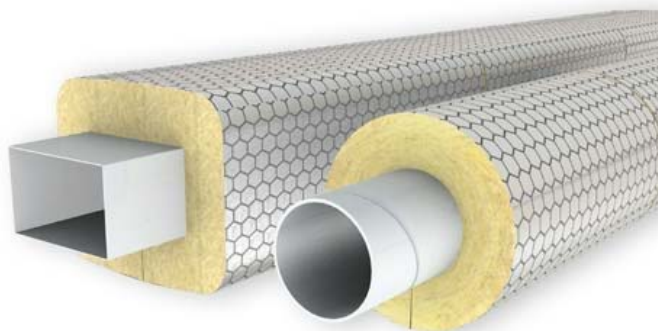


NAME OF PRODUCT

**Stone wool wired mats
Stone wool slabs and
Pipe sections and insulation
components produced from
them**

MANUFACTURER

**Paroc Oy Ab
Läkkisepäntie 23, PL 47
00620 Helsinki**



DESCRIPTION OF PRODUCT

Paroc Oy Ab produce and deliver wired mats, slabs and pipe sections and their components manufactured from stone wool. Thicknesses and dimensions of the products are given in paragraph 11.

Products are intended to be used as fire insulation of air ducts. Products are chosen for use according to the required fire resistance class.

CERTIFICATION PROCEDURE

This certificate is based on an initial type assessment of the product and inspection of the quality assurance system related to the product, as per sections 3.5 and 14. The general certification procedures are based on the certification system of VTT (Technical Research Centre of Finland).

The validity of this certificate is given in section 17 and the terms of validity in section 17.

To check the validity of this certificate, contact VTT, tel. 020 722 4911.

Using the VTT name in promotional material or reproducing and distributing any part of this certificate is allowed only by written permission of VTT.

CONTENT

1. Regulations and standards on product requirements	3
2. Other standards and instructions	3
3. Product description, marking and quality control	3
4. Delivery and storage on site	4
5. General	4
6. Installation	4
7. Structural performance	4
8. Sound insulation	4
9. Moisture behaviour	4
10. Thermal insulation	5
11. Fire safety	5
12. Durability	7
13. Manufacturer's instructions	7
14. Testing and analysis for this certificate	8
15. Other material	8
16. Validity period of the certificate	9
17. Conditions of validity	9
18. Other conditions	9

REGULATIONS, STANDARDS AND INSTRUCTIONS

1. Regulations and standards on product requirements

1.1 According to VTT's evaluation, the products presented in this certificate meet the essential requirements given in the parts of the National Building Code of Finland and standards that are essential to their use provided that also design of the construction project and installation are according to the requirements.

E1 *Structural fire safety, Regulations and guidelines 2002*, as per section 11 of this certificate

E7 *Fire safety of ventilation installations, Guidelines 2004*, as per section 11 of this certificate

2. Other standards and instructions

2.1 The manufacturer of the product has stated that the materials used in the manufacture and the manufacturing process itself complies with the following guidelines and standards:

- SFS-EN-ISO 9001 Quality management systems – Requirements
- SFS-EN-ISO Environmental management systems -- Requirements with guidance for use
- SFS 3976 Pipe, vessel and equipment insulations. Insulating materials and elements
- SFS 5454 Insulation of pipes, vessels and equipment. Test methods of insulating materials, elements and covers
- SFS 3978 Insulation of pipes, vessels and equipment. Application of thermal insulation

PRODUCT INFORMATION

3. Product description, marking and quality control

3.1 Insulating materials covered by this certificate are stone wool slabs, mats or sections and components produced from them. Provided densities and insulation thicknesses for each fire class are presented in section 11 of this certificate.

3.2 More detailed product descriptions and dimension alternatives are presented on manufacturers www-pages.

3.3 Products are identified through the markings in the packages, which include product name, dimensions, manufacturer's name, production time and other information connected to product and country-specific approvals.

3.4 The manufacturer's internal quality control includes inter alia daily controls of dimensions, density and markings. Manufacturer has an ISO 9001 quality system certified by DNV.

3.5 External quality control is carried out according to the certification contract between the Paroc Oy Ab and VTT.

4. Delivery and storage on site

4.1 Products are packed into plastic or cardboard and are delivered to sites as pallet packages protected with plastic film.

4.2 Products are stored according to the instructions of the manufacturer, in the way the do not get wet or break down.

DESIGN INFORMATION

5. General

5.1 Design information given in this certificate is based on the assumption that constructional solutions, installation methods and other initial data are in compliance with this certificate and that given requirements, instructions and standards are followed.

6. Installation

6.1 The products are installed according to the manufacturers Installation guide and to the appropriate extent according to the standard SFS 3978. Picture concerning installation principles is in the Annex A1. Model of the installation report that shall be done is in annex A

7. Structural performance

7.1 Products have no influence on the structural performance of the building. Designer shall inspect that the fastenings of the insulated ducts are according to the instructions.

8. Sound insulation

8.1 Stone wool products improve sound insulation. Extent of sound insulation effect has not been evaluated.

9. Moisture behaviour

9.1 The air duct insulations are used indoors. Water absorption, WS, of the Stone wool is $\leq 1 \text{ kg/m}^2$.

10. Thermal insulation

10.1 Stone wool acts also as thermal insulation. Thermal insulation properties have not been evaluated in certification process.

11. Fire safety

11.1 The requirements for the fire safety of buildings and of products used in them are given in the National Building Code of Finland, part E1, Structural fire safety in buildings, Regulations and guidelines 2002. Guidelines concerning fire safety of ventilation installations are given in the National Building Code of Finland, part E7, Fire safety of ventilation installations.

11.2 Reaction to fire classes of the insulations is presented in the tables 1 and 2.

11.3 Fire resistance classes of insulated ducts manufactured from steel sheet are presented in the tables 3, 4 and 5. Fire classes are identical with the type approval decision YM 252/6221/2006 (issued 5.12.2006).

Table 1. Fire classes of the non-coated Stone wool products

Product group	Reaction to fire class	Nominal density, at least (kg/m ³)
	EN 13501-1	EN 1602, EN 13470
Stone wool wired mats	A1	80
Stone wool slabs	A1	
Stone wool pipe sections and components produced from them	A1 _L	

Table 2. Reaction to fire classes of coated stone wool products

Product group	Reaction to fire class	Nominal density, at least (kg/m ³)	Coating
	EN 13501-1	EN 1602, EN 13470	
Stone wool wired mats	A2-s1,d0	80	Aluminium foil
Stone wool slabs	A2-s1,d0		Aluminium laminate
Stone wool pipe sections and components produced from them	A2 _L -s1,d0		Glass felt

Table 3. Insulation thicknesses of rectangular ducts in different fire classes

Fire class of the duct	*Insulation thickness, mm	
	Stone wool wired mat	Stone wool slab
EI 15	40	40
EI 30	60	60
EI 45	80	80
EI 60	80	100
EI 90	120	120
EI 120	120	140

*Presented insulation thicknesses provide that ducts are manufactured according to the standards SFS 3281 and 3282 in the way, that thickness of duct steel sheet is adequate, taking into account used material and duct size. Hanging of the ducts and fastening of the insulation shall be done according to the principles presented in the Annex A1.

Table 4. Insulation thicknesses of circular spiral ducts in different fire classes (when nominal density of the insulation is at least 80 kg/m³).

Diameter of duct mm	Thickness of insulation*						*Internal diameter of pipe section mm
	Fire resistance class of the duct						
	EI 15	EI 30	EI 45	EI 60	EI 90	EI 120	
63	30	35	45	50	65	75	70
80	30	35	45	55	70	80	89
100	30	40	50	60	70	85	108
125	30	40	50	60	75	90	133
160	30	40	55	65	80	90	168
200	30	45	55	65	85	100	208
250	30	45	60	70	90	105	259
315	30	45	60	70	90	105	324
400	30	45	60	75	95	110	406
500	30	50	65	75	95	115	508
630	30	50	65	75	100	115	630
800	30	50	65	80	100	120	813
1000	30	50	65	80	105	125	1016
1250	30	50	65	80	105	125	1250

* Presented insulation thicknesses provide that ducts are manufactured according to the standards SFS 3281 and 3282 in the way, that thickness of duct steel sheet is adequate, taking into account used material and duct size. Hanging of the ducts and fastening of the insulation shall be done according to the principles presented in the Annex A1. When insulation thickness is >100 mm, insulation shall be done in two layers and so that joints are not above each other.

Table 5. Insulation thicknesses of circular spiral ducts in different fire classes (when nominal density of the insulation is at least 100 kg/m^3).

Diameter of duct mm	Insulation thickness*						*Internal diameter of pipe section mm
	Fire resistance class of the duct						
	EI 15	EI 30	EI 45	EI 60	EI 90	EI 120	
63	30	35	40	45	55	65	70
80	30	35	40	50	60	70	89
100	30	35	45	50	60	70	108
125	30	35	45	55	65	75	133
160	30	35	45	55	70	80	168
200	30	40	50	60	75	85	208
250	30	40	50	60	75	90	259
315	30	40	55	65	80	90	324
400	30	40	55	65	80	95	406
500	30	40	55	65	80	95	508
630	30	45	55	65	85	100	630
800	30	45	55	65	85	100	813
1000	30	45	55	70	85	105	1016
1250	30	45	55	70	90	105	1250

*Presented insulation thicknesses provide that ducts are manufactured according to the standards SFS 3281 and 3282 in the way, that thickness of duct steel sheet is adequate, taking into account used material and duct size. Hanging of the ducts and fastening of the insulation shall be done according to the principles presented in the Annex A1. When insulation thickness is $>100 \text{ mm}$, insulation shall be done in two layers and so that joints are not above each other.

12. Durability

12.1 Stone wool insulations resist, when installed according to instruction and when performance of the building is correct, during the life time of the building/structure.

12.2 Binder will vanish from the insulation when its temperature exceeds $200 \text{ }^\circ\text{C}$. However the insulation property of the product remains as the same, but strength will weaken down. Sintering temperature of stone wool insulations is $> 1000 \text{ }^\circ\text{C}$.

INSTRUCTIONS FOR INSTALLATION AND USE

13. Manufacturer's instructions

13.1 Installation of insulations shall be done according to the instructions of the manufacturer. Installation company prepares an installation report according to the Annex A.

TECHNICAL ASSESSMENT

14. Testing and analysis for this certificate

14.1 Behaviour of the products in fire has been tested according to the test methods defined in the standard EN 13501-1. Fire resistance properties of the insulated ducts have been tested and calculated in the way provided in the certification procedure and received insulation thicknesses for each fire resistance class are given in the tables 3 – 5.

15. Other material

Operational safety bulletin is available in manufacturer's www- pages.

VALIDITY OF THE CERTIFICATE

16. Validity period of the certificate

This certificate is valid until 1.4.2011.

17. Conditions of validity

The certificate is valid assuming that no fundamental changes are made to the product, and that the manufacturer has a valid quality control contract. A list of valid certificates is available from VTT.

18. Other conditions

The references made in this certificate to publications in the National Building Code of Finland and standards are valid in the form used at the time the certificate was issued.

The recommendations in this certificate concerning safe use of the product are minimum requirements that shall be met when using the product. The certificate does not override current or future requirements imposed by act or decree. In addition to what is specified in this certificate, good general building practice shall be observed in the design, manufacture and use of the product.

The manufacturer is in charge of the product's quality and factory production control. In issuing this certificate, VTT 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.

VTT Technical Research Centre of Finland finds insulation products manufactured by Paroc Oy Ab to be suitable for use in construction as described in this certificate. This certificate No. VTT-C-4735-09 has been awarded as described above to Paroc Oy Ab.

On behalf of VTT, 30.11.2009



Liisa Rautiainen
Assessment Manager



Lina Markelin-Rantala
Research Scientist

INSTALLATION REPORT

PRODUCTS: Manufactured by Paroc Group Oy Ab:

- Mineral wool wired mats PAROC Wired Mat 80, PAROC Wired Mat 80 AluCoat, PAROC Wired Mat 80 AL1, PAROC Wired Mat 100, PAROC Wired Mat 100 AluCoat, PAROC Wired Mat 100 AL1 and PAROC Wired Mat 130.
- Mineral wool slabs PAROC Fire Slab 80, PAROC Fire Slab 80 AluCoat, PAROC Marine Fire Slab 100 and PAROC Marine Fire Slab 110.
- Mineral wool Sections PAROC Section (+DL), PAROC Segment (+DL), PAROC Bend, PAROC Lock, PAROC Chimney Section, PAROC Section 140 (+DL), PAROC Segment 140 (+DL), PAROC Lock 140, PAROC Section AluCoat T, PAROC Section AluCoat, PAROC Section 100 AluCoat and PAROC Section 140 AluCoat.
- Insulation Kits PAROC AirCoat -products.

VTT-certificate No VTT-C-4735-09

Installation destination: _____

Address: _____

Installation company information:

Name	
Address	
Phone/fax	
E-mail/Internet-address	

Installer	
Installation time	
Type of the product, size, other identifying information	
Installation place identification (building part/floor/rooms)	
Other information	

Products have been installed according to installation instructions of the manufacturer.

Place and date: _____, _____.20____

Signature: _____

Name in printed text: _____

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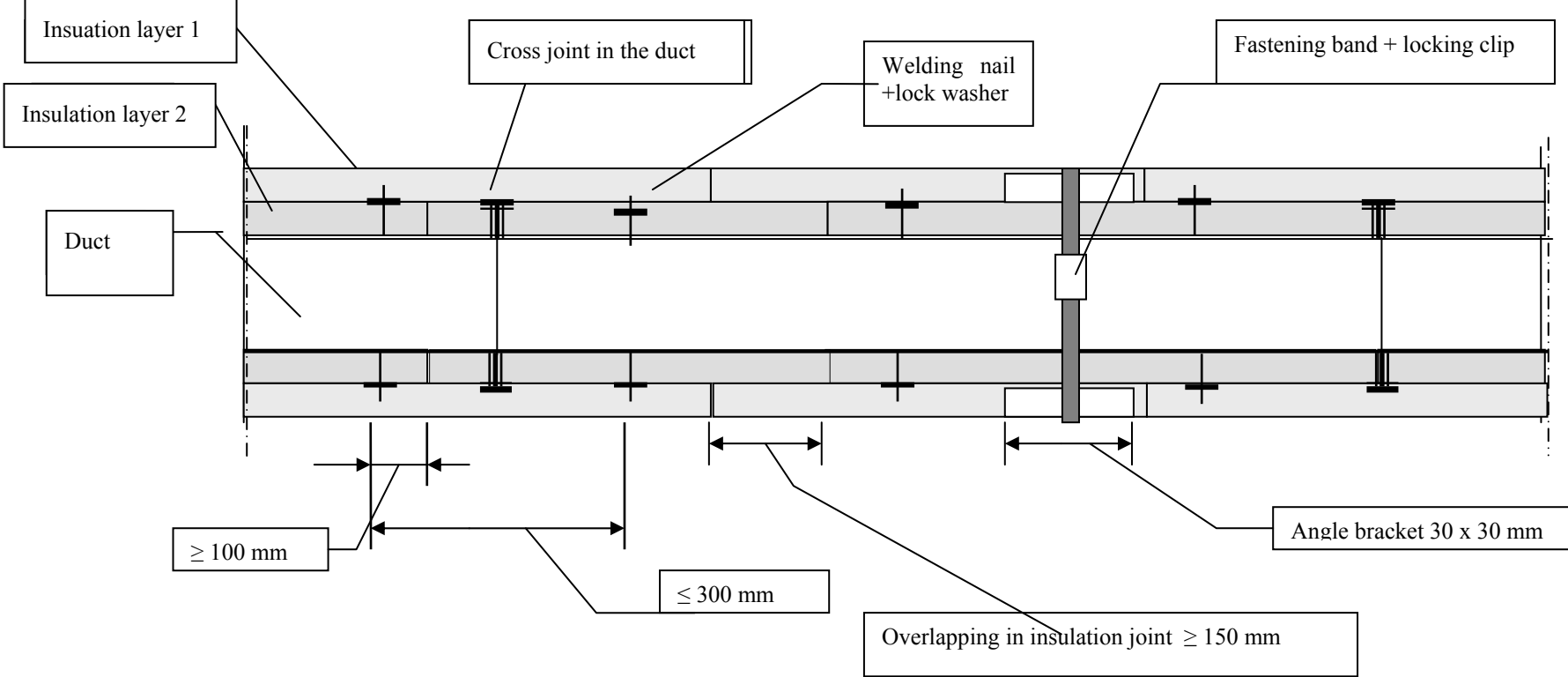
name.surname@vtt.fi
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Fire insulation of rectangular duct using stone wool slabs

Annex A1 1(3)

Fastening of insulation,

Picture 1. Longitudinal section of duct, principle drawing



Fire protection of the rectangular duct with stone wool slab**Annex A1 3(3)**

Fastening of the insulation

- Place insulation slabs around the duct in two layers in such a way, that inner (insulation layer 1) and outer (insulation layer 2) joints overlap with each other at least 150 mm.
- In the corners of duct, place the insulation slabs into sides stepwise in such a way there is no direct connection between inner surface of the duct and outer surface of the insulation in case insulation slabs possibly move e.g. due to the thermal movement of metallic duct.
- Inner insulation layer is fastened on to duct with welding nails. Metallic lock washers with diameter approx.30 mm are installed on the top of nails.
- The distance between the welding nails shall not exceed 300 mm in any place.
- Every piece of insulation slab shall be fastened at least with two welding nails.
- Distance of the welding nail of the edge of insulation slab shall be at least 100 mm.
- The length of welding nail shall be highest the thickness of the inner insulation slab + 15 mm.
- Press the lock washers against the surface of the inner insulation slab in such a way that the lock washer presses against the insulation by max 2x the lock washers thickness.
- Fasten the outer insulation layer on top of the inner insulation layer using steel bands tightened around the duct adapting the instructions in picture 2 of the standard SFS 3978. The distance between the steel bands shall nowhere exceed 400 mm.
- Each piece of insulation slab shall be fastened with minimum two bands.
- The distance of the band from the insulation slab edge shall be at least 100 mm.
- Place metal angle brackets at the duct corners to prevent the fastening band from pressing into the insulation slab when tightening the band. The angle bracket shall be a L-profile of the size 30 x 30 mm, and minimum length 200 mm.
- Tighten the bands and lock them with metal locking clips in such a way that the angle bracket presses into the insulation by max. the material thickness of the angle bracket.