



Installation manual

for installation of pipe systems in the ground

Contents

Alvenius.....	5
A. Receiving and unloading goods	6
B. Pipe trench	8
C. Preparations for installation	10
D. Installation of pipes in the pipe trench	12
E. Anchoring.....	19
F. Testing the system for leaks	20
G. Taping.....	22
H. Backfilling	24
I. Documentation	27
J. Disinfection of drinking water pipes.....	27
K. Maintenance and repairs.....	28
Appendix 1 Bundle sizes	31
Appendix 2 Deflection	34

If you need help

If you encounter any problems with the installation of Alvenius pipe systems, please contact us and we will help you.

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Alvenius

Performance in piping

For Alvenius, specially adapted system solutions for steel pipes, couplings and surface treatment are standard. We develop, manufacture and supply mainly spirally welded steel pipe systems with quick couplings that are stronger and lighter and have lower flow resistance and lower overall costs.

As the pipes are spirally welded with a unique steel that is classified for pressure vessels, they can be made thin-walled yet strong. And the spiral welding means that they stay straight.

Alvenius systems are available with different types of corrosion protection and coatings:

- HDG – hot-dip galvanisation
- FlowMax® with CorroFlo® (internal and external thermoplastic coating)
- RocShield® (coated internally and externally with CorroFlo® and coated externally with highly resistant RocShield®)

To ensure that the system functions optimally, it is important for it to be installed and tested correctly.

If you follow the manual, you will install it correctly and safely, and get a pipe system of the highest quality.

To ensure that you completely understand the entire process from checking all the materials to completion of installation, start by reading through the entire installation manual.

Remember

To follow existing laws, general safety regulations, local regulations and instructions prepared for the specific project.

Make sure also that you have the latest version of the installation manual.

Follow the instructions in this installation manual, otherwise no warranties will be valid.

The latest version is available at:

www.alvenius.com - "Downloads"

You can also find the installation manual here:



A. Receiving and unloading goods

General information

- Be careful when handling materials
- Always use soft lifting straps
- Place the lifting forks under the protective plastic
- Avoid damage during unloading and inspection
- Always use appropriate personal protective equipment

A1. Overview of materials

- Pipes, fittings and accessories are normally delivered by truck
- Check the contents of the delivery against the Alvenius delivery document
- If anything is missing, please contact Alvenius immediately

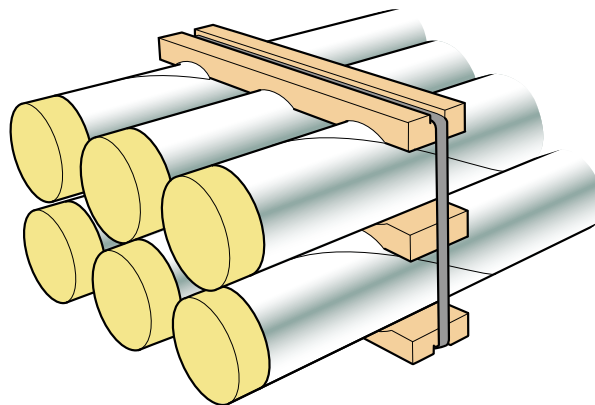
For bundle sizes, see Appendix 1.

A2. Check and inspect the entire delivery

- Check the quality of the delivery
- Are there any signs of damage? Is there any visible damage?
- Is there any indication that the load has shifted or of incorrect handling? Perform a careful inspection.
- Never use damaged pipes or fittings. Contact Alvenius if there is any damage.

A3. Check and inspect the pipes

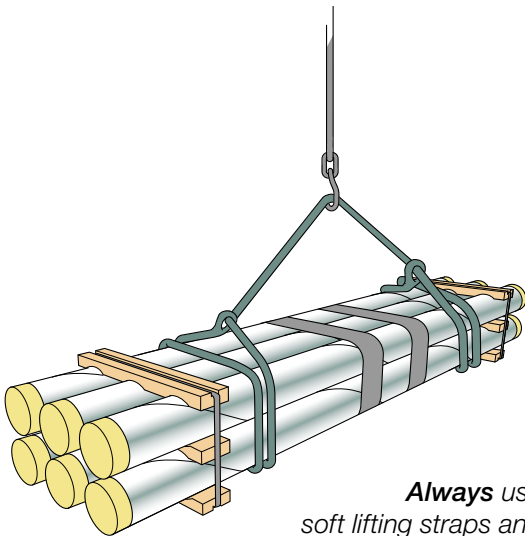
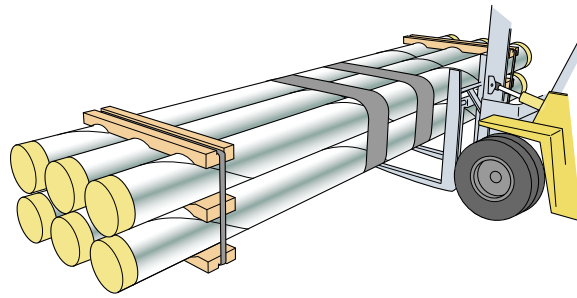
- Check that the end protection is intact both before and after unloading
- Check that the coating is undamaged
- Never use damaged pipes or accessories. Contact Alvenius if there is any damage.



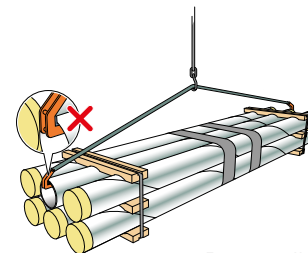
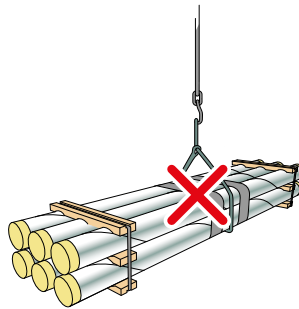
*Check and inspect
the entire delivery and the pipes*

A4. How to store and keep pipes, fittings and accessories after unloading

- The storage site should be near the installation site, if possible
- The storage site must be level, flat, clean and as dry as possible
- Ensure that it is possible to transport the goods to the installation site
- Ensure that both people and machines can easily work around the goods
- Place the lifting forks under the protective plastic to avoid damage to the pipes' coating



Always use
soft lifting straps and
double strap slings



Do not lift
at the pipe ends

- Alternatively, the pipes can be unloaded with double strap slings made of soft material
- Place the bundles on wooden studs on the ground
- Separate each bundle with studs
- If necessary, secure the pipes to prevent them from rolling
- Store couplings and fittings on pallets. Gaskets, tape, mounting grease and DENSOMASTIC™ must be kept at room temperature before use.

Remember

- Safety
- To check that the lifting equipment can cope with the weight of the goods. See *delivery documents*.
- To never tip, roll or throw pipes or fittings off a truck
- To never unload pipes and fittings with lifting equipment made of metal such as pallet forks, chains or cables without protection
- To always use soft lifting straps
- To not lift at the pipe ends
- Ties must be cut with suitable tools (for example tin snips or side cutting pliers).
- Before the pipe bundles are opened, check that they are not inclined and are secured against rolling and sliding and that there are no unauthorised persons near them.



B. Pipe trench

When you install pipes in the ground, you have to dig a pipe trench. It must be dug with bevelled sides to eliminate landslides and landslips. The base of the pipe trench must be level, have a steady gradient and be at a frostproof depth.

Use an excavator that is suitable for the terrain, the dimensions of the pipe trench and the type of soil.

Dig the pipe trench and prepare the pipe foundation before the pipes are transported to the trench, to minimise the risk of damage to the pipes.

If the soil is suitable for laying pipes, the bottom layer of the pipe foundation may not be necessary. If a bottom layer needs to be laid in the pipe foundation, its thickness when packed must be at least 150 mm.

The pipe foundation must produce a uniform pressure distribution. Avoid laying pipes on rocks or stones or on a base that has poor bearing capacity. Use backfill that can be properly packed.

Remember

- Safety
- To bevel the edges to prevent landslide
- To remove stones and loose material

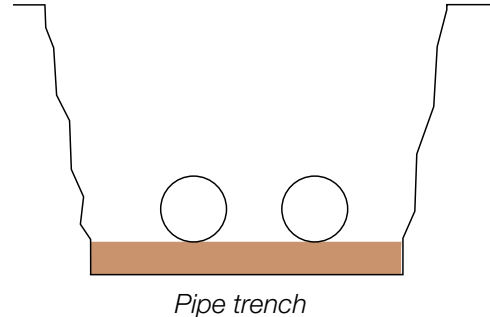
Remember also to follow existing laws, general safety regulations, local regulations and instructions prepared for the specific project.

Make sure also that you have the latest version of the installation manual.

B1. Pipe trench

Width:

- Calculate the number of parallel pipes, their diameter, and the necessary distance between the pipes. *See the illustration.*
- Remember that you need to be able to work comfortably and safely in the pipe trench during installation.
- Factor in any additional width for gullies, hydrants and other equipment
- Also factor in any additional width for anchoring with support blocks or other attachments/fixed points. *See section E.*



Depth:

- Calculate the required minimum depth as per the conditions present.

B2. Pipe foundation

- The pipe foundation and the bottom layer of the foundation must stretch along the full length of the pipeline
- The pipe foundation's backfill affects the load and tension distribution on the pipe. Consequently, appropriate backfill, which does not damage the pipeline or pipe foundation, must be added and be packed adequately.
- The backfill above the highest point of the pipe must be at least 150 mm when packed if a light vibrator is used, and at least 300 mm if heavier compacting machines are used
- Alvenius pipes and fittings can be laid directly on the prepared pipe foundation
- Avoid laying pipes on frozen ground

B3. Drainage

- If possible, the pipe trench should be drained so that water cannot collect around the pipes
- Water collecting around the pipes can have a negative impact on the service life of the system
- Lay a drainage hose beside the pipes that ends in a gully or ditch

C. Preparations for installation

Ensure that all equipment is to hand before you start installation.

Mechanical equipment may be needed to transport pipes to the installation site and to lift pipes into place (pipes in dimensions up to around 8 inches can be lifted by hand).

For bundle sizes, see Appendix 1.

C1. Installation equipment checklist

- Buckets
- Ratchet wrench/impact wrench/torque wrench
- Sleeves (long)
- Fine files
- Hammer
- Pick
- Spade
- Alvenius mounting grease
- Alvenius coating repair kit
- Rags
- Crowbar
- Wooden pipe supports
- Wooden wedges

C2. Pipe supports/blocks

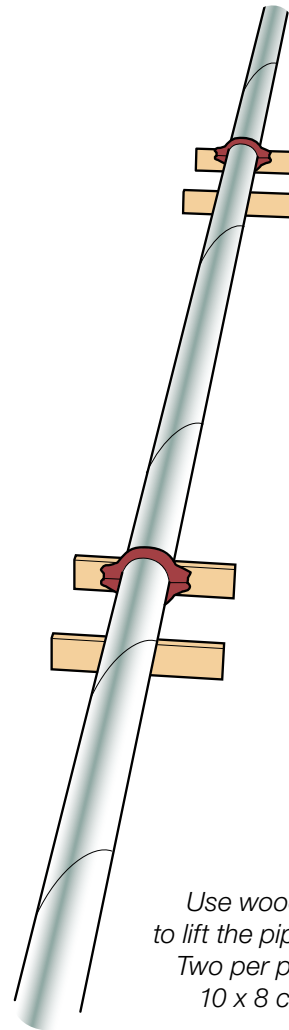
- Use wooden pipe supports to lift the pipes off the ground. Two per pipe (approximately 10 x 8 cm, or as required).
- Adjust the pipe supports so that the pipes can be installed in as flat a line as possible without unnecessary kinks

C3. Laying the pipes

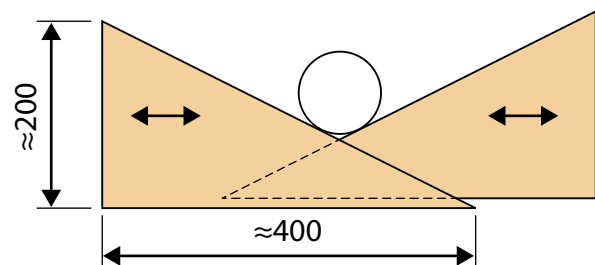
- The pipes must be lifted down with lifting straps and placed on the pipe supports in the trench to make it easier to fit the couplings
- Use wooden wedges for level adjustment during installation

C4. Leak tests and commissioning

- Pipes must be tested for leaks according to existing standards and statutory provisions, see section F

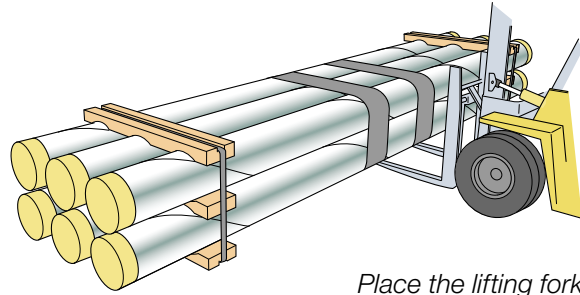


Use wooden pipe supports to lift the pipes off the ground. Two per pipe (approximately 10 x 8 cm, or as required).

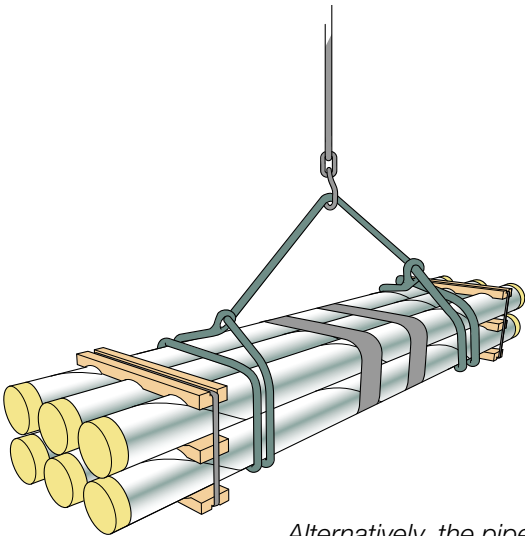


 **Remember**

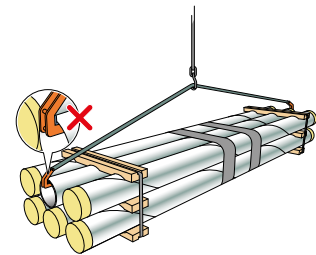
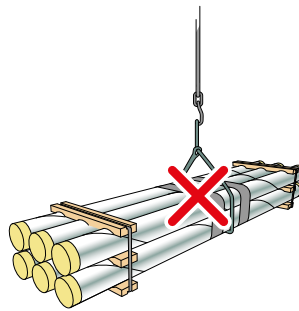
- Safety
- That the lifting equipment must be able to cope with the weight of the goods.
See delivery documents.
- To never tip, roll or throw pipes or fittings off a truck
- To never unload pipes and fittings with lifting equipment made of metal such as pallet forks, chains or cables without protection
- To always use soft lifting straps
- To not lift at the pipe ends



Place the lifting forks under the protective plastic to avoid damage to the pipes' coating



Alternatively, the pipes can be unloaded with double strap slings made of soft material



*Do **not** lift at the pipe ends*



D. Installation of pipes in the pipe trench

Alvenius pipe systems have quick couplings. No welding, no special tools – all you need to fit the couplings is a socket spanner or an impact wrench and if necessary a torque wrench.

Installation sequence:



To ensure the coupling is leakproof, all the contact surfaces on the pipes, fittings and couplings must be clean.

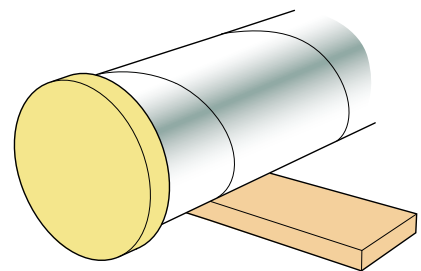
D1. Check the material

Pipes and couplings are available in various versions, depending on dimensions and working pressure, but they look virtually the same.

It is therefore important to check that the right components are used for the right part of the pipe system in terms of pressure class, diameter and type. See the installation drawing.

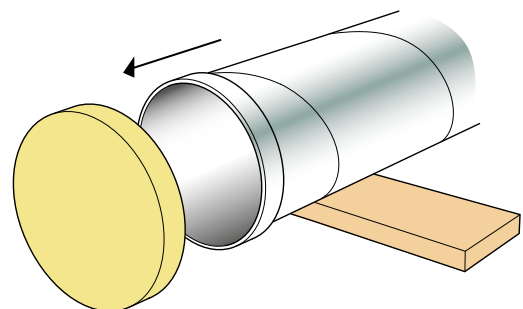
D2. Lay the pipes

- Lay the pipes in a straight line with a steady gradient
- Avoid large deflections and tension
- Make use of the flexibility of the coupling for small deflections. See appendix 2.
- Use Alvenius pipe bends with different degrees of angle for large deflections
- We can make special parts if necessary

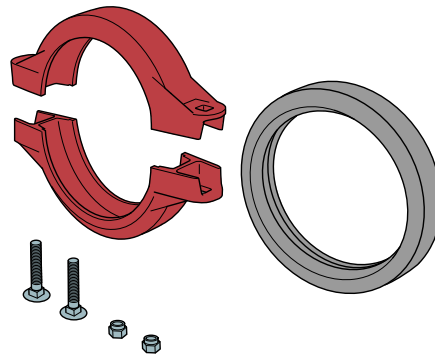


D3. Installation

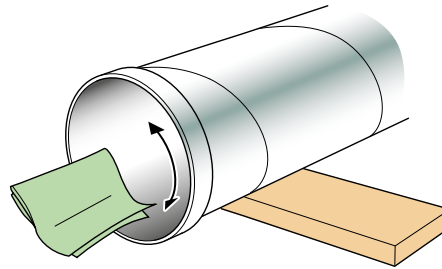
- Remove the end protection
- Inspect the pipes and pipe ends
- **For HDG pipes**, inspect the pipes and coupling grooves. If necessary, file away any surplus zinc in the groove and repair with zinc paint. See section K.
- Place the pipe ends approximately 40 mm apart
- Place a wooden block under each pipe end. Use wooden wedges for level adjustment.



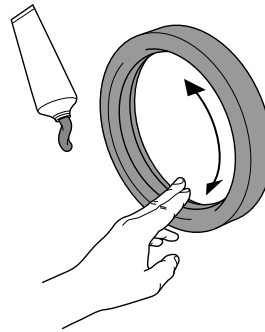
- Open the coupling and inspect the gasket



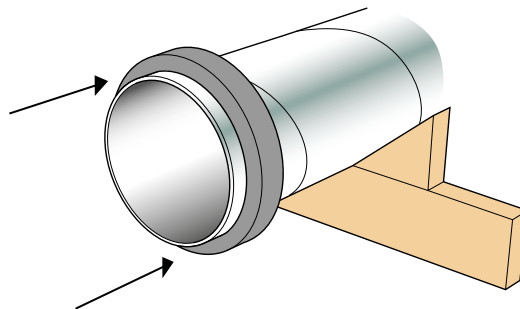
- Wipe the pipe end, groove and gasket clean



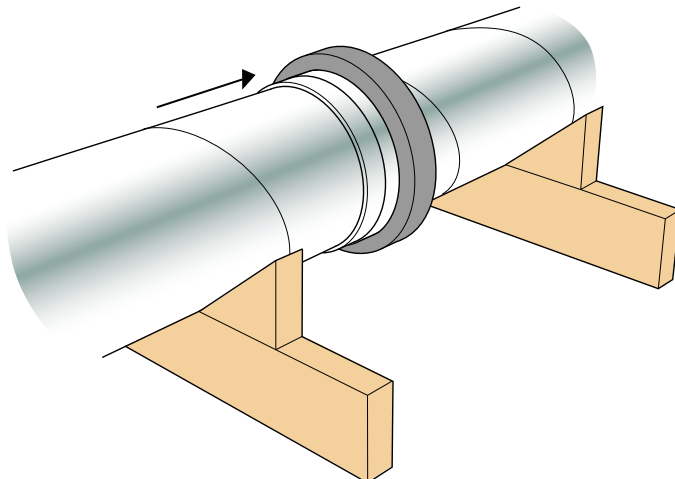
- Grease the gasket on the inside and outside with mounting grease



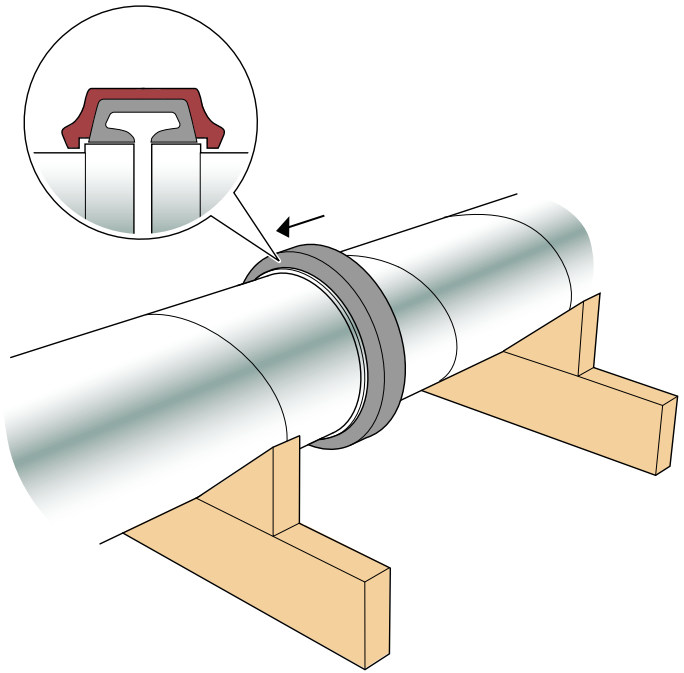
- Push the entire gasket over one pipe end



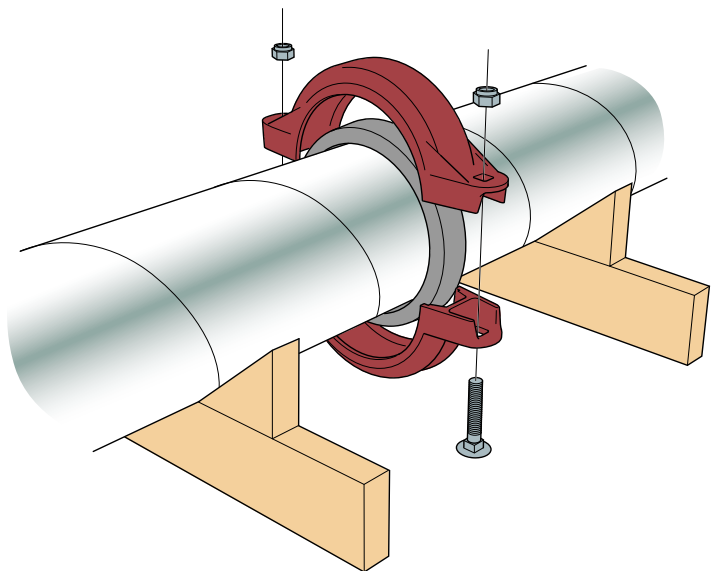
- Push the pipe ends together
- Adjust them vertically and horizontally using wooden wedges so they line up



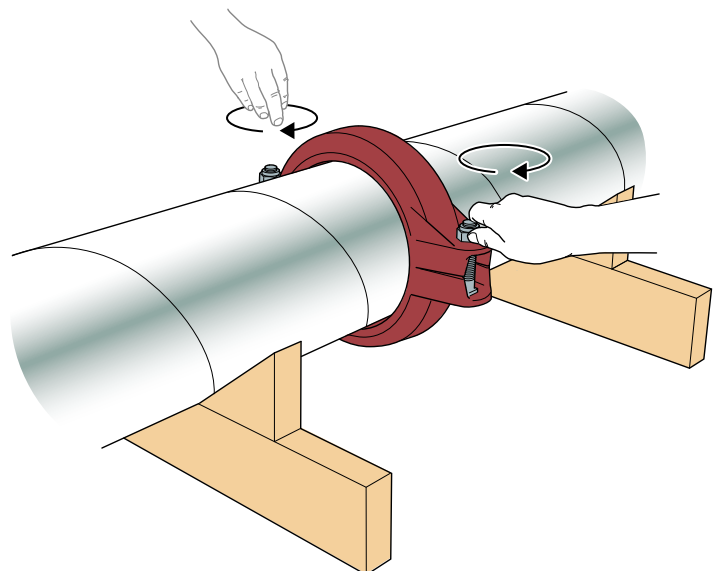
- Then pull the gasket back over the joint so that lips of the gasket are in contact with both pipe ends



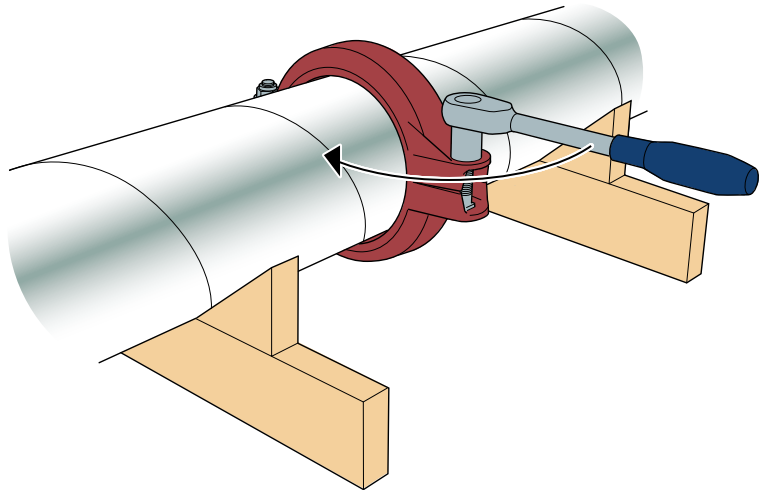
- Fit the halves of the coupling so that they cover both the gasket and the pipe ends



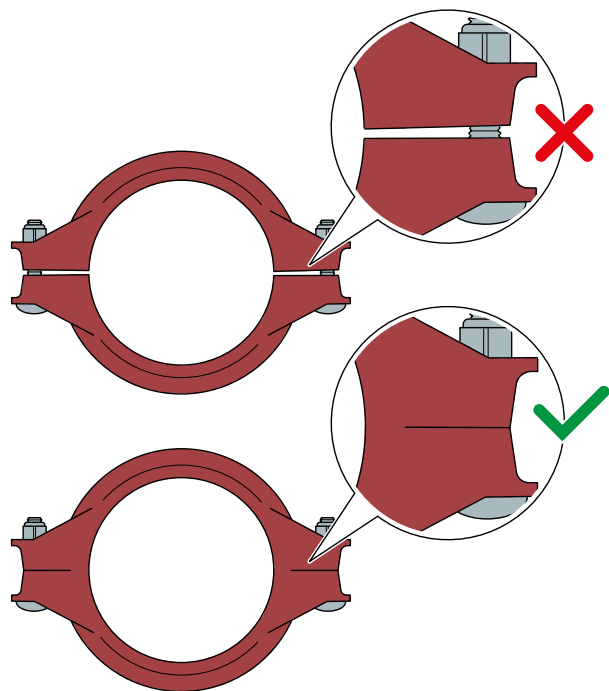
- Tighten the nuts by hand first, as far as possible



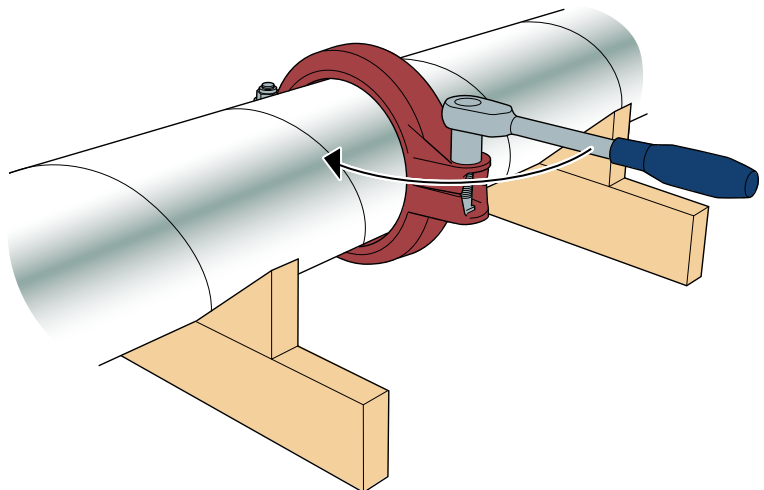
- Then tighten the nuts alternately and evenly using a socket spanner with a ratchet wrench or impact wrench



- Check that the gasket has not been caught between the halves of the coupling
- Check that the halves of the coupling are in contact with each other. There must be no gap.



- For Alvenius K10 couplings the nuts shall be tightened by a ¼ turn after closing the gap
- For other couplings, follow the instructions by each coupling manufacturer (eg. Victaulic I-100)
- Remove any wooden wedges and proceed to the next joint
- Remember that retightening of the nuts might be necessary after the leak tightness test, see section F
- The system allows for angular deflection in each flexible coupling. See appendix 2



D4. Length adjustment

Alvenius pipe systems include standard pipes in a sufficient number of different lengths to avoid the need for adjustments or cuts on site.

However, if it is necessary to adjust the length of a pipe, they can be cut, deburred, taped and joined with a plain end coupling of type Straub or Norma.

For drinking water applications, lacquer for drinking water pipes is used to protect the cut surface.

Then join with a plain end coupling of type Straub or Norma.

For length adjustment on site, you need:

- A suitable plain end coupling
- A file for deburring
- Butyl tape (or lacquer for drinking water)
- A suitable cutting tool
- A tape measure
- Suitable lacquer for drinking water pipes (.ex. Grossol-Muffenlack, part number 3507711-I, Gross & Perthun Lackfabrik)

See the instruction film on length adjustment:

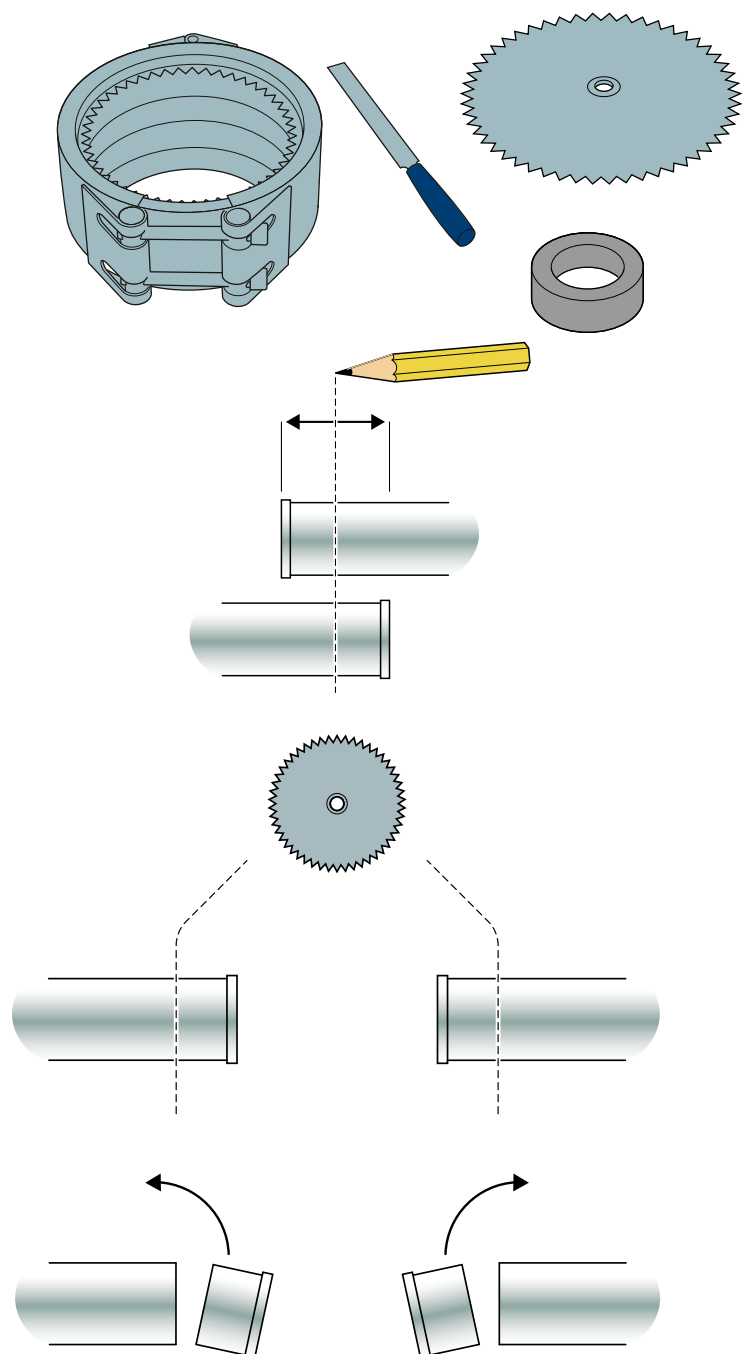


- For length adjustment, a plain end coupling of type Straub or Norma is used

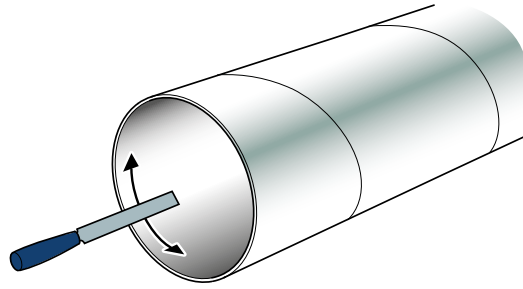
- Place the pipes so they overlap and mark where each pipe end is to be cut

- Cut both pipe ends

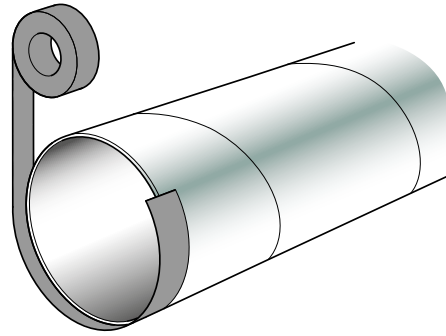
- Remove the pipe ends cut off



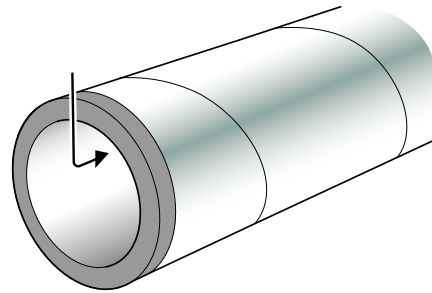
- Deburr both pipe ends carefully on both the inside and outside so that no burrs remain when tape is applied



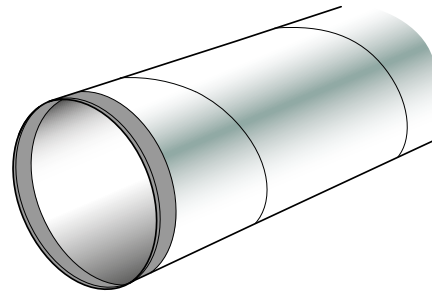
- Tape both pipe ends. Tape so that approximately 50% of the tape can be folded in.
- In drinking water pipes, the bright cut surfaces should instead be covered with a suitable lacquer for drinking water pipes. Then proceed to the last item on this page.



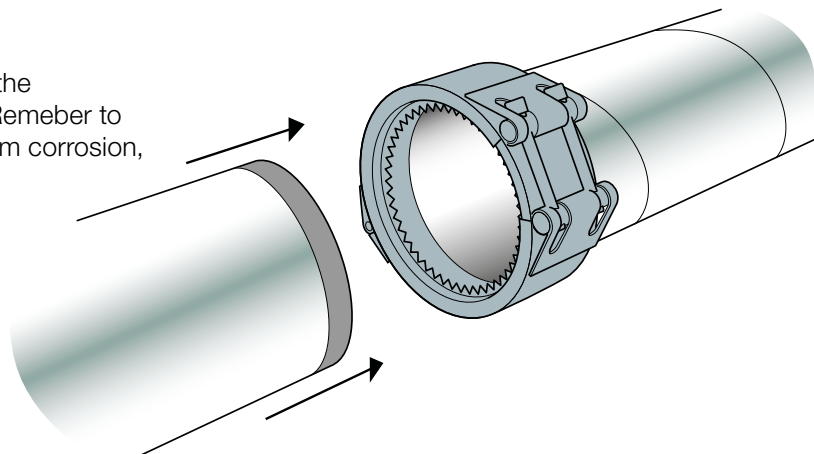
- Ensure that there is sufficient tape so that it can be folded into the pipe ends



- Fold the tape into the pipe ends and ensure that it is firmly attached



- Fit the coupling according to the manufacturer's instructions. Remember to protect (tape) the coupling from corrosion, see section G.





E. Anchoring

All pressure pipes are subject to shear forces on account of the internal pressure in the pipe. Consequently, the pipeline should be anchored in certain cases, above all for tees, branch pipes, changes in dimensions and end points, and also before and after deflections.

Pipelines should also be anchored on gradients steeper than approximately 15° as the pipeline may otherwise move.

Remember

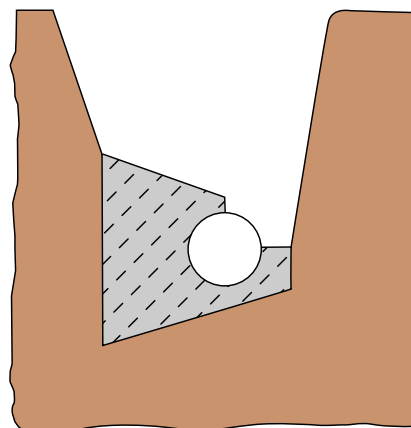
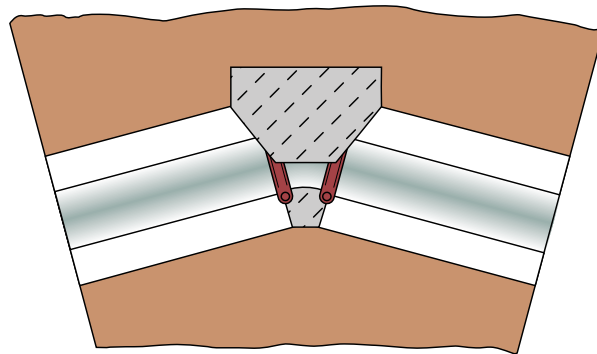
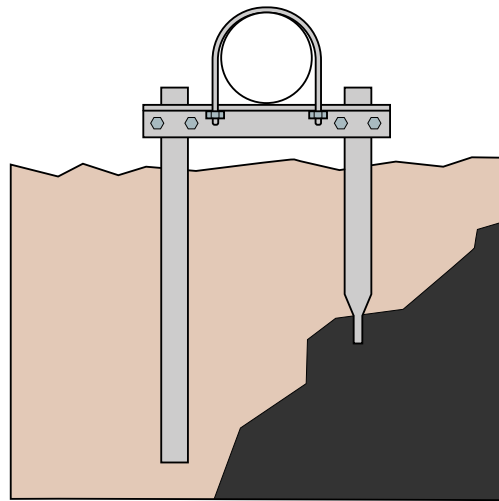
- Calculate the dimensions and location of the anchoring based on the conditions present.

E1. Anchoring a pipeline

- The design varies, according to the pressure and forces to which the pipe system is exposed and whether the installation is above or below ground
- For above ground installations the recommendation is to have two supports per pipe
- The simplest design involves one or two galvanised stays being driven into the ground. Fix angle irons at a suitable height to give the pipeline a steady gradient and fix the pipe with rubber-coated pipe fixings.
- If the ground is unstable or on rock, the pipeline may be fixed with special pipe suspenders. Ensure that the pipes' coating is protected adequately.
- With deflections greater than 22.5 degrees and high working pressure (exceeding the maximum allowable pressure for the coupling during eg. pressure testing and/or any water hammers) as well as at pump housings, concrete pedestals in accordance with 'DVGW Arbeitsblatt GW 310' or equivalent must be used.

Remember

- To protect the coating against damage in connection with anchoring



F. Testing the system for leaks

Before the pipe trench is backfilled, the pipe system must be tested for leaks so that any leaks can be remedied. We recommend backfilling but leaving the couplings free for inspection before testing begins.

Pressurised pipelines must be tested for leaks after they have been laid. It is also necessary to check that the pipe is laid in the right place. Pressure pipes must be checked according to the requirements in EN 805 or any other applicable national standard, and sewage pipes must be checked according to the requirements in EN 1610 or another applicable national standard.

Leak tests must be carried out by qualified personnel with knowledge of pipe systems, leak testing, relevant test standards and safety regulations, etc.

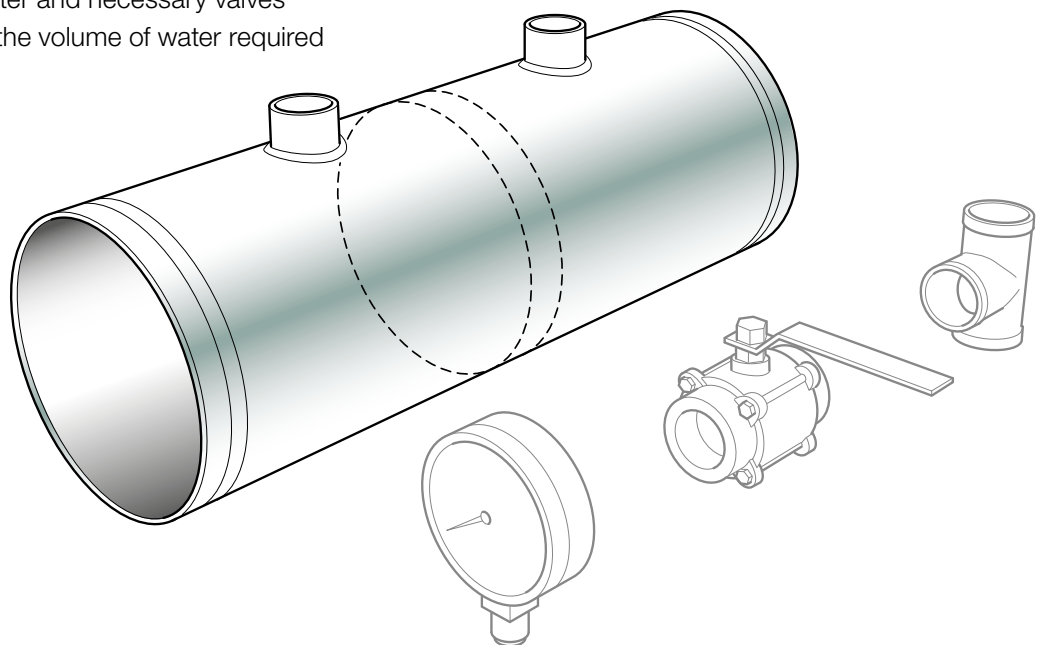
Remember

- Check the working pressure for which the pipe system is designed
- Before the leak testing, you must have carried out the necessary anchoring. If the leak test is carried out against a closed valve in a gully, the area around the chamber should be full
- Follow the instructions in this installation manual, otherwise no warranties will be valid
- For 80 bar system, the test pressure shall be 100 bar and the nuts shall be tightened after testing

Remember also to follow existing laws, general safety regulations, local regulations and instructions prepared for the specific project. Make sure also that you have the latest version of the installation manual.

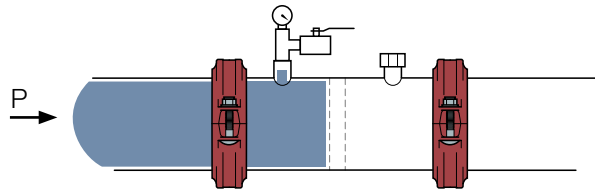
F1. Equipment checklist

- A suitable pump for the working pressure
- Alvenius test pipes as required
- A manometer and necessary valves
- Access to the volume of water required

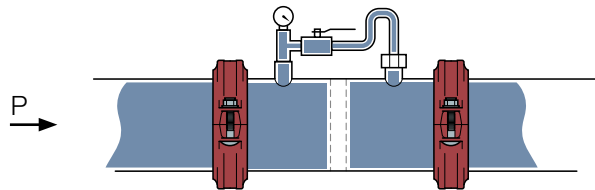


F2. Implementation of the leak test

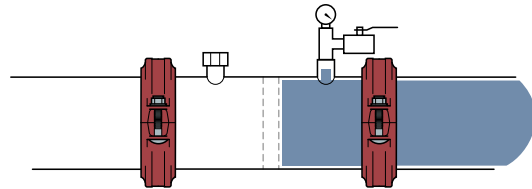
- We suggest that the system be tested for leaks in sections
- If necessary, fit one Alvenius test pipe at the start of the pipeline and one at the end of the section to be tested
- Fill the pipe with water
- Ventilate carefully
- Flush the pipeline clean as, in practice, it is not possible to prevent sand, gravel and soil entering it



- Apply half the working pressure in the part to be tested to expand the pipeline. Maintain this pressure for 30 minutes.



- Then test the pipe system according to the regulations and standards that apply to the system in question, the pipe line should be partly covered with backfill material according to section H
- If there are no regulations for the leak test, the pipeline must be subjected to a maximum of 1.3 times the nominal pressure for one hour. The pipe is regarded as leakproof if the pressure drop does not exceed 20 kPa.

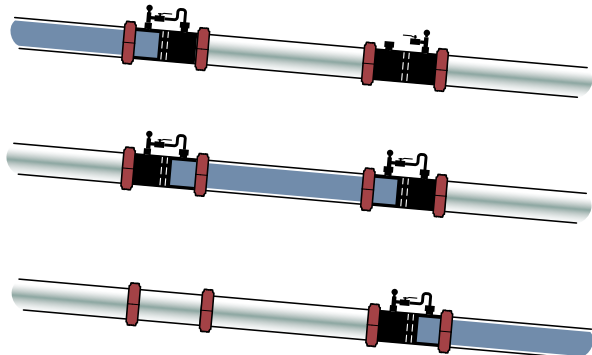


Remember

- In case the test pressure exceeds the marking pressure of the coupling, the nuts shall be tightened after testing (see section D)

TIPS!

- When installing a pipeline on a gradient, the water can be reused for the next test section
- If an Alvenius test pipe was used, this is replaced with a 600 mm Alvenius standard pipe when the test has been completed



G. Taping

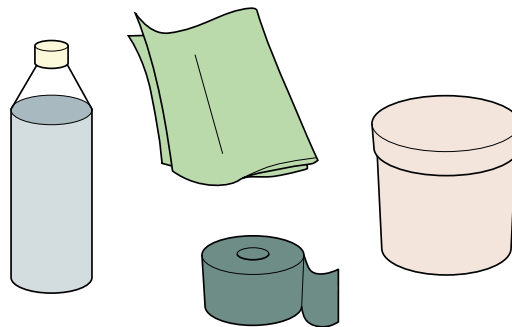
Taping the coupling and any other parts that are not corrosion-protected is an important part of the installation work for pipe systems that are laid in the ground.

Remember that the system must be tested for leaks before being taped.

Material consumption and tape width			
Pipe Dimension [mm]	Denso Paste primer [kg]	Densomastic [kg]	Densoplast tape 100 mm [m]
76 – 89	0.03	0.70	2.0
102 – 114	0.05	1.00	3.0
133 – 168	0.07	1.60	5.0
203 – 219	0.10	2.25	6.5
254 – 273	0.12	2.70	9.0
323 – 355	0.15	6.75	12.0
406 – 457	0.20	10.50	16.0
508 – 610	0.30	15.00	22.0

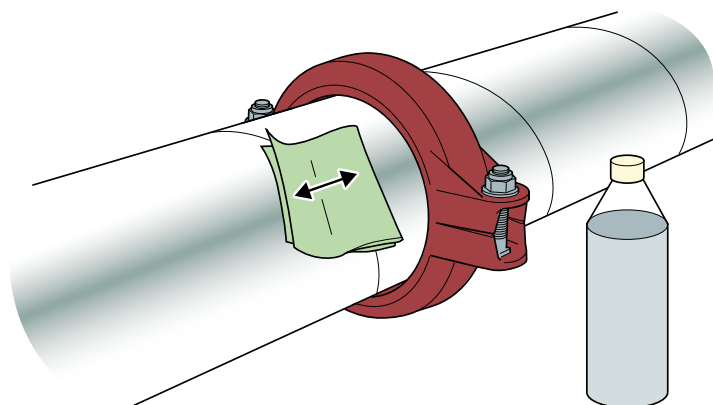
G1. Material

- For best taping results, we recommend DENSOPLAST™
- DENSOMASTIC™ may also be used to make the contour uniform
See the table above for the correct tape width.

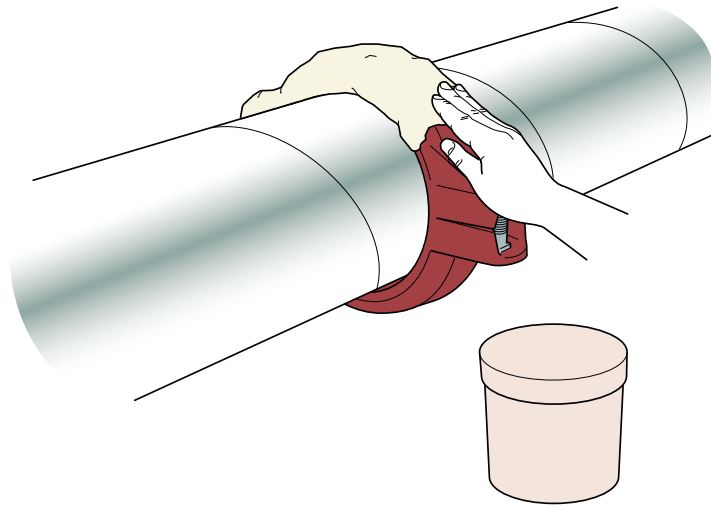


G2. Safe taping

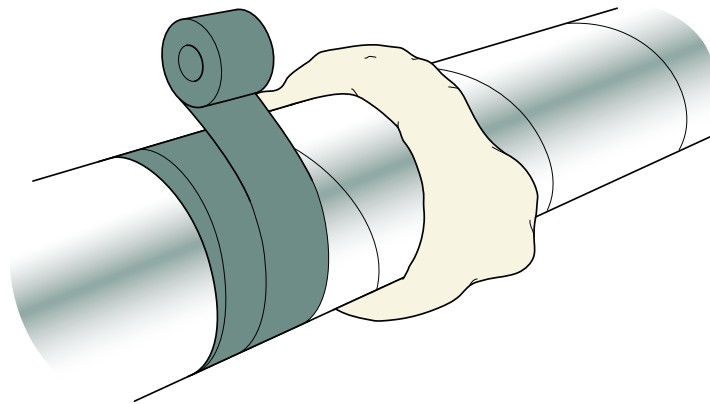
- Wipe the surface to be taped clean



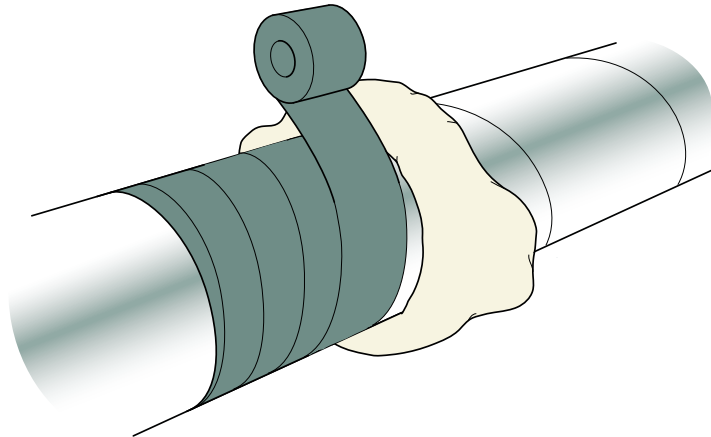
- If necessary, place DENSOMASTIC™ around the coupling to make the contour uniform. Be careful to seal around the coupling, bolt and nut.



- Then wind the tape spirally around the pipe
- Tape a minimum of 50 mm on each side of the coupling
- Press air out of folds and cracks and smooth the surface by hand

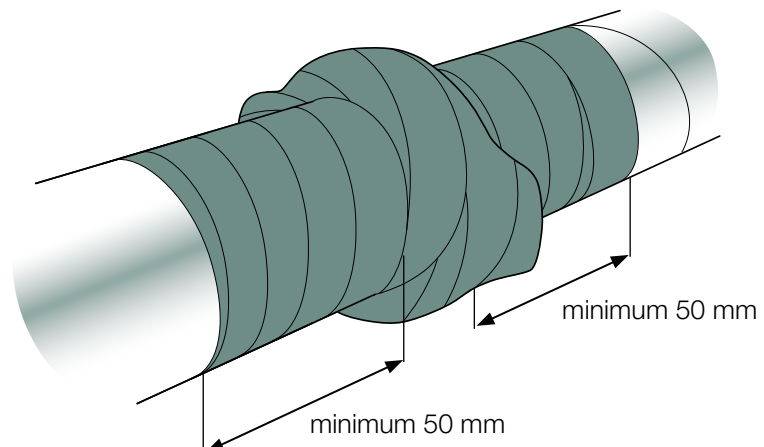


- Overlap approximately 50% and ensure that the overlaps are uniform



G3. Taping other parts.

- DENSOPLAST™ tape may also, if necessary, be used for other non-corrosion-protected parts.
Application – see above.





H. Backfilling

The pipe trench should be backfilled immediately after testing has been approved and the pipes have been taped.

Remember

Remember to follow existing laws, general safety regulations, local regulations and instructions prepared for the specific project.

Make sure also that you have the latest version of the installation manual.

H1. Particle size:

a) Pipe zone

For hot-dip galvanised (HDG) pipes and for FlowMax® pipes with CorroFlo®, easily compactable backfilling material must be used for backfilling throughout the pipe zone.

For example, use round-grain gravel or other material that does not have sharp edges or contain components larger than:

22 mm for $DN \leq 200$

40 mm for $DN > 200$

For pipes coated with RocShield®, sharp-edged gravel or backfilling material with particle size 8/16 may also be used.

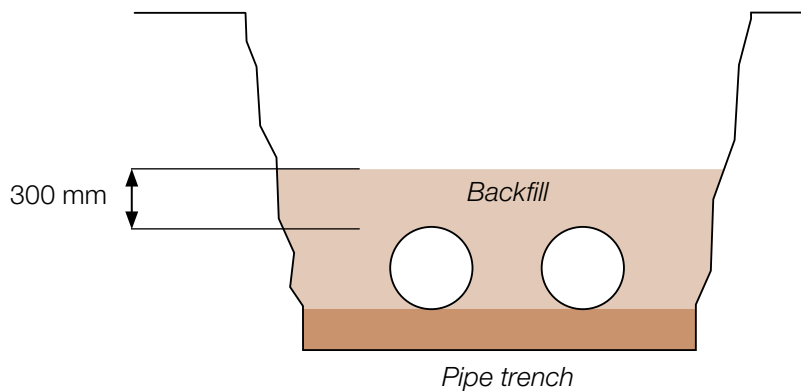
b) Backfilling

For backfilling above the pipe zone, fill containing stones smaller than 300 mm in size may be used.

H2. Pipe zone

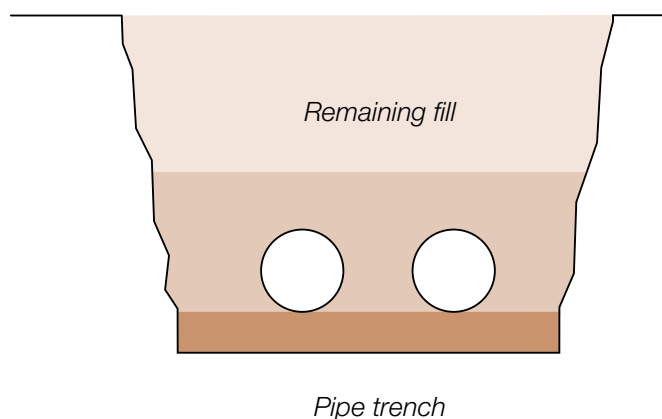
- In the pipe zone, an easily compactable material (see section H) that does not damage the pipeline should be used. The fill should be laid in layers and then compacted sufficiently. The backfill above the highest point of the pipe must be at least 150 mm when packed if a light vibrator is used, and at least 300 mm if heavier compacting machines are used.
- Do not use frozen backfilling material
- Next to anchors and fixed points and adjacent pipes, you must be extra careful to compact the backfilling material
- If you use excavated material for the backfill, you should use a screen scoop, crush scoop* or screen net with a mesh size appropriate to the particle sizes described in section H
- Plastic marker tape should be laid on top of the backfill to facilitate future location of the pipes, etc.

*Type MB, VTN, etc.



H3. Backfilling

- For the rest of the backfill, material should be used that can be compacted according to the relevant requirements. Coarse-grained and/or mixed material types should preferably be used. If excavated materials are of good quality, they may be used for backfilling (section H).
- Stones of up to 300 mm in size may be included in the fill if they are evenly distributed. However, avoid large accumulations.
- If the fill is to be compacted, the largest stone size should not exceed 2/3 of the layer thickness after compaction
- The fill must go up to ground level
- Remember that fill sinks a little over time so add a little more fill than necessary
- Restore the previous ground cover as well as possible





I. Documentation

It is important to document everything carefully.

This facilitates any future extensions, conversions and repairs.

- Check that plan drawings and detailed drawings are correct
- Check that the actual pipe route is documented
- Check that any deviations have been documented

J. Disinfection of drinking water pipes

Water companies must be able to supply drinking water that meets hygiene requirements.

To do so, it may be necessary to disinfect the drinking water pipes.

Follow local and national regulations for the use of disinfectants.

K. Maintenance and repairs

Damage or planned maintenance? No problem
– Alvenius has repair kits for many conceivable situations.

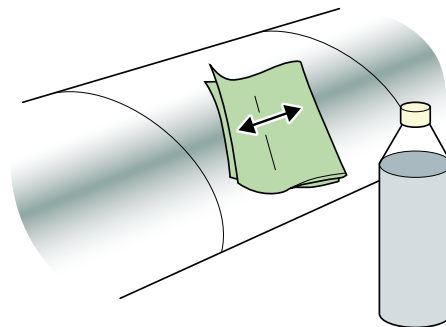
K1. To repair HDG pipes and fittings, you need:

- Zinc paint for cold galvanisation. Other paint may be used, but it must have a dry matter content of at least 92% by weight of metallic zinc.
- Cleaning spirit, for example methanol or similar non-petroleum product
- Coarse abrasive paper (min. 40 grain)

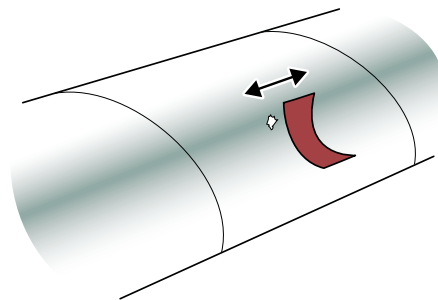


Proceed as follows:

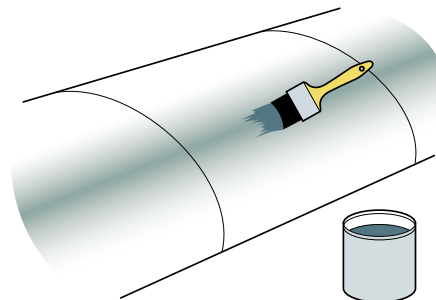
- Damage smaller than 10 cm² can be repaired with zinc paint
- Clean the area with a suitable cleaning spirit, for example methanol or similar non-petroleum product



- Abrade down to the steel with coarse abrasive paper (min. 40 grain)



- Paint with a brush, in several layers if necessary, to a layer thickness of min. 100 µm

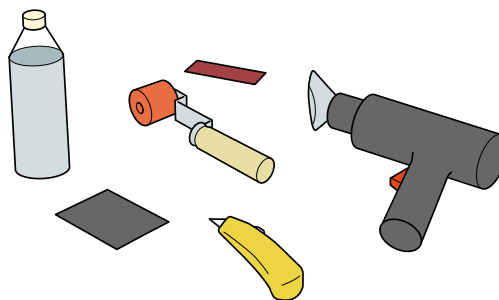


K2. To repair RocShield®/CorroFlo®-coated pipes and fittings, you need:

- CorroFlo® strips
- A knife
- Emery cloth and/or a steel brush
- A clean cloth
- A hot-air gun
- A silicone roller

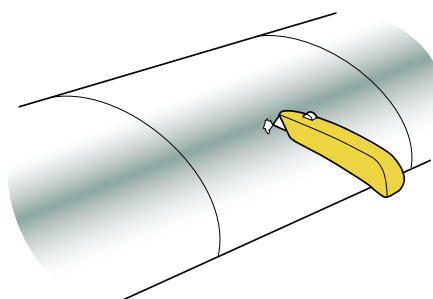
The above items are included in the Alvenius Repair Kit

- Cleaning spirit, for example methanol or similar non-petroleum product

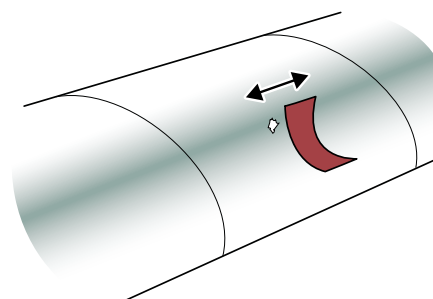


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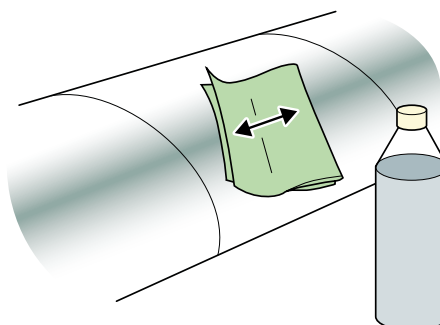
- Cut or scrape away loose plastic around the damage with a sharp knife



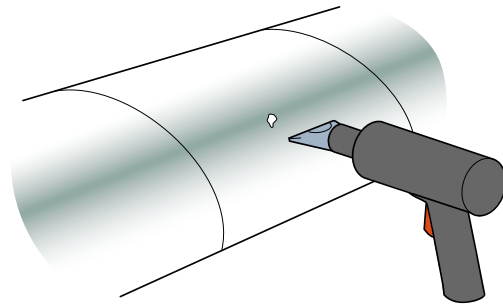
- Polish the scraped surface with emery cloth or a steel brush



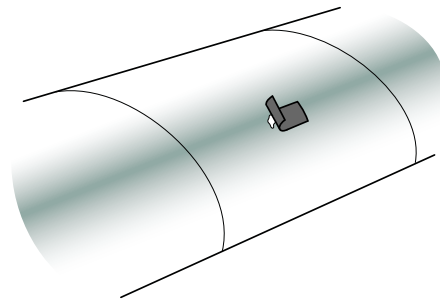
- Clean the surface to be repaired with a suitable cleaning spirit, for example methanol or similar non-petroleum product



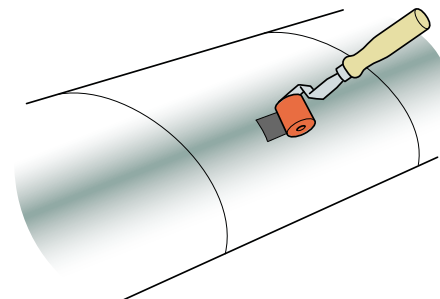
- Heat the surface with a hot-air gun until the plastic around the damage begins to melt. This is shown by the surface becoming brighter



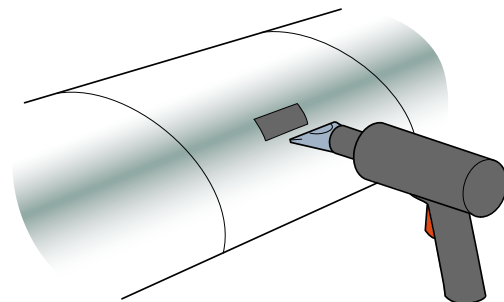
- Apply a strip of CorroFlo® to the hot surface so that it overlaps the plastic around the damage



- Attach the strip properly by rolling it with a silicone roller dipped in water so that any air bubbles disappear



- Finally, heat the repair with the hot-air gun so that the surface becomes brighter and the plastic is firmly attached



Alternative repair methods




- Butyl tape
- Polyurethane-based paints.

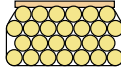

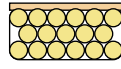
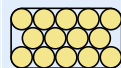
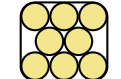





1. Bundles

Pipe CG. CGB. AGS. AGSB CorroFlo® & RocShield®					
DN	Ø [mm]		Width [mm]	High [mm]	Number of pipes
50	60.3	-	-	-	-
65	76.1	-	-	-	-
80	88.9		580	376	15
100	114.3		580	444	12
125	139.7		465	520	9
150	168.3		580	589	9
200	219.1		465	515	4
250	273.0		580	626	4
300	323.9		678	725	4
350	355.6		741	789	4
400	406.4		843	890	4
450	457.2		944	1002	4
500	508.0		1047	1094	4
600	610.0		1871	665	3

Pipe CG. CGB. AGS. AGSB Hot-Dip Galvanized					
DN	Ø [mm]		Width [mm]	High [mm]	Number of pipes
50	60.3		372	194	17
65	76.1		390	238	14
80	88.9		546	274	17
100	114.3		580	317	14
125	139.7		564	385	11
150	168.3		510	464	8
200	219.1		442	467	4
250	273.0		548	273	2
300	323.9		650	325	2
350	355.6		712	356	2
400	406.4		814	407	2
450	457.2		915	458	2
500	508.0		1017	509	2
600	610.0		1221	611	2

Pipe K10 CorroFlo® & RocShield®					
K10	Ø [mm]		Width [mm]	High [mm]	Number of pipes
48	48.3	-	-	-	-
60	60.3	-	-	-	-
76	76.1	-	-	-	-
102	101.6		580	402	15
152	152.4		580	554	9
203	203.0		465	482	4
254	254.0	-	-	-	-
355	355.6	-	-	-	-

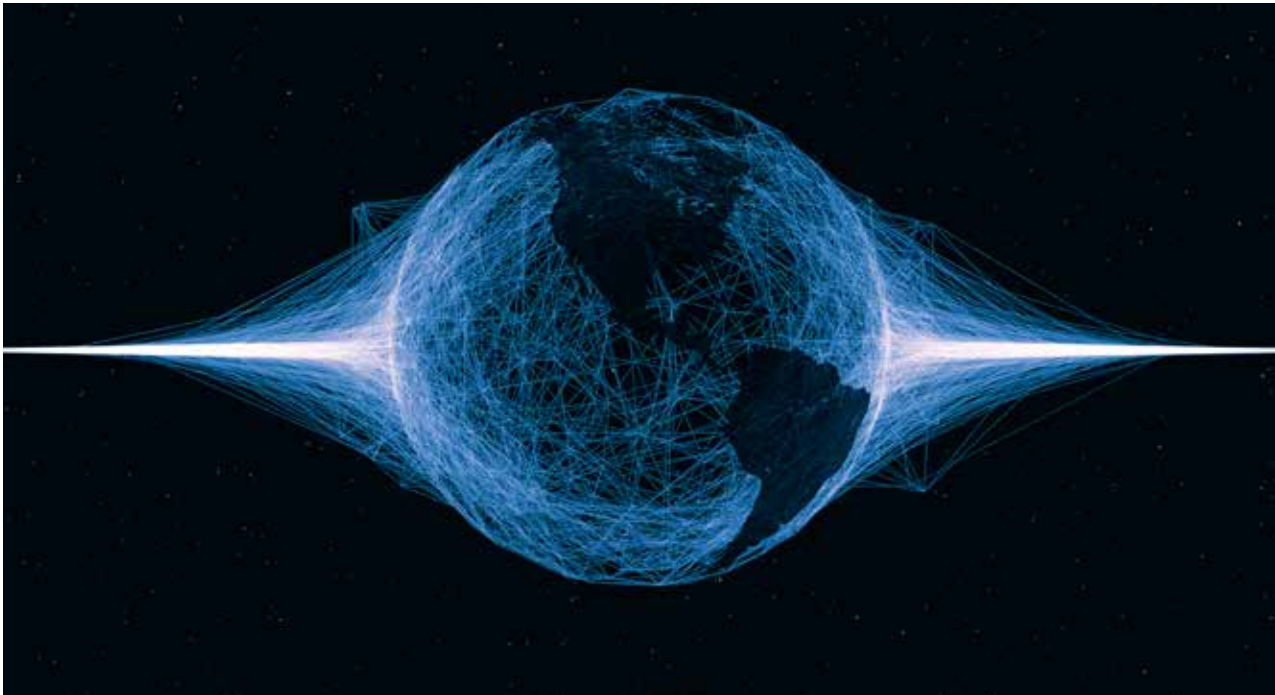
Pipe K10 Hot-Dip Galvanized					
K10	Ø [mm]		Width [mm]	High [mm]	Number of pipes
48	48.3		366	212	26
60	60.3		386	198	17
76	76.1		495	247	17
102	101.6		540	295	14
152	152.4		484	441	8
203	203.0		433	444	4
254	254.0		547	271	2
355	355.6		783	390	2

2. Deflection

Deflection in Coupling K10					
OD Nom.	Min. pipe separation	Min. deflection dec.degrees	Min. deflection dd.mm	Min. mm/m	Min. radius [m] at pipe length 6 [m]
48.3	4.0	4.37°	4°22′	76.4	78.5
60.3	5.0	4.45°	4°27′	77.6	77.2
76.1	5.0	3.47°	3°28′	60.6	99.0
101.6	6.0	3.18°	3°10′	55.5	108.0
133	6.0	2.45°	2°27′	42.8	140.0
152.4	6.0	2.12°	2°7′	37.1	161.5
203	8.0	2.11°	2°7′	36.9	162.4
254	7.0	1.46°	1°28′	25.6	234.0
318	5.0	0.84°	0°50′	14.7	408.0
368	6.0	0.88°	0°52′	15.4	390.0

**Max usable deflection per coupling
(For design and installation)**

Pipe Dimension			OGS Roll grooved (RG)		OGS Cut grooved (CG)		AGS Roll or Cut grooved		Min. radius [m] with pipe length 6 meter		
DN	Inch	mm	Degrees	mm/m	Degrees	mm/m	Degrees	mm/m	OGS RG	OGS CG	AGS
40	1½	48.3	0.97°	16.9	1.93°	33.7			355.6	177.8	
50	2	60.3	0.76°	13.2	1.52°	26.5			453.3	226.7	
65	2½	73.0	0.63°	10.9	1.25°	21.8			550.0	275.0	
		76.1	0.60°	10.5	1.20°	20.9			573.0	286.5	
80	3	88.9	0.52°	9.0	1.03°	18.0			665.4	332.7	
90	3½	101.6	0.45°	7.9	0.90°	15.7			763.9	382.0	
		108.0	0.84°	14.7	1.68°	29.4			408.4	204.2	
100	4	114.3	1.20°	20.9	2.40°	41.9			286.5	143.2	
120	4½	127.0	1.08°	18.8	2.15°	37.5			319.8	159.9	
		133.0	1.01°	17.7	2.03°	35.3			339.5	169.7	
		139.7	0.98°	17.0	1.95°	34.0			352.6	176.3	
125	5	141.3	0.98°	17.0	1.95°	34.0			352.6	176.3	
		152.4	0.90°	15.7	1.80°	31.4			382.0	191.0	
		159.0	0.86°	15.1	1.73°	30.1			398.6	199.3	
		165.1	0.83°	14.4	1.65°	28.8			416.7	208.3	
150	6	168.3	0.81°	14.2	1.63°	28.4			423.1	211.5	
		203.2	0.68°	11.8	1.35°	23.6			509.3	254.6	
200	8	219.1	0.63°	10.9	1.25°	21.8			550.0	275.0	
		254.0	0.54°	9.4	1.08°	18.8			639.6	319.8	
250	10	273.0	0.50°	8.7	1.00°	17.5			687.5	343.8	
		304.8	0.45°	7.9	0.90°	15.7			763.9	382.0	
300	12	323.9	0.43°	7.4	0.85°	14.8			808.9	404.4	
350	14	355.6	0.39°	6.8	0.78°	13.5	0.55°	9.6	887.2	443.6	625.0
375	15	381.0	0.36°	6.3	0.73°	12.7			948.3	474.2	
400	16	406.4	0.34°	5.9	0.68°	11.8	0.48°	8.3	1018.6	509.3	723.7
450	18	457.0	0.30°	5.2	0.60°	10.5	0.43°	7.4	1145.9	573.0	808.9
500	20	508.0	0.28°	4.8	0.55°	9.6	0.38°	6.5	1250.1	625.0	916.7
550	22	559.0	0.24°	4.1	0.48°	8.3	0.38°	6.5	1447.5	723.7	916.7
600	24	610.0	0.23°	3.9	0.45°	7.9	0.31°	5.5	1527.9	763.9	1100.1



Alvenius was founded in 1951 and ever since we have focused on supplying the global market with high-quality quick coupling steel pipe systems.

Today, Alvenius focuses its expertise on the segments tunnels, mines, industry, fire protection and extinguishing, water and wastewater systems and artificial snow making.

We have a presence in Asia, Africa, the Middle East, North and South America, Europe and, of course, our domestic market Sweden.

Our international approach offers many advantages.

Above all else, it means that we understand the conditions and demands of your particular market – wherever that may be.



Member of Boxholm Group



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