Certification of Materials and Components

Standardisation of the industry’s approach to quality control and assurance processes

Martin Fowlie
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Overview of DNV GL Group - Who we are

We take a broader view to enable our customers to become safer, smarter and greener

- In today’s world, businesses are facing technological, regulatory social and operational challenges that are becoming ever more complex. At the same time stakeholders are demanding more accountability and transparency from them. In such a climate, both businesses and governments need an independent partner who will empower them to make decisions with confidence. A partner who will enable them to become safer, smarter, and greener. A partner like DNV GL.

- Our name is new, but our company is backed by 150 years of deep industry experience.

- In September 2013, DNV and GL Noble Denton joined forces to bring greater expertise and enhanced innovation capabilities to our customers.
Overview of DNV GL Group - What Drives Us?

▪ **Our Purpose:**
  – To safeguard life, property and the environment.

▪ **Our vision:**
  – Global impact for a safe and sustainable future.

▪ **Our Values:**
  – We build trust and confidence.
  – We never compromise on quality or integrity.
  – We are committed to teamwork and innovation.
  – We care for our customers and each other.
  – We embrace change and deliver results.
Overview of DNV GL Group – How are we organised?

With 16,000 employees in over 100 countries and 300 offices, we operate across four business areas and one independent business unit:

- **Maritime:** We are the world’s leading classification society and maritime adviser.
- **Oil & Gas:** We are the leading technical adviser to the global oil & gas industry, enabling safe, reliable and enhanced performance in projects and operations.
- **Energy:** We are a world leader in testing, certification and advisory services for companies and organizations in the electrical power value chain, including renewables.
- **Business Assurance:** We are one of the world’s leading certification bodies, partnering with companies across all types of industries to assure the performance of their organizations, products, people and facilities
- **Software:** We are the world-leading provider of software for a safer, smarter and greener future in the energy, process and maritime industries

This is the new DNV GL. With the scale to see even further, and the strength to make a difference, we are ready to help our customers make the world safer, smarter and greener.
Why me and Why DNV GL Aberdeen

- Oil and Gas (Business Area)
  - Offshore Services
    - Approval Centre
      - Topsides and Facilities
      - Subsea, Pipelines and Pressure Vessels
    - Product Certification
      - Certification of Materials and Components
    - Offshore Verification
      - In-service verification (ICP Role)
  - Risk Management Services
  - Marine and Offshore
- Maritime (Business Area)
  - Vessels in Operation (ViO)
Subsea systems – managing risk across the asset lifecycle

SERVICES

Feasibility & concept selection
Design
Manufacturing
Installation & commissioning
Operation & maintenance
Decommissioning

Technology qualification

Design
Manufacturing
Installation & commissioning
Operation & maintenance
Decommissioning

Noble Denton marine assurance and advisory

Verification

Product certification

Quality surveillance and inspection

Noble Denton marine assurance and advisory

Integrity management

Life extension

Failure investigation and lab testing

Risk management advisory

Flow assurance and sand management

Software
Is there such a thing as a ‘typical’ subsea project?
How to ensure cost, quality and schedule objectives in this new world?

▪ Challenges
  – More challenging projects
  – More complex supply chains
  – Introduction of new (sub)suppliers
  – Longer distances between players
    – e.g. Company in Australia, Contractor in Dubai, main deliveries from USA, UK and Italy
  – Cultural diversity

▪ Mitigations
  – We (the industry) have to be consistent in our requirements
  – We have to create predictability to the entire supply chain, therefore prescriptive routines have to be established
  – We have to create confidence between the parties though standardisation
**Standardisation - the new innovation**

- Focus to date 2003:
  - Quality
  - Cost
  - Schedule

- “Standardisation” becoming the buzzword in the industry
  - Our reflection is that many talk about standardisation as the *solution*
  - But what does the industry understand by *Standardisation*?
  - “Standardisation enables reduced costs. There is a potential for further cost reductions in equipment, project processes and documentation for subsea developments”

- Our (DNV GL) recent JIP’s show us that within the industry there is a desire to ‘standardise’
  - Subsea Material Forgings
  - Offshore Leak Detection
  - Subsea Integrity Management
  - Subsea Documentation Standard
How to find motivation for standardisation?

▪ If we shall succeed with standardisation there must be a motivation

▪ Motivation comes from
  – Avoiding unnecessary work and rework
  – Competition on equal terms
  – Gain efficiency by minimizing last minute ‘nice to have’ versus ‘need to have’
  – Take away requirements that does not contribute to function or quality

▪ By being smart when standardising on requirements and processes, standardisation should not restrict innovation

▪ What is the benefit of discussing standardisation of materials and components without addressing work processes – such as when requesting verification and certification services.
What’s the difference between Verification and Certification?

**Certification**
- “Third-party issue of a statement, based on a decision following review, that fulfilment of specified requirements has been demonstrated related to products, processes or systems. Review shall in this context mean verification of the suitability, adequacy and effectiveness of selection and determination activities, and the results of these activities, with regard to fulfilment of specified requirements by an object of conformity assessment.”
- Typically, certification is performed where there is a publically available scheme of examination for those items being certified (e.g. DNV GL Rules for Classification, Standards for Certification, Pressure Equipment Directive etc.)
- According to our systematics, certification may only be performed when DNV GL have the authorisation on behalf of the owner of the certification scheme to issue certificates.

**Verification**
- “Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled.”
- Verification is typically performed on a scope of work dictated by the client, for example under the Safety Case Regulations, DNV-OSS-306, ‘Company’ Standards.

**Classification?**
Offshore Classification

- Offshore Classification establishes basic requirements for Mobile Offshore Units (MOUs), and verifies the required safety standards during design, construction and operation. It is based on both theoretical analysis and practical experience.
- Our clients widely use our service specifications, standards and recommended practices as part of their project specification apart from adopting them as their company standards.
- The Offshore Codes consist of a three level hierarchy of publications:
  - Offshore Service Specifications
  - Offshore Standards
  - Recommended Practices
- A basic premise of the offshore standards is that, where sound and industry accepted standards exist, we will not seek to duplicate these industry standards. Accordingly, we accept the meeting of our offshore standards via compliance with such industry recognised standards.
Offshore Classification

- The following components are integral to the integrated, lifecycle, risk management approach of offshore classification.

- **Design approval**
  - By applying a flexible approach, supported by sound risk principles, we ensure that the optimal path is taken in verification of designs, that requirements and criteria are appropriate and that the objectives of the relevant standards are met. We achieve this within an agreed and realistic timetable.

- **Fabrication survey and commissioning**
  - Ultimately, the fabrication survey and commissioning activities should confirm that the unit is built to pre-agreed standards.

- **Certification of materials and components (CMC)**
  - Classification requires that materials, components or systems be certified as meeting class and regulatory requirements before delivery to the yard. This a vital tool for eliminating unnecessary supply chain delays. When coupled with supplier assessment pre-contract services, this creates a powerful tool for the industry to utilise in managing supply chain risks.

- **In-service surveys**
  - Our in-service classification services are fully integrated with those of both owners and regulatory authorities. This leads to the highest level of integrity, coupled with the least amount of downtime.
DNV-OSS-101

DNV GL’s Rules for Classification of Offshore Drilling and Support Units, the terms and procedures for assigning and maintaining classification, including listing of the applicable technical references to be applied for classification. of mobile offshore units (units) of the following design types:

— ship-shaped units
— column-stabilised units
— self-elevating units

for the following services:
— drilling
— well intervention
— accommodation
— heavy-lifting
— general offshore support.

Rules for Classification of Offshore Drilling and Support Units

OCTOBER 2014
DNV-OS-E101 Drilling Plant

- These outline the technical requirements for the systems, including
  - Drilling equipment
  - Well Intervention Equipment
- Written for all to use.
- Refers to other rules as applicable as well as normative international standards.
Certification Scheme for Subsea Equipment and Components

- The DNV GL scheme for Certification of Subsea Equipment and Components are based on well established industry standards
- Standard (DNVGL-ST-0035) and Service Specification (DNVGL-SE-0045) must be read together
- DNV GL do not introduce a new set of requirements to the industry
- The launched standard refers to and accepts:
  - ISO 13628 series
  - ISO 10423
  - API 17 series
  - API 6A
  - Standards referred from the above, as ASME, ASTM, applicable NORSOK and DNV standards are recognized and part of this
- With this standard DNV GL has no intention of re-invent the wheel or provide a new set of requirements to the industry
Service Document Scope

- subsea tree
- subsea wellhead
- tubing hanger system
- isolation plugs
- mudline suspension equipment
- drill-through mudline suspension equipment
- control system
- subsea structures
- ROV intervention equipment
- production and injection manifolds
- modular and integrated single satellite and multiwell templates
- subsea processing and subsea boosting stations
- flowline riser bases (FRB)
- export riser bases (ERB)
- pipeline end manifolds (PLEM)
- pipeline end terminations (PLET)
- T- and Y-connections
- subsea isolation valve (SSIV).
- The new service documents cover the product certification phases.
- Risk based verification becoming more commonplace means of demonstrating compliance to authorities.
This DNV GL Standard (ST) provides principles and technical requirements for design and manufacturing of subsea equipment and components.

It requires the application of industry codes and standards which are typically associated with subsea production systems (e.g. ISO 13628 Series, API 17 series).

Has been written for general world-wide application.

Multiple iterations of development

Intended to reflect relative simplicity of DNV-OS-E101
Clearly defined well barriers relating to well integrity in drilling and well operations, as defined in NORSOK D-010, are considered as an essential pre-requisite for compliance with this standard.

D-010 provides a simple and efficient way to describe and document the well barrier elements.

The inference is that the ‘FEED’ has identified various risk control options to avoid single point failures or failures of the barriers in general.

These need to be documented and tested – not only at manufacture but also in-service.

Implies that this information will be prepared in collaboration with and properly communicated to the end-user.
DNVGL-ST-0035 – ‘Key’ Points

- Defines components and equipment
  - Component: An assembly of sub-components e.g. valve, tree connector, choke valve, tree frame etc.
  - Equipment: The highest level of an assembly of components e.g. Xmas tree, tubing hanger, control module, manifold, PLEM, PLET etc.
- Any deviations, exceptions and modifications to the design codes and standards shall be documented and agreed by all parties.
  - Meaning that we will endeavour to certify full code compliance or have the manufacturer seek end user agreement before ‘accepting’ the deviations on the certificates.
- The latest issue of the standards valid on the date of contract signed between the contracting parties shall be used, unless otherwise specified in the contract.
  - Acknowledges the need for ‘repeat’ work for particular applications.
- Design Principles should be quite self explanatory
  - Codes are prescriptive for the design requirements for the various components and equipment
**DNVGL-ST-0035 – ‘Key’ Points**

- Test stands and fixtures are specifically mentioned to draw the attention to the need to consider vessel movement issues.
  - Cat I equipment under DNV-OS-E101 but not normally prescribed as requiring certification.
- DNV-RP-B401 made mandatory for certification by DNV GL
  - Who wants to pay to ‘fix’ a cathodic protection system which could have been avoided.
  - Often argued that the RP are ‘just’ recommendations and so somehow considered optional.
- Manufacture, workmanship and testing shall be performed by qualified operators and in accordance with documented procedures.
  - These shall be subject to review/scrutiny by the attending surveyor.
  - May where required also be subject to ‘approval’
- Process starts at factory gate and ends at factory gate.
  - Mirrors what we see as a ‘typical’ manufacturing environment.
This explains how we do what we need to do in order to issue a certificate.

- This is in effect the publically available scheme.

- Should be read with the ‘ST-0035 and shall not include any ‘technical’ requirements.

- Is intended to complement, and not substitute, verification of subsea facilities/systems as defined in DNV-OSS-306 which is a risk based verification service.
Product Certification Process

Design verification is the examination of the assumptions, methods and results of the design process and is performed to confirm that the requirements to the specific component are fulfilled.

Manufacturing assessment shall be carried out by means of full time attendance, audits, inspections or spot checks of the work, as appropriate, in sufficient detail to confirm that the specified requirements of the subsea component are fulfilled.
Scope of work for verification of design

- Review of the design process by
  - review of design quality management documentation
  - audit of design quality management system
- Review of specifications for design by
  - review of the design basis
  - evaluation of the design criteria
- Review of design reports and drawings by
  - review of the main component documentation to confirm that the main operating conditions have been accounted for in design, that the governing conditions are identified, and that the chosen design philosophies are in accordance with specified codes and standards
  - evaluation of the main methods used and spot checks of the input data and the calculation results
  - detail review of main design reports
- Performing independent parallel calculations by
  - simplified independent analyses/ calculation(s) performed by spot checks
  - advanced independent analyses/ calculation(s) performed by spot checks
- Review of specifications for manufacture and operation by
  - spot check of critical aspects
  - review of main specifications
Scope of work for manufacturing assessment

- Manufacturing assessment typically comprises:
  - reviewing the manufacturing processes
    - review of manufacturing management systems
    - audit of the quality management system
  - reviewing manufacturing procedures
    - review manufacturing procedures for confirmation of compliance with the manufacturing specifications
  - reviewing qualification process
    - review the manufacturing procedure specification, (MPS) and manufacturing procedure qualification test (MPQT), if applicable
    - review of welding and welder qualifications
    - review of NDT inspection and inspector qualifications
  - surveillance during manufacture
    - visit-based or full-time attendance during manufacturing to confirm that the delivered component has been produced in accordance with the manufacturing procedures
    - visit-based attendance during testing, to confirm that the delivered component has been tested in accordance with the test procedures
    - review of final documentation
Certification and Documentation Requirements

- Categorisation of equipment depends on importance for safety or reliability and takes operating and environmental conditions into account. Once assigned, the category of equipment defines the scope of activities required for certification.

- The breakdown of equipment and components is based on the scopes of the selected standards and is likely to evolve with ‘experience’ and importantly feedback.

- For equipment category I, the following procedure shall be followed:
  - design assessment, documented by a design verification report (DVR) or type approval certificate.
  - manufacturing survey, documented by issuance of a product certificate.

- Equipment of category II is normally acceptable on the basis of a certificate prepared by the manufacturer. As a minimum, the certificate shall contain the following data:
  - equipment specification or data sheet
  - equipment traceability information
  - operating limitation(s) of the equipment
  - statement from the manufacturer to confirm that the equipment has been constructed and manufactured according to recognised methods, codes, and standards
Certification and Documentation Requirements

- Standardised documentation types provide a useful means of communication of the essential information to perform the review.
- Is likely to evolve upon completion of the ‘documentation’ JIP
- A few of the more commonly required documents are:
  - Functional Design Specification
  - Safety Assessment
  - Arrangement Drawing
    - Detailed drawing
    - Materials selection report
    - Material specifications
  - Design Analysis
  - Design validation test record
  - O, I and M Manuals
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Martin Fowlie
martin.fowlie@dnvgl.com
+44 (0) 1224 335 034

www.dnvgl.com

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