



REHAU®

Unlimited Polymer Solutions



REHAU CONNECTION SYSTEMS

AWADOCK® FOR SEALED HOUSE CONNECTIONS

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INGENIOUSLY SIMPLE, SIMPLY INGENIOUS: AWADOCK FROM REHAU

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AWADOCK offers numerous variants for the connection of polymers and traditional materials to concrete, reinforced concrete and vitrified clay pipes.

Moreover, with special AWADOCK types, it is also possible to connect to main sewers with smooth exteriors and to drop structures.

Your REHAU sales office will be happy to help with any further queries.



DAMAGED SIDE INLETS

NOT UNUSUAL



Damaged side inlet – inward projecting pipe socket

One out of five occurrences of damage in sewer networks involves side connections. As such, according to the result of the 2004 DWA survey on “condition of the sewer system in Germany”, these symptoms represent the majority of sewer damages. System managers rate damaged connections as the most common faults (see diagram below).

An incorrectly made connection to the sewer pipe causes the following symptoms:

- Leaking connections as a result of missing or unsuitable fittings
- Inward projecting pipes
- Ingrown roots

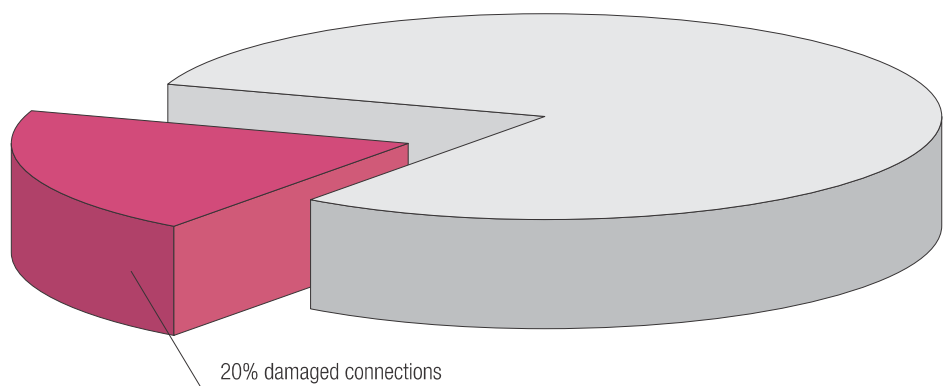


Damaged side inlet

Consequences of Damaged Side Inlets:

- Contamination of the groundwater by escaping sewage
- Additional loads on sewage treatment plants as a result of infiltration water
- Pipe blockages

Percentage Distribution of Sewer Damages



Source: results of the 2004 DWA survey

AWADOCK NEW GENERATION

THE REVOLUTION IN SEWER CONNECTION

The airbag revolutionised safety technology in the automotive industry.

The brand new “AWADOCK NEW GENERATION” connection system combines ingenious functionality with unique safety technology.

This safety principle works in a similar way to the airbag, which reduces the risk of head and chest injuries in the event of a car crash. However, the airbag is not a substitute for a seatbelt but rather only an addition. The statistics show that the belt is still the principal lifesaver in the case of car accidents. Airbags significantly increase the safety of occupants.

In a figurative sense, the reliable, tried and tested AWADOCK connecting seal is comparable with the seatbelt. The new second seal takes on the role of the airbag in the system. If a leak occurs between the drill hole and the seal, the green “airbag seal” absorbs the water, expands its volume, and therefore closes the leak. The permanent seal is thus restored.

Fraunhofer Institute Develops Q-TE-C®

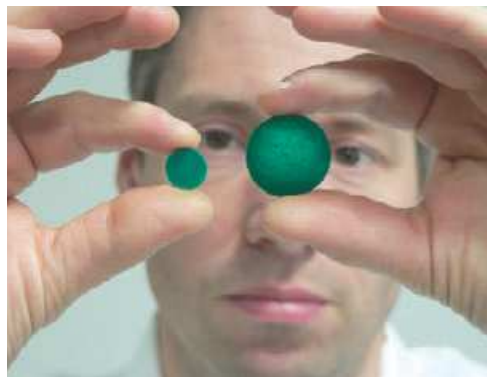
The green “airbag seal” is called Q-TE-C and is a swelling thermoplastic elastomeric composite. This seal was developed with Fraunhofer UMSICHT specifically for the application of the AWADOCK connection system. It starts to swell and seals leaks when it comes into contact with water.



AWADOCK NEW GENERATION



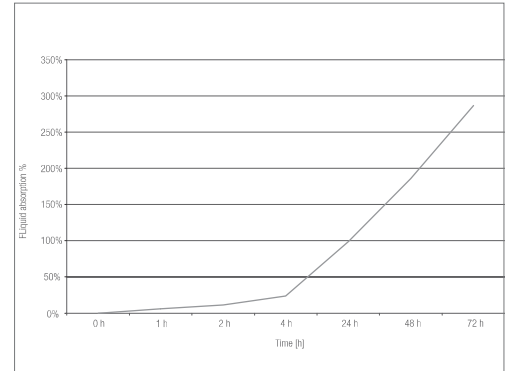
The airbag can save lives.



Unswollen (left) and swollen Q-TE-C sample.

Features and Advantages of the Q-TE-C Material

- Reliable swelling capacity
- High cycle capacity; the ability to absorb and retain water is maintained permanently even with frequent changing between dry and wet (e.g. with shifting groundwater level).
- Dimensionally stable even when swollen
- High water retention capacity under compressive load
- Seal directly at the point of leakage
- Swelling pressure engineered specifically for the product application



Liquid absorption of Q-TE-C depending on duration of swelling



AWADOCK NEW GENERATION Structure

The seal effect of the previous AWADOCK design remains in place without restriction. This means that a large drill hole tolerance of a total of 3 mm (200 -1/+2 mm) is still permitted.

Despite this ability to compensate for such large tolerances, it is not always possible to eliminate defects, e.g. such as voids in the drill hole soffit or skewed drilling.

As such, with the Q-TE-C seal, a new safety feature has now been incorporated, which is able to provide a subsequent seal in case of damage.

Here, the swelling seal is inserted into a groove in the connecting seal and presses against the hole soffit. The Q-TE-C seal is encapsulated by two further sealing lips above and below the sealing groove, which thus ensure additional sealing.

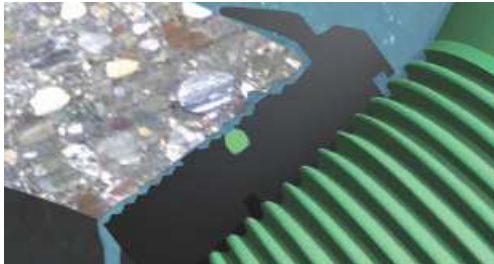


AWADOCK NEW GENERATION

SEALS LEAKS AUTOMATICALLY

How AWADOCK NEW GENERATION Works

In certain installation situations, the hole soffit may have larger flaws, e.g. voids, score marks, or the hole is drilled at a slight angle to the pipe axis.



The connection leaks. Groundwater enters the main sewer.



In 10 to 24 hours, the Q-TE-C starts to swell. The seal starts to work.



After approx. 48 to 72, the leak is permanently sealed. The Q-TE-C seal is encapsulated in the connecting seal in such a way that the water is retained. Drying out is minimised.

Frequently Asked Questions

How many swelling cycles can be achieved with Q-TE-C?

Ongoing investigations into cycle capacity are being conducted at Fraunhofer UMSICHT. At present, it can already be stated that the water absorption functions reliably even after several dozen cycles.

Is such a high cycle capacity actually necessary in the sewer?

The number of cycles should be defined by the performance of the material. In the sewer, this remains at only a few cycles. On the one hand, the Q-TE-C seal is encapsulated in the connecting seal in such a way that the water is held in the seal. On the other hand, complete drying out would happen only in a warm, dry airflow. The relative atmospheric humidity of over 90 % in the sewer is sufficient to prevent drying out.

Why does swelling not begin immediately on contact with water?

In order to also continue to guarantee practical and easy installation on the construction site, REHAU has developed the seal in such a way that noticeable swelling starts only between 10 and 24 hours later. As such, the seal does not swell unintentionally before installation, e.g. in the case of accidentally damp storage on the construction site.

AWADOCK NEW GENERATION

ON THE IKT TEST STAND



AWADOCK DN 160 achieves "VERY GOOD" in the IKT product test

Have any weaknesses been found in AWADOCK to date?

No. On the contrary: The AWADOCK screw principle with the conical structure has been roven 100,000 times.



AWADOCK is one of the most purchased house connection systems and was awarded the rating "VERY GOOD" in the IKT "house connection nozzles – 2002 status" product test. AWADOCK with Q-TE-C provides even greater assurance in installation and operation – with safety for generations.

AAWADOCK NEW GENERATION on the IKT Test Stand

Based on the trials in the house connection nozzle product tests, REHAU has commissioned new practical tests from the institute for underground infrastructure (IKT), some of which are under tighter test conditions.

The following tests have been conducted:

1. Seal for a standard hole within drill hole tolerances of 200 + 2/-1 mm
2. Seal for a hole outside of the tolerance range – 204 mm hole – e.g. caused by uneven drill bit
3. Seal after skewed drilling (5° deviation) – possible source of faults particularly in the case of small main pipes

The Result is Obvious:

The AWADOCK connection system guarantees the seal and function even under these difficult surrounding conditions. In tests 2 and 3, AWADOCK with Q-TE-C sealed off the leaks after max. 48 hours.

As these test parameters surpass the standard manufacturer specifications on the market, IKT awarded the AWADOCK NEW GENERATION "IKT tested" seal.



AWADOCK NEW GENERATION

AWADOCK WITH BALL JOINT

AWADOCK FOR COMPOSITE SEWER PIPES



AWADOCK NEW GENERATION with ball valve

AWADOCK Providing the Ball – For Even Greater Flexibility

A new design is being added to the AWADOCK connection system for the connection of DN 160 PP or PVC pipes to concrete, reinforced concrete and vitrified clay pipes.

A **ball joint is integrated** into the screw sleeve, so the connected **secondary pipe can be angled horizontally or vertically by $\pm 7.5^\circ$ at infinitely variable intervals.**

This flexibility makes installation easier, particularly in confined pipe trenches.



$\pm 7.5^\circ$ connection with infinitely variable horizontal or vertical angling

AWADOCK CP

Side Connection for Composite Sewer Pipes.

AWADOCK CP (corrugated pipes) guarantees the sealed and reliable connection of KG DN 160/200 side inlets to composite sewer pipes.

With three variants, the connecting seals developed specifically for these cover connections to main sewer pipes from DN/OD 315 to DN/OD 1200. As such, AWADOCK CP is a winner with its simple, universal, reliable application and permanent seal up to 0.5 bar.

Properties:

- PP screw sleeve with SBR versatile connecting seal
- Three variants for size range DN/OD 315-DN/OD 1200
- DN 160 connection for pipes from DN/OD 315 to DN/ID 800
- DN 200 connection for pipes from DN/OD 800 to DN/OD 1200

Advantages:

- Universally usable for all standard composite pipes available on the market, in accordance with DIN EN 13476
- Simple, quick and reliable to screw in
- Permanently sealed up to 0.5 bar



AWADOCK CP Type A – internal view

AWADOCK NEW GENERATION

THESE PRODUCT ADVANTAGES ENSURE DURABILITY



Permanent seal



Installation – simple and quick

Permanent Seal

The conical screw sleeve is screwed into the connecting seal. The entire surface of the seal presses against the drill hole and even the sealing requirements of DIN EN 1610 are surpassed: the seal has been proven in trials up to 1 bar.

Installation – Simply and Quickly Screwed In:

- Centre drill with core drill and de-burr the hole
- Insert the connecting seal
- Apply lubricant
- Firmly screw in the conical screw sleeve with the installation wrench
- Connect the pipe. Done!

No Inward Projecting Pipes

A rebate in the screw sleeve prevents the connecting pipe from protruding into the main sewer.

Corrosion Protection

The cut reinforced steel in reinforced concrete pipes is reliably protected from corrosion by connecting seals of different lengths. The seal and connection lengths match the wall thicknesses of the main sewer (type A/B/C/D...).

High Expulsion Resistance in the Pressure Test

When the conical screw sleeve is screwed into the connecting seal, a high surface pressure is produced against the drill hole. This results in a high level of expulsion resistance.



“Very Good” in IKT Product Test (2002 Status) and IKT Tested!

Impervious to Shear Loads and Angling

Shear loads and angling occur as the result of the different settlement behaviour of the main and connecting pipes. Sealing below the house connection nozzle also presents a problem.

For this reason too, ATV-DVWK-139 pt. 9 demands flexibility in the connections. They must be able to “absorb movement. Possible settlement and the resulting loads in the connection area” should be taken into account.

The AWADOCK connection system meets these requirements by the compression of the high-volume connecting seal. It was rated “VERY GOOD” for both loads in the IKT product test.

Approved by the General Building Inspectorate Under Z-42.1-348

Flexible

New AWADOCK screw sleeve with ball joint allows angling of $\pm 7.5^\circ$ and makes installation easier in confined pipe trenches.



Greater Drill Hole Tolerance – Greater Safety During Installation

The green “airbag seal” (Q-TE-C) can permanently seal leaks between the drill hole and the connecting seal, e.g. as the result of defective drilling.

With wide, solid connecting seals, drill hole tolerances of + 2 mm to -1 mm can be bridged.

Safety for Generations

All connection nozzles in the AWADOCK product range are fitted with the new Q-TE-C seal.

Internal Lettering Provides Information

The front of the connecting seal holds the following important information:

- Brand
- Product name
- AWADOCK type (A, B, C...)
- Year and month of production

When the pipe is removed, it is therefore possible to check that the correct product has been installed.

Moreover, the product will still be identifiable 50 or 80 years later.



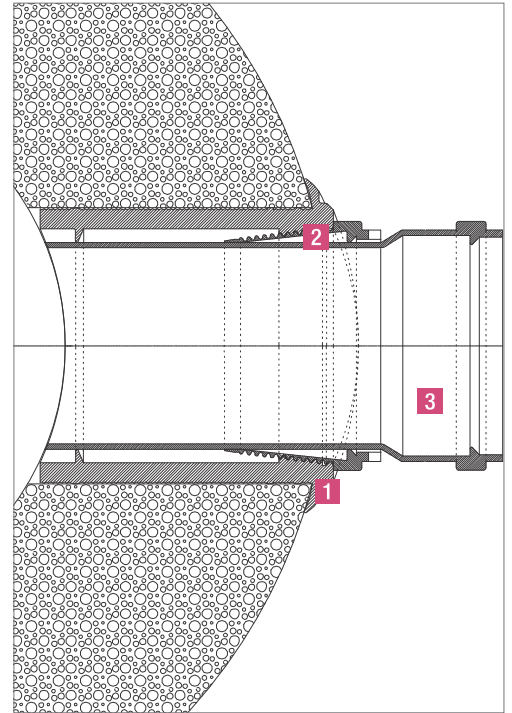
AWADOCK®

FOR THICK WALLED AND MULTI-LAYER REINFORCED CONCRETE PIPES

AWADOCK for Thick Walled and Multi-Layer Reinforced Concrete Pipes

The set comprises:

- 1** A connecting seal, matched to the wall thickness of the pipe, with a closing lip on the inside
- 2** A screw sleeve – designed as a pipe breakthrough
- 3** A concave chamfered AWADUKT PP SN4 connecting pipe, which compresses the closing lip of the seal
- 4** Lubricant and fitting instructions



AWADOCK T-FLEX -

THE CONNECTION TO PLASTIC PIPES WITH SMOOTH EXTERIORS

AWADOCK T-Flex connection system for the retrospective connection of PVC and PP sewer pipes in sizes DN/OD 110 to DN/OD 200 to main sewer pipes with smooth surfaces.

- The seal is generated on the outside wall of the pipe and not in the hole. With the AWADOCK T-Flex connection system, **large tolerances are possible** for drilling, i.e. standard drill bits can be used.
- The comprehensive external **seal ensures the seal effect even when the pipe is slightly deformed.**
- **Very easy and quick installation**
- Flexible connection, **absorbs ground settlement and prevents shearing**
- **Root-proof**
- An integrated pipe rebate **prevents protrusion into the main pipe.**

Usage Recommendation for the AWADOCK T-Flex Types

Depending on the connection and main sewer pipe, the following AWADOCK T-Flex types are to be used:

DN/OD	External-Ø Connecting pipe	External-Ø Main pipe	Core hole (mm)
110	105 - 120	200 - 400	117 - 125
160	150 - 170	250 - 500	167 - 175
200	175 - 200	300 - 500	203 - 213



Fitting:



Step 1:

Use a drill to create a core hole (see usage recommendation). Ensure that the hole is made at an angle of 90° to the pipe axis.



Step 2:

Cleanly de-burr the edge of the core hole.



Step 3:

Place the AWADOCK T-Flex connecting element centrally on the drill hole.



Step 4:

Fix AWADOCK T-Flex to the main pipe using both steel clips. When doing this, ensure that the clips are passed through the correct openings.



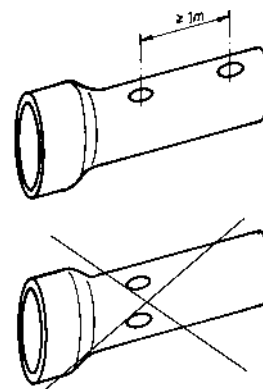
Step 5:

Firmly tighten both tensioning straps (10 Nm) and shorten if necessary.



Step 6:

Insert the connecting pipe to the integrated rebate. Tighten the tensioning strap (6 Nm).



Advice for Drilling Cast and Plastic Pipes:

- The minimum spacing between two connections to one cast or plastic pipe should be 1 m.
- Avoid drilling a second hole directly opposite.

AWADOCK® CONNECTION SYSTEM

FITTING INSTRUCTIONS

Specifications for Storage and Installation#



- Store AWADOCK with Q-TE-C dry and protected from the wet.
- Protect from wet until shortly before installation, in order to prevent unintended swelling before installation.
- Observe the fitting instructions on all AWADOCK packaging.

When fitting the **AWADOCK connection system**, please observe the following stages:

Step 1:

Use a core drill to create a hole at the point to be connected. For hole diameter, see the table. Check the hole soffit for defective points and correct if necessary.



Create a hole

Step 2:

Insert the AWADOCK connecting seal into the hole. Ensure that the closing lip of the connecting seal lies flush with the external concrete wall. The arrows on the seal point lengthwise along the pipe.



Insert the AWADOCK connecting seal into the hole

Step 3:

Lubricate the internal thread of the AWADOCK connecting seal. Then, using the installation wrench (special accessories), evenly and centrally screw the AWADOCK screw sleeve into the connecting seal to the final turn of the thread.



Screw the AWADOCK screw sleeve into the connecting seal

Step 4:

Lubricate the spigot end of the pipe to be connected and insert it into the AWADOCK screw sleeve up to the rebate.



Insert the pipe into the AWADOCK screw sleeve up to the rebate

Tender specifications are available from the REHAU sales office or as an internet download from www.rehau.de/tiefbau.

Sewer Connection Systems

DN/OD 160/90° Saddle Piece with Ball Joint, KG Concrete, Clayware Concrete, Clayware

DN/OD 160/90° saddle piece with polypropylene conical screw sleeve with integrated ball joint; the pipe can be angled in ball joint between 0 and 7.5°(total 15°) at infinitely variable intervals in all directions. SBR connecting seal with internal thread and additional swelling thermoplastic elastomer seal, with building inspectorate authorisation Z-42.1-348.

Saddle piece for side connection of DN/OD 160 sewer pipes with smooth walls to concrete or reinforced concrete pipes, in accordance with DIN 4032/4035 or DIN EN 1916, or clayware pipes in accordance with EN 295 DN ____; wall thickness approx.: ____ mm
Correct connection to the sewer using a core drill (hole: 200 mm +2/-1 mm) must be calculated into the piece price.

Saddle piece with ball joint, e.g. REHAU AWADOCK NEW GENERATION with ball joint or equivalent art.

Make / type offered:

To be completed by the bidder

1.00 Pc.

DN/OD 200/90° Saddle Piece, KG Concrete, Clayware Concrete, Clayware

DN/OD 200/90° saddle piece with polypropylene conical screw sleeve. SBR connecting seal with internal thread and additional swelling thermoplastic elastomer seal, with building inspectorate authorisation Z-42.1-348.

Saddle piece for the side connection of DN/OD 200 sewer pipes with smooth walls to concrete or reinforced concrete pipes, in accordance with DIN 4032/4035 or DIN EN 1916, or vitrified clay pipes in accordance with EN 295 DN ____; wall thickness approx.: ____ mm
Correct connection to the sewer using a core drill (hole: 257 mm +2/-1 mm) must be calculated into the piece price.






Saddle piece with ball joint, e.g. REHAU AWADOCK NEW GENERATION with ball joint or equivalent art.

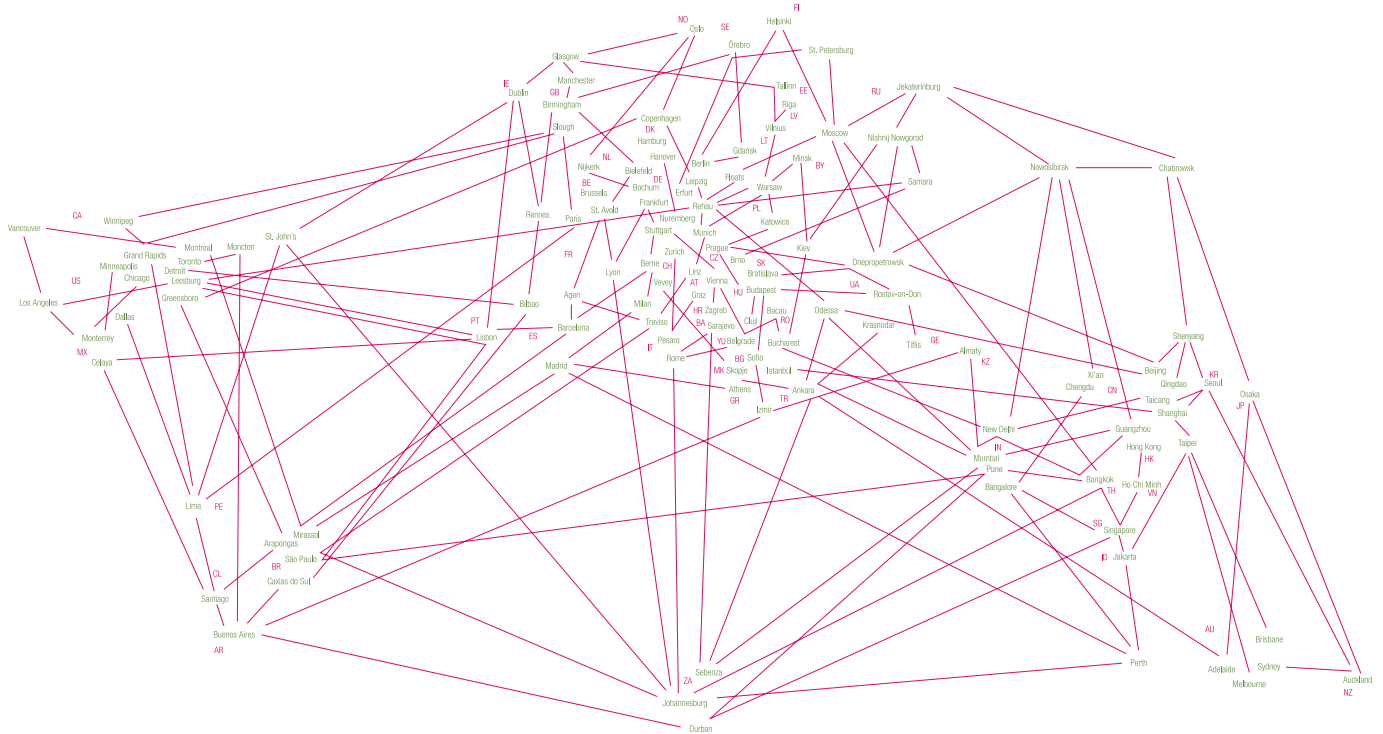
Make / type offered:

To be completed by the bidder

1.00 Pc.

AWADOCK Connection Options

Connection nozzles	Wall thickness of the main pipe in mm	Main pipe diameter	KG connection			VCP connection	Glass fibre reinforced plastic / cast connection	KG wall breakthrough		KG conn	
			AWADOCK DN/OD 160 With ball joint	AWADOCK DN/OD 160	AWADOCK DN/OD 200	AWADOCK VCP DN/ID 150	Glass fibre reinforced plastic / cast DN/MD 150	AWADOCK MD DN/OD 160	AWADOCK MD DN/OD 200	Combi set DN/OD 250	
Diameter Hole			200 + 2 mm - 1 mm	200 + 2 mm - 1 mm	257 + 2 mm - 1 mm	200 + 2 mm - 1 mm	200 + 2 mm - 1 mm	200 ± 1 mm	250 ± 1 mm	276 ± 1 mm	
Diameter Drill bit			200 mm	200 mm	257 mm	200 mm	200 mm	200 mm	250 mm	276 mm	
Connection Main pipe											
Concrete/ DIN EN 1916 reinforced concrete pipes	60-85		Type A 179950-500	Type A 176001-500	Type A 170501-500 (just connectable) from DN 400)	Type A 176051-500	Type A 176151-500				
	85-115		Type B 179960-500	Type B 176011-500	Type B 170511-500	Type B 176061-500	Type B 176161-500				
	115-160		Type C 179970-500	Type C 176021-500	Type C 170521-500	Type C 176071-500	Type C 176171-500				
	160-175		Type D 179980-500	Type D 176041-500	Type D 176009-500						
	180-195			Type E 176005-500	Type E 176014-500						
	200-215			Type F 176006-500	Type F 176015-500						
	220-235			Type G 176007-500	Type G 176016-500						
	240-250			Type H 176008-500	Type H 176017-500						
	≥ 60	≥ DN 500									176231-001
	≥ 60	≥ DN 600									
≥ 60	≥ DN 800										
DIN EN 295-1 vitrified clay pipes	37-60	≥ DN 300	Type K 179990-500	Type K 176201-500	Type K 170541-500 (erst anschließbar ab DN 400)	Type K 176211-500					
	60-85		Type A 179950-500	Type A 176001-500	Type A 170501-500	Type A 176051-500	Type A 176151-500				
DIN EN 1916 concrete shafts											
flat walls and rec- tangular concrete shafts	≥ 60							170991-500 171001-500 171021-500	171391-500		
AWASCHACHT PP DN 1000											
Pipes with smooth exteriors: e.g. PP in accor- dance with DIN EN 1852, PVC in accordance with DIN EN 1401		DN 200-DN 400									
		DN 250-DN 500									
		DN 315-DN 500									
DIN EN 13476 composite sewer pipes		DN OD 315 - DN ID 400									
		DN OD 500 - DN ID 800									
		DN OD 800 - DN OD 1200									
Suitable tools	Installation wrench		176111-500/520								
	Drill bit / hole saw		176301-001		176321-001		176301-001		-		176047-100



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