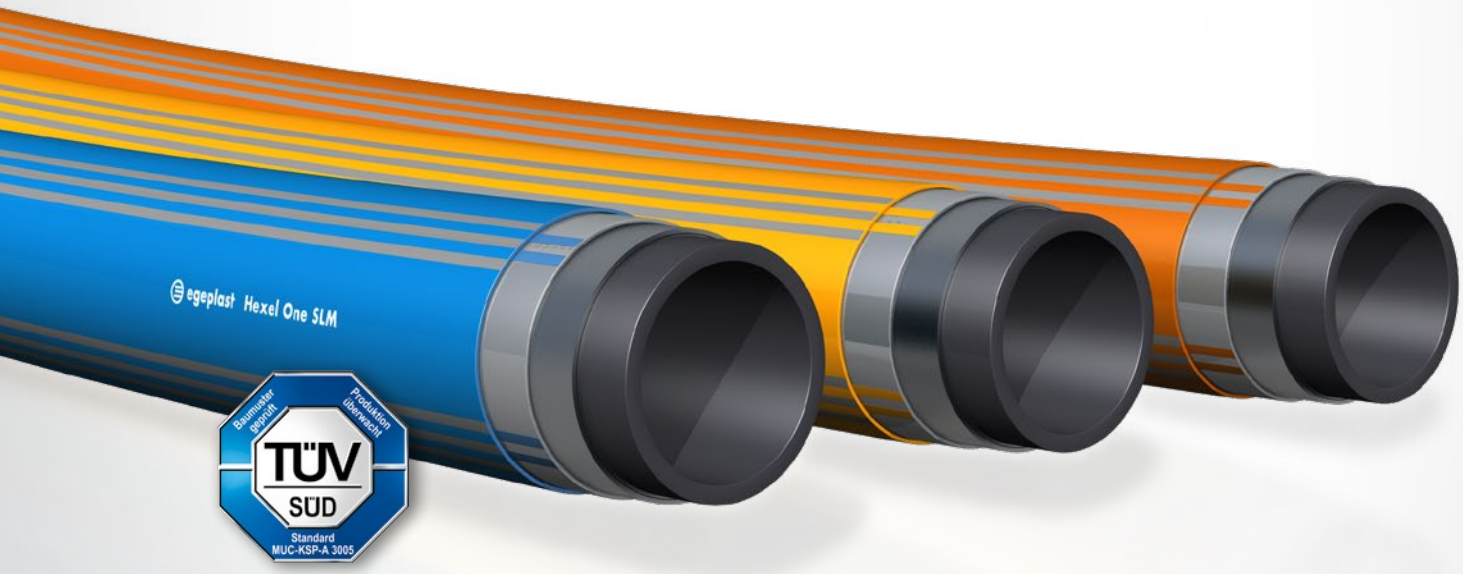
egeplast

# HexelOne® SLM Raised Pressure Pipes

## with Protective Coating

Installation Guidelines

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# Foreword

The following information in this document corresponds to the state of the art at the time of its preparation. It makes no claim to completeness and serves as information and advice. No liability can be derived from it. Subject to changes.

Our customer service team will be happy to answer any queries on the installation, use, servicing or repair of our products or other questions. Our Sales Force and Technical Service are also available to provide any technical assistance you require.

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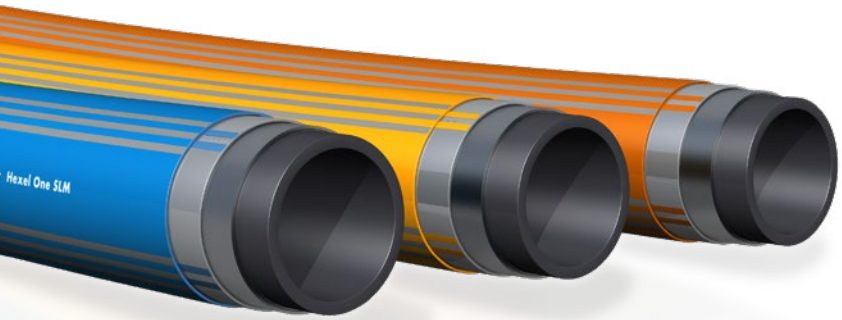
# 1 | Product Description

## egeplast **HexelOne® SLM**
## Raised pressure pipes with protective coating




### Pipes for drinking water – gas pipes – wastewater pipes – industrial applications

The HexelOne® pipe is a self-reinforced high pressure pipe, a mono composite made solely from polyethylene. This reinforcement makes new areas of application possible in the "raised pressure" area, in other words operating pressures above applications previously covered using PE pipes.

The added outer layer of the coating reliably protects the pipe from scratches and notches, in particular in the case of trenchless applications.

### Operating pressures of HexelOne® "Raised Pressure"

In the case of homogeneous pressure pipes the long-term durability of the material, e.g. PE 100, is the decisive dimensioning parameter that has been used to determine the operating pressures that are common today for the SDR 11 pipe range, which are max. 16 bar for drinking water and 10 bar for gas pipelines (at 20°C and with a safety factor of C = 1.25 for drinking water and 2 for gas). The use of HexelOne® pipes from the Raised Pressure range enables the operating pressure to be almost doubled.

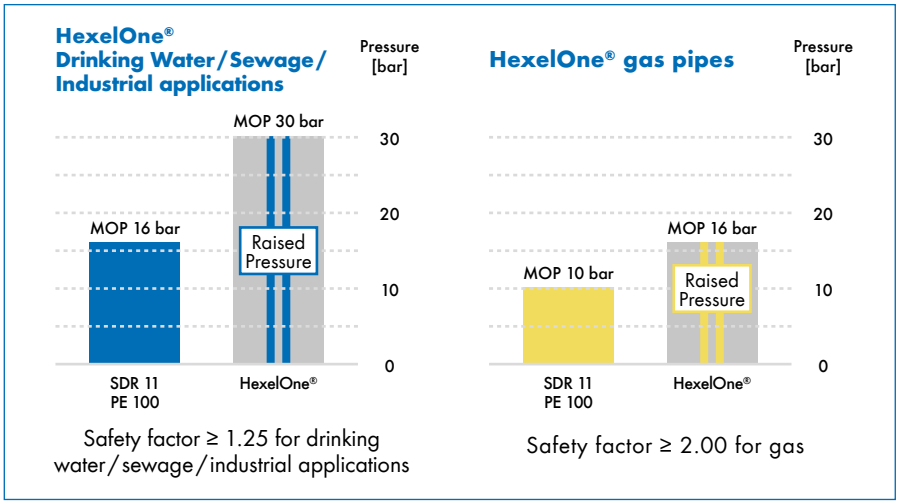


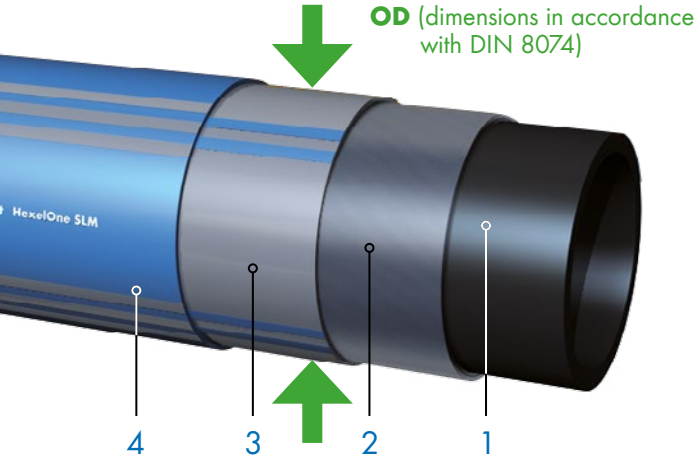

Fig. 1.1

MOP = Maximum Operating Pressure

| Permissible operating pressures | | |
|---|---|---|
| Dimension | Gas (C ≥ 2.0) | Drinking water/waste water/industry (C ≥ 1.25) |
| 90 x 8.2 mm | 16 bar | 30 bar |
| 110 x 10.0 mm | 16 bar | 30 bar |
| 125 x 11.4 mm | 16 bar | 30 bar |
| 160 x 14.6 mm | 16 bar | 25 bar |

Other dimensions and operating pressures on request

## HexelOne® SLM is a pipe made of a "**homogeneous material**" with 3 functional layers and added, abrasion-resistant protective coating




1: Excellent and proven medium durability due to PE 100-RC in the inner layer

2: Enhanced pressure resistance due to a medium layer made of stretched PE 100

3: Tried and tested weld property in compliance with DVS due to the outer layer made of PE 100

4: Added protective coating as protection from scratches and notches

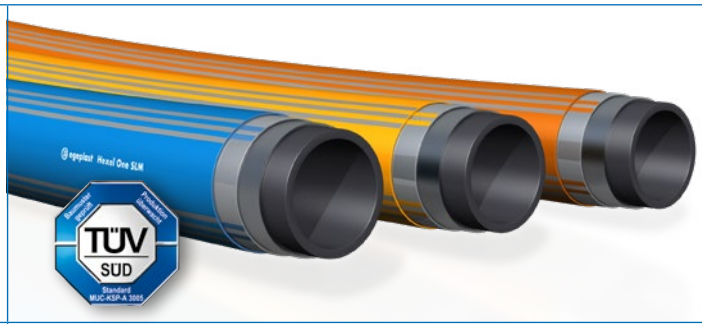
egeplast HexelOne® SLM high pressure pipes comprise a PE 100-RC core pipe, two layers of high strength, modified tapes made of PE 100 and an outer layer made of PE 100. In dimensional terms the 'mono composite' HexelOne® structure consisting exclusively of PE 100 / PE 100-RC materials complies with DIN 8074.

The added protective coating protects the pipe from scratches and notches during transport, handling and installation.

### Applications / recommended use

| | | |
|---|---|---|
| Open trench installation in sand bed | Pipe bursting of steel pipes | Ploughing |
| Milling | Relining | Horizontal directional drilling |
| Pipe bursting of steel pipes | | |

# Product data sheet

| | |
|---|---|
| egeplast<br>**HexelOne® SLM**<br>Raised pressure pipes with protective coating |  |
| Pipe structure: | Pipes with dimensions in accordance with DIN 8074<br>with added, outer protective layer |
| Dimensions: | 90 x 8,2 mm<br>110 x 10,0 mm<br>125 x 11,4 mm<br>160 x 14,6 mm<br>Dimensions in accordance with DIN 8074<br>plus protective layer |
| Applications: | Drinking water, gas and wastewater pressure mains<br>and industrial pipelines |
| Material: | PE 100 / PE 100-RC<br>Protective coating: polyolefin |
| Welding group: | 003 |
| Identification: | Lettering each metre / media-related colouring |
| Forms of delivery: | Coils / drums in lengths of 100 m<br>Sticks in 12 m lengths<br><br>Others on request |
| Certification pipe and connection technology: | TÜV SÜD |
| Standards and regulations / installation technology: | DVGW W400-1/2, GW 320-1, GW 321, GW 323, GW 324,<br>DIN EN 805, DIN EN 12007, G 469, GW 332 |

# 2 | Installation Guidelines for HexelOne® SLM Raised Pressure Pipes

# egeplast **HexelOne® SLM**

Supplement to the PE pressure pipe installation instructions A135 and A435 from the Kunststoffrohrverband e.V., Bonn (plastic pipe association)

## 2.1 General remarks

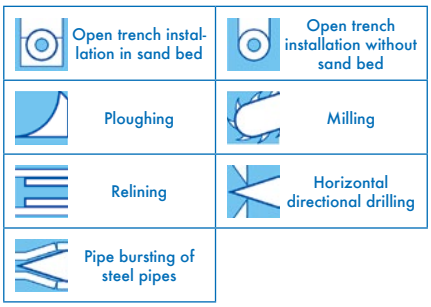
egeplast HexelOne® SLM pipes comprise a PE 100-RC core pipe, two layers of high strength, modified tapes made of PE 100 and an outer layer made of PE 100. In dimensional terms the 'mono composite' HexelOne® structure consisting exclusively of PE 100 / PE 100-RC materials complies with DIN 8074, with added, outer protective coating.

### 2.1.1 Scope

The installation guidelines apply to underground HexelOne® SLM pipes in accordance with certification by TÜV SÜD for use as drinking water and wastewater pressure mains as well as for gas and industrial use. The pipe joints and pipeline parts must be designed for the respective operating pressure and will be described in these installation guidelines along with the installation regulations.

## 2.2 Installation

HexelOne® raised pressure pipes with protective coating are suitable for the following installation methods:




### 2.2.1 Permitted tractive forces

Compliance with the following permitted tractive forces must be observed when installing HexelOne® SLM pipes.
Exceeding these leads to permanent damage to the pipeline and must be prevented using suitable measures. Tractive forces must be measured and recorded.

Weldable jacking heads should be used. To ensure that the surface of the protective coating is not damaged during insertion, an additional outer sleeve should be used which encloses the protective coating. Alternatively the butt edge should be protected using design measures (e.g. by the weld seam).

| Dimension | Permitted tractive force [in kN] |
|---|---|
| 90 x 8.2 mm | 21.06 |
| 110 x 10.0 mm | 31.40 |
| 125 x 11.4 mm | 40.66 |
| 160 x 14.6 mm | 66.66 |

Tractive force: Specification in kN for HexelOne® SLM "Raised Pressure" pipes at 20°C pipe wall temperature

NB: Values should be reduced by 10% if the insertion takes longer than 30 min. and by 25% if the insertion takes longer than 20 hours

### 2.2.2 Permitted bending radii

The elasticity of the pipe material can be exploited when changing direction.

The bending radius must not fall below the radii specified in the following table. Appropriate fittings must be inserted where radii are smaller.

| Pipe wall temperature [°C] | Smallest permitted bending radius $R_{min}$ (in mm) |
|---|---|
| 0 | 75 x OD |
| 10 | 52.50 x OD |
| 20 | 30 x OD |

Where pipe wall temperatures are between 0°C and 20°C the respective permitted bending radius can be calculated using linear interpolation.

Falling below the bending radii for a short period of time during the insertion process is permitted if the run of pipe is supported, e.g. using guide pulleys, so that construction measures ensure there is no possibility of kinking or damage to the pipe.

## 2.3 Joining technique

Welding by means of combination welding and connection using HexelPress® compression fittings are available as permitted joining techniques for HexelOne® SLM pipes and fittings.

The following joining techniques have been tried, tested and certified by TÜV SÜD as compliant with the pressure class. The installation instructions set out should be followed and only joints and pipe parts belonging to HexelOne® system should be used. The assembly instructions for these parts must be observed accordingly.

### 2.3.1 Welding connections

The multiple layered structure of the pipes should be taken into consideration when welding. The connection of two HexelOne® male ends using butt fusion alone is not sufficient for a joint that complies with the pressure class. This is because the high strength medium layer is melted in the weld zone and loses its original strength!

The welding joints should be carried out in accordance with DVS Guideline 2207 Part 1, whereby it must be considered that the butt weld must be reinforced by additional electrofusion welding. The jointing of HexelOne® SLM pipes is therefore performed with a **combination of**

- butt fusion welding
  **and**
- electrofusion welding procedures.

HexelOne® electrofusion couplers and system fittings have been tested and approved by TÜV.

**NB:**
The transition to standard solid wall pipes likewise takes place using combination welding or – as described in Section 2.3.2 – by means of approved system compression fittings.

## Welding preparation for use of pipes in trenchless installation procedures

### Marking the area to be scraped / removing the protective coating

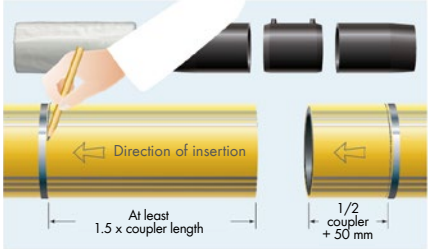



Fig. 2.1 Mark the area to be scraped

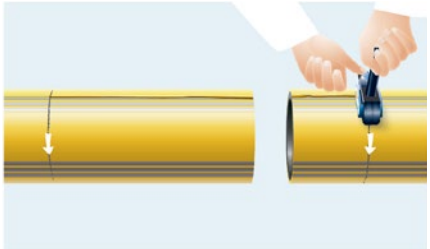


Fig. 2.2 Remove the protective coating using the egeplast M10 peeling tool

The protective coating should be completely removed using the egeplast M10 peeling tool. The guide is half the length of the fitting plus 50 mm, in pulling direction at least 1.5 x coupler length.

### Removing the oxide layer

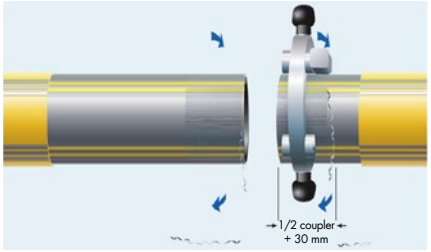



Fig. 2.3 Remove the oxide layer using a rotary scraper

Clean the core pipe in the area where the coating has been removed using a suitable PE cleaner and lint-free, non-coloured paper.
Mark the area to be scraped on the core pipe. The guide is 1/2 coupler + 30 mm, to leave space for subsequent planing.

Rotary scrapers should be used to remove the oxide layer; rotary scrapers which permit use on a pipe with any peeling length are recommended (e.g. Georg Fischer "RS" or Friatec "FWSG SE").

### Sliding over the egeplast egeFit® shrinking sleeve and the header pipes / sliding over the electrofusion coupler

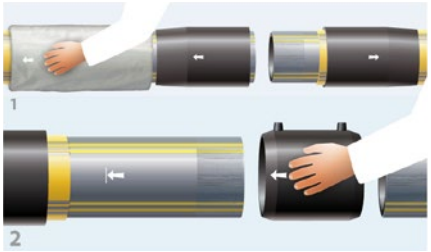



Fig. 2.4 Slide on the header pipes and the electrofusion coupler

The next step is to slide on an egeplast egeFit® shrinking sleeve (still packed) before making the pipe connection. For later bridging of edges, header pipes have to be slid over the two pipe ends subsequently.

They have to be slid over the protective layer and be positioned here temporarily during the further processing steps.

Subsequently, the electrofusion coupler has to be pushed in pulling direction onto the cleaned pipe end. If necessary, re-rounding clamps have to be used.

**NB:**
For use of the pipes in open trench installations, the use of header pipes is not required!

## Welding 1: Butt welding

**NB:**

- The mobile skid of the butt welding machine should be positioned in the direction that the pipes are being pulled!
- Due to the added protective coating, special clamping inserts are required to weld the pipes. These can be obtained from egeplast.

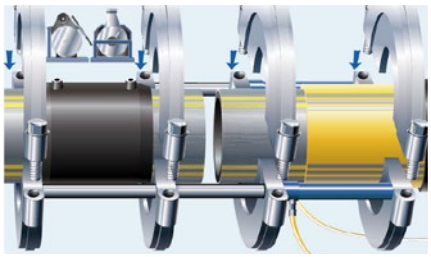


Fig. 2.5 Clamping the pipe ends in the butt fusion welding machine

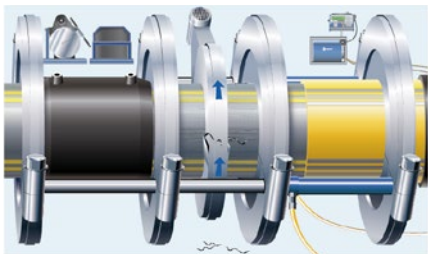


Fig. 2.6 Planing the front areas of the pipe

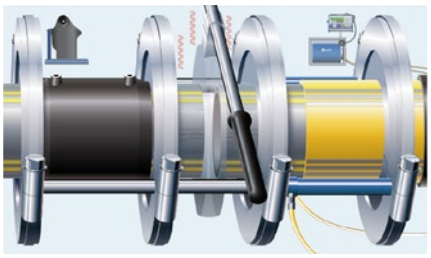


Fig. 2.7 Heating the pipe ends to be welded

Butt welding is carried out according to DVS 2207 Part 1 after completing the preparatory tasks.

To do this, the electrofusion coupler slid on earlier is temporarily placed between the clamping inserts (see Fig. 2.5).

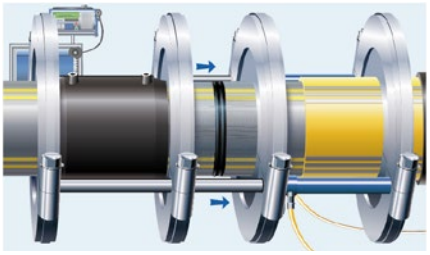


Fig. 2.8 Cooling the butt weld joint under joining pressure

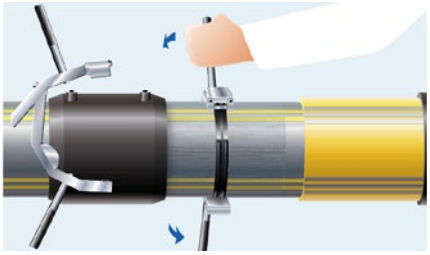


Fig. 2.9 Removal of the external bead

Once the cooling period has expired, the weld bead is removed with an external debeader so that the electrofusion coupler can be welded centrally over the butt fusion joint. It is advisable to mark the subsequent position of the coupler on the weld seam.

## Welding 2: Electrofusion welding

The area either side of the butt fusion joint, which has already been prepared for welding the electrofusion coupler, is cleaned again thoroughly using a suitable PE cleaner.

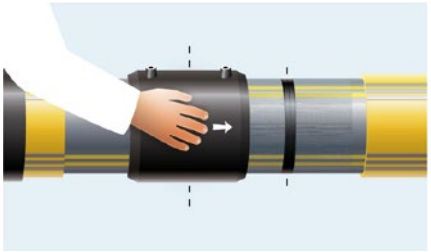


Fig. 2.10 Sliding the electrofusion coupler centrally over the bead-free butt joint

Slide the electrofusion coupler centrally over the butt fusion weld seam, marking the corresponding area beforehand.

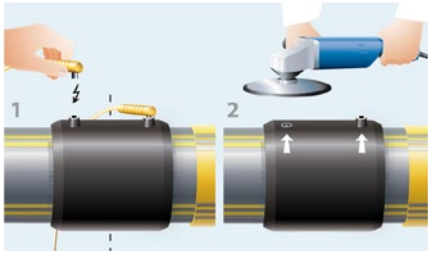



Fig. 2.11 Welding the coupler / Removal of contact plugs

Only TÜV-approved HexelOne® electrofusion couplers may be used for welding. Carry out the weld according to the welding parameters specified by the manufacturer of the fitting. The assembly instructions must be adhered to accordingly.

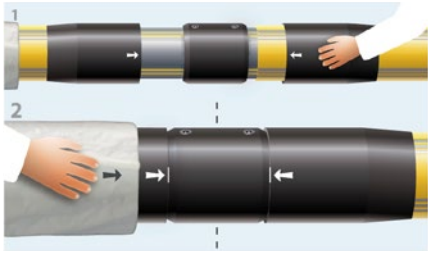



Fig. 2.12 Positioning of the header pipes

Once the cooling period has expired, the contact plugs of the coupler have to be removed and the header pipes have to be slid back to the coupler.

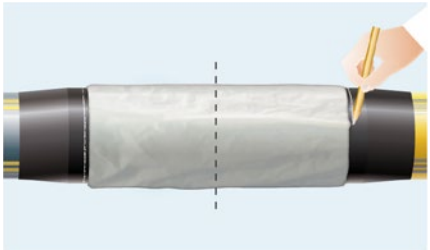


Fig. 2.13 Positioning of the shrinking sleeve

Position the shrinking sleeve in the center above the weld seam and mark the shrink area. Slide back the sleeve afterwards and remove from the shrink area.

Fig. 2.14 Roughen the shrink area of the sleeve radially using emery cloth. Dry and clean the area subsequently

The shrinking area is to be roughened with an emery cloth (P60) in order to achieve better adhesion. Dry and clean the area subsequently.

Fig. 2.15 Preheating the pipe surface and applying the hot-melt adhesive

Preheat the pipe surface and apply the enclosed hot-melt adhesive, approx. 5 cm from the end of the shrinking sleeve on either side.

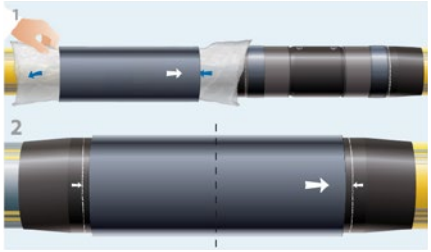



Fig. 2.16 Removal of the protective foil and alignment of the shrinking sleeve

Subsequently remove the protective foil into a single direction. Align shrinking sleeve to the center.

Fig. 2.17 Shrinking of the sleeve by means of a soft gas flame

Shrinking of the sleeve by means of a „soft" gas flame. Processing from the center towards the outside. Keep propane gas burner constantly circulating. When the shrinking sleeve fits closely, installation is complete and prepared for trenchless installation.

Note:
After shrinking, the joint should cool down to ambient temperature in order for the material to achieve sufficient consistency.

## 2.3.2 Connection using compression fittings

HexelPress® system compression fittings may be used as an alternative to welding. These compression fittings are not intended for trenchless insertion with horizontal directional drilling, but are usually deployed for the incorporation/ connection of steel pipes, for example.

The compression fittings should be backfilled with sand according to the applicable rules and guidelines. In addition it is recommended that these metal fittings are protected against corrosion by tried and tested measures like the WRAPPING GREEN system or similar. Shrinking sleeves can be used as well.

NB:

Due to the functional principle of the fitting axial movement of one of the two pipe ends to be connected has to be ensured. Alternatively special connectors are available for subsequent installation (SI) (see P. 16 for installation).

• HexelPress® compression fittings (dimension range 90 mm/110 mm)

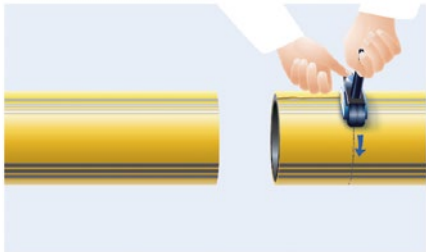


Fig. 2.18 Removal of the protective coating with the egeplast M10 peeling tool

The protective coating should be completely removed in the compression area using the egeplast M10 peeling tool. The guide for trimming the coating:
Dimension OD 90 mm: 120 mm Dimension OD 110 mm: 140 mm

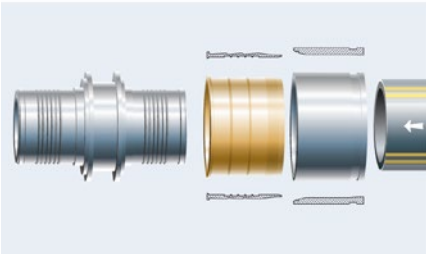


Fig. 2.19 HexelPress® compression fitting

The HexelPress® coupler for dimensions 90 and 110 mm consists of a support body, squeezing ring and compression ring. They are pressed together with the pipeline using a 3-cylinder compression tool (DMP-PWZ 3 / Item No. 114 181).

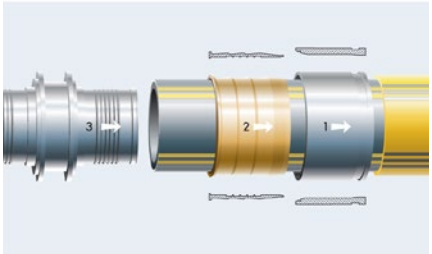



Fig. 2.20

**Assembly:** First the compression ring and then the squeezing ring are slid onto the HexelOne® pipe to be pressed in. A non-metallic tool is now used to insert the support body into the pipe until the cut surface of the pipe has been slid as far as possible into the support bushing.

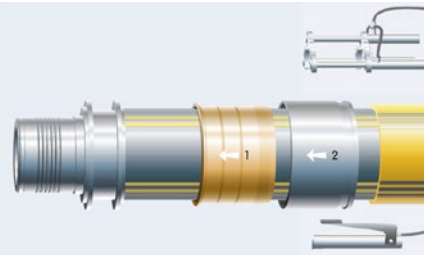



Fig. 2.21

The squeezing ring is pushed back again in the direction of the arrow until it likewise sits as far as possible on the support body. The compression ring is pushed towards the support body until it sits firmly on the squeezing ring.

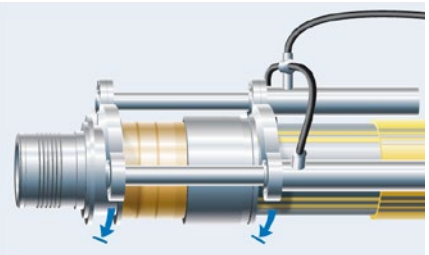


Fig. 2.22

The compression tool which has been opened is placed over the fitting and closed as much as possible (Fig. 2.22); this position is then secured using the attached pin (Fig. 2.23).

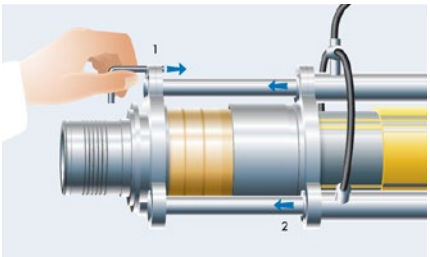



Fig. 2.23

The insides of the tool jaws are now placed on the outsides of the end stop of the support body and the front end of the compression ring on the pipe side. The tool is now moved together hydraulically until the compression ring connects with the collar of the support body. Clearance between compression ring and collar must be equal on all the circumference (Fig. 2.23).

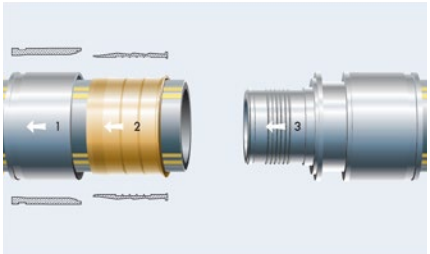



Fig. 2.24

The second joint (Fig. 2.24) is carried out analogously; Consider that axial movability of at least one end must be ensured.

• HexelPress® compression fittings (dimension range 125 mm/160 mm)

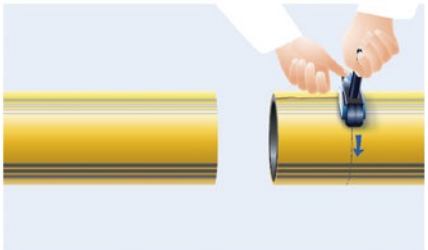


Fig. 2.25 Removal of the protective coating with the egeplast M10 peeling tool

The protective coating should be completely removed in the compression area using the egeplast M10 peeling tool. The guide for trimming the coating:
Dimension OD 125 mm: 280 mm
Dimension OD 160 mm: 350 mm

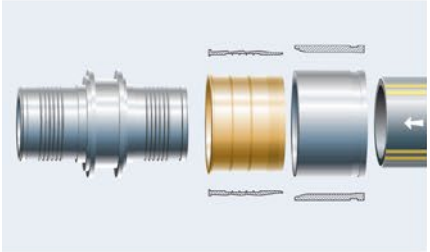


Fig. 2.26 HexelPress® compression fitting

The HexelPress® coupler for dimensions 125 and 160 mm consists of a support body, squeezing ring and compression ring. They are pressed together with the pipeline using a 4-cylinder compression tool (DMP-PWZ 4 / Item No. 119060).

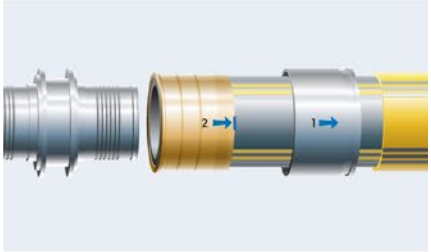



Fig. 2.27

**Assembly:** Slide the compression ring onto the pipe. Slide the squeezing ring as far as it will go onto the end of the pipe to be pressed.

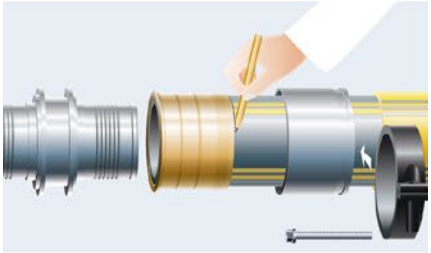


Fig. 2.28

Mark the position of the squeezing ring.

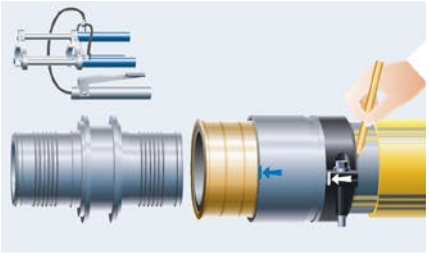


Fig. 2.29

Slide the compression ring back onto the squeezing ring. Mount the clamping ring onto the pipe approx. 1 cm behind the compression ring (position gripping elements to the pipe end), tighten screw, mark the position.

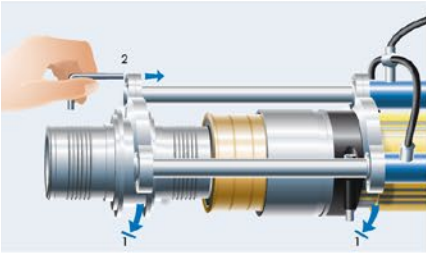



Fig. 2.30

Position the support of the HexelPress® compression fitting on the end of the pipe, attach the insertion aid, insert the locking pins acc. to pipe diameter and secure.

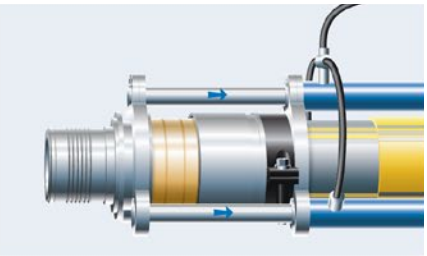


Fig. 2.31

Connect the hydraulic pump to the insertion aid and pump it till the pipe end is reached by the stopp of the fitting body. Then remove the insertion aid by releasing and removing the pin.

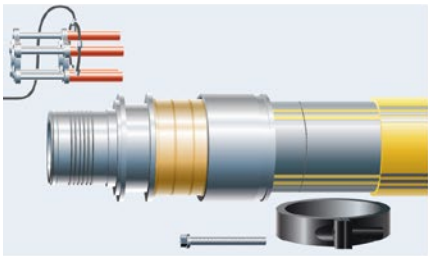


Fig. 2.32

Release the clamping ring and remove from the pipe. Connect the open compression tool to the hydraulic pump, place the compression tool over the compression fitting and close as far as possible. Ensure the correct position of

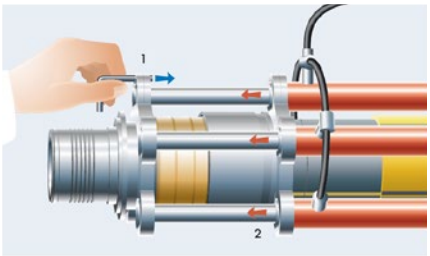



Fig. 2.33

the clamping jaws on the end stops; the correct position is indicated by the marking on the tool. Secure the tool using the locking pin. Actuate the hydraulic pump until the compression ring reaches the end stop of the support.

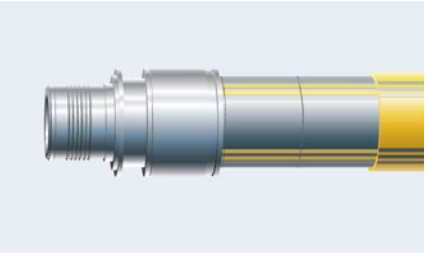


Fig. 2.34

Care must be taken that the clearance between the compression ring and the end stop is consistent across the entire circumference. Fit other compression fittings in the same way.

- HexelPress® connectors for subsequent installation (SI)

The HexelPress® connectors for subsequent installation (SI) are used where no axial free movement of one end of the pipe is possible. They have a longer support onto which compression takes place after positioning.

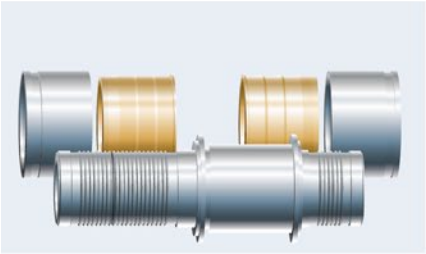


Fig. 2.35

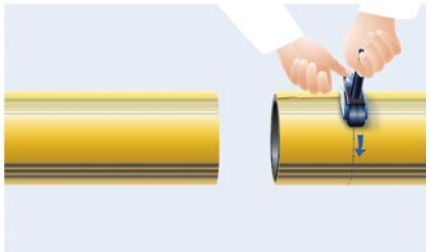


Fig. 2.36 Removal of the protective coating using the egeplast M10 peeling tool

The protective coating should be completely removed in the compression area using the egeplast M10 peeling tool.
The guide for trimming the coating:
Dimension OD 90 mm: 120 mm
Dimension OD 110 mm: 140 mm
Dimension OD 125 mm: 280 mm
Dimension OD 160 mm: 350 mm

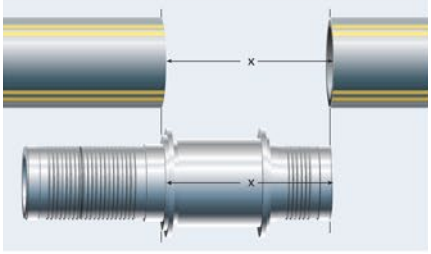



Fig. 2.37

Prepare shortening of the pipe ends/pipe cut-out: pipe ends must be aligned to shorten them. The requisite length for the cut-out "x" can be taken directly from the fitting. Use appropriate tools to cut one or both pipe ends to the required gap „x".

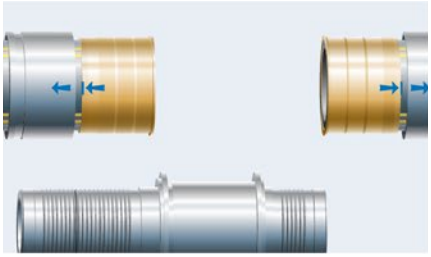


Fig. 2.38

The cut must be at right angles to the pipe axis. First slide the compression rings and then the squeezing rings onto both pipe ends.

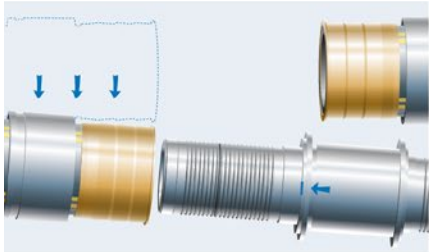


Fig. 2.39

Ensure that at least one pipe end has enough space to be moved out of the alignment to permit the long end of the fitting to be inserted into the pipe end. Then completely insert the long end of the fitting into the pipe till the stop.

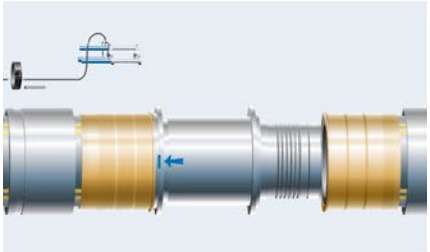


Fig. 2.40

This is done either by hand (dimensions 90 and 110 mm) or using the pipe insertion tool (dimensions 125 and 160 mm). Realign pipe and fitting again.

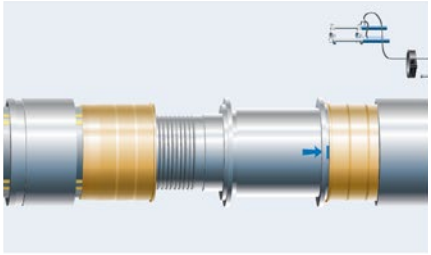


Fig. 2.41

Guide the fitting by hand (dimensions 90 and 110 mm) or using the pipe insertion tool (dimensions 125 and 160 mm) with a crosswise movement into the open pipe end so that the end stop of the short end of the fitting is against the pipe end. Care must be taken that the long end of the fitting does not protrude beyond the marking and out of the pipe end.

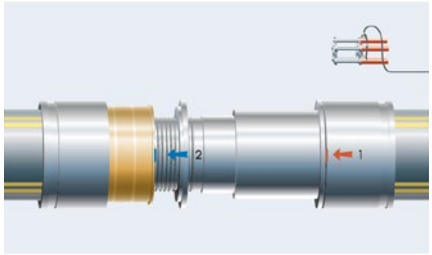



Fig. 2.42

Carry out the jointing of the short end of the fitting according to the above instructions (step 1). Then release the end stop on the long end (secured on the support by a threaded fitting). This serves as end stop for the compression tool. After release, the end stop should be moved or twisted to the end of the pipe (step 2).

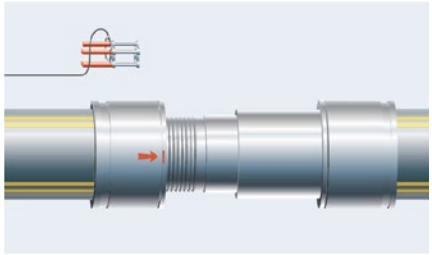


Fig. 2.43

The jointing of the long end of the fitting is then carried out.

## Material transition pieces with steel weld-on end

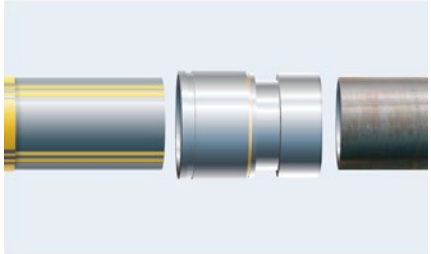


Fig. 2.44 Short weld-on end

For the HexelPress® transition pieces with short steel weld-on end, the material transition (weld-on end) should first be welded onto the existing steel pipe. Then, once the weld connection has cooled, the jointing with HexelOne® pipes can be carried out as previously described.

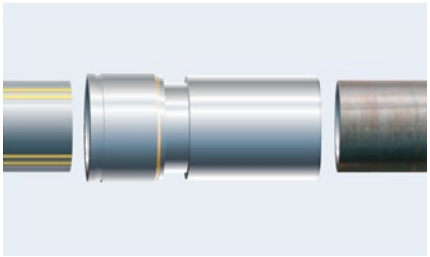


Fig. 2.45 Long weld-on end

Alternatively HexelPress® transition pieces with long weld-on end are available; these can be pressed in before the weld-on end has been welded to the steel pipe.

## 2.4 Pressure testing

The leak tightness of the installed pipe run must be checked in accordance with DVGW code of practice G 469 (gaseous media) or DIN EN 805 (water and other liquid media).

## 2.5 Squeeze off

If the flow of medium under pressure has to be temporarily blocked for incorporation and repair measures, the pipeline can be squeezed off.

The squeeze off should take place as set out in DVGW instruction GW 332.

0.5 m of protective coating should be removed from each side to be squeezed off before positioning the squeezing mechanism.

After completing the work, the pipe should be put back into shape on the squeezed area using re-rounding clamps.

The squeezed area should then be permanently marked and reinforced with metal clamps. The squeezed off area and the exposed pipe ends should then be backfilled with sand.

# Notes

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