

## **Electrical resistance sensors for the determination of the protection potential of buried structure under cathodic protection**

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The installation of metallic coupons in the vicinity of buried pipes under cathodic protection (CP) allows theoretically to measure the potential and the current density through the simulated coating defect. Nevertheless, this type of monitored coupon does not provide direct information on the actual efficiency of the CP and corrosion rates that could be caused by a CP failure over time or not adapted CP design.

In this study, very sensitive electrical resistance (ER) sensors, allowing obtaining precise corrosion data in real-time were adapted for soil applications. They were used in the selected soils and conditions to determine the off potential and current density corresponding to a corrosion rate of 10  $\mu\text{m}/\text{year}$ , which corresponds to the maximal corrosion rate of buried structures considered as protected according the standard ISO 15589-1:2015. The adapted ER sensors appeared to be particularly suitable for determining the protection potential and CP criteria in a relatively short time. For the tested soils and conditions, the results showed that the cathodic protection criteria recommended in ISO 15589-1:2015 are very conservative compared to those measured experimentally. This method therefore seems particularly relevant for the determination of the protection potential in complex or polluted media, in the absence of data in the literature.