

Abstract

This work focuses on the broad spectrum of possible techniques for measuring corrosion rates.

A short introduction into the basics of corrosion, influencing parameters and types of corrosion is essential. Some formulas covering the kinetics of the corrosion process will be explained, including the Tafel equation and the Butler-Volmer equation.

These measurement techniques are divided into two major groups: the physical and the electrochemical measurement methods. The physical methods are generally cheaper and easier to perform. On the other hand, the electrochemical methods are faster. The main difference is that the physical methods measure an average corrosion rate over a longer period of time, while the electrochemical methods measure instantaneous rates. In this work some methods and their advantages and disadvantages are described: linear resistance measurements, electrochemical impedance spectroscopy, weight loss measurements, plate thickness measurements, electrochemical noise analysis and the use of hydrogen probes.

The most commonly used instrument for the measurement of corrosion rates is the potentiostat. The potentiostat applies a potential to a working electrode and measures the resulting current flow. With this resulting current, Faraday's law allows to calculate the material loss (and subsequently the corrosion rate). The working principle of the potentiostat and a test setup are explained.