kaimann
SAINT-GOBAIN

Kaiflex®

Application guide

Version: 17.06.2025

© Kaimann GmbH · Subject to change without notice.

Contents

© Kaimann GmbH · Subject to change without notice.

General information

Cleaning surfaces

The surfaces must be clean, dry and free of grease. Unclean surfaces must be treated with Kaiflex Cleaner.

Choosing the insulation thickness

The design of the insulation thickness depends on the system to be insulated and the ambient conditions. In case of constantly fluctuating ambient temperatures and humidity levels, the insulation thickness should be calculated for each component.

Our Technical Information “Material consumption” provides a simple overview of the minimum insulation thicknesses in accordance with VDI 2055. Our KaiCalc calculation tool can be used to precisely calculate the insulation thickness.

Basic rules for insulating refrigeration systems

- Before insulating the system, it is important to check whether the surface needs to be treated with corrosion protection (e.g. Kaifinish corrosion protection). If you have any further questions, please contact our Technical Support.
- To ensure secure bonding, particular attention must be paid to critical areas such as elbows, flanges and suspensions. Before bonding the tube ends/joints, a partition sealing should be carried out (see page 4).
- Never insulate systems where the parts to be insulated are too close together. Observe the necessary minimum clearances (see DIN 4140). Deformation of the insulation by surrounding components is not permitted.
- Tubes with an oval shape must always be slit on the flat side.

Special aspects must be considered when insulating system parts made of stainless steel. Please ask our Technical Support for more information.

Bonding with Kaiflex special adhesives

Preparation: The condition of the Kaiflex special adhesive must be checked before use. The solids in the adhesive settle at the bottom of the can. For this reason, the Kaiflex special adhesive must be stirred well, not just shaken. Always follow the application instructions on the adhesive can. To reduce skin formation, the adhesive can be decanted into a container with a small opening cross-section. Stir the adhesive well before use until there is no sediment at the bottom of the can. This procedure should be repeated regularly for extended periods of use.

Application conditions: The system to be insulated must not be in operation and may only be put back into operation 36 hours after bonding. Kaiflex tape may only be used after the solvent has completely diffused out (after 36 hours). Application under direct sunlight must be strictly avoided. The areas must be protected against UV radiation and ozone. The ideal working temperature is +20 °C. Depending on the special adhesive used, application should not occur below +5 °C to +10 °C. At temperatures above +30 °C, the flash-off time is considerably shorter. Conversely, temperatures be-

© Kaimann GmbH · Subject to change without notice.

low +10 °C and high humidity of over 80 % can lead to the formation of condensation on the adhesive film. Please contact our Technical Support (see also "Technical data sheet – Kaiflex Special Adhesive").

Drying time:	36 hours
Storage:	cool, dry and frost-free.
Shelf life:	1 year
Normal quantities used:	0.20 to 0.25 l per m² for full-surface bonding (see Technical Information "Material consumption")

Standard bonding: Use a brush with short, stiff bristles or a spatula. Apply a thin, even layer of adhesive to both surfaces. Wait until the adhesive is dry to the touch. Depending on the ambient conditions and the Kaiflex special adhesive used, this takes 4 to 20 minutes. Check the adhesive surface using the finger test. If the finger does not stick to the surface and the surface does not feel tacky, the bond should be made. Press the surfaces to be bonded firmly together. Always apply the adhesive seams under compression, never under tension.

- In difficult-to-access construction situations, it may be advisable to carry out wet bonding (with no flash-off time). Further information: see "Technical help" (from page 89).
- Application guides for self-adhesive materials: see pages 34 and 78

Insert bonding: Wet bonding (without flash-off) is used when inserting insulation components. Always cut the Kaiflex insulation materials approx. 10–30 mm longer (approx. 30–50 mm longer for Kaiflex EPDMplus insulation materials) to ensure they are applied under compression. Once the bonding surfaces have been joined together under compression, the final wet bonding process follows. To do this, pull the butt seams slightly apart and apply a thin, even layer of adhesive to the surfaces to be bonded. Then press the adhesive seams together with even pressure. No flash-off time is required.

Partition sealing: In accordance with DIN 4140, partition sealing should be used to enhance system safety in cold insulation applications. The insulation material is bonded to the pipe every 2 meters over a width equal to the insulation thickness. The adhesive must be applied to both the insulation material and the pipe. Further information: see "Technical help" (from page 89).

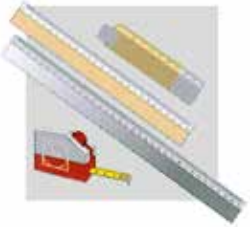
Coated surfaces: For painted surfaces, it must be ensured that the adhesive is compatible with the coating. Do not use the adhesive on surfaces that have been treated with products containing asphalt, bitumen or linseed oil. Only use rust protection systems that are approved in accordance with worksheet AGI Q 151 and tested in conjunction with solvent-based adhesives. The Kaifinish corrosion protection system is ideal for corrosion protection.

Using Kaifinish Color protective coating

Kaifinish Color can be applied after a 36-hour flash-off time of the Kaiflex special adhesive. The insulation must be protected against UV radiation during this flash-off period. The protective coating should then be applied as soon as possible, no later than within one day.

© Kaimann GmbH · Subject to change without notice.

Tools

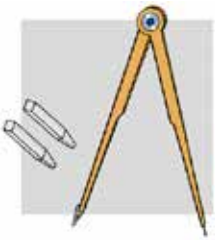


Ruler and tape measure

for measuring and as guides for tracing lines to cut.

Scissors

for trimming the insulation material.



Silver pen and compass

to draw reference lines for measurements and cuts.

Metal band

as a guide for cutting tube ends at elbows.

Stanley or other knife

with different blade lengths.

Various brushes

and spatula for applying the adhesive.

Calliper

for measuring the external diameter of the pipework to be insulated.

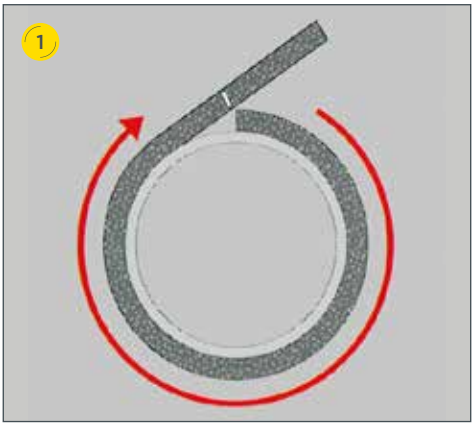
Circular punches

(bevelled tubes) for punching holes.

Other useful tools: Cutting template, glue pump, sharpening stone, pocket rule and ceramic knife.

© Kaimann GmbH · Subject to change without notice.

Practical tips

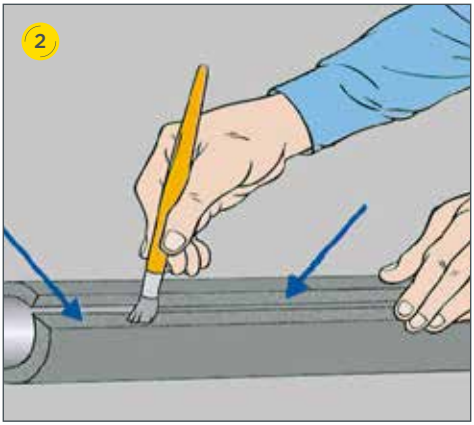


Measuring circumference

- The thickness of the strip is equal to the insulation thickness.

Measuring circumference: To determine the pipe circumference, wrap a flat strip around the pipe without applying tension or compression. Do not stretch or compress the strip!

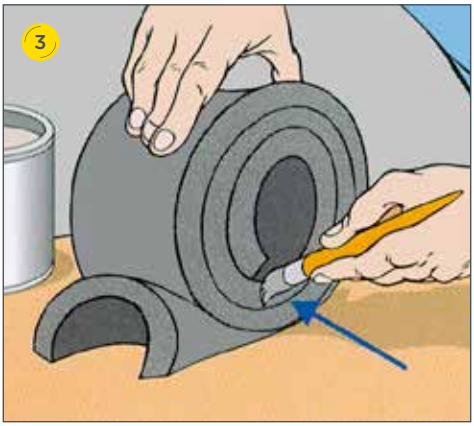
Mark the point where the ends overlap, then cut the strip to length at the mark.



Bonding the seams of a slit tube

To make it easier to apply adhesive to the seams, the tube can be slid over a pipe with a larger diameter (to prevent the seams from touching). Alternatively, scrap pieces can be wedged inside the tube to hold the seams open. Then slide the tube over the pipe to be insulated and bond the joints.

- Adhesive seams on tubes and sheets should never be under tension, but always applied under compression.



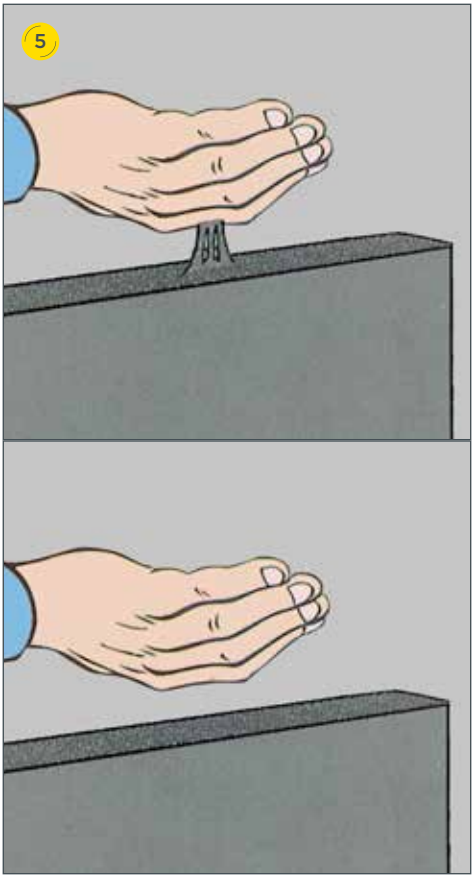
Short and relatively thin tubes can be rolled up and then coated with adhesive. The tube can then be unrolled onto the pipe for easy installation.

© Kaimann GmbH · Subject to change without notice.

Practical tips

Bonding the joints of sheet material

When bonding insulation sheets, the long cut surface should be carefully coated with adhesive. The best bonding results are achieved when the adhesive is applied thinly and evenly with a brush (short, stiff bristles). Once the adhesive has been applied, ensure that it has dried properly before attempting to stick the edges together.



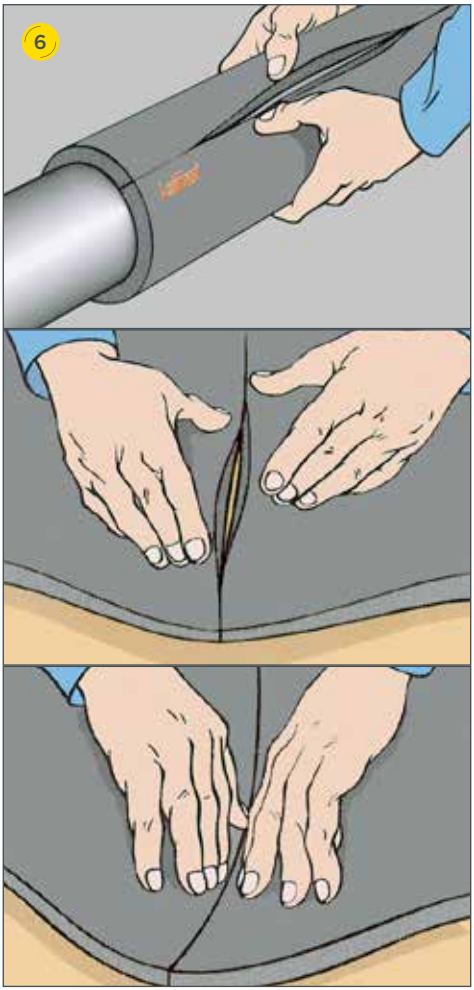
Proper flash-off time of for adhesives

Use the “finger test” to check whether the applied adhesive has sufficiently flashed off. If the adhesive still sticks to the back of your hand, as shown in the figure, the flash-off time must be extended.

- General rule: Check with the back of your hand whether the adhesive a) forms strings when touched and/or b) still feels cold. In both cases, the flash-off time must be extended.
- Solvent-free Kaiflex special adhesives have a significantly longer flash-off time. Depending on the ambient conditions, it can take 20 to 30 minutes for these adhesives to flash off completely.

© Kaimann GmbH · Subject to change without notice.

Practical tips



Joining the adhesive seams

The piece of insulation is wrapped around the pipe, and the long cut surface is closed with light pressure.

It is advisable to work from the outside in.

Join the ends at the centre.

Applying adhesive to large surfaces

A spatula or roller is suitable for spreading adhesive over large surfaces. Here too, the adhesive should be applied thinly. After applying adhesive to both surfaces and allowing for sufficient flash-off time, the sheet material can be applied to the surface to be insulated.

© Kaimann GmbH · Subject to change without notice.

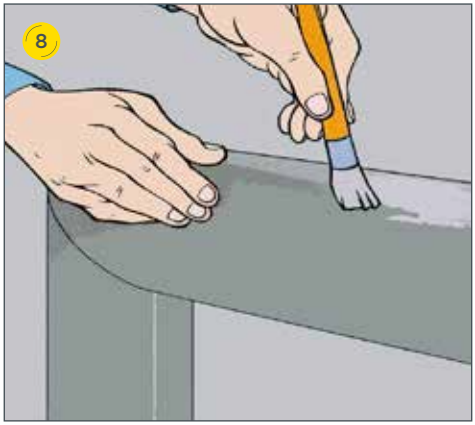
Practical tips

Installation of sheet material on pipes

The following guidelines apply when installing sheet material on pipes:

Sheet thickness mm	Tolerance mm	External ø mm			
		≥ 88.9	≥ 114	≥ 159	≥ 600
9	± 1.0	•	•	•	•
13	± 1.0	•	•	•	•
16	± 1.0	•	•	•	•
19	± 1.0	•	•	•	•
25	± 2.0		•	•	•
32	± 2.0			•	•
50	± 2.0				•

Kaiflex KKplus s2 tubes are available with increasing insulation thicknesses. If these tubes are replaced with sheets of the same type, the insulation thickness may be insufficient. To ensure the calculated minimum insulation thickness is maintained, the next thicker sheet should be used.



Kaifinish Color protective coating for outdoor use

Applying two coats of Kaifinish Color renders Kaiflex materials resistant to UV radiation and weather conditions. The protective coating must be applied within three days after the insulation has been installed. There should be a minimum interval of two hours between coats. If possible, apply the second coat at a right angle to the first coat. Protective coatings must be renewed every two years. Kaiflex EPDMplus / Solar EPDM can be used outdoors without additional protection.

© Kaimann GmbH · Subject to change without notice.

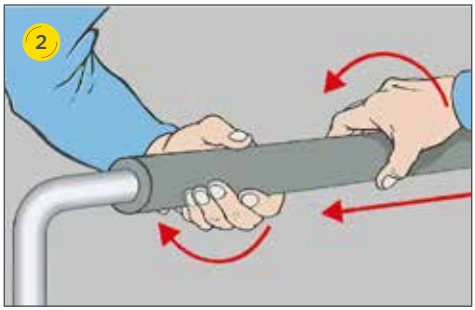
1 Application of TUBE MATERIAL

© Kaimann GmbH · Subject to change without notice.

1.1 Pipe <DN 150

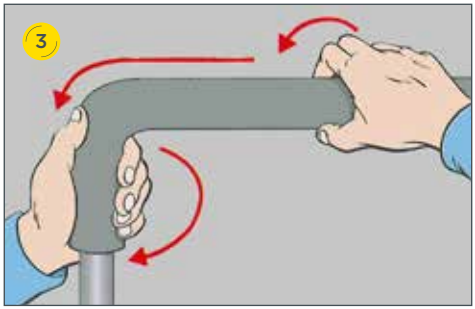
Insulation prior to pipe installation

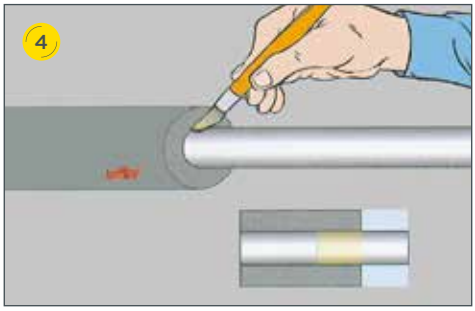
- Approximately 80 % of piping in buildings can be insulated prior to installation. This simplifies the process and saves time.



The tube can be more easily slid over the pipe using a slight twisting motion. This also reduces tensile stress and minimises the risk of damage. Particular care must be taken with elbows to ensure that the tube is not excessively stressed on the outer side.

- This reduces the insulation thickness, which may consequently fall below the required minimum insulation thickness.
- Halogen-free materials – such as Kaiflex HFplus s2 – must not be installed under tension. For elbows, the fabrication of preformed segments (segmented elbows) is mandatory (see page 84).



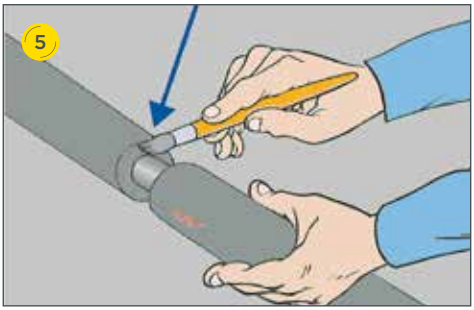


Once the tube is in its final position, partition sealing should be applied to fix it in place.

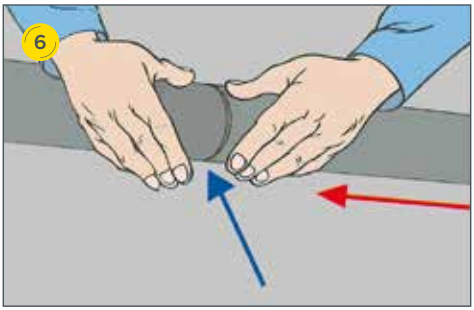
- For further information, see the general notes on “Partition sealing” (page 4).

© Kaimann GmbH · Subject to change without notice.

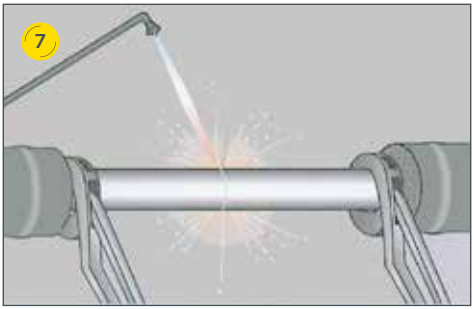
1.1 Pipe <DN 150



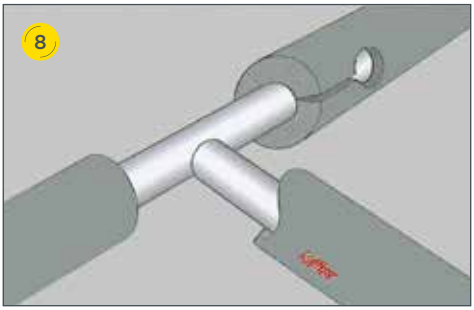
Apply adhesive to the joints of both the fixed tube and the following tube.



Press the tube ends together firmly.



For soldered or welded seams, the insulation must be pushed back and secured 25–30 cm on each side of the weld. Once the soldered or welded joints have cooled down, the pipe can be fully insulated.



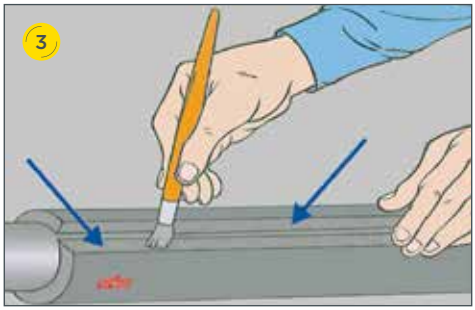
Critical piping sections such as elbows or branches should be checked again before the Kaiflex material is finally bonded.

© Kaimann GmbH · Subject to change without notice.

1.2 Pre-installed pipe

The uninsulated pipe before the insulation is installed.

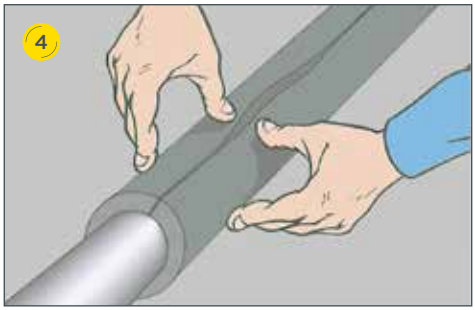
For already installed pipes, the tube must be slit lengthwise. ❗ To facilitate the subsequent bonding process, very sharp knives should be used. Recommendation: Use a Kaimann ceramic knife for a clean, straight cut.



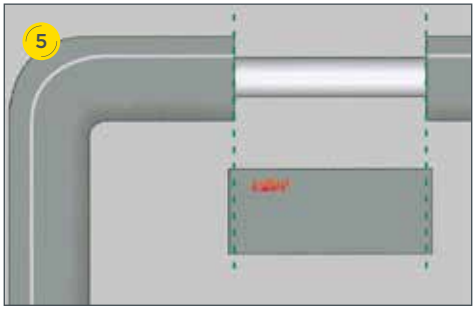
First, apply adhesive to the seams of the tube and allow the flash-off time to pass before fitting it around the pipe. For tubes already in position, press the slit open slightly in order to apply a thin, even layer of adhesive along the seams.

© Kaimann GmbH · Subject to change without notice.

1.2 Pre-installed pipe

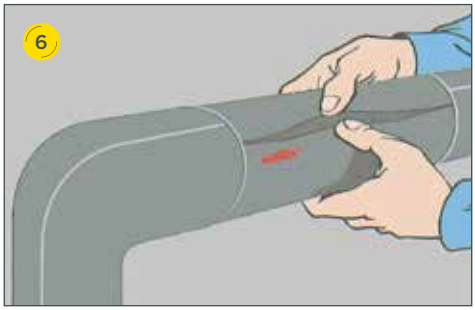


Press the seams together from the outside in so that they are flush.



At transitions between two tubes, the piece to be inserted should be cut with an overlap.

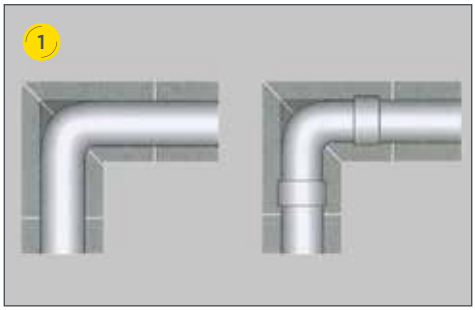
- Pieces that are too short may compromise the insulating performance.
- For more information, see the general notes on “Insert bonding” (page 4).



The piece to be inserted should be slit lengthwise and then bonded in place.

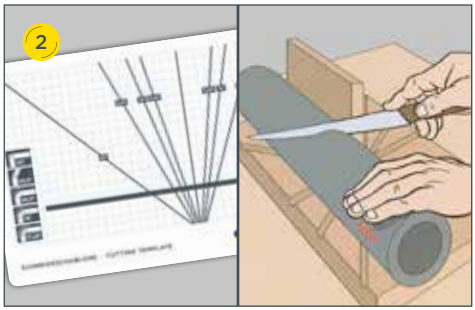
© Kaimann GmbH · Subject to change without notice.

1.3 Elbow



An elbow can be insulated in different ways:

- with a 90° elbow
- with a segmented elbow

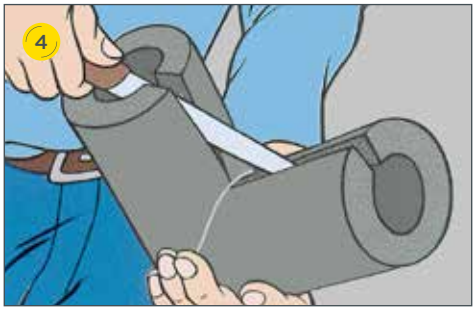


Insulation of an elbow on pipes of equal diameter

Take a tube of sufficient length to cover the elbow. Then cut the piece at a 45° angle in the middle.

Cutting templates can be used for this purpose. A knife with a long blade is required.

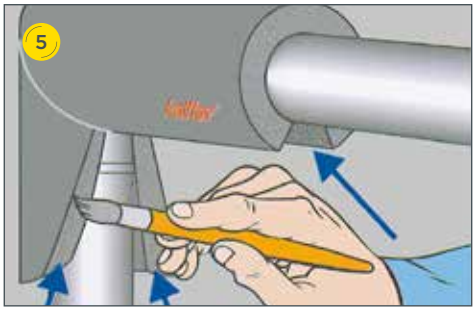
Form a right angle and bond the joints.



Once the adhesive has partially dried, the inner side of the elbow can be slit lengthwise.

© Kaimann GmbH · Subject to change without notice.

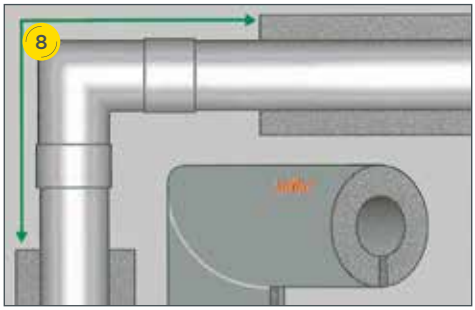
1.3 Elbow



The adhesive can be applied before or after positioning the insulation on the pipe as required.

Press the longitudinal joints together.

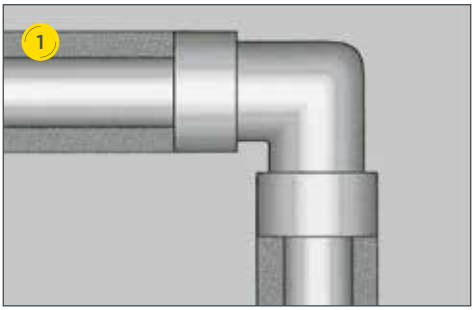
Apply adhesive to the end pieces of the elbow section and the straight tube, then join them.



If the straight pipe sections are already insulated, the right-angled section must be accurately measured to fit.

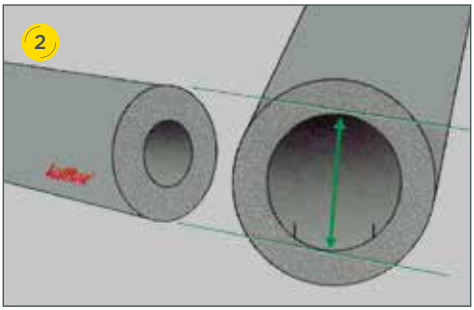
© Kaimann GmbH · Subject to change without notice.

1.3 Elbow

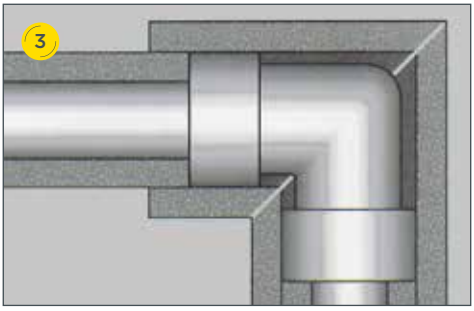


Insulation of an elbow on pipes of different diameters

If the elbow has a different external diameter than the straight pipe sections, insulate the straight sections first.



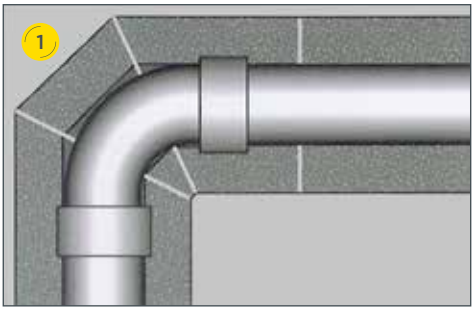
Take a tube with an internal diameter matching the external diameter of the smaller tube.



The right-angle piece cut from this tube must overlap the already installed tubes by at least the thickness of the insulation layer and then be bonded to them (see page 16).

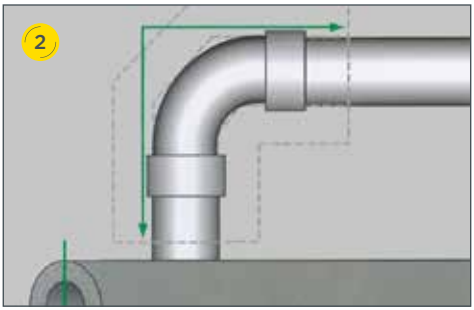
© Kaimann GmbH · Subject to change without notice.

1.3 Elbow

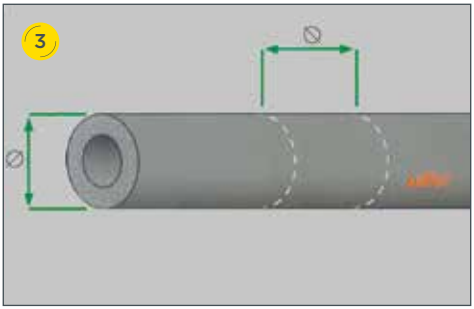


Insulation of an elbow with segmented elbows for pipes of equal diameter

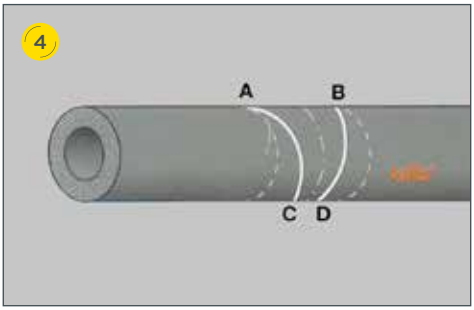
An elbow can also be insulated using joined segments of tubing. This requires two angled cuts.



Take a Kaiflex tube piece of the required length for the elbow.



Mark the external diameter of the tube with two parallel lines along the centre of the tube.

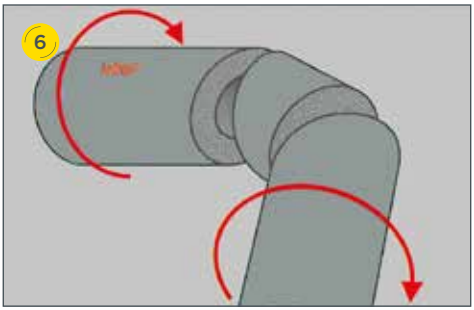


After locating the centre line, mark two points (C and D) approximately 1 cm from the centre line on each side. Connect points A and C as well as B and D (see figure).

© Kaimann GmbH · Subject to change without notice.

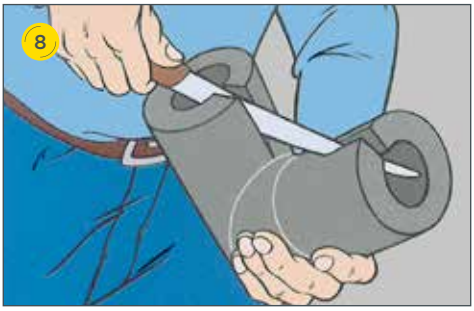
1.3 Elbow

Cut out the middle section along the lines connecting points A to C and B to D.



The sheet is assembled by twisting the individual cut segments.

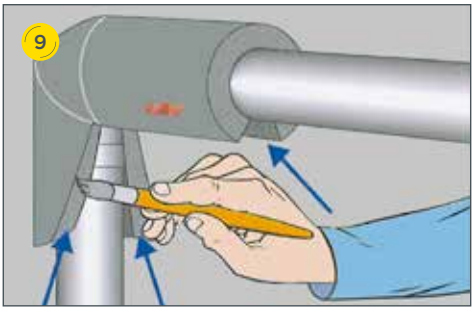
The cut segments are then bonded together.



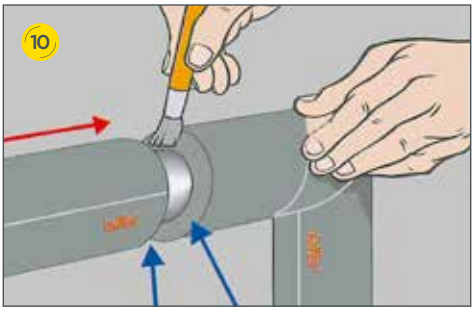
Once the adhesive has partially dried, the inner side of the elbow can be slit lengthwise.

© Kaimann GmbH · Subject to change without notice.

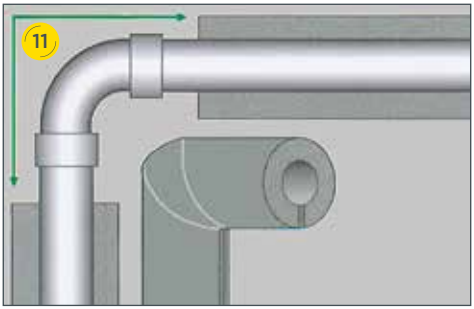
1.3 Elbow



The adhesive can be applied before or after positioning the insulation on the pipe as required.



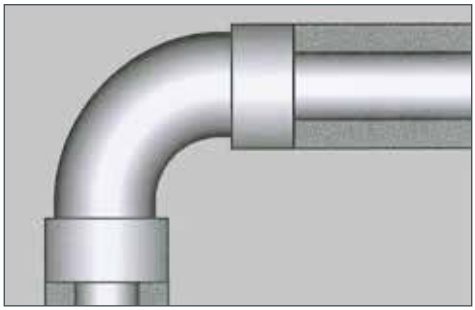
After applying adhesive to the end pieces of the elbow section and the straight tube, join them.



If the straight pipe sections are already insulated, the elbow must be accurately measured to fit. The length of the elbow to be installed must not be too short.

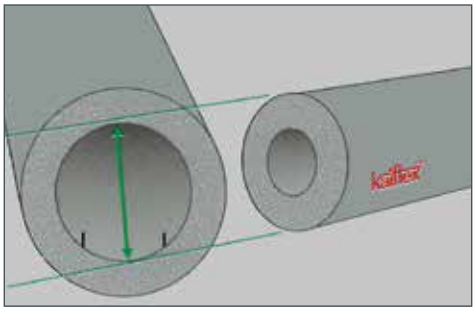
© Kaimann GmbH · Subject to change without notice.

1.3 Elbow

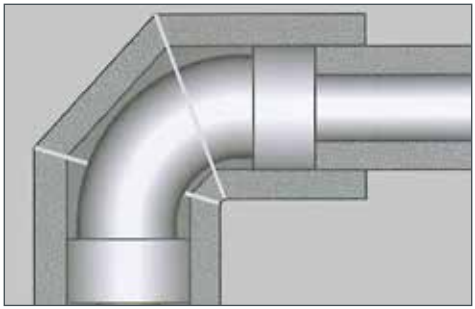


Insulation of an elbow with segmented elbows for pipes with different external diameters

If the external diameters of the straight pipe sections are smaller than that of the elbow piece, these sections must be insulated first.



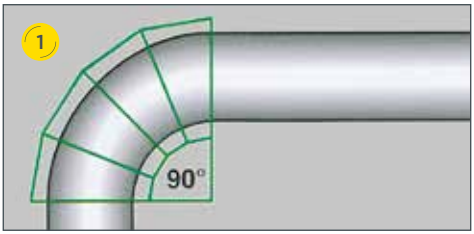
Take tube with an internal diameter matching the extern al diameter of the smaller tube.



In this case, the segmented elbow must overlap the ends of the adjoining smaller tube by at least the thickness of the selected insulation layer. Further details are illustrated on the on the preceding pages.

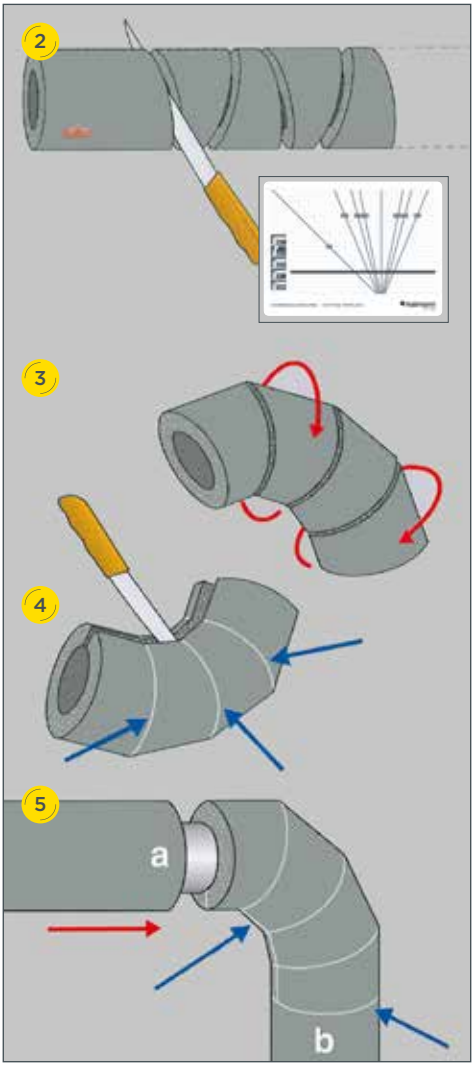
© Kaimann GmbH · Subject to change without notice.

1.4 Segmented elbow



It is recommended to use segmented elbows to avoid tension and a potential reduction of insulation thickness.

Halogen-free materials – such as Kaiflex HF-plus s2 – must always be installed using segmented elbows.



A tube section of the appropriate size is cut into 3 or 5 equal parts to form a 90° elbow. A mitre box or cutting template can be helpful for this process.

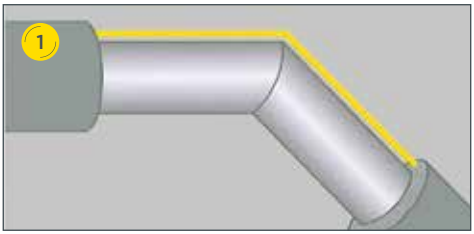
Rotate every second segment by 180° to create an elbow piece.

After bonding the individual segments, slit the elbow along the inside.

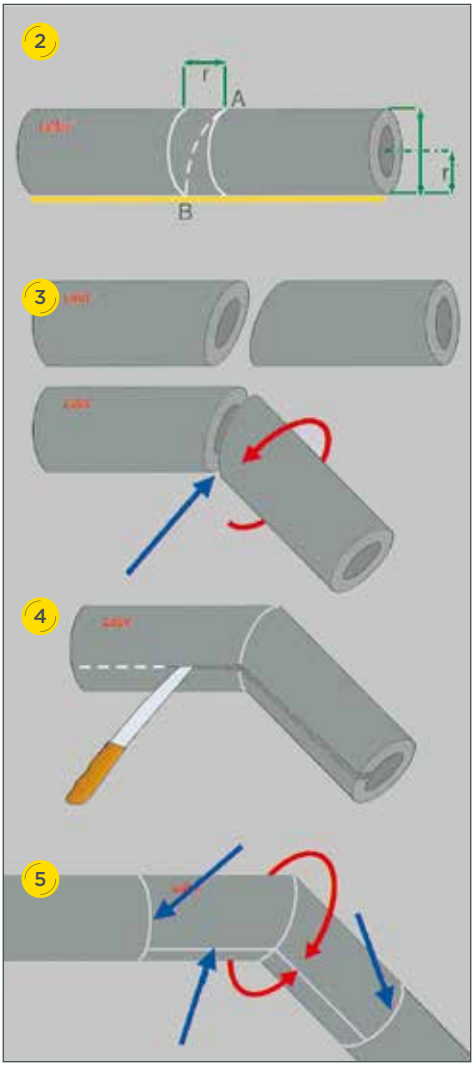
Fit the elbow onto the pipe and bond it to the adjacent straight tube sections.

© Kaimann GmbH · Subject to change without notice.

1.5 Elbow >90° (bevel / mitre)



For these elbows, it is recommended to insulate the straight pipe sections first.



Mark two parallel lines on the tube section at a distance equal to the tube radius. Then connect point A with point B (see figure 2).

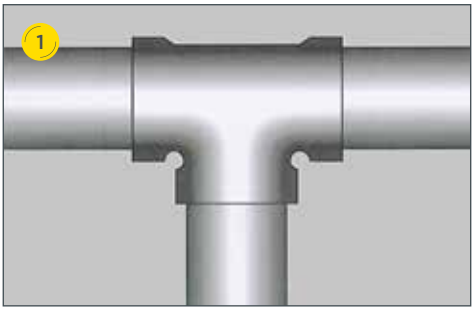
Cut the tube along this line and rotate to create the desired angle.

After bonding, slit the tube along the inside.

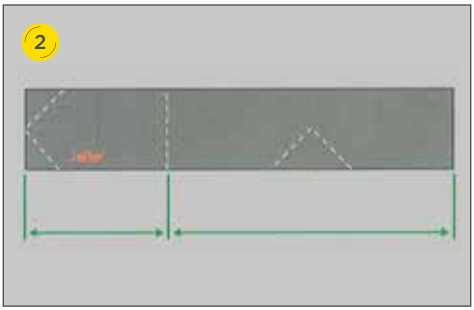
After fitting the elbow, bond all the seams.

© Kaimann GmbH · Subject to change without notice.

1.6 T-fitting



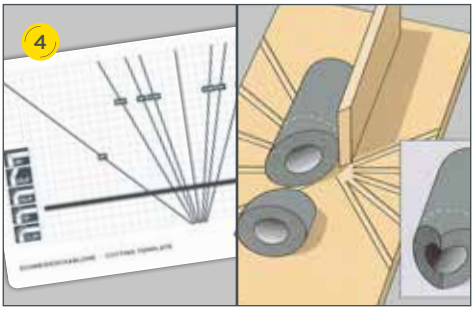
T-fittings can be insulated either first or last. However, it is recommended to begin by insulating the T-fittings.



T-fittings can be cut in two ways: with 45° cuts or by punching out a hole.

Insulation of a T-fitting with 45° cuts

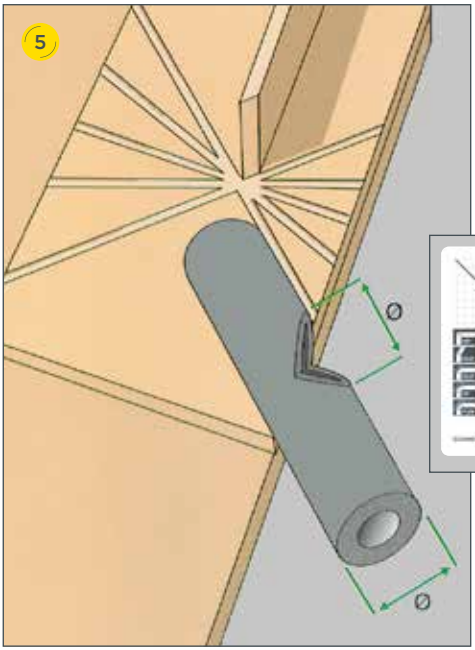
Cut a section of the tube into two parts so that one part is 1/3 and the other 2/3 of the total length.

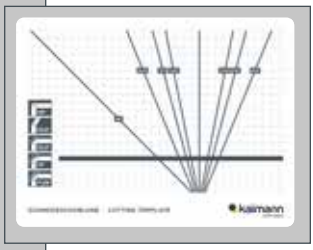


The shorter tube section is cut at an angle of 45° on each side, starting from the centre line at the end.

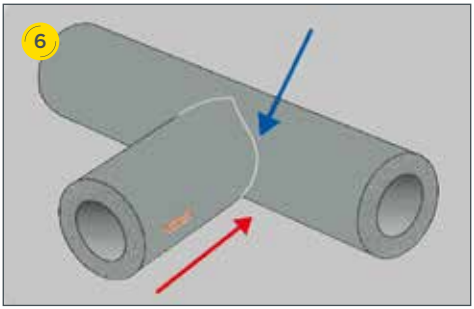
© Kaimann GmbH · Subject to change without notice.

1.6 T-fitting





From the centre of a second tube, cut out a 90° wedge matching the external tube diameter.

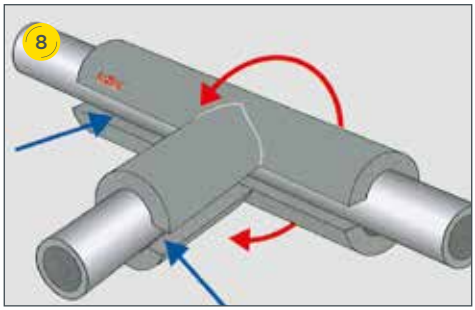


Bond the pre-cut parts together to form a “T” shape.

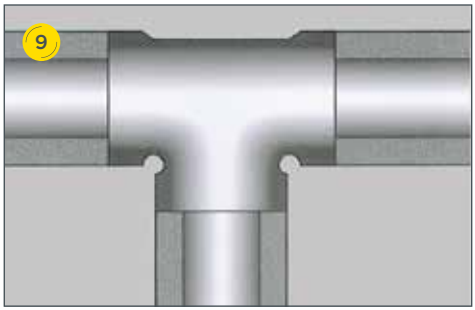
Slit the "T" piece open and apply adhesive either before or after fitting it onto the pipe (see figure).

© Kaimann GmbH · Subject to change without notice.

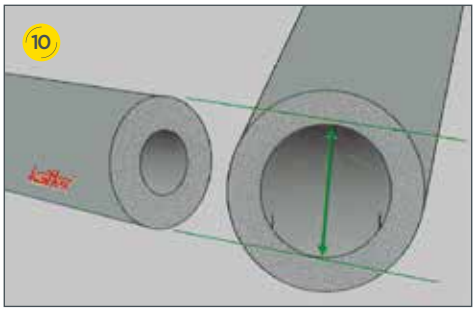
1.6 T-fitting



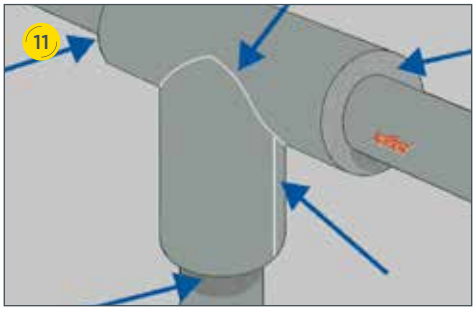
After the adhesive has flashed off, press the joints together.



If the adjoining pipes have a smaller external diameter than the T-fitting, the T-fitting must be insulated last.



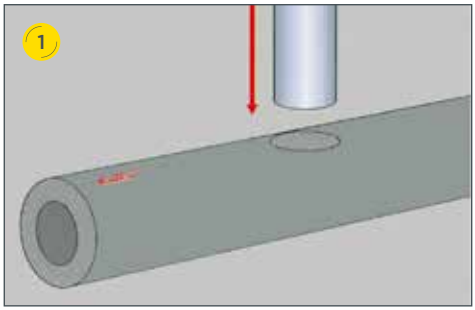
The T-fitting is fabricated as described above. In this case, select a tube with an internal diameter matching the external diameter of the smaller tube.



The T-fitting should overlap the adjacent insulation by at least the thickness of the selected insulation layer and must be bonded to it.

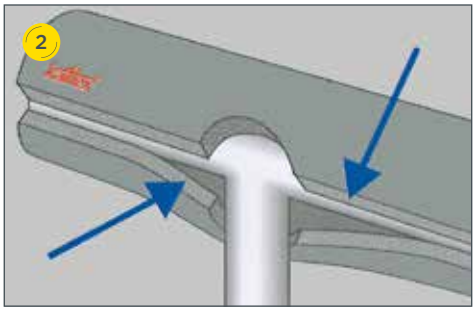
© Kaimann GmbH · Subject to change without notice.

1.6 T-fitting

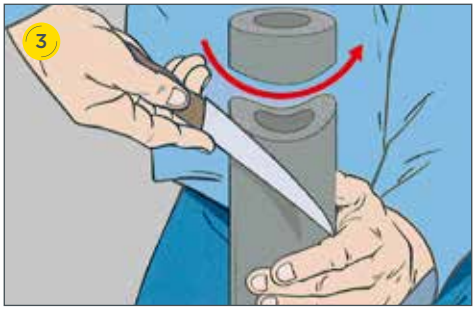


Insulation of a T-fitting by punching

Use a bevelled pipe with the same diameter as the branch to punch a hole in the tube.



To install, slit the tube lengthwise and bond along the seam.

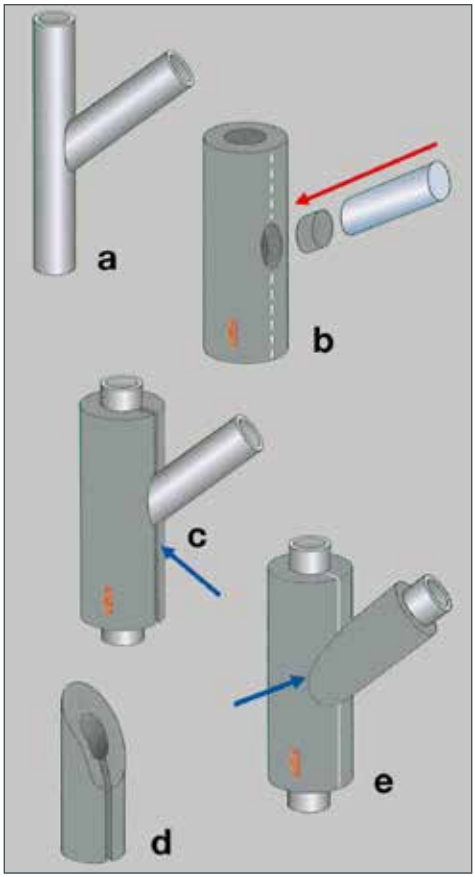


Adjust the end of the tube to match the external radius of the previously mounted piece.

Apply adhesive to both joint faces and bond.

© Kaimann GmbH · Subject to change without notice.

1.6 T-fitting



Insulation of other angles

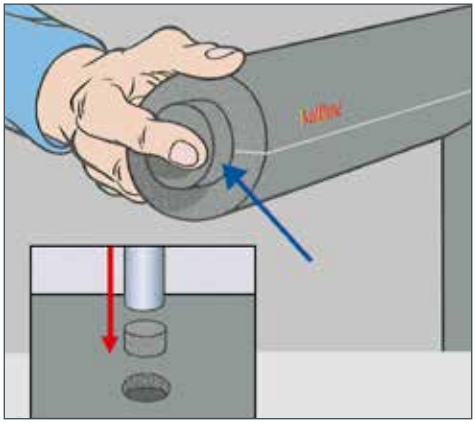
a) Cut the tube to the required length.

b) Use a bevelled pipe to punch a hole into the tube sized to match the branch.

c) Slit the tube lengthwise and bond it in place on the pipe.

d) Trim the end of the connecting tube to match the external diameter of the mounted tube.

e) Fit the tube and bond it on both sides.

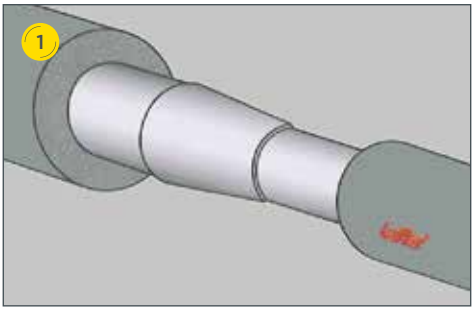


Insulation of pipe ends

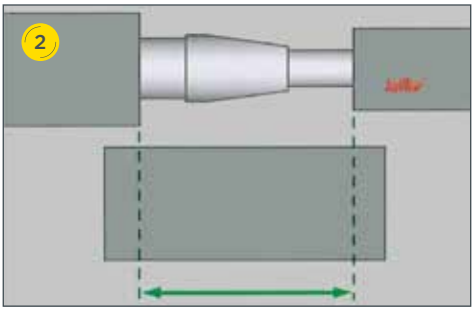
Punch a circular piece from a scrap section that matches the internal diameter of the insulated tube. Bond the circular piece in place using wet bonding.

© Kaimann GmbH · Subject to change without notice.

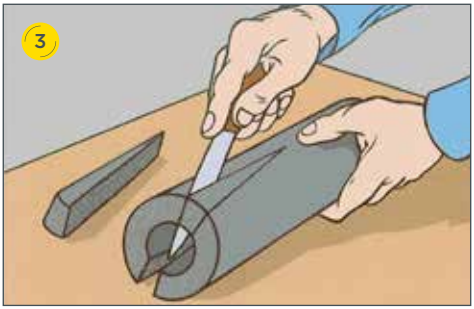
1.7 Pipe reducer



When insulating a reducer between two pipes of different diameters, ensure there is sufficient space.



Cut a piece of tubing with the larger diameter to the appropriate length.



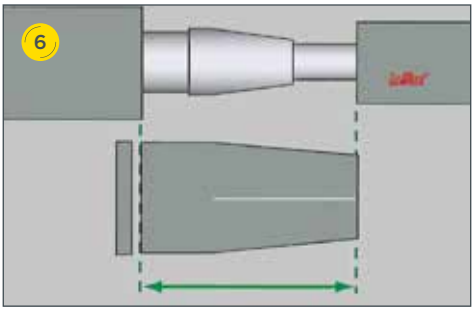
Cut two equally sized, opposing wedges from it.

Bond the cut faces to reduce the tube diameter.

© Kaimann GmbH · Subject to change without notice.

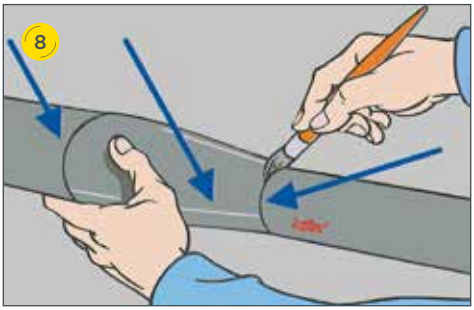
1.7 Pipe reducer

On the narrower side, cut the tube to fit the smaller dimension.



Trim the other side to the required overall length.

To install the tube section, slit the tube lengthwise.

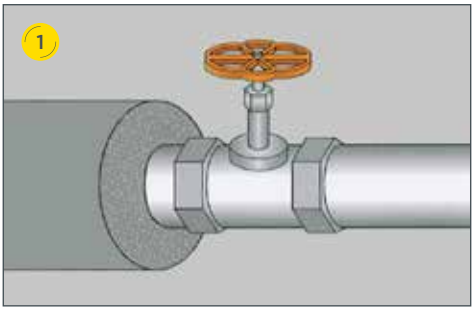


Bond the reducer at the longitudinal seam and at the seams with the adjoining tubes.

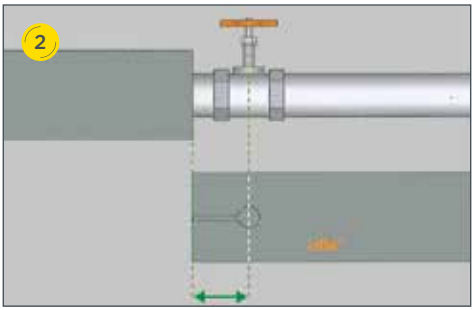
For more information, see the general notes on “Insert bonding” (page 4).

© Kaimann GmbH · Subject to change without notice.

1.8 Valve

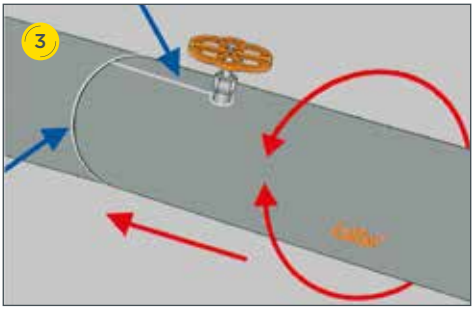


The insulation of a valve can be designed differently depending on the type.

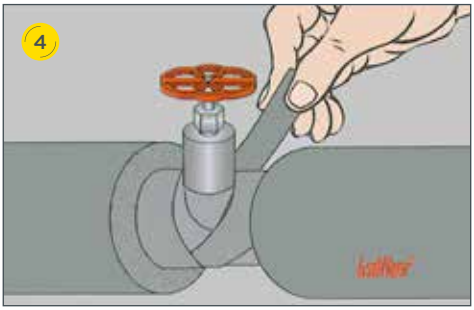


Small valves

Cut the Kaiflex tube to the required length and punch a hole for the handwheel.



Fit the tube on the pipe, adjust it around the valve and bond it.

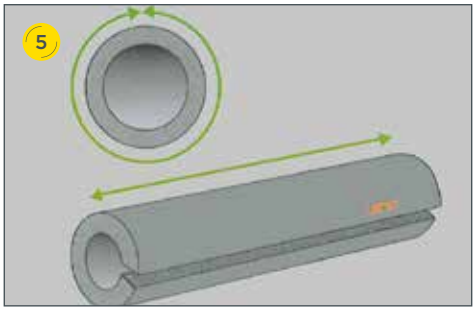


Large valves

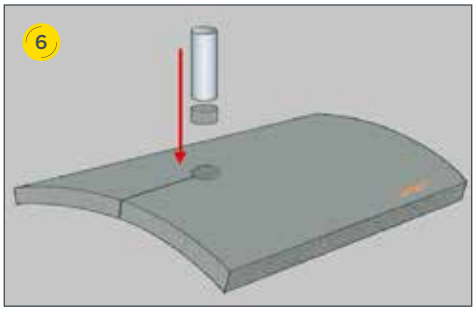
First insulate the pipe sections to the left and right of the valve. Then wrap the valve with Kaiflex tape.

© Kaimann GmbH · Subject to change without notice.

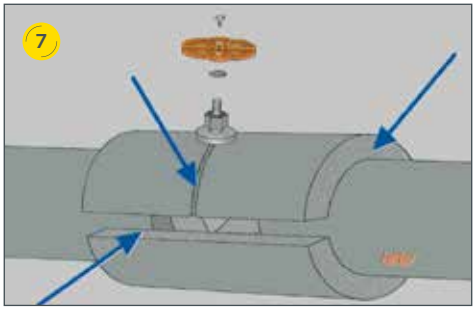
1.8 Valve



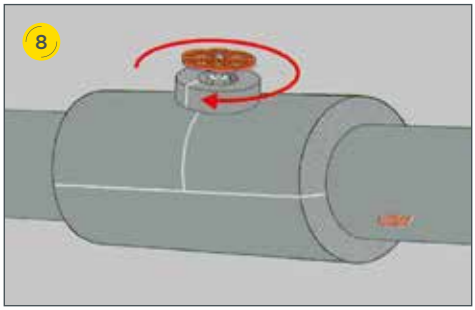
Cut a sheet of the same insulation thickness to match the circumference of the valve's external diameter. Choose the width so that it overlaps the adjacent tubes.



Make a central cut in the sheet and punch a hole at the end of the cut to fit around the valve.



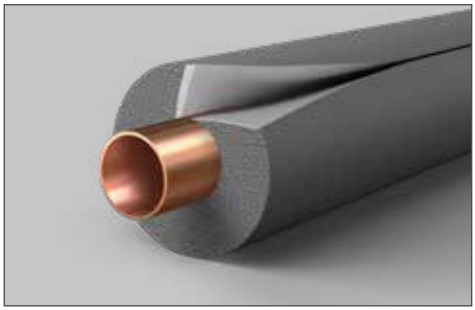
Fit the trimmed sheet so that it overlaps the adjacent insulation. For easier installation, the handwheel may be removed. Then bond all seams and overlaps.



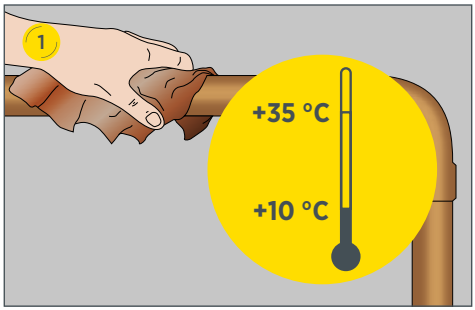
Optionally, a ring made from a strip of sheet material can be placed around the valve stem. Bond this as well.

© Kaimann GmbH · Subject to change without notice.

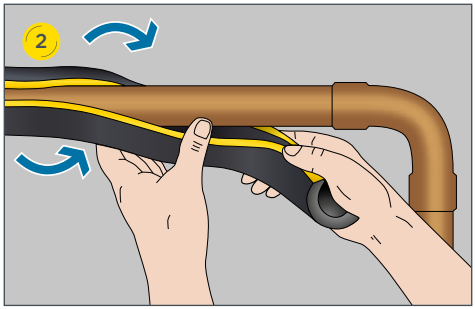
1.9 Self-adhesive tube



Self-adhesive tubes are recommended for already installed pipework where pre-insulation is not possible. The advantages of self-adhesive tubes are their ease of use and time-saving installation. When insulating elbows using self-adhesive tubes, high tension must be avoided (see page 36).

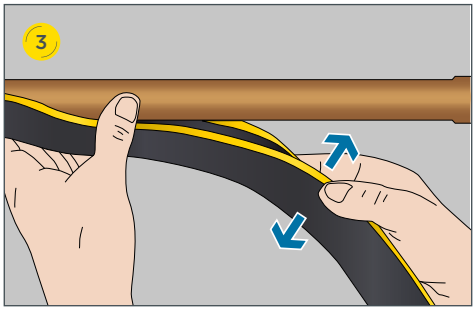


First, clean the pipe with Kaiflex Cleaner to remove dust, dirt, oil and water. Install self-adhesive tubes at ambient temperatures between +10 °C and +35 °C.



Slip the tube over the pipe.

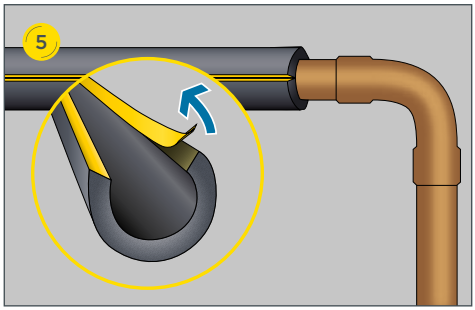
Do NOT remove the protective backing film from the adhesive layer in advance!



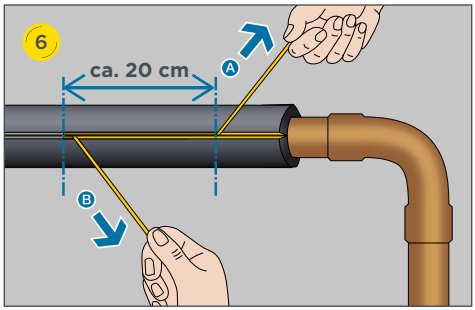
Position the tube so that the self-adhesive surface is easily accessible.

© Kaimann GmbH · Subject to change without notice.

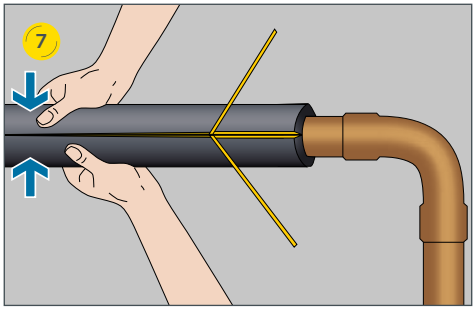
1.9 Self-adhesive tube



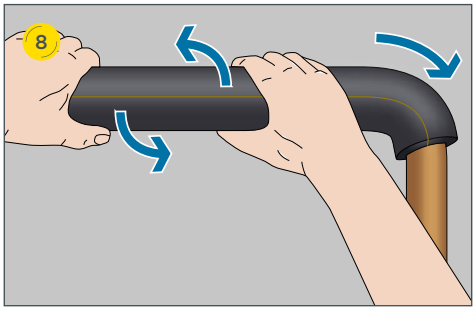
Peel off the end of the backing film.



Gradually remove the backing film on both sides, section by section.



Carefully join the adhesive seam from the inside out. Apply firm, even pressure to press the seam together along its entire length.

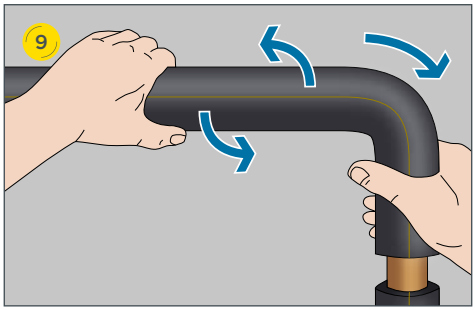


Push the bonded tube over the pipe using a rotating motion.

Do NOT pull the insulation!

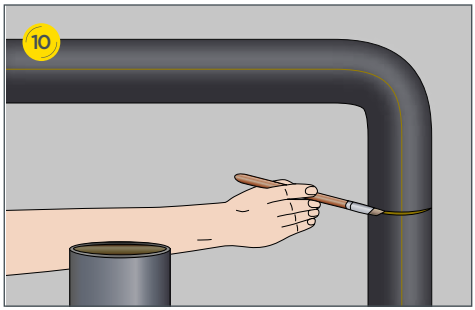
© Kaimann GmbH · Subject to change without notice.

1.9 Self-adhesive tube



In the area of elbows, carefully push the tubes over with rotating movements.

DO NOT pull!



The butt seams are bonded under compression.

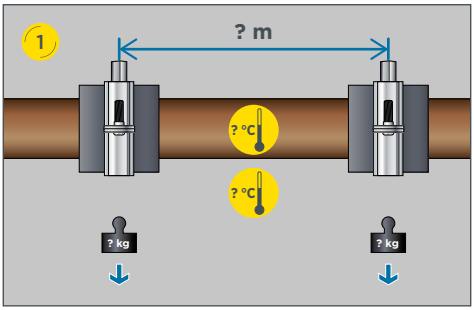
Tubes can generally be pushed over elbows. With tightly bent pipes (with small radii), there is a risk that the insulation will be compressed at the throat of the elbow. This will lead to a reduction in the insulation thickness. In refrigeration and air conditioning applications, the calculated insulation thickness is thus no longer maintained, which can lead to condensation forming on the surface of the insulation material. If the insulation overlaps and this causes compression of the adhesive seam, segmented elbows must be fabricated. Recommendation: Always use tube material without a self-adhesive seal for insulating elbows. When installing tubes with self-adhesive seals, there is also a risk of impermissible compression of the adhesive seam in the elbow area. This can lead to the seams opening.

© Kaimann GmbH · Subject to change without notice.

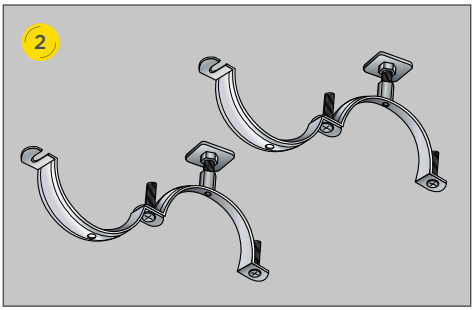
2 Application of PIPE SUPPORTS

© Kaimann GmbH · Subject to change without notice.

2.1 Installation procedure

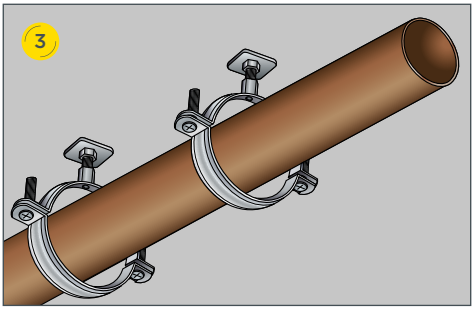


To ensure consistently good insulation in the area of suspensions, specially developed pipe supports with matching pipe clamps should be used.

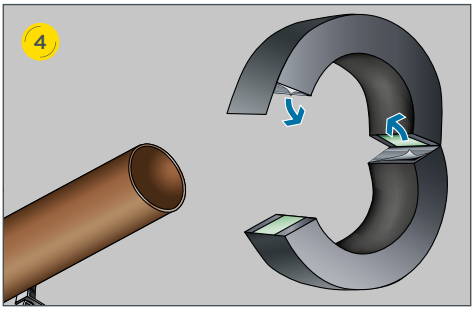


For better visualisation, the following work steps have been divided into multiple figures, showing a coherent assembly step.

Open the pre-assembled pipe clamps for pipe installation.



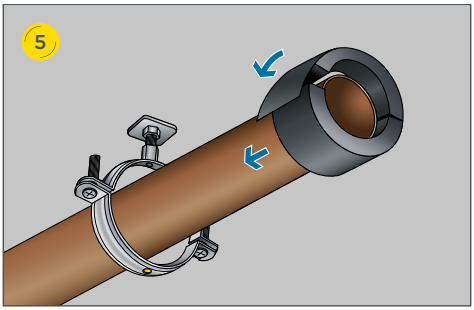
Position the pipe for mounting the pipe supports. Close the clamp loosely.



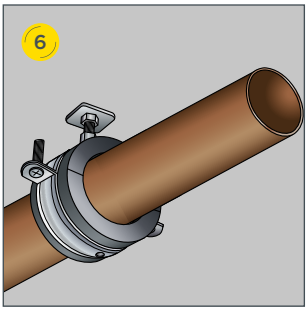
Open the two halves of the pipe support and mount them on the pipe according to the suspension point. Observe the distances between the fixing points in accordance with the permissible suspension loads. Engage the tongue-and-groove joint and close the pipe support, removing the backing film on both sides beforehand if necessary.

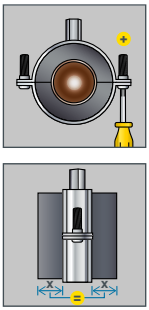
© Kaimann GmbH · Subject to change without notice.

2.1 Installation procedure

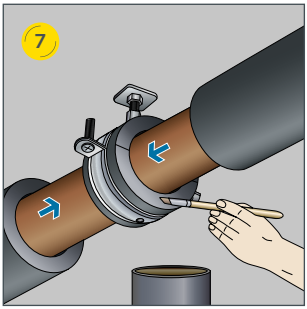


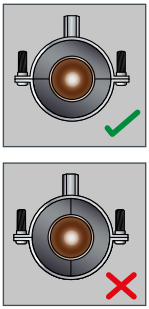
Close the pipe support using the self-adhesive tab and position it centred on the pipe clamp.





Align the pipe support horizontally and tighten the pipe clamp.





Bond the joints between the pipe support and the adjacent insulation sleeves.

- Ensure the correct alignment of the pipe support.

© Kaimann GmbH · Subject to change without notice.

2.2 Pipe clamp / non-system pipe support

Fit the tube insulation and check the clamping force.

Non-system pipe supports must be insulated in the same way as standard pipe clamps.

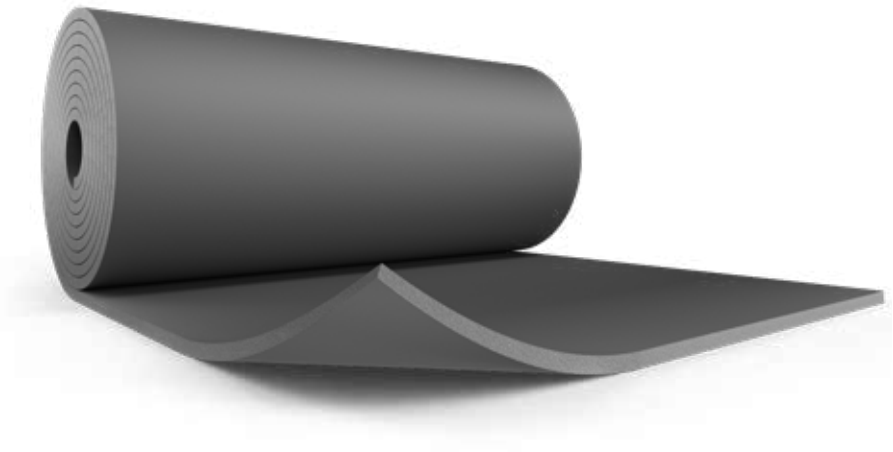
Cut a strip of insulation from sheet material. The strip length must match the circumference of the insulation tube plus the insulation thickness. Make a slit and use a pipe to punch out a hole.

Fit the insulation strip and bond the seam.

Bond both overlaps of the strip to the adjacent insulation tubes.

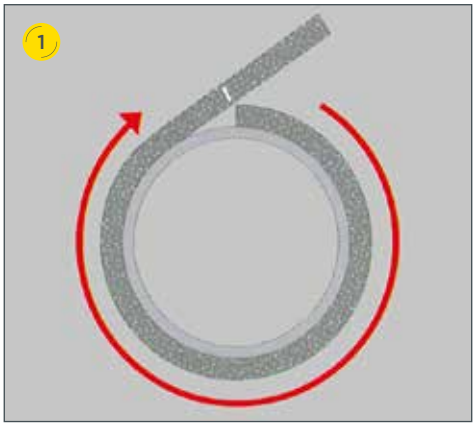
© Kaimann GmbH · Subject to change without notice.

3 Application of SHEET MATERIAL



© Kaimann GmbH · Subject to change without notice.

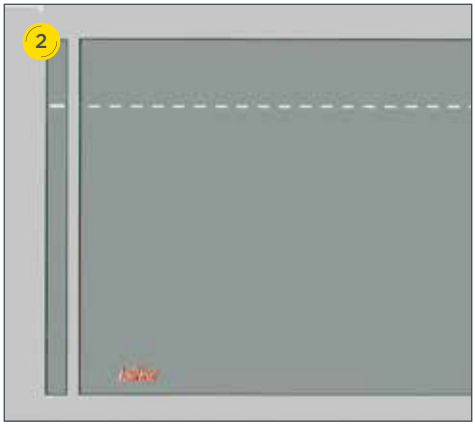
3.1 Pipe ≥DN 150



Pipe insulation made from sheet material

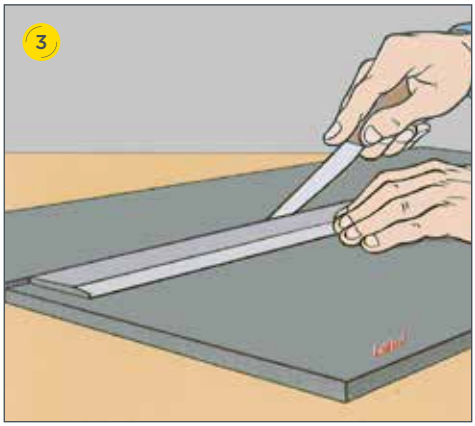
Wrap a strip of sheet material with the required insulation thickness around the pipe and mark the circumference.

- Do not stretch or compress the strip!



Place the strip next to the sheet and mark the required length on the sheet.

- Do not stretch or compress the strip or the sheet!



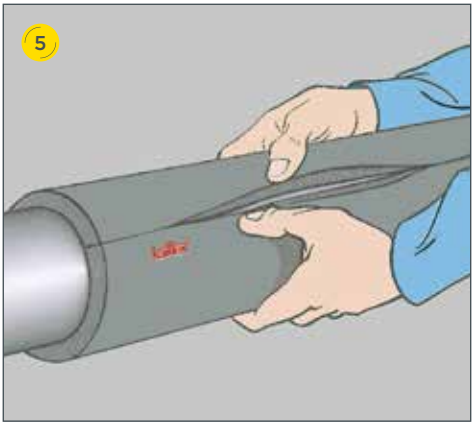
Cut the sheet to size with a sharp knife.

- Use a metal ruler or square to guide the knife for a clean, straight cut.

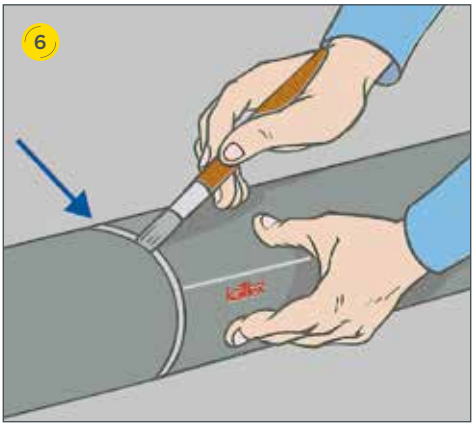
© Kaimann GmbH · Subject to change without notice.

3.1 Pipe ≥DN 150

Coat both longitudinal edges with adhesive and allow to flash off.



Wrap the sheet around the pipe and seal the seam.

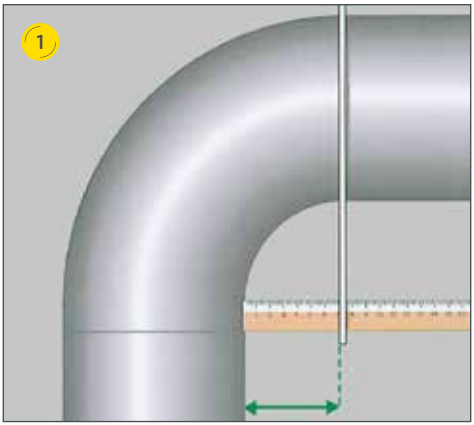


Connect both sheet-covered pipe sections by bonding the joint faces.

If the insulation surface is not flush, brush over the seam again with a brush to make any necessary corrections.

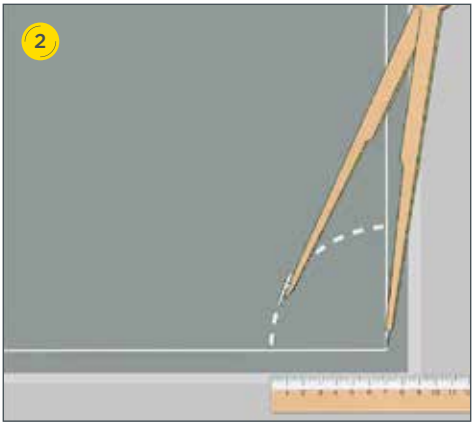
© Kaimann GmbH · Subject to change without notice.

3.2 Elbow

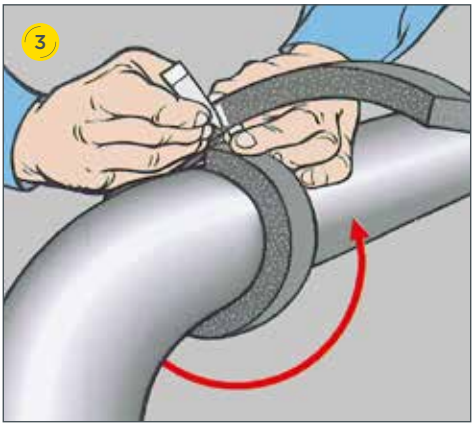


Determine the internal radius.

❗ To insulate an elbow, the geometry of the internal radius must be determined (see figure).



Before applying the internal radius, transfer the insulation thickness to the sheet (see figure). Then mark the measured internal radius along the line drawn. Connect the marked points with a compass. This will result in a 90° circular elbow.

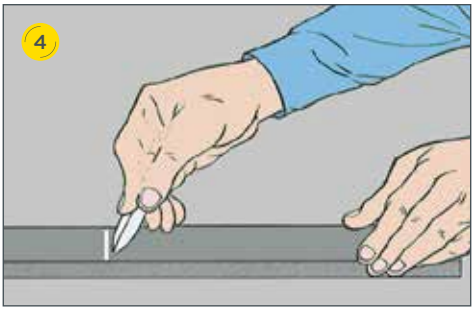


Use a strip of sheet material with the same insulation thickness to measure the circumference.

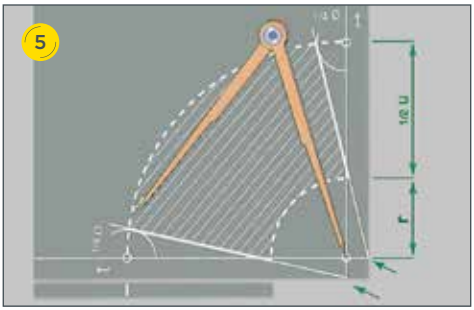
❗ Do not stretch or compress the strip!

© Kaimann GmbH · Subject to change without notice.

3.2 Elbow



Halve the circumference and mark it on the strip.



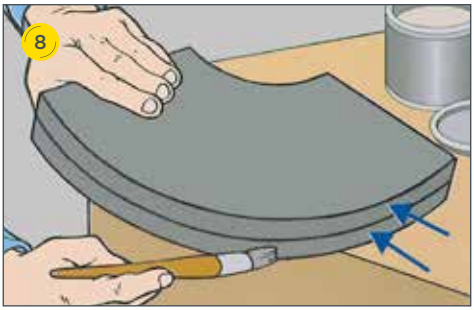
Starting from the inner semicircle, transfer the half circumference onto the sheet. Connect the marked points with a compass. This will result in a 90° circular elbow. From the outer edge of the outer circumference, mark ¼ of the diameter and draw a line to the points indicated by arrows.(see figure).

Cut out the first semicircle from the sheet.

Use the first semicircle as a template to mark and cut out the second semicircle on another sheet.

© Kaimann GmbH · Subject to change without notice.

3.2 Elbow



Place the two semicircles on top of each other and coat the outer edges with adhesive.

After the flash-off time, join the two elbow halves along the outer radius. It is advisable to start from the outside

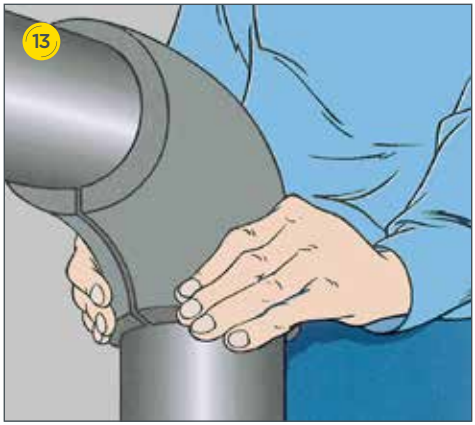
and then join the ends at the centre.

Ensure that the inner side is bonded flush.

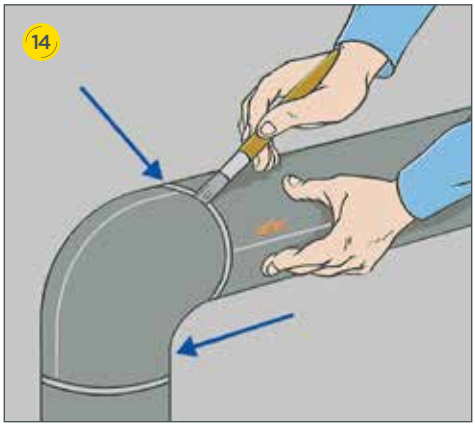
© Kaimann GmbH · Subject to change without notice.

3.2 Elbow

Then coat the inner cut faces with adhesive.



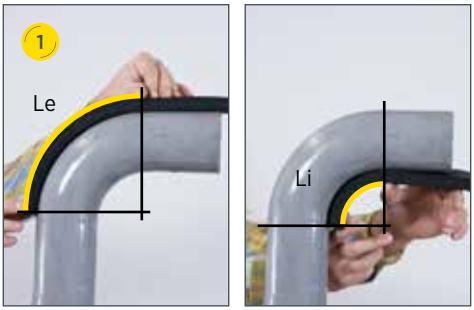
Fit the elbow onto the pipe and bond the inner seam.



Finally, bond the elbow to the tubes at the joint faces.

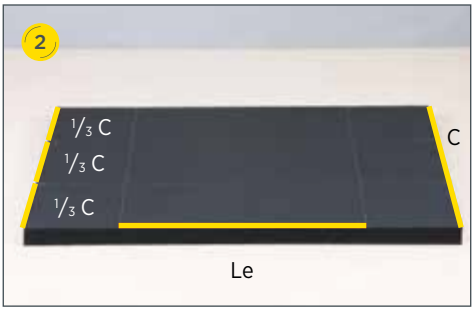
© Kaimann GmbH · Subject to change without notice.

3.3 One-piece elbow



Determine the circumference (C) of the pipe – see page 44, figure 3. Determine the external length (Le) and internal length (Li) of the pipe elbow using a strip of sheet material with the required insulation thickness.

❗ Do not stretch or compress the strip!



Cut the sheet into a rectangle. The width must match the pipe circumference (C). The minimum length must be the external length of the elbow (Le) plus at least 10 cm on both sides of the elbow.

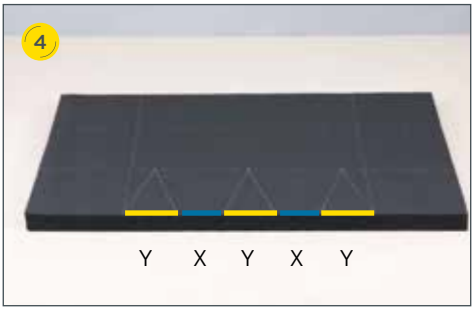
Use a ruler and silver pen to divide the circumference (C) into three equal sections.

3

Insulation thickness mm	Number of angles required				
	≥ 88.9	≥ 114	≥ 163	≥ 219	≥ 273
9	2	3	3	4	5
13	2	3	3	4	5
19	3	3	4	5	6
25	3	4	5	5	6
32	4	5	5	6	7

Use the table to determine the number of angles to be cut.

❗ The values in the table are guide values!



X: Divide the internal length (Li) of the pipe elbow by the number of angles (n) minus 1.

Y: Divide the difference between the external (Le) and internal length (Li) of the pipe elbow by the number of angles to be cut.

❗

$$X = \frac{Li}{(n-1)} \qquad Y = \frac{(Le-Li)}{n}$$

© Kaimann GmbH · Subject to change without notice.

3.3 One-piece elbow

Divide the longitudinal edge of the sheet (Le) into alternating X and Y sections (see figure). Use these markings to draw isosceles triangles with a height of 1/3 of the circumference (C) and a width of Y. Cut out these triangles with a knife. Repeat the same on the opposite edge.

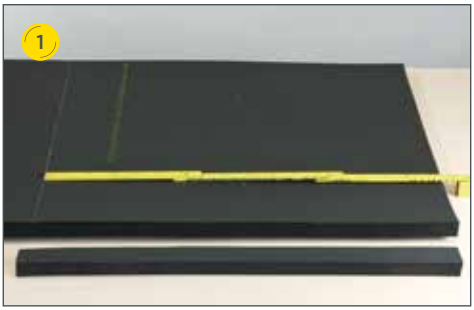
Coat the cut faces with adhesive and allow the adhesive to flash off.

Once the flash-off time has elapsed, join the individual segments together. To prepare for installation, apply adhesive along the longitudinal seam.

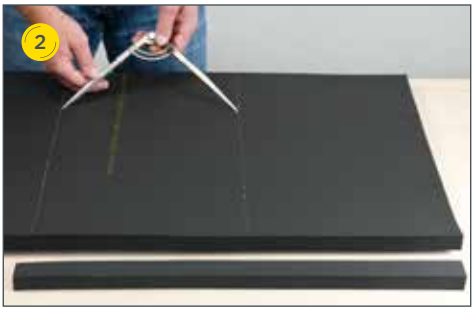
Slip the one-piece elbow over the pipe and seal the longitudinal seam. Finally, bond the elbow to the adjacent insulation at the joint faces.

© Kaimann GmbH · Subject to change without notice.

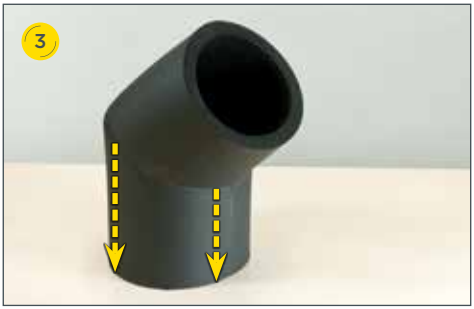
3.4 Elbow >90° (bevel / mitre)



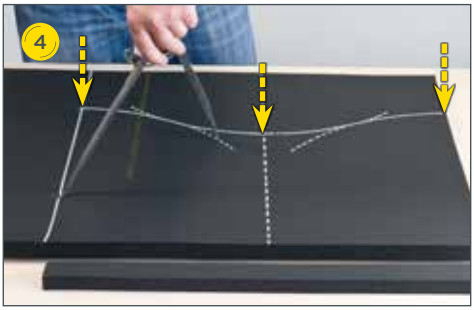
Use a strip of sheet material to measure the circumference of the part to be insulated.



Then draw a centre line to halve the circumference.



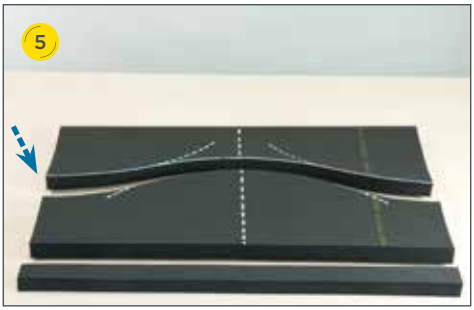
Determine the height of the insert piece at both the inner and outer side of the elbow.



Transfer the outer and inner height of the pipe elbow to the sheet and use a compass (U/2) to connect the cut edges with a circular arc.

© Kaimann GmbH · Subject to change without notice.

3.4 Elbow >90° (bevel / mitre)



Cut along the markings of the drawn arc. The upper and lower pieces form a mirrored fitting when rotated 180° (see Figure 6).

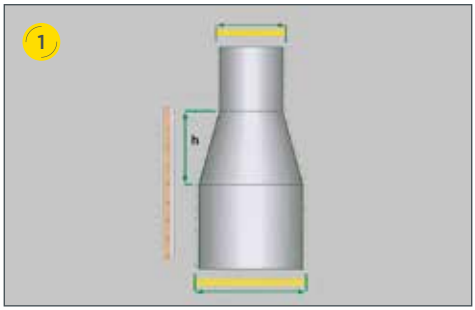
Trim the mitre/bevel cut and match it to the opposite piece.

Finally, bond the butt seam and install the mitred/ bevelled section on the pipe.

This is the mitred/bevelled section prepared for installation.

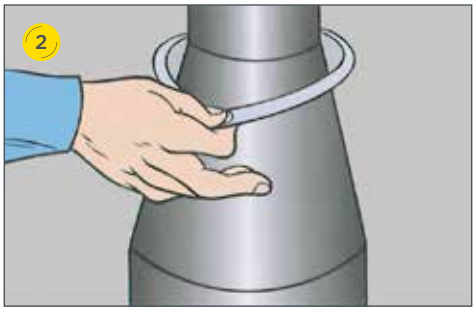
© Kaimann GmbH · Subject to change without notice.

3.5 Pipe reducer

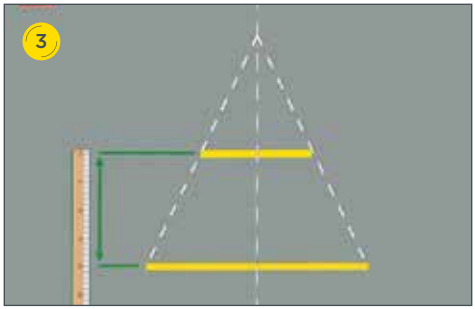


To insulate a pipe with two different diameters, the geometric profile must first be determined.

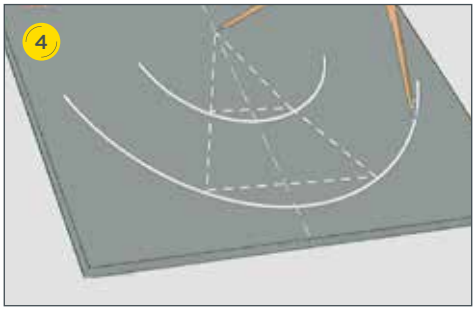
Start by measuring the height of the reducer.



Use an outside calliper or a tape measure to determine the two diameters of the pipe reducer. Add twice the insulation thickness to these dimensions.



Transfer all measurements (larger and smaller pipe diameters and the height of the reducer) to the sheet. Then, connect the outer points of the marked lines and determine the point of intersection (see figure).

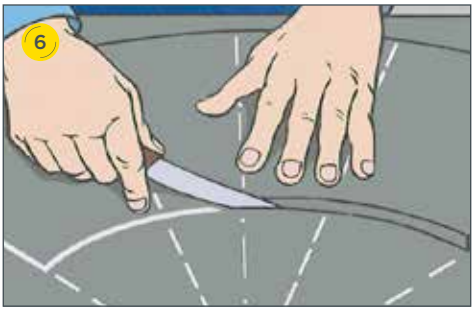


Use a compass to connect the outer points of the diameters (placing the compass at the intersection point along the centre line).

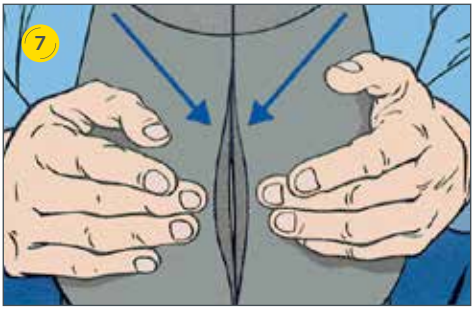
© Kaimann GmbH · Subject to change without notice.

3.5 Pipe reducer

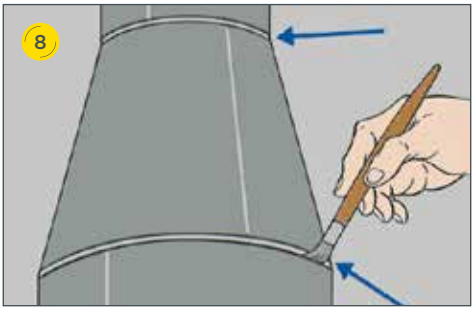
Use a strip of sheet material with the same insulation thickness to measure the circumference of the pipe. Mark the centre of the circumference and position the strip centred on the outer arc / larger pipe diameter of the sheet. Then, connect the outer points of the strip to the intersection point along the centre line.



Cut out the reducer.



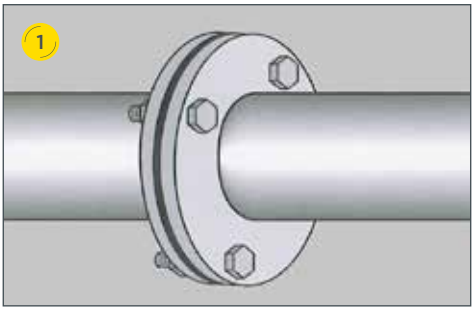
To bond the longitudinal edge, work from the outside inward.



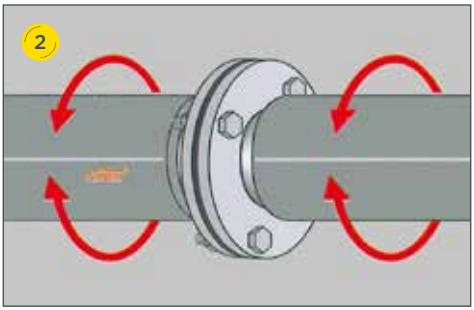
Bond the adjacent insulation to the reducer at the joints.

© Kaimann GmbH · Subject to change without notice.

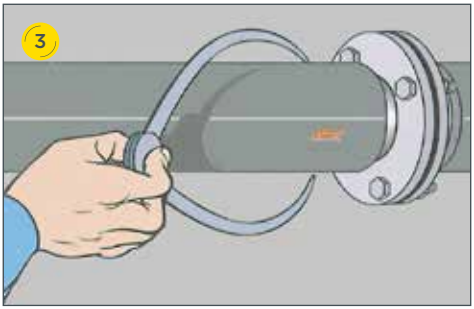
3.6 Flange



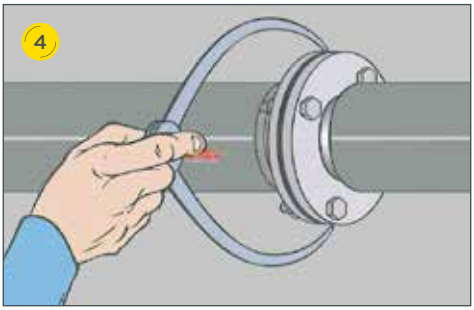
A flange can be insulated in two ways. The following describes insulation applied directly to the object. Alternatively, the flange cap can be prefabricated.



First, insulate the pipe up to the flange.



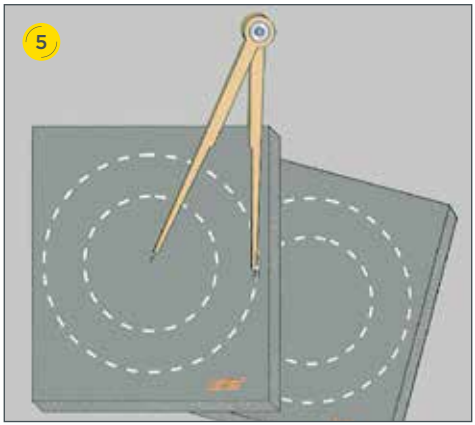
Determine the diameter of the already insulated pipe.



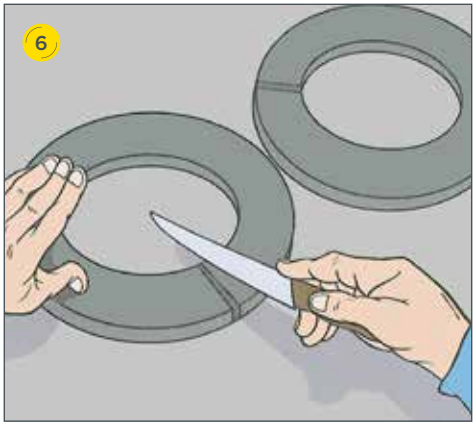
In the same way, measure the flange diameter.

© Kaimann GmbH · Subject to change without notice.

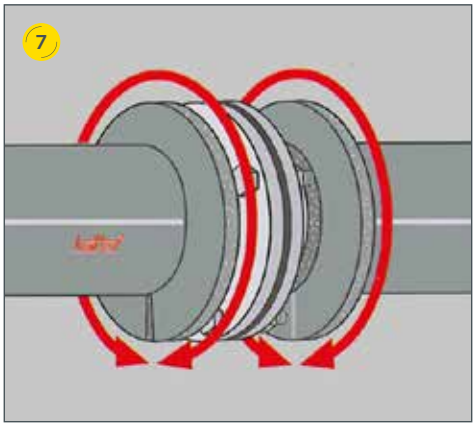
3.6 Flange



Transfer both diameters to a sheet using a compass.



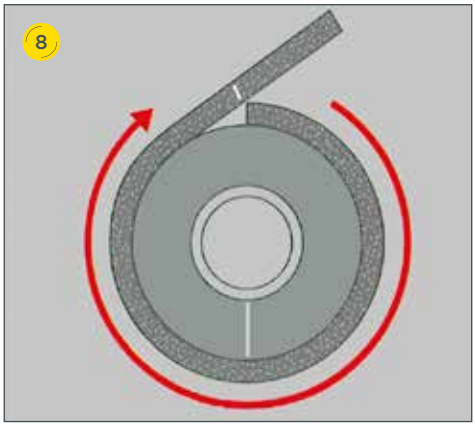
Cut out the rings from the sheet and make an opening.



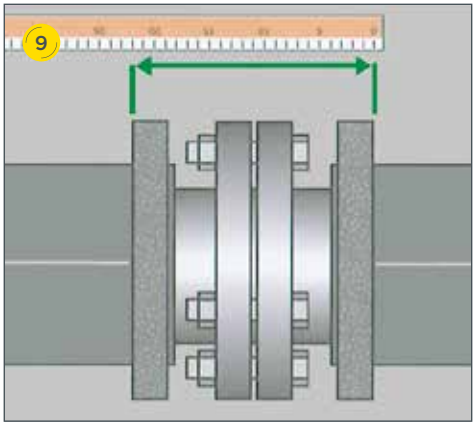
Bond the rings around the outer ends of the already insulated pipe.

© Kaimann GmbH · Subject to change without notice.

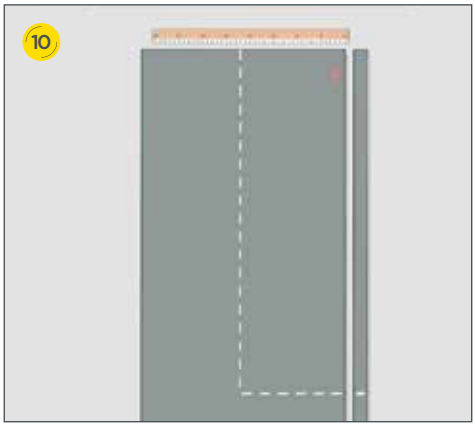
3.6 Flange



Use a strip of sheet material of the same insulation thickness to measure the circumference of the mounted rings.



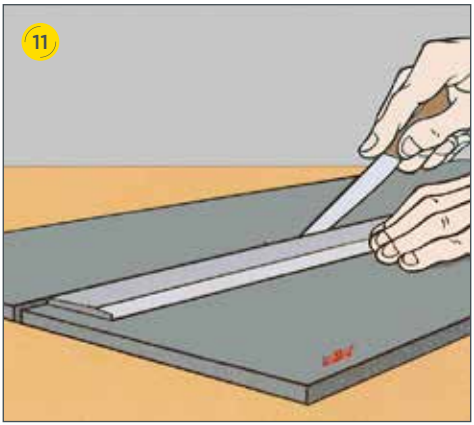
Measure the outer distance between the rings.



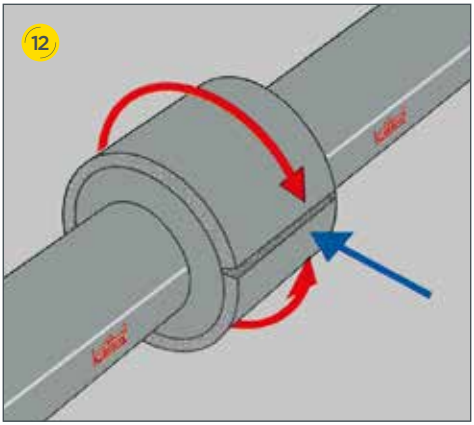
Transfer this distance and the circumference of the rings to a sheet.

© Kaimann GmbH · Subject to change without notice.

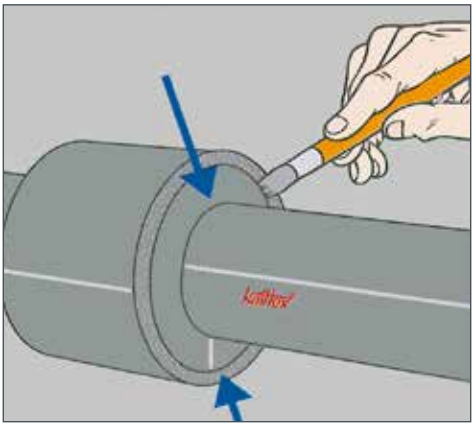
3.6 Flange



Use a ruler to assist with cutting.



Apply adhesive to the surfaces to be bonded in advance. Bond the flange jacket to the rings and close the longitudinal seam.

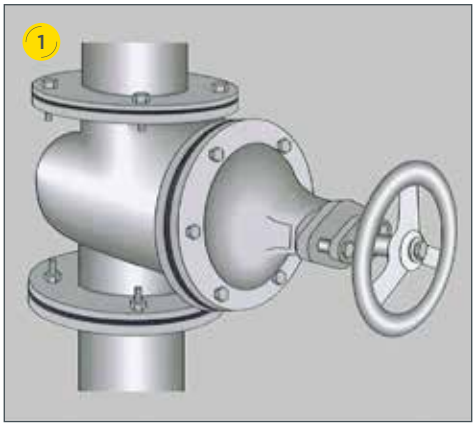


Due to construction conditions, hard-to-reach seams and joints may also be bonded later using wet bonding (with no flash-off time).

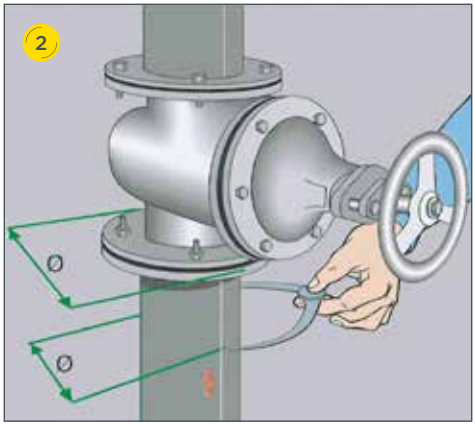
Further information:
see “Technical help” (from page 89).

© Kaimann GmbH · Subject to change without notice.

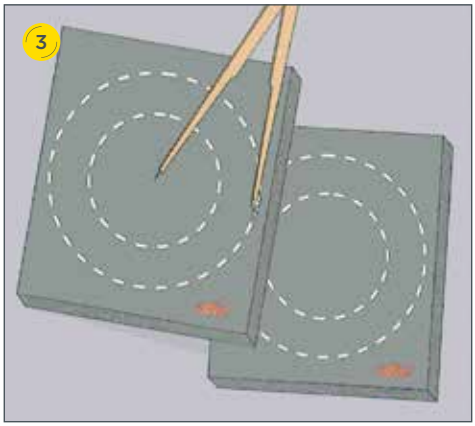
3.7 Valve



A valve can be insulated in two ways. The following describes insulation applied directly to the object. Alternatively, the valve cap can be prefabricated.



Use an outside calliper to measure the diameters of the already bonded tubes of the flange.



Use a compass to transfer the diameters of the insulated pipe and the flange to a sheet.

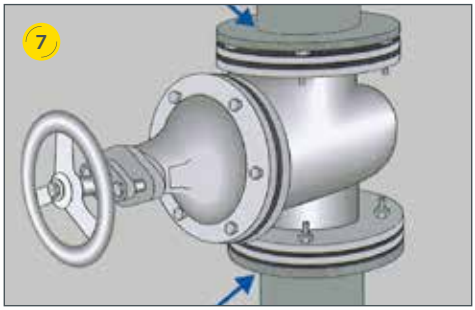
© Kaimann GmbH · Subject to change without notice.

3.7 Valve

Cut out the two rings from the sheet.

Make a cut-out opening in the rings for mounting.

Apply adhesive to the surfaces to be bonded in advance. Place the cut-out rings around the insulated pipe and bond them to the butt seam.

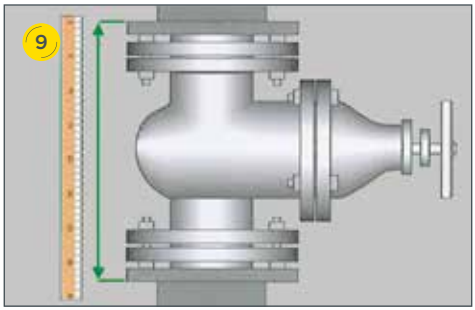


Bond the rings to the installed insulation.

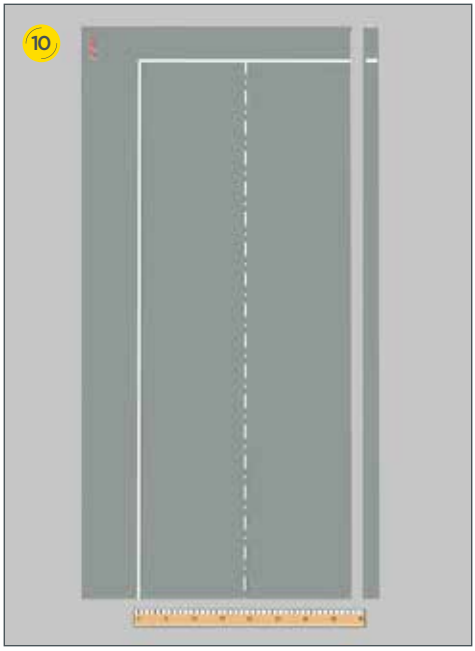
© Kaimann GmbH · Subject to change without notice.

3.7 Valve

Use a strip of sheet material of the same insulation thickness to measure the circumferences of the rings.



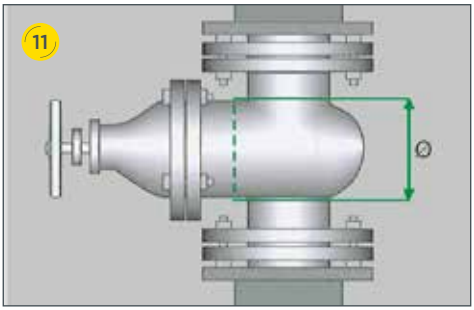
Measure the outer distance between the rings.



Transfer the distance and circumference of the rings to a sheet and draw a centre line.

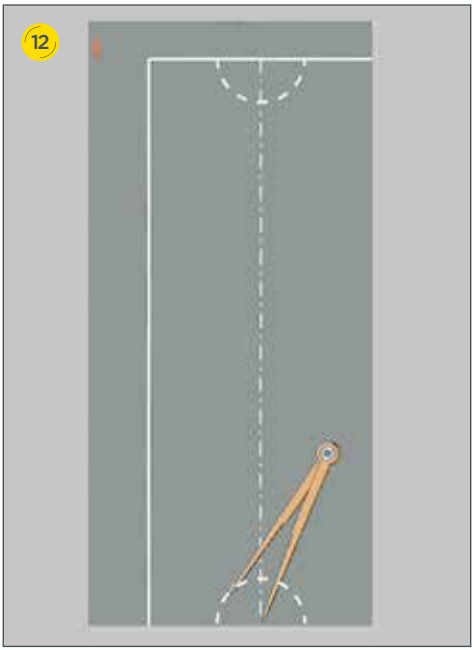
© Kaimann GmbH · Subject to change without notice.

3.7 Valve

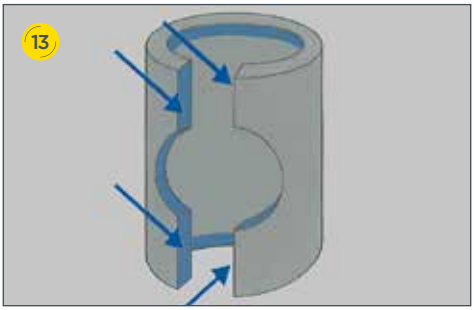


Measure the diameter of the valve seat.

Cavities must be filled with Kaiflex material to prevent air exchange.



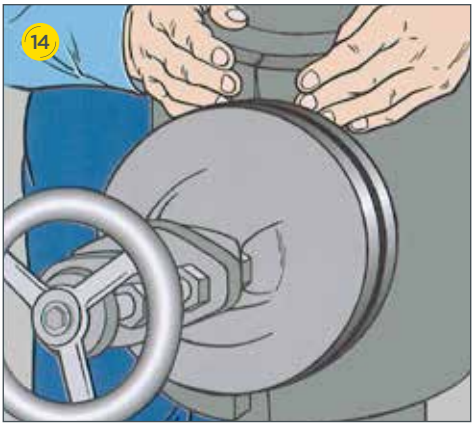
Halve the diameter determined and draw a semicircle at both ends of the centre line using a compass.



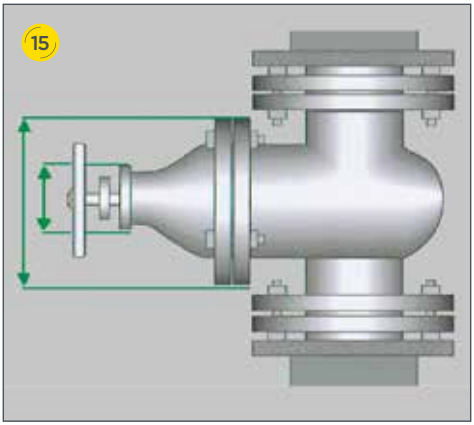
After cutting, coat the surfaces to be bonded with adhesive.

© Kaimann GmbH · Subject to change without notice.

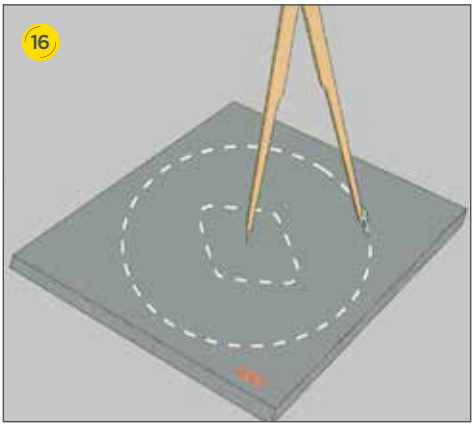
3.7 Valve



Once the adhesive has flashed off, place the valve jacket around the mounted rings and bond them together.



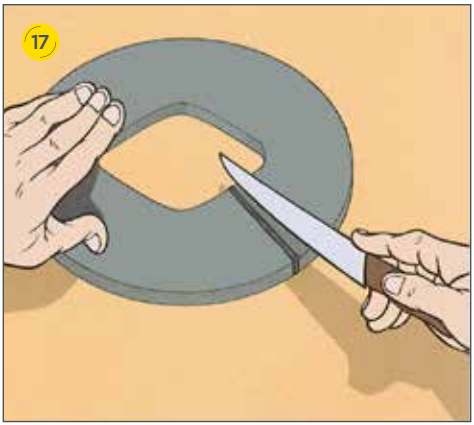
In the next step, the front part of the valve is insulated. Determine the diameter of the front flange and the spindle.



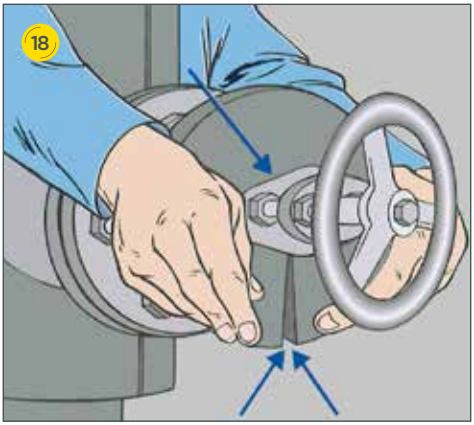
Transfer these dimensions to a sheet.

© Kaimann GmbH · Subject to change without notice.

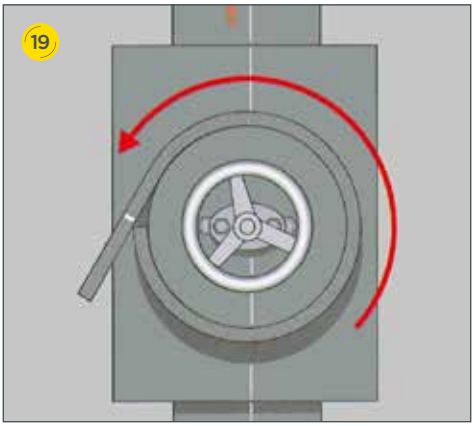
3.7 Valve



Cut out the ring and make a cut-out opening.



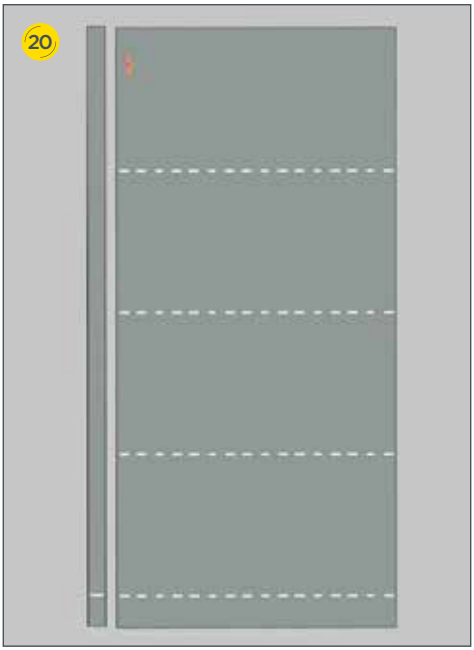
Position the insulation at the adjustment screws of the stuffing box and bond it in place (not on the spindle).



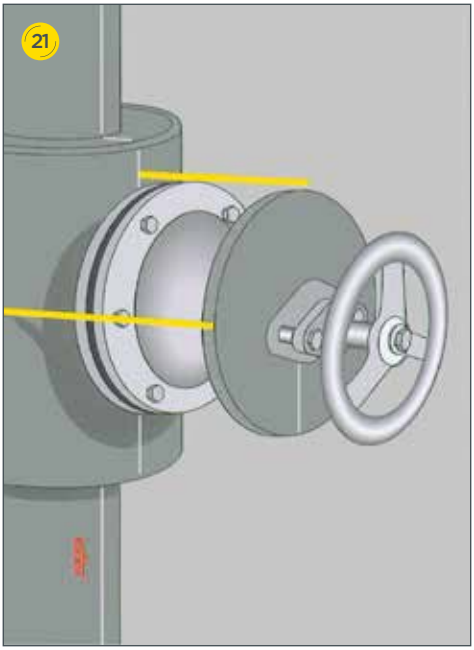
Use a strip of sheet material with the same insulation thickness to measure the circumference of the mounted ring.

© Kaimann GmbH · Subject to change without notice.

3.7 Valve



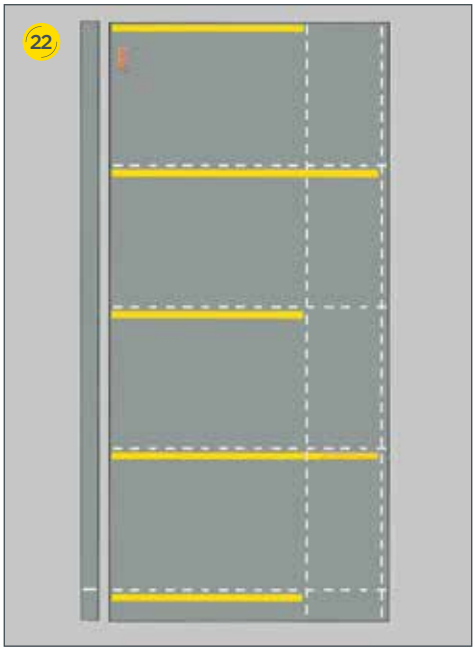
Transfer the circumference to a sheet and divide it into four equal sections.



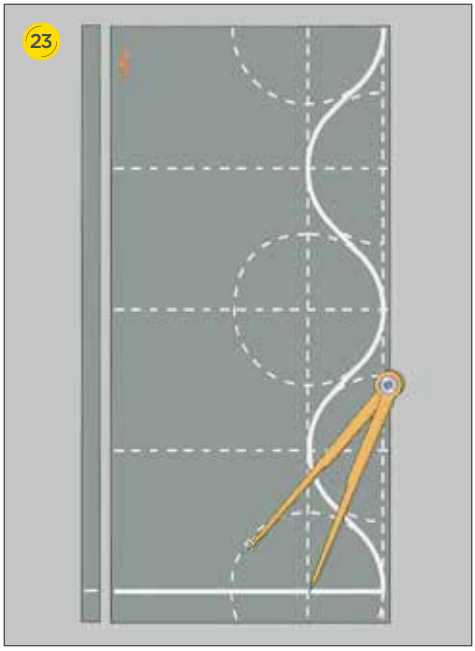
Measure the minimum and maximum height of the jacket from the outer edge of the mounted ring to the adjoining insulation jacket.

© Kaimann GmbH · Subject to change without notice.

3.7 Valve



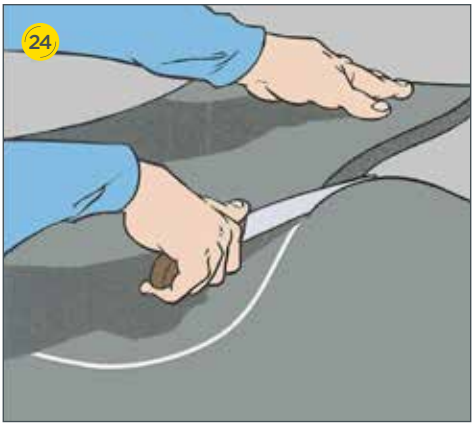
Transfer both measurements to the marked subdivision lines (see figure).



To create a continuous cutting line, use a compass to draw semicircles on the insulation sheet. The radius is determined by the difference between the measured minimum and maximum height.

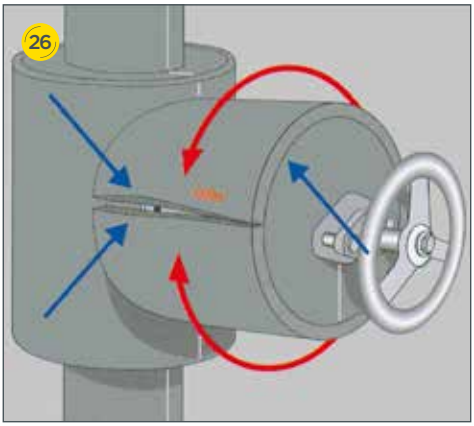
© Kaimann GmbH · Subject to change without notice.

3.7 Valve



Cut along the marked line.

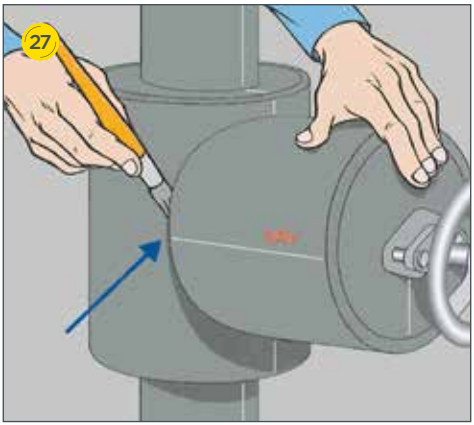
To ensure secure bonding, bevel the cut along the maximum height to match the surface of the jacket.



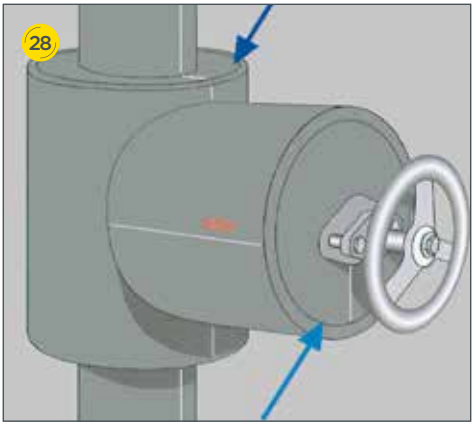
Bond the insulation jacket along the longitudinal seam and to the ring.

© Kaimann GmbH · Subject to change without notice.

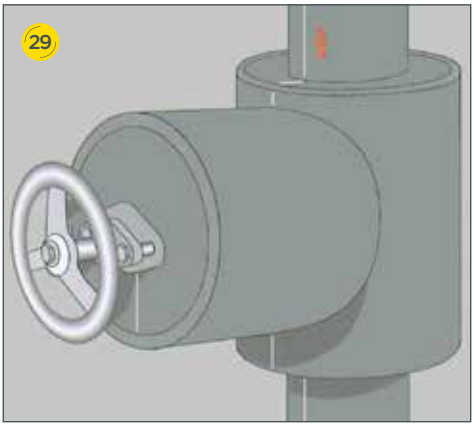
3.7 Valve



Bond the butt seams of the two jacket surfaces.



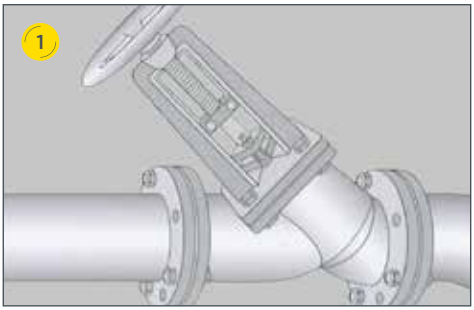
Finally, check all adhesive joints for airtightness and rework if necessary.



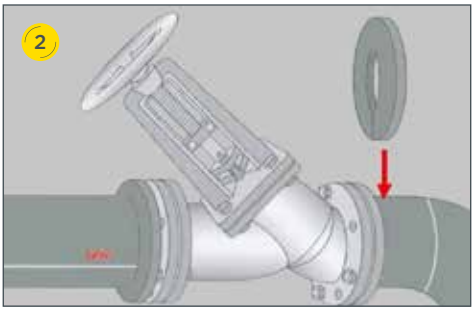
The valve insulation is now complete.

© Kaimann GmbH · Subject to change without notice.

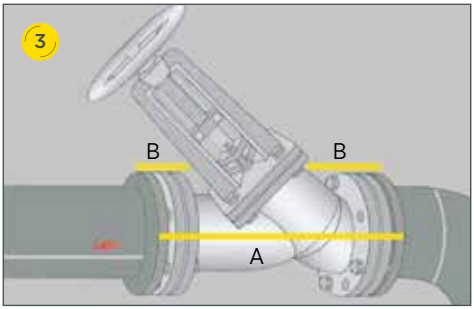
3.8 Angle seat valve



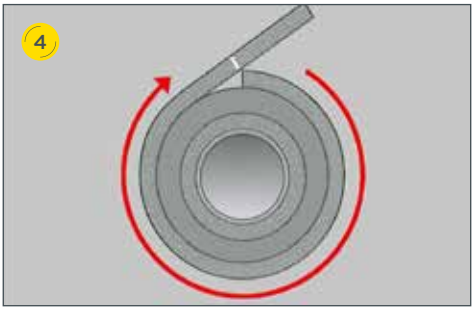
First insulate the adjoining pipe sections and then the angle seat valve.



To insulate the flanges, follow the steps described above.



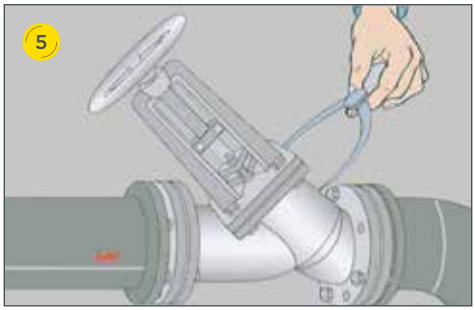
Measure the outer distance (A) between the two fitted rings, as well as the respective distance (B) between the valve and the ring.



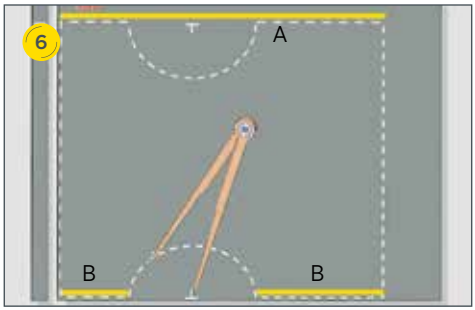
Measure the circumference of the rings.

© Kaimann GmbH · Subject to change without notice.

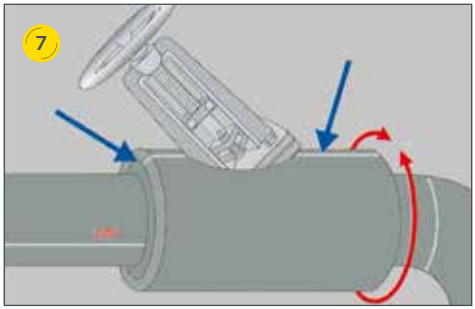
3.8 Angle seat valve



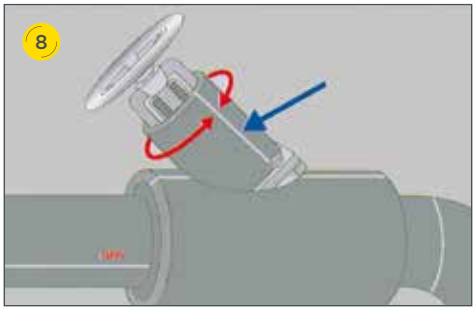
Use an outside calliper to measure the diameter of the valve seat.



Transfer the measured distances (step 3) and the ring circumference (step 4) onto a sheet. Then use a compass to mark the valve seat diameter (step 5) onto the sheet.



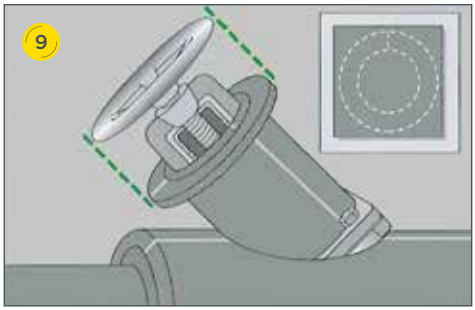
After cutting, fit the insulation jacket and bond it at the longitudinal seam and to the rings.



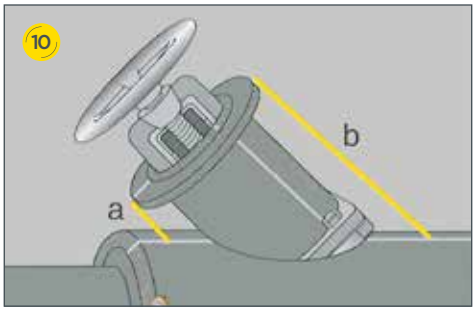
Then insulate the spindle housing.

© Kaimann GmbH · Subject to change without notice.

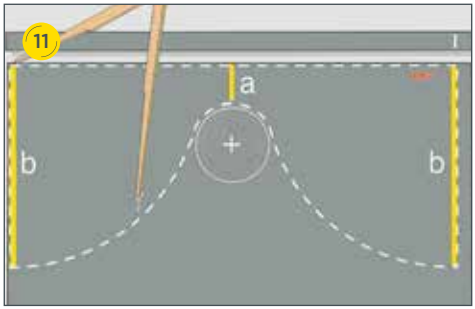
3.8 Angle seat valve



The ring must match the external diameter of the handwheel and the internal diameter of the spindle housing so that it rests on the fitted insulation jacket.



Measure the distance between the ring and the insulation on the spindle seat at points a and b.



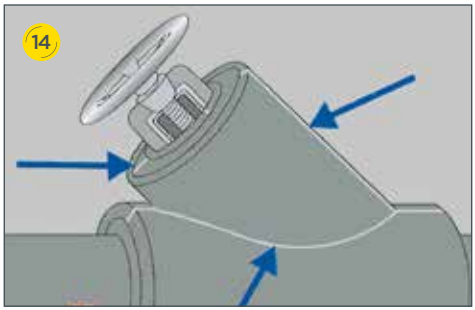
Cut a sheet to match the circumference of the handwheel and transfer the measurements (see figure). The diameter of the circle at point “a” corresponds to ¼ of the pipe diameter including insulation.

Cut out the shaped part along the lines.

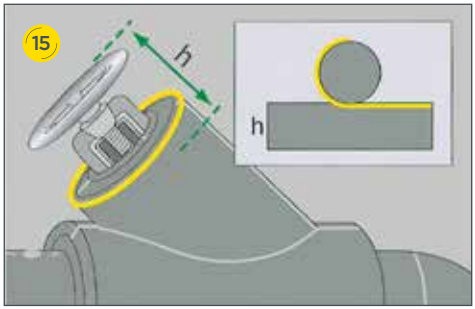
© Kaimann GmbH · Subject to change without notice.

3.8 Angle seat valve

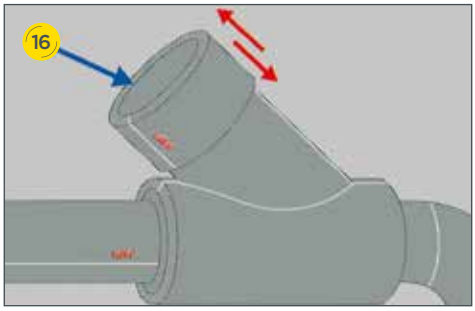
Bevel the curved edge inward using a knife so it fits the contour of the jacket.



Apply the shaped part and bond all seams and joints.



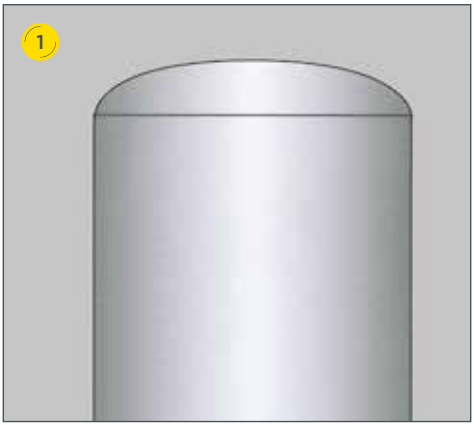
A cap can be applied as an additional measure. To determine the cap dimensions, refer to the figure.



The cap should be dimensioned so it can be pushed on and removed under tension.

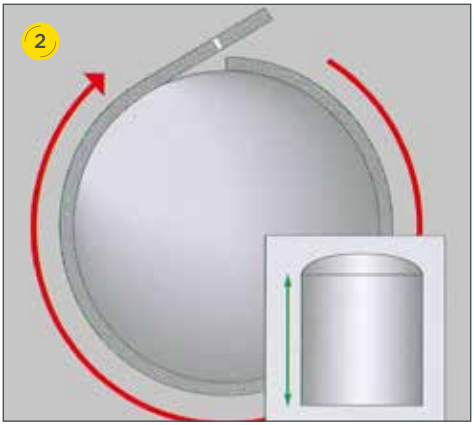
© Kaimann GmbH · Subject to change without notice.

3.9 Vessel

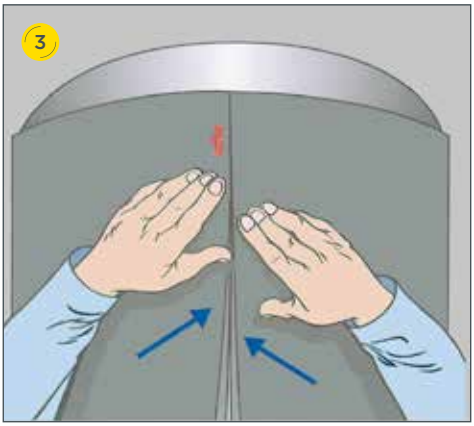


A vessel can be insulated in two ways. Either insulate the vessel lid and base first and then the sides, or the other way round. The second option is described here as an example.

The surface of the vessel must be clean, dry and free of grease. Clean any dirty areas using Kaiflex Cleaner. The insulation must not be applied to rusted or corroded surfaces.



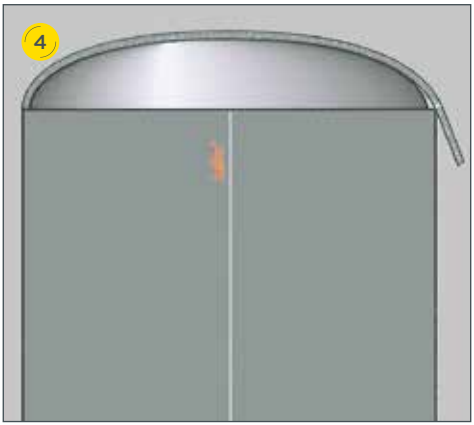
To determine the vessel circumference, use a strip of insulation sheet with the same thickness.



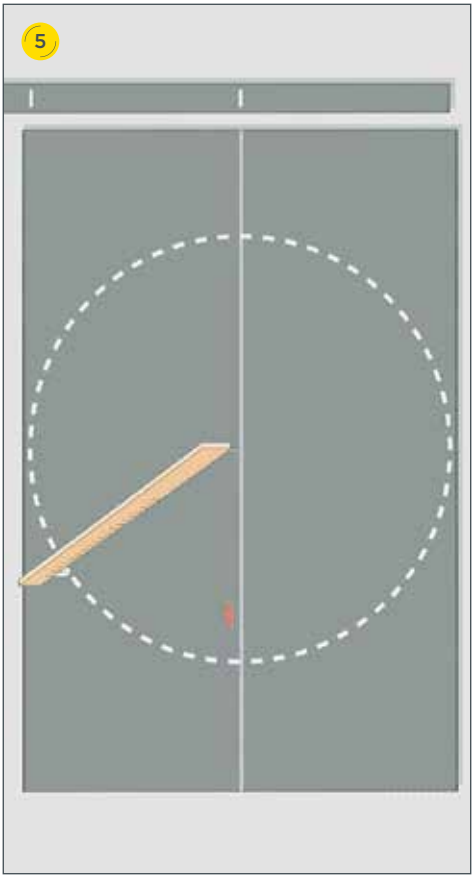
Transfer the measurements onto a sheet and cut accordingly. Use a brush to apply adhesive to both the vessel surface and the seam of the insulation. Also spread adhesive on the insulation surface using a spatula and allow both to flash off adequately. Then position the sheet on the vessel and press the seam together firmly.

© Kaimann GmbH · Subject to change without notice.

3.9 Vessel



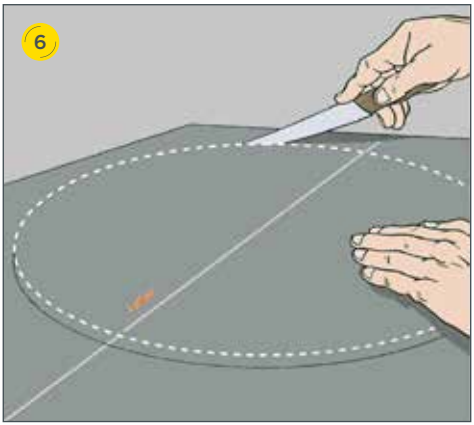
To insulate the vessel head, first determine the outermost diameter using a strip of insulation sheet.



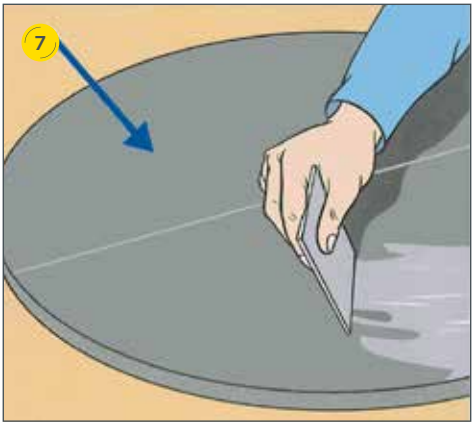
Transfer the diameter onto a sheet.

© Kaimann GmbH · Subject to change without notice.

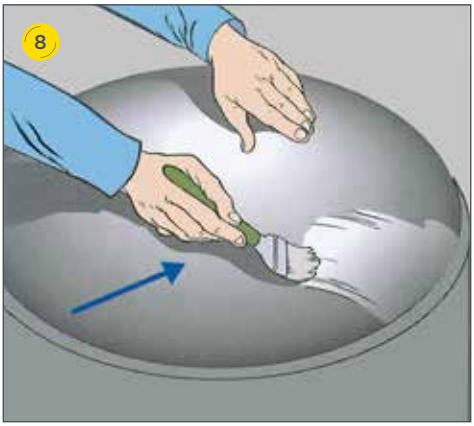
3.9 Vessel



Then cut out the insulation for the vessel head.



Apply adhesive to the insulation with a spatula.



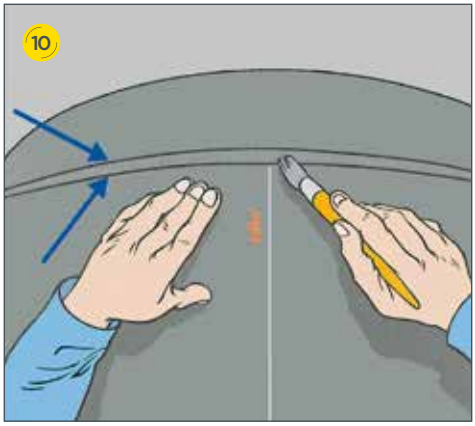
Apply adhesive to the vessel lid with a brush.

© Kaimann GmbH · Subject to change without notice.

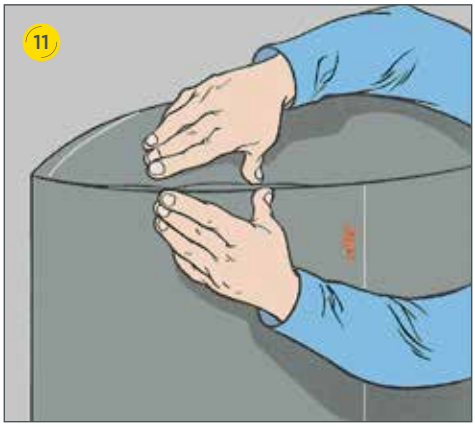
3.9 Vessel

Bond the sheet to the vessel lid. Press down from the centre outward to prevent air pockets.

Ensure the insulation is centred.



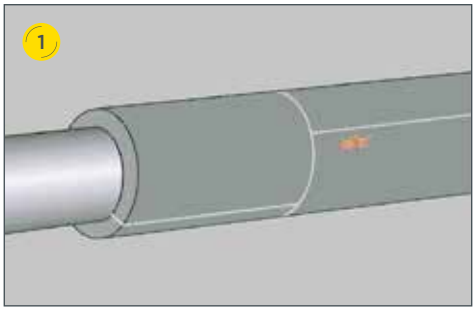
Once the vessel head insulation is properly centred, it can be bonded to the insulation of the vessel wall.



Coat the seams with adhesive and bond them together.

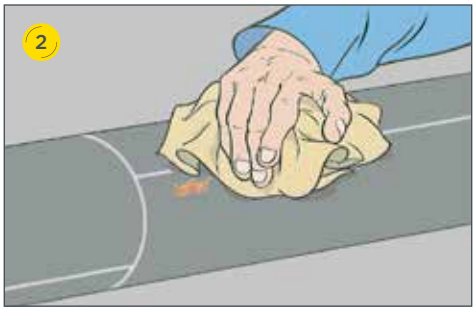
© Kaimann GmbH · Subject to change without notice.

3.10 Multi-layer insulation

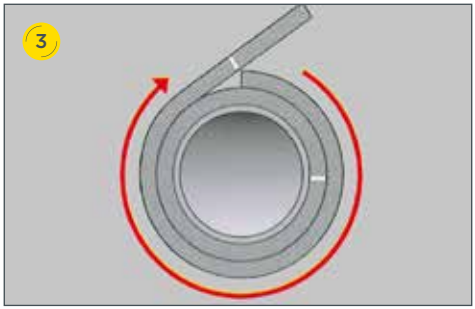


The insulation thickness can also be increased by installing multiple layers. For instructions on installing the first layer, refer to the preceding pages.

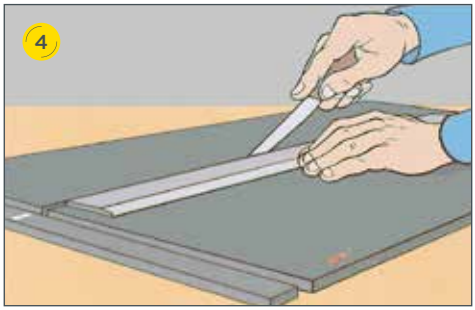
For ultra-low-temperature systems with medium temperatures below –50 °C, please contact our Technical Support.



Clean the surface of the first insulation layer.



Use a strip of sheet material with the same insulation thickness to measure the circumference of the second layer.



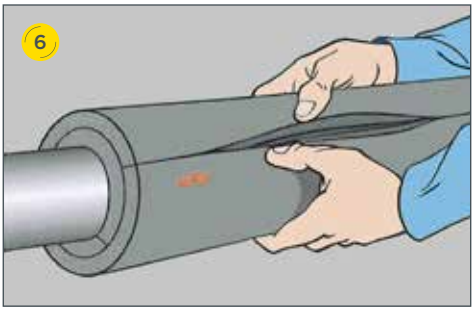
Cut the sheet material accordingly.

© Kaimann GmbH · Subject to change without notice.

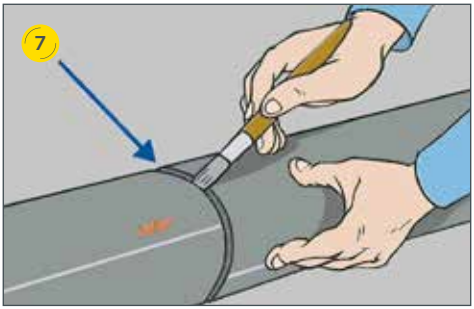
3.10 Multi-layer insulation

Apply adhesive to the longitudinal seams of the sheet.

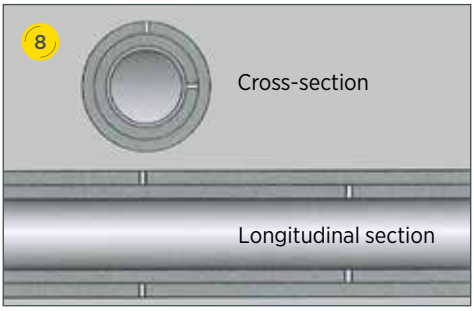
The layers must not be bonded together, as the individual sheets may be subject to different degrees of expansion or contraction when the plant is operational.



Place the sheet onto the mounted insulation. Ensure the seams are offset.



Bond the adjacent joints.



The longitudinal seams and cross-joints should be arranged offset from one another (see figure). This ensures maximum reliability and helps maintain the insulation performance of the installed material.

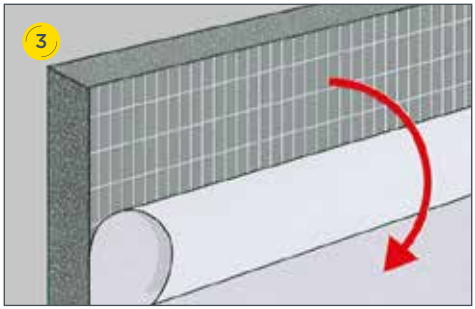
© Kaimann GmbH · Subject to change without notice.

3.11 Self-adhesive sheet

The surfaces must be clean, dry and free of grease. Clean any dirty areas using Kaiflex Cleaner. The insulation must not be applied to rusted or corroded surfaces.

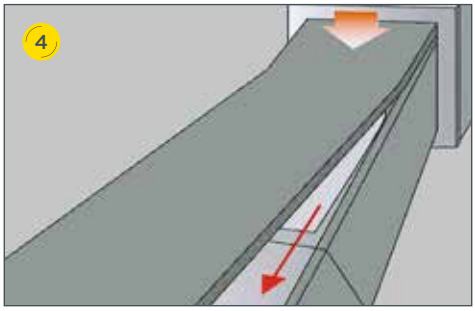
Cut the required amount of sheet material from the roll.

Installation should not take place at ambient temperatures below +10 °C or above +35 °C.



Peel back a small section of the backing film from the edge of the sheet.

Only remove the backing film shortly before installation.

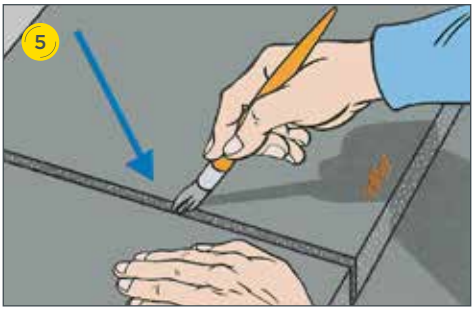


Starting from one end of the sheet, apply it to the surface. Gradually remove the backing film and press the material on evenly and firmly. Avoid stretching/compressing the sheet.

As shown in the example: First insulate the underside, then the side sections, and finally the top (this reduces the risk of moisture ingress).

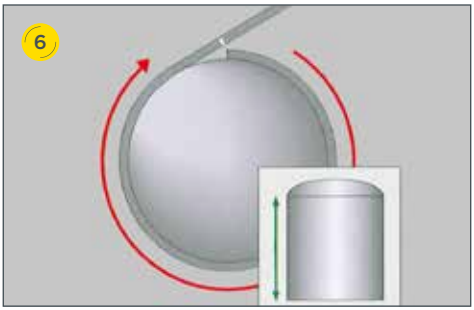
© Kaimann GmbH · Subject to change without notice.

3.11 Self-adhesive sheet

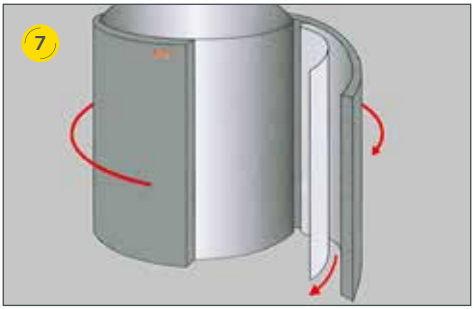


Bond the joints with wet adhesive.

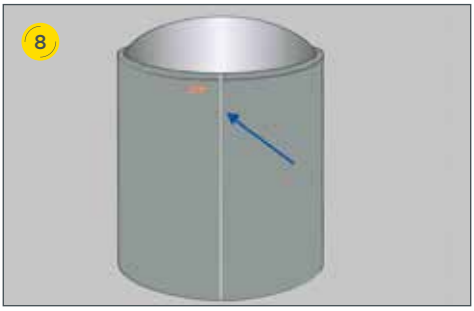
- When installing multiple layers of self-adhesive sheets, the seams should be staggered.
- Before bonding a self-adhesive sheet to an open-cell cut edge, the edge should be coated with adhesive.



To insulate tanks and large vessels using self-adhesive sheet material, determine the height and circumference. Transfer these measurements to a sheet and cut it to size.



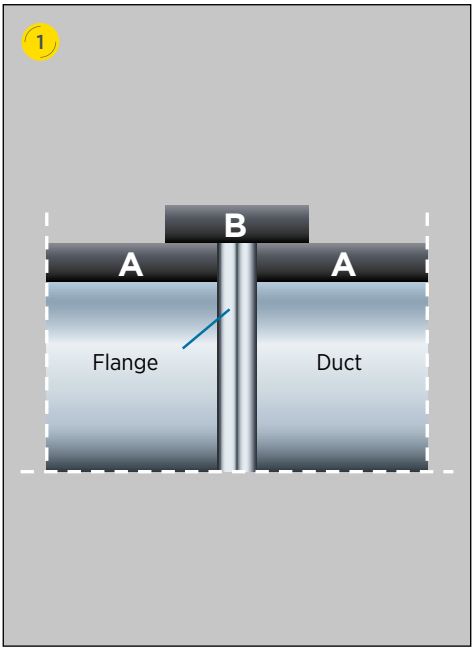
Fix one end of the sheet to the surface. Peel off the backing film in sections while pressing the material down firmly and evenly.



Seal the seams using wet adhesive.
Then insulate the vessel head as described above (see page 72 et seq.).

© Kaimann GmbH · Subject to change without notice.

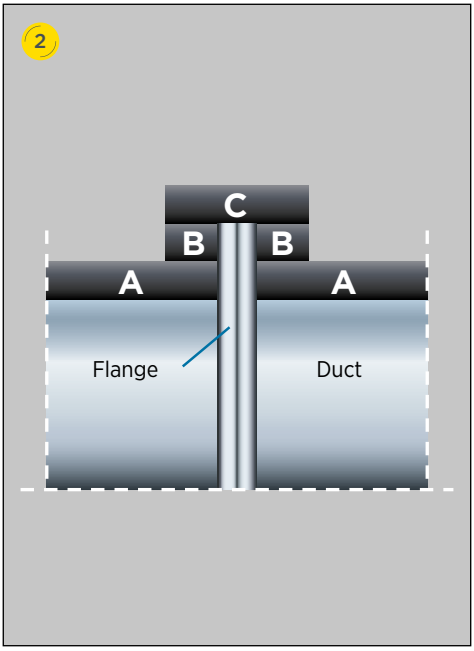
3.12 Flange for ventilation ducts



Variant 1: Flange height ≤ insulation thickness

A Mount the sheet material up to the flange.

B Insulate the flange using a strip of sheet material of the same insulation thickness. Recommendation: Width = flange thickness + at least 2 x insulation thickness



Variant 2: Flange height ≥ insulation thickness

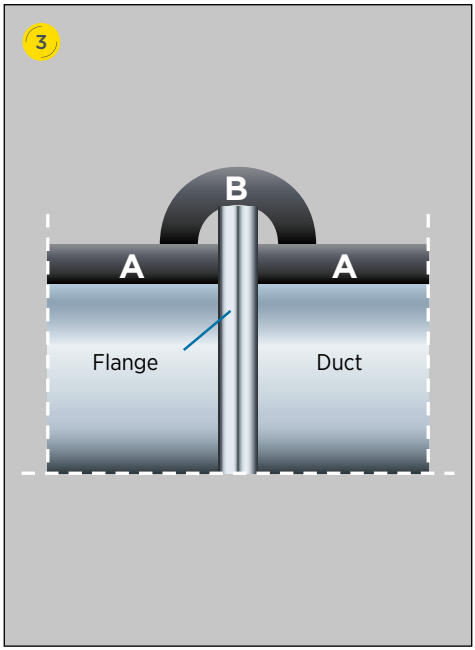
A Mount the sheet material up to the flange.

B **Use a strip of sheet material to build up the insulation to the height of the flange.**

C Insulate the flange using a strip of sheet material of the same insulation thickness. Recommendation: Width = flange thickness + at least 2 x insulation thickness

© Kaimann GmbH · Subject to change without notice.

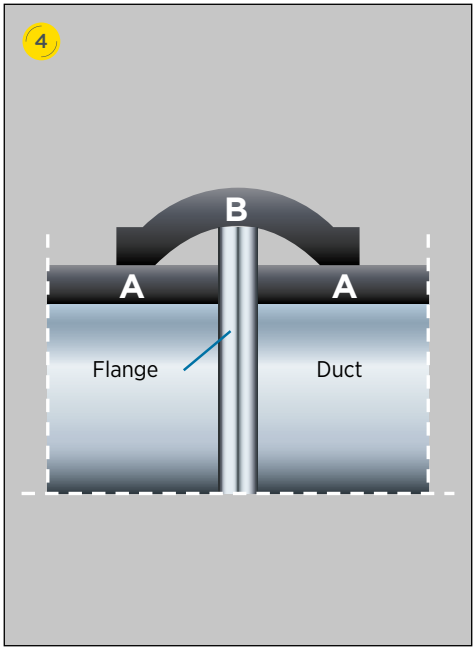
3.12 Flange for ventilation ducts



Variant 3: Flange height ≥ insulation thickness

A Mount the sheet material up to the flange.

B Insulate the flange using a halved insulation tube of matching insulation thickness. The half-diameter must at least correspond to the flange projection.



Variant 4: Flange height ≥ insulation thickness

A Mount the sheet material up to the flange.

B **Insulate the flange using a strip of sheet material of the same insulation thickness** (strip width ≥ 125 mm).

The flange insulation must be bonded over the full surface at all contact points. The same insulation thickness must be applied to all areas of the flange as specified for the duct. The flange insulation can also be carried out using self-adhesive material.

© Kaimann GmbH · Subject to change without notice.

Notes

© Kaimann GmbH · Subject to change without notice.

4 Application of SPECIAL MATERIAL

© Kaimann GmbH · Subject to change without notice.

4.1 Halogen-free material

Instructions for use in shipbuilding

Halogen-free materials – such as Kaiflex HFplus s2 – are sensitive to certain environmental influences, particularly when used in maritime environments, such as on ships or offshore platforms.

In addition, only materials approved by BG Verkehr and marked accordingly with the wheelmark symbol (MED) may be used for offshore applications.

For further information, see Technical help: “Working with Kaiflex insulation materials on ships” (page 99).

Tension-free installation

Halogen-free materials – such as Kaiflex HFplus s2 – are more sensitive and mechanically vulnerable than standard elastomeric foams, as they lack the stabilising effect of halogenated components. As a result, the surface of the insulation material is more delicate, and microcracks may form during installation under tension. To prevent such cracking, the insulation materials must be installed with **little or no tension**.

Insulation thickness mm	External ø mm			
	≥ 88.9	≥ 114	≥ 219	≥ 273
6	•	•	•	•
10	•	•	•	•
13	•	•	•	•
19	•	•	•	•
25			•	•
32 [1)]			•	•
50 [2)]				•

• = suitable
1) Multi-layer structure: 13 mm inner layer + 19 mm outer layer
2) Multi-layer structure: 13 mm inner layer + 19 mm + 19 mm outer layer

Installation of sheet material

The internal diameter must not fall below the minimum value specified in the table! Sheets that are too small or incorrectly cut must never be installed.

© Kaimann GmbH · Subject to change without notice.

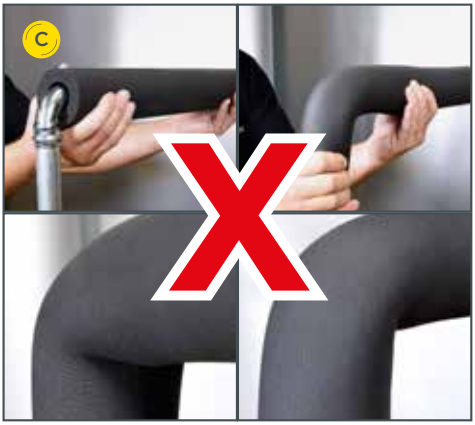
4.1 Halogen-free material

When insulating pipework, insulation thicknesses of ≥32 mm must be created using a multi-layer structure (see table). The thinner insulation thickness forms the inner layer (see figure A)!

Installation of tube material

Pipe insulation

If in doubt, a larger internal tube diameter should be selected (see figure B). Pushing tubes on with excessive force or resistance must be avoided at all costs.



Insulation of angles and elbows

When insulating elbows and bends, tubes must also not be pushed on with excessive force or resistance. To ensure tension-free installation, halogen-free materials must always be installed over elbows using pre-formed sections (see page 16 et seq.).

© Kaimann GmbH · Subject to change without notice.

4.1 Halogen-free material

The following example shows the correct procedure for the tension-free insulation of an elbow with halogen-free sheet material.

To insulate an elbow, its radius must be determined. This should be measured along the neutral axis.

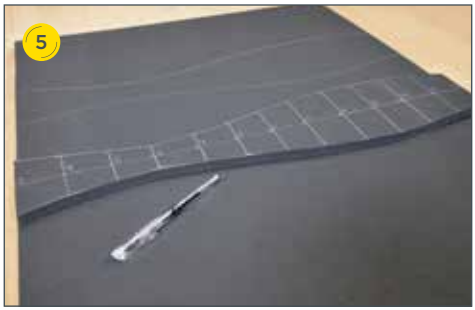
Determine the circumference of the pipe using a strip of sheet material of the same insulation thickness. To avoid tension, an additional 10 mm should be added to the measured circumference. Cuts over 3 m in length should be extended by 20 mm.

Transfer the elbow to the sheet. First, mark the elbow radius and divide it into the required elbow sections. Draw the diameter of the elbow across the centre and divide it into six equal sections.

© Kaimann GmbH · Subject to change without notice.

4.1 Halogen-free material

Divide the circumference into twelve equal sections and mark these above and below.



This so-called “fish” serves as a template for the central segments of the elbow. The two beginning/ end pieces are made from a halved “fish” shape.

Use a knife to cut out the drawn elbow sections.

Lay the longitudinal seams of the individual elbow segments against one another and apply adhesive.

© Kaimann GmbH · Subject to change without notice.

4.1 Halogen-free material

After the flash-off time, install the beginning piece. Join the longitudinal seam from the outside inwards.

Repeat steps 7 and 8 for the middle and end pieces. Also bond the joint faces.

This results in a pipe elbow insulated without tension.

If multiple layers are required to achieve the specified insulation thickness, steps 2 to 9 must be repeated (see table on page 84).

© Kaimann GmbH · Subject to change without notice.

5 | TECHNICAL HELP

© Kaimann GmbH · Subject to change without notice.

Content

© Kaimann GmbH · Subject to change without notice.

5.1 Cold insulation according to DIN 4140

5.1.1 Working with Kaiflex insulation materials as cold insulation according to DIN 4140

For use as cold insulation according to DIN 4140, we generally recommend the use of Kaiflex brand insulation material.

Definition of cold insulation according to DIN 4140:

"Insulation system for media that are stored below ambient temperature and for processes carried out below ambient temperature."

- This definition applies to all media below ambient temperature, e.g. rainwater pipes and, where applicable, supply and/or exhaust air ducts.

DIN 4140 recommends various insulation materials for cold insulation under sections 6.1 et seq. Section 6.1.8 specifically addresses FEF (Flexible Elastomeric Foam), such as Kaiflex insulation materials.

Kaiflex insulation materials can be used without restriction as cold insulation for media temperatures down to –50 °C. It can be used at temperatures as low as –196 °C after consultation with our Technical Support.

The use of mineral fibre insulation materials is severely restricted in section 6.1.2 and limited to only a few applications: "The use of mineral wool and other fibrous or open-cell insulation materials is severely restricted due to the risk of moisture penetration. In practical terms, it can only be used when adding diffusion-tight layer, such as a double layer of cladding or a vapour barrier specially applied to the product or system.

Mineral fibre insulation is only approved for occasional use in cold conditions or as a "preliminary insulation in refrigeration systems ... that must be cleaned occasionally using hot water ... for which the temperature resistance of the cold insulation materials used is inadequate" – provided that the outer cold insulation layer and its vapour barrier ensure a virtually diffusion- and flow-tight seal.

In practice, elastomeric foams have proven themselves as cold insulation for decades. Several million meters of Kaiflex tubes and sheets have been installed during this time.

For special areas of application, we offer additional insulation materials with a high water vapour diffusion resistance:

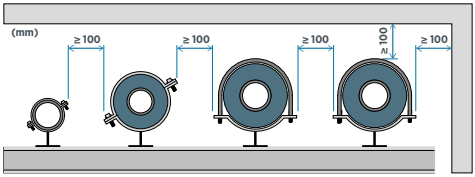
Kaiflex EPDMplus:	from +150 °C to –200 °C
Kaiflex HFplus s2:	halogen-free

5.1.2 Minimum distances from objects according to DIN 4140

Section 4.4 of DIN 4140 "Insulation work on industrial installations and technical building equipment – Execution of thermal and cold insulation" stipulates, among other things, that "In order to be able to insulate the object properly and without complications...", (...) minimum distances of 100 mm must be maintained between the insulations. For objects with a diameter of more than 600 mm, this distance should be at least 1,000 mm.

This required space for the insulation must already be taken into account during the planning stage. Accordingly, the insulation thicknesses should be determined in the early planning stage. Likewise, this must be taken into account for the pipe isometry and the distances between the individual objects in the calculation.

To ensure proper installation of the insulation system, the specified minimum distances between objects should be observed (see figure).



Minimum distances between insulated pipelines (dimensions in mm).

© Kaimann GmbH · Subject to change without notice.

5.1 Cold insulation according to DIN 4140

5.1.3 Working with Kaiflex insulation material on stainless steel pipes according to DIN 4140

Kaiflex insulation materials can be safely used in combination with stainless steel pipes.

Most Kaiflex products comply with DIN 1988 requirements for corrosion-resistant steels, with a limit of less than 0.05 % by mass of water-soluble chloride ions.

According to current best practices, the specifications set out in DIN 4140 (Insulation work on industrial installations and building equipment – Execution of thermal and cold insulation) must be observed (Section 4 “General requirements for insulation”).

The following conditions must be met in order to insulate the object correctly:

- Corrosion protection work has been carried out where necessary.
- For cold insulation applications, the object must already be protected against corrosion.

AGI Q 151 (Insulation work: Corrosion protection for thermal and cold insulation in technical installations) provides recommendations and specifies requirements for corrosion protection.

For austenitic stainless steels, corrosion protection is recommended for temperatures between –80 °C and +120 °C. In each case, it is up to the planner to decide whether this is necessary.

AGI Q 151 “Corrosion protection for thermal and cold insulation in industrial installations” states the following:

Chloride ions in combination with moisture and operating temperatures > +35 °C can lead to stress corrosion cracking in stainless steels.

Objects made of stainless steel do not require corrosion protection if they:

1. are used as refrigeration systems in the temperature range from –50 °C to +20 °C
2. can only reach ambient temperature (max. +35 °C) during shutdown periods
3. are not flushed with warm media

© Kaimann GmbH · Subject to change without notice.

5.2 Bonding

5.2.1 Tension-free formation of adhesive seams

When applying Kaiflex special adhesive or Kaiflex self-adhesive products, care must always be taken to ensure that seams are bonded under compression, never under tension.

5.2.2 Partition sealing

Kaiflex special adhesives are specifically formulated for use with Kaiflex insulation materials. The use of other adhesives in combination with Kaiflex products does not guarantee long-term bonding performance. Furthermore, compatibility with other pipe materials (where they deviate from standard) must be verified.

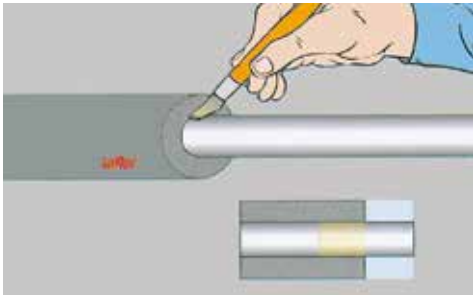
To limit potential damage to the object under the insulation from leakage, particularly in cold insulation applications, partition sealing must be performed. This type of bonding significantly enhances the overall system reliability.

Preparation: Solid components in the adhesive settle at the bottom of the can. For this reason: Stir the Kaiflex special adhesive thoroughly, do not simply shake it.

According to DIN 4140 “Insulation work on industrial installations and building equipment – Execution of thermal and cold insulation”, partition sealing must be applied every two metres. At intervals of no more than two metres, the ends of tubes or sheet sections must be bonded directly to the pipe over a width approximately equal to the insulation thickness.

For this, apply adhesive to the inner surface of the tube or sheet and to the pipe surface using a brush and then bond them. This way, the Kaiflex insulation material is directly bonded to the installation component, forming an airtight seal.

This ensures that any condensation or moisture that may occur cannot spread across the entire pipe system. If any damage occurs, it allows the installer to locate the affected areas quickly and repair them with relatively little effort. This process requires compliance with DIN 4140 and correct execution of partition sealing.



5.2.3 Wet bonding

Kaiflex special adhesives are specifically formulated for use with Kaiflex insulation materials. The use of other adhesives in combination with Kaiflex products does not guarantee long-term bonding performance.

Preparation: Solid components in the adhesive settle at the bottom of the can. For this reason: Stir the Kaiflex special adhesive thoroughly, do not simply shake it.

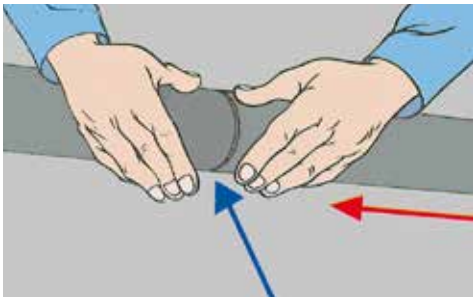
Certain rules must be followed for all bonds.The bonding result depends on various factors, including site conditions such as temperature, humidity and dust. These influence both the flash-off time and the adhesive behaviour. The flash-off time can be shortened by higher temperatures and good ventilation, for example. The age of the adhesive must also be taken into account. Solvent can escape from opened containers over time, increasing

© Kaimann GmbH · Subject to change without notice.

5.2 Bonding

the viscosity of the adhesive. This makes it more difficult to apply the adhesive and shortens the flash-off time.

There is no flash-off time with wet bonding. It is important to ensure that the relevant Kaiflex insulation materials are always cut approximately 10-30 mm longer (for Kaiflex EPDMplus, approx. 30-50 mm) to allow for installation under compression. After the tube and sheet ends have been joined under compression, the butt seams are bonded together by wet bonding. To do this, the butt seams are pulled apart slightly and a thin, even layer of adhesive is applied to the surfaces to be bonded. The bonded seams are joined together with even pressure. No flash-off time is required.



5.2.4 Full-surface bonding on pipework and vessels

DIN 4140 (Insulation work on industrial installations and building equipment) and the Kaimann installation instructions contain no regulation or recommendation stating that insulation materials (tubing/sheets) must be bonded to the entire surface of pipework (up to 600 mm).

This is technically impossible with non-slit tubes and does not correspond to the state of the art.

With small pipe dimensions, full-surface bonding can lead to stresses due to faulty bonding at the longitudinal seam.

For pipes and vessels with a diameter of ≥600 mm, DIN 4140 stipulates that the insulation material must be bonded over the entire surface.

© Kaimann GmbH · Subject to change without notice.

5.2 Bonding

5.2.5 Bonding in combination with plastic / composite pipes

Kaiflex materials are often bonded to ABS, PE, PP, rigid PVC or HDPE pipes using Kaiflex special adhesive. To date, no adverse effects have been identified. Plastic pipes and composite pipes can therefore be insulated with Kaiflex materials and (where necessary) bonded using Kaiflex special adhesive without concern.

Kaiflex special adhesives are compatible with all plastic pipes, such as PVC-C, PE-XA and PE-HD. Bonding Kaiflex to PP, PE-XA and LLDPE is not ideal.

Improved adhesion can be achieved by roughening the surface of the pipe in the bonding area. In the case of partition sealing on ABS pipes, solvent from the adhesive may become trapped. This can lead to hairline cracks and accelerate the ageing of the ABS pipe.

Solution: First, apply Kaiflex tape around the pipe and then perform the partition sealing on top of the tape. This step is not required for bonding the longitudinal seams.

Kaiflex special adhesive does not cause any damage to PVC pipes. However, the adhesive is not suitable for bonding PVC pipes to each other. If a partition sealing is to be carried out, the PVC pipe must be roughened beforehand. PVC pipes, especially soft PVC, contain a relatively high proportion of plasticisers. Over time, these plasticisers migrate out of the pipe. This plasticiser migration causes the adhesive to soften over time when Kaiflex material is bonded with Kaiflex special adhesive, which can cause the adhesive seam to come apart. Roughening the PVC pipe beforehand improves mechanical adhesion and reduces the risk of bond failure.

© Kaimann GmbH · Subject to change without notice.

5.3 Special installation cases

5.3.1 Insulation by sliding on tube material

In principle, it is possible to apply tube insulation material by sliding the material over elbows.

- Halogen-free materials – such as Kaiflex HFplus s2 – must not be installed under tension. For elbows, the fabrication of preformed segments (segmented elbows) is mandatory (see page 84).

For small pipe diameters, there is a risk that the insulation may lift in the throat area of the elbow. In refrigeration/air conditioning applications, this would mean that the calculated insulation thickness would not be met, potentially causing condensation on the insulation surface.

When working with self-adhesive tube materials, there is also a risk that the adhesive layer may become excessively compressed, causing the seams to open.

- The following must always be observed:
  - If the insulation lifts or the adhesive seam is compressed, segmented elbows must be cut.
  - For insulating elbows, tube material without self-adhesive seams is recommended.

5.3.2 Air pockets under Kaiflex insulation

When installing Kaiflex materials, air pockets between the object and the insulation must be minimised.

In practice, small hollow spaces – such as those at fittings or flange connections – cannot always be completely ruled out. To reduce these hollow spaces, strips of Kaiflex material can be inserted underneath. Adhesives or sealing compounds should not be used to fill these spaces.

A diffusion-proof seal between the insulation and the object is essential to prevent air circulation and the associated build-up of condensation.

5.3.3 Installation of sheet metal cladding on Kaiflex insulation material

There are two variants for installing steel sheet cladding on Kaiflex insulation. From a physical standpoint, a direct installation of the sheet metal cladding (i.e. without an air gap) on Kaiflex surfaces is recommended.

1) **Direct installation of the sheet metal cladding**
   For direct installation, the insulation thickness should be increased to account for the penetration depth of the metal screws. Minor surface damage to the insulation is not critical, as vapour resistance is ensured across the entire insulation layer.

2) **Installation of the sheet metal cladding on spacers**
   Alternatively, the sheet metal cladding can be mounted on spacers, creating a 10–15 mm air gap. Strips of insulation sheet material can serve as spacers. These should be positioned on the insulation surface at the start and end of each one-metre sheet metal segment, covering roughly ¾ of the pipe circumference. In this setup, drainage or ventilation holes of at least 10 mm must be placed at intervals not exceeding 300 mm.

© Kaimann GmbH · Subject to change without notice.

5.3 Special installation cases

5.3.4 Use of self-adhesive sheet material in ventilation ducts

At airflow speeds below 10 m/s inside ventilation ducts, no delamination of self-adhesive sheet material occurs when properly installed. This also applies when using Kaiflex special adhesive.

Before installation, ensure that all surfaces are clean, dry and free of grease. Unclean surfaces must be treated with Kaiflex Cleaner.

Sheet material should only be applied inside the duct when external installation is not feasible.

© Kaimann GmbH · Subject to change without notice.

5.4 Special application areas

5.4.1 Working with Kaiflex insulation material on nitrogen-carrying pipes

Kaiflex insulation materials have a temperature resistance (medium) of +110 °C to –50 °C (–200 °C). At low temperatures, the following technical conditions must be considered:

Temperature range from –50 °C to –110 °C
In this temperature range, the insulation system must consist of at least two material layers (the insulation thickness and division of each layer depend on the required thermal transmittance value and dew point position). The first layer must be installed using Kaiflex EPDMplus, followed by the desired Kaiflex standard material in the required thickness. The internal diameter of the first insulation layer should always be one size larger than that of the pipe to be insulated. For example, for a pipe with a diameter of 22 mm, a Kaiflex EPDMplus tube with an internal diameter of 28 mm should be selected. When using Kaiflex sheet material, the internal diameter should also be slightly larger ("finger gap"). In addition, an abrasion protection foil – such as aluminium foil or Kaiflex Protect Alu-TEC cladding – must be installed between the pipe and the bottom insulation layer.

Temperature range from –110 °C to –196 °C
In this temperature range, the insulation system must consist of at least three layers. The first layer should again be Kaiflex EPDMplus, while the second and third layers are installed using the desired Kaiflex standard material. An example of a very cold medium is liquid nitrogen. On pipework carrying liquid nitrogen, there is a risk that liquid oxygen will form inside the insulation core, as nitrogen's boiling point (–196 °C) is 13.5 °C lower than that of oxygen (–182.5 °C). Oxygen from the air may therefore condense on pipework containing liquid nitrogen. This condensed liquid oxygen may react aggressively to organic material. It is therefore essential to install a vapour-tight foil — e.g. aluminium foil or Kaiflex Protect Alu-TEC coating material. The foil should be laid so that it is fully bonded over at least the first layer. It is recommended that a vapour barrier be installed in at least every second subsequent layer. All penetrations must also be sealed vapour-tight. Joints and overlaps must be sealed airtight with aluminium tape and sealed using Kaiflex Protect sealant. For vertical pipework, each layer must be fully bonded. In critical environments or extreme climates, Cladding Protect (R) HD, which can be sealed airtight, may be used.

5.4.2 Working with Kaiflex insulation material in clean rooms

Kaiflex insulation materials do not release particles into the air and can be used in clean rooms.

For areas with stringent cleaning requirements, we recommend using coating materials such as Kaiflex Protect Alu-NET or Alu-TEC. These coatings are resistant to many cleaning agents and offer good mechanical durability. Uncoated Kaiflex insulation materials offer limited resistance to mechanical stress and should therefore be protected accordingly.

© Kaimann GmbH · Subject to change without notice.

5.4 Special application areas

5.4.3 Working with Kaiflex insulation materials on ships

Special atmospheric conditions must be considered when using halogen-free materials in maritime environments, such as on ships or offshore platforms.

In addition, only materials approved by BG Verkehr and marked accordingly with the wheelmark symbol (MED) may be used for offshore applications. The following Kaiflex insulation products are MED-certified:

- Kaiflex KKplus s2
- Kaiflex KKplus s3
- Kaiflex ST s2
- Kaiflex ST
- Kaiflex HFplus s2

In accordance with the underlying tests carried out to obtain MED approval, only approved Kaiflex Special Adhesives may be used. The quantities used are as follows:

- Kaiflex KKplus s2: 250g/m² Kaiflex Special Adhesive 414
- Kaiflex KKplus s3: 250g/m² Kaiflex Special Adhesive 414
- Kaiflex ST s2: 250g/m² Kaiflex Special Adhesive 414
- Kaiflex ST: 250g/m² Kaiflex Special Adhesive 414
- Kaiflex HFplus s2: 250g/m² Kaiflex Special Adhesive 414

The use of elastomeric insulation materials at sea differs significantly from onshore use due to the variable atmosphere and the resulting variable exposure of the insulation materials. This is due to the fact that the system is in motion and may pass through different climate zones, which in turn affects ambient temperatures, humidity, UV exposure, etc.

When used at sea, the following stress factors and their effects on Kaiflex insulation materials must be considered:

- UV exposure: not resistant
- Ozone exposure: not resistant
- Oil vapours: partially resistant, swelling caused by oil mist may increase sensitivity to other influences.
- Seawater: resistant

© Kaimann GmbH · Subject to change without notice.

5.5 Regulatory requirements

5.5.1 Working with Kaiflex ST s2 / ST and Kaiflex HT s2 on drinking water pipes (cold) according to DIN 1988 Part 200

Our Kaiflex Kaiflex ST s2 / ST or Kaiflex HT s2 materials are recommended for the insulation of drinking water pipes according to DIN 1988 Part 200.

As described in DIN 1988 Part 200, the following requirements must be met when dimensioning insulation thickness:

- Compliance with legal and other requirements (e.g. regional building regulations) (Note: DIN 4140 Part 1 and Part 2 are not applicable for drinking water systems).
- Avoidance of condensation and moisture penetration of the insulation thicknesses (the recommended minimum insulation thicknesses listed in DIN 1988 Part 200 should be verified using our KaiCalc calculation tool based on actual operating conditions on site).
- Compliance with planned and/or prescribed operating temperatures
- Protection against warming

❗ The insulation thicknesses listed in DIN 1988 Part 200 – Table 9 are guide values for “typical operating conditions in residential buildings”.

During periods of stagnation, even insulation cannot provide permanent protection against warming and/or freezing.

DIN 1988 Part 200 recommends the use of “closed-cell materials with high resistance to water vapour diffusion” for the insulation of drinking water pipes (cold). It warns of the risk of moisture penetration when open-cell or fibrous insulation materials are used.

Insulation materials made of polyethylene (e.g. Kaifoam PE, Kaifoam PE-RO, Kaifoam PE-DWS, Kaifoam PE-AB, Kaifoam PE-DHplus) are generally suitable provided all seams are sealed with diffusion-tight bonding. However, challenges may arise in practice. Achieving a diffusion-tight bond with PE insulation materials is difficult due to the material’s stiffness and low adhesion properties. In this area, highly flexible insulation materials made of synthetic rubber (Kaiflex KKplus s1/s2/s3 and Kaiflex HT s2) have proven effective.

5.5.2 Insulation of alternating temperature systems according to GEG

Large temperature differences between cooling and heating modes place high demands on the design of an insulation system. In addition, heat loss limits defined by the German Building Energy Act (GEG) must be taken into account.

Because the specified insulation thicknesses are based on a prescribed mean temperature, it is especially important that insulation materials are subject to third-party monitoring for thermal conductivity and have a “declaration of performance”.

With a thermal conductivity of 0.040 W/(m·K) at +40 °C, Kaiflex HT s2 is designed precisely for this application.

The insulation material is suitable both for preventing condensation and limiting heat loss.

For alternating temperature systems operating with a medium temperature of +6/+12 °C, Kaiflex HT s2 is recommended at 100 % insulation thickness during cooling mode.

In addition to the minimum insulation thickness requirements for hot pipelines, the GEG 2024 now also defines minimum requirements for cold distribution and cold water lines. For example, pipes with an internal diameter of up to 22 mm must be insulated with at least 9 mm of insulation, and pipes with an internal diameter of more than 22 mm must be insulated with at least 19 mm.

© Kaimann GmbH · Subject to change without notice.

5.5 Regulatory requirements

5.5.3 Minimum required performance according to MVV TB

Since the introduction of MVV TB 2019/1 et seq., the building regulatory requirements for the minimum performance of flame-retardant construction products have been significantly tightened. In the revised version of the MVV TB 2019/1 et seq., a minimum classification of s2 (limited smoke development) is now required for flame-retardant construction products, whereas previously a minimum classification of s3 (unlimited smoke development) was sufficient.

Building regulatory requirement	Construction products, except linear pipe insulation materials and floor coverings	Linear pipe insulation materials
Non-combustible	A2-s1, d0	$A2_L$-s1, d0
Non-combustible and additional melting point > 1,000 °C		
Flame-retardant with no burning droplets or falling particles, and with low smoke development	C-s1, d0	C_L-s1, d0
Flame-retardant with no burning droplets or falling particles	C-s2, d0	C_L-s2, d0
Flame-retardant with low smoke development	C-s1, d2	C_L-s1, d2
Flame-retardant	C-s2, d2	C_L-s2, d2
Normally flammable with no burning droplets or falling particles	E	E_L
Normally flammable	E-d2	E_L-d2

Source: MVV TB 2025/4 Annex 4, Table 1.2

The current status of the federal state-specific implementation of the MVV TB can be found on the website of the DIBt.

Compliant product solutions with Kaiflex

A wide range of Kaiflex products meet the flame-retardancy requirements according to MVV TB 2019/1 et seq. This applies in particular to the entire range of tubes and sheets in the following product groups:

Product	Euroclass acc. to EN 13501-1 for sheets	Euroclass acc. to EN 13501-1 for tubes
Kaiflex KKplus s1	B-s1, d0	B_L-s1, d0
Kaiflex KKplus s2	B-s2, d0	B_L-s2, d0
Kaiflex HFplus s2 ALU	B-s2, d0	n.a.
Kaiflex HT s2	n.a.	C_L-s2, d0

© Kaimann GmbH · Subject to change without notice.

5.5 Regulatory requirements

5.5.4 Fire-protection enclosures according to MLAR

The commentary in the 3rd revised and expanded edition of the "Model Conduit Systems Directive (MLAR)" addresses the following topic:

Topic: "Special constructions for fire-protection enclosure of surface-mounted combustible pipes or combustible insulation materials made from synthetic rubber (flame-retardant) on non-combustible pipes in required corridors."

***Variant:** "Sheet metal cladding on synthetic rubber"
Non-combustible pipes with combustible insulation materials made from synthetic rubber may be surface-mounted in required corridors if they are fully enclosed with continuous sheet metal cladding (thickness ≥ 0.4 mm) for purposes of fire protection.

- The penetration depth of screws/rivets in the cladding area must be taken into account when calculating the insulation thickness and spacing. "Spacers" such as insulation strips made from synthetic rubber with a maximum thickness of 13 mm should be installed lengthwise.

* Implementation of the above variant must be verified via an expert opinion from an accredited body with respect to the protection objectives in accordance with MLAR/LAR, including application of fire partitions by the system provider or the installer in each specific project, and must be submitted to the local building authority.

© Kaimann GmbH · Subject to change without notice.

5.6 Properties of Kaiflex insulation materials

5.6.1 Ingredients of Kaiflex insulation materials

Kaiflex insulation materials are elastomers based on synthetic rubber.

In foamed form, rubber is used in mattresses, sponges, and also in insulation materials.

Rubber is generally supplemented with fillers such as carbon black, plasticisers, cross-linking agents, age-retardants, flame retardants and pigments. Additional additives may be included depending on the requirements of the final product.

All Kaiflex products are silicone-free. Self-adhesive products use backing films that include a siliconised layer. The adhesive used, however, is silicone-free.

Kaiflex insulation materials comply with ECHA regulations on REACH/SVHC and are free of PFAS, HBCD, halogenated blowing agents, and similar substances. They therefore meet the content requirements of certification schemes such as DGNB, LEED, BREEAM, MINERGIE, etc. If you have any further questions, please contact our Technical Support.

5.6.2 Microbial inertness of Kaiflex insulation materials according to VDI 6022

Many Kaiflex insulation materials meet the requirements of VDI 6022 (Hygienic requirements for ventilation and air-conditioning systems), as confirmed by testing in independent laboratories. Due to their microbial inertness, Kaiflex insulation materials are therefore ideal for use in HVAC systems.

5.6.3 Emissions from Kaiflex insulation materials according to ISO 16000

New Kaiflex insulation materials have a “typical” inherent odour in the first few weeks, which dissipates over time. The warmer the ambient temperature, the more quickly this odour subsides.

Kaiflex insulation materials emit only very low levels of volatile organic compounds (VOCs). This is confirmed by independent testing according to ISO 16000 by Eurofins, demonstrating compliance with the Indoor Air Quality “Gold” standard.

5.6.4 Installation of Kaiflex insulation materials at low temperatures

Kaiflex insulation materials should ideally be installed at temperatures above +10 °C.

At lower temperatures, please note that the flash-off time of the adhesive increases significantly. Kaiflex special adhesive must not be used below +5 °C. The ideal application temperature is +20 °C. The drying time of the adhesive is 36 hours, during which the temperature should not fall below +5 °C.

Furthermore, on large pipe diameters and with thick insulation layers, Kaiflex insulation materials become less flexible and more difficult to work with near freezing temperatures (compared to +10 °C or +20 °C).

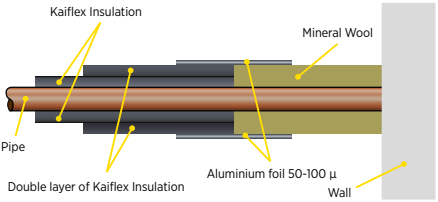
It is also important to note that Kaiflex self-adhesive tube and sheet materials may only be bonded at a minimum temperature of +10 °C.

© Kaimann GmbH · Subject to change without notice.

5.7 Transition to other insulation materials

5.7.1 Proper transition from Kaiflex insulation materials to mineral wool pipe sections

At transition points between Kaiflex insulation material and mineral wool pipe sections, it is recommended to double-layer the Kaiflex insulation in order to create a clean transition to the pipe section (see figure). The transition between the two materials must be covered with a 50–100 µ thick aluminium foil. This aluminium foil should overlap both insulation systems by approximately 5–10 cm.



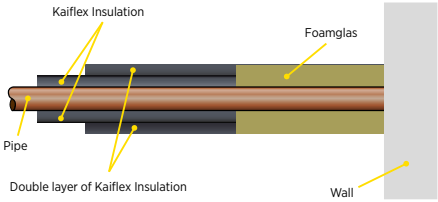
5.7.2 Proper transition from Kaiflex insulation materials to foam glass sections

At transitions points between Kaiflex insulation material and cellular glass sections, the procedure illustrated in the diagram is recommended:

The Kaiflex insulation may need to be double-layered, and the end face of the cellular glass section should be coated with Kaiflex special adhesive before bonding. This is necessary to provide a sufficient bonding surface on the cellular glass.

Once the adhesive has dried adequately, both the surface of the cellular glass and the end face of the Kaiflex insulation must be evenly and thinly coated with Kaiflex special adhesive.

It is important to ensure that the adhesive seam between the insulation and the cellular glass is created under pressure and executed with particular care.



© Kaimann GmbH · Subject to change without notice.

Notes

© Kaimann GmbH · Subject to change without notice.

Notes

© Kaimann GmbH · Subject to change without notice.

© Kaimann GmbH · Subject to change without notice.

The content of this document corresponds to our present state of knowledge and experience at the date of publication. No legal guarantee can be given, unless it has been explicitly agreed. The state of experience and knowledge is developing continuously.
Please ensure that you always use the latest edition of this document (available at www.kaimann.com). All values are based on results obtained under typical conditions of use. The described product applications do not take special circumstances in consideration. Recipients of these technical specifications are to check with Kaimann in advance if given values are meeting the specifications of the intended area of application. For further information please contact our Customer Service.

Kaiflex® und Kaifinish® are registered trademarks of the Kaimann GmbH.

© Kaimann GmbH · Hansastraße 2-5 · 33161 Hövelhof · Germany
Phone: +49 5257 9850-0 · E-Mail: info.kaimann@saint-gobain.com · www.kaimann.com

Subject to change without notice.

Version: 17.06.2025 · KAI_ApplGde_Kaiflex_EN · 7000546