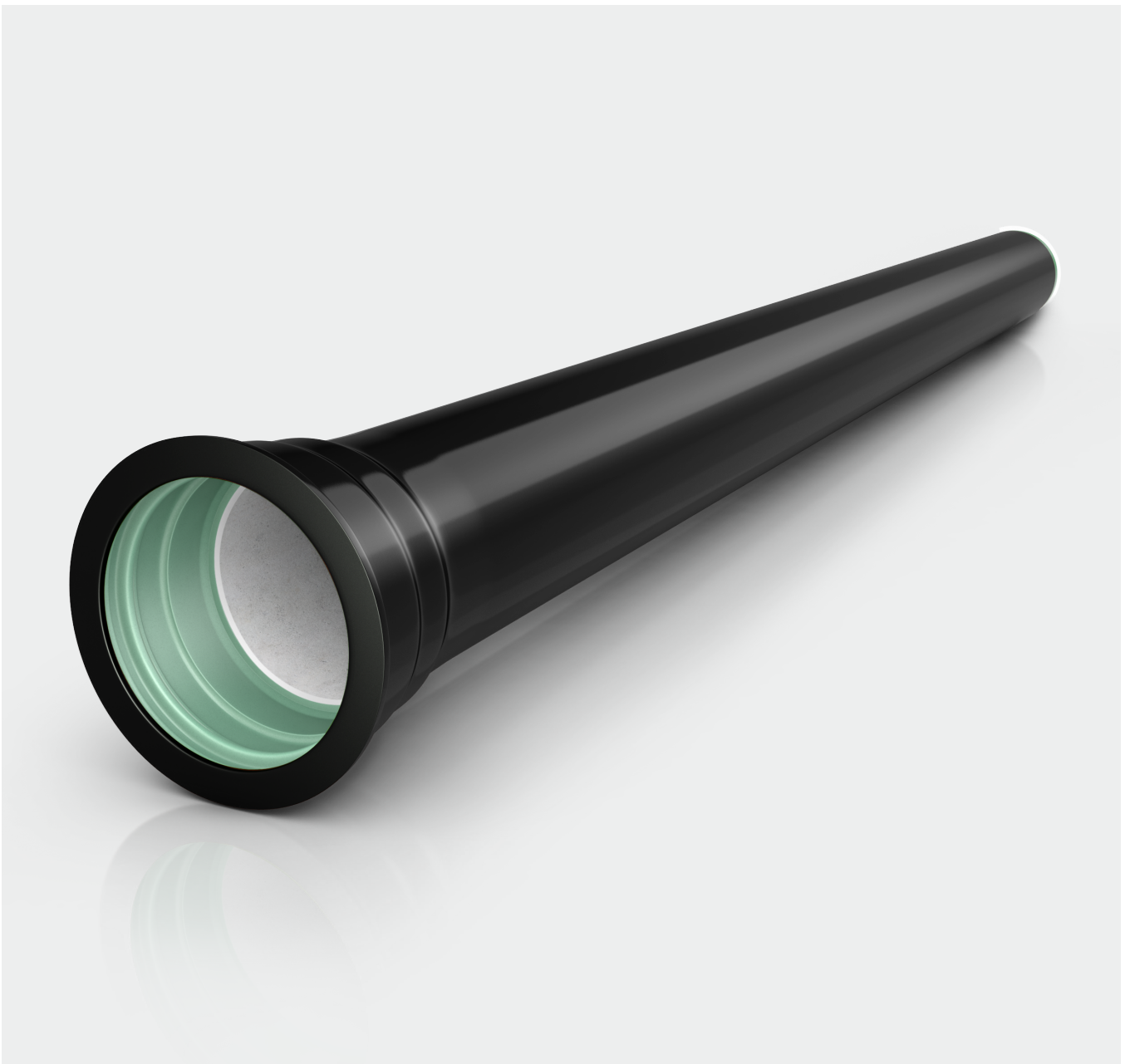


ECOCEM – fully protected pipe with insulating polyurethane (PUR) coating and inorganic cement mortar lining

Efficient protection in all substrates – also in areas subject to stray currents

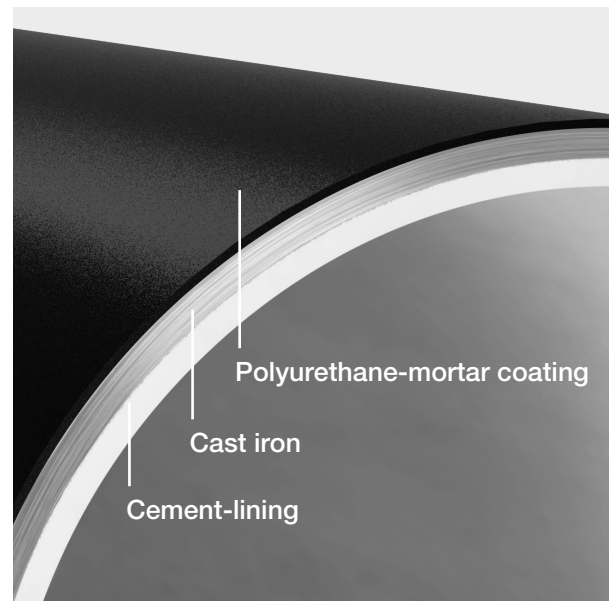


ECOCEM – stray currents stand no chance, tried-and-tested cement mortar lining on the inside

When an inorganic lining is sought and even electrical corrosion should stand no chance, then ECOCEM pipes are THE solution thanks to the perfect combination of innovative and tried-and-tested coating technologies. ECOCEM fully protected pipes made from ductile cast iron with non-porous polyurethane coating (0.9 mm thick) offer complete protection as an electrically insulating system including thrust-resisting rings – with a technical service life of 140 years.

The polyurethane coating i.a.w. EN 15189 is considered a reinforced coating i.a.w. EN 545 Annex D.2.3. and i.a.w. EN 598 Annex B.2.3. ECOCEM can therefore be used in all substrates with any degree of corrosiveness, from pH 1 to pH 14 and with the occurrence of stray currents. This complete protection ex works is activated immediately once the pipes are assembled, without requiring any additional work by the installer.

The tried-and-tested inorganic cement mortar lining i.a.w. DIN 2880 in layer thicknesses from 4 to 6 mm (depending on diameter) can be used for transporting all types of water for human consumption and offers a high hydraulic capacity.



Special features for installation and assembly

The particularly high mechanical stability of PUR, its high degree of impact strength and the formidable adhesive tensile strength allow permissible grain sizes up to a maximum grain size of 100 mm (grit 0/63 mm) for the coating material of ECOCEM ductile cast-iron pipes.

The non-porous PUR outside protection provides the pipe with long-lasting protection against mechanical and chemical attacks and this passive corrosion protection remains unchanged over the entire life of the pipe.

Peeling away of the outside protection is eliminated. This makes ECOCEM (together with ECOPUR) the most installation-friendly fully protected pipe on the market. The smooth surface of the PUR outside coating minimises friction resistance when installed underground and reduces pull forces when using trenchless installation methods. In conventional trench installation, the excavated material can be fully utilised for filling the trenches.

ECOCEM – benefits at a glance

- Technical operating life of up to 140 years
- Many years of experience in working with PUR technology since 1972
- External PUR is considered to be a reinforced coating in accordance with EN 545 and EN 598, usable in all substrates with any degree of corrosiveness (pH 1 - 14), and in applications where stray currents occur
- Inorganic cement mortar lining for transporting all types of water for human consumption
- Extreme ease of installation in all available pipe systems (together with ECOPUR)

Use

- Municipal water supply and sewerage
- Projects with trenchless installation
- Turbine pipes and anergy networks: Ideal hydraulic performance
- Due to highest static strength characteristics the ideal solution for projects:
 - With very small or very large pipe covers
 - In non-loadbearing soils
 - Using post installation (one support per pipe)
 - On bridges or supporting walls (can be installed as a self-supporting system with one support per pipe)
 - Ideal for very high traffic and earth loads (airports, rail transport, motorways)
 - In areas subject to aggressive media, stray currents and electrical corrosion as well as in tunnels



Ductile cast-iron pipes – for sustainability in the life cycle

High operating reliability, economical operation and a long operating life are key criteria when selecting a suitable pipe material for the construction of a pipe system.

In addition to the classic drinking water supply and wastewater disposal, the excellent technical properties of ductile cast iron enable the use in high-performance applications. As a result, cast pipe systems have become an increasingly popular solution for alternative applications.

Whether they are used for industrial applications (e.g. fire extinguishing systems, discharge of process water), in the energy industry, for pressure pipes in hydroelectric power plants, for „cold“ district heating networks, in industrial snow-making or for alternative trenchless installation technologies, ductile cast-iron pipes have gained acceptance as a superior pipe material.

Ductile cast-iron pipes – with their outstanding properties – provide major advantages throughout the entire range of services:

Technical

- High pressure resistance with large safety reserves
- Maximum static load-bearing capacity, high and low covers are possible
- Innovative thrust-protected/longitudinal positive locking joints
- High-performance solutions thanks to wall thicknesses, coatings and linings being optimised according to the application
- Certified in accordance with EN 545/598, audited by MPA NRW

Economic

- Very long service life up to 140 years with consistently good material properties
- Standard fittings made of ductile cast iron for optimised solutions in line management and connecting pipes
- Angleability up to 5°, saves fittings
- Easy handling and assembly, low maintenance
- Economically the most efficient solution on the market

Ecological

- Push-in socket systems with 100% tight pipe connections
- Linings and coatings suitable for foodstuffs
- Protection of drinking water and ground water by diffusion-tight pipe walls
- Ecological, environmentally friendly material, sustainable and recyclable
- Swiss/German quality products

The systematic use of ductile cast-iron pipe systems increases the average operating life in the networks, which means that the required investment cycles remain manageable in a controllable manner

Cement mortar lining – with active and passive protection

How it works

The cement mortar lining offers active and passive protection. The active effect is based on an electrochemical process. Water penetrates the pores of the cement mortar. Here the water has a pH value above 12 as a result of the absorption of free lime from the mortar. No corrosion is possible on cast iron in this pH range. The passive effect is achieved from the mechanical separation of cast iron pipe wall and water.

Layout

The cement mortar lining of ductile cast iron pipes is an integral component of the product. Therefore, the requirements and testing methods are standardised in EN 545 (water) and EN 598 (wastewater).

In the centrifugal rotation procedure the pipe is brought up to a high rotational speed after the fresh mortar is poured (sand-cement-water mix) so that the centrifugal acceleration is at least twenty times the acceleration due to gravity.



With this acceleration and through additional vibration forces the fresh mortar experiences compression and smoothing. During the centrifugal rotation some of the mixing water is driven out.

The surface of the cement mortar lining is enriched with fine grain and fine elements.

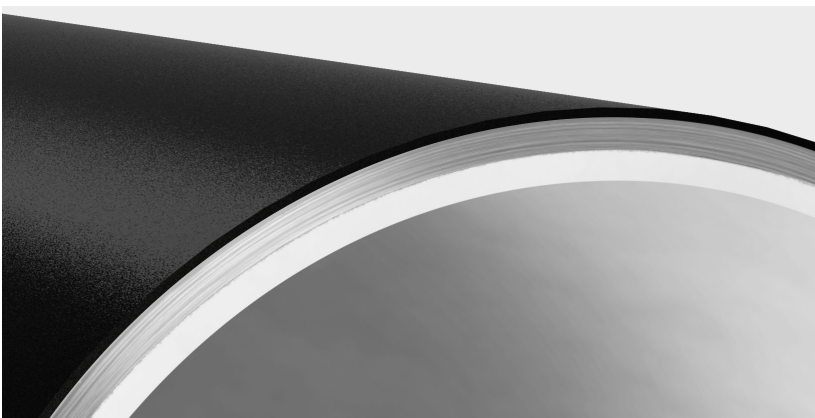
In ripening chambers the cement mortar lining is hardened at a defined humidity and temperature.

The thickness of the cement mortar lining of ductile cast-iron pipes is 4 to 6 mm depending on the nominal size.

Applications of the tried-and-tested cement mortar lining

Ductile cast iron pipes with a cement mortar lining (blast furnace cement (BFSC)) can be used for transporting all types of water for human consumption. Equipped with a high alumina cement mortar coating lining, ductile cast-iron pipes can be used for transporting all types of water, such as surface water and domestic sewage water, as well as certain types of industrial wastewater, provided that they are not exposed to values below pH 4 and above pH 10.

In agreement between manufacturer and user, the application range for special cases can be extended. Here other influencing factors such as temperature, type of main aggressive components, frequency of occurrence, etc., must be considered.



Cement mortar lining

- Transports all types of water for human consumption
- With a high alumina cement mortar coating lining, also suitable for domestic sewage water and industrial wastewater (pH 4 to pH 10)
- Also suitable for special cases (take note of influencing factors)

Pore-free PUR coating – resistant, electrically insulating coating system for highly corrosive environments

Ductile cast-iron pipes with a polyurethane coating are standardised in EN 545 and EN 598. The PUR coating is applied to the ground and blasted external surface of the pipes using a two-component thermal spraying process. The entire manufacturing process is carried out in accordance with EN 15189.

Leading-edge compound materials technology

The combination of ductile cast-iron and PUR boasts excellent mechanical characteristics. The best properties of ductile cast iron and PUR are permanently combined, which massively increases the service life of the piping system.

Robust polyurethane (PUR)

The mechanical, chemical and thermal stability of PUR is particularly high because the macromolecule of the thermoset material is three-dimensionally cross-linked.

PUR is shockresistant and exhibits no cold flow. The adhesion between the PUR coating and the ductile cast iron is regularly tested and certified by the Materials Testing Office MPA NRW.

Long-term corrosion prevention

The pore-free, integral PUR coating permanently protects the pipes from mechanical and chemical damage. It provides full protection against electrocorrosion, for example caused by stray currents, direct current (DC) railways or inhomogeneous bedding.

Due to the electrically insulating pipe connections, each pipe forms a galvanic island in itself and is therefore not electrically conductive. The PUR coating as passive corrosion protection remains unchanged over the entire service life of the pipe.

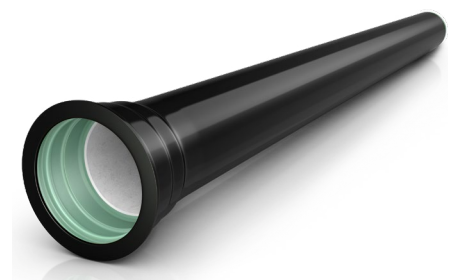
Embedding in all types of soil

The PUR coating is immune to aggressive soils and is suitable for neutral as well as acidic or heterogeneous soils. One pipe type for all soils also reduces storage costs!

The increasing occurrence of stray currents in the ground is the primary reason for the increased use of integrally protected cast-iron pipes with PUR coatings over time.

The outstanding properties of the polyurethane (PUR) coating are determined according to EN 15189 by the two requirements of adhesive tensile strength and pore-free status.

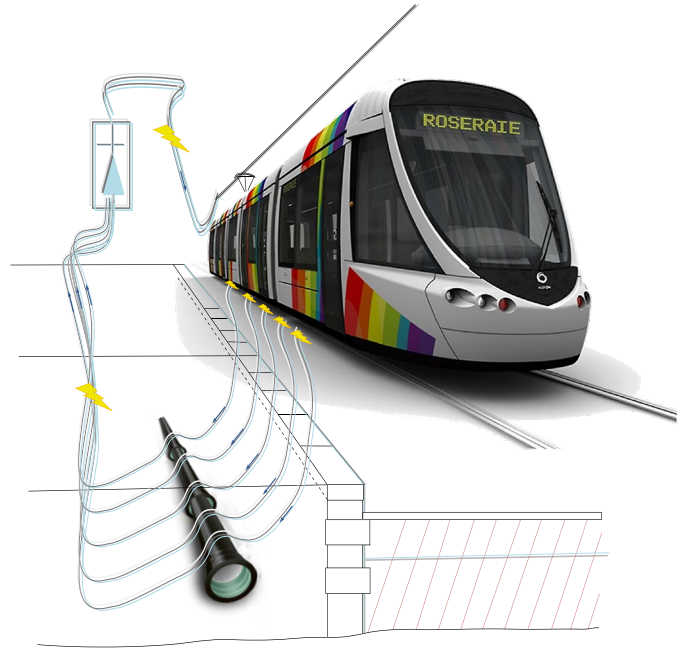
Ductile cast-iron pipes with a PUR coating allow permissible grain sizes from 0 to 63 mm, with a maximum grain size of 100 mm, round or broken.



Ductile cast-iron pipes with a PUR coating are suitable for an almost unlimited range of application areas

Protection against stray currents

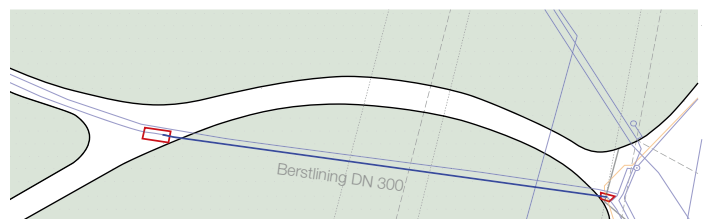
The PUR coating protects ductile cast-iron pipes against corrosion, such as that caused by stray current. Ductile cast-iron pipes with PUR coating are suitable for all types of soil with any degree of aggressiveness, and can also be used in groundwater or brackish water.



Trenchless laying

Installing pipelines with trenchless technologies is often the optimal solution in undercrossings, for culvert pipelines or in urban areas.

On account of their high loading capacity, vonRoll ECOCEM ductile cast-iron pipes are especially well suited to trenchless pipeline construction. The exterior coating in PUR is extremely robust from the mechanical point of view and its bonding to the cast-iron surface is excellent.



Open laying method

The sturdy vonRoll ECOCEM pipe requires no special bedding. The pipes can easily be embedded with suitable excavation material. Expensive gravel bedding is not necessary. This also saves transport and construction costs. The sturdy and impact-resistant PUR coating stands up to even the hardest pipelaying conditions.



Simple to handle and process

Often, pipes have to be cut to size or fitted with house mains connections. Shortening vonRoll ECOCEM pipes to the required length presents no problems and can be done without peeling and without damaging the PUR coating. Tapping for a house connection is just as easy.

Economic benefits of external PUR coating

- No need to replace the soil or use additional pipe bedding, the excavated soil can be reused
- Cost and time savings since no excavated material needs to be removed and deposited
- Long-term corrosion protection and thus long service life (according to DVGW up to 140 years)
- Cost optimisation through time savings in handling and processing

ECOCEM – A pipe using individual, solution-oriented joint techniques

ECOPUR pipes are available in all socket joint technologies offered by the vonRoll hydro Group.

The socket joints in our ductile cast-iron pipe systems have impressive properties:

- Guaranteed tight connections (positive and negative pressure)
- Flexible, deflectable up to 5°
- Root-resistant joint technology
- Electrically insulating joint system
- Longitudinal force-locking, with frictional locking or positive locking
- For high-pressure applications, operating pressures of up to 100 bar
- Perfect for trenchless installation



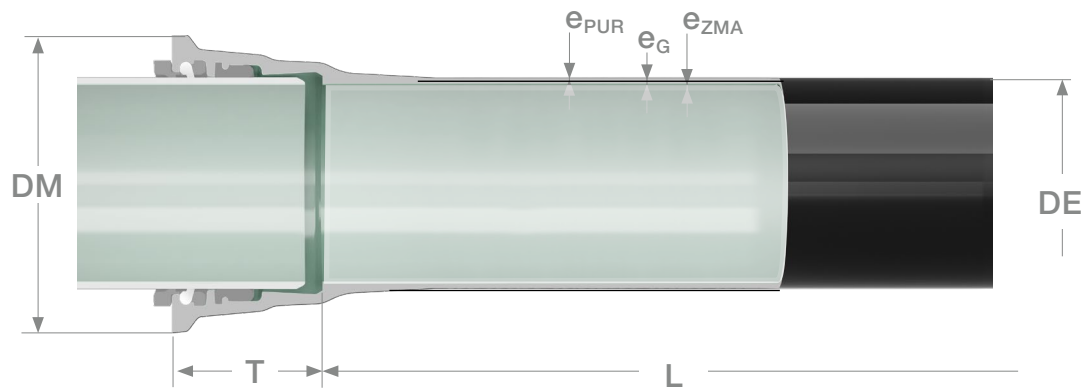
ECOPUR HYDROTIGHT socket pipe

Ductile cast-iron pipe in accordance with EN 545

HYDROTIGHT push-in socket with double chamber

Lining: Polyurethane (PUR) in accordance with EN 15655

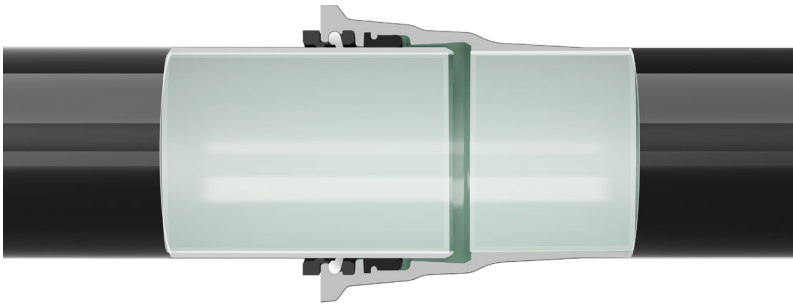
Coating: Polyurethane (PUR) in accordance with EN 15189



DN	Pipe class	L mm	DE mm (nominal)	e _G mm (minimal)	e _{ZMA} mm (nominal)	e _{PUR} mm (nominal)	DM mm	T mm	Weight kg/m (theoretical)
80	C100	6000	98 ^{+1/-2.7}	4.7	4.0	0.9	167	119	16.1
100	C100		118 ^{+1/-2.8}	4.7	4.0	0.9	188	120	20.0
125	C64		144 ^{+1/-2.8}	4.0	4.0	0.9	215	123	26.0
150	C64		170 ^{+1/-2.9}	4.0	4.0	0.9	242	126	32.0
200	C64		222 ^{+1/-3.0}	5.0	4.0	0.9	295	131	41.3
250	C50		274 ^{+1/-3.1}	4.8	4.0	0.9	352	131	54.6
300	C50		326 ^{+1/-3.3}	5.7	4.0	0.9	410	130	70.7
350	C40		378 ^{+1/-3.4}	5.3	5.0	0.9	464	135	85.5
400	C40		429 ^{+1/-3.5}	6.0	5.0	0.9	517	145	107.0

Thrust-resisting ring HYDROTIGHT FIG. 2807

(frictional locking)



DN	Fig. 2807B bar	Fig. 2807A bar	Possible deflection
80	25	40	3°
100	25	40	3°
125	25	40	3°
150	25	40	3°
200	25	40	3°
250	16	25	3°
300	16	25	3°
350	–	16	3°
400	–	16	3°

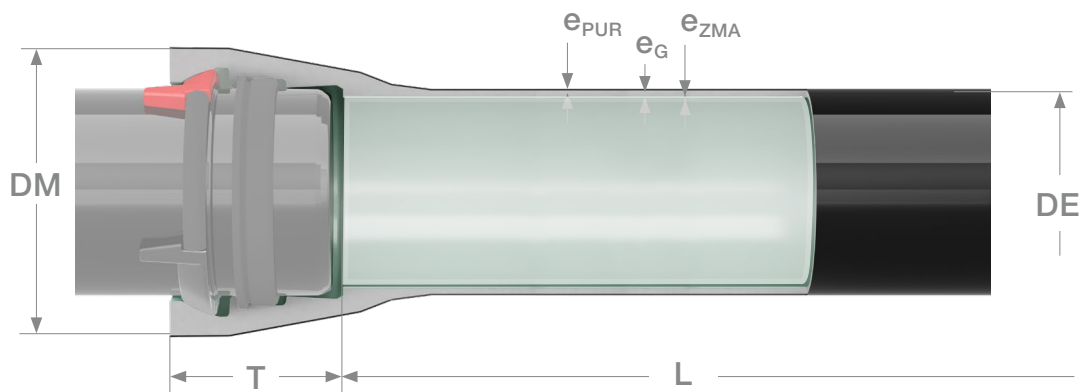
ECOPUR BLS socket pipe

Ductile cast-iron pipe in accordance with EN 545

BLS push-in socket with double chamber

Lining: Polyurethane (PUR) in accordance with EN 15655

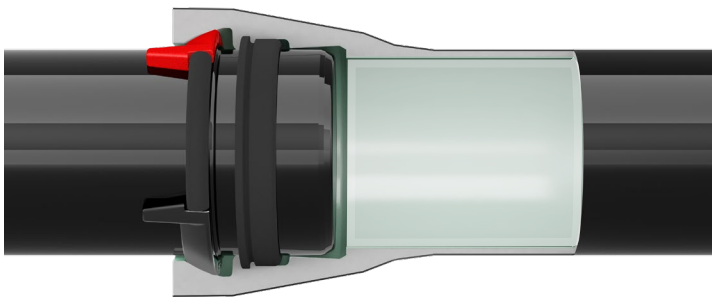
Coating: Polyurethane (PUR) in accordance with EN 15189



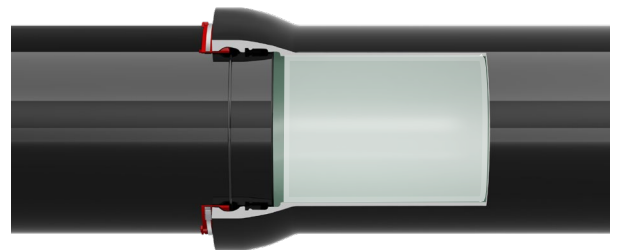
DN	Pipe classe	L mm	DE mm (nominal)	e _G mm (minimal)	e _{ZMA} mm (nominal)	e _{PUR} mm (nominal)	DM mm	T mm	Weight kg/m (theoretical)
80	K10	6000	98 ^{+1/-2.7}	4.7	4.0	0.9	158	127	16.8
100	K10		118 ^{+1/-2.8}	4.7	4.0	0.9	184	135	20.8
125	K10		144 ^{+1/-2.8}	4.8	4.0	0.9	208	143	27.0
150	K10		170 ^{+1/-2.9}	5.1	4.0	0.9	241	150	33.1
200	K9		222 ^{+1/-3.0}	4.8	4.0	0.9	295	160	42.8
250	K9		274 ^{+1/-3.1}	5.2	4.0	0.9	359	165	56.8
300	K9		326 ^{+1/-3.3}	5.6	4.0	0.9	412	170	72.2
400	K9		429 ^{+1/-3.5}	6.4	5.0	0.9	523	190	107.0
500	K9		532 ^{+1/-3.8}	7.2	5.0	0.9	638	200	143.3
600	K9		635 ^{+1/-4.0}	8.0	5.0	0.9	734	175	190.4
700	K9		738 ^{+1/-4.3}	8.8	6.0	0.9	851	197	239.7

Thrust-resisting ring BLS

(positive-locking)



BLS DN 80 – DN 500



BLS DN 600 / 700

DN	Number Lock	PFA bar	Permissible tensile strength kN (DVGW)	Possible deflection	Min. curve radius m	Lock set weight kg
80	2 / 3 ¹⁾	100/110 ¹⁾	70	5°	69	0.4 / 0.7 ¹⁾
100	2 / 3 ¹⁾	75/110 ¹⁾	100	5°	69	0.4 / 0.8 ¹⁾
125	2 / 3 ¹⁾	63/110 ¹⁾	140	5°	69	0.6 / 1.1 ¹⁾
150	2 / 3 ¹⁾	63/75 ¹⁾	165	5°	69	0.8 / 1.4 ¹⁾
200	2 / 3 ¹⁾	40/63 ¹⁾	230	4°	86	1.1 / 1.9 ¹⁾
250	2 / 3 ¹⁾	40/44 ¹⁾	308	4°	86	1.5 / 2.7 ¹⁾
300	4	40	380	4°	86	2.7
400	4	30	558	3°	115	4.4
500	4	30	860	3°	115	5.5
600	9	32	1200	2°	172	9
700	10	25	1400	1.5°	230	11

¹⁾ With high-pressure lock

The push-in socket connection technologies of the vonRoll hydro group are designed for a wide range of applications and guarantee maximum operational safety – particularly for high performance applications!

Full range of fittings – for every installation situation

A complete range of socket fittings is available for all connection technologies of the vonRoll hydro Group. The full protection philosophy is guaranteed by means of an integral epoxy resin thick film in accordance with EN14901 and the increased requirements according to GSK/RAL-GZ 662.



The fully protected fittings range of the vonRoll hydro Group is suited to unlimited use in soils of any corrosiveness (in accordance with EN 545) and fulfils the most demanding requirements both during installation and during continuous operation.

ECOCEM pipes are ideal for any installation situation – even when exposed to electric current!



ECOCEM pipes are the tailor-made solution for installation areas exposed to particular hazards and for the most difficult underground conditions:

- In highly aggressive or contaminated soils (contaminated sites)
- In case of stray current hazard due to railway lines, earthing systems, cathode protection, etc.
- For extinguishing water pipes in road and railway tunnels with an aggressive tunnel environment
- For installation in groundwater
- For all soils, regardless of corrosiveness (pH 1 to 14)
- For trenchless installation such as burst lining or directional drilling process

