Welding instruction folder PKS® electrofusion socket

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1. Installation General installation guidelines

1.1. Foreword

This guideline has been devised by the manufacturer and must be strictly observed. The relevant standards (e.g. DIN EN 1610) and instructions (DWA-A 139) apply.

In cases where the guideline cannot be followed, the manufacturer must be contacted for approval of an alternative procedure. This approval can be obtained by the customer at any time from FRANK GmbH at the technical project planning and implementation stages.

Pipes and other components that have been damaged or deformed during transport or storage must not be installed and separated from the OK pipes and parts. This also applies to pipes and components that have not been examined as regards their technical suitability for the project, or that have been approved in the context of a different project. If you become aware of any deviations from the technical framework conditions (i.e. installation conditions, static conditions, specific local conditions, weather, etc.), stop laying and contact the manufacturer without delay.

1.2. Transport

PKS® pipes, fittings, manholes and special construction elements must be transported using suitable vehicles. During transportation, they must be secured such that they cannot slide on the loading space. Other objects on the loading space may not hit against the pipes. The loading space must be even and free of sharp objects that could damage the pipe walls. Special care must be taken when loading and unloading the pipes and components to prevent damage.

1.3. Handling

When loading pipes and manholes, use suitable hoists. Do not throw the pipes or let them fall down. They may not be dragged along the ground. Take special care to protect the electrofusion socket and spigot ends. Prefabricated components (e.g. fittings, manholes and storm water tanks) must be lifted by the lifting eyes provided to prevent inadmissible loading.

1.4. Storage

PE/PP pipes must be stored on level ground. Do not place the pipes on stones or sharp-edged objects. The pipes must be stored so that they cannot become damaged or deformed. Protect them against dirt, point loads and other mechanical damage. Ensure that the electrofusion socket and the spigot in particular are protected from dirt and deformation; otherwise, they cannot be joined properly.

In summer, protect the pipes from extreme heat. We



ig. 1.1 - Storage of PKS® pipe (example)



advise storing the pipes in the shade or under an opaque tarpaulin or geotextile membrane.

For temporary storage on the construction site, it might be necessary to prepare the storage location, depending on the ground and weather conditions. The pipes must be secured and stabilised with squared timbers and wedges so that they will not roll away. Put squared timbers under the first row of pipes. Pipe stacks must not be higher than 3 metres.

Before placing the pipes in storage, check the original packaging for damage. Should the packaging be damaged, check all exposed pipe sections for dirt and clean them immediately. Then cover them with foil. Do not attach self-adhesive foil to the inside of sockets or spigot ends.



1.5. Pipe laying (in open trench)

According to DIN EN 1610, a load carrying capacity certificate must be submitted for all underground sewage and drain pipes prior to installation. For PKS® pipes, verification of the load carrying capacity is provided according to work sheet ATV-DVWK-A 127 for the static strength calculation, based on the questionnaire (soil, installation conditions, etc.) filled-in by the customer.

The pipes must be installed according to the results of the static strength calculation. In the event of deviations from the assumptions on which the calculation is based and/or changes in the local installation conditions, do not install the pipes but contact FRANK GmbH for advice on the next step to be taken. Flexible pipes must always be stored loose, with a minimum pipe support angle of 2α = 120°.



Fig. 1.2 Typical cross-section according to DIN EN 1610

According to DIN EN 1610, the bedding below the pipe must be 10 to 15 cm thick and made from compactable, stone-free material (grade G1 or G2). The same material must be used for the bedding to a level of 15 cm above the top of the pipe. The bedding must be installed and compacted in layers. Take care that the compacting equipment does not touch the pipe. You must pay particular attention to backfill compaction in the area of the interpolar gap and in the open profile area in the case of PR pipes. Directly on top of the pipe, compress only from a layer of 30 cm above the pipe. The top fill material must also be installed and compacted in layers. Up to a cover height of 1.0 m above the top of the pipe, use only light- or medium-weight compacting equipment. Heavy compacting equipment must only be used from a minimum cover height of 1.0 m.

Take suitable measures to prevent soil from falling into the trench and ensure that the bedding material is not accidentally spread into the ground surrounding the trench. The soil material on both sides of the pipe must be refilled and compacted in layers to provide a stable trench. During pipe installation, keep the trenches free of



Fig. 1.3. - Installation and backfill compaction

water and sludge to ensure buoyancy. Proceed with particular caution in areas where pliable pipes are connected to concrete structures and manholes as settlement differences can occur under some circumstances. Leak tests must always be performed before the trench is backfilled, as it is otherwise difficult to locate and repair leaks.

High temperature fluctuations in open trenches, for instance when pipes are exposed to direct sunlight, can cause changes in the length of the pipes. This can be prevented by covering the pipes with an opaque foil or geotextile membrane. Do not leave the pipe in the trench exposed for longer than is necessary (e.g. to carry out the leak test). The potential elongation of the pipe must be taken into account when planning fixed points and connections between different materials, and suitable measures must be taken to prevent any negative impact on the quality of the installation.



1.6. Leak test

There are various methods and standards for leak tests, and it is normally up to the project client or his agent to choose the most suitable method. The leak test must be approved by the pipe manufacturer. This approval can be obtained by the customer from FRANK GmbH at any time during the technical project planning and implementation stages.

FRANK GmbH recommends performing leak tests according to DWA-A 139 and DIN EN 1610, method LE (air pressure test). If possible, the test should be performed before the trench is backfilled, by testing the individual pipe joints. We recommend using a socket pressure tester (available on loan from FRANK GmbH). With this method, the leak test can be performed before the entire pipeline is completed.



Fig. 1.4. - Socket pressure tester



2. Welding instruction

Instructions for installing and welding PKS® pipes with integrated electrofusion socket

2.1. General information

- Electric power supply: generator, minimum power 15 kVA; constant power output. The connection/extension cable must be at least 3 x 2.5 mm².
- All welding work must be performed by suitably trained and qualified personnel.
- Protect the welding area from dirt, moisture and direct sunlight.
 At temperatures below +5 °C, take appropriate measures to prevent temperatures dropping even lower in the welding area (e.g. by erecting a tent or preheating components).

2.2. Preparation / welding

- Do not remove the protective foil until just before cleaning or joining the socket and spigot end (see Fig. 2.1.).
- Check the socket and the spigot end for possible damage in transit (if necessary, consult with FRANK GmbH)
- Position the pipes so that the connecting points for the wires are easily accessible.
- Clean the spigot end and the socket with a PE cleaner, using lint-free, non-dyed paper (see Fig. 2.2.). Remove persistent dirt with a brush or similar implement and then clean the area with a PE cleaner.
- Using a waterproof pen, mark the existing socket depth at the spigot end at a minimum of 3 evenly space Push the pipes together to the stop/mark (when doing this, make sure to join them straight), align them axially and ve such that there is no bending. Make sure that there is no contamination or moisture between the socket a the spigot end.
- With PKS® pipes from DN 800 onwards, use a support ring to increase the joining pressure (see fig. 2.4.). This ring must be positioned approx. 20 mm from the pipe edge at the spigc and braced (see also annex 2.4. fig. 2.11.). For wall connections and manhol sockets, always use a support ring, irrespective of the pipe dimensions.











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Fig. 2.4.

- After preparation, the pipes must be welded without delay.
- First tighten the support ring and then insert the FRANK tension band into the groove at the socket end. The FRANK placed at an offset (min. distance 250mm) to the connection wires (see fig. 2.5).
- Tighten the tension band with the tool until the gap between socket and spigot end is fully closed (if necessary, consult with FRANK GmbH)
- For short lengths, secure the socket and the spigot end so that the cannot be shifted against each other.
- Bend the connection wires to suit the adapter dimensions and shorten them such that the adapter is in contact with the socket end (max. distance 10mm) (see fig. 2.6.). Connect the welding cables to the adapter. When connecting the welding device, take care that the welding cables do not cause any stress or shear forces on the connection wires and are not strained (risk of short circuit) (see fig. 2.6.). From DN 1400, observe the connection plc annex 2.4., fig. 2.10.
- Enter the welding parameters (with barcode scanner or manually). Start the welding process Fig. 2.8
- Re-tighten the tension band after 2/3 of the process has been completed and again just before the welding time elapses.

2.3. End of welding / quality assurance

- After the welding time has elapsed, label the weld with a permanent felt-tip pen (weld number, date, welding voltage, time, welder) (see fig. 2.9).
 Disconnect the adapter from the connection wires. (caution: risk of injury from burns).
- During the cooling time (approx. 40 min.), do not move the pipe. Do not carry out compaction or similar work near the pipe.
- After the cooling time has elapsed, remove the tension band and the support ring.
- Test the welded connection for leakage according to DIN EN 1610.
 Prior to side filling or sheath installation, always perform a preliminary leak test (DIN EN 1610, section 10) (see also annex 2.4. fig. 2.12.).



Fig. 2.5.



Fig. 2.6.



Fig. 2.7.



Fig. 2.8.



Fig. 2.9.





Fig. 2.10. - Connecting diagram of split heating circuit (two-part electrofusion wires) from DN 1400



Fig. 2.11. - Position of support ring



Fig. 2.12. - Socket pressure tester in transport pipe



3. Required tools Tools needed for PKS® welding

Generator

Generator power	Device	
7.5 kW	1x PolyControl PKS / 1x Tiny PKS	
21 kW	2x PolyControl PKS / 1x Tiny PKS	
21 kW	1x Mammut	
16A fuse per phase		

Extension cable

Cable length	Cross-section (230V / 400V)
Up to 30m	3x 2.5mm² / 5x 2.5mm²
Up to 50m	3x 4.0mm² / 5x 4.0mm²

Tools

Tangit	Tangit PE-Reiniger (mind. 1 Liter)	✓
	Tücher , Papierrolle (fusselfrei)	✓
· ·	Drahtbürste	✓
1	Hammer	✓
0	Kneifzange	✓
	Handfeger	✓
	Handschaber	✓
	Markierungsstift (weiß, wasserfest)	✓
	Zollstock/Maßband	✓

We recommend inquiring about our PKS® welding starter set!

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4. AIO welding code Explanation of the AIO welding code A=All, I=in, O=one

4.1. AIO welding code

<u>All PKS® electrofusion sockets have an AIO welding code label near the socket end.</u>

Old welding code



New welding code



Welding with preheating (ambient temperature < 5 °C)







1 Preheating

The first step is to preheat the joint via the electrofusion wires.

2 Heat-soaking

The temperature that entered due to preheating can distribute evenly in the welding area. If necessary, you can re-tension the sockets and spigot ends (if there is a wide gap) as early as this stage.

3 Welding

You carry out welding via the electrofusion wire with the welding current switched on.

4.2. Welding without preheating (ambient temperature \geq 5 °C)

The joints are welded as normal without preheating (exception: DN 2300 and DN 2400).

Note: For DN 2300 and DN 2400, preheating is always required, i.e. also at ambient temperatures \geq 5 °C. That is why the respective barcode labels include two separate code strips. The barcode at the top with the sun icon \updownarrow must be used for electrofusion welds at ambient temperatures of +5 °C to + 50 °C.

The barcode at the bottom with the snowflake icon * must be used for electrofusion welds at ambient temperatures of - 10 °C to + 4 °C.



All PKS® electrofusion sockets, including preheated ones, must be re-tensioned after 2/3 of the welding time has elapsed.

4.3. Barcode illegible - what do I do?

Manual code input

If the code is illegible, enter the welding parameters (numbers below the code) manually at the welding device. Should the barcode label have been damaged so that it has become completely illegible even for manual entry, contact our application department.

Tip!

When welding pipes of equal dimensions, remove the barcode label from one of the sockets (pipes) and keep it as a "backup copy" in a folder so that you can repeatedly scan it for the other welds.



5. Socket pressure tester Operating manual of socket pressure tester

5.1. Assembly of tester

- Assemble the steel body, using the screws supplied (butt joint marks must match).
- Mount the wheel assemblies.
- Mount the tandem cellular seal.
 (Do not use force! Do not damage seal!)
 Venting seal at top of pipe, filling connection at bottom of pipe The two valve connections must be flush with the steel rim.
- Mount filling nozzle. Attach the air connection unit to fill the tandem cellular seal.
- Connect air system: Compressor - safety switch and testing device (input) Safety switch and testing device (end elements) - tandem seal Safety switch and testing device (testing chamber) - centre chamber (bottom) Safety switch and testing device (pressure recorder) - pressure recorder

5.2. Socket testing

- Deburr and clean the pipe section near the socket.
- Insert the socket pressure tester (see fig. 5.1.).
- The diameter of the socket pressure tester is about 40 mm smaller than that of the pipe. Using the handwheel, adjust the wheels so that the tester is properly centred in the pipe and can move with ease (see fig. 5.2
- Position the device at the pipe socket.

5.3. Air pressure test with safety switch and testing device (S/T):

- Connect the venting fittings (top).
- Pump up the sealing chamber using the S/T, min. 2 bar to max. 3 bar
- Using the S/T, apply the desired test pressure to the test chamber based on DIN1610 method L. Shut off the air supply (see fig. 5.3.).
- Switch on the pressure recorder and open the shut-off valve (adjust test pressure, shut off air supply).
- Perform the test for the required test time (see fig. 5.4.).

5.4. After testing:

- Open the venting valve.
- Switch off the pressure recorder.
- Release the air pressure from the sealing chamber



Fig. 5.1.



Fig. 5.2.



Fig. 5.3.



Fig. 5.4



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6. Instruction log

Instruction in welding PKS® sewage pipes with an electrofusion socket

Date:	 -	
Customer:		
Company:	 	
Construction site:	 	
Welding machine:	 Machine no.:	

The training course was based on the PKS® welding instruction folder and the installation instructions for CONDOR sewer pipe saddles of type E/i.

•	The welding instruction folder was gone through in-depth.		
•	The participants produced weld(s) and performed a leak test, using a socket pressure tester.		
•	All questions of the participants were answered during the course.		
•	Each participant was given a welding instruction folder.		

We hereby confirm that the person named below participated in the training course and has been given a copy of the welding instruction folder and the electrofusion welding instructions.

Surname:	First name:	Signature:

Instructor:	Phone:
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