Coating systems for protection of propeller shafts - Non-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@dnvg.com

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CHANGES – CURRENT

This is a new document.
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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 coating systems for protection of propeller shafts.

The general requirements for obtaining DNV GL type approval certificate is given in class programme DNVGL CP 0338 Type approval scheme.

The procedures and requirements described in this CP are applicable for obtaining the Society’s TA certificate based on requirements given the Society's rules and standards, e.g.:

- RU SHIP Pt.7 Ch.1 Sec.1 [1.6.6]
- RU SHIP Pt.4 Ch.4 Sec.1 [6.1.3]

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 coating systems for protection of propeller shafts.

This CP does not set the design requirements to the coating systems for protection of propeller shafts. TA is based on compliance with design requirements given in the rules and/or other regulations and standards. The CP describes the applicable requirements and 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.

The Society’s type approval certificate will cover one grade of the actual product with the possibility to include variants.

For a coating system this means:

- grade: full coating system, including one or more coats (as per system definition)
- variants: colour variants, thinned variants and similar.

The Society's type approval certificate is normally limited to one manufacturer at one production site, however, other arrangements may be agreed upon with the Society.

The approval is solely connected to the corrosion prevention properties of the coating system. The approval does not include any evaluation of toxicity, contamination, pollution, or fire technical properties.

Type tests as specified in Sec.2 [3], are to be carried out and verified in one of the following ways:

- at a DNV GL laboratory
- at an accredited and independent laboratory accepted by the Society
- at the manufacturer's premises in the presence of a surveyor.

The type test results shall be submitted to the Society for evaluation, in form of a test report according to ISO 17025 and the additional requirements of the relevant test standard.

1.3 Application

RU SHIP Pt.4 Ch.4 Sec.1 [6.1.3] require that coating systems for protection of propeller shafts shall be type approved by the Society in accordance with this CP for equipment to be installed on classed vessels.
A TA certificate in accordance with this CP will confirm compliance with the requirements in the rules as specified in RU SHIP Pt.4 Ch.4 Sec.1 [6.1.3]. 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 References
Standard referred to in this document:

3 Documentation
For TA of coating systems for protection of propeller shafts 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 must be easily available for surveyors 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 name (grade) with list of variants 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:
   — 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. A reference to applicable rules and standards, which the product shall comply with
4) product description (number and type of components, colour, consistence, etc.)
5) field of application and special application limitations of the product (temperature (dry and wet conditions), dry film thickness, number of coats, compatibility between different layers/coats, protection from corrosion, resistance to bending and impact, resistance to erosion/abrasion, etc.)
6) product specification, including technical data sheets (TDS) and material safety data sheets (MSDS), with relevant product information, including required transitions limitations
7) application instructions; surface preparation (blasting and profile standard), maximum level of water soluble salts, cleanliness (rust, grease, dust, salt, oil contamination), climatic conditions (temperature, humidity), ventilation requirements, curing times, dry-to-recoat intervals etc.
8) procedures for in-service maintenance or repair (if relevant)
9) description of production processes, including standard operating procedures (SOP)¹
10) description of quality assurance system or copy of ISO 9001 certificate¹
11) quality plan for material intended to be installed on board ships¹

¹ will be verified during initial type approval assessment prior to the issuance of the type approval certificate
12) test results (from tests already carried out) with references to standards, methods etc.
13) information regarding marking of the product or packaging
14) any relevant certificates with their issue number and/or date (e.g. quality management system certificate)
15) overview of test and measuring equipment, including calibration certificates
16) in-service experience, if available
17) witnessed type test results and initial assessment report by the Society shall be submitted when completed.

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\(^2\) will verified by surveyor during type testing
SECTION 2 REQUIREMENTS

1 Design requirements

The coating systems for protection of propeller shafts shall comply with the relevant requirements of the Society's rules and standards, see Sec.1 [1.1].

The protection arrangement that is covered by this class programme will be limited to synthetic coating systems, and typically consist of:

— a layer of a soft or flexible synthetic coating, plus
— a single or multiple layers of synthetic coating with reinforcements (e.g. glass fibre, glass flake, synthetic cloths).

Other arrangements based on synthetic coatings or resins may also be accepted for type approval.

The type approval comprises the various components of the coating system, both in liquid condition and in the condition when applied in full compliance with the coating manufacturer's recommendations (see Sec.1 [3], item 3-5).

Quality control during surface preparation and application of the coating system in the workshop is, however, not included in the type approval. It is recommended that all steps of the surface preparation and the coating process are well documented (e.g. daily logs, non-conformity reports) and made available for possible review and/or follow up by interested parties.

The type approval certificate is invalid if the formulation of the coating system is changed to a degree deemed significant by the Society.

The applicant/coating manufacturer(s) shall inform the Society about changes to technical data sheets (TDS) and material safety data sheets (MSDS) with basis in formulation changes as well as significant changes in the application procedures (e.g. changes in the maximum or minimum coating interval).

2 Requirements for 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 in production will be checked with respect to:

— control of incoming materials
— scope of quality control, i.e. proof that test methods, test quantity and test equipment complies to the applicable standard EN or ISO
— traceability and marking system
— production records
— storage condition and procedure.

3 Requirements for material

3.1 General

The coating system including any variants is to be defined and documented as described under Sec.1 [3] above.

Surface preparation, cleanliness, salt concentration, steel profile/roughness and climatic conditions required during coating process are to be specified in the technical data sheets (TDS) and these should be sufficient to assure that the coating, applied according to these instructions, can serve its purpose as corrosion protection for the propeller shaft satisfactorily. As a minimum the following properties shall be verified by testing:

1) resistance to corrosion
2) adhesive strength
3) resistance to cathodic disbonding
4) tensile strength
5) flexural strength.

Prior to performance testing, the test procedures shall be agreed with the Society. Further tests may be required depending on sort of coating system.

Instructions for maintenance and repair of the coating system shall be given by the coating manufacturer.

3.2 Fatigue testing

The applied coating or coating system must be good enough to tolerate the same loads as the steel shaft, i.e. it must be assured that the coating will not crack under regular loads. In case of single or multiple layers of e.g. hard epoxy-based coatings the fatigue properties must be documented, either by testing or calculations.

3.3 Testing of final coating system

The coating manufacturer shall specify the required tests to be performed after application of the full coating system, to ensure that the overall quality set by the coating manufacturer is met.

4 Requirements for marking of product

The package shall be marked. The marking shall at least include the following information:

— manufacturer’s name and address or trade mark
— production plant
— product name (grade)
— storage instruction
— production date
— batch number
— quality guarantee period, if any.

The marking is to 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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