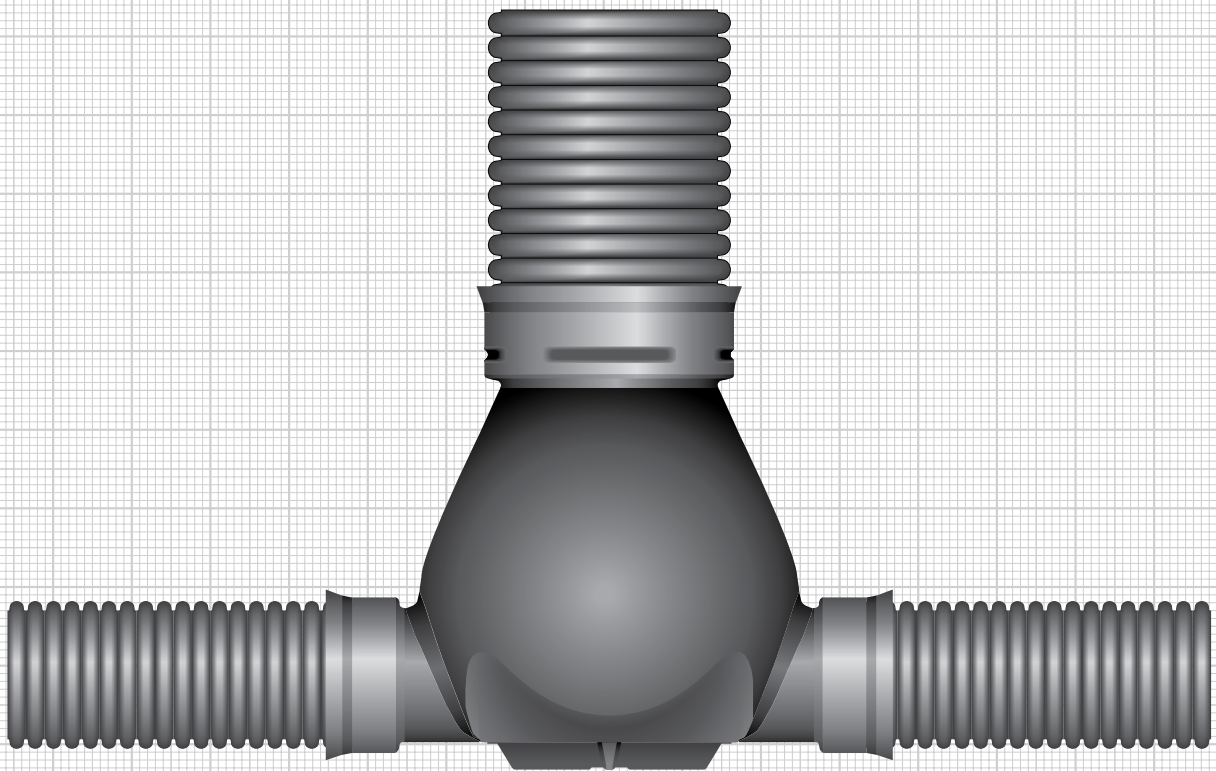


Installation manual

AquaPipe® system



Transport pipe

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The recommendations are based on DIN EN 1610, DWA-A 139 and DWA-A 127. They apply in addition to the following information.

General information on using our products and systems:

Information about or assessments of the use and installation of our products and systems is exclusively provided on the basis of the information submitted. We do not assume any liability for damage caused by incomplete information. If the actual situation deviates from the planned situation or if a new situation occurs or if different or new installation techniques are applied, these must be agreed upon with FRÄNKISCHE, since these situations or techniques may lead to different conclusions. Notwithstanding the above, the customer is solely responsible for verifying the suitability of our products and systems for the intended purpose. In addition, we do not assume any liability or responsibility for system characteristics and system functionalities when third-party products or accessories are used in combination with FRÄNKISCHE systems. We only assume liability if original FRÄNKISCHE products are used. For use in other countries than Germany, country-specific standards and regulations must also be observed.

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1 Incoming material inspection

Check pipes, pipe components, shafts, shaft components and accessories upon delivery to make sure they are labelled sufficiently and comply with the requirements of the customer. Please observe

the manufacturer's specifications. Carefully examine all parts both upon delivery and right before installation to make sure that they are free from damage. Reject damaged components and note

this down on the delivery note.

2 Transport to the construction site

Generally transport pipes, pipe components, shafts, shaft components and accessories using appropriate vehicles;

load and unload under professional supervision. Pipes should be largely supported during transport.

3 Unloading the lorry

Using excavator and crane:

Generally use hoisting slings (e.g., textile slings). Do not use chains and ropes. Avoid dropping, dumping as well as hitting the pallets, pipes, shafts, shaft components and accessories hard against each other.

Attach hoisting slings in the middle of the pallet spaced 3.5 m apart. Help controlling the pallets by hand. Do not move pallets on the lorry using crowbars or rods.

Using forklifts:

Place pallets on forks crossways; ensure largest-possible spacing between the forks.

4 Storage at the construction site

Do not dump pallets with a jerk on hard ground. Store the pallets on even ground that is sufficiently hard to prevent pallets and/or base battens from bogging down.

Pipes and fittings can be stored outside; the storage period outside should, however, not exceed one year.

In order to prevent excessive heating of pipes during summer and damage from UV exposure due to sustained direct sunlight, we recommend that the pipes should be stored in the shade or covered with brightly coloured, light-tight tarpaulin.

Observe the following in terms of storage of pipes and shafts:

1. Store pipes in a way which guarantees proper even bearing.
2. Do not stack loose pipes higher than 1 m. Secure pipe stacks at the sides.
3. You may stack packeted pipe pallets on top of each other. Do not stack more than 2 pallets on top of each other.
4. A maximum of 4 coils of pipe may be stored on top of each other for AquaFlex. If required, support laterally.
5. Store shafts on their base on even and solid ground to prevent deformation of the shafts.



5 Transport to the pipe trench

Thanks to their low weight, the transport of individual pipes and accessories up to a nominal diameter of DN 350 and/or of shafts to the pipe trench does not require any special lifting equipment. Use suitable tools (e.g., wide textile slings) in connection with lifting equipment for larger nominal diameters. Lifting equipment and fixtures must not

pose any risk of damaging pipe components and/or shafts. Implicitly avoid hooks, chains, cables or other tools which could lead to edgy or jerky stresses and slip.

If transport is effected in pallets, the specifications according to Section 3 "Unloading the lorry" apply. Trans-

porting individual pipes using chains or ropes is forbidden.

6 Creating the trench

The provisions according to the regulations regarding the installation of sewer pipes (DIN EN 1610) apply regarding the minimum trench width (depending on nominal width and installation depth). Please note that too narrow trenches impede proper installation (compaction of the embedding area). Trenches that are too wide increase costs. Create a small recess in the trench bottom to ensure continuous pipe and shaft

Nominal width	Shored trench and unshored trench ($\beta > 60$ degrees)	Unshored trench ($\beta < 60$ degrees)
DN 150–DN 200	$D_o + 0.40$ m	$D_o + 0.40$ m
DN 250–DN 350	$D_o + 0.50$ m	$D_o + 0.40$ m
DN 400–DN 600	$D_o + 0.70$ m	$D_o + 0.40$ m
DN 800	$D_o + 0.85$ m	$D_o + 0.40$ m

bearing. A trench width of at least 1.30 m is required in the shaft area to allow professional embedding.

7 Installation

Generally adhere to the provisions of DIN EN 1610 during installation. The bedding and backfill materials specified in the pipe stress calculations must be installed and compacted to the specified

standard. This is the only way to make sure that the resulting deflection equals the deflection determined through pipe stress calculations and that the minimum safety standards in the stress and

stability analysis are complied with. We recommend using pipes with a length of 3 m for gradient conditions smaller than or equal to 0.8 %.

7.1 Bearing

The bedding area must be level and free of stones. Create and compact the bearing with at least 10 cm to 15 cm of stoneless, compactable material. According to the specifications of DIN EN 1610, use compactable material such as soils of the categories G1 (non-cohesive soils – GE, GW, GI, SE, SW, SI), G2 (slightly cohesive soils – GU, GT, SU, ST) or G3 (cohesive mixed soils – silty clay and gravel – \overline{GU} , \overline{GT} , \overline{SU} , \overline{ST}). Embed the pipe on the sides according to the specified bedding angle. Create a small recess in the bottom around the base area of the shaft bottom (approx. 8 cm) and backfill loosely using backfill material (pipe bedding).

Push the shaft with its base into this bedding. Install the shaft analogously to the pipe support. Make sure that the trenches are free from water, e.g., stormwater, infiltration water, spring water or water leaking from pipes, during installation. The way of dewatering must not influence the embedding area and the pipe system. Take measures to avoid washout of fines during dewatering. Consider the influence of drainage measures on groundwater movements and the stability of the surroundings. Sufficiently seal all construction site drainage after finishing dewatering measures.



7 Installation

7.2 Installation of pipes and shafts

7.2.1 Material inspection

Before installation, check pipes, pipe components, shafts, shaft components and accessories for damage which

might have occurred during transport and/or storage. Damaged components must not be installed.

7.2.2 Pipe installation

Connect pipes using push-fit couplings. For this purpose, pipes are delivered including couplings and sealing rings.

Nominal width	Insertion area marking
DN 150	110 mm
DN 200	148 mm
DN 250	170 mm
DN 300	193 mm
DN 350	170 mm
DN 400	201 mm
DN 500	255 mm
DN 600	270 mm
DN 800	370 mm

Marking table

1. Clean the insertion area of the pipe and the insides of the couplings from dirt using a rag or similar.
2. Insert the profile sealing rings continuously and without overexpanding individual spots into the second complete corrugation trough at the spigot.
3. Use a marker to mark the insertion area according to the marking table. This is the only way to ensure the installation of pipes without gaps (see marking table).
4. Evenly apply a sufficient amount of lubricant to the profile sealing ring and the inside of the coupling's insertion area. Do not use oils and greases.



Attention

Lubricated pipe ends must not be placed on the bedding (risk of embedding material sticking to the pipe ends).

5. Right before installation, check couplings and pipe end again for foreign objects and remove if necessary. Please pay particular attention to gravel, sand or crushed stones which could have entered the coupling during work at the pipe and/or adheres to lubricated sections.
6. Insert pipes to the limit stop and/or the marking. Protect the pipe section using a square timber and distribute installation forces equally during installation.

7 Installation

7.2.3 Shortening pipes

Cut the pipes to length in the middle of the corrugation trough and align upright to the pipe axis using a fine-toothed saw or other appropriate tools. Remove edges and irregularities on the cutting surfaces with a grater, file or another suitable tool.



7.2.4 Shaft connections to AquaTrafficControl

Proceed as follows:

1. Clean the insertion area of the pipe and the insides of the shaft connections at AquaTrafficControl from dirt using a rag or similar.
2. Insert the profile sealing ring continuously and without overexpanding individual spots into the **first** complete corrugation trough of the AquaPipe pipe at the spigot (when cutting pipes, make sure that cuts are in the middle of the corrugation trough and there is no damage to the corrugation edge).
3. Evenly apply a sufficient amount of lubricant to the profile sealing ring and the inside of the shaft connection. Do not use oils and greases.
4. Right before installation, check the shaft connection and pipe ends again for foreign objects and remove if necessary. Please pay particular attention to gravel, sand or crushed stones which could have entered the insertion area during work at the pipe and shaft and/or stick to lubricated sections.
5. Insert pipes to the limit stop. Protect the pipe section using a square timber and distribute installation forces equally during installation.

7.2.5 Embedding and backfilling of pipes and shafts

The provisions of DIN EN 1610 and DWA-A 139 generally apply. Carry out backfilling according to design specifications. It includes side filling, covering within the embedding area, and main backfilling. Create the embedding of the pipe in the embedding area with stoneless, compactable material. Backfill the bedding material evenly on both sides of the pipe above the pipe crown in layers of approx. 15 cm, and compact using light compaction equipment only or, if required, even by hand. Further filling (as of approx. 15 cm above the pipe crown) must be made in layers with constant compaction of the filling material. Mechanical compaction of main backfilling with light to medium equipment directly above the pipe should only be performed starting from a minimum

thickness of 30 cm above the pipe crown. Use heavy compaction equipment only starting from a depth of cover of 1.0 m above the pipe crown. Choose compaction equipment, the number of compaction runs and the thickness of layers subject to compaction depending on the material to be compacted and the pipe system to be installed. To avoid load concentration on the pipe, consistent compaction throughout the entire embedding area must be ensured. In addition, the pipes must not come in contact with compaction equipment. Preferably secure the pipes from lateral and vertical forces during installation. Embed the shaft and compact the bedding material analogously to the pipe. Insert the extension pipe for this process (see Section 7.2.6).

Please observe the following

The use of heavy construction gear and vehicles and storing excavated material in the area over covered pipes are not admissible unless relevant load conditions have been considered in the static calculation. This holds true particularly for pipe systems with low depths of cover.

7.2.6 Placing the extension pipe

The extension pipe must be inserted into the upper area of the shaft base body. For watertight systems, place the profile

sealing ring into the first corrugation trough of the extension pipe. Evenly apply a sufficient amount of lubricant to

the profile sealing ring and the inside of the insertion area. Do not use oils and greases. Afterwards, insert the

7 Installation

7.2.6 Placing the extension pipe (continued)

extension pipe until it reaches the inside stops of the insertion area only, not beyond that. The remaining area below the stops serves as a compensating area. The extension pipe must be

aligned upright when backfilling. The shafts can be seen better during the construction period if the extension pipes protrude from the planum.

7.2.7 Shortening and cutting the extension pipe

Cut the extension pipes to length in the middle of the corrugation trough using a fine-toothed saw or a pipe cutter. Remove edges and irregularities on the cutting surfaces with a grater, file or

another suitable tool. Extension pipes can also be extended using couplings and sealing rings. For this purpose, mount the sealing ring into the second complete corrugation trough at the spig-

ot and install the coupling as described in Section 7.2.2.

8 Placing shaft covers

Install standard shaft covers according to DIN EN 124, CW 610, installation according to design specifications. Alternatively, you can also use covers for rolling-in in bituminous layers. Shaft covers, concrete support ring, bucket handle and bucket are not included in FRÄNKISCHE's scope of delivery and must be supplied on site. As soon as the road superstructure is being prepared, the bearing for the shaft covers must be created. The shaft cover is integrated into the road superstructure within the road. The concrete support ring and the carrier layer below transfer traffic loads into the soil. There must be no direct load transfer between the support ring/carrier layer and the extension pipe. The bedding must be flat and without stationary loads and must be compacted according to the requirements. The concrete support ring must be placed centrally without affecting the bearing. The shaft cover and/or,

if required, more equalisation rings must be placed on a 10-mm-thick mortar joint to prevent stationary loads. If the cover is outside the road, the bearing for the cover must be prepared separately from compactable material. When using support rings according to DIN 4034 Part 1 (and compatible adapter rings for covers that can be rolled-in) and when using the DOM sealing ring, extension pipes can be connected to the cover properly. The DOM sealing ring must be mounted onto the last corrugation of the extension pipe for this purpose. Make sure to mount it continuously and without over-expanding individual spots. Evenly apply a sufficient amount of lubricant to the top of the DOM sealing ring and the inside of the support rings. Subsequently, install the concrete support ring over the DOM sealing ring; make sure that the sealing lip centrally seals against the concrete support ring.

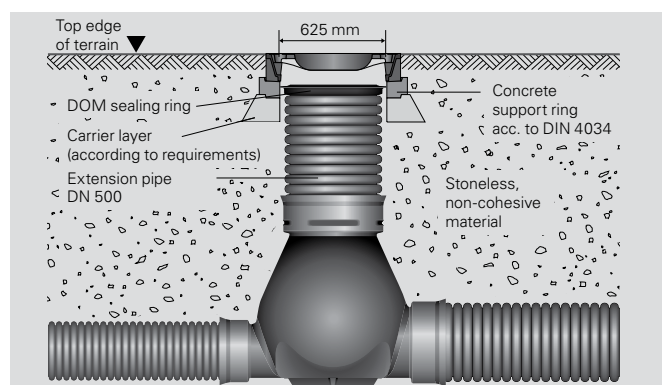


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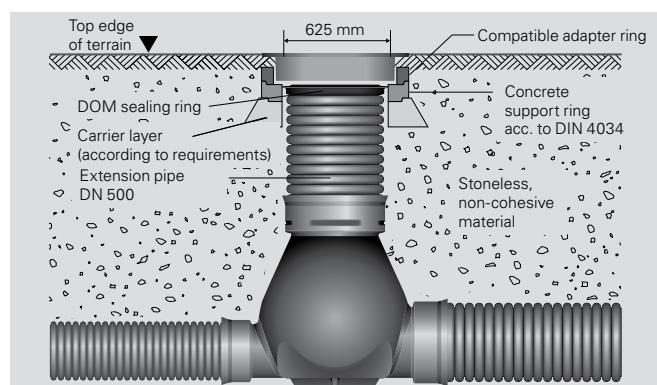
The height of the cover of support ring and frame must be clarified in connection with the use of a dirt trap. The dirt trap should not rest directly on the extension pipe.

Attention

You must not asphalt directly to the pipe in the area of the bituminous layers. Using standard equalisation rings, you can locally adjust this area.



AquaTrafficControl with standard cover 625 mm



AquaTrafficControl with cover for rolling-in in bituminous road surfaces

9 Connections to concrete shafts and wall lead-throughs

Only FRÄNKISCHE shaft lining must be used for the connections of pipes to shafts or wall lead-throughs.

1. Clean the insertion area of the shaft lining before installation.
2. Apply a sufficient amount of lubricant to the complete insertion area of the shaft lining.
3. Insert the profile sealing ring continuously and without overexpanding
4. Apply a sufficient amount of lubricant to the entire profile sealing ring.
5. Insert the pipe evenly and centrally into the shaft lining up to the limit stop.

individual spots into the first complete corrugation trough. (When cutting pipes, make sure that cuts are in the middle of the corrugation trough and that there is no damage to the corrugation edge.)



10 Flexible connections of pipes to shafts

A design without joint pieces is possible with a proper connection of pipes to concrete shafts and/or AquaTraffic-Control. If, for planning reasons, a flexible connection is required project-specifically, this can be done easily on site

(DIN EN 1610; 8.7.4). The necessary short pipes smaller than or equal to 1,000 mm can be cut on site. Flexibility is provided by the standard coupling and the appropriate sealing rings.

11 Installation of fittings

Since fittings feature couplings at both ends, the same procedure applies to their installation as to the installation of pipes.

Lubricants and sealing rings are also required. Install sealing rings into the second complete corrugation trough at the spigot.

12 Installation of the retrofit AquaDock® connection

The AquaDock connection set allows the watertight and reliable connection of AquaFlex connection pipes DN 150 and AquaPipe DN 150 to the AquaPipe stormwater pipe DN 300, DN 350,

DN 400, DN 500, and DN 600. Connections are equally possible for new installations and existing pipe systems. AquaDock connection sets are delivered completely assembled and are

connected to the AquaPipe pipe according to the following instructions.

NB

Use the saddle for retrofit connections of AquaPipe/AquaFlex DN 200 to AquaPipe from DN 300. Observe the appropriate installation instructions included with each saddle delivery.

12 Installation of the retrofit AquaDock® connection

1. Cutting a hole

Use an appropriate hole saw ($\varnothing 178.5 \pm 0.5$ mm) incl. pilot drill to cut a hole into the main pipe. We recommend the hole saw from our range of products. Make sure that the drilling is carried out vertically in relation to the pipe axis.

Important: After drilling the pipe wall has been completed, the drill must first be switched off and brought to a complete halt. Then remove the hole saw from the opening. We recommend using



our drill stand. This makes proper drilling easy and safe.

NB

If the on-site conditions allow for it, the hole should be cut outside the excavation pit before installing the pipe. The confined space in the trench may otherwise compromise the quality of the hole and the tightness of AquaDock.

2. Removing edges and cuttings

Remove all edges and cuttings from the hole. Use fine abrasive paper.

Important: Cuttings in the sealing area may significantly influence tightness.

NB

We recommend using a knife and fine abrasive paper for removing edges and cuttings.

3. Applying lubricant

Make sure that the AquaDock connection set is free from dirt. Apply a sufficient amount of lubricant to the outside of the pressing nozzle (Fig. 3). No lubricant must be applied to the sealing ring.



NB

The sealing ring must rest against the saddle.

4. Inserting AquaDock

Insert the AquaDock connection set into the hole such that the support ring (saddle) rests evenly on the pipe outside diameter (Fig. 4).



5. Tightening screws

Use an installation wrench to initially tighten the screws 1 and 2 by approx. 5 clockwise rotations (Fig. 5). Then, tighten screws 3 and 4 also by 5 clockwise rotations. Repeat this initially only for 1 and 2 and then for 3 and 4 until the screw heads rest against the lock ring.



6. Functional test

Reach through the opening of AquaDock and check the position of the sealing.

Important: The sealing must rest evenly snug inside the pipe wall.



13 Lateral connections to concrete pipes and concrete shafts

The concrete connection set allows the retrofit connection to concrete pipes and concrete shafts. The set includes a connection sealing, an EPDM sealing ring and a cuff.

1. Drilling into the concrete pipe and/or shaft using a core drill to bore diameter according to the table. (Drill bit available via building material supplier).

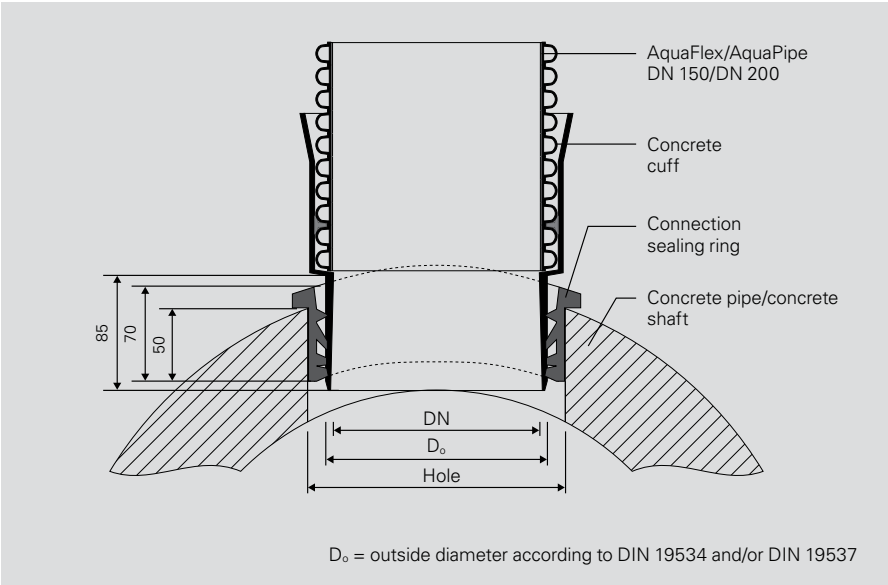
2. Insert the connection sealing into the drill hole without lubricant.

3. If required, cut the cuff to the connection pipe thickness and taper properly.

4. Apply a sufficient amount of lubricant to the connection sealing ring and cuff end (especially the chamfer) (the concrete cuff has a sufficient chamfer so that no tapering is required).

5. Centrally align the concrete cuff and insert into the sealing.

6. Connection of the sewer pipes using sealing ring and lubricant (also observe Section 14).



AquaPipe and/or AquaFlex	Required hole diameter	Cat. no.
DN 150	186 mm	57687155
DN 200	226 mm	57687205
DN 250	306 mm	57687255
DN 300	341 mm	57687305
DN 400	426 mm	57687405
DN 500	526 mm	57687505

14 Bend radii and coupling connection ...



... when installing AquaFlex:

AquaFlex pipes must not fall below a bend radius of 0.5 m during installation. It is crucial to observe a straight and central insertion of the pipe ends when connecting with couplings (e.g., AquaDock, road gully, etc.). Angles of more than 3 degrees are not permitted and may

lead to leaks. When embedding and subsequently backfilling, make sure that the pipe is not pulled out of the coupling.

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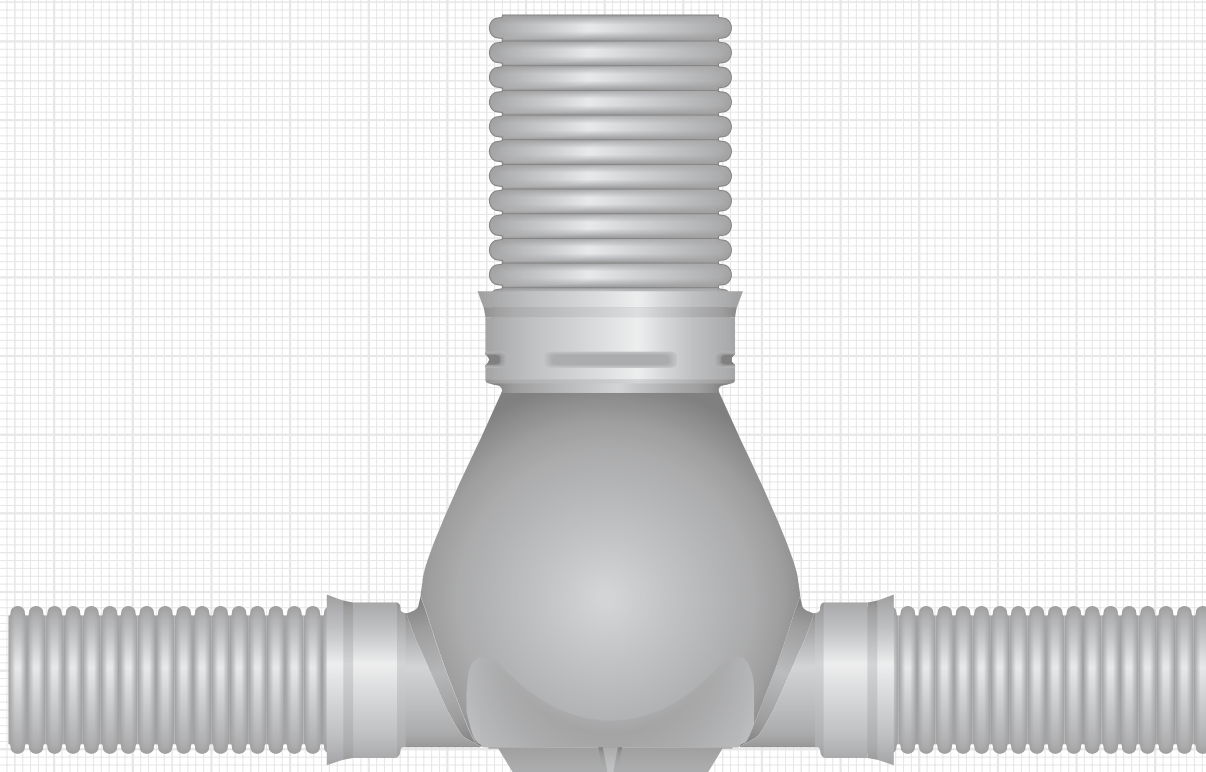
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