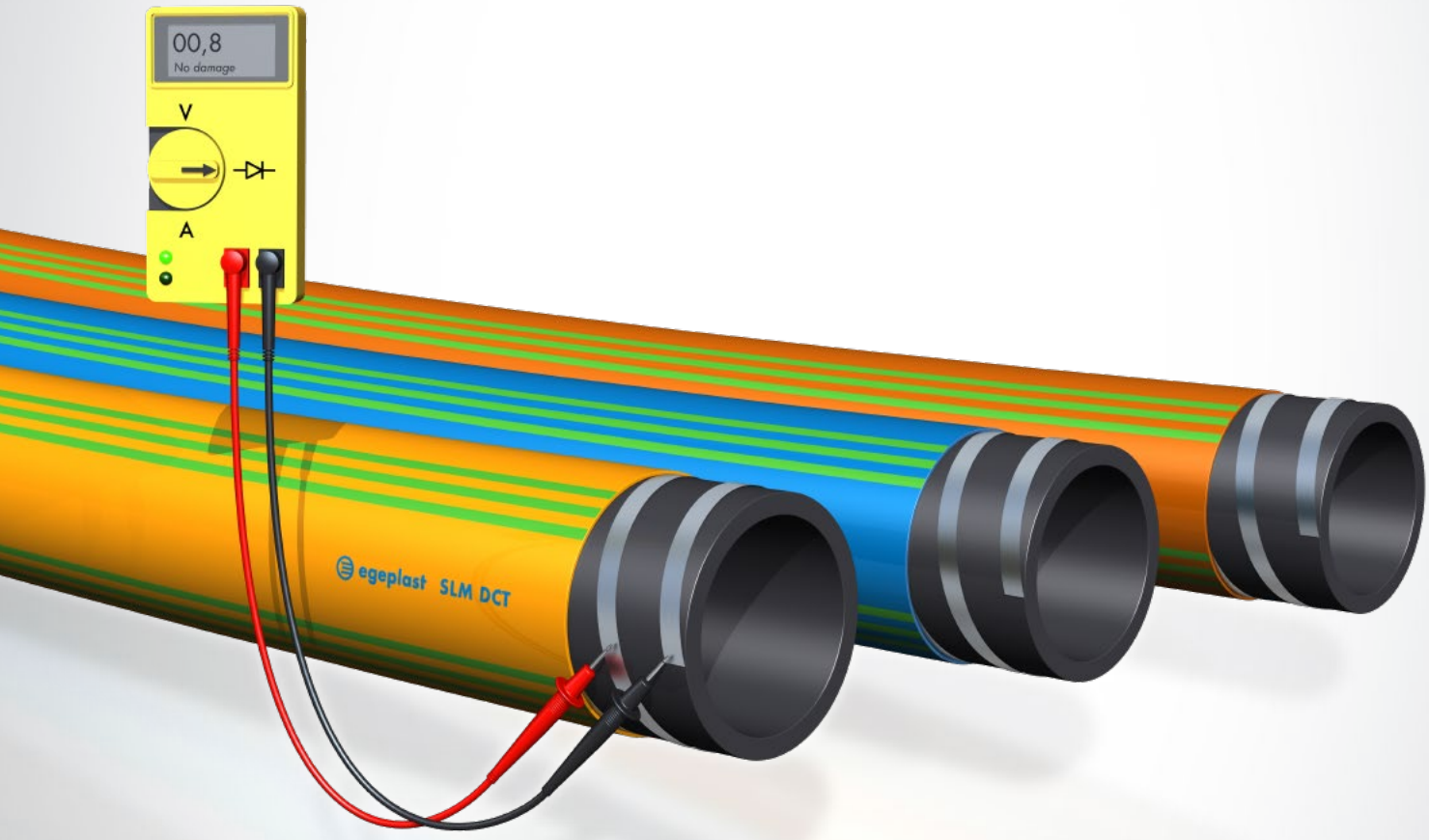
egeplast

SLM® DCT

Processing Guidelines



egeplast

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. Mistake 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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1 | Processing Guidelines SLM® DCT pipes

Supplement to the installation instructions for PE pressure pipes A 135 and A 435 from the Kunststoffrohrverband e.V. in Bonn

1.1 General Information

The egeplast SLM® DCT 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. Two spirally wound conductive strips are integrated between the protective layer and the medium-bearing pipe. The green stripes serve to identify it as a multilayer pipe.

Scope of application

The processing guidelines apply to buried egeplast SLM® DCT pipes with inner pipes made of PE 100-RC. The pipe connections and pipeline components must comply with the respective operating pressure. The serviceability of the system is guaranteed only if the joints are carried out in accordance with the egeplast processing guidelines.

Installation, open trench method


Open with sand bed


Open without sand bed

egeplast SLM® DCT pipes are suited for installation without a sand bed because they are made of PE 100-RC, which is highly resistant to stress-induced cracking. The excavated soil is suitable for backfilling as long as it can be compacted.

For the assessment of the backfill soil, the DIN 18196 – inter alia – is relevant. The pipe trench is to be designed, among others, according to the DIN 4124 (Excavation pits and trenches).

For gas pipes, the minimum cover should be 0.6 to 1.0 m, although for sections up to a maximum length of approx. 2.0 m which are not subjected to any particular load (such as front yards, sidewalks), the cover can be reduced to 0.5 m. Drinking water pipes need to be installed at depths between 1.0 and 1.8 m (depending on the climatic and soil conditions) and must be frost-proof. Furthermore, the construction of water pipelines is to comply with the DVGW Worksheet W400-2.

Installation, ploughing and milling


Ploughing


Milling

The egeplast SLM® DCT 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 constructively ruled out.

Installation, trenchless method


Soil displacement


Relining


Horizontal Directional Drilling


Pipe Bursting

Multilayer pipes such as egeplast SLM® DCT is a practical solution in the case of trenchless installation and rehabilitation, the outer surface of the pipes is securely protected against wear. DVGW Worksheets GW 321 (Horizontal Directional Drilling) and GW 323 (pipe bursting) recommend the use of pipes with protective layers.

- 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 allowable bending radius may not be exceeded.
- 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 (refer to Figures 1-1 and 1-2).
- Longitudinal force-locked joining procedures must be carried out according to the current regulatory codes of the DVGW and DVS. For trenchless installation, only butt welding in conjunction with egeplast egeFit® shrinking sleeves is acceptable.


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 elbows 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 and 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]

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

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]
$\vartheta_{pipe\ wall}$ = Temperature of the pipe wall during installation [°C]

In the case of pipe wall temperatures between 0 °C und 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.

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 SLM® DCT (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 to 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 protective layer is no additional obstacle when installing, pulling heads with an outer sleeve that surrounds the protective 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 SLM® DCT			
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 **Electrofusion Welding**

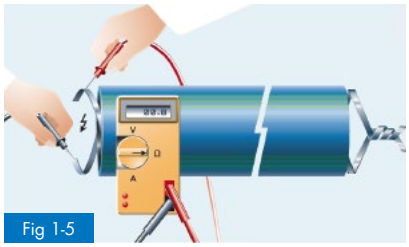


Fig 1-5

Establishing an electrically conductive bridge on the first pipe section

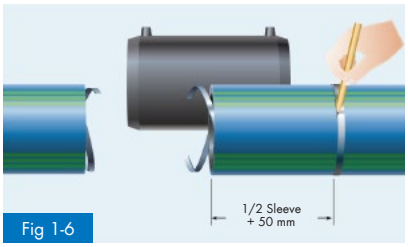


Fig 1-6

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

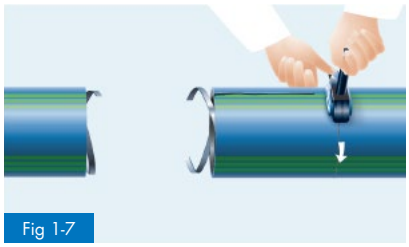


Fig 1-7

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

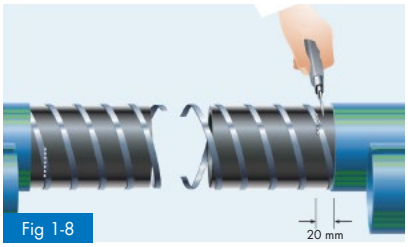


Fig 1-8

Cutting back of the conductive strips; 20 mm minimum must remain on the pipe for subsequent processing

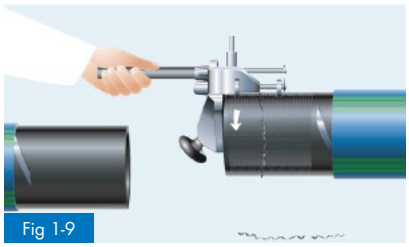


Fig 1-9

Removal of the oxide layer using a rotary scraper

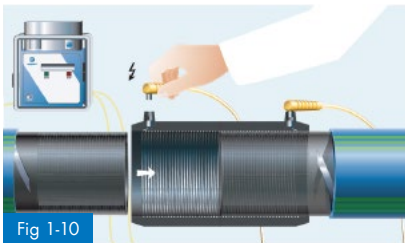


Fig 1-10

Welding procedure acc. to DVS 2207, Part 1

ⓘ egeplast SLM® DCT pipes can be welded with the help of all common electrofusion fittings made of PE 100 and PE 80 after removal of the outer layer from the pipe ends. In doing so, additional attention must be paid to the fitting manufacturers' guidelines and instructions.

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

Preparation of the pipe section (Figure 1-5)

- The most relevant factor determining proper functioning of the egeplast SLM® DCT pipe is the continuity of the conductive strips, which is ensured by creating an electroconductive bridge at the first pipe segment for the further examinations of the pipe string over the course of the construction project. The bridge remains at the pipe end. As the construction work progresses, the contact resistance of the already installed pipe string is to be tested (measurement on the upper side of the conductive strips), followed by recording of the measured resistance in every single case. Also cf. the measurement protocol in section 1.6.

Removal of the outer layer at the jobsite (Figure 1-6 to 1-7)

If not already delivered with the outer layer being removed, the layer must be removed in the welding area without leaving any residue. For removal of the protective layer, we recommend the peeling tool M10 or M10 maxi. Any damage to the conductive strips must be avoided.

- The length of the pipe to be peeled corresponds to half the length of the fitting plus at least +50 mm. See also Table 1-5, Page 11.

Welding of the pipeline (Figure 1-8 to 1-10)

- The conductive strips must be cut away from the welding area, leaving a distance of approx. 20 mm from protective layer to the end of the conductive strips. It is not necessary to loosen the conductive strips from the core pipe.
- Machining of the pipe surface according to the specifications of DVS 2207-1 and processing directives of the fittings manufacturer. Any damage to the conductive strips through the rotary scraper has to be avoided.
- Welding acc. to directive DVS 2207-1.

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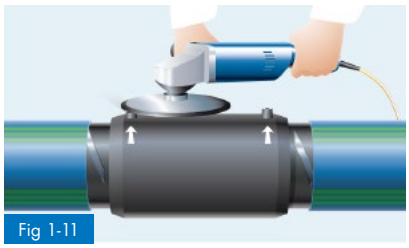


Fig 1-11

Removing the contact plugs

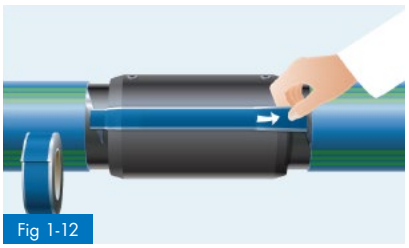


Fig 1-12

Restoring and fixing of electrical connection

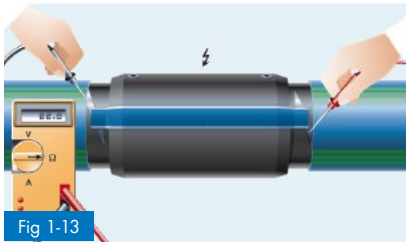


Fig 1-13

Measuring the ohmic resistance

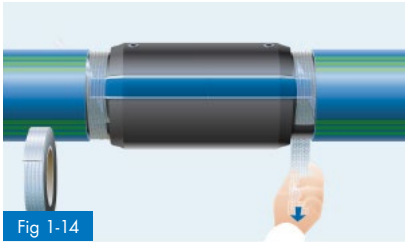


Fig 1-14

Masking of the electrical connections

Electrical connection of the conductive strips (Figure 1-11 to 1-12)

• Removal of the the contact plugs by using a suitable tool, after expiry of the cooling time.

• Restoring of the electrical connections with a highly conductive aluminium adhesive tape. The aim is to cover the largest possible contact surfaces.

CAUTION! Conductive strips are only conductive on the upper side.

CAUTION! Pairs of conductive strips are to be connected, conducting separately - short circuits and cross connections must be prevented.

Measuring the contact resistance (Figure 1-13 to 1-14)

• Measuring of the ohmic resistance of the newly established electrical connection (on the upper side of the conductive strips of the pipe).

Info: The resistance value must be less than 1.0 Ω – if necessary, rework accordingly. The measured resistance values are to be recorded,
see also the Measurement Protocol in Section 1.6.

• Masking of the electrical connections – in the area of the gap between the pipe and the electrofusion fitting – with duct tape (Fig. 1-14)

Continuation on the next page ➞

Post-factory coating of the welding area (Figures 1-15 to 1-17)

• Open trench installation

Step 1: Water-tight insulation of the electrical joint using egeplast wrapping green.

• for dimensions of up to OD 90 mm:
- full wrapping with 10 % overlap minimum
- Starting and ending point of wrapping 5 cm on the protective layer minimum

• for dimensions from OD 110 mm:
- Insulation of the exposed conductor strips in the area of the annular gap - start of wrapping no less than 5 cm on the protective layer up to across the edge of the socket
- Lengthwise insulation of the remaining, axially located conductive strip

Step 2: Mechanical protection of the insulation layer using egeplast mechanical protect.

ⓘ Alternatively, the mechanical protection of the insulation layer (step 2) can also be ensured using commercially available shrink-on products.
ⓘ For more information on the material required for post-factory coating, also cf. Table 1-4 on page 10.


Fig 1-15

Step 1: Waterproof insulation of the electrical joint (dimensions of up to OD 90 mm)

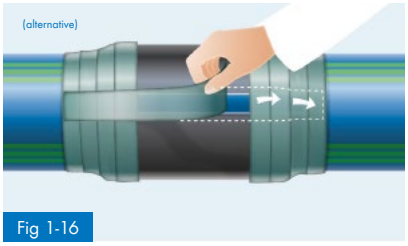


Fig 1-16

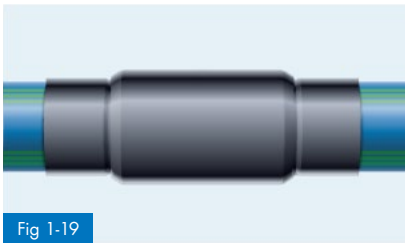
Step 1: Waterproof insulation of the electrical joint (dimensions from OD 110 mm)


Fig 1-17

Step 2: Example: Mechanical protection of the insulation layer


Fig 1-18

Mechanically protected/insulated joint


Fig 1-19

Joint, protected using shrinking sleeve

• Trenchless installation

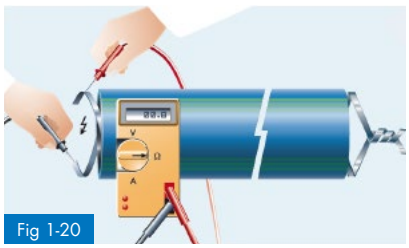
For trenchless installation, the butt welding method in conjunction with egeplast egeFit® shrinking sleeves is the only permissible procedure!

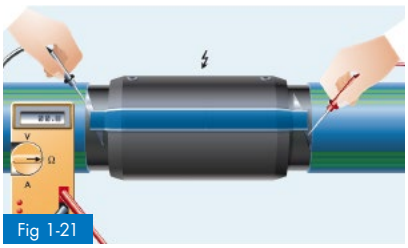
Measurements

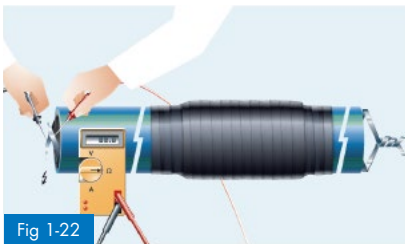
• Contact resistance check of the entire pipe string for increasing pipe length (on the upper side of the conductive strips) and recording of the ohmic resistance

• Measuring of continuity for every joint and recording of ohmic resistance

• Test continuity of the entire pipe string prior to installation


Fig 1-20


Fig 1-21


Fig 1-22

For help related to the individual measurements, please refer to the measurement protocol in section 1.6.

Material requirements for post-factory coating of electrofusion joints

Electrofusion welding of SLM® DCT pipes must be followed by establishing an electrically conductive connection from one pipe to the next using highly conductive adhesive aluminum tape. The final mechanical protection will be guaranteed by means of wrapping using a 2-layer-protection system.

The following table shows a summary of the requirements of the necessary post-factory coating material.

Material requirements for post-factory coating of electrofusion joints*						
Medium-Bearing pipe DIN 8074 OD [mm]	highly conductive adhesive aluminum tape		egeplast wrapping green - for waterproof insulation of joints		egeplast mechanical protect - for mechanical protection of the insulation layer	
	Estimatet quantity/ connection [in m]	Supply width [in mm]	Estimatet quantity/ connection [in m]	Supply width [in mm]	Estimatet quantity/ connection [in m]	Supply width [in mm]
25	0.6	25	1.0	50	1.8	50
32	0.6	25	1.2	50	2.2	50
40	0.6	25	1.6	50	2.7	50
50	0.6	25	2.0	50	3.5	50
63	0.6	25	2.4	50	4.4	50
75	0.8	25	2.8	50	5.4	50
90	0.8	25	3.6	50	6.6	50
110	0.8	25	2.1	100	2.6	100
125	0.8	25	2.3	100	3.0	100
140	0.8	25	2.5	100	3.4	100
160	1.0	25	3.0	100	4.0	100
180	1.0	25	3.1	100	4.5	100
200	1.0	25	3.5	100	5.1	100
225	1.0	25	3.9	100	6.0	100
250	1.0	25	4.4	100	7.1	100
280	1.0	25	4.8	100	7.9	100
315	1.5	25	5.4	100	9.2	100
355	1.5	25	6.1	100	10.7	100
400	1.5	25	6.8	100	12.4	100
450	1.5	25	7.6	100	14.3	100
500	1.5	25	8.5	100	16.6	100
560	1.5	25	9.6	100	19.1	100
630	1.5	25	10.0	100	22.6	100

Tab 1-4 * Reference values for layer cutback of the SLM® DCT Pipes, Table 1-5, are the basis of the requirements.

Reference values for layer cutback – Electrofusion Welding

Before electrofusion welding of egeplast SLM® DCT pipes can take place, the protective outer layer must be removed with egeplast peeling tools. Peeling of the pipe ends can be carried out by egeplast on request.

Layer Cutback for SLM® DCT pipes	
Medium-Bearing pipe DIN 8074 OD [mm]	Electrofusion joint* [mm]
	Protective layer
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 1-5 * Dimensions specified for the product ranges of the egeplast, Georg Fischer, Friatec, and Plasson companies. Long electrofusion couplers are not considered.

1.4.2 **Butt Welding**

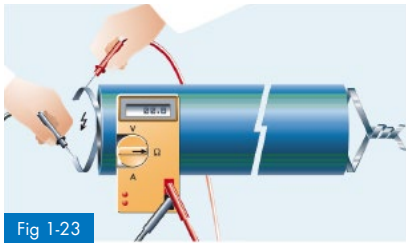


Fig 1-23

Establishing an electrically conductive bridge on the first pipe section

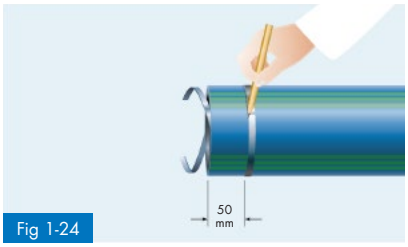


Fig 1-24

Marking the area from which the layer is to be peeled

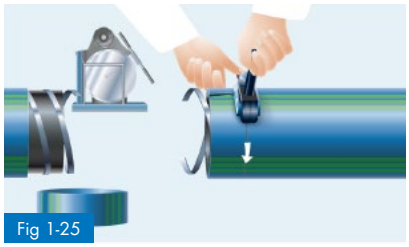


Fig 1-25

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

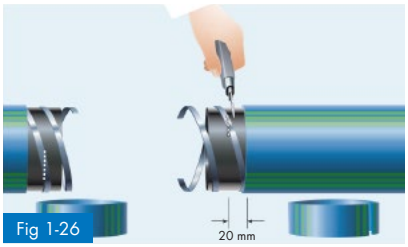


Fig 1-26

Trimming the conductive strips

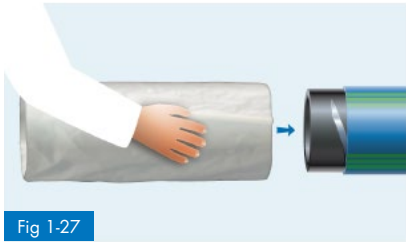


Fig 1-27

Mount shrinking sleeve prior to manufacture of the pipe joint, do not remove the protective foil

Preparation of the pipe section (Figure 1-23)

• The most relevant factor determining proper functioning of the egeplast SLM® DCT pipe is the continuity of the conductive strips, which is ensured by creating an electroconductive bridge at the first pipe segment for the further examinations of the pipe string over the course of the construction project. The bridge remains at the pipe end. As the construction work progresses, the contact resistance of the already installed pipe string is to be tested (measurement on the upper side of the conductive strips), followed by recording of the measured resistance in every single case. Also cf. the measurement protocol in section 1.6.

Removal of the outer layer at the jobsite (Figure 1-24 to 1-27)

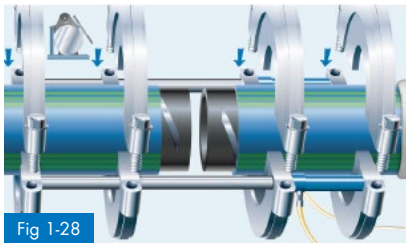
If not already delivered with the outer layer being removed, the layer must be removed in the welding area without leaving any residue. For removal of the protective layer, we recommend the peeling tool M10 or M10 maxi. Damage to the conductive strips must be avoided.

• Marking of the area to be peeled, at least 50 mm; it is recommended to adjust the peeling length to the outside debeader (see also Table 1-7, Page 16)

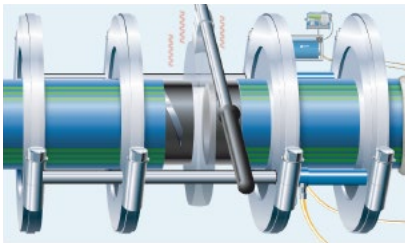
• The conductive strips must be cut away from the welding area; there must be a distance of approx. 20 mm from protective layer to the end of the conductive strips. It is not necessary to loosen the conductive strips from the core pipe.

For mechanical protection of the joint, egeplast recommends the use of egeplast egeFit® shrinking sleeves. The sleeve is packed in a protective foil for delivery. This foil protects it from humidity and contamination. The sleeve must be pushed onto the pipe to be welded while it is still in its packed condition, prior to establishing the pipe connection.

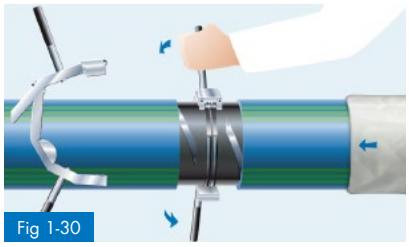
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Fig 1-28

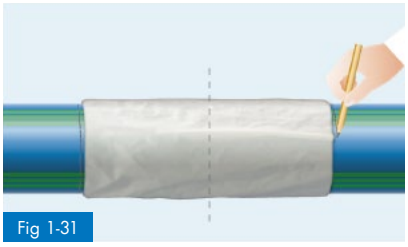
Mounting of the special clamping jaws available at egeplast (see Table 1-8)



Welding according to DVS 2207, Part 1


Fig 1-30

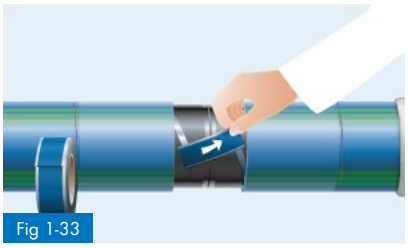
Removal of weld bead with an outer debeader


Fig 1-31

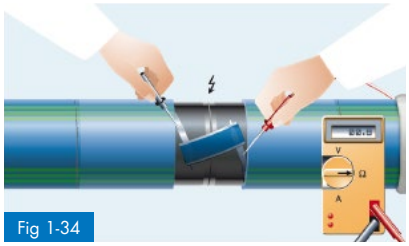
Positioning of the shrinking sleeve


Fig 1-32

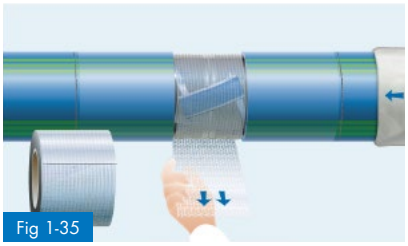
Roughen the shrink area of the sleeve radially with the emery cloth.


Fig 1-33

Restoring the electrical connection


Fig 1-34

Measuring the ohmic Resistance


Fig 1-35

Masking of the electrical connection

Welding of the pipeline (Figure 1-28/1-32)

• Clamping jaws are to be used that are adjusted to the outer diameter of the protective layer of the pipe. Appropriate clamping jaws for Widos welding machines are available at egeplast (see also Table 1-8, Page 22).

• Welding according to directive DVS 2207-1.

• Removal of the weld bead with an appropriate outer debeader

Damages to the conductive strips are to be avoided. Position the shrinking sleeve in the center above the weld seam and mark the shrink area. Subsequently slide back the sleeve and remove it from the shrink area. The protective layer is to be roughened in the area of the shrinking sleeve which is to be positioned later using an emery cloth (P60) for better adhesion (Figure 1-32).

Electrical connection of the conductive strips (Figure 1-33)

• Reestablishment of the electrical connection by means of highly conductive aluminum tape, self-adhesive.

The aim is to cover the largest possible contact surfaces.

CAUTION! Conductive strips are only conductive on the upper side.

CAUTION! Pairs of conductive strips are to be connected, conducting separately - There must be no short circuits and cross connections.

Measuring the contact resistance (Figures 1-34 to 1-35)

• Measuring of the ohmic resistance of the newly established electrical connection (on the upper side of the conductive strips of the pipe).

Info: The resistance value must be less than 1.0 Ω – if necessary, rework accordingly. The measured resistance values must be recorded; see also Measurement Protocol in Section 1.6.

• Masking of the electrical connection with duct tape (Figure 1-35)

Continuation on the next page ➞

Post-factory coating of the welding area (Figures 1-36 to 1-43)

Step 1: Waterproof insulation of the electrical joint by means of egeplast wrapping green (Fig. 1-36)

- full wrapping with 10 % overlap minimum
- Beginning and end points of wrapping no less than 5 cm on the protective layer

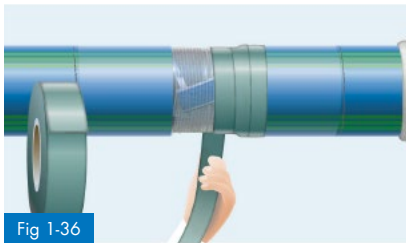


Fig 1-36

Waterproof insulation of the electrical joint, 10 % overlap minimum

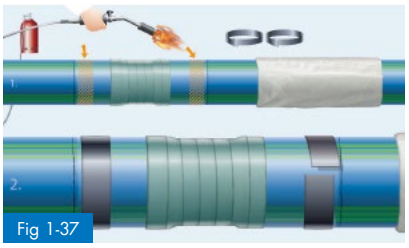


Fig 1-37

Preheating the pipe surface and applying the hot-melt adhesive

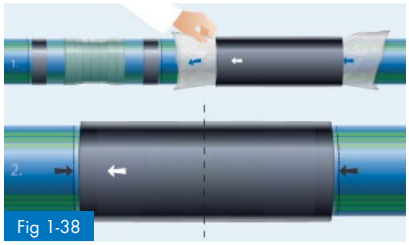


Fig 1-38

Removal of the protective foil and alignment of the shrinking sleeve



Fig 1-39

Shrinking by using a soft gas flame

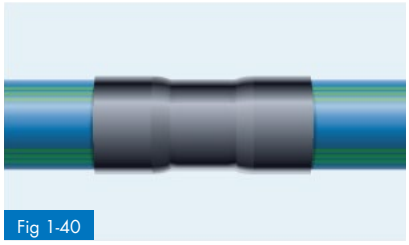


Fig 1-40

Welded joint protected by means of a shrinking sleeve

Step 2: Mechanical protection of the insulation layer using egeplast egeFit® shrinking sleeves (Figs. 1-37 up to 1-39)

Drying and cleaning of the shrink area. Preheat the pipe surface and apply the enclosed hot-melt adhesive, approx. 5 cm from the end of the shrinking sleeve on either side (Fig. 1-37). Subsequently remove the protective foil into a single direction. Align shrinking sleeve to the center and position above the weld seam (Fig. 1-38).
Before initiating the shrinking process, make sure to protect the protective layer with suitable heat protection mats around the edges of the shrinking sleeve.
Use a soft, yellow gas flame for shrinking on the sleeve. Always work from the middle outwards and constantly keep the propane torch rotating (Fig. 1-39). The installation is complete once the shrinking sleeve fits closely.

For material requirement for the post-factory coating, refer also to Table 1-6, page 15.

Note:
Following the shrink-on process, the joint should be allowed to cool down to ambient temperature to enable the material to obtain adequate strength.

Measurements

- Contact resistance check of the entire pipe string for increasing pipe length (on the upper side of the conductive strips) and recording of the ohmic resistance
- Measuring the continuity for every joint and recording of ohmic resistance
- Test continuity of the entire pipe string prior to installation

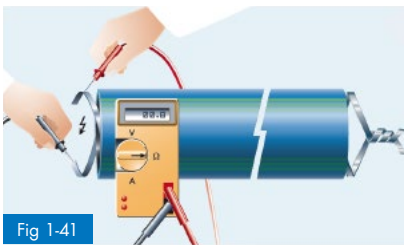


Fig 1-41

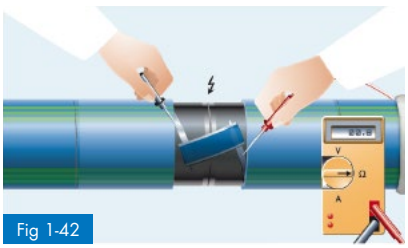


Fig 1-42

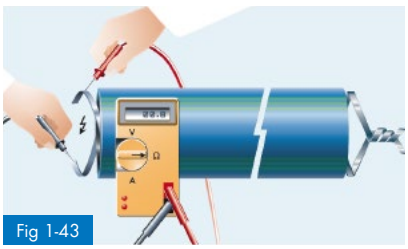


Fig 1-43

For help related to the individual measurements, please refer to the measurement protocol in section 1.6.

Material requirement for post-factory coating – Butt Welding

Electrofusion welding of SLM® DCT pipes must be followed by establishing an electrically conductive connection from one pipe to the next with the help of highly conductive adhesive aluminum tape. For final waterproof and mechanical protection, wrapping by means of a 2-layer-protection system is used.
The following table shows a summary of the requirements of the necessary post-factory coating material.

Material requirement for post-factory coating – Butt Welding*					
Medium-Bearing pipe DIN 8074 OD [mm]	highly conductive adhesive aluminum tape		egeplast wrapping green – for water-tight insulation of the joint		egeplast egeFit® shrinking sleeves
	estimated quantity/ connection [in m]	Supply width [in mm]	estimated quantity/ connection [in m]	Supply width [in mm]	
25	0.8	25	0.6	50	on request
32	0.8	25	0.7	50	on request
40	0.8	25	1.0	50	on request
50	0.8	25	1.1	50	on request
63	0.8	25	1.4	50	on request
75	0.8	25	1.6	50	on request
90	0.8	25	1.9	50	●
110	0.8	25	1.3	100	●
125	0.8	25	1.5	100	●
140	1.0	25	1.6	100	●
160	1.0	25	1.8	100	●
180	1.0	25	2.0	100	●
200	1.0	25	2.2	100	●
225	1.0	25	2.5	100	●
250	1.0	25	2.7	100	●
280	1.2	25	3.0	100	●
315	1.2	25	3.3	100	●
355	1.2	25	3.7	100	●
400	1.2	25	4.1	100	●
450	1.2	25	4.6	100	●
500	1.4	25	5.1	100	●
560	1.4	25	5.7	100	●
630	1.4	25	6.3	100	●

Tab 1-6: * Basis for the requirements is the recommended cutback width of egeplast protective layer pipes using WIDOS outer debeaders, refer to Table 1-7

Reference values for layer cutback - Butt Welding

The protective layer must be removed using egeplast peeling tools prior to butt welding of the SLM® DCT pipes. Straight length products beginning with an OD of 75 mm have already been partly stripped of their layer at the factory in the required length.

Layer Cutback for SLM® DCT Pipes			
Medium-Bearing pipe DIN 8074 OD [mm]	Butt welding [mm]		optimized for WIDOS external debeaders
	Protective layer	Aluminium	
25	40	20	-
32	40	20	-
40	40	20	-
50	40	20	-
63	40	20	-
75	40	20	-
90	40	20	-
110	40	20	Size 1
125	40	20	Size 1
140	50	30	Size 1 / Size 2
160	50	30	Size 1 / Size 2
180	50	30	Size 2 / Size 3
200	50	30	Size 2 / Size 3
225	50	30	Size 2 / Size 3
250	50	30	Size 2 / Size 3
280	60	40	Size 3 / Size 4
315	60	40	Size 3 / Size 4
355	60	40	Size 4
400	60	40	Size 4
450	60	40	Size 4
500	70	50	Size 6
560	70	50	Size 6
630	70	50	Size 6 / Size 8

Tab 1-7

1.4.3 Tapping saddles made of plastic material

ⓘ The instructions related to the electrical connection of the conductive strips for tapping saddles made of plastic and the post-factory coating (Figs. 1-50 up to 1-57) must only be respected if the system is to be subjected to tracking / detection in the future.

ⓘ If the system is to be used for tracking / detection in the future, metal fitting such as valves, tapping bridges etc. must be bridged with the help of connecting pieces. Also cf. section 1-8 „Connecting pieces".

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.

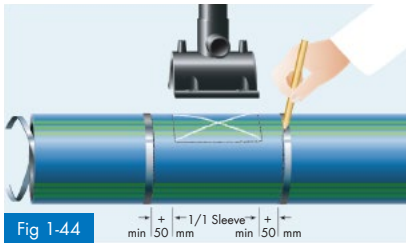
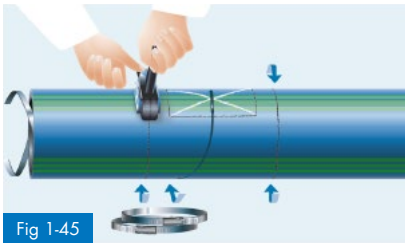
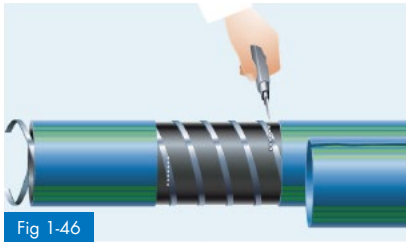


Fig 1-44

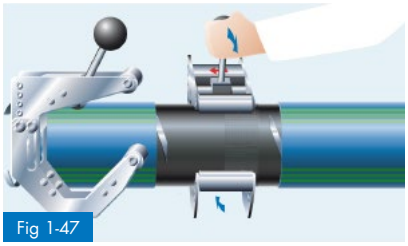
Marking the area from which the outer layer is to be peeled


Fig 1-45

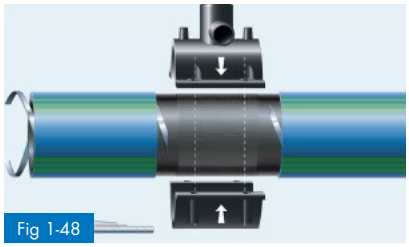
Removal of the protective layer with the egeplast M10 / M10 maxi peeling tool


Fig 1-46

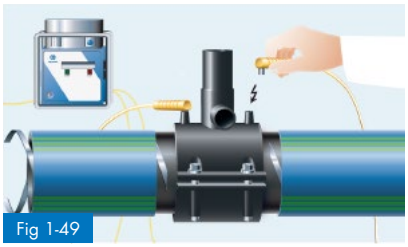
Trimming the conductive strips


Fig 1-47

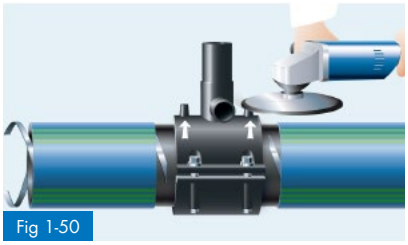
Removal of the oxide layer using a suitable peeling device


Fig 1-48

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


Fig 1-49

Welding process acc. to DVS 2207 Part 1


Fig 1-50

Removal of the contact plugs with a suitable tool


Fig 1-51

Restoring and fixing of electrical connection

Removal of the outer layer in the welding area (Fig. 1-44 to 1-45)

- Marking of the fitting dimensions, provisions should be made here for an additional 50 mm minimum.
- Removal of the protective layer with the egeplast M10/M10 maxi peeling tool

Welding (Fig. 1-46 to 1-49)

- The conductive strips must be cut away from the welding area; there must be a distance from protective layer to the end of the conductive strip of approx. 20 mm. It is not necessary to loosen the conductive strips from the core pipe.
- Machining of the pipe surface according to the specifications of DVS 2207-1 and processing directives of the fitting manufacturer. The application of saddle scrapers is recommended.
- Welding process acc. to DVS 2207 Part 1

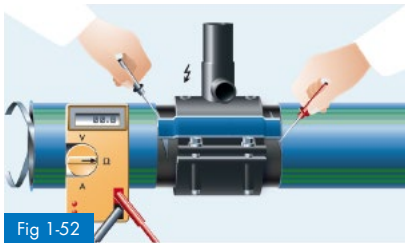
Electrical connection of the conductive strips (Figures 1-50 to 1-51)

- Removal of the contact plugs by using a suitable tool, after expiry of the cooling time.
- Restoring of the electrical connections with a highly conductive aluminium adhesive tape. The aim is to cover the largest possible contact surfaces.

CAUTION! Conductive strips are only conductive on the upper side.

CAUTION! Pairs of conductive strips are to be connected, conducting separately - short circuits and cross connections must be prevented.

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Fig 1-52

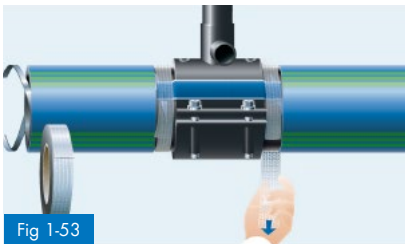
Measuring the ohmic resistance

Measuring the contact resistance (Figure 1-52 to 1-53)

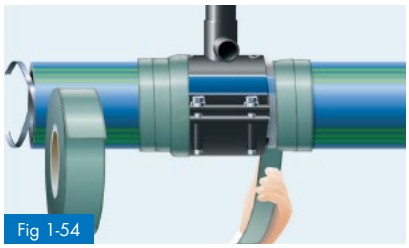
• Measuring the ohmic resistance of the newly established electrical connection (on the upper side of the conductive strips of the pipe).

Info: The resistance value must be less than 1.0 Ω – if necessary, rework accordingly. The measured resistance values are to be recorded, see also Measurement Protocol in Section 1.7.

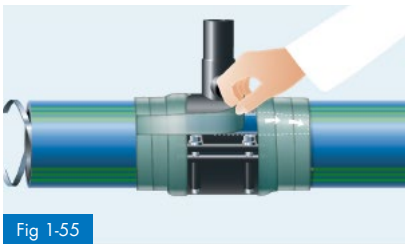
• Masking of the electrical connections – in the area of the annular gap between the pipe and the electrofusion fitting – with duct tape (Fig. 1-53)


Fig 1-53

Masking of the electrical connection


Fig 1-54

Waterproof insulation of the electrical joint


Fig 1-55

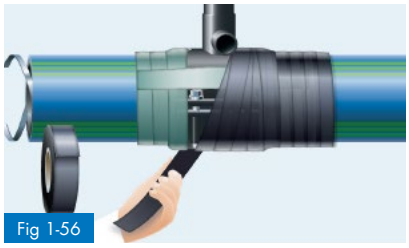
Waterproof insulation of the electrical joint

Post-factory coating of the welding area

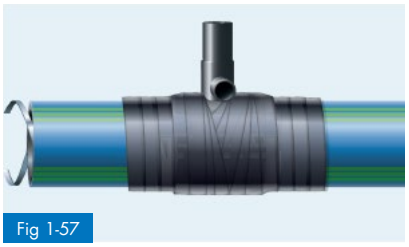
Step 1: Waterproof insulation of the electrical joint using egeplast wrapping green

- Insulation of the exposed conductive strips in the area of the annular gap - start of wrapping no less than 5 cm on the protective layer up to across the edge of the fitting body
- Lengthwise insulation of the remaining, axially located conductor

Step 2: Mechanical protection by means of egeplast mechanical protect


Fig 1-56

Mechanical protection of the insulation layer


Fig 1-57

Mechanically protected/insulated tapping saddle

1.4.4 Flanged Joints

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

- 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 SLM® DCT Pipes can be handled in the same way as PE 100 pipes using commercially available push-fit connectors and compression fittings.

The protective layer and the conductive strips must be removed in the joint area.

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

1.5 Functions

1.5.1 Proof of Non-Damage (Integrity Test)

To verify integrity of the inserted piping directly after installation, the DCT conductors at the joints are electrically connected with one another separately to create two separate coils. These two conductive strips are then electrically connected with one another in the exit pit. A successful electrical continuity test gives reliable proof of the technically sound condition of the protective layer and hence of the pipeline itself.



Fig 1-58: Verification of integrity using a continuity tester

A sufficiently waterproof execution of the joint allows for subsequent localisation of any potential damage to the pipe system which might have occurred during installation.

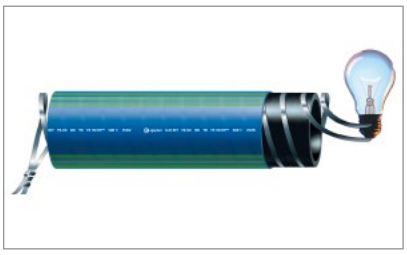


Fig 1-59: Functional principle

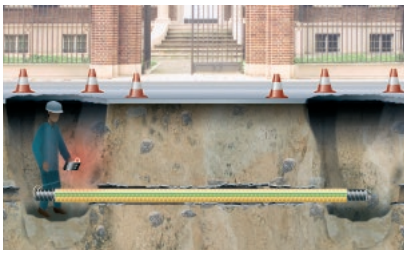


Fig 1-60: Verification of integrity

1.5.2 Detection of Pipeline

Integrated electrical conductors help to track and thus precisely localise the egeplast SLM® DCT pipe underground.

In the case of active detection, a signal, i.e. an electromagnetic alternating field, is sent with a sender to the conductive strips (target conductors). This method is applied in order to track the pipeline in the ground (depth and pipeline route).

egeplast recommends galvanic coupling for detection and tracking of the SLM® DCT pipe. Galvanic (direct) coupling means establishing a conductive connection between the sender and a target conductor (here: SLM® DCT conductive strips).

During sending of a direct signal to the conductive strips, a receiver that is to be routed via the pipeline at the ground surface, is able to acknowledge emanating electromagnetic fields and to display them visually via a display in terms of location and depth.

Prerequisite is the grounding of the conductive strips at the end of the pipeline as well as free accessibility of the conductive strips to permit connection of the sender. Inclusion of connecting pieces is recommended here. Cables, connected to the conductive strips, may be routed to the ground surface by means of this component and may be made accessible e.g. via a surface box.

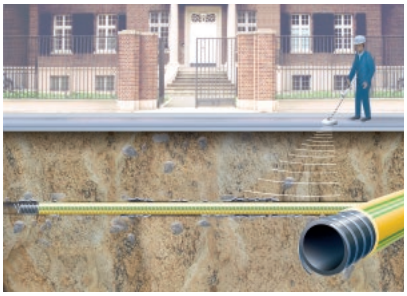


Fig 1-61: Detection of the installed pipeline

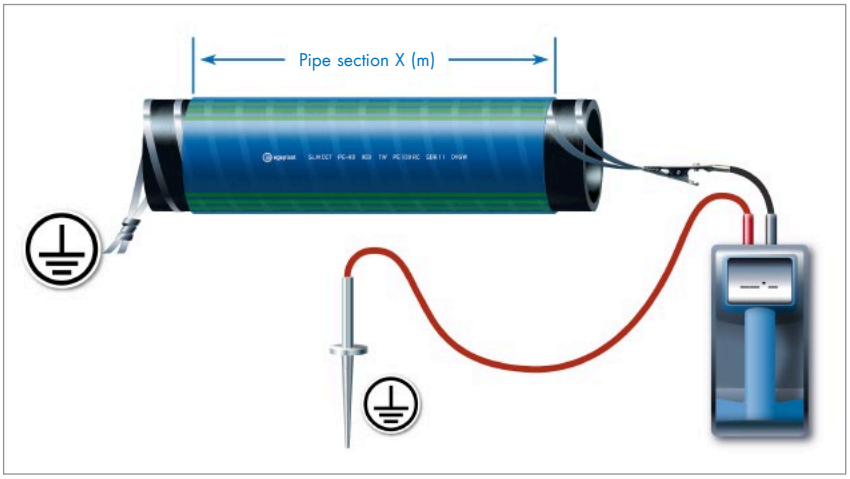


Fig 1-62: Functional principle

1.6 Measurement Protocol egeplast SLM® DCT

Prior to and after processing, testing of the SLM® DCT conductive strips is carried out with an appropriate continuity tester.

Measurement Protocol dated: _____

Dimension: _____

SDR: _____

Construction project: _____

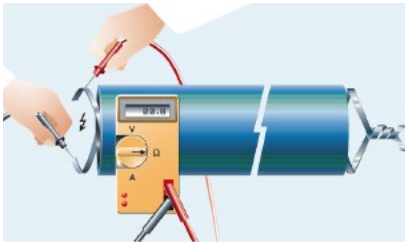
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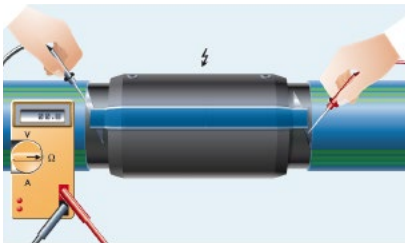
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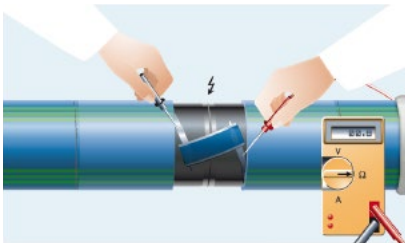
1. Contact resistance test of the entire pipe string during the construction process.



Contact resistance at Joint no.	Measured value in Ω	Contact resistance at Joint no.	Measured value in Ω

2. Checking the contact resistance of the joints (electrofusion / butt fusion)*



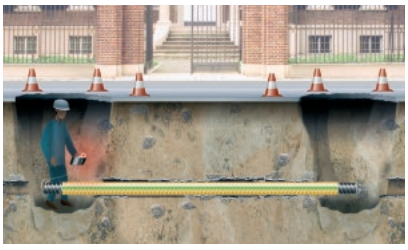


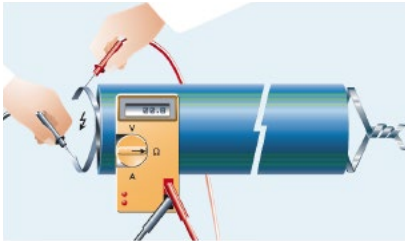
Joint No.	Measured value in Ω	Joint No.	Measured value in Ω

* The resistance value must be less than 1.0 Ω

3. Verifying the integrity of the pipe (integrity check) at the installed pipe section

Integrity check must be performed directly after installation. Additional testing directly before installation is recommended.





Company/Signature

1.7 Overview of Outer and Medium Pipe Diameters egeplast SLM® DCT / 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 the required adapter 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 egeplast SLM® DCT [mm]	WIDOS Butt Fusion Machines - Area of Application				
		WIDOS 4600	WIDOS 4800	WIDOS 4900	WIDOS 5100	WIDOS 6100
25	27.0					
32	34.5					
40	43.0					
50	54.3					
63	67.3	●	●*	●*		
75	79.8	●	●*	●*		
90	95.3	●	●*	●*		
110	116.1	●	●*	●*		
125	131.6	●	●*	●*		
140	147.0	●	●*	●*		
160	168.1	●	●*	●*		
180	188.8	●	●*	●*		
200	208.5	●	●*	●*		
225	233.6	●	●*	●*		
250	258.7		●	●	●*	
280	288.8				●*	
315	323.9				●*	
355	366.0				●	
400	411.1				●	
450	461.2					●
500	511.4					●
560	571.6					●
630	642.0					
710	720.0					
800	810.0					
900	910.0					
1000	1010.0					
1200	1210.0					
Manufacturing tolerances possible		* Appropriate adapter required				

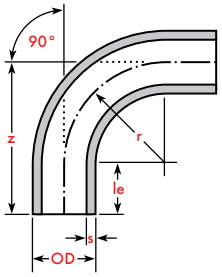
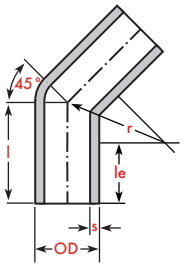
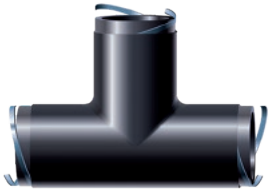
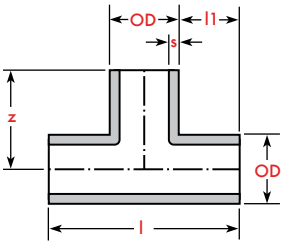
Tab 1-8

1.8 System Components

As a system manufacturer, egeplast supplies a complete range of fittings with integrated conductive strips tailored to the SLM® DCT pipe.

The relevant information material is available separately and we will be glad to provide it to you. Welding of the pipes and fittings and insulation must be performed in analogy to the Processing Instructions for butt welding or electrofusion welding respectively, also cf. section 1.4.

- Fittings

Seamless bends made from egeplast PE 100-RC pipe with integrated conductive strips different versions		
Segmented fittings made from egeplast PE 100-RC pipe with integrated conductive strips different versions		
Fittings, compliant with pressure class, made from PE 100 with integrated conductive strips different versions		

Tab 1-9 Fitting Programme (Extract)

• Connecting Pieces

In order to ground the pipeline and send signals directly for detection at a later date, it is recommended to route the conductive strips for galvanic (direct) coupling to the ground surface in an conduit/cable ducting pipe.

In this case inclusion of connecting pieces is recommended. Cables, connected to the conductive strips, may be routed to the ground surface by means of this component and may be made accessible, e.g. via a surface box.

Connecting pieces are also used to bridge valves and manhole structures, in particular if the pipe should be permanently detectable.

Inclusion of the connecting pieces is carried out in line with Section 1.4.

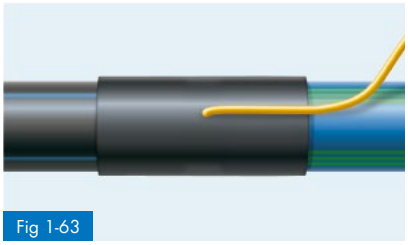


Fig 1-63

egeplast SLM® DCT Connecting Piece, Type 1

Connecting Piece Type 1:
Transition adapter standard pipe/ SLM® DCT pipe; with a plain end; incl. connection cable with a length of 5 m

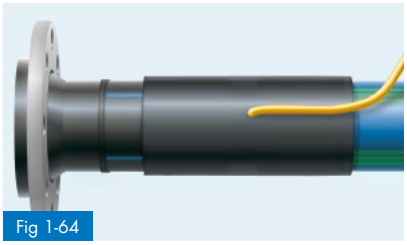


Fig 1-64

egeplast SLM® DCT Connecting Piece, Type 3

Connecting Piece Type 3:
Connecting piece with factory welded stub end and loose flange incl. connection cable with a length of 5 m

Notices

egeplast

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