SERVICE SPECIFICATION

DNVGL-SE-0436 Edition April 2018

Shop approval in renewable energy
FOREWORD

DNV GL service specifications contain procedural requirements for obtaining and retaining certificates and other conformity statements to the objects, personnel, organisations and/or operations in question.

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**CHANGES – CURRENT**

This document supersedes the March 2016 edition of DNVGL-SE-0436. Changes in this document are highlighted in red colour. However, if the changes involve a whole chapter, section or sub-section, normally only the title will be in red colour.

**Changes April 2018**

**Table Detailed list of changes**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Reference (Identification of paragraph)</th>
<th>Reason for the change</th>
</tr>
</thead>
<tbody>
<tr>
<td>General update of the section as described in detail below, renaming section title</td>
<td>Sec.1</td>
<td></td>
</tr>
<tr>
<td>Additional/adapted terms and definitions according to Table 1-4</td>
<td>Table 1-4</td>
<td>explanation of wording used within service specification</td>
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<tr>
<td>Updated table for DNV GL documents</td>
<td>Table 1-1</td>
<td>need for update and adaption due to obsolete references, new standards available</td>
</tr>
<tr>
<td>Updated table for EN/ISO documents</td>
<td>Table 1-2</td>
<td>need for update and adaption due to additional references within service specification</td>
</tr>
<tr>
<td>General update of the section as described in detail below</td>
<td>Sec.2</td>
<td></td>
</tr>
<tr>
<td>Listing of required documentation in combination with additional description, listing of scope of on-site inspection in combination with additional description</td>
<td>[2.1]</td>
<td>establish one section with required generic documentation and generic scope of on-site inspection</td>
</tr>
<tr>
<td>General scope and additional description moved to [2.1], but component specific requirements remain within section, change of headline to “Production and repair of...”, reduced validity time for certificate of two years and limited number of team leaders covered by on-site inspection for production and repair of rotor blades and other FRP components</td>
<td>[2.2]</td>
<td>avoid repeatedly wording within current section, improve quality control during production and repair of rotor blades and other FRP components</td>
</tr>
<tr>
<td>General scope and additional description moved to [2.1], but component specific requirements remain within section, small editorial change in the wording</td>
<td>[2.3]</td>
<td>avoid repeatedly wording within current section</td>
</tr>
</tbody>
</table>


<table>
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<tr>
<th>Topic</th>
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<td>[2.4]</td>
<td>avoid repeatedly wording within current section</td>
</tr>
<tr>
<td>General scope and additional description moved to [2.1], but component specific requirements remain within section</td>
<td>[2.5]</td>
<td>avoid repeatedly wording within current section</td>
</tr>
<tr>
<td>New section for the production of electrical components</td>
<td>[2.6]</td>
<td>pending industry guidance for current example</td>
</tr>
<tr>
<td>New section for the production of power cables</td>
<td>[2.7]</td>
<td>pending industry guidance for current example</td>
</tr>
<tr>
<td>New section for the testing of materials and components</td>
<td>[2.8]</td>
<td>pending industry guidance for current example</td>
</tr>
<tr>
<td>Modified certificate example</td>
<td>App.A</td>
<td>consideration of latest publication date of service specification</td>
</tr>
</tbody>
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**Editorial corrections**

In addition to the above stated changes, editorial corrections may have been made.
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SECTION 1 GENERAL

1.1 Introduction

This service specification (SE) specifies DNV GL’s services for shop approval at wind turbine component suppliers. It serves as a:

— guidance for manufacturers/developers/owners for DNV GL service specification for shop approval
— common communication platform for describing the scope and extent of activities performed for shop approval
— contractual basis for the service Shop Approval.

The service specification is divided into:

— Sec.1 provides the procedural information of the shop approval services covered by this specification for wind turbine component suppliers in order to achieve a shop approval certificate. In particular, deliverables needed for a shop approval are defined.
— Sec.2 describes the services in detail, where the general scope in combination with examples for individual disciplines are given in:
  — [2.1] General
  — [2.2] Production and repair of rotor blades and other fibre reinforced plastic components
  — [2.3] Production of machinery components
  — [2.4] Production of steel structures
  — [2.5] Production of grout material
  — [2.6] Production of electrical components
  — [2.7] Production of power cables

Based on [2.1] and the principle structure of the single disciplines above, the service specification may be applied for other disciplines.

The DNV GL document system is organized according to a three-level document hierarchy, with these main features:

— service specifications (SE): DNV GL service specifications contain procedural requirements for obtaining and retaining certificates and other conformity statements to the objects, personnel, organisations and/or operations in question
— standards (ST): DNV GL standards contain requirements, principles and acceptance criteria for objects, personnel, organisations and/or operations
— recommended practices (RP): DNV GL recommended practices contain sound engineering practice and guidance.

Guidance note:
The latest revision of all DNV GL documents may be found in the list of publications on the DNV GL website www.dnvgl.com/rules-standards/

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1.2 Objective

It is the objective of the DNV GL shop approval described in this service specification to detail and clarify the activities necessary to verify compliance with the state-of-the-art of the shop, inspection methods and production procedures being audited. The service specification has been written with the aim to provide a flexible and modular concept, to address individual needs, and to reduce the costs for the manufacturing process without compromising the added value and quality.
The DNV GL shop approval is aligned with several standards but has:

— shorter update cycles to meet the latest state-of-the-art
— more guidance and descriptions to facilitate the application
— rephrased DNV GL requirements for clarity
— additional options offered
— flexible concept to address and cope with specific project needs.

Depending on the specific individual interests and the agreed scope, the key benefits from applying this service specification may be, among others:

— possible reduction of efforts during inspections and audits
— possible reduction of amount of manufacturing certification/evaluation during type certification
— possible reduction of amount of manufacturing surveillance during project certification
— confirmation of requirements as stated by project developers, investors, operators, original equipment manufacturers (OEM), governmental and non-governmental organisations prior to contract award
— building of trust in the design and construction (confidence in technical integrity) – quality management
— proving that 3rd party approval is performed to investor or insurer
— supporting sustainable energy production throughout life-cycle of components
— facilitating better risk assessment for insurance
— minimising financial project risks by proven qualification for producing high demanding components
— increasing reliability in the governmental’ and consumers’ interests
— reducing risks to environment and people
— avoiding or reducing damages.

Consequently, if a workshop holds a DNV GL shop approval this may provide a benefit during component, type or project certification.

1.3 Scope

The certification concept for shop approval provides evidence to stakeholders that a manufacturer has demonstrated verifiable capability for the manufacturing process. Capability is relative to an approved scope of work to comply with a set of requirements identified as being critical for the respective processes. This service of shop approval certifies that a workshop operates with approved production facilities, working procedures, quality management system, methods and qualified staff. DNV GL assesses and verifies the customer’s capability to manufacture wind turbine components in compliance with national as well as international standards and guidelines or acknowledged methods.

The DNV GL shop approval is independent from component, type or project certification and is always workshop specific. It consists of the two main elements general document review and on-site inspection. The general document review includes evaluation of the general quality documentation, e.g. specifications and procedures for manufacturing purposes. As part of the shop approval an on-site inspection of the workshop facilities and relevant associated manufacturing or inspection methods and quality processes is performed. Furthermore, validity check of equipment being used as well as skills of staff is covered by this service. The service specification also describes conditions for maintaining the shop approval.

1.4 Application

A shop approval certificate may be granted for a workshop for production, manufacturing or maintaining of components, materials respective inspection methods and general procedures related to renewable energy.

1.5 References

This document makes reference to relevant DNV GL documents. Unless otherwise specified in the certification agreement or in this service specification, the latest valid revision of each referenced document applies.
Table 1-1 DNV GL documents

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNVGL-OS-C401</td>
<td>Fabrication and testing of offshore structures</td>
</tr>
<tr>
<td>DNVGL-SE-0073</td>
<td>Project certification of wind farms according to IEC 61400-22</td>
</tr>
<tr>
<td>DNVGL-SE-0074</td>
<td>Type and component certification of wind turbines according to IEC 61400-22</td>
</tr>
<tr>
<td>DNVGL-SE-0190</td>
<td>Project certification of wind power plants</td>
</tr>
<tr>
<td>DNVGL-SE-0441</td>
<td>Type and component certification of wind turbines</td>
</tr>
<tr>
<td>DNVGL-ST-0076</td>
<td>Design of electrical installations for wind turbines</td>
</tr>
<tr>
<td>DNVGL-ST-0126</td>
<td>Support structures for wind turbines</td>
</tr>
<tr>
<td>DNVGL-ST-0145</td>
<td>Offshore substations</td>
</tr>
<tr>
<td>DNVGL-ST-0359</td>
<td>Subsea power cables for wind power plants</td>
</tr>
<tr>
<td>DNVGL-ST-0361</td>
<td>Machinery for wind turbines</td>
</tr>
<tr>
<td>DNVGL-ST-0376</td>
<td>Rotor blades for wind turbines</td>
</tr>
<tr>
<td>DNVGL-ST-C502</td>
<td>Offshore concrete structures</td>
</tr>
<tr>
<td>DNVGL-RU-SHIP-Pt2</td>
<td>DNV GL rules for classification: Ships - Part 2 Materials and welding</td>
</tr>
<tr>
<td>GL-II-2</td>
<td>GL rules and guidelines - II Materials and Welding - Part 2: Non-metallic Materials</td>
</tr>
<tr>
<td>GL-IV-1</td>
<td>GL Rules and Guidelines - IV Industrial Services - Part 1: Guideline for the Certification of Wind Turbines</td>
</tr>
</tbody>
</table>

Table 1-2 External documents

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSH no. 7005</td>
<td>Standard Design of Offshore Wind Turbines</td>
</tr>
<tr>
<td>ISO 9000</td>
<td>Quality management systems – Fundamentals and vocabulary</td>
</tr>
<tr>
<td>ISO 9001</td>
<td>Quality management systems – Requirements</td>
</tr>
<tr>
<td>ISO/IEC 17025</td>
<td>General requirements for the competence of testing and calibration laboratories</td>
</tr>
</tbody>
</table>

1.6 Definitions and abbreviations

1.6.1 Definition of verbal forms

Table 1-3 Definitions of verbal forms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>shall</td>
<td>verbal form used to indicate requirements strictly to be followed in order to conform to the document</td>
</tr>
</tbody>
</table>
### 1.6.2 Definition of terms

#### Table 1-4 Definition of terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>application form</td>
<td>template form provided by DNV GL to the customer</td>
</tr>
<tr>
<td></td>
<td>The purpose of this form is to gain first technical information about the workshop. This form may differ between the single disciplines as stated in Sec.2 and has to be filled out by the customer.</td>
</tr>
<tr>
<td>asset</td>
<td>used in the context of wind farm projects to describe the project or object to be developed, manufactured and maintained</td>
</tr>
<tr>
<td></td>
<td>In this service specification the term refers to either wind turbines with support structures or the offshore substation with topside and support structure.</td>
</tr>
<tr>
<td>certification</td>
<td>third-party issue of a statement that, based on a decision following review, fulfilment of specified requirements has been demonstrated related to products, processes or systems (ISO 17000)</td>
</tr>
<tr>
<td>certification report</td>
<td>document issued by DNV GL summarizing results of general document review as well as on-site inspection</td>
</tr>
<tr>
<td>certificate</td>
<td>document signed by DNV GL and affirming that, at the time of assessment, the asset, component or workshop referred into the certificate met the requirements stated in the normative documents</td>
</tr>
<tr>
<td>component</td>
<td>main part of an asset</td>
</tr>
<tr>
<td></td>
<td>In this service specification, the term refers to rotor–nacelle-assembly, part of the support structure of the wind turbine (tower, sub-structure and foundation), topside equipment, and parts of support structure for substation (topside structure, sub-structure and foundation).</td>
</tr>
<tr>
<td>customer</td>
<td>DNV GL's contractual partner</td>
</tr>
<tr>
<td>foundation</td>
<td>part of the support structure for a wind turbine or substation that transfers the loads acting on the structure into the soil</td>
</tr>
<tr>
<td>general document review</td>
<td>documentation review with focus on project and/or component independent requirements</td>
</tr>
<tr>
<td></td>
<td>The general document review includes the evaluation of the specifications and procedures for manufacturing purposes.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
</tr>
</tbody>
</table>
| initial audit | manufacturing surveillance for project certification  
During this single inspection the general qualification of the manufacturer and the critical manufacturing processes with respect to the component will be audited. |
| inspections | regular witnessing process during the manufacturing of a component or parts of it |
| inspection and test plan | document defining inspection and test scope as well as responsibilities for related parties |
| on-site inspection | a single inspection to be carried out at a workshop or for a process which shall be approved |
| optional services | services which are not part of the scope required in order to obtain a certification report and a shop approval certificate |
| outstanding issue | deviation from standards and technical requirements specified in the certification agreement, and which needs to be completed for full compliance in order to obtain a shop approval certificate  
Outstanding issues will be identified within the certification report. |
| recommendation | non-mandatory advice |
| routine test | test to which each individual component is subject to testing during or after manufacturing |
| shop approval | independent verification of a workshop for production, manufacturing and repair of components, materials and methods as well as general procedures related to renewable energy |
| specific document review | review in addition to the general document review considering design specific requirements |
| substation | transformer stations or converter stations or platforms, with or without accommodations  
In general, whenever the term is used in this service specification, it describes the substation including the support structure, as this is the power transferring unit. |
| sub-structure | part of the support structure for a wind turbine which extends upwards from the soil and connects the foundation and the tower  
The term is also used to designate the part of the support structure for a substation which extends upwards from the soil and connects the foundation and the topside or platform. |
| support structure | structure of a wind turbine below the yaw system of the rotor-nacelle-assembly and includes tower structure, sub-structure and foundation  
The term is also used to designate the structure below of the topside structure and includes sub-structure and foundation of a substation. |
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>type test</td>
<td>test made on a specific component which is representative of others, to demonstrate that these components generally comply with the specified requirements (not covered by the routine tests)</td>
</tr>
<tr>
<td></td>
<td>A component is considered to be representative of others if it is built according to the same drawings using the same techniques and materials in the same factory.</td>
</tr>
<tr>
<td>verification</td>
<td>confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (ISO 9000)</td>
</tr>
<tr>
<td>wind turbine</td>
<td>system which converts kinetic wind energy into electrical energy</td>
</tr>
<tr>
<td></td>
<td>In general, whenever the term is used in this service specification to describe the wind turbine, it describes the rotor-nacelle-assembly including the support structure, as this is the power generating unit.</td>
</tr>
<tr>
<td>workshop</td>
<td>place of production or manufacturing line of the component</td>
</tr>
</tbody>
</table>

### 1.6.3 Abbreviations

Abbreviations and symbols used in this service specification.

#### Table 1-5 Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSH</td>
<td>Bundesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency)</td>
</tr>
<tr>
<td>CC</td>
<td>component certification</td>
</tr>
<tr>
<td>FRP</td>
<td>fibre reinforced plastics</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electrotechnical Commission</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>ITP</td>
<td>inspection and test plan</td>
</tr>
<tr>
<td>NDT</td>
<td>non-destructive testing</td>
</tr>
<tr>
<td>NDE</td>
<td>non-destructive examination</td>
</tr>
<tr>
<td>OEM</td>
<td>original equipment manufacturer</td>
</tr>
<tr>
<td>QA</td>
<td>quality assurance</td>
</tr>
<tr>
<td>QM</td>
<td>quality management</td>
</tr>
<tr>
<td>PC</td>
<td>project certification</td>
</tr>
<tr>
<td>RNA</td>
<td>rotor-nacelle-assembly</td>
</tr>
<tr>
<td>RP</td>
<td>DNV GL recommended practice</td>
</tr>
<tr>
<td>SE</td>
<td>DNV GL service specification</td>
</tr>
<tr>
<td>ST</td>
<td>DNV GL standard</td>
</tr>
<tr>
<td>TC</td>
<td>type certification</td>
</tr>
</tbody>
</table>
1.7 Procedural requirements

1.7.1 General

This service specification describes the DNV GL services rendered as well as the technical requirements that shall be met by the customer for a shop approval certificate.

The DNV GL shop approval consists of two main phases, see [1.7.4] and [1.7.5]. The phases are related to the review of customer’s documentation and to an on-site inspection of the manufacturing line.

1.7.2 Customer - DNV GL interaction

The shop approval provides a third party verification of compliance between the intentions – as specified in the scope of certification and by the procedures – and of the result as defined for the product under application of the appropriate materials, processes and other resources.

The input from the customer and the deliverables by DNV GL shall be agreed in detail between the customer and DNV GL as part of the contract. In general the DNV GL shop approval certificate is issued when the final certification is completed with no issue pending. A list of deliverables is shown in [1.7.9].

In a workshop each manufacturing phase of a component may be certified independently according to the DNV GL shop approval and will be completed with the issue of a shop approval certificate for the phase under verification. Final time frames of the verification and certification activities shall be discussed and agreed between the customer, DNV GL, and suppliers before commencement of the work.

**Guidance note:**
As an example the shop approval related to the production of machinery components may be subdivided into the following phases; material handling, forging, welding, machining, non-destructive testing (NDT), assembly and/or testing.

---end---of---guide---note---

1.7.3 Procedure

The customer interested in a DNV GL shop approval shall agree with DNV GL about scope and basis of the general document review and the on-site inspection. The scope and basis are tailor-made for the specific shop approval.

**Guidance note:**
Key words related to the scope and basis may be found within single disciplines as stated in Sec.2.

---end---of---guide---note---

1.7.4 Description of general document review

The document review shall focus on quality assurance aspects. It should be done prior to the on-site inspection and shall as a minimum address the following items:

— review of workshop qualification (where appropriate)
— review of document handling procedures
— review of personal qualification certificates (where appropriate)
— review of material certificates
— review of manufacturing instructions
— review of assembly instructions
— review of test procedures.

1.7.5 Description of on-site inspection

After assessing the documentation provided by the customer, DNV GL shall carry out an on-site inspection. The on-site inspection is the key element of the shop approval. The scope of the on-site inspection is based on the general document review. During the on-site inspection, relevant areas and procedures shall be inspected by DNV GL. For further details of the on-site inspection, refer to the Sec.2.

During the on-site inspection the general qualification of the manufacturer and the general manufacturing processes shall be audited. After finalization of the on-site inspection a closure meeting is mandatory.

1.7.6 Added value

If a customer holds a DNV GL shop approval this may provide a benefit during component, type, or project certification, refer to [1.7.7] and [1.7.8]. This benefit may be a reduction of the amount of manufacturing certification/evaluation during type certification and a reduction of the amount of manufacturing surveillance during project certification. There is already a risk reduction through the on-site inspection before and/or at an early stage of project start. The DNV GL service specification for shop approval offers guidance for wind turbine component suppliers or workshops. The shop approval provides an improvement of the product’s quality through implementation of solutions for non-conformities made in the process of the shop approval. A reduction of costs and time during start of production may be ensured due to consideration of work packages done. Moreover, manufacturer quality may be proven and compliance to a specific set of specifications may be attested by a third party.

Based on the selected certification scheme different certification phases with related service specification documents are possible, see Figure 1-1.

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**Figure 1-1 Certification phases for component, type and project certification**
Figure 1-2 Modular concept of DNV GL shop approval

1.7.7 Shop approval during component or type certification

The general document review as part of the manufacturing certification/evaluation may be omitted during component or type certification if a shop approval for the workshop is in place, see Figure 1-2. However, the scope of the specific document review shall be agreed with DNV GL. Further reference is given in DNVGL-SE-0441 and DNVGL-SE-0074.

During type certification the witnessing of design specific manufacturing steps for the component subject to manufacturing certification/evaluation shall be carried out. If a shop approval for the workshop is in place, the scope of the witnessing may be reduced in agreement with DNV GL.

1.7.8 Shop approval during project certification

The general document review as part of the manufacturing surveillance may be omitted during project certification if a shop approval for the workshop is in place, see Figure 1-2. However, the scope of the specific document review shall be agreed with DNV GL. Further reference is given in DNVGL-SE-0190 and DNVGL-SE-0073.

During project certification the initial audit as part of the manufacturing surveillance may be omitted if a shop approval for the workshop is in place. The scope of the regular inspections may be reduced in agreement with DNV GL.
1.7.9 Deliverables

A DNV GL shop approval may be issued to a workshop as defined in [1.1.3] applying the specific description according to Sec.2 of this service specification. The shop approval deliverables consists of the following two documents:

— shop approval certification report
— shop approval certificate.

Each shop approval certificate is supported by a related certification report, which shall describe the extent of the general document review and the on-site inspection including non-conformities and how said issues were acceptably closed in combination with possible recommendations.

In the case of outstanding issues having been identified or full compliance may not be concluded or obtained during the process of shop approval, the deliverables will depend on the nature of the lack of compliance. If outstanding issues have been identified, a shop approval certificate will not be issued. DNV GL will deliver a certification report stating the outstanding issues that shall be closed before issuing of the shop approval certificate.

Guidance note:
A shop approval certificate may be issued according to GL-IV-1 or GL-IV-2.

---e-n-d---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

1.7.10 Certificate validity, maintenance and re-certification

The validity of the shop approval certificate is up to three years after the date of first release unless otherwise specified within Sec.2.

The duration of validity will be stated within the shop approval certificate.

Maintenance of the shop approval certificate for the workshop by DNV GL requires that the following information is documented:

— modifications during manufacturing
— deviating manufacturing process or operating failures
— reporting by the customer of planned major modifications in the workshop.

The scope for the maintenance process may be reduced if the maintenance process has started before the specified validity period expires, but only if it may be shown that no major changes at the workshop have been introduced. This shall be specifically agreed between DNV GL and the customer. Nevertheless, the on-site inspection is defined as the main basis for a maintenance of the shop approval.

Specific description for maintenance for the individual disciplines is defined in Sec.2.

Re-certification of the certificate may become necessary, if the validity of certificate is expired or additional requirements for maintenance of the shop approval certificate are set by national authorities or by the applicable code or standard.

In the case of major changes of the approved production processes and methods during the validity time of the shop approval, the changes shall be reported to DNV GL. The subsequent measures will be evaluated by DNV GL and may vary from a document review to a re-inspection in order to maintain the shop approval.

Safety relevant incidents related to items covered by the shop approval shall be reported to DNV GL without delay. DNV GL shall evaluate the incidents. In case of a serious defect of the asset in question, DNV GL shall suspend the certificate until elimination of the cause. The certificate shall be re-enacted after successful verification of the rectifying measure.

1.7.11 Documentation requirements

The documentation submitted for the certification process shall be complete and self-explanatory. The content shall meet the requirements of the standards referred and applied in the production. All relevant
documentation shall be subject oriented and in a logical sequence to facilitate cross checking of documents
(e.g. specifications and process descriptions etc.). Each document shall be named explicitly by at least title,
document number, number of pages, date and a revision description table. Furthermore the documents
shall be signed officially at least by the author and/or the approving person to identify responsibilities.
Alternatively the documentation submitted shall bear unambiguous evidence of having been subject to
designer’s and/or owner’s own quality management system.
The documentation, including standards and codes as well as other requirements and specifications, shall be
prepared in English, unless otherwise agreed in writing between DNV GL and the customer.
All documentation for evaluation shall be forwarded to DNV GL in electronic form, as pdf-files. Other forms of
documentation such as print-outs may be an alternative, if agreed.

1.7.12 Certification requirements for quality management

The customer shall provide evidence of having and applying a consistent quality management system
covering all aspects of the manufacturing of the component. In particular the customer shall document and
demonstrate quality management procedures to DNV GL as relevant for his procedures as well as for his
suppliers’ procedures, covering the complete manufacturing process.
A quality management system for the manufacturing workshop shall be in place and assessed by DNV GL.
If a valid certificate for ISO 9001 of an accredited certification body is in place, DNV GL may reduce this
assessment to a plausibility check.
General requirements of the available quality management system in place shall not be affected by this
service specification.

1.7.13 Standards, codes and additional requirements

The standards, codes and additional requirements which form the basis for the activities in the workshop
shall be agreed and/or listed and agreed at a very early stage and will be evaluated for compliance with the
manufacturing for completeness and adequate suitability and applicability. The evaluation of the choice of
standards, codes and additional requirements shall be conducted early in the project.
For dated standards and codes, only the edition cited applies. For undated references, the latest edition of
the referenced document including any amendments applies. In case of deviations from this rule, it shall be
agreed on an individual basis and in advance with DNV GL.

1.7.14 Combination of standards

The DNV GL shop approval certification shall follow the principles described in this service specification.
Wherever combinations of standards and external criteria are set in practice, the exact terms of reference
and documents to be referred shall be agreed at the beginning of the project and shall be specified in detail.
DNV GL reserves the right to set additional requirements in order to cover issues that are essential for the
manufacturing process but not covered by the standards in question.
In case standards are combined, caution shall be exercised and the choice of standards shall be subject to
acceptance by DNV GL.
It is not allowed to combine safety measures in the workshop from different standard systems due to the
possible differences in the underlying safety philosophies of the different standard systems.

1.7.15 Safety requirements

The customer, or other entity having legal responsibility for the premises where DNV GL personnel will
work, shall inform DNV GL of any safety and health hazards related to the work and/or any safety measures
required for the work, prior to starting the work, or if such information is not available at that time, during
the performance of the work.
Whenever DNV GL undertakes work on site, the customer shall provide all adequate safety measures to ensure a working environment that is safe and in accordance with all relevant legislation. Whenever during the execution of work on site a DNV GL employee judges that the work situation is unsafe the work shall be suspended until the situation has been made safe.
SECTION 2 SPECIFIC DESCRIPTION

2.1 General

The general document review shall be accomplished prior to the on-site inspection. Relevant documents to be submitted may be identified by using the application form for shop approval. Where documents are project related, they shall refer to the production to be witnessed during the on-site inspection.

The required documentation usually comprises:

— QM certificate
— staff qualification matrix
— work instructions and quality control sheets
— production process description
— ITP for the intended approval scope
— calibration certificates.

After DNV GL has conducted the general document review, a feedback will be given to the customer in a written form.

If outstanding issues have been identified, DNV GL will decide whether these issues have to be clarified prior to the on-site inspection or prior to the issue of the shop approval certificate.

The on-site inspection shall preferably take place in situations representative for normal working conditions for the specific type of work. This means that there should be an ongoing and representative production or, if relevant, actual repair work should be carried out. In case this is not possible, the reason for this should be clarified and an alternative way forward shall be discussed and agreed.

The agenda for the on-site inspection should be agreed in advance based on individual case. The on-site inspection starts with an introductory meeting, during which the different steps of the inspection are to be scheduled. As a general guidance, the entire value creating chain shall be inspected.

If applicable, the on-site inspection may consist of the following steps:

— inspection of incoming goods
— inspection of materials
— storage area and testing rooms
— climate control
— dimension control
— manufacturing process
— inspection of components
— manufacturing, assembly and finishing area
— NDT witnessing including calibration and execution
— witnessing of routine testing and supervision of tests
— quality documentation
— handling of non-conforming products
— identification system (tracking and labelling)
— dispatching area for transport.

2.2 Production and repair of rotor blades and other fibre reinforced plastic components

The shop approval related to rotor blades and other fibre reinforced plastic (FRP) components will be based on the technical requirements as stated in DNVGL-ST-0376.

The scope of a shop approval may cover production as well as repair.
In addition to [2.1] the following documentation shall be provided for general document review for production:
— information about the professional qualification of the team leaders
— floor maps of the production and storage areas.

In addition to [2.1] the following documentation shall be provided for general document review for repair:
— generic repair instructions and reports
— information about the professional qualification of the team leaders of repair teams.

In addition to [2.1] the on-site inspection for production consists of the following steps:
— laboratories related to production
— procedure for final inspection
— production accompanying documentation.

In addition to [2.1] the on-site inspection for repair consists of the following steps:
— damage inspection
— repair work and related documentation
— inspection of service vehicle and
— storage of repair material.

Shop approvals are carried out on a spot-check basis. Within e.g. the shop approval for repair the qualification of the team leaders of the repair teams are verified randomly. To cover a representative scope of work an inspection plan should be set up before on-site inspections are conducted.

Guidance note:
The maximum number of team leaders covered by one on-site inspection is practically five persons. If more than five team leaders are applied for, additional verification measures are required and should be agreed as a part of the project planning. Additional teams may be covered by additional on-site inspections focusing on different working steps or repair measures.
The decision on the amount of on-site inspections may depend among others on the outcome of the inspection, the demonstrated experience and development of the repair shop as well as the review of customer claims, if any.

The shop approval certificate is valid up to one year after the date of first release. Maintenance of the shop approval certificate may be granted up to two years at a time.

2.3 Production of machinery components
The shop approval for the production of machinery components shall be based on the technical requirements stated in DNVGL-ST-0361.
The required documentation stated in [2.1] shall be provided for general document review.
In addition to [2.1] the on-site inspection consists of the following steps:
— rough and fine machining
— heat treatment
— metallurgical checks.

2.4 Production of steel structures
The shop approval for the production of steel structures shall be based on the technical requirements stated in DNVGL-ST-0126.
In addition to [2.1] the welding procedure specification (WPS) and related welding procedure qualification record (WPQR) for the intended approval scope shall be provided for general document review.
In addition to [2.1] the on-site inspection consists of the following steps:
— re-drying procedures of consumables
— surface preparation and coating.

2.5 Production of grout material

The shop approval for production of grout material will be based on the technical requirements as stated in DNVGL-ST-0126.

The required documentation stated in [2.1] shall be provided for general document review.

In addition to [2.1] the on-site inspection consists of the following steps:
— production process following the material flow
— packaging/storage of grout material and identification of packaged product
— quality control and testing of grout material.

2.6 Production of electrical components

The shop approval for production of major electrical components (e.g. power electronic conversion system, electrical machinery and switchgear) supplied for application in renewable energy technologies shall be based on technical requirements stated in DNVGL-ST-0076.

The required documentation stated in [2.1] shall be provided for general document review.

In addition to [2.1] the on-site inspection consists of the following steps:
— machining or cutting
— in process inspections
— final testing.

A random review of the sub-suppliers' quality documentation may include e.g. insulation materials, conductor, control unit, spring operating mechanism, drive unit, housings and carriers, earthing-switch, current and voltage transformers, circuit breaker, terminations and busbars.

2.7 Production of power cables

The shop approval for production of power cables and accessories shall be based on the technical requirements stated in DNVGL-ST-0359.

Focus is on the medium- and high-voltage power cables supplied to the renewable energy industry.

The required documentation stated in [2.1] shall be provided for general document review.

In addition to [2.1] the on-site inspection consists of the following steps:
— extrusion process
— degassing procedure
— screening, lead sheath and over-sheath
— stranding and armouring
— type and routine test.

A random review of the sub-suppliers' quality documentation may include e.g. raw insulation and semiconducting compounds, copper, aluminum and steel wires.

2.8 Testing of materials and components

DNV GL offers an approval of the laboratory as an alternative to repetitive witnessing. The laboratory approval for material and component testing will be based on the principles as stated in ISO/IEC 17025.

The scope of a laboratory approval has to be defined by the customer and may cover standardized test methods as well as in-house test methods.
In addition to [2.1] the following documentation shall be provided for assessment together with the application form for the laboratory approval:

— list of test methods applied for
— test procedure for each test method
— general instructions and control sheets affecting the quality of test results
— organisation chart of the test laboratory and the company the test laboratory is part of
— proof of competence for the head of laboratory and his deputy
— responsibilities of laboratory staff
— floor map of the laboratory
— list of testing devices
— example of a test report (anonymised data).

In addition to [2.1] the on-site inspection consists of the following steps:

— measuring devices and calibration
— sample handling
— sample preparation
— test witnessing
— data acquisition and storage.

During the on-site inspection, each test method applied for has to be witnessed. Any additional test method as an extension of the scope requires witnessing as well. In the case that the additional test method is similar to a test method already approved, the witnessing may be postponed to the next regular inspection.

The laboratory approval is valid up to one year after the date of release. A maintenance of the laboratory approval may be granted for one year subsequent to the expiry date of the previous certificate. The decision on the maintenance depends among others on the outcome of the inspection, the demonstrated experience and development of the laboratory as well as the review of customer claims, if any.

The scope for the maintenance may be reduced, but only if it can be shown that no major changes at the laboratory or of the test procedures have meanwhile been introduced, and the position of the head of laboratory and his deputy have been unchanged. As a rule, each test method has to be witnessed at least once in a three years time period.
APPENDIX A CERTIFICATE EXAMPLE

SHOP APPROVAL

Certificate No.: SA-DNVGL-SE-0436-[ID with 5 digits]-[rev.] Issued: [YYYY]-[MM]-[DD] Valid until: [YYYY]-[MM]-[DD]

Issued for:
Repair of Rotor Blades for Wind Turbines fabricated from Fibre Reinforced Plastics

Issued to:
<Workshop>
< Address line >
< Address line >

According to:
DNVGL-SE-0436:2018-04 Shop approval in renewable energy

Based on the documents:
CR-SA-DNVGL-SE-0436-[ID]-[rev.] Certification Report, dated yyyy-mm-dd

This Shop Approval is valid for field repair.

Supervisory Personnel
First Name Last Name
First Name Last Name

Heads of Repair Teams
First Name Last Name
First Name Last Name

Changes in the responsible personnel as named in this certificate are to be approved by DNV GL.

[Name of SLL for "Cert. decision"]
[Function]

Place, yyyy-mm-dd
For DNV GL Renewables Certification

By DAKKS according DIN EN ISO/IEC 17025 accredited Certification body for products. The accreditation is valid for the fields of certification listed in the certificate.

[Name of PM "doing it"]
[Function]

Place, yyyy-mm-dd
For DNV GL Renewables Certification
CHANGES – HISTORIC

March 2016 edition

General
This is a new document.
About DNV GL

DNV GL is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Operating in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener.