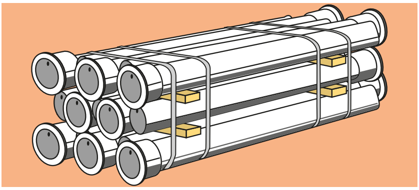
# INSTALLATION GUIDE

PIPELINE SOLUTIONS FOR THE FUTURE

PAM SAINT-GOBAIN

# CONTENTS

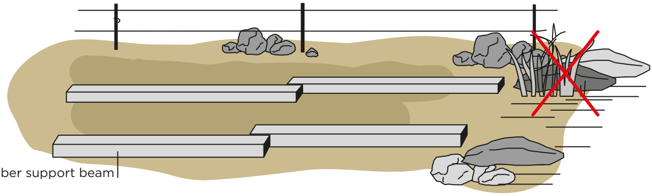
# Storage



*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 PREPARE THE STORAGE AREA

The storage area for pipes, fittings and accessories must be organized for each type of products and also by diameter.




**Do not store** products on unstable or sloping ground.

**Avoid**:

- Marshy ground
- Contaminated ground
- Placing pipes directly on the ground

Support beams, spacers and chocks must be made from construction-grade lumber without any brittle knots. The minimum dimensions are specified in the following tables.

## 2 STORE THE GASKETS

(according to the latest version of ISO 2230)

In particular, **avoid**:

- Removing gaskets from their bags
- Exposing gaskets to sunlight
- High storage temperatures

**Restrict** storage times.

Storage life: in ten years for EPDM (drinking water systems) and seven years for other gaskets in optimal storage conditions (contact us for our recommendations).

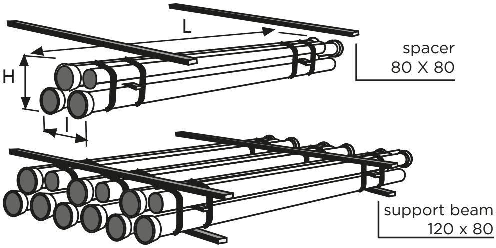
Refer to ISO 2230:2002 - Rubber products - Guidelines for storage

*When installing pipes at low temperatures, bring rings up to a temperature of 20°C to ensure maximum flexibility (such as by immersing them in warm water).*

# Storage

## 3 DN 60 TO 300: DELIVERY IN BUNDLES

**Stack** while keeping the bundles perfectly square. Do not exceed the maximum heights specified in the following table.




**Always ensure a good tension of the bundle straps. Never lift a bundle with hooks or vacuum pads. Use slings that support the bundle from underneath (the straps used to secure the bundles are not slings and are not designed to withstand the load).**

## Bundle stack heights

Maximum number of stackable bundles

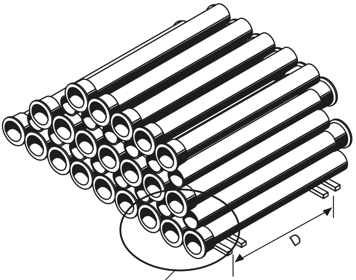
| Type of pipe | DN | Number of bundles on the ground | Max. no. stacked bundles | Bundle contents and dimensions | | | |
|---|---|---|---|---|---|---|---|
| | | | | L m | W m | H m | Bundle weight (kg) |
| NATURAL INTEGRAL | 60 (24 pipes/bundle) | 6 | 6 | 6.3 | 0.54 | 0.49 | 1411 |
| | 80 (15 pipes/bundle) | 5 | 6 | 6.3 | 0.57 | 0.42 | 1148 |
| | 100 (15 pipes/bundle) | 5 | 6 | 6.3 | 0.67 | 0.50 | 1398 |
| | 125 (12 pipes/bundle) | 4 | 5 | 6.3 | 0.65 | 0.58 | 1380 |
| | 150 (9 pipes/bundle) | 3 | 5 | 6.3 | 0.59 | 0.66 | 1272 |
| | 200 (6 pipes/bundle) | 3 | 5 | 6.3 | 0.75 | 0.56 | 1190 |
| | 250 (4 pipes/bundle) | 2 | 4 | 6.3 | 0.63 | 0.67 | 1044 |
| | 300 (4 pipes/bundle) | 2 | 4 | 6.3 | 0.74 | 0.77 | 1319 |
| BLUTOP TOPAZ | 75 (30 pipes/bundle) | 4 | 6 | 6.3 | 0.534 | 0.564 | 927 |
| | 90 (30 pipes/bundle) | 3 | 5 | 6.3 | 0.635 | 0.605 | 1095 |
| | 110 (20 pipes/bundle) | 3 | 4 | 6.3 | 0.608 | 0.621 | 904 |
| | 125 (20 pipes/bundle) | 3 | 4 | 6.3 | 0.668 | 0.697 | 1032 |
| | 140 (12 pipes/bundle) | 3 | 4 | 6.3 | 0.631 | 0.531 | 902 |
| | 160 (12 pipes/bundle) | 3 | 5 | 6.3 | 0.626 | 0.71 | 825 |

# Storage

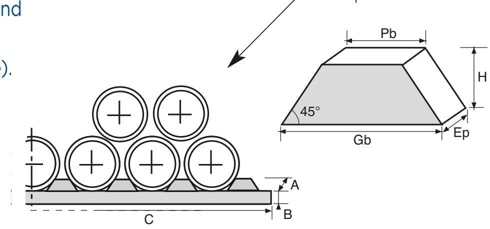
## 4 DN 350 TO 2000: LOOSE DELIVERIES

**Stack** pipes into pyramids or use spacers **without exceeding the maximum heights** specified in the tables on page 6 to avoid damaging the products.

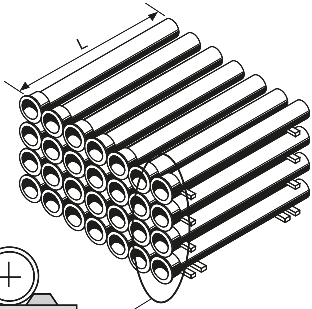
### Stacking in pyramids



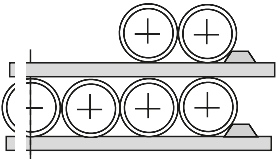

**Nail** chocks to the support beams on the ground (at the ends and between each pipe).

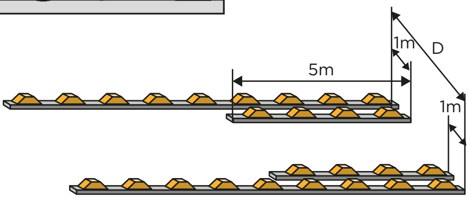



### Stacking with spacers




**Nail** chocks to the end of each spacer.






*To improve storage safety, add two extra support beams at the ends of the stack as shown above.*

# Storage

## Bundle stack heights (DN 350 to 2000)

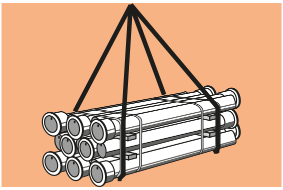
| Pyramid - Standard Pipes | | |
|---|---|---|
| **DN** | **Number of layers** | **Stack height** (m) |
| **350** | 13 | 3.90 |
| **400** | 11 | 3.82 |
| **450** | 10 | 3.92 |
| **500** | 9 | 3.92 |
| **600** | 7 | 3.72 |
| **700** | 6 | 3.74 |
| **800** | 5 | 3.61 |
| **900** | 4 | 3.31 |
| **1000** | 4 | 3.67 |
| **1100** | 3 | 3.10 |
| **1200** | 3 | 3.38 |
| **1400** | 3 | 3.95 |
| **1500** | 2 | 2.95 |
| **1600** | 2 | 3.13 |
| **1800** | 2 | 3.52 |
| **2000** | 2 | 3.91 |

| Spacers - Standard Pipes | | |
|---|---|---|
| **DN** | **Number of layers** | **Stack height** (m) |
| 350 | 6 | 2.81 |
| 400 | 6 | 3.12 |
| 450 | 5 | 2.87 |
| 500 | 5 | 3.13 |
| 600 | 4 | 2.93 |
| 700 | 4 | 3.36 |
| 800 | 3 | 2.89 |
| 900 | 3 | 3.18 |
| 1000 | 3 | 3.51 |
| 1100 | 2 | 2.58 |
| 1200 | 2 | 2.79 |
| 1400 | 2 | 3.21 |
| 1500 | 2 | 3.42 |
| 1600 | 2 | 3.53 |

## Stack chocks (DN 350 to 2000)

| DN | Trapezoidal chocks | | | | Support beams | | | |
|---|---|---|---|---|---|---|---|---|
| | **Gb** mm | **Pb** mm | **Hc** mm | **Ep** mm | **A** mm | **B** mm | **C** m | **D** m |
| **350** | 330 | 170 | 80 | 80 | 100 | 100 | 5 | 4 |
| **400** | 360 | 200 | 80 | 80 | 100 | 100 | 5 | 4 |
| **450** | 400 | 200 | 100 | 80 | 100 | 100 | 5 | 4 |
| **500** | 430 | 230 | 100 | 80 | 100 | 100 | 5 | 4 |
| **600** | 490 | 250 | 120 | 80 | 100 | 100 | 5 | 4 |
| **700** | 570 | 330 | 120 | 100 | 120 | 100 | 5 | 4.5 |
| **800** | 640 | 340 | 150 | 100 | 120 | 100 | 5 | 4.5 |
| **900** | 710 | 410 | 150 | 100 | 130 | 120 | 5 | 4.5 |
| **1000** | 780 | 380 | 200 | 100 | 130 | 120 | 5 | 4.5 |
| **1100** | 850 | 450 | 200 | 100 | 130 | 120 | 5 | 5 |
| **1200** | 910 | 510 | 200 | 120 | 150 | 120 | 5 | 5 |
| **1400** | 1010 | 610 | 200 | 120 | 150 | 120 | 5 | 5 |
| **1500** | 1080 | 580 | 250 | 120 | 150 | 120 | 5 | 5 |
| **1600** | 1140 | 540 | 300 | 120 | 150 | 120 | 5 | 5 |
| **1800** | 1300 | 700 | 300 | 150 | 180 | 120 | 5 | 5 |
| **2000** | 1350 | 750 | 300 | 150 | 180 | 120 | 5 | 5 |

# Handling



*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 BASIC ADVICE

To avoid damaging the products:

- **Use** lifting equipment that is capable of supporting the weights specified in the tables below.
- **Prevent** pipes from banging or rubbing against the trailer's sides and pillars.
- **Lift and move** the pipes gently to prevent any swinging.
- **Do not drag** pipes across the ground and do not let pipes fall to the ground.

## 2 BUNDLE WEIGHTS AND DIMENSIONS

| DN | No. layers x no. pipes | L | W | H | Bundle weight NATURAL/ BLUTOP | INTEGRAL/ TOPAZ bundle weight |
|---|---|---|---|---|---|---|
| | | m | m | m | kg | kg |
| **60** | 4 x 6 | 6.33 | 0.54 | 0.49 | 1356 | |
| **75** | 5 x 6 | 6.3 | 0.51 | 0.59 | 921 | 921 |
| **80** | 3 x 5 | 6.33 | 0.56 | 0.42 | 1098 | 1188 |
| **90** | 5 x 6 | 6.3 | 0.59 | 0.63 | 1122 | 1122 |
| **100** | 3 x 5 | 6.33 | 0.67 | 0.50 | 1337 | 1459 |
| **110** | 4 x 5 | 6.3 | 0.63 | 0.71 | 962 | 962 |
| **125** | 3 x 4 | 6.33 | 0.65 | 0.58 | 1040 | 1447 |
| **125** | 4 x 5 | 6.3 | 0.68 | 0.65 | 1034 | 1034 |
| **140** | 4 x 4 | 6.3 | 0.63 | 0.53 | 902 | 902 |
| **150** | 3 x 3 | 6.3 | 0.59 | 0.66 | 1196 | 1290 |
| **160** | 3 x 4 | 6.3 | 0.63 | 0.63 | 901 | 907 |
| **200** | 2 x 3 | 6.3 | 0.75 | 0.56 | 1087 | 1134 |
| **250** | 2 x 2 | 6.3 | 0.63 | 0.67 | 1013 | 984 |
| **300** | 2 x 2 | 6.3 | 0.74 | 0.77 | 1333 | 1234 |

NATURAL/ INTEGRAL BLUTOP/ TOPAZ

# Handling

## 3 PIPE UNIT WEIGHT

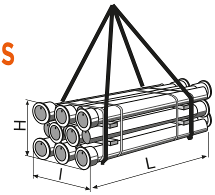
| DN | pipe length (m) | | pipe weight (kg) | | | | |
|---|---|---|---|---|---|---|---|
| | working | overall | NATURAL CLASSIC | BLUTOP TOPAZ | UNIVERSAL All versions | | INTEGRAL PLUVIAL |
| **60** | 6.00 | 6.09 | 56.5 | | | | |
| **75** | 6.00 | 6.11 | | 30.6 | | | |
| **80** | 6.00 | 6.09 | 73.2 | | 94.8 | C100 | 79.8 |
| **90** | 6.00 | 6.13 | | 37.2 | | | |
| **100** | 6.00 | 6.09 | 89.10 | | 116.7 | C100 | 97.3 |
| **110** | 6.00 | 6.15 | | 45.6 | | | |
| **125** | 6.00 | 6.10 | 109.8 | | 144.3 | C64 | 120.0 |
| **125** | 6.00 | 6.16 | | 53.4 | | | |
| **140** | 6.00 | 6.18 | | 60.0 | | | |
| **150** | 6.00 | 6.10 | 132.9 | | 173.8 | C64 | 143.3 |
| **160** | 6.00 | 6.20 | | 70.8 | | | |
| **200** | 6.00 | 6.10 | 181.2 | | 239.2 | C64 | 192.1 |
| **250** | 6.00 | 6.10 | 253.3 | | 311.4 | C50 | 254.9 |
| **300** | 6.00 | 6.11 | 333.3 | | 401.3 | C50 | 308.1 |
| **350** | 6.00 | 6.11 | 413.0 | | 498.5 | C40 | 393.4 |
| **400** | 6.00 | 6.11 | 476.4 | | 586.5 | C40 | 465.0 |
| **450** | 6.00 | 6.11 | 562.8 | | 700.3 | C40 | 506.5 |
| **500** | 6.00 | 6.12 | 666.9 | | 831.2 | C40 | 632.4 |
| **600** | 6.00 | 6.12 | 903.4 | | 1121.2 | C40 | 821.4 |
| **700** | 7.00 | 7.15 | 1295.1 | | 1368.0 | C30 | 1383.8 |
| **800** | 7.00 | 7.15 | 1591.7 | | 1915.5 | C30 | 1692.9 |
| **900** | 7.00 | 7.15 | 1940.2 | | 2332.1 | C30 | 2025.7 |
| **1000** | 7.00 | 7.16 | 2323.0 | | 2696.6 | C30 | 2386.5 |
| **1000** | 8.27 | 8.43 | 2712.3 | | | C30 | 2787.3 |
| **1100** | 8.27 | 8.43 | 3238.1 | | | | 3605.8 |
| **1200** | 8.26 | 8.43 | 3775.9 | | 4250.8 | C25 | 4154.9 |
| **1400** | 8.19 | 8.44 | 5182.5 | | 5601.8 | C25 | 5546.9 |
| **1500** | 8.18 | 8.45 | 5877.8 | | 6330.8 | C25 | 6240.1 |
| **1600** | 8.18 | 8.45 | 6589.4 | | 7069.4 | C25 | 6946.4 |
| **1800** | 8.17 | 8.45 | 8109.7 | | 8602.4 | C25 | 8444.9 |
| **2000** | 8.17 | 8.45 | 9837.6 | | 10486.1 | C25 | 10099.3 |

The preferred classes for NATURAL and CLASSIC pipes are as follows:
-C40 for DN 60 to 300
-C30 for DN 350 to 600
-C40 for DN 700 to 2000

## 4 DN 60 TO 300: LIFTING BUNDLES

**Use** textile slings suited to the load.

**Ensure** that the slings support the bundle from underneath.



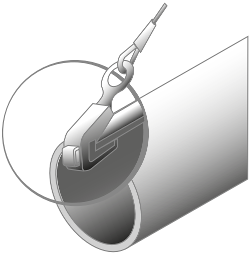

**Caution! Never lift a bundle with hooks or vacuum pads. The straps used to secure the bundles are not designed to withstand the load.**

# Handling

## 4 DN 350 TO 2000: LIFTING BY THE ENDS

**Use** hooks that are suited to the load. Hooks must offer a secure attachment and a **protective surface*** (such as polyamide).

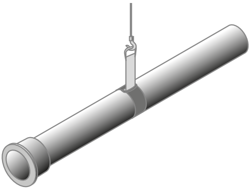
**Hooks available on order.*



*Caution: hooks are designed to lift single pipes and not a bundle of several pipes.*

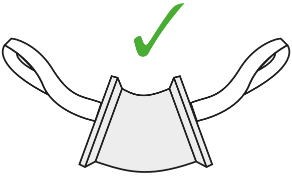
## 5 DN 350 TO 2000: LIFTING BY THE PIPE BARREL

**Use** a **textile sling** suited to the load.
**Attach** the belt to the **center of gravity** and ensure that it does not slip.

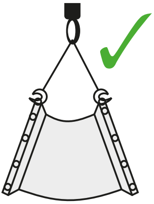


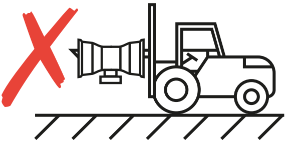
## 6 HANDLING FITTINGS

**Use** textile slings to avoid damaging the internal lining and the external coating of the fittings.

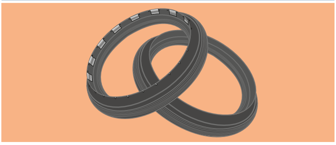
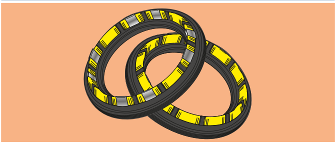



*Flanged fittings can be lifted using hooks attached to the holes in the flanges.*





# Blutop / Blutop Vi / Topaz / Topaz Vi joint

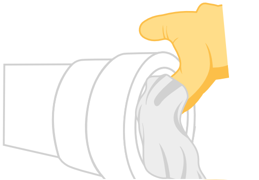
| One-piece gaskets | Plastic segment gaskets |
|---|---|
|  |  |

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 CLEAN

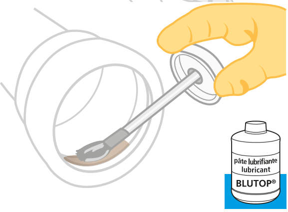
Carefully **clean** the inside of the socket, the spigot and the gasket.

**Keep all parts clean** until assembly has been completed.



## 2 LUBRICATE

Using a clean paintbrush, **lubricate** the fitting's gasket groove.

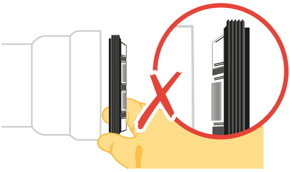


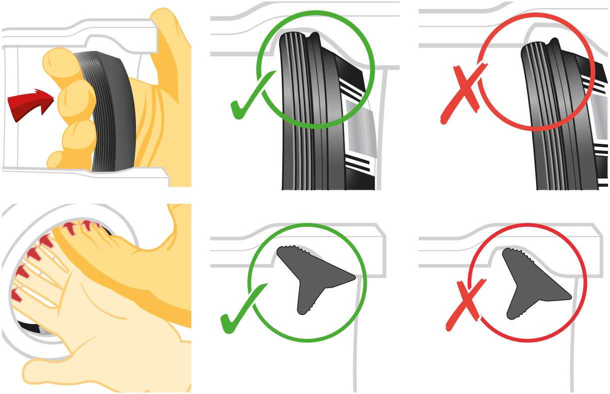

## 3 INSERT THE GASKET

**Ensure** that the gasket is properly seated in its housing.

Always **pull** the gasket towards the outside to ensure that it is correctly positioned.

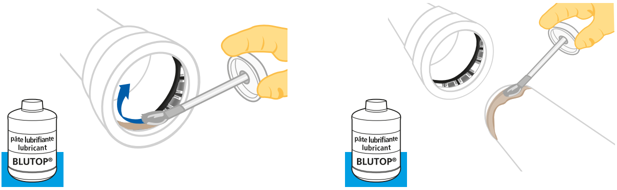
**Ensure** that the entire surface of the gasket is pressed in all points of the circumference





# Blutop / Blutop Vi / Topaz / Topaz Vi joint

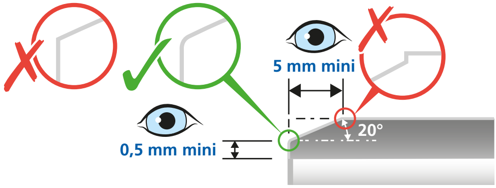
## 4 LUBRICATE




The inserted gasket and the spigot must be lubricated with Blutop lubricant paste (ref. **214616**).

## 5 CHECK THE CHAMFER

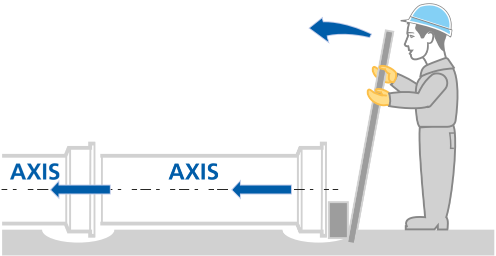
If the pipe needs to be cut, chamfer the edge as shown below. After chamfering the edge, there should not be any sharp edges.




## 6 ASSEMBLE

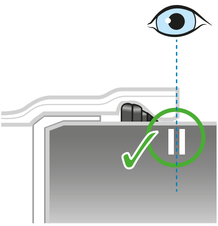
The pipe or fitting must be **perfectly centered and aligned** with the centerline of the installed pipe.

**Refer** to the "Assembly equipment" guide.



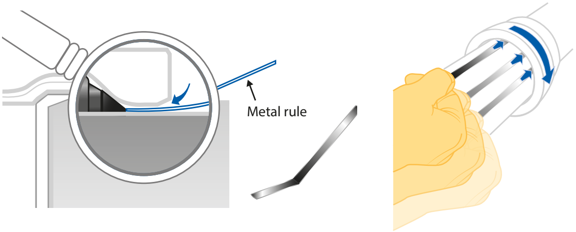

## 7 CHECK THE DEPTH

After assembly, only a single line should still be visible.



# Blutop / Blutop Vi / Topaz / Topaz Vi joint

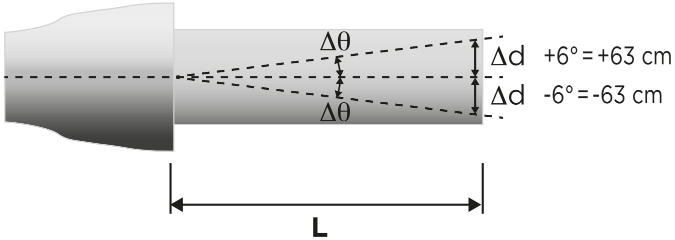
## 8 CHECK THE POSITION OF THE GASKET




Before deflecting the joint, insert a metal rule into the socket gap and ensure that the depth of penetration is the same around the whole circumference.
PAM metal rule ref: **241031**.

## 9 INFORMATION

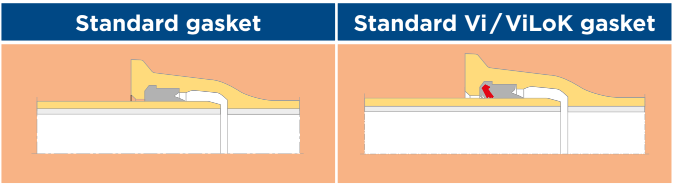
### Angular deflection




Pipes must be connected together while keeping them perfectly aligned with their centerlines.

**The joint must only be deflected when fully assembled and before pressurizing the system.**

# Standard joint / Standard Vi / ViLoK joint




*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

Using the marking as a reference, **check** that the gasket is suited to the project specifications:

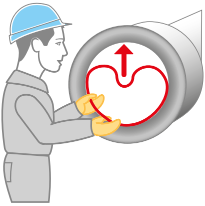

- DN
- Material:
  - For drinking water: EPDM
  - For sewage: NBR + yellow marking (stripes or dots)
- Storage life: ten years for EPDM (drinking water systems) and seven years for other joints subject to optimal storage conditions (contact us for our recommendations).
- Refer to ISO 2230:2002 - Rubber products - Guidelines for storage

## 1 CLEAN

Carefully **clean** the inside of the socket, the spigot and the gasket.

**Keep** all parts clean until assembly has been completed.

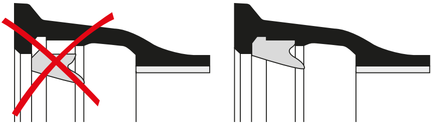
## 2 INSERT THE GASKET



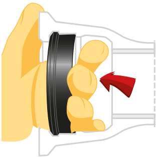
**Insert** the joint ring before the pipe is laid in the trench.

## 3 CHECK THE GASKET

**Ensure** that the gasket is properly seated in its groove and especially on the inner loop.



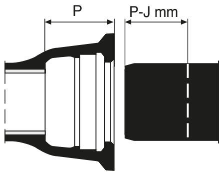

Always **pull** the gasket towards the outside to ensure that it is correctly positione d.



# Standard joint / Standard Vi / ViLoK joint

## 4 MARK THE INSERTION DEPTH

(if there is no original marking, i.e. if the pipe has been cut or a spigot is used from a different range).




**Mark** the spigot at a distance of P-J mm.

*Caution: failure to adhere to the insertion depth will affect the performance of any angular deflections.*

| **DN** (mm) | **P** (mm) | **J** (mm) | **P-J** (mm) |
|---|---|---|---|
| **60** | 89.5 | 15 | 74.5 |
| **80** | 92.5 | | 77.5 |
| **100** | 94.5 | | 79.5 |
| **125** | 97.5 | | 82.5 |
| **150** | 100.5 | | 85.5 |
| **200** | 106.5 | | 91.5 |
| **250** | 105.5 | | 90.5 |
| **300** | 107.5 | | 92.5 |
| **350** | 110.5 | 20 | 90.5 |
| **400** | 112.5 | | 92.5 |
| **450** | 115.5 | | 95.5 |
| **500** | 117.5 | | 97.5 |
| **600** | 132.5 | | 112.5 |
| **700** | 192 | 25 | 167.0 |
| **800** | 197 | | 172.0 |
| **900** | 200 | | 175.0 |
| **1000** | 203 | 30 | 173.0 |
| **1100** | 225 | | 195.0 |
| **1200** | 235 | | 205.0 |
| **1400** | 245 | 40 | 205.0 |
| **1500** | 265 | | 225.0 |
| **1600** | 265 | | 225.0 |
| **1800** | 275 | | 235.0 |
| **2000** | 290 | | 250.0 |

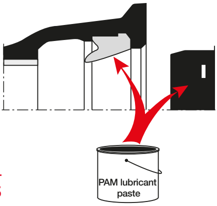
# Standard joint / Standard Vi / ViLoK joint

## 5 LUBRICATE

**Coat**:
- The exposed surface of the gasket
- The pipe chamfer and spigot

Never lubricate the interior of the gasket groove.

Apply a sufficient amount of lubricant paste with a paintbrush (refer to the quantities table on the next page).




Comply with the recommended applications specified in the safety data sheets available in the Downloads section on www.pamline.com.

### DIFFERENT MARKINGS

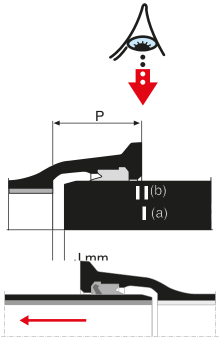
| DN 60 to 600 and DN 1400 to 2000 | DN 700 to 1200 |
|---|---|

## 6 ASSEMBLE

**Center** and **introduce** the spigot into the perfectly aligned socket:

(a) Up to the marked line corresponding to "P-J mm"

(b) Up to the area between the white lines




**DN 700 to 1200: three lines**

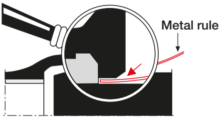
- After joining two pipes (spigot and socket), only one line can be seen.
- After joining a pipe with a fitting, two lines can be seen.
- For STD Vi and ViLoK joints, extend the gasket by pulling the spigot out of the socket until correctly seated.

Failure to observe the insertion depths could lead to the risk of leaks.

## 7 CHECK THE ASSEMBLY

Before angular deflection, insert a metal rule into the socket gap and ensure that the depth of penetration is the same around the whole circumference.

PAM metal rule ref: **241031**

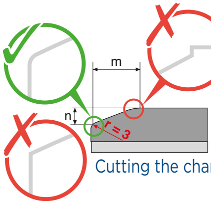



*- In cold temperatures and especially with small diameters, store joints in a heated room.*
*- Gaskets can be soaked in water for easier set up.*

# Standard joint / Standard Vi / ViLoK joint

## 8 INFORMATION

### Cuts and chamfers



Cutting the chamfer

| DN | **m** (mm) | **n** (mm) |
|---|---|---|
| **60 to 600** | 9 | 3 |
| **700 to 1200** | 15 | 5 |
| **1400 to 1600** | 20 | 7 |
| **1800 to 2000** | 23 | 8 |

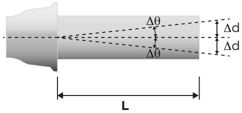
### Lubricant paste

| Number of boxes for 100 joints | | | | | | | |
|---|---|---|---|---|---|---|---|
| **DN** | **No.** | **DN** | **No.** | **DN** | **No.** | **DN** | **No.** |
| **60** | 2 | **250** | 4 | **600** | 9 | **1200** | 24 |
| **80** | 2 | **300** | 5 | **700** | 13 | **1400** | 40 |
| **100** | 2 | **350** | 5 | **800** | 15 | **1500** | 45 |
| **125** | 2 | **400** | 6 | **900** | 17 | **1600** | 50 |
| **150** | 3 | **450** | 6 | **1000** | 19 | **1800** | 60 |
| **200** | 3 | **500** | 7 | **1100** | 21 | **2000** | 71 |

### Angular deflection

Pipes must be connected together while keeping them perfectly aligned with their centerlines.

**The joint must only be deflected when fully assembled and before pressurizing the system.**

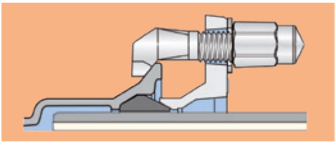
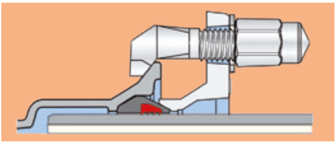



| Maximum admissible deflection: STD pipes | | | |
|---|---|---|---|
| **DN** | Δ θ (°) | **L** m | Δ **d** (cm) for L |
| **60 to 300** | 5 | 6 | 52 |
| **350 to 600** | 4 | 6 | 42 |
| **700 to 1000** | 4 | 7 | 49 |
| **1100 to 1200** | 4 | 8 | 56 |
| **1400 to 1600** | 3 | 8 | 42 |
| **1800** | 2.5 | 8 | 35 |
| **2000** | 2 | 8 | 28 |

| Maximum admissible deflection: STD Vi / VILOK pipes | | | |
|---|---|---|---|
| **DN** | Δ θ (°) | **L** m | Δ **d** (cm) for L |
| **60 to 150** | 5 | 6 | 52 |
| **200 to 250** | 4 | 6 | 42 |
| **300 to 350** | 3 | 6 | 31 |
| **400 to 600** | 2 | 6 | 21 |
| **700** | 2 | 7 | 24 |

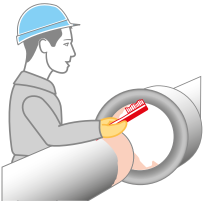
# Express New joint / Express New Vi joint

## DN 60 to 150

| Express New joint | Express New Vi joint |
|---|---|
|  |  |

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 CLEAN

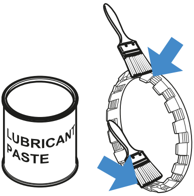


Carefully **clean** the inside of the socket, the spigot and the gasket.

Keep all parts clean until assembly has been completed.

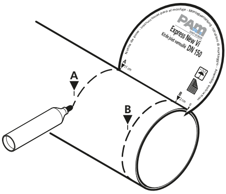
## 2 LUBRICATE

Using a clean paintbrush, **lubricate** the inside of the socket, the inside of the gland and the gasket.



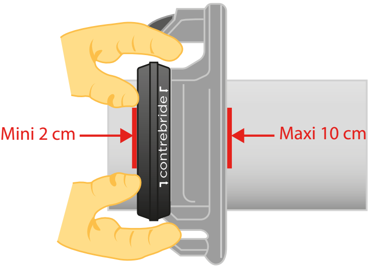

## 3 MARK THE INSERTION DEPTH

**Marking** from the spigot A=10cm and B=2cm with a tape measure or with the template provided.




*After cutting a pipe, Express New and Express New Vi joints are directly fitted, no need to recreate the chamber on the spigot, a deburring is needed.*

## 4 MOUNT THE ELEMENTS ON THE SPIGOT

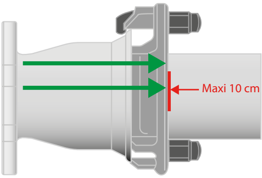



**The joint must be properly installed** (gland position is specified)

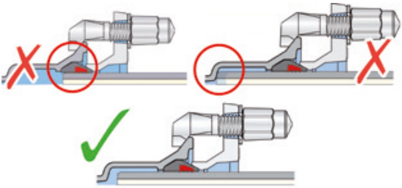
# Express New joint / Express New Vi joint

## 5 ASSEMBLE THE ELEMENTS

**Joint** the socket and the spigot (with gland positon according to the mark)




## ENSURE THE CORRECT DEPTH

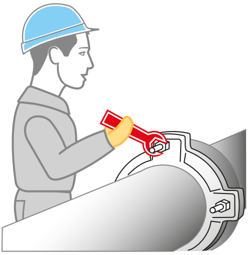


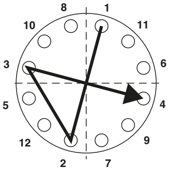
## 6 TIGHTEN THE BOLTS

**Tighten** the bolts with a torque wrench in successive passes.

Bolt torque values:

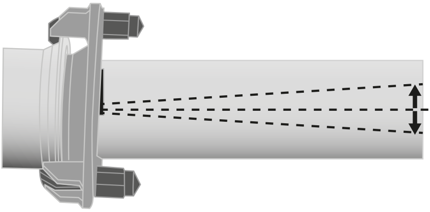
•**Pre-tightening: 2 daN.m**





# Express New joint / Express New Vi joint

## Angular deflection




*Values (for guidance only) for a 6-meter pipe from DN 60 to DN 150.*

The pipe must be perfectly aligned with the fitting.
**The pipe must be deflected after pre-tightening but before final tightening.**

•**Final tightening DN60 to DN150:**

**Express New 14 m.daN**
**Express New VI 10 m.DaN**

Express New and Express New Vi bolts need to be tightened with a **size 27 ring spanner**.

## 7 INFORMATION

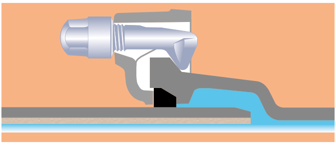
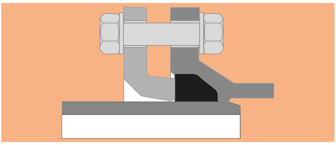
**Check** that the nuts are tight:

•When installing several successive fittings
•After hydraulic testing

**Re-tighten** if necessary.

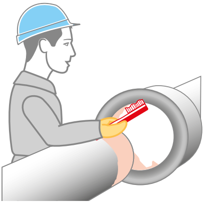

Failure to observe the tightening rules could lead to the risk of leaks.

# Express joint

| DN ≤ 1200 | DN ≥ 1400 |
|---|---|
|  |  |

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

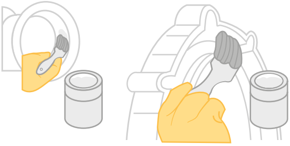
## 1 CLEAN



Carefully **clean** the inside of the socket, the spigot and the gasket.

**Keep** all parts clean until assembly has been completed.

## 2 LUBRICATE

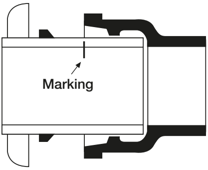


Using a clean paintbrush, **lubricate** the fitting's gasket groove and the inside of the gland.

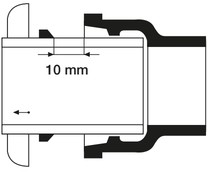
## 3 MARK THE INSERTION DEPTH

**Introduce** the spigot fully while ensuring that both parts are perfectly aligned.

**Mark** a line to represent the insertion depth.




**Place** the gasket approximately 10 mm from the line. It can be done easily by using light lubrification.

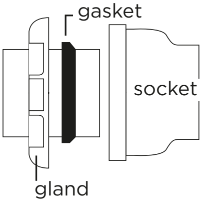



*After cutting a pipe, Express joints can be mounted directly, i.e. there is no need to chamfer the spigot; only deburring is recommended.*

# Express joint

## 4 MOUNT THE ELEMENTS

**Position the beveled edge of the gasket towards the fitting's socket.**

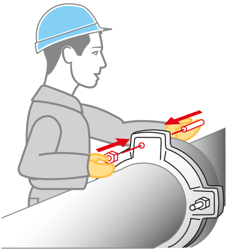



## 5 ASSEMBLE

**Slide** the gasket onto the pipe barrel until properly seated and bring the gland into contact.

**Ensure** that the gland and gasket are perpendicular to the pipe centerline.

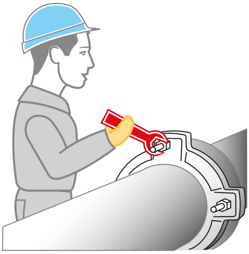
**Insert** the bolts and **pre-tighten while keeping the joint in alignment.**



## 6 TIGHTEN THE BOLTS

**Check** the position of the gland.

**Tighten** the bolts with a torque wrench in successive passes as shown in the diagram.

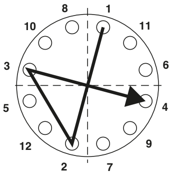


**Bolt** torque values:

•DN 200 to 400: 12 daN.m Ø22 bolts:

•DN 400 to 1200: 30 daN.m Ø27 bolts:

**Check that bolts are properly tightened before hydraulic testing. Re-tighten if necessary.**




**Comply with the insertion depths, otherwise the required angular deflection might not be achieved.**

Tools required for tightening bolts:

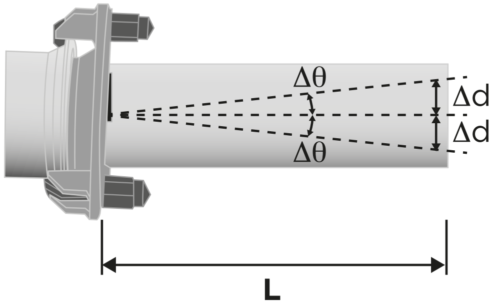
•Ø22: 30 spanner

•Ø27: 35 spanner

# Express joint

## 7 INFORMATION

### Angular deflection



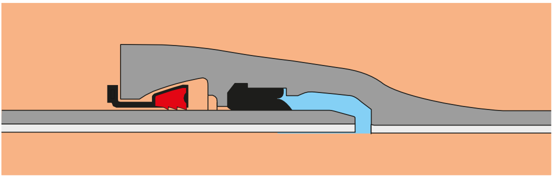

Pipes must be connected together while keeping them perfectly aligned with their centerlines.

**The pipe must be deflected after pre-tightening but before final tightening.**

| Maximum admissible deflection: | | | |
|---|---|---|---|
| **DN** | Δ θ (°) | **L** m | Δ **d** (cm) for L |
| **200 to 300** | 4° | 6 | 42 |
| **350 to 600** | 3° | 6 | 32 |
| **700 to 800** | 2° | 7 | 25 |
| **900 to 1000** | 1°5 | 7 | 19 |
| **1000 to 1200** | 1°5 | 8 | 21 |
| **1400** | 3° | 8 | 42 |
| **1500 to 1600** | 2° | 8 | 28 |
| **1800** | 1.5° | 8 | 21 |
| **2000** | 1° | 8 | 14 |

# UNIVERSAL Vi joint

**Range of DN 80 to 600 pipes and fittings**



This joint requires the use of **UNIVERSAL STANDARD pipes** featuring a double chamber **socket** to receive the:

•**STANDARD gasket,** which ensures a watertight seal

•**UNIVERSAL Vi locking ring with inserts**; the inserts anchor the assembly during interlocking.

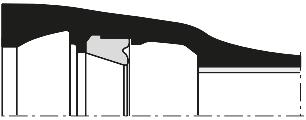
## 1 CLEAN

Carefully **clean** the inside of the socket, the spigot, the gasket and the locking ring.

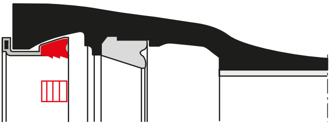
**Keep** all parts clean until assembly has been completed.

## 2 POSITION THE RINGS

The joint must be **perfectly aligned** during assembly.



STANDARD gasket

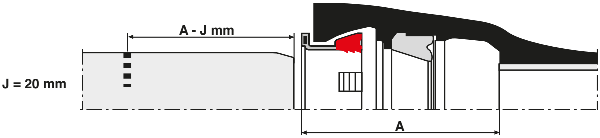


UNIVERSAL Vi locking ring with inserts

## 3 MARK THE INSERTION DEPTH

Mark the spigot if there is no original marking.

| DN | A (mm) | DN | A (mm) | DN | A (mm) | DN | A (mm) |
|---|---|---|---|---|---|---|---|
| **80** | 147 | **150** | 155 | **300** | 187 | **450** | 198 |
| **100** | 147 | **200** | 162 | **350** | 192 | **500** | 210 |
| **125** | 147 | **250** | 173 | **400** | 186 | **600** | 217 |

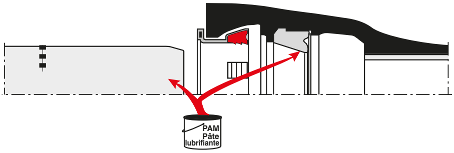


# UNIVERSAL Vi joint

## 4 LUBRICATE

Using the lubricant paste, **coat** the:

•**Exposed side** of the gasket
•**Chamfer** and **spigot**

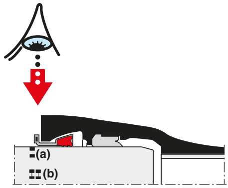



## 5 ASSEMBLE

**Center** and **introduce** the spigot into the perfectly aligned socket:

(a) **Up to the line corresponding to A-20 mm** in case of a cut pipe or standard spigot

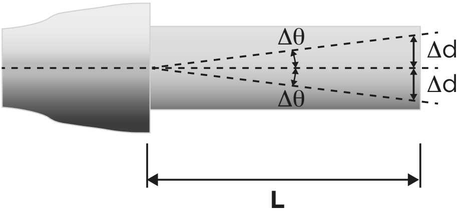
(b) **Between the two lines** if they are original markings on the Universal pipes




## 6 INFORMATION

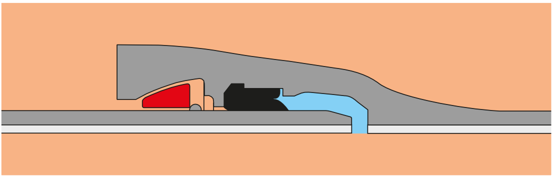
### Angular deflection

| Maximum admissible deflection: | | | |
|---|---|---|---|
| **DN** | Δ θ (°) | **L** m | Δ **d** (cm) for L |
| **80 to 450** | 3° | 5.95 | 32 |
| **500** | 2° | 5.97 | 21 |
| **600** | 2° | 5.97 | 21 |



# UNIVERSAL Ve joint

**Range of DN 100 to 1600 pipes and fittings**



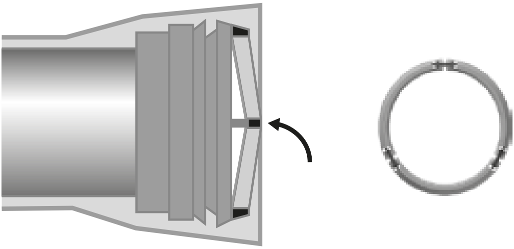
This joint requires the use of UNIVERSAL STANDARD pipes featuring:

- A **weld bead** on the spigot
- A double chamber socket to receive the **STANDARD gasket** and the **UNIVERSAL Ve locking ring**

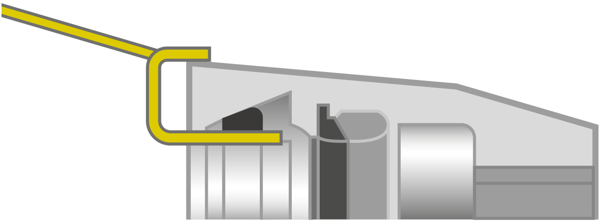
## 1 POSITION THE LOCKING RING

### DN 100 to 200

**Fit** the locking ring into its groove.



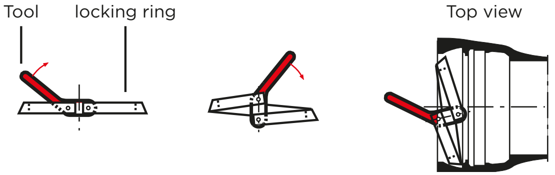
**Hold** the locking ring in place with the mounting wedges.



# UNIVERSAL Ve joint

## DN 250 to 700

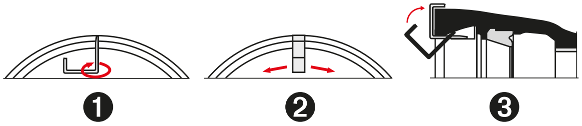
**Fit** the locking ring into its groove by reducing its external diameter using the appropriate tool.




**Insert** the wedge (sideways) between the end edge of the locking ring.

**Twist** by 90° to create a gap between the two ends.

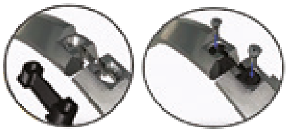
**Fold** down the wedge against the face of the socket.



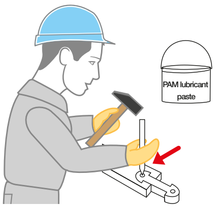

In both cases, **place** the opening of the locking ring at the top of the pipe (for easier removal).

## DN 800 to 1600

**Insert** a connector at the end of a first segment on the flat side (internal).

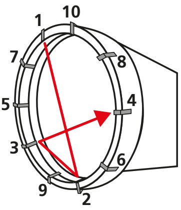


**Line** up a pin (previously covered in lubricant paste) opposite its groove and **point** its inclined face like that of the connector.

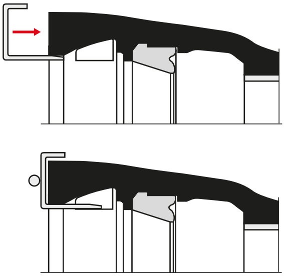



**Drive** in the pin with a hammer and Ø3.9 mm punch.

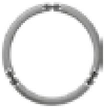
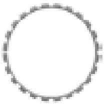
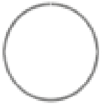
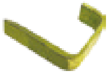
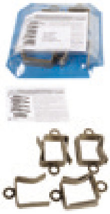
To keep the tension evenly balanced in the elastomer connectors, **proceed** in the specified order.



# UNIVERSAL Ve joint

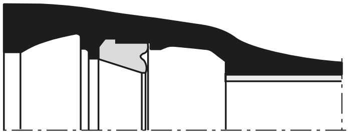


## Locking ring accessories according to DN

| DN | Assembly | | | |
|---|---|---|---|---|
| | Locking ring | Lever | Wedge | Number |
| 100 |  | |  | 3 |
| 125 | | | | |
| 150 | | | | 4 |
| 200 | | | | |
| 250 |   |  |  | 1 |
| 300 | | | | |
| 350 | | | | |
| 400 | | | | |
| 450 | | | | |
| 500 | | | | |
| 600 | | | | |
| 700 | | | | |
| 800 |  | |  | 7 |
| 900 | | | | 8 |
| 1000 | | | | 9 |
| 1200 | | | | 10 |
| 1400 | | | | 10 |
| 1500 | | | | 12 |
| 1600 | | | | 12 |

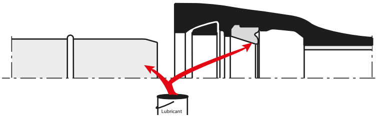
# UNIVERSAL Ve joint

## 2 INSERT THE GASKET



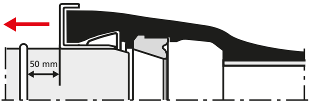
## 3 LUBRICATE

Using the lubricant paste, **coat** the:
- Exposed side of the gasket
- Chamfer and spigot

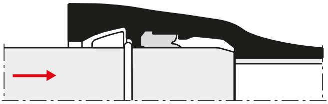



## 4 ASSEMBLE

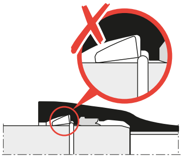
The joint must be **perfectly aligned** during assembly.




Introduce the spigot in the locking ring and then remove the wedge (the weld bead is approximately 50 mm from the socket).

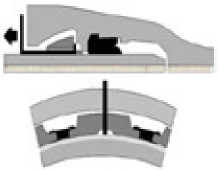


Introduce the spigot fully into the socket. When the locking ring is open, it opens when the weld bead passes through and then clamps to the barrel.

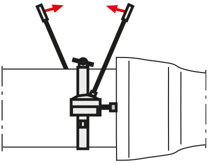


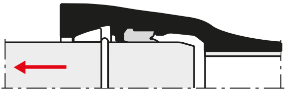
**Check** that the locking ring is not partially touching the weld bead due to insufficient insertion of the spigot or an excessive angular deflection.

**Pull** on each part of the locking ring with the mounting hook to ensure that it is properly positioned.



## 5 EXTEND THE JOINT





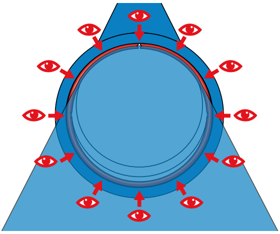
**Extend the joint** by pulling the spigot out of the socket until the locking ring comes into contact with its groove in the socket.

To do so, **use** a collar fitted with hydraulic jacks or **pull** with the bucket of a digger using a suitable textile strap.

# UNIVERSAL Ve joint

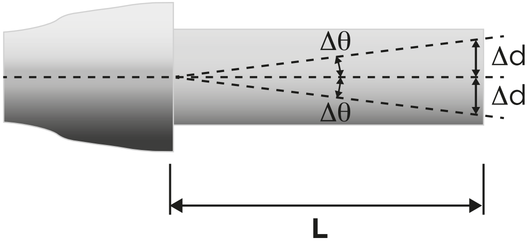
## 6 CHECK THE POSITION OF THE LOCKING RING

**Ensure** that the full circumference of the metal locking ring is in contact with the pipe.



## 7 INFORMATION

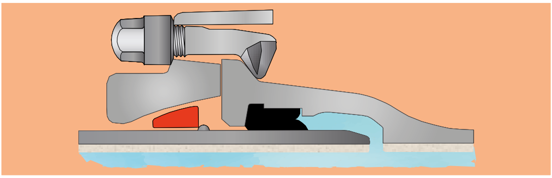
### Angular deflection




<table>
<tr><th rowspan="2">DN</th><th>Angular deflection</th><th>Displacement Δ d<br>for L</th><th>L</th></tr>
<tr><th>degree</th><th>cm</th><th>m</th></tr>
<tr><td>100</td><td>3°</td><td>32</td><td rowspan="11">5.97</td></tr>
<tr><td>125</td><td>3°</td><td>32</td></tr>
<tr><td>150</td><td>3°</td><td>32</td></tr>
<tr><td>200</td><td>3°</td><td>32</td></tr>
<tr><td>250</td><td>3°</td><td>32</td></tr>
<tr><td>300</td><td>3°</td><td>32</td></tr>
<tr><td>350</td><td>3°</td><td>32</td></tr>
<tr><td>400</td><td>3°</td><td>32</td></tr>
<tr><td>450</td><td>3°</td><td>32</td></tr>
<tr><td>500</td><td>2°</td><td>21</td></tr>
<tr><td>600</td><td>2°</td><td>21</td></tr>
<tr><td>700</td><td>2°</td><td>21</td><td rowspan="2">6.89</td></tr>
<tr><td>800</td><td>2°</td><td>25</td></tr>
<tr><td>900</td><td>1.5°</td><td>18</td><td>6.87</td></tr>
<tr><td>1000</td><td>1.2°</td><td>15</td><td>6.88</td></tr>
<tr><td>1200</td><td>1.1°</td><td>15</td><td>8.15</td></tr>
<tr><td>1400</td><td>0.8°</td><td>10</td><td rowspan="2">8.08</td></tr>
<tr><td>1600</td><td>0.5°</td><td>7</td></tr>
</table>

# Standard Ve joint

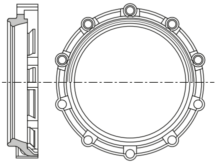
## Range of DN 80 to 1200 pipes and fittings



This joint **requires a**:

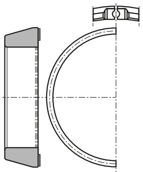
- Standard pipe with a weld bead on the spigot
- Standard VE gland
- Standard VE locking ring
- Standard gasket

### Standard gland



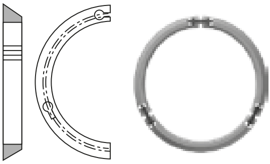
### Standard VE locking ring: one-piece or segmented

**One-piece: DN 250 to 700**



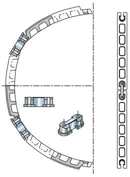
*The one-piece locking ring is an open ring*

**Segment: DN 80 to 200**



*The locking ring is supplied preassembled*

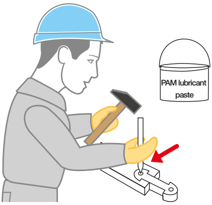
**Segment to be assembled: DN 800 to 1200**



**Insert** a connector at the end of a first segment on the flat side (internal).

**Line** up a pin (previously covered in lubricant paste) opposite its groove and point its inclined face like that of the connector.

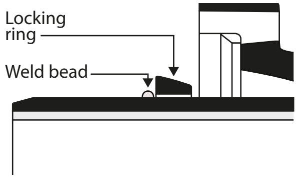
**Drive** in the pin with a hammer and Ø3.9 mm punch.



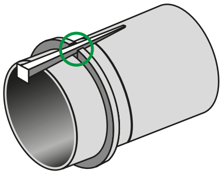
# Standard Ve joint

## 1 POSITION THE GLAND AND LOCKING RING

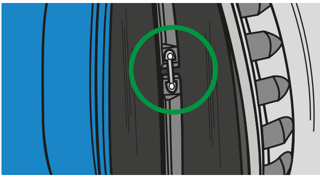
**Slide** the gland and locking ring over the weld bead.



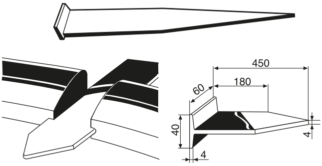

**To pass the locking ring over the weld bead.**

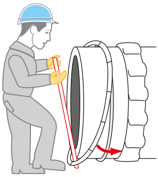


*Use a trapezoidal wedge*



*Pass the ring over the weld bead using a crowbar or similar tool*

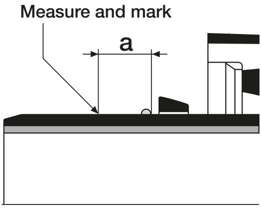


## 2 MARK THE INSERTION DEPTH

| DN | a (mm) |
|---|---|
| **80 to 125** | 20 |
| **150 to 200** | 25 |
| **250 to 500** | 30 |
| **600 to 1100** | 35 |
| **1200** | 25 |

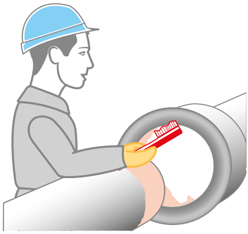
Measure and mark from the weld bead according to dimension "a"




## 3 CLEAN

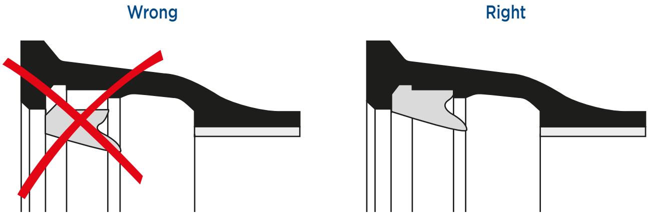
Carefully **clean** the inside of the socket, the spigot and the gasket.

**Keep** all parts clean until assembly has been completed.



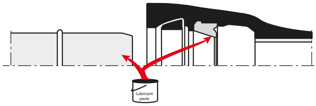
# Standard Ve joint

## 4 POSITION AND CHECK THE GASKET



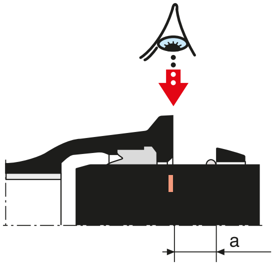

## 5 LUBRICATE

Using the lubricant paste, **coat** the:
- •Exposed side of the gasket
- •Chamfer and spigot



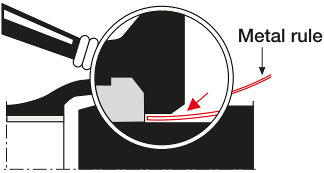

## 6 ASSEMBLE

**Center** and **introduce** the spigot into the perfectly aligned socket up to the line corresponding to "a":




## 7 CHECK THE ASSEMBLY

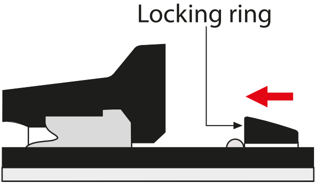
The metal rule must **enter** the same depth all the way around the circumference.




## 8 POSITION THE LOCKING RING

**Move** the locking ring forward until it comes into contact with the weld bead.

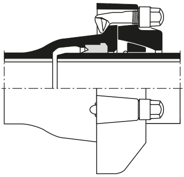
**Check** that it is touching the weld bead around the entire circumference of the spigot.



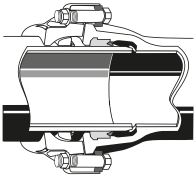
# Standard Ve joint

## 9 POSITION THE GLAND

**Position** the gland so that it is in contact with the locking ring.
**Insert** the bolts and nuts.
**Screw** by hand until in contact with the gland.
**Tighten** the bolts diagonally until the gland touches the socket face.

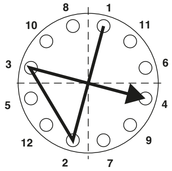


Iron nuts and bolts
DN 80 to 1200



Steel nuts and bolts
DN 800 to 1200 (16 bar < PFA 25 bar)

**Tighten** the bolts in the order indicated in the diagram opposite and according to the recommended torque values.

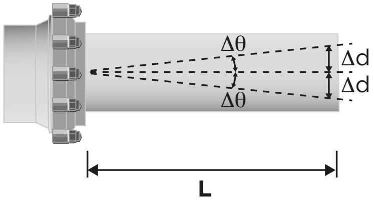



| DN | **Torque** (daN.m) | **spanner type and Ø** |
|---|---|---|
| **80 to 200** | 12 | Ø22: 30 spanner |
| **200 to 600** | 30 | Ø27: 36 spanner |
| **700 to 1200** | | |

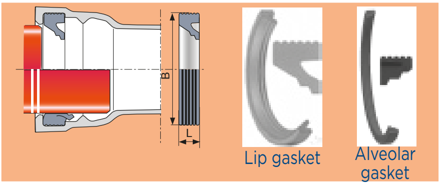
## 10 INFORMATION

### Angular deflection

| DN | Δ θ (°) | **L** m | Δ **d** (cm) for L |
|---|---|---|---|
| **60 to 150** | 5° | 6 | 52 |
| **200 to 300** | 4° | 6 | 42 |
| **350 to 600** | 3° | 6 | 32 |
| **700 and 800** | 2° | 7 | 25 |
| **900 and 1000** | 1.5° | 7 | 19 |
| **1100 and 1200** | 1.5° | 8 | 21 |



# TAG / IM joint



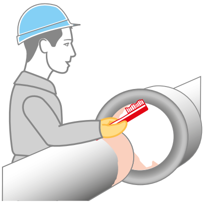

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

Using the marking as a reference, **check** that the gasket is suited to the project specifications:
- DN
- Material:
  - For sewage: NBR + yellow marking (stripes or dots)
- Storage life: seven years for NBR (sewage) subject to optimal storage conditions (contact us for our recommendations)


## 1 CLEAN

Carefully **clean** the inside of the socket, the spigot and the gasket.

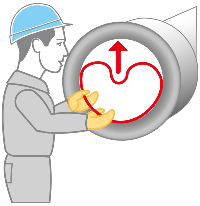
**Keep** all parts clean until assembly has been completed.



## 2 INSERT THE IM GASKET

**Insert** the gasket before the pipe is laid in the trench.

Always use the IM gasket, since the STANDARD gasket is incompatible with TAG pipes.



## 3 CHECK THE JOINT

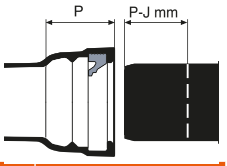
**Ensure** that the gasket is properly seated in its groove.

# TAG / IM joint

## 4 MARK THE INSERTION DEPTH

(if there is no original marking, i.e. if the pipe has been cut or a spigot is used from a different range).

Mark the spigot at a distance of P-J mm.



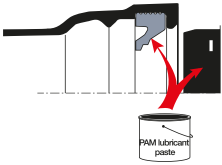

| DN (mm) | P (mm) | J (mm) | P-J (mm) |
|---|---|---|---|
| **150** | 98 | 15 | 83 |
| **200** | 104 | 15 | 89 |
| **250** | 104 | 15 | 89 |
| **300** | 105 | 15 | 90 |

## 5 LUBRICATE

**Coat**:
- The exposed surface of the gasket
- The pipe chamfer and spigot

Apply a sufficient amount of lubricant paste with a paintbrush (refer to the quantities table).

**Comply with the recommended applications specified in the safety data sheets available in the Downloads section on www.pamline.com.**

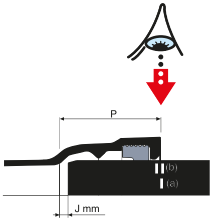



## 6 ASSEMBLE

**Center** and **introduce** the spigot into the perfectly aligned socket:

(a) Up to the marked line corresponding to "P-J mm"

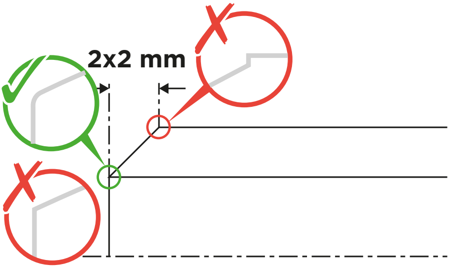
(b) Up to the area between the white lines



# TAG /IM joint

## 7 INFORMATION

### Cuts and chamfers



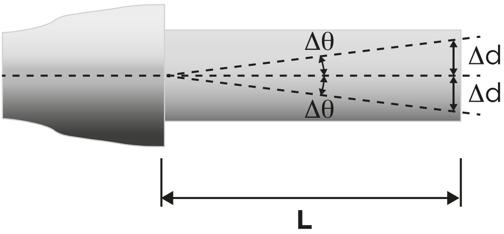

### Treating a cut pipe

**Apply** the appropriate paint: ISOLARM 671-50 ref.**179099**.
Refer to the instructions for cutting pipes.

### Lubricant paste

| Number of boxes for 100 joints | | | |
|---|---|---|---|
| **DN** | **No.** | **DN** | **No.** |
| **125** | 2 | **250** | 4 |
| **150** | 3 | **300** | 5 |
| **200** | 3 | | |

### Angular deflection

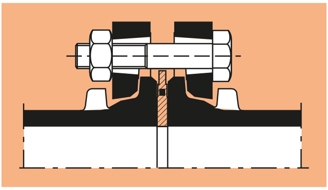



Pipes must be connected together while keeping them perfectly aligned with their axes.

**The joint must only be deflected when fully assembled and before pressurizing the system.**

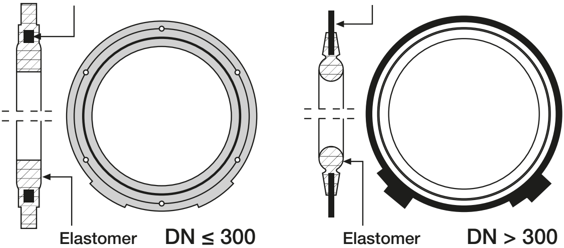
| Maximum admissible deflection: | | | |
|---|---|---|---|
| **DN** | Δ θ (°) | **L** m | Δ **d** (cm) for L |
| **125 to 300** | 4 | 6 | 42 |

# Flanged joint



*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

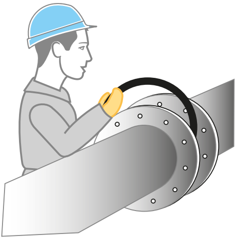
## 1 METAL-REINFORCED GASKETS




Overmolded rings

Clipsed rings

## 2 CLEAN AND ALIGN THE FLANGES



- **Check** the appearance and cleanliness of the flange and flange gasket
- **Align** the parts to be mounted.
- **Leave** a large enough **gap** for the flange gasket between the two flanges.

**Flange gasket thickness:**

**DN ≤ 300: 10 mm; DN ≥ 300: 16 mm**

# Flanged joint

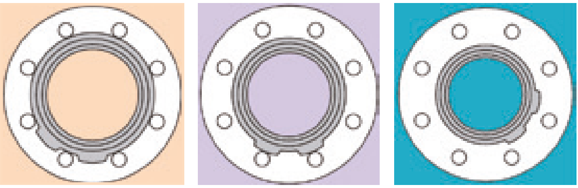
## 3 POSITION THE REINFORCED GASKET

**Center** the reinforced gasket according to the method specified in the tables:

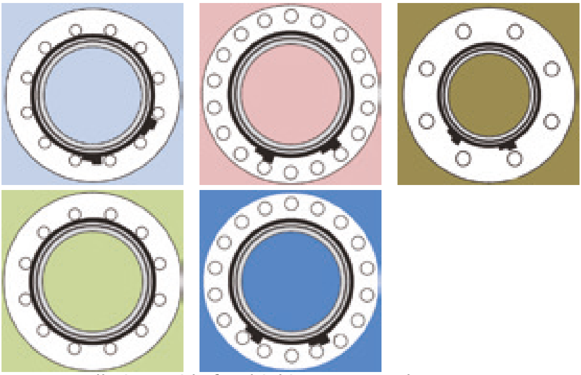
| DN | PN 10 | PN 16 | PN 25 | PN 40 | PN 63 |
|---|---|---|---|---|---|
| 40 | | | | | |
| 50 | | | | | |
| 60 | | | | | |
| 65 | | | | | |
| 80 | | | | | |
| 100 | | | | | |
| 125 | | | | | |
| 150 | | | | | |
| 200 | | | | | |
| 250 | | | | | |
| 300 | | | | | |
| 350 | | | | | |
| 400 | | | | | |
| 450 | | | | | |
| 500 | | | | | |
| 600 | | | | | |
| 700 | | | | | |
| 800 | | | | | |
| 900 | | | | | |
| 1000 | | | | | |
| 1100 | | | | | |
| 1200 | | | | | |
| 1400 | | | | | |
| 1500 | | | | | |
| 1600 | | | | | |
| 1800 | | | | | |
| 2000 | | | | | |

| Gasket resting on the bolts | Pins resting on the lower bolts | Visual centering |
|---|---|---|

**Overmolded gaskets DN ≤ 300**



**Clipped gaskets DN > 300**

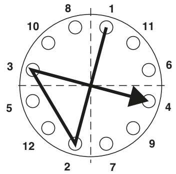


# Flanged joint

## 4 TIGHTEN THE BOLTS

**Insert** the bolts.

**Tighten** the bolts in the order indicated in the diagram opposite and according to the recommended torque values.




**Do not exert any tractive force on the junction when tightening the bolts.**

## 5 COMPLY WITH THE TIGHTENING TORQUE VALUES

**The recommended torque values are for greased threads (mechanical grease).**
The bolts are only tightened to compress the reinforced gasket and not exert any tractive force on the pipeline elements.

| Metal-reinforced gasket | | | | | |
|---|---|---|---|---|---|
| DN | Bolt tightening torque values for flanges | | | | |
| | PN 10 | PN 16 | PN 25 | PN 40 | PN 63 |
| | daN.m | daN.m | daN.m | daN.m | daN.m |
| **40** | 4 | 4 | 4 | 4 | 4 |
| **50** | 4 | 4 | 4 | 4 | 4 |
| **60** | 4 | 4 | 4 | 4 | 6 |
| **65** | 4 | 4 | 4 | 4 | 6 |
| **80** | 4 | 4 | 4 | 4 | 6 |
| **100** | 4 | 4 | 6 | 6 | 8 |
| **125** | 4 | 4 | 8 | 8 | 12 |
| **150** | 6 | 6 | 8 | 8 | 15 |
| **200** | 6 | 6 | 8 | 12 | 18 |
| **250** | 6 | 8 | 12 | 15 | 18 |
| **300** | 6 | 8 | 12 | 15 | 18 |
| **350** | 6 | 8 | 15 | 18 | 30 |
| **400** | 8 | 12 | 18 | 30 | 40 |
| **450** | 8 | 12 | 18 | 30 | |
| **500** | 8 | 15 | 18 | 40 | 50 |
| **600** | 12 | 18 | 30 | 50 | |
| **700** | 12 | 18 | 40 | 60 | |
| **800** | 15 | 30 | 50 | | |
| **900** | 15 | 30 | 50 | | |
| **1000** | 18 | 40 | 60 | | |
| **1100** | 18 | 40 | 60 | | |
| **1200** | 30 | 50 | 60 | | |
| **1400** | 40 | 50 | 70 | | |
| **1500** | 40 | 60 | 70 | | |
| **1600** | 50 | 60 | 70 | | |
| **1800** | 50 | 60 | 80 | | |
| **2000** | 50 | 70 | 80 | | |

# Flanged joint

## 6 SOCKET DIMENSIONS

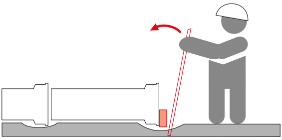
| DN | PN 10 | | PN 16 | | PN 25 | |
|---|---|---|---|---|---|---|
| | Bolt | Socket | Bolt | Socket | Bolt | Socket |
| **40** | M16 | 24 | M16 | 24 | M16 | 24 |
| **50** | M16 | 24 | M16 | 24 | M16 | 24 |
| **60** | M16 | 24 | M16 | 24 | M16 | 24 |
| **65** | M16 | 24 | M16 | 24 | M16 | 24 |
| **80** | M16 | 24 | M16 | 24 | M16 | 24 |
| **100** | M16 | 24 | M16 | 24 | M20 | 30 |
| **125** | M16 | 24 | M16 | 24 | M24 | 36 |
| **150** | M20 | 30 | M20 | 30 | M24 | 36 |
| **200** | M20 | 30 | M20 | 30 | M24 | 36 |
| **250** | M20 | 30 | M24 | 36 | M27 | 41 |
| **300** | M20 | 30 | M24 | 36 | M27 | 41 |
| **350** | M20 | 30 | M24 | 36 | M30 | 46 |
| **400** | M24 | 36 | M27 | 41 | M33 | 50 |
| **450** | M24 | 36 | M27 | 41 | M33 | 50 |
| **500** | M24 | 36 | M30 | 46 | M33 | 50 |
| **600** | M27 | 41 | M33 | 50 | M36 | 55 |
| **700** | M27 | 41 | M33 | 50 | M39 | 60 |
| **800** | M30 | 46 | M36 | 55 | M45 | 70 |
| **900** | M30 | 46 | M36 | 55 | M45 | 70 |
| **1000** | M33 | 50 | M39 | 60 | M52 | 80 |
| **1100** | M33 | 50 | M39 | 60 | M52 | 80 |
| **1200** | M36 | 55 | M45 | 70 | M52 | 80 |
| **1400** | M39 | 60 | M45 | 70 | M56 | 85 |
| **1500** | M39 | 60 | M52 | 80 | M56 | 85 |
| **1600** | M45 | 70 | M52 | 80 | M56 | 85 |
| **1800** | M45 | 70 | M52 | 80 | M64 | 95 |
| **2000** | M45 | 70 | M56 | 85 | M64 | 95 |

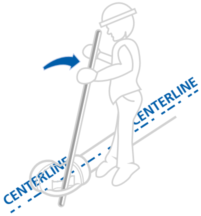
# Assembly equipment

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 CROWBAR

### Pipes and fittings - DN 125

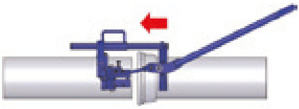




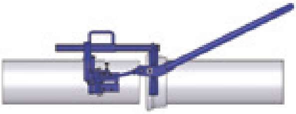

## 2 BI DN ASSEMBLY EQUIPMENT

### Standard Natural / Integral pipes and fittings

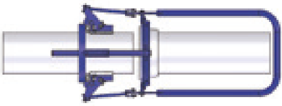
### DN 100-125, DN 150-200, DN 250-300

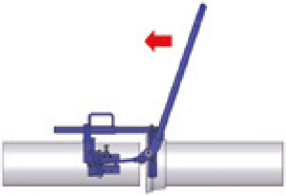


**1- Place** the socket frame behind the socket of the installed pipe and **slide** until touching as shown by the arrow.

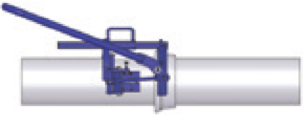


**2- Put** the lever in the lower position and then **move** the grip section using the handle so that the four grips are correctly positioned against the pipe.





**3- Stand** so that you are facing the socket and firmly **pull** the lever towards you in the direction shown by the arrow until the lever is in the lower position.



4- If necessary, **repeat** the procedure from step three until both pipes are totally interlocking.

⚠ Comply with the insertion depth

# Assembly equipment

## Universal Natural / Integral pipes and fittings

**Attach** the collar to the spigot.
**Pre-tighten** with a spanner.

**Position** the cams by turning them towards the spigot.

**Attach** the collar to the pipe's socket. Run the chain beneath the spigot and socket.

**Tighten**.

**Connect** the collar links to the cams on the barrel collar.

Use the levers to **tension** the assembly.

Once the collars are correctly positioned, **tighten** as necessary.

**Position** the two levers on the cam nuts of the barrel collar as shown. **Pull** both levers together at the same time.

**Join** the pipes according to the depth lines indicated on the spigot of each pipe.

Comply with the insertion depth

## Blutop / Topaz pipes and fittings DN 75, 90, 110, 125, 140, 160

**Attach** the collar to the spigot.

**Pre-tighten** with a spanner.

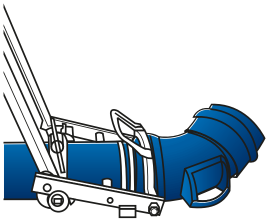
**Position** the cams by turning them towards the spigot.

**Attach** the collar to the pipe's socket.

**Bring** the two half-collars together, so that the junction between both parts is located by the pipe's assembly crown.

**Pre-tighten** with a size 4 hex key.

**Connect** the collar links to the cams on the barrel collar.



Use the levers to **tension** the assembly.

Once the collars are correctly positioned, **tighten** as necessary.

**Position** the two levers on the cam nuts of the barrel collar as shown. **Pull** both levers together at the same time.

**Join** the pipes according to the depth lines indicated on the spigot of each pipe.

# Assembly equipment

## 3 MULTI DN ASSEMBLY EQUIPMENT

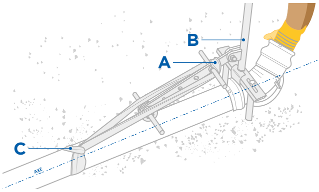
### Blutop / Topaz pipes and fittings DN 75 to 160

**Set** the fork gap to the relevant diameter (behind the socket). **Tighten** with a size 24 spanner.

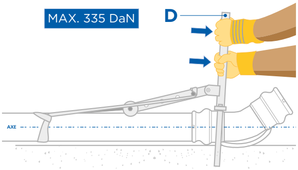
**Pass** the strap provided around the pipe barrel, but without tightening.

**Place** the tool with the fork pointing straight up behind the fitting (or pipe) collar.

**Attach** the strap to [A].
**Keep** the lever [B] upright.
**Fasten** the strap at [C] so that it is wrapped tightly around the pipe.

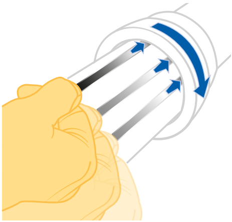



**Pull** the lever as shown in [D] and assemble while ensuring that the fitting (or pipe) is aligned with the centerline.




**Deflect** after assembly if necessary (maximum deflection of 6°).

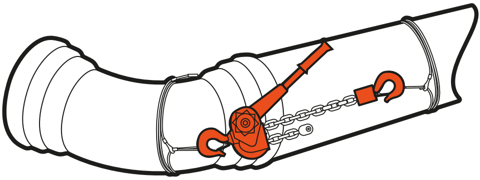
**Check** that the gasket is properly positioned using the metal rule supplied in the Blutop or Topaz joint box.



# Assembly equipment

## Pipes and fittings with non-restrained joints or anchored joints (Blutop Vi, Standard Vi and Universal Vi)

Pull lift or ratchet chain winch

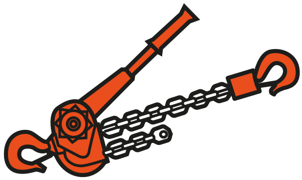


| DN Blutop / Topaz | Pipe / Pipe Ratchet chain winch | Number | Pipe / Fitting Ratchet chain winch | Number |
|---|---|---|---|---|
| WITH FLAT STRAPS 2t Chain length 2m | | | | |
| 125 | 750 kg | 1 | 750 kg | 1 |
| 140 | -- | -- | 250 kg | 2 |
| 150 | 750 kg | 1 | 750 kg | 1 |
| 160 | -- | -- | 250 kg | 2 |
| 200 | 1500 kg | 1 | 1500 kg | 2 |
| 250 | 1500 kg | 1 | 1500 kg | 2 |
| 300 | 1500 kg | 2 | 1500 kg | 2 |
| 350 | 1500 kg | 2 | 1500 kg | 3 |
| WITH FLAT STRAPS 3t Chain length 3m | | | | |
| 400 | 1500 kg | 2 | 1500 kg | 3 |
| 450 | 1500 kg | 2 | 1500 kg | 3 |
| 500 | 1500 kg | 2 | 1500 kg | 3 |
| 600 | 3000 kg | 2 | 1500 kg | 3 |
| 700 | 3000 kg | 2 | 3000 kg | 2 |
| 800 | 3000 kg | 2 | 3000 kg | 2 |
| WITH FLAT STRAPS 6t Chain length 5m | | | | |
| 900 | 6000 kg | 2 | 6000 kg | 3 |
| 1000 | 6000 kg | 2 | 6000 kg | 3 |
| 1100 | 6000 kg | 2 | 6000 kg | 3 |
| 1200 | 6000 kg | 2 | 6000 kg | 3 |
| WITH FLAT STRAPS 8t Chain length 6m | | | | |
| 1400 | 6000 kg | 3 | 6000 kg | 3 |
| 1500 | 6000 kg | 3 | 6000 kg | 3 |
| 1600 | 6000 kg | 3 | 6000 kg | 3 |
| 1800 | 6000 kg | 3 | 6000 kg | 3 |
| 2000 | 6000 kg | 3 | 6000 kg | 3 |

These values are provided for guidance only and may vary according to the installation conditions (temperature, lubrication, assembly of cut sections, etc.).

# Assembly equipment

### Ratchet chain winches



| Maximum service load | Reference |
|---|---|
| **250** | 265417 |
| **750** | 265418 |
| **1500** | 158511 |
| **3000** | 158513 |
| **6000** | 158518 |

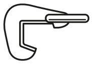
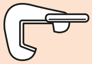
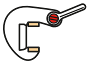
## 4 ACCESSORIES

### Flat textile straps

| Color | Max. load | Length | Reference |
|---|---|---|---|
| **Purple** | 1.5 t | 2 m | 158511 |
| **Green** | 2 t | 2 m | 158512 |
| | | 8 m | 158380 |
| **Yellow** | 3 t | 3 m | 158514 |
| | | 4 m | 158515 |
| | | 5 m | 158516 |
| **Gray** | 4 t | 5 m | 158517 |
| | | 8 m | 219996 |
| **Red** | 5 t | 6 m | 158388 |
| **Brown** | 6 t | 5 m | 158519 |
| **Blue** | 8 t | 4 m | 158383 |
| | | 6 m | 199148 |
| | | 7 m | 199201 |
| | | 10 m | 158520 |

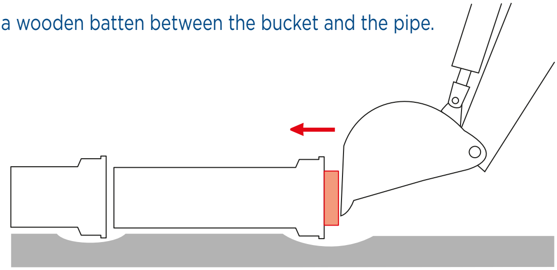
To recognize the straps, count the number of seams (e.g. 3 seams = 3 t).

### Hooks for connecting pipes

| DN | Visual | Reference |
|---|---|---|
| **60 to 300** |  | 158 021 |
| **350 to 600** |  | 158 025 |
| **700 to 1200** |  | 158 026 |
| **1400 to 2000** |  | 158 605 |

## 5 DIGGER BUCKET DN 125 AND OVER

**Insert** a wooden batten between the bucket and the pipe.



# Pipe cutting

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 EQUIPMENT AND TOOLS REQUIRED

- Gloves, protective mask and goggles
- Brush, abrasive paper and cutter
- Paintbrushes, roller
- Gas burner

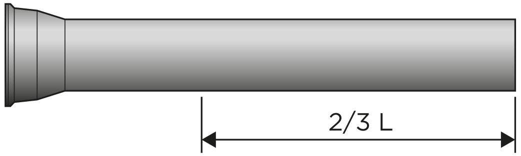
## 2 CHECK THE EXTERNAL DIAMETER

Before cutting, use a circometer to **check** that the OD measured is less than the OD + 1mm (see table below).

| DN | OD mm | DN | OD mm | DN | OD mm | DN | OD mm |
|---|---|---|---|---|---|---|---|
| **60** | 77 | **250** | 274 | **600** | 635 | **1200** | 1255 |
| **80** | 98 | **300** | 326 | **700** | 738 | **1400** | 1462 |
| **100** | 118 | **350** | 378 | **800** | 842 | **1500** | 1565 |
| **125** | 144 | **400** | 429 | **900** | 945 | **1600** | 1668 |
| **150** | 170 | **450** | 480 | **1000** | 1048 | **1800** | 1857 |
| **200** | 222 | **500** | 532 | **1100** | 1151 | **2000** | 2082 |

**DN ≤ 300 mm**: preferably cut within 4 m of the spigot.

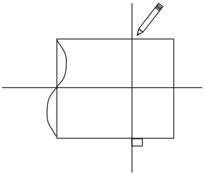
**DN ≥ 350 mm**: preferably cut pipes that have been calibrated (to be specified when ordering). These pipes are marked with metallic gray paint on the socket face.




*For Blutop and Topaz: DN/OD = outer diameter.*

## 3 DRAW THE CUTTING LINE

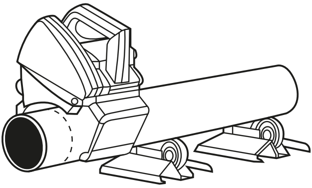
**Draw** the cutting plane perpendicular to the pipe centerline.

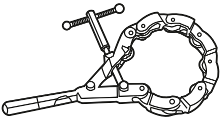


# Pipe cutting

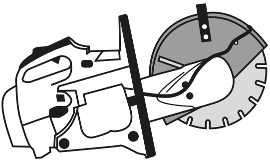
## 4 CUTTING

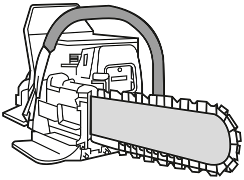
**DN 60 to 300**: cut the pipe with an electric, heat or manual pipe cutting machine.



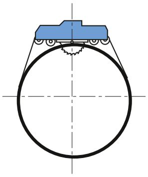


**DN 350 to 700**: use a cut-off saw or chainsaw.





**DN ≥ 700**: use a compressed air saw (e.g. FEIN) with a special attachment for chamfering the pipe.



*Irrespective of the cutting tool used, always fit a diamond disc.*

## 5 CUTTING SPECIAL COATINGS

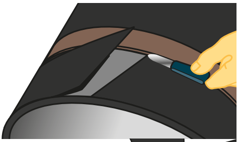
### TT PE AND TT PUX PIPES


**Draw** the cutting marks (CPe) according to the following table:

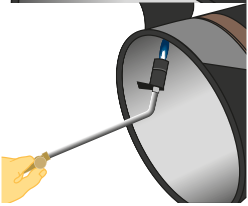
| DN | STANDARD TT pipe | UNIVERSAL TT pipe |
|---|---|---|
| | mm | mm |
| **60 and 80** | 95 | NK |
| **100** | 100 | NK |
| **125 and 150** | 105 | NK |
| **200 and 250** | 115 | NK |
| **300** | 120 | NK |
| **350 and 400** | 120 | 205 |
| **450 and 500** | 125 | 225 |
| **600 and 700** | NK | NK |

# Pipe cutting

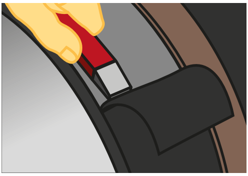
**Cut** the PE/PUX coating with a cutter through to the iron, but without damaging the iron.
**Make** a lengthwise cut to strip off the PE.



**Preheat** the area to be cut from the inside. Max 50°C.

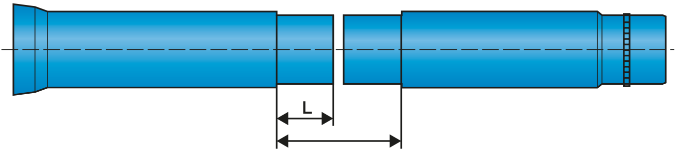


**Remove** the PE/PUX with a chisel.
By heating the pipe, the adhesive remains on the PE/PUX.



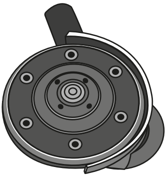
## ZMU PIPES

**Draw** the cutting marks (L) according to the following table:

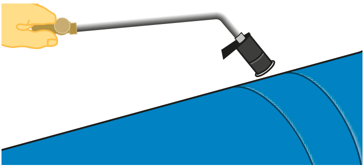



| | DN | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | 700 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TYT / STD / TYT-SIT PLUS/ STD VI | L | 95 | 100 | 105 | | 110 | 115 | 120 | | | 130 | 145 | 225 |
| UNIVERSAL | L | 130 | 155 | 170 | 165 | 170 | 180 | 195 | 225 | 190 | 215 | 230 | 265 |

**Cut** away the cement without damaging the iron.
You can use a special disc with a 5 mm shoulder (ref.**185104**).



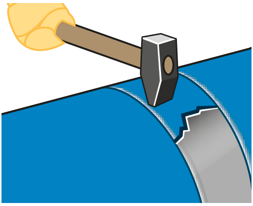
**Preheat** the area between the cuts in the cement coating. Max 50°C.
**Create** a lengthwise cut with a chisel.



# Pipe cutting

**Remove** the cement coating with a small hammer and chip off any cement traces with a chisel.

**Repair** the cement coating with kit ref. **18842** (refer to the "Repair products" guide).



## ISOPAM PIPES

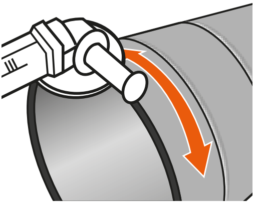
**Draw** the cutting area according to the following table:

| DN | Insulation to be removed A (mm) | DN | Insulation to be removed A (mm) |
|---|---|---|---|
| **100** | 97 | **300** | 130 |
| **125** | 100 | **350** | 148 |
| **150** | 103 | **400** | 150 |
| **200** | 109 | **500** | 155 |
| **250** | 108 | **600** | Contact us |

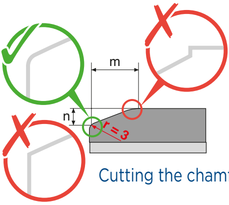
**Cut** the polyethylene coating and insulation (be careful not to cut into the iron).
**Remove** the insulation and properly **clean** the spigot.

## 6 DEBURRING AND CHAMFERING

**For mechanical joints** (EXPRESS, COLLARS, etc.), **deburr** the cut edge with a grinder.



**For push-in joints** (STANDARD, STANDARD Vi, ViLok, UNIVERSAL Vi and UNIVERSAL Ve):

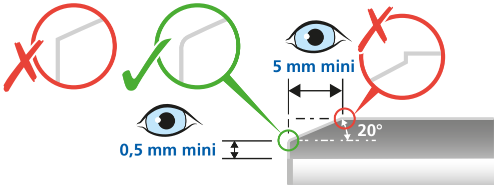



Cutting the chamfer

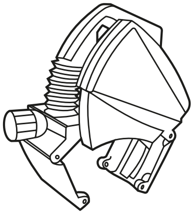
| DN | m (mm) | n (mm) |
|---|---|---|
| **60 to 600** | 9 | 3 |
| **700 to 1200** | 15 | 5 |
| **1400 to 1600** | 20 | 7 |
| **1800 to 2000** | 23 | 8 |

# Pipe cutting

**For** Blutop, Blutop Vi, Topaz and Topaz Vijoints:

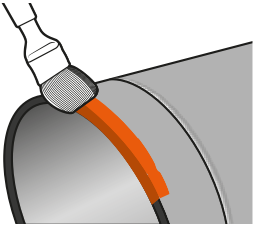



*For Blutop and Topaz pipes, remember to use the bluCut machine, which is capable of cutting and chamfering the pipe at the same time.*



## 7 REPAIR THE EXPOSED IRON

**Repair** the protective coating on the exposed face and chamfer.



**Brush** to remove any dirt or loose particles.
**Dry** the surfaces to be coated (in case of low temperatures or high humidity, use a gas burner).
**Apply** high-zinc anticorrosion primer NATZINC (ref. **251222**) with a paintbrush.
**Allow to dry** for a few minutes.
**Apply** the appropriate paint for the pipe coating:

| Type of coating | Repair product |
|---|---|
| **Natural / Blutop** | AQUACOAT<br>0.75 kg dose, ref. **240991** |
| **Integral** | EUROKOTE 4820 Red Brown 1 kg dose, ref. **184653** |
| **TAG 32** | ISOLARM 671-50 ref. **179099** |
| **Classic / Standard TT / Standard TT PUX / Isopam / ZMU** | ENDOLAC 245-30 FGC<br>1 kg dose, ref. **158134** |

*Also refer to the "Repair products" guide.*

# Pipe cutting

## PH1 AND TOPAZ PIPES

Ask for Topaz repair kit ref. **250714**.

**Clean** the surface to be coated.
**Brush** or rub with abrasive paper.
**Remove** any dust with a cloth.
**Clean** the inside of the pipe: after cutting, ensure that there are no filings inside the pipe.
**Preheat** the surface with successive sweeps across the entire surface with a brazing torch (2 min). Maximum temperature: 50°C.
**Apply an initial coat** of EUROKOTE 4820 paint ref. **184653** (1 kg dose) or **220817** (kit of five 50 ml syringes).
**Gently heat** the surface for three minutes after application to accelerate the drying time.
As soon as the first coat is tacky to the touch, **apply** the second coat of EUROKOTE 4820 paint.
**Heat** the surface for five minutes after applying the paint to dry it completely (the coat is dry to the touch without leaving any prints).

**Thickness after two coats: 250 µm**

**Check with a circometer (Topaz):**

| DN | Max. OD after repair | Max. OD before cutting |
|---|---|---|
| | mm | mm |
| **75** | 75.9 | 75.5 |
| **90** | 90.9 | 90.5 |
| **110** | 111.0 | 110.6 |
| **125** | 126.1 | 125.7 |
| **140** | 141.2 | 140.8 |
| **160** | 161.3 | 160.9 |

## 8 REPAIRING SPECIAL COATINGS

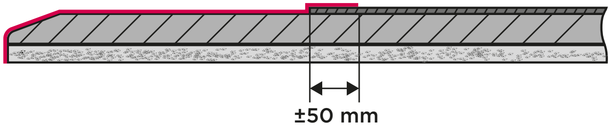
## TT PE PIPES

**Clean** the surface to be coated.
**Brush** or **rub** with abrasive paper.
**Remove** any dust with a cloth.
**Apply** a coat of paint **(refer to the "Repair products" guide)**.
**Allow to dry**.

# Pipe cutting

## TT PUX PIPES

**Clean** the surface to be coated.
**Brush** or **rub** with abrasive paper.
**Remove** any dust with a cloth.
**Apply** an initial coat of paint with a paintbrush (**refer to the "Repair products" guide**) by covering the end of the spigot and beyond the chamfer by overlapping the cement.



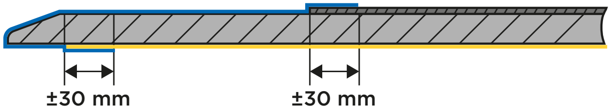

**Gently** heat the surface for three minutes after application to accelerate the drying time.
As soon as the first coat is tacky to the touch, **apply** the second coat of paint.

## ISOPAM PIPES

After assembling the junction, **cover** the exposed area with a foam spacer.
**Joint** the renovated part and the pipe coating using Impermastic sealing tape.
**Cover** the entire surface with a protective sleeve.

## PUR PIPES

Thoroughly **water** the pipe while cutting.
**Clean** the surface to be coated.
**Brush** or **rub** with abrasive paper.
**Remove** any dust with a cloth.
**Apply** an initial coat of paint with a paintbrush or spatula in case of a small surface area (**refer to the "Repair products" guide**) by covering the end of the spigot and beyond the chamfer by overlapping the interior polyurethane.




**Gently** heat the surface for three minutes after application to accelerate the drying time.

# Locking weld bead on site

## Creating the weld bead

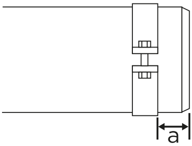
*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

### 1 REQUIRED EQUIPMENT

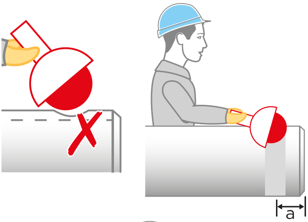
- Electric welding machine with a minimum capacity of 150 amperes.
- Electric or pneumatic grinder.
- Copper guide in accordance with the table on the next page.
- Recommended electrodes: ferro-nickel electrodes - Ø3.2 mm Solid wire: FeNi alloy with 55% Ni according to ISO 1071. Electrode grades are available as SC Ni Fe1 and SC Ni Fe2.
- Ref. **158179** 5 kg box of electrodes (160 electrodes).

### 2 SURFACE PREPARATION

**Draw** the position of the bead using the copper guide while complying with dimension a.

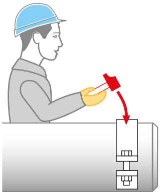



**Prepare** the surface to be welded by lightly grinding (i.e. grinding all coatings without affecting the thickness of the iron) over a strip of approximately 50 mm.



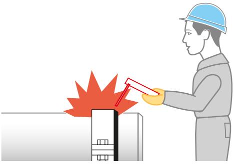

**Position** the copper guide ahead of the weld while complying with dimension a.

The guide must fit **snugly** around the whole circumference of the pipe. Tap with a hammer if necessary.



### 3 DEPOSIT THE LOCKING WELD BEAD

**Weld** against the guide to obtain a flat vertical face at right angles to the pipe's surface.

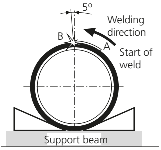


Preferably **work the weld** between marks A and B by turning the pipe.

The electrode must be positioned at an angle of 5°.

Number of passes: refer to the table on the following page.

**Caution:** the height of the copper guide does not correspond to the height of the weld bead (refer to the table on the following page).



# Locking weld bead on site

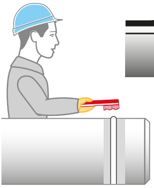
## 4 REPAIRING THE EXTERNAL COATING

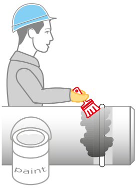
**Brush** the welded area.

**Apply** paint with a paintbrush in moderation to avoid attenuating the vertical face of the weld bead on the pipe.

**Paint reference:**

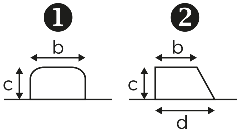
Each product range has its dedicated line of repair products - refer to the "External coating repairs" guide.

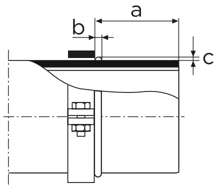





**Comply with the recommended applications specified in the safety data sheets available in the Downloads section on www.pamline.com.**

## Weld bead dimensions and position



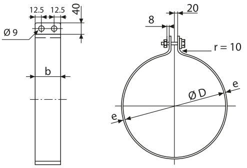




| | DN | a +/- 3 mm | b +/- 1.5 mm | d +/- 0.5 mm | c +/- 0.5 mm | No. of passes |
|---|---|---|---|---|---|---|
| STD-VE & UNI VE 1 | 80 | 85 | 6.5 | - | 3.5 | 1 |
| | 100 | 90 | | | | |
| | 125 | 95 | | | | |
| | 150 | 95 | | | | |
| | 200 | 100 | | | | |
| | 250 | 110 | | | | |
| | 300 | 115 | | | | |
| | 350 | 115 | 7.5 | - | 4 | |
| | 400 | 113 | | | | |
| | 450 | 120 | | | | |
| | 500 | 125 | | | 4.5 | |
| | 600 | 135 | | | | |
| | 700 | 158 | | | | |
| STD-VE & UNI VE 2 | DN | a +/- 2 mm | b +/- 0.5 mm | d +/- 1 mm | c +0.5/-0.8 mm | |
| | 800 | 150 | 5 | 9 | 5 | 1 |
| | 900 | 155 | | | | |
| | 1000 | 165 | | | | |
| | 1100 | 165 | | | | |
| | 1200 | 170 | | | | |
| UNI VE 2 | DN | a +/- 2 mm | b +/- 1 mm | d +/- 1 mm | c +0.5/-0.8 | |
| | 1400 | 190 | 8 | 14 | 6 | 1 |
| | 1500 | 192 | | | | |
| | 1600 | 195 | | | | |
| PAMLOCK 2 | DN | a +3/-2 mm | b +/- 1 mm | d +/- 2 mm | c +3/-1 mm | |
| | 1400 | 170 | 8 | 17 | 8 | 1 |
| | 1500 | 180 | | | | |
| | 1600 | 195 | | | | |
| | DN | a +3/-2 mm | b +/- 1 mm | d +/- 2 mm | c +/- 1 mm | |
| | 1800 | 222 | 16 | 25 | 11 | 1 |
| | 2000 | 243 | | | | |

# Locking weld bead on site

## Copper guide details

**Once created, the weld bead must be inspected using the appropriate means.**



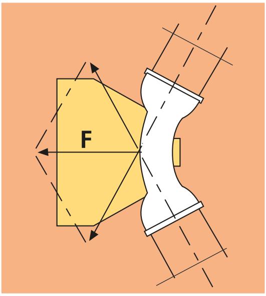

| DN | D | e | b | WEIGHT |
|---|---|---|---|---|
| 80 | 96 | | | 0.72 |
| 100 | 116 | | | 0.75 |
| 125 | 142 | | 25 | 0.84 |
| 150 | 168 | | | 0.94 |
| 200 | 220 | | | 1.12 |
| 250 | 271 | | | 1.81 |
| 300 | 323 | | | 2.06 |
| 350 | 375 | | 35 | 2.32 |
| 400 | 427 | | | 2.58 |
| 450 | 477 | 5 | | 2.82 |
| 500 | 528 | | | 3.07 |
| 600 | 631 | | | 5.1 |
| 700 | 734 | | | 5.82 |
| 800 | 837 | | | 5.62 |
| 900 | 940 | | 50 | 7.27 |
| 1000 | 1043 | | | 7.99 |
| 1100 | 1140 | | | 8.67 |
| 1200 | 1249 | | | 9.44 |
| 1400 | 1455 | | | 34.3 |
| 1500 | 1558 | | | 36.6 |
| 1600 | 1661 | 10 | 80 | 39 |
| 1800 | 1868 | | | 43.6 |
| 2000 | 2073 | | | 48.2 |

## Estimated time for producing a locking weld bead

| DN | No. electrodes | Grinding time | Welding time | Total time |
|---|---|---|---|---|
| 80 | 3 to 4 | 4 min | 9 min | 20 min |
| 100 | 4 to 5 | 5 min | 11 min | 25 min |
| 125 | 5 to 6 | 5 min | 13 min | 30 min |
| 150 | 6 to 7 | 6 min | 16 min | 35 min |
| 200 | 8 to 9 | 6 min | 20 min | 40 min |
| 250 | 10 to 11 | 6 min | 25 min | 50 min |
| 300 | 12 to 14 | 7 min | 30 min | 1 hr |
| 350 | 14 to 16 | 8 min | 35 min | 1 hr 5 min |
| 400 | 16 to 18 | 9 min | 40 min | 1 hr 15 min |
| 450 | 18 to 20 | 10 min | 45 min | 1 hr 30 min |
| 500 | 20 to 22 | 11 min | 50 min | 1 hr 35 min |
| 600 | 23 to 27 | 13 min | 1 hr | 1 hr 50 min |
| 700 | 27 to 31 | 15 min | 1 hr 10 min | 2 hr 10 min |
| 800 | 31 to 36 | 18 min | 1 hr 20 min | 2 hr 25 min |
| 900 | 35 to 40 | 20 min | 1 hr 30 min | 2 hr 40 min |
| 1000 | 39 to 45 | 22 min | 1 hr 40 min | 2 hr 55 min |
| 1100 | 43 to 49 | 24 min | 1 hr 50 min | 3 hr 10 min |
| 1200 | 47 to 54 | 26 min | 2 hr | 3 hr 30 min |
| 1400 | 55 to 62 | 31 min | 2 hr 20 min | 4 hr |
| 1500 | 59 to 67 | 33 min | 2 hr 30 min | 4 hr 20 min |
| 1600 | 62 to 71 | 35 min | 2 hr 40 min | 4 hr 40 min |
| 1800 | 70 to 80 | 40 min | 3 hr | 5 hr 10 min |
| 2000 | 78 to 89 | 44 min | 3 hr 10 min | 5 hr 50 min |

Grinding and welding times are given for guidance only. Times may vary according to worksite conditions.

# Anchor blocks



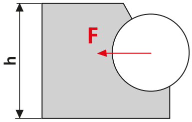

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*
*All the values contained in this document are provided by SAINT-GOBAIN PAM for guidance only. They are no substitute for carrying out prior studies or enlisting the services of a consultant.*

## 1 CONSTRUCTION RECOMMENDATIONS

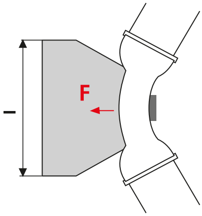
The concrete anchor blocks presented hereinafter have been designed for the most frequently encountered types of soil and laying conditions.

**If the laying conditions are not covered by the following tables, contact SAINT-GOBAIN PAM.**

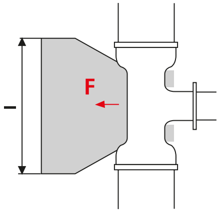
It is important to cast the concrete **directly against the surrounding soil** and use a concrete mix offering adequate strength.




When designing the anchor blocks, do not forget to leave the **gaskets exposed** for inspection during subsequent hydraulic testing.




*Caution! Never excavate in the immediate vicinity of an anchor block restraining thrust without having taken the precaution of sufficiently reducing the pressure in the main during work.*



# Anchor blocks

## 2 ANCHOR BLOCK DIMENSIONS

### Soil with HIGH mechanical strength

- Internal friction: $\phi$ = **40°**
- Soil strength: $\sigma$ = **0.6 daN/cm²**
- Mass density: $\gamma$ = **2t / m³**
- Height of cover: **H = 1 m**
- No groundwater

| Soil with high mechanical strength | | | | | | |
|---|---|---|---|---|---|---|
| DN | Test pressure | 1/32 bend w x h / V | 1/16 bend w x h / V | 1/8 bend w x h / V | 1/4 bend w x h / V | Blank flange and tee w x h / V |
| | bar | m x m /m³ | m x m /m³ | m x m /m³ | m x m /m³ | m x m /m³ |
| 60 | 10 | 0.07x0.16/0.01 | 0.14x0.16/0.02 | 0.17x0.26/0.02 | 0.31x0.26/0.04 | 0.22x0.26/0.03 |
| | 16 | 0.11x0.16/0.02 | 0.14x0.26/0.02 | 0.27x0.26/0.04 | 0.48x0.26/0.07 | 0.35x0.26/0.04 |
| | 25 | 0.17x0.16/0.03 | 0.22x0.26/0.03 | 0.41x0.26/0.05 | 0.71x0.26/0.14 | 0.52x0.26/0.08 |
| 80 | 10 | 0.1x0.18/0.02 | 0.20x0.18/0.04 | 0.25x0.28/0.04 | 0.45x0.28/0.07 | 0.33x0.28/0.05 |
| | 16 | 0.16x0.18/0.03 | 0.21x0.28/0.03 | 0.39x0.28/0.06 | 0.68x0.28/0.14 | 0.50x0.28/0.08 |
| | 25 | 0.17x0.28/0.02 | 0.32x0.28/0.04 | 0.59x0.28/0.11 | 1.00x0.28/0.31 | 0.74x0.28/0.17 |
| 100 | 10 | 0.13x0.20/0.03 | 0.18x0.30/0.03 | 0.33x0.30/0.05 | 0.58x0.30/0.11 | 0.43x0.30/0.07 |
| | 16 | 0.20x0.20/0.05 | 0.28x0.30/0.05 | 0.51x0.30/0.1 | 0.88x0.30/0.25 | 0.65x0.30/0.14 |
| | 25 | 0.22x0.30/0.04 | 0.42x0.30/0.07 | 0.76x0.30/0.19 | 1.03x0.40/0.47 | 0.95x0.30/0.30 |
| 125 | 10 | 0.17x0.22/0.04 | 0.24x0.33/0.05 | 0.44x0.33/0.09 | 0.76x0.33/0.21 | 0.56x0.33/0.13 |
| | 16 | 0.19x0.33/0.04 | 0.37x0.33/0.07 | 0.67x0.33/0.16 | 0.94x0.43/0.41 | 0.85x0.33/0.26 |
| | 25 | 0.29x0.33/0.06 | 0.55x0.33/0.12 | 0.99x0.33/0.35 | 1.35x0.43/0.85 | 1.02x0.43/0.49 |
| 150 | 10 | 0.21x0.25/0.06 | 0.3x0.35/0.07 | 0.55x0.35/0.14 | 0.79x0.45/0.31 | 0.70x0.35/0.19 |
| | 16 | 0.24x0.35/0.05 | 0.46x0.35/0.11 | 0.83x0.35/0.27 | 1.17x0.45/0.67 | 0.88x0.45/0.38 |
| | 25 | 0.37x0.35/0.09 | 0.69x0.35/0.19 | 1.02x0.45/0.51 | 1.66x0.45/1.37 | 1.27x0.45/0.79 |
| 200 | 10 | 0.28x0.30/0.10 | 0.42x0.40/0.14 | 0.66x0.50/0.24 | 1.11x0.50/0.68 | 0.83x0.50/0.38 |
| | 16 | 0.35x0.40/0.11 | 0.65x0.40/0.22 | 0.99x0.50/0.53 | 1.44x0.60/1.37 | 1.23x0.50/0.83 |
| | 25 | 0.52x0.40/0.16 | 0.81x0.50/0.36 | 1.42x0.50/1.11 | 2.03x0.60/2.72 | 1.56x0.60/1.61 |
| 250 | 10 | 0.35x0.35/0.16 | 0.55x0.45/0.22 | 0.86x0.55/0.45 | 1.28x0.65/1.18 | 1.08x0.55/0.7 |
| | 16 | 0.45x0.45/0.18 | 0.72x0.55/0.31 | 1.27x0.55/0.98 | 1.71x0.75/2.4 | 1.42x0.65/1.43 |
| | 25 | 0.58x0.55/0.20 | 1.05x0.55/0.67 | 1.63x0.65/1.90 | 2.22x0.85/4.61 | 1.84x0.75/2.79 |
| 300 | 10 | 0.42x0.40/0.24 | 0.59x0.60/0.23 | 1.05x0.60/0.73 | 1.57x0.70/1.90 | 1.19x0.70/1.09 |
| | 16 | 0.55x0.50/0.29 | 0.89x0.60/0.52 | 1.40x0.70/1.52 | 1.96x0.90/3.79 | 1.60x0.80/2.26 |
| | 25 | 0.72x0.60/0.34 | 1.17x0.70/1.05 | 1.84x0.80/2.97 | 2.45x1.10/7.28 | 2.10x0.90/4.39 |
| 350 | 10 | 0.49x0.45/0.33 | 0.70x0.65/0.35 | 1.14x0.75/1.06 | 1.72x0.85/2.78 | 1.31x0.85/1.61 |
| | 16 | 0.58x0.65/0.24 | 0.96x0.75/0.76 | 1.54x0.85/2.22 | 2.20x1.05/5.58 | 1.78x0.95/3.33 |
| | 25 | 0.85x0.65/0.52 | 1.38x0.75/1.58 | 2.04x0.95/4.35 | 2.70x1.35/10.86 | 2.27x1.15/6.49 |
| 400 | 10 | 0.55x0.50/0.43 | 0.74x0.80/0.48 | 1.22x0.90/1.48 | 1.79x1.10/3.86 | 1.51x0.90/2.27 |
| | 16 | 0.66x0.70/0.38 | 1.10x0.90/1.07 | 1.68x1.00/3.09 | 2.28x1.40/8.01 | 1.96x1.10/4.64 |
| | 25 | 0.90x0.80/0.72 | 1.48x0.90/2.18 | 2.02x1.40/6.31 | 3.09x1.40/14.74 | 2.44x1.40/9.20 |

# Anchor blocks

## Soil with MEDIUM mechanical strength

- Internal friction: $\phi = 30°$
- Soil strength: $\sigma = 0.6\ daN/cm^2$
- Mass density: $\gamma = 2t/m^3$
- Height of cover: **H = 1 m**
- No groundwater

| Soil with medium mechanical strength | | | | | | |
|---|---|---|---|---|---|---|
| DN | Test pressure | 1/32 bend w x h / V | 1/16 bend w x h / V | 1/8 bend w x h / V | 1/4 bend w x h / V | Blank flange and tee w x h / V |
| | bar | m x m /m³ | m x m /m³ | m x m /m³ | m x m /m³ | m x m /m³ |
| 60 | 10 | 0.11x0.16/0.01 | 0.14x0.26/0.01 | 0.26x0.26/0.03 | 0.46x0.26/0.06 | 0.33x0.26/0.03 |
| | 16 | 0.17x0.16/0.02 | 0.21x0.26/0.02 | 0.40x0.26/0.05 | 0.69x0.26/0.14 | 0.51x0.26/0.07 |
| | 25 | 0.17x0.26/0.02 | 0.33x0.26/0.03 | 0.60x0.26/0.10 | 1.01x0.26/0.29 | 0.75x0.26/0.16 |
| 80 | 10 | 0.15x0.18/0.02 | 0.20x0.28/0.02 | 0.38x0.28/0.05 | 0.65x0.28/0.13 | 0.48x0.28/0.07 |
| | 16 | 0.16x0.28/0.02 | 0.31x0.28/0.04 | 0.57x0.28/0.10 | 0.97x0.28/0.29 | 0.73x0.28/0.16 |
| | 25 | 0.25x0.28/0.03 | 0.47x0.28/0.07 | 0.84x0.28/0.22 | 1.13x0.38/0.53 | 1.06x0.28/0.34 |
| 100 | 10 | 0.19x0.20/0.04 | 0.26x0.30/0.04 | 0.49x0.30/0.08 | 0.84x0.30/0.23 | 0.62x0.30/0.13 |
| | 16 | 0.21x0.30/0.03 | 0.41x0.30/0.06 | 0.74x0.30/0.18 | 1.01x0.40/0.45 | 0.93x0.30/0.29 |
| | 25 | 0.33x0.30/0.05 | 0.61x0.30/0.12 | 1.08x0.30/0.38 | 1.44x0.40/0.92 | 1.10x0.40/0.53 |
| 125 | 10 | 0.18x0.33/0.03 | 0.35x0.33/0.06 | 0.64x0.33/0.15 | 0.90x0.43/0.38 | 0.81x0.33/0.24 |
| | 16 | 0.29x0.33/0.05 | 0.54x0.33/0.10 | 0.96x0.33/0.33 | 1.32x0.43/0.81 | 0.99x0.43/0.46 |
| | 25 | 0.43x0.33/0.07 | 0.80x0.33/0.23 | 1.15x0.43/0.62 | 1.86x0.43/1.61 | 1.42x0.43/0.95 |
| 150 | 10 | 0.23x0.35/0.04 | 0.44x0.35/0.09 | 0.80x0.35/0.25 | 1.12x0.45/0.62 | 0.84x0.45/0.35 |
| | 16 | 0.36x0.35/0.07 | 0.67x0.35/0.17 | 0.99x0.45/0.49 | 1.62x0.45/1.30 | 1.23x0.45/0.75 |
| | 25 | 0.54x0.35/0.11 | 0.82x0.45/0.33 | 1.42x0.45/1 | 2.00x0.55/2.41 | 1.54x0.55/1.43 |
| 200 | 10 | 0.33x0.40/0.08 | 0.62x0.40/0.17 | 0.94x0.50/0.49 | 1.38x0.60/1.26 | 1.18x0.50/0.76 |
| | 16 | 0.51x0.40/0.13 | 0.79x0.50/0.35 | 1.38x0.50/1.05 | 1.97x0.60/2.57 | 1.52x0.60/1.52 |
| | 25 | 0.64x0.50/0.23 | 1.15x0.50/0.73 | 1.74x0.60/2.00 | 2.32x0.80/4.74 | 1.94x0.70/2.91 |
| 250 | 10 | 0.43x0.45/0.14 | 0.69x0.55/0.29 | 1.09x0.65/0.85 | 1.63x0.75/2.19 | 1.35x0.65/1.31 |
| | 16 | 0.57x0.55/0.20 | 1.03x0.55/0.64 | 1.59x0.65/1.80 | 2.16x0.85/4.35 | 1.79x0.75/2.64 |
| | 25 | 0.84x0.55/0.43 | 1.33x0.65/1.26 | 2.04x0.75/3.44 | 2.66x1.05/8.18 | 2.32x0.85/5.02 |
| 300 | 10 | 0.53x0.50/0.22 | 0.85x0.60/0.48 | 1.34x0.70/1.39 | 1.87x0.90/3.46 | 1.53x0.80/2.06 |
| | 16 | 0.70x0.60/0.33 | 1.14x0.70/1.00 | 1.79x0.80/2.81 | 2.38x1.10/6.86 | 2.05x0.90/4.15 |
| | 25 | 1.03x0.60/0.70 | 1.50x0.80/1.99 | 2.21x1.00/5.37 | 3.01x1.30/12.92 | 2.38x1.30/8.13 |
| 350 | 10 | 0.55x0.65/0.22 | 0.92x0.75/0.69 | 1.47x0.85/2.03 | 2.10x1.05/5.09 | 1.71x0.95/3.04 |
| | 16 | 0.83x0.65/0.50 | 1.25x0.85/1.47 | 1.89x1.05/4.13 | 2.62x1.35/10.22 | 2.13x1.25/6.22 |
| | 25 | 1.11x0.75/1.01 | 1.67x0.95/2.93 | 2.34x1.35/8.13 | 3.52x1.35/18.40 | 2.81x1.35/11.69 |
| 400 | 10 | 0.64x0.70/0.31 | 1.06x0.80/0.98 | 1.60x1.00/2.82 | 2.18x1.40/7.31 | 1.87x1.10/4.24 |
| | 16 | 0.88x0.80/0.68 | 1.44x0.90/2.07 | 1.97x1.40/5.96 | 3.00x1.40/13.87 | 2.37x1.40/8.68 |
| | 25 | 1.19x0.90/1.41 | 1.84x1.10/4.09 | 2.68x1.40/11.08 | 4.01x1.40/24.73 | 3.21x1.40/15.82 |

# Anchor blocks

## 3 HYDRAULIC THRUST

**Thrust F = test P x f** (1 bar)

| Example: | 45° bend<br>DN = 150<br>Test P = 10 bar | Thrust F = 1740 DaN |
|---|---|---|

### Thrust f for pressure of 1 bar

| DN | Tee or blank flange (daN) | 1/4 bend (daN) | 1/8 bend (daN) | 1/16 bend (daN) | 1/32 bend (daN) |
|---|---|---|---|---|---|
| **60** | 47 | 66 | 36 | 18 | 9 |
| **80** | 75 | 107 | 58 | 29 | 15 |
| **100** | 109 | 155 | 84 | 43 | 21 |
| **125** | 163 | 230 | 15 | 63 | 32 |
| **150** | 227 | 321 | 174 | 89 | 44 |
| **200** | 387 | 547 | 296 | 151 | 76 |
| **250** | 590 | 834 | 451 | 230 | 116 |
| **300** | 835 | 1180 | 639 | 326 | 164 |
| **350** | 1122 | 1587 | 859 | 438 | 220 |
| **400** | 1445 | 2044 | 1106 | 564 | 283 |

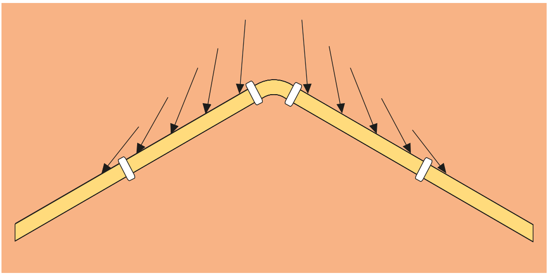
## 4 SOIL CHARACTERISTICS

The values below are those generally accepted for soil characterization. They are no substitute for actual site or laboratory measurements.

| Soil type | Dry / wet | | Submerged | |
|---|---|---|---|---|
| | $\phi$ | $\gamma$ | $\phi$ | $\gamma$ |
| | degrees | t/m$^3$ | degrees | t/m$^3$ |
| **Fragmented rock** | 40 | 2 | 35 | 1.1 |
| **Gravel, sands** | 35 | 1.9 | 30 | 1.1 |
| **Gravel, sands Silts / clays** | 30 | 2 | 25 | 1.1 |
| **Silts / clays** | 25 | 1.9 | 15 | 1.1 |
| **Humus Organic clays / silts** | 15 | 1.5 | no mean characteristics | |

*$\phi$: soil internal friction angle*
*$\gamma$: soil density*
*(standard geotechnical data)*

# Anchoring



*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*
*All the values contained in this document are provided by SAINT-GOBAIN PAM for guidance only. They are no substitute for carrying out prior studies or enlisting the services of a consultant.*

## 1 CONSTRUCTION RECOMMENDATIONS

The self-anchoring of push-in joints represents an alternative technique to concrete anchor blocks for withstanding the hydraulic thrust of buried pipelines.

The anchoring lengths suggested below have been calculated for the most frequently encountered types of soil and laying conditions (minimum height of cover = 1 m).

**If the laying conditions are not covered by the following tables, contact SAINT-GOBAIN PAM.**

Anchoring is recommended in case of space constraints (urban areas) or non-cohesive soils.

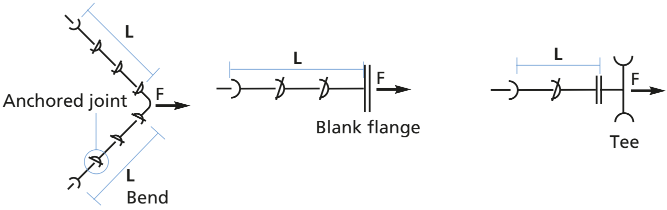
The length to be anchored **does not depend on the anchoring joint used**.

The length to be anchored **depends on the pipe's type of external coating**:

•Usual coatings: BioZinalium, Zinalium or Zinc

•Special coatings: Standard TT, PUX, ZMU or PE sleeve

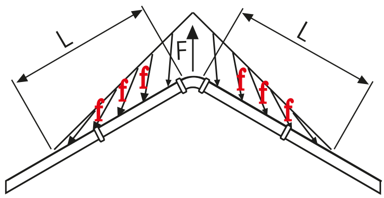
Length **L** to be anchored according to the diagrams below:




## 2 ANCHORING PRINCIPLE

# Anchoring

**F :** hydraulic thrust on the joint
**f :** soil/pipe friction
**L :** length to be anchored




The technique involves anchoring joints over a sufficient length L on both sides of a bend so as to harness the friction forces (f) between the anchored sections (L) and the soil to withstand the hydraulic thrust (F).

## 3 SOIL CHARACTERISTICS

The values below are those generally accepted for soil characterization. They are no substitute for actual site or laboratory measurements.

| Soil type | Dry / wet | | Submerged | |
|---|---|---|---|---|
| | ϕ | γ | ϕ | γ |
| | degrees | t/m³ | degrees | t/m³ |
| **Fragmented rock** | 40 | 2 | 35 | 1.1 |
| **Gravel, sands** | 35 | 1.9 | 30 | 1.1 |
| **Gravel, sands**<br>**Silts / clays** | 30 | 2 | 25 | 1.1 |
| **Silts / clays** | 25 | 1.9 | 15 | 1.1 |
| **Humus**<br>**Organic clays / silts** | 15 | 1.5 | no mean characteristics | |

*ϕ: soil internal friction angle*
*γ: soil density*
*(standard geotechnical data)*

# Anchoring

## 4 ANCHORING LENGTHS

### Assumptions for the calculation:

- Internal friction: $\phi = 30°$
- Soil strength: $\sigma = 0.6$ daN/cm$^2$
- Mass density: $\gamma = 2t/m^3$
- No groundwater

### Usual coatings:

- BioZinalium, Zinalium or Zinc

| Anchoring lengths (in m) calculated with the above assumptions | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Joint type | | 1/4 bend | | | 1/8 bend | | | 1/16 bend | | | 1/32 bend | | | Blank flange, valve or tee | | |
| Height of cover (m) | | 1 | 1.5 | 2 | 1 | 1.5 | 2 | 1 | 1.5 | 2 | 1 | 1.5 | 2 | 1 | 1.5 | 2 |
| DN | Test pressure | Lengths to be anchored (m) | | | | | | | | | | | | | | |
| 60 | 10 | 4.6 | 3.1 | 2.4 | 2.9 | 1.9 | 1.5 | 1.6 | 1.1 | 0.8 | 0.8 | 0.6 | 0.4 | 5.8 | 4.0 | 3.0 |
| | 16 | 7.3 | 5.0 | 3.8 | 4.6 | 3.1 | 2.3 | 2.6 | 1.7 | 1.3 | 1.4 | 0.9 | 0.7 | 9.4 | 6.4 | 4.8 |
| | 25 | 11.5 | 7.8 | 5.9 | 7.1 | 4.8 | 3.7 | 4.0 | 2.7 | 2.1 | 2.1 | 1.4 | 1.1 | 14.6 | 9.9 | 7.5 |
| 80 | 10 | 5.8 | 4.0 | 3.0 | 3.6 | 2.5 | 1.9 | 2.0 | 1.4 | 1.0 | 1.1 | 0.7 | 0.6 | 7.4 | 5.0 | 3.8 |
| | 16 | 9.3 | 6.3 | 4.8 | 5.8 | 3.9 | 3.0 | 3.2 | 2.2 | 1.7 | 1.7 | 1.2 | 0.9 | 11.8 | 8.1 | 6.1 |
| | 25 | 14.5 | 9.9 | 7.5 | 9.0 | 6.1 | 4.7 | 5.1 | 3.4 | 2.6 | 2.7 | 1.8 | 1.4 | 18.5 | 12.6 | 9.5 |
| 100 | 10 | 7.0 | 4.7 | 3.6 | 4.3 | 2.9 | 2.2 | 2.4 | 1.7 | 1.3 | 1.3 | 0.9 | 0.7 | 8.9 | 6.0 | 4.6 |
| | 16 | 11.1 | 7.6 | 5.8 | 6.9 | 4.7 | 3.6 | 3.9 | 2.6 | 2.0 | 2.1 | 1.4 | 1.1 | 14.2 | 9.7 | 7.3 |
| | 25 | 17.4 | 11.9 | 9.0 | 10.8 | 7.4 | 5.6 | 6.1 | 4.1 | 3.1 | 3.2 | 2.2 | 1.7 | 22.1 | 15.1 | 11.5 |
| 125 | 10 | 8.4 | 5.8 | 4.4 | 5.2 | 3.6 | 2.7 | 2.9 | 2.0 | 1.5 | 1.6 | 1.1 | 0.8 | 10.7 | 7.3 | 5.6 |
| | 16 | 13.5 | 9.2 | 7.0 | 8.4 | 5.7 | 4.3 | 4.7 | 3.2 | 2.4 | 2.5 | 1.7 | 1.3 | 17.2 | 11.7 | 8.9 |
| | 25 | 21.1 | 14.4 | 10.9 | 13.1 | 8.9 | 6.8 | 7.3 | 5.0 | 3.8 | 3.9 | 2.7 | 2.0 | 26.8 | 18.3 | 13.9 |
| 150 | 10 | 9.9 | 6.8 | 5.1 | 6.1 | 4.2 | 3.2 | 3.4 | 2.4 | 1.8 | 1.8 | 1.2 | 0.9 | 12.6 | 8.6 | 6.5 |
| | 16 | 15.8 | 10.8 | 8.2 | 9.8 | 6.7 | 5.1 | 5.5 | 3.8 | 2.9 | 2.9 | 2.0 | 1.5 | 20.1 | 13.8 | 10.5 |
| | 25 | 24.7 | 16.9 | 12.9 | 15.3 | 10.5 | 8.0 | 8.6 | 5.9 | 4.5 | 4.6 | 3.1 | 2.4 | 31.4 | 21.5 | 16.4 |
| 200 | 10 | 12.7 | 8.7 | 6.7 | 7.9 | 5.4 | 4.1 | 4.4 | 3.0 | 2.3 | 2.3 | 1.6 | 1.2 | 16.2 | 11.1 | 8.5 |
| | 16 | 20.3 | 14.0 | 10.7 | 12.6 | 8.7 | 6.6 | 7.1 | 4.9 | 3.7 | 3.8 | 2.6 | 2.0 | 25.9 | 17.8 | 13.6 |
| | 25 | 31.8 | 21.9 | 16.7 | 19.7 | 13.6 | 10.4 | 11.1 | 7.6 | 5.8 | 5.9 | 4.0 | 3.1 | 40.4 | 27.8 | 21.2 |
| 250 | 10 | 15.4 | 10.7 | 8.1 | 9.6 | 6.6 | 5.1 | 5.4 | 3.7 | 2.8 | 2.8 | 2.0 | 1.5 | 19.6 | 13.6 | 10.4 |
| | 16 | 24.6 | 17.0 | 13.0 | 15.3 | 10.6 | 8.1 | 8.6 | 5.9 | 4.5 | 4.5 | 3.1 | 2.4 | 31.3 | 21.7 | 16.6 |
| | 25 | 38.5 | 26.6 | 20.4 | 23.9 | 16.5 | 12.7 | 13.4 | 9.3 | 7.1 | 7.1 | 4.9 | 3.8 | 49.0 | 33.9 | 25.9 |
| 300 | 10 | 18.0 | 12.5 | 9.6 | 11.2 | 7.8 | 6.0 | 6.3 | 4.4 | 3.3 | 3.3 | 2.3 | 1.8 | 22.9 | 15.9 | 12.2 |
| | 16 | 28.8 | 20.0 | 15.4 | 17.9 | 12.4 | 9.5 | 10.0 | 7.0 | 5.3 | 5.3 | 3.7 | 2.8 | 36.6 | 25.5 | 19.6 |
| | 25 | 45.0 | 31.3 | 24.0 | 27.9 | 19.4 | 14.9 | 15.6 | 10.9 | 8.4 | 8.3 | 5.8 | 4.4 | 57.2 | 39.8 | 30.6 |
| 350 | 10 | 20.5 | 14.4 | 11.0 | 12.7 | 8.9 | 6.9 | 7.1 | 5.0 | 3.8 | 3.8 | 2.7 | 2.0 | 26.1 | 18.3 | 14.1 |
| | 16 | 32.8 | 23.0 | 17.7 | 20.4 | 14.3 | 11.0 | 11.4 | 8.0 | 6.1 | 6.1 | 4.2 | 3.3 | 41.8 | 29.2 | 22.5 |
| | 25 | 51.3 | 35.9 | 27.6 | 31.9 | 22.3 | 17.1 | 17.9 | 12.5 | 9.6 | 9.5 | 6.6 | 5.1 | 65.3 | 45.7 | 35.1 |
| 400 | 10 | 23.0 | 16.1 | 12.4 | 14.3 | 10.0 | 7.7 | 8.0 | 5.6 | 4.3 | 4.2 | 3.0 | 2.3 | 29.3 | 20.5 | 15.8 |
| | 16 | 36.8 | 25.8 | 19.9 | 22.8 | 16.0 | 12.4 | 12.8 | 9.0 | 6.9 | 6.8 | 4.8 | 3.7 | 46.8 | 32.9 | 25.3 |
| | 25 | 57.5 | 40.3 | 31.1 | 35.7 | 25.1 | 19.3 | 20.0 | 14.0 | 10.8 | 10.6 | 7.5 | 5.7 | 73.1 | 51.4 | 39.6 |

# Anchoring

A **safety factor** may be applied to the length to be anchored, depending on the:

- **Laying conditions**
- **Quality** and **compaction** of the **backfill**
- **Uncertainties surrounding the physical characteristics** of the backfill

Where applicable, allowance should be made for any partial presence of groundwater by correcting the weight of the full pipe and applying the corresponding Archimedes' value.

**If using a polyethylene sleeve:**

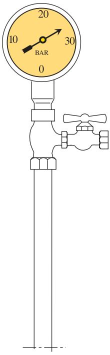
Apply a multiplier of 1.9 to the length to be anchored.

**If using pipes with a polyethylene (TT) or polyurethane (PUX) coating:**

Apply a multiplier of 1.5 to the length to be anchored.

**Other cases: contact us.**

# Hydraulic testing




*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 PREPARATION FOR THE TEST

### Recommendations

The recommendation is to not exceed a length of 2,000 meters.

The length of the section to be tested depends on the layout configuration and the project's technical specifications.

Depending on the type of worksite, it is better to pressurize the pipeline while leaving the joints exposed to check for leaks.


### Calculate the hydraulic forces

Developed at the ends of the main and install a suitably sized restraint system.

**Thrust F = test P x f (1 bar)**

Example : DN = 150 Test P = 10 bar Thrust F 227 daN

| DN | f(1bar) daN | DN | f(1bar) daN | DN | f(1bar) daN | DN | f(1bar) daN |
|---|---|---|---|---|---|---|---|
| **60** | 47 | **250** | 590 | **600** | 3167 | **1200** | 12370 |
| **80** | 75 | **300** | 835 | **700** | 4278 | **1400** | 16787 |
| **100** | 109 | **350** | 1122 | **800** | 5568 | **1500** | 19236 |
| **125** | 163 | **400** | 1445 | **900** | 7014 | **1600** | 21851 |
| **150** | 227 | **450** | 1809 | **1000** | 8626 | **1800** | 27612 |
| **200** | 387 | **500** | 2223 | **1100** | 10405 | **2000** | 34045 |

# Hydraulic testing

**Calculate the volume of water**

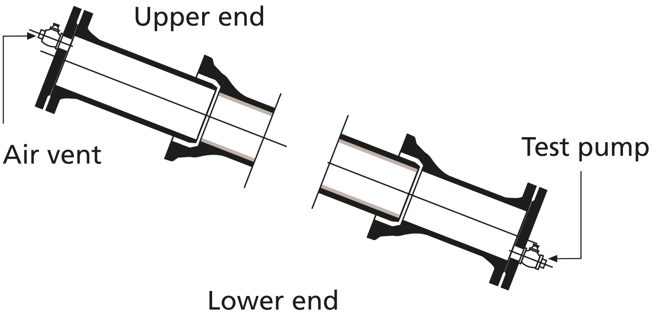
Calculation for the volume of water in $m^3$

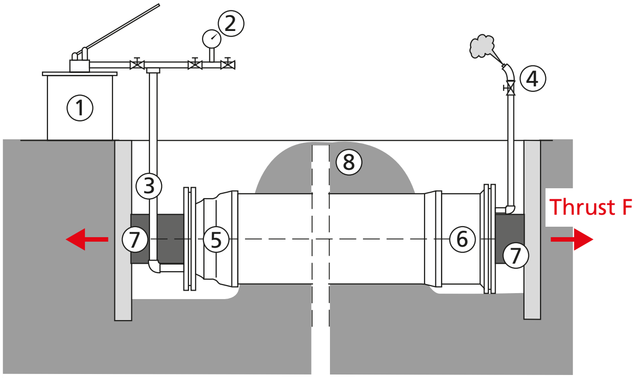
$\pi \times (DN/2000)^2 \times$ pipeline length

Example: 1,850-metre section of DN 800 pipe

$3.1415 \times (800/2000)^2 \times 1850 = 929.78\ m^3$

**Block the ends** of the test section with blank flanges equipped with valves for water filling and air venting.



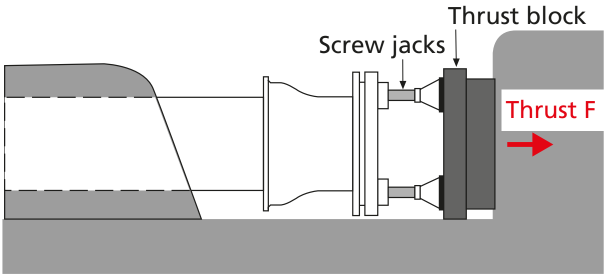




1 - Test pump
2 - Manometer
3 - Pump connection
4 - Air vent

5 - Lower end part
6 - Upper end part
7 - Anchor system
8 - Spoil

# Hydraulic testing

Pressurizing the pipe compresses the temporary end restraints. If necessary, use screw jacks to compensate for any compression.




**Absorb the forces** using timbers laid across the trench or by sheet piling (also provide lateral restraints).

**Avoid** using the end of a previously laid and hydraulically tested pipe section as a buttress.

## 2 PIPE FILLING AND TEST PREPARATION

**Gradually fill** the main from the low points.

**Increase to maximum pressure** and **leave for 24 hours** according to EN 805 before performing the test for the main to reach equilibrium (rehydration of the pipes' cement internal lining).

### Checking filling

Any air in the main must be **completely removed.**

**Check** that the air valves are functioning.

**Open** the wash-out valves to check the arrival of water.

## 3 PRESSURE TEST

With the pipes completely filled, slowly **increase** the pressure until the planned test pressure is reached.

**Keep** a constant eye on the restraints

**Apply** the defined test criteria.

The test pressure should not fall by more than 0.2 bar when maintained for one hour in accordance with EN 805.

**Empty** the main, **remove** the test equipment and, **connect** up the section.

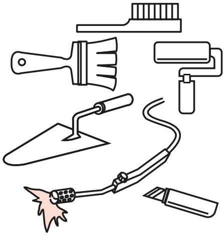
**Flush** out the main thoroughly to remove any foreign bodies trapped during laying.

**Disinfect** before commissioning.

# External coating repairs

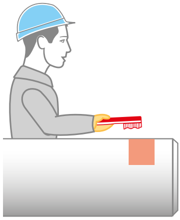
*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 EQUIPMENT AND TOOLS REQUIR

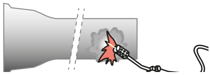


- Gloves, protective mask and goggles
- Brush, abrasive paper and cutter
- Spatula, mastic knife
- Paintbrushes, roller
- Gas burner
- Adhesive roller

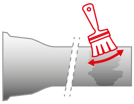
## 2 PIPES WITH A BIOZINALIUM AND ZINALIUM EXTERNAL COATING: Natural, Integral, Blutop, Topaz, Tag 32



**Brush** to remove any dirt or loose particles.

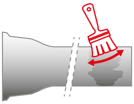


**Dry** the surfaces to be coated (in case of low temperatures or high humidity, use a gas burner).



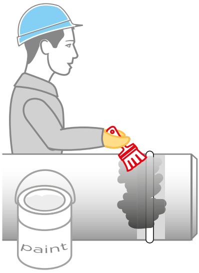
If the iron is exposed, **apply** high-zinc anticorrosion primer NATZINC (ref. **251222**) with a paintbrush with vertical and horizontal strokes.

Allow to **dry** for a few minutes.



**Apply** AQUACOAT paint with a paintbrush (NATURAL / BLUTOP Blue ref. **240991** – INTEGRAL / TAG32 / TOPAZ Red ref. **240990**) with vertical and horizontal strokes.

## 3 FITTINGS WITH AN EPOXY EXTERNAL COATING: Natural, Blutop, Integral, Topaz (all versions).




**Brush** and clean the area to be touched up and then **dry**.

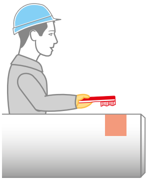
**Apply** the epoxy paint with a paintbrush or spatula with vertical and horizontal strokes.

- **Natural / Blutop**: EUROKOTE 4820 Blue (1 kg dose: ref. **158255**)
- **Integral / Tag32 / Topaz**: EUROKOTE 4820 Red Brown (1 kg dose: 184653 or kit of five 50 ml syringes: ref. **220817**)
- **Standard TT PUX and Integral TT PUX:** Eurokote 4820 Ivory (ref. **220818**)

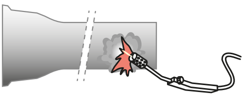
# External coating repairs

## 4 PIPES WITH A ZINC AND SYNTHETIC PAINT EXTERNAL COATING

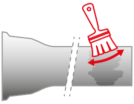
**Brush** to remove any dirt or loose particles.



**Dry** the surfaces to be coated (in case of low temperatures or high humidity, use a gas burner).

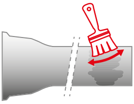


If the iron is exposed, **apply** high-zinc anticorrosion primer NATZINC (ref. **251222**) with a paintbrush with vertical and horizontal strokes.

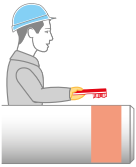


Allow to **dry** for a few minutes.

**Apply** ENDOLAC 245-30 FGC paint (ref. **158134**) with a paintbrush with vertical and horizontal strokes.



## 5 PIPES WITH A POLYETHYLENE EXTERNAL COATING



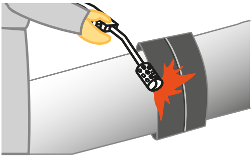
### 5.1 Significant damage

**Roughen** the area to be repaired with abrasive paper.

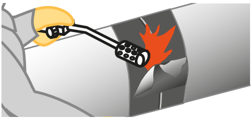
**Clean and dry** the area.

**Preheat** to approximately 60°C.

**Fit** an open heat-shrink sleeve (reference on request).

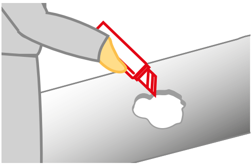


**Wrap** the sleeve all around the pipe's circumference using a gas burner and then fit the closing strip.



### 5.2 Moderate damage

Repair kit ref. **111216** comprising abrasive paper, mastic and a repair strip.

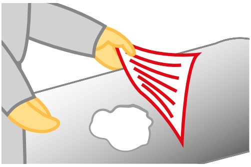


**Clean** and **dry** the exposed area.

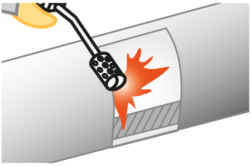
**Cut off** and **remove** the damaged PE.

# External coating repairs

**Preheat** to approximately 60°C.
**Apply** the mastic and smooth with a knife.
**Place the repair strip** with a 50 mm overlap on the edges of the cut area.



**Heat** the strip with a gas burner until the heat-sensitive paint changes color.
**Press** the strip down wearing appropriate gloves.

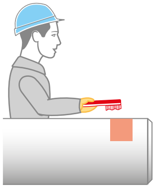


### 5.3 Minor damage

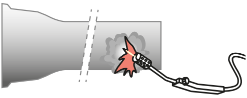
In case of minor damage to the TT coating, use the **PE repair stick** (ref. **175507**). Using a brazing torch, heat the stick until it drips onto the damaged area and then smooth over.

## 6 PIPES WITH A POLYURETHANE EXTERNAL COATING

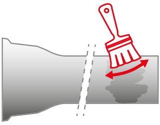
**Brush** to remove any dirt or loose particles and then **sand** to clean and roughen the surface.
**Remove** any dust from the surface to be coated.



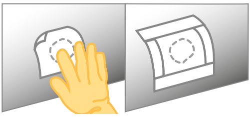
**Heat** with a gas burner to remove any traces of humidity.



**Apply** the product to the surface with a syringe (Eurokote 4820 Ivory – ref. **220818**).



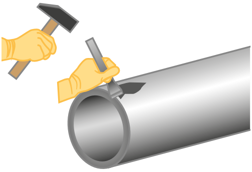
**Cover** with a sheet of PVC to smooth out and protect the product.
Close with adhesive.



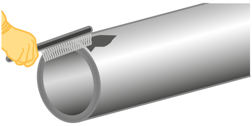
*In case of major damage to the PUX coating, follow procedure 5.1 in the previous chapter.*

# External coating repairs

## 7 PIPES WITH A CEMENT EXTERNAL COATING



**Prepare** the affected surface by removing the damaged and loose mortar.



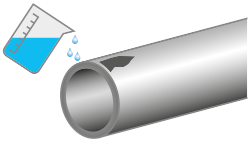
**Brush** to remove any dirt or loose particles and then **clean** the surface.

**Prepare** the ZMU repair kit (DN 80 to 600: ref. **218842**).

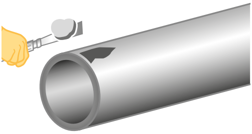
•Mix the dry components

•Add the liquid while stirring vigorously

•Leave for five minutes and then mix again



**Dampen** the surface.



**Fill** with mortar using a spatula and then smooth the surface.

(DN≥700: ref. **158009**)

**Prepare** the SIKADUR 31DW mixture with three parts R (resin) and one part H (hardener). **Mix** to an even consistency.

Preferably **position** the area to be repaired facing downwards.

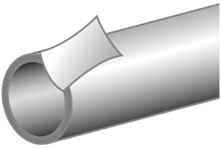
**Remove** any damaged and loose mortar.

**Clean** until spotless.

**Apply** the mixture and compact to ensure the correct thickness.

**Smooth** the surface.

**Minimum application temperature: + 5°C.**



**Cover** with plastic film or a damp cloth to maintain a high level of humidity and ensure that the mixture sets properly.

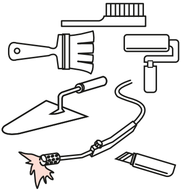
Optimal drying time: 2 hr 30 min.

# Internal lining repairs

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

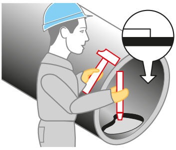
*For all mixtures of resins and hardeners, you must comply with the specified proportions.*

## 1 EQUIPMENT AND TOOLS REQUIRED



- Gloves, protective mask and goggles
- Brush, abrasive paper and cutter
- Spatula, mastic knife
- Paintbrushes, roller
- Gas burner

## 2 PIPES WITH A CEMENT INTERNAL LINING (DRINKING WATER AND SEWAGE): Natural, Integral, Classic (all versions).



**Prepare** the SIKADUR 31DW mixture (ref. **158009**) with three parts R (resin) and one part H (hardener). **Mix** to an even consistency.

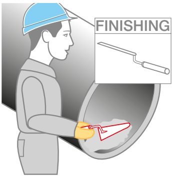
Preferably **position** the area to be repaired facing downwards.

**Remove** any damaged and loose mortar.

**Clean** until spotless.

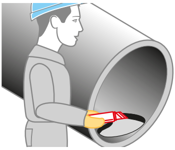
**Apply** the mixture and compact to ensure the correct thickness.

**Smooth** the surface.

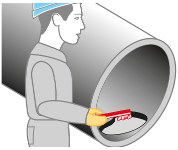



*For a socket without a cement lining, use:*
- *NATURAL: NatZinc ref. 251222 (5 kg dose) and then Aquacoat (0.75 kg dose) ref. 240991*
- *CLASSIC and STANDARD TT: NatZinc ref. 251222 (5 kg dose) and then Endolac (1 kg dose) ref. 158134*
- *INTEGRAL and INTEGRAL TT or PUX: NatZinc ref. 251222 (5 kg dose) and then Eurokote (1 kg dose) ref. 236283*

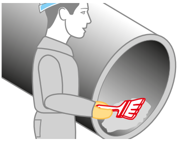
## 3 PIPES WITH A DUCTAN AND EPOXY INTERNAL LINING (DRINK. WATER AND SEWAGE): Blutop, Topaz, Tag32.



**Deburr** the edges of the damaged area with a cutter.



**Sand** and **clean** the damaged area.



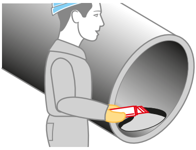
**Apply** the Eurokote 4820 mixture to the damaged area with a paintbrush.

- Blutop: ref. **158255** (1 kg dose) or **220815** (five 50 ml syringes)
- Topaz: ref. **184653** (1 kg dose) or **220817** (five 50 ml syringes)
- Tag32: ref. **184653** (1 kg dose) or **220817** (five 50 ml syringes)

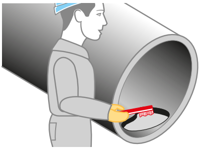
**Allow to dry**.

# Internal lining repairs

## 4 PIPES WITH A POLYURETHANE INTERNAL LINING (DRIN. WATER AND SEWAGE): Natural PUR, Integral pH1.

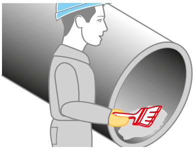


**Deburr** the edges of the damaged area with a cutter.

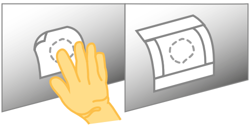


**Brush** and **clean** to remove any dirt or loose particles.

**Dry** the surfaces to be coated (in case of low temperatures or high humidity, use a gas burner).



**Apply** EUROKOTE 4820 Ivory paint (1 kg dose, ref. **185005** or five 50 ml syringes ref. **220818**) with a paintbrush with vertical and horizontal strokes.



**Cover** with a sheet of PVC to smooth out and protect the product.
**Close** with adhesive.

**Allow to dry**.

*For a socket without a polyurethane lining, use:*
*- NATURAL PUR: ref. **158255** (1 kg dose) or **220815** (five 50 ml syringes)*
*- INTEGRAL pH1: ref. **184653** (1 kg dose) or **220817** (five 50 ml syringes)*

## 5 FITTINGS WITH AN EPOXY COATING (DRINK. WATER AND SEWAGE): Natural, Integral, Classic (all versions).

**Deburr** the edges of the damaged area with a cutter.

**Sand** and **clean** the damaged area.

**Apply** the Eurokote 4820 mixture to the damaged area with a paintbrush.

- •Natural / Blutop / Topaz: ref. **158255** (1 kg dose) or **220815** (five 50 ml syringes)
- •Integral / Tag32 / PUX: ref. **184653** (1 kg dose) or **220817** (five 50 ml syringes)

**Allow to dry**.

**Comply with the recommended applications specified in the safety data sheets available in the Downloads section on www.pamline.com.**

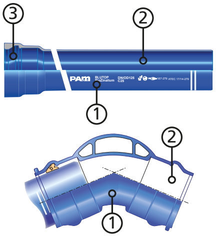
# Repair products

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 DRINKING WATER AND SEWAGE PIPES & FITTINGS

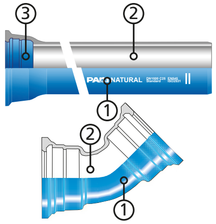
### BLUTOP range - DN/OD 75 to 160

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 240991 | AQUACOAT blue 5005 | 0.75 kg dose |
| ② interior | 158255 | EUROKOTE 4820 bleu | 1 kg dose (R68%+H32%) |
| ③ interior socket | 240991 | AQUACOAT blue 5005 | 0.75 kg dose |
| ① exterior and ② interior | 158255 | EUROKOTE 4820 blue | 1 kg dose (R68%+H32%) |



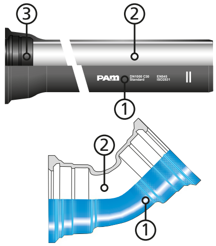

### NATURAL range - DN 80 to 1000

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 240991 | AQUACOAT blue 5005 | 0.75 kg dose |
| ② interior | 158009 | SIKADUR 31 DW | 1 kg dose (R80%+H20%) |
| ③ interior socket | 240991 | AQUACOAT blue 5005 | 0.75 kg dose |
| ① exterior and ② interior | 158255 | EUROKOTE 4820 blue | 1 kg dose (R68%+H32%) |



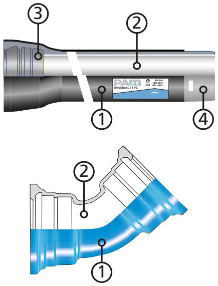

### CLASSIC range - DN 700 to 1200

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 265365 | AQUACOAT black | 0.75 kg dose |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg kit (R75%+H25%) |
| ③ interior socket | 265365 | AQUACOAT black | 0.75 kg dose |
| ① exterior and ② interior | 158255 | EUROKOTE 4820 blue | 1 kg dose (R68%+H32%) |




### TT PE range - DN 80 to 700

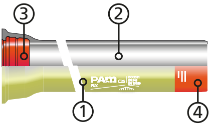
| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior (minor damage) | 175507 | PE repair stick | 1 item |
| ① exterior (moderate damage) | 111216 | heat-shrink patch kit | 1 item |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg kit (R75% + H25%) |
| ③ interior socket and ④ spigot | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | and 265365 | AQUACOAT black | 0.75 kg dose |
| ① exterior and ② interior | 158255 | EUROKOTE 4820 blue | 1 kg dose (R68%+H32%) |

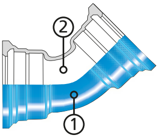


# Repair products

## TT PUX range - DN 800 to 2000

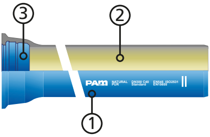
| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 185005 | EUROKOTE 4820 ivory | 1 kg dose (R68%+H32%) |
| | or 220818 | EUROKOTE 4820 ivory | kit of five 50 ml syringes |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg kit (R75% + H25%) |
| ③ interior socket | 184653 | EUROKOTE 4820 brown red | 1 kg dose (R68%+H32%) |
| ④ spigot | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 184653 | EUROKOTE 4820 brown red | 1 kg dose (R68%+H32%) |
| ① exterior and ② interior | 158255 | EUROKOTE 4820 blue | 1 kg dose (R68%+H32%) |



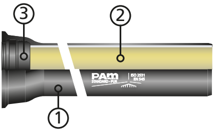

## NATURAL PUR range - DN 150 to 700

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 240991 | AQUACOAT Blue 5005 | 0.75 kg dose |
| ② interior and ③ interior spigot | 185005 | EUROKOTE 4820 Ivory | 1 kg dose (R68%+H32%) |
| | or 220818 | EUROKOTE 4820 Ivory | kit of five 50 ml syringes |



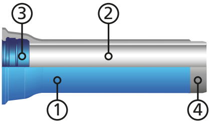

## CLASSIC PUR range - DN 800 to 2000

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg (R90%+H10%) dose |
| | 265365 | AQUACOAT black | 0,75 kg box |
| ② interior | 185005 | EUROKOTE 4820 ivory | 1 kg dose (R68%+H32%) |
| | ou 220818 | EUROKOTE 4820 ivory | kit of five 50 ml syringes |
| ③ interior spigot | 265365 | AQUACOAT black | 0,75 kg box |



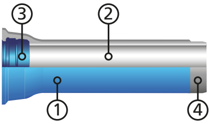

## ZMU range - DN 80 to 600

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 218842 | ZMU repair kit | 1.2 kg tub |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg kit (R75% + H25%) |
| ③ interior socket | 240991 | AQUACOAT Blue 5005 | 0.75 kg dose |
| ④ spigot | 158134 | ENDOLAC 245-30 FGC | 1 kg box |




## ZMU range - DN ≥ 700

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 158009 | SIKADUR 31 DW | 6 kg kit (R75% + H25%) |
| ② interior | | | |
| ③ interior socket | 240991 | AQUACOAT Blue 5005 | 0.75 kg dose |
| ④ spigot | 158134 | ENDOLAC 245-30 FGC | 1 kg box |

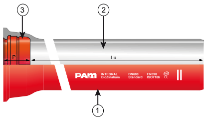


# Repair products

## 2 SEWAGE PIPES AND FITTINGS

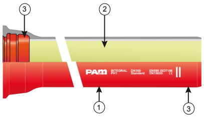
### INTEGRAL range (BioZinalium, Zinalium,Aquacoat ) DN 80 to 2000

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 240990 | AQUACOAT | 0.75 kg dose |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg dose (R75% + H25%) |
| ③ interior spigot | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 240990 | AQUACOAT | 0.75 kg dose |



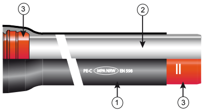

### INTEGRAL pH1 range - DN 150 to 2000

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior DN 150 to 600 | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 236283 | EUROKOTE 448 brown red | 1 kg dose (R80%+H20%) |
| ① exterior DN 700 to 2000 | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 236283 | EUROKOTE 448 brown red | 1 kg dose (R80%+H20%) |
| ② interior | 185005 | EUROKOTE 4820 ivory | 1 kg dose (R68%+H32%) |
| | or 220818 | EUROKOTE 4820 ivory | kit of five 50 ml syringes |
| ③ interior socket and exterior spigot | 184653 | EUROKOTE 4820 brown red | 1 kg dose (R68%+H32%) |
| | 220817 | EUROKOTE 4820 brown red | kit of five 50 ml syringes |



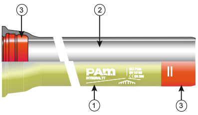

### INTEGRAL TT PE range - DN 80 to 700

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 175507 | PE repair stick | 1item |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg dose (R75%+H25%) |
| ③ interior socket and exterior spigot | 251222 | NATZINC | 5 kg dose (R90% + H10%) |
| | and 240990 | AQUACOAT red | 0,75 kg dose |



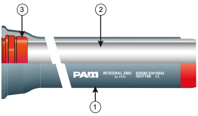

### INTEGRAL TT PUX range - DN 150 to 2000

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 185005 | EUROKOTE 4820 ivory | 1 kg dose (R68%+H32%) |
| | ou 220818 | EUROKOTE 4820 ivory | kit of five 50 ml syringes |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg dose (R75% + H25%) |
| ③ interior socket and exterior spigot | 184653 | EUROKOTE 4820 brown red | 1 kg dose (R68%+H32%) |
| | ou 220817 | EUROKOTE 4820 brown red | kit of five 50 ml syringes |




### INTEGRAL ZMU range - DN 80 to 700

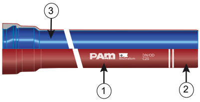
| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 218842 | ZMU repair kit | 12 kg box |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg dose (R75%+H25%) |
| ③ interior socket and exterior spigot | 251222 | NATZINC | 5 kg dose (R90% + H10%) |
| | 236283 | EUROKOTE 448 brown red | 1 kg dose (R80%+H20%) |



# Repair products

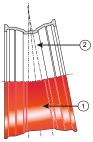
## TOPAZ range - DN 75 to 160

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 240990 | AQUACOAT | dose de 0.75 kg |
| ② cut | 184653 | EUROKOTE 4820 red brown | dose de 1kg (R68%+H32%) |
| | or 220817 | EUROKOTE 4820 red brown | kit of five 50 ml syringes |
| | 250714 | reparative kit cut TOPAZ | |
| ③ interior | 158255 | Eurokote 4820 blue | 1kg dose (R68%+H32%) |



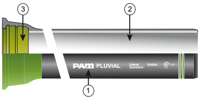

## INTEGRAL and TOPAZ fittings (all versions) - DN 75 to 2000

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 184653 | EUROKOTE 4820 red brown | 1 kg dose (R68%+H32%) |
| | or 220817 | EUROKOTE 448 Red Brown | kit of five 50 ml syringes |
| ② interior | 184653 | EUROKOTE 4820 Red brown | 1 kg dose (R68%+H32%) |
| | or 220817 | EUROKOTE 4820 Red brown | kit of five 50 ml syringes |



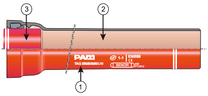

## PLUVIAL range - DN 350 to 2000

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 265365 | AQUACOAT CLASSIC PLUVIAL | 0.75 kg box |
| ② interior | 158009 | SIKADUR 31 DW | 6 kg dose (R75% + H25%) |
| ③ int. and ext. spigot | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | - | Green paint | Contact us |



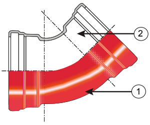

## TAG 32 BioZinalium range - DN 150 to 300

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior | 251222 | NATZINC | 5 kg dose (R90%+H10%) |
| | 240990 | AQUACOAT Red | 0.75 kg dose |
| ② interior | 184653 | EUROKOTE 4820 Red Brown | 1 kg dose (R68%+H32%) |
| | or 220817 | EUROKOTE 4820 Red Brown | kit of five 50 ml syringes |
| ③ interior socket | 184653 | EUROKOTE 4820 Red Brown | 1 kg dose (R68%+H32%) |
| | or 220817 | EUROKOTE 4820 Red Brown | kit of five 50 ml syringes |
| cut | 179099 | ISOLARM 671-50 protective paste for repairing cuts | 200 g tube |




## TAG 32 fittings DN 150 to 300

| area | ref. | product | packaging |
|---|---|---|---|
| ① exterior and ② interior | 184653 | EUROKOTE 4820 brown red | 1 kg dose (R68%+H32%) |
| | or 220817 | EUROKOTE 4820 brown red | kit of five 50 ml syringes |




Comply with the recommended applications specified in the safety data sheets available in the Downloads section on www.pamline.com.

# Polyethylene sleeve General instructions

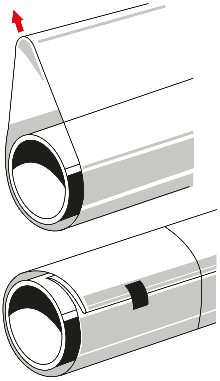
The process of fitting a PE sleeve involves applying a continuous barrel sleeve (outside the trench) and subsequently a joint sleeve (at the bottom of the trench).

- Pipes must be clean and dry (no soil entrapped between the pipe and sleeve).
- The pipe bed and backfill must not contain any stones or fragmented rock that could damage the sleeve during laying or in service (soil load).

## SPECIAL INSTRUCTIONS

### DETAIL 1
### Barrel sleeve

Carefully **apply** the PE sleeve so that it is tight against the pipe. Fold the sleeve at the top.



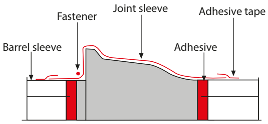
### DETAIL 2
### Joint sleeve

Carefully **fit** the joint sleeve closely around the junction and overlap the barrel sleeves (upstream and downstream).

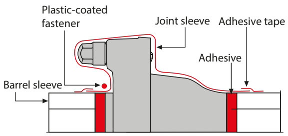
**Secure** with a fastener as close as possible to the gland (EXPRESS joint) or socket face (STANDARD joint).

**Fix the ends** with adhesive tape overlapping the barrel sleeve and joint sleeve.

STANDARD joint




EXPRESS joint



# Polyethylene sleeve
# Sleeving the barrel

*NATURAL, INTEGRAL (ZINALIUM + BIOZINALIUM), ZMU, STANDARD TT and INTEGRAL TT pipes do not require sleeves.*

## 1 SLIDE

Before lowering into the trench, **lift** the pipe in the middle (refer to the "Handling" guide) and **slide** the pleated barrel sleeve over the spigot.

## 2 UNFOLD

Since the pipe is supported by two battens, **spread** the barrel sleeve over the full length of the pipe and carefully **wrap** the sleeve tightly around the pipe (the PE sleeve must not billow).

## 3 FASTEN

**Secure** the fold down with adhesive tape.

**Fix** the ends of the sleeve to the pipe barrel with adhesive tape overlapping both the barrel and the sleeve (around the full circumference).

**Add** fasteners (plastic-coated steel wire) every 1.5 m.

**Slip** on the joint sleeve.

## 4 ASSEMBLE

**Lower** the pipe into the trench.

**Join the pipe**. The fold must always be positioned at the top the pipe.

## 5 WRAP

**Bring** the joint sleeve over the socket and spigot.

*Make sure that you create a large enough gap under the pipe to easily fit the sleeve (and secure with adhesive tape and fasteners) - see diagrams.*

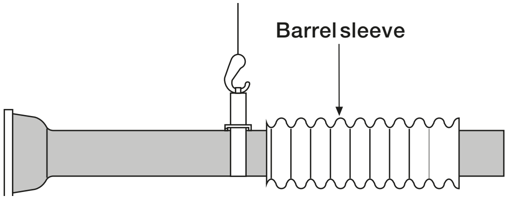
**Fit** the joint sleeve as thightly as possible.

Successive assembly of barrel and joint sleeves must form a continuous protection.
Use the same sleeving to protect fittings.

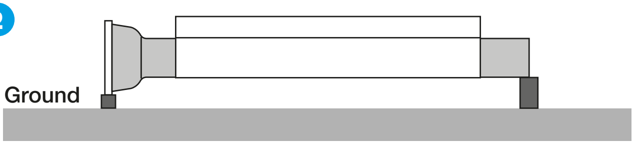
# Polyethylene sleeve
# Sleeving the barrel

*The contractor is responsible for analyzing and eliminating any risks when installing the PE sleeve (especially the use of personal protective equipment).*

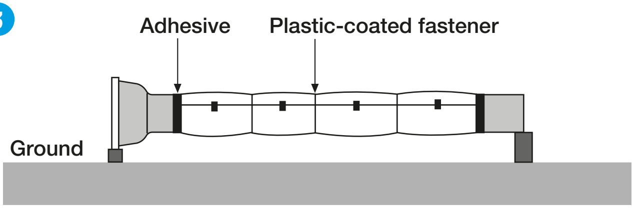
1



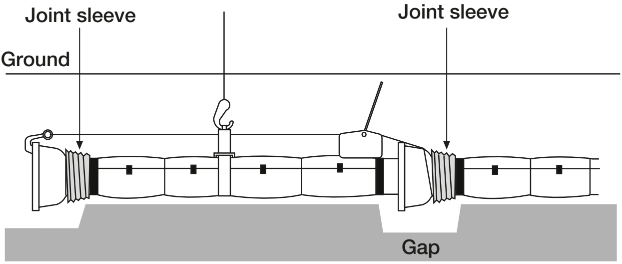

2



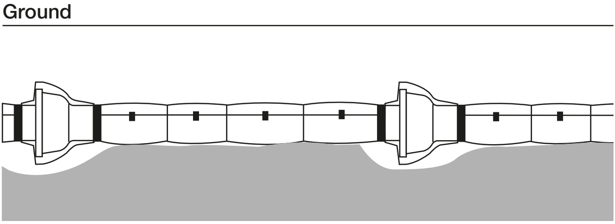

3




4



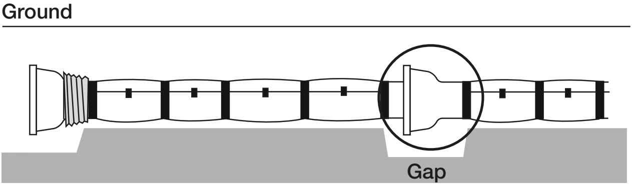

5



# Polyethylene sleeve
# Sleeving the joint

## 1 PULL

**Pull** the joint sleeve over the spigot and socket. Make sure that you create a large enough gap under the pipe to easily fit the sleeve (and secure with adhesive tape).

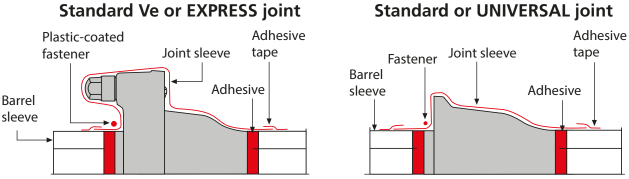



## 2 FIX

**Fold** the joint sleeve over and wrap as tightly as possible, overlapping the adjoining barrel sleeves (the fold must always be positioned at the top).

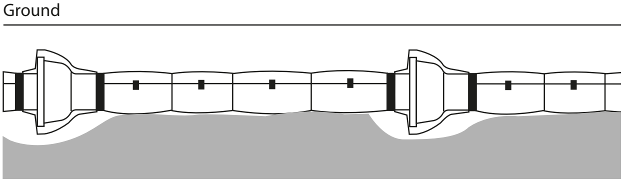
**Secure** with adhesive tape as close as possible to the gland (STANDARD Ve or EXPRESS joint) or socket face (STANDARD or UNIVERSAL joint).

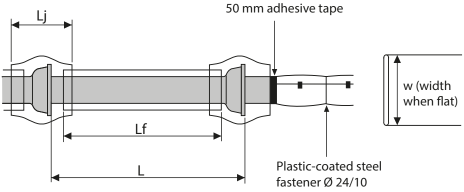
**Fix** the ends on the adjoining barrel sleeves with adhesive tape wrapped around the whole circumference to make a watertight overlap.




## 3 ASSEMBLE

Successive assembly of barrel and joint sleeves must form a **continuous protection**.

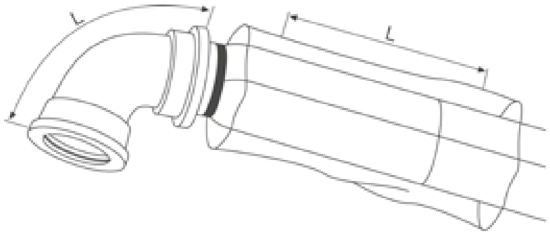


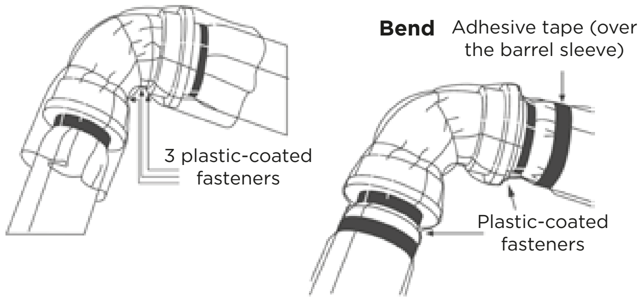



# Polyethylene sleeve
# Sleeving fittings

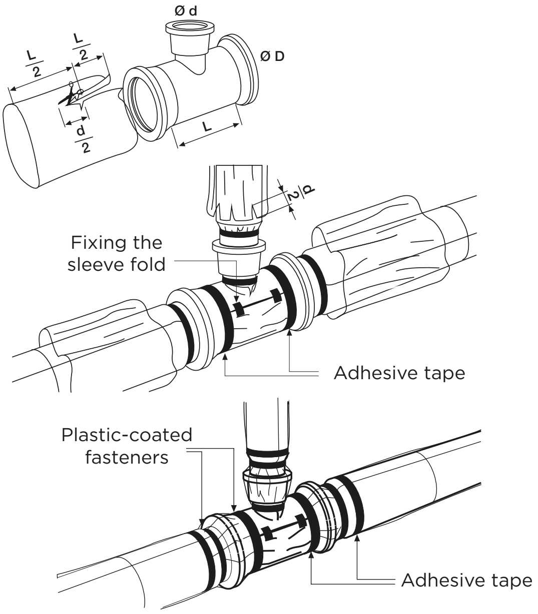
**Use** the same polyethylene sleeve to protect fittings.
Polyethylene sleeves must be fitted according to the same recommendations (in particular, the polyethylene sleeve must be wrapped around the pipe as tightly as possible).

## Bend

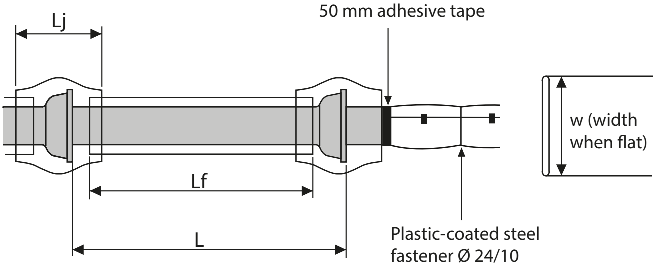



## 3-socket tee



# Preparing the barrel and joint sleeves




| DN | | Barrel | | Joint (according to type) | | | Sleeve thickness | Number of fasteners |
|---|---|---|---|---|---|---|---|---|
| | | | | STD UNI PK | EXP STD Ve | | | |
| | L | W | Lf | W | W | Lj | | |
| | m | m | m | m | m | m | µm | |
| *60 | 6 | 0.31 | 5.8 | 0.31 | 0.40 | 0.60 | 200 | 4 |
| *80 | 6 | 0.31 | 5.8 | 0.31 | 0.40 | 0.60 | 200 | 4 |
| *100 | 6 | 0.31 | 5.8 | 0.31 | 0.56 | 0.60 | 200 | 4 |
| *125 | 6 | 0.40 | 5.8 | 0.40 | 0.56 | 0.60 | 200 | 4 |
| *150 | 6 | 0.40 | 5.8 | 0.41 | 0.56 | 0.60 | 200 | 4 |
| *200 | 6 | 0.56 | 5.8 | 0.56 | 0.71 | 0.60 | 200 | 4 |
| *250 | 6 | 0.71 | 5.8 | 0.71 | 0.90 | 0.60 | 200 | 4 |
| *300 | 6 | 0.71 | 5.8 | 0.71 | 0.90 | 0.60 | 200 | 4 |
| *350 | 6 | 0.90 | 5.8 | 0.90 | 1.12 | 0.70 | 200 | 4 |
| *400 | 6 | 0.90 | 5.8 | 0.90 | 1.12 | 0.70 | 200 | 4 |
| *450 | 6 | 1.12 | 5.8 | 1.12 | 1.12 | 0.70 | 200 | 4 |
| *500 | 6 | 1.12 | 5.8 | 1.12 | 1.25 | 0.70 | 200 | 4 |
| *600 | 6 | 1.25 | 5.8 | 1.25 | 1.60 | 0.70 | 200 | 4 |
| 700 | 7 | 1.60 | 6.7 | 1.60 | 1.60 | 0.80 | 200 | 5 |
| 800 | 7 | 1.80 | 6.7 | 1.80 | 2.24 | 0.80 | 200 | 5 |
| 900 | 7 | 2.24 | 6.7 | 2.24 | 2.24 | 0.80 | 200 | 5 |
| 1000 | 7 | 2.24 | 6.7 | 2.24 | 2.50 | 0.80 | 200 | 5 |
| 1100 | 7 | 2.50 | 6.7 | 2.50 | 2.50 | 0.80 | 200 | 5 |
| 1200 | 8.26 | 2.50 | 7.7 | 2.50 | 2.50 | 0.80 | 400 | 6 |
| 1400 | 8.19 | 2.80 | 7.7 | 2.80 | | 0.80 | 400 | 6 |
| 1500 | 8.18 | 3.10 | 7.7 | 3.10 | | 0.80 | 400 | 6 |
| 1600 | 8.18 | 3.10 | 7.7 | 3.10 | | 0.80 | 400 | 6 |
| 1800 | 8.17 | 3.60 | 7.7 | 3.60 | | 0.80 | 400 | 6 |
| 2000 | 8.13 | 4.50 | 7.7 | 4.50 | | 0.80 | 400 | 6 |

*(*) For STANDARD pipes (DN 60 to 600), barrel and joint sleeves are supplied pre-cut to size in one package.*

# Re-rounding DN 200 to 700

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

Using a circometer, ensure that the outer diameter complies with the following values:

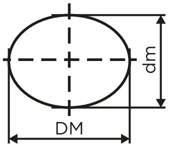
| DN | Outside diameter OD (mm) | |
|---|---|---|
| | Nominal value | Limit deviations |
| **200** | 222 | + 1/-3.0 |
| **250** | 274 | + 1/-3.1 |
| **300** | 326 | + 1/-3.3 |
| **350** | 378 | + 1/-3.4 |
| **400** | 429 | + 1/-3.5 |
| **450** | 480 | + 1/-3.6 |
| **500** | 532 | + 1/-3.8 |
| **600** | 635 | + 1/-4.0 |
| **700** | 738 | + 1/-4.3 |

*Excerpt from EN 545 - Table 15*

*However, pipes may become oval-shaped due to transportation and handling, meaning that fittings cannot be assembled correctly.*

## 1 CHECK THE OVALITY

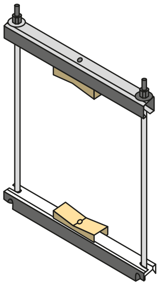
$$\text{Ovality (\%)} = \frac{DM-dm}{DM+dm} \times 100$$




DM: maximum diameter measured

dm: minimum diameter measured

### TACKLE (ref. 244524)

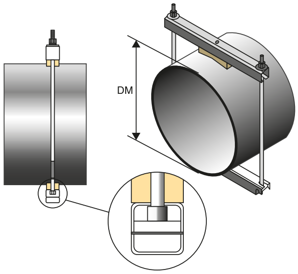


- Two steel **bars** (top and bottom) fitted with movable pads
- Two **threaded rods** (right-hand thread)
- Two **Nylstop nuts** + **washers**

## 2 FIT

**Fit** the tackle according to the diagram.

*The tackle can be set up 50 cm from the end of the pipe so that sleeves can be fitted.*




## 3 TIGHTEN

**Tighten** the nuts by hand so that the tackle is stable.

With a size 30 spanner, **tighten** the nuts on the rods **alternately** and **gradually**.

# Re-rounding DN 200 to 700

## 4 CHECK

**Check** that the spigot is perfectly round.

**Ensure** that the procedure has not damaged the cement lining.

## 5 ASSEMBLE

With the device still in position, **assemble** the joint.

The nuts must be kept tight while mounting the joint to compensate for any elastic deformation in the pipe.

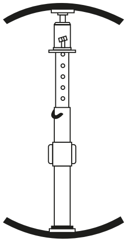
*In case of a small diameter pipe, you can rotate the bars using the adjustable pads.*

# Re-rounding DN ≥ 800

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

**TACKLE ref. 225018 (DN 800 to 1000) – ref. 158333 (DN 1200 to 2000)**

- **Hydraulic jack**
- **Adjustable support**



Using a circometer, ensure that the outer diameter complies with the following values:

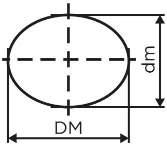
| DN | Outside diameter OD (mm) | |
|---|---|---|
| | Nominal value | Limit deviations |
| **800** | 842 | + 1/-4.5 |
| **900** | 945 | + 1/-4.8 |
| **1000** | 1048 | + 1/-5.0 |
| **1100** | 1152 | + 1/-6.0 |
| **1200** | 1255 | + 1/-5.8 |
| **1400** | 1462 | + 1/-6.6 |
| **1500** | 1565 | + 1/-7.0 |
| **1600** | 1668 | + 1/-7.4 |
| **1800** | 1875 | + 1/-8.2 |
| **2000** | 2082 | + 1/-9.0 |

*Excerpt from EN 545 - Table 15*

*However, pipes may become oval-shaped due to transportation and handling, meaning that fittings cannot be assembled correctly.*

## 1 CHECK THE OVALITY

$$\text{Ovality (\%)} = \frac{DM-dm}{DM+dm} \times 100$$

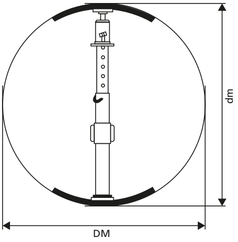



DM: maximum diameter measured

dm: minimum diameter measured

## 2 POSITION

**Position** the parts according to the diagram while respecting the ovalization position.



# Re-rounding DN ≥ 800

## 3 ADJUST

**Adjust** the support according to the diameter.

## 4 OPERATE

**Operate** the jack and **check** that the spigot is perfectly round.

## 5 CHECK

**Ensure** that the procedure has not damaged the cement lining.

## 6 ASSEMBLE

With the device still in position, **assemble** the joint.

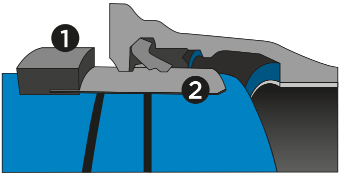
# Dismantling joints

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## STANDARD Vi, UNIVERSAL Vi AND BLUTOP Vi

### 1 REQUIRED EQUIPMENT

| DN | Ref. anvil 1 | Ref. Steel shim 2 | Number of shims required |
|---|---|---|---|
| **Standard Vi and UNIVERSAL Vi** | | | |
| 60 | | | 3 |
| 80 | 110680 | | 4 |
| 100 | | | 5 |
| 125 | 110681 | | 6 |
| 150 | | | 7 |
| 200 | | | 9 |
| 250 | | 110682 | 11 |
| 300 | | | 13 |
| 350 | | | 15 |
| 400 | 110683 | | 16 |
| 450 | | | 18 |
| 500 | | | 19 |
| 600 | | | 23 |
| 700 | | | 27 |
| **Blutop Vi** | | | |
| 75 | | | 3 |
| 90 | 110680 | | 4 |
| 110 | | 110 682 | 4 |
| 125 | | | 5 |
| 140 | 110681 | | 5 |
| 160 | | | 6 |

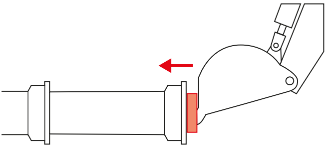



- Gloves, goggles, safety shoes
- Brush, cloth
- Lump hammer
- Lubricant paste
- Textile straps

### 2 PREPARATION

**Rinse** with water and brush the joint.
**Clean the annular space as much as possible.**

**Push** the spigot fully into the socket to release the inserts.

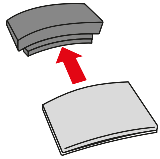


**Prepare** the lubricant paste, the anvil and extractor shims.

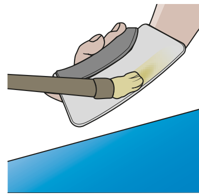
# Dismantling joints

## 3 POSITION THE EXTRACTOR SHIMS

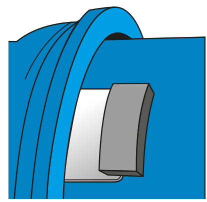
**Slide** the first shim into the slot in the anvil.



**Coat** the exposed part of the shim with lubricant paste (both sides).

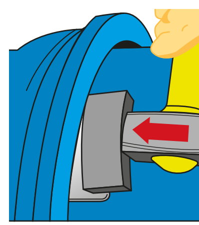


**Place** the shim + anvil in the annular space.
The large side of the shim must be in contact with the joint.

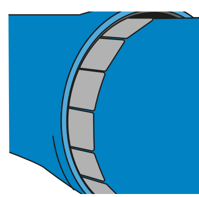


Gradually **drive** the shim between the joint and the pipe.

**Keep** the shim flat against the pipe barrel if necessary.



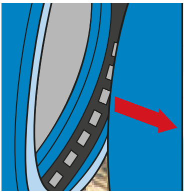
**Repeat** all the way round the joint for the other shims.



*Overlap the shims by approximately 4 to 5 mm.*
**The final shim can be slipped beneath the first shim.**

# Dismantling joints

## 4 DISMANTLING THE JUNCTION



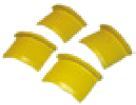
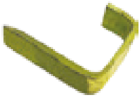
**Draw** the spigot out of the socket using textile straps and a digger bucket.

**After dismantling the joint, ensure that the surface of the spigot is smooth before reusing. If the spigot is damaged, it must be cut off.**

**Under no circumstances must the dismantled Standard Vi / Universal Vi / Blutop Vi joint be reused.**

## UNIVERSAL Ve

## 1 REQUIRED EQUIPMENT

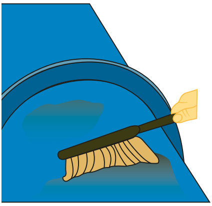
| DN | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 700 | 800 | 900 | 1000 | 1200 | 1400 | 1500 | 1600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shim |  | | | | | |  | | | | | |  | | | | | | |
| Number | 3 | 4 | | | | | 4 | 5 | | | | | 14 | 16 | 18 | 20 | 20 | 24 | 24 |

- Gloves, goggles, safety shoes
- Brush, cloth
- Lump hammer
- Lubricant paste
- Textile straps

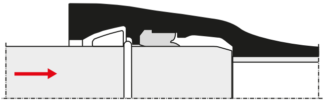
# Dismantling joints

## 2 PREPARATION

**Rinse** with water and brush the joint.
**Clean** the annular space as much as possible.



**Push** the spigot fully into the socket to release the locking ring.

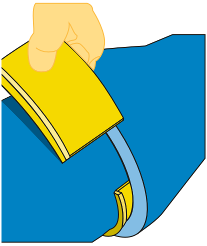


**Prepare** the lubricant paste and the dismantling tools.

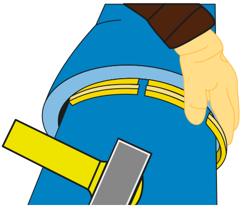
## 3 POSITION THE SHIMS

### DN 100 to DN 300

Gradually **hammer** the wedge between the metal locking ring and the pipe until reaching the weld bead.

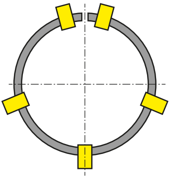


**Repeat** all the way round the joint for the other shims.

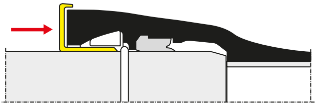


### DN 350 to DN 700

**Insert** shims between the metal locking ring and the pipe, starting at opposite ends of the open ring.



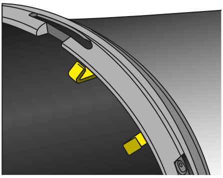
**Insert** the remaining three shims around the rest of the joint.



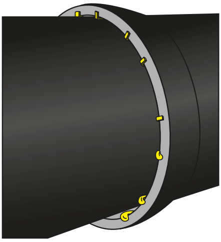
# Dismantling joints

## DN 800 to DN 1600

**Introduce** the extractor shims between the pipe and the metal locking ring (one shim at the end of each segment).

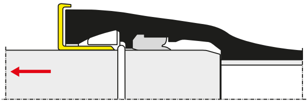


**Proceed** in the same way for all the segments around the circumference.



## 4 DISMANTLING THE JUNCTION

**Draw** the spigot out of the socket using textile straps and a digger bucket.



**Under no circumstances must the dismantled Standard joint be reused.**

**Refer to the PamlineTV sheet at the end of the folder.**

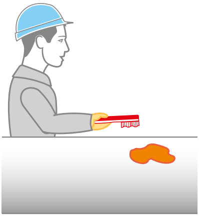
# Repairing pipes

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

## 1 PIERCED PIPES

### Repair collar

Longitudinal fracture ≤ 35% of the collar
Circumferential fracture ≤ 10 mm



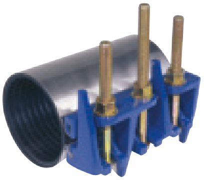
- **Clean** the part of the pipe that needs to be repaired.
- **Fit** the collar around the damaged section.
- **Ensure** that the gasket is not folded and mated firmly against the pipe.

*Lubricate the gasket with soapy water or lubricant paste.*

- **Position** the opposite end of the collar on top of the gasket.
- **Insert** the bolts and tighten by hand.
- **Turn** the collar in the direction indicated by the arrow on the label.
- **Ensure** that the damaged section is beneath the vulcanized part of the joint.
- Gradually **tighten** the nuts until the jaws close together.

The vulcanized part of the joint must not be deformed, otherwise leaks could occur.

### Different types of repair collars



# Repairing pipes

## 2 BROKEN PIPE (NON-ANCHORED SECTION)

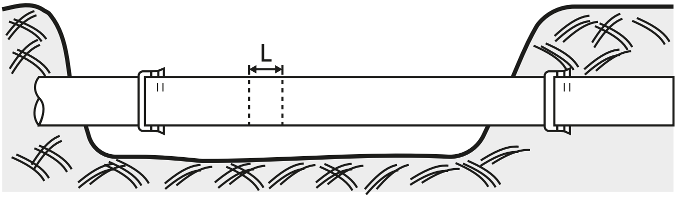
## ULTRALINK, LINK GS, ULTRAQUICK, QUICK GS, EXPRESS COUPLINGS

- Carefully **remove** the soil around the existing pipeline.
- **Use** a circometer to check the pipe's diameter.
- **Cut** out the damaged area of the existing pipe (refer to PIPE CUTTING).
- **Remove** the damaged section.
- **Check** the length before creating the replacement section UU while allowing for an admissible gap:
  **Length of replacement section UU = C – 2 x J**
- **Present** replacement section UU with the junction elements in alignment with the two pipes that need to be connected.
- **Position** the fittings while creating an equal gap on each side of the replacement section UU.
- **Bring** each of the components together and insert the bolts. **Check** that all parts are perfectly positioned.

In case of drinking water systems, **all parts must be disinfected before assembly.**

## 3 LEAKING JUNCTION (NON-ANCHORED SECTION)

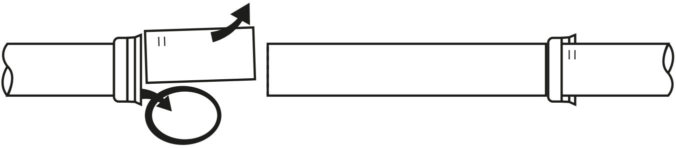
- Carefully **remove** the soil around the existing pipeline.
- **Use** a circometer to check the pipe's diameter.
- **Draw** the cutting marks (between 150 and 250 mm):




- **Cut** and **remove** the marked section (refer to the PIPE CUTTING guide)

# Repairing pipes

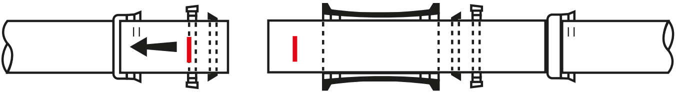
•**Free** the spigot cut-out and remove the joint:



The joint **must** be replaced.

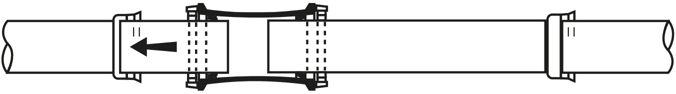
•**Insert** a new STANDARD JOINT (refer to the STANDARD JOINT guide) in the socket.

•**Draw** the marks for the position of the EXPRESS coupling (refer to the EXPRESS JOINT guide). For the section remaining in place: **insert** the gland, gasket and coupling:



•**Re-assemble** the spigot spigot section after checking for conformity.

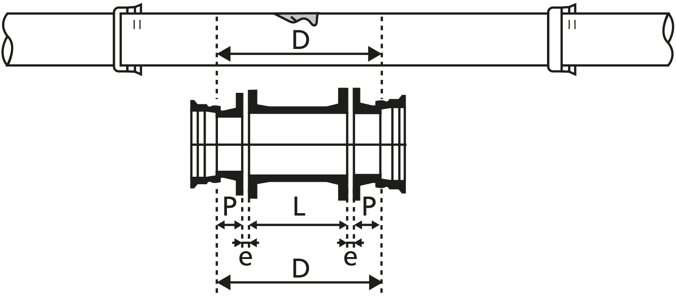
•**Place** the EXPRESS collar in the middle of the cut-out section and then assemble the glands with the bolts.



## 4 BROKEN PIPE (ANCHORED SECTION)

•Parts required for the repair:
- –1 flanged short pipe
- –2 STANDARD socket flanges
- –2 flanged joints
- –2 STANDARD Ve anchoring kits (gland and locking ring)

•**Mark** the cutting lines according to the following formula:

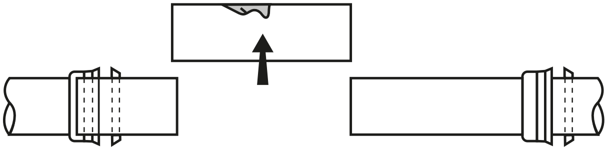



**D** (cut length) = **L + (2 x e) + (2 x P)**

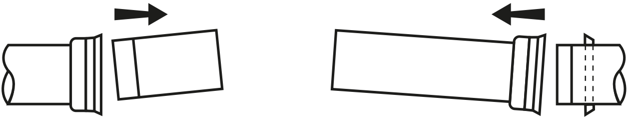
e = 20 mm / L= 250 or 500 mm / P = according to the DN

# Repairing pipes

•**Cut** according to D and then remove the damaged section.

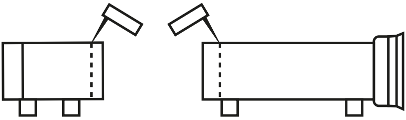


•**Dismantle** the two cut sections.



*A special tool may be required depending on the type of anchored joints (refer to the DISMANTLING ANCHORED JUNCTIONS guide).*

•**Recreate** a locking weld bead on each of the two cut sections.

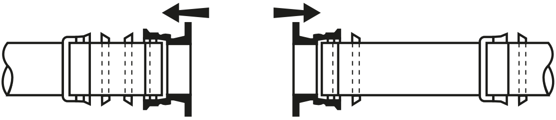


*(refer to the WELD BEAD guide)*

•**Recreate** the chamfers (refer to the PIPE CUTTING guide).

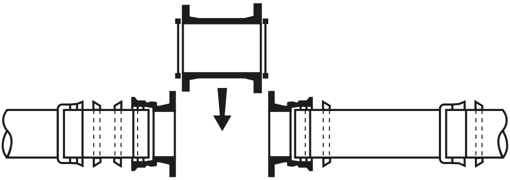
On each of the two ends of the pipe, **re-assemble** the cut sections fitted with Standard Ve glands.

**Present** and **assemble** the two flange sockets.



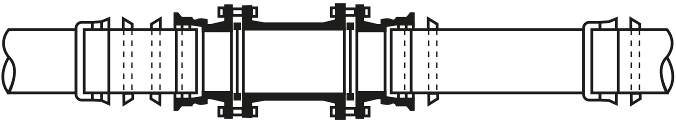
Fully **insert** the two flange sockets.

•**Position** the flanged short pipe and the two flat joints between the flange sockets



# Repairing pipes

- **Install** the bolts in the holes and gently **tighten** (by hand).
- **Position** the four STANDARD glands and bolts.
  **Tighten** slightly by hand.



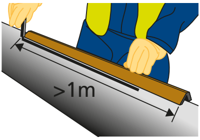
- Finally, **tighten** the flange bolts and then the gland bolts.

*Refer to the FLANGE JOINTS guide*
*Refer to the STANDARD Ve JOINTS guide*

# Branches for sewage pipes - rectangular hole

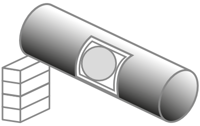
## Saddle branches

### 1 DRAW




Using the template provided, **draw** the following on the pipe barrel:

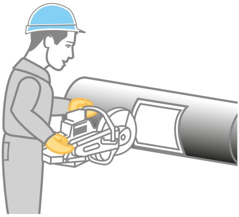
- The external rectangular outline of the plate.
- The internal outline of the pipe neck from the saddle branch.
- A rectangle corresponding to the dimensions specified in the following table and positioned around the circle drawn during the previous step.



| DN | Opening dimensions | |
|---|---|---|
| | **Length** (mm) | **Width*** (mm) |
| **200** | 190 | 190 |
| **250** | 190 | 250 |
| **300** | 240 | 250 |
| **400** | 300 | 300 |
| **500** | 300 | 300 |
| **600** | 300 | 300 |

* Cut on the line. Measure on the circumference (circle arc).

### 2 CUT AND CLEAN



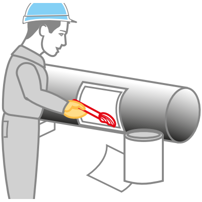
Using a disc cutter, **cut** the rectangular opening in the pipe barrel on the inside of the line.
Comply with the centerline of the pipe shown on the cutting template.

**Use** a multi-material cutting disc.

**Avoid** cutting over the line in the corners.

Using a cloth, **clean** the part of the pipe barrel to which the plate will be mounted, as well as the inside of the pipe and the face to be re-coated.

### 3 REPAIR

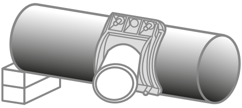


**Repair** the coating on the exposed part of the pipe after cutting by applying fast-drying epoxy paint with a paintbrush.

If necessary, **repair** the lining.

Product used: ISOLARM protective paste (ref. **179099**)

### 4 ASSEMBLE



**Fit** the gasket in the housing on the internal face of the plate.

**Lubricate** the gasket once seated in its housing.

**Start** assembly in the middle of each straight section and progressively fit by hand. Use a mallet if necessary.

**Fit** the plate to the pipe barrel.

Gradually **tighten** the bolts, alternating on both sides until the plate is perfectly in contact with the pipe barrel.

**Fit** and **tighten** the stirrups (until the part is in contact with the pipe).

# Branches for sewage pipes - round hole

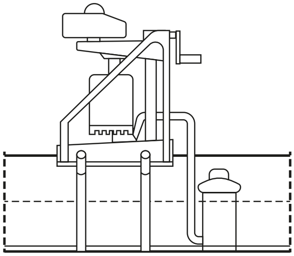
## 90° saddle branches

### 1 BORE

**Use** a boring machine with a centering base.

**Bore** with a hole saw specifically for iron (Ø172 mm for 150 branches and Ø232 mm for 200 branches).

**Lubricate** with water.

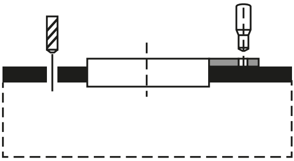


### 2 PUNCH AND DRILL

**Mark** the position of the two holes with a center punch.

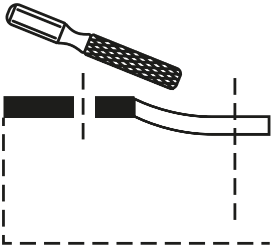
**Drill** a hole with a 13 mm diameter.

Preferably **use** a drill bit with a tungsten carbide tip for hardened steel and abrasive materials.



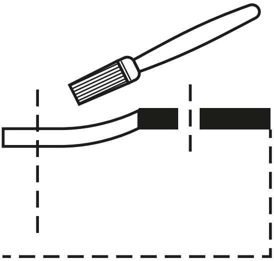
### 3 Deburr

Carefully **deburr** and **break** the angles.



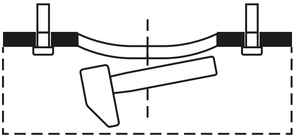
### 4 COAT

**Coat** the exposed parts with ISOLARM paste (INTEGRAL, TAG 32) or EUROKOTE (INTEGRAL PUX, INTEGRAL pH1).



### 5 MOUNT THE BOLTS

**Mount** the two bolts with their compressed plastic rings in the holes.



# Branches for sewage pipes - round hole

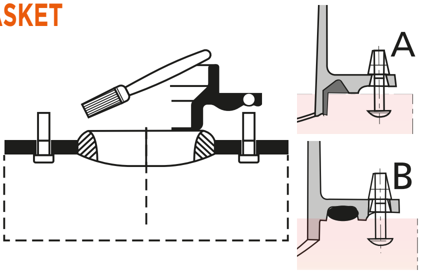
## Saddle branches

### 6 POSITION THE GASKET

**Position** the gasket according to the type of joint (see diagrams A and B).

**Check** that the gasket is properly seated.

**Lubricate** the gasket.

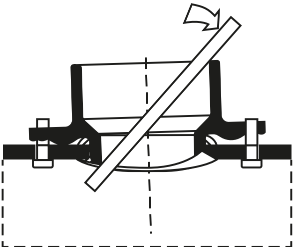



### 7 ASSEMBLE

**Mount** the fully assembled iron part with a single bolt.

**Place** a washer and nut on the bolt, but without tightening.

**Finish mounting** the iron part. If necessary, use a wooden lever to avoid damaging the coating. Gradually **apply** increasing pressure and avoid jerky movements.

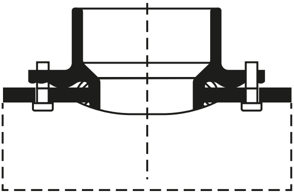


### 8 TIGHTEN

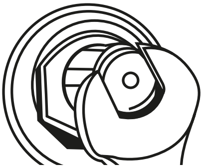
**Add** the second bolt.

**Tighten** both nuts.

**Hold** the bolt by means of the flat sections at the end of the bolt (size 7 spanner).



Torque: **30 N.m**



*Hole saws that are suitable for iron are marketed by PAM.*

| DN | **Ø bore** (mm) | reference |
|---|---|---|
| **150** | 172 | **111173** |
| **200** | 232 | **111174** |

# Branches for sewage pipes - round hole

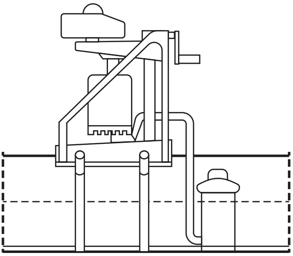
## Swivel saddle branches

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

### 1 BORE

**Use** a boring machine with a centering base and a hole saw specifically for iron (Ø172 mm for 150 branches and Ø232 mm for 200 branches).

**Lubricate** with water.



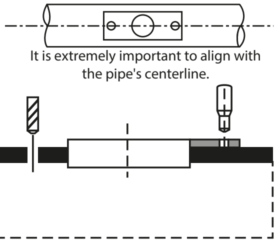
### 2 PUNCH AND DRILL

**Position** the template while respecting the pipe's centerline.

**Mark** the position of the two holes with a center punch.

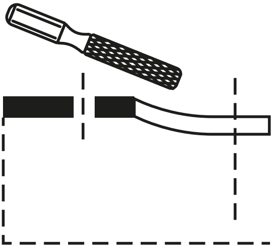
**Drill** a hole with a 13 mm diameter.

Preferably **use** a drill bit with a tungsten carbide tip for hardened steel and abrasive materials (high performance).




### 3 Deburr

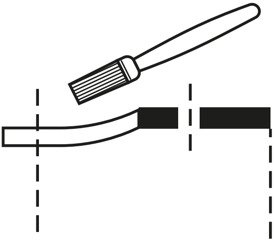
Carefully **deburr** and **break** the angles.



### 4 COAT

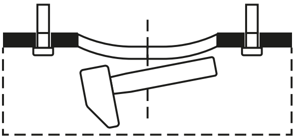
**Coat** the exposed parts with:

- ISOLARM paste ref. 179099 for INTEGRAL or TAG 32 pipes
- IVORY paint ref. 220818 for INTEGRAL TT or INTEGRAL pH1 pipes



### 5 MOUNT THE BOLTS

**Mount** the two bolts with their compressed plastic rings in the holes.



# Branches for sewage pipes - round hole

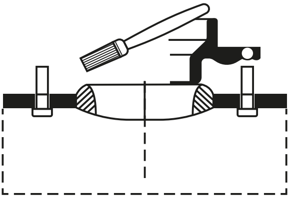
## Swivel saddle branches

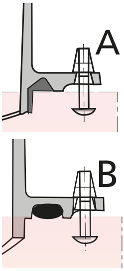
### 6 POSITION THE GASKET

**Position** the gasket according to the type of joint (see diagrams A and B).

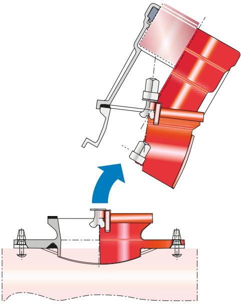
**Check** that the gasket is properly seated.

**Lubricate** the gasket.






**Unmount** the branch so that the plate can first be fitted.

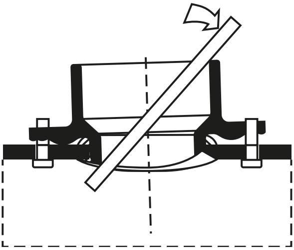


### 7 ASSEMBLE

**Mount** the fully assembled iron part with a single bolt.

**Place** a washer and nut on the bolt, but without tightening.

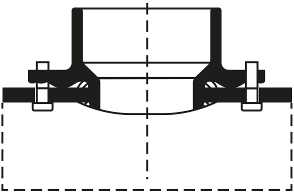
**Finish mounting** the iron part. If necessary, use a wooden lever to avoid damaging the coating. Gradually **apply** increasing pressure and avoid jerky movements.



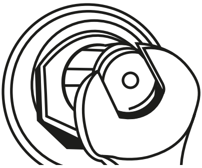
### 8 TIGHTEN

**Add** the second bolt.

**Tighten** both nuts with a size 17 spanner.



**Hold** the bolt by means of the flat sections at the end of the bolt (size 7 spanner).



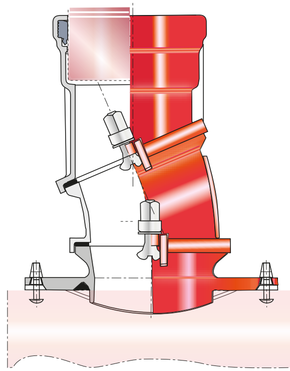
# Branches for sewage pipes - round hole
## Swivel saddle branches

### 9 ASSEMBLE

**Re-mount** the upper elements.

**Turn** the assembly towards its connection position and hold in place.

**Fit** and **tighten** the stirrups.



*Hole saws that are suitable for iron are sold by PAM.*

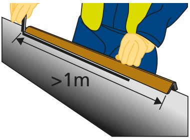
| DN | **Ø bore** (mm) | reference |
|---|---|---|
| **150** | 172 | **111173** |
| **200** | 232 | **111174** |

# Branches for sewage pipes - rectangular hole

## Swivel saddle branches

*The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).*

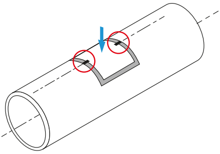
### 1 DRAW



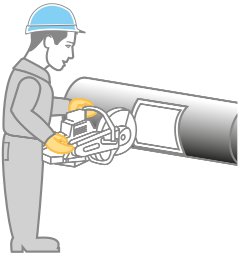

**Draw** the centerline at the top of the pipe using an angle bar.

Using the template provided, **draw** the following on the pipe barrel.

**Position** the template provided on the top centerline using the two markings indicated.

### 2 CUT AND CLEAN



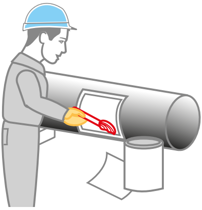
Using a disc cutter, **cut** the rectangular opening in the pipe barrel on the inside of the line. Comply with the centerline of the pipe shown on the cutting template.

**Use** a multi-material cutting disc.

**Avoid** cutting over the line in the corners.

Using a cloth, **clean** the part of the pipe barrel to which the plate will be mounted, as well as the inside of the pipe and the face to be re-coated.

### 3 REPAIR



**Repair** the coating on the exposed part of the pipe after cutting by applying fast-drying epoxy paint with a paintbrush.

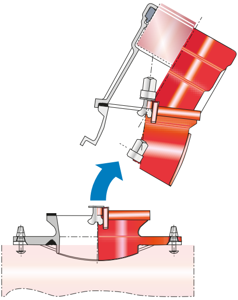
If necessary, **repair** the lining.

Product used: ISOLARM protective paste (ref. **179099**)

### 4 ASSEMBLE

**Unmount** the branch so that the plate can first be fitted.

**Fit** the gasket in the housing on the internal face of the plate.

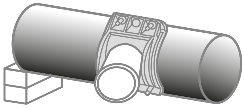


# Branches for sewage pipes - rectangular hole
## Swivel saddle branches

**Lubricate** the joint once seated in its housing.

**Fit** the plate to the pipe barrel.

**Start** assembly in the middle of each straight section and progressively **fit** by hand. Use a mallet if necessary.

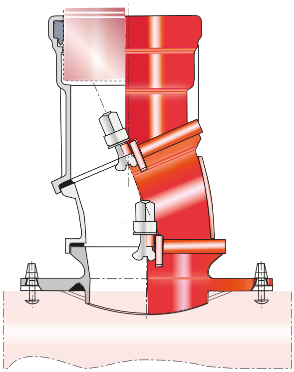


Gradually **tighten** the bolts, alternating on both sides until the saddle is perfectly in contact with the pipe barrel.

**Re-mount** the upper elements.

**Turn** the assembly towards its connection position and **hold** in place.

**Fit** and **tighten** the stirrups.



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