

# Naval Assurance

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## INTRODUCTION

Classification in its conventional understanding, is an important contributor to the assurance process of naval vessels. However, Classification needs to be adapted to navy's specific needs and the governance and regulatory environment within which they are operating. A navy shall serve the security interest of its respective nation and can therefore not be the subject of a prescribed regime as is the case for merchant vessels. This calls for assurance processes that, while covering Classification, is more diversified with a wider scope to fulfil specific Navy assurance requirements. Consequently, DNV GL's services for naval vessels are referred to as **DNV GL Naval Technical Assurance** indicating a more generic approach to the complete assurance process with respect to Materiel Safety, not limited to the conventional understanding of Classification. In contrast to the traditional Classification approach, the scope of assurance to be applied, including the particular standards to be referenced (as prescribed by the applicable government requirements), are defined together with the relevant naval authority for each project.

The key reason for acquiring a naval vessel is to achieve a specified operational effect. Basically, DNV GL's Naval Technical Assurance approach covers all platform related aspects, and thus is separate or complementary to any combat system assurance regime. Although the present paper is limited to Materiel Safety, DNV GL also takes a wider perspective in the services it offers for naval Ships through complementary Advisory Services. Examples of such services are analysis for assuring shock hardening, ensuring residual strength after specified damage events, etc.

## DNV GL NAVAL TECHNICAL ASSURANCE

Due to its natural complexity, total assurance for a naval vessel covers various areas including amongst others, the platform and the weapon system interface, but also areas such as maintenance and logistics. The latter includes topics such as spare part management as well as munitions, crewing, training and victualling.

Ultimately naval total assurance is about ensuring the seaworthiness outcome and the required operational availability. Within the total assurance for naval vessels, technical assurance i.e. assuring the safety, reliability and availability performance of the platform are the key elements.

The objective of DNV GL Technical Assurance is to provide through-life technical assurance to navies that:

- builds on and incorporate state of the art assurance regimes and methods with proven track record for ensuring an adequate level of Materiel Safety;

- provides confidence in the process by external stakeholders;
- is cost efficient.

It is developed for and can be applied to naval vessels and vessels with similar modes of operation, for example vessels for coast guard duty, border control and police. DNV GL Naval Technical Assurance is not applicable to vessels for which the full SOLAS convention applies.

The naval technical assurance approach by DNV GL serves as a key element within a total assurance systematic for naval vessels by providing a solution for the technical assurance of the platform i.e. all systems except the combat or weapon systems respectively.

One of the main goals of the approach is to enable a systematic process that can be tailored to the individual needs and boundary conditions of the particular navy and project. This is realized by a modular set-up of the approach - expressed by two key documents - the standards plan and the certification matrix – both of which are endorsed and owned by the Naval Authority after a definition in close cooperation with and support by, DNV GL. The set-up for both the standards plan (SP) as well as the certification matrix (CM) follow the philosophy of the Naval Ship Code (NSC) and addresses similar assurance areas to be verified. The SP is defined as the document, agreed by the Naval Administration, listing the standards, specifications, conventions etc. or other criteria that are being used to demonstrate that a vessel meets the Performance Requirements, Functional Objectives and Goals of the Technical Areas of Part 1 of the NSC. The CM is similar to Justification, Validation and Verification defined in the NSC.

The DNV GL Naval Technical Assurance process steps are summarised in the following **Error! Reference source not found.**

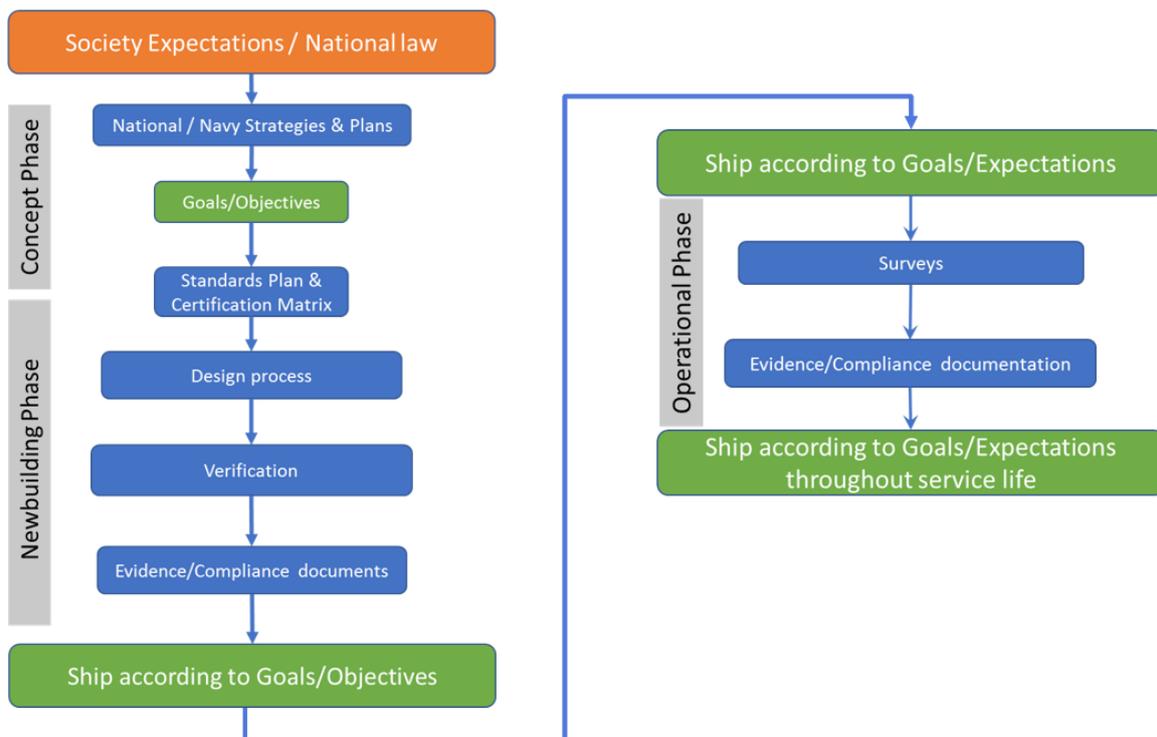


Figure 1: DNV GL Naval Technical Assurance process steps

The DNV GL Naval Technical Assurance is divided in three Phases: the Concept Phase, the Newbuilding Phase and the Operational Phase.

The objective of the Concept Phase is to develop a Specification of the vessel that ensures the specified Goals and Objectives are fulfilled. This Specification shall be detailed enough for the purpose of describing requirements for procurement and fabrication. DNV GL's involvement in this Phase is the subject of an agreement with the client and may cover Materiel Safety alone or in addition other attributes of the vessel.

There are three key deliverables from the Concept Phase:

- The Standards Plan;
- The Certification Matrix;
- Acceptance by the naval administration of the Standards Plan.

The Goals and Objectives for the vessel are normally outside of DNV GL's contribution. However, the definition of these have a large influence on how the DNV GL Naval Technical Assurance process is carried out. It is therefore imperative that full understanding is established between navy, yard and DNV GL on this matter.

It is advantageous to distinguish between Goals/Objectives concerning Materiel Safety in peace time and Goals/Objectives concerning the Operational Effect of the vessel in a wartime scenario as the applicable Standards are different and consequently a Standards Plan with regard to Operational Effect will have very little overlap with that for Materiel Safety.

#### **DEVELOPMENT OF A STANDARDS PLAN**

The Goals and Objectives are translated into the Standards Plan, whereby the ship and its equipment and systems are divided in groups that can be dealt with on an individual basis. DNV GL's default approach is to address this using the Safety Areas listed below, which follow the arrangement in ANEP-77 Naval Ship Cope:

- Hull structure
- Buoyance, stability and controllability
- Engineering systems
- Seamanship systems
- Fires safety
- Escape, evacuation and rescue
- Navigation
- Communication

- Dangerous goods

However, the way in which this division is done can vary between the particular regulatory systems and different nomenclature can be used: disciplines, safety areas, compliance obligations etc. In this process Goals and Objectives for each Safety Area are defined, followed by prescriptive technical solutions ensuring that the Goals and Objectives for each Safety Area are met, forming the Standards Plan.

The Standards Plan shall include the following:

- Specification of applicable standards;
- Links between the requirements in the standards to corresponding requirements in the navy's regulatory system;
- Justification of how the requirements in the Goals/Objectives and or regulatory requirements are fulfilled.

This Standards Plan shall then be agreed by the Naval Administration.

The Standards Plan may consist of any type of technical documentation specifying technical requirements supporting the Goals/Objectives:

- Navy proprietary standards;
- DNV GL Class Rules;
- IMO instruments;
- STANAG;
- ISO standards;
- IEC standards;
- Outcome of risk analysis;
- Other standards.

The most efficient option in this process is using existing risk controls, i.e. already available Standards, with the advantages that the solutions are based on well-known and proven technology for which ample operational experience is already available and that no additional resources are required for developing the solutions.

However, it is possible that a selected standard may not be suitable to its full extent, especially with respect to vessel operation under a naval regime. Tailoring is applied to adapt the existing standard to the required solution. Such a process includes developing technical solutions that can be demonstrated equivalent to the specified Standard or developing other actions to compensate for the increased risk, for example modifications of operational procedures, frequently referred to as mitigation. For such cases dedicated risk analyses may be applied.

## **THE CERTIFICATION MATRIX**

The second key deliverable from the Concept Phase is the Certification Matrix. The purpose of the Certification Matrix is to control the execution of the activities providing evidence of compliance. The Certification Matrix specifies:

- how the verification with regard to the Standards Plan shall be carried out (verification of technical documents, test, sea trial etc.);
- by which organisation;
- the compliance documentation.

The Standards Plan and the Certification Matrix will be agreed by and thus eventually owned by the Naval Administration.

However, the drafting of the Standards Plan and the Certification Matrix can be carried out by parties other than the Naval Administration. For example, the responsibility for the work may be the remit of the procurement authority, the designer, the yard or third-party pre-project services. DNV GL can provide assistance in the process and has already done this for several naval newbuilding projects.

## **THE NEWBUILDING PHASE**

The objective of technical assurance in the Newbuilding Phase is to generate the evidence based on which it can be concluded that the requirements defined in the Standards Plan are complied with and fulfilled, and to generate the specified compliance documentation. This phase is a straightforward verification process covering technical documentation, plan approval, analysis, testing or survey during the fabrication of the vessel.

## **THE OPERATIONAL PHASE**

Similarly, the objective of the technical assurance in the Operational Phase is to generate the evidence based on which it can be concluded that the requirements defined in the Standards Plan are complied with throughout the service life of the vessel.

## **CONTRIBUTION TO THE TECHNICAL ASSURANCE PROCESS**

DNV GL contributes in two ways in the Technical Assurance process:

- by providing Benchmarks in the form of technical standards (the Class Rules) and
- by providing verification and classification for the control of the assurance process.

Although naval vessels are different from merchant vessels in several aspects, there are also similarities. For example, many of the requirements for peacetime operation, global citizenship and occupational health and safety are similar for both merchant and naval vessels:

- the Float and Move out of Float, Move and Fight
- the vessels shall be a safe place to be
- The vessel shall be environmentally friendly

Differences between naval and merchant vessels required by combat operation are predominately naval survivability including susceptibility, vulnerability, and recoverability.

Considering separately the similarities and differences, the DNV GL systematics may provide a mature system of control delivering materiel assurance:

- For merchant ship scope, the DNV GL systematics of Class Rules and standards (ST), guidelines (CG), programmes (CP), statutory interpretations (SI), service specifications (SE) and recommended practices (RP) represent a large scope of standardised solutions for Materiel Assurance;
- For naval ship scope, the flexible approach using Navy proprietary standards, DNV GL Class Rules for naval ships, applicable IMO instruments, bespoke risk analysis and other standards, as described in this paper, may contribute Materiel Assurance.

DNV GL's assurance process has been developed and refined over many years and is the subject of continuing development with respect to quality, efficiency and, importantly, the creation of a user-friendly interface to yards, owners, flag administrations and navies.

The assurance process ensures efficiency and quality in the verification processes and also give the client access to DNV GL's technical competence and service experience in the form of direct technical support.

## **DNV GL NAVAL CLASSIFICATION**

DNV GL Naval Classification is a process providing technical assurance services for the Newbuilding Phase and the Operational Phase and is applicable from the point when the Standard Plan has been specified and agreed upon by the Naval Administration.

DNV GL Naval Classification is applied when the Standards Plan consist mainly or in its entirety of DNV GL class rules and IMO Instruments.

The scope of DNV GL Naval Classification process steps are summarised in the following Figure 2:

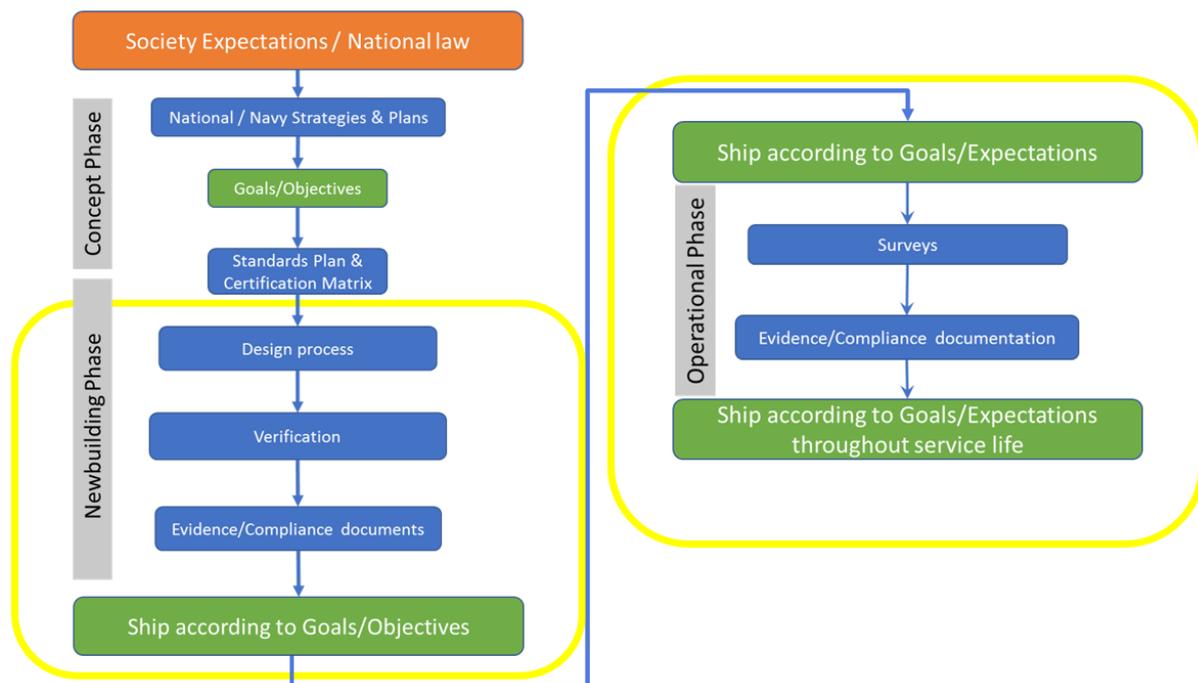


Figure 2: DNV GL Naval Technical Assurance – Scope of DNV GL Class

The objectives for DNV GL Naval Classification are the same as for the Newbuilding and Operational Phases as described above for DNV GL Naval Technical Assurance, ensuring that the vessel is fabricated and maintained in compliance with the specified standards.

### DNV GL CLASSIFICATION RULES – THE BENCHMARK

The DNVGL Rules (RU-NAVAL, RU-SHIP, RU-HSLC) have been developed based on experience from more than 150 years of merchant shipping and more than 40 years of DNVGL cooperation with navies in different countries. They provide technical standards for the design and construction within all key areas relevant for the Materiel safety for practically any type of ship, merchant or naval. Having been developed and used for a long period they can be relied on as tried and tested solutions for providing adequate control of the Materiel safety.

These rules thus provide relevant Benchmarks for the design and equipment of naval vessels and for communicating the navy's objective with regard to safety and for the use in the Naval Technical Assurance process. A Benchmark is also a yard stick against which other technical solutions can be measured e.g. navy proprietary standards, or solutions based on risk analyses.

### RESPONSIBILITIES

Although both DNV GL Naval Technical Assurance and DNV GL Naval Classification provide a systematic method ensuring the required safety and reliability of a naval platform, there are significant differences between both methods, which need to be considered when a decision is to be made on the preferable approach for the particular naval ship. Eventually it depends

on the general procedures and preferences of the Naval Administration and may vary depending if it is new-building or an existing ship in operation.

## **FUTURE DEVELOPMENTS**

Looking into the future it can be expected that despite of the understandable reluctance within defence organization regarding voluntary or involuntary information sharing, digitalization will significantly gain importance in terms of utilization of available information to increase the operational availability and decrease the related efforts time and cost wise.

The practical implementation and standard usage of digital twins along with condition-based maintenance procedures is seen as a future key element to get the goal. Standardization of data and interfaces as well as the achievement of sufficient data and information provision mainly from component manufacturers are seen as main challenges ahead.

## **CONCLUSIONS**

DNV GL Naval Technical Assurance provides a number of advantages for the navy and their stakeholders.

DNV GL Naval Technical Assurance is a comprehensive and self-contained service. It covers the whole process from the inception of the development of the vessel once the operational intent has been specified as based on national interest. It is generic and can, as such, be applied to all aspects of the Materiel state of a naval vessel, being it relevant for Materiel safety or for attributes of the vessel ensuring that operational intents are fulfilled. DNV GL Naval Technical Assurance can support any navy regulatory system as well as provide a regulatory solution for navies who could find it useful.

For a navy this process provides an all-encompassing seamless process from inception to end of service life. The process ensures that everything with influence on the final performance of the vessel is addressed and that nothing is lost underway due to changes of responsibilities in different phases.

A government can obtain assurance that public resources are used as intended and that a project delivers to specified requirements. Similarly, the DNV GL Naval Technical Assurance process provides evidence that requirements for ensuring the health and safety aspects of a naval vessel as a workplace are adhered to. The same applies in case of the general public.

For all stakeholders in the Newbuilding process the DNV GL Naval Technical Assurance provides clear specifications and requirements for verification and certification providing direct input to their own work processes.

DNV GL Naval Technical Assurance has been proven to provide a sound solution for the verification of the compliance of the platform of a navy ship with the requirements i.e. fulfillment of the operational duties in a safe and reliable way. Therefore, the approach can be seen as a major element within the total assurance of a navy ship.

Due to its high flexibility in terms of the verification or reference basis i.e. the selected Rules and standards but also in terms of the scope the naval technical assurance approach appears to be suitable especially when applied for ships already in operation. When it comes to application for new-building projects it depends very much on the procedures, the strategy and the capabilities of the naval authority regarding which approach to adopt i.e. whether naval technical assurance or naval classification is the Materiel Assurance strategy to be realised.