CLASS PROGRAMME

Type approval

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Sacrificial anode materials - Metallic materials
FOREWORD

DNV GL class programmes contain procedural and technical requirements including acceptance criteria for obtaining and retaining certificates for objects and organisations related to classification.

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Any comments may be sent by e-mail to rules@dnvgl.com

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SECTION 1 GENERAL

1 Introduction

1.1 Objective
The objective of this class programme (CP) is to describe the type approval (TA) scheme for sacrificial anode materials.

The general requirements for obtaining DNV GL type approval certificate is given in class programme DNVGL CP 0388 Type approval scheme

The procedures and requirements described in this CP are applicable for obtaining TA certificate based on requirements given in the Society's rules and standards, and NORSOK Standard M-503 (2007).

Guidance note:
This class programme is not applicable for obtaining EU Marine Equipment Directive (MED) certificates. Visit www.dnvgl.com for information on MED certification.

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1.2 Scope
This CP gives a description of the procedures and requirements related to documentation, design and type testing applicable for TA of sacrificial anode materials.

This CP does not set the design requirements to the sacrificial anode materials. TA is based on compliance with design requirements given in the DNV GL rules and/or other regulations and standards. The CP describes how to document compliance with the requirements in order to obtain a TA certificate for the equipment. This includes, where relevant, technical requirements for how the type tests shall be performed.

A type approval certificate will normally cover one alloy type. Other arrangement may be agreed upon.

This type approval programme does not apply to the approval of anode design or to the anode fastening devices.

A type approval certificate is limited to one manufacturer at one production site.

The following test results will be printed in the type approval certificate:
— test duration
— electrochemical efficiency (Ah/kg) / (protective current capacity)
— closed circuit potential (mV) v.s. Ag/AgCl/seawater / (driving voltage)
— temperature range the approval is valid for.

Type tests as specified in Sec.2 [3], shall be carried out and verified in one of the following ways:
— at a DNV GL laboratory
— at a recognized and independent laboratory or a laboratory accepted by the Society
— at the manufacturer's premises in the presence of a surveyor representing the Society.

1.3 Application
TA of equipment in accordance with this CP is not mandatory but may be used as an alternative to case by case design approvals for equipment to be installed on vessels classed with the Society.

A TA certificate in accordance with this CP will confirm compliance with the requirements specified in [1.1]. The TA certificate will not confirm compliance with requirements in other parts of the rules. In case additional requirements in other parts of the rules shall be covered by the TA certificate, this shall be specified in the application for TA and will be stated in the TA certificate.
2 Documentation

For TA of sacrificial anode materials the following documentation shall be submitted by the manufacturer at initial type approval and updated, at renewal. The documentation shall, to the extent possible, be submitted as electronic files. The manufacturer shall keep one (1) copy of type approval documentation in their own file. The documentation that forms the basis for the TA shall be easily available for the Society's surveyor at the TA applicant's premises. When documentation is submitted in paper format, normally two copies of the documentation shall be submitted to the Society. No documentation will be returned to the company applying for TA.

The documentation shall be in the English language, if not otherwise agreed. (Please number documentation according to below list to facilitate review):

1) type designation, i.e. product/trade names to be included in and stated on the type approval certificate
2) name and address of manufacturer, to be listed on type approval certificate. Additionally, the following shall be specified, if applicable:
   — details for all relevant production places
   — manufacturer’s name
   — mailing address
   — contact person
   — phone and fax number
   — e-mail and web address (if applicable).
3) basis for approval. I.e. applicable rules and standards which the sacrificial anode alloy shall comply with ref. [1.1].
4) product description/specification: a description or data sheet that gives a satisfactory characterization of the anode alloy. The data sheet is at least to include information on:
   — trade name
   — alloy type (aluminium, zinc or other basis)
   — chemical composition including contents (minimum and maximum) of all alloying and impurity elements affecting anode performance
   — closed circuit potential/driving potential to polarise the cathode
   — electrochemical efficiency in Ah/kg of the sacrificial anode alloy materials as regards protective current capacity.
5) field of application and special limitations of the product to be stated in the type approval certificate
6) description of the production equipment and the process employed/fabrication processes including calibration certificates for instruments (if relevant)\(^1\)
7) description of quality control arrangement including copies of the relevant certificates with issue number and/or date (e.g. quality management system certification)
8) test results (from tests already carried out for quality control, e.g. short term testing according to DNVGL RP B401 App.B) with references to standards, methods, calibration certificates of instruments used in testing etc.
9) information regarding marking of the product or packaging \(^2\)
10) overview of test and measuring equipment, including calibration certificates\(^2\)
11) in-service experience, from use in same or similar operating environment, if available
12) witnessed type test results and initial assessment report by Society's local office shall be submitted when completed.

\(^{1}\) To be verified by initial survey (renewal survey when relevant) prior to the issuance of the type approval certificate
\(^{2}\) to be verified by surveyor during type testing
SECTION 2  GENERAL REQUIREMENTS

1 Design requirements
The sacrificial anode materials shall comply with the relevant requirements of the following publications:
  — DNV GL offshore standard, DNVGL OS C101
  — DNV GL offshore standard, DNVGL OS F101
  — DNV-RP-B401, Cathodic Protection Design

2 Requirements to production and quality control arrangement
The manufacturer should have a quality system that meets ISO 9001 standards, or equivalent. If this quality standard is not fulfilled, the extent of type testing and assessments will be specially considered.
The quality control arrangement will particularly be checked with respect to:
  — control and identification of incoming raw materials
  — test equipment, test methods, test samples and reference to standards used
  — treatment of anode inserts and cables
  — quality control tests on chemical composition
  — weight and dimensional control
  — surface condition of produced anodes
  — traceability and marking system
  — production test reports/records
  — production record
  — system for issuing material certificates
  — storage condition and procedure
  — etc.

3 Requirements to material

3.1 Extent of type tests
Representative samples of the sacrificial anode alloy shall be selected from production or storage by the surveyor during initial assessment for further type testing. Further details regarding the number and shape of samples to be collected is given in [3.2].
Type testing is required in order to obtain the electrochemical efficiency of the sacrificial anode alloy material as regards protective current capacity (Ah/kg).
The type testing is based on long term (normally 12 months) testing submerged in seawater according to a recognised test procedure, e.g. DNVGL RP B401 App.C.
Other test procedures may be used subject to an agreement with the Society prior to testing.
The closed circuit potential, electrochemical efficiency, corrosion pattern and susceptibility to passivity shall be documented.
The chemical composition of the test samples shall be checked to ensure that it is according to the specification.

3.2 Test procedures
A detailed description of the test parameters is given in DNVGL RP B401 App.C.
The assigned test laboratory shall submit their test procedures to the Society for review prior to starting the testing.

3.2.1 Specimens for testing
Test specimens shall be machined to a cylindrical shape, as given in DNVGL RP B401 App.C [12.2.3]. As cast specimens may be considered for alloys requiring heat treatment. However, no heat treatment of the casting is allowed for Zn and Al-Zn-In anode materials. The sampling shall be made from an anode with a weight min 30% of the max. weight of anode to be qualified (see DNVGL RP B401 App.C [12.2.1]).

3.2.2 Number of specimens
Minimum 5 specimens of each heat/batch to be documented shall be tested.

3.2.3 Chemical composition
The chemical composition of the test specimens shall be representative for the anode specification given by the manufacturer.
In case manufacturer has specified e.g. min 2.5% Zn, min 0.010% In and max. 0.090% Fe for an Al-based material, then the Zn and In contents of the material to be tested shall be reasonable close to the min contents of alloying elements (Zn, In) and max contents of impurity elements (e.g. Fe) respectively (see DNVGL RP B401 App.C [12.2.2]).
TA may be given on either composition mentioned in the listed standard(s) or based on a composition that the manufacturer has developed.
The chemical composition to be used for type testing shall be accepted by the Society before testing is started and confirmed to be representative for the chemical composition (according to data sheet or other relevant manufacturer data).

3.2.4 Testing environment
The testing environment, especially temperature and salinity, shall be according to DNVGL RP B401 App.C. If the testing environment differs substantially from the requirements given in this appendix, this will be noted on the type approval certificate.

4 Requirements to marking of product
The anodes shall be marked. The marking shall at least include the following information:
— anode type and denomination (full product name or short version of product name) to be stamped on each anode
— the manufacturer's name and address or trade mark shall be traceable either from the above anode type denomination or from a separate stamp
— production batch number/ identification
— production date, if applicable.
The marking shall be carried out in such a way that it is visible, legible and indelible. The marking of product shall enable traceability to the Society's type approval certificate.
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