



## Overview

### Complete RPA test set

- RPA-measurement device
- Measurement cells
- Electrodes
- Faraday cage
- Dispensing peristaltic pump
- PC incl. software

## Introduction

Under the sponsorship of GSB International a complete measuring system for rest potential analysis was developed by iLF Magdeburg gGmbH and IPS Elektronlabor GmbH & Co. KG developed a complete measuring system for rest potential analysis. While the RPA<sub>iLF</sub> method was developed by iLF gGmbH and a first pilot system was installed at some test customers, IPS Elektronlabor GmbH & Co. KG developed a complete system suitable for industrial use with the corresponding hardware and software. Special emphasis was placed on the functionality of the measuring system even under adverse conditions. The electrochemical method of open circuit analysis (RPA<sub>iLF</sub>) is used for testing, evaluating and monitoring Cr-free pretreatment layers on aluminium alloys.

The complete measuring system makes it possible, primarily in the (aluminium) coating industry, to obtain important process quality parameters within a short time, so that it serves a quasi inline control with reduced waiting times.

## Measurement method

First, three pretreated aluminium sheets or profiles are clamped sideways on the top of the measuring cell. Then the electrolyte (5% Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub>, pH 7) is filled into the measuring cells. In addition, there is a reference electrode (Ag/AgCl), which is immersed in the electrolyte and fixed via the stand.

The sheet metal (as working electrode) and the reference electrode are electrically connected to the measuring instrument via cables so that a potential can be measured. For each measuring cell, a tube of the peristaltic pump is positioned next to the reference electrode so that the corrosion stimulator reaches the electrolyte.

The fourth tube of the pump is inserted into a glass vessel to additionally control the amount of the dripped corrosion stimulator.

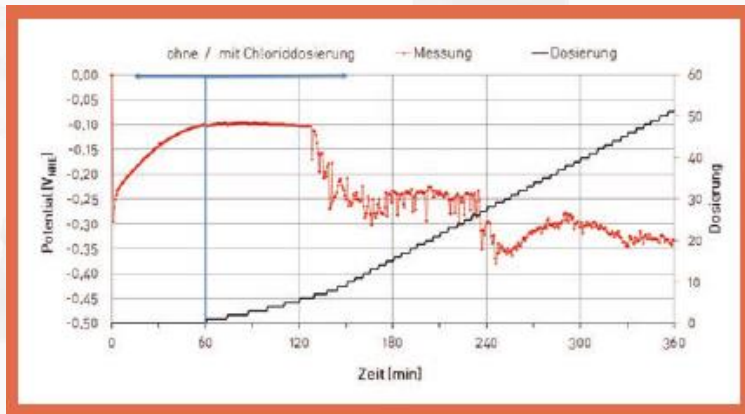
The measurement can be started, recorded and evaluated via the PC with the appropriate software.

First, the measurement is carried out for 60 minutes without adding the corrosion stimulator. This allows the potential to stabilize. After 60 minutes, an additional corrosive load is applied by adding a corrosion stimulator to the electrolyte. This takes place until the rest potential drops abruptly.

Afterwards the actual measurement can be finished.

## Evaluation criteria

After the measurement, the evaluation can be carried out with the help of the software. The critical chloride quantity (c-kr value) at the time of the potential drop is calculated. The c-kr value indicates the resistance of the pre-treated Al material to a corrosive load under defined boundary conditions. It is used as a reference for process control during pre-treatment..



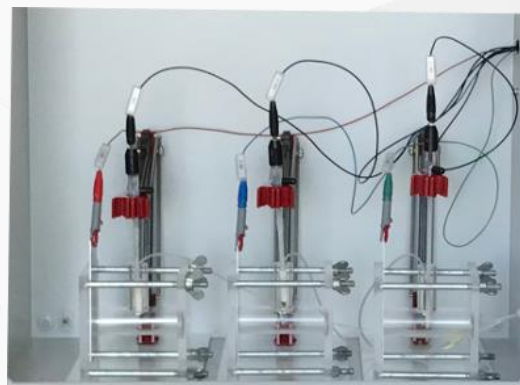
Example of a potential-time curve for a pre-treated aluminium plate



View on right side of Faraday cage with computer and dispensing peristaltic pump

## Technical details

Range	$\pm 10$ V
Input impedance RE	$10^{13} \Omega$
Bandwidth	100 Hz
ADC	24 Bit, max. resolution $1 \mu\text{V}$
DAC	16 bit for control of dispensing peristaltic pump



Experimental setup for RPA<sub>IPL</sub> with 3 measuring stations