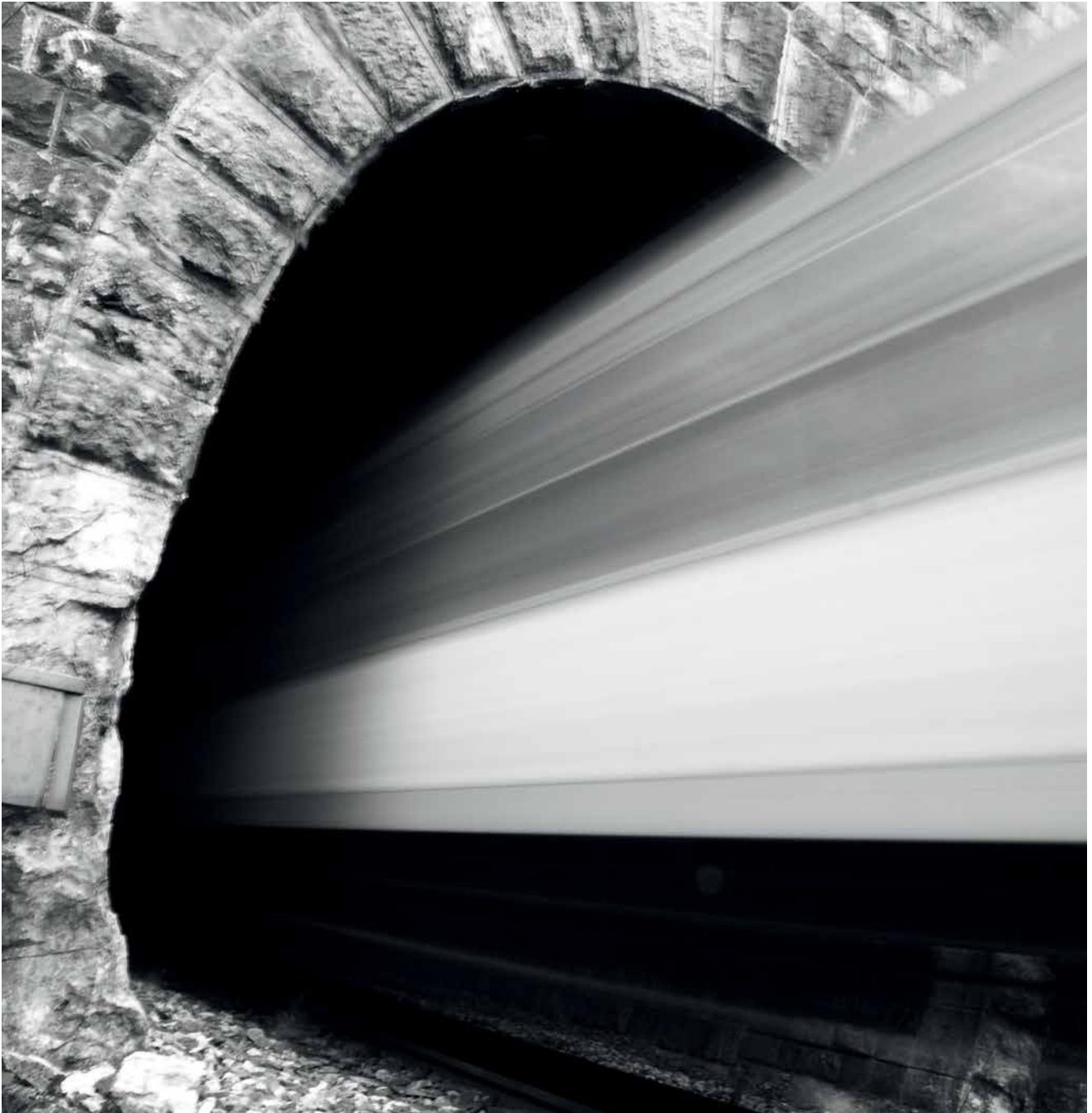




**PAROC**

Insulation and Fire Protection for Rail Infrastructure



## CONTENTS

Pipe and duct insulation & fire protection . . . . .	3
Innovative one-piece Bends for highly efficient pipe elbow insulation . . . . .	4
Straight pipe section insulation . . . . .	5
Duct insulation with flexible mat . . . . .	6
Duct insulation with rigid slab . . . . .	7
Duct and equipment insulation with extra compression and impact strength . . . . .	8
Duct fire protection with flexible mat . . . . .	9
Duct fire protection with rigid slab . . . . .	10
Fire safety with PAROC® Stone wool . . . . .	11

## PIPE AND DUCT INSULATION & FIRE PROTECTION

The HVAC systems in rail assets such as stations and tunnels perform many roles. Paroc solutions for HVAC include non-combustible and energy efficient insulation solutions for all parts of the HVAC system; from heating and water pipes, HVAC equipment and ventilation ducts. HVAC systems must be insulated using a solution that provides good thermal insulation properties as well as fire protection and noise reduction where needed.

Paroc HVAC products with aluminium foil facing also help to prevent condensation, which is another key role of well-functioning HVAC insulation. Condensation causes damage to pipes and surrounding structures and equipment.



Paroc stone wool solutions provide maintenance free thermal, sound and fire insulation that lasts for the assets' whole lifetime. Paroc stone wool is an excellent fire insulation material, with a high softening temperature of over 1000°C, and fire rating non-combustible Euroclass A1 or A2.

### LU APPROVED PRODUCT REGISTER

Paroc has certified its rail products with the London Underground (LU) Approved Product Register, detailed in the remainder of this guide.

The purpose of the products register is to:

- provide an accessible catalogue of products which are accepted as suitable for purpose in relation to the LU network
- provide consistent approvals workflow and records
- promote innovation and shared learning across LU and suppliers

- reduce / eliminate duplication of assurance approvals
- obtain consent to test / trial products insitu
- support LU Standard 1-011 Registration of Products

Since 2013 the use of the Products Register across all asset groups of London Underground etc has been mandated, and now covers the whole product assessment process.

LU approved products may be used in the London Underground network, Crossrail projects and some other parts of the rail system. Paroc products listed in this guide are compliant with LU Standard 1-085, and can be installed in sub-surface locations.

### FIRST MINERAL WOOL INSULATION TO ACHIEVE BES 6001 FOR RESPONSIBLE SOURCING

Paroc has been certified with the BES 6001 Responsible Sourcing standard for construction products by Building Research Establishment Limited (BRE). The certification includes all Paroc's European sites for the production of thermal insulation. Paroc is the first mineral wool insulation manufacturer to achieve BES 6001 and was awarded a "Good" rating for its responsible sourcing of materials.

Paroc is the first insulation manufacturer to hold both LU approvals and BES 6001. Importantly for BREEAM assessments, Paroc HVAC thermal insulation is Green Guide rated A+ or A, and BES 6001 certification also allows extra credits for Responsible Sourcing to be claimed.

Sustainability is an increasingly important issue within the construction industry. Transparency, including responsibility in the supply chain, is a way to display sustainable operation throughout the industry. BES 6001 certification safeguards manufacturers' credibility while providing reassurance for contractors and clients, as they meet their requirements for sustainable development.

Paroc aims to continuously improve its operations and ensure high quality in all processes. Paroc's operating principles guide the actions of all employees and all processes are certified according to current regulations and valid standards. All Paroc manufacturing plants and quarries are certified according to ISO 14001 and ISO 9001. Our Polish plant is also certified according to OSHAS 18001. Our products are CE marked.

Major construction companies association UKCG have stated their intention to buy products with 3rd party certified Responsible Sourcing - and welcomed Paroc's achievement of BES 6001. Paroc has developed a reputation for higher quality products and service in the UK - we are HVAC and technical insulation specialists.

### ENERGY EFFICIENCY AND TAX EFFICIENCY

The Enhanced Capital Allowances (ECA) Scheme for Energy Saving Technologies encourages businesses to invest in energy-saving items specified on the Energy Technology List (ETL). This list is managed by the Carbon Trust on behalf of Government. The 2013 Chancellor's Budget included an announcement that, for the first time, expenditure on energy-saving items connected to railway assets, and purchased from 1st April 2013, would be eligible for enhanced capital allowances (ECAs).

The Enhanced Capital Allowances scheme allows London Underground and London Rail to claim 19p tax back for every pound spent on pipework insulation. This includes the cost of the material, transportation to the site and direct installation costs. A proportion of project "add-on" costs such as preliminaries can also be claimed.

ECA compliance is shown by installing a minimum thickness of insulation specified in tables based on either BS5422 or NES Y-50. Paroc can supply the data required and will offer further information or calculation services towards project specification.

## INNOVATIVE ONE-PIECE BENDS FOR HIGHLY EFFICIENT PIPE ELBOW INSULATION

### PRODUCT DESCRIPTION

PAROC Hvac Bend AluCoat T – prefabricated insulation component made of stone wool with reinforced aluminium foil facing. Tape fastening on the longitudinal seam. Innovative one-piece Bends providing thermal and condensation insulation for pipe elbows. Advantages - less cutting on site; less dust / fibre released; less waste; quicker install shortens the required time for insulation; cost saving on the insulation of the projects; insulation effectiveness at the pipe elbows becomes as good as on the straight sections.

Pipe-work insulated with the appropriate insulation thicknesses shown in BS5422:2009, or the 'ECA Enhanced' tables of NES Y-50 (2011), is eligible for consideration under the ECA (Enhanced Capital Allowances) Scheme. PAROC Hvac Bend AluCoat T is compliant with LU Standard 1-085, and can be installed in sub-surface locations.



APPROVAL NUMBER

**LUL APR PRODUCT ID 2427**

### CASE STUDY

The Stockholm City Line is a railway tunnel under construction beneath central Stockholm in Sweden which will be used by the Stockholm Commuter Rail. The line will be 6 kilometres (3.7 mi) long, double track and electrified. It will have two stations: Stockholm City Station will be located directly below T-Centralen, the central station of the Stockholm Metro. The Odenplan station will be the other station, and will be located next to the Odenplan metro station. The line is scheduled to enter service in 2017.

**PAROC Hvac Bend AluCoat T** is being used extensively to control heat transfer and condensation risk in the water piping elbows.





## STRAIGHT PIPE SECTION INSULATION

### PRODUCT DESCRIPTION

PAROC Hvac Section AluCoat T – stone wool pipe section with reinforced aluminium foil facing. Tape fastening on the longitudinal seam. Thermal and condensation insulation of pipework and air ducts.

Pipe-work insulated with the appropriate insulation thicknesses shown in BS5422:2009, or the 'ECA Enhanced' tables of NES Y-50 (2011), is eligible for consideration under the ECA (Enhanced Capital Allowances) Scheme. PAROC Hvac Section AluCoat T is compliant with LU Standard 1-085, and can be installed in sub-surface locations.



APPROVAL NUMBER

**LUL APR PRODUCT ID 2428**

### CASE STUDY

Warsaw Metro Line 1 & 2. This is a rapid transit system serving the capital of Poland. It consists of a single north-south line that links central Warsaw with its densely populated northern and southern suburbs, with the second east-west line will opening in 2015.

Because of the intensive use of the stations, interior materials are used with very high resistance to wear and tear. All combustible materials and those that emit toxic fumes and gases, are not certified for use here.

**PAROC Hvac Section AluCoat T** has been used extensively to control heat transfer and condensation risk in the water piping systems.



## DUCT INSULATION WITH FLEXIBLE MAT

### PRODUCT DESCRIPTION

Icerock Ductwrap – high quality mineral fibre rolls, faced with reinforced aluminium foil. Thermal and acoustic insulation for air conditioning, warm air and extract ducts. Also used for insulation of water storage and expansion tanks. Icerock mineral wool products are made from pure Icelandic basalt and are characterised by a consistent texture, low shot, low thermal conductivity, excellent resilience, low dust levels, and significantly improved handling characteristics. Icerock Ductwrap is compliant with LU Standard 1-085, and can be installed in sub-surface locations.



APPROVAL NUMBER

**LUL APR PRODUCT ID 2430**

### CASE STUDY

Vauxhall Underground station improvements continue in anticipation of passenger numbers soaring by 40% over the next few years. To create extra space, the ticket hall is being reconfigured to fit more ticket gates. The station, its subways and stairways are being completely refurbished and a lift will be installed between the ticket hall and platforms.

**Icerock Ductwrap** has been used for thermal and condensation protection of some ventilation ductwork.



## DUCT INSULATION WITH RIGID SLAB

### PRODUCT DESCRIPTION

Icerock Ductslab – high quality mineral fibre slab faced with reinforced aluminium foil. Thermal and acoustic insulation for air conditioning, warm air and extract ducts. Also used for insulation of water storage and expansion tanks. Icerock mineral wool products are made from pure Icelandic basalt and are characterised by a consistent texture, low shot, low thermal conductivity, excellent resilience, low dust levels, and significantly improved handling characteristics.

**Icerock Ductslab** is compliant with LU Standard 1-085, and can be installed in sub-surface locations.



APPROVAL NUMBER

**LUL APR PRODUCT ID 2431**

### CASE STUDY

Vauxhall Underground station improvements continue in anticipation of passenger numbers soaring by 40% over the next few years. To create extra space, the ticket hall is being reconfigured to fit more ticket gates. The station, its subways and stairways are being completely refurbished and a lift will be installed between the ticket hall and platforms.

**Icerock Ductslab** has been used for thermal and condensation protection of some ventilation ductwork



## DUCT AND EQUIPMENT INSULATION WITH EXTRA COMPRESSION AND IMPACT STRENGTH

### PRODUCT DESCRIPTION

PAROC Pro Lamella Mat AluCoat – stone wool lamella mat with a reinforced aluminium foil facing. Thermal and condensation insulation of air ducts and other ventilation ducts and equipment. Lamella Mat provides additional compression, shear and impact resistance compared to other mats and slabs of similar density. **PAROC Pro Lamella Mat AluCoat** is compliant with LU Standard 1-085, and can be installed in sub-surface locations.



APPROVAL NUMBER

**LUL APR PRODUCT ID 2429**

### CASE STUDY

Currently under reconstruction, the railway station in Katowice, Poland envisages an innovative communications centre, a symbol of an active and enterprising city. The area of the Katowice station will be about 6,000 sqm, of which 3,000 sqm will be an area dedicated exclusively to passenger service: ticketing, spacious waiting room, luggage storage, modern information points, toilets and changing rooms. This area will be almost three times higher than the old station hall. The interiors of the new station will be bright, friendly and modern, with continuous monitoring and fire prevention systems providing a high level of security for travellers.

**PAROC Pro Lamella Mat AluCoat** is being used extensively for a very robust solution of thermal and condensation protection of the ventilation ductwork.





## DUCT FIRE PROTECTION WITH FLEXIBLE MAT

### PRODUCT DESCRIPTION

PAROC Hvac Fire Mat GreyCoat – stone wool wired mat with reinforced grey aluminium facing. For fire insulation of ventilation ducts – also providing thermal and acoustic insulation.

**PAROC Hvac Fire Mat GreyCoat** is compliant with LU Standard 1-085, and can be installed in sub-surface locations. Test reports to EN1366-1 show up to 2 hours duct fire protection, depending on thickness. The product may form part of a fire protection system and as such, the installation of the system shall be carried out by an installer, recognised under a suitable accredited independent third party certification scheme, in accordance with the manufacturer's instructions. These instructions should enable the installer to fit the product correctly and allow checks to be undertaken by the LU Fire Engineer in accordance with London Underground procedures.



APPROVAL NUMBER

**LUL APR PRODUCT ID 2422**

### CASE STUDY

Tikkurila railway station is the third busiest on the trunk line from Helsinki. After the completion of the Ring Railway, Tikkurila will be the primary connection point between long-distance trains and the Helsinki Airport, which will make it the second busiest railway station in Finland. During ongoing development, Tikkurila will experience a remarkable transformation into an atmospheric walking district, including Tikkurila Park, which will have a playground, skateboarding and parkour areas and space for a stage.

**PAROC Hvac Fire Mat** has been used extensively here to provide timed duct fire resistance, and to therefore help maintain safe division of fire compartments throughout the railway station development.

Circular Duct	
Fire classification	Insulation thickness (mm)
EI 30	60
EI 60	80
EI 120	100

Rectangular Duct	
Fire classification	Insulation thickness (mm)
EI 30	60
EI 60	90
EI 120	100



## DUCT FIRE PROTECTION WITH RIGID SLAB

### PRODUCT DESCRIPTION

PAROC Hvac Fire Slab EI120 GreyCoat – stone wool slab with grey aluminium facing. For fire insulation of rectangular ventilation ducts and chambers – also providing thermal and acoustic insulation.

**PAROC Hvac Fire Slab EI120 GreyCoat** is compliant with LU Standard 1-085, and can be installed in sub-surface locations. Test report to EN1366-1 shows 60 mm achieves 2 hours duct fire protection. The product may form part of a fire protection system and as such, the installation of the system shall be carried out by an installer, recognised under a suitable accredited independent third party certification scheme, in accordance with the manufacturer’s instructions. These instructions should enable the installer to fit the product correctly and allow checks to be undertaken by the LU Fire Engineer in accordance with London Underground procedures.

Also available are **PAROC Hvac Fire Slab EI60 GreyCoat** and **PAROC Hvac Fire Slab EI30 GreyCoat**, achieving 60 minutes and 30 minutes duct fire protection respectively, at 60 mm thickness.



#### APPROVAL NUMBER

**LUL APR PRODUCT ID 2426**  
**LUL APR PRODUCT ID 2435**  
**LUL APR PRODUCT ID 2436**

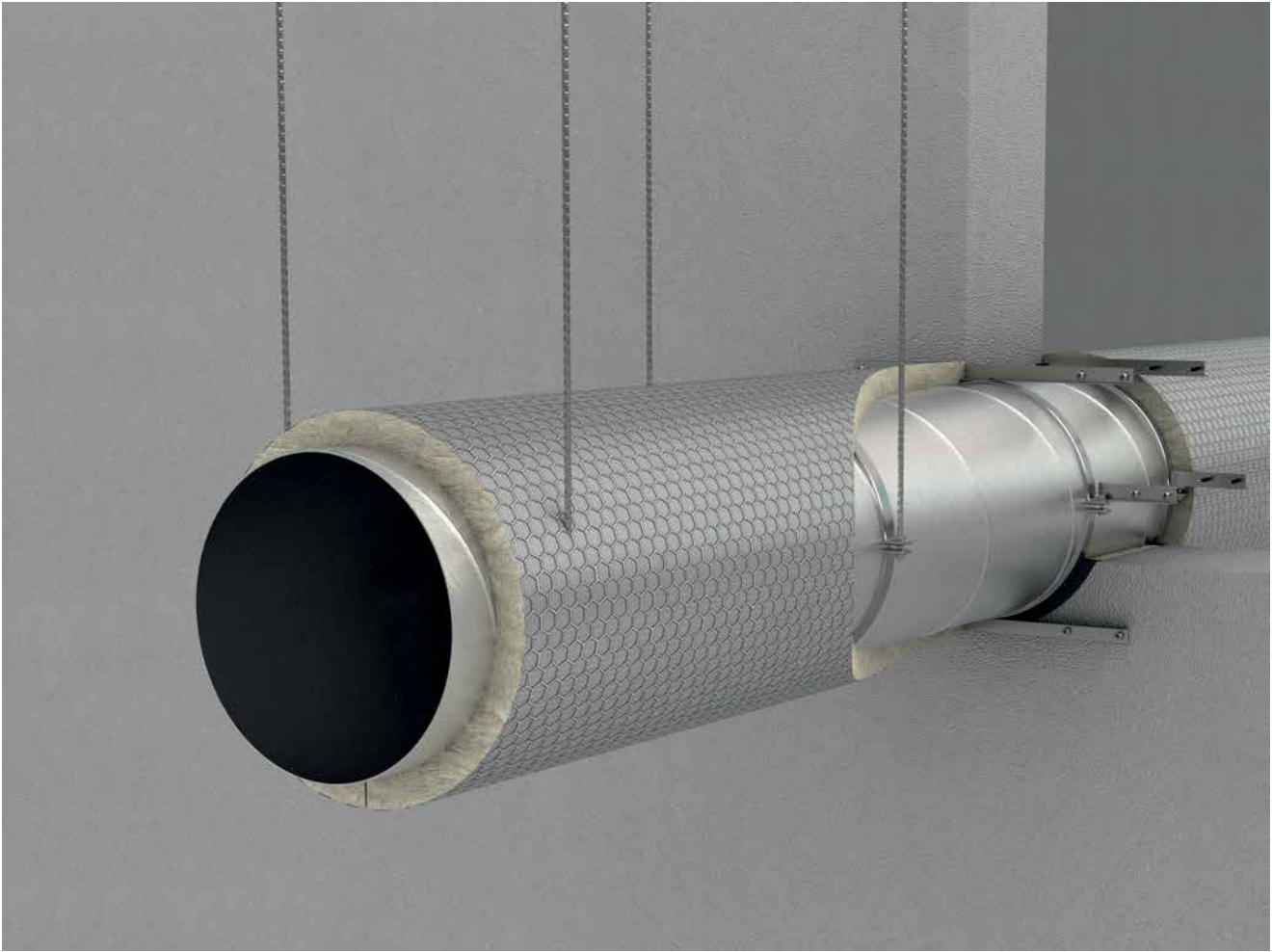
### CASE STUDY

Northern Europe’s largest innovation hub is located in the Finnish districts of Otaniemi, Keilaniemi and Tapiola. The area and its lively activities are well described by the name ‘Innovation Garden’. The Aalto University metro station in the Lansimetro system, is an important entrance to Otaniemi. The goal is to create an urban centre at the station and to utilise innovative solutions for emission-free campus and connecting traffic, smoothly linked to the metro station.

**PAROC Hvac Fire Slab** has been used extensively here to provide timed duct fire resistance, and to therefore help maintain safe division of fire compartments throughout the metro station development.

Rectangular Duct	
Fire classification	Insulation thickness (mm)
EI 30	60
EI 60	60
EI 120	60





## FIRE SAFETY WITH PAROC® STONE WOOL

PAROC stone wool products can fulfill the highest fire safety standard – Euroclass A1. Using insulation solutions with PAROC Stone wool therefore means getting a long-term, maintenance-free and failsafe fire protection that doesn't need regular testing, like systems with dampers and sprinklers do.

Since 1999, there is a harmonized European standard for fire resistance tests of ventilation ducts – EN 1366-1. The test method covers the entire construction and not just the duct insulation. The aim is to delay a fire from spreading long enough for people to be able to reach safety.

### EASY DIMENSIONING

PAROC fire protection system covers both rectangular and circular ducts, oriented in a horizontal or vertical direction. The required product and densities are the same regardless of orientation or whether the insulation is protecting from fire spreading from inside the duct out, or vice versa. This makes the dimensioning simple.

Fire classes including EI30 – EI120 are possible and the tables in this brochure show the dimensions needed

for each product to give a construction the required fire class. 'E' stands for integrity and 'I' for insulation; the figure stands for the number of minutes the construction prevents fire spread. Integrity has to do with the capacity of the ducts to contain flames, hot gases and smoke and insulation the capacity to prevent heat from spreading to surrounding structures.

Further information is available in our full guide to fire-resisting duct solutions, 'PAROC Hvac Fire'.



Paroc is the leading manufacturer of energy-efficient insulation solutions in the Baltic Sea region. The cornerstones of our operations are customer and personnel orientation, constant innovation, profitable growth and sustainable development. Paroc products include building insulation, technical insulation, marine and offshore insulation, sandwich panels and acoustic products. The products are manufactured in Finland, Sweden, Lithuania and Poland and as of 2013 also in Russia. Paroc has sales and representative offices in 14 European countries.



#### **BUILDING INSULATION**

offers a wide range of products and solutions for all traditional building insulation. The building insulation products are mainly used for the thermal, fire and sound insulation of exterior walls, roofs, floors and basements, intermediate floors and partitions.



#### **SOUND ABSORBING**

ceilings and wall panels for interior acoustic control, as well as industrial noise control products, are available in the range.



#### **TECHNICAL INSULATION**

products are used for thermal, fire and sound insulation in HVAC systems, industrial processes and pipe work, industrial equipment as well as shipbuilding and offshore industry.



#### **SANDWICH PANELS**

are fire proof lightweight steel-faced panels with a core material of stone wool. Paroc panels are used for façades, partitions and ceilings in public, commercial and industrial buildings.



The information in this brochure describes the conditions and technical properties of the disclosed products, valid at the time of publication of this document and until replaced by the next printed or digital version. The latest version of this brochure is always available on the Paroc website. Our information material presents applications for which the functions and technical properties of our products have been approved. However, the information does not mean a commercial guarantee. We do not assume liability of the use of third party components used in the application or the installation of our products. We cannot warrant the suitability of our products if used in an area or conditions which are not provided in our information material. As a result of constant further development of our products we reserve the right to make alterations to our information material at any time. PAROC is registered trademark of Paroc Group.

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