ISO 22858:2020 (E)

Corrosion of metals and alloys — Electrochemical measurements — Test method for monitoring atmospheric corrosion

Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

4 Summary of sensors

5 Free corrosion current sensor

5.1 Free corrosion current sensor description
5.2 Sensor geometry
5.3 Uniform corrosion current measurement
5.3.1 Use and conditions for uniform corrosion measurements
5.3.2 Method 1 — Sine wave excitation
5.3.3 Method 2 — Triangle wave excitation
5.3.4 Method 3 — Potential step excitation
5.4 Localized corrosion current measurement
5.5 Free corrosion rate and total free corrosion for sensors without coatings
5.5.1 Free corrosion current and current density
5.5.2 Free corrosion penetration rate
5.5.3 Free corrosion mass loss rate
5.5.4 Total free corrosion mass loss and corrosion penetration
5.6 Free corrosion current and total charge for sensors with coatings
5.6.1 Use and conditions for free corrosion measurements with coatings
5.6.2 Free corrosion current for a coated sensor
5.6.3 Free corrosion total charge for a coated sensor
5.7 Free corrosion sensor preparation
5.7.1 Considerations for free corrosion sensor surface preparation
5.7.2 Free corrosion sensors without coatings
5.7.3 Free corrosion sensors with coatings and surface treatments
5.7.3.1 Coatings and surface treatments for use with free corrosion sensors
5.7.3.2 Organic coating
5.7.3.3 Coating application and processing
5.7.3.4 Coating scribe defect
5.8 Specification and inspection — Free corrosion sensors
5.8.1 Visual inspection
5.8.2 Sensor range and span
5.8.3 Electrical verification tests
5.8.3.1 Continuity test
5.8.3.2 Electrical resistance test
5.8.4 Corrosion verification tests

6 Galvanic corrosion current sensor

6.1 Galvanic corrosion current sensor description
6.2 Sensor geometry
6.3 Galvanic corrosion current measurements
6.3.1 Methods for galvanic corrosion current measurement
6.3.2 Method 1 — Zero-resistance ammeter
6.3.3 Method 2 — Precision resistor

6.4 Galvanic corrosion rate and total galvanic corrosion without coatings
6.4.1 Galvanic corrosion current
6.4.2 Galvanic corrosion rate for mass loss and corrosion penetration
6.4.3 Total galvanic corrosion mass loss and corrosion penetration
6.5 Galvanic corrosion rate and total galvanic corrosion with coatings
6.5.1 Use and conditions for galvanic corrosion measurements with coatings
6.5.2 Galvanic mass loss corrosion rate for a coated sensor
6.5.3 Total galvanic mass loss for a coated sensor
6.6 Galvanic corrosion sensor preparation
6.6.1 Considerations for galvanic corrosion sensor preparation
6.6.2 Galvanic corrosion sensors without coatings
6.6.3 Galvanic corrosion sensors with coatings and surface treatments
6.7 Specification and inspection — Galvanic corrosion sensors
6.7.1 Visual, span and range inspection
6.7.2 Electrical verification tests
6.7.2.1 Continuity test
6.7.2.2 Electrical resistance test
6.7.3 Corrosion verification tests

7 Thin film conductance sensors

7.1 Conductance sensor description
7.2 Sensor geometry
7.3 Surface conductance measurement method
7.4 Surface conductance sensor preparation
7.5 Specification and inspection — Conductance sensor
7.5.1 Visual, span and range inspection
7.5.2 Electrical verification tests
7.5.2.1 Continuity test
7.5.2.2 Electrical resistance test
7.5.3 Conductive solution verification tests

8 Coating barrier property sensors

8.1 Coating barrier property sensor description
8.2 Coating barrier property measurements
8.3 Coating barrier property sensor preparation
8.3.1 Sensor preparation for coating
8.3.2 Coating test condition
8.4 Specification and inspection — Coating barrier property sensor
8.4.1 Visual, span and range inspection
8.4.2 Electrical measurements
8.4.2.1 Continuity test
8.4.2.2 Resistance test
8.4.3 Sensing system impedance verification tests

9 Atmospheric testing with electrochemical sensors

9.1 Types of atmospheric tests
9.2 Test arrangement
9.3 Test duration
9.4 Sensor selection
9.5 Sampling time interval
9.6 Date and time information

10 Test report

10.1 Test report guidance
10.2 Sensor information
10.3 Surface preparation
10.4 Test description
10.5 Sensor inspection
10.6 Data storage

Annex A (informative) Example images of electrochemical sensors

Annex B (informative) Equivalent circuit analysis for two-electrode measurements

B.1 Polarization resistance theory

B.2 Polarization resistance for two-electrode sensor
B.3 Solution resistance assumption

Annex C (informative) Example of reporting information

C.1 Test report
C.2 Measurement system and sensor information
C.3 Time dependent data records
C.3.1 Electrochemical data records
C.3.2 Environmental data records

Page count: 21