Operating and maintenance instructions

VAG BAIO®*plus* System

KAT 5210-B Edition4 01-09

Content

1. General

1.1 Safety

These operation and maintenance instructions must be observed and applied along with the general "VAG Installation and Operation Instructions for Valves".
Arbitrary alterations of the products or parts supplied are not allowed. VAG will not assume any liability for consequential damage due to non-compliance with these instructions.
When using this valve, the generally acknowledged rules of technology have to be observed (e.g. DIN standards, DVGW data sheets, VDI directives, etc.). The installation must only be carried out by qualified engineers. For further technical information such as dimensions, materials or range of application, please refer to document KAT 5210-A.

2. Transport and storage

2.1 Transport

The transportation of the valve and fittings to the installation location must be undertaken in suitable and stable packing corresponding to the valve's or fittings size. The packing must guarantee protection against weather influences and damage from external forces.
In some cases, e.g. overseas transport, with specific climatic influences, the valves must be protected by wrapping them in plastic film and adding a desiccant.

The factory-applied corrosion protection coating must be especially well protected at all times.The coating must be protected against impact damage which may be caused by other metallic parts. When the valves are packed, it needs to be made sure that the individual parts are placed separately (e.g. with cardboard layers placed between them) in the skeleton container. The valves and fittings must be handled carefully during unloading and installation, i.e. they must not be subjected to throwing or pulling.

2.2 Storage

Store the valves and fittings in a dry and well-aerated location. Protect the valves and fittings from direct radiator heat.

2.2.1 Coating

As the UV resistance of the epoxy-powder coating is limited, the parts must not be stored outdoors.
For the installation of the powder coated valves and fittings of the BAIO®*plus* System an equalizing sand bed is required. It is not appropriate to bed the valves and fittings of this system in gravel (as is common practice with ZM-coated pipes).

2.2.2 Elastomer parts (wedges, seals)

Gate wedges and elastomer seals are made of high-grade EPDM rubber mixes approved according to KTW and W270.
These materials are temperature sensitive (max. 70°C) and their UV resistance is limited!

For this reason, valves and fittings of the BAIO®*plus* System should not be stored outdoors!

The seals and sealing surfaces must be protected against dirt and soiling.

Improper storage may cause the seals or wedges to become brittle or otherwise deteriorate which in turn may result in leaks and/or difficult operation and poor closing properties of the valves later on !!

2.2.3 PE welding ends

PE (polyethylene) materials are light-sensitive in general.

The PE welding ends of the BAIO®*plus* System (e.g. BAIO®*PEa*) must never be stored outdoors.

As yellow or blue PE pipe materials deteriorate faster than black, the BAIO®*plus* System always uses only black PE form parts. However, the durability of black PE welding ends is limited as well.

- Maximum storage time: 5 years after the date of manufacture (For date of manufacture see information on PE welding end)

- PE welding ends must be protected against mechanical damage (e.g. grooves).

2.2.4 Pull-Locks

The clamping rings used for the Pull-Locks of the BAIO®*plus* System (e.g. BAIO®*stop*) must be protected against soiling, exposure to UV radiation and mechanical damage.

Improper storage and handling of the tension-guard components may result in the guard losing its protective properties.

3. Product and function description

3.1 The BAIO®*plus* System

Efficient, easy and fast to install, the BAIO®*plus* System connects valves (gate valves, underground hydrants, etc.) and the corresponding fittings as well as pipelines. The decisive advantages of this screwless plug-in system based on the Tyton® socket are:

- Positive interior interlock of valve and fittings
- Tension-proof connection between valve, fittings and pipeline
- Low installation and material costs as compared to flanged connections

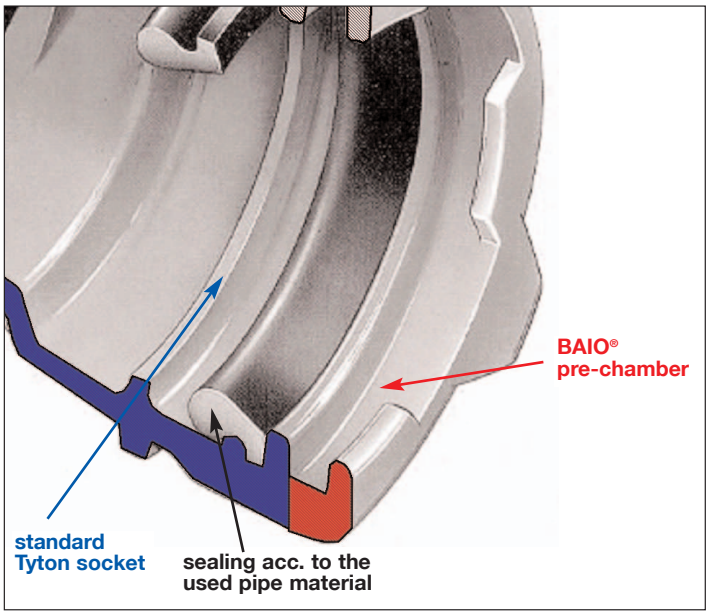
The BAIO®*plus* System can be used with almost all common pipeline materials (ductile cast-iron, PVC- and PE-pipes) and for almost all water pipeline system conditions. It is therefore perfectly suitable for all buried pipelines with respect to both the main pipes and the distribution.

The advantages

- Fast and easy assembly
- Integrated Pull-Lock between fittings and valves
- Tension-proof connection between fittings, valves and pipeline which does not require grounding
- One system for almost all common types of pipe (ductile cast i ron, PVC- and PE-pipes) in nominal sizes from DN 80 to 200
- A screwless connection which prevents corrosion
- Tension-free as spigot end sockets can be connected at a 3° angle
- Corrosion protection by EP-P coating, tested to the guidelines issued by **G**ütegemeinschaft **S**chwerer **K**orrosionsschutz (GSK/ Quality Association for Heavy-Duty Corrosion Protection)
- Low inventory levels required

3.2 The BAIO®*plus* socket

The basic concept underlying the connection technology of the BAIO®*plus* System is the screwless, widely-used plug-in connection between spigot end and socket.
The BAIO®*plus* socket is composed of the well-known TYTON® socket and a pre-chamber for interlocking (see picture 1).



Picture 1: BAIO®*plus* socket

This design allows the use of commercially available (TYTON® and TYTONSIT®) pipe seals for ductile cast-iron pipes and the GKS-seal (GKS = Guss-Kunststoff-Dichtung / ductile cast-iron plastic seal) for PVC- and PE- pipes.

3.3 The principle of the BAIO®*plus* tension guard

There are two basic types of Pull-Locks in the BAIO®*plus* System

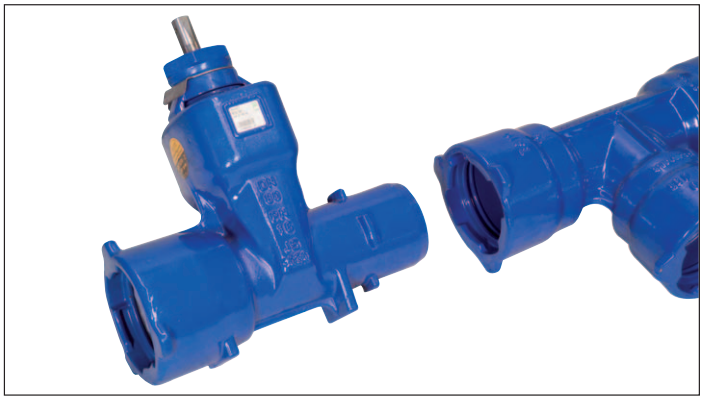
- The positive interior interlock using the bayonet catch principle between valves and fittings

- The frictionally-engaged exterior interlock (BAIO®*stop*) consisting of a tension ring and a clamping ring to connect all commonly used types of pipe (ductile cast-iron, PVC- and PE-pipes)

3.3.1 The BAIO®*plus* interior interlock

The bayonet interior interlock is a well-known and proven solution.All BAIO®*plus* fittings and BAIO®*plus* valves are equipped with this tension-proof and positive interior interlock between spigot end with cams and socket with interlocking pre-chamber.

Example of a mounting sequence of possible connections with the spigot end socket gate valve:



Picture 2: Interior interlock

- Turn spigot end (the gate valve in this case) 45° to the left
- Clean the spigot end and seal, grease both lightly and push spigot end into the socket up to the stop. The cams located at the spigot end will completely enter into the notches of the socket.
- Turn the spigot end (the gate valve in this case) to the right up to the stop.

Caution: When interlocking gate valves, make sure that the stem is aligned vertically. To align the gate valve, do not use the installation equipment as this might damage the coupling and the extension stem.

3.3.2 The BAIO®*plus* exterior interlock

The principle of the frictionally-engaged, tension-proof exterior interlock is used in the system solutions BAIO®*stop* Pull-Lock for ductile cast-iron, PVC- or PE-pipes.

For the interlock, suitable clamping and tension rings are used. This interlock can be fast and easily undone, if this should be required.
Example of an assembly sequence of an exterior interlock with a ductile cast-iron pipe connection:

Picture 3: Exterior interlock

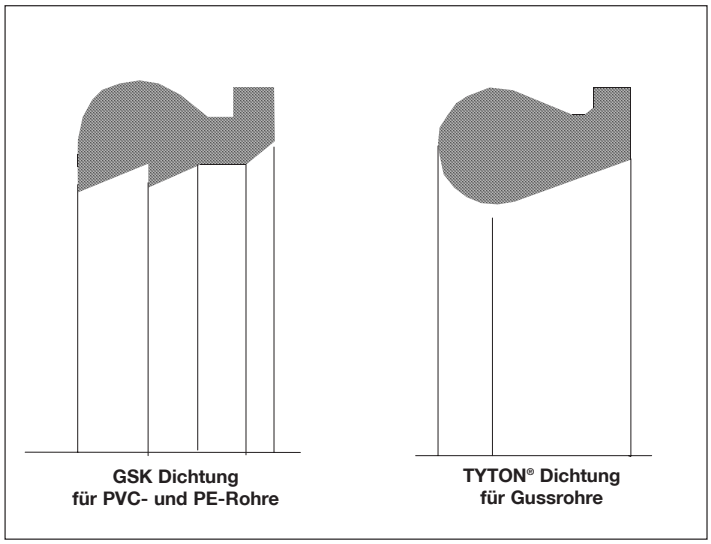
1. Cut ductile cast-iron pipe to desired length and chamfer it
2. Measure the insertion depth of the pipe and mark it
3. Push the tension ring over the end of the pipe
4. Expand the clamping ring and push it over the pipe end up to the insertion depth measured. Make sure that the larger diameter is installed facing towards the socket.
5. Slightly grease the socket seal.
   Caution: It is essential that the pipe is grease-free in the functional zone of the tension ring. Non-compliance with this instruction may cause the Pull-Lock to fail.
6. Push the pipe end into the socket up to the stop.
7. Expand the clamping ring and push it up to the end face of the socket.
8. Push the tension ring over the exterior cams of the socket and lock it by firmly turning it to the right.

The Pull-Lock between the fitting and valve or that between the pipeline and fitting/valve does not discharge the pipeline builder from his responsibility to ensure there are Pull-Locks between the pipeline sections as may be required by the local conditions and the technical rules and regulations for the laying and tension-proofing of pipelines. For the connection to ductile cast-iron pipes, a TYTONSIT® seal may be used.

3.4 Seals used in the BAIO®*plus* System

The geometry of the sealing area of the fittings and valve socket in the BAIO®*plus* System is exactly the same as that of the well-known and most widely used TYTON® socket.

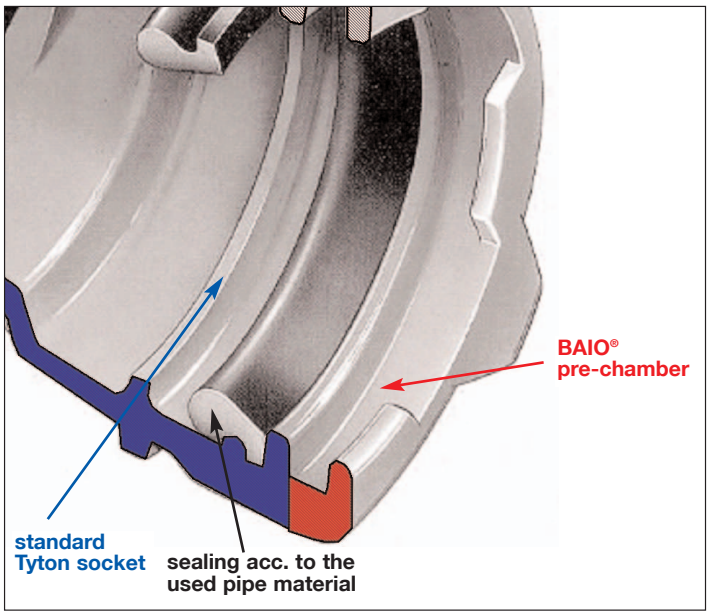
Therefore the commercially available ductile cast-iron pipe seals (TYTON® and TYTONSIT®) are used for the connection of fittings and ductile cast-iron pipes, and the GKS seal (GKS = Guss-Kunststoff-Dichtung / ductile cast-iron plastic seal) is used for PVC- and PE-pipes.



Picture 4: Sealing types

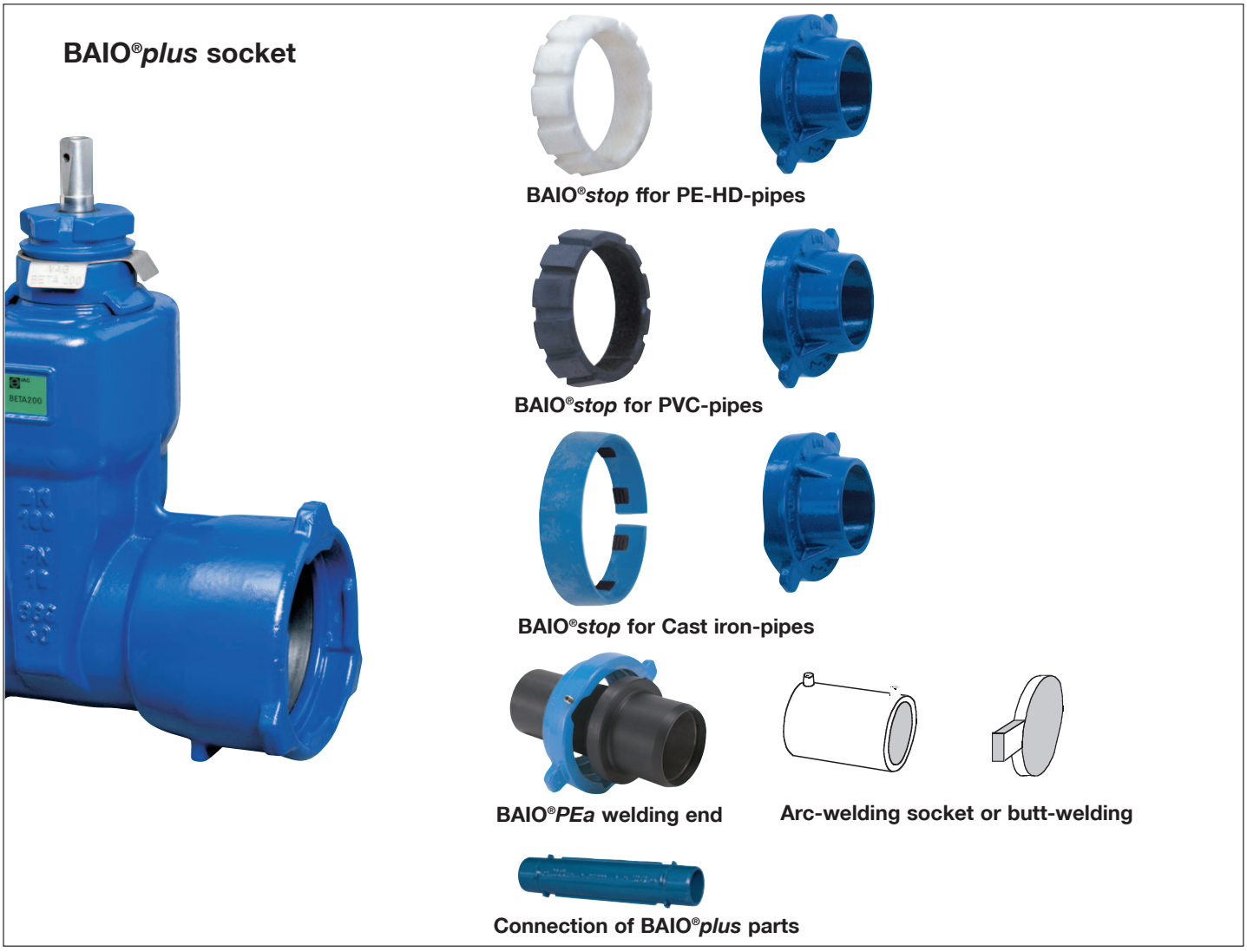
When the seal is inserted into the socket, it needs to be made sure it is accurately positioned in the TYTON® socket chamber area.

The first socket chamber is the so-called interlocking chamber for the cams of the spigot end.



Picture 5: BAIO®*plus* socket

3.5 The universal system for all types of pipes



Picture 6: BAIO®*plus* System

4. Installation of components of the BAIO®*plus* System

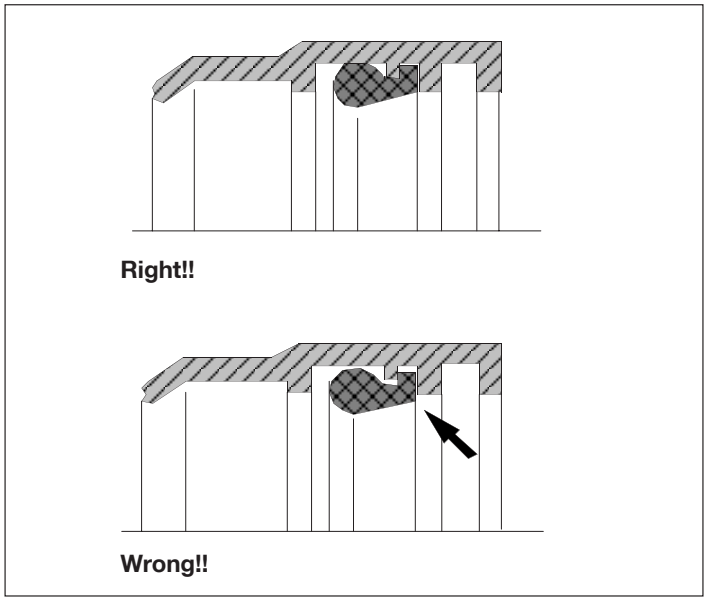
4.1 Before installation

All valves and fittings must be subjected to visual inspection before their installation.

The coating must be checked for damage and it must be ensured the appropriate seal is used (see 3.4 Seal types).

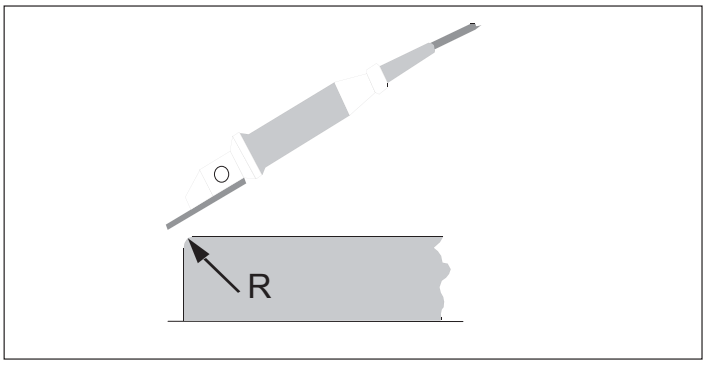
It also needs to be checked whether the sealing ring has been properly installed !

The inner hard rubber edge of the sealing ring must not reach beyond the centering collar!



Picture 7: Installation of the sealing ring

The pipes must be properly chamfered and the seals must be lubricated using a lubricant with approval for drinking water (KTW recommendation).
Recommended radius for pipes up to DN 200 ....R 5-6 mm



Picture 8: Chamfered of the pipes

When BAIO®*stop* Pull-Locks are used, no lubricant must be applied to the functional section of the clamping ring or to the clamping ring itself.

Non-compliance may lead to the Pull-Lock using its protective properties.

4.2 Bedding of pipes

When epoxy-powder coated valves and fittings of the BAIO®*plus* System are used, the pipeline needs to be laid in an equalizing sand bed. Bedding the pipes, valves and fittings in gravel (as is common practice with ZM-coated pipes) is not appropriate.

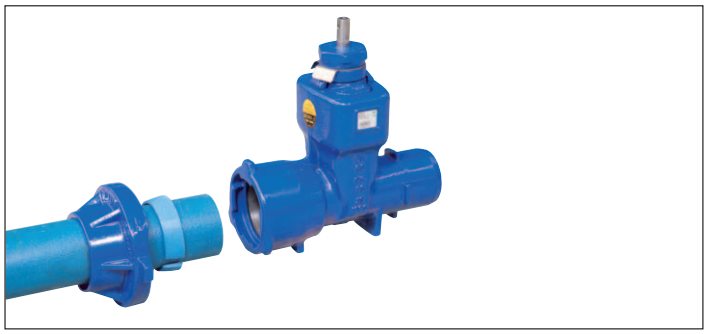
The pipeline trench in the road body must be filled according to the Specification Sheet for the Filling of Pipeline Trenches issued by Forschungsgesellschaft für das Straßenwesen (Research Institute for Road Construction, Cologne).

Besides the above, the relevant, generally accepted standards and regulations and the accident prevention regulations apply.

4.3 Mounting instructions

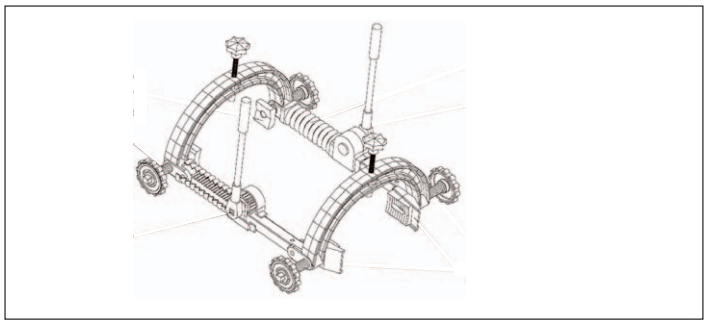
4.3.1 Mounting of pipes into the BAIO®*plus* socket

The BAIO®*plus* socket is a universal socket for the connection of almost all commonly used types of pipe such as ductile cast-iron, PVC- and PE-HD-pipes.



Picture 9: Mounting

To support ductile cast-iron pipe assembly for sizes of 150 DN and more, it is advisable to use a special pipe mounting device.



Picture 10: Pipe mounting device

The following items must be observed during installation:

- Proper chamfering of the pipe end (see 4.1)
- Appropriate seal and proper seat of the seal in the socket (see 4.1 and 3.4)
- Light greasing of the seal
- Insertion of the pipe up to the stop, then visual inspection to check for the proper fit of the seal all around
- This does not apply to the BAIO®*U-part* without threaded outlet. These parts have no stop and can therefore be slid on completely.

For the installation of the welding ends (e.g. BAIO®*PEa*) the relevant technical rules must be observed and complied with. Welding work on PE pipelines must only be done by specially trained skilled staff.

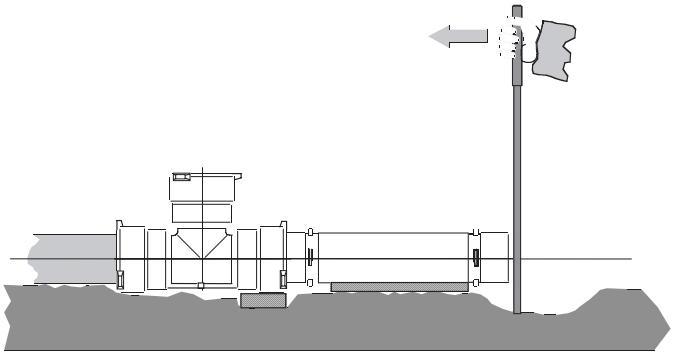
In addition to the above, the relevant, generally accepted standards and regulations apply.

4.3.2 Joining valves and fittings

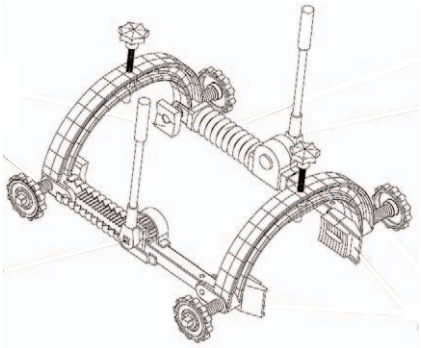
When valves and fittings of the BAIO®*plus* System are combined, it is always required to use a TYTON® seal.

A simple lever or a special assembly device can be used to make assembly easier..

Easy assembly using a lever



Assembly device

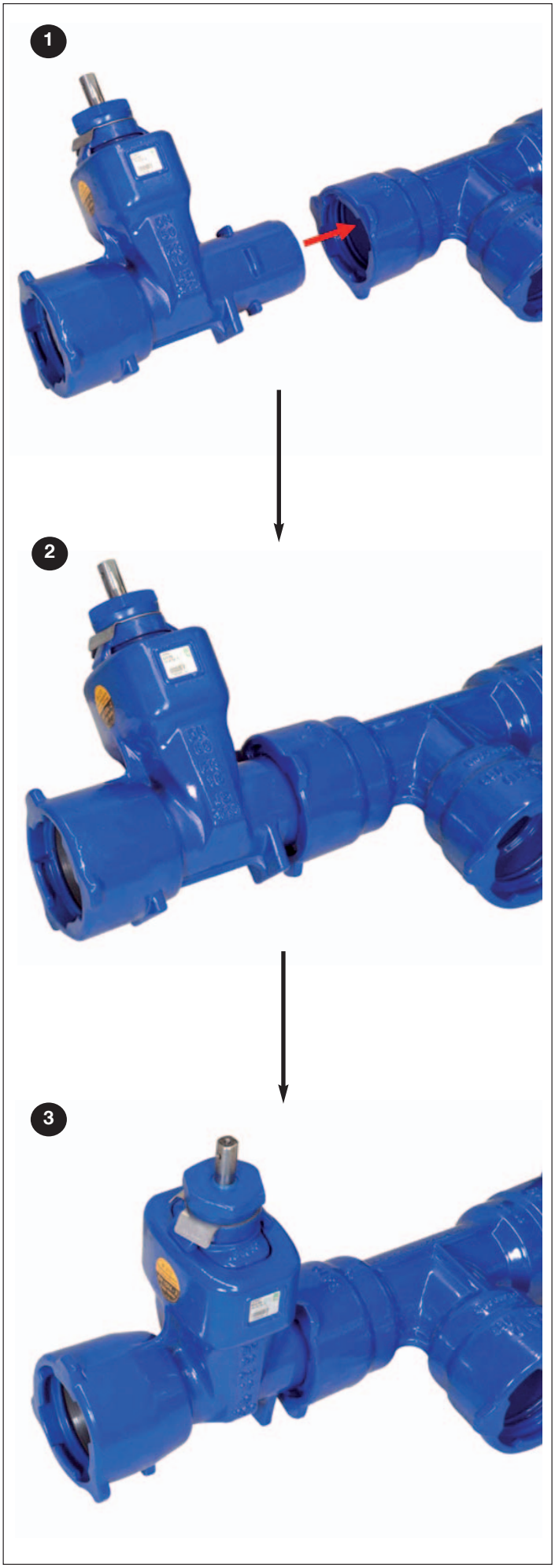


Picture 11: Posibilities of assembly

The assembly steps are as follows:

- Slightly grease the TYTON® seal in the socket.
- Turn the spigot end (the gate valve in this case) by 45° to the left.
- Clean the spigot end and seal, grease both of them lightly and push the spigot end into the socket up to the stop. The cams on the spigot end will completely disappear in the notches of the socket.
- Turn the spigot end (the gate valve in this case) to the right up to the stop

Note: When interlocking gate valves, it must be ensured that the stem is aligned vertically. Do not use the installation equipment to align the valve as this may damage the coupling and the stem extention

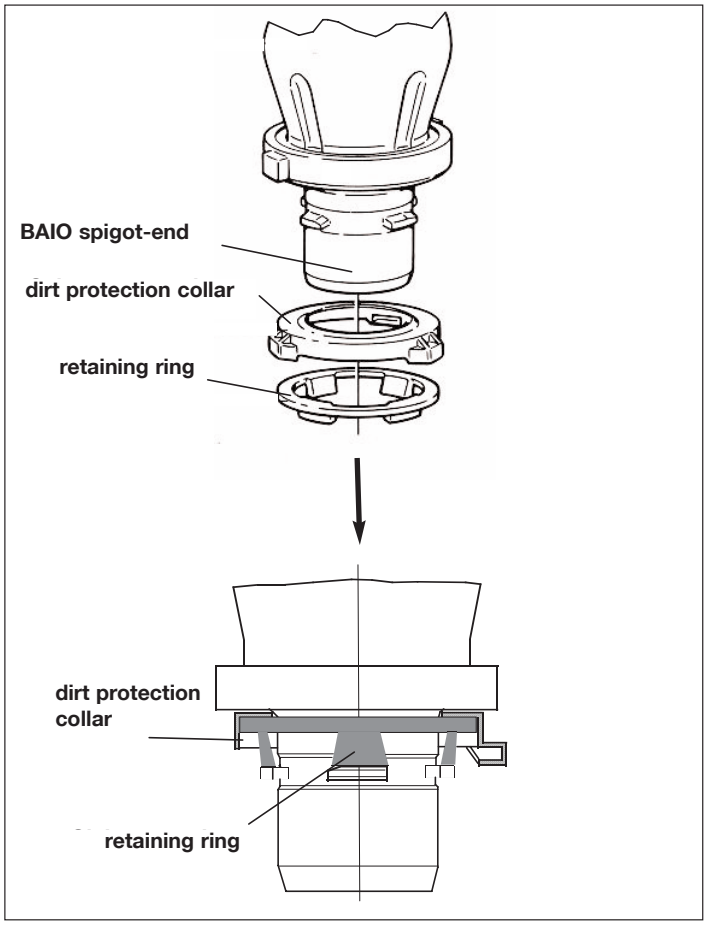


Picture 12: Steps of assembly

4.3.3 Assembly of hydrants with spigot end

Underground and standpost hydrants DN 80 or air valves with spigot end must be secured against unintentional unlocking.
For this purpose the BAIO®*plus* System is equipped with a dirt and twist protection consisting of a dirt protection collar and a retaining ring.

The dirt and twist protection consists of two parts and is usually factory-assembled on the valve or hydrant. If not pre-assembled, the rubber dirt protection collar must be pushed onto the spigot end over the locking cams. Then the retaining ring must also be pushed over the locking cams and turned until it is positioned behind the cams (see picture).



Picture 13: Spigot-end underground hydrant

During the subsequent assembly of the spigot end in the socket, the retaining ring drops into the free spaces of the socket while the spigot end and socket are being locked. This method reliably prevents unintentional unlocking.

If the valve is equipped with a plastic retaining ring (black), this ring must be pushed down manually into its proper interlocking position.
Then the rubber dirt protection collar must be pulled over the outer cams of the socket.
Finally, check the lock for proper function by turning the valve with your hand.

TYTONSIT® is not suitable for ensuring reliable tension protection as

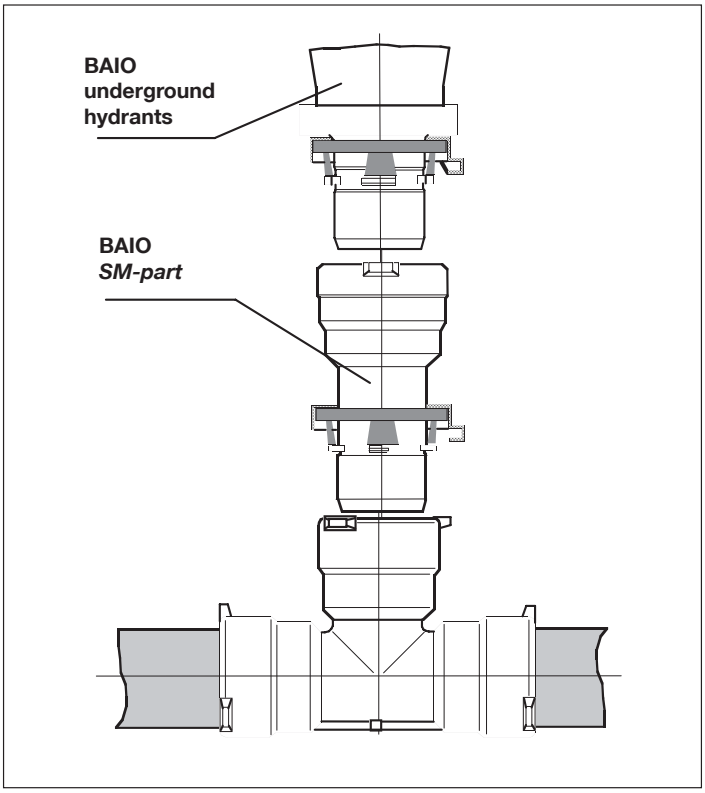
- It cannot be disassembled without destroying it

and

- The TYTONSIT® seal is not designed for use with plastic-coated parts.

In unfavourable conditions, the tension protection of TYTONSIT® seal cannot be guaranteed!

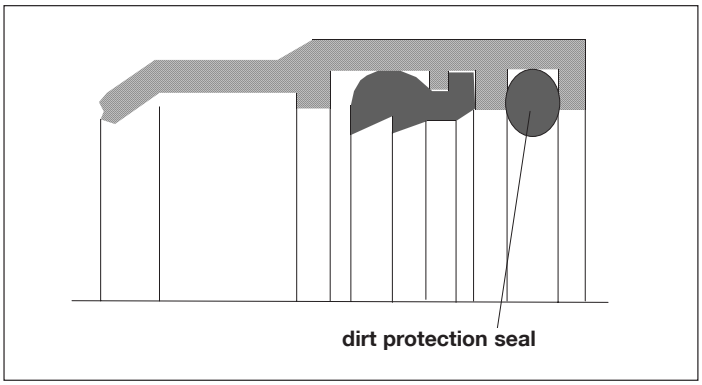
If *SM-parts* from the BAIO®*plus* System are used to compensate for insufficient installation depth they also have to be equipped with a dirt and twist protection device to prevent unintentional unlocking (see picture).



Picture 14: Using of the *SM-parts*

4.3.4 Dirt protection of the BAIO®*plus* sockets

When installing the BAIO®*plus* socket in loamy or silty grounds, it must be protected against dirt - in particular when installed in plastic pipes (e.g. by a petroleum jelly tape) - as the dirt particles washed or squeezed inside during assembly may affect the proper function of the seal.



Picture 15: Dirt protection seal

For plastic pipes (PVC- and PE-pipes) we recommend a special rubber dirt protection seal which is inserted into the locking chamber before the GKS seal (see picture).

4.3.5 Replacement of seals in the BAIO®*plus* System

For the replacement of seals, the following procedure should be observed.

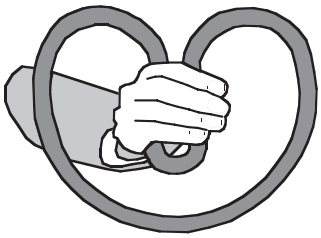
4.3.5.1 Disassembly

- Carefully push a screwdriver between the socket and seal, making sure not to damage the seal.
- Carefully remove the seal from the retaining groove without damaging the coating.

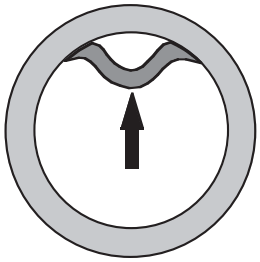
4.3.5.2 Assembly

Check the retaining groove before inserting the seal. The coating must be smooth and even and the cast-iron material must not be rough or dented.

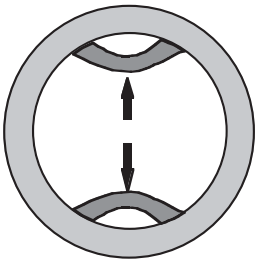
- Squeeze the cleaned sealing read in order to obtain a heart shape.



- Place the sealing in the socket so that the hard rubber collar catches in the retaining groove of the socket. Then carefully and smoothly push in the remaining loops.

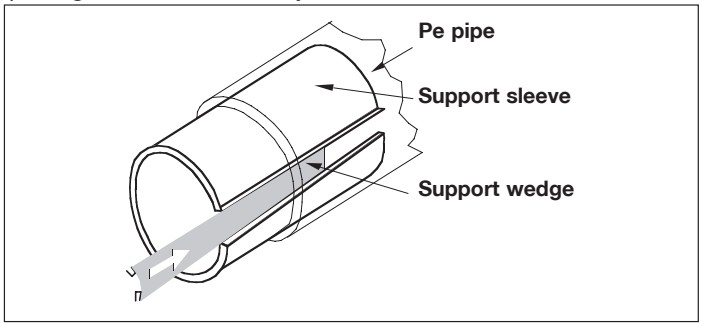


- Should inserting the remaining loop of the sealing ring be a problem, pull out the sealing ring a bit on the opposite side. These two smaller loops can now be pushed in easily.



4.3.6 Use of supporting sleeves in the BAIO®*plus* System

For PE-pipes inserted directly into the BAIO®*plus* socket and equipped with a BAIO®*stop* Pull-Lock, the following applies WATER applications: For use with PE 80 pipes the installation of a supporting sleeve is advisable, for use with PE 100 pipes a supporting sleeve is mandatory!



Picture 16: Supporting sleeve

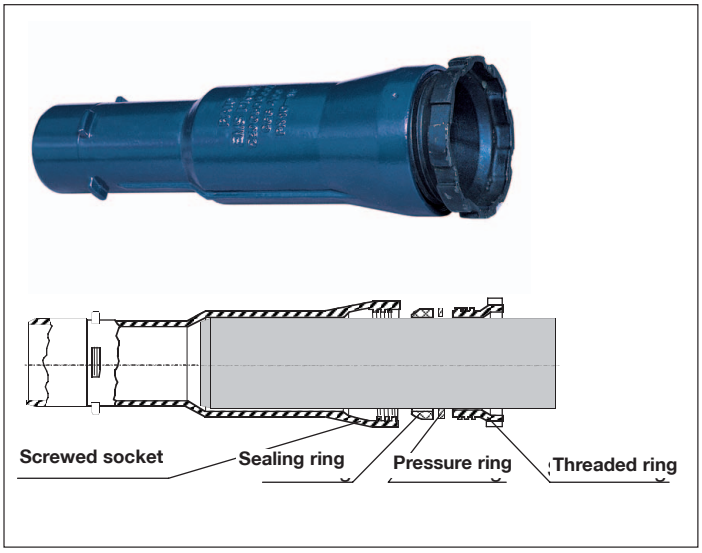
Assembly of the supporting sleeve:

- Insert the supporting sleeve in the PE- pipe until it reaches the stop.
- Drive home the clamping wedge
- Saw off the protruding end of the wedge so that it is flush with the pipe end.

4.4 Installation information

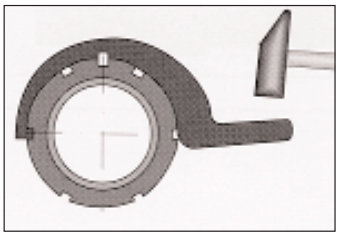
4.4.1 Rehabilitation of pipeline systems with the BAIO®*plus* System (BAIO®*EMS-part*)

Originally designed for use in new pipeline systems, the BAIO®*plus* System is increasingly being used in the rehabilitation of old pipeline systems. For this purpose a special fittings was developed, called *EMS-part* (**E**inbau-**M**uffen-**S**tück = installation socket part).



Picture 17: *EMS-part*

This fittings consists of a screw socket, a sealing ring, a pressure ring and a threaded ring (see picture).
To install the *EMS-part*, first the screw socket is disassembled, then the threaded ring, pressure ring and sealing ring are pushed over the pipe (see picture) and the BAIO®*plus* form parts and valves are mounted. Then the *EMS-part(s)* are pushed into the BAIO®*plus* socket and locked.



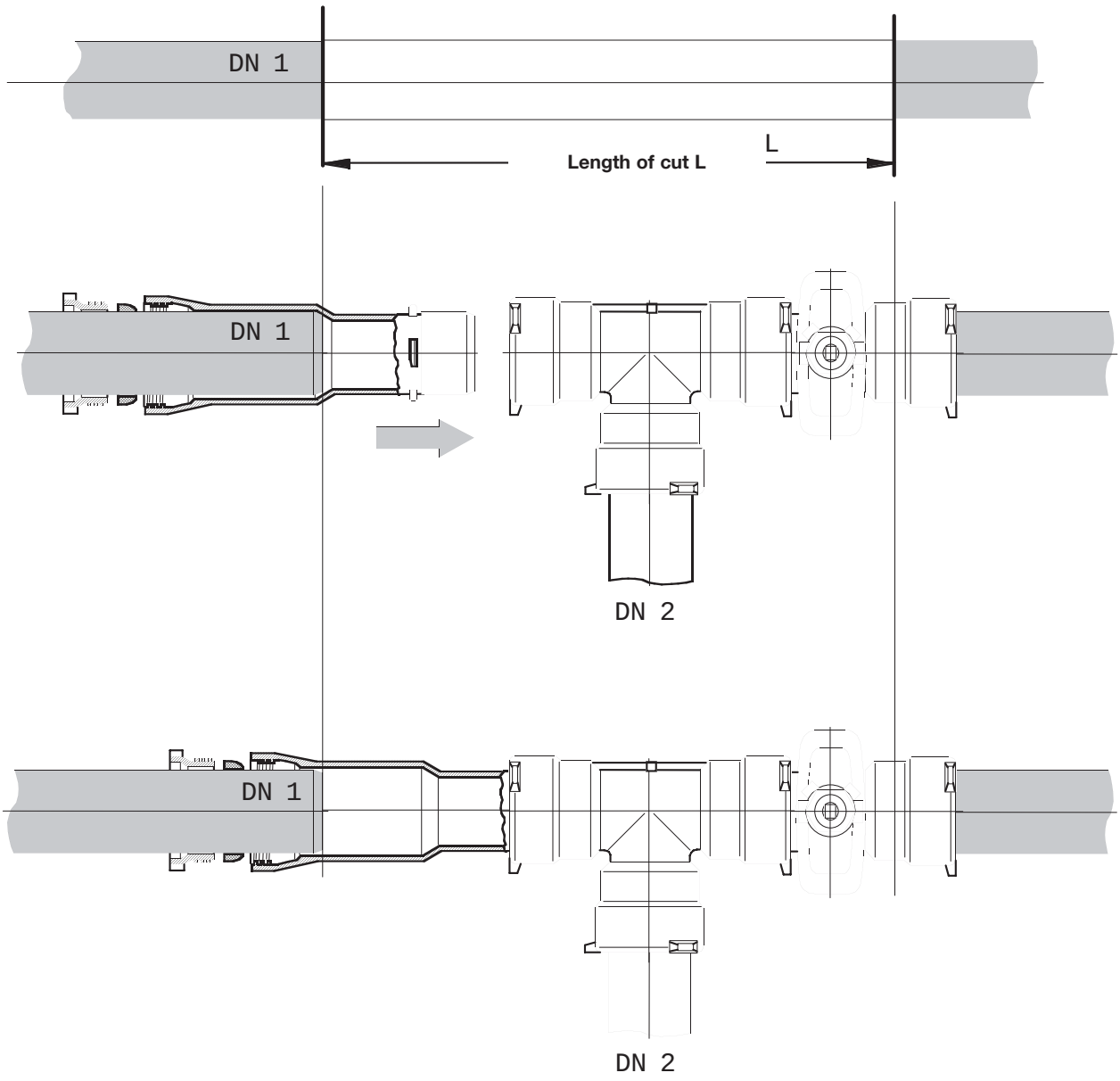
Picture 18

Afterwards the sealing ring and the pressure ring are inserted into the screw socket and the threaded ring is fastened using a wrench to achieve a tight connection.

The following pages give you an overview of possible rehabilitation solutions using BAIO®*EMS-part*.

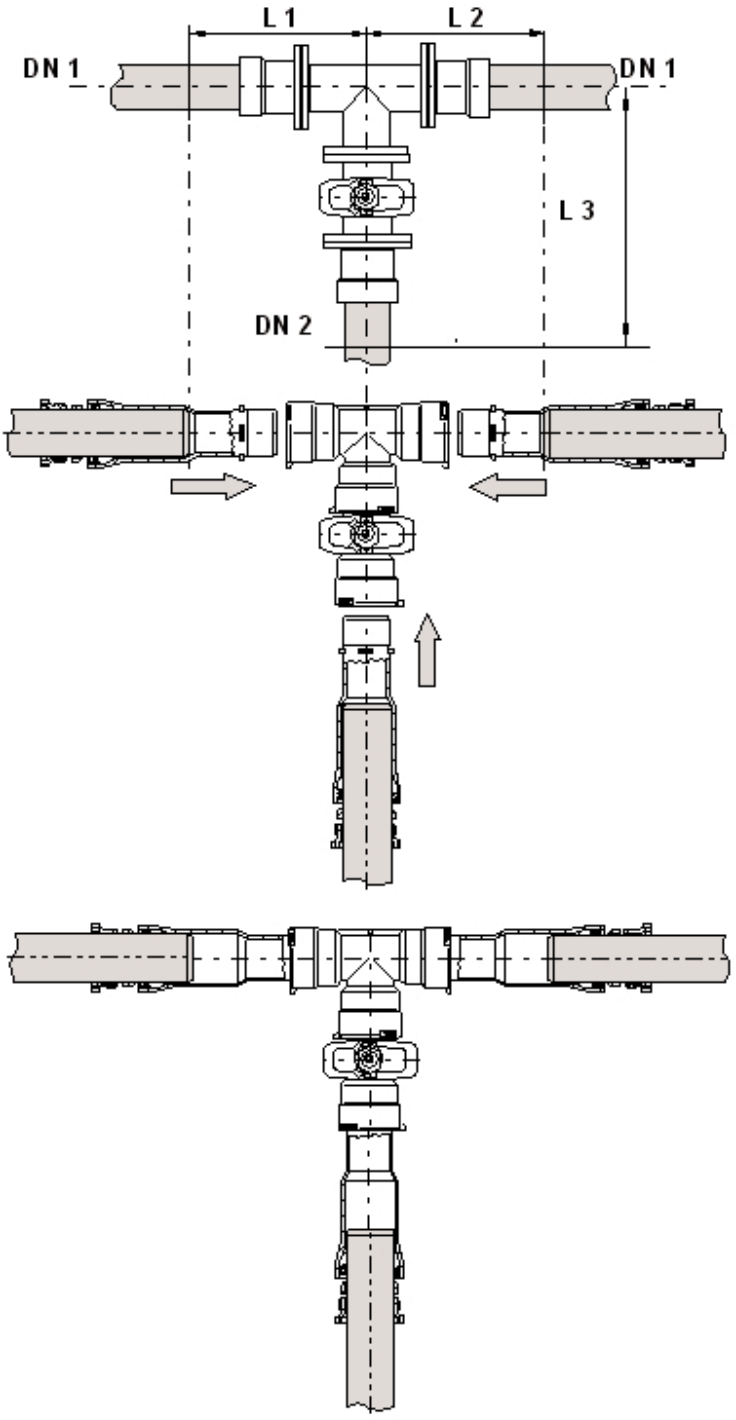
For specific problems not covered here, our sales representatives will gladly provide assistance.

4.4.2 Installation of a branch with gate valve in an existing pipeline



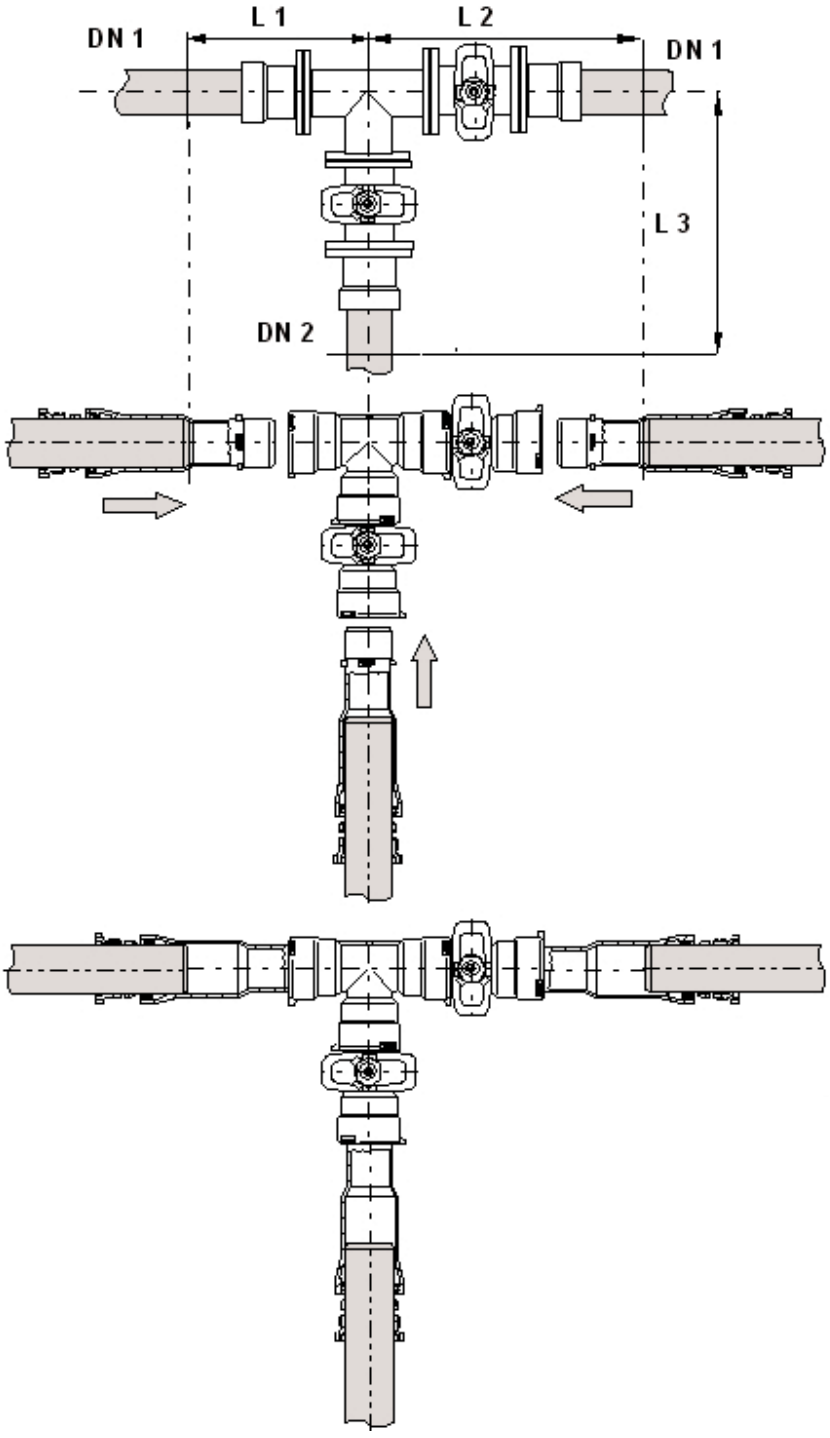
Pipeline DN 1 (mm)	Branche DN 2 (mm)	Length of separating cut L (mm)
80	80	780
100	80	855
100	100	865
125	80	900
125	100	925
125	125	955
150	80	915
150	100	995
150	125	950
150	150	1000
200	80	995
200	100	1020
200	125	1045
200	150	1075
200	200	1135

4.4.3 Replacement of an existing flange cross with one gate valve by a BAIO®*plus* cross



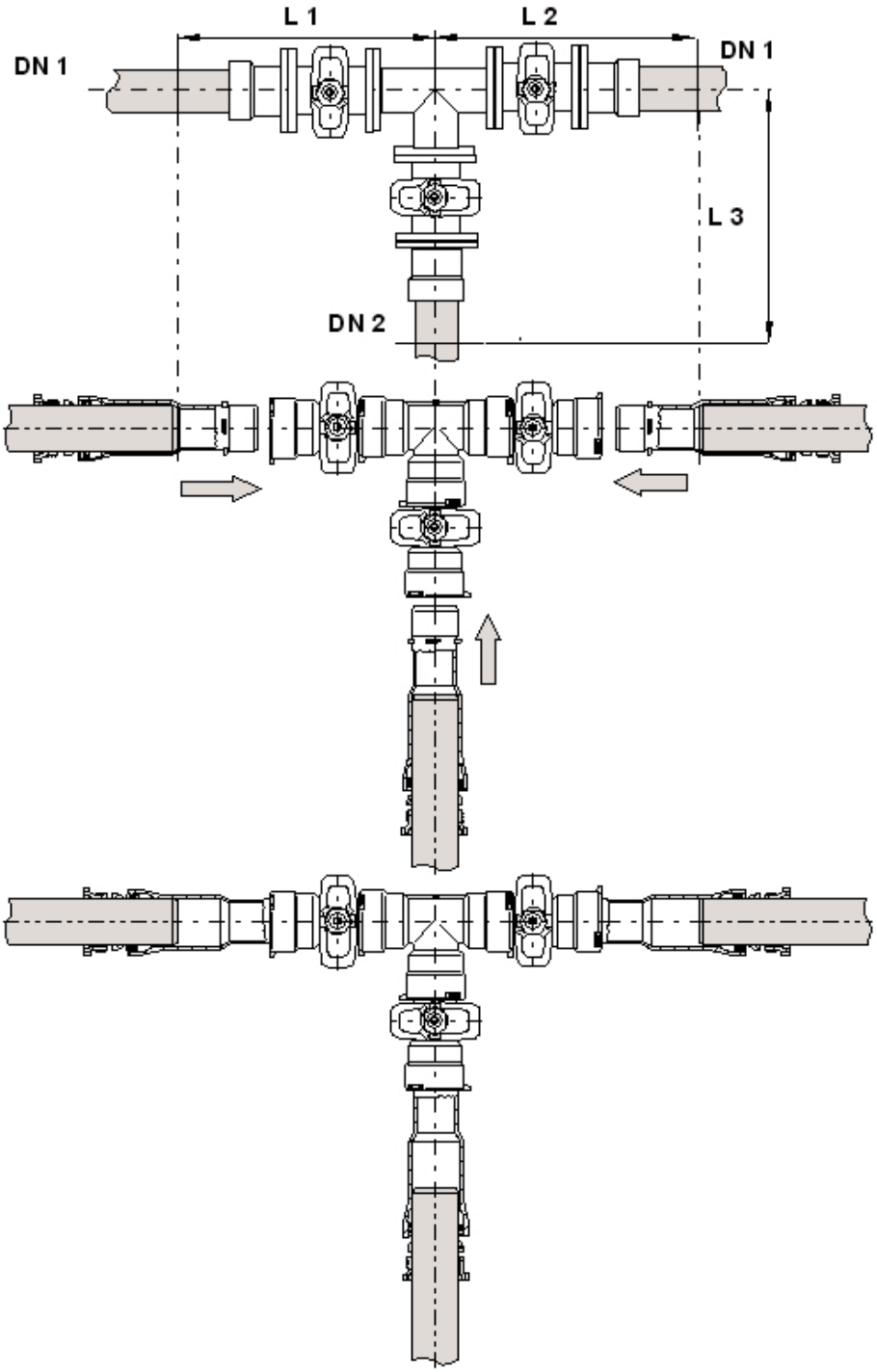
DN 1 (mm)	**DN 2** (mm)	**L1** and **L2** (mm)	**L3** (mm)
80	80	420	630
100	80	445	640
100	100	455	675
125	80	475	655
125	100	485	690
125	125	500	740
150	80	475	665
150	100	515	700
150	125	495	750
150	150	520	765
200	80	510	690
200	100	525	725
200	125	535	790
200	150	550	790
200	200	580	860

4.4.4 Replacement of an existing flange cross with two gate valves by a BAIO®*plus* cross



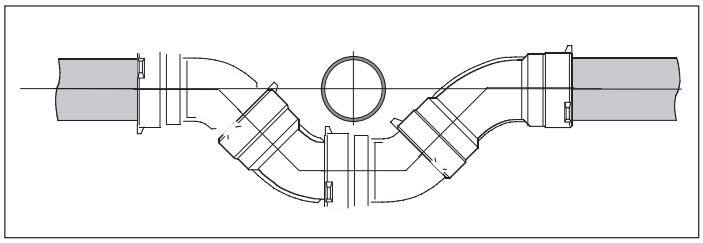
DN 1 (mm)	DN 2 (mm)	L1 (mm)	L2 (mm)	L3 (mm)
80	80	420	630	630
100	80	445	665	640
100	100	455	670	675
125	80	475	715	655
125	100	485	730	690
125	125	500	745	740
150	80	475	725	665
150	100	515	765	700
150	125	495	745	750
150	150	520	770	765
200	80	510	790	690
200	100	525	805	725
200	125	535	815	790
200	150	550	830	790
200	200	580	860	860

4.4.5 Replacement of an existing flange cross with three gate valves by a BAIO®*plus* cross



DN 1 (mm)	**DN 2** (mm)	**L1** and **L2** (mm)	**L3** (mm)
80	80	630	630
100	80	665	640
100	100	670	675
125	80	715	655
125	100	730	690
125	125	745	740
150	80	725	665
150	100	765	700
150	125	745	750
150	150	770	765
200	80	790	690
200	100	805	725
200	125	815	790
200	150	830	790
200	200	860	860

4.5 Construction of siphon culverts with the BAIO®*plus* System



Picture 19: Construction of siphon culverts

The following BAIO®*plus* components are available for the construction of siphon culverts:
- 45° MSK elbows (socket-spigot end elbows)
- 11°, 22°, 30° and 45° MMK-parts (socket-socket elbows)

They are installed as described in the drawing above.

4.6 Extension of underground hydrants with the BAIO®*plus* System (SM-part)

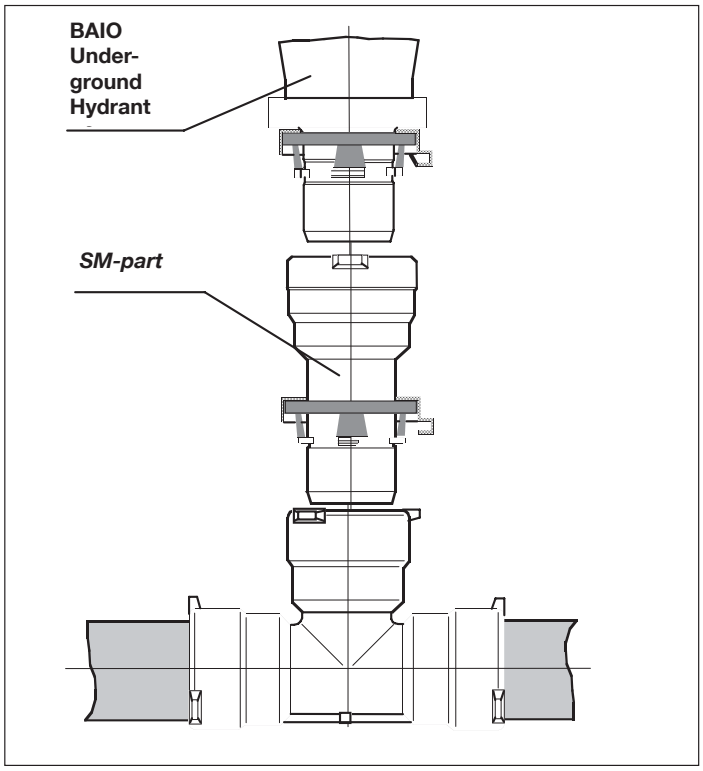
It may happen in practice that

- an underground hydrant is supplied and the installation depth is insufficient

or

- the final thickness of the road topping exceeds the originally planned thickness.

In these cases the underground hydrant is extended by an *SM-part* (spigot-end-socket part).
BAIO®*plus* DN 80 *SM-parts* are available in the following lengths: 150, 200 and 300 mm.



Picture 20: Extension of hydrants

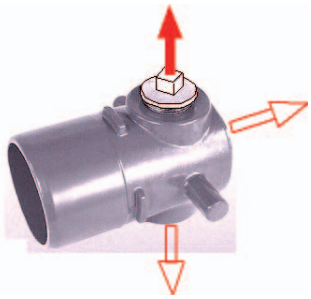
In this case, not only the underground hydrant but also the SM-part must be protected against unintentional unlocking by means of a dirt and twist protection device.

4.7 Prevention of dead water spaces in house connections

Areas critical with respect to hygiene such as dead water spaces in branch lines must be prevented as early as in the planning stage (cf. DIN 1988). To prevent these dead water spaces, the BAIO®*plus* System supplies a range of EN-parts, MMN-parts, socket-end caps and spigot-end caps providing the possibility of direct connection to pipeline systems in the house.

BAIO®*plus* socket-end cap with malleable cast-iron plug (also on both sides)

Female thread G 1 1/2"



BAIO®*plus* spigot-end cap with malleable cast-iron plug (also on both sides or on the front)

Female thread G 1 1/2"

BAIO®*MMN-parts* with female thread outlet (also on both sides or on the front)

Female thread on both sides G 1 1/2"

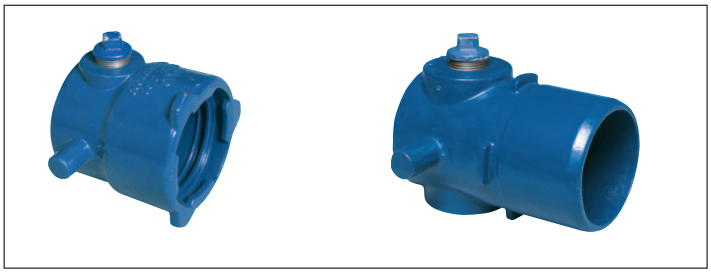
Picture 21: Connection of House Connection pipelines

In these installation situations as well, the quality of the drinking water must be ensured by purging before use.

4.8 Pressure test, leak test

After the installation of the valve or hydrant, an appropriate pressure test must be performed according to the applicable rules and regulations.

For testing individual sections, a BAIO®*plus* socket-end cap or BAIO®*plus* spigot-end cap can be used.



Picture 22: Pressure test / leak test

During the performance of pressure and leak tests the applicable regulations must be complied with as otherwise this may lead to property damage or physical injury..

5. System parts

The BAIO®*plus* System is constantly being improved.

For up-to-date information on the current applicable specifications, please refer to our catalogues or contact our sales representatives.

6. Maintenance and service

In general:

The BAIO®*plus* System is maintenance-free!

Individual valves such as gate valves or hydrants should be monitored and serviced according to the guidelines of the DVGW specification sheet W392 (pipe network inspection and water losses, procedures and assessment).

7. Trouble-shooting

Problem	Cause / Remedial action
Pipe cannot be mounted	Repair coating using the coating repair kit
Pipe cannot be mounted	1. Has the proper seal been installed? 2. Grease seal 3. Chamfer pipe properly 4. Outer diameter of pipe too large? 5. Check roundness of pipe and use rounding clamps if necessary 6. Use pipe assembly device
BAIO®*plus* socket connection leaks	1. Has the proper seal been installed? 2. Are there grooves in the pipe? 3. Pipe incompletely inserted into socket? 4. Is the seal dirty? 5. Is the seal damaged or dislocated? 6. Outer diameter of pipe too small?
BAIO®*plus* Pull-Lock does not work (BAIO®*stop*)	1. Remove lubricants in the clamping ring area. 2. For ductile cast-iron pipes: bituminous coating too thick. Remove excessive bitumen in the clamping ring position. 3. Has the proper clamping ring been used? Exchange clamping ring, if necessary. 4. Has the clamping ring been used before? Replace clamping ring. 5. Is the clamping ring dirty? Replace clamping ring. 6. Check for correct outer diameter of the pipe. Pipe too small?
Gate valve does not close properly	Wedge is damaged. Replace the upper part of the gate valve including wedge and seals.
Gate valve cannot be operated	Is the control equipment damaged? If so, replace. Is the stem deformed? If so, replace upper part of the gate valve including wedge and seals.
Gate valve leaks at the stem	Replace upper part of the gate valve including wedge and seals. (In this case, please contact us)
Valve or form part can not be interlocked	1. Has the valve or fitting been properly inserted? 2. Is the interlock dirty? 3. Is foreign matter blocking the interlock?

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Edition4 -01/09