

---

# PRODUCT CERTIFICATE

---

## PRODUCT APPLICATION

PAROC Hvac Fire insulation solutions  
for ventilation ducts

## MANUFACTURER

Paroc Oy Ab  
P.O. Box 240  
FI-00181 Helsinki



## INTRODUCTION

PAROC Hvac Fire insulation solutions consist of stone wool insulating materials manufactured by Paroc Oy Ab and specified in this certificate, fastenings and sealants. In this certificate the installation principles and fire resistance capability of the assembled PAROC Hvac Fire insulation solutions are presented. Suitable PAROC Hvac Fire insulation solution is selected according to the type of the ventilation duct and required fire resistance class.

The insulating materials used in the PAROC Hvac Fire insulation solutions are CE-marked according to the product standard EN 14303. CE-marking according to EN 14303 cannot be used to declare fire resistance.

## CERTIFICATION PROCEDURE

This certificate has been issued by Eurofins Expert Services Oy, which is a certification body (S017) accredited by FINAS.

This certificate is based on certification criteria no. SERT R045/15, type testing of the PAROC Hvac Fire insulation solutions and manufacturer's procedures to ensure the functionality of the fire insulation solutions according to section 3 of this certificate. The general certification procedures are based on the certification system of Eurofins Expert Services Oy.

The conditions of validity of this certificate are described in section 10.

## TABLE OF CONTENTS

REGULATIONS, STANDARDS AND INSTRUCTIONS .....	3
1 Regulations .....	3
2 Other instructions and requirements.....	3
PRODUCT INFORMATION .....	3
3 Products, markings and quality control.....	3
4 Delivery and storage on site .....	4
DESIGN INFORMATION .....	4
5 General .....	4
6 Installation .....	4
7 Fire safety .....	4
INSTRUCTIONS FOR INSTALLATION AND USE.....	6
8 Manufacturer's instructions.....	6
VALIDITY OF THE CERTIFICATE .....	7
9 Validity period of the certificate .....	7
10 Conditions of validity .....	7
11 Other conditions .....	7
APPENDIX A1: Installation report.....	8
APPENDIX A2: Fire insulation details.....	9

## REGULATIONS, STANDARDS AND INSTRUCTIONS

### 1 Regulations

According to the assessment of Eurofins Expert Services Oy, the PAROC Hvac Fire insulation solutions, if installed in accordance with the provisions of this certificate, will contribute to meet the relevant requirements of the Finnish building legislation as stated in the following:

848/2017, *Decree on the fire safety of buildings*, in accordance with section 7 of this certificate.

### 2 Other instructions and requirements

Other instructions and requirements applicable to the product:

EN 14303, Thermal insulation for building equipment and industrial installations – Factory made mineral wool (MW) products – Specification.

Eurofins Expert Services Oy certification rules SERT R045/15, based on tests according to EN 1366-1 and partly applying EXAP EN 15882-1:2011.

Ilmanvaihtolaitosten paloturvallisuus -opas, [www.talotekniikkainfo.fi](http://www.talotekniikkainfo.fi) (manual for fire safety of ventilation plants, available in Finnish only).

Paroc Oy Ab Hvac insulations, Installation guide, November 2018 (available in Finnish only).

## PRODUCT INFORMATION

### 3 Products, markings and quality control

Products used in the PAROC Hvac Fire insulation solutions are presented in Table 1.

*Table 1. Products used in the PAROC Hvac Fire insulation solutions.*

Stone wool wired mats	PAROC Hvac Fire Mat BlackCoat
Stone wool slabs	PAROC Hvac Fire Slab EI30 BlackCoat
	PAROC Hvac Fire Slab EI60 BlackCoat
	PAROC Hvac Fire Slab EI120 BlackCoat
Stone wool pipe sections	PAROC Hvac AirCoat pipe section and components made from it
Sealing products for penetrations	Silicate glue Sika® FireStop PAROC stone wool, loose wool, nominal density at least 80 kg/m <sup>3</sup>
Fastenings	As defined in the installation guide and Annex A2

The nominal densities and thicknesses required from the insulating materials in the fire insulation solutions are presented for each fire resistance class in section 7 of this certificate.

Essential characteristics according to standard EN 14303 are declared by the manufacturer in the declarations of performance, available from the manufacturer.

The insulation materials are identified by the markings on the packages, which include product name, dimensions, manufacturer's name, production time and other product information.

The manufacturer performs factory production control of the insulating materials according to the standard EN 14303.

The procedures to ensure the functionality of the fire insulation solutions are the following:

- The manufacturer ensures that the installation instruction guide and this certificate are made readily available.
- No changes to the fire insulation solutions or products are made before Eurofins Expert Services Oy has evaluated the effect of the changes to the fire resistance given in this certificate.
- Insulating materials used in the fire insulation solutions are clearly and unambiguously marked with product label.
- The manufacturer ensures that the installation companies have been instructed to document the installation using the installation report according to Annex A1.
- The manufacturer ensures that the installation companies have been instructed to deliver a copy of the installation report together with the copy of this certificate for filing in the construction documentation.
- The installed fire insulations are identifiable.

The assessment of conformity of the installed fire insulation system is not covered by this certificate.

#### **4 Delivery and storage on site**

The insulating materials are packed into plastic or cardboard packages and delivered to sites in a pallet protected with plastic film.

The insulating materials are delivered and stored according to the manufacturer's instructions to prevent them from getting wet, dirty or damaged.

### **DESIGN INFORMATION**

#### **5 General**

The design information given in this certificate is based on the assumption that the structural solutions, fastening methods and other initial data are accordant to this certificate and the given requirements, instructions and standards are followed.

#### **6 Installation**

The products are installed according to the manufacturer's installation guide. Figures concerning the installation principles of stone wool wired mats, slabs and pipe sections as well as penetrations of circular and rectangular ducts are presented in Annex A2. A template of the installation report that the installation company shall prepare is presented in Annex A1.

#### **7 Fire safety**

The requirements for the fire safety of buildings and building products used in them are given in the National Building Code of Finland 848/2017, Decree on the fire safety of buildings.

The results presented in this certificate are valid provided that the ventilation ducts meet the requirements given in the National Building Code of Finland, the requirements given in this certificate are fulfilled, and the fire insulation of the ducts has been performed according to the manufacturer's installation instructions and as described in Annex A2.

In the declarations of performance the manufacturer has declared the reaction to fire classes shown in Table 2. The nominal density and the facing material of the product are also shown in Table 2.

Table 2. Reaction to fire class, nominal density and facing of PAROC Hvac Fire insulating materials.

Product	Reaction to fire class	Nominal density	Facing
PAROC Hvac Fire Mat BlackCoat	A2-s1, d0	80 kg/m <sup>3</sup>	Aluminium laminate
PAROC Hvac Fire Slab EI30 BlackCoat	A2-s1, d0	80 kg/m <sup>3</sup>	Aluminium laminate
PAROC Hvac Fire Slab EI60 BlackCoat		120 kg/m <sup>3</sup>	
PAROC Hvac Fire Slab EI120 BlackCoat		180 kg/m <sup>3</sup>	
PAROC Hvac AirCoat and insulating components made from it	A2 <sub>L</sub> -s1, d0	85 kg/m <sup>3</sup>	Aluminium laminate

The fire resistance of insulated circular spiral ducts made of galvanized steel and rectangular ducts made of galvanized steel sheet for internal and external fire exposure (o↔i) in horizontal and vertical duct orientations (ve ho) are presented in Table 3. Table 3 presents also the minimum insulation thickness and nominal density of insulating material in different fire resistance classes and the maximum cross section dimensions of the ventilation ducts.

Table 3. The maximum cross section dimensions of ducts and the minimum insulation thickness and density of PAROC Hvac Fire insulating materials required for circular and rectangular ducts in different fire resistance classes.

Product	Class	Insulation thickness	Nominal density
<b>Circular duct, maximum diameter 1000 mm</b>			
PAROC Hvac Fire Mat BlackCoat	EI 15 (ve ho o↔i)	50 mm	80 kg/m <sup>3</sup>
	EI 30 (ve ho o↔i)	50 mm	80 kg/m <sup>3</sup>
	EI 60 (ve ho o↔i)	80 mm	80 kg/m <sup>3</sup>
	EI 90 (ve ho o↔i)	100 mm	80 kg/m <sup>3</sup>
	EI 120 (ve ho o↔i)	100 mm	80 kg/m <sup>3</sup>
<b>Circular duct, maximum diameter 250 mm</b>			
PAROC Hvac AirCoat	EI 30 (ve ho o↔i)	50 mm	85 kg/m <sup>3</sup>
<b>Rectangular duct, maximum width of the cross section 1250 mm and height 1000 mm</b>			
PAROC Hvac Fire Slab EI30 BlackCoat	EI 15 (ve ho o↔i)	60 mm	80 kg/m <sup>3</sup>
PAROC Hvac Fire Slab EI30 BlackCoat	EI 30 (ve ho o↔i)	60 mm	80 kg/m <sup>3</sup>
PAROC Hvac Fire Slab EI60 BlackCoat	EI 60 (ve ho o↔i)	60 mm	120 kg/m <sup>3</sup>
PAROC Hvac Fire Slab EI120 BlackCoat	EI 90 (ve ho o↔i)	60 mm	180 kg/m <sup>3</sup>
PAROC Hvac Fire Slab EI120 BlackCoat	EI 120 (ve ho o↔i)	60 mm	180 kg/m <sup>3</sup>

The insulation thickness in each fire resistance class may be increased by maximum 20 %. The capacity of the suspensions of horizontal ducts shall be ensured.

The minimum steel thickness of the ventilation duct in relation to the cross section dimensions of duct shall be as given in Table 4. In addition, the leakage class shall be as defined in Table 4 and the stiffness of the duct system shall be as of the tested or better.

Table 4. Minimum steel thickness of the ventilation duct to be insulated and minimum duct leakage class.

Duct type	Cross section dimensions of the duct	Steel thickness	Duct leakage class, minimum
Circular	Ø 63 - 315 mm	min. 0,5 mm	D
	Ø 400 - 1000 mm	min. 0,7 mm	
Rectangular	longer side ≤ 300 mm	min. 0,5 mm	C
	longer side > 300 - 800 mm	min. 0,7 mm	
	longer side > 800 - 1250 mm	min. 0,9 mm	

The fire resistance of the fire-separating structure shall be equal to or higher than the fire resistance of the insulated duct. The massive fire-separating structure shall have density of at least 575 kg/m<sup>3</sup>. The minimum thickness of rigid fire compartment wall shall be 70 mm in fire resistance class EI 30, 95 mm in fire resistance class EI 60 and 130 mm in fire resistance classes EI 90 and EI 120. The thickness of the massive fire compartment slab shall be at least 100 mm in fire resistance classes EI 30 and EI 60 and 150 mm in fire resistance classes EI 90 and EI 120.

The stresses in suspension devices of horizontal ducts caused by supported load shall not exceed the values presented in Table 5.

Table 5. Maximum values of stresses in suspension devices depending on fire resistance time.

Type of load	Maximum stresses	
	Fire resistance time ≤ 60 min	Fire resistance time > 60 min - ≤ 120 min
Tensile stress in all vertically orientated components	9 N/mm <sup>2</sup>	6 N/mm <sup>2</sup>
Shearing stress in screws <sup>1)</sup>	15 N/mm <sup>2</sup>	10 N/mm <sup>2</sup>

<sup>1)</sup> Screws of class 4.6 according to standard EN ISO 898-1.

Vertical ducts are fastened storey by storey, bracing distance not exceeding 5 m.

Horizontal ducts are mounted by using steel suspension clamps and threaded steel rods. The maximum distances between suspension devices, between duct joints and suspension devices, and distances between duct joints and fire-separating structures are given Figures 1 and 4 of Annex A2. The maximum distance between suspension device and the closest insulation joint is 300 ± 100 mm, except for rectangular ducts of fire resistance EI 90 and EI 120 it is 65 mm ± 100 mm.

Suspension of ducts at the fire-separating structure is presented in Figures 2, 3 and 5 of Annex A2.

The penetrations of the rectangular and circular ducts are sealed according to the Figures 2, 3 and 5 of Annex A2. The maximum gap between the duct and the penetration in the fire-separating structure is 30 mm.

When one, two or three sided ventilation ducts are in question, the suspension of ducts is different from the requirements of the test standard. In that case the fire insulation of a ventilation duct can be performed using insulation that has been tested for the required fire resistance class and installing it according to the alternative installation methods recommended by the manufacturer. In these cases it is recommended to select a solution fulfilling higher fire resistance class than the fire resistance class required for the construction works.

## INSTRUCTIONS FOR INSTALLATION AND USE

### 8 Manufacturer's instructions

Installation of the fire insulation solution shall be made according to the manufacturer's instructions. Installation company prepares an installation report according to the Annex A1.

Safety data sheet of the insulating materials is available from the manufacturer.

## VALIDITY OF THE CERTIFICATE

### 9 Validity period of the certificate

This certificate is valid until February 18, 2024.

The validity of the certificate may be confirmed at Eurofins Expert Services Oy web pages.

### 10 Conditions of validity

The certificate is valid assuming that no fundamental changes are made to the product, and that the manufacturer has a valid contract on certification.

### 11 Other conditions

The references made in this certificate to the parts of the National Building Code of Finland, standards and instructions apply in the form they were valid on the date the certificate was signed.

The recommendations in this certificate concerning the safe use of this product are minimum requirements that shall be satisfied when using the product. The certificate does not override current or future requirements imposed by laws and statutes. In addition to the issues presented in this certificate, design, manufacturing and use shall follow appropriate construction methods.

The manufacturer is in charge of the product's quality and factory production control. In awarding this certificate, Eurofins Expert Services Oy does not bind itself to indemnification liability concerning personal injury or other damage that may directly or indirectly result from using the product described in this certificate.

This certificate EUFI29-19000981-C has been granted as described above to Paroc Oy Ab.

On behalf of Eurofins Expert Services Oy on February 19, 2019



Tiina Ala-Outinen  
Business Unit Manager



Tiina Tirkkonen  
Senior Expert

*This document has been signed electronically*

This certificate is the English version of the original certificate no. VTT-C-11685-16, signed February 19, 2019. In case of dispute the Finnish original certificate is valid.

APPENDIX A1: Installation report

CERTIFICATE NO. EUFI29-19000981-C

Products installed:	Circular duct	Rectangular duct	Fire resistance class	Insulation thickness
PAROC Hvac Fire Mat BlackCoat <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EI ____	
PAROC Hvac Fire Slab EI30 BlackCoat <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EI ____	
PAROC Hvac Fire Slab EI60 BlackCoat <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EI ____	
PAROC Hvac Fire Slab EI120 BlackCoat <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EI ____	
PAROC Hvac AirCoat pipe section and components made from it <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EI ____	
Sealing products:				

Installation site:

Site identification	
Address	
Installation site specifications (building part, floor, rooms)	
Installation time	
Additional information	

Installation company:

Name	
Address	
Name of the installer	
Contact information (phone and e-mail)	

Products have been installed according to the manufacturer's installation instructions

Place and date: \_\_\_\_\_, \_\_\_\_:\_\_\_\_.20\_\_\_\_

Signature: \_\_\_\_\_

Clarification of signature: \_\_\_\_\_

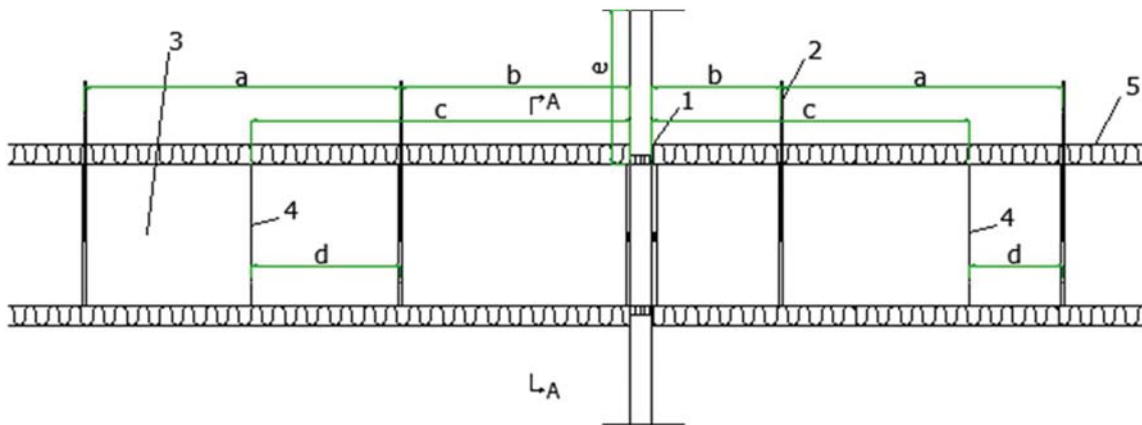


APPENDIX A2: Fire insulation details

**Figure 1. Duct suspension, duct joint and fire insulation.**  
**Circular horizontal or vertical duct.**  
**Fire insulation with stone wool wired mat PAROC Hvac Fire Mat BlackCoat or stone wool pipe section PAROC Hvac AirCoat.**

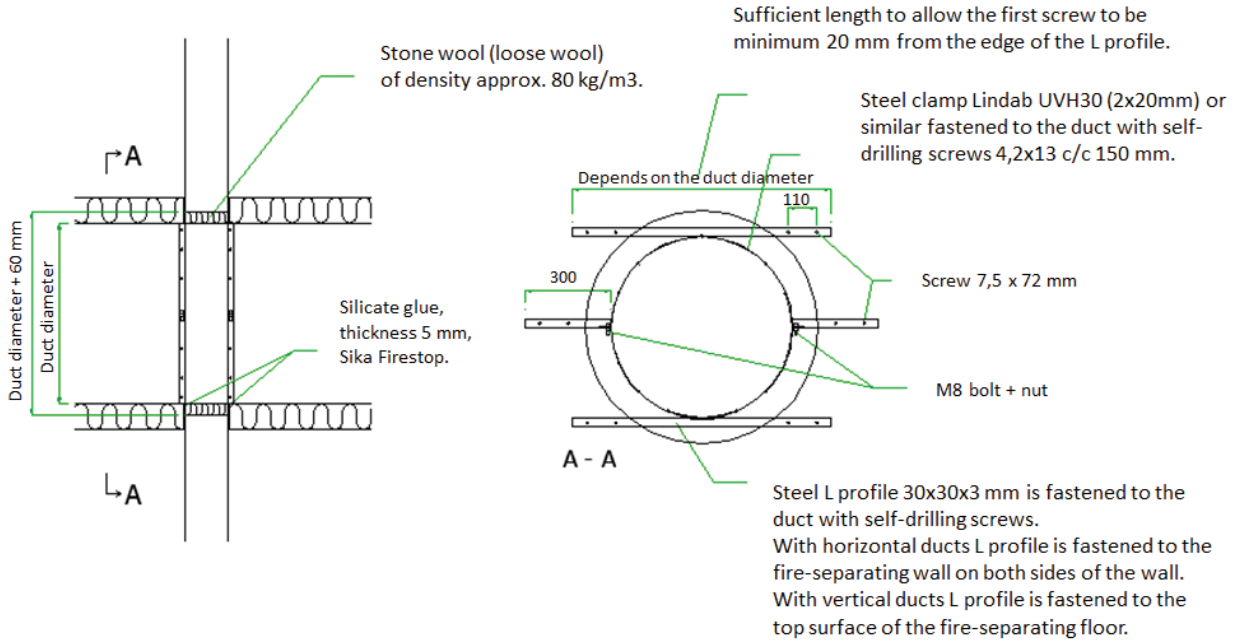
Note\* Suspension of circular duct  
 Horizontal ducts are suspended with threaded steel rods that are attached to suspension clamps 2 x 20 mm, Lindab UVH30 (or similar).  
 Vertical ducts are supported at each floor with max. distance of 5 m between supports.

Note \*\* Duct joint  
 Circular ducts are joined with a coupling connector Lindab NPU (or similar). Fastening is done with self-drilling screws 4,2x13 mm c/c 150 mm.



Dimensions	Ducts insulated with stone wool wired mat	Ducts insulated with stone wool pipe section	5 Insulating material	PAROC Hvac Fire Mat/Hvac AirCoat
a	1350 mm (max, horiz.)	1100 mm (max, horiz.)	4 Duct joint	Note **
b	1350 mm (max, horiz.)	900 mm (max, horiz.)	3 Duct	Lindab SR
c	b + d (horiz.)	1200 mm (min, horiz.)	2 Suspension	Note *
d	30 mm ± 100 mm (horiz.)	100 mm (min, horiz.)	1 Penetration sealing	Section A-A
e	no restriction	no restriction	Circular ducts insulated with stone wool wired mat PAROC Hvac Fire Mat or stone wool pipe section PAROC Hvac AirCoat	
			<b>PAROC</b>	
				JiLi/Ala

**Figure 2. Penetration sealing and duct suspension at the fire-separating structure.  
Circular horizontal or vertical duct.  
Fire insulation with stone wool wired mat PAROC Hvac Fire Mat BlackCoat.**

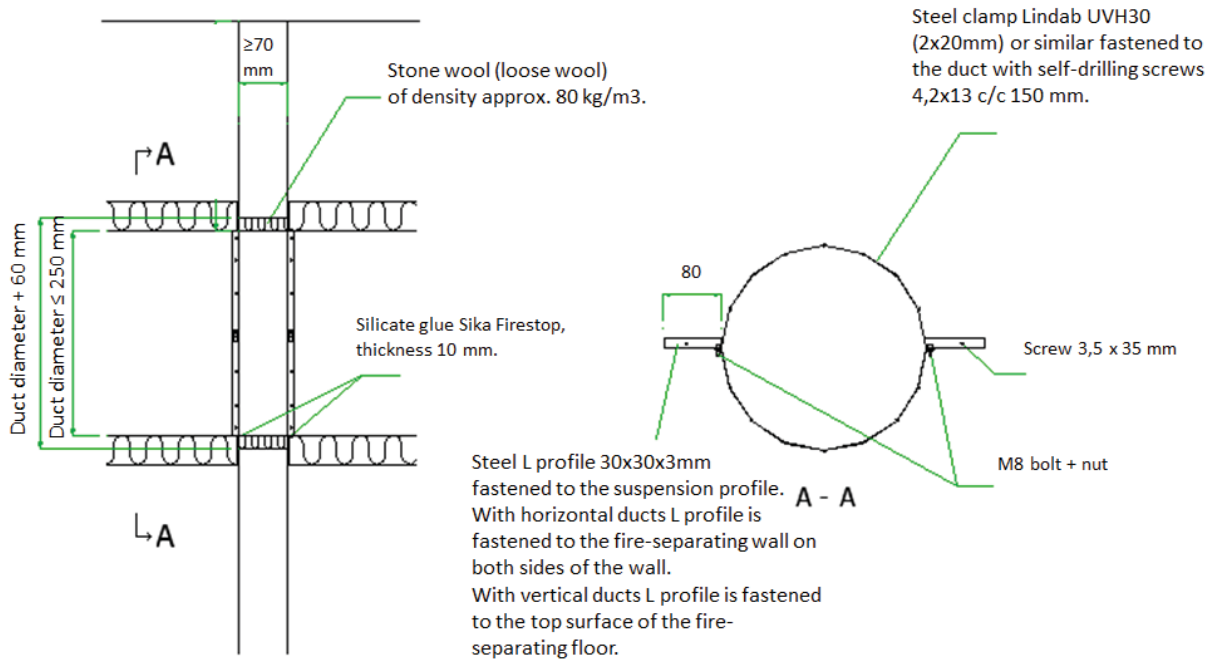


**Penetration sealing**

Gap between the penetration and the duct is max. 30 mm. Gap between the penetration and the duct is filled with stone wool (loose wool) of density approx. 80 kg/m<sup>3</sup>. Silicate glue is tightly applied over the loose wool and the fire-separating structure for approx. 100 mm width around the duct, thickness of glue approx. max. 5 mm.

Circular ducts insulated with stone wool wired mat PAROC Hvac Fire Mat	
Penetration of horizontal and vertical circular ducts Steel spiral duct and insulation	
<b>PAROC</b>	JiLi/ALa

**Figure 3. Penetration sealing and duct suspension at the fire-separating structure.  
Circular horizontal or vertical duct.  
Fire insulation with stone wool pipe section PAROC Hvac AirCoat.**



**Penetration sealing**

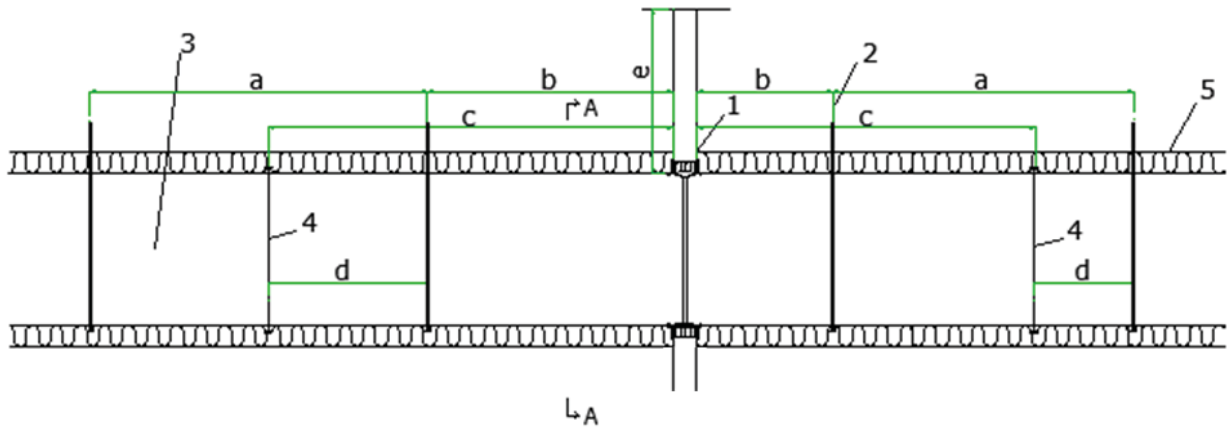
Gap between the penetration and the duct is max. 30 mm.  
Gap between the penetration and the duct is filled with stone wool (loose wool) of density approx. 80 kg/m<sup>3</sup>. Silicate glue is tightly applied over the loose wool and the fire-separating structure for approx. 60 mm width around the duct, thickness of glue 10 mm.

Circular ducts insulated with stone wool pipe section PAROC Hvac AirCoat	
Penetration with horizontal and vertical circular ducts	
Steel spiral duct and insulation	
<b>PAROC</b>	JiLi/ALa

**Figure 4. Duct suspension, duct joint and fire insulation.**  
**Rectangular horizontal or vertical duct.**  
**Fire insulation with stone slabs PAROC Hvac Fire Slab EI30 BlackCoat, PAROC Hvac Fire Slab EI60 BlackCoat or PAROC Hvac Fire Slab EI120 BlackCoat.**

Note \* Suspension of duct  
 Horizontal ducts are suspended with threaded steel rods that are attached to the supporting U profile of size 30x30x3mm.  
 Vertical ducts are supported at each floor with max. distance of 5 m between supports.

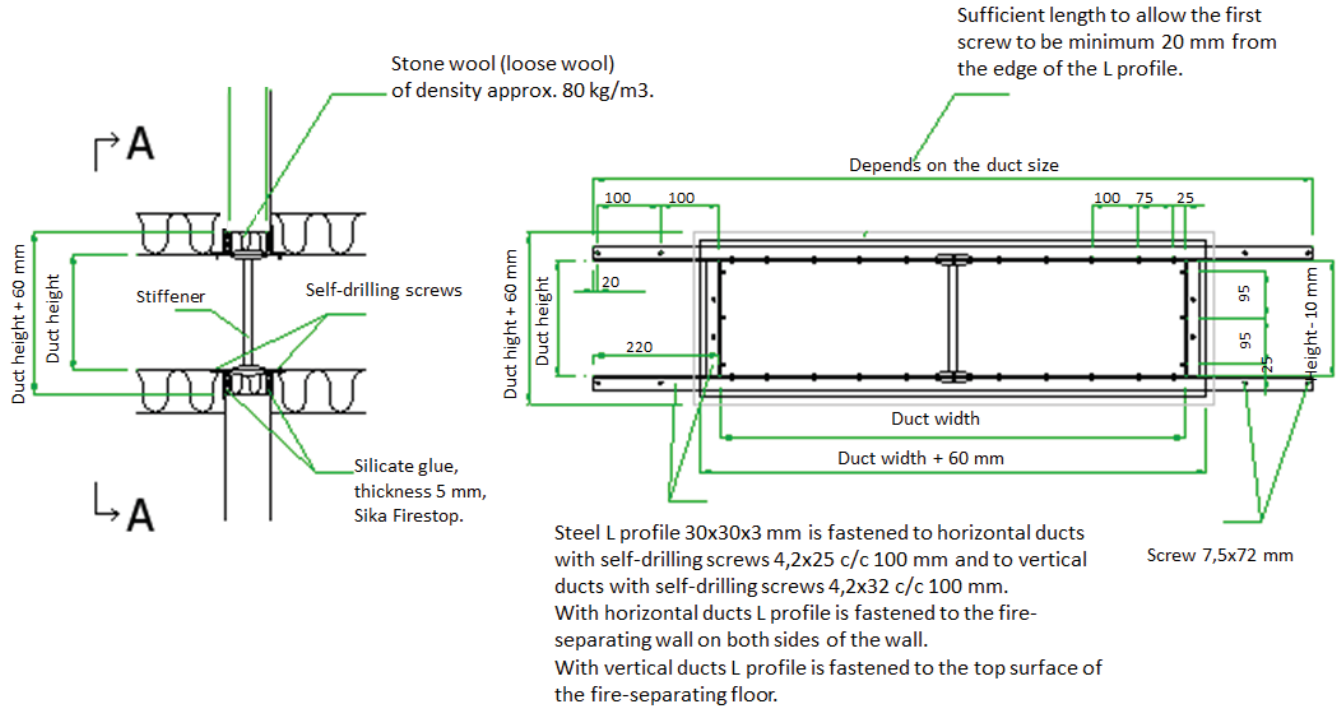
Note \*\* Duct joint  
 Rectangular ducts are joined with a sliding C profile Lindab RJSP (or similar) that is attached to the square-edged duct ends.



Dimensions	Ducts insulated with stone wool slabs
a	1680 mm for ≤ EI 60 (max, horiz.) 1360 mm for EI 90-EI 120 (max, horiz.)
b	same as dimension a
c	b + d (horiz.)
d	555 mm ± 100 mm for ≤ EI 60 (horiz.) 95 mm ± 100 mm for EI 90-EI 120 (horiz.)
e	no restriction

5	Insulating material	PAROC Hvac Fire Slab
4	Duct joint	Note **
3	Duct	Lindab LKR
2	Suspension	Note *
1	Penetration sealing	Section A-A
Rectangular ducts insulated with stone wool slab PAROC Hvac Fire Slab		
<b>PAROC</b>		JiLi/Ala

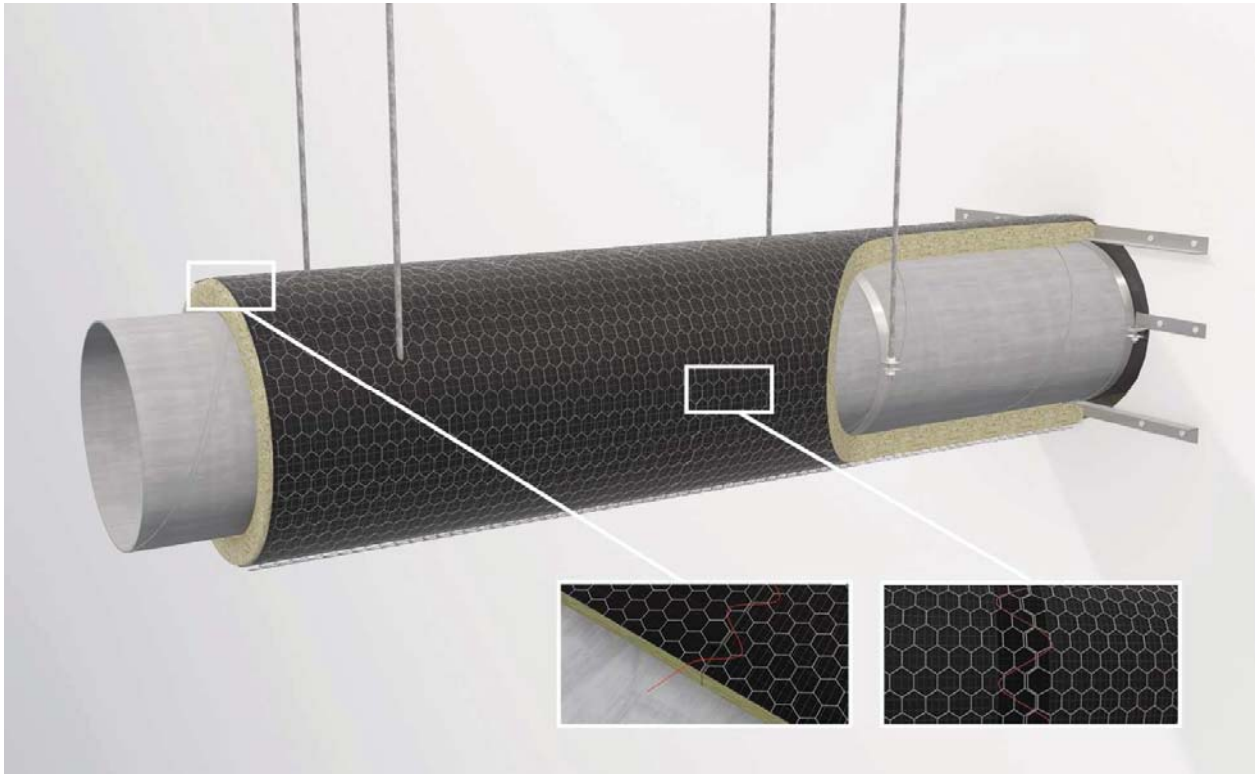
**Figure 5. Penetration sealing and duct suspension at the fire-separating structure.  
 Rectangular horizontal or vertical duct.  
 Fire insulation with stone wool slabs PAROC Hvac Fire Slab EI30 BlackCoat,  
 PAROC Hvac Fire Slab EI60 BlackCoat or PAROC Hvac Fire Slab EI120 BlackCoat.**



**Penetration sealing**  
 Gap between the penetration and the duct is max. 30 mm.  
 Gap between the penetration and the duct is filled with stone wool (loose wool) of density approx. 80 kg/m3.  
 Silicate glue is tightly applied over the loose wool for approx. 100 mm width around the duct, thickness max. approx. 5 mm.

Rectangular ducts insulated with stone wool slab PAROC Hvac Fire Slab		
Penetration of horizontal and vertical rectangular ducts		
Steel sheet duct and insulation		
<b>PAROC</b>		
	JiLi/ALa	

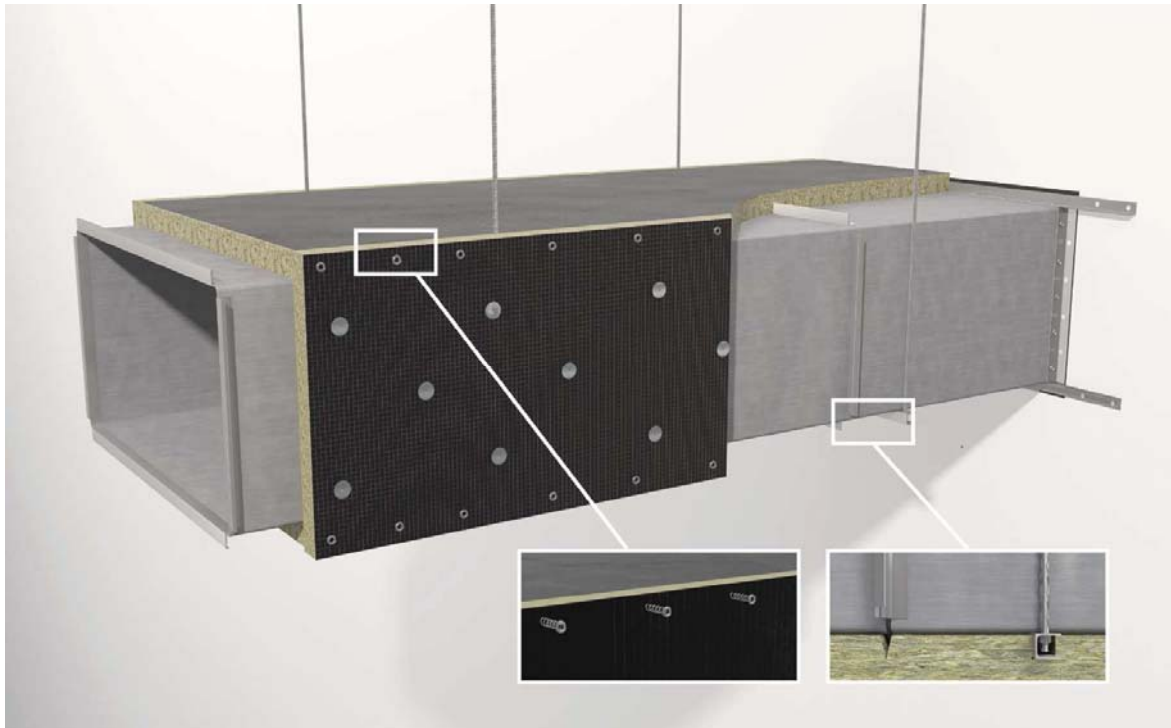
**Figure 6. Detailed installation instructions.  
Circular horizontal or vertical duct.  
Fire insulation with stone wool wired mat Hvac Fire Mat BlackCoat.**



**Insulation of circular duct with stone wool wired mat PAROC Fire Mat BlackCoat**

- Circular ducts are joined with factory-made steel coupling connectors, equipped with EPDM rubber gaskets. Ducts are fastened to coupling connectors with self-drilling screws or rivets *c/c* 150 mm.
- The suspension of the duct is made according to the Figures 1 and 2 of Annex A2 and Table 5 of section 7 of this certificate.
- The penetration, penetration sealing and fastening of the circular duct to the fire-separating structure are made according to the Figure 2 of Annex A2.
- Wired mat is installed tightly against the fire-separating structure and on top of the suspension clamps as presented in the figure above.

**Figure 7. Detailed installation instructions.  
Rectangular horizontal or vertical duct.  
Fire insulation with stone wool slabs PAROC Hvac Fire Slab EI30 BlackCoat,  
PAROC Hvac Fire Slab EI60 BlackCoat or PAROC Hvac Fire Slab EI120 BlackCoat.**

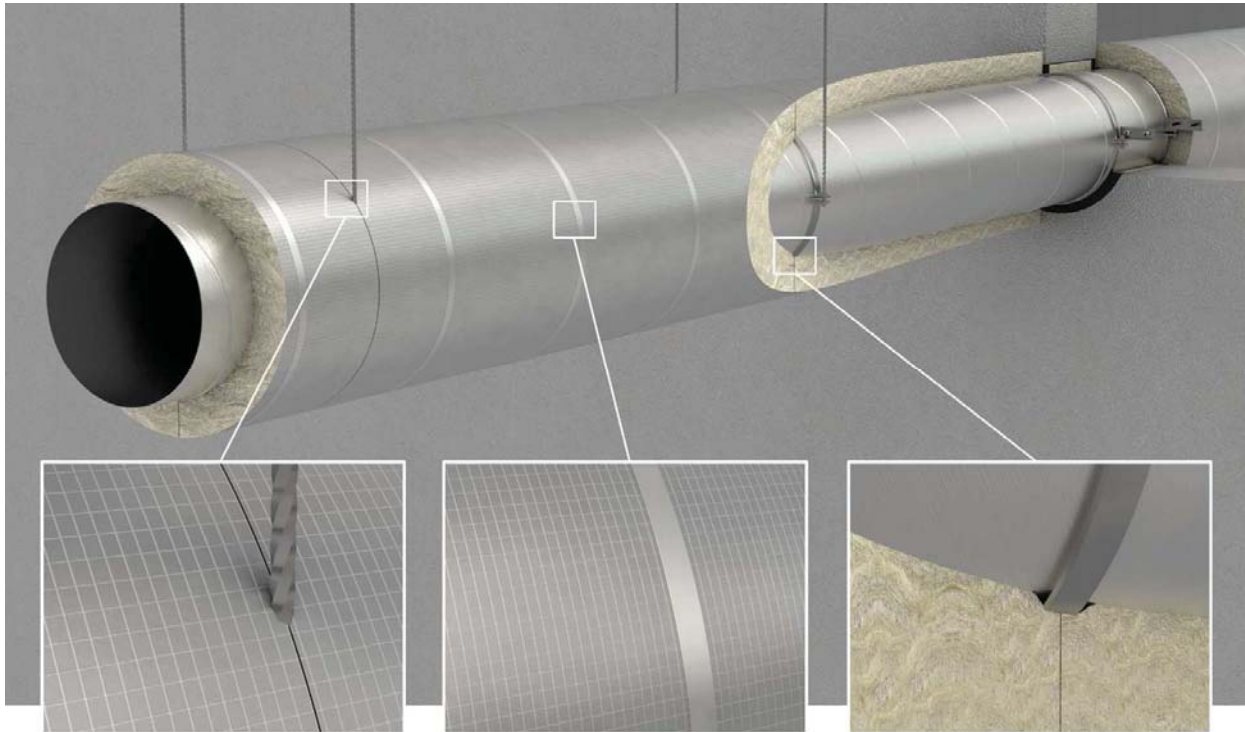


**Insulation of rectangular duct with stone wool slabs PAROC Hvac Fire Slab EI30 BlackCoat, PAROC Hvac Fire Slab EI60 BlackCoat or PAROC Hvac Fire Slab EI120 BlackCoat**

- The ends of rectangular ducts are square-edged and steel L-profiles are attached to them with spot-welding c/c 150 mm. The size of L-profiles is at least 30 x 30 x 0,8 mm. Ducts are joined with sliding C-profiles, which have minimum thickness of 0,85 mm, and corner profiles. Joints are sealed with polybutene sealing compound and EPDM rubber gasket.
- When the length of the longer side of rectangular duct exceeds 500 mm, the duct shall be stiffened perpendicular with the longer side with stiffeners that are installed at the midpoint of each 1250 mm long duct segment. Steel pipes of diameter 16 mm and thickness 2 mm are used as stiffeners that are fastened with four M70 mm washers (thickness 1 mm) to the duct (inside and outside) and with M6 bolts.
- The suspension of the duct is made according to the Figures 4 and 5 of Annex A2 and Table 5 of section 7 of this certificate.
- The penetration, penetration sealing and fastening of the rectangular duct to the fire-separating structure are made according to Figure 5 of Annex A2.
- Stone wool slabs are installed tightly against the fire-separating structure and a cutting corresponding to the dimensions of the supporting profile is made to the slab at the supports, see the figure above.
- Slabs are fixed using pins (min.  $\varnothing$  2,7 mm, length 62 mm) with steel washers ( $\varnothing$  30 mm) and fire screws (length 120 mm). The minimum number of pins is 12 per slab. Pins are positioned 50 mm from the edges and in rows with a maximum center to center distance of 300 mm.
- On top of the duct, slabs do not need to be fastened with pins. Slabs are fastened to their position with fire screws (first screws placed 30 mm from the slab edge and max. c/c 228 mm for  $\leq$  EI 60 and max. c/c 180 mm for EI 90 - EI 120) that are installed through the vertical slabs on the sides of the duct.
- When installing the slabs it shall be ensured that the corners are tightly insulated. The tightness of the slab joints is secured with fire screws which fasten the vertical slabs on the sides of the duct to the horizontal slabs above and below the duct.



**Figure 8. Detailed installation instructions.  
Circular horizontal or vertical duct.  
Fire insulation with stone wool pipe section PAROC Hvac AirCoat.**



**Insulation of circular duct with stone wool pipe section PAROC Hvac AirCoat**

- Circular ducts are joined with factory-made steel coupling connectors equipped with EPDM rubber gaskets. Ducts are fastened to coupling connectors with self-drilling screws c/c 150 mm.
- The suspension of the duct is made according to the Figures 1 and 3 of Annex A2.
- The penetration, penetration sealing and fastening of the circular duct to the fire-separating structure are made according to the Figure 3 of Annex A2 and Table 5 of section 7 of this certificate.
- Pipe section is installed tightly against the fire-separating structure.
- Pipe sections are fastened with steel band (16 x 0,4 mm). Steel bands for 1200 mm long pipe section are installed at maximum c/c 300 mm.
- Transverse joints shall be tightened by installing pipe sections tightly against each other. Transverse joints shall be positioned at the duct suspensions.
- Pipe sections are installed on top of the suspension clamps as presented in the figure above.