

Assembly instructions

FRIALEN Imperial
couplers, reducers, FRIASTOP, pressure
tapping tees, shutoff saddles, spigot
saddles, FIXBLOC



Table of Content

- 1. About this document 5
 - 1.1. Purpose of these instructions and target group 5
 - 1.2. Using these instructions 5
 - 1.3. Symbols used 5
 - 1.4. Other applicable documents 6
 - 1.5. Updates to these assembly instructions 6
- 2. Intended use 6
 - 2.1. Standards and regulations 7
 - 2.2. Applications 7
 - 2.3. Personnel qualifications 8
- 3. Notes on usage and storage 9
 - 3.1. Pressure loading capacity 9
 - 3.2. Environmental and storage conditions 10
- 4. Standards and regulations 10
- 5. Product overview 11
 - 5.1. Products covered in this procedure 11
 - 5.2. Labeling on the component 11
 - 5.2.1. Embossed markings 11
 - 5.2.2. Batch identification 11
 - 5.2.3. Barcode sticker: fusion and traceability 12
 - 5.2.3.1. Barcode sticker: Preheating 13
- 6. Power source and electrofusion unit 13
 - 6.1. Power source 13
 - 6.2. Electrofusion unit 14
- 7. General preparation 15

7.1.	Preparation	15
7.1.1.	Clean the pipe and work area	15
7.1.2.	Cutting pipe to length	16
7.1.3.	Measure and mark the fusion zone	17
7.1.4.	Remove the oxide layer	18
7.1.5.	External and internal pipe end preparation	21
7.1.6.	Restoration of irregular/oval pipe	22
7.1.7.	Cleaning	22
7.2.	Assembling the fusion fitting	24
7.3.	Fusion process	26
7.3.1.	Connect the electrofusion control box	26
7.3.2.	Preheating	27
7.3.3.	Reading fusion parameters and start fusion process	28
7.3.4.	Marking the fusion joint	29
7.3.5.	Repeating fusion	30
7.3.6.	Cooling time	30
8.	Processing FRIASTOP M Gas-Stop	30
8.1.	Product description	30
8.2.	Preparatory work and installation	32
8.3.	Putting into service	32
9.	Processing FRIALEN pressure tapping tees	33
9.1.	Product description	33
9.2.	Preparatory work	33
9.3.	Installing the pressure tapping tee	34
9.4.	Fusion process	34
9.5.	Tapping	35
10.	Processing FRIALEN shutoff saddles	37
10.1.	Product description	37
10.2.	Preparatory work	37

10.3. Installing the shutoff saddle	37
10.4. Fusion process	38
10.5. Fitting for bubble setting devices and tapping the main pipe	39
11. Processing FRIALEN spigot saddles	40
11.1. Product description	40
11.2. Preparatory work	41
11.3. Installing the spigot saddle	41
11.4. Fusion process	41
11.5. Tapping	41
12. Processing FRIALEN FIXBLOC	43
12.1. Product description	43
12.2. Preparatory work	44
12.3. Installing the FIXBLOC	44
12.3.1. Installing the FIXBLOC using a tensioning strap	44
12.3.2. Installing FIXBLOC using the FWFB clamping unit	46
12.4. Fusion process	48
12.5. Cooling time	48
12.6. Removal of the tensioning strap or FWFB clamping unit	48
13. Joint acceptance criteria	49
14. Updates of assembly and operating instructions	52
15. Channel partners	53

1. About this document

1.1. Purpose of these instructions and target group

This procedure describes work steps and precautions to ensure safe and correct handling and installation of Aliaxis electrofusion products. This procedure has been qualified in accordance with the requirements of CFR 192.283 Plastic Pipe: Qualifying joining procedures.

These instructions are intended for the following audiences:

- Qualified installers
- Infrastructure owner

1.2. Using these instructions

INFO

- Read these instructions carefully before installation and use.
 - Observe all other applicable documents.
 - The owner must keep these instructions for the service life of the product.
 - Follow the sequence of work steps as described.
-

1.3. Symbols used

The following marks and symbols are used in this document:

DANGER

This warning describes an imminent danger.

- Failure to observe it will result in death or serious injury.

WARNING

This warning describes a possible imminent danger.

- Failure to observe it may result in death or serious injury.

CAUTION

This warning describes a possible imminent danger.

- Failure to observe it may result in minor to moderate injuries.

HINT

This warning describes a danger that may result in damage to property.

- Measures to avoid damage to property are described here.

INFO

This note provides information on the following topics:

- Application tips
- Additional information

1.4. Other applicable documents

The following documents are applicable in conjunction with these installation instructions:

- FRIATOOLS operating instructions from Aliaxis Deutschland GmbH for working with and installing the components.
- Technical data sheets of Aliaxis Deutschland GmbH.
- Quick guides and product information supplied with the product.
- All labeling on the product.

1.5. Updates to these assembly instructions

The technical information contained in these operating and assembly instructions is reviewed regularly to make sure it is up to date.

The date of the last revision is specified on the document (on each page at the bottom next to the page number) .

For updated instructions visit our website at
<https://www.aliaxis.de/en/services/downloads>

2. Intended use

FRIALEN PE 100 fusion fittings are suitable for use with PE 2406/2708, PE 3408/4710, PE 100, PE 100 RC, PE 100 RT and PE 80 pipe materials that meet applicable standards,

such as ASTM D2513 or CSA B137.4. Including outside diameter tolerances and out of roundness requirements.

i INFO

Scratches and gouges which cannot be removed during the normal peeling process indicate that the jointing area is not suitable for electrofusion.

2.1. Standards and regulations

For detailed and up-to-date information on FRIALEN fusion fittings from Aliaxis Deutschland GmbH, please refer to the technical data sheets on our website, at

www.aliaxis.de/en/services/downloads

FRIALEN fusion fittings meet the requirements of codes and standards in the United States (ASTM F1055, ASTM D2513) and Canada (CSA Z662, CSA B137.4.1) for use in water and gas pressure pipe applications.

2.2. Applications

FRIALEN fittings are used for fusion joints of pressure pipes made of polyethylene for use in gas and water distribution, e.g. pressure drainage, industry and landfill site construction.

FRIALEN fittings must only be fused according to size and dimensions stated on the fitting. A minimum pipe wall thickness of at least 0.090 inch (2.29 mm) is required for pipe sizes up to and including 1 ¼" IPS. For 2" IPS and larger, tapping tee products may be installed on SDR 17.6 to SDR 11 pipes, couplings may be installed on SDR 17.6 to SDR 11 pipes*. Compatible Standard Dimension Ratio (SDR)** statement above is relevant to fusibility only. FRIALEN electrofusion fittings are designed to meet the pressure requirements of SDR 11 piping systems, installation on systems with pressure ratings greater than SDR 11 are not permitted.

** (SDR) **S**tandard **D**imension **R**atio is the outside diameter divided by wall thickness.

i INFO

* FRIALEN electrofusion couplers are used for fused polyethylene pressure pipes for gas & water distribution.

These electrofusion couplers may only be fused in accordance with the dimension and pressure range indicated on the fitting.

For pipe sizes up to and including 1 ¼" IPS, a minimum pipe wall thickness of 0.090 inch (2.29 mm) is required.

Couplers and tapping tees are generally designed for SDR 11. Couplers can also be applied for SDR 17 pipes (see the marking on the barcode).

In exceptions (dimensions 3 - 6 inches), joints are even suitable for SDR 9.

These SDR markings refer to the suitability of the couplings for fusing as well as their technical use under pressure.

So far, the tapping tees are only suitable for SDR 11 (exceptions are SDR 10 for 1.25" IPS).

i INFO

PE materials having a fusion flow rate MFR value:

- 190/5 range of 0.007 - 0.06 Oz/min (0.2 - 1.7 g/10 min)
-

i INFO

When operating with other media than natural gas and water, please contact your local authorized channel partner.

2.3. Personnel qualifications

All persons involved in handling and using the fittings must meet the following requirements:

- They must have received training or instruction in how to assemble and install the products or tools (e.g. for gas applications Title 49 of the Code of Federal Regulations, Section 192.285).
 - They must have read and understood these instructions and all other applicable documents.
-

i INFO

For more information on working with the fittings and for technical support, visit the Aliaxis Deutschland GmbH website <https://www.aliaxis.de/en/services/downloads> or contact your local authorized channel partner.

3. Notes on usage and storage

3.1. Pressure loading capacity

WARNING

High pressures

Risk of injury

When subjecting pipe and fittings to high pressures, local rules and regulations and company safety practices must be respected.

FRIALEN electrofusion fittings are tested and approved according to ASTM F1055 and CSA B137.4.1 for a maximum operating pressure of up to 125 PSI gas or 200 PSI water.

FRIALEN electrofusion fittings can be subjected to a test pressure of up to 1.5 times maximum operating pressure under normal application and operating conditions*.

* Normal operating temperature range of between 14°F to 113°F (-10°C to 45°C)

INFO

Currently, all our products meet the European standard from 14°F to 113°F (-10°C to 45°C).

An application from -22°F to 140°F (-30°C to 60°C) is also possible, provided that the customer ensures during the processing that the pipe, the fitting and the surrounding area guarantee the processing temperature of min. 14°F (-10°C) or max. 113°F (45°C) during fusing by means of aids such as e.g. heated/cooling blankets or a heated/cooled tent.

The proof in the laboratory that our products also function without these aids is still pending. This proof is to be provided within the framework of the Pro PLCM for all FRIALEN Imperial products.

We currently assume that our product, which meets the highest standards worldwide, will pass these tests with ease.

The pressure load bearing capability of FRIALEN fittings made of PE 100 is determined by the SDR and a design factor (DF)* of 0.4 at a reference temperature of 68°F (20°C).

* (DF) Design Factor is the design derating according to applicable code

SDR Fitting	Fitting Material	max. operating pressure in PSI Gas (DF 0.4)
11	PE4710/PE100	125

3.2. Environmental and storage conditions

HINT

Improperly stored fusion fittings

Leaking fusion joint

Improperly stored fusion fittings must not be installed because this could result in leaking fusion joints.

FRIALEN electrofusion fittings can be stored and used for over ten years, provided the general storage specifications are adhered to.

Suitable storage conditions:

- Store in closed rooms or containers.
- Store in original, undamaged packaging (plastic bag, cardboard box).
- Protect from UV radiation and other adverse conditions.
- Protect against the effects of weather such as moisture and frost.
- Storage temperature up to 122°F / 50°C.

i INFO

Confirm that fittings are in original packaging before installation. Damaged or improperly packaged fittings must not be installed.

4. Standards and regulations

For detailed and up-to-date information on FRIALEN fusion fittings from Aliaxis Deutschland GmbH, please refer to the technical data sheets on our website, at <https://www.aliaxis.de/en/services/downloads> or contact your local sales partner.

FRIALEN PE 100 fusion fittings are suitable for use with PE 100, PE 100 RC, PE 100 RT, PE 80, PE 2406/2708 and PE 3408/4710 pipe materials that meet applicable standards, such as ASTM D2513 or CSA B137.4.

They meet the requirements of codes and standards in the United States (ASTM F1055, ASTM D2513) and Canada (CSA Z662, CSA B137.4.1) for use in water and gas pressure pipe applications.

5. Product overview

5.1. Products covered in this procedure

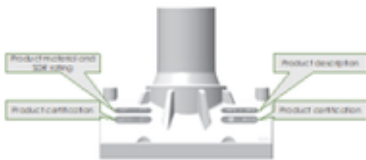
These installation instructions describe the installation process for the Imperial series of FRIALEN fusion fittings from Aliaxis Deutschland GmbH.

- Couplers UBI / MBI
- Reducers MRI
- FRIASTOP
- Pressure tapping tees DAAI
- Shutoff saddles SPAI
- Spigot saddles SAI
- FIXBLOC

For components not covered by these installation instructions, please refer to the appropriate installation instructions!

5.2. Labeling on the component

5.2.1. Embossed markings



- Product material and SDR rating
- Product certifications
- Product description

This image shows only an example, other fittings may look different.

Image 1:

5.2.2. Batch identification

FRIALEN electrofusion fittings are embossed with batch traceability data, depending on the production facility, one of the following embossed batch number examples will be located on the surface of the fitting, batch markings are read from left to right:

Example 1:



- Week of production (calendar week) (stamps 1+2)
- Year of production (stamp 2)
- Material code letter (stamp 3)

⇒ Calendar week 14/year 2019/E

Image 2:

Example 2:

Some fittings are marked directly with normal text/numbers.

1419

- Production week digits 1 and 2 (week 14)
- Production year digits 3 and 4 (year 2019)

⇒ Calendar week 14/year 2019/E

5.2.3. Barcode sticker: fusion and traceability

FRIALEN electrofusion fittings are provided with a barcode sticker.

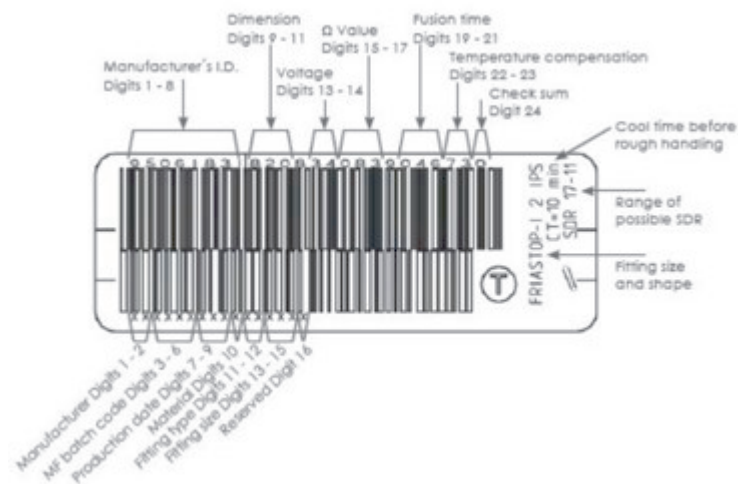


Image 3:

Top barcode (fusion barcode conforming to ISO 13950):

The fusion parameters are contained in the main barcode. The parameters are read into the fusion unit via a wand or handheld scanner. Via the emergency input mode, the 24-digit number sequence can be entered manually into the fusion unit. The electrofusion units automatically monitor the fusion process and regulate the energy supplied within set limits.

i INFO

Manual fusion based on time and voltage only is not permitted.

Bottom barcode (traceability barcode conforming to ASTM F-2897 and ISO 12176-4):

Data about the fitting (e.g. manufacturer, size, material, batch) are contained in this barcode and enable component traceability. These data can be archived electronically together with the fusion parameters. Suitable electrofusion units are required.

5.2.3.1. Barcode sticker: Preheating

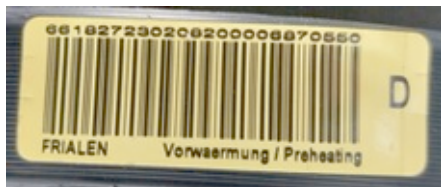


Image 4:

For UBI couplers from 16 DIPS and 20 IPS, in addition to the fusion parameter and traceability barcode (white barcode sticker), a preheating (yellow barcode sticker) is affixed to the fitting. Preheating barcode and procedure are utilized to reduce annular gap between coupling and pipe to within certain limits.

6. Power source and electrofusion unit

6.1. Power source

A power supply, i.e: generator with a continuous peak output of 5000 WATTS/5KVA or higher (measured at the output) will supply enough current to fuse FRIALEN fittings size range ½CTS through 8IPS.

A power supply, i.e: generator with a continuous peak output of 7500 WATTS/7.5KVA or higher (measured at the output) will supply enough current to fuse FRIALEN fittings size range 10IPS through 28IPS.

Generator requires a 20A female 3-prong twist lock receptacle on the 110V/120V side for direct connection of the power cord of most used ISO-12176-2 compliant fusion control units.

If the generator is equipped with an idle control switch or auto-idle (throttle) switch, it must be in the OFF position prior to beginning the electrofusion process.

Allow a suitable warm-up time for the generator prior to turning on the electrofusion control unit and ALWAYS turn the electrofusion control unit off and remove the power cable from the generator before shutting the generator down.

i INFO

Fusion boxes are sensitive to input power parameters. The installer is advised to exercise caution when selecting suitable portable power products.

It is recommended to avoid operating other electric power tools on the same generator during the actual fusion cycle, as this has also been known to cause voltage and/or frequency changes which may result in a control unit shutdown.

6.2. Electrofusion unit

Installers should use machines which conform to ISO 12176. All FRIALEN fittings are equipped with a fusion barcode according to ISO 13950 which allows automatic reading of all required fusion parameters to the fusion control unit.

i INFO

Danger of overheating in the extension cord!

- If an extension cord is required, consult the fusion control unit manufacturer guidelines to ensure adequate conductor size.
 - Power cords must be uncoiled during fusion.
-

i INFO

Always use the electrofusion control unit with a Ground Fault Interrupter (GFI).

i INFO

Manual electrofusion control units (without barcode reader), should be considered obsolete technology. Installation of FRIALEN electrofusion fittings with these units is not recommended.

7. General preparation

i INFO

Before starting work, make sure that all tools (e.g. scrapers, electrofusion units, any necessary alignment clamps or rounding clips, etc.) and auxiliary materials (e.g. marker pens, cleaning agents and cloths) are available. This will ensure a reliable, trouble-free fusion process and prevent interruptions!

7.1. Preparation

i INFO

Before commencing assembly process, it is imperative that the installer ensures equipment, site conditions and materials will allow the installation to continue without interruption. Interrupted installation could allow introduction of contaminants and/or have negative consequences to fusion quality.

i INFO

The sequence of work steps must be strictly followed as described.

7.1.1. Clean the pipe and work area



Image 5:

- Remove coarse dirt and dust from the fusion zone/work area equal 2 times the length of the intended fusion zone (establish a water-wash clean zone on the pipe).
- Water (detergent free) should be used to remove dirt and mud from the pipe.
- Cleaning material: absorbent, lint-free and undyed wiping cloth.
- Mark the boundary of the clean zone on the pipe and ensure that subsequent cleaning does not exceed this established zone.
- Clean and dry the pipe with a clean wiping cloth. Clean the pipe all the way to the marked clean zone boundary.

i INFO

The work area should be protected from inclement weather!

7.1.2. Cutting pipe to length

⚠ WARNING

Heating coils not completely covered by the pipe can lead to overheating, uncontrolled melting or spontaneous combustion.

Burn injuries

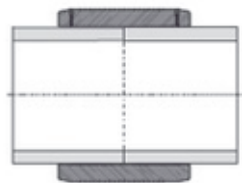
- ▶ Cut the pipe at right-angles to the pipe axis.

i INFO

Before you start cutting the pipe, ensure pipe to be fused is within SDR range 17 – 11 (other SDR range on request) and is the correct size for the fitting to be fused!

It may be necessary to cut pipe ends before joining in order to remove “toe-in”* or to ensure squareness of pipe ends. If a pipe cut is required, then cut the pipe at a right angle to the pipe axis (see Image 8). A suitable tool is a PE pipe cutter or a saw with blade suitable for plastics which achieves as close to square cut as is practical.

* “Toe-in” Extruded polyethylene pipe ends are slightly smaller diameter at the face of pipe joints.



▪ Pipe cut squarely



Cut the pipe at right-angles to the pipe axis.

Image 6:

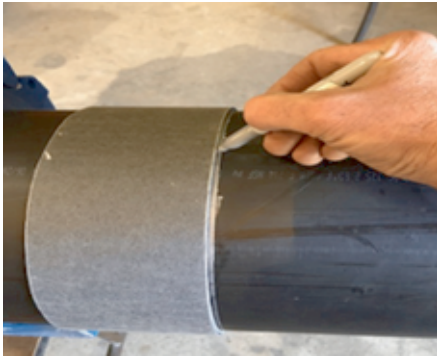


Image 7:

Prior to cutting pipe, it is recommended that a pipe wrap is used for marking pipe to ensure squareness of cut.

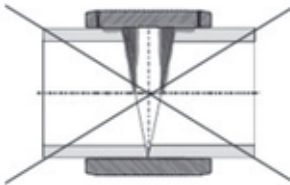


Image 8:

- **Pipe not cut squarely**



Failure to achieve square cut of pipe ends may cause the heating coil to not be fully covered by the pipe which may result in overheating, uncontrolled melt formation or self-ignition.

7.1.3. Measure and mark the fusion zone

Insertion depth:

The insertion depth, i.e., the distance between the coupling edge and the internal stop or the area of the fusion saddle includes the fusion zone and the cooling zone. The installer should take care to extend marking beyond total area to allow 1/2 inch (12 mm) of visibly peeled area for inspection purposes following joint completion.



Image 9:

- Marking with a marker pen the insertion depth for couplings.



Image 10:

- Marking with a marker pen the fusion zone for saddle fittings.

7.1.4. Remove the oxide layer

An oxidized layer forms on all PE pipes and spigot surfaces during storage. This outer layer cannot be fused and must be removed. First remove contamination from the pipe and/or spigot surfaces. When marking peeling area, note that an additional allowance length or perimeter of the fitting of + 1/2 inch (+ 12 mm) is required as evidence that the peeling operation has been respected. Use the FWSG peeler tool in the appropriate size or an approved equivalent which respects the desired peel thickness values listed in table below to remove a continuous peel from the pipe or spigot surface.



- Rotational peeler tool FWSG for pipe ends and fitting spigots.



- Rotational peeler tool FWSG SE for pipe ends and saddle areas.

Image 11:

Nominal Pipe Size (NPS)	Peeler tool	Desired peel thickness (mm)	Wear limit [mm]	Desired peel thickness (inch)	Wear limit (inch)
1/2 CTS - 2 IPS	FWSG 63 FWSG SE	0.15 – 0.225	> 0.229	0.006" - 0.008"	> 0.009"
3 IPS - 8 IPS	FWSG 225 FWSG SE	0.25 – 0.35	> 0.4	0.010" - 0.0137"	> 0.0157"
3 IPS - 14 IPS	FWSG 400 FWSG SE	0.15 - 0.25	0.229 / 0.3	0.006" - 0.010"	0.006" / 0.011"

Nominal Pipe Size (NPS)	Peeler tool	Desired peel thickness (mm)	Wear limit [mm]	Desired peel thickness (inch)	Wear limit (inch)
24 IPS - 36 IPS	FWSG 900	0.25 - 0.35	0.4	0.010" - 0.0137"	0.0157"

i INFO

Incomplete or improper removal of the oxide layer could compromise the fusion integrity.

Pipe spigots, e.g. fittings DAAI or transition fittings are to be prepared in the same manner as the installation specifications for pipes.
 Rotational peeler tools must conform to tolerances prescribed in Table above. An equal and seamless peeling is achieved by using FWSG and FWSG SE peeler tools (see Table below).

Peeler tool	Feature	Pipe dimension
FWSG 63	Cross-dimensionally	d ½" – 2"
FWSG 225	Cross-dimensionally	d 3" – 8"
FWSG 400	Cross-dimensionally	d 3" – 14"
FWSG 710S (half length of coupling)	Cross-dimensionally	d 10" – 28"
FWSG 710L	Cross-dimensionally	d 10" – 28"
FWSG 900L	Cross-dimensionally	d 25" – 36"
FWSG SE	Dimension-bound	d 2", 3", 4", 6", 8" and 12"

A one-time, complete removal is sufficient (min. 0.006 inch (min. 0.15 mm)). If following the peeling process, damages to the pipe surface, axial grooves or scratches are observed, the section is not suitable for electrofusion. Such visual indications suggest damages are in excess of the peel thickness and may contain embedded contaminations.

Please check condition and wear of the blade in the peeler tool regularly. Worn blades must be replaced.

i INFO

Worn peeler blades may lead to an excessive peel thickness, which may result in an excessively large annular gap in the fusion zone.

i INFO

File, rasp, plainer, emery cloth and/or sandpaper are not permitted tools for removal of contamination or oxidation because they may insufficiently prepare the surface, introduce flat spots and/or introduce contamination.



Image 12:

To control the complete surface removal, we recommend applying marking (control) lines. If during peeling of the surface un-peeled areas occur at some points (e.g. in case of bundled coils or oval pipes), these areas can be corrected using a manual scraping tool.

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

i INFO

The rework of un-peeled areas are to touch up scraping to remove skipped areas.

7.1.5. External and internal pipe end preparation



Image 13:

It is recommended best practice to break the edge inside and outside of the cut end of the pipe prior to insertion into the coupling. For this operation, a manual scraper is a suitable tool. The purpose of this step is to remove any sharp edges which may damage the coupling when sliding into place. Deburring the inside edge of the pipe end eliminates the possibility that burrs are present in pipeline flow and/or contaminate the fusion joint.

i INFO

Remove from the pipe any debris that is produced by the pipe end preparation. This could impede the flow and/or possible have a negative impact on the fusion result.

7.1.6. Restoration of irregular/oval pipe

⚠ WARNING

Crush hazard

Improper handling of re-rounding clamps can result in hands or fingers being pinched during assembly and fastening.

- ▶ Observe the operating instructions for the device and the manufacturer's specifications when fitting and operating the re-rounding clamp.
- ▶ Wear leather gloves for protection during assembly.
- ▶ Do not place hands or fingers between the pipe and the re-rounding clamp.
- ▶ Do not place hands or fingers between device components.



Image 14:

Plastic pipe, in particular bundled coils and reels, may become oval during storage.

Pipe out of roundness in the fusion zone which exceeds 1.5% of the outer diameter or is > 0.11 inch (> 3 mm), means re-rounding of the pipe is mandatory. Please use re-rounding clamps for this purpose which are installed at the end of the fusion zone.

7.1.7. Cleaning

⚠ CAUTION

Skin contact with cleaning agent

Cracked, dry skin

- ▶ Wear protective gloves.
- ▶ Apply in limited quantities at a time.
- ▶ Observe the manufacturer's safety instructions.



Image 15:



Image 16:

The surfaces

- of the pipes to be fused and
- the interior surfaces of the electrofusion fitting must be clean, dry and free from any grease.

These areas are to be cleaned with a suitable cleaning agent and lint-free towel.

i INFO

For ideal cleaning result, use lint-free and non-dyed paper.

The amount of the PE cleaning agent is to be chosen such that the lint-free towel is slightly wet. Skin contact is to be avoided. Please observe the safety notes from the manufacturer of the PE cleaning agent. When cleaning, ensure that no contaminations from the un-peeled pipe surface are introduced into the fusion zone.

i INFO

When using isopropyl alcohol cleaning agents, the alcohol percentage must be at least 94%, an alcohol content of 98.9% is preferred.

Positive results can be achieved using acetone as a cleaning agent however regional environmental restrictions may prohibit its use. It is therefore not a recommended cleaning solution unless expressly approved by appropriate local authorities. **The cleaning agent must be completely evaporated before starting the fusion process.**

Cleaning agent should be applied to lint-free towel and not directly onto the pipe or fitting surface.

Installer should exercise caution with tapping tee position when cleaning to prevent collection of cleaning agent inside tapping tee stack.

While exercising caution to avoid re-introducing contamination to the cleaned and prepared fusion zone, re-application of marking line for the fusion zone width with a marker may be necessary. The line may have been removed during peeling 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, e.g. because of dew or frost, is to be removed using suitable aids.

i INFO

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

7.2. Assembling the fusion fitting

When connecting FRIALEN electrofusion fittings and pipes, it is to be ensured that the contact terminals are accessible for installing fusion control unit leads.

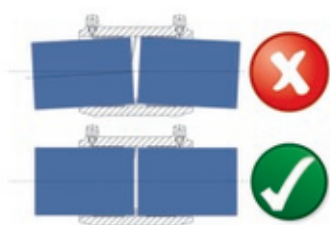


Image 17:

FRIALEN electrofusion fittings should be slipped on without using force. The prepared insertion end must be inserted into the fitting up to the mark. If needed, rounding clamps are to be used.

The fitting must fit squarely onto the end of the pipe, without tilting or jamming. All joints prepared for fusion must not be under stress. Pipes must not be under bending stress or hanging unsupported in the fusion fitting.

i INFO

Repeated peeling may not be performed to remedy installation problems due to out-of-roundness!

For larger couplings where out-of-roundness prevents insertion of pipe into fitting, a simple identification of high points is possible by placing the coupling against the leading edge of the prepared pipe end and evaluating the annular gap.

i INFO

Some FRIALEN electrofusion couplings (MBI) may have center stops that will confirm the insertion depth. In cases when the coupling must be slid all the way onto the pipe (i.e., repair application), the tabs can be easily broken off by quickly sliding the coupling onto the pipe with a sudden jolt, forcing the pipe into the coupling.

Make sure the coupling only slides within the clean area. Ensure any residual debris from center stop removal is cleared away from fusion zone.

i INFO

For repair applications without gap between pipe sections it may be necessary to slide coupling completely onto pipe end, for this reason it is necessary to clean the full length of the coupling.

Ensure a tension-free assembly of components

All joints prepared for fusion must be tension-free. Pipes may not be positioned in the FRIALEN electrofusion fitting under bending stress or self-load. After the installation of the pipe ends, it must still be possible to move coupling by hand.



Image 18:

If required, piping or fitting can be supported. A suitable clamping tool may be utilized to ensure movement of the joint during the fusion and cooling cycle does not occur. The tension-free fixing of the joint is to be maintained until the “clamped” cooling time stated on the instruction document is reached.

i INFO

A non-tension-free or shifted joint may result in an escaping melt flow and a defective joint during fusion.

Before starting the fusion process, check again the markings on the pipe to determine whether the insertion depth of the pipe end in the FRIALEN electrofusion fitting has moved (correct, if required).

7.3. Fusion process

⚠ WARNING

A non-tension-free or shifted joint

Escaping melt flow can cause burnings on skin!

- ▶ Before fusion, check that the pipe is seated correctly in the fitting, by means of the marking lines.
- ▶ Avoid stressing the joint during the fusion process.
- ▶ Always keep a distance of 3 feet (1 meter) to the fusion site during the fusion process for general safety reasons.

7.3.1. Connect the electrofusion control box

i INFO

Only use ISO Universal barcode fusion control unit conforming to ISO 12176-2.



Image 19:

Make sure that the fusion contacts on the fusion fitting are easily accessible and that stresses or loads from the fusion cables do not affect the fusion joint.

Connect the electrofusion control box outlet cable to the FRIALEN electrofusion fitting connector pins.

i INFO

FRIALEN fitting connector pins are 4.0 mm.

7.3.2. Preheating

i INFO

For UBI couplings from 16 DIP and 20 IPS, use of the preheating system is required.

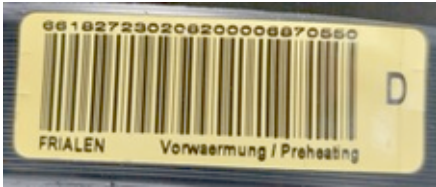


Image 20:

With the aid of a special preheating barcode (yellow barcode sticker), the annular gap between the FRIALEN electrofusion coupling and the pipe can be compensated within certain limits. The maximum bridgeable gap between coupling and pipe must not exceed 0.12 inches (3 mm) around the entire circumference.

For the fusion coupling centered and fitted on the pipe, this means: $\Delta d \leq 0.24$ inches (≤ 6 mm).

Procedure for using the preheating system:

1. Prepare the joint area as described in these installation instructions.
2. Center the coupling on the pipe so that the annular gap is as equal as possible around the circumference. Support the coupling if necessary.
3. Seal the annular gap with adhesive tap to prevent thermal losses.
4. Close open pipe ends to prevent a chimney effect.
5. Standard procedure:
 - a. Preheat **first** side of coupling: scan the yellow barcode into the electrofusion unit and start the process, then
 - b. Preheat **second** side of coupling: scan the yellow barcode into the electrofusion unit and start the process, then
 - c. **First** coupling side: check the annular gap: If it is still too large, preheating can be repeated max. 2 more times. If OK: Start fusion of **first** coupling side (scan white barcode), then
 - d. **Second** coupling side: check the annular gap: If it is still too large, preheating can be repeated max. 2 more times. If OK: Start fusion of **second** coupling side (scan white barcode).

i INFO

A holding time must always be observed between preheating and the actual fusion process to allow the components (coupling and pipe) to heat up evenly. This holding time is approximately the same as the preheating time and fusion time, depending on the size approx. 15-30 minutes. When processing only one coupling side, the holding time must be observed between preheating and fusion. If the holding time is exceeded by more than double, the process described above must be repeated.

7.3.3. Reading fusion parameters and start fusion process

▲ WARNING

Escape of plastic melt during fusion

Burns on the skin

For your general safety, always keep at least 3 feet (1 m) away from the fusion joint during the fusion process.

The permitted installation ambient temperature range is between 14°F to 122°F (-10°C to 50°C). The stated fusion time on the fitting barcode is the fusion time at 68°F (20°C). An automatic temperature compensation feature is applied to increase or decrease fusion time based on actual ambient temperature conditions at time of fusion.

i INFO

Check and if necessary correct the alignment of the fusion joint before starting the fusion process.



Image 21:

The fusion parameters are contained in the main (top) barcode on the barcode sticker. Reading the barcode with a wand or barcode scanner.

After reading the barcode, the fitting data are to be compared with the data shown on the unit's display. If the values are consistent, **start fusion process**.

Please observe the operating instruction of the fusion control unit.

The bottom barcode on the barcode sticker contains traceability data. It only needs to be read if component traceability is being used.

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

For FRIALEN electrofusion fittings equipped with a fusion indicator, the latter only indicates the fusion process has been completed. The proper fusion process is, however, only indicated by the fusion control unit!

i INFO

Avoid stress or load caused by fusion cable connections.

7.3.4. Marking the fusion joint



Image 22:

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 electrofusion fitting.

With this identification it is ensured that fusion joints are not overlooked.

7.3.5. Repeating fusion

If required, a fusion can be repeated but the joint surfaces must be cooled to ambient temperature before restarting the fusion cycle. When the fitting is cool to touch, it is considered suitable for refusion.

A repeated fusion is only allowed in the event that the power supply was interrupted during the fusion process. Any other error message or joint acceptance criteria failure cannot be corrected by a repeated fusion.

INFO

Prior to repeating fusion a second time, please contact your local sales engineer by phone or authorized channel partner for technical support.

INFO

Observe the joint acceptance criteria in this general installation guide (see appendix).

INFO

After fusion is complete, wait at least 15 seconds before carefully removing the cables from the fitting.

7.3.6. Cooling time

Movement of the fusion surfaces during the cooling cycle can result in failure.

INFO

Observe the cooling time listed on the barcode label of the fitting (CT)!

8. Processing FRIASTOP M Gas-Stop

8.1. Product description

Application



Image 23:

The FRIASTOP type Maxitrol Gas-Stop is used in domestic gas service pipes for operating pressures from 2 to 125 psi. It is a safety device that automatically shuts off the flow of gas if the pipe is damaged e.g. during excavation or drilling work. The FRIASTOP is preferably installed in the branch from the main line to the domestic service line, directly downstream of the pressure tapping tee. The type selected depends on the minimum mains operating pressure and the required flow rate.

How it works



Image 24:

The FRIASTOP type Maxitrol Gas-Stop closes automatically at a defined gas flow rate, as typically occurs when the domestic gas service pipe is damaged. The gas flow is shut off immediately and abruptly. The Gas-Stop has a bleed-by feature that allows pressure to build up in the repaired, intact gas pipe, and the valve opens again automatically.

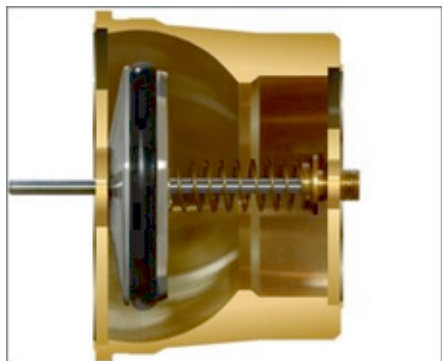


Image 25:

- FRIASTOP Maxitrol Gas-Stop in open position.

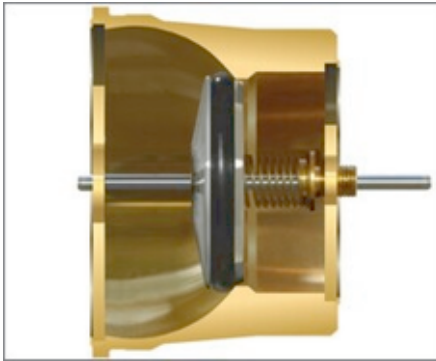


Image 26:

- FRIASTOP Maxitrol Gas-Stop in closed position.

8.2. Preparatory work and installation

The FRIASTOP type Maxitrol Gas-Stop is installed like a FRIALEN electrofusion coupling (see chapter 7. "General preparation").

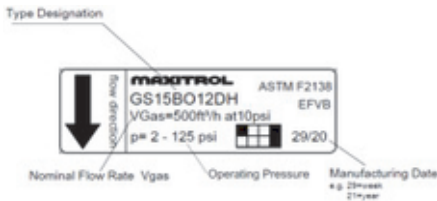


Image 27:

For installation, pay attention to the Gas-Stop manufacturer's typeplate on the FRIALEN safety fitting.

- Flow direction (see arrow on the typeplate)
- Type designation of the Gas-Stop
- Functional pressure range p [psi]
- Max. nominal flow rate / max. pressure loss V_{GAS} [ft³/h]

The FRIASTOP type Maxitrol Gas-Stop can be installed in any orientation, but horizontal installation is recommended.

i INFO

When installing, make sure that no dirt or debris such as swarf, leaves etc. enter the gas pipe. This would impair the function of the Gas-Stop.

8.3. Putting into service

Putting into service by tapping the main line and filling the domestic service line must be done with a slow increase in pressure to prevent the Gas-Stop from closing.

Closed Gas-Stop can be opened again by applying counterpressure (up to mains pressure) using a suitable pressure source, e.g. nitrogen or natural gas cylinder.

During the pressure test, the test air must be fed in upstream of the Gas-Stop in such a way that the closing flow rate at the Gas-Stop is not reached. If the Gas-Stop closes, the downstream section is not tested.

If the pressure downstream of the Gas-Stop is relieved, e.g. for venting, this must be done in a controlled manner. If the pressure is released too quickly, or the valve is opened too much, the Gas-Stop may close.

I INFO

When installing the FRIASTOP type Maxitrol Gas-Stop and putting it into service, observe the labeling on the product, all documents supplied with the product, and the FRIASTOP product data sheet.

9. Processing FRIALEN pressure tapping tees

9.1. Product description



Image 28:

FRIALEN DAAI pressure tapping tees are suitable as branches for pressurized and unpressurized gas and water supply pipes. Tapping tees may be installed on SDR 17 to SDR 11 pipes. Other SDR ranges on request.

Applications:

- Gas applications: maximum operating pressure 125 psi.
- Water applications: tested and approved in accordance with AWWA (for DAAI 2" and 3") and AWWA C906 (for DAAI > 3") for maximum operating pressure of up to 200 psi.

9.2. Preparatory work

The preparatory work to install FRIALEN DAAI pressure tapping tees are described in chapter 7. "General preparation".

9.3. Installing the pressure tapping tee

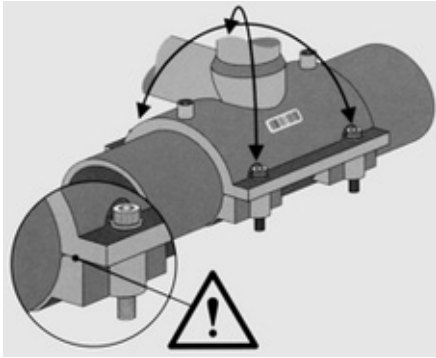


Image 29:

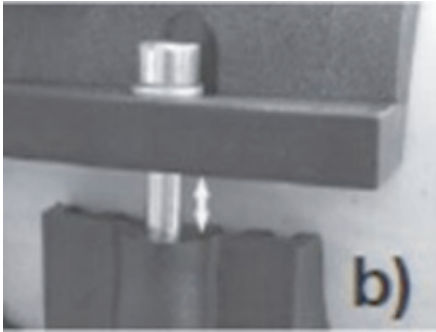


Image 30:

- Undo the pre-fitted screws on one side.
- Open the top and bottom parts, with the still screwed side serving as a hinge.
- Place the DAAI pressure tapping tee onto the prepared pipe surface.
- Tighten all four screws **evenly in a cross pattern** using an Allen key as **far as they will go**.
 - For DAAI 2, 3 and 8 inches, the top and bottom parts must be screwed together until they are touching (see fig. 31).
 - For DAAI 4 and 6 inches, tighten until the end of the thread is reached. Check that the DAAI is seated firmly on the pipe (see fig. 32).

i INFO

The bottom parts are an integral part of the pressure tapping tees and serve to apply the joining pressure.

9.4. Fusion process

Reading fusion parameters and start fusion process according to chapter 7.3. "Fusion process".

i INFO

For DAAI pressure tapping tees, the factory-set drilling configuration must not be changed before the fusion process!

9.5. Tapping

HINT

Pressure test before tapping

A pressure test is strongly recommended to ensure fusion integrity prior to tapping.

i INFO

Observe cooling times before tapping!

i INFO

Before tapping, fuse branch pipeline fitting according to this general installation guide.



Image 31:

Remove the plug by unscrewing it from the tapping tee stack.

Check that the O-ring on the plug is correctly positioned and in perfect condition.



Image 32:

Using the appropriate FRIALEN actuating key, screw the drill down evenly in a clockwise direction until it reaches the lower stop.

Then screw the drill back up in an anticlockwise direction until it reaches the upper stop.

Place the plug back on the tapping tee stack and screw it down by hand or with the FRIALEN actuating key until the collar of the plug is just touching the end face of the tapping tee stack. Then turn the plug back **a half turn** to relieve the pressure on the O-ring.

i INFO

Too much tightening force on the collar can break the plug or strip the hexagon socket. In this case the plug must be replaced.

i INFO

Make sure the actuating key is in perfect condition, no deformations or burrs on the tool.

To prevent access, we recommend sealing the tapping tee stack with a DK fusion cap (cap for pressure tapping tees). Make sure that all necessary work steps are followed, see chapter 7. "General preparation".

10. Processing FRIALEN shutoff saddles

10.1. Product description



Image 33:

FRIALEN SPAI shutoff saddles are used to shut off the media flow with the aid of commercially available bubble setting devices, or for venting/flushing high and medium density polyethylene pipes in gas supply systems. Shutoff saddles may be installed on SDR 17 to SDR 11 pipes. Other SDR ranges on request.

Applications:

- Gas applications: maximum operating pressure 125 psi.

10.2. Preparatory work

The preparatory work to install FRIALEN SPAI shutoff saddles are described in chapter 7. "General preparation".

10.3. Installing the shutoff saddle

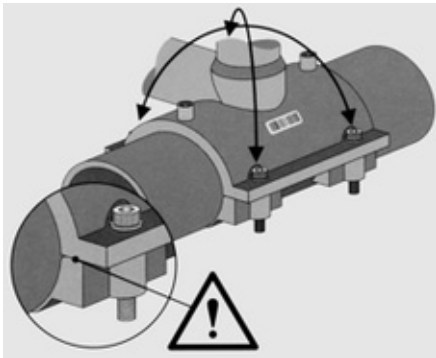


Image 34:

Installation of SPAI 3 IPS - 8 IPS:

- Undo the pre-fitted screws on one side.
- Open the top and bottom parts, with the still screwed side serving as a hinge.
- Place the SPAI shutoff saddle on the prepared pipe surface.
- Tighten all four screws **evenly in a cross pattern** using an Allen key **as far as they will go**.

i INFO



SPAI shutoff saddles 10 IPS - 12 IPS are installed using the FRIATOP clamping unit. Follow the "FRIATOP clamping unit" operating instructions, from our website <https://www.aliaxis.de/en/services/downloads>.

Image 35:

10.4. Fusion process

Reading fusion parameters and start fusion process according to chapter 7.3. "Fusion process".

10.5. Fitting for bubble setting devices and tapping the main pipe



Image 36:

The SPAI shutoff saddle is suitable for use with commercially available bubble setting devices and can also be used for tapping the main pipe.

Follow the respective manufacturer's installation instructions for tapping and bubble setting devices.



Image 37:

Fit brass plug

Screw in the brass plug until the O-ring seals in the stack. In the end position, the plug projects beyond the stack by approx. 0.06 inches (approx. 1.5 mm). Screwing the plug in requires a torque of approx. 110 lb-ft (approx. 150 Nm), which is achieved using suitable tools.



Image 38:



Image 39:

Fit plastic cap or SPAC fusion cap

After fitting the brass plug, the stack of the SPAC has to be protected against access using the supplied screw cap, or permanently using the SPAC fusion cap.

*SPAC is not supplied with the SPAC.

i INFO

The SPAC fusion cap must be installed on the stack of the SPAC shutoff saddle in accordance with the installation requirements for FRIALEN safety fittings.

11. Processing FRIALEN spigot saddles

11.1. Product description



Image 40:

FRIALEN SAI spigot saddles are suitable for creating branches for pressurized and unpressurized gas and water supply pipes made of high and medium density polyethylene. Spigot saddles may be installed on SDR 17 to SDR 11 pipes. Other SDR ranges on request.

Applications:

- Gas applications: maximum operating pressure 100 psi.
- Water applications: maximum operating pressure 160 psi.

11.2. Preparatory work

The preparatory work to install FRIALEN SAI spigot saddles are described in chapter 7. "General preparation".

11.3. Installing the spigot saddle

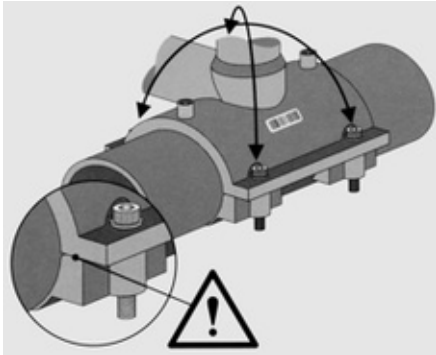


Image 41:

Installation of SAI 3 IPS - 8 IPS:

- Undo the pre-fitted screws on one side.
- Open the top and bottom parts, with the still screwed side serving as a hinge.
- Place the SAI spigot saddle on the prepared pipe surface.
- Tighten all four screws **evenly in a cross pattern** using an Allen key **as far as they will go**.

11.4. Fusion process

Reading fusion parameters and start fusion process according to chapter 7.3. "Fusion process".

11.5. Tapping

HINT

Pressure test before tapping

A pressure test is strongly recommended to ensure fusion integrity prior to tapping.



Image 42:

Tapping unpressurized pipe:

Tapping is carried out using a standard hole saw. Note the maximum tapping diameter in the table below.

Tapping under pressure:

Special tapping equipment and an additional shutoff element, e.g. ball valve, are required for tapping under pressure. Tapping can be carried out up to the maximum operating pressure of the main pipe.

Table 44: Maximum tapping diameter

Diameter d_1/d_2 in IPS	Maximum tapping diameter [inch]
3" / 2"	1.850"
4" / 2"	1.850"
6" / 4"	3.543"
8" / 4"	3.543"

Connect the outlet of the FRIALEN SAI spigot saddle to a branch pipeline fitting according to this general installation guide.

12. Processing FRIALEN FIXBLOC

12.1. Product description

The FRIALEN FIXBLOC is used where high axial pushing and pulling forces have to be absorbed. For example, for pipe rehabilitations, when creating fixed points and fixings.

Applications:

- PE pipes SDR 17 to SDR 11, from d 6 to d 64 inches (d 160 to d 1600 mm).



Image 43:



Image 44:



Image 45:

The FRIALEN FIXBLOC is easy and quick to install using a tensioning strap or – if the pipe circumference is not accessible – using the FRIATOOLS FIXBLOC FWFB clamping unit.

- For installation using a tensioning strap, a standard tensioning strap is used to hold the FIXBLOC on the pipe.
- With the FRIATOOLS FIXBLOC FWFB clamping unit, the FIXBLOC can be fitted on PE pipes in the dimension range d 6 to d 20 inches (d 160 to d 500 mm) at the pipe cut edge.

12.2. Preparatory work

The preparatory work to install FRIALEN FIXBLOC are described in chapter 7. "General preparation".

12.3. Installing the FIXBLOC

12.3.1. Installing the FIXBLOC using a tensioning strap

⚠ CAUTION

Tensioning strap is under tension

Risk of injury

Failure of the tensioning strap may result in injury. Before use, check the condition of the belt and replace it if necessary.



Image 46:

Installation using a tensioning strap at any position on the pipe:

Position the FIXBLOC on the prepared pipe surface, guide the tensioning strap around the pipe and thread the belt into the two tabs on the FIXBLOC.

8 INFO

A multiple FIXBLOC application is also possible, using several FIXBLOCs around the pipe.



Image 47:

Insert the end of the tensioning strap into the strap ratchet and operate the strap ratchet to fix the FIXBLOC on the pipe.

Tensioning strap selection:

Use tensioning straps with a strap width of approx. 2 inches (approx. 50 mm) and a minimum length of approx. 3.5 x pipe diameter. If multiple FIXBLOCs are used, the strap length must be adjusted accordingly.



Image 48:

The FIXBLOC should now be positioned on the pipe without any gaps.

Check and if necessary correct the position of the FIXBLOC, ensuring it is held in contact with the pipe without any gaps.

12.3.2. Installing FIXBLOC using the FWFB clamping unit



Image 49:

Installation using FWFB clamping unit on end of pipe:

If it is not possible to use a tensioning strap for installation, e.g. because the pipe circumference is not accessible, the FWFB clamping unit must be used to clamp the FIXBLOC.

Mount the fixing plate onto the FIXBLOC.

When mounting the fixing plate on the FIXBLOC, make sure that the two guide rails on the fixing plate are positioned on the two outer segments of the FIXBLOC.



Image 50:

Position the FIXBLOC with the pre-mounted fixing plate on the pipe surface.

Now fit the first of the three screw clamps in the middle position on the fixing plate. A guide is provided on the fixing plate to make it easier to fit the screw clamp.

Turn the handle of the screw clamp to clamp the FIXBLOC firmly in position on the pipe.

i INFO

After fitting the first screw clamp, check that the FIXBLOC is correctly positioned on the pipe!



Image 51:

Then fit the two remaining screw clamps onto the outer positions of the fixing plate.

Guides are attached to the fixing plate for fitting the two screw clamps in the two outer positions.

Turn the handles using a ratchet or a wrench so that the FIXBLOC is held against the pipe surface without any gaps.

i INFO

When tightening the two outer screw clamps, make sure the middle screw clamp does not become loose. Retighten it if necessary.



Image 52:

The FIXBLOC is correctly mounted on the pipe when the two outer guides rest on the pipe.

The FIXBLOC should now be positioned on the pipe without any gaps.

i INFO

Check and if necessary correct the position of the FIXBLOC, ensuring it is held in contact with the pipe without any gaps!

12.4. Fusion process



Image 53:



Image 54:

Connect the electrofusion control box outlet cable to the fusion contacts on the FIXBLOC, and scan the fusion parameters, which are contained in a barcode on the barcode sticker, using a wand or barcode scanner.

The barcode required for fusion is affixed to a tab on the component.

When installing the FIXBLOC using the FWFB clamping unit, the barcode is covered by the clamping unit. Therefore the barcode must be scanned with a wand or barcode scanner **before** fitting the fixing plate.

Start the electrofusion process.

12.5. Cooling time

i INFO

It is imperative that you observe the cooling time CT specified on the barcode. If the cooling time is not observed, the anchoring force of the FIXBLOC may be significantly reduced.

The FIXBLOC must remain clamped during the cooling time. Once the cooling time has elapsed, the tensioning strap or the FWFB clamping unit can be removed.

12.6. Removal of the tensioning strap or FWFB clamping unit

⚠ CAUTION

Fixing plate is under tension

Risk of injury when opening the screw clamps.
Open the screw clamps slowly!

Once the cooling time has elapsed (CT on barcode);

- if a **tensioning strap** was used, release the strap by opening the strap ratchet. Then remove the tensioning strap from the FIXBLOC.
- If a **clamping unit** was used, release the clamping pressure on the FIXBLOC by turning the handles of the screw clamps. After opening the screw clamps, you can take them out of the guide rails on the fixing plate and take the fixing plate off the FIXBLOC.

13. Joint acceptance criteria

INFO

The described sequence of the processes must be adhered to.

1. Ensure the pipe was peeled properly.
2. Coupling and Reducer: Ensure the pipe ends were fully inserted to the markings.
3. Saddle fittings: Ensure fitting was installed within marked saddle area markings.
4. Ensure the pipe and coupling / saddle fitting were aligned and secured during the fusion and cooling cycles.
5. Ensure the correct fusion cycle was completed with no interruption or error code from the electrofusion control box.
6. Ensure the correct cooling time was followed.
7. Ensure there is no "outflow" anywhere around the base of the fitting. If there are visible signs of "outflow", the fitting must be replaced. Outflow is defined as any material visible beyond the fitting when viewed from a square cut angle.
8. Check the pop-up indicators according to the "joint acceptance criteria for pop-up indicators" in Image 55 - 58.

INFO

On all FRIALEN electrofusion fittings, movement of the fusion indicator is only a witness that a fusion cycle has been done. This indicator is under no circumstances the proof of a correct joint. Any movement of the fusion indicator(s) is just a visual verification that energy / heat during the fusion was in place (see Image 55 - 58).

In case of no movement, confirm the following:

- All steps in the preparation of the joint (peeling, cleaning & clamping) have been respected.
- A visual check to ensure no melt outflow is present.
- No errors are shown on the fusion unit display.

Provided this criteria are met, the fusion joint may be accepted and subject to normal pressure test requirements.

Acceptance criteria for pop-up indicators



Image 55:

- Limited or no movement



Image 56:

- Normal movement



Image 57:

- Above normal movement



Acceptance criteria for pop-up indicators

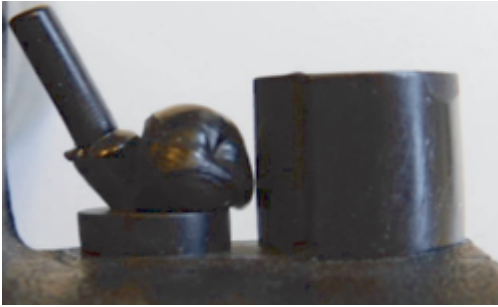


Image 58:

- Melt outflow
- Replace the fusion fitting!



i INFO

Fusion with melt outflow is not acceptable!

i INFO

Any fusion not meeting the joint acceptance criteria above must be cut out and replaced accordingly.

14. Updates of assembly and operating instructions

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 assembly and operating instructions, please contact your authorized local channel partner.

The latest assembly and operating instructions can be downloaded on our website,

www.aliaxis.de/en/services/downloads

15. Channel partners

For further information on the installation of FRIALEN electrofusion fittings, please contact:



USA channel partner

IPEX Inc. –

Toll free: (866)-473 9462

<http://www.ipexna.com>



Canada channel partner

KTI Limited –

Toll free: (800)-665 9654

<http://www.ktiltd.on.ca>

Aliaxis Deutschland GmbH

Infrastruktur

Steinzeugstrasse 50

68229 Mannheim

Tel +49 621 486-2828

Fax +49 621 486-1598

info.de@aliaxis.com

www.aliaxis.de

