

# Monoline assembly instructions

The powerful electrofusion system

for PE pressure pipelines



The technical data is not binding and not an expressly warranted characteristic of the goods.  
It is subject to change.  
Please consult our General Conditions of Supply.

# Standards and Regulations

## General

Monoline fittings meet the requirements of the relevant international and national standards and regulations with regard to dimensions, identification, materials and mechanical and physical properties.

### The relevant standards

The relevant standards can primarily be divided into three main groups, as shown below:

Norms	Committees
ISO	International Organization for Standardization Organisation Internationale de Normalisation
EN	Europäisches Komitee für Normung Comité Européen de Normalisation European Committee for Standardization
SN, DS, UNI, DIN, BS, NF, Ö Norm, DVGW etc.	National Committees for Norms

## The European Product Standards

The harmonization of European standards is one of the key achievements of the common European market. Technical regulations and national standards are no longer allowed to restrict the free exchange of goods and services.

In the CEN (Comité Européen de Normalisation) committees, users national associations/ organizations and manufacturers have come together to create uniform European standards. These CEN Standards will become imperative for all members of the European Community as well as for the EFTA States who voted in its favour. They may then not be overruled by a national standard.

All European product standards have a uniform structure. They consist of 7 parts with the following structure:

Part 1: General
Part 2: Pipes
Part 3: Fittings
Part 4: Valves
Part 5: Fitness for purpose
Part 6: Recommended practice for installation
Part 7: Assessment of conformity

PE products that are used for underground piping for gas and water distribution, are subject to the following standards:

EN 12201:  
PE in water distribution

EN 1555:  
PE in gas distribution

The Monoline range of products is designed in such a way that they comply with these standards. Our commitment to quality and the knowledge that standards only include the minimum requirements, have resulted in internal quality standards, which are more or less above the «Norm Level».

# General

## Electrofusion

Using electrofusion to join PE pipes and valves enables a secure, systematic, economical and efficient installation of buried PE piping systems.

## Prerequisites

Monoline electrofusion products are supplied with a barcode label, which contains all relevant fusion data.



### Compatibility

The Monoline range is appropriated for a fusion with the standard polyethylene materials PE 63, PE 80 and PE 100, with a melt flow rate (MFR between 0.2 and 1.4 g/10 min) and which are listed below.

Manufacturer	Material Type	Material	Melt Flow Range MFR 190/5 (g/10 min)
Borealis AB	HE 2467	PE 63 (PE-HD)	0.5
	HE 2467 BL	PE 80 (PE-HD)	0.5
	ME 2418	PE 80 (PE-MD)	0.8
	ME 2421/2424	PE 80 (PE-MD)	0.9
	ME 0909	PE 80 (PE-MD)	0.6
	Borstar HE 3490/3492/3494	PE 100 (PE-HD)	0.3
	CE 4664	PE 80 (PE-HD)	0.45
	DE 3964	PE 80 (PE-MD)	0.75
	BP Solvay	Rigidex PC001-55	PE 80 (PE-HD)
Rigidex PC002-40/2040		PE 80 (PE-MD)	0.9
Rigidex PC002-50		PE 80 (PE-MD)	0.85
Rigidex PC3100F Blue		PE 100 (PE-HD)	0.22
Rigidex PC4100F Black		PE 100 (PE-HD)	0.22
Eltex TUB 71/72		PE 63 (PE-HD)	0.45
Eltex TUB 101/102		PE 80 (PE-MD)	0.8
Eltex TUB 131/132		PE 80 (PE-HD)	0.85
Eltex TUB 131 N2010/N2012		PE 80 (PE-HD)	0.46
Eltex TUB 171/172/174		PE 80 (PE-HD)	0.85
Eltex TUB 121/124/125		PE 100 (PE-HD)	0.5
Eltex TUB 121/124/125 N2025		PE 100 (PE-HD)	0.3
Sabic Polyolefine GmbH	Vestolen A5041R	PE 80 (PE-HD)	0.5
	Vestolen A4042R	PE 80 (PE-HD)	0.8
	Vestolen A6060R	PE 100 (PE-HD)	0.3
Basell	Lupolen 3822 D GB00350	PE 80 (PE-MD)	0.9
	Hostalen GM5010T3	PE 80 (PE-HD)	0.45
	Hostalen GM7040G	PE 80 (PE-HD)	0.45
	Hostalen GM5140	PE 80 (PE-MD)	0.85
	Hostalen CRP100	PE 100 (PE-HD)	0.22
Atofina	Finathene 3802	PE 80 (PE-MD)	0.9
	Finathene XS 10	PE 100 (PE-HD)	0.3

This list does not claim to be comprehensive.

For clarifications, please contact the pipe and pipe material manufacturer.



**In use with other PE-materials like PE-X, composite pipes and pipes not listed in the above mentioned melt flow index, please consult your pipe manufacturer.**

Joining method:

In addition to other joining methods, it is also possible to join PE-X pipes using electrofusion.

However, partly through the cross-linking methods and the resulting properties, Georg Fischer Wavin cannot issue a general approval for electrofusion products for all PE-X pipe types.

For reasons of processing safety, we recommend using only the pipe types and material types tested and approved by Georg Fischer Wavin, in accordance with the applicable technical rules.

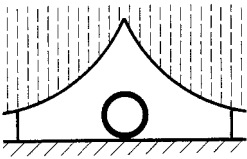
# Assembly and operating instructions

## Joining tips

The quality of the joint depends to a considerable extent on the care with which the preparatory work is performed. Electrofusion jointing should be carried out only by trained personnel.

Protect the fusion zone against bad weather, such as rain, snow or wind. Admissible temperature range for electrofusion is  $-10\text{ °C}$  to  $+45\text{ °C}$ .

The national guidelines are to be observed. A more uniform temperature profile around the entire pipe circumference can be achieved by shielding the fusion zone against direct sunlight or inclement weather.



Especially check that the electrofusion automatic machine and the fusion zone are placed under the same climatic conditions.

Monoline fittings are supplied in a polyethylene bag. Fittings that arrive at the place of installation in their original packing, must neither be machined nor cleaned with the PE cleaner. If the products (spigots) are nevertheless machined, then it will not reduce the quality if it is done professionally. However, it is not necessary.

**Exception:** If the fusion zones are touched by hand during assembly, the fittings must be cleaned with the PE cleaner.



- Use only PE cleaner with soft, absorbent paper to clean the fusion zones. Dusters soaked in PE cleaner are allowed.
- Clean only the scraped fusion surface. Otherwise, there is danger of transferring dirt to the already cleaned surface.
- When using markers, check that no ink reaches the fusion zone. Even when cleaning marker ink, take care that no ink touches the fusion zone.
- Ink in the fusion zone **cannot** be removed completely despite repeated cleaning. The pipe piece should be remachined or replaced.
- Pipes that are oval or not round should be rounded using rounding clamps in the connection zone.
- Use clamping tools or suitable devices to fix the pipes and fittings. In particular when working with coiled pipes, ensure that no force is applied between the pipe and fusion zone during the fusion and cooling phase.
- To transfer the fusion data to the fusion unit, you must always use barcode stickers on the product.
- Wait until minimum cooling times before removing clamping tools.

**Regarding tapping and conducting the pressure test please observe the assembly instructions.**

#### Protection of fusion area

The pipe and fitting surfaces to be fused should be carefully protected from dust, grease, oil and lubricants. Use only cleaning agents that are suitable for PE.



**Attention: There should be no grease (such as hand cream, oily dusters, silicon etc.) in the fusion zone!**

#### Storage

Monoline electrofusion fittings are packed separately in a polythene bag. If the fittings are protected from direct sunlight in the original packing and not stored above 50 °C, they can be stored for almost 10 years.

The storage duration commences on the date that the fittings are produced.

#### Operating pressure and operating temperature

PE fittings and saddles come in sizes that correspond to the creep strength requirements of the associated ISO Series 4065.

Operating pressures for water (Total operating coefficient C min = 1.25):

Pipe class	Operating pressure PE 100	Operating pressure PE 80	Temperature
ISO S3.2 SDR 7.4	–	16 bar	20 °C
ISO S5 SDR 11	16 bar	12.5 bar	20 °C
ISO S8 SDR 17/17.6	10 bar/9.6 bar	8 bar/7.6 bar	20 °C
ISO S12.5 SDR 26	6.4 bar	5 bar	20 °C

Operating pressures for gas (Total operating coefficient C min = 2.0):

Pipe class	Operating pressure PE 100	Operating pressure PE 80	Temperature
ISO S5 SDR 11	10 bar	4 bar	20 °C
ISO S8 SDR 17/17.6	5 bar	1 bar	20 °C

Details about the dependence of operating pressures on the operating temperatures are available on request.

### Product and fusion data

Monoline electrofusion products are supplied with an adhesive label containing all relevant product and processing data.

The products can be joined using any kind of polyvalent fusion units (40 Volt) that comply with the current, international standards.

### Fusion preparation

**The pipe should be wiped clean, prepared and finally cleaned using a PE cleaner.**

**Rotating tools should be used for uniform and time-saving pipe preparation.**

**Please comply with the assembly and operating instructions.**

### Permissible minimum pipe outer diameter

d Pipe	Min. chip thickness*	Per. minimum pipe outer diameter after peeling
20 mm	0.20 mm	19.6 mm
25 mm	0.20 mm	24.6 mm
32 mm	0.20 mm	31.5 mm
40 mm	0.20 mm	39.5 mm
50 mm	0.20 mm	49.5 mm
63 mm	0.20 mm	62.5 mm
75 mm	0.20 mm	74.4 mm
90 mm	0.20 mm	89.4 mm
110 mm	0.20 mm	109.4 mm
125 mm	0.20 mm	124.4 mm
140 mm	0.20 mm	139.4 mm
160 mm	0.20 mm	159.4 mm
180 mm	0.20 mm	179.4 mm
200 mm	0.20 mm	199.4 mm
225 mm	0.20 mm	224.4 mm
250 mm	0.20 mm	249.3 mm
280 mm	0.20 mm	279.3 mm
315 mm	0.20 mm	314.3 mm
355 mm	0.20 mm	354.3 mm
400 mm	0.20 mm	399.3 mm
450 mm	0.20 mm	449.3 mm
500 mm	0.20 mm	499.3 mm

\* This chip thickness is recommended by Georg Fischer Wavin, for any deviation ask for pipe suppliers confirmation

Tip: Maximum permissible pipe ovalness 1.5%  
The data refers to the pipe inner diameter without «+ tolerance»

As a result: If the average pipe outer diameter is equal to the upper tolerance limit, the pipe can be cut out by scraping until the permissible pipe outer diameter. In this case, the chip thickness can be greater than 0.3 mm.



**For PE 100 we strictly recommend rotating peeling tools!**

The stability and surface hardness of PE 100 is greater than that of PE 80. This is especially noticeable when the scraping tools become blunt. Therefore regular testing and maintenance of wear parts is required. We recommend servicing the units at least once a year.

## **Refusion**

If there is power failure caused by external influences (for ex. generator failure) and if the electrofusion is subsequently interrupted, you can refuse the joint. The following points should be kept in mind during refusion:

- Check and correct the cause of the fault. Appropriate error messages on the fusion unit might provide tips on the possible cause.
- Do not remove the clamping tools.
- Cool the fitting completely again, i. e. cool to the ambient temperature. Do not use other resources to cool the fitting (cold water etc.).
- Protect the joint from dirt and moisture during the cooling phase.
- Carry out the fusion again in accordance with the assembly instructions and the specifications on the data carrier.
- Test the fusion for leaks, conduct a pressure test.
- Observe the fusion process for short circuits.

**If the fusion joint fails in the pressure test or for short circuits, refusion is no longer allowed.**



# Suitability of electrofusion fittings with different pipe\* wall thicknesses (fusion compatibility)

Electrofusion coupler SDR 11 MONOLINE Type LU				
Pipe diameter d [mm]	SDR 11 ISO S 5	SDR 17/17.6 ISO S 8	SDR 26 ISO S 12.5	SDR 33 ISO S 16
20	+			
25	+			
32	+			
40	+			
50	+			
63	+	+	+	+
75	+	+	+	+
90	+	+	+	+
110	+	+	+	+
125	+	+	+	+
140	+	+	+	+
160	+	+	+	+
180	+	+	+	+
200	+	+	+	+
225	+	+	+	+
250	+	+	+	+
280	+	+	+	+
315	+	+	+	+
355	+	+	+	+
400	+	+	+	+

Electrofusion coupler SDR 17 MONOLINE Type LU				
Pipe diameter d [mm]	SDR 11 ISO S 5	SDR 17/17.6 ISO S 8	SDR 26 ISO S 12.5	SDR 33 ISO S 16
160	+	+	+	+
180	+	+	+	+
200	+	+	+	+
225	+	+	+	+
250	+	+	+	+
280	+	+	+	+
315	+	+	+	+
355	+	+	+	+
400	+	+	+	+
450	+	+	+	+
500	+	+	+	+

Electrofusion fittings SDR 11 MONOLINE Type LU				
Pipe diameter d [mm]	SDR 11 ISO S 5	SDR 17/17.6 ISO S 8	SDR 26 ISO S 12.5	SDR 33 ISO S 16
20	+			
25	+			
32	+			
40	+			
50	+	+		
63	+	+		
75	+	+		
90	+	+	+	
110	+	+	+	
125	+	+	+	
160	+	+	+	
180	+	+	+	
200	+	+	+	
225	+	+	+	
250	+	+	+	

## Branch fittings SDR 11 MONOLINE Type LU

Main dimension				
Pipe diameter d [mm]	SDR 11 ISO S 5	SDR 17/17.6 ISO S 8	SDR 26 ISO S 12.5	SDR 33 ISO S 16
110	+	+		
125	+	+		
140	+	+		
160	+	+		
180	+	+		
200	+	+		
225	+	+		
250	+	+		

## Outlet dimension

Pipe diameter d [mm]	SDR 11 ISO S 5	SDR 17/17.6 ISO S 8	SDR 26 ISO S 12.5	SDR 33 ISO S 16
90	+	+		
110	+	+		
125	+	+		

Electrofusion saddle SDR 11 MONOLINE Type LU				
Pipe diameter d [mm]	SDR 11 ISO S 5	SDR 17/17.6 ISO S 8	SDR 26 ISO S 12.5	SDR 33 ISO S 16
40	+			
50	+			
63	+			
75	+	+		
90	+	+		
110	+	+		
125	+	+		
160	+	+		
180	+	+		
200	+	+		
225	+	+		

### Remarks

- \* Pipes have to comply with the valid international standards. The melt flow rate (MFR) of the pipe has to be between 0.2 and 1.4 g/10 min.
- The local laws and regulations have to be fulfilled.
- All testing is based on PE100 pipes.

\*\*\* Consultation required depending on operation conditions.

# Assembly instructions for Electrofusion couplers and fittings d20–315 mm



The coupler/fitting remains in the PE protective bag until just before the fusion. Wipe the pipe clean of any large dirt with a dry cloth, cut at a right angle and clamfer.



Remove the oxidated layer from the pipe ends with a rotating peeling tool. The peeling length must be at least the insertion length of the coupler/fitting. Please observe the min. swarf thickness and the max. allowable wall thickness reduction.



Clean the fusion areas of the pipe ends. Use lint-free cleansing tissues and PE cleaning agent to do this.



Mark the insertion depth of the fitting on the pipe.



Take the coupler/fitting out of the bag without touching the fusion zones. If contaminated or touched they are to be cleaned as described above.



6 Screw or unscrew transition adaptor.



Insert the first pipe up to the marking. Mount the clamp and tighten firmly.



For Electrofusion fittings up to 63 mm, tighten the integrated clamp firmly and symmetrical.



Afterwards, proceed with the second pipe accordingly.



Fusion to be carried out with a fusion unit which is compatible with the system according to the instructions of the manufacturer.



After the fusion, check that the indicators have come up and then remove the cables. The indicators show that sufficient energy has been applied but does not however guarantee the quality of the fusion.

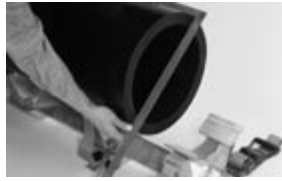


After complying with the cooling times, remove the clamp. Do not carry-out pressure test until minimum cooling time has elapsed.

# Assembly instructions for Monoline Electrofusion couplers d355–d500 mm



1. Before use, ensure fitting remains in its original packaging and that it is always stored in a flat position.



2. Pre-clean fusion zone of pipe with a dry and clean cloth. Ensure pipe end is cut at right angles. Deburr if necessary.



3. Adjust peeling tool (e.g. PT2) to required length. Check ovality of pipe with one complete turn of peeling tool (with blade in neutral position). Correct ovality as required.



4. Remove oxidised layer on pipe end using rotary scraper (observe maximum allowable diameter reduction).



5. Degrease fusion zone with suitable agent. If complete slide-over is required, the pipe end should be degreased for a distance equivalent to the length of the coupler.



6. Mark insertion depth on pipe with at least 3 evenly distributed marks (120° apart) around circumference of pipe.



7. Remove coupler from its packaging taking care not to touch fusion surfaces. Examine for possible damage.



8. Slide coupler along first pipe up to the depth markings.



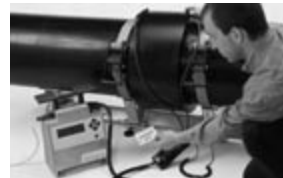
9. Firmly clamp first pipe ensuring coupler is centrally positioned.



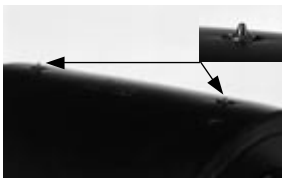
10. Push second pipe into coupler up to the depth markings.



11. Firmly clamp second pipe and ensure that fusion area is stress-free.



12. Carry-out fusion procedure in accordance with operation instructions for control unit. Compare final fusion time with data carrier.



13. When fusion process has been completed, check fusion indicators and display on control unit. Remove fusion cables. The indicators show that sufficient energy has been applied but does not however guarantee the quality of the fusion.



14. When cooling time has elapsed remove pipe clamp. Cooling time is shown in display and additionally on data carrier.



15. Do not carry-out pressure test until minimum cooling time has elapsed.



### 1a) Insertion depth L1 in mm for couplers

d		(mm)	20	25	32	40	50	63	75	90	110	125	140	160	180	200	225	250	280	315	355	400	450	500
L1	SDR 11	(mm)	27	27	30	32	37	40	45	50	55	79	84	90	95	101	110	122	126	132	122	122	-	-
L1	SDR 17	(mm)	-	-	-	-	-	-	-	-	-	-	-	90	95	101	110	122	126	132	122	122	145	145

### 1b) Insertion depth L1 in mm for fittings

d		(mm)	20	25	32	40	50	63	75	90	110	125	160	180	200	225	250
L1	SDR 11	(mm)	34	34	36	39	43	48	61	62	72	74	92	95	104	112	123

### 2) Minimum cooling time for couplers and fittings in minutes

d	SDR	Remove bracket	Pressure test		SDR	Remove bracket	Pressure test	
			p ≤ 6 bar	p ≤ 24 bar			p ≤ 6 bar	p ≤ 24 bar
(mm)		(min)	(min)	(min)		(min)	(min)	(min)
20-63	11	6	10	30	-	-	-	-
75-110	11	10	20	60	-	-	-	-
125-160	11	15	30	75	17	15	30	75
180-225	11	20	45	90	17	30	45	90
250-400	11	30	60	150	17	30	60	150
450-630	-	-	-	-	17	40	60	150

p = test pressure

# Assembly instructions for Electrofusion saddles and tapping valves

## **Monoline electrofusion saddles**

They are used for domestic and branch lines of PE pressure pipelines in gas and water distribution systems.

In addition, they are used when installing bypass lines, placing stop off bags in low pressure lines, connecting valves and plugging minor pipe defects.

They can be fused on PE lines in operation. The built-in drilling cutter enables tapping even at the maximum permissible operating pressure; the disc cut out of the pipe wall is permanently kept in the drilling cutter.

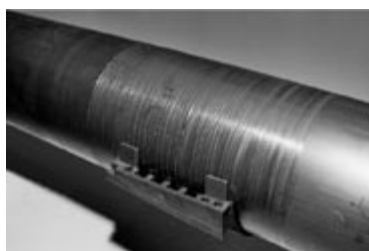
# Assembly instructions for Monoline saddles



The saddle stays in the PE protective bag until just before the fusion. Wipe the pipe clean of any large dirt. Remove the oxidized layer from the pipe ends with a rotating peeling tool (min.- length of saddle). Please observe the min. swarf thickness and the max. allowable wall thickness reduction.



Clean the fusion areas of the pipe ends. Use lint-free cleansing tissues and PE cleaning agent to do this.  
**Attention:** Clean only the peeled area in a circumferential direction!



Remove the saddle from the packaging without touching the fusion zone. Position the clamp part of the saddle on the bottom and click it on.  
**Please observe:** By turning the bottom part of the saddle, the direction of the clamping wedges can be changed.



The fusion zone of the saddle upper part is to be cleaned as mentioned above if soiled or touched. Upper body of saddle is mounted so that the guidance elements of the upper and lower parts interlock.



Mount clamping wedges with a suitable tool (rubber hammer) up to stop position.



Fusion to be carried out with a machine suitable for this system. Fusion executed according to operating manual of the manufacturer. The fusion process is to be supervised.



After the fusion, check that the indicators have come up and then remove the cables. The indicators show that sufficient energy has been applied but does not however guarantee the quality of the fusion.



The saddle outlet is to be cleaned as described above if it has been touched or soiled. Carry out the connection on the outlet line by means of a coupler. Please consult the installation instructions for couplers/ electrofusion fittings.



After the end of the minimum cooling time for the saddle and coupler or electrofusion fitting, the pressure test of the outlet can be carried out.



Remove the twist cap. Tapping of the mains is carried out with an Allen key in clockwise direction. After reaching the bottom stop-off position, the cutter is turned anti-clockwise until it reaches the stop position at the top.



Tighten the cap by hand until it reaches the limit stop.



Please observe: The tapping saddles are equipped with a safety lock. This function is activated when the cap is tightened until the limit stop is reached and the locking teeth grip into each other.

## 1 Minimum cooling time for saddles in minutes

d	Pressure test/Tapping	
	p ≤ 6 bar	p ≤ 24 bar
(mm)	(min)	(min)
40-225	20	60

p = test pressure

# Monoline tapping saddle



## General, preparatory work

Installation is done according to the Monoline Instruction leaflet.



**Do not carry-out tapping and pressure test until minimum cooling time has elapsed.**



## Recommended tapping tool

Tapping key, Code No 701 486 960

To be used with adjustable and removable lever and/or ratchet.



**We strongly recommend not to use any electrical driven tools for tapping!**

# Monoline tapping valve



## General, preparatory work

Installation is done according to the Monoline Instruction leaflet.



Do not carry-out tapping and pressure test until minimum cooling time has elapsed.



## Recommended tapping tool

Operating key and operating rod with outer square, width over flats of hexagonal nut SW 14.

With the key turn clockwise until the bottom stop. The pipe is tapped, the valve is shut. Open the valve anticlockwise.



We strongly recommend not to use any electrical driven tools for tapping!



# Repair sequence

Drill out damaged part of pipe.



Push a PE repair plugs into the hole using a hammer until the top flange is adjacent to the pipe.



Use a file to machine the PE plugs, so that it is flush with the pipe surface.

**Prepare fusion surface and saddle assembly according to our assembly instructions for Mono-line Electrofusion saddles.**

# Assembly instruction for Monoline Electrofusion branch fittings

## Working step 1

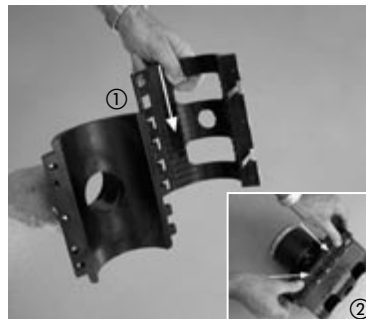
### Fusion to main



Clean the pipe in the fusion zone with a dry cloth. Remove the oxide coating of the pipe with a rotary, cutting stripping unit. The stripping width is at least the width of the branch fitting. Note the minimum cutting depth and maximum permissible reduction of wall thickness.



Clean the pipe in the fusion zone. Use a white, not fraying cleaning cloth and PE cleaning agent.



Remove the branch fitting from the packing without touching the fusion zones. Insert the lower part in the side of the snap hinge ① or press in from the front ②. If the fusion zones are touched by hand or soiled in any other way, these must be cleaned as described in 2.



Place the branch fitting on the pipe, engage with guide lugs, position and secure with the screws. Tighten the screws alternately up to the stop on the lower section.



Fuse saddle according to operating instructions for the fusion unit. Use the saddle fusion data medium for fusing with the main.



After fusion, check appearance of fusion indicator and remove fusion cable. The appearance of the fusion indicators means that the branch fitting has already been welded. The indicators provide no information about the quality of the joint.

## Working step 2.1

# Welding the branch application without pressure



Observe a minimum waiting time before tapping the main.  
Tap the main according to the working instructions for the tapping tool.



Alternatively a power drill with an appropriate cutter can be used.  
Observe maximum permissible tapping diameter (65 mm or 86 mm).



Clean connecting piece and remove oxide coating on spigot end with a rotary scraper. The scraping length is at least the insertion depth of the branch fitting. Observe the minimum depth of cut and maximum permissible reduction in wall thickness. Follow the assembly instructions for the connecting piece.



Clean the connecting piece in the fusion zone. Use a white, not fraying cleaning cloth and PE cleaning agent. Mark the insertion depth of the connecting piece.



Insert the connecting piece up to the stop in the branch fitting and secure with the integral clamp.  
If the fusion zone is touched by hand or soiled in any other way, this must be cleaned as described in 4.



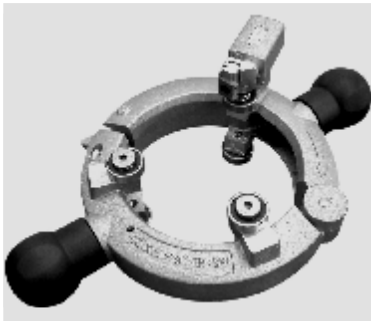
Fuse branch according to operating instructions for the fusion unit.  
Use the branch fusion data medium for fusing with the connecting piece. Note correct insertion depth of connecting piece.



After fusion, check appearance of fusion indicator and remove fusion cable. The appearance of the fusion indicators means that the branch fitting has already been welded. The indicators provide no information about the quality of the joint.

## Working step 2.2

# Fusion of branch application under pressure



Clean connecting piece and remove oxide coating on spigot end with a rotary, cutting stripping unit. The stripping length is at least the insertion depth of the branch fitting.

Observe the minimum depth of cut and maximum permissible reduction in wall thickness. Follow the assembly instructions for the connecting piece.



Clean the connecting piece in the fusion zone. Use a white, not fraying cleaning cloth and PE cleaning agent. Mark the insertion depth of the connecting piece.



Insert the connecting piece up to the stop in the branch fitting and secure with the integral clamp. If the fusion zone is touched by hand or soiled in any other way, this must be cleaned as described in 2.



Weld branch according to operating instructions for the fusion unit. Use the branch fusion data medium for fusing with the connecting piece. Note correct position of connecting piece.



After fusion, check appearance of fusion indicator and remove fusion cable. The appearance of the fusion indicators means that the branch fitting has already been welded. The indicators provide no information about the quality of the joint.



Observe a minimum waiting time before tapping the main.

Tap the main according to the working instructions for the tapping tool. Observe maximum permissible tapping diameter (65 mm or 86 mm).

# Monoline Electrofusion Units

## Overview of the MSA electrofusion units and their technical data

Following electrofusion units are available:

- MSA 200; manual fusion unit
- MSA 250; automatic fusion unit
- MSA 300; automatic fusion unit
- MSA 350; recording fusion unit
- MSA 400; retracing fusion unit

General	MSA 200	MSA 250	MSA 300	MSA 350	MSA 400
Welding data: Barcode input (I2/5, Code128)	-	✓	✓	✓	✓
Welding data: Manual input (U, t)	(only t)	✓	✓	✓	✓
Traceability: Barcode input (Code128-C)	-	-	-	-	✓
Traceability: Manual input	-	-	-	-	✓
Protocolling collect	-	-	-	✓	✓
Protocolling single	-	-	-	✓	✓
Info text	-	-	-	✓	✓
Security protocolling (Security memory)	-	-	-	-	✓
Security protocolling memory: Configurable (Fixed/overrun)	-	-	-	-	✓ (750)
Security protocolling memory: Only overrun	-	-	-	✓ (750)	✓ (750)
Protocol memory (Number protocols)	-	-	-	-	400/800/1600
Protocol memory: Memory card as a flexible memory	-	-	-	-	✓
Operator identification: Configuration as compulsory	-	-	-	✓	✓
Commission number: Configuration as compulsory	-	-	-	✓	✓
Protocol print MSA	-	-	-	✓	✓
Sort according to commission number	-	-	-	✓	✓
Sort according to welding number	-	-	-	✓	✓
Revision: Configurable	-	-	-	✓	✓
Interface	-	-	-	-	serial RS232
Operator languages	-	-	-	-	serial RS232
Display	LED 1 x 4 N	LED 1 x 4 N	max. 24	max. 24	max. 24
Size display (B/H)	50/18 mm	50/18 mm	LCD graphic	LCD graphic	LCD graphic
Contrast display configurable	-	-	132/39 mm	132/39 mm	132/39 mm
Background light	-	-	✓	✓	✓
Error message as written text	-	-	✓	✓	✓
Transport case: Solid aluminium-PVC case, blue	-	-	✓	✓	✓
Delivery extent:	Instruction manual, packing		Welding unit with barcode reader, 4 mm adaptor, instruction manual, packing, and * positions		
<b>Options</b>					
Barcode scanner	-	x	x	x	x
Adaptor 4,7 mm	x	x	x	x	x
PC cable serial	-	-	-	x	x*
Printer cable serial --> parallel	-	-	-	x	x
Printer cable parallel	-	-	-	x	x*
Transport case: Robust aluminium-PVC case, blue	x	-	-	-	-
MSA WIN-WELD software usable	-	-	-	x	x*
<b>Technical data</b>					
<b>Input</b>					
Voltage	VAC	180-264			
Power	A	16			
Frequency	Hz	45-65			
Power factor controller		✓	✓	✓	✓
<b>Output</b>					
Voltage	V	39.5	8-42 [48]	8-42 [48]	8-42 [48]
Power	A	2.5-100	0.5-90	0.5-90	0.5-90
Max. power consumption	W	3200	3780	3780	3780
Power output stage		Phase operating	Combinat. circuit	Combinat. circuit	Combinat. circuit
<b>General</b>					
Automatic temperature compensation		✓	✓	✓	✓
Working temperature	°C	-10 to + 45 °C			
Protection type	IP	65			
Protection class		1			
Length of connector cable	m	3			
Length of main cable	m	3			
Active cooling of housing (Patent applied)		✓	✓	✓	✓
Generator-positive-list		not necessary			
Conform of standards		EN 60335-1, EN 60335-2-45, EN 50081-1, EN 50082-1, EN 55014, EN 61000-3-3			
Warranty	Mt	12	24		
Dimensions (W/H/D)	mm	230/340/160	284/364/195	284/364/195	284/364/195
Weight inclusive cables	Kg	19	11.5	11.5	11.5

## Integrated Quality Assurance

### MSA electrofusion units with automatic recording

The automatic recording feature in the MSA 350 and MSA 400 electrofusion automatic systems is an additional cornerstone. The MSA 400 offers a thorough Quality Assurance System from the pipe material to laying the pipe and fitting.

MSA - SCHWEISSPROTOKOLL											
Datum: 25.04.2009											
Nr.	Z.Nr.	SWISS	Nr.	Gr.	Werkst.	Logo	Typ	Charakteristik	T. Nr.	Auftraggeber	
8	10098	*	F	12.90.1099	GF	D	33mm		20	G	38408794042544
9	10098	*	F	12.90.1099	GF	D	33mm		12	G	38408794042544
10	10098	*	F	12.90.1099	GF	D	33mm		11	G	38408794042544
11	10098	*	F	12.90.1099	GF	D	33mm		11	G	38408794042544
12	10098	*	F	12.90.1099	GF	D	33mm		11	G	38408794042544
13	10098	*	F	12.90.1099	GF	D	33mm		11	G	38408794042544
14	10098	*	F	12.90.1099	GF	D	33mm		11	G	38408794042544
15	10098	*	F	12.90.1099	GF	D	33mm		12	G	38408794042544
16	10098	*	F	12.90.1099	GF	D	33mm		12	G	38408794042544
17	10098	*	F	12.90.1099	GF	D	33mm		12	G	38408794042544
21	10098	*	F	20.90.1099	GF	D	33mm		22	G	schultrauss 1
117	10098	*	F	01.12.1099	GF	D	100mm		22	G	38408794042544
118	10098	*	F	01.12.1099	GF	D	100mm		23	G	38408794042544
119	10098	*	F	18.01.2008	GF	D	33mm		23	G	schultrauss 1
127	10098	*	F	25.04.2009	GF	D	33mm		23	G	schultrauss 1

Legende:		
*M) Nachschweißung	D) Debitrigler	H) Frischbleibezeit
T) Umgebungstemperatur	T) Handfestigkeit	P) Probekörperfehler
! = Schwerefall	**M) Barcodatengabe	B) Betriebslogischer
	*M) Magnetkarte	M) Magnetkarte

Illustration of MSA 350 and MSA 400 collective record

MSA - SCHWEISSPROTOKOLL	
Datum: 25.04.2009	
<b>ALLGEMEINES</b>	
Auftragsnummer:	
Antragsnummer (Zulassung/Datum):	
Datumsfirma:	25.04.2009
Vertragdatum:	11.05
Schweiss-Richtlinie Nr.:	127 /
Umgab. Schweiss-Mittel-Nr.:	
SWISS-Barcode:	
CAI:	
Bemerkungen:	
<b>FITTINGSDATEN</b>	
Hersteller:	GF
Fitting-Typ:	I   Muffenverbinder
Dimension:	33mm
Rohrmaterial:	
Produktions-Quelle:	20004
Widerstand-programmierung:	F0123 +0E / 48 S3
Widerstand:	7,48 / 7,300 Ohm
<b>SCHWEISSDATEN</b>	
SCHW:	ISI
Schweißspannung:	40,0   40,1 V
Schweißzeit:	43 s   81 s
Schweißenergie:	1,79 kJ
Umgebungstemperatur:	23 °C
Prüfspannung einbauen:	OK
Feldnummer:	0   Schweißzeit in Ordnung
Debitrigler:	*   Barcode
Probekörperfehler:	F   Probekörperfehler
<b>GERÄTEDATEN</b>	
Familien-Code-Nr.:	01 / 1000
Typ:	MSA40
Produktions-Quelle - Schweiß:	01.05.1000
Geräte-Identifikation:	01 01 600-000
<b>RÜCKVERFOLGBARKEITSDATEN</b>	
File-Nr.:	GF 33mm 0 20001156000103
Element 1:	12,0 m
Element 2:	5,8 m
<b>Legende:</b>	
*M) Nachschweißung	*M) Gut
**M) Barcodatengabe	**M) Magnetbleibezeit

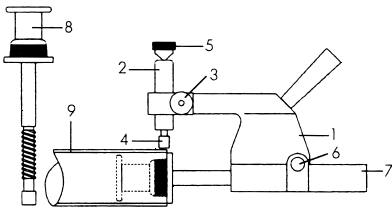
Illustration of MSA 400 individual record

# Operating Instructions

## Peeler PT 1E



The required applications are set in the basic unit for each pipe dimension and pipe wall thickness. Clean pipes well before and cut to length at right angles.



1. Hand pistol tool
2. Cutter connecting pin
3. Thumb screw
4. Cutter head
5. Pressure thumb screw
6. Quick release head for the thrust nut
7. Cavity
8. Pipe insertion adaptor
9. Pipe

- Select the correct pipe spindle and insert it inside the pipe.
- Release the cutter connecting pin (2), where you loosen the thumb screw sufficiently, so that it is possible to move up and down. Take back the cutter connecting pin to its top position and tighten the entire thing with the thumb screw.
- Maintain pressure on the cutter head by turning the thumb screw (5), until the V marking in the base is loosened and is located at an angle of 90° to the V marking above on the cutter connecting pin.
- While you hold the quick release head for the thrust nut (6), according to the diagram, position the hand pistol tool on the threaded shaft of the spindle at the start of the pipe (9). Now, you can loosen the quick release head again.
- Position the cutter head (4) about 1mm before the pipe outer wall, where you loosen the thumb screw (3), lower the cutter connecting pin and again fasten.
- Apply pressure on the cutter head by fastening the pressure thumb screw by one quarter turn until the V marking is located in the slot.
- Rotate the hand pistol tool around the pipe until the cutter head has obtained the required length of the peeled pipe. This completes the preparation.
- The tool is removed by maintaining the spring pressure by turning the pressure thumb screw by one quarter turn. Then the quick release head is actuated and the hand pistol tool is released. Do not touch the prepared surface while taking it out of the pipe insertion adaptor.

### Changing the tool blade PT 1E

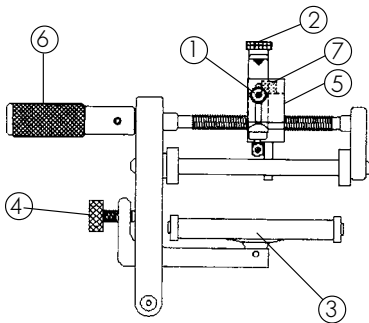
Use 3-mm-Inbus-spanner and keep clean.

## Peeler PT 2



### Preparation of PE pipe

Clean roughly and cut to length at right angles.



- 1 Clamp screw
- 2 Prestress screw
- 3 Arm brackets
- 4 Clamp screw
- 5 Knife holder
- 6 Handle
- 7 Tension screw

- Take knife to top position (loosen clamp screw 1, this withdraws the tool holder). Again fasten clamp screw 1. Remove protective cap on tool.
- Turn spring loaded screw 2 in such a way that pre-tension is produced (the wedge is on the plane surface).
- Open arm bracket 3 (screw 4), slide tool on the pipe end and take the arm bracket to the top position; fasten with screw 4. Tool can move in the pipe periphery.
- Open tension screw 7 until the knife holder 5 can be moved up to the marked peeling length.
- Loosen clamp screw 1 and move tool blade to the pipe surface. Fasten clamp screw again.
- Turn spring loaded screw 2 in such a way that pre-tension is produced (the wedge moves into the prism).
- Hold tool on the handle 6 and turn clockwise evenly until the pipe surface to be scraped is machined.

### Disassembly of tool

- Turn spring loaded screw 2 in such a way that pre-tension is produced (the wedge moves is on the plane surface).
- Loosen clamp screw 1 and withdraw tool blade. Fasten clamp screw again.
- Attach protective cap on the tool blade, keep tool clean.

### Changing the tool blade PT 2

Use 3-mm-Inbus-spanner and keep clean.



# Rotary Peeler RS



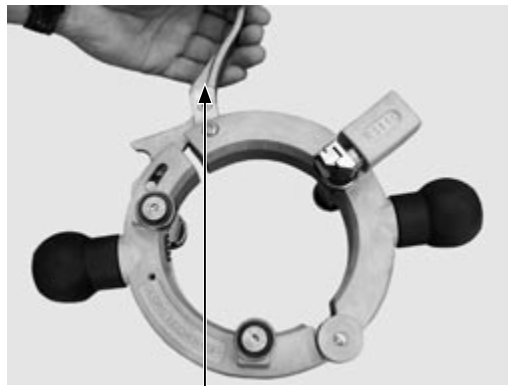
## Preparation

Observe general tips for preparation and assembly of fittings.

## Mounting the Rotary Peeler onto the pipe

### Marking the Peeling length

1. Mark the peeling length (end position) at the pipe; when doing electrofusion saddle preparations mark the start and end position.
2. Open the Rotary Peeler by turning the release handle (1),



1



### Mounting the Rotary Peeler onto the pipe Important

3. Put the Rotary Peeler around the pipe and lock by turning the release handle (1).

For an optimal intrusion into pipe the blade (2) of the Rotary Peeler have to be fastened. 2/3 over the peeling start position.



1



2

The Rotary Peeler is now fixed on the pipe.

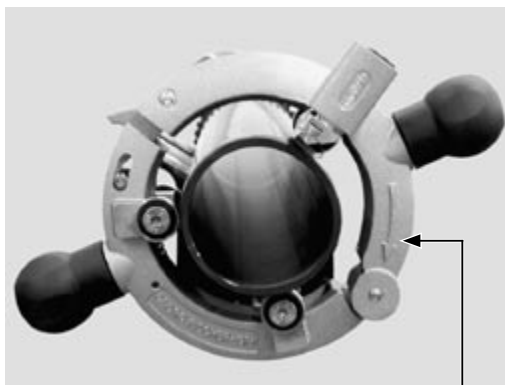
## Processing the pipe

1. Turn the Rotary Peeler by handles (3) around the pipe in shaft direction (4), until the desired peeling length is reached.



3

3



4

### Note

The chip, which results by peeling with the Rotary Peeler should automatically separate at the end of operating by removing the Rotary Peeler. If this is not the case, then the chip can be removed by hand.

2. Open the release handle (1) and remove the Rotary Peeler from the pipe.



1

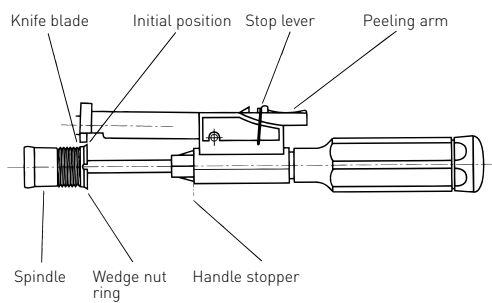
Now the pipe is optimally prepared for the subsequent processing.

## Peeler PT 4



### Preparation of PE Pipe

Clean pipe and cut to length at right angles.



- Bring spindle to initial position, i.e. knife disc and wedge nut ring behind the spindle should be at same height.
- Release stop lever. Then depress spring loaded peeling arm with cams and push the spindle firmly into the pipe cut vertical before until the pipe sits on the wedge nut ring behind spindle. Now loosen spring loaded peeling arm.
- Rotate the handle clockwise and the surface is shaved. Rotate until the desired peeled length is obtained, i.e. until the stopper on the handle.
- Depress peeling arm and pull out spindle from the pipe.  
Remove shavings without touching the peeled surface.

### Changing the tool blade PT 4

Use size 6 Phillips screwdriver and keep clean.



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