



NACE SP0387-2019
Item No. 21036
Reaffirmed 2019-12-19
Revised 2014-10-06
Reaffirmed 2006-07-18
Revised 1999-06-24
Reaffirmed April 1990
Approved June 1987

Metallurgical and Inspection Requirements for Cast Galvanic Anodes for Offshore Applications

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 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 assumes no responsibility for the interpretation or use of this standard by other parties and accepts responsibility for only those official NACE interpretations issued by NACE in accordance with its governing procedures and policies which preclude the issuance of interpretations by individual volunteers.

Users of this NACE 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 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 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CAUTIONARY NOTICE: NACE standards are subject to periodic review, and may be revised or withdrawn at any time in accordance with NACE technical committee procedures. NACE 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 standards may receive current information on all standards and other NACE publications by contacting the NACE *FirstService* Department, 15835 Park Ten Place, Houston, TX 77084-5145 (tel: +1 281-228-6200, email: firstservice@nace.org).

ABSTRACT

Reaffirmed in 2019. Defines minimum physical quality and inspection standards for cast sacrificial anodes for offshore applications. The objectives of the standard are (1) to standardize an industry-wide practice that can be used by consultants, manufacturers, and users to define the physical requirements of anodes and (2) to be specific enough to assist the inspection authority in its task of confirming that anodes comply with the physical requirements.

KEYWORDS

Cracking, defects, fabrication, identification marking, inserts, inspection, sacrificial anodes, welding, TG 454.

Foreword

The purpose of this standard practice is to set minimum physical quality and inspection standards for cast galvanic anodes for offshore applications. The objectives of this standard are to standardize an industry-wide practice that can be used by consultants, manufacturers, and users to define the physical requirements of cast galvanic anodes, and to be specific enough to assist the inspection authority in its task of confirming that cast galvanic anodes comply with the physical requirements.

This standard is complementary to NACE SP0176,¹ DNVGL⁽¹⁾-RP-B401² and EN⁽²⁾ 12495.³

This standard was originally prepared in 1987 by NACE Task Group T-7L-5, a component of Unit Committee T-7L on Cathodic Protection, in association with a working group of the Corrosion Control Engineering Joint Venture (CCEJV), sponsored by NACE International and the Institute of Corrosion Science and Technology (ICorr).⁽³⁾ It was reaffirmed in 1990, revised in 1999, and reaffirmed in 2006 by Specific Technology Group (STG) 30, "Oil and Gas Production—Cathodic Protection." It was revised in 2014 and reaffirmed (with editorial changes) in 2019 by Task Group (TG) 454, "Metallurgical and Inspection Requirements for Cast Galvanic Anodes for Offshore Applications," which is administered by STG 30, "Oil and Gas Production—Cathodic Protection." This standard is issued by NACE under the auspices of STG 30.

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.

⁽¹⁾ DNV GL, Veritasveien 1, 1363 Oslo, Norway.

⁽²⁾ European Committee for Standardization (CEN), rue de Stassart 36, B-1050 Brussels, Belgium.

⁽³⁾ Institute of Corrosion Science and Technology (ICorr), P.O. Box 253, Leighton Buzzard, Bedfordshire LU7 1FG United Kingdom.

NACE International Standard Practice (SP0387-2019)

Metallurgical and Inspection Requirements for Cast Galvanic Anodes for Offshore Applications

1.	General	4
2.	Definitions	4
3.	Physical Requirements of Cast Galvanic Anodes	5
4.	Manufacturer Documentation.....	8
	References.....	9

Section 1: General

- 1.1 This standard defines minimum physical quality and inspection standards for cast galvanic anodes for offshore applications.
- 1.2 This standard is applicable to typical offshore platform anode configurations, and although some aspects of the standard may be relevant to all galvanic anodes, it is not intended to apply to bracelet, tank, pipeline, or extruded anodes, or generally to anodes below 50 kg (110 lb) net weight.
- 1.3 This standard is applicable to cast galvanic anodes used on offshore structures, e.g., cast galvanic anodes with circular or trapezoidal cross sections, with length substantially greater than width, and generally of a "stand-off" (having extensions to the steel insert to achieve stand-off) or flush-mounted configuration.
- 1.4 The manufacturer shall be responsible for meeting the quality levels specified in this standard. The user may determine the extent of inspection to be conducted to prove compliance with the quality specified.
- 1.5 The manufacturer shall have a documented quality plan for the manufacture and inspection of cast galvanic anodes, which may be in accordance with ISO⁽⁴⁾ 10005.⁴

Section 2: Definitions

Batch: A group of anodes produced before, between, or after a significant interruption of the casting sequence of a heat of anodes.

Cast Galvanic Anode: A metal that provides sacrificial protection to another metal that is more noble when electrically coupled in an electrolyte. This type of anode is the electron source in one type of cathodic protection.

Certificate of Conformity: A written statement made by the representative (executive) of the manufacturer and endorsed by a representative of the user that the anodes listed comply with the requirements of the purchase order.

Cold Lap: (1) A linear discontinuity with rounded edges at exposed surfaces that is caused by solidification of the meniscus of a partially cast metal or alloy (e.g., an anode used for cathodic protection) as a result of interrupted flow of the casting stream or the joining of two casting streams at too low a temperature. (2) A protective film consisting of one or more coats, applied in a predetermined order by prescribed methods to an as-specified dry film thickness, including any reinforcing material that may be specified.

Cold Shut: Horizontal surface discontinuity caused by solidification of a portion of a meniscus during the progressive filling of a mold, which is later covered with more solidifying metal as the molten metal level rises. Cold shuts generally occur at corners remote from the point of pour.

Cracking: Fracture of a material along a path that produces a linear discontinuity (without complete separation).

Electrochemical Properties: Those properties of potential and current capacity that characterize a galvanic anode and that can be assessed by quantitative tests.

Heat: The product that is cast to a planned procedure in one melting operation in one furnace, without significant interruption. It is also called a melt and defines the molten metal and identifies the anodes cast from it.

Insert: The form over which the anode is cast and that is used to connect the anode to the structure requiring protection. It is sometimes referred to as a core.

Low-Carbon Steel: Steel having less than 0.30 mass percent carbon and no intentional alloying additions.

Nonmetallic Inclusions: Particles of oxides and other refractory materials entrapped in liquid metal during the melting or casting sequences.

Porosity: Generally distributed fine holes caused by gas bubbles, shrinkage (formed by the starvation of eutectic material within the dendrite arms during "unfed" solidification), or a combination of the two mechanisms when hydrogen in solution diffuses into the lower-pressure shrinkage voids.

⁽⁴⁾ International Organization for Standardization (ISO), 1 rue de Varembe, Case Postale 56, CH-1211 Geneva 20, Switzerland.