

# FRIALEN<sup>®</sup>-Large Pipe Technique for laying large pipes and relining pipe networks

## Fitting Instructions



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# 1. Safety

## 1.1 Safety advice and tips

The following warning symbols are used in these assembly instructions:



### **DANGER!**

#### **Describes impending danger!**

Non-observance of this warning may lead to serious damages to health and objects.



### **WARNING!**

#### **Describes a dangerous situation!**

Non-observance of this warning may cause minor injuries or damage to objects.



### **IMPORTANT!**

#### **Describes advice and other useful information!**

## 2. Areas of Application

**FRIALEN® Safety Fittings** are used for weld joints at pressure pipes made of polyethylene in the dimensions SDR 17.6 to SDR 11 for use in gas and water supply, pressure drainage, industry and landfill construction.

For processing of pipes SDR > 17.6, please call us.

When operating with other media than water and natural gas, please contact our application engineering department.



### **IMPORTANT!**

The information and processing instructions mentioned on the fitting or enclosed shall apply predominantly.

### 3. Standard publications and specifications for use

For detailed and up-to-date information on FRIALEN® Safety Fittings, please see the technical datasheets available on the Internet ([www.frialen.com](http://www.frialen.com)).

Please observe the guidelines of the DVGW standard publications, and of the DVS, BGR 500 (VBG 50), EN 1555, EN 12201, EN 13244, UVV and respectively national regulations.



#### **DANGER!**

**The described sequence of the processes is absolutely to be adhered to.**

**FRIALEN® Safety Fittings** can be used with pipes made of **PE 100, PE 80, PE 63, PE 50** according to DIN 8074/75, EN 1555-2, EN 12201-2, EN 13244-2, ISO 4437 and ISO 4427.

For PE pipes, a fusion flow rate MFR 190/5 in the range of 0.2 – 1.7g/10 min. applies.

We recommend using pipes with a limited dimension tolerance range, tolerance class B.

**FRIALEN® Safety Fittings** consist of PE 100 and meet the requirements according to DIN 16963-5, -7, EN 1555-3, EN 12201-3, EN 13244-3, ISO 8085-3 as well as the DVGW test bases. FRIALEN® Safety Fittings can be fused with FRIAMAT® Electrofusion Units at ambient temperatures between - 10 °C and + 45 °C. Fittings from d 710 between 0 °C and + 45 °C.

For material transition joints, the material- or system-specific standards and installation guidelines apply in addition.



#### **WARNING!**

**Fusion with other pipe materials such as e.g. PP, PVC etc. is not possible.**



#### **WARNING!**

Pipes and moulded components should have settled to a balanced temperature level between - 10 °C and + 45 °C (Couplers UB d 710 between 0 °C and + 45 °C) when being processed.



### **IMPORTANT!**

FRIALEN® Safety Fittings are identified by a batch marking.

This reads from left to right:

- Production week (KW) (stamp 1+2)
- Production year (stamp 2)
- Material identification letter (stamp 3)

Example:



KW 14/01/E

The FRIALEN® Safety Fittings can be stored and processed for a long time, provided the general storage specifications are adhered to. When properly stored (in closed rooms or containers (boxes)) and/or not exposed to UV radiation as well as effects of weather (humidity etc.), a storage and processing period of more than 4 years can be assumed.



### **WARNING!**

**Improperly stored component parts may not be processed because this may result in leaking fusion joints.**

### **Traceability**

An automatic component traceability is possible when using e.g. traceability-capable FRIAMAT® Electrofusion Units with a special barcode (see Figure 9) which contains the specific data of the fitting, e.g. manufacturer, dimension, material, batch. These data on component traceability can be electronically archived together with the fusion process data.



### **IMPORTANT!**

**Manual electrofusion units (without barcode reader), e.g. FWS 225, are no longer state-of-the art. Processing of FRIALEN® Safety Fittings with these units is thus no longer possible.**

### **3.1 Pressure load-bearing capability**

The pressure load-bearing capability of FRIALEN® Safety Fittings made of PE 100 is expressed in SDR stages.

$$\text{SDR} = \frac{\text{pipe outer diameter } d}{\text{pipe wall thickness } s}$$

The design factor C (calculation coefficient for PE components) depends on the area of application and the specifications (min. 1.25).

Fitting material: PE 100 (FRIALEN® standard)	Water	Gas
	maximum operating pressure in bar for new: C = 1.25	maximum operating pressure in bar for new: C = 2
SDR Stage		
17	10	5
11	16	10
7.4	25	-

The parts are identified and usable with regard to their load-bearing capability according to the above table.



**DANGER !**

**Fusion with escaping media is not permissible.**

**4. Couplers from d 250 mm**

**4.1 Cutting to length of pipes**

Cut off the pipe in a right angle to the pipe axis (see Figure 1). A suitable tool is a PE pipe cutter or a saw with toothings suitable for plastics.

Distinctive conical oblique pipeends must be cut off, if necessary.

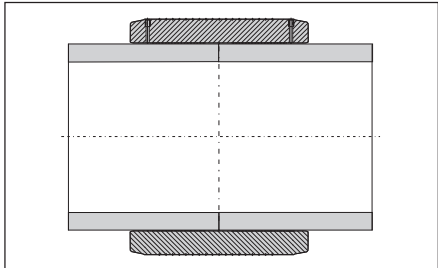


Figure 1



**DANGER!**

**A non-rectangular pipe cutting may cause the heating coil partially not being covered by the pipe which may result in overheating, uncontrolled melt formation or self-ignition (see Figure 2).**

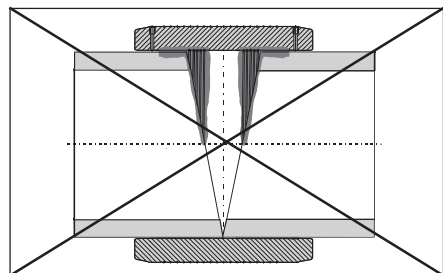


Figure 2

## 4.2 Measure fusion zone, mark with a FRIALEN® marker and remove oxide layer

### Fusion zone:

The length of the fusion zone corresponds to half the length of the coupler.

At first, remove contaminations from the pipe. A processing allowance of approx. + 5 mm in addition of the insertion depth provides proof after fusion that the oxide layer has been removed properly. Using a manual scraper or **FRIALEN® Scraper tools** (see Figure 4 a+b+c), the oxide layer, which formed during on the surface of HDPE pipes and spigot fittings during storage, has to be removed completely directly before the assembly.



### **IMPORTANT!**

The Scraper tool **FWSG 710 S** and **FWSG 710 L** have proved themselves for a long time in use application and serve for the scraping of pipes in the dimension area d 250 to d 710.

Besides, the **FWSG 710 S** scrapes only half a sleeve length, so that it is possible to scrape spigot fittings. With the **FWSG 710 L** the whole sleeve length is scraped to make easier the assembly as a slide-over coupler.

The scraper tools **FWSG SE 250**, **280** and **315** are proper for both, preparation of couplers-, and saddle assembly.



Figure 3



Figure 4a



Figure 4b



Figure 4c



**WARNING!**

If the oxide layer is not removed completely, inhomogeneous, leaking fusion joints may result.



**WARNING!**

The FWSG 710 scraper tool must in all circumstances be used for fittings from d 710.

A one-time, complete removal is sufficient (min. 0.15 mm).

Damages to the pipe surface as e.g. axial grooves or scratches may not be located within the fusion zone.



**WARNING!**

An excessive swarf removal may result in an excessively large annular gap which either cannot or only insufficiently closed by fusion (for the remedy see item 4.8).

Please thus regularly check the condition of the blade at the manual scraper and the wear of the scraper blade at the scraper tool. Worn blades must be replaced (see FRIALEN® Info No. 1).

Scraper Tool	Estimated swarf thickness (mm)	Abrasion limit (mm)
FWSG 225	0.25 - 0.35	0.4
FWSG 710	0.30 - 0.40	0.5
FWSG SE 250 - 315	0.25 - 0.35	0.4

Please note that the indicated wearing margin applies to FRIALEN® Safety Fittings. Where appropriate please observe manufacturers' indications.

Filing or sanding are not permitted because contaminations are introduced.

For a control of the complete surface removal over the entire surface, we recommend to apply marking (control) lines (see Figure 3). If during scraping of the surface non-scraped areas occur at some points (e.g. in case of oval pipes), these areas are to be reworked.



The processed zone is to be protected against dirt, soap, grease, subsequently flowing water and unfavourable effects of weather (e.g. moisture, frost formation). Do not touch the fusion zone again after scraping.



**WARNING!**

**FRIALEN® Safety Fittings with integrated heating coils guarantee optimal heat transfer through their exposed heating coils and may thus not be scraped at the inside of the fitting.**

**4.3 External and internal chamfering of the cutting edge (See Figure 5)**

For this purpose, the manual scraper is a suitable tool. A good chamfer on the outside diameter of the face of the pipe will make it easier to fit the coupler. **Remove swarves from within the pipe.**



Figure 5

**4.4 Restoration of irregular / oval pipes**

Pipes, in particular bundled coils and drums, may lose their roundness during storage. If the pipe out-of-roundness in the fusion zone area exceeds 1.5% of  $d$  (outer diameter) or is  $> 3.0$  mm, these pipes must be rounded in the fusion zone area. Please use rounding clamps for this purpose which are installed at the end of the fusion zone (See Figure 6).



Figure 6



**WARNING!**

**For the installation of fittings from  $d$  710 rounding clamps for the pipes need to be applied in all circumstances.**

With UB couplers  $d$  280 to  $d$  450 the pipe may be adjusted to the coupler following evaluation of the annular gap ( $> 1$  mm) by using the pre-heating barcode.



## **WARNING!**

The pre-heating barcode must be applied when using fittings from d 500.

### **4.5 Cleaning**

The surfaces of the pipes to be fused and the interior surfaces of the FRIALEN® Safety Fittings must be absolutely clean, dry and free from any grease. These areas are to be cleaned with a suitable cleaning agent and **exclusively with absorbent, lint-free and non-dyed paper** directly before the assembly and after scraping (see Figure 7).



Figure 7

We recommend PE cleaning agents which meet the requirements of the test basis DVGW-VP 603, e.g. AHK cleaning agents.

When cleaning, ensure that no contaminations from the unscraped pipe surface are introduced into the fusion zone.



## **WARNING!**

**When using alcoholic cleaning agents, the alcohol percentage must be at least 99.8% according to DVGW-VP 603.**

The cleaning agent **must be completely evaporated** before starting the fusion process.

Now, using the **FRIALEN® marker**, re-mark the line (approx. 120° distributed around the circumference) to show the width of the fusion zone on the pipe since this will have been removed by scraping and cleaning.

The joint surfaces must be clean and dry before installing the fitting. The cleaned fusion zone should not be touched with bare hands. Moisture in the area of the joint area, e.g. because of dew or frost, is to be removed using suitable aids.

The fusion fitting is to be removed from the packaging only directly before the planned processing. The packaging protects the fittings against external influences during transport and storage.

#### 4.6 Inserting push fit ends or pipe ends into the fitting.

When the **FRIALEN® Safety Fittings** and pipes are being assembled care should be taken to ensure that the contact sockets are accessible to allow connection of the fusion plug. Assembly can be assisted by tapping around the face with a plastic hammer at the same time. **When assembling do not tilt.** The worked insertion end must be pushed into the fitting up to the mark. If necessary hydraulic rounding clamps should be used (see Figure 6).

Repeated scraping of the outer diameter might be necessary if the tolerance is big. Repeated scraping may not be performed to remedy installation problems due to out-of-roundness!

If the fitting cannot be slipped on without using force despite the above described procedure, a repeated scraping is permitted. (see item 4.4).

A simple control of the high points is possible by installing the coupler and evaluating the annular gap.

#### 4.7 Ensuring a tension-free assembly of the components

All joints prepared for fusion must be tension-free. Pipes may not be positioned in the **FRIALEN® Safety Fitting** under bending stress or self-load. After the installation on the pipe ends, it must still be possible to move the couplers by hand.

If required, the piping or the fitting is to be supported or suitable fixing facilities are to be used. The tension-free fixing of the joint is to be maintained until the cooling time stated on the barcode and in the table is reached. (see item 4.9).

Before starting the fusion process, check again based on the markings whether the position of the pipe insertion end in the **FRIALEN® Safety Fitting** has shifted (correct, if required).



#### **WARNING!**

**A non-tension-free or shifted joint may result in an impermissible melt flow and a defective joint during fusion (see Figure 8).**

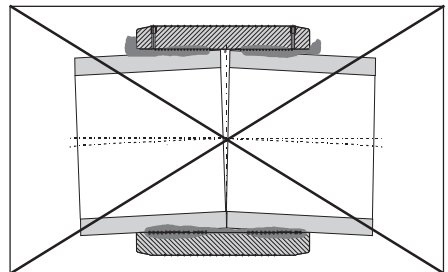


Figure 8

#### 4.8 Pre-heating for reducing the annular gap between coupler and pipe.



##### **WARNING!**

Only use fusion units which have been approved by the manufacturer with regard to their function for the processing of FRIALEN® Safety Fittings. See DVS 2207-1.

Use FRIAMAT® fusion units only for FRIALEN® UB d 710!

##### **Preheating barcode (see also instruction leaflet enclosed with the component part)**

The ring gap between the coupler and the pipe can be compensated for to a certain extent by using a specifically matched preheating barcode (Figure 9). The maximum bridgeable distance between the coupler and the pipe may not exceed 3 mm across the entire circumference. For the coupler mounted and centred at the pipe, this means:  $\Delta d \leq 6 \text{ mm}$ .

For relining slide-over couplers REM d110/DN100 and d160/DN150, a maximum gap of 2 mm applies. The thermal reduction of tensions in the joining area has also a positive effect on the fusion result.



Figure 9

##### **Procedure:**

1. Preparation of the joining area corresponding to the FRIALEN® installation instructions for large pipes and pipe network relining.
2. Centre the coupler on the pipe such that the ring gap across the circumference is as equal as possible. If required, support the coupler.
3. Close the ring gap with adhesive tape to prevent heat losses.
4. Close open pipe ends (chimney effect).
5. Standard processing:
  - I. Preheating of first coupler side, record yellow barcode with FRIAMAT® electrofusion unit and start the process; then
  - II. preheating of second coupler side, record yellow barcode with FRIAMAT® electrofusion unit and start the process; then
  - III. first coupler side: check the ring gap: if it is still too large, the preheating can be repeated 2 x maximum. If ok: Start **fusion of first coupler side**, (white barcode), then
  - IV. second coupler side: check the ring gap: if it is still too large, the preheating can be repeated 2 x maximum. If ok: Start **fusion of second coupler side**, (white barcode)



**WARNING!**

Between preheating and fusion, a waiting time is always required to ensure heating through of the component parts. This waiting time corresponds approximately to the preheating or fusion time, depending on the dimension approx. 15-30 minutes. If only one coupler side is to be processed, the waiting time between preheating and fusion is to be observed.

If the waiting time is exceeded by more than the double time, the described process is to be repeated.

#### 4.9 Carrying out the fusion



**WARNING!**

Only use fusion units which have been approved by the manufacturer with regard to their function for the processing of FRIALEN® Safety Fittings. See DVS 2207-1.

Use FRIAMAT® fusion units only for FRIALEN® UB d 710!

For the fusion of the coupler d 800 please observe our FRIALEN® Info No. 42.



Figure 9a

The fusion parameters are contained in the main barcode affixed to the FRIALEN® Safety Fitting. When using fully automatic fusion units (e.g. FRIAMAT®), the parameters are entered into the fusion unit using the reader. After reading of the barcode (see Figure 9a), the fitting data are to be compared with the data shown on the unit's display.

The subordinated barcode contains the data for component traceability (see information). This barcode is only to be read if the component traceability function is to be used. This requires suitable fusion units.

The fusible pipe series are listed in the SDR labelling on the label.

The fusion units automatically monitor the fusion process and control the supplied energy in determined limits.



**Information:**

The fusion parameters are encoded on the barcode label in the form of a 24-digit figure (top), the data for component traceability in the form of a 26-digit column of numbers (bottom), and can also be entered manually into the FRIAMAT® fusion unit using the emergency entry mode.



**Information:**

Fusion units FRIAMAT® L and FRIAMAT® LE are not suitable for the fusion of large couplers.

For fittings with separate coils (see Figure 10), each fitting side is to be fused separately.

For fittings with continuous coil, both fitting sides are to be fused simultaneously (see Figure 11).

FRIALEN® Safety Fittings are equipped with a swell indicator, this only gives an indication that fusion has taken place. This swell indicator signals the fusion process, by changing its colour (red) and by increase of volume. The proper progress of the fusion process, however, is only shown by the fusion unit.

After reading of the barcode, the fitting data are to be compared with the data shown on the unit's display. If they are identical, **start fusion**. Please observe the operating instruction of the FRIAMAT® fusion unit.

Avoid stress on the connecting spot.

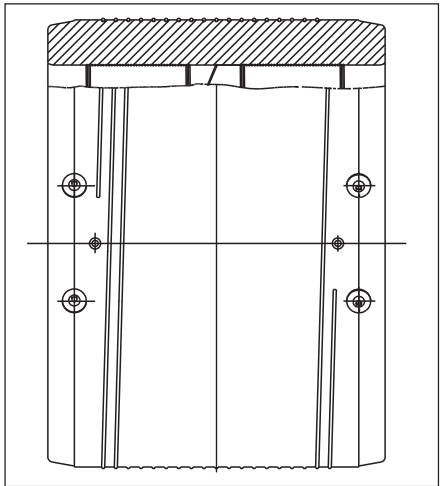


Figure 10

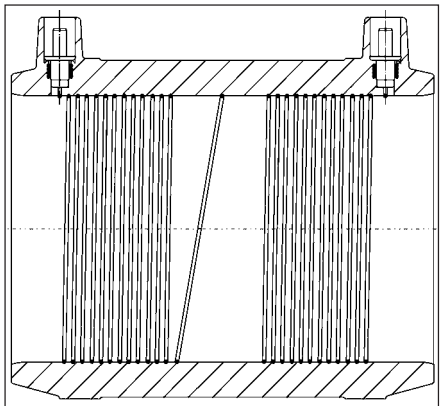


Figure 11



**WARNING!**

Keep a distance of one meter to the fusion site during the fusion process for general safety reasons.

The obtained **actual fusion time** is to be compared with the **target fusion time** on the unit and to be noted on the pipe or the **FRIALEN® Safety Fitting** (See Figure 12).

With this identification it is ensured that no fusion point is overlooked.

**In case of doubt**, a fusion can be repeated. But the joint surfaces must be cooled down to ambient temperature before each renewed fusion. Please contact for this purpose your local FRIALEN® sales engineer by phone or the FRIALEN® Hotline.



Figure 12

**4.10 Cooling times.**

The cooling time is

- a) the time which is required to cool down the component to the temperature which facilitates the movement of the joint. This time is also listed on the barcode and is identified by CT.
- b) the time which is required to cool down the component to the temperature which facilitates the application of the full test or operating pressure. This is classified into pressure volumes of up to 8 bar and > 8 bar.



**WARNING!**

**When inserting piping (e.g. relining) it is the cooling time before pressurising which is important.**

Diameter in mm	Cooling time in minutes for FRIALEN® couplers and fittings		
	CT until the joint may be moved	Up to pressurising at up to 8 bar	Up to pressurising at > 8 bar
250 – 355	30	75	100
400 – 710	40	95	120
800	90	200	240



**Information:**

A piping may only be commissioned after successful pressure test (see EN 805, EN 12007 and DVGW G 469, W 400). The guidelines of the DVGW leaflets for pressure tests, the European standards or the country-specific regulations are to be observed.



**Information:**

The detachment of the outer armouring wire during the cooling down stage is caused by the thermal expansion characteristics of the fused joint and does not present a problem.

## 5. Saddle parts - Top Loading

FRIALEN® TL saddle parts are used with pipes from SDR 17 to SDR 11 from d 250 mm. The processing occurs with the FRIATOP Clamping Unit (Figure 15b).

### 5.1 DAA-TL Pressure Tapping Tees - Top Loading, d 250 - 315 (400)

FRIALEN® DAA-TL Pressure Tapping Tees Top-Loading are suitable for fitting as branch connectors onto unpressurised or pressurised pipelines.



**WARNING!**

FRIALEN® pressure tapping valves  $\geq d 355$  mm may be processed using only SDR 17 and SDR 17,6 pipes due to tapping technique. Processing temperature: between 0 °C and 45 °C.

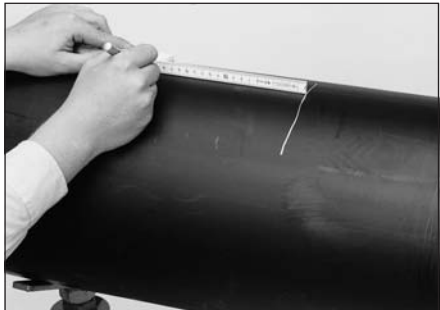


Figure 13



### 5.1.1 Measuring of fusion zone of the pipes (and the lateral outlet spigot), marking and removing oxide layer

The fusion zone: is the area of pipe covered by the saddle; for a side outlet it is the insertion depth on the smooth pipe spigot. The oxide layer in the area of the fusion zone, which has formed on the surface of the HDPE pipes during storage, must be **totally** removed with a hand scraper or a scraper tool (e.g. FWSG SE) immediately **before** assembly (See Figure 14).

A processing allowance of several millimetres in addition to the covered area provides proof after fusion that the oxide layer has been properly removed from the pipe.



#### **WARNING!**

**If the oxide layer is not removed completely, leaking fusion joints may result.**

**Worn blades of the scraper tool and manual scraper must be replaced.**

A one-time, complete removal is sufficient (min. 0.15 mm). A uniform surface without flattening and material grates at the pipe diameter should be the result.



#### **WARNING!**

**Filing or sanding of the pipe is not permitted because contaminations are introduced.**



Figure 14



Figure 14 a

For a control of the complete surface removal over the entire surface, we recommend to apply marking (control) lines (see Figure 13). If during scraping of the surface non-scraped areas occur at some points, these areas are to be reworked.

The processed zone is to be protected against dirt, soap, grease, subsequently flowing water and unfavourable effects of weather (e.g. moisture, frost formation).

### 5.1.2 Cleaning

The surfaces of the pipes to be fused and the interior surfaces of the **FRIALEN® DAA-TL Pressure Tapping Tees Top-Loading** must be absolutely clean, dry and free from any grease. These areas are to be cleaned with a suitable cleaning agent and **exclusively with absorbent, lint-free and non-dyed** paper directly before the assembly and after scraping.

We recommend PE cleaning agents which meet the requirements of the test basis DVGW-VP 603, e.g. AHK cleaning agents.

When cleaning, ensure that no contaminations from the unscraped pipe surface are introduced into the fusion zone.



#### **WARNING!**

**When using alcoholic cleaning agents, the alcohol percentage must be at least 99.8% according to DVGW-VP 603.**

The cleaning agent **must be completely evaporated** before starting the fusion process.

Subsequently, re-apply marking line for the fusion zone width with the **FRIALEN® marker** because this line was removed during scraping and cleaning. The joint surfaces must be clean and dry before installing the fitting. The cleaned fusion zone should not be touched with bare hands. Moisture in the area of the joint area, e.g. because of dew or frost, is to be removed using suitable aids.

The fusion fitting is to be removed from the packaging only directly before the planned processing. The packaging protects the fittings against external influences during transport and storage.

### 5.1.3 Assembly

- Place the saddle onto the prepared surface of the pipe.
- Fit the adapter of the FRIATOP clamping device (Figure 15a).
- Fit the clamping device as directed in the Operating Instructions (Figure 15b).



#### **WARNING!**

**For pressure tapping tees and pressure tapping valves, the factory drill setting may not be changed before starting the fusion process.**

### 5.1.4 Carrying out of fusion

When fusing **Pressure Tapping Tees** to media-carrying pipings, the following operating pressures may not be exceeded until the pipe has cooled down completely:



Figure 15a



Figure 15b

Pipe material	PE 80		PE 100	
SDR	17	11	17	11
Maximum permissible working pressure in bar				
Gas pipe	2	5	5	10
Water pipe	8	12.5	10	16



### **WARNING!**

**Only use fusion units which are authorised by their manufacturer to process FRIALEN® Safety Fittings as part of their function. See DVS 2207-1.**

The fusion parameters are contained in the main barcode affixed to the **FRIALEN® Safety Fitting**. When using fully automatic fusion units (e.g. **FRIAMAT®**), the parameters are entered into the fusion unit using the reader. After reading of the barcode, the fitting data are to be compared with the data shown on the unit's display. If they are identical, **start fusion**. Please observe the operating instruction of the FRIAMAT® fusion unit.

The fusion units automatically monitor the fusion process and control the supplied voltage in determined limits.

The swell indicator only indicates to the performed fusion process. The proper fusion process is, however, only indicated by the fusion unit!



### **WARNING!**

**Keep a distance of one meter to the fusion site during the fusion process for general safety reasons.**

**The obtained ACTUAL fusion time is to be compared with the target fusion time on the unit and to be noted on the pipe or the FRIALEN® Safety Fittings.**

**With this identification it is ensured that no fusion point is overlooked.**

**After the fusion process has finished always maintain the jointing pressure for a 10 minute cooling period!**

### 5.1.5 Tapping and application of the test and operating pressure

The following waiting times are to be observed:

Diameter in mm	Cooling time in minutes for FRIALEN® Saddle fittings	
	Up to pressurisation via outlet	CT Up to tapping
≥ 250	50	60

The cooling time CT stated on the components corresponds to the cooling time until tapping.



#### **WARNING!**

**If the waiting times are not observed, leaking fusion joints may result. The general installation instructions must be observed before tapping.**

### 5.1.6 Tapping of Pressure Tapping Tees

Remove blanking plug. Turn the drill down up to the lower stop using the matching FRIALEN® activating key (SW 19) (See Figure 16).

Turn the drill backwards up to the upper stop. Position the blanking plug and turn down the FRIALEN® activating key until the collar of the plug **slightly touches** the front face of the drill spigot.

Subsequently, turn back the plug **half a turn** to relieve the O-ring tension.



Figure 16



#### **WARNING!**

**If the collar is excessively tightened, the plug may break or the hexagonal seat may be overwound. In this case, the plug has to be replaced.**

**We recommend closing the tapping dome with a fusion cap K. The required scraping and cleaning are to be performed (see items 4.2 - 4.8).**

### 5.1.7 Tapping of DAV-TL pressure tapping valves d 250 - 315 (400) (Figure 17)



#### **WARNING!**

**Because of tapping requirements, the FRIALEN-pressure tapping valves  $\geq d 355$  can only be installed on pipes with SDR 17.**

Installation, fusion and cooling times as 5.1.3 et seq.

Tap by turning square spanner clockwise up to lower end position. The valve is now closed. In order to open the valve, the tap must be moved anti-clockwise up to the end position. After arriving the end position turn back approx. half a rotation.



Figure 17

The metal end points for the 'open shut' positions of the valve lead to a distinctly noticeable increase in the activating force. As sealing takes place in the closed position using a radially injected O-ring, it is not necessary to apply a great deal of pressure when closing the valve.

Install the FRIALEN Installation Kit EBS on the 14 mm square of the DAV-TL and secure the splint against pull out. Set the required overlapping height on telescoping frame. Telescoping frame may be adjusted by sliding scale and will stop securely at any point. The **FRIALEN® EBS** is technically perfectly adapted to the **FRIALEN® DAV-TL**.

## 5.2 VAM-RG-TL Valve Tapping Saddles d 250 - 315 (560)

### 5.2.1 Assembly

The preparation of the installation and the fusion process is made analogue to the **FRIALEN® Pressure Tapping Tee** (see 5.1.1 to 5.1.4).



#### **WARNING!**

The fusion range of the saddle covers the dimensions d 250 up to d 560. If necessary application technology restrictions must be considered by drill tool (usually applicable until d 315 SDR 11).



Figure 18

Restrictions concerning the application must be considered, e.g. length of drilling tool. Details of these components, given by manufacturer, have to be regarded.

The cooling times are to be observed (see item 5.1.5 **Pressure Tapping Tee**).

The fitting is drilled using a suitable close-off device or fitted with a valve in accordance with the relevant Fitting Instructions from the different valve manufacturers. The preparation and conduct of the pressure test are carried out in accordance with the details given by the valve manufacturer.

The threaded components fitted at the factory must be **secured with a spanner to prevent them from twisting**.

**Care should be taken to ensure that the insulation work is carried out in accordance with the regulations (DVGW Standard Publication).**

## 5.3 SPA-TL Shut off Saddles Top-Loading d 250 - 315 (560)

### 5.3.1 Assembly



#### **WARNING!**

The fusion dimensions of the component includes d 250 - d560. If necessary application technological restrictions have to be regarded. For example by borer tool or balloon, normally applicable up to d 315 SDR 11. Details of these components, given by manufacturer, have to be regarded. Processing temperature: between 0 °C and 45 °C.

**FRIALEN® Shut-off Saddles** (see Figure 19) are prepared for installation and fused analogue to **FRIALEN® Pressure Tapping Tees** (see Chapters 5.1.1 – 5.1.4). The tapping of the pipe can be made after cooling down (see item 5.1.5) and observing the installation instructions of the tapping/shut-off saddle installation equipment of the relevant manufacturer.



Figure 19

### Installing the brass plug

The plug is to be installed up to the stop; the O-ring must seal in the dome. The required torque of approx. 150 Nm can be achieved through a lever. A visual control takes place (Figure 20). A torque screwdriver is not necessary.

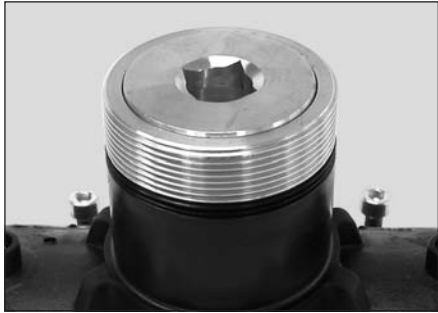


Figure 20

After fitting the brass plug either the plastic nut must be screwed on or a **FRIALEN® cap for Shut off Saddles** must be fused on, ensuring that the usual scraping and cleaning work is carried out (see Figure 21).



Figure 21

## 5.4 SA-TL Spigot Saddles Top-Loading d 250 - 560

### 5.4.1 Assembly

The preparation of the installation and the fusion process is made analogue to the **FRIALEN® Pressure Tapping Tee** (see 5.1.1 - 5.1.5).



Figure 22





### **WARNING!**

The tapping is made with commercially available tapping units in an unpressurised state with or under pressure using shut-off valves.

We recommend the tapping unit of the company of Hütz + Baumgarten, Remscheid ([www.huetz-baumgarten.de](http://www.huetz-baumgarten.de)), especially designed for this purpose.

Please ask our FRIALEN® Application Engineering Department.

The manufacturer's installation instructions are to be observed.

## **5.5 VSC-TL Repair Saddle Top-Loading d 250 - 560**

### **5.5.1 Assembly**

For localised damage to the pipe at a single point the damaged spot can be sealed off with a plug and then fused with the repair Saddle Top-Loading.

The preparation of the installation and the fusion process of the individual half shells is made analogue to the **FRIALEN® Pressure Tapping Tee** (see 5.1.1 - 5.1.5).



Figure 23



### **WARNING!**

**Care must be taken to ensure that during assembly the damaged or deformed point on the pipeline lies in the centre of the heating element.**

**Fusion with escaping media is not permissible.**

## 5.6 AKHP-TL Tapping Ball Valves d 250 - d 560

AKHP-TL Tapping Ball Valves allow the drilling of unpressurised or pressurised pipelines.



### **WARNING!**

The fusion zone of the component includes the dimensions d 250- d 560. If necessary application technological restrictions have to be regarded. For example by borer tool or balloon, normally applicable up to d 315 SDR 11. Details of these components, given by manufacturer, have to be regarded.



Figure 24

Details of these components, given by manufacturer, have to be regarded.

### 5.6.1 Assembly

The preparation of the installation and the fusion process of the tapping ball valve AKHP is made as saddle component analogue to the **FRIALEN® Pressure Tapping Tee** (see items 5.1.1 - 5.1.5).



### **INFORMATION:**

For a leakage-free tapping of pressurised pipings, we recommend the tapping unit of the company of Hütz + Baumgarten, Remscheid ([www.huetz-baumgarten.de](http://www.huetz-baumgarten.de)). Please ask our Application Engineering Department.

The telescopic FRIALEN-actuation key BS is particularly designed for the technical and geometrical requirements of the KHP ball valve.

## 6. Pipeline relining

### 6.1 Procedures and areas of application

Defective old pipelines made of cast iron, steel or other conventional materials can be renovated by drawing in an HDPE pipe, as an alternative to laying new pipes.

Standard pipes are used for the **relining process** and are joined using suitable FRIALEN® Safety Fittings.

For the so-called close-fit process (lining with precisely fitting pipes), however, the pipes which are used have a cross section which has been changed in the manufacturing process (e.g. U-liners) or on the building site itself (e.g. Swage lining). The outside diameter of these pipes is matched to the inside diameter of the old pipeline and thus deviates from the standard.

The ends of each renovated section of pipeline can be fused with **FRIALEN® REM Relining Slide-over Couplers**.

At points where it is scheduled to fuse on a coupler or a saddle the relining pipe should be sized to the nominal inside diameter during the reshaping by fitting half shells.

## 6.2 REM Relining Adapter Couplers

One end of the **REM Relining Adapter Coupler** (Figure 25) is matched to the dimensions of the pipes used for this process. The other end corresponds to the standard pipe size. This allows renovated sections of pipeline to be connected using fitted pieces of standard pipe. The fittings are used like slide-over couplers.

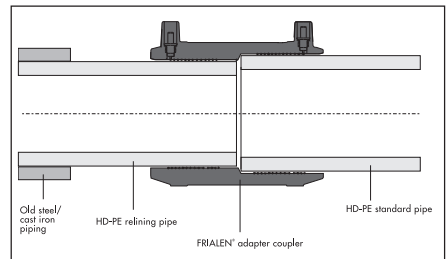


Figure 25

## 6.3 Fitting and fusion

### 6.3.1 Relining using HDPE standard pipes

When joining standard pipes the appropriate FRIALEN® Safety Fittings are used. The fitting and fusion is carried out in a similar fashion to that in item 2. For couplers > d 250 mm preheating in accordance with item 4.8 is recommended when there are larger annular gaps.

### 6.3.2 Close-fit relining

After the renovation the HDPE pipes used will often exhibit deviations both in their diameter and from the ideal round shape in the area of the proposed joint. Depending on the characteristics of the pipe the joint can be made using a preheating code, and also in conjunction with a support sleeve or a pipe expander tool.

### 6.3.3 Pre-heating: Procedure see item 4.8

### 6.3.4 Support sleeve

In case of larger deviations in shape or size on the ends of the pipes in the area of the joint the use of support sleeves is recommended (Figure 26). The fitting can then be used as a slide-over coupler.

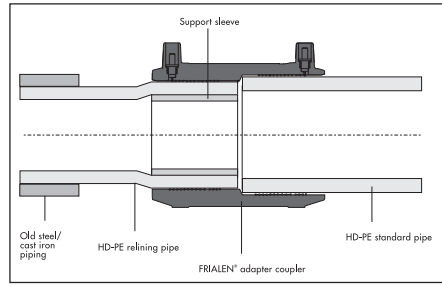


Figure 26

For fitting the support sleeve a suitable pipe expander tool has to be employed (Figure 27). Before using the pipe expander tool deviations in shape must be taken into account. The expander shells should be positioned to give an optimum rounding effect.

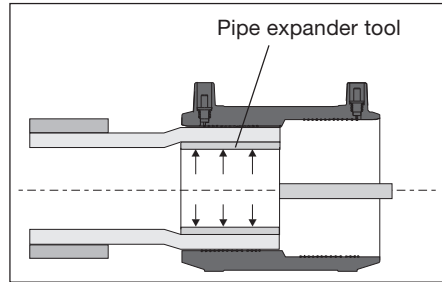


Figure 27

The design of the support sleeve is dependent on the medium flowing, the material and the pipe size.

The fitting of coupler and sleeve will be made easier if the pipe tolerances are taken into account when deciding on the size. **The use of preheating in accordance with item 6.3.3 will then be essential.**

### 6.3.5 Use of a pipe expander tool as a temporary support sleeve

If a support sleeve is not wanted the coupler can be fused using a suitable pipe expander tool, matched to the size of the pipe. Use of the preheating barcode (see item 6.3.3) is particularly important to reduce the stresses in the pipe. The tool must remain in place during the fusion process and until the cooling period has passed.

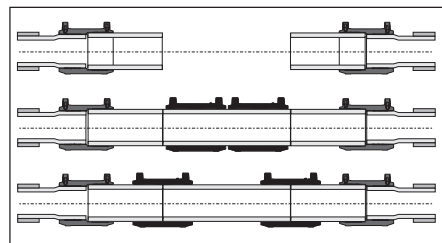


Figure 28

#### 6.4 Cooling times

For cooling times item 4.10 is applicable.

#### 6.5 Relining fittings and clips (top loading)

When fitting saddle components (Figure 29) care must be taken with any ovality or flattening of the HDPE pipe. In order to achieve a uniform surface pressure, and thus a proper fusion, the radius of curvature on the inner liner at the site of the proposed joint must correspond to the diameter range  $d$  of the moulded component being used. If necessary the saddle must be brought into line either axially or radially.



Figure 29

The assembly of the saddle components occurs according to items 5.1.1 to 5.1.6

Before the renovation the old pipe should be cut away at the point where a moulded saddle component is to be fused to the inner liner pipe. The pipe diameter will be brought to size at the proposed jointing point by fitting half shells.

When fitting a house connection at some later point access to the inner liner is gained by using a window cutter to get through the old pipe.

## **7. Update of these assembly instructions**

Further operating and assembly instructions are available:

- FRIALEN® Safety Fittings for House Service and Supply pipings up to d 225
- FRIAFIT® Sewage System
- FRIAMAT® Electrofusion Units
- FRIATOOLS® Scraper Tools
- FRIATOP Clamping Unit
- FWFIT Clamping and Tapping Tool

These technical statements are regularly revised to be up-to-date. The date of the last revision is stated on the document. For an updated version of the operating instructions, please visit our website [www.frialen.com](http://www.frialen.com) on the Internet. You will find the “Download” page on the navigation bar. This page contains our updated operating instructions as pdf documents. We will also mail them to you on request.



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