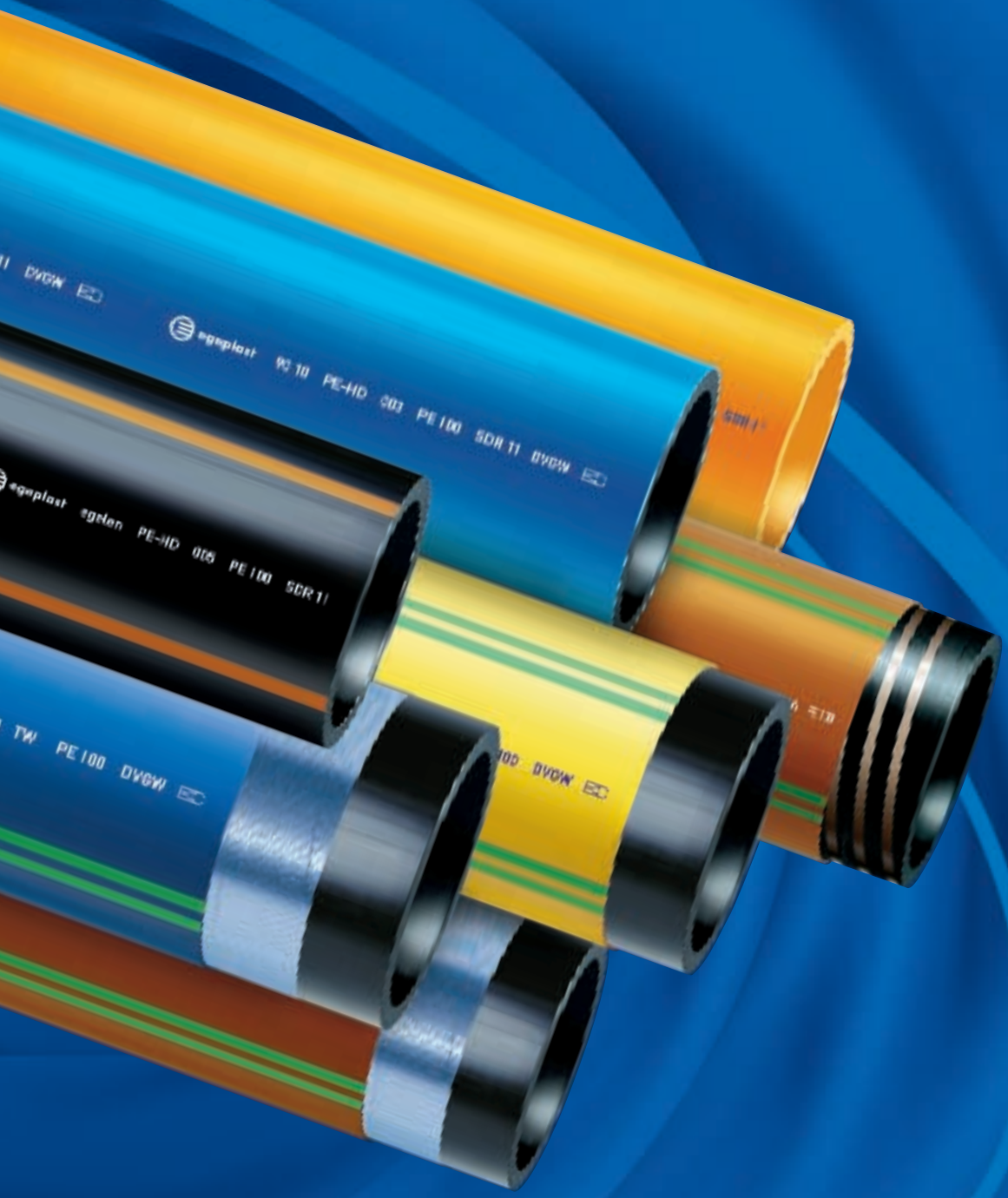
Product Range

For modern Applications and Installation Methods



egeplast

The right Pipe for every Application

Open-Trench Installation with Sand Bed

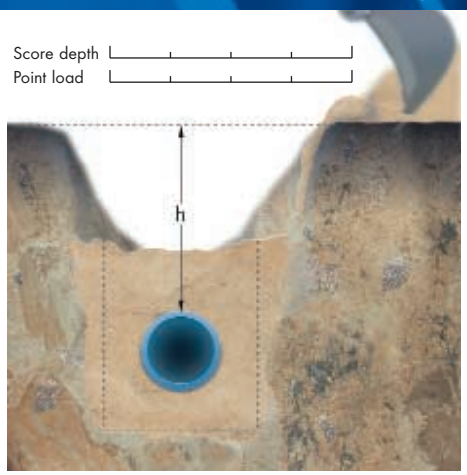
Page 5

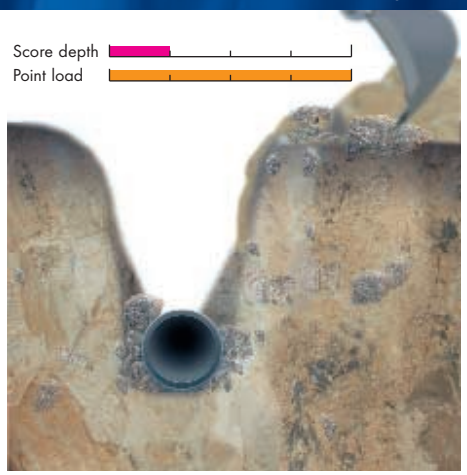
Open-Trench Installation without Sand Bed

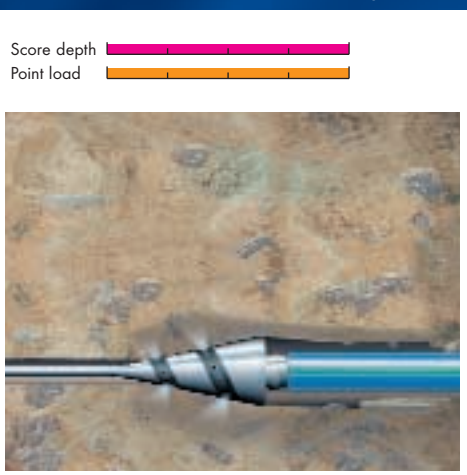
Page 6–9

Trenchless Installation and Renovation

Page 10–12

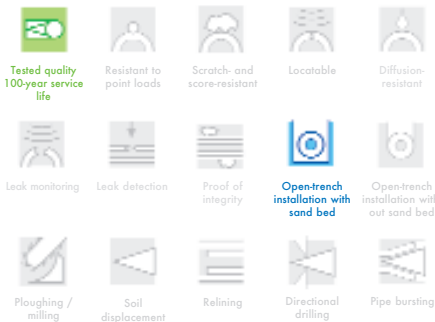






egelen®

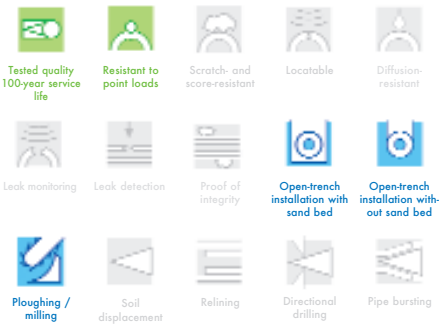
The egeplast egelen® pipe is a standard pressure pipe made from high-density polyethylene (PE 100, optionally PE 80). A long service life of over 100 years, high flexibility and light weight are the main quality features of this pipe.



Dimensions: d_n 16 mm – d_n 1200 mm
SDR: SDR 26 – SDR 7.4
Certifications: DVGW, KIWA, DS, SVGW, ÖVGW, SIS, DIN-Gost, Belgaqua, WIS, DWI, KIWA-Gas, IGNG, VUSAPL-NITRA
Quality marks: DVGW registration number for gas and drinking water, DIN Certco test mark for sewage
Standards: DIN EN 1555-2, DIN EN 12201-2, DIN EN 13244, DIN 8074, DIN 8075, WIS 4.32.17, ÖNORM B 5172, ÖNORM B 5192, BRL-K-533/03, GW 335 T2
Supply form: Coils, drums, straight lengths

egeplast 90 10®

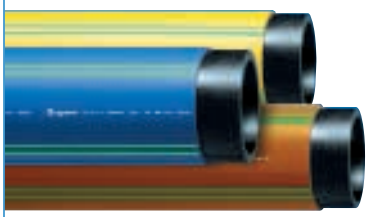
The egeplast 90 10® pipe is a pressure pipe made from PE 100 RC^{plus}* with extremely high resistance to slow crack propagation. A 10% coloured outer layer is isometrically integrated to allow accurate assessment of pipe surface damage in compliance with applicable regulations (e.g. EN, DVS, DVGW, KRV). Only damage extending to a depth of no more than 10% of minimum pipe wall thickness is permitted. Particularly suitable for open-trench installation without a sand bed and installation by ploughing or milling.



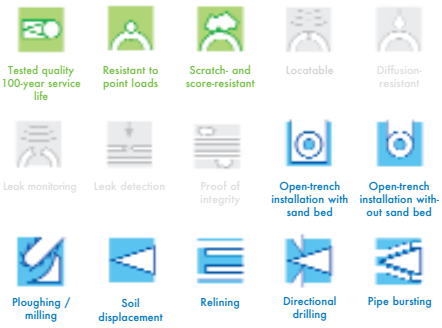
Dimensions: d_n 25 mm – d_n 630 mm
SDR: SDR 17 ≥ 250 mm, SDR 11
Certifications: DVGW
Quality marks: DVGW registration number for gas and drinking water
Standards: DIN EN 1555-2, DIN EN 12201-2, DIN EN 13244, DIN 8074, DIN 8075, GW 335 T2
Material testing: HESSEL Ingenieurtechnik
Supply form: Coils, drums, straight lengths

* Resistance to Crack

egeplast SLM® 2.0



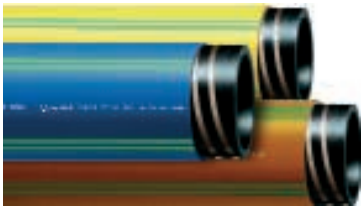
Trenchless installation methods impose higher demands on pipe material. The pressure-bearing pipe wall of the SLM® 2.0 is produced from modern PE 100 RC^{plus}* pipe materials, and the pipe also has an extremely hard outer layer to protect it from scratches and scoring. It is essential for black box installations and therefore recommended by the German DVGW in its Codes of Practice GW 321 and GW 323!



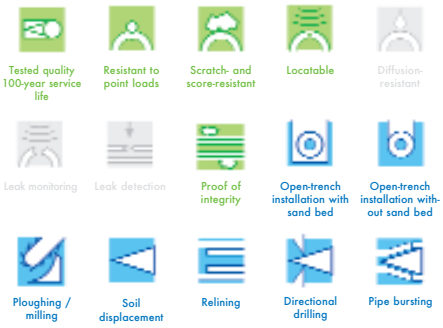
Dimensions: d_n 25 mm – d_n 1200 mm
SDR: SDR 17 – SDR 7.4
Certifications: DVGW, SVGW, ÖVGW, DIN-Gost, IGNG, DWI
Quality marks: DVGW registration number for gas and drinking water, DIN Certco test mark for sewage
Standards: DIN EN 1555-2, DIN EN 12201-2, DIN EN 13244, DIN 8074, DIN 8075, ÖNORM B 5172, ÖVGW B 5192, GW 335 T2
Material testing: HESSEL Ingenieurtechnik
Supply form: Coils, drums, straight lengths

* Resistance to Crack

egeplast SLM® 2.0 DCT



The already excellent properties of the egeplast SLM® 2.0 pipe are further enhanced by the integration of two spirally wound conductive strips. These not only enable the egeplast SLM® 2.0 DCT* pipe to be accurately located but also make it possible to check pipe integrity after installation for acceptance of the work. This option gives both customer and contractor the highest guarantee of safety, even under the most adverse soil conditions.



Dimensions: d_n 25 mm – d_n 1200 mm
SDR: SDR 17 – SDR 7.4
Certifications: DVGW, SVGW, ÖVGW, DIN-Gost, IGNG, DWI
Quality marks: DVGW registration number for gas and drinking water, DIN Certco test mark for sewage
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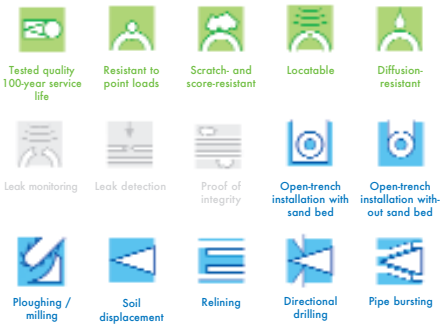
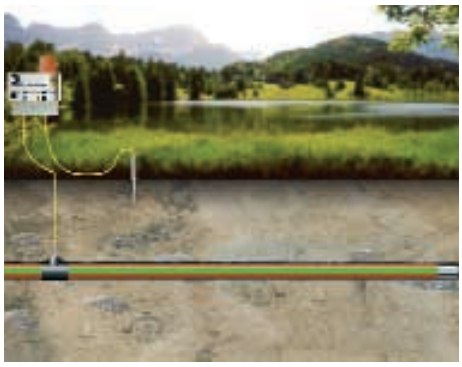
Material testing: HESSEL Ingenieurtechnik
Supply form: Coils, drums, straight lengths

egeplast SLA® 2.0

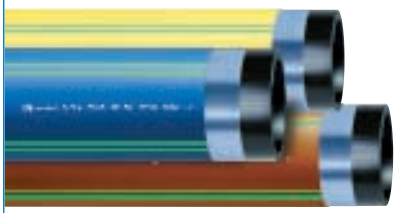
The egeplast SLA® 2.0 pipe is the only plastic drinking water pipe with global approval for installation in contaminated soil. It incorporates a diffusion-resistant barrier layer that prevents the ingress of pollutants. One useful option opened up by the SLA® 2.0 is to install drinking water and sewage pipes together in a combined line.



Dimensions: d_n 25 mm – d_n 630 mm
SDR: SDR 17 – SDR 7.4
Certifications: DVGW, KIWA
Quality marks: DVGW registration number
Standards: DIN EN 1555-2, DIN EN 12201-2, DIN 8074, DIN 8075, BRL-K-545/01, BRL-K-533/03, GW 335 T2
Material testing: HESSEL Ingenieurtechnik
Supply form: Coils, drums, straight lengths



egeplast 3L/SLA®-System



In addition to diffusion resistance, the egeplast 3L/SLA® pipe offers the advantage of continuous leak monitoring and leak location to the nearest 10 cm. It is the only pipe system to meet the requirements for continuous leak monitoring specified by ATV-DVWK-A 142 for class II water protection zones.

Dimensions: d_n 25 mm – d_n 1200 mm
SDR: SDR 17 – SDR 7.4
Certifications: DVGW
Quality marks: DVGW registration number for gas and drinking water, DIN Certco test mark for sewage
Standards: DIN EN 1555-2, DIN EN 12201-2, DIN EN 13244, DIN 8074, DIN 8075, GW 335 T2
Material testing: HESSEL Ingenieurtechnik
Supply form: Coils, drums, straight lengths

* Detection & Checking Technology

PE Raw Material – 100-Year Service Life

Increase in the strength of polyethylene from the first to the third generation

Material	MRS* N/mm²
PE 63	6.3
PE 80	8.0
PE 100	10.0

*MRS: Minimum Required Strength (DIN ISO 12162)

PE raw material

A service life of more than 100 years is scientifically guaranteed for today's high-quality HDPE pipe grades on the basis of internal pressure creep rupture tests performed on these pipes in accordance with DIN EN ISO 12162 and the standard extrapolation method specified in ISO/TR 9080. This long service life is confirmed by practical experience with using HDPE pipes in water and gas supply systems and sewage lines. HDPE pipeline systems – some of which have already been in service for almost 50 years – are characterised by high reliability and extremely low maintenance and repair costs.

Reliable, flexible and economical

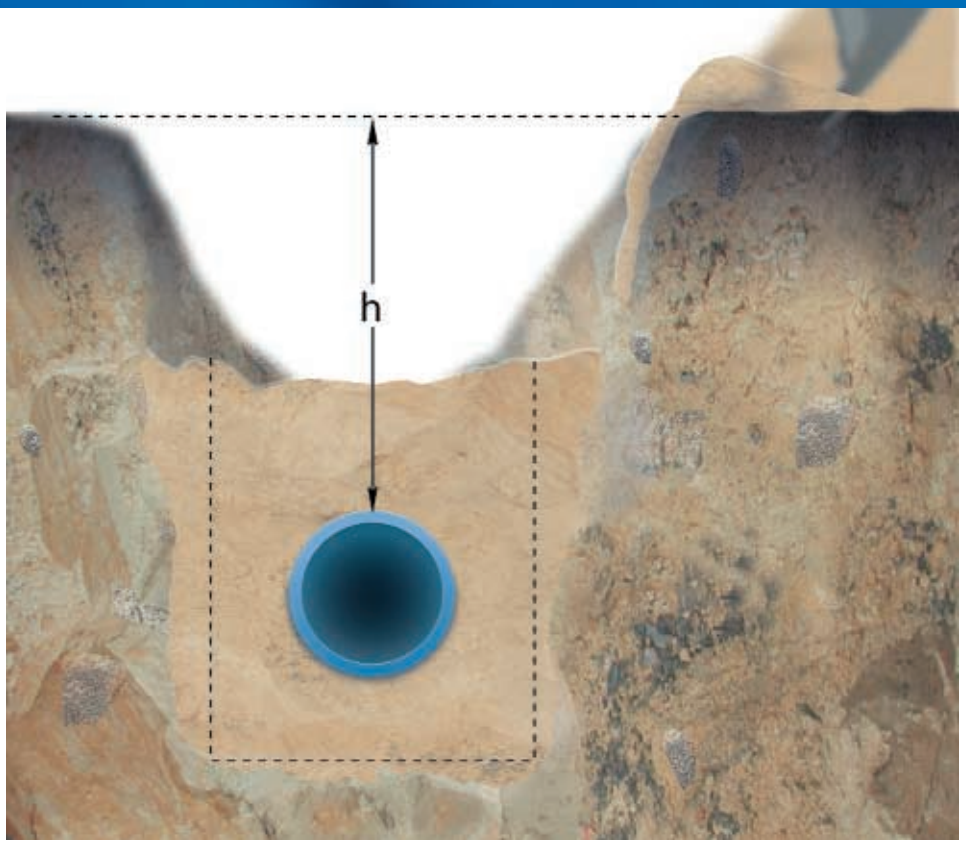
The advantageous properties of polyethylene pipes are undeniable. Polyethylene pipes are robust, stable to aggressive media and corrosion, and highly resistant to mechanical effects. They are also lightweight and flexible and permit economic pipe installation. The flexibility of the material means that long pipe lengths can be supplied in accordance with the particular requirements of the project and installation site. This enables the quantity of fittings and welding work to be reduced to a minimum. Pipe lengths can be tailored to the needs of the installation project so cutting transportation costs.

Extremely flexible transportation options help minimise costs

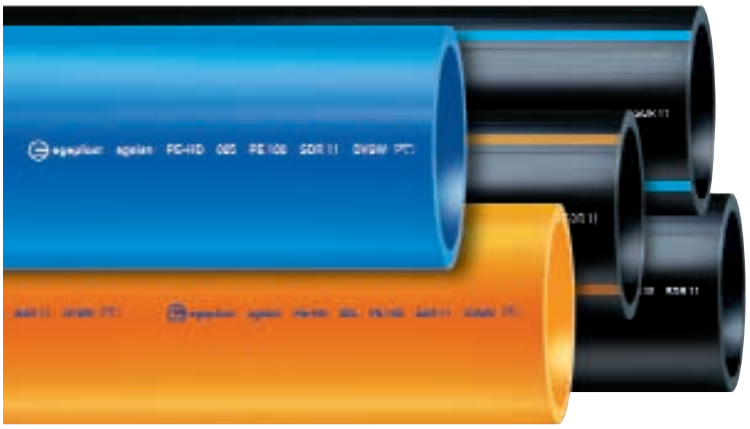
Open-Trench Installation with Sand Bed

Defined pipeline zone required

When installing a pipeline by the open-trench method, the pipeline zone is precisely defined.
The actual design of the pipe trench is governed by DIN 4124 "Construction pits and trenches" (and other standards), which precisely stipulates working widths, shoring etc. With this method of installation, the soil surrounding the pressurised, medium-bearing pipe is specially prepared to protect it from external effects. DIN EN 805 and DVGW guideline W-400-2 specify that the pipe should be bedded in sand or fine gravel. These regulations allow a maximum particle size of 22 mm. This is the only way to prevent point or linear loads on the pipe caused by unsuitable materials in the trench.



Score depth
Point load



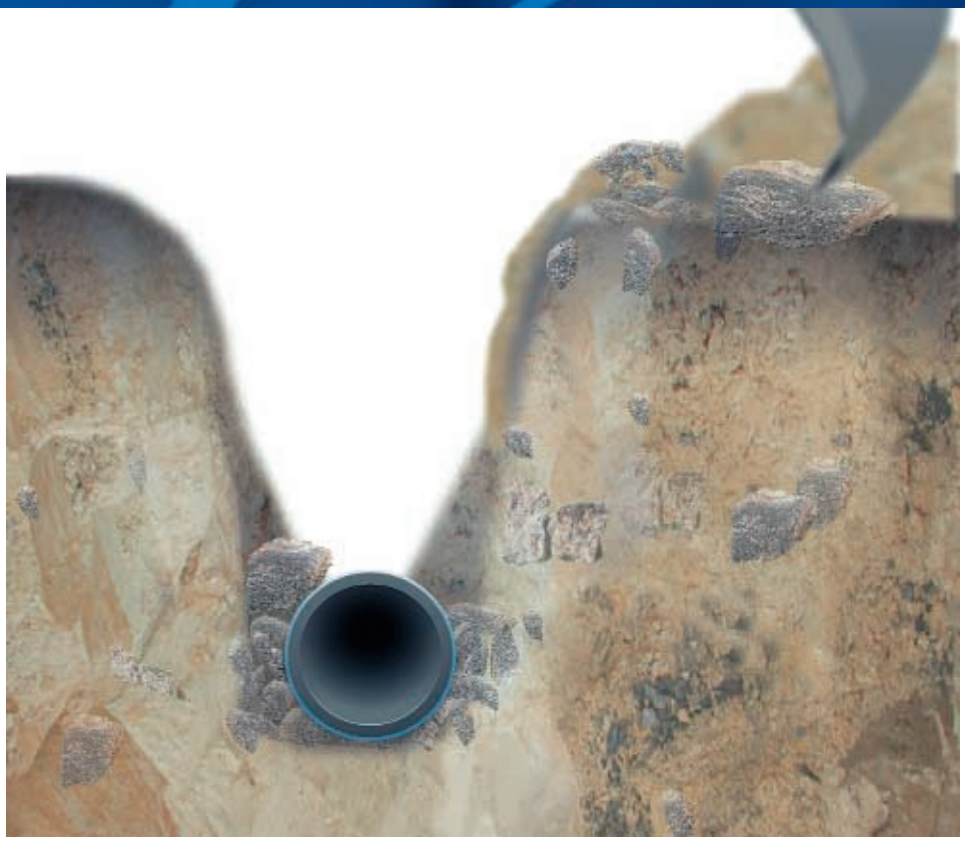
egelen®

Drinking water pipes · gas pipes · pressurised sewage pipes · industrial pipes

egelen® pipes are produced to EN standards and DVGW guidelines and, depending on the application, generally bear the DVGW registration number or the DIN Certco test mark. Compliance with these quality standards is ensured through in-house quality control and monitoring by independent testing institutes such as the Süddeutsches Kunststoffzentrum (South German Plastics Centre) in Würzburg or KIWA in the Netherlands.

The latest production plants and patented tools and dies allow egeplast to obtain very smooth internal pipe surfaces (< 5 µm). By employing very long cooling zones, pipelines with low internal stresses can be extruded, which, for example, minimises collapse of pipe ends in pipe cutting.

Open-Trench Installation without Sand Bed



Backfilling with excavated soil permits faster, more cost-effective pipelaying

Sand bedding unnecessary thanks to modern materials

Increasing cost pressures are forcing many utilities providers to examine whether costly sand bedding is really necessary when installing new lines. If the excavated soil can be compacted, then it can be reused to backfill the trench instead of sand. Of course, this presupposes a pipe system that is capable of withstanding the resultant loads. In rural areas, it is also possible to install new pipelines at a very rapid rate by ploughing or milling.

Ploughing

In this process, the new pipe is continuously ploughed in and then the pipe furrow is immediately covered over again.

Milling

Special equipment cuts a narrow pipe trench into which the flexible pipe is laid in the same operation. The excavated soil is used as backfilling material.

Installation without a sand bed can scratch the surface of newly laid pipe. According to DIN EN 12007, only damage extending to a depth of no more than 10% of minimum pipe wall thickness is permitted. In addition, stones can exert point or linear loads on the outer surface of the pipe over a prolonged period – besides the normal operating stresses such as internal pressure, soil and traffic loads – and so cause damage. In the absence of a sand bed to provide protection, the selected pipe system must be able to withstand typical surface damage such as scratches and, in particular, point loads so that these do not induce stress cracking.

Open-Trench Installation without Sand Bed

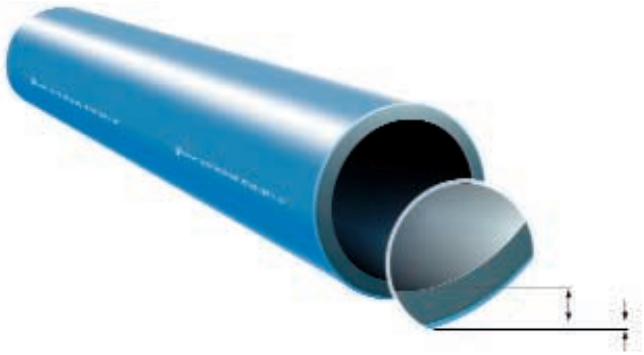
Cutting Costs without compromising Safety

egeplast 90 10®

Drinking water pipes · gas pipes · pressurised sewage pipes

The egeplast 90 10® pipe is a pressure pipe made from PE 100 RC^{plus} (Resistance to Crack) with extremely high resistance to slow crack propagation. A 10% coloured outer layer is isometrically integrated to allow accurate assessment of pipe surface damage in compliance with DIN EN, DVS, DVGW and KRV. The two layers are inseparably bonded by coextrusion. egeplast developed the 90 10® pipe specially for open-trench installation without a sand bed and installation by ploughing or milling.

The ideal combination: modern crack-resistant materials, clever pipe design and overall low cost



90 % of standard wall thickness PE 100 RC^{plus} black
10 % of standard wall thickness PE 100 RC^{plus} coloured
=100 % safety

Stress-crack-resistant thanks to PE 100 RC^{plus}

In open-trench pipe installation without a sand bed, the pipes are exposed to large point loads from stones. This can give rise to stress cracks.

The material used to produce the egeplast 90 10® pipe is ideal for the application. egeplast uses only stress-crack-resistant PE RC^{plus} material (Resistance to Crack) of MRS class PE 100. This material is capable of withstanding point loads because of its excellent stress crack resistance.

Finally: pipe surface checks possible at a glance

To guarantee 100% safety, any damage to the pipe occurring at the installation site can now be accurately assessed. The European regulations (DIN EN 12007), the Deutscher Verein für Schweißtechnik (German Association for Welding Technology or DVS), the DVGW (German Association of Gas and Water Engineering) and the Kunststoffrohrverband (German Plastic Pipe Association or KRV) permit only damage (scoring/notches) extending to a depth of no more than 10% of minimum pipe wall thickness. For this reason, a 10% coloured outer layer is isometrically integrated into the egeplast 90 10® pipe so that it is possible to see at a glance whether this requirement is being met.

The colour of the outer layer also serves to identify gas, drinking water or sewage pipes.

Open-Trench Installation without Sand Bed

Safety through outstanding Materials

When a new pipe is installed without sand bedding, it is exposed to additional point loads from stones during service. To ensure that the resulting localised stress concentration peaks do not lead to cracks in the pipe wall, pipe must be produced from materials that have good stress crack resistance. Information on the stress cracking behaviour (slow crack growth) of pipe materials is provided by the notch test and the FNCT test. To make it possible to predict the service life of pipes additionally exposed to point loading, Dr. Hessel Ingenieurtechnik has compared experimental studies of pipes under internal pressure and additional point loading with results obtained in the FNCT test (3R International 4/2001 and 6/2001).

Notch test (ISO 13479)

In the notch test, a pipe section with defined notches is tested until failure at a test temperature of 80 °C and test pressure of 9.2 bar (SDR 11, PE 100).

Full notch creep test FNCT (ISO 16770)

In the FNCT, small test bars of the test material are notched with a sharp edge all round and then subjected under a constant tensile stress of 4 N/mm² at 80 °C (+2% Arkopal N 100) until failure. The test simulates localised stress concentrations.

Point loading test developed by Dr. Hessel

A pipe under internal pressure is additionally indented by a punch applied against it as a point load (penetration depth: 6% of outside diameter) to simulate loading by a stone. The test temperature is 80 °C (+2% Arkopal N 100).

3 tests – one result: long service life under load

For PE 100 RC^{plus} (Resistance to Crack) materials used to produce pipes with protective functions, the Kunststoffrohrverband (German Plastic Pipe Association) specifies testing times of more than 5000 h in the notch test. This is the same as the requirement for crosslinked PE. (The requirement for standard PE 100 as per DVGW – German Association of Gas and Water Engineering – Code of Practice GW 335 A2 is only 500 h!). The egeplast 90 10® pipe significantly exceeds these requirements.

Dr. Hessel has identified and published a correlation between the results of the FNCT and the point loading test. egeplast uses only selected PE 100 materials (PE 100 RC^{plus}) for egeplast 90 10®pipe. In quality control testing, these materials must demonstrate an endurance time of at least 3300 h in the FNCT. Only this material quality enables pipes to pass the component test for 100 years' service life under point loading. egeplast 90 10® pipes are regularly subjected to this component test in the form of a one-year creep rupture test under internal pressure with additional point loading at 80 °C (+2% Arkopal N 100).
In both the notch and FNCT tests, the PE RC^{plus} (Resistance to Crack) materials used for the 90 10® pipe perform significantly better than standard PE 100 grades and therefore considerably exceed the values required for pipes with protective functions.

With its excellent resistance to stress cracking, the egeplast 90 10® pipe withstands point loads and can therefore be installed without sand bedding.

Open-Trench Installation without Sand Bed

Flexible to install, safe to weld

Safe to weld

egeplast 90 10® pipes can be joined by the well established methods of hot tool butt welding and welding with electrofusion fittings.

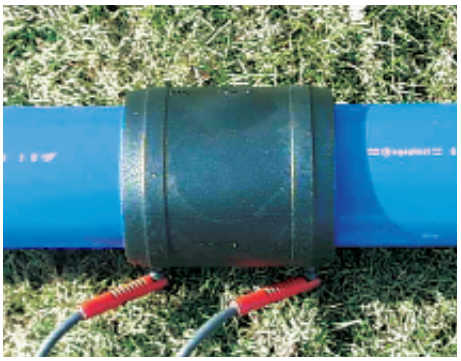
These pipes are produced by coextrusion from PE 100 RC^{plus} materials (welding group 003), which have all demonstrated their suitability for welding as per DVS (German Association for Welding Technology). The integrated layers are welded together and inseparably bonded. The two-layer pipes are welded using the parameters specified in DVS 2207.

Extremely high reliability without costly pipe bedding

egeplast 90 10® pipes are resistant to stress crack damage and so make costly preparation of a sand bed unnecessary. Even stony soils can be directly used for backfilling, provided that they are compactable. Expensive soil replacement is therefore saved as is the often time-consuming and costly delivery and removal of backfilling material.

Flexible to install

egeplast 90 10® pipes are flexible and mobile. These properties enable them to be installed by ploughing or milling. With their excellent resistance to point loading, egeplast 90 10® pipes are ideally suited for installation methods in which the excavated soil is used as a backfilling material.



Welding with electrofusion fittings

egeplast 90 10® pipes can be welded with all currently available electrofusion fittings made from PE 100 and PE 80. The clever pipe construction always ensures compliance with DVS regulations.

In preparation for welding, egeplast and fitting manufacturers alike recommend using rotary peelers to remove the oxide layer.

Trenchless Installation and Renovation

Very high demands on pipelines

Open-trench pipe installation not only represents a hazard to traffic and causes annoyance to local residents but also permanently damages the road surface. This has resulted in a growing acceptance of trenchless pipe installation methods, which can also be used to lay pipes under rivers, lakes or traffic routes.

At the same time, these methods save time and money. Cost savings of up to 50 percent can be achieved according to a publication by the Bavarian State Ministry for Regional Development and Environmental Affairs of September 11, 1996 – a powerful argument in view of the high cost pressure on the public purse.

Recommended by the DVGW:

Various options are available for trenchless pipe installation. With all these methods, there is an increased risk of pipe damage. The extent of this damage cannot be determined once the pipe is laid (black box installation!). For this reason, pipes with a protective outer layer are required and are therefore recommended by the DVGW (German Association of Gas and Water Engineering) for directional drilling (Code of Practice GW 321) and for pipe bursting (Code of Practice GW 323).

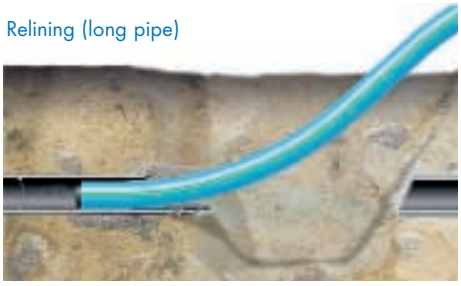
Horizontal directional drilling (HDD)

Horizontal directional drilling is a steerable wet drilling method. Depending on the nature of the soil and borehole radius, scratches, scoring and point loading by stones can damage the newly installed pipe.

Soil displacement

Pneumatically operated impact moles are generally used to install service lines. They “shoot” through the ground towards a target some meters away, pulling the pipe behind them. The surrounding stones can scratch the new pipe and cause point loading.

Relining (long pipe)



This method is used for renovating defective pipelines. Depending on the condition of the old pipe, scratches and scoring can be caused in the new pipe. Steel pipes with V-welds pose a particularly high risk. Increased point loads are not likely with this method.

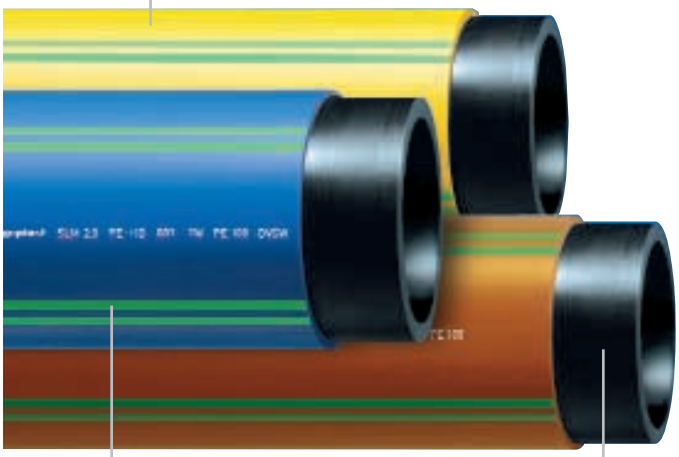
Pipe bursting

This method is technically challenging. Depending on the material from which the old pipe is made and the condition of the old pipe, the new pipe is susceptible to scratches and scoring. Shards and stones can give rise to increased point loads during service.

Trenchless Installation and Renovation

Always with protective Outer Layer - per DVGW Recommendation!

Protective outer layer made from an extremely abrasion-resistant, mineral-reinforced polypropylene



Four green double stripes to identify the SLM® 2.0 as a multilayer pipe

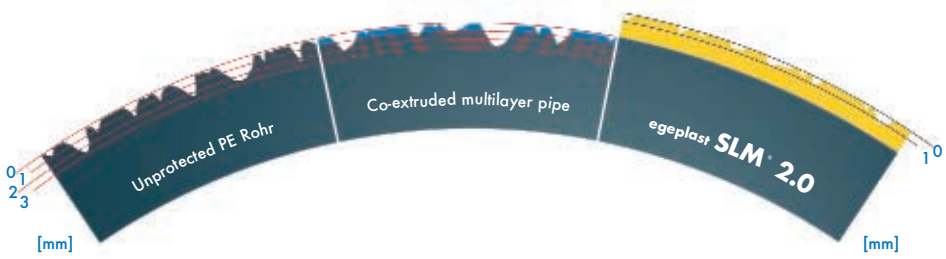
DVGW test-marked and certified product pipe made from PE 100 RC^{plus}, complying with the requirements of DIN 8074/75

egeplast SLM® 2.0

Drinking water pipes · gas pipes · sewage pipes

Trenchless installation methods impose higher demands on the pipe material. The pressure-bearing pipe wall of the SLM® 2.0 is produced from modern PE 100 RC^{plus} pipe materials (Resistance to Crack), and the pipe also has an extremely abrasion-resistant outer layer to protect it from scratches and scoring. This hard outer layer is essential for black box installation and therefore recommended by the German DVGW in its Code of Practice GW 321 and GW323!

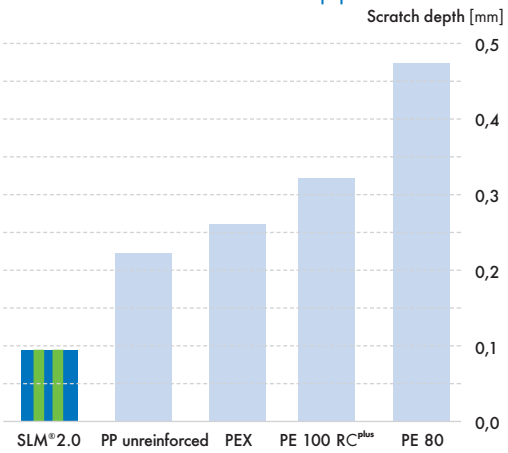
Unprotected PE pipe versus SLM® 2.0 pipe with protective outer layer



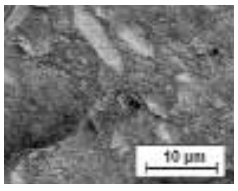
Trenchless installation methods expose pipes to high forces. This cross section shows the score depth into an unprotected PE 100 pipe (left), a co-extruded multilayer pipe (centre) and the SLM® 2.0 pipe (right) after pipe installation. The differences can be clearly seen.

The pressure-bearing wall of the SLM® 2.0 pipe is free from scoring because the protective outer layer has absorbed all external loads. It is clearly evident that scoring in the unprotected PE 100 pipe and co-extruded multilayer pipe has penetrated about three times as deep as in the protective outer layer of the SLM® 2.0 pipe. Under the protective outer layer, the pressure-bearing pipe wall shows no damage at all.

Scratch resistance of different pipe materials



Scratch test results,
Official materials testing laboratory at the University of Hanover



Mineral microparticles in the SLM® 2.0 protective outer layer

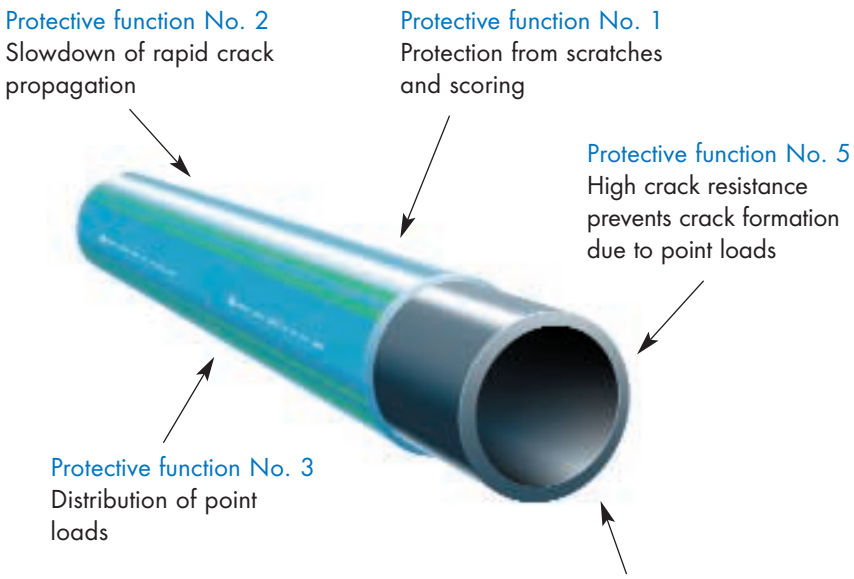
Conclusion:
The mineral microparticles make the protective outer layer of the SLM® 2.0 pipe resistant to scratches and scoring. The surface of the outer layer is three times harder than the PE 100 surface. The pressure-bearing pipe wall remains absolutely undamaged. For this reason, egeplast recommends against using unprotected PE pipes (such as egelen® or egeplast 90 10®) for black box installation!

Protective Functions of the SLM® 2.0 Pipe

A service life of 100 years is scientifically guaranteed for today's HDPE pipe materials on the basis of internal pressure creep rupture tests performed on these pipes in accordance with DIN EN ISO 12162 and the standard extrapolation method specified in ISO/TR 9080.

This very long service life expectancy is based on the assumption that the pipes are exposed only to internal pressure. Service life can, however, be significantly reduced in some cases if the pipe

- is weakened by scratches or scoring
- sustains damage leading to formation of a crack that runs through the pipe wall
- is exposed to localised stress concentration peaks due to point or linear loading in addition to the internal pressure stress.



To guarantee a full service life, the SLM® 2.0 pipe has the following protective functions:

Protective function No. 1

To prevent serious consequences, EN standards, DVGW Code of Practice G 472 and the DVS welding guideline permit only damage extending to a depth of no more than 10% of minimum pipe wall thickness. In addition, the damage must have a flat run-out to avoid crack propagation. To protect HDPE pipes from scoring in trenchless installation, egeplast has additionally incorporated a protective outer layer in the SLM® 2.0 pipe. Reliable protection from scratches and scoring is provided by this additional layer made from mineral-reinforced polypropylene. The damage does not therefore impinge on the pressure-bearing pipe core.

Protective function No. 2

The two-layer structure impedes rapid crack propagation.

Protective function No. 3

During service, the protective outer layer prevents stones or old pipe shards from coming into direct contact with the pressure-bearing HDPE pipe core. Any point loads that occur are distributed by the protective outer layer, so significantly reducing localised stress concentration peaks.

Protective function No. 4

The modern crack-resistant material PE 100 RC^{plus} used to manufacture the core pipe provides protection from crack growth. The crack propagation resistance of this material has been demonstrated by its higher values in the FNCT test.

Protective function No. 5

To prevent localised stress concentration peaks due to point loading from initiating cracks on the inside of the pipe, the material used for the pipe core has very high stress crack resistance.

Conclusion: The various protective functions of the SLM® 2.0 pipe permit trenchless installation and reliable operation of the HDPE pipeline for over 100 years.

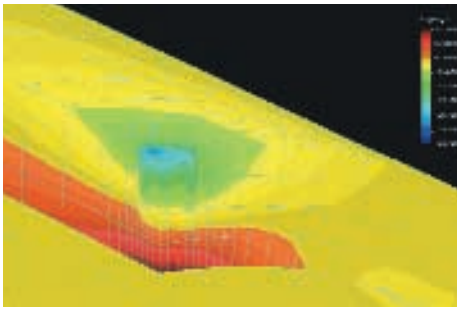
Unprotected PE pipe versus SLM® 2.0 pipe with protective outer layer

Pipes with a protective outer layer offer dual protection against point loading

1. Core pipe
The PE 100 RC^{plus} materials (Resistance to Crack) used exclusively by egeplast for the pressure-bearing core pipe provide reliable protection from stress cracks initiated by point loading.

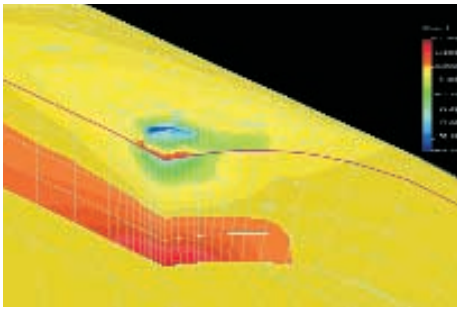
These PE 100 RC^{plus} materials show the best results in currently used test methods:
- FNCT > 3300 hours
- Notch test > 5000 hours

2. Protective outer layer
In addition, the protective outer layer acts like a "hard shell", keeping the direct load off the pressure-bearing pipe core and distributing the extra stresses, particularly from sharp-edged stones and old pipe shards.



Point loading effect on unprotected PE pipe: very high stress concentration peaks on the inside
(Source: FEM calculation at Münster University of Applied Sciences)

Stress concentration peaks on the inside of an SLM® 2.0 pipe are cut by half! Finite element calculations show the advantages offered by an SLM® 2.0 pipe in terms of point loading resistance. There is no stress concentration acting on the core pipe in the direct contact area. Stress concentration is significantly reduced between the area under load and the surface of the core pipe.

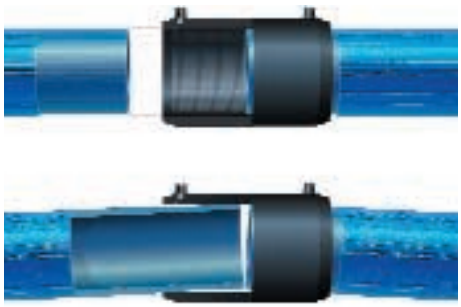


Point loading effect on an SLM® 2.0 pipe with protective outer layer
(Source: FEM calculation at Münster University of Applied Sciences)

The stress concentration peak on the inside of the pipe is only 50 percent of the stress occurring in an unprotected PE pipe.
(Source: FEM calculation at Münster University of Applied Sciences)

Conclusion:
The protective outer layer of the SLM® 2.0 pipe distributes point loads and keeps them off the core pipe. The crack-resistant polyethylene material reliably prevents crack formation on the inside of the pipe.

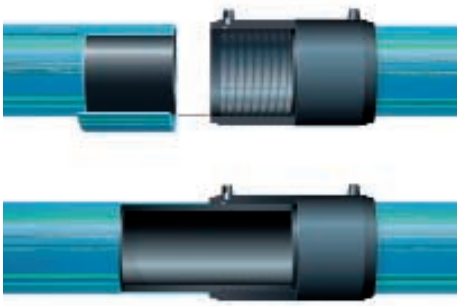
After pipe installation, the protective outer layer permits safe welding



Electrofusion socket welding of unprotected pipe

The necessary excessive removal of material from the scratched pipe surface down to the root of the deepest score with a rotary peeler weakens the pressure-bearing pipe wall.

Safe welding is not possible because the weld gap is enlarged and there is a risk of residual scratches and contamination.



Electrofusion socket welding of SLM® 2.0

After peeling off the scratched protective outer layer of the SLM® 2.0 pipe, a minimal oxide layer (0.2 mm) is removed from the surface of the undamaged PE core pipe.

Because of the perfect fit between the mating surfaces, safe welding can be carried out.

The pipe surface is smooth and clean

An important requirement for safe welding of an HDPE pipe, particularly for subsequent connection of a tapping saddle for a domestic service line, is a clean, undamaged surface.

The two-layer structure of the SLM® 2.0 pipe permits safe welding in accordance with DVS guidelines, even after the pipe has undergone very harsh treatment during installation.

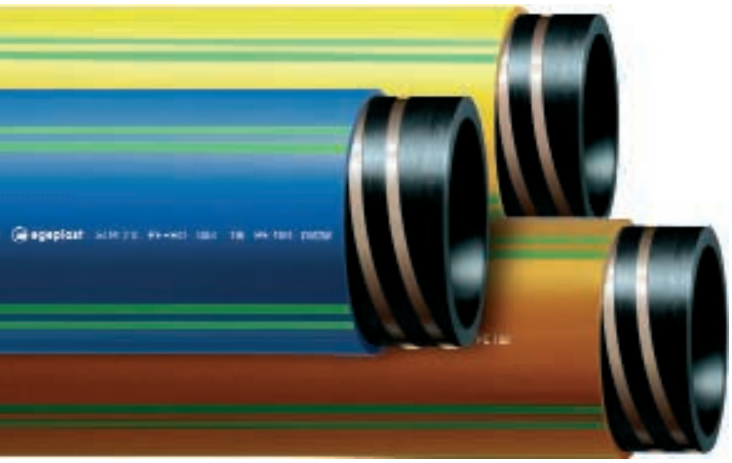
Detecting the installed Pipeline and checking Integrity

Conductive strips integrated into the pipe permit subsequent pipe detection

In trenchless pipelaying, the parallel installation of a detector strip is virtually impossible. Yet subsequent detection of a pipeline laid by trenchless installation is often essential for later construction work.

Integrity of plastic pipes laid by trenchless installation can be checked

Black box pipe installation under adverse conditions leads many network operators to question how safe the buried pipeline is, particularly when it is being used to transport sensitive media. For this reason, DVGW Code of Practice GW 323 specifies that an integrity check should be carried out on new pipelines installed by the pipe bursting method.



egeplast SLM® 2.0 DCT

Drinking water pipes · gas pipes · sewage pipes

The already excellent properties of the egeplast SLM® 2.0 pipe are further enhanced by the integration of two spirally wound conductive copper strips. These not only enable the egeplast SLM® 2.0 DCT pipe to be accurately located but also make it possible to check pipe integrity after installation for acceptance of the work. This option gives both customer and contractor the highest guarantee of safety, even under the most adverse soil conditions.

Detecting the installed Pipeline and checking Integrity

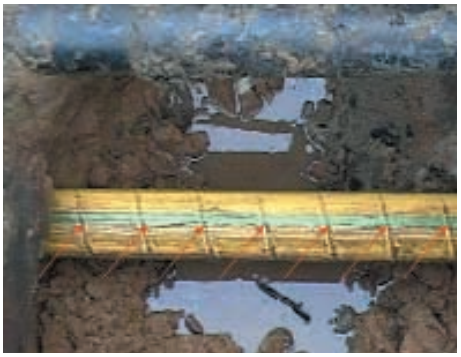
SLM® 2.0 DCT pipe (**D**etection & **C**hecking **T**echnology) Insertion damage checking

A common feature of all trenchless methods is that, unlike in open-trench installation, the pipeline zone cannot be prepared. The pipe is therefore frequently inserted through stony ground or building rubble and, in pipe bursting, through the displaced shards of the old pipe. The extent of damage to the pipe surface cannot be assessed until the pipe passes through the intermediate inspection pits.

To avoid the risk of damage, pipes with special protective functions are therefore required.
The SLM® 2.0 DCT pipe incorporates a damage indicator that makes it possible to check the integrity of new pressure pipes (score depth = 0% of standard wall thickness) during and after pipe insertion (e.g. in bursting cast iron pipes).

▲ Detection with standard equipment possible

Another advantage of this multilayer pipe with integrated electrical conductor is that it can be detected under the ground and therefore accurately located for subsequent construction work with standard equipment.



◄ Second-generation egeplast SLM® 2.0 DCT pipe with protective outer layer and integrated damage indicator (arrows) in an intermediate inspection pit

If, during pipe insertion, the protective outer layer of the pipe is scored right through, a spirally wound electrical conductor under the protective layer is severed. Following pipe insertion, a simple continuity checker can be used to test electrical continuity and so provide proof of the integrity of the new pressure pipe.

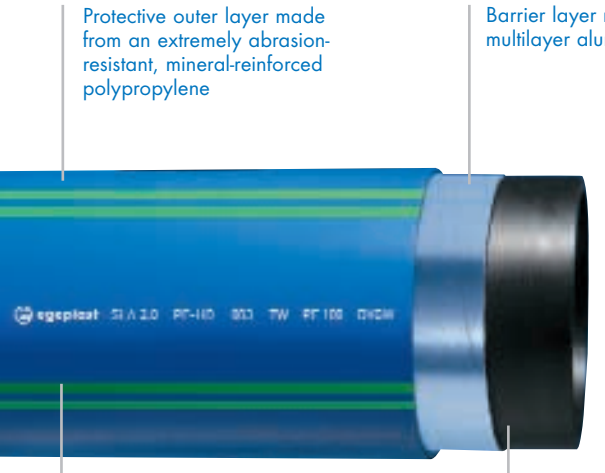
◄ Proof of integrity with a continuity checker

Protecting Drinking Water in contaminated Soil

Problem

When drinking water lines are installed in contaminated soil, there is a risk of contamination due to the ingress of pollutants. Hydrocarbons, being chemically related to polyethylene, have particularly high migration rates through PE.

The risk of drinking water contamination is highest in industrial and agricultural areas, in the vicinity of landfill sites, filling stations, former military areas and defective sewers and under rivers.



egeplast SLA® 2.0

Drinking water pipes

The SLA® 2.0 safety pipe developed by egeplast prevents the ingress of pollutants into drinking water. With its intelligent combination of thermoplastic and metal materials, this pipe opens up a completely new field of application beyond conventional polyethylene pipe applications, i.e. installation of plastic drinking water pipes in soil that is contaminated or at risk from contamination.

The core of the SLA® 2.0 safety pipe is a DVGW certified and test-marked drinking water pipe made from PE 100 RC^{plus} (optionally PE 80). The core pipe is enhanced by the incorporation of a barrier layer made from a specially developed, multilayer aluminium foil. The aluminium foil wrapped around the core pipe serves as a diffusion barrier. The core pipe and aluminium layer are protected by a patented outer layer made from an extremely abrasion-resistant, mineral-reinforced polypropylene.

Protecting Drinking Water in contaminated Soil

Verification of diffusion resistance was carried out by the Dutch KIWA Institute. KIWA is an internationally recognised institute for the certification of drinking water systems, based in the Netherlands. The KIWA testers have determined that even after 100 years' service, no diffusion of the specified substances is likely to occur.

The long-term permeation and diffusion measurements were carried out using bottle tests and helium diffusion. The pipe was immersed in a solution of methanol, trichloroethene and toluene.

As a result of the positive test results, the SLA® 2.0 pipe was awarded product certificate BRL-K-545/01 by KIWA in 1995. The SLA® 2.0 pipe system is therefore the only plastic pipe in the world approved for installation in contaminated soil.

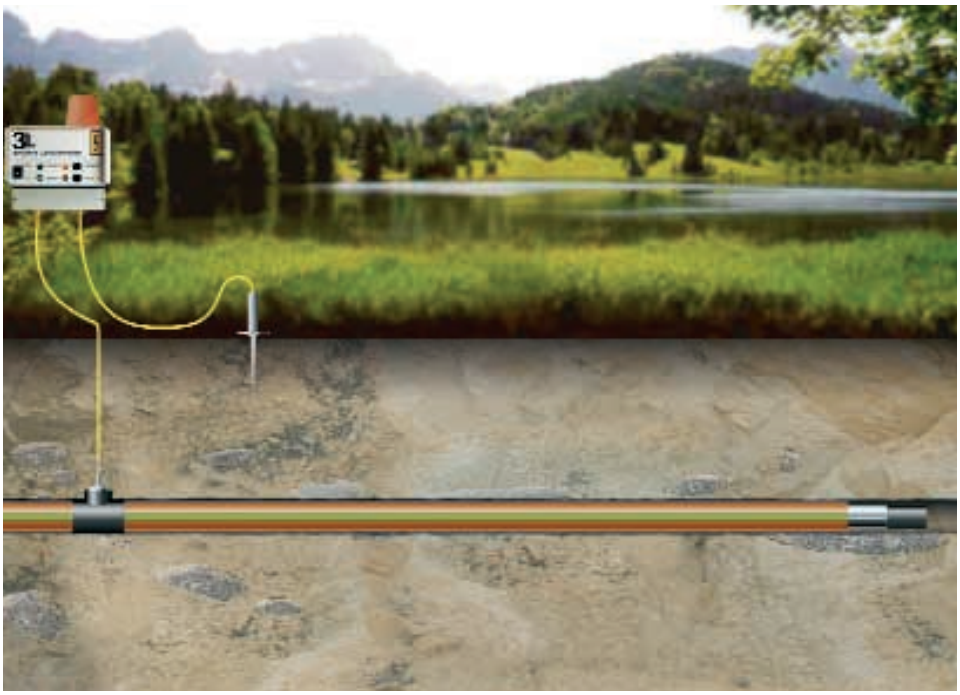
Organic compounds	Maximum permitted concentrations (µg/l) in the groundwater			
	Polyethylene (PE) (SLA®)		Polyvinyl chloride (PVC)	
	homogeneous	with AL barrier	homogeneous	with rubber ring
Benzene	9	1 780 000	178 000	5
Trichlormethane (chloroform)	10	6 800 000	800 000	10
Hexane	100	9 500	2 375	100
Phenol	23 000	8 500 000	1 000 000	23 000

Source: KIWA (We would be pleased to send you the values for other chemicals on request)

Diffusion barrier permits installation of pipe bundles

The diffusion resistance and high flexibility of SLA® 2.0 pipes allows underwater installation of sewage and drinking water lines in a single pipe bundle.

Continuous Leak Monitoring



Continuous leak monitoring – required in a class II water protection zone

Gas and drinking water lines, as well as sensitive sewage or industrial lines, can be temporarily or continuously monitored for damage during service.

Maximum safety through continuous leak monitoring

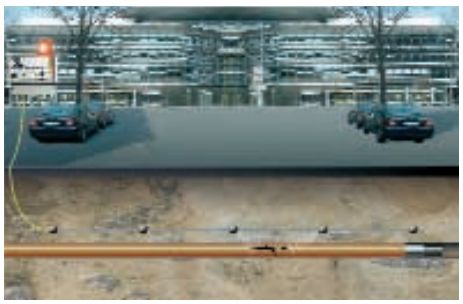
Sewage and other critical media are usually transported in underground pipes. The condition of a buried pipeline, unlike an aboveground line, cannot be visually assessed. In view of this fact, several questions arise: How safe are underground pipeline systems in reality? What happens if there is a leak? How are leaks located? Determining whether a buried pipeline is undamaged and able to fulfil its function without restriction is no simple task.

Proof of integrity

In trenchless pipe installation under very critical soil conditions, it is necessary to verify immediately after pipe insertion, e.g. for acceptance of the work, that the new line has not been damaged.

Leak detection with soil spikes

If damage has occurred, it can be accurately located to within half a meter by sensors mounted on soil spikes along the route of the pipeline.

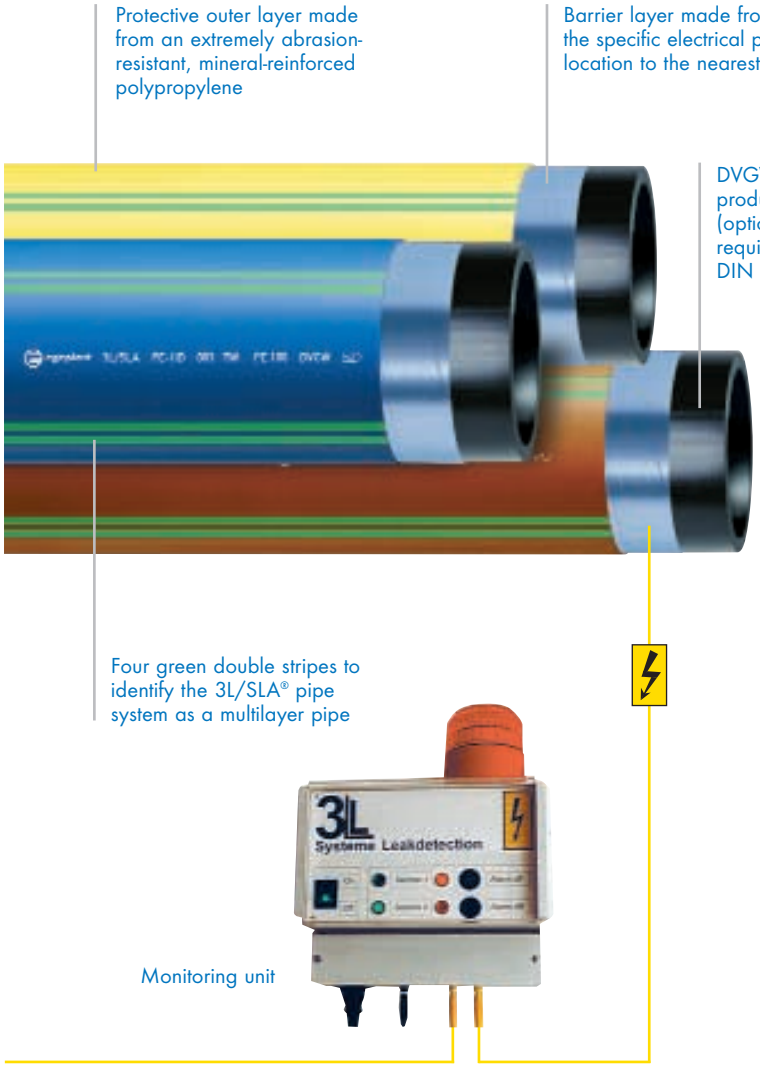


Continuous leak monitoring with a detector cable

If a cable with sensors is laid alongside the pipeline, the location of any damage can be indicated to the nearest 10 cm as soon as it occurs. This method is appropriate where the surface of the ground above the pipeline is completely sealed and it is not possible to insert soil spikes afterwards.

Continuous Leak Monitoring

A Pipe System that reports and locates Damage immediately



egeplast 3L/SLA®-System

Trinkwasserrohre · Gasrohre · Abwasserrohre · Industrierohre

The 3L/SLA® pipe system is an innovative pipeline technology developed by egeplast for underground pipe installation. It not only enables continuous pipe monitoring but also allows for fast location of pipe damage to the nearest 10 cm. The 3L/SLA® pipe system is suitable for both pressure and gravity lines and is recommended wherever safety is at a premium! The many additional benefits that it offers make it the right choice, even where no specific conditions have to be met.

Continuous monitoring of pipes transporting sensitive media or data

Searching for leaks in a pipeline is a very expensive business in practice. In most cases, the pipe trench has to be re-excavated with heavy equipment – often in the wrong place at first. This procedure is very time-consuming and ultimately incurs enormous costs. In addition, depending on the medium being transported, a serious risk may be posed to the environment.
The legislation therefore lays down special requirements for underground pipeline systems in certain areas, e.g. class I and class II drinking water protection zones (ATV-DVWK-A 142).

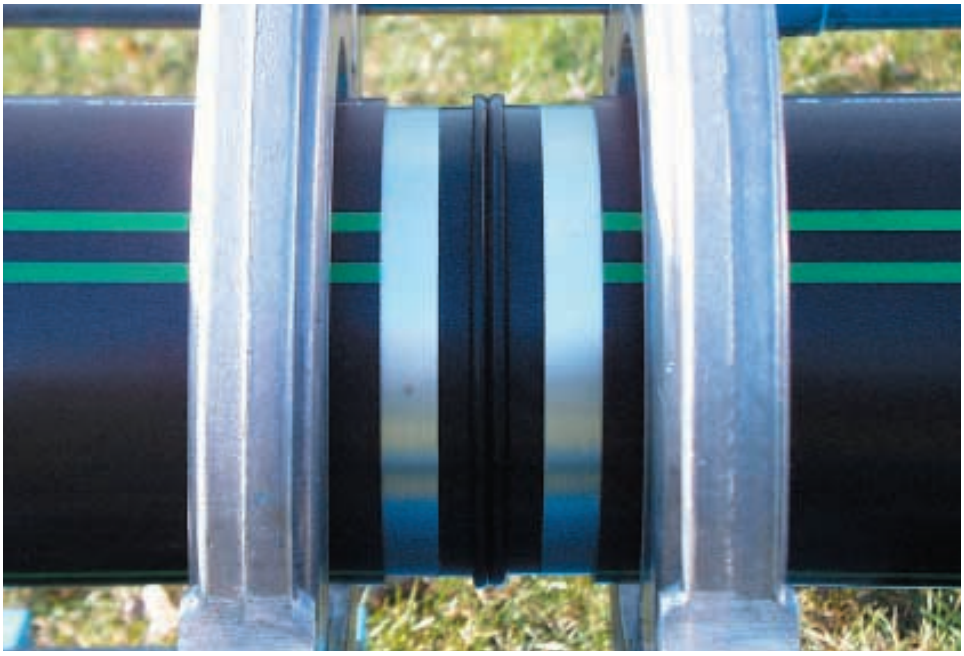
Extremely high reliability is also required in industrial plants, however, to ensure that leaks are detected and located immediately. Fiber-optic cables transporting highly sensitive data can be protected in an optimal way by the 3L/SLA-System as well.

The basis of the system is the three-layer 3L/SLA® pipe:

The inner product pipe made from polyethylene (PE 100 RC[plus]) is surrounded by a conductive aluminium foil layer and then an outer protective layer made from a mineral-reinforced polypropylene (PP).

Continuous Leak Monitoring

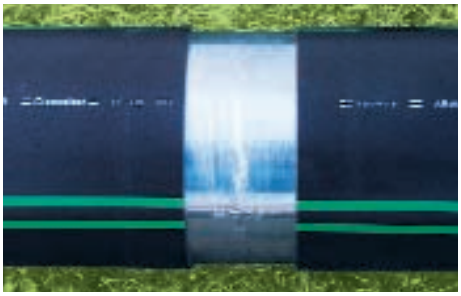
Monitored also as a complete System



The first step is to weld the polyethylene pressure pipes together.

The 3L/SLA® pipe is used to meet increased safety requirements for pipelines transporting sensitive media. These could be drinking water or industrial lines or sewage lines through water protection zones (ATV-DVWK-A 142). Damage is immediately reported and can be located to the nearest 10 cm.

This method is documented in ATV-DVWK-M 146 "Sewage lines in water catchment areas".



In the next step, the electrically conductive aluminium layer is joined up by an aluminium tape, thus establishing electrical continuity along the entire pipeline.

Finally, the joint is electrically insulated from the surrounding soil with a shrink sleeve.

The electrical connection is made via a factory-produced 3L/SLA® connector.

There must be electrical continuity of the aluminium detection layer through all the pipe joints.

Electrical insulation of the aluminium detection layer from the surrounding soil must be ensured.

In order to detect damage, the surrounding soil is required as an electrical conductor. For this reason, the 3L/SLA® system cannot be installed inside a casing pipe – which is unnecessary anyway.

Factory-produced, 3-layer, 90° bend

Factory-produced, 3-layer, 45° branch fitting

Continuous leak monitoring in class II water protection zones

Installation of a 930 m pressurised sewage line through a class II water protection zone by ploughing at Giengen:

For authorisation to lay a pipeline across this water protection zone, the regulatory agencies not only required a pipeline system that complied with ATV-DVWK-A 142 but also trenchless installation to minimise environmental impact. This ruled out double pipe systems because these generally have to be installed by the open-trench method. Supplied as two 465 m coils on two reels, the 3L/SLA® pipe (dimensions: 180 x 16.4 mm, PN 16) was first laid out along the route of the line, then welded together and finally ploughed in. The 1.5 m-deep furrow produced by the plough was immediately covered over again and the soil settled under its own weight in a few hours. This environmentally sound method of installing the 930 m pipeline took only two days.

When the pipelaying work was finished, the 3L monitoring unit was installed at the sewage treatment plant.

Continuous leak monitoring and detection with parallel-laid detector cable

Sewage line installed under the newly constructed laboratory at RWTH Aachen University

In constructing a new laboratory at RWTH Aachen University, a 3L/SLA® pipeline (dimensions 110 x 6.6 mm) was installed by the conventional method and then the area was covered over with a poured concrete slab. For this reason, a detector cable was laid alongside the pipeline so that leaks could be located to the nearest 10 cm at any time.

Verifying the integrity of a new pipe after trenchless installation

Maximum safety for a gas line at Sigmaringen

A 50 m 3L/SLA® gas line (dimensions 160 x 14.6 mm) was installed by horizontal directional drilling. Because of the adverse soil conditions, safety was a very high priority for the utility providers, Stadtwerke Sigmaringen. When the pipeline installation was completed, an integrity check had to be carried out: 3L system test results confirmed that the installation was free of damage.

egeplast Pipe-Heater System
Stress-free welding of Pipe Coils

egeplast Pipe-Heater System

The egeplast Pipe-Heater System permits stress-free welding of pipe coil ends and tapping saddles.

One of the great advantages of PE pipe is its flexibility, which allows it to be delivered to the installation site in very long lengths as a pipe coil. If the pipes are deformed by coiling, stress-free welding is difficult to accomplish. The methods commonly applied on the project site today are often technically awkward, time-consuming and sometimes even dangerous to man and material. Uniform heating helps, however, to relieve stresses in the pipe. The egeplast Pipe-Heater System can significantly reduce pipe bending or ovality through microprocessor-controlled heating. When the desired result has been obtained, the heating process can be stopped at any time. The pipe ends remain stress-free and straight, even after cooling. Heating sleeves are available for pipe outside diameters ranging from 32 mm to 180 mm. Up to a pipe outside diameter of 90 mm, the two pipe ends can be heated at the same time. From OD = 110 mm, both a heating sleeve and an internal core are connected to the base unit. This way the egeplast Pipe-Heater System helps to increase safety and productivity on the project site.

The egeplast Pipe-Heater System – makes welding easy with stress-free pipe ends

Pipe dimension range:	OD 32 mm to OD 180 mm
Primary voltage:	230 V
Secondary voltage:	41-28 V
Power output:	1400 W
Protection class:	IP 42
Dimensions:	53.5 cm x 43.5 cm x 31.5 cm
Weight:	32 kg

egeplast Pipe-Heater base unit

egeplast Pipe-Heater sleeve

egeplast Pipe-Heater internal core

egeplast special Accessories

egeplast accessories for pipe systems with a protective outer layer

egeplast provides support for pipe installation projects right from the pre-planning stage. egeplast products are backed by a full installation site service. This offer naturally includes advice on the system accessories, as well. These can be supplied to customer requirements.

Clamps for egeplast pipes with a protective outer layer

egeplast pipes with a protective outer layer have a larger outside diameter (OD) than standard HDPE pipes. Because of this, special pipe clamps are required for welding. egeplast supplies specially adapted pipe clamps for all currently available welding machines.

egeplast outer layer cutter

Pipe dimension range:	OD 25 mm to OD 1000 mm
Primary voltage:	230 V AC
Power output:	900 W
Dimensions:	27 cm x 7 cm x 15 cm
Weight:	3 kg

The outer layer cutter is recommended for larger pipe dimensions. Use of this cutter in combination with the M10 peeling tool facilitates removal of the outer layer, even when fitting tapping saddles.

egeplast M10 peeling tool

Pipe dimension range:	OD 25 mm to OD 160 mm
Pipe dimension range when used in combination with the outer layer cutter:	OD 180 mm to OD 1000 mm
Dimensions:	21 cm x 3 cm x 5 cm
Weight:	0.25 kg

The handy M10 peeling tool is ideal for pipe dimensions up to 160 mm.

Pipe Series and Pressure Ratings – Overview

SDR		26		17,6		17		11		9		7,4	
PE 80 SF= 1.25	PN	5.0		7.5		8.0		12.5		16.0		20.0	
PE 100 SF= 1.25	PN	6.0		9.6		10.0		16.0		20.0		25.0	
d.a. (mm)		s (mm)	Supplied as	s (mm)	Supplied as	s (mm)	Supplied as	s (mm)	Supplied as	s (mm)	Supplied as	s (mm)	Supplied as
16										2.0	S/R	2.3	S/R
20								2.0	S/R	2.3	S/R	3.0	S/R
25								2.3	S/R	3.0	S/R	3.5	S/R
32				2.0	S/R	2.0	S/R	3.0	S/R	3.6	S/R	4.4	S/R
40				2.3	S/R	2.4	S/R	3.7	S/R	4.5	S/R	5.5	S/R
50		2.0	S	2.9	S/R	3.0	S/R	4.6	S/R	5.6	S/R	6.9	S/R
63		2.5	S	3.6	S/R	3.8	S/R	5.8	S/R	7.1	S/R	8.6	S/R
75		2.9	S	4.3	S/R	4.5	S/R	6.8	S/R	8.4	S/R	11.5	S/R
90		3.5	S	5.1	S/R	5.4	S/R	8.2	S/R	10.1	S/R	12.3	S/R
110		4.2	S	7.1	S/R	6.6	S/R	10.0	S/R	12.3	S/R	15.1	S/R
125		4.8	S	8.0	S/R[2]	7.4	S/R[2]	11.4	S/R	14.0	S/R	17.1	S/R
140		5.4	S	9.0	S/R[2]	8.3	S/R[2]	12.7	S/R	15.7	S/R	19.2	S/R
160		6.2	S	9.1	S/R[2]	9.5	S/R[2]	14.6	S/R	17.9	S/R	21.9	S/R
180		6.9	S	10.2	S	10.7	S	16.4	S/R[2]	20.1	S/R[2]	24.6	S/R[2]
200		7.7	S	11.4	S	11.9	S	18.2	S	22.4	S	27.4	S
225		8.6	S	12.8	S	13.4	S	20.5	S	25.2	S	30.8	S
250		9.6	S	14.2	S	14.8	S	22.7	S	27.9	S	34.2	S
280		10.7	S	15.9	S	16.6	S	25.4	S	31.3	S	38.3	S
315		12.1	S	17.9	S	18.7	S	28.6	S	35.2	S	43.1	S
355		13.6	S	20.1	S	21.1	S	32.2	S	39.7	S	48.5	S
400		15.3	S	22.7	S	23.7	S	36.3	S	44.7	S	54.7	S
450		17.2	S	25.5	S	26.7	S	40.9	S	50.3	S	61.5	S
500		19.1	S	28.3	S	29.7	S	45.4	S	55.8	S	68.3*	S
560		21.4	S	31.7	S	33.2	S	50.8	S				
630		24.1	S	35.7	S	37.4	S	57.2	S				
710		27.2	S	40.2	S	42.1	S	64.5*	S				
800		30.6	S	45.3	S	47.4	S						
900		34.4	S	51.0	S	53.3	S						
1000		38.2	S	56.6	S	59.3	S						
1200		45.9	S	68.0*	S								

[1] = Gas operating pressure pursuant to DVGW
[2] = Available in coils for special transportation
[3] = Only pipes with outer pipe diameter of d.a. >63 mm

Dimensions pursuant to DIN EN 12201-2 Other dimensions on request S=Sections R=Coils
*Dimensions pursuant to DIN EN 8074

DVGW-approved pipe series: – Drinking water: SDR 7.4 and SDR 11 for PE 80, SDR 11 and SDR 17[3] for PE 100
– Gas (up to d.a. 630mm): SDR 17.6[3] and SDR 11 for PE 80, as well as SDR 11 and SDR 17[3] for PE 100

egeplast

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