

PAROC PRO LAMELLA MAT (WR) CLAD

INSTALLATION MANUAL FOR ROUND
AND RECTANGULAR DUCTS

MINIMUM
INSTALLATION
TEMPERATURE:
10 °C



PAROC[®]

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(WR) = water-repellent version available without surcharge



ROUND DUCTS

Handling and working safely with PAROC stone wool

TOOLS:

- a suitable or recommended knife for cutting stone wool - e. g. PAROC Knife XTK 001 or 003,
- a tape measure or a wooden meter,
- a compass,
- a spatula for smoothing the tape - e. g. PAROC Spatula,
- a routing marker (preferably dry-erased one).

ACCESSORIES:

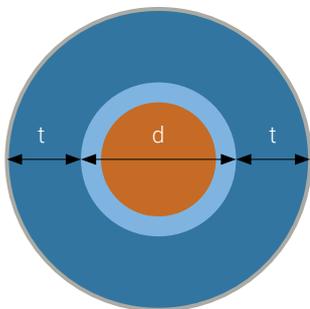
- see page 23

PREPARATION:

Before the installation, clean the duct surfaces from dust, grease and other contamination,

- the next step is to measure the duct diameter,
- then calculate the insulation circuit ("L") using the following data and formulae:
 - "D" - duct diameter
 - "t" - mat thickness

$$D = d + 2 t$$
$$L = \pi D$$



Two methods are used to calculate the length of the mat:

1. Mathematic calculation using the "2r"π formula, where "2r = D" (the diameter), which allows its simplification to $L = \pi D$.

Example:

The Ø100 pipeline is to be insulated with a 50 mm thick lamella mat.

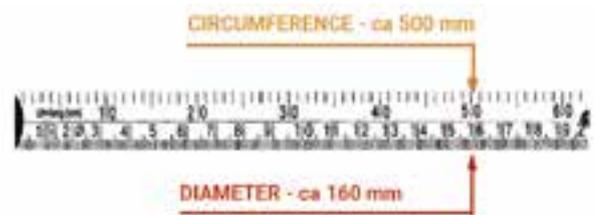
Pipeline diameter including insulation:

$$D = \varnothing + 2 \times t = 100 + 2 \times 50 = 100 + 100 = 200 \text{ mm}$$

The length of the lamella mat: $L = \pi D = 3.14 \times 200 \text{ mm} = 628 \text{ mm}$.

This means that the lamella mat is to be cut to the length of $\approx 630 \text{ mm}$

2. Calculation using a meter which has a scale divided into two parts: one with a millimetre graduation, the other (above), with the diameter conversion based on the number $\pi = 3,14$.



Example:

The Ø60.3 pipeline is to be insulated with a 50 mm thick lamella mat.

Pipeline diameter including insulation:

$$D = \varnothing + 2 \times t = 60 + 2 \times 50 = 60.3 + 100 = 160.3 \text{ mm}$$

Length of the lamella mat: for a value of 160.3 mm on a millimetre scale, read the circumference conversion value to the specified diameter above.

This means that the lamella mat is to be cut to the length of $\approx 500 \text{ mm}$.



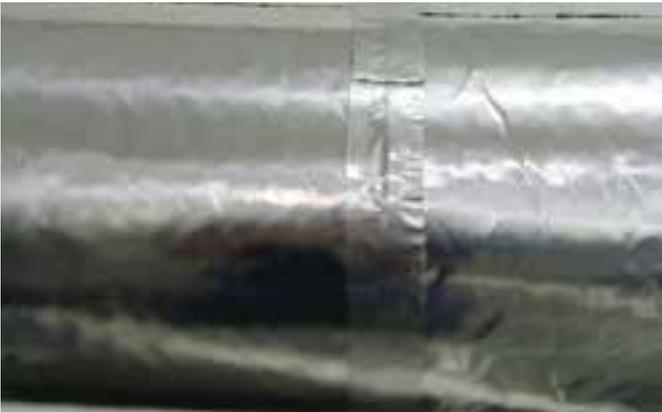
CIRCULAR STRAIGHT DUCTS



The calculated length of the mat should be cut along the folding lines of the lamellas. The folding lines (strips) of the lamellas help us to cut the mat straight to its edge. Cutting in the other direction will make it impossible to wrap the mat around the pipeline;



With small pipeline diameters, high circumferential stresses may occur. To ensure that the mat is tightly pulled together, an PAROC Clad Tape with the sealing and adhesive compound is applied around the circumference (2 times) to secure the mat firmly on the folding. Then the tape is also glued on the longitudinal folding;



The folding lines of the mats are glued in a circumferential manner by connecting individual sections of the mats.

ELBOWS AND FITTINGS

The mineral wool lamella mat with Clad T cladding can be used to insulate straight sections and fittings of the pipelines

Bent elbows

In the case of bent parts, such as bent elbows, the following installation method can be used:

Take the measurement (of the pipeline circumference, chord of the elbow radius measured in the throat);



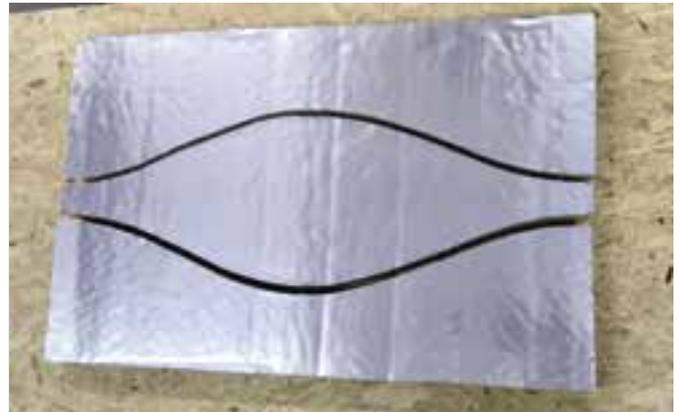
Take the measurement (of the pipeline circumference, chord of the elbow radius measured in the throat);



Cut out the circumference of the insulation (mat) of the appropriate length;
In the selected location, mark an auxiliary line (the symmetry of the middle element of elbow insulation);
On the auxiliary line, mark the point corresponding to the half the length (circumference) of the mat;
At a point on both sides, mark half the diameter of the pipeline with the insulation, e.g. if a $\varnothing 250$ pipe is insulated with a 50 mm thick mat, the diameter of the insulated pipeline is 350 mm and its half is 175 mm;

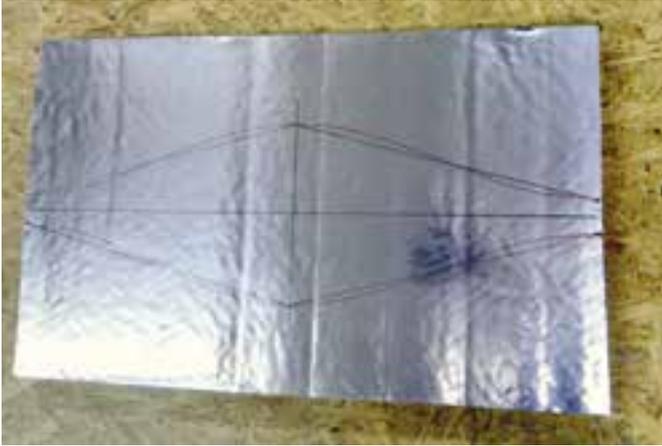


On both edges of the perimeter, on the auxiliary line, mark about 1/5 of the length of the elbow measured at the throat, diagonally, e.g. if the length is 210 mm, the dimension to be applied on both sides should be about 40 mm;
Connect the points from the edge of the circumference with the points in the middle;

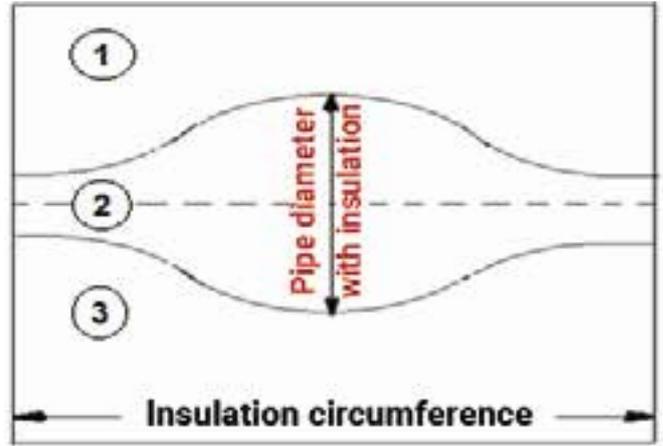


Cut out the resulting figure and place the following element of the elbow in the order listed below:

- 1 - the front of the elbow insulation,
- 2 - the middle of the elbow insulation,
- 3 - the end of the elbow insulation.



Draw a curve from points on the edge on one side through the point in the middle of the circumference, linking it to the point at the end of the circumference;



Seal the transverse joints with PAROC Clad Tape with the sealing compound.

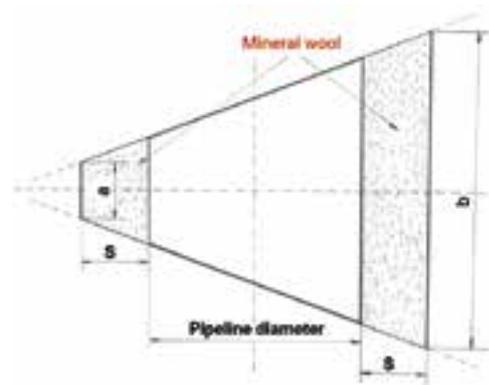


Segmented elbows

In the case of bent parts, such as segmented elbows, the following installation method can be used:



Take the measurements (of the pipeline circumference and the distance on the outside and the inside of the elbow segment);



Prepare an appendant drawing:

- draw a projection of the segment with its axis of symmetry,
- mark the insulation thickness on the inside and outside of the segment,
- extend the lines of the sides of the segment at intersections with the marked insulation thickness,
- read the value inside "a" and outside "b";

Cut out the circumference of the insulation (mat) of the appropriate length;



In the selected location, mark an auxiliary line (the symmetry of the middle element of elbow insulation);

On the auxiliary line, mark the point corresponding to the half the length (circumference) of the mat;

At the point on both sides, mark half of the dimension "b";

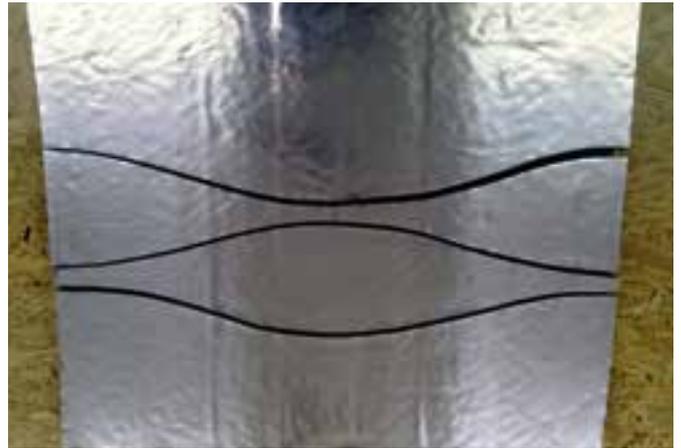


On both edges of the circumference, on the auxiliary line on both sides, mark half of the dimension "a";

Connect the points from the edge of the circumference with the points in the middle;



Draw a curve from points on the edge on one side through the point in the middle of the circumference, linking it to the point at the end of the circumference;



Cut out the resulting figure by duplicating, it depending on the number of segments in the elbow. To prevent waste, you can use the element cut out from the wool as a template by moving it halfway around the circumference. Then the folding will be alternately - once in the throat of the elbow, then on the outside of the elbow;



Place the cut out elements are put on the elbow and cover the circumference joints with PAROC Clad Tape with the sealing compound.

Bend - elbow below 90°

To perform insulation on a bend - elbows below 90° - you have to:

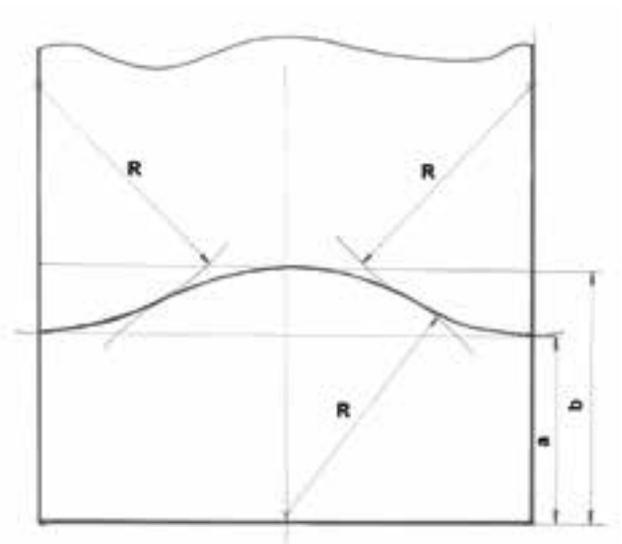


Measure the arc (diameter, distance at the lowest spot "a" and the highest spot "b");

Cut the mat with Clad T cladding to the appropriate length;

Divide the length of the mat in half;

From the bottom of the mat, mark the lengths of the lowest spot "a" and the highest spot "b" of the arc;



On both sides of the mat, draw arcs (with the radius corresponding to half the circumference of the insulated pipeline) that are tangential to the lowest spot "a" of the arc;

From the half of the mat, draw an arc (with a radius corresponding to half the circumference of the insulated pipeline), which is tangential to the highest spot "b" of the arc;

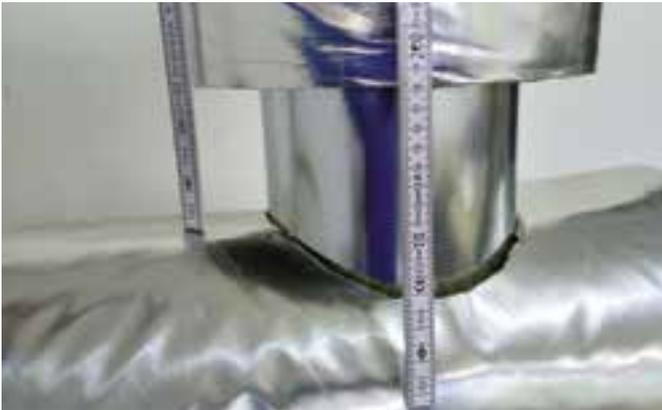
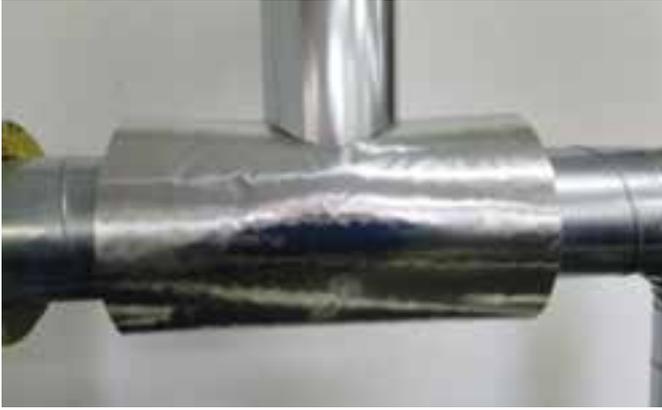
The curve formed from the drawn arcs is the line of penetration of the bend parts, where both elements form the whole insulation. The first element will have a folding line on the shortest bend, and the second one at the longest bend.



The cut out elements should be placed on the bend - the elbows below 90° - and the longitudinal and circumferential joints should then be covered with PAROC Clad Tape with the sealing compound.

Tees

In the case of branched elements such as tees you should:



First, insulate the section of the pipeline to which the tee connects;

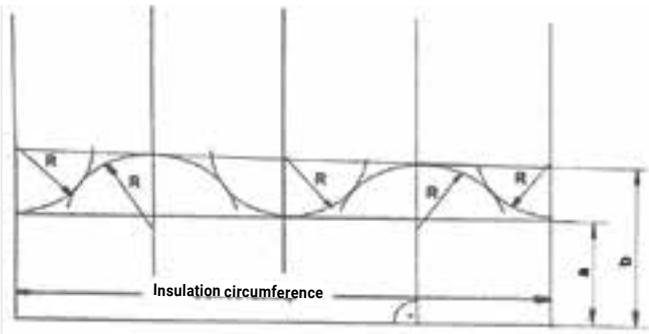
Then, measure the tee:

- dimension in the shortest spot,
- dimension at the longest spot measured after insulation;

Cut out the circumference of the insulation (mat) of the appropriate length;

Divide the circumference into 4 equal parts and draw perpendicular lines;

On the length of the mat, mark the length of the tee with a line in the shortest and longest spot;



At the ends of the mat and at its centre (from the line of division into 4 parts), draw the arcs tangential to the line corresponding to the length "a" of the tee in the shorter spot using the compass. The value of the compass radius should be equal to half of the diameter of the pipeline together with the insulation to which the T-pipe connects;



Draw the arcs with the same value using the compass, tangential to the line indicating the length 'b' of the tee at its longest spot. The resulting arcs form a curve of the so-called tee penetration line;

Cut out the resulting figure and place it on the pipeline tee;

Seal the transverse joints with PAROC Clad Tape with the sealing compound.

Reduction

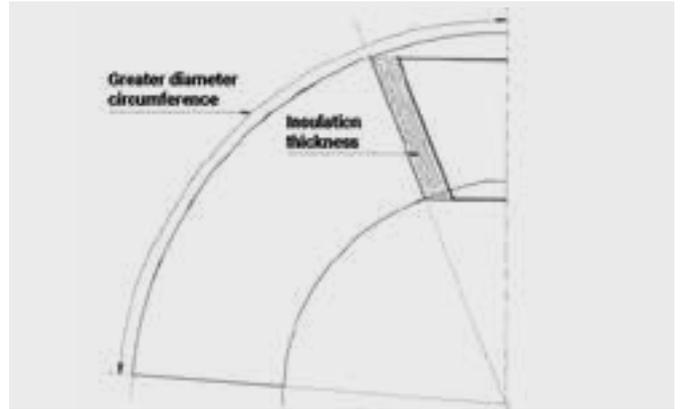
To perform the insulation reduction of mats with Clad T cladding you have to:



Measure the reduction (large and small diameter and its length);

Execute insulation of large and small diameter reduction;

At the edge of the mat, draw half of the reduction side projection adding the insulation thickness to it;



Extend the side surface of the reduction with the line by crossing its axis of symmetry and thus creating an "S" point.

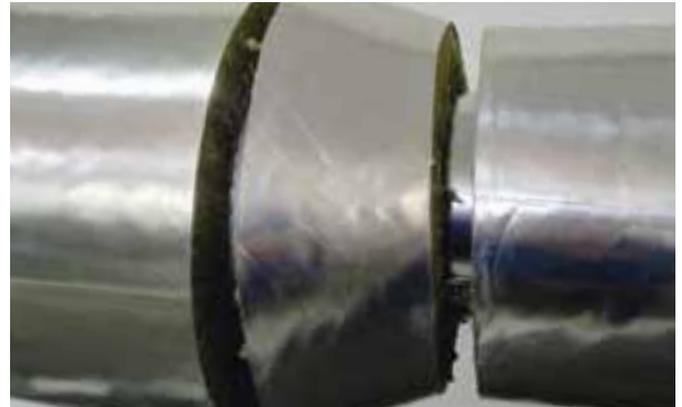
From the "S" point, draw wide arcs crossing the edges of the large and small diameter reduction;

On a large-diameter arc, apply the perimeter dimension of the large-diameter mat;

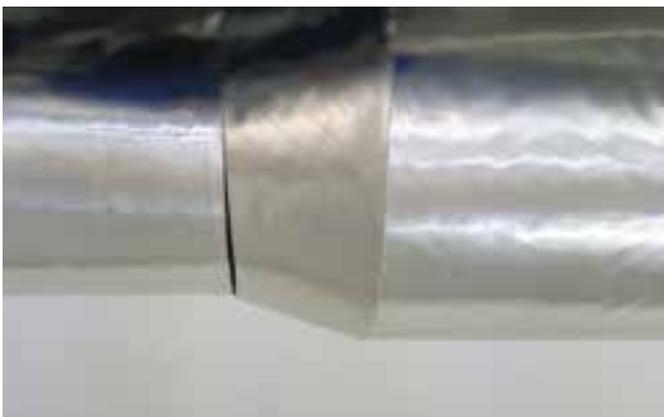
From the point of circumference of the large diameter, draw a line connecting it to the "S" point, thus closing the reduction circumference.



Cut out the mat element at a slanting angle so that after cutting out it may complete the insulation at the reduction spot;



Install the cut-out element in the place of reduction;



Seal the transverse joints with PAROC Clad Tape with the sealing compound.

RECTANGULAR DUCTS

handling of and working safely with with PAROC stone wool

TOOLS:

Following tools are required for installation of PAROC Pro Lamella Mat Clad:

- sharp mat knife - e. g. PAROC Knife XTK 001 or 003,
- tape measure or wooden measuring stick,
- marker,
- PHP insulation pin welder - e. g. PAROC welding device,
- 45° angle cutting strip.

PREPARATION:

- The first step is to measure the duct: its width, height, and length;
- Before assuming installation, clean the duct surfaces of all dust, grease, and other dirt;
- Calculate the periphery. To calculate the periphery of insulation ("L") on ventilation ducts, you will need the following data:
 - - width ("a") and height ("b") of the ventilation shaft,
 - - insulation thickness ("t").

The following formula is used to calculate the mat length and required material:

where:

- a – duct height,
- b – duct width,
- t – mat thickness.

$$L = 2 \times a + 2 \times b + 8 \times t$$

ACCESSORIES:

• PAROC Head Pins Insulated:

For installing mats on the surfaces of ventilation ducts through the so-called reverse method by welding;

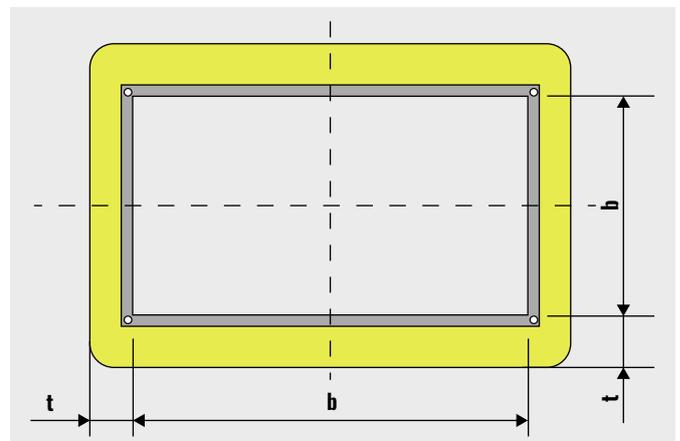
• PAROC Clad Tape:

Water resistant butyl rubber tape with very high tack and very high ageing resistance

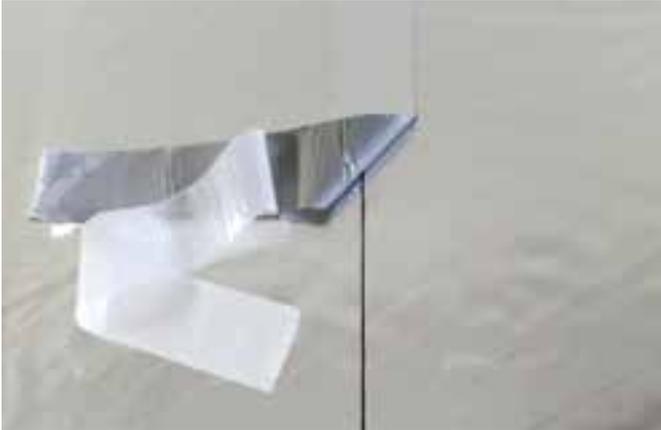
• PAROC Clad Dots:

PAROC Clad Dots are the optimal solution when it comes to cover pins' heads

- spatula – for even connection of the tape to the lining , e. g. PAROC Spatula
- spray adhesive to additionally glue the mat to the duct surfaces.



RECTANGULAR STRAIGHT DUCTS

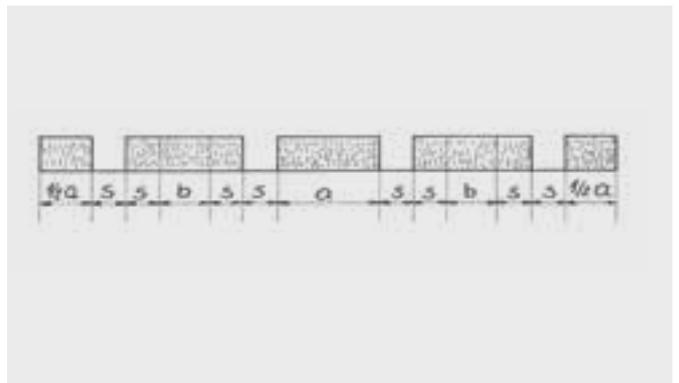
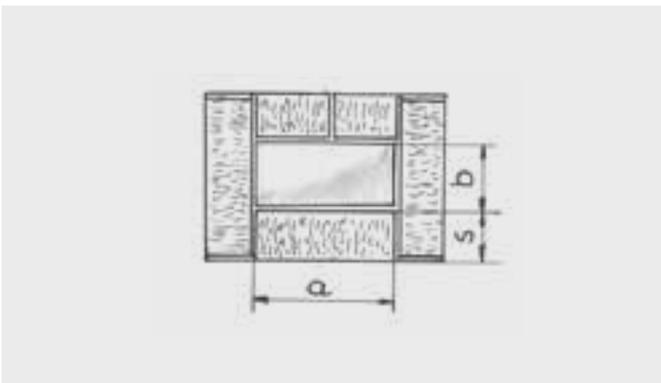


In order to follow requirements coming from DIN4140 standard related to a need of keeping min. 3% of gradient to protect a top surface of a rectangular ventilation duct against accumulation rainwater please put PAROC Pro Wedge (WR) and next on it install PAROC Pro Lamella (WR) Clad.

Cut the mat with the knife to the desired size from the side of the lining, taking into consideration additional dimension (height PAROC Pro Roof Wedge (WR)). Mark the duct dimensions and material thickness on the inside. Compensate for the folding point, which should appear in the middle of one of the duct sides. This way, you will not use as much PAROC Clad Tape when taping up the folded mat and ensure an aesthetic finish. If the fold is on the edge of the duct, you will have to tape up the whole insulation thickness.

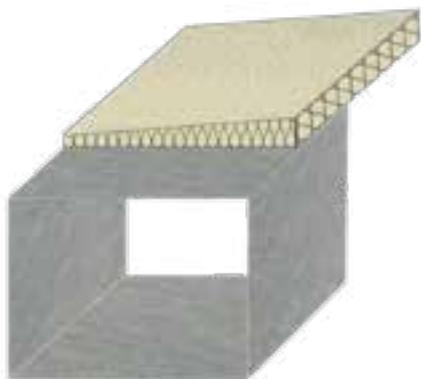
During the installation work, you must make sure to eliminate any gaps between successive insulation elements to eliminate so-called thermal bridges and prevent the material from being damaged by birds.

The images below present division of segments by duct side length with consideration of insulation thickness. The fold points are cut to make the mat edges easier to fold;

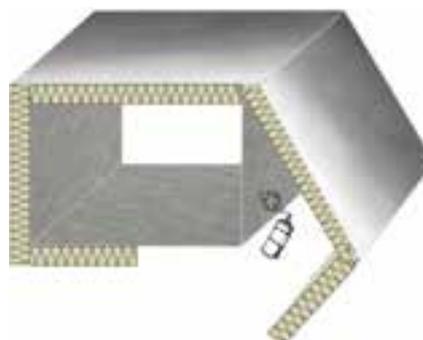


SOLUTION

STEP 1: Installation of wedges



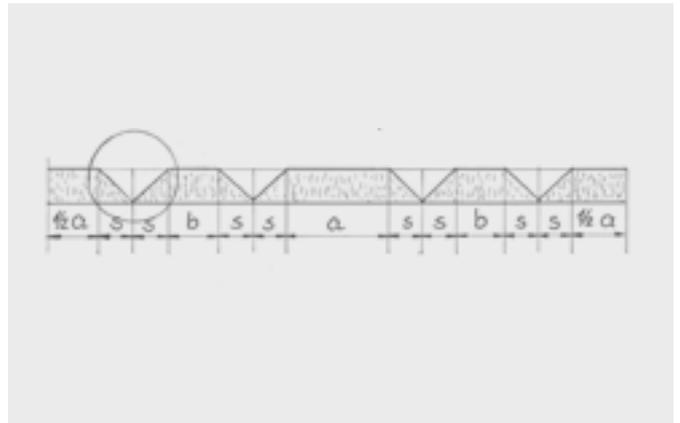
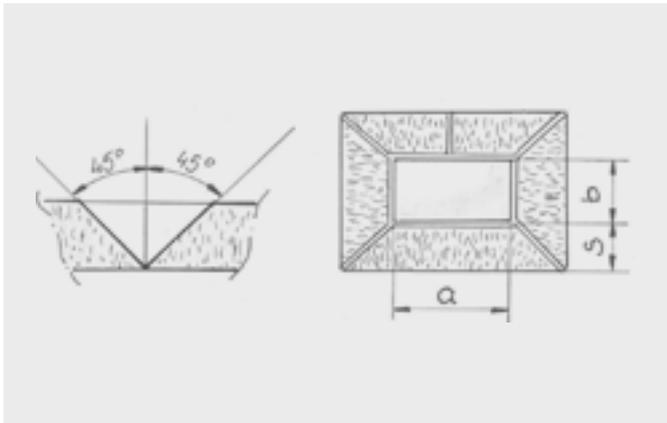
STEP 2: Installation of PAROC Pro Lamella Mat (WR) Clad (on top of the Wedge)



Solution		
Air duct with [mm]	Dimension of the wedge [mm]	
<600	42/60×600×1200 or 25/60×600×1200	
600-1200	25/60×1200×600	
1200-1800	25/60×1200×600 + 42/60×600×1200	
1800-2400	25/60×1200×600 + 25/60×1200×600	



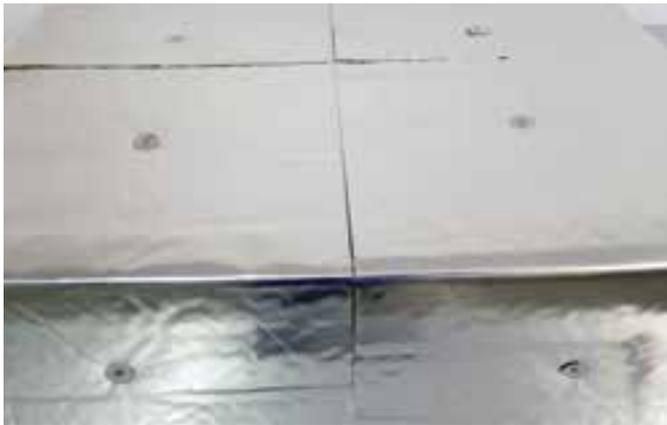
A different way is presented below. The fold points are cut at a 45° angle with consideration of two thicknesses of the applied insulation material. This cut can be made with a cutting strip with the same angle. The fold points are cut to make the mat edges easier to fold.



The images below present division of segments by duct side length with consideration of insulation thickness with this method.



the mat is installed to the duct by placing it on the duct surface and matching the cuts to the edges while simultaneously piercing the lining with the pins and welding them to the duct surface.



All folds of the individual mats and the points of welded pins must be secured with PAROC Clad Dots. We recommend that you use the spatula to ensure that the dots adhere tightly to the lining.



ELBOWS AND PROFILED SURFACES



Measure the arcs of the (inner and outer) elbow of the ventilation duct;
Mark them on the material by adding the equivalent of insulation thickness to the outer arc;



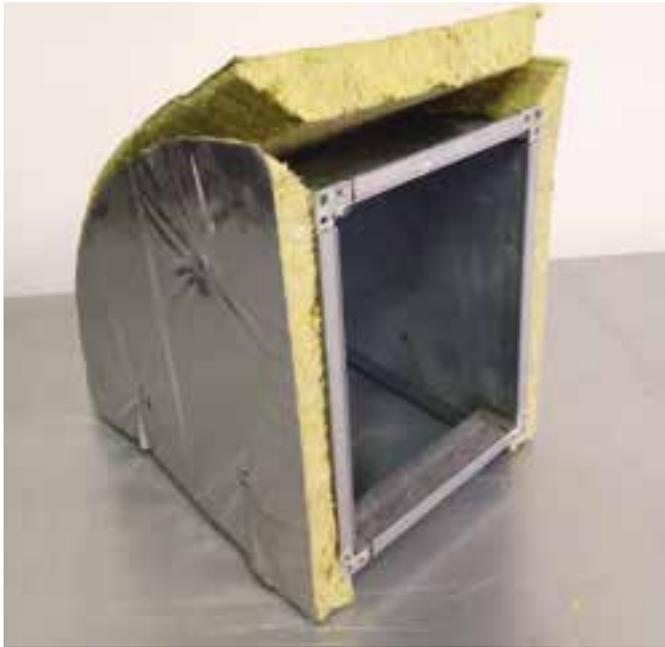
Add the value corresponding to two times the insulation thickness to the mat strip for the arc duct surface so you will not have to tape up the fold on the duct edge on the entire insulation thickness;



Cut out two (mirror) arc elements for the side surfaces of the elbow and a segment for the arc surface of the elbow;



Cut the sections intended for the elbow sides and the arc surface of the elbow at a 45° angle in order to avoid having to tape up the entire insulation thickness;



The components of elbow insulation are installed by placing them on the duct surface and matching on the edges while simultaneously piercing the lining with the pins and welding them to the duct surface;



All points of welded pins must be secured with PAROC Clad Dots. The fold points of individual mats are taped as follows:
 - first on the arc surface,
 - then in spots around every 50 mm to the side surfaces.



We recommend that you use the spatula to ensure that the Dots adhere tightly to the lining



Video
PAROC Clad-System

PAROC CLAD SYSTEM: INSULATION SOLUTION FOR EXTERNAL PIPEWORK AND DUCTWORK APPLICATIONS

UV-RESISTANT, IMPERMEABLE TO WATER, SALT WATER RESISTANT

In today's world, insulation systems that are economically sustainable, efficient through time saving installation across a wide range of applications, are in demand.

The Clad-System by PAROC effectively insulates pipework and ventilation systems quickly, safely, and sustainably with a special highly durable multiple layer composite film for external applications. It reliably protects PAROC stone wool against moisture, environmental impact, and chemical substances.

As a result of the high temperature resistance of our Pro (industrial) stone wool products which is the base insulation material for the Clad-System, it can be used on temperatures up to 680°C. Therefore, it protects against temperature losses on high temperature systems and steam lines for example.

COMPREHENSIVE TEST REPORTS AVAILABLE

In order to increase the range of applications the Clad-Film underwent specific tests. For example, testing included for safety of use in food industry applications (food contact applications according to EC 1935/2004, EU 10/2011, EC 2023/2006 as well as the German Food and essential Commodities and Animal Feed Code, or LFGB for short).

In addition, the Clad-Surface is smooth, easy to clean and due to its resistance to chemical substances - provides bacteria no ground on which to grow on, so it can be used in laboratories and clean rooms.

The Clad-System by PAROC can also be used in coastal applications, since its resistance to salt air and salt water has been proven along with successful puncture resistance testing in accordance with DIN EN 14 477 resulting in the Clad-System offering protection against "bird pecking" which is further supplemented by its sturdy base material.

Another major advantage of the Clad-Surface can be found when personal protection is of importance. Due to a higher emission ratio (ϵ 0.65) of the Clad-Film, insulation thicknesses can be reduced when compared to insulation in conjunction with metal cladding (low emissivity), resulting in a cost saving.

UNLOCKING FURTHER APPLICATION POSSIBILITIES

PAROC Clad-System offers further application possibilities due to its fully metal-free and non-corroding surface which reduces the weight of a construction and is maintenance friendly. In addition to the system being perfectly suited for all building services, due to its watertight installation it can be used in areas in danger of flooding. The system can also be used to insulate pipework or ventilation systems which require weather protection in areas where space is limited or tight, which make inflexible metal covering systems difficult to use.

Installation of the Clad-System is made easy by comprehensive instructions, specific accessories such as matching tape, Clad Dots (circular prefabricated tape for covering fastenings and cut-outs), along with documentation and test reports.



PAROC CLAD PRODUCTS



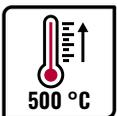
EXPLANATION OF SYMBOLS

TECHNICAL SPECIFICATIONS

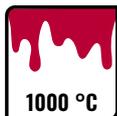
Nominal density



Maximum service temperature



Melting point

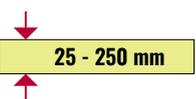


Non-combustible



DIMENSIONS

Thickness



Width



Length



Inner diameter



Insulation thickness



Section length



ADDITIONAL INFORMATION

Data sheet

Accessories

Installation video

Packing details

Dimension Guide

Installation manual

Water-repellent version available without surcharge

(WR)

CLAD SYSTEM

PAROC PRO SECTION (WR) 140 CLAD T

Stonewool pipe section with a uv-resistant, fibre reinforced aluminium coating



ADDITIONAL SYSTEM PRODUCTS



PAROC PRO BEND (WR) CLAD



PAROC PRO SEGMENT (WR) CLAD



PAROC PRO COMBI (WR) 140 CLAD T



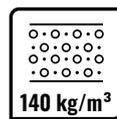
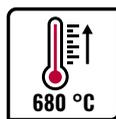
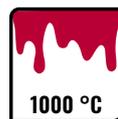
MINIMUM
INSTALLATION
TEMPERATURE:
10 °C

APPLICATION

- Thermal insulation of outdoor pipelines
- Due to a weather-resistant aluminum coating, outdoor installation without additional cladding systems; additionally the mineral wool is protected from mechanical loads, moisture as well as chemical substances

TECHNICAL SPECIFICATIONS

- Water-repellent according to EN 1609
- AS quality according to EN 13468 and AGI Q 132
- The surface temperature of the lamination must be limited to 80 °C
- CE designation Code: MW-EN 14303-T8/T9-ST(+)-680-WS1-MV2-CL10
- PAROC Pro WR products are tested according to LABS conformity standard VDMA 24364



Nominal value of the thermal conductivity λ according to DIN EN 12667

t	°C	50	100	150	200	250	300	400
$\lambda_{N,P}$	W/mK	0.041	0.047	0.054	0.063	0.073	0.085	0.110



Video PAROC
Clad-System

CLAD SYSTEM

PAROC PRO LAMELLA MAT (WR) CLAD

Stonewool lamella mat with UV-resistant, fibre reinforced aluminium coating



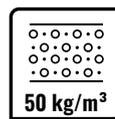
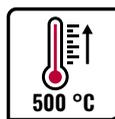
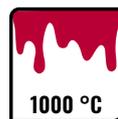
MINIMUM
INSTALLATION
TEMPERATURE:
10 °C

APPLICATION

- Outdoor insulation of ventilation ducts, pipelines and containers;
- The insulation system does not require any further cladding systems; additionally
- The mineral wool is protected from mechanical loads, moisture and chemical substances

TECHNICAL SPECIFICATIONS

- Water-repellent according to EN 1609
- AS quality according to EN 13468 and AGI Q 132
- Compressive strength > 10 kPa according to EN 826
- The surface temperature of the lamination must be limited to 80 °C
- CE designation Code: MW-EN 14303-T4-ST(+)-500-WS1-MV2-CL10
- PAROC Pro WR products are tested according to LABS conformity standard VDMA 24364



Nominal value of the thermal conductivity λ according to DIN EN 12667

t	°C	10	50	100	200	300
$\lambda_{N,P}$	W/mK	0.039	0.045	0.055	0.081	0.120



Video PAROC
Clad-System

CLAD SYSTEM ACCESSORIES

PAROC CLAD DOTS

PAROC Clad Dots are the optimal solution when it comes to cover pins' heads

MINIMUM
INSTALLATION
TEMPERATURE:
10 °C



Ø mm	Piece / roll	Rolls per box
90	100	6

PAROC CLAD TAPE

Water resistant butyl rubber tape with very high tack and very high ageing resistance

MINIMUM
INSTALLATION
TEMPERATURE:
10 °C



Application

- Used amongst others for masking of Clad faced products. The Clad sealing tape can be used as moisture and diffusion barriers; ideal for sealing the joints when using PAROC Clad products.
- Permanently seal pipes and ventilation ducts facings in heating, ventilation and air conditioning engineering. The butyl sealing tapes are also used as moisture and diffusion barriers in underground construction. PAROC Clad Tape gives a great finish and safe installation

Length mm	Width mm	Rolls per box
10000	30	20
10000	50	12
10000	75	8
10000	100	6

PAROC CLAD ALU TAPE

Water resistant acryl tape with very high tack and very high ageing resistance for pipe elbows

MINIMUM
INSTALLATION
TEMPERATURE:
10 °C



Length m	Width mm	Rolls per box
10	50	12

PAROC PRO ROOF WEDGE (WR)

Stonewool wedge plate with a gradient of at least 3%. The length measure corresponds to the longitudinal direction of the duct.



Thickness mm	Length mm	Width mm
25/60	600/1200	1200/600
42/60	600	1200

CONTACT



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-  Paroc Headquarter
-  Paroc Production / Branch
-  Paroc Sales Office
-  Paroc Sales Representative



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Marketing Manager Industry

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DURABLE

PAROC® stands for energy-efficient and fire safe insulation solutions of stonewool for new and renovated buildings, marine and offshore, acoustics and other industrial applications. Behind those products, there is an 80-year history of stonewool production knowhow backed with technical insulation expertise and innovation.



REUSABLE

Building Insulation offering covers 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.



**SOUND
REDUCING**

Technical Insulation offering includes thermal, fire and sound insulation in HVAC systems, industrial processes and pipework, industrial equipment as well as shipbuilding and offshore industry.

For more information please visit www.paroc.com



FIRE PROOF



**MOISTURE
PROOF**



SAFE



**ENERGY
EFFICIENT**



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