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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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 Transformers power and measurement.

For a description of the Society’s type approval scheme in general and further information on general conditions and procedures for obtaining the Society's TA certificate, see the Society's document 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 in:
— DNV GL rules for classification - Ships RU SHIP Pt.4 Ch.8 Electrical installations
— DNV GL offshore standard OS D201 Electrical installations
— tDNVGL CG 0339 Environmental test specification for electrical, electronic and programmable equipment and systems.

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.

1.2 Scope
This CP gives a description of the procedures and requirements related to documentation, design and type testing applicable for TA of Transformers - power and measurements.

This CP does not set the design requirements to the Transformers - power and measurement. TA is based on compliance with design requirements given in the rules and/or other regulations and standards. The CP describes the applicable design 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.

1.3 Application
TA of equipment in accordance with this CP is not mandatory.

A TA certificate in accordance with this CP will confirm compliance with the requirements in the 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.

2 Documentation
For TA of Transformers the following documentation shall be submitted:
1) main drawings for assembled transformers
2) references to design standards, rules, specifications etc.
3) specification of applied material for enclosure and insulation
4) test reports (from tests already carried out, if any)
5) applicant’s proposal to product sample test and routine test
6) documentation of reliability and endurance on board ships and offshore units, if any
7) special operational limitations
8) field of application:
   — power transformer
   — current transformer
   — voltage transformer
   — instrument transformer.
9) list of type designations for each variant
10) construction details:
    — voltage
    — power
    — temperature class
    — insulation class
    — enclosure (IP) class
    — explosion protection + certificate from recognised test laboratory.
    — special properties, if any.
11) test program, which as a minimum includes the elements as per Sec.3. The test program shall refer to
    the relevant IEC standards for each test
12) application for type approval form 90.01a.
SECTION 2 PRODUCT REQUIREMENTS

1 Design requirements
The transformer shall comply with the relevant requirements of the following publications in its latest edition including amendments:

— DNV GL rules for classification - ShipsRU SHIPS Pt.4 Ch.8
— DNV GL offshore standards OS D201
— DNVGL class programmeCG 0339
— IEC 60092-303, Part 303 - Equipment - Transformers for power and lighting
— IEC 60076-1, Part 1 - Power transformers - General
— IEC 60076-11, Part 11 - Dry type transformers
— IEC 61869-1, Part 1 - General requirements
— IEC 61869-2, Part 1 - Additional requirements for current transformers
— IEC 61869-3, Part 3 - Inductive voltage transformers
— IEC 61869-4, Part 4 - Additional requirements for combined transformers.

1.1 Test requirements
The testing is divided into:

— visual inspection
— electrical/mechanical tests
— environmental tests.

1.2 Visual inspection
By visual inspection, it shall be verified that the test sample is in conformity with the approved plans.

1.3 Electrical/mechanical tests
The tests shall be according to the relevant parts of the following Table of tests in Sec.3 Table 1.
The transformers are divided into two categories:

Category 1 comprising a new design where complete test program is required
Category 2 comprising transformers of different power sizes, where power variations take place within same basic design and frame size, by changing magnetic core length and number of windings

1.4 Environmental tests
Tests related to endurance and reliability of the product on board ships, e.g. vibration test, should take account of the environmental strains on board vessels.
## SECTION 3 TEST REQUIREMENTS

### 1 General

### Table 1 Table of tests

<table>
<thead>
<tr>
<th>No.</th>
<th>Task</th>
<th>Specification of tests</th>
<th>TT CAT.1</th>
<th>RT CAT.1</th>
<th>TT CAT.2</th>
<th>RT CAT.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Visual inspection</td>
<td>RU SHIP Pt.4 Ch.8 Sec.6</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B.</td>
<td>Electrical/mechanical tests</td>
<td>See Sec.2[1.2]</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

#### I. Power transformers

| BI.1 | Temperature test at full load           | IEC 60076-11 Cl. 23                    | X        |        |        |        |
| BI.2 | Measurement of wind. resistance         | IEC 60076-11 Cl. 15                    | X        | X        | X        | X        |
| BI.3 | Measurement of voltage ratio and vector | IEC 60076-11 Cl. 16                    | X        |        |        |        |
| BI.4 | Measurement of impedance voltage, short circuit imp. and load loss | IEC 60076-11 Cl. 17 | X | X | X | X |
| BI.5 | Measurement of no-load loss and current | IEC 60076-11 Cl. 18 | X | X | X | X |
| BI.6 | Dielectric tests                         | IEC 60076-11 Cl. 19 & 20, IEC 60076-3 | X        | X        | X        | X        |
| BI.7 | Measurement of voltage drop             | RU SHIP Pt.4 Ch.8 Sec.6                | X        |        |        |        |
| BI.8 | Measurement of insulation. resistance   | RU SHIP Pt.4 Ch.8 Sec.6                | X        | X        | X        | X        |

#### II. Current transformers (rated frequencies from 15 Hz to 100 Hz)

| BII.1 | Short time current test                  | IEC 61869-2 Cl. 7.2.201               | X        |        |        |        |
| BII.2 | Temperature rise test                    | IEC 61869-2 Cl. 7.2.2                 | X        |        |        |        |
| BII.3 | Impulse test of primary winding          | IEC 61869-2 Cl. 7.2.3                 | X        |        |        |        |
| BII.4 | Electromagnetic Compatibility Test       | IEC 61869-2 Cl. 7.2.5                 | X        |        |        |        |
| BII.5 | Test for accuracy                        | IEC 61869-2 Cl. 7.2.6                 | X        | X        |        |        |

#### III. Inductive voltage transformers (rated frequencies from 15 Hz to 100 Hz)

| BIII.1 | Short time current test                  | IEC 61869-3 Cl. 7.2.301               | X        |        |        |        |
| BIII.2 | Temperature rise test                    | IEC 61869-3 Cl. 7.2.2                 | X        |        |        |        |
| BIII.3 | Impulse test of primary winding          | IEC 61869-3 Cl. 7.2.3                 | X        |        |        |        |
| BIII.4 | Electromagnetic Compatibility test       | IEC 61869-3 Cl. 7.2.5                 | X        |        |        |        |
| BIII.5 | Test for accuracy                        | IEC 61869-3 Cl. 7.2.6                 | X        | X        |        |        |

TT = Type Test  
RET = Routine Test
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