Shop primers for corrosion protection of steel plates and sections
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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Changes – Current

This is a new document.
SECTION 1 GENERAL

1 Introduction

1.1 Objective

The objective of this class programme (CP) is to describe the type approval (TA) scheme for shop primers for corrosion protection of steel plates and sections.

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

The production site may be qualified and certified through the approval of manufacturer (AoM) scheme in accordance with DNVGL CP 0425.

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, e.g. RU SHIP Pt.2 Ch.4 Sec.6.

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 shop primers for corrosion protection of steel plates and sections.

This CP does not set the design requirements to the shop primers for corrosion protection of steel plates and sections. TA is based on compliance with design requirements given in the 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 cover one grade of the actual product with the possibility to include variants. For shop primers this means:

— grade: the basis of a shop primer, e.g. zinc epoxy, zinc silicate, iron oxide and percentage (%) level of zinc
— variants: colours, pigments and additives.

This type approval concerns only the verification that the shop primer has no detrimental effect on the finished weld.

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

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

— at a Society's 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.

1.3 Application

DNV GL rules RU SHIP Pt.2 Ch.4 Sec.6 require that shop primers for corrosion protection of steel plates and sections are type approved in accordance with this CP 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 in the Society’s rules as 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.

1.4 Renewal

Provided an approval of manufacturer certificate (see DNVGL CP 0425 Manufacturer of Fibre Reinforcements) which is still valid for at least one year is available, an exemption from the obligation concerning retention and renewal surveys listed in the class programme DNVGL CP 0338 Type Approval scheme will typically apply.

2 References

Standards referred to in this document:
— DVS 0501:1976-03, Testing of pore-forming tendency when overwelding production coatings (FB) on steel
— DASt-Richtlinie 006, Überschweissen von Fertigungsbeschichtungen im Stahlbau (Deutscher Ausschuss für Stahlbau DAST)

3 Documentation

For TA of shop primers for corrosion protection of steel plates and sections the following additional 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 Society’s 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.

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) basis for approval. A reference of applicable rules and standards which the product is to comply with, see [1.1]
3) product description: number of components, characteristic pigment, binder base, etc.
4) field of application and special limitations of the product
5) product specification, data sheet giving principal characteristics of the shop primer e.g. shelf life, thickness of primer, curing and drying conditions, inspection procedure etc.
6) description of fabrication processes
7) description of quality control arrangement
8) test results (from tests already carried out) with references to standards, methods etc., if applicable
9) information regarding marking of the product or packaging
10) in-service experience, if available
11) type test results and initial assessment report shall be submitted when completed (see Sec.2 [3]).

1 to be verified by initial assessment prior to the issuance of the Type Approval Certificate
SECTION 2 REQUIREMENTS

1 Design requirements
The shop primers for corrosion protection of steel plates and sections shall comply with the relevant requirements of the following publications:

— RU SHIP Pt.2 Ch.4 Sec.6.
— offshore standard, DNVGL OS C101
— offshore standard, DNVGL OS C401.

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 be particularly be checked with respect to:

— control of incoming materials
— test equipment, test methods, test samples and reference to standards used
— traceability and marking system
— production test reports, production record
— storage conditions and procedures.

3 Requirements to material

3.1 Extent of type tests
A representative sample of the shop primer including thinner to be selected from production or storage by the Society's surveyor during initial assessment at the manufacturer for further type testing. Type testing of the shop primer’s pore-forming tendency is to be carried out according to one of the test methods described below.

Tests carried out to the guideline DVS 0501 (replaced by ISO 17652 standards in 2007) may still be accepted provided formulation of the shop primer has remained unchanged since the time of testing.

If requested by the manufacturer the type approval may also include trace gas measurements during flame cutting of plates coated with shop primer, in accordance with ISO 17652-4.
### Table 1 Type Testing of the shop primers pore-forming tendency

<table>
<thead>
<tr>
<th>Property</th>
<th>Test methods ¹)</th>
<th>Number and selection of test specimens</th>
<th>Acceptance Criteria ²)</th>
<th>Definition of value</th>
<th>Level of verification</th>
<th>Frequency of verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pore-forming tendency of the shop primer. The amount of pores after welding which might impair the mechanical properties.</td>
<td>The Society’s shop primer test procedure (described below) or ISO 17652-2, or guideline (DVS 0501 (March 1976))</td>
<td>1 litre of shop primer including thinner 2 specimens cut from one test assembly as shown in Figure 3 or 8 specimen</td>
<td>Maximum 15% pores as an average over the full 200 mm length of weld.</td>
<td>The maximum pore diameter/length, percentage of porosity and through-thickness pores are to be reported. The fracture must occur along the centre of the weld (not along the fusion line), if this is not the case the specimen must be rejected.</td>
<td>— Society’s laboratory — witnessed by the Society at manufacturer — independent laboratory</td>
<td>Type approval assessment</td>
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<td>≤ 125 mm² area of pores per specimen (i.e. max. 16%)</td>
<td>Mean total pore area per specimen. other requirements as per the standard</td>
<td>— Society’s laboratory — witnessed by the Society at manufacturer — independent laboratory</td>
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</tbody>
</table>

¹) Other standards may be agreed upon with the Society prior to testing

²) See Figure 1.
3.2 DNV GL shop primer test procedure

1) Two steel plates (300 × 100 × 15 mm) of grade VL E36 or equivalent are blast cleaned prior to spraying of primer to a thickness of x mm (specified as the maximum/mean thickness recommended by the manufacturer), on one side of each test plate.

2) After the curing of the primer (as specified by the manufacturer) the plates are placed in a welding jig, as shown in Figure 2. The plates are to be kept in position by using a uniform applied force of
approximately 15 kN. An approximate 300 mm long single pass fillet weld with approximately 4 mm throat thickness \((a=4 \text{ mm})\) is deposited between the two plates as shown in Figure 2.

3) The welding is to be performed in the flat position (PA) using a rutile type flux core wire with diameter 1.2 mm. The wire shall be classified as low hydrogen (H5) using M21 (5-25% CO\(_2\) + Ar) shielding gas. The wire shall not be a type purposely developed for welding on shop primed steel.

4) After completion of the welding, the test assembly is to be sectioned into two (2) equal test specimens with a length of 100 mm each, as shown in Figure 3. The two centre sections are to be break tested by bending the specimen until rupture occur in the fillet weld, see Figure 4. The two end sections (start/stop area) are to be discarded. The fracture must occur along the centre of the weld (not along the fusion line), if this is not the case the specimen must be rejected.

5) The fracture faces from the break test specimens are to be examined using a projector giving minimum 5 X magnification, or visually if considered sufficient. The maximum pore diameter and percentage of porosity are to be reported. The maximum acceptable amount of pores is 15% as an average over the full 200 mm length of weld.

Figure 2 Plates in welding jig

Figure 3 Welding in flat position (PA), a single pass fillet weld with approximately 4 mm throat thickness \((a=4\text{mm})\)
Figure 4 It is advised that the test assembly is sectioned into two (2) equal test specimens with a length of 100 mm each, in order to avoid splitting at fusion line.

Figure 5 Bend testing by bending the specimens until rupture occurs in the fillet weld.

4 Requirements to marking of product

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

— manufacturer’s name and address or trade mark
— production plant/place of manufacture
— type designation/product name
— production date/batch no
— storage instruction/shelf life (if relevant).

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.
CHANGES – HISTORIC

There are currently no historical changes for this document.
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