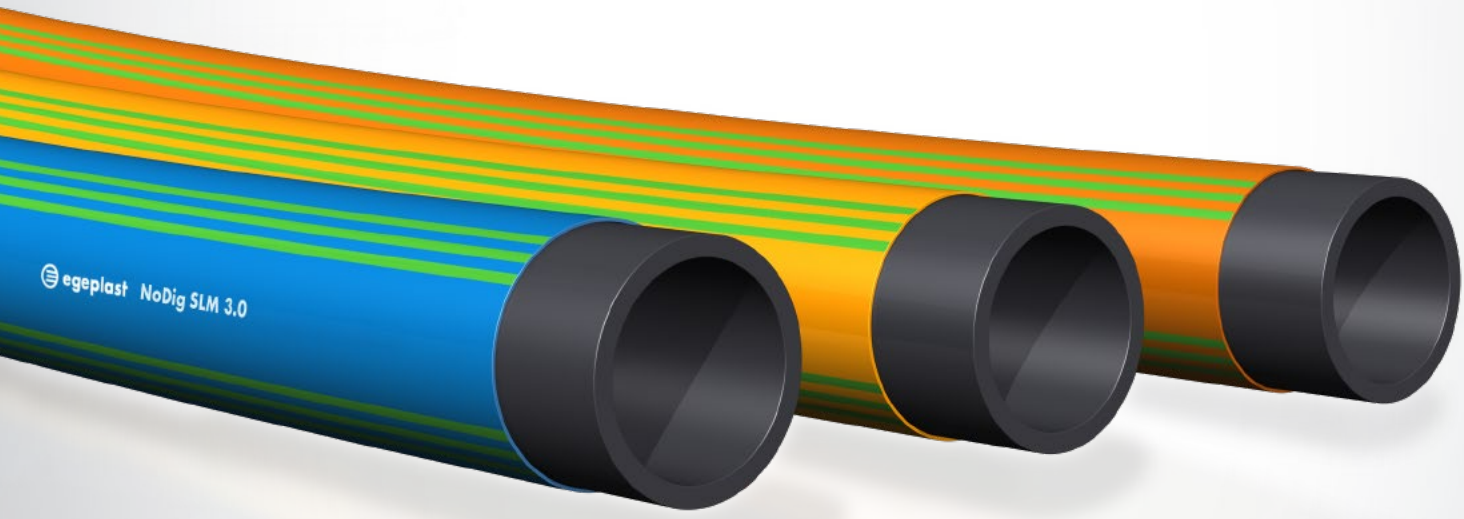
egeplast

NoDig SLM® 3.0

Processing Guidelines



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Foreword

Details given in this brochure reflect the state of the art. No claim is made with regard to their completeness, they are intended for instruction and guidance; no obligation may be derived from it. Mistakes and subject to change reserved.

Our customer service will be pleased to answer any further questions regarding the installation or use of our products, or any other questions. In addition, our customer and applications engineering services are pleased to be at your disposal to provide any technical guidance that you may want.

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Telephone: +49 2575 9710-0
Fax: +49 2575 9710-110
Email: info@egeplast.de

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1 Processing Guidelines

NoDig SLM® 3.0 Pipes

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

1.1 General Information

The NoDig SLM® 3.0 consists of a core pipe according to DIN 8074/75, upon which a protective layer is additionally extruded in order to increase its scratch and abrasion resistance. The green stripes serve to identify it as multilayer pipe.

Scope of Application

The processing guidelines apply to buried egeplast NoDig SLM® 3.0 pipes with inner pipes made of PE 100-RC. The pipe connections and pipeline components must comply with the respective operating pressure.

Installation, Ploughing and Milling


Ploughing


Milling

The egeplast NoDig SLM® 3.0 pipe is quite flexible. This makes installation using the ploughing or milling procedures possible. The minimum allowable bending radius should be observed. If the radius falls below the minimum permissible bending radii because of the installation method chosen, any damage like kinking or overstretching must be ruled out.

Installation, open trench


Open with sand bed


Open without sand bed

egeplast NoDig SLM® 3.0 pipes are suitable for installation without a sand bed due to the highly stress cracking resistant material PE 100-RC. The excavated material is suitable for backfilling, as long as it can be compacted.

In order to assess the filling soil, the DIN 18196, inter alia, is relevant. The pipe trench is to be constructed among others, according to DIN 4124 (Excavation Pits and Trenches). The minimum covering for gas pipelines are 0.6 to 1.0 m, by which covering can be reduced to 0.5 m for sections up to a length of approximately 2.0 m, that do not have to bear any particular load (front yards, walkways). Potable water pipes must be laid frost-resistant by covering them at depths of 1.0 to 1.8 m (according to climate and soil conditions). Apart from this, DVGW Worksheet W400-2 shall apply for the Construction of Water Mains.

Installation, trenchless method


Soil displacement


Relining


Horizontal Directional Drilling


Pipe Bursting

Multilayer pipes such as the egeplast NoDig SLM® 3.0 is a practical solution in the case of trenchless installation and rehabilitation, as the outer surface of the pipe is securely protected against wear. The DVGW Worksheets GW 321 „Horizontal Directional Drilling" and GW 323 „Pipe Bursting" recommend the application of such protective layer pipes.

- The DVGW rules define the maximum permissible tensile forces. Exceeding the permissible tensile forces will cause permanent damage to the new pipeline and shall be prevented by taking the appropriate measures. The tensile forces are to be measured and recorded.
- The minimum permissible bending radius is to be observed.
- In the case of protective layer pipes, special pulling heads with an outer sleeve, that surrounds the protective layer, are recommended. Alternatively, the joint edge is to be constructively protected, e.g. by welded seam. See also Figures 1-1 and 1-2.
- The axially force-locking connection must be established according to applicable rules of DVGW and DVS.
- In order to prevent protruding edges at the joints, the egeplast processing guidelines must be observed.


Fig 1-1


Fig 1-2

1.2 Permissible Bending Radii

The bending radius must not fall below any of the following bending radii. Pipe bends or fittings are to be used in the case of smaller radii.

Pipe wall temperatures [°C]	Minimum permissible bending radius R_{min} [in mm]				
	SDR 33	SDR 26	SDR 17/17.6	SDR 11	SDR 7.4
0	150.0 x OD	112.5 x OD	75.0 x OD	75.0 x OD	75.0 x OD
10	100.0 x OD	75.0 x OD	52.5 x OD	52.5 x OD	52.5 x OD
20	60.0 x OD	45.0 x OD	30.0 x OD	30.0 x OD	30.0 x OD

Tab1-1: Following KRV Installation Instructions A 135/99-15 und A 435/96-10, DVGW Worksheet GW 320, GW 321, GW 324, GW 325 and DVGW Code of Practice GW 323

OD = Outer diameter core pipe [in mm]

$$R_{interpolated} = R_{20°C} + \left[\frac{R_{0°C} - R_{20°C}}{20°C}\right] \cdot (20°C - \vartheta_{pipe\ wall})$$

with:

$R_{interpolated}$ = required bending radius [mm]
$R_{0°C}$ = Bending radius of the pipe at 0°C [mm]
$R_{20°C}$ = Bending radius of the pipe at 20°C [mm]
$\vartheta_{pipe\ wall}$ [°C] = Temperature of the pipe wall during installation

In the case of pipe wall temperatures between 0°C and 20°C, the respective permissible bending radius can be determined by linear interpolation.

Temporary permissible bending radii for e.g. trenchless installation methods

Pipe wall temperatures [°C]	Temporary permissible, construction-related bending radii R_{min} [in mm] for e.g. trenchless installation methods	
	SDR 17	SDR 11
0	56.0 x OD	37.0 x OD
20	22.0 x OD	15.0 x OD

Tab1-2: Following DVGW Worksheet GW 320-1

OD = Outer diameter core pipe [in mm]

ⓘ In the case of a temporary, process-related reduction of the permissible bending radii, damage caused by buckling when bending or overexpanding must be constructively ruled out.

ⓘ The above-mentioned bending radii do not apply to pipes, whose joints were post-factory coated with a mechanical protective coating, as e.g. two-component polyurethane coatings.

1.3 Permissible Tensile Forces

The values apply to pipes made of PE 100, PE 100-RC as well as to egeplast protective layer pipes such as the NoDig SLM® 3.0 (since only the medium-carrying pressure pipe will be burdened during pipe installation). They are to be measured and recorded. Exceeding the permissible tensile forces will lead to permanent damage of the pipeline, appropriate measures shall be taken to avoid this.

Special pulling heads are to be used. In order to prevent protruding edges and to ensure that the edge of the protective layer is no additional obstacle when installing, pulling heads with an outer sleeve which surrounds the protective outer layer are commonly used. As an alternative, the protruding edge is to be constructively protected.

Tensile force: Permissible tensile force in kN for pipes of PE 100 and PE 100-RC at 20 °C pipe wall temperature

Note: Values are to be reduced by 10% for pulling periods of > 30 min. and 25% for a pulling period of > 20 h.

Outer diameter	Permissible tensile force NoDig SLM® 3.0			
OD [mm]	SDR 17.6 [kN]	SDR 17 [kN]	SDR 11 [kN]	SDR 7.4 [kN]
25		1.31	1.64	2.36
32	1.71	1.80	2.65	3.81
40	2.72	2.83	4.22	5.96
50	4.29	4.43	6.56	9.34
63	6.71	7.06	10.42	14.69
75	9.55	9.96	14.56	20.93
90	13.60	14.34	21.06	30.01
110	20.51	21.43	31.40	45.00
125	26.28	27.33	40.66	57.94
140	33.16	34.32	50.76	72.83
160	43.12	44.89	66.66	94.97
180	54.38	56.88	84.25	120.04
200	67.51	70.29	103.90	148.50
225	85.29	89.03	131.64	187.81
250	105.14	109.30	162.01	231.74
280	131.85	137.29	203.06	290.67
315	166.99	173.98	257.20	367.97
355	211.37	221.22	326.38	466.77
400	268.93	280.03	414.55	593.08
450	339.90	354.89	525.39	750.23
500	420.55	438.59	648.06	925.83
560	525.86	549.18	812.24	
630	666.20	695.93	1028.79	

Tab 1-3: See also DVGW Worksheets GW 320, GW 321, GW 324, GW 325 and DVGW Code of Practice GW 323



Fig 1-3



Fig 1-4

1.4.1 Butt Welding

Processing Information

The NoDig SLM® 3.0 pipes can be welded **without prior removal of the protective layer, a removal of the protective outer layer is not necessary.** The principle used for joining is DVS Guideline 2207 Part 1.

ⓘ The protective layer should be removed from the welding area when connecting to protective pipes from other manufacturers and when connecting to standard pipes or fittings and components made from PE 100/ PE 100-RC. Suitable peeling tools should be used to remove the protective layer. egeplast recommends using M10 peelers (for use on pipes up to OD 225 mm) or M10 maxi (for use on pipes with OD ≥180 mm).

ⓘ The subsequent application of weld seam protection systems after joining is not necessary.

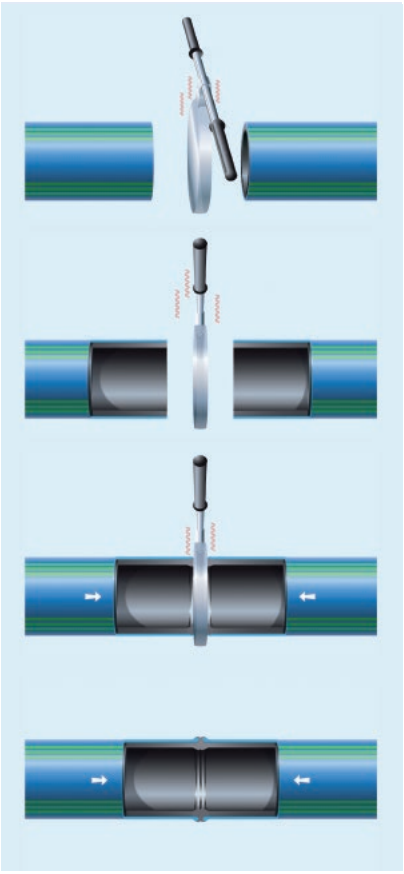
ⓘ Special clamps which are adapted to the outer diameter are required using butt fusion so that the ends of pipes can be securely positioned. Appropriate clamps and any adapters that may be required for particular tasks can be obtained from egeplast.

Overview of outer and core pipe diameter of egeplast NoDig SLM® 3.0	
Medium-Bearing pipe DIN 8074 OD [mm]	Outer diameter egeplast NoDig SLM® 3.0 [mm]
25	27.0
32	34.2
40	42.2
50	52.6
63	65.8
75	78.0
90	93.0
110	114.0
125	129.0
140	144.0
160	165.0
180	186.0
200	206.0
225	231.0
250	257.0
280	287.0
315	322.0
355	363.0
400	408.0
450	459.0
500	509.0
560	569.0
630	639.0
710	720.0
800	810.0
900	910.0
1000	1010.0
1200	1210.0

Subject to manufacturing tolerances

Tab 1-4

Joining Principle



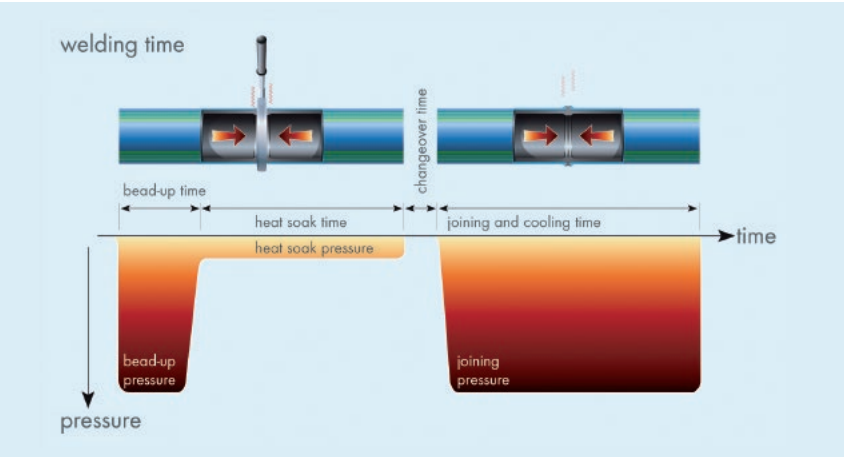


Fig 1-5 (top): Time flow for butt fusion in accordance with DVS 2207 Part 1

Fig 1-6 (left): Principle of butt fusion of egeplast NoDig SLM® 3.0 pipes without cutting back the outer layer

After trimming the pipe ends, the joining surfaces of the pipes are moved to the heating element and heated under pressure, until a circumferential bead has formed (bead-up).

Heat soaking then takes place almost without pressure. On completion of the heat soak time, the heating element is removed (changeover) and the pipes are joined under pressure (joining), keeping the changeover time as short as possible.

The pipes must be allowed to cool down without tension under joining pressure.

Joining Procedure

Due to the enlarged pipe crosssection when **welding egeplast NoDig SLM® 3.0 pipes without any removal of the protective outer layer**, egeplast recommends adapting the welding parameters in order for the procedure to comply with guidelines. The enlarged outer diameter and the thicker pipe wall should accordingly be taken into consideration when calculating the settings.

In addition to the bead-up and joining pressure, the bead height as well as the corresponding times (heat-soak and cooling) should be adapted to the dimension of pipe. The welding principle is DVS Guideline 2207 Part 1. Under DVS 2207-1, a guidance value of 0.15 N/mm² should be applied for bead-up and joining of PE-HD pipes under pressure. The reference value for the heating element temperature is 220 °C.

egeplast will be happy to provide the relevant tables of parameters for standard butt fusion jointing machines. Alternatively these are available to download from www.egeplast.de.

Calculating the joining pressures

Drag pressure of the machine

+ adapted bead-up resp. cooling pressure
(depending on the SLM® pipe dimension and machine)

= joining pressure

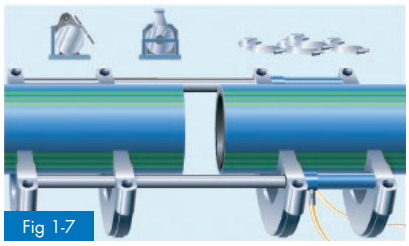


Fig 1-7

Insertion of the special clamps for protective pipes

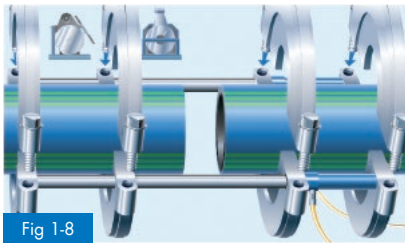


Fig 1-8

Insertion of the pipes in the butt welding machine

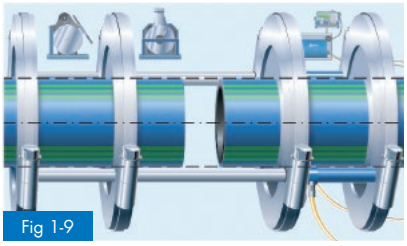


Fig 1-9

Clamping and aligning the pipes
To simplify compensation for misalignment, position the pipes by aligning the print on the individual rods.

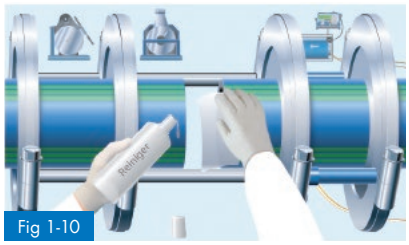


Fig 1-10

Cleaning pipes by using PE cleaner and clean, undyed, lint-free paper

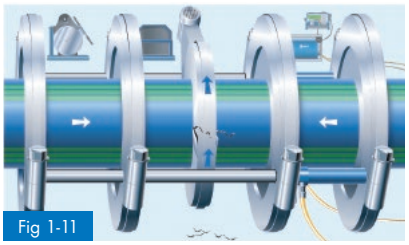


Fig 1-11

Trimming the pipe ends, carefully removing any debris from the joining area of the pipes

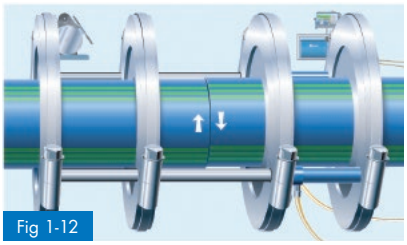


Fig 1-12

Check pipes for **misalignment** (maximum 0.1 x wall thickness) and gap width (see Tab 1-5). Where necessary clean joining surfaces again with PE cleaner and clean, undyed, lint-free paper

OD ≤ 355 mm	gap width ≤ 0.5 mm
400 mm ≤ OD < 630 mm	gap width ≤ 1.0 mm
630 mm ≤ OD < 800 mm	gap width ≤ 1.3 mm
800 mm ≤ OD ≤ 1000 mm	gap width ≤ 1.5 mm
OD > 1000 mm	gap width ≤ 2.0 mm

Tab 1-5: Maximum permissible gap widths under DVS 2007 Part 1

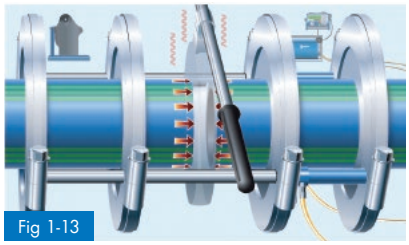


Fig 1-13

Bead-up and heat soaking

Insert the heating element and position; reference value for the heating element temperature is 220 °C.

Press pipes against the heating element. Start pre-heating after initial bead-up.

ⓘ The joining surfaces of the pipes being welded may not be damaged and must be free from contamination.

ⓘ When **welding egeplast NoDig SLM® 3.0 pipes without removal of the protective layer**, egeplast recommends adapting the welding parameters in order for the procedure to comply with guidelines.

egeplast will be happy to provide the relevant tables of parameters for standard butt fusion jointing machines. Alternatively these are available to download from www.egeplast.de.

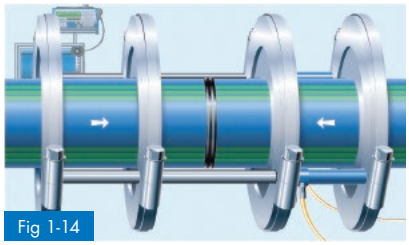


Fig 1-14

At the end of the pre-heating time, remove the heating element and bring together the pipe end faces within the changeover time. **Build up joining pressure**. **Cool** the pipes **down under joining pressure**.

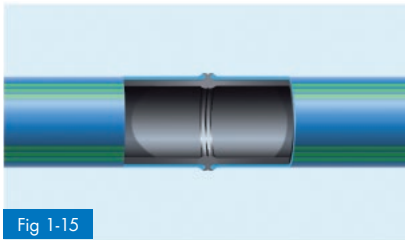


Fig 1-15

At the end of the cooling period, release the pipes from the machine and remove them.

Installation Information

ⓘ In the case of pipe bursting, the recommendation is to remove the external bead after joining (in accordance with DVGW code of practice GW 323). With relining the external bead should likewise be removed. The bead may be left on the pipe with all other installation methods.

ⓘ With trenchless installation, the use of special pulling heads with an outer sleeve that envelops the protective layer is recommended. Alternatively, suitable measures should be taken to protect the protruding edge (e.g. using a weld seam).

ⓘ The pulling forces should be measured and recorded. Exceeding these causes permanent damage to the pipeline and must be prevented using suitable measures.

General Information

When using mechanical connectors and in the case of electrofusion fittings (electrofusion couplers, tapping saddles etc.), the added protective layer should be removed in the joint area. Suitable peeling tools should be used to remove the protective layer. egeplast recommends using M10 peelers (for use on pipes up to OD 225 mm) or M10 maxi (for use on pipes with OD ≥180 mm).

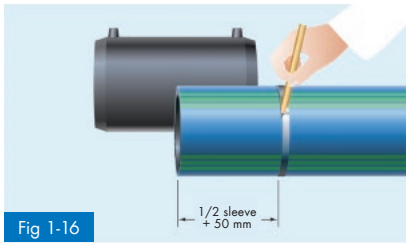


Fig 1-16

Marking the area from which the layer is to be peeled

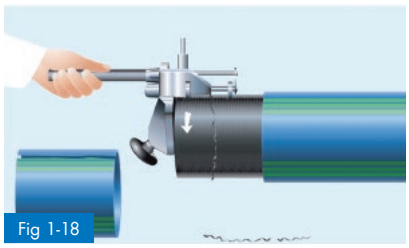

Fig 1-17

Removal of the protective layer with the egeplast M10 / M10 maxi peeling tool

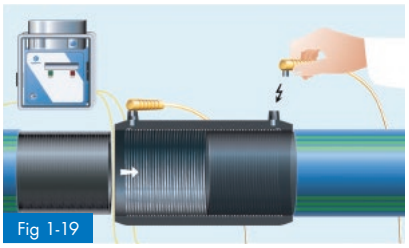
Before electrofusion welding of egeplast NoDig SLM® 3.0 pipes the protective layer must be removed residue-free, using an egeplast peeling tool (M10 / M10 maxi) (Fig 1-16/1-17). The length of outer layer to be peeled corresponds to at least half the length of the electrofusion coupler plus 50 mm (see also guidance values Tab 1-6).

The contact surfaces must be prepared by scraping and cleaning before welding (Fig 1-18).

The assembly instructions given by the respective manufacturers are to be followed. Standards for workmanship are laid out in DVS 2207, Part 1.


Fig 1-18

Removal of the oxide layer using a rotary scraper

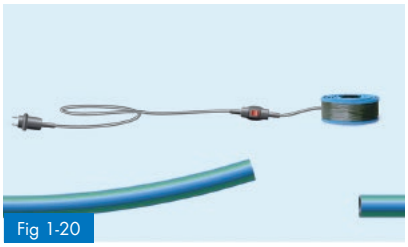

Fig 1-19

Welding procedure acc. to DVS 2207, Part 1

ⓘ egeplast NoDig SLM® 3.0 pipes may be welded to all the commonly used fittings made from PE 100 and PE 80 after removal of the outer layer from the pipe ends. The guidelines and specifications given by the fittings manufacturers must also be followed.

ⓘ Removing the outer layer on the pipe ends can be carried out by egeplast on request.

ⓘ egeplast recommends using the pipe heater system (Fig 1-20) for stress-free welding of pipes stored on coils and drums.


Fig 1-20

Guidance values for cutting back the outer layer prior electrofusion

Cutback for egeplast NoDig SLM® 3.0	
Medium-Bearing pipe DIN 8074 OD [mm]	Electrofusion welding* [mm]
25	90
32	95
40	100
50	105
63	115
75	120
90	130
110	140
125	145
140	150
160	155
180	160
200	165
225	175
250	185
280	190
315	200
355	205
400	215
450	225
500	235
560	240
630	255

Tab 1-6: *Specified dimensions according to the delivery range of the companies Georg Fischer, Friatec and Plasson; Long sleeve sockets were not taken into account Pipe ends can be trimmed by egeplast on request

1.4.3 Tapping

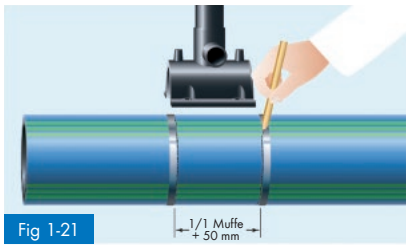


Fig 1-21

Marking the area from which the outer layer is to be peeled

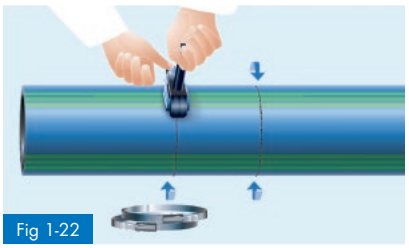


Fig 1-22

Removal of the protective layer with the egeplast M10 / M10 maxi peeling tool

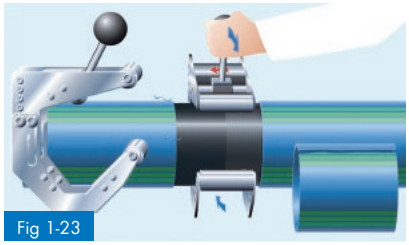


Fig 1-23

Removal of the oxide layer using a suitable scraping tool

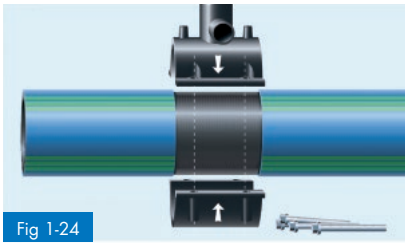


Fig 1-24

Mounting the tapping fitting according to the manufacturer's installation instructions

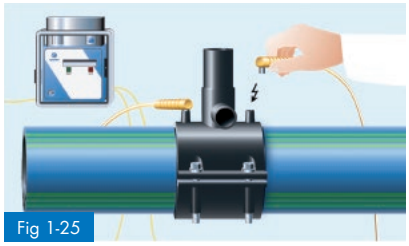


Fig 1-25

Welding process acc. to DVS 2207-1

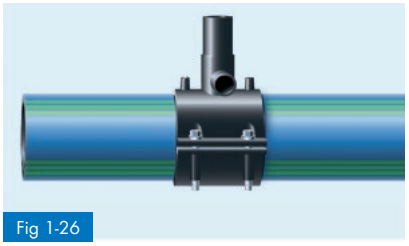


Fig 1-26

The tapping fitting is welded securely to the egeplast NoDig SLM® 3.0 pipe

When processing tapping saddles, clamps etc. the protective layer must be completely removed so that installation can take place on the core pipe. The processing instructions of the respective fitting manufacturer should be observed.

Use of the egeplast peeling tools

Removal of the outer layer can be carried out with the egeplast peeling tools M10 / M10 maxi.

Note on processing weldable tapping saddles

The welding area on the surface of the pipe must be machined completely prior to welding. Subsequent welding of the tapping fitting must take place according to DVS 2207, Part 1 and technical instructions of the fitting manufacturers.

1.4.4 Flanged Joints

The following types of design are commonly used for making flanged joints:

- Stub end for electrofusion
- Stub end for butt fusion

RC pipes are handled in the same way as PE 100 pipes.

1.4.5 Push-fit Connections / Compression Fittings

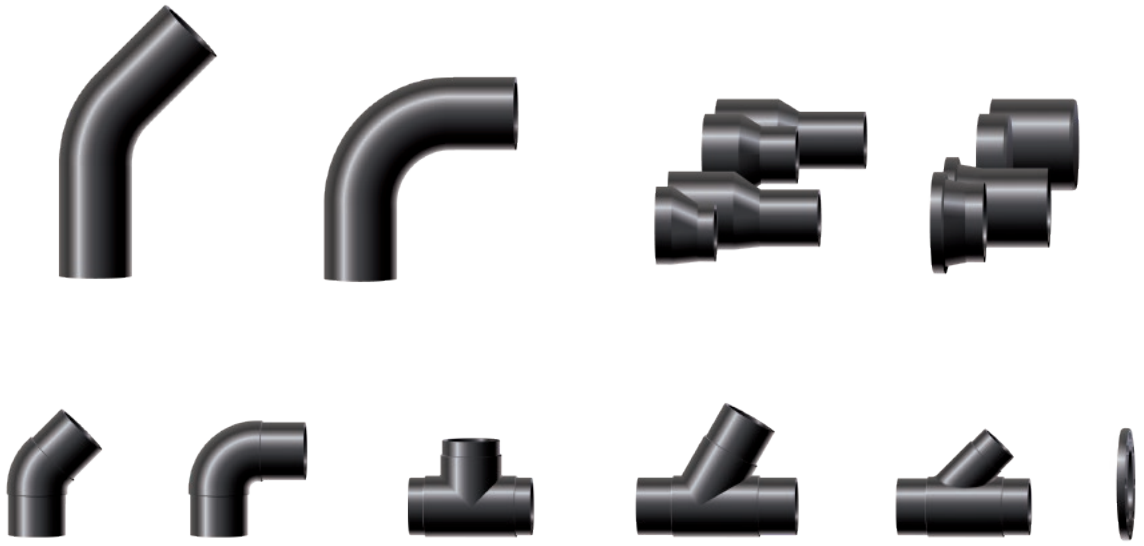
egeplast NoDig SLM® 3.0 pipes can be handled in the same way as PE 100 pipes using commercially available push-fit connectors and compression fittings. The protective layer must be removed in the joint area.

The processing recommendations of the respective manufacturer must be observed separately.

1.5 System Components

egeplast NoDig SLM® 3.0 pipes may be integrated into the pipeline network with all commercially available fittings and connecting elements. Particular attention must be paid to processing recommendations of the respective manufacturers.

egeplast offers numerous fittings made of PE 100 / PE 100-RC. We would be pleased to provide you with the respective documentation separately.



1.6 Overview of outer and medium pipe diameters / Butt Welding Machines / Clamping Jaws

In the case of a welding connection by means of butt-welding, the pipe ends are gripped with clamping jaws that have been specially adjusted to the outer diameter, so that the pipe ends to be welded can be firmly secured. Special clamping jaws and adapters for WIDOS welding machines are available at egeplast on request.

The following list contains the outer diameter of the pipes as well as the applicable versions of WIDOS machines that may be used, depending on the pipe dimensions.

Medium-Bearing pipe DIN 8074 OD [mm]	Outer diameter NoDig SLM® 3.0 [mm]	WIDOS Butt Fusion Machines - Area of Application				
		WIDOS 4600	WIDOS 4800	WIDOS 4900	WIDOS 5100	WIDOS 6100
25	27.0					
32	34.2					
40	42.2					
50	52.6					
63	65.8	●	●*	●*		
75	78.0	●	●*	●*		
90	93.0	●	●*	●*		
110	114.0	●	●*	●*		
125	129.0	●	●*	●*		
140	144.0	●	●*	●*		
160	165.0	●	●*	●*		
180	186.0	●	●*	●*		
200	206.0	●	●*	●*		
225	231.0	●	●*	●*		
250	257.0		●	●	●*	
280	287.0		●	●	●*	
315	322.0		●		●*	
355	363.0				●	
400	408.0				●	
450	459.0					●
500	509.0					●
560	569.0					●
630	639.0					
710	720.0					
800	810.0					
900	910.0					
1000	1010.0					
1200	1210.0					
Manufacturing tolerances possible		* Appropriate adapter required				

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egeplast

egeplast international GmbH

Tel.: +49 2575 9710-0 | Fax: +49 2575 9710-110
Robert-Bosch-Straße 7 | 48268 Greven, Germany
info@egeplast.de | www.egeplast.de/en

ege 2675 UK 09/26
[ege 1841 UK]