correct suspension support system must be selected. The use of threaded rods depending on the size of the channel is shown in Table 8. In most cases, it is sufficient to use an M8 threaded rod when hanging the smoke duct sections, and an M10 threaded rod when hanging larger ducts. It is important to note that if the total side length of the duct is greater than 3500 mm, the M10 threaded rod system must already be used. The distance between the suspended threaded rod systems shall not exceed 1500 mm and the distance from the connection on either side shall not exceed 600 mm. There can be only one flange connection between two rod suspension points. The maximum permissible length of the threaded rod is 2 m. It is possible to use two short threaded rods by connecting them with an extended VJ8 or VJ10 nut to secure the rods with an additional tightening nut. It is important to choose the correct mounting profiles for the loads. The recommended profile dimensions are shown in Table 6 and two types and thicknesses of mounting profiles are used: BxH-S 35x20-1.75 (one or two units per duct) 35x21-2,0 and/or 30x45-1.5. It is possible to hang one duct not on one profile, but on two, so it is possible to use the M8 and lighter series profile for larger ducts. It is recommended to secure the fastening profiles with locking nuts, thus stabilizing the fastening profiles.



Detailing: 1 - Threaded rod M8, M10 (see table for use of rods), 2 - U-type mounting profile (see profile selection table), 3 - Nut 2 piece. and washer 2 piece.

Fig. 5 Hanging scheme on the suspension support the smoke duct

Table 5

Threaded rod depending on duct dimensions. Duct length 1500 mm (if supporting on one mounting profile)										
	H (height), [mm]									
W (width), [mm]	200	250	300	400	500	600	700	800	900	1000
200	M8	M8	M8	M8	M8	M8	M8	M8	M8	M8
300	M8	M8	M8	M8	M8	M8	M8	M8	M8	M8
400	M8	M8	M8	M8	M8	M8	M8	M8	M8	M8
500	M8	M8	M8	M8	M8	M8	M8	M8	M8	M8
600	M8	M8	M8	M8	M8	M8	M8	M8	M8	M8
700	M8	M8	M8	M8	M8	M8	M8	M8	M8	M8
800	M8	M8	M8	M8	M8	M8	M8	M8	M8	M10

900	M8	M8	M8	M8	M8	M8	M8	M8	M10	M10
1000	M8	M8	M8	M8	M8	M8	M8	M10	M10	M10
1100	M8	M8	M8	M8	M8	M8	M10	M10	M10	M10
1200	M8	M8	M8	M8	M8	M10	M10	M10	M10	M10
1250	M8	M8	M8	M8	M10	M10	M10	M10	M10	M10

Table 6

Dimensions of the suspension profile depending on the dimensions of the duct. Duct length 1500 mm										
	H (height), [mm]									
W (width), [mm]	200	250	300	400	500	600	700	800	900	1000
200	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75
300	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75
400	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75
500	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75
600	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75
700	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75
800	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75 x2/ 35x21-2,0
900	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0
1000	35x20-1,75	35x20-1,75	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5
1100	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5
1200	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	30x45-1,5
1250	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 35x21-2,0	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	35x20-1,75 x2/ 30x45-1,5	30x45-1,5	30x45-1,5	30x45-1,5	30x45-1,5	30x45-1,5

6. *Smoke duct sections with flexible connector*

To prevent the smoke extraction duct sections from elongating the duct during a fire and to prevent the resulting forces from bending or otherwise resizing the smoke duct at high temperatures, ducts with a flexible connection must be installed as shown in Figure 6. Ducts longer than 5 meters must be fitted with flexible connections. The distance between two flexible joints must not exceed 10 m. Once the flexible connector is installed, it should be in the fully extended state to allow the duct to heat up due to the existing flexible connector. The two ducts between which the flexible joint is installed must be equal and parallel in all directions in order to take advantage of the full range of motion of the flexible joint. It is not possible to replace the individual components of the flexible connector. The flexible connector should be replaced all as a single unit. The flexible connection is an integral part of the smoke duct and is also CE certified. When the smoke duct sections are installed with a free last connection, the effect of the duct elongation during a fire must be assessed. A 10 meter smoke duct can lengthen up to 100 mm in the event of a fire. If the free last branch of the channel has the ability to move then it may be not possible to install a flexible connection. However, if the sections of the smoke duct are with bends, bypasses around obstacles, then it is necessary to install flexible joints that will allow the duct to expand rather than rest on obstacles, bend, crush, or otherwise change its geometry.

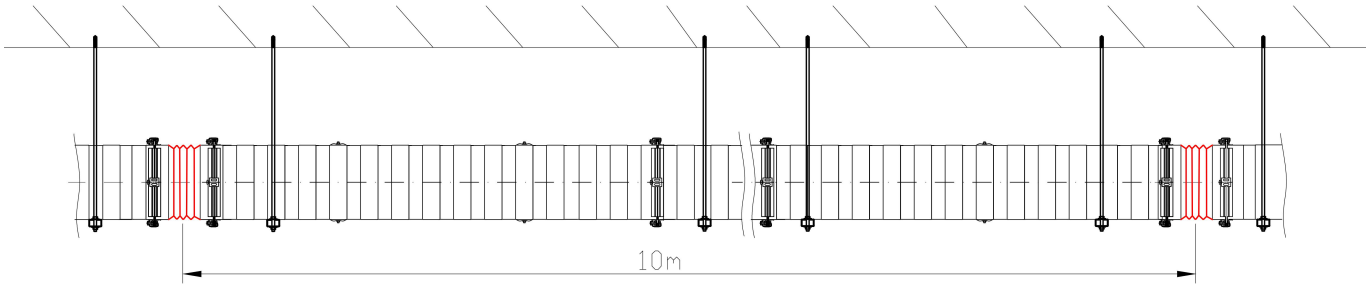


Fig. 6 The scheme of hanging smoke duct with flexible joint

The flexible connection is ready for installation in the stretched state, it has extension pins specially prepared for this purpose. The flexible connection must be fitted with extension pins - they must be left. When the duct sections are all connected and the system is suspended, then the tension pins need to be cut or unscrewed from the flexible joint. The flexible joint must remain in the stretched position, but without the extension pins.

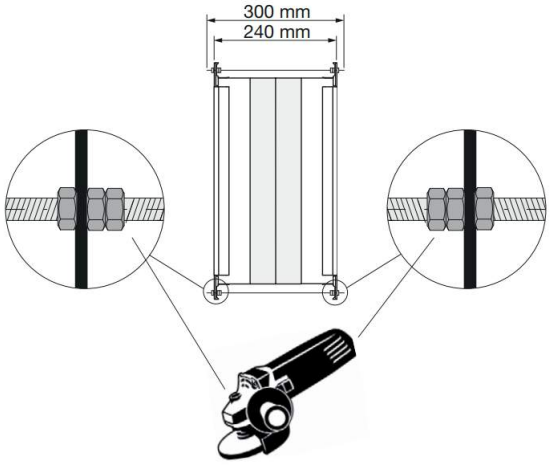


Fig. 7 Installation of flexible joint

7. *Smoke duct sections with possible openings*

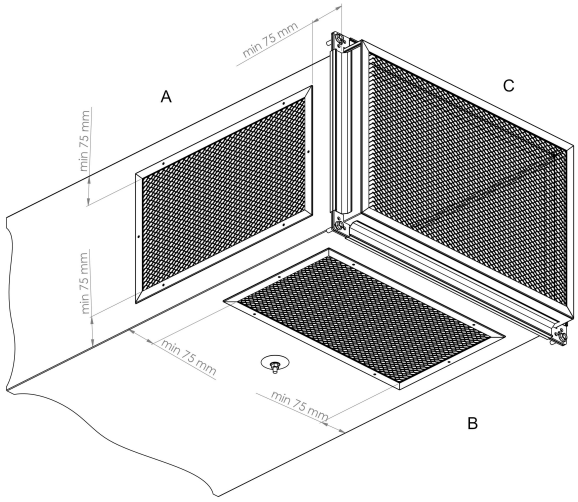


Fig. 8 Installation of openings in smoke duct sections

Smoke duct openings are installed in places where hot gas and smoke would be effectively removed during a fire. In all cases, the applicable rules for the design and installation of smoke and heat control systems must be observed. Openings in the smoke ducts must be installed in places where they are not covered by other elements of the building and do not interfere with the free removal of smoke and hot gases. In cases where the smoke ducts is intended for single compartment and only one smoke damper is installed according to the area of the smoke zone and when the damper is in the smoke duct at the smoke extraction shaft, then openings for smoke entry must be installed at the end of the duct. We recommend covering the openings with a net. The coefficient of reduction of the passage area of the opening with the net is 87%. In all other cases, smoke dampers must be fitted in the openings.

The openings installed in the smoke extraction ducts must be no closer than 75 mm from the edges and end of the duct as shown in Figure 8. Fastening of all elements is only possible with steel fasteners. The openings must be installed without changing the stiffness of the duct. It is forbidden to remove or relocate the internal stiffening elements of the smoke duct.

The arrangement of the openings is recommended in the vertical sides of the smoke duct, as shown in Figure 8 for openings A and C. An opening cut in the horizontal plane B is only possible as an additional opening if there is not enough space, due to the fact that smoke and hot gas always collect at the highest point.

This type of openings with a net does not require additional sealing with fire-retardant mastic at the joint. In other cases, when installing openings for smoke dampers, the installation instructions for smoke dampers must be followed.

8. *Smoke duct components*

The materials listed in Table 7 below are used in the manufacture of smoke duct sections and the installation of smoke duct sections in the facility. All incoming materials are inspected and their suitability determined. Materials can only be used that have been tested in smoke duct system, or higher resistance eg. thicker threaded rods, thicker suspension profiles. Gasket and mastic must be used in the same or analogous way (supporting documents must be available).

Table 7

Materials used in the manufacture and installation of smoke duct sections				
No.	Name of the material	Parameters	In factory	Installation
1.	Steel sheet	0,9±0,05 mm	+	
2.	Connection flange	F30 mm.	+	
3.	Tube	Ø17,2x2,3mm	+	
4.	Threaded rod	M8	+	
5.	Supporting washer	Ø70 mm	+	
6.	Bolt, nut, washer	M10x30, M10		+
7.	Universal clamp	VG20- M8		+
8.	Intumescent mastic	Pyroplex® CE Intumescent Acrylic	+	
9.	Ceramic tape	Kerafix2000SK 20x3 mm		+
10.	Threaded rod for suspension	M8 arba M10	+	+
11.	Supporting profile	35x20-1,75, 35x21-2,0 or 30x45-1,5 or not less alternative supporting.		+

9. Service and maintenance

- All parts of the smoke duct section must be installed as described in this manual.
- The flange connections must be tightened at the corners and additionally tightened with universal clamps.
- All elements of the smoke duct must be of regular uniform shape, any reduction in cross-sectional area is prohibited.
- All fastening and hanging materials must be selected according to the weight of the smoke duct section used.
- It is recommended to distribute the total weight of the system on the suspension profiles as evenly as possible.
- If a flexible connection is used, it should be installed in the most stretched condition and used where the smoke duct is most likely to lengthen between two fixed nodes, walls, or turns when heated. The flexible connection will allow the smoke duct to lengthen and not change the geometry due to loads.
- Do not leave any flammable materials or parts on the surface of the duct. It is recommended to leave a distance of at least 50 mm from the smoke duct to other materials or elements in the building.

10. Annual inspection form for the installed system for the building operator.

The smoke duct sections in the building must be inspected at least once a year and a inspection form must be completed. The recommended parameters to be checked are given in Table 8.

Table 8

Annual inspection form for the installed smoke duct system			
Name of smoke duct system:			
Check date:			
Who did the maintenance work			
Company, person:		Signature:	
Address:		Phone number:	

No.	Checked parameters	Result	Notes
1.	Check that the smoke duct sections are not deformed or mechanically damaged.		
2.	Check the section connections bolts are not loose. Tighten if necessary.		
3.	Check the connecting gaskets for damage and replace if necessary.		
4.	Check the cleanliness of the ducts. Clean if necessary.		
5.	Check the finish of the openings where the duct crosses it. Report if necessary.		
6.	Confirm that the smoke duct sections function as part of the smoke extraction system.		

Note: Smoke duct sections are only part of the entire smoke extraction system. As a result, the entire smoke extraction system must be inspected in accordance with the operating and maintenance instructions.

11. Conformity assessment of installation works

TECHNIKA

Conformity assessment of installation works

This is only a conformity assessment, which is confirmed by the installer and provided to the customer of the document. This signature confirms that the installer has received the installation instructions and that he/she has gradually carried them out and carried out the installation work correctly.

Company name	
Address	
Phone number	
E - mail	
Object name	
Installation completion date	

☐ I declare that the smoke duct sections are installed in accordance with the manufacturer's installation manual

Data: _____ Signature:_____