



NACE Standard RP0176-2003
Item No. 21018

Standard Recommended Practice

Corrosion Control of Steel Fixed Offshore Structures Associated with Petroleum Production

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Foreword

Offshore structures represent large capital investments. Structures are being placed in offshore areas worldwide and are being designed to withstand forces resulting from hurricanes, arctic storms, tidal currents, earthquakes, and ice floes. Moreover, platform structures are currently being placed in deeper waters and, therefore, have become larger, more complex, and more expensive. Control of corrosion on structures is necessary for the economic development of oil and gas production, to provide safe support for working and living areas, and to avoid potential harm to the environment. For the purposes of this standard, offshore structures are considered to be stationary structures (platforms or subsea facilities) that are fixed to the sea floor by gravity, piling, and/or mooring cables.

This NACE International standard is intended for use by corrosion control personnel concerned with the corrosion of steel fixed offshore platforms associated with petroleum production. It outlines materials, practices, and methods for control of corrosion for steel fixed structures associated with petroleum production located in offshore areas. The purpose is to facilitate more effective corrosion protection of structures by the presentation of reliable information. Corrosion on offshore structures can be divided into three major areas: the submerged zone, the splash zone, and the atmospheric zone. The submerged zone also includes that portion of the structure below the mudline. This standard does not include procedures for the control of internal corrosion of wells, piping, and associated equipment that may be in use on the structure, but does include external protection of these items in the atmospheric zone on the structure.

This standard was originally issued in 1976 and revised in 1983 by Task Group (TG) T-1-2 on North Sea Corrosion Problems. It was revised in 1994 by Task Group T-1-5 and in 2003 by Task Group 170, which is administered by Specific Technology Group (STG) 30 on Oil and Gas Production—Cathodic Protection. TG 170 is sponsored by STGs 02 on Protective Coatings and Linings—Atmospheric and STG 05 on Cathodic/Anodic Protection. It is issued by NACE International under the auspices of STG 30.

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| <p>In NACE standards, the terms <i>shall</i>, <i>must</i>, <i>should</i>, and <i>may</i> are used in accordance with the definitions of these terms in the <i>NACE Publications Style Manual</i>, 4th ed., Paragraph 7.4.1.9. <i>Shall</i> and <i>must</i> are used to state mandatory requirements. The term <i>should</i> is used to state something good and is recommended but is not mandatory. The term <i>may</i> is used to state something considered optional.</p> |
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Section 1: General

1.1 This standard provides guidelines for establishing minimum requirements for the control of corrosion on steel fixed offshore structures associated with petroleum production, and on the external portions of associated oil and gas handling equipment. Fixed structures include platforms, tension leg platforms (TLPs), and subsea templates. This standard does not include guidelines for corrosion control of temporarily moored mobile vessels used in petroleum production.

1.2 For this standard, corrosion on structures is divided into three zones: the submerged, splash, and atmospheric zones. Each zone is examined separately.

1.3 This standard does not designate guidelines for every specific situation because of the complexity of environmental conditions. In many instances, there may be several solutions to the problem and, when appropriate, meritorious alternative solutions have been included.

1.4 This standard does not include guidelines for corrosion control of the internal portions of wells, piping, and associated equipment that may be installed on or attached to structures.

1.5 This standard includes corrosion control of the external surfaces of attached pipelines above the splash zone. When ownership of the pipeline is different from that of the structure, the structure owner's responsibility for the pipeline usually ends at a designated point or valve on the structure.

1.6 Underwater pipelines and pipeline risers are specifically excluded from this standard.

1.7 Alternative methods are acceptable to accomplish the objectives of this standard; however, deviation should be made only if, in the opinion of a competent corrosion specialist, the objectives expressed in the standard have been achieved.

Section 2: Definitions

NOTE: Additional definitions for cathodic protection and coatings technology may be found in NACE Standard RP0169,¹ the *NACE Corrosion Engineer's Handbook*,² and the NACE International 2002 *Glossary of Corrosion-Related Terms*.³

Anchor Pattern: The irregular peak and valley pattern created on the surface of steel by the effect of blasting media hitting the steel at high velocity.

Anode: The electrode of an electrochemical cell at which oxidation occurs. Electrons flow away from the anode in the external circuit. Corrosion usually occurs and metal ions enter the solution at the anode.

Atmospheric Zone: The zone of the structure that extends upward from the splash zone and is exposed to sun, wind, spray, and rain.

Calcareous Coating or Deposit: A layer consisting of calcium carbonate and other salts deposited on the surface. When the surface is cathodically polarized as in cathodic protection, this layer is the result of the increased pH adjacent to the protected surface.

Cathode: The electrode of an electrochemical cell at which reduction is the principal reaction. Electrons flow toward the cathode in the external circuit.

Cathodic Disbondment: The destruction of adhesion between a coating and the coated surface caused by products of a cathodic reaction.

Cathodic Protection: A technique to reduce the corrosion of a metal surface by making that surface the cathode of an electrochemical cell.

Chalking: The development of loose, removable powder (pigment) at the surface of an organic coating, usually caused by weathering. Controlled chalking provides for self-cleaning of the surface and leaves the surface in good condition for recoating.

Chlorinated Rubber: A particular film former used as a binder, made by chlorinating rubber.

Corrosion: The deterioration of a material, usually a metal, that results from a reaction with its environment.

Corrosion Specialist: A person who, by reason of his/her education and/or experience, is qualified to evaluate and solve problems related to the corrosion of materials. In this standard, corrosion specialist refers to one who is qualified in the control of corrosion in marine environments.

Crosslink: The result of a chemical reaction linking two chains in the molecular structure of a coating and changing the final state of the coating.

Current: (1) A flow of electric charge. (2) The amount of electric charge flowing past a specified circuit point per unit time, measured in the direction of net transport of positive charges. (In a metallic conductor, this is the opposite direction of the electron flow.)