ELECTROLYTIC MARKING SYSTEM

Marking Process – Electrolytic Marking

All materials with electrically conductive surfaces can be electrolytically marked. The marking process is comparable to screen printing; however, instead of ink, electric current and electrolyte are used. The electrolyte is a mildly acidic to neutral salt solution.
As with screen printing, a stencil is placed on the workpiece to be marked. At the permeable areas of the stencil, the electrolyte reacts with the workpiece under the influence of electric current. The result is an exact reproduction of the stencil pattern on the workpiece surface.
From a chemical perspective, electrolytic marking is an electrolytic oxidation of the material surface. The surface is oxidized to a maximum depth of 10 µm. The marking consists of various oxides of the base material and is both permanent and abrasion-resistant.

To Marking of Aluminium – Mildly Acidic Electrolytes:

$$2\,Al \rightarrow 2\,Al^{3+} + 6\,e^-$$
$$6\,H^+ + 6\,e^- \rightarrow 3\,H_2$$
$$2\,Al + 6\,H^+ \rightarrow 2\,Al^{3+} + 3\,H_2$$

The aluminium ions formed react with the water contained in the electrolyte to form aluminium oxide:

$$2\,Al^{3+} + 3\,H_20 \rightarrow Al_2O_3 + 6\,H^+$$

The overall equation is therefore:

$$2\,Al + 3\,H_20 \rightarrow Al_2O_3 + 3\,H^2$$

To Marking of Steel and Stainless Steel – Neutral Electrolytes:

$$2\,Fe \rightarrow 2\,Fe^{2+} + 4\,e^-$$
$$0_2 + 2\,H_2O + 4\,e^- \rightarrow 4\,OH^-$$
$$2\,Fe + O_2 + 2\,H_20 \rightarrow 2\,Fe(OH)_2$$

The iron hydroxide can further react to form additional iron oxides:

$$4\,Fe(OH)_2 + O_2 \rightarrow 4\,FeO(OH) + 2\,H_2O$$

Technical Operation

Technically, electrolytic marking is very straightforward: in addition to a power supply unit and the electrolyte, only a marking head is required. The stencil is either clamped onto the marking head or placed directly on the workpiece to be marked. The marking head is connected to the positive pole of the power supply, and the workpiece to the negative pole. As soon as the electrolyte-soaked marking head is pressed against the workpiece, the circuit is closed and current flows – the workpiece is marked.

The EU 80 is essentially a transformer operating on 230 V AC, with an output voltage of up to 24 V AC. Depending on the material, the marking will appear darker than the base material (black marking) or lighter (white marking).

These models also support DC marking. When using direct current, a greater marking depth can be achieved (max. 10 µm). Special electrolytes are available for deep marking applications.

The felt pad serves as the electrolyte reservoir and is clamped over the marking head. Since the felt pad carbonises during operation, it must be replaced regularly to maintain consistent marking quality. Various felt types are available for black/white markings and deep markings.

A black felt pad containing carbon is used for black/white markings. To prevent the marking from burning into the felt, a conductive mesh is stretched over it. This mesh ensures an even distribution of current across the entire marking surface.

After marking, the workpiece must be cleaned with a neutraliser to prevent corrosion. For marking corrosion-sensitive materials, corrosion-free electrolytes are available. When using these electrolytes, the workpiece does not need to be neutralised after marking. For additional corrosion protection, the marked and cleaned workpiece can be treated with a corrosion inhibitor.

MADE IN GERMANY Solingen

TÜVRheinland ZERTIFIZIERT
Management System ISO 9001:2015
www.tuv.com
Zertifikat-Registrier-Nr. 01 100 060010

GS1 Germany
Solution Partner
Östling Marking Systems GmbH

HIBC APPROVED SOLUTION PROVIDER

ELECTROLYTIC MARKING SYSTEM

Marking Process – Electrolytic Marking

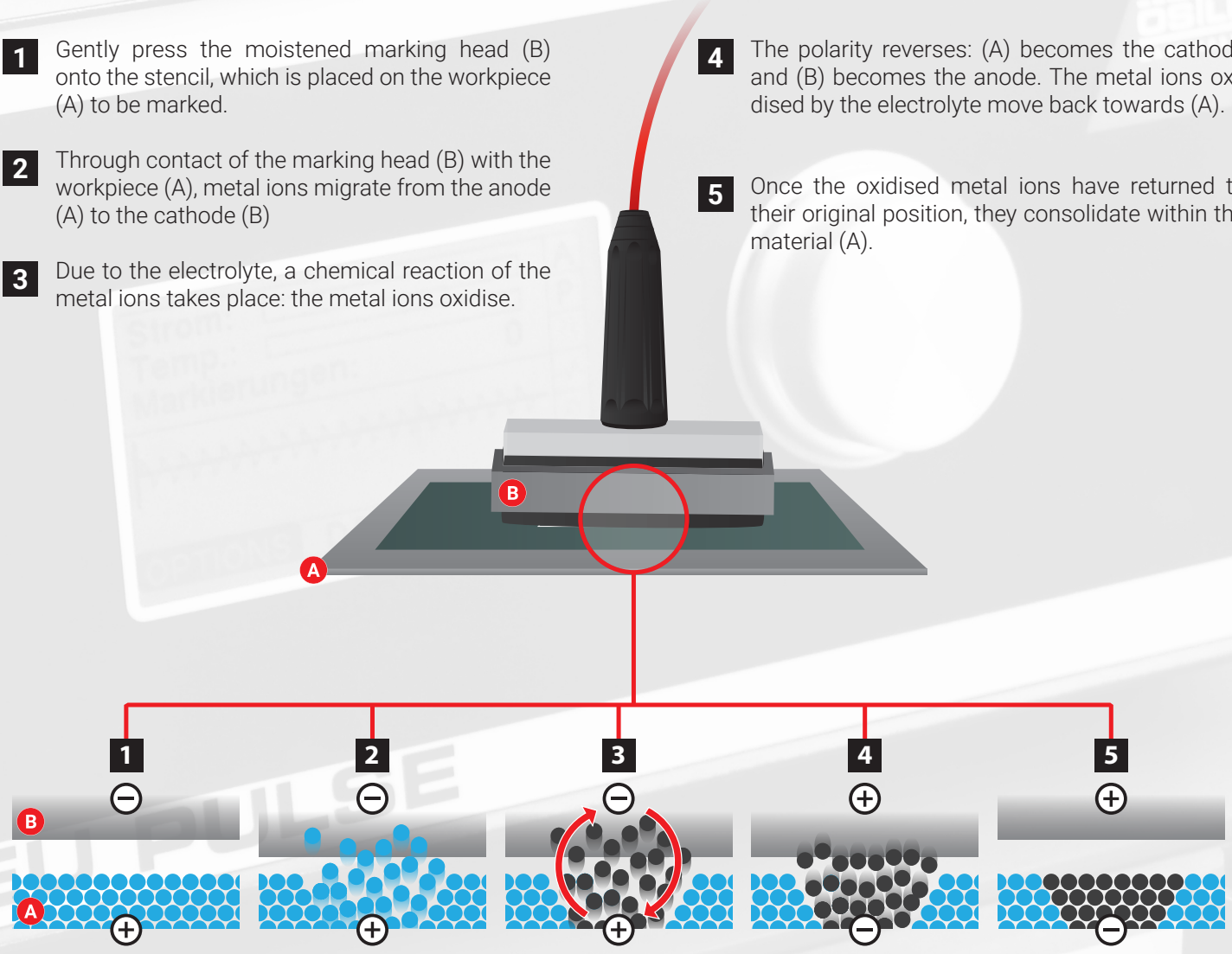
1 Gently press the moistened marking head (B) onto the stencil, which is placed on the workpiece (A) to be marked.

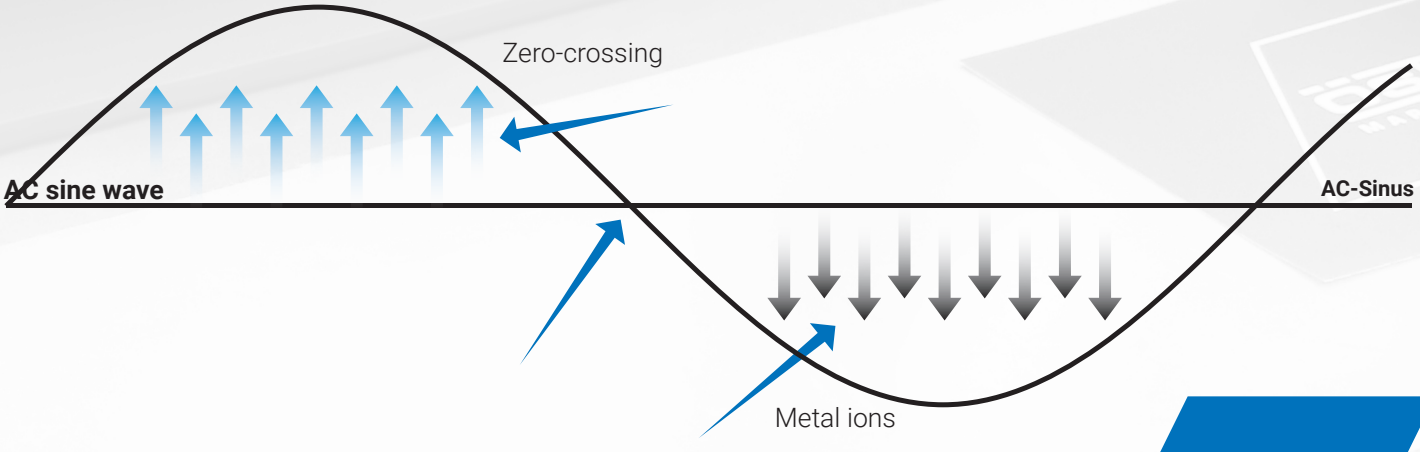
2 Through contact of the marking head (B) with the workpiece (A), metal ions migrate from the anode (A) to the cathode (B)

3 Due to the electrolyte, a chemical reaction of the metal ions takes place: the metal ions oxidise.

4 The polarity reverses: (A) becomes the cathode and (B) becomes the anode. The metal ions oxidised by the electrolyte move back towards (A).

5 Once the oxidised metal ions have returned to their original position, they consolidate within the material (A).





ÖSTLING MARKINGSYSTEMS

OSTLING.COM