ELCA SPECIAL RECTIFIERS FOR HARD CHROMIUM
(type PRP – PRPR)

The process (covered by European patent) is based on the use of **periodic reversing polarity** that allows to get a completely **crack-free** layer and therefore the **resistance to corrosion is very high**.

However the **hardness and elasticity (resistance to thermal and mechanical shocks**) are **lower** in comparison with the ones obtained by means of conventional direct current.

In order to get a high resistance to corrosion and high hardness and elasticity, a **double or multilayer** deposit system is used.

A first layer, usually touching the base metal, must be obtained by means of periodic reversing polarity**; a second layer** must be superimposed by means of conventional direct current on the first layer **(high elasticity and hardness** even if cracked).
The cracks of the second layer do not reach the base metal thanks to the first crack-free layer**.**

In conclusion it is the first layer which is important for provision of resistance to corrosion whilst the second layer provides the hardness and elasticity of the deposit.

PRACTICAL ADVICE TO GET MULTILAYER DEPOSITS

Before starting to superpose different layers with different features it is **very important to check if the preset parameters of periodic reversing polarity allow actually to obtain a crack-free deposit.**
Our advice is to carry out some preliminary tests by depositing only one layer with periodic reversing polarity, according to the instructions here below:

To obtain a crack-free layer
The rectifier must work all treatment long with periodic reversing polarity:
The parameter **recommended values** are the following:

- Interval between 2 negative pulses **(PIC POS) = 15 sec.** (D)
- Duration **PIC NEG = 10÷12 centisec**. (E)
- Amplitude **(%) PIC NEG = 50%** (B) (only if equipped with ELCA RAMPER)

As a rule a small crack-free deposit (4 ÷ 8 micron) is enough to get a good resistance to corrosion.

If possible no mechanical working must be carried out after the end of the process and before checking the resistance to corrosion.
If some **cracks** (which can cause an low resistance to corrosion) **are still present**, you can try to decrease the number of them or to eliminate them , as follows:

- **Increasing** negative pulse duration (PIC NEG) .
  This value can be increased up to 20÷30 centisec.
- **Decreasing** the interval between 2 negative pulses (PIC POS) .This value can be decreased step by step up to 2÷5 sec. (till some adhesion problems occur).

After **checking the actual increasing in the resistance to corrosion** compared with the values obtained with conventional direct current, it is possible to carry out a **second** layer using **direct current.**

To get a multilayer deposit:

- Start depositing a **first crack-free layer (few microns with periodic reversing** polarity using the working parameters checked in the previous tests).
- Superpose a **second layer (cracked)** which completes the thickness of the layer which is obtained using **direct current.**

Carry out the following tests: hardness, resistance to corrosion, elasticity and **compare them with the ones obtained by means of conventional deposit by using direct current.**
Increase step by step the thickness of the crack-free layer till the optimum compromise value is reached according to the quality of the deposit you need (resistance to corrosion, hardness).

In conclusion it is the first layer which is important for provision of resistance to corrosion whilst the second layer provides the hardness and elasticity of the deposit .
Four or multilayer deposits can be got alternating those obtained with periodic reversing polarity with those without periodic reversing polarity.

SUPERPOSING OF POSITIVE PULSES

The use of **positive pulses** superposed on the base level allows to obtain a **finer grain layer** .
Hardness, throwing power and deposition rate increase.

The recommended values in the working with **positive pulses** are:

- Base time = 3 centisec. (F)
- Pulse time = 3 centisec. (G)
- Pulse amplitude (%) = 30÷40% (C)

WAVEFORMS AND PARAMETERS