# 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 Method 2 Triangle wave excitation 5.3.3
  - Method 3 Potential step excitation 5.3.4
  - 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
  - Free corrosion penetration rate 5.5.2
  - 5.5.3 Free corrosion mass loss rate
  - Total free corrosion mass loss and corrosion penetration 5.5.4
  - Free corrosion current and total charge for sensors with coatings 5.6
  - 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
  - Considerations for free corrosion sensor surface preparation 5.7.1
  - Free corrosion sensors without coatings 5.7.2
  - 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
  - Specification and inspection Free corrosion sensors 5.8
  - 5.8.1 Visual inspection
  - Sensor range and span 5.8.2
  - 5.8.3 **Electrical verification tests**
  - **Continuity test** 5.8.3.1

6

- 5.8.3.2 **Electrical resistance test**
- **Corrosion verification tests** 5.8.4
- Galvanic corrosion current sensor
  - 6.1 Galvanic corrosion current sensor description
  - 6.2 Sensor geometry
  - 6.3 Galvanic corrosion current measurements
  - Methods for galvanic corrosion current measurement 6.3.1
  - 6.3.2 Method 1 — Zero-resistance ammeter
  - Method 2 Precision resistor 6.3.3

- 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
- Thin film conductance sensors

7

- 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
- Solution resistance assumption B.3

#### Annex C (informative) Example of reporting information

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

Page count: 21