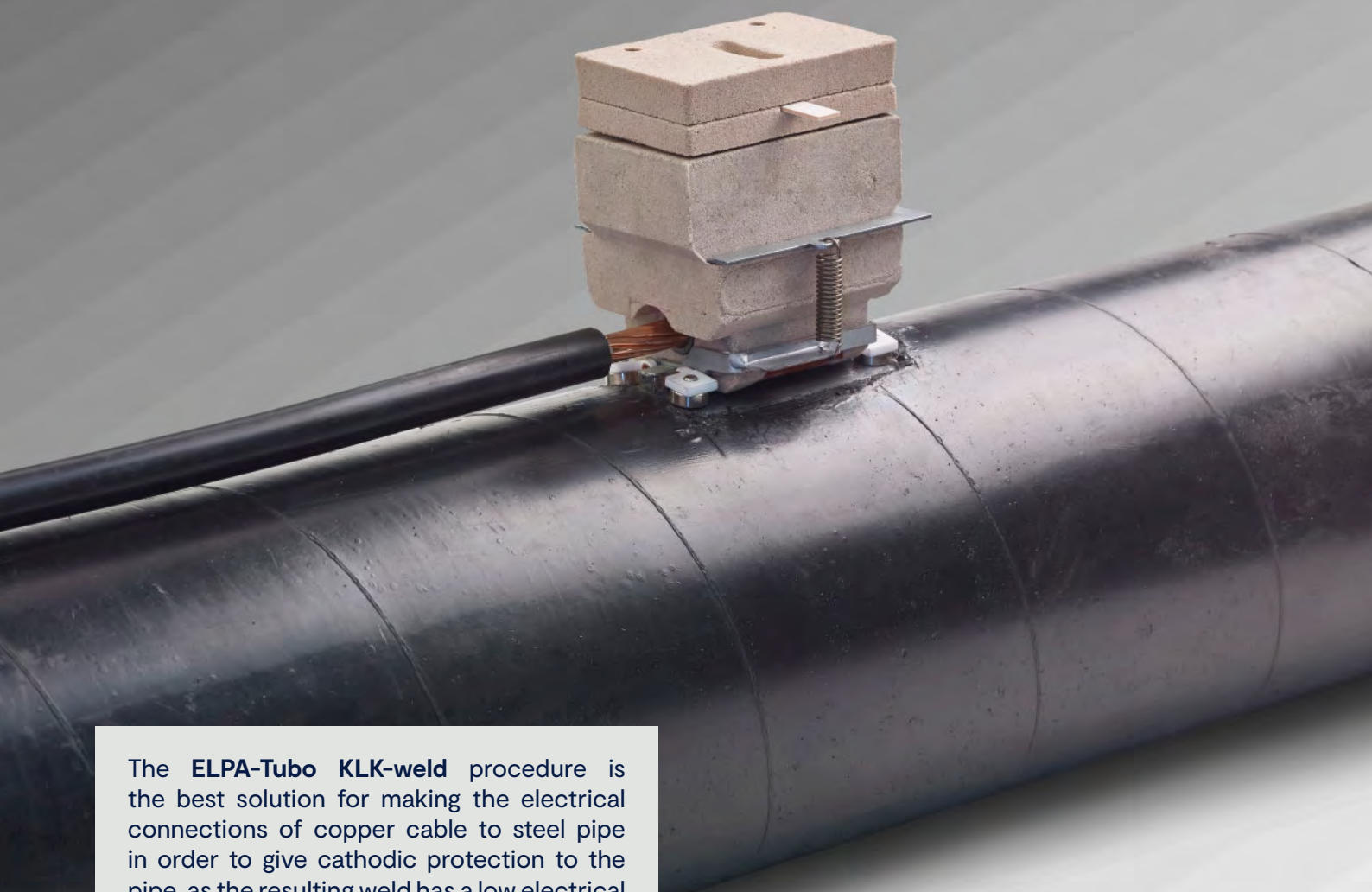
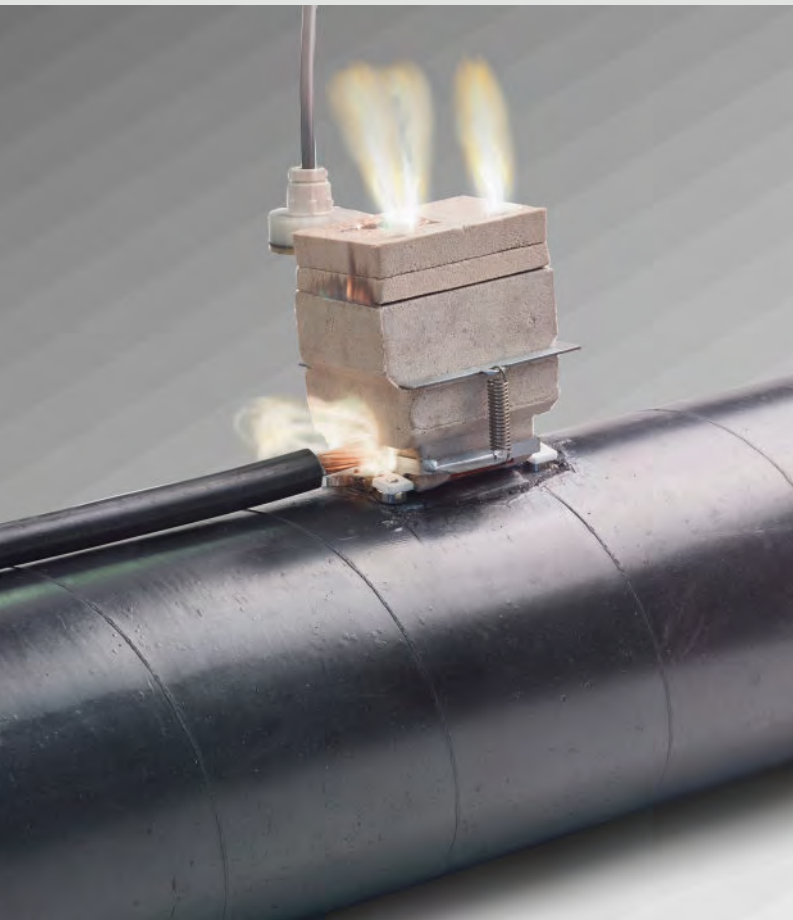


Welding Procedure ELPA-Tubo

Welding procedure for making electrical connections of copper cable to steel pipe.

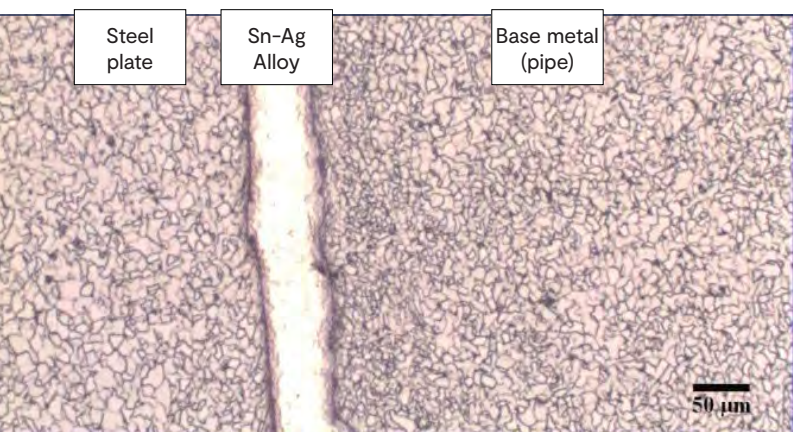


The **ELPA-Tubo KLK-weld** procedure is the best solution for making the electrical connections of copper cable to steel pipe in order to give cathodic protection to the pipe, as the resulting weld has a low electrical resistivity and a high mechanical strength in the connection. This procedure does not change the structure of the steel pipe as the temperature never exceeds 450 °C.



As the mechanism that attaches the mould to the pipe does not include any embracing element, the pipe does not need to be completely unearth; it is sufficient to uncover the top of the pipe.

The electrical resistance in the connection is lower than $10^{-4} \Omega$, and the mechanical shear strength in the pipe/plate joint is greater than 25 kN.



Unlike other welding procedures, the **ELPA-Tubo KLK-weld** procedure does not affect the structure of the steel pipe. A micrograph of the welded joint between the plate and the pipe reveals that the structure of the steel pipe remains unchanged and free from micro-cracks.

The **ELPA-Tubo KLK-weld** procedure combines aluminothermic welding and braze-welding processes in which the latter partially uses the heat produced by the former. A ferritic steel plate is placed between the copper conductor and the pipe absorbing the thermal shock of the aluminothermic molten metal. As a result of this, the plate will be welded to the cable's end. A tin-silver alloy on the pipe side of this plate makes the pipe/plate joint possible through the combination of the heat that melts this alloy and the strength of the device that pushes the plate to the pipe during the solidification process. The result is a fault free braze-weld.



The **ELPA-Tubo KLK-weld** kit includes the following parts:

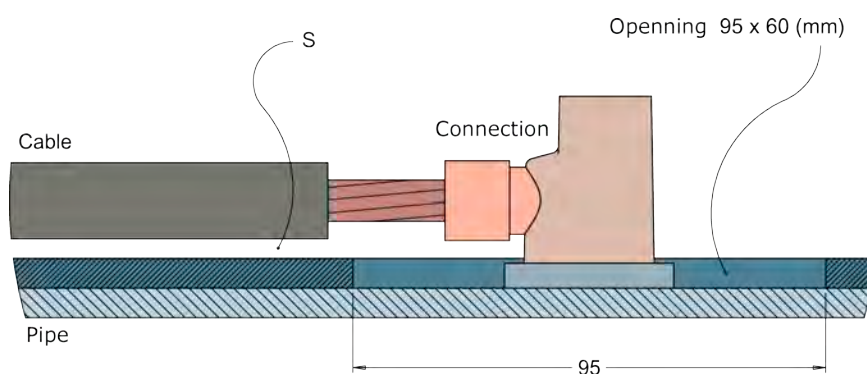
- Ceramic mould with a steel plate, sleeve for cable entrance, metal disc to seal the tap hole, sealing joints, lid with fuse for the remote starting, and a fixing device;
- Cartridge containing the welding and the ignition powder;
- Flux portion;
- Additional sleeves to be used with other cable sections (as an option);
- User's guide;



The same kit may be used on pipes of any size, and it's also useful for welding cables with different gauges. Examples of possible kits are:

Denomination	Possible cables (*)		
Kit ELPA-Tubo 6 - 25	6 mm ²	25 mm ²	
Kit ELPA-Tubo 10 - 16 - 35	10 mm ²	16 mm ²	35 mm ²
Kit ELPA-Tubo 50 - 70	50 mm ²	70 mm ²	

(*) Besides of the section, the diameter of each cable has also to be specified.

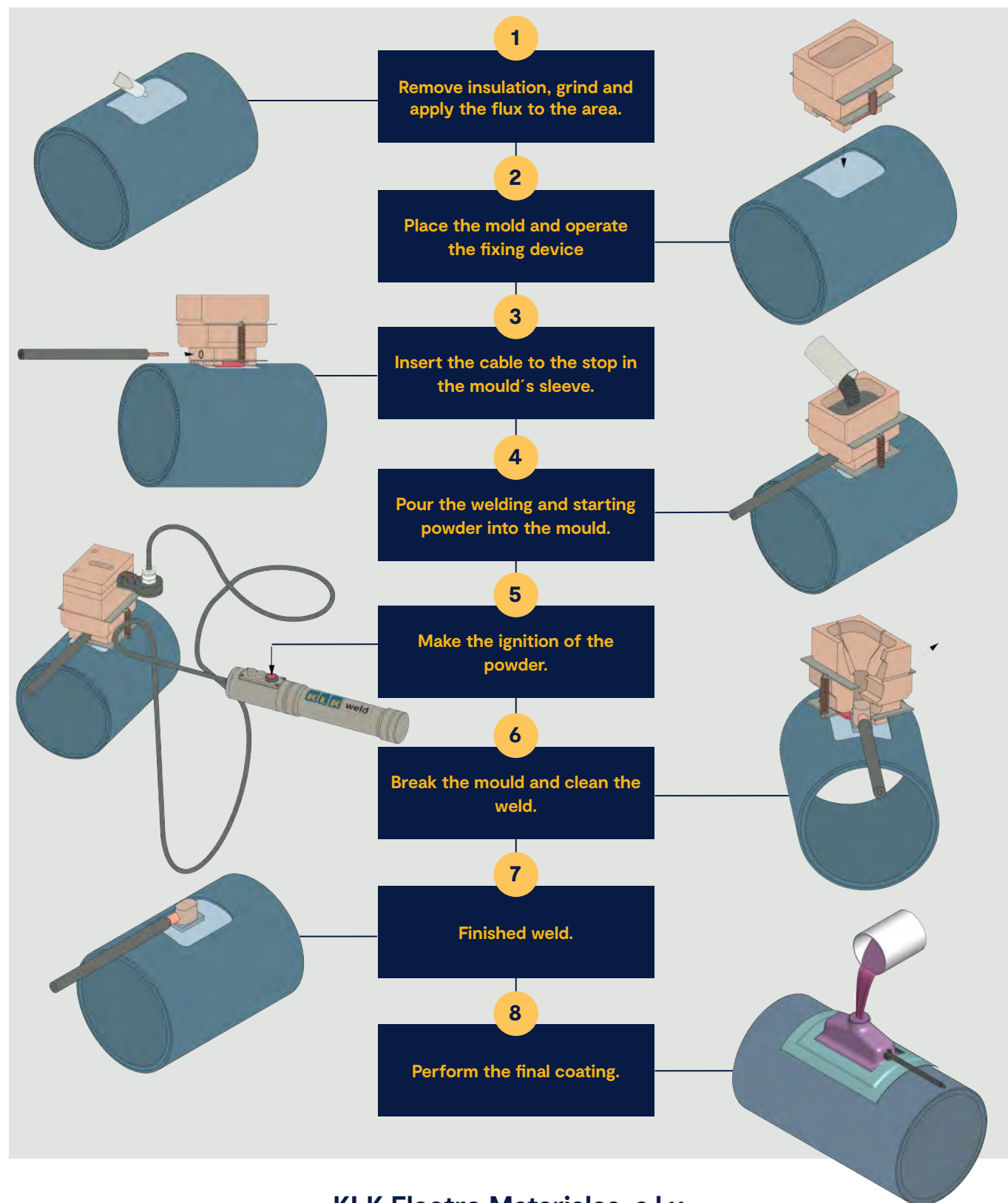


The area to be protected includes the opening made in the insulation of the pipe, of dimensions 95 x 60 (mm), the end of the cable whose insulation had been removed in a length of 50 mm, and the connection itself. The space between cable and pipe insulation (S) favors the flow of the coating resin in that area.

The starting of the welding powder is made from the distance thanks to the **Electrical Igniter Device KLK-weld**. The traditional Flint igniter can also be used as an alternative.



Easy and convenient use.



KLK Electro Materiales, s.l.u.

Camino de la Peñona, 38-B.
33211 Gijón (Asturias) · Spain

Tel. +34 985 321 850 - Fax. +34 985 312 820 info@klk.es

Z.A. de L'Europe, 6 rue de l'Orge.

68920 Wintzenheim Logelbach · France

Tel. +33 (0) 389 201 730 - Fax. +33 (0) 389 201 731 info@eke.fr