

**SABUG**

...einfach bessere Technik!

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# IP-*plus*<sup>®</sup>

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THE INNOVATIVE

**WELDING SYSTEM**

FOR STANDARD

POLYPROPYLENE

**SEWER PIPES**

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## IP-*plus*®

Plastic pipelines with rubber sealing rings are used in many areas of wastewater technology today. However, due to legal regulations or special requirements, these rubber-sealed systems do not cover all the necessary safety requirements. Many areas have much higher safety requirements.

The patented IP-plus welding system offers the possibility to increase the safety of socketed wastewater pipes in a simple way. The system was developed to weld socketed polypropylene (PP) wastewater pipes and the associated fittings together. This means that these pipe systems can now also be used in areas where otherwise only expensive complex systems with special electrofusion sockets could be welded.

It is also possible to weld different PP pipe systems together. Even connections to manhole systems or commercially available street drains can be carried out safely with the IP-plus welding system.

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**The Innovative  
welding system for  
standard sewer pipes**

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## Legal Disclosure

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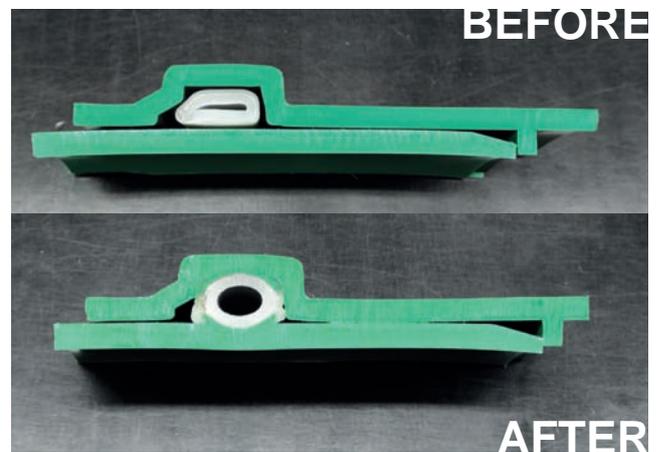
## Functional description

The function of the IP-plus welding system differs from the systems of conventional processes with electrofusion welded sockets. In this process, the joining pressure required for welding is generated during the welding process itself. The basis of the welding system is an inner carrier torus. The torus is surrounded by a copper wire winding which distributes the necessary welding heat within the entire welding area during the welding process. The surface of the welding ring is formed by a coating of polypropylene, which serves as a welding filler.

When the temperature is increased, the torus heats up and melts the surrounding tube material and the welding filler in a defined manner. At the same time, a force is generated perpendicular to the tube axis, resulting in a welding of the two tube partners and allowing even larger tolerances to be reliably compensated. A special welding process offers the possibility to model the temperature and the added power during the welding process to obtain a perfect welding result.

This type of welding means that it is no longer necessary to mechanically process the pipe ends before

welding. „Scraping“ is no longer necessary. The expansion of the weld ring during welding reliably breaks up oxide layers and renders them harmless. This is proven by the Scraping tests carried out at the MP-FA-Leipzig (Test Report No. PB 5.2/14-259-1). The function of the IP-plus welding system was confirmed by the German Institute for Building Technology DIBt (Z- 42. 5-553).



## Advantages

- ✓ Root resistant material and axially force-locking joint
- ✓ high chemical resistance of pipes and joints
- ✓ Certified by DIBt (Z-42.5-553)
- ✓ Conforms to AwSV 08.2017
- ✓ Successful LAU and JGS inspections!
- ✓ Temperature application range -20°C to +95°C
- ✓ High temperature resistant (up to 90°C continuous, 95°C in peak)
- ✓ High pressure resistant (tested up to 14 bar)
- ✓ Highly resistant to high pressure flushing
- ✓ Significantly increased safety compared to rubber-sealed push-in joint systems
- ✓ Significant cost savings compared to PE-HD welding systems
- ✓ Simple assembly process
- ✓ Electronic data documentation

## Application areas

- ✓ High quality sewage pipes
- ✓ Chemical plants with highly polluted waste water
- ✓ Fuel stations and fuel storage facilities
- ✓ Agricultural Wastewater disposal
- ✓ Biogas plants
- ✓ Foundation piping
- ✓ Pipe routing in Downhill sections with axial loads
- ✓ Drinking water protection areas
- ✓ Safety requiring facilities





## Municipal Drainage

Many municipalities and wastewater associations have already opted for welded pipe systems in the area of wastewater drainage. *And for a good reason.*

Damaged socket joints characterize the picture of pipeline damage. Root ingrowth, pressing groundwater, socket misalignments, axial displacement and seals that no longer operate properly often led to leaks in the pipelines in the past. Today, infiltrations of groundwater into the wastewater system have to be handled at high cost in the treatment plant. Exfiltrations also pose an enormous risk to our groundwater.

Even statically unstable roads caused by flushing out of the pipeline zones can be traced back to the above mentioned damage. In many cases, PE-HD sewer pipes are now used, which are welded with electro-

fusion sockets.

However, these solutions are much more expensive than sockets PP sewer pipe systems. The cost of pipes and fittings alone is much higher than the price of PP sewer pipes. Also, due to their low longitudinal stiffness, PE pipes require a complex and accurate laying technique to avoid underfloors. Given today's cost pressures, this cannot always be guaranteed. Welding itself also requires a relatively large amount of effort with the PE-HD solutions.



The IP-plus welding system offers a real alternative to the PE-HD pipe systems in connection with sockets standard PP sewer pipes. The costs for the PP pipe material, for assembly and welding are lower than for the PE-HD alternative.

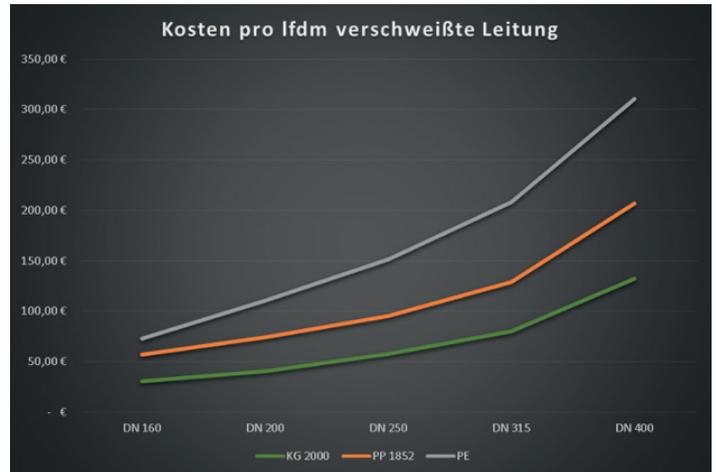
Furthermore, it is possible to weld almost all PP pipe systems to each other. All manholes and road gullies made of PP or concrete manholes with PP manhole sleeves can be easily welded on. This opens up an extremely wide range of possible applications on the construction site.

The IP-plus welding system offers the simple possibility of welding only at the points that are really at risk. For instance, in the case of a crossing avenue, it is conceivable that only the joints in the area of influence of the roots are welded. All other joints remain rubber-sealed.

## Cost Consideration

The economic analysis shows that the use of the IP-plus welding system already results in a significant saving of material costs due to the price advantage of the direct costs of pipes and fittings compared to the PE-HD pipe systems. The welding times and, above all, the cooling times are significantly lower than for the comparable pipes made of PE-HD. This also results in significant cost savings.

In addition, one should not ignore the logistical circumstance offered by a pipe system kept in stock. If necessary, it is possible to obtain missing and unscheduled components quickly and without further delay from the local building materials dealer. Please ask us for the brochure „Business economics of the IP-plus welding system“.



**Sample cost comparison: Pipes according to DIN EN 1852 and DIN EN 14758 (KG 2000) welded with IP-plus welding system, compared to welded PE-HD wastewater pipes of the same ring stiffness. This shows the significant cost savings of 25-40% in the total cost consideration. (depending on diameter)**

## Concept: »SABUG-Q«

The „SABUG-Q“ concept is a comprehensive quality assurance program that accompanies the IP-plus welding system in its entirety. The quality of the welding ring is monitored by us from the selection of the base material and determination of the producer, through production, to welding and acceptance at the construction site.

All the mechanisms for constantly checking the results will ultimately lead to the desired outcome:

»SABUG-Q« Quality line	– <b>Production monitoring</b>	– External monitoring DIBt – Batch number (approx. 20 pieces) – Manufacturer date – Traceability of all material and staff
	– <b>Packaging</b>	– Packaging unit with seal
	– <b>Construction site support</b>	– Technician on site – Extensive training
	– <b>Welding documentation</b>	– Welding seam form – USB interface – Caldersafe system



**»A sealed, long term stable welded joint that will serve for many years to come.«**

# Testing and certification

The IP-plus welding system had to prove many times during the development process and through multiple functional tests that it meets the high requirements. This made it possible to develop an extremely safe and stable welding process. Of course, the general building authority approval of the German Institute for Building Technology was also granted for this - DIBt (Z-42. 5-553).

The IP-plus welding system naturally meets the serviceability requirements of DIN EN 14758 (KG 2000) and DIN EN 1852, as well as the material requirements of DIN EN ISO 1167-1 (internal creep pressure test).

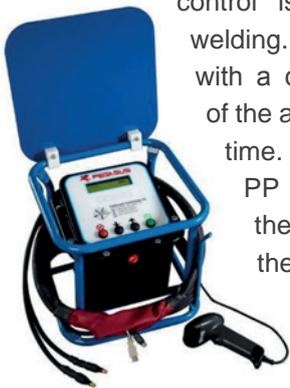
We will be happy to provide further evidence from independent test institutes regarding JGS and LAU systems as well as the results of meaningful bursting pressure tests - just ask us!



Requirements	Proof of tightness / leak test	Leak test drinking water protection zone	Verification of the internal creep pressure ratio behavior	Verification of the serviceability for the pipe system	Verification of the internal creep pressure behavior	Verification of the serviceability for the pipe system
Norm	DIN EN 1610	ATV 241 (alt)	Creep internal pressure behavior DIN EN 14758	Verification of the pipe system according to DIN EN 14758	Material testing according to DIN EN 1852-1	Verification of the pipe system according to DIN EN 1852-1
			DIN EN ISO 1167-1	EN 1277	DIN EN ISO 1167-1	EN 1277
Pressure / Tension	0,2 bar (Air) 0,5 bar (Water)	2,5 bar	4,2 Mpa	+ 0,5 bar to - 0,3 bar	4,2 Mpa	+ 0,5 bar to - 0,3 bar
Temperature	20°C	23°C	80°C	23°C	80°C	23°C
Time	15 min.	15 min.	140 h	15 min.	140 h	15 min.
Verification	DIBt-certificate Z-42.5-553	certificate VTT	certificate VTT	certificate VTT	certificate VTT	certificate VTT
Evaluation	OK	OK	OK	OK	OK	OK

## The welding process

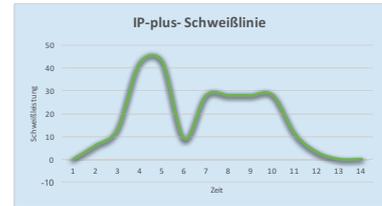
For perfect control of the welding, the execution of the welding process is carried out by using the multi-voltage welding process (MVS). In order to obtain a homogeneous and perfect welded joint and to reduce the welding and cooling times, the temperature control is changed during welding. This is achieved with a defined modulation of the applied voltage over time. The melting of the PP materials and the thermal activation of the carrier ring are specifically controlled as a function of the ambient temperature. As a result, a process is obtained which reliably performs optimum welding of the various pipe systems from -10°C to +40°C ambient temperature. By concentrating the welding heat on a rela-



tively small area, this process enables the so-called low protection voltage of < 50 V to be reliably maintained even for large dimensions. (DGV Rule 103-003)

tively small area, this process enables the so-called low protection voltage of < 50 V to be reliably maintained even for large dimensions. (DGV Rule 103-003)

The individually packaged IP-Plus welding rings are provided with barcode stickers. This barcode is scanned into the welding device by a hand-held scanner for welding. This reliably identifies the welding ring and calculates the welding parameters according to the outside temperatures.



Welding and cooling times		
Nominal widths	Welding times (rounded up)	Cooling times
DN 110	3 min.	10 min.
DN 125	4 min.	12 min.
DN 160	5 min.	15 min.
DN 200	5 min.	18 min.
DN 250	6 min.	20 min.
DN 315	7 min.	23 min.
DN 400	8 min.	23 min.
DN 500	8 min.	27 min.
DN 600	9 min.	30 min.



### Theoretical part

- Basics of plastic welding
- Instruction in the IP-plus welding system
- Introduction to the „Multi-Voltage“ welding technology
- Assembly instructions
- Tips and tricks to avoid mistakes



### Practical part

- Practical welding exercises
- Evaluation & analysis of the welding

## Training of welders

The IP-plus welding system differs from the welding processes with which other commercially available electrofusion sockets are processed. For this reason, special training courses are offered by SABUG to acquire the necessary expertise. This enables both experienced PE welders as well as persons who have no experience in this field to use the IP-plus welding system correctly and safely.

Training for the SABUG IP-plus welding system consists of two training sections.



## Welding indicators

The IP-plus welding system offers the possibility of external indication. For this purpose, thermo-sensitive indicator stickers are used, which display a performed weld by discoloration.

From the inside, a completed weld is indicated by a slight bulge. This bulge has an elevation of a few 1/10 mm, but is visible during camera inspection due to the acute angle.

Thus, even after the pipeline has been backfilled, a clear statement can be made as to whether welding has been carried out.



## Assembly



The IP-plus welding ring is so simply designed that it can be installed professionally in just a few steps. The existing rubber sealing ring is replaced by the IP-plus welding ring and then welded with an electric welder.

For assembly, the rubber sealing ring is removed from the pipe systems groove.

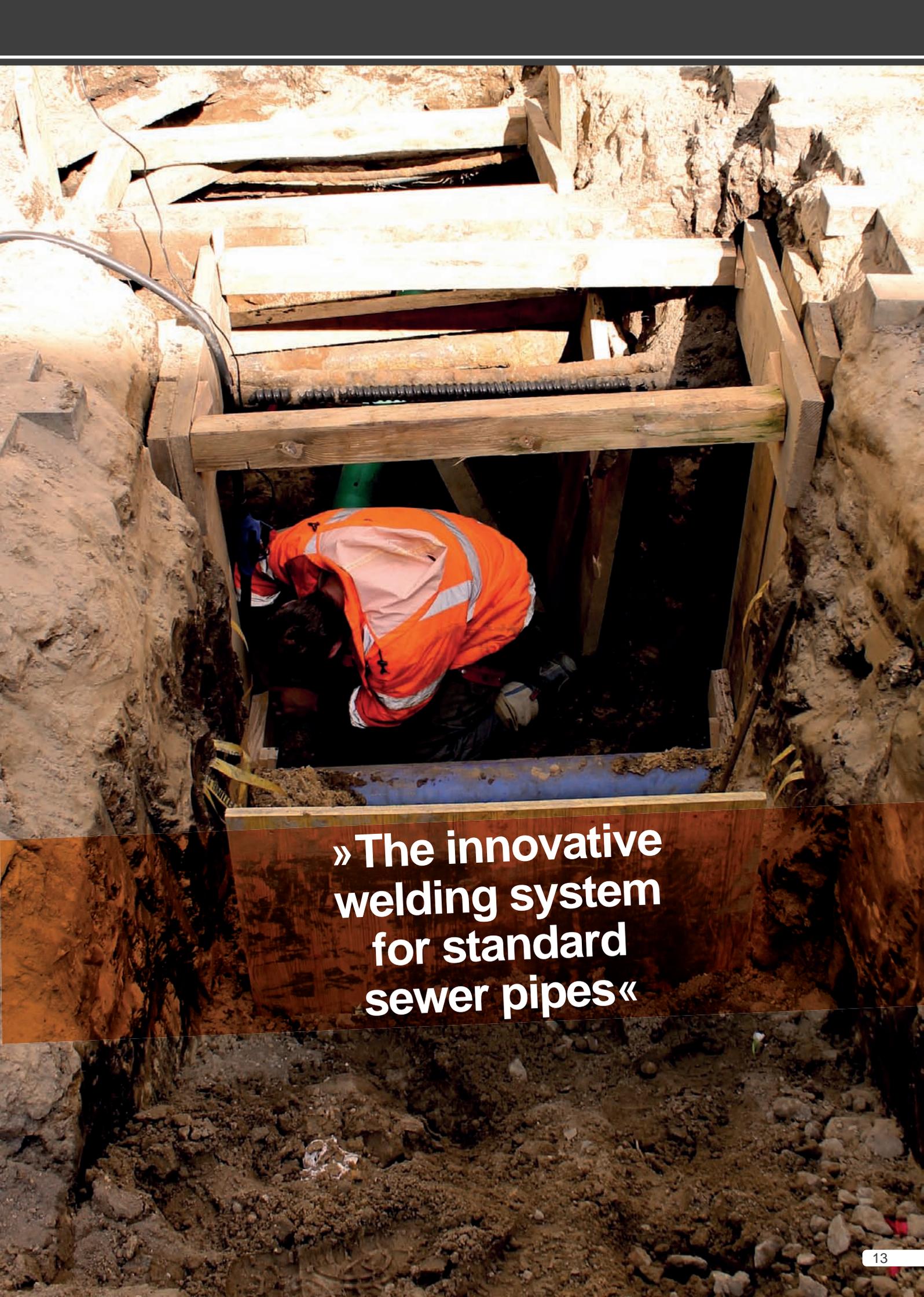
As preparation, only the socket area and the spigot cleaned with a PP cleaner. Mechanical processing such as peeling or scraping off the oxide layer is completely unnecessary here! Insertion forces do not occur during installation of the pipeline. This allows extremely convenient installation even in cramped conditions.

After the IP-plus welding ring has been inserted, the pipe is pushed together as usual. The subsequent welding now joins all components together in a non-detachable manner.

For more information, please refer to the assembly instructions on our homepage!

[www.sabug.de](http://www.sabug.de)



A construction worker wearing a bright orange safety vest with reflective stripes is crouching inside a deep trench. The trench is reinforced with wooden shoring and bracing. A large blue pipe is visible at the bottom of the trench. The ground is dark and appears to be soil or rock. The worker is focused on their task, possibly inspecting or working on the pipe.

**» The innovative  
welding system  
for standard  
sewer pipes«**

## Connections to other components

The IP-plus welding system offers various options for the transition to other components. All plastic chambers and fittings made of polypropylene with socket or spigot end designs in accordance with the DIN EN 14758 or DIN EN 1852 standards can be welded on directly and without any

problems. Connections to concrete manholes are realized with the original manhole chucks of the pipe systems.

For the transition to PE-HD pipes we recommend the use of flanged connections.



## Product range

### SABUG IP-plus welding ring

For welding pressureless wastewater pipes in accordance with DIN EN 14758 and DIN EN 1852.



Dimensions	Art.-Nr.	Art.-Nr.	VE
	DIN EN 14758	DIN EN 1852	
DN 110	31110	-	25/50
DN 125	31125	-	25/50
DN 160	31160	32160	25/50
DN 200	31200	32200	20
DN 250	31250	32250	20
DN 315	31300	32300	10
DN 400	31400	32400	5
DN 500	31500	32500 *	5
DN 600	-	32600 *	5

\* available soon

### SABUG IP-plus V 2 electric welding unit

The welding device, specially developed for the IP-plus welding system, enables the welding of polypropylene pipe systems. Shipment includes hand scanner and bag.



Description	Art.-Nr.	Unit
Welding machine for sale	30000	per unit
Rent welding machine		
Base fee	30100	once
Daily rental	30101	per day
Monthly rental	30102	flat rate

### SABUG IP-plus assemblybox

The necessary equipment for professional welding. The box contains appropriate cleaning materials, covering material, installation aids and tools compiled so that the assembly can be started immediately.



Description	Art.-Nr.	Unit
Assembly box IP-plus	30104	per unit

### SABUG Twin welding cable

Enables the simultaneous welding of two welded joints.



Description	Art.-Nr.	Unit
Twin-cable	30110	per unit

### Accessories



Description	Art.-Nr.	Unit
Assembly pliers	30111	per unit
Assembly shoes	30112	per unit
PP cleaner	30113	per unit
Cutter knife	30114	per unit
Marking pen	30115	per unit
Indicator sticker	30116	per unit
Adhesive tape	30117	per unit
Cable support-clips	30118	per 20 units

**IP-*plus***<sup>©</sup>



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