

**A Brugg invention:
new polymer
joints that make
your cable system
more reliable.**



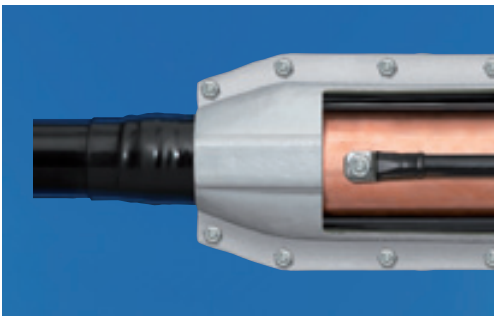
High voltage cable systems are as reliable as their accessories. Brugg Cables never forgets this and leaves nothing to chance. To underline our dedication, research and improvements are made all the time. Based on our well-known MP family we came up with a new joint for voltages up to 145 kV. It fully considers the needs of our customers and demonstrates Brugg Cables' commitment to quality and reliability.

Maximum operation reliability. Cables are standardised with a radial moisture barrier of a metallic shield. In Brugg Cables' efforts to make the accessories as reliable as the cable, a metallic radial moisture barrier became a standard part of all joints. Depending on the type of the joint, the barrier is a metal foil (Al or Cu) or a copper tube. Both versions extend the lifetime and reliability of your cable system.

Wide range of usage. For greater flexibility in the application on your cables, the insulation diameter of XLPE for the joints has been extended from 57 to 102 mm.

High flexibility in application. To provide more flexibility in application, four different protection designs were developed. A heat shrink cover provides basic protection. If greater protection is required, a copper tube or a box of polyester filled with an insulation compound, or even both, can be selected. With these features, it is easy to choose the appropriate design for the application without incurring great expense.

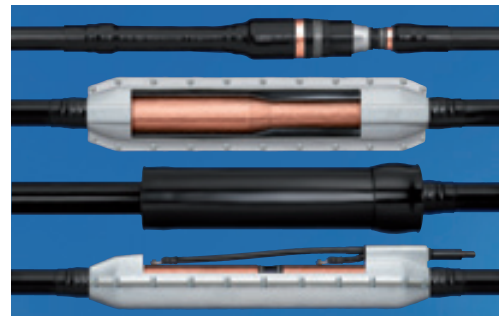
Easier installation. The reduced dimensions of the joint make laying and installation much easier.



Maximum operation reliability with a metal radial moisture barrier as standard for all joints.



Wide range of application with insulation diameters from 57 to 102 mm.



High flexibility in usage without incurring great expense with our 4 different protection designs.



Easier installation thanks to smaller dimensions.

Based on excellent experience with joints of our MP family, all main advantages of the pre-tested one-piece SiR slip-on bodies have been kept. As the most crucial element of the joint, design, material selection and production of the insulation body undergoes extensive research at Brugg Cables. As a result, the outstanding properties and long-time stability of the SiR were maintained and the electrical design was optimised.

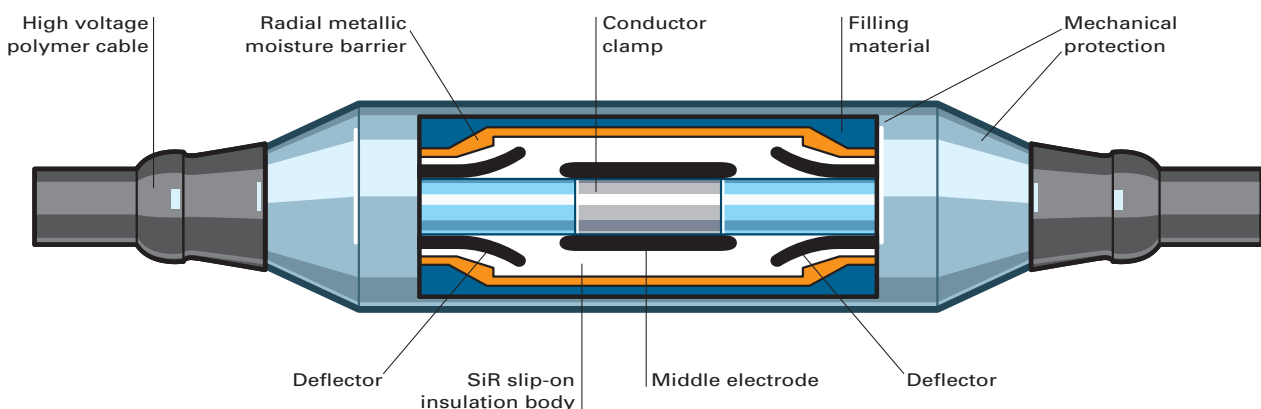
The insulation body comprises the semiconductive deflectors & middle electrode and the insulation compound. Thanks to a perfect combination of outstanding electrical and mechanical properties and excellent interface behaviour, silicone rubber (SiR) is used for the deflectors, the middle electrode and the insulation. To ensure proper functioning at all voltage loads and to guarantee a long and reliable life, the semiconductive parts are made of solid material. For optimal electrical stress distribution, the insulation body was designed based on computer FEM-simulations.

The extreme flexibility of the SiR ensures easy and fast assembling. The excellent elasticity of the SiR has an optimised level of surface pressure and ensures void-free contact between the insulation body and the cable. These advantages will remain constant over an extremely long service period.

All these features result in a joint that is highly reliable and will last a lifetime. For added quality, the insulation bodies are produced as a single piece, are prefabricated in-house and are pre-tested in our Swiss production plant.

Advantages of the prefabricated and pre-tested one-piece SiR insulation body:

- Very high breakdown strength of >23 kV/mm at 50/60 Hz
- Excellent temperature stability of -50 to +180 °C
- Very high life exponent of $n \gg 40$
- Excellent field grading performance at high frequency load due to semiconductive parts of solid material
- Optimal electrical stress distribution due to computer-assisted FEM-design
- Void-free contact pressure on the cable surface at normal and elevated load conditions with the excellent elasticity of the SiR
- Long lifetime due to excellent mechanical properties of the SiR
- Connection of different types of polymer cables with different insulation diameters possible due to a high elasticity of the SiR slip-on body



Design of the polymer joint

By incorporating a radial metallic moisture barrier as standard, the reliability of the joint is even greater. Four different mechanical designs ensure added flexibility in usage and application. Smaller dimensions and a larger diameter range for applications round off the new features. Together with the proven advantages of the SiR slip-on body, you are always well connected with our new joints.

That you can benefit from the advantages of the new slip-on joints, we offer the products for polymer cables with insulation diameters of 57 to 102 mm and a conductor cross-section of up to 2500 mm².





The joints are tested to a service voltage of 145 kV and a BIL level of 650 kV.

At a glance, the main advantages of our pre-tested slip-on joints are:

- Very compact dimensions
- 100 % failure free pre-tested one-piece SiR slip-on bodies

- Total moisture barrier provided by a radial metallic shield as a standard
- No preload during transport or storage
- Possibility to use different types of outer mechanical protection designs
- Easy to handle and install thanks to a longer middle electrode and exceptional elasticity, no high mechanical forces needed for installation
- Possible to apply coaxial cross-bonding cables up to a cross-section of 500/500 mm²
- Many uses in all environments, laying conditions and climates

Application table of the slip-on joints.

Type	MPAH	MPAP	MPCC	MPCP
				
Radial moisture barrier	Metal foil of Al or Cu	Metal foil of Al or Cu	Cu-tube	Cu-tube
Mechanical protection	Heat shrink cover	Protection box	Cu-tube with HDPE-coating	Cu-tube and protection box
Advantages	<ul style="list-style-type: none"> - Extremely compact dimensions - Total sealing against moisture - Cost effective solution 	<ul style="list-style-type: none"> - Good mechanical protection in different environments - Total sealing against moisture 	<ul style="list-style-type: none"> - Compact dimensions - High degree of mechanical protection - Total sealing against moisture 	<ul style="list-style-type: none"> - Highest degree of mechanical protection - Total sealing against moisture
Application	<ul style="list-style-type: none"> - For limited dimensions, such as small manholes - In tunnels or concrete manholes without permanent water ingress 	<ul style="list-style-type: none"> - All types of laying, such as in tunnels, concrete pits or buried installations - In buried installations with humid soil 	<ul style="list-style-type: none"> - All types of laying, such as in tunnels, concrete pits or buried installations - In installations with permanent humidity or shallow water 	<ul style="list-style-type: none"> - All types of laying, such as in tunnels, concrete pits or buried installations - In installations with permanent humidity or shallow water

Technical data slip-on joints.

Operating voltage	Max. conductor cross-section (Cu/Al)	Ø over polymer insulation	Max. Ø of outer sheath	Type	Type of mechanical protection
U _{max} / kV	mm ²	mm	mm		
145	2500	57–102	155	MPAH 1.145	Heat shrink cover
145	2500	57–102	155	MPAP 1.145	Protection box
145	2500	57–102	155	MPCC 1.145	Cu-tube with HDPE-coating
145	2500	57–102	155	MPCP 1.145	Cu-tube and protection box

Brugg Cables is devoted to the quality, performance and reliability of its products. High standards in production and testing are the order of the day at our factory in Switzerland. Computerised machines and skilled personnel are the guarantee for our high quality. To ensure this, each insulation body is tested individually. Of course, all our joints are suitable for any type of polymer cable or cable manufacturer.

Earthing. Earthing can be made according to customer specifications. All joints are designed that either direct earthing, straight through connection or cross-bonding is possible. Cross-bonding cables can be applied up to 500/500 mm².

High quality in production. Consistent, high quality standards in manufacturing are guaranteed by using computerised machines. To ensure 0-failure during production, each part is tested several times in the manufacturing process. Every device is certified individually.

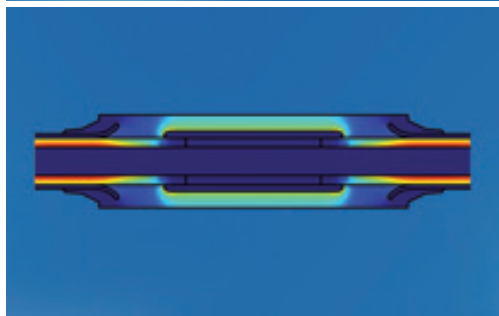
Standards. All joints are designed according to international standards, such as IEC 60840 or IEEE 404-2000. As a matter of course, we are certified according to ISO 9001 and ISO 14001.

Testing. To guarantee the quality of our products, testing is essential. All equipment is tested extensively in R&D. Our products are type-tested according to IEC 60840 and IEEE 404-2000. To ensure that all slip-on bodies are 100 % working, they all have to pass a routine test in accordance with IEC 60840.

Installation. To ensure highest quality in the field, we have an own installation department. Brugg engineers operate around the world, erecting and commissioning our various products. In order that you benefit as much as possible, we offer a complete installation service, training for your teams or the supervision of the installation by our experts, all at a reasonable price.



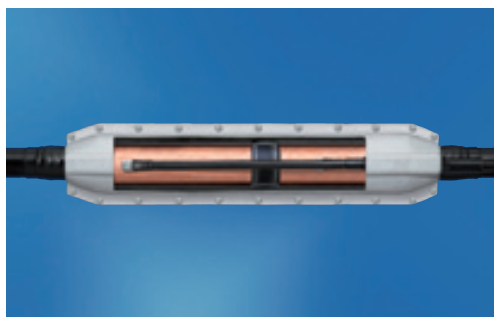
MPAH.
Joint with metal foil and heat shrink cover.



Simulations.
Design based on computer FEM-simulations for optimal electrical stress.



Laying in a tunnel.
Joints with Cu-tube and HDPE-coating in a tunnel.



MPCP.
Joint with Cu-tube and protection box.



Final testing.
Every joint is tested individually to ensure 100 % performance.



Laying in a pit.
Joints with protection box in a concrete pit.

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