



**NACE Standard SP0387-2006**  
**(formerly RP0387-99)**  
**Item No. 21036**

## **Standard Practice**

# **Metallurgical and Inspection Requirements for Cast Galvanic Anodes for Offshore Applications**

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## 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 (1) 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 (2) 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 Standard RP0176,<sup>1</sup> and with respect to its limited offshore content, the British Standards Institution (BSI)<sup>(1)</sup> 7361, Part 1.<sup>2</sup>

The manufacturer should have a documented quality plan for the manufacture and inspection of cast galvanic anodes. The content and development of the quality plan and associated documentation is outside the scope of this standard.

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).<sup>(2)</sup> This standard was reaffirmed in 1990, revised in 1999, and reaffirmed in 2006 by Specific Technology Group (STG) 30 on 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, 4th. ed., Paragraph 7.4.1.9. *Shall* and *must* are used to state mandatory requirements. The term *should* is used to state something considered good and is recommended but is not mandatory. The term *may* is used to state something considered optional.

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SP0387-2006

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Standard  
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**Contents**

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

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## 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.

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## 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) Discontinuity caused by solidification of the meniscus of a partially cast anode as a result of interrupted flow of the casting stream. The solidified meniscus is covered with metal when the flow resumes. Cold laps can occur along the length of an anode. (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 metal along an irregular path producing a discontinuity similar to a ragged edge. It can occur during the solidification of an anode (hot cracking), during the contraction of an anode after solidification, or under externally applied loads. Hot cracking may be associated with the shrinkage depression that can occur in open-topped molds.

**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% 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.

**Protrusion:** Extraneous material on the anode surface. It may interfere with the anode-to-structure fit, appear unattractive, and be a safety hazard if there are sharp edges. Protrusions can be formed by careless filling of the mold or the flash from imperfect fitting of mold sections.

**Rimming (Rimmed) Steels:** An incompletely deoxidized steel. Also called *Rimming Steel*. (See ASM<sup>(3)</sup> Handbook, Desk Ed.,<sup>3</sup> for a detailed definition.)

**Rust Discoloration:** A brown bloom of iron oxide.

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<sup>(3)</sup> ASM International (ASM), 9639 Kinsman Rd., Materials Park, OH 44073-0002.