INSTALLATION MANUAL FOR ROUND AND RECTANGULAR DUCTS

PAROC® PRO LAMELLA MAT CLAD

OWENS CORNING® PAROC®

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ROUND DUCTS

TOOLS:

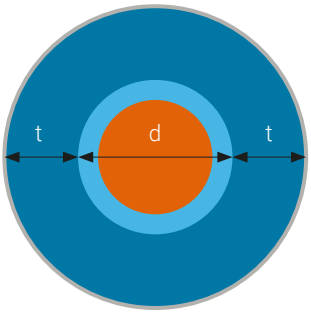
- a suitable or recommended knife for cutting stone wool - e. g. PAROC® Knife XTK 001 or 003,
- a tape measure or a wooden meter,
- a compass,
- a spatula for smoothing the tape,
- a routing marker (preferably dry-erased one).

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" - outside diameter of insulated pipe/circular duct
  - "t" - insulation thickness
  - "d" = outside diameter of pipe/circular duct (without insulation)

D = d + 2 t
L = π D



For round ducts with diameter below 1000 mm , the use of alternative solutions such as pipe sections or a lamella mat double-layer system is recommended. These alternatives offer greater material flexibility and may be more suitable for applications requiring bending, alignment, or adaptation during installation.

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 = "π D".

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

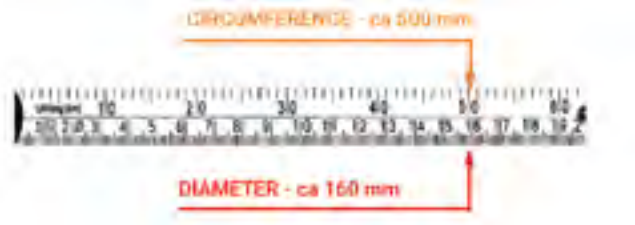
Pipeline diameter including insulation:

D = Ø + 2 x t = 100 + 2 x 50 = 100 + 100 = 200 mm

The length of the lamella mat: L = π D = 3.14 x 200 mm = 628 mm.

This means that the lamella mat is to be cut to the length of ≈ 630 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 π = 3,14.



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

Pipeline diameter including insulation:
D = Ø + 2 x t = 60 + 2 x 50 = 60.3 + 100 = 160.3 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 ≈ 504 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; avoid joining the mats in the top half of the pipe or duct (between 9 o'clock and 3 o'clock when looking at the clock face). This area is more exposed to environmental factors like rain, wind, and sunlight, which can affect the integrity over time. By avoiding joints in this upper section, you reduce the risk of water infiltration and other damage. Instead, placing the joints in the lower half (between 3 o'clock and 9 o'clock) ensures they are less exposed and better protected, leading to a more durable and reliable closure.

TO ENSURE PROPER OVERLAP WHEN APPLYING THE TAPE, FOLLOW THESE STEPS:

All joints must be closed by using PAROC® Clad Tape or PAROC® Clad Alu Tape. For straight sections use only tape with at least 75 mm width; please note that 100 mm wide tape is recommended. More narrow tape should be used only on inside of elbows or where space is limited.

1. Direction of Flow: *Always apply the tape in the direction of the flow of precipitation. This helps prevent water from seeping under the tape.*
Use Tape Locks: *For added security, use tape locks to hold the tape in place. This helps prevent the tape from shifting or peeling off over time.*

2. Smooth Application: *As you apply the tape, smooth it out to remove any air bubbles or wrinkles. This ensures a tight seal and better adhesion.*

3. Tape position: *Avoid joining the tapes in the top half of the pipe or duct (between 9 o'clock and 3 o'clock when looking at the clock face). This area is more exposed to environmental factors like rain, wind, and sunlight, which can affect the integrity of the tape over time. By avoiding tape joints in this upper section, you reduce the risk of water infiltration and other damage. Instead, placing the joints in the lower half (between 3 o'clock and 9 o'clock) ensures they are less exposed and better protected, leading to a more durable and reliable seal.*

4. *Always make sure that tape is applied without wrinkles and openings. Use a spatula to smoothen out any air bubbles. There must be no gaps or "pockets" where water can accumulate.*

5. *For fixation and stabilization of the mats, apply 19 mm wide aluminum bands in the circumferential direction with max distance 300 mm cc. For best finish and/or to prevent bands from moving on vibrating ducts, it's recommended to cover the aluminum bands with PAROC® Clad Tape or PAROC® Clad Alu Tape.*

ELBOWS AND FITTINGS

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

PIPE ELBOWS

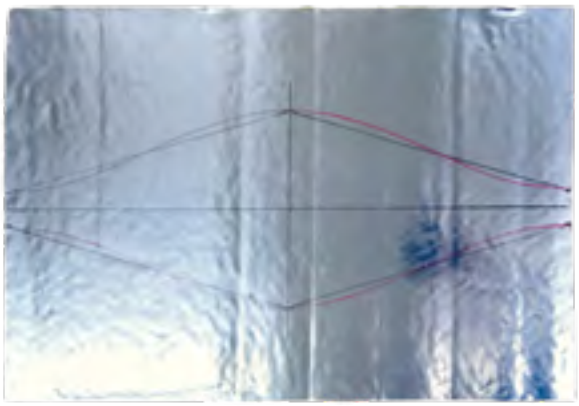
In the case of bent parts, such as bent elbows, the following installation method can be used:
Take the measurement (of the pipeline circumference, chord of the elbow radius measured in the throat);

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

2. *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 Ø250 pipe is insulated with a 50 mm thick mat, the diameter of the insulated pipeline is 350 mm and its half is 175 mm;*

3. *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;*

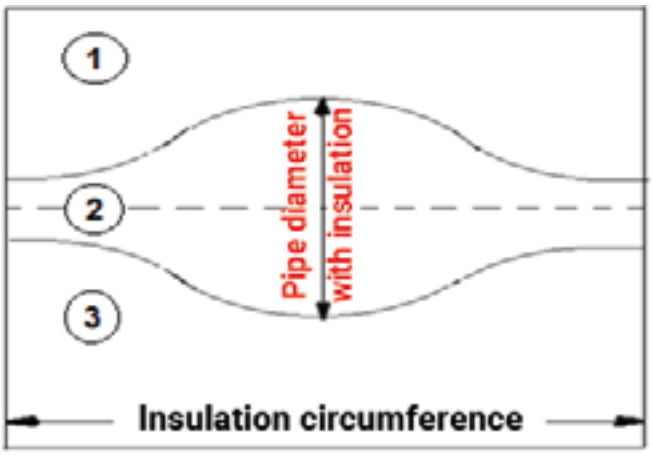
4. *Draw a curve from points on the edge on one side through the point in the middle of the circumference, linking it to the point at the end of the circumference;*



5. *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.*

6. *Seal the transverse joints with PAROC® Clad Tape or PAROC® Clad Alu Tape.*



7. *Any cut to fit sections must be secured by minimum 2 aluminum bands and tape according to the description above.*

8. *An alternative method is to use metal cladding elbow segments as template when cutting the insulation segments.*

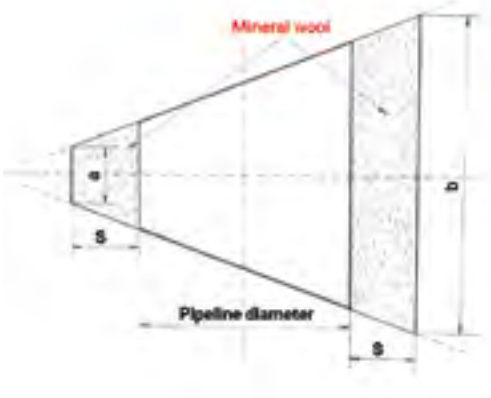
SEGMENTED ELBOWS

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

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

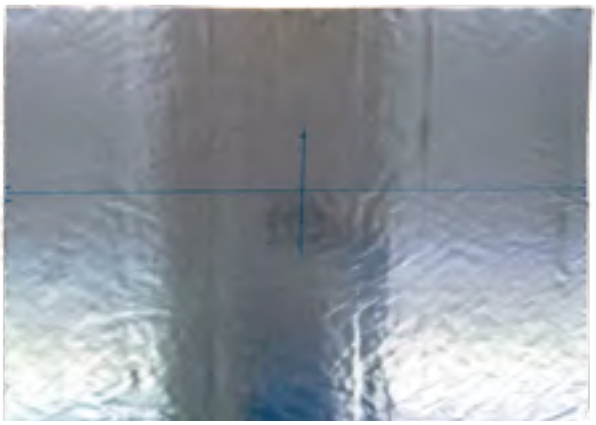
2. *Prepare an appendant drawing:*
- *draw a projection of the segment with its axis of symmetry,*
- *mark the insulation thickness on the inside and outside of the segment,*
- *extend the lines of the sides of the segment at intersections with the marked insulation thickness,*
- *read the value inside "a" and outside "b";*

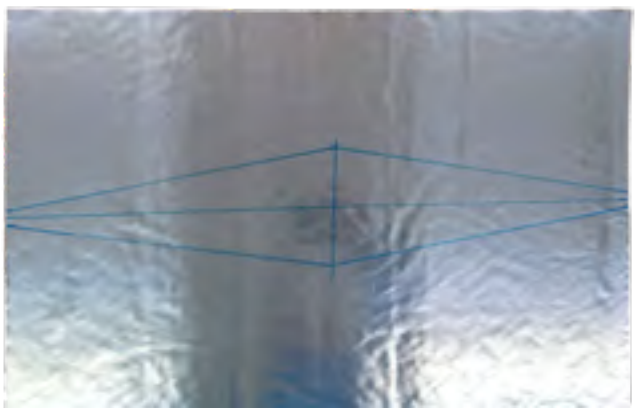
Cut out the circumference of the insulation (mat) of the appropriate length;



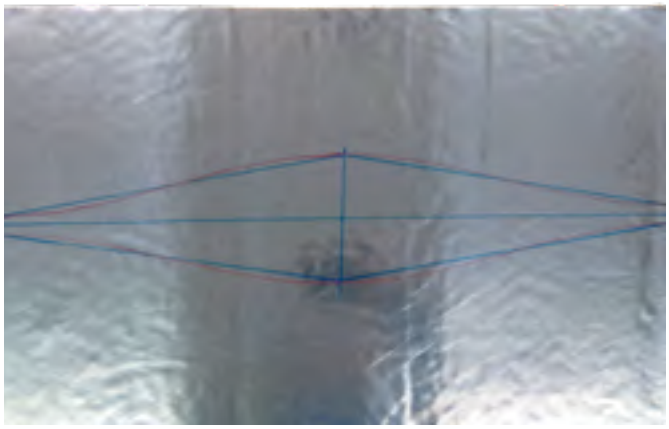
3. *In the selected location, mark an auxiliary line (the symmetry of the middle element of elbow insulation); On the auxiliary line, mark the point corresponding to the half the length (circumference) of the mat; At the point on both sides, mark half of the dimension "b".*

4. *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;*

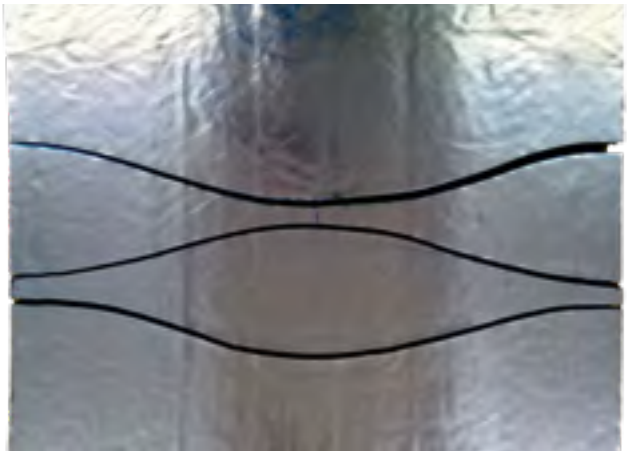




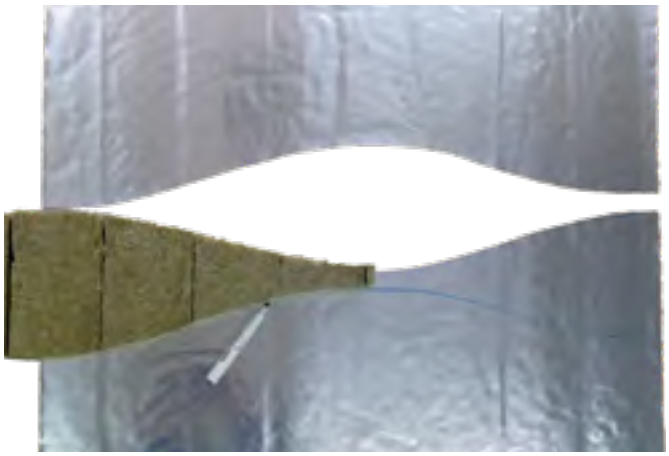
5. *Draw a curve from points on the edge on one side through the point in the middle of the circumference, linking it to the point at the end of the circumference;*



6. *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 half-way around the circumference. Then the folding will be alternately - once in the throat of the elbow, then on the outside of the elbow;*



7. *Any cut to fit seclons must be secured by minimum 2 aluminum bands and tape according to the descriplon above.*

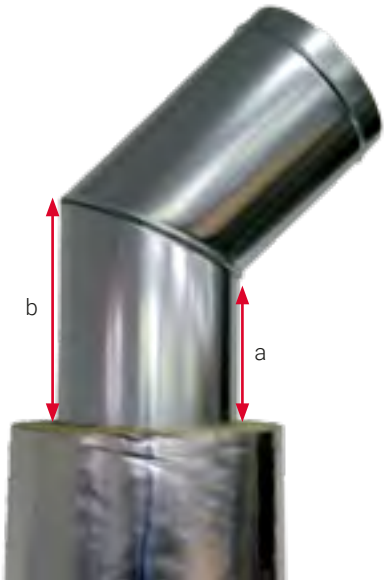


8. *Place the cut out elements are put on the elbow and cover the circumference joints with PAROC® Clad Tape or PAROC® Clad Alu Tape.*

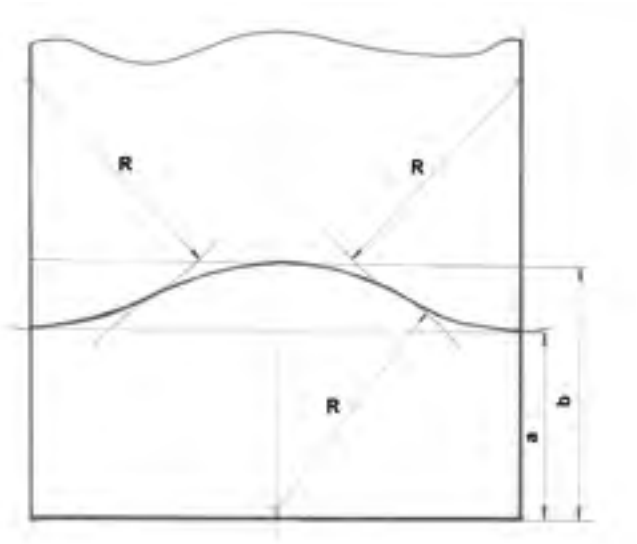
BEND - ELBOW BELOW 90°

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

1. *Measure the arc (diameter, distance at the lowest spot "a" and the highest spot "b");*
Cut the mat 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;



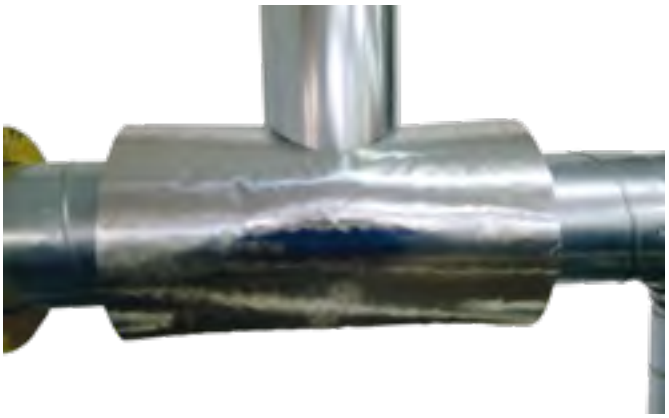
2. *On both sides of the mat, draw arcs (with the radius corresponding to half the circumference of the insulated pipeline) that are tangential to the lowest spot "a" of the arc;*
From the half of the mat, draw an arc (with a radius corresponding to half the circumference of the insulated pipeline),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

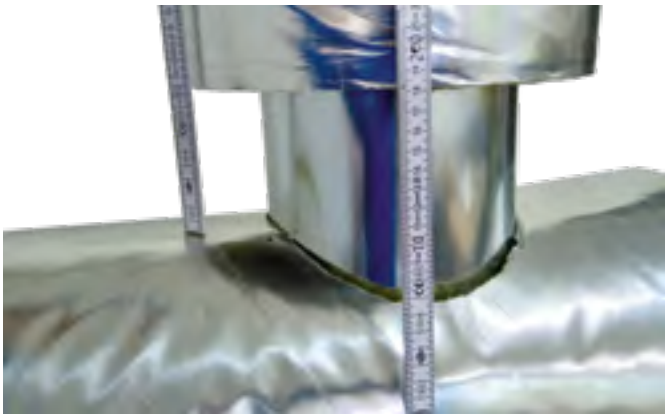


3. *The cut out elements should be placed on the bend - the elbows below 90° - and the longitudinal and circumferential joints should then be covered with PAROC® Clad Tape or PAROC® Clad Alu Tape.*

TEES

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

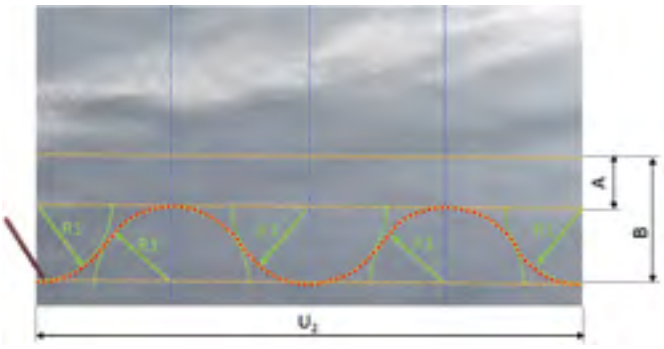




1. *First, insulate the section of the pipeline to which the tee connects; Then, measure the tee:*
- dimension in the shortest spot,
- dimension at the longest spot measured after insulation;
Cut out the circumference of the insulation (mat) of the appropriate length;
Divide the circumference into 4 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;

2. *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 or PAROC® Clad Alu Tape.



REDUCTION

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

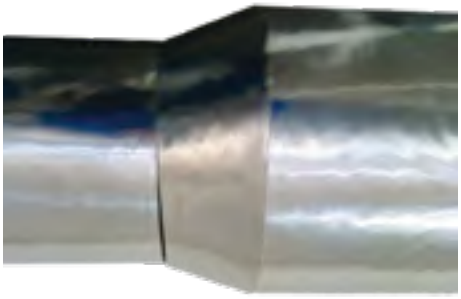
1. *Measure the reduction (large and small diameter and its length); Execute insulation of large and small diameter reduction; At the edge of the mat, draw half of the reduction side projection adding the insulation thickness to it;*

2. *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.*

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

4. *Install the cut-out element in the place of reduction;*

5. *Seal the transverse joints with PAROC® Clad Tape or PAROC® Clad Alu Tape.*



For vertical ducts with a lenght > 4 meters, support rings to prevent the insulation from sagging are recommended. Maximum distance between support rings should be 4 meters.

RECTANGULAR DUCTS

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,
- 45° angle cutting strip,
- 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.

PREPARATION:

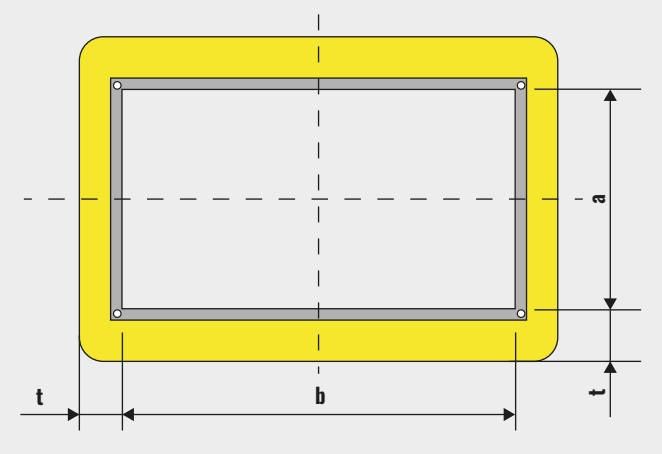
- The first step is to measure the duct: its width, height, and length;
- Before assuming installation, clean the duct surfaces of all dust, grease, and other dirt;
- Calculate the periphery. To calculate the periphery of insulation ("L") on ventilation ducts, you will need the following data:
- - width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

L = 2 x a + 2 x b + 8 x t

ACCESSORIES:

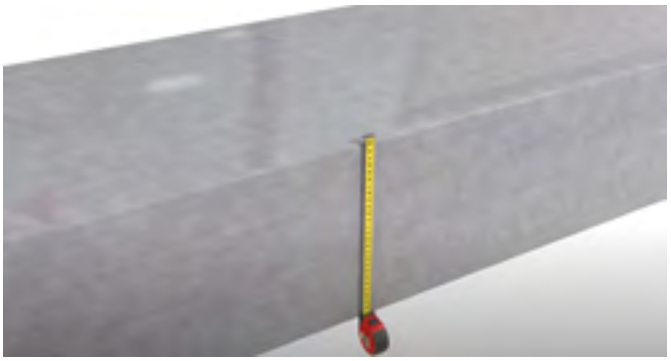
- **PAROC® Clad Tape:**
  Water resistant butyl rubber tape with very high tack and very high ageing intended for indoor installations
- **PAROC® Clad Dots:**
  PAROC® Clad Dots are the optimal solution when it comes to cover pins' heads
- **PAROC® Clad Alu Tape:**
  UV resistant tape intended for outdoor installation when UV resistance and increased durability is needed.
- spatula – for even connection of the tape to the lining.
- spray adhesive to additionally glue the mat to the duct surfaces.

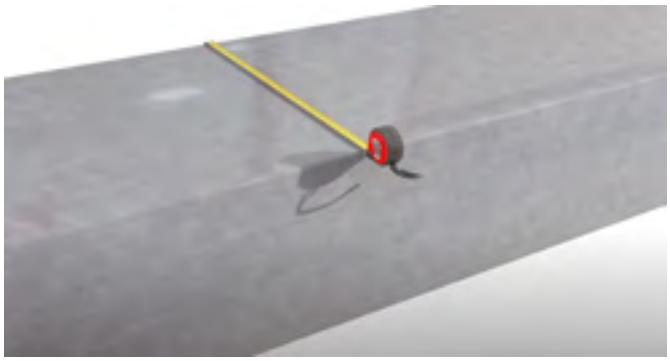


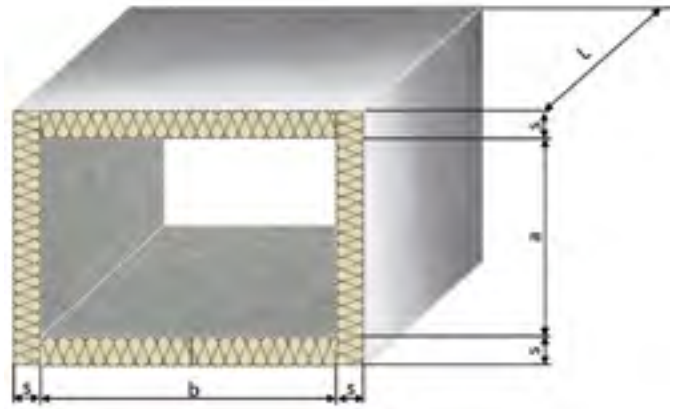
RECTANGULAR STRAIGHT DUCTS

OPTION 1: CONTINOUS LAMELLA MAT WITH CUT-OUTS

1. *Measure length, width and height of duct*





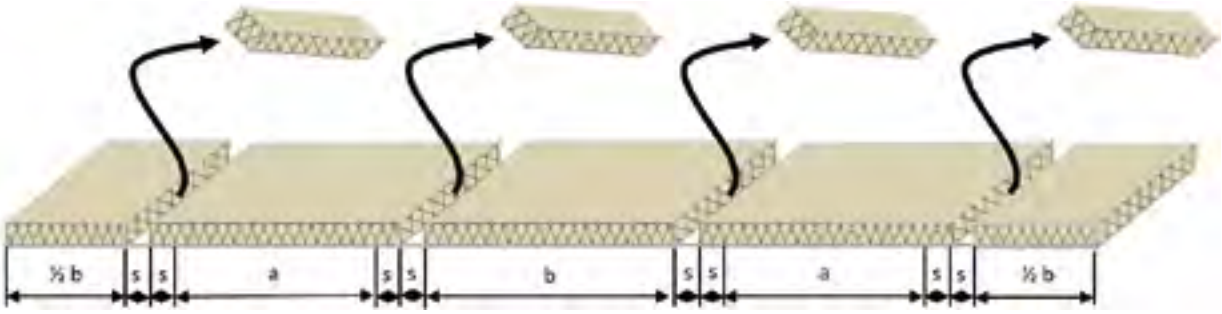


2. *Use this formular to calculate the needed material:*

$$U = 2 \cdot (a + b + 4 \cdot s)$$

a *– duct height*
b *– duct width*
s *– insulation thickness*
L *– duct length*

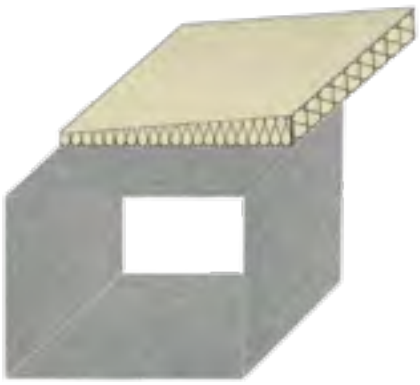
3. *Cut the lamella mat until you reach the coating. (distance cuts = insulation thickness).*
Please ensure that the Clad coating is not damaged. Remove the lamella from the clad coating and dispose of them properly. Repeat this process for each duct edge. When cutting, take this into account the joints should be below the channel if possible. That way the mat can be economically and visually appealing closed or sealed with PAROC® Clad Tape or PAROC® Clad Alu Tape.



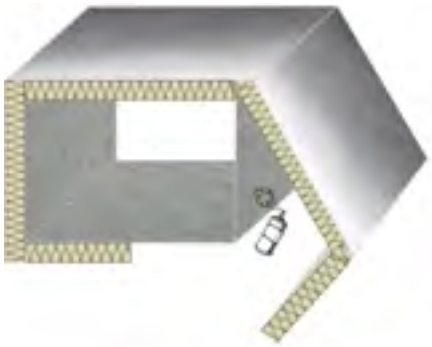
cut-out
width = insulation thickness

OPTION 2: INSTALLATION WITH PAROC® PRO ROOF WEDGE (WR) (RECOMMENDED)

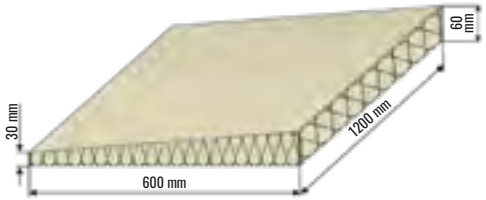
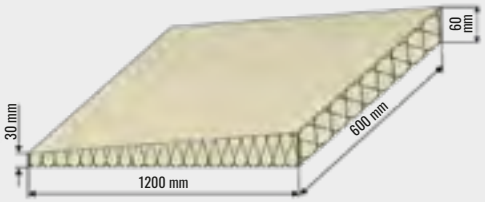
STEP 1: Installation of wedge

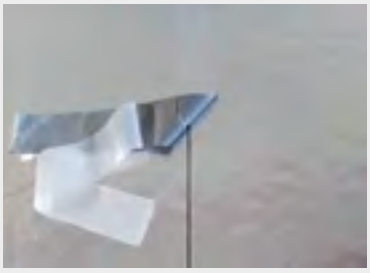


STEP 2: Installation of PAROC® Pro Lamella Mat Clad (on top of the Wedge)



Recommendations

Air duct with [mm]	Dimension of the wedge [mm]	
<600	30/60×600×1200	
600-1200	30/60×1200×600	



Seal all open edges with PAROC® Clad Tape or PAROC® Clad Alu Tape; use PAROC® Clad Dots for the welding pins.
All connections (T-pieces, supports etc.) must also be sealed. Air pockets under the PAROC® Clad Tape or PAROC® Clad Alu Tape should be avoided. We therefore recommend using a plastic spatula over the entire taped area to achieve optimal adhesion and a wrinkle-free surface.

If there are edges in corner areas of the ventilation duct, the PAROC® Clad Tape or PAROC® Clad Alu Tape must be applied in the middle of the joint; the tape overlaps should be at least 20 mm on each side.

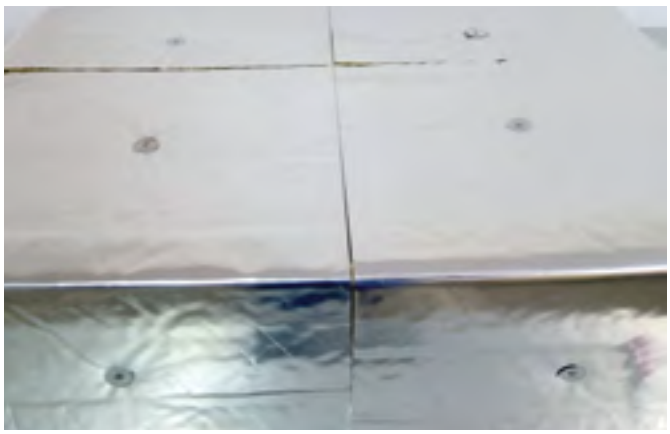
Recommendation:
To seal hard-to-reach cut edges (cutouts, etc.), it is recommended to use a permanently elastic sealing compound (no maintenance joint), for example M-Glue from BRAAS Monier or equivalent.

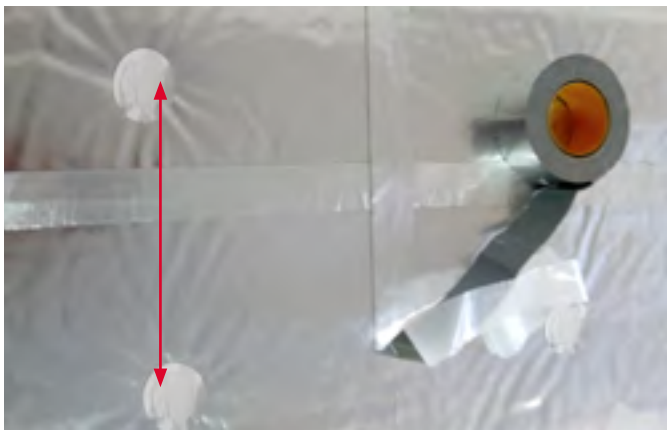
Please note that no tensile forces should act on the PAROC® Clad Tape. The tape is used for waterproofing masking and not fir mechanical fixation.

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. Avoid joining the mats in the top half of the duct (between 9 o'clock and 3 o'clock when looking at the clock face). This area is more exposed to environmental factors like rain, wind, and sunlight, which can affect the integrity over time. By avoiding joints in this upper section, you reduce the risk of water infiltration and other damage. Instead, placing the joints in the lower half (between 3 o'clock and 9 o'clock) ensures they are less exposed and better protected, leading to a more durable and reliable closure.

All folds of the individual mats and the points of welded pins should be secured with PAROC® Clad Dots. We recommend that you use a spatula to ensure that the dots adhere tightly to the lining. The length of the pins should fit the insulation thickness.

The distance between the pins should not exceed 300 mm.





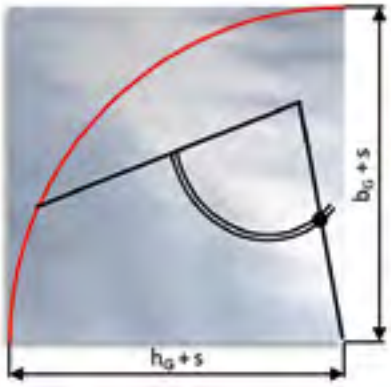
RECTANGULAR DUCT BENDS

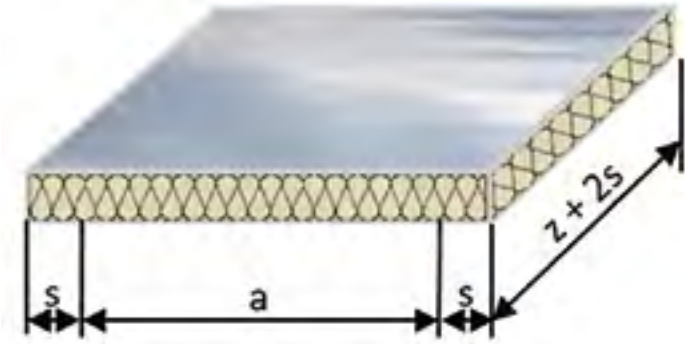
1. *measure length*

- ***h*** *– duct height*
- ***h_G*** *– total height of duct*
- ***a*** *– duct width 1*
- ***b*** *– duct width 2*
- ***b_G*** *– total width of duct*
- ***z*** *– length of duct back*
- ***s*** *– insulation thickness*

2. *Cut the duct sides according to the formula below and mark the radius of the duct bend. For small bends we recommend using a drawing circle. For larger ones, the radius can be marked using a folding rule.r* ***Be sure to add the insulation thickness to the duct dimensions!***

$$Cutting_{duct\ sides} = (b_G + s) \cdot (h_G + s)$$

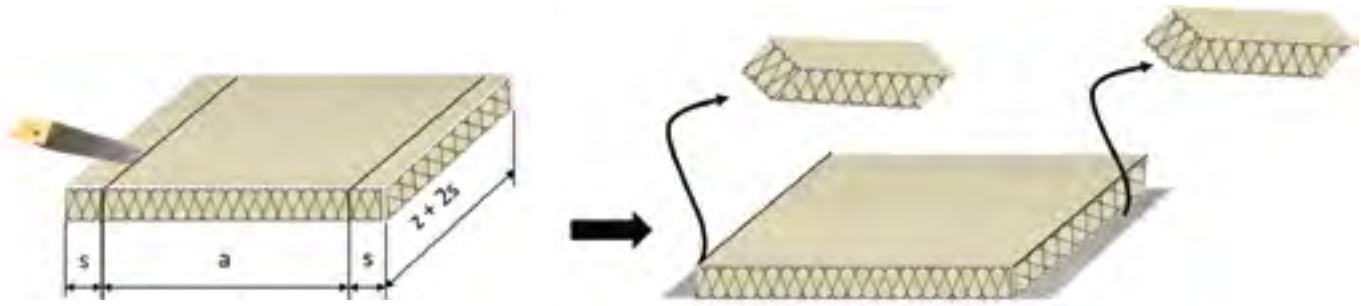




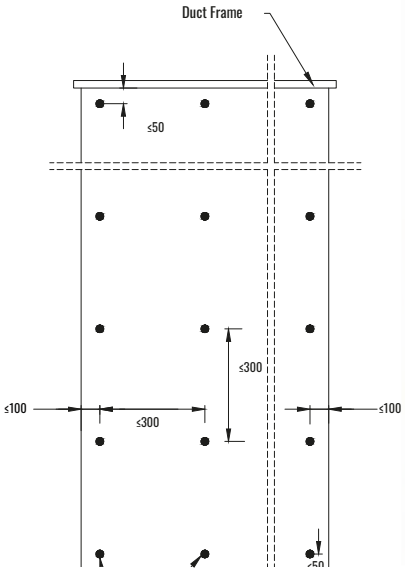
3. *Now cut the back of the canal accordingly the following formula:*

$$Cutting_{duct\ bend} = (a + 2 \cdot s) \cdot (z + 2 \cdot s)$$

4. *The lamella mats are then cut on the side up to the coating (s = insulation thickness). Remove the two-sided cut-outs and then use the remaining clad lamination as a "cover" for those surfaces on the side..*



5. *Mount the PAROC® Pro Lamella Mat Clad on the duct sides and back. In order to make the installation easier, a spray adhesive could be used. For the permanent mechanical fixation on the duct we recommend using welding pins; with a maximum distance 300 mm. To ensure a uniform positioning of welding pins, we recommend using a corresponding template.*



6. *Then seal all open edges using PAROC® Clad Tape or PAROC® Clad Tape or PAROC® Clad Alu Tape; to seal the welding pin we recommend using PAROC® Clad Dots. In case there are edges in corner areas of the ventilation duct, the PAROC® Clad Tape or PAROC® Clad Alu Tape should be placed in the middle of the joint; overlapping at least 20 mm. For an optimal gluing connection of the duct's back to the side parts, cut PAROC® Clad Tape or PAROC® Clad Alu Tape every 20 to 40 mm (depending on the radius of the channel) and attach these to the side parts using a spatula.*

Possible air pockets under the PAROC® Clad Tape or PAROC® Clad Alu Tape should absolutely be avoided. Therefore, post-processing is done using a spatula.

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