

4 Open Trench Installation without Sand Bed

egeplast 90 10[®] RC^{plus}

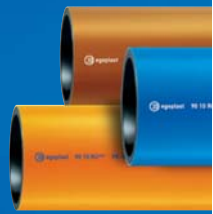


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4 Open Trench Installation without Sand Bed

4.1 Procedure Description

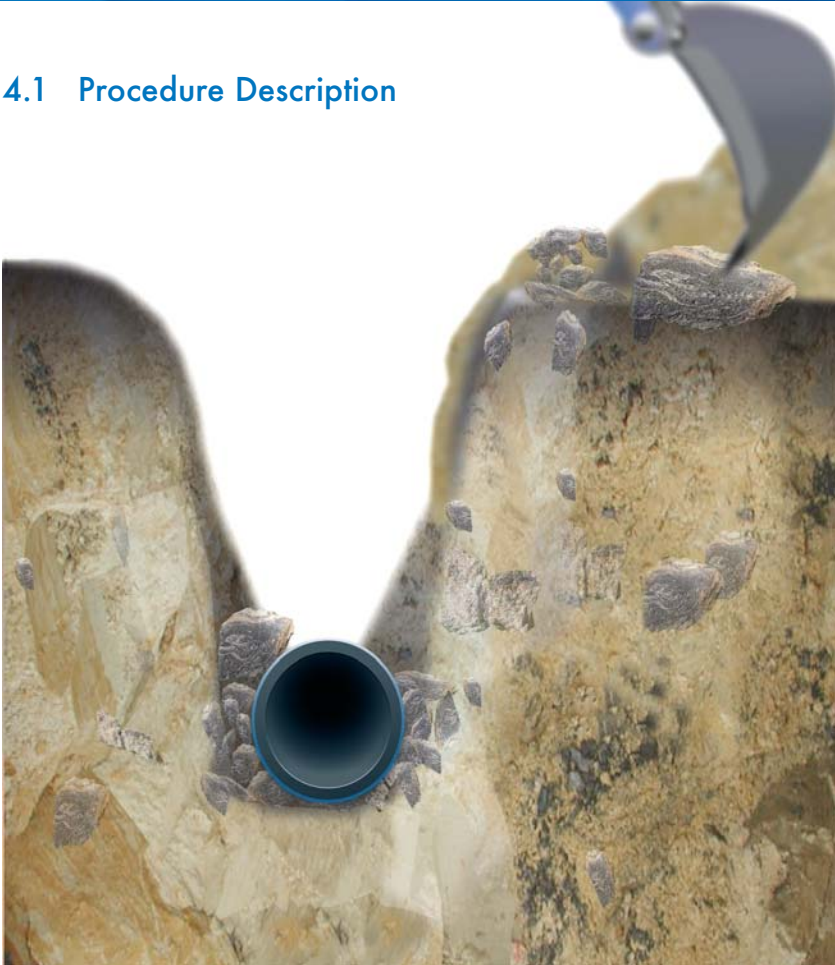


Fig 4-1: Backfilling with excavated soil permits faster, more cost-effective pipelaying.



Sand bedding not necessary thanks to modern materials

Increasing cost pressure is forcing many utilities to examine the necessity of costly sand bedding when installing new pipelines. If the excavated soil can be compacted, it can be reutilised for backfilling, instead of using sand. Of course, this presupposes a pipe system that can withstand the resultant loads. In rural regions, the possibility also exists of installing new pipelines at a tremendous rate using ploughing or milling.

Ploughing



Fig 4-2: In this procedure, the new pipe is ploughed in continuously, and the pipe furrow is closed again immediately afterwards.

Milling



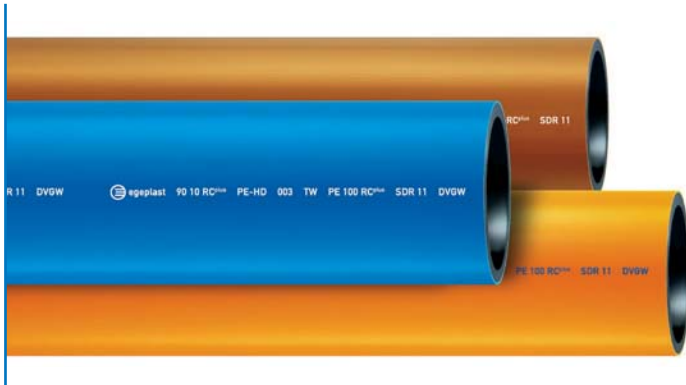
Fig 4-3: Special equipment cuts a narrow pipe trench into which the flexible pipe is laid in the same operation. The excavated soil is used as backfilling material.

Dispensing with the sand bedding can result in the outer surface of newly installed piping becoming scratched (max. 10% of the pipe wall thickness permissible). Furthermore, stones can exert point loads or linear loads on the outer surface of the pipe over an extended duration – in addition to the regular operating loads, such as internal pressure, soil and traffic loads – and thus cause damage. If pipe protection by means of a sand bed is dispensed with, the selected pipe system must be able to withstand the slight surface damage caused by scratches and, in particular, point loads, so that these do not result in stress-induced cracking.

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4.2 Product Description

egeplast 90 10[®] RC^{plus}



Drinking Water Pipes · Gas Pipes · Sewage Pressure Pipes

The egeplast 90 10[®] RC^{plus} 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[®] RC^{plus} pipe specially for open-trench installation without a sand bed and installation by ploughing or milling.

egeplast 90 10[®] RC^{plus} pipes made of PE 100 RC^{plus} offer the following technical properties:

- Long service life
- High flexural creep modulus
- High notched impact strength
- Problem free weldability
- High resistance to slow crack propagation and hence optimal protection against stress-induced cracking caused by point loads
- certified quality

Resistant to stress-induced cracking thanks to PE 100 RC^{plus}

The pipes are exposed to high point loads from stones in open trench installation without a sand bed. This can lead to the formation of stress-induced cracks.

The material for the egeplast 90 10[®] RC^{plus} pipe is ideally selected. egeplast uses RC^{plus} (Resistance to Cracking) materials of MRS class PE 100; these are especially resistant to stress-induced cracking. Because of their excellent resistance to cracking, these materials are able to withstand any point loads which may arise.

Inspection of the pipe surface at a glance

To guarantee 100% safety, it is necessary to be able to assess accurately any damage which may occur at the building site. Both the Deutsche Verein für Schweißtechnik (DVS) and the DVGW, as well as the Kunststoffrohrverband (KRV), permit material loss (scoring / notching) to a maximum of 10% of the wall thickness in their guidelines. For this reason, the egeplast 90 10[®] RC^{plus} pipe incorporates a 10% coloured outer layer within its nominal dimensions. This makes it possible to tell at a glance whether these specifications have been met.

The coloured outer layer also serves as colour coding for gas, drinking water or sewage pipes.

Pipes made of PE 100 RC^{plus} can also be supplied with an extremely resistant protective coating for use with trenchless installation techniques and renovation procedures. Please refer to Chapter 5 "Trenchless Installation / Renovation" and Chapter 6 "Locating and Validating the Integrity of the Installed Pipeline" for additional information.

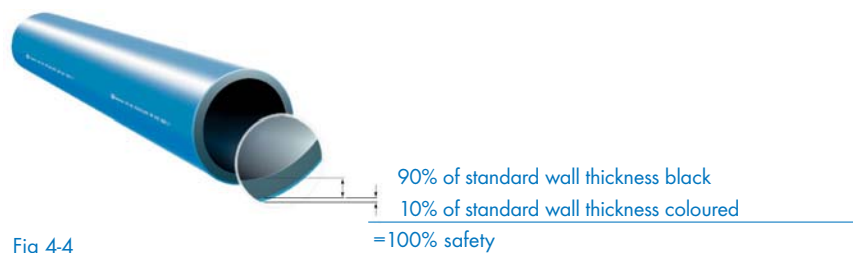


Fig 4-4

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egeplast 90 10[®] RC^{plus}



4.3 PE 100 RC^{plus} Quality Assurance

Modern installation procedures make special demands of pipe material. The materials used must satisfy additional requirements, over and above the material properties monitored according to the applicable standards and DVGW Worksheet GW 335 Part A2. The resistance of the pipe material to slow crack growth is critical

for the lifespan of the pipe under extreme operating conditions, if the pipe is to achieve the standard service life of 100 years in spite of the increased demands. In particular, resistance to stress-induced cracking can be improved enormously through optimised polymerisation. The qualities of today's PE 100 RC^{plus} allow it to almost

reach the resistance to stress-induced cracking of cross-linked polyethylene PEX, which has been used for years in harsh conditions.

The notch test and the FNCT test provide information about the stress-induced cracking behaviour (slow crack growth) of a pipe material.



Fig 4-5: Notch test (ISO 13479)

In the notch test according to ISO 13479, a section of pipe is notched as specified, and afterwards tested to destruction at a test temperature of 80 °C and test pressure of 9.2 bar (SDR 11, PE 100).

ISO 16770 describes a further development of the notch test. In the FNCT, small test bars of the material to be tested are incised with a sharp edge



Fig 4-6: Full notch creep test FNCT (ISO 16770)

and, at 80 °C (+2% Arkopal N 100), subjected to a constant tensile load of 4 N/mm² until they fail. The test simulates localised stress concentrations.

An additional check is the point load test using the Dr. Hessel method. This test reproduces very well the effect of a stone pressing against the pipe. A pipe, which has been internally pressurised, is also dented inwards using a round punch as

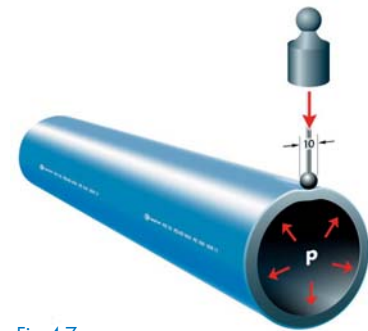


Fig 4-7: Point load test using the Dr. Hessel method

a point load (penetration depth: 8.2% of the external diameter) in order to simulate the stress caused by a stone. The test is carried out at a temperature of 80 °C (+2% Arkopal N 100).



So as to be able to make estimates of the service life of pipes under additional point loading, Dr. Hessel Ingenieurtechnik compared tests of pipes under internal pressure, and with additional point loading, to the results from the FNCT test (3R international 4/2001 and

6/2001). With this comparison, the stresses to which a pipe installed without a sand bed is exposed during its operating life may be related to the results of FNCT testing, and thus the FNCT test may be adopted for regular quality monitoring.

Performed within the framework of the full quality testing cycle are: monitoring of the material properties of all PE 100 RC^{plus} raw material charges by

FNCT tests, and monitoring of the material properties after processing of the raw material. The latter is carried out on the produced pipe by a testing laboratory which is accredited to perform such analyses. The PE 100 RC^{plus} materials perform distinctly better than the standard PE 100 types in both the notch and FNCT tests, with values that lie well above those stipulated for pipes with protective properties.

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	Internal Pressure Creep Test	S4 Test (Fast Crack Growth) 110x10 mm	Notch Test	FNCT	Point Load Test, Dr. Hessel Method
PE as per GW 335 Part A2	$\sigma = 12,4\text{N/mm}^2$; 20°C ≥ 100 h as per DIN 8075	pc ≥ 8 bar	80°C; 9.2bar ≥ 500 h	250 - 800 h 1)	1000 - 3000 h 1)
PE 100 + 2)	$\sigma = 12,4\text{N/mm}^2$; 20°C ≥ 200 h	pc ≥ 10 bar	80°C; 9.2bar ≥ 500 h	250 - 800 h 1) >300 h 3)	1000 - 3000 h 1)
PE 100 RC ^{plus}	$\sigma = 12,4\text{N/mm}^2$; 20°C ≥ 200 h	pc ≥ 10 bar	80°C; 9.2bar ≥ 5000 h	≥ 8760 h	≥ 8760 h

Tab 4-1 1) Values from 3R-international 4/2001 and 6/2001
2) The PE 100+ Association is an amalgamation of polyethylene manufacturers who voluntarily exceed the standard requirements
3) Data from a few manufacturers

The quality of the material utilised can be documented on request with a 3.1 B certificate.

egeplast uses only selected PE 100 materials (PE 100 RC^{plus}) for the egeplast 90 10[®] RC^{plus} pipe. These materials must demonstrate a time to failure of at least 8760 h in the FNCT. As an additional

control, the quality of PE 100 RC^{plus} is monitored within the framework of the full quality testing cycle. The quality of these materials is such that their suitability for a 100 year service life for a pipe under point loading may be confirmed by structural testing. egeplast 90 10[®] RC^{plus} pipes are subjected regularly to such structural testing: an internal pres-

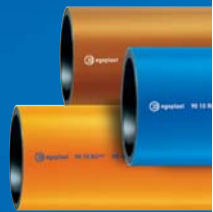
sure creep test lasting for one year, with additional point loading, at 80°C (+2% Arkopal N 100). The PE 100 RC^{plus} materials perform distinctly better than the standard PE 100 types in both the notch and FNCT tests, with values that lie well above those stipulated for pipes with protective properties.

Continuous quality monitoring



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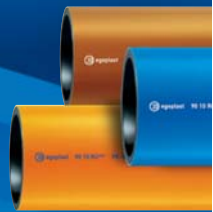


Testing of the Material PE 100 RC ^{plus}			
Property	Requirement	Test Procedure	Frequency
Melt index	as per specifications	EN ISO 1133:1999 Condition T 5 kg, 190°C 10 minutes	Min. 1 x per week as well as on every change of material and on every dimension check
Loss on drying	≤ 0.1%	Infrared method	per charge
Homogeneity	≤ grade 3	ISO 18553	per charge
Density	≥ 930 kg/m ³	DIN EN ISO 1183-2, DIN EN ISO 1872-1	per charge
Colour	as per DVGW GW 335 Part A2		regularly
Resistance to weathering	as per DVGW GW 335 Part A2 DIN EN 12201-1 DIN EN 1555-1	Black as per ISO 6964, blue and yellow as per DIN EN 921 and following DIN EN ISO 6259-1	regularly
Thermal stability	>20 minutes at 200°C	DIN EN 728	per charge
Microbiology	as per KTW recommendation as well as DVGW GW 335 Part A2	DVGW W 270	approval testing
Fast crack growth	as per DVGW GW 335 Part A2 DIN EN 12201-1 DIN EN 1555-1	ISO 13477	1 x annually
Gas resistance	as per DVGW GW 335 Part A2 DIN EN 12201-1 DIN EN 1555-1	DVGW GW 335 Part A2	approval testing
Hygiene	as per KTW recommendation as well as DVGW GW 335 Part A2	DIN EN 10204	approval testing
Odour and taste	as per KTW recommendation as well as DVGW GW 335 Part A2	DIN EN 10204	per charge
Slow crack growth	as per DVGW GW 335 Part A2 DIN EN 12201-1 DIN EN 1555-1	Notch test DIN EN ISO 13479	1 x annually
Slow crack growth	>8760 h as per Full Quality Testing Cycle	FNCT ISO 16770 80°C, 4 N/mm ² , 2% Arkopal	per charge

Tab 4-2

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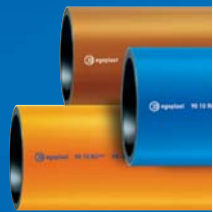
Additional Testing of the Finished PE 100 RC ^{plus} Piping			
Property	Requirement	Test Procedure	Frequency
Labelling	as per DVGW GW 335 Part A2 DIN EN 12201-2 DIN EN 1555-2	visual inspection	regularly every 2 hours
Texture	as per DVGW GW 335 Part A2	visual inspection	regularly every 2 hours
Colour	as per DVGW GW 335 Part A2	visual inspection	regularly every 2 hours
Warm storage	as per DVGW GW 335 Part A2		1 x per week
Homogeneity	as per DVGW GW 335 Part A2	visual inspection	1 x per week
Thermal stability	>20 minutes at 200 °C	DIN EN 728	1 x per week
Internal pressure creep test	as per DVGW GW 335 Part A2 DIN EN 12201-2 DIN EN 1555-2	80 °C, 165 h; PE 80 $\sigma = 4.6 \text{ N/mm}^2$ PE 100 $\sigma = 5.5 \text{ N/mm}^2$	on every start at least 1 x per week
Melt index	max. 20% variation from the raw material	EN ISO 1133:1999 Condition T 5 kg, 190 °C 10 minutes	on every change and on every dimension check at least 1 x per week
Hygiene	as per KTW recommendation as well as DVGW GW 335 Part A2	DVGW W 270	1 x annually
Labelling	as per DVGW GW 335 Part A2 DIN EN 12201-2 DIN EN 1555-2	visual inspection	regularly every 2 hours
Slow crack growth	>8760 h as per Full Quality Testing Cycle	FNCT ISO 16770 80 °C, 4 N/mm ² , 2% Arkopal	6 x annually
Point loading test	>8760 h as per Full Quality Testing Cycle	HESSEL PA PLP 2.2-2 2004-05 80 °C, 4 N/mm ² , 2% Arkopal	3 x annually

Tab 4-3

The egeplast 90 10[®] RC^{plus} pipe is, as a consequence of its excellent resistance to stress-induced cracking, insensitive to point loads and therefore need not be bedded in sand.

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HESSEL
Ingenieurtechnik

Confirmation of continuous Quality Inspection

Subject: Inspection of pipes made from PE 100 RC^{plus} within the scope of the „Full Quality Testing Cycle“

Product: egeplast 9010[®]-RC^{plus} pipe for drinking water, gas supply and waste water for non-conventional pipe installation

Manufacturer: egeplast Werner Strumann GmbH & Co. KG
Robert-Bosch-Str. 7, DE-48268 Greven, Germany

Scope of inspection:
(Full Quality Testing Cycle)



1. Prove of the transfer-function from testing to service conditions
2. Inspection of the materials properties of all raw material batches designated as PE 100 RC^{plus} using the FNCT
3. Inspection of the materials properties after processing
4. Prove of the expected minimum service life using pipes under point load in type tests every year
5. Statistical validation of the minimum requirements of PE 100 RC^{plus}

This is to certify that due to the above mentioned inspections the following minimum requirements are fulfilled:

FNCT (PA FNCT 2.1-3 2004-03): 4 N/mm², 80 °C, 2% Arkopal N-100 testing time: > 8760 h

Point loading test (PA PLP 2.2-2 2004-05): 4 N/mm², 80 °C, 2% Arkopal N-100 testing time: > 8760 h

The egeplast 9010[®]-RC^{plus} pipes made from PE 100 RC^{plus} are qualified for sandless installation techniques.

HESSEL Ingenieurtechnik GmbH Officially approved as a test, inspection and certification facility (NRW 37).

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Net: www.hessel-ingtech.de



According to DIN EN ISO/IEC 17025 accredited Test-Laboratory by
DAP Deutsches Akkreditierungssystem Prüfwesen GmbH

Date: 11.05.2007

Authorized to sign:

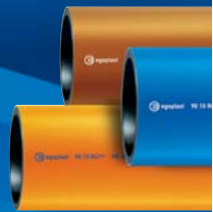
(Dr.-Ing. Joachim Hessel)

It is not allowed to multiply this confirmation or parts of this confirmation without written permission of HESSEL Ingenieurtechnik.

Fig 4-8

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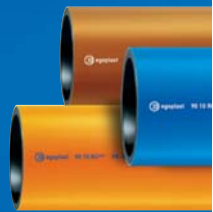
4.4 Technical Information

4.4.1 Product Data Sheet for egeplast 90 10[®] RC^{plus} Drinking Water Pipes

Dimension:	OD 25 mm – OD 630 mm
Pipe construction:	 <ul style="list-style-type: none">• 90% of the nominal wall thickness on the inside black• 10% of the nominal wall thickness on the outside blue to identify the medium as drinking water SDR 17 ≥ 160 mm, SDR 11
Material:	PE 100 RC ^{plus} (Resistance to Crack)
Approval:	DVGW
Standards:	DVGW GW 335 Part A2; DIN 8074/75; DIN EN 12201
Welding group:	003
Finish:	With smooth ends
Labelling:	With coloured metre marking
Delivery form:	<ul style="list-style-type: none">• 6, 12 or 20 m straight lengths (up to max. 30 m)• Bundled coils of 100 m (up to OD 160/180 mm)• Custom lengths on request• Larger lengths on drums
Regulatory code / installation methods:	DVGW W400-1/2, DIN EN 805; DIN 4124
Material testing:	HESSEL Ingenieurtechnik 

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4.4.2 Product Data Sheet for egeplast 90 10[®] RC^{plus} Gas Pipes

Dimension:	OD 25 mm – OD 630 mm
Pipe construction:	 <ul style="list-style-type: none">• 90% of the nominal wall thickness on the inside black• 10% of the nominal wall thickness on the outside orange to identify the medium as natural gas <p>SDR 17 ≥ 160 mm, SDR 11</p>
Material:	PE 100 RC ^{plus} (Resistance to Crack)
Approval:	DVGW
Standards:	DVGW GW 335 Part A2; DIN 8074/75; DIN EN 1555
Welding group:	003
Finish:	With smooth ends
Labelling:	With coloured metre marking
Delivery form:	<ul style="list-style-type: none">• 6, 12 or 20 m straight lengths (up to max. 30 m)• Bundled coils of 100 m (up to OD 160/180 mm)• Custom lengths on request• Larger lengths on drums
Regulatory code / installation methods:	DVGW G 472, DIN EN 12007; DIN 4124
Material testing:	HESSEL Ingenieurtechnik 

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4.4.3 Product Data Sheet for egeplast 90 10[®] RC^{plus} Sewage Pressure Pipes

Dimension:	OD 25 mm - OD 630 mm
Pipe construction:	 <ul style="list-style-type: none">• 90% of the nominal wall thickness on the inside black• 10% of the nominal wall thickness on the outside brown to identify the medium as sewage <p>SDR 17 ≥ 160 mm, SDR 11</p>
Material:	PE 100 RC ^{plus} (Resistance to Crack)
Approval:	The egeplast 90 10 [®] RC ^{plus} sewage pressure pipes are monitored by the 'Süd-deutsches Kunststoff-Zentrum (SKZ)' in Würzburg
Standards:	DVGW GW 335 Part A2; DIN 8074/75; DIN EN 13244
Welding group:	003
Finish:	With smooth ends
Labelling:	With coloured metre marking
Delivery form:	<ul style="list-style-type: none">• 6, 12 or 20 m straight lengths (up to max. 30 m)• Bundled coils of 100 m (up to OD 160/180 mm)• Custom lengths on request• Larger lengths on drums
Regulatory code / installation methods:	Recommended: by analogy to DVGW W400-1/2, DIN EN 805; DIN 4124
Material testing:	HESSEL Ingenieurtechnik 

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4.5 Installation Guidelines for egeplast 90 10[®] RC^{plus} Pipes

Supplement to the installation instructions for PE pressure pipes A 135 and A435 from the Kunststoffrohrverband e.V. in Bonn

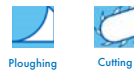
4.5.1 General Information on Installation

The egeplast 90 10[®] RC^{plus} pipe is a pressure pipe made of PE 100 RC^{plus} (Resistance to Cracking) with the highest resistance to slow crack propagation. The pipe wall incorporates a coloured outer layer which accounts for 10% of its thickness and is included in the nominal dimensions of the pipe. This layer facilitates an accurate assessment of the pipe surface as required by the relevant regulating bodies (e.g. EN, DVS, DVGW, KRV) – only 10% damage is permitted. Developed especially for open trench installation without a sand bed, as well as for installation by ploughing and cutting.

Scope of application

The installation instructions apply to soil covered egeplast 90 10[®] RC^{plus} pipes made of PE 100 RC^{plus} in accordance with DIN 8074 and DIN 8075 for use as drinking and domestic water pipelines, and as gas pipelines. The pipe joints and pipeline components must be rated for use with their respective operating pressures.

Installation, ploughing and milling



The egeplast 90 10[®] RC^{plus} pipe is flexible and manoeuvrable.

These attributes make installation using the ploughing or milling procedures possible. The minimum allowable bend radius should be observed. The bend radius can, however, be under-stepped for a short time during the installation process, provided that the pipe string is supported by some mechanism, e.g. guide rollers, that makes kinking of the pipe impossible. The increased stretching of the outer fibres which results from this is not critical for PE 100 RC^{plus}, the material used here.

Installation, open-trench method



egeplast 90 10[®] RC^{plus} pipes are suited for installation without a sand bed because they are made of PE 100 RC^{plus}, which is particularly resistant to stress-induced cracking. Their suitability for installation without a sand bed is verified by an independent testing institute on the basis of continual quality checks.

The excavated soil is suitable for back-filling if it can be compacted. egeplast does not make any provisos for its composition in terms of grain size. Considerable cost savings result from eliminating the need to dispose of the excavated soil.

For assessment of individual cases, it is necessary to determine the total cost of soil replacement and weigh that against the additional cost of the egeplast 90 10[®] RC^{plus} pipe.



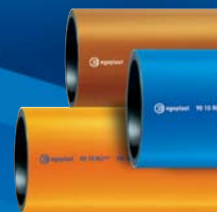
Fig 4-9: Schematic diagram Ploughing procedure



Fig 4-10: Schematic diagram Milling procedure

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4.5.2 Joining Techniques

Electrofusion welding

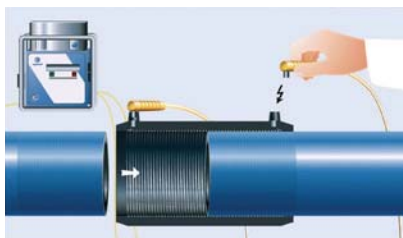


Fig 4-11: Electrofusion welding

egeplast 90 10[®] RC^{plus} pipes may be welded to all the commonly used moulded fittings made from PE 100 and PE 80 for electrofusion welding. The surface is to be prepared for welding by machining in accordance with DVS Guideline 2207, Part 1. egeplast recommends, as do the fittings manufacturers, the use of rotary scrapers to remove the oxide film. The guidelines and specifications given by the fittings manufacturers must also be followed.

Butt fusion welding

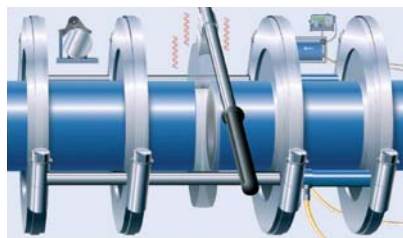


Fig 4-12: Butt fusion welding

egeplast 90 10[®] RC^{plus} pipes are manufactured using a coextrusion process from PE 100 RC^{plus} materials of welding group 003. The individual pipe layers are inseparably bonded together in this process. The two-layered composition permits butt fusion welding of the pipes with one another as well as joining with any other approved material. The joining process is based on the welding parameters given by DVS 2207.

The PE 100 RC^{plus} materials correspond to welding group 003. All of the PE100 RC^{plus} materials used by egeplast have demonstrated their suitability for welding in accordance with DVS.

Mounting of tapping fittings

There are no requirements differing from normal engineering practice for mounting welded tapping fittings onto egeplast 90 10[®] RC^{plus} pipes.

Flanged joints

The following types of design are commonly used for making flanged joints (see DIN 16963 Parts 4 and 8):

- Stub end for electrofusion welding
- Stub end for butt fusion welding

The axes of the pipeline sections to be joined must be aligned when making flange joints. The bolts should be tightened evenly in a crosswise sequence.

Screw-clamp joints

egeplast 90 10[®] RC^{plus} pipes can be joined using clamp connectors made of plastic or metal.

Clamp connectors made of plastic must conform to DIN 8076 Part 3; those made of metal must conform to DIN 8076 Part 1 or 2.

The pipe end must be flared when using clamp joints with support bushings. This is usually accomplished by driving in the support bushings.

The pipe end should be chamfered on the inside without notching when assembling clamp joints.

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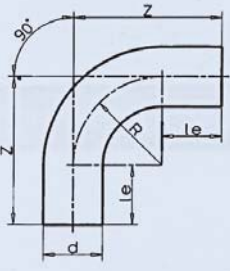

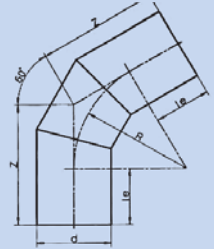
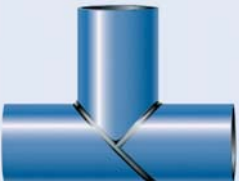
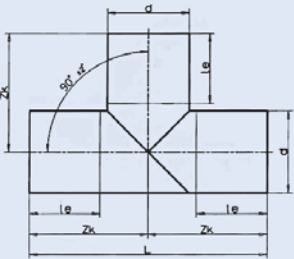
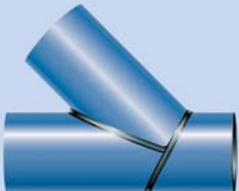
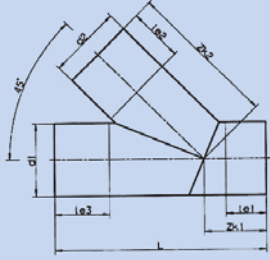
egeplast 90 10[®] RC^{plus}



4.5.3 System Techniques

egeplast 90 10[®] RC^{plus} pipes can be integrated into the pipeline network with all the moulded fittings and joining elements normally used in the trade. The manufacturers' instructions should be followed in doing so.

Moulded fittings, of PE 100 RC^{plus} quality, are also offered as part of the product range of egeplast 90 10[®] RC^{plus} pipes. A selection of the commonly used moulded fittings is shown below.

<p>Seamlessly drawn elbow made of PE 100 RC^{plus}</p> <p>Constructed according to requirements</p>		
<p>Segmented elbow made of PE 100 RC^{plus}</p> <p>Constructed according to requirements</p>		
<p>Segmented T-Pieces made of PE 100 RC^{plus}</p> <p>Constructed according to requirements</p>		
<p>Branches made of PE 100 RC^{plus}</p> <p>Constructed according to requirements</p>		

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4.6 RFP Forms

4.6.1 RFP Form for egeplast 90 10[®] RC^{plus} Drinking Water Pipe



Preliminary note:

Drinking water pipe in accordance with DIN 8074/8075, DIN EN 12201 for installation without a sand bed, made of PE 100 RC^{plus} with the highest resistance to slow crack growth (FNCT minimum requirement: ≥ 8760 h in accordance with DVS 2203-4; $T=80^{\circ}\text{C}$, $\sigma=4\frac{\text{N}}{\text{mm}^2}$, 2% Arkopal), 90% of the nominal wall thickness black, 10% of the nominal wall thickness on the outside blue to identify the medium as drinking water. Verified in accordance with both DIN 8075 and DVGW GW 335 Part A2, with an integrated 10% coloured indicator layer, included in the nominal dimensions, on the outside, to facilitate an accurate assessment of the pipe surface as required by the relevant regulating bodies.

Monitoring of constant material quality as well as regular structural testing is carried out by an independent testing institute which is accredited according to DIN EN ISO/IEC 17025 to perform such analyses. The suitability of the product for installation without a sand bed is verified by an independent assessor.

All necessary pipeline joints created by means of either electrofusion welding or butt fusion welding are to be made according to the requirements of the applicable DVS technical guidelines. The pipeline junctions are to be completed according to the pipe manufacturer's current technical manual. The piping is to be stored and transported on the building site in compliance with the KRV guidelines.

Product:

egeplast 90 10[®] RC^{plus} drinking water pipe
made of PE 100 RC^{plus} or equivalent

Manufacturer:

egeplast Werner Strumann GmbH & Co. KG
Robert-Bosch-Str. 7 48268 Greven, Germany
Tel.: +49.2575.9710-0 Fax: +49.2575.9710-110
e-mail: info@egeplast.de <http://www.egeplast.de>

Specification of services:

egeplast 90 10[®] RC^{plus} drinking water pipe
made of PE 100 RC^{plus} with dimensions:

_____mm, SDR_____

delivered as straight lengths of 6 / 12 m

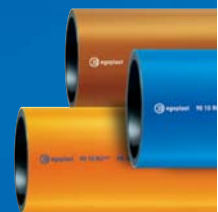
delivered as bundled coils in lengths of _____m

Deliver _____running metres and install professionally according to DIN and appropriate installation guidelines

as drinking water pipe: _____€ / running metre

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egeplast 90 10[®] RC^{plus}



4.6.2 RFP Form for egeplast 90 10[®] RC^{plus} Gas Pipe



Preliminary note:

Gas pipe in accordance with DIN 8074/8075, DIN EN 1555 for installation without a sand bed, made of PE 100 RC^{plus} with the highest resistance to slow crack growth (FNCT minimum requirement: ≥ 8760 h in accordance with DVS 2203-4; $T=80^{\circ}\text{C}$, $\sigma=4\frac{\text{N}}{\text{mm}^2}$, 2% Arkopal), 90% of the nominal wall thickness black, 10% of the nominal wall thickness on the outside orange to identify the medium as natural gas. Verified in accordance with both DIN 8075 and DVGW GW 335 Part A2, with an integrated 10% coloured indicator layer, included in the nominal dimensions, on the outside, to facilitate an accurate assessment of the pipe surface as required by the relevant regulating bodies.

Monitoring of constant material quality as well as regular structural testing is carried out by an independent testing institute which is accredited according to DIN EN ISO/IEC 17025 to perform such analyses. The suitability of the product for installation without a sand bed is verified by an independent assessor.

All necessary pipeline joints created by means of either electrofusion welding or butt fusion welding are to be made according to the requirements of the applicable DVS technical guidelines. The pipeline junctions are to be completed according to the pipe manufacturer's current technical manual. The piping is to be stored and transported on the building site in compliance with the KRV guidelines.

Product:

egeplast 90 10[®] RC^{plus} gas pipe
made of PE 100 RC^{plus} or equivalent

Manufacturer:

egeplast Werner Strumann GmbH & Co. KG
Robert-Bosch-Str. 7 48268 Greven, Germany
Tel.: +49.2575.9710-0 Fax: +49.2575.9710-110
e-mail: info@egeplast.de <http://www.egeplast.de>

Specification of services:

egeplast 90 10[®] RC^{plus} gas pipe
made of PE 100 RC^{plus} with dimensions:

_____mm, SDR_____

delivered as straight lengths of 6 / 12 m

delivered as bundled coils in lengths of _____m

Deliver _____running metres and install professionally according to DIN and appropriate installation guidelines

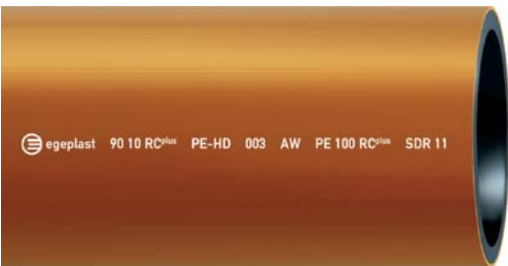
as gas pipe: _____€ / running metre

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egeplast 90 10[®] RC^{plus}



4.6.3 RFP Form for egeplast 90 10[®] RC^{plus} Sewage Pressure Pipe



Preliminary note:

Sewage pressure pipe in accordance with DIN 8074/8075, DIN EN 12201 for installation without a sand bed, made of PE 100 RC^{plus} with the highest resistance to slow crack growth (FNCT minimum requirement: ≥ 8760 h in accordance with DVS 2203-4; $T=80^{\circ}\text{C}$, $\sigma=4\frac{\text{N}}{\text{mm}^2}$, 2% Arkopal), 90% of the nominal wall thickness black, 10% of the nominal wall thickness on the outside brown to identify the medium as sewage. Verified in accordance with DIN 8075, SKZ monitored, with an integrated 10% coloured indicator layer, included in the nominal dimensions, on the outside, to facilitate an accurate assessment of the pipe surface as required by the relevant regulating bodies.

Monitoring of constant material quality as well as regular structural testing is carried out by an independent testing institute which is accredited according to DIN EN ISO/IEC 17025 to perform such analyses. The suitability of the product for installation without a sand bed is verified by an independent assessor.

All necessary pipeline joints created by means of either electrofusion welding or butt fusion welding are to be made according to the requirements of the applicable DVS technical guidelines. The pipeline junctions are to be completed according to the pipe manufacturer's current technical manual. The piping is to be stored and transported on the building site in compliance with the KRV guidelines.

Product:

egeplast 90 10[®] RC^{plus} sewage pressure pipe
made of PE 100 RC^{plus} or equivalent

Manufacturer:

egeplast Werner Strumann GmbH & Co. KG
Robert-Bosch-Str. 7 48268 Greven, Germany
Tel.: +49.2575.9710-0 Fax: +49.2575.9710-110
e-mail: info@egeplast.de <http://www.egeplast.de>

Specification of services:

egeplast 90 10[®] RC^{plus} sewage pressure pipe
made of PE 100 RC^{plus} with dimensions:

_____mm, SDR_____

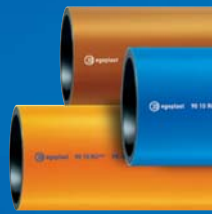
- delivered as straight lengths of 6 / 12 m
- delivered as bundled coils in lengths of _____m

Deliver _____running metres and install professionally according to DIN and appropriate installation guidelines

as sewage pressure pipe: _____€ / running metre

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egeplast 90 10[®] RCplus



4.7 Recycling and Environmental Protection



Fig 4-13

Polyethylene is an organic material and consists only of carbon and hydrogen. It has a wholly neutral impact on the environment. PE, being a thermoplastic, can be remelted an almost unlimited number of times and processed into new products. Pipe off-cuts and discarded plastic pipe material, which, for example, accumulate during the installation of plastic pipe systems, should therefore be recycled if at all possible.

At the start of 1994, the Kunststoffrohrverband (KRV), together with the Gütegemeinschaft Kunststoffrohre (GKR), had already introduced a national collection and recycling system for plastic materials, which is free of charge for the trade and its customers and incorporates an obligation to take back these materials. This environmentally conscious system eliminates dumping or incineration together with the high costs which arise from disposal by these methods.



Fig 4-14: Recycling box

Recycling boxes are provided on a loan basis to the customer as collection containers. The plastic pipe material, at least partially cleaned, is then thrown into these boxes. Once the boxes have been filled, their collection and exchange for empty boxes is arranged. Only boxes which are filled exclusively with plastic pipe material are taken. The recycling boxes are then brought, via regional collection points, to a recycling plant in which the collected pipe material is sorted, cleaned, and cut into small pieces to be employed subsequently for other uses.

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