



# Technical Report

**ISO/TR 22801**

## **Corrosion of metals and alloys — Testing methods for corrosion of conducting alloys in AC electric current condition**

*Corrosion des métaux et alliages — Méthodes d'essai pour la  
corrosion des alliages conducteurs dans des conditions de courant  
alternatif*

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## Foreword

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This document was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*.

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## Introduction

As demonstrated in References [6] to [15], magnetic and electric fields influence corrosion behaviour in metallic materials. Depending on the composition and microstructure of the materials, magnetic and electric fields either increase or decrease the corrosion rate. In high-voltage power transmission systems (operating at voltage  $\geq 10$  kV), the alternative current (AC) and direct current (DC) flowing through the conducting materials (e.g. copper, aluminium and their alloys) generate intense magnetic and electric fields. These fields induce distinct corrosion behaviours in the materials. The global high-voltage transmission lines exceed 4,7 million km. Corrosion of conducting materials/alloys leads to localized overheating and mechanical failure, disrupting power supply reliability, accelerating equipment degradation and increasing costs.

A suitable testing method for conducting metals under an electric current is essential for selecting and evaluating the performance of materials. However, the conventional corrosion test methods (e.g. electrochemical test, salt spray test) do not take current-induced effects into consideration. This document therefore proposes a corrosion test method designed to simulate the operating conditions of conducting materials in high-voltage power transmission systems. Considering the global dominance of alternating current (AC) in power transmission infrastructure, this testing method focuses on AC-induced corrosion. This in turn provides comparative results that enable manufacturers to optimize material design, thereby enhancing the longevity and reliability of power transmission equipment.

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