

GENERAL SPECIFICATION

CORROSION

GS EP COR 201

Galvanic anodes according to EN 12496

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1. Scope

The document defines Company requirements regarding the design, the production, the quality and the inspection tests for the supply of galvanic anodes for cathodic protection.

This document supplements or modifies the European Standard [EN 12496](#).

For anode supply in small quantity intended for maintenance operations, such as for process vessel internal anodes replacement, the use of [EN 12496](#) only is acceptable.

2. Reference documents

This document is the TOTAL E&P transposition of the TOTAL S.A. Harmonized GS GR COR 851.

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
ASTM D1141	Standard Practice for the Preparation of Substitute Ocean Water
ASTM E29	Using Significant Digits in Test Data to Determine Conformance with Specifications
ASTM G97	Standard Test Method for Laboratory Evaluation of Magnesium Sacrificial Anode Test Specimens for Underground Application
DNV-RP-B401	Cathodic Protection Design
EN 10204	Metallic products - Types of inspection documents
EN 12496	2013 Edition - Galvanic anodes for cathodic protection in seawater and saline mud
ISO 8501-1	Preparation of Steel Substrates Before Application of Paints and Related Products - Visual Assessment of Surface Cleanliness - Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates After Overall Removal of Previous Coatings



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Reference	Title
NACE TM0190	Impressed Current Laboratory Testing of Aluminium and Zinc Alloy Anodes

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published.

Reference	Title
GS EP COR 401	Installation of anodes on submerged pipelines
GS EP STR 100	Offshore steel structures - General
GS EP STR 101	Design of Offshore jackets and Subsea structures
GS EP STR 901	Design rules and construction standards for ancillary structures of offshore installations

3. Applicability

This specification is applicable to onshore and offshore.

4. Definitions of terms

For the purpose of this document, the following terms and definitions apply:

Company: Any entity of the TOTAL Group mentioned in the contract or the order.

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5. Amendment to [EN 12496](#)

The following requirements for sacrificial anodes design, production, quality and inspection shall be read as a complement to European Standard [EN 12496](#).

§ 1 Scope *(Amended section)*

This document applies to all sacrificial anodes including those for production water, brackish water, fresh or potable water, etc.

§ 4.3.4 Anode consumption rate *(Additional information)*

E anode consumption rate is also called practical mass consumption (kg/A.yr).

Q current capacity is also called electrochemical capacity (A.h/kg).

§ 5.1 General *(Additional section)*

Re-melting of sacrificial alloy shall not be permitted for the anode manufacture.

Anodes shall be packed in such a way that there will be no damage to connecting strips, cables, etc.

§ 5.2 Chemical composition *(Additional section)*

The alloys for sacrificial anodes shall be only as per the compositions indicated below:

- Magnesium alloy:
 - Type **M1** of Annex B (table B 3) of [EN 12496](#)
 - Type **M2** of Annex B (table B 3) of [EN 12496](#).
- Zinc alloys:
 - Type **Z1** of Annex B (table B 5) of [EN 12496](#)
 - Type **Z2** of Annex B (table B 5) of [EN 12496](#)
 - Type **Z4** of Annex B (table B 5) of [EN 12496](#) for specific use in high temperature (above 50°C).
- Aluminium alloys:
 - Type **A3** of Annex B (table B 1) of [EN 12496](#)
 - Type **A4** of Annex B (table B 1) of [EN 12496](#) (proprietary alloy for specific use with low driving voltage requirement).

All the compositions are given in mass percentage.

Concerning the threshold values given in the [EN 12496](#), they shall be considered as the actual limits, i.e.