

Standard Test Method

Evaluating the Accuracy of Field-Grade Reference Electrodes

This NACE International standard represents a consensus of those individual members who have reviewed this document, its scope, and provisions. Its acceptance does not in any respect preclude anyone, whether he or she has adopted the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not in conformance with this standard. Nothing contained in this NACE International standard is to be construed as granting any right, by implication or otherwise, to manufacture, sell, or use in connection with any method, apparatus, or product covered by Letters Patent, or as indemnifying or protecting anyone against liability for infringement of Letters Patent. This standard represents minimum requirements and should in no way be interpreted as a restriction on the use of better procedures or materials. Neither is this standard intended to apply in all cases relating to the subject. Unpredictable circumstances may negate the usefulness of this standard in specific instances. NACE International assumes no responsibility for the interpretation or use of this standard by other parties and accepts responsibility for only those official NACE International interpretations issued by NACE International in accordance with its governing procedures and policies which preclude the issuance of interpretations by individual volunteers.

Users of this NACE International standard are responsible for reviewing appropriate health, safety, environmental, and regulatory documents and for determining their applicability in relation to this standard prior to its use. This NACE International standard may not necessarily address all potential health and safety problems or environmental hazards associated with the use of materials, equipment, and/or operations detailed or referred to within this standard. Users of this NACE International standard are also responsible for establishing appropriate health, safety, and environmental protection practices in consultation with appropriate regulatory authorities if necessary, to achieve compliance with any existing applicable regulatory requirements prior to the use of this standard.

CAUTIONARY NOTICE: NACE International standards are subject to periodic review, and may be revised or withdrawn at any time in accordance with NACE technical committee procedures. NACE International requires that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of initial publication and subsequently from the date of each reaffirmation or revision. The user is cautioned to obtain the latest edition. Purchasers of NACE International standards may receive current information on all standards and other NACE International publications by contacting the NACE International FirstService Department, 1440 South Creek Dr., Houston, Texas 77084-4906 (telephone +1 281-228-6200).

Approved 2013-01-08
NACE International
1440 South Creek Drive
Houston, Texas 77084-4906
+1 281-228-6200

ISBN 1-57590-261-3
©2013, NACE International

Currently in preview, click buy full version

Foreword

This standard describes a test method for evaluating the accuracy of field-grade reference electrodes used for obtaining field measurement of structure-to-electrolyte potentials. The test method described in this standard is a relatively quick, simple, and inexpensive way to evaluate the accuracy of a field-grade reference electrode. The test method measures the potential difference between the field-grade electrode and a master reference electrode.

Field-grade reference electrodes are subject to contamination from repeated exposure to electrolytes of varying chemical composition. Contamination can alter the open-circuit potential of the field-grade reference electrode and thus alter the accuracy of structure-to-electrolyte potential measurements in the field.

This standard test method is intended for use by consultants, suppliers, and users of cathodic protection systems to ensure the accuracy of field-grade reference electrodes.

This standard was prepared Task Group (TG) 436, "Electrodes, Field-Grade: Test Methods," which is administered by Specific Technology Group (STG) 62, "Corrosion Monitoring and Measurement—Science and Engineering Applications," and sponsored by STG 05, "Cathodic/Anodic Protection," STG 30, "Oil and Gas Production—Cathodic Protection," and STG 35, "Pipelines, Tanks, and Well Casings." It is published by NACE International under the auspices of STG 62.

In NACE standards, the terms *shall*, *must*, *should*, and *may* are used in accordance with the definitions of these terms in the *NACE Publications Style Manual*. The terms *shall* and *must* are used to state a requirement, and are considered mandatory. The term *should* is used to state something good and is recommended but is not considered mandatory. The term *may* is used to state something considered optional.

**Standard
Test Method**

**Evaluating the Accuracy of
Field-Grade Reference Electrodes**

Contents

1: General:	1
2: Definitions	1
3: Test Equipment and Test Solution	1
4: Test Procedure	2
References	5
Bibliography	5
FIGURES	
Figure 1: Electrodes in test solution in nonmetallic container	3
Figure 2: Electrode tips pressed into sponge thoroughly soaked with test solution.	4

Section 1: General

1.1 This standard describes a test method for evaluating the accuracy of copper/copper sulfate and silver/silver chloride reference electrodes used in the field for measurement of structure-to-electrolyte potentials.

1.2 This standard does not apply to the evaluation of reference electrodes used in laboratory work.

1.3 This standard should be used in conjunction with the practices described in the latest revision of NACE Standard TM0101 and NACE Standard TM0497,² when appropriate.

Section 2: Definitions

Reference Electrode: An electrode having a stable and reproducible potential, which is used in the measurement of other electrode potentials.

Structure-to-Electrolyte Potential: The potential difference between the surface of a buried or submerged metallic structure and the electrolyte that is measured with reference to an electrode in contact with the electrolyte.

Master Reference Electrode: An electrode of known accuracy that is used in the evaluation of the accuracy of reference electrodes used in field work.

Open Silver/Silver Chloride Electrode: An electrode in which the Ag/AgCl element is in direct contact with the surrounding electrolyte; these electrodes are usually used in full-strength seawater.

Section 3: Test Equipment and Test Solution

3.1 The intent of the following procedure is to establish a low-resistance conductive (ionic) path, free of junction potentials, between the Master Electrode and the the field-grade reference electrode to be tested. Experience has shown that the following test arrangement will accomplish this. Deviation from the arrangement in Section 3 and the procedure in Section 4 are allowed provided that they do not affect the test result.

3.2 Test Equipment

3.2.1 The test equipment used to evaluate the accuracy of the field-grade reference electrode shall be as follows:

3.2.1.1 Voltmeter with a minimum of 10 MΩ of input resistance and appropriate lead wires.

3.2.1.2 A suitably sized non-metallic container.

3.2.1.3 A sponge large enough to contact both electrodes simultaneously (optional).

3.2.1.4 Field-grade reference electrode to be evaluated in this test.

3.2.1.5 Master reference electrode, which shall be a new or newly rebuilt reference electrode that is the same type as the test reference electrode.

3.2.1.5.1 The electrolyte type and concentration of the master reference electrode shall be the same as the test reference electrode.

3.2.1.5.2 Newly rebuilt reference electrodes shall be rebuilt in accordance with the manufacturer's published instructions.