

**ANNEX 3**

**RESOLUTION MSC.454(100)**  
**(adopted on 7 December 2018)**

**REVISED GUIDELINES FOR VERIFICATION OF CONFORMITY WITH GOAL-BASED  
SHIP CONSTRUCTION STANDARDS FOR BULK CARRIERS AND OIL TANKERS**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

HAVING ADOPTED, by resolution MSC.287(87), the International Goal-Based Ship Construction Standards for Bulk Carriers and Oil Tankers (hereinafter referred to as "the Standards") and, by resolution MSC.290(87), SOLAS regulations II-1/2.28 and II-1/3-10 to make the Standards mandatory,

NOTING that section 6 of the Standards requires that the rules for the design and construction of bulk carriers and oil tankers of an organization which is recognized by an Administration in accordance with the provisions of SOLAS regulation XI-1/1, or national rules of an Administration used as an equivalent to the rules of a recognized organization according to SOLAS regulation II-1/3-1, shall be verified as conforming to the goals and functional requirements of the Standards, based on the guidelines developed by the Organization,

RECOGNIZING the need for revision of the *Guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers*, adopted by resolution MSC.296(87), in light of the experience gained with their application and the recommendations made by the GBS Audit teams and to support their implementation,

HAVING CONSIDERED, at its 100th session, the proposed Revised guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers,

1. ADOPTS the Revised guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers, the text of which is set out in the annex to the present resolution;
2. REQUESTS Administrations and organizations recognized by Administrations in accordance with the provisions of SOLAS regulation XI-1/1 to utilize the Revised guidelines when applying for verification that their design and construction rules for bulk carriers and oil tankers conform to the Standards;
3. INVITES Contracting Governments to note that these Revised guidelines should take effect on documentation submitted for initial verification and on rule and/or documentation changes undergoing the maintenance of verification process on or after 1 January 2020;
4. RESOLVES to review these Revised guidelines, as necessary, in view of experience gained with their application;
5. REVOKES resolution MSC.296(87) on 1 January 2020.

## ANNEX

### REVISED GUIDELINES FOR VERIFICATION OF CONFORMITY WITH THE INTERNATIONAL GOAL-BASED SHIP CONSTRUCTION STANDARDS FOR BULK CARRIERS AND OIL TANKERS

#### INTRODUCTION

1 The Organization adopted, by resolution MSC.287(87), the *International goal-based ship construction standards for bulk carriers and oil tankers* (hereinafter referred to as "the Standards"), specifying goals, functional requirements and verification of conformity to ensure that ships are constructed in such a manner that, when properly operated and maintained, they can remain safe for their design life, and that all parts of a ship can be easily accessed to permit proper inspection and ease of maintenance.

2 These Revised guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers (hereinafter referred to as "the Guidelines") provide the procedures necessary for demonstrating and verifying that the ship design and construction rules for bulk carriers and oil tankers of an Administration or its recognized organization conform to the Standards, including both the method and criteria to be applied during the verification process.

3 The Guidelines are composed of two parts:

- .1 Part A establishes the procedures to be followed in order to verify that ship design and construction rules conform to the Standards. It includes sections on initial verification and maintenance of verification of the rules.
- .2 Part B provides detailed documentation requirements and evaluation criteria that should be used to verify that the rules conform to the Standards.

4 Those rules having been verified as conforming to the Standards, according to previous version of the Guidelines (resolution MSC.296(87)), should not be re-verified based on an updated version of the Guidelines.

#### Definitions

5 For the purpose of the Guidelines, the following definitions apply:

- .1 *Conformity* means fulfilment of Tier I goal(s) and Tier II functional requirement(s) of the Standards.
- .2 *Corrective action*: action intended to eliminate the cause(s) of a non-conformity.
- .3 *Improvement action*: action intended to address an observation.
- .4 *Finding* means an observation or a non-conformity.
- .5 *Non-conformity* means non-fulfilment of a Tier I goal(s) and Tier II functional requirement(s) of the Standards or lack of information or documentation requirements that prevent the evaluation criteria from being applied when conducting the audit.

- .6 *Objective evidence* means quantitative or qualitative information, records or statement of fact which are based on observation, measurement or historical service data and which can be verified.
- .7 *Observation* means statements of facts or proposals made during an audit which are based on objective evidence but are not a non-conformity, and that may provide the basis for improvement.
- .8 *Organization* means the International Maritime Organization.
- .9 *Rules or rule set* means requirements for hull design and construction of bulk carriers and/or oil tankers operating in unrestricted worldwide service. Within the verification audit process, any information and/or documentation, either supporting or included in the rule development process, which may include guidelines, interpretations and internal procedures considered necessary to assess the conformity of the rules may be interpreted as a part of the rule set.
- .10 *Secretary-General* means the Secretary-General of the International Maritime Organization.
- .11 *Self-assessment* means the Submitter assesses its rules for the design and construction of bulk carriers and/or oil tankers for conformity with the goals and functional requirements as set out in the Standards.
- .12 *SOLAS* means the International Convention for the Safety of Life at Sea, 1974, as amended.
- .13 *Standards* means the *International goal-based ship construction standards for bulk carriers and oil tankers*, adopted by the Organization by resolution MSC.287(87).
- .14 *Submitter* means any Administration or recognized organization that requests the Organization to verify that its ship design and construction rules for bulk carriers and/or oil tankers conform to the Standards.
- .15 *Third party* means a party that is neither the Organization nor the Submitter.
- .16 *Verification* (and any variation of the word *verify*) means the rules for the design and construction of bulk carriers and oil tankers have been compared to the Standards and have been found to be in conformity or are consistent with the goals and functional requirements as set out in the Standards.
- .17 *Verification audit* or *audit* means the process of evaluating the Submitter's rules, self-assessment and supporting documentation to ascertain the validity and reliability of information. The purpose of the audit is to assess the conformity of the submitted rules with the Standards based on work done on a sampling basis.
- .18 *Validation* means the act of examining methodologies, assessments, procedures, hypothesis or criteria used in requirements or calculations in order to make them acceptable.

- .19 *Benchmarking* means the act of measuring the performance of methodologies, assessments, criteria and requirements by using indicators that can be compared with an accepted standard or with experimental and/or service history data, performance levels or outcomes known to be reliable.
- .20 *Rule change* means any text change to an existing rule or rule set already verified as conforming to the Standards.
- .21 *Categorization of rule changes* means assigning a new rule or rule change to one of the following categories for the purpose of maintenance of verification:

Category	Designation	Explanation
1	Corrigenda and follow-up change	Editorial corrigenda; or rule changes reflecting amendments to IMO mandatory instruments
2	Minor change	Change or deletion of a rule requirement or addition of new requirements not belonging to categories 1 or 3
3	Major change	Change of basic methodology or technology or basic assumptions, e.g. changing the basis for load determination; introduction of new technologies which will require change of permissible values (acceptance criteria), etc.

## PART A VERIFICATION PROCESS

### Scope of verification

6 This part establishes the procedures to be followed in order to verify that rules for the design and construction of bulk carriers and/or oil tankers conform to the Standards. The verification process consists of two main elements: self-assessment of the rules by the Submitter and an audit of the rules, the self-assessment and the supporting documentation by the Organization.

### Initial verification

#### *Initiation*

7 Any Administration or recognized organization wishing to have its rules verified as conforming to the Standards should initiate the process with a letter to the Secretary-General, requesting a verification audit of their rules. The letter should be accompanied by a complete technical documentation package (see paragraph 10) and a supporting letter from an Administration that has recognized the Submitter, if applicable.

8 The Secretary-General notifies the Submitter of his decision to accept or reject the request and, if accepted, advises the expected date for establishment of the GBS audit team

(the Team) to audit the submission. If the request is rejected, the Secretary-General will include the reason for doing so.

9 The Submitter may withdraw the application at any time prior to consideration by the Maritime Safety Committee.

### **Submission**

10 The Submitter should provide a technical documentation package for review in electronic form in English (to each member of the Team and the Secretariat), including:

- .1 the rule set to be verified as conforming to the Standards;
- .2 all items listed under information and documentation requirements in part B of these Guidelines which are not included in .1 above and are included in the internal quality management system or the rule development process as applicable;
- .3 a self-assessment, addressing all items listed under information and documentation requirements and evaluation criteria in part B of these Guidelines;
- .4 a clear indication of any instance where a functional requirement, or portions of it, are satisfied by IMO mandatory instruments that are not part of the submitted rules (e.g. SOLAS or MARPOL requirements);
- .5 any other documentation which, in the Submitter's opinion, supports their assessment that the rules conform to the Standards;
- .6 a completed Submission Template (see appendix 1);
- .7 a clear indication of any confidential and/or proprietary information submitted with the documentation package; and
- .8 in case a Submitter uses third-party rules, procedures and technical documentation, the following should be submitted in addition to sub-paragraphs .1 to .7 above:
  - .1 a clear statement that the use of such rules, procedures and technical documentation does not infringe any copyright material;
  - .2 clear procedures, as part of the internal quality management system, for the regular review and continuous improvement of the submitted rules, procedures and technical documentation; and
  - .3 details of processes, procedures and associated documentation that ensure proper monitoring and implementation of the third-party rules.

### ***Audit process***

- 11 The initial verification audit (audit) is an iterative process based on the following steps:
- .1 the Secretary-General verifies that the submitted technical documentation package includes all of the elements specified in paragraph 10;
  - .2 the Secretary-General establishes the GBS audit team and forwards the request for audit and technical documentation package to the Team with the instructions given in paragraph 12;
  - .3 the Team reviews the information, confirms completeness of the documentation submitted, exchanges views and establishes an audit plan;
  - .4 the Team conducts the audit;
  - .5 the Team prepares an interim audit report for the Submitter that contains the preliminary findings of the audit, requests for additional information as needed, and possible non-conformities, using the report format specified in appendix 2. Where the Team has identified a possible non-conformity, they should explain the reasons for reaching that conclusion;
  - .6 upon receipt of the interim report, the Submitter may respond by submitting additional documentation through the IMO Secretariat to the Team to address the reported non-conformities and/or requests for additional information;
  - .7 the Team prepares a final audit report with a recommendation, using the report format specified in appendix 2, and provides it to the Secretary-General with a copy to the Submitter. Where the Team has identified an unresolved non-conformity, they should explain the reasons for reaching that conclusion;
  - .8 the Submitter should prepare corrective action plans to address any non-conformities reported by the Team and submit them to the Secretary-General;
  - .9 the Team reviews the corrective action plans and sends its recommendation to the Secretary-General; and
  - .10 the Team's comments and suggestions related to the audit process should be submitted in a separate report to the Secretary-General.

12 The Team is expected to conduct an audit to determine whether the submitted rules conform to the Tier I goals and each of the Tier II functional requirements, based on the criteria in part B of the Guidelines. In undertaking this task, the Team should exercise their professional judgement in determining the depth of the audit.

13 Where the Submitter can clearly indicate that a functional requirement, or portions of it, are covered by IMO mandatory instruments (e.g. SOLAS or MARPOL requirements), but are not part of the submitted rules, the Team should accept this as part of the verification, provided that it does not affect other covered functional requirements. Mandatory IMO instruments used to satisfy functional requirements should be applied in a manner consistent with IMO interpretations.

14 Timescales for the initial verification audit process should be agreed between the Secretary-General, the Team and the Submitter at an early stage. Deviations to agreed timescales can be considered by the Secretary-General upon timely request.

### ***Appeal***

15 The Submitter, through their supporting Administration, can appeal a finding of the GBS audit team to the Secretary-General. Notification of intent to appeal must be made within 30 days after receiving the Team's final audit report. The appeal request should follow within six months of the notification with the documentation to support the appeal request. After the supporting documentation is received, the Secretary-General should establish an appeal board, independent of the original Team, to adjudicate the request. This appeal board should be comprised of three or five members and be selected by the Secretary-General from the same list of experts described in paragraph 37. These members should not have participated in the Team that conducted the audit that is being appealed.

### ***Approval***

16 The Secretary-General forwards the final audit report of the Team, any corrective action plans, supplemented by any appeal report and any auditors' recommendations on the corrective action plans, if applicable, to the Committee for consideration and final decision.

17 Ships contracted for construction to any new rules or rule changes to rules already verified as conforming to the Standards may be deemed to meet the Standards until a final decision is made by the Committee.

18 The Committee considers the submission from the Secretary-General, with a view to confirming that the information provided by the Submitter demonstrates that the rules conform to the Standards.

19 Where non-conformities have been found and corrective action plans have been submitted, the rules and/or the documentation should be revised as necessary and the documentation to demonstrate rectification of non-conformities according to the agreed corrective action plans should be submitted for audit (see paragraphs 26.1, 27.1 and 27.3). During this process, ships contracted for construction to any new rules or rule changes to rules already verified as conforming to the Standards may be deemed to meet the Standards until a final decision is made by the Committee unless the Committee agrees that there is a non-conformity that compromises safety.

20 Upon final decision by the Committee, the Secretary-General notifies the relevant Administration and recognized organization as to whether the submitted rules conform to the Tier I goals and Tier II functional requirements of the Standards. In the case of non-conformity, the notification letter should include specific details to support the determination of non-conformity.

21 The Secretary-General circulates the results of successful verifications to Member Governments by appropriate means and maintains a list of all rule sets that have been verified for conformity as well as the original copy of the documentation package submitted.

### ***Common submissions by groups of Submitters***

22 Where documentation is common to more than one recognized organization or Administration, Submitters may make a request to the Secretary-General to submit a single package containing all the common documents.

23 Individual recognized organizations and Administrations should also submit their own documentation demonstrating how the common documents have been incorporated into their own requirements. The individual package should also include any additional information which is relevant to the audit. For an initial audit, the individual submission should be supported by an Administration which has recognized the Submitter, as required by paragraph 7.

24 Supporting Administrations should receive from the individual Submitter a copy of any common submission made on behalf of the recognized organization they are supporting.

25 The Secretary-General may establish a separate Team to evaluate the common submission. If such a team is established, it should liaise with the Team that is considering the individual submissions to ensure that findings identified in the individual package that are related to the common package are addressed.

### **Maintenance of verification**

26 The addition of new rules or changes to rules already verified as conforming to the Standards may be introduced as a result of:

- .1 the application of corrective actions emanating from previous verification audits; or
- .2 a continuous improvement process, which may take into account the experience gained and the due consideration by the Administration or the recognized organization the rules of which have been verified as conforming to the Standards, which also includes the addressing of observations stemming from previous verification audits.

27 Addition of new rules or changes to rules already verified as conforming to the Standards should be processed as follows:

- .1 if they are as a result of paragraph 26.1 above, each Submitter should notify and make available any new rules or rule changes, including the necessary documentation regarding the completion of corrective actions for the non-conformities reported, to the Secretary-General and to all Administrations that have recognized them. The notification should include, at least (see also appendix 3):
  - .1 an extract from the original rule linkage summary table related to the non-conformity;
  - .2 a copy of the text of the original non-conformity;
  - .3 an explanation of the investigation related to the non-conformity;
  - .4 a copy of the detailed action plan applied, including how the non-conformity has been rectified and any impact of the corrective actions;
  - .5 a self-assessment (rule linkage) addressing all non-conformities; and
  - .6 any supporting documentation, e.g. rule change proposals, updated technical background documents, changed procedures, etc.



- .2 If they are as a result of paragraph 26.2 above, at least annually, each recognized organization whose rules have been verified as conforming to the Standards should make available any new rules or rule changes, including any errata, corrigenda or clarifications, to the Secretary-General and to all Administrations that have recognized them. The Secretary-General should also be provided with a rule commentary. All changes should be listed in the rule commentary including their categorization as per paragraph 5.21 and, for categories 2 and 3 changes, the rule commentary must clearly indicate the impact of the changes on conformity with the Standards of those rules already verified. The commentary should include, but not be limited to:
- .1 an explanation of why the changes were considered necessary, including a description of the issues under consideration;
  - .2 the extent to which the changes address the issues under consideration;
  - .3 an explanation of the way the rules were formulated/drafted;
  - .4 an indication of any impact on and/or contribution to safety, security or environmental protection; and
  - .5 an indication of any impact on net and gross scantlings.
- .3 The Organization should audit all new rules and rule changes received per sub-paragraph .1 above. To such an extent, the new rules, rule changes and the necessary documentation should be submitted in a timely manner. The Secretary-General should establish a Team accordingly and forward the compilation of new rules and changes received per sub-paragraph .1 to it for consideration. The Team should conduct a preliminary review of the new rules and changes, exchange views and establish an audit plan. The Team conducts the audit and prepares a verification audit report with a recommendation and provides it to the Secretary-General with a copy to the Submitter. Where the Team has identified a non-conformity or an unresolved non-conformity, it should explain the reasons for reaching that conclusion. The findings of the Team should be forwarded by the Secretary-General to the Committee for further consideration and final disposition at the earliest opportunity after the Committee session that had considered the final audit report and had decided upon conformity. The Secretary-General should notify the relevant Submitter(s) as to whether the non-conformity has been rectified.
- .4 The Organization should review and audit the rule changes received per sub-paragraph .2 every three years. The Secretary-General should establish a Team and forward the compilation of annual changes received per sub-paragraph .2 to it for consideration. Using their professional judgement, the team should conduct a review of all the changes taking into account the information submitted, particularly the Submitters' categorization of the rule changes and the impact assessment, exchange views and establish an audit plan. Category 3 changes should be subject to audit; category 2 changes may require an audit depending on the impact of the change; category 1 changes need not be audited unless the team deems it necessary. The Team should provide the audit plan to the Secretary-General for submission to the Committee, and to the Submitters for information.

The Team conducts the audit and prepares a maintenance of verification audit report with a recommendation and provides it to the Secretary-General. Where the Team has identified a non-conformity, it should explain the reasons for reaching that conclusion. The findings of the Team should be forwarded by the Secretary-General to the Committee for further consideration and final disposition.

- .5 When an Administration considers a new rule or rule change described in sub-paragraph .2 above to result in non-conformity with the Standards, it may request the Secretary-General to conduct a review of the rule or the change, respectively. The request should include supporting justification why such a review is necessary. The Secretary-General should establish a Team to assess the request of the Administration and the impact of the change(s) on conformity with the Standards, and then assess the necessity of conducting an audit, regardless of the three-year cycle. The recommendations of the Team should be forwarded to the Committee by the Secretary-General, along with the request from the Administration and supporting documentation, for further consideration and final disposition.
- .6 The Submitter may request the Secretary-General to conduct a review of the rule or the change, respectively. The request should include supporting justification why such a review is necessary. The Secretary-General should establish a Team to assess the request of the Submitter and the impact of the change(s) on conformity with the Standards, and then assess the necessity of conducting an audit, regardless of the three-year cycle. The recommendations of the Team should be forwarded to the Committee by the Secretary-General, along with the request from the Submitter and supporting documentation, for further consideration and final disposition.
- .7 Any Administration the rules of which have been verified against the Standards should be subject to the process described in sub-paragraphs .1 to .5 above, as applicable.
- .8 Rules should be considered to be in conformity unless sub-paragraphs .3, .4 or .5 above result in non-conformities. During the subsequent process ships contracted for construction to the revised rules may be deemed to meet the Standards.

#### ***Rectification of non-conformities after initial or maintenance audits***

28 Where non-conformities are identified and corrective action plans submitted, the Submitter should prepare a further submission to demonstrate that the non-conformity has been rectified.

29 The submission should contain the following information (see also appendix 3):

- .1 an extract from the original rule linkage summary table related to the non-conformity;
- .2 a copy of the text of the original non-conformity;
- .3 a copy of the submitted corrective action plan;
- .4 details of how the non-conformity has been rectified; and

- .5 any supporting documentation, e.g. rule change proposals, updated technical background documents, changed procedures, etc.

30 The Secretary-General will establish an audit team to review the submission and forwards the documentation package to the Team for the following course of action:

- .1 The Team should conduct a preliminary review of the new rules and the changes, exchange views and establish an audit plan. The Team conducts the audit. The Team may interact with the Submitters for clarification or requests for additional material.
- .2 The Team prepares an audit report with a recommendation and provides it to the Secretary-General with a copy to the Submitter. Where the Team has identified a non-conformity or an unresolved non-conformity, they should explain the reasons for reaching that conclusion.
- .3 The Secretary-General forwards the audit report to the Committee for consideration and final decision.
- .4 The Committee considers the report prepared by the Team with a view to confirming that the information provided by the Submitter demonstrates that the non-conformity has been rectified.

31 Upon final decision by the Committee, the Secretary-General notifies the relevant Submitter as to whether the non-conformity has been rectified.

#### ***Follow up of observations***

32 Notwithstanding the provisions in paragraphs 26 and 27 above, where observations are identified, the Submitter should prepare a further submission to demonstrate that an observation has been recognized and will be addressed.

33 The submission should contain the following information:

- .1 the original documentation related to the observation(s);
- .2 a copy of the text of the observation(s);
- .3 a copy of the improvement action(s); and
- .4 any supporting documentation.

34 During the maintenance of verification audit, any improvement action plans should be made available to the auditor(s).

35 The Committee may request re-verification of rules if significant changes are made to the Standards or other IMO mandatory instruments or if there is a compelling need.

#### **GBS audit team**

36 A GBS audit team, established under the auspices of the Committee, will conduct an audit of the Submitter's documentation package to verify whether the rules conform to the Standards.

The Team will serve as an independent panel of technical experts which are not considered to be representing any Member State of the Organization or any organization in consultative status. The Team should consist of three (3) or five (5) members, depending on the complexity of the submission(s) and/or the necessary time to review the documentation package(s), e.g. in case of common submissions. A simple majority will be required to recommend a finding of non-conformity for a functional requirement. The voting of individual members will be kept confidential, with the resulting outcome considered as a decision of the Team. In any case, the view of the minority should be fully documented in the final audit report of the Team.

37 Administrations and non-governmental organizations in consultative status with the Organization may nominate individuals for inclusion in a list of experts, maintained by the Secretary-General, from which the members of the Team will be selected. Nominations should be provided to the Secretary-General and should be accompanied by a curriculum vitae.

38 Nominees should have adequate knowledge of, and experience in, ship structural design and construction, the Standards and classification society rules and rule development and be able to correctly interpret the rules for correlation with relevant regulatory requirements. Additionally, nominees should satisfy at least some of the following requirements:

- .1 engineering degree in naval architecture and/or structural engineering;
- .2 scientific or engineering knowledge of technical subjects addressed in ship structural standards including strength of materials, structural analysis, fatigue analysis, hydrodynamics and load calculations, and structural reliability;
- .3 design, construction or operating experience with the type of ship addressed by the ship rules being verified;
- .4 knowledge of ship safety construction requirements, including SOLAS requirements and industry standards, guidelines and practices;
- .5 knowledge of environmental protection requirements related to ship structures;
- .6 knowledge and experience in survey, inspection and maintenance of ship structures;
- .7 knowledge and experience in shipbuilding and ship construction practices;
- .8 knowledge and experience in auditing; and
- .9 research experience in any of the areas referred to in subparagraphs .1 to .7 above.

39 The members of the Team will be selected by the Secretary-General as needed from the list of experts, giving due consideration to the qualifications listed in paragraph 38 and ensuring appropriate and balanced representation and expertise for the specific rules being considered. Additionally, the Secretary-General will select one of the members of the Team to be responsible for overall coordination of the audit. The Team should exercise their professional judgement in concluding compliance with the Standards. Until reports are issued to the Committee, this audit process is understood to be between the auditors and the Submitters and information related to the process should be maintained in confidence between these parties. Team members should not have any conflict of interest relating to the rules being verified. In addition, Team members should act in a neutral manner.

40 Each member of the GBS audit team or of the appeal board should sign a confidentiality agreement with the Secretary-General, stating that they will not disclose any proprietary information that is provided to them for the purpose of verifying rules, with the exception of the documentation required for the interim or final reports.

41 The Team should consider the need for transparency throughout their deliberations. The Team should meet in person with the Submitter at least once during the audit process at a mutually agreed location and date to address any questions and issues that may arise during the audit process, review any additional documentation needed to complete the audit, and to share their preliminary findings.

42 The Secretary-General will provide the GBS audit team with adequate administrative assistance to support the verification process, including a permanent secretary.

## **PART B INFORMATION/DOCUMENTATION REQUIREMENTS AND EVALUATION CRITERIA**

### **INTRODUCTION**

43 This part provides detailed information and documentation requirements and evaluation criteria to assist the Submitter to conduct a self-assessment that the rules conform to the Tier I goal(s) and Tier II functional requirement(s) of the Standards, as outlined in part A. It includes a statement of intent, information and documentation requirements, and evaluation criteria for each Tier II functional requirement. Additionally, the information and documentation requirements and evaluation criteria serve as the auditing standard for the GBS audit team.

44 The statement of intent links Tier II functional requirement(s) to Tier III verification of conformity by providing an overview of what the verification of the particular functional requirement should achieve.

45 The information and documentation requirements establish specific items that should be included and addressed in the submission supporting the verification.

46 The evaluation criteria should be considered as the basis for conducting the self-assessment and audit.

47 One or more information and documentation requirements may be applicable to one or more evaluation criteria. This relationship will depend upon the nature and extent of the information and documentation required, as well as the scope and extent of the evaluation criteria.

48 Justification means providing the supporting data, analysis or other study that demonstrates the adequacy of the methodology, process or requirement. It should include:

- .1 basis for the assumptions made;
- .2 description of the uncertainties associated with them; and
- .3 any sensitivity analyses carried out.

It includes documented rationale on which the validity of the hypothesis or criteria used in the requirements or calculations are based. These may be the results of research work, historical data, statistics, etc. For example, justification of safety factors should describe how the many related assumptions and uncertainties, such as environmental conditions, loads, structural analysis methodology and strength criteria, are accounted for.

49 Where commentary or data are requested, it is sufficient for such information to be contained in a rule commentary or other supporting documentation.

50 Where the rules establish a process to evaluate and accept alternatives, the submission should clearly identify the process for determining that an equivalent level of safety is achieved.

## **INFORMATION AND DOCUMENTATION REQUIREMENTS AND EVALUATION CRITERIA**

### ***DESIGN***

#### **1 Design life**

##### **1.1 *Statement of intent***

Confirm that the specified design life is at least 25 years and incorporated in the rules.

##### **1.2 *Information and documentation requirements***

1.2.1 Statement of the design life in years used in developing the rules.

1.2.2 Description of the assumptions and methods used to incorporate design life into the rules. This should include, but not be limited to, consideration of extreme loads, design loads, fatigue and corrosion.

##### **1.3 *Evaluation criteria***

1.3.1 Are structural strength, fatigue and corrosion additions, and any other design parameters used in the rules based upon the specified design life?

1.3.2 Has the design life been applied in sections of the rules where specified?

#### **2 Environmental conditions**

##### **2.1 *Statement of intent***

Confirm that the wave data and associated ship motions and loads are developed on the basis of North Atlantic environmental conditions and the relevant long-term sea state scatter diagrams for the specified design life.

##### **2.2 *Information and documentation requirements***

2.2.1 Source of sea state data (scatter diagrams, etc.) including method and date of data collection and geographical location represented by the data.

2.2.2 Justification that sea state data and predictions used to develop motions and loads are representative of North Atlantic environmental conditions.

2.2.3 Justification of the methodology used to develop ship motions and loads, including assumptions related to speed, distribution of headings, number of cycles of wave encounters, probability of exceedance of design values, sea states, wave spectral shapes, hull form and other relevant parameters. Clearly define limits of applicability and provide guidance for assessment when outside this range.

2.2.4 Description of how the methodology used to develop ship motions and loads has been validated against experimental or service history data.

### **2.3 Evaluation criteria**

2.3.1 Does the wave data properly represent North Atlantic conditions and include the regions where the most severe conditions are expected?

2.3.2 Do the rules specify the wave spectrum and statistical analysis methods used to obtain the design extreme value, including its probability of exceedance?

2.3.3 Are the design extreme motions and loads based on appropriate number of cycles of wave encounters corresponding to at least a 25-year design life?

2.3.4 Are the ship speeds and headings used for assessment of ship motions and loads based upon speeds and headings that can be expected in the sea states under consideration?

2.3.5 Do the rules properly specify the range of applicability of ship motions and loads, and when further analysis, such as direct seakeeping analysis or model testing, is required? Do the rules clearly state the assumptions used in the methodologies to develop ship motions and loads?

2.3.6 Are the methodologies used to develop ship motions and loads validated by experimental or service history data?

## **3 Structural strength**

### **3.1 Statement of intent**

Confirm that the rules require a ship to be designed to withstand at net scantlings the operational and environmental loads for its specified design life. Confirm that the rules include the appropriate safety margins which reflect the degree of uncertainty.

### **3.2 Information and documentation requirements**

3.2.1 Description of how the rules provide net scantlings that are sufficient to avoid excessive deformation (either elastic or plastic, as appropriate) and prevent failure modes including, but not limited to, those involving yielding and buckling of hull girder and structural members. Include the following:

- .1 Description of the strength assessment methodology.
- .2 Explanation of how the net scantlings concept is applied in the rules for structural design.
- .3 Justification of the methodologies used to obtain the global and local, static and dynamic design loads.

- .4 Justification of the acceptable limits of yielding and buckling.
- .5 Explanation of how the rules prevent deformation from compromising the integrity of the ship's structure. The term "deformation" means translational and/or rotational displacement.
- .6 Explanation of the requirements for finite element structural modelling, including load application, boundary conditions, element selection and mesh size. Explanation of how primary, secondary and tertiary stresses are considered.
- .7 List of the loading conditions considered in the rules that are to be included in the structural evaluation. Justification of the loading conditions especially in terms of what parts of the structure may be critically loaded and stressed.
- .8 Description of how construction tolerances and procedures, and material imperfections are accounted for in the rules.
- .9 Justification of the rationale of the rules for weld design and procedures.
- .10 Justification of how structural continuity is taken into account in the rules, including termination of primary structures at the fore and aft ends of the cargo block.
- .11 Explanation of how the rules consider deformations or vibration levels that may damage or impair the ship structure, equipment or machinery.
- .12 Description of the safety factors in conjunction with assumed design load(s) and justification as to why they are appropriate.
- .13 Description of how the strength assessment methodology has been validated against experimental and service history data.
- .14 Example(s) of the rules applied to representative design(s). The example(s) should include an illustration of the midships section and of the cargo region showing net and gross scantlings, as well as a summary of the background calculations used to develop the scantlings.

3.2.2 Explanation of how the rules consider structural integrity at net scantlings for typical loading/discharging and ballast exchange scenarios, including criteria to determine acceptability and provide reasonably attainable sequences of loading, discharging and ballasting.

3.2.3 Justification of the methodology used for the calculation of local stresses, including stress concentration factors, if utilized.

3.2.4 Justification of how the rules account for sloshing effects.

3.2.5 Description of how the rules determine that the net scantlings are sufficient to provide adequate ultimate strength. Include the following:

- .1 description of the ultimate strength assessment methodology;
- .2 justification of how the net scantlings concept is applied in the rules for ultimate strength;



- .3 justification of the loads considered for the ultimate strength analysis;
- .4 explanation of the methodology used for calculating hull girder capacity and ultimate strength of plates and stiffeners, individually and in combination;
- .5 description of acceptable limits of ultimate strength, including safety factors, with justification why they are appropriate; and
- .6 description of how the ultimate strength assessment methodology has been validated against experimental and service history data.

3.2.6 Description of any protective arrangements and/or reinforcements required to avoid damage caused by loading/unloading equipment that would compromise the ship's structural integrity.

### **3.3 Evaluation criteria**

3.3.1 Do the rules specify the probability of exceedance for which global and local dynamic loads are calculated?

3.3.2 Are the limits of yielding, buckling and ultimate strength set at levels that will maintain the structural integrity?

3.3.3 Do the rules satisfactorily consider deformations that may compromise the integrity of the ship's structure?

3.3.4 Do the rules adequately specify the required extent of finite element models and how ship structures should be modelled, including how boundary conditions and loads are to be applied, and elements and mesh size selected? Are primary, secondary and tertiary stresses properly accounted for?

3.3.5 Are the following loading conditions included: homogeneous, partial, alternate loads, multi-port, ballast conditions including ballast management, and loading and offloading sequences and intermediate conditions? Are these, and any other conditions identified in the loading or stability manuals, considered without exceeding allowable bending moments, shear forces and stresses?

3.3.6 Is the methodology for developing the lightship and deadweight load distributions clearly defined, in a way that it will be consistently applied?

3.3.7 Do the rules satisfactorily consider workmanship standards and construction tolerances?

3.3.8 Do weld designs and procedures provide a level of strength of welds in their net condition to withstand the expected loads on the joints?

3.3.9 Are the requirements for tapering primary structures, including transitions fore and aft of the cargo block, defined in sufficient detail in the rules?

- .1 Where prescriptive measures are specified, do these measures provide for adequate continuity and termination of primary structure and primary supporting members?

- .2 Where analytical methods are allowed for evaluating structural continuity, is the methodology sufficiently defined to enable adequate assessment of the proposed arrangements for the termination of primary structure and primary supporting members? Do these analytical methods include both the local stress evaluation and the effect of the relative stiffness of the members at the termination?

3.3.10 Do the rules satisfactorily consider deformations or vibration levels that may damage or impair the ship structure, equipment or machinery?

3.3.11 Do the rules include adequate safety factors?

3.3.12 Do the rules include methodology for the development of local loads, including specifying the characteristics of intended cargoes relevant to loading (cargo arrangement, minimum density, angle of repose for bulk cargo) and minimum density of ballast to be applied?

3.3.13 Do the rules specify procedures for direct calculation of local stresses in structural details. If direct calculation is not required, do the rules include definition and application of stress concentration factors? If stress concentration factors are utilized, a justification of the definition and application of these factors should be included.

3.3.14 With regard to local strength:

- .1 Do the rules require the structure in way of cargo and ballast spaces to be suitable for any level of filling, from empty to maximum capacity (where maximum capacity is either full or the clearly defined operational limit on filling height or cargo mass)?
- .2 Do the rules define loading conditions for evaluation, including the loaded/empty condition of adjacent cargo and/or ballast spaces, and the draughts to be considered for each loading condition?
- .3 For oil tankers, do the rules consider any reasonable combination of cargo or ballast space loading, including asymmetric loading and loading in any one athwartships row across to be empty at or near the scantling draught?
- .4 Do the assumed draught limits and assumed densities and other cargo characteristics cover the expected operational range?
- .5 Do the local strength evaluations consider the effects of maximum allowable still water and wave bending and shear loads on the structure?
- .6 Are sloshing effects adequately covered by the rules?

3.3.15 Do the rules require adequate protective arrangements and/or reinforcements to avoid damage caused by loading/unloading equipment that would compromise the ship's structural integrity?

3.3.16 Have the results from the strength and ultimate strength assessments been benchmarked? Do they compare favourably with service history and other standards?

3.3.17 Do the illustrations of the representative designs show net and gross scantlings? Do the background calculations show how the structure at net scantlings withstands the operational and environmental loads for the specified design life?

## **4 Fatigue life**

### **4.1 *Statement of intent***

Confirm that the fatigue life is not less than the specified design life.

### **4.2 *Information and documentation requirements***

4.2.1 Description of how the rules provide that structural arrangement and net scantlings are sufficient to meet a calculated fatigue life not less than the specified design life. Include the following:

- .1 Description of the fatigue assessment methodology used in the rules including sea state data, long-term statistics of wave data applied in fatigue calculations, derivation of cyclic loads, calculation of stress ranges, modelling of their distribution functions, S-N curves used and factors of safety or margins taken.
- .2 Explanation of where and how the net scantlings concept is applied in the rules for fatigue. Justification of the values of the scantlings used in the calculations.
- .3 List of the loading conditions required by the rules to be considered as part of the fatigue evaluation. Justification of the selection of loading conditions.
- .4 Justification of how the rules take into account dynamic loads and their combinations, including the probability level for which dynamic loads are calculated.
- .5 Justification of the process for the selection of the structural members and typical critical design details required to be included in evaluation of ship's fatigue life.
- .6 Justification of procedures for the calculation of cyclic stresses and stress ranges in structural details. Explanation of the method used to take into account stress concentrations, as may be applicable to the detail analysed.
- .7 Explanation of the requirements for finite element structural modelling, including load application, boundary conditions, element selection and mesh size. Explanation of how primary, secondary and tertiary stresses are considered.
- .8 Description of how construction tolerances and procedures are accounted for in the rules. Description of how surface treatment, such as grinding and peening, is addressed in the rules.
- .9 Description of how the rules consider the effect on fatigue life of unprotected structural details in seawater (e.g. when the breakdown of coating leads to exposure to seawater).
- .10 Description of how the rules take into consideration slamming (e.g. whipping) and vibratory-induced fatigue effects (e.g. springing or propeller induced vibrations). Justification should be provided if not explicitly considered in fatigue assessment.

- .11 Explanation of the effect of uncertainties/assumptions on fatigue life, highlighting any margins used in fatigue calculations, taking into consideration the consequence of failure of the particular structural member.
- .12 Description of how the fatigue assessment methodology has been validated against experimental and/or service history data.

#### **4.3 Evaluation criteria**

4.3.1 Is the methodology used in fatigue life assessment properly justified? Are the explanations provided to cover the sea state data used, long-term statistics of wave data applied, derivation of cyclic loads, method of calculation of the stress ranges and their distribution functions, S-N curves used and the factors of safety or margins taken, satisfactory?

4.3.2 Are the values of the scantlings required to be used in the calculations properly justified according to the net scantlings concept?

4.3.3 Are the assumed operating conditions (e.g. loaded and ballast) specified by the rules in the long-term fatigue response analysis adequate for a representative ship's operating profile? Are the stress ranges so obtained appropriate to represent the long-term fatigue response?

4.3.4 Are the internal/external dynamic loads and their combinations based on the North Atlantic environment? Is the probability level for which these loads are calculated properly justified?

4.3.5 Do the rules require the systematic identification of areas prone to fatigue throughout the entire ship that are required to be included in the evaluation of the ship's fatigue life?

4.3.6 Are the procedures for the calculation of cyclic stresses and stress ranges in structural details properly justified?

4.3.7 Do the rules properly take into account stress concentrations, as may be applicable to the detail analysed?

4.3.8 Do the rules specify the required extent of finite element models and how ship structures should be modelled, including how boundary conditions and loads are to be applied, and elements and mesh size selected? Are primary, secondary and tertiary stresses properly accounted for?

4.3.9 Do the rules satisfactorily consider construction tolerances and procedures? Is surface treatment, such as grinding and peening, adequately considered?

4.3.10 Do the fatigue life calculations consider degradation of coating performance under seawater environment?

4.3.11 Do the rules take slamming (e.g. whipping) and vibratory-induced fatigue effects (e.g. springing or propeller induced vibrations) into consideration? If not explicitly considered in fatigue assessment, is adequate justification provided?

4.3.12 Do the rules satisfactorily account for uncertainties or assumptions on fatigue life assessment?

4.3.13 Have the results from the fatigue life assessment methodology been benchmarked? Do the results compare favourably with service history and other standards?

## **5 Residual strength**

### **5.1 Statement of intent**

Confirm that the rules provide a reasonable level of residual strength after damage (e.g. collision, grounding and flooding).

### **5.2 Information and documentation requirements**

5.2.1 Description of how ships designed to the rules with intact structure at net scantlings have sufficient ultimate strength to sustain flooding as defined in relevant IMO instruments.

5.2.2 Justification that ships designed to the rules have adequate residual strength to survive a casualty event. Include the following:

- .1 Description of the methodology used to assess residual strength.
- .2 Description of the flooding scenarios and the corresponding structural damage. Explanation of the relationship of the flooding scenarios with IMO instruments.
- .3 Description of the environmental conditions and period of exposure representative of the sea states expected for collision and grounding scenarios, and justification why they are appropriate.
- .4 Description of the acceptance criteria for residual strength of the ship in damaged condition, and justification if different from ultimate strength.
- .5 Where it is determined that the rules inherently provide adequate residual strength, justification should be provided that demonstrates through analysis of a range of representative ship designs and loading conditions.

5.2.3 Description of how the residual strength assessment procedure has been validated with experimental and/or casualty history data.

### **5.3 Evaluation criteria**

5.3.1 Can a ship designed to the rules sustain flooding as defined in relevant IMO instruments and survive with intact structure at net scantlings?

5.3.2 Does a ship designed to the rules have sufficient residual strength to survive a more significant casualty event (e.g. flooding with structural damage due to collision or grounding) under environmental conditions consistent with the likelihood of occurrence? Are the assumed damage scenarios representative of the intent of damage in relevant IMO instruments?

5.3.3 Has the residual strength assessment procedure been validated with experimental and/or casualty data?

## **6 Protection against corrosion**

### **6.1 Coating life**

#### **6.1.1 *Statement of intent***

Confirm that the coatings are properly selected and applied to protect the structure throughout the target useful life of the coating.

#### **6.1.2 *Information and documentation requirements***

6.1.2.1 Provision of information on coating life and mandatory use of coatings, including:

- .1 mandatory locations and/or spaces where coatings are required to be used;
- .2 types of coating to be used for the various spaces;
- .3 required target useful life of the coating and explanation for selection; and
- .4 the coating performance standard to be followed (e.g. IMO PSPC<sup>1</sup> where mandated).

6.1.2.2 Description of the requirements to be followed in spaces where other corrosion prevention systems are used.

6.1.2.3 Description of the procedures used to verify that the selected coating system with associated surface preparation and application methods is compatible with the shipyard production processes.

6.1.2.4 Description of the procedures used to verify that the specified coating procedures have been followed.

6.1.2.5 If an alternative is proposed to that prescribed by IMO instruments, justification to support the selection of coating standards and target useful life of the coating or areas of application.

#### **6.1.3 *Evaluation criteria***

6.1.3.1 Do the rules include appropriate requirements to achieve stated target useful life of the coating and fulfil SOLAS requirements as a minimum?

6.1.3.2 Do alternative or additional requirements allowed by the rules provide protection levels at least equivalent to those required by SOLAS?

6.1.3.3 Are the procedures indicated in 6.1.2.3 and 6.1.2.4 adequately documented in the rules?

6.1.3.4 Is adequate justification provided to support the use of alternatives to SOLAS or other IMO instruments?

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<sup>1</sup> Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers, adopted by the Organization by resolution MSC.215(82), as amended.

## **6.2 Corrosion addition**

### **6.2.1 *Statement of intent***

Confirm that the rules for corrosion addition values are rationally based and adequate for the specified design life.

### **6.2.2 *Information and documentation requirements***

6.2.2.1 Description of the methodology used to determine values for the design corrosion additions so that the scantlings remain above net scantlings over the specified design life.

6.2.2.2 Description of how assumed corrosion rates and rule design corrosion additions are determined based on ship type and location within the hull. Description should address how stress corrosion and any other modes of accelerated corrosion have been taken into consideration.

6.2.2.3 Description of any additional rule requirements that provide special consideration for other parameters such as unusual cargoes, loadings, trading patterns, material properties, etc.

6.2.2.4 Description of how corrosion of welds and heat-affected zones are considered.

6.2.2.5 Description of the steel/structure renewal criteria.

6.2.2.6 Description of how the methodology to determine corrosion addition and establish steel/structure renewal criteria has been validated against experimental and service history data.

### **6.2.3 *Evaluation criteria***

6.2.3.1 Does the methodology and supporting statistical data justify the corrosion additions?

6.2.3.2 Confirm that reductions in the rule design corrosion additions are prohibited.

6.2.3.3 Is consideration given to the corrosion of welds and heat-affected zones?

6.2.3.4 Do the rules clearly establish the steel/structure renewal criteria? For ships in service, do the renewal criteria provide for scantlings that are not less than the required net scantlings and that produce a hull girder section modulus within SOLAS requirements?

6.2.3.5 Has the methodology used to determine corrosion addition and establish steel/structure renewal criteria been benchmarked? Does it compare favourably with experimental and service history data?

## **7 Structural redundancy**

### **7.1 *Statement of intent***

Confirm that the rules require sufficient redundancy to withstand localized damage in any one stiffening structural member.

### **7.2 *Information and documentation requirements***

7.2.1 Demonstration that the rules have adequate requirements to provide ship structural redundancy.

7.2.2 Description of the requirements for localized damage assessments, including where applicable, modelling in finite element structural analysis.

7.2.3 Description of how the methodology used to assess structural redundancy has been validated against experimental and/or service history data.

### **7.3 Evaluation criteria**

7.3.1 Does a ship designed to the rules have sufficient structural redundancy to survive localized damage to a stiffening member?

7.3.2 Are the methods for assessing the consequences of localized damage satisfactorily described?

7.3.3 Has the methodology used to assess structural redundancy been validated? Does it compare favourably with experimental or casualty history data?

## **8 Watertight and weathertight integrity**

### **8.1 Statement of intent**

Confirm that the rules require adequate watertight and weathertight integrity for North Atlantic environmental conditions, including adequate strength for the closing arrangements and adequate redundancy for the securing devices.

### **8.2 Information and documentation requirements**

8.2.1 Description of the rule requirements for watertight and weathertight integrity.

8.2.2 Description of how the rules consider criteria from IMO instruments for determining which openings in the hull envelope are required to be watertight or weathertight.

8.2.3 Explanation of the criteria used in the development of the rules to determine that the strength and redundancy for closing arrangements, if appropriate, of the watertight and weathertight openings is adequate for the environmental conditions and specified design life.

### **8.3 Evaluation criteria**

8.3.1 Do the rules satisfy all relevant IMO watertight and weathertight integrity requirements?

8.3.2 Do the rules require sufficient strength for closing arrangements and securing devices to meet environmental conditions, design loads and specified design life? Do the rules require securing devices to have adequate redundancy?

## **9 Human element considerations**

### **9.1 Statement of intent**

Confirm that the rules incorporate human element and ergonomic considerations into the structural design and arrangement to facilitate operations, inspection and maintenance activity.



## **9.2 Information and documentation requirements**

9.2.1 Description of how the rules consider human element and ergonomics during the structural design and arrangement of the ship, including:

- .1 stairs, vertical ladders, ramps, walkways and work platforms used for permanent means of access and/or for inspection and maintenance operations;
- .2 structural arrangements to facilitate the provision of adequate lighting and ventilation, and to minimize noise and vibration in spaces normally occupied or manned by shipboard personnel;
- .3 structural arrangements to facilitate the provision of adequate lighting and ventilation in tanks or closed spaces (e.g. duct keels, pipe tunnels, etc.) for periodic inspections, survey and maintenance; and
- .4 structural arrangements to facilitate emergency egress of inspection personnel or ships' crew from tanks, holds, voids, etc.

9.2.2 Description of how ergonomic design principles are factored into the design rules, including any guidance information provided to designers.

## **9.3 Evaluation criteria**

9.3.1 Are human element and ergonomic considerations accounted for in the design of stairs, vertical ladders, ramps, walkways and work platforms?

9.3.2 Do the rules address structural or other arrangements to facilitate adequate lighting and ventilation in spaces normally manned or occupied by the crew?

9.3.3 Do the rules address structural or other measures to reduce the generation and transmission of vibration to a level at or below the acceptable ergonomic standards for spaces normally manned or occupied by the crew?

9.3.4 Do the rules address structural or other arrangements to facilitate adequate lighting and ventilation for the purposes of inspection, survey and maintenance?

9.3.5 Do the rules require structural arrangements to facilitate emergency egress from tanks or closed spaces?

## **10 Design transparency**

### **10.1 Statement of intent**

Confirm that the design and construction process is transparent, and that design information is clearly stated and made available to the classification society, the owner and the flag State, with due consideration to intellectual property rights.

## **10.2 Information and documentation requirements**

10.2.1 Description of how the rules require design specific information as required by SOLAS regulation II-1/3-10 to be included in the Ship Construction File (SCF), including:

- .1 areas requiring special attention throughout the ship's life;
- .2 all design parameters limiting the operation of a ship;
- .3 any alternatives to the rules, including structural details and equivalency calculations;
- .4 "as built" drawings and information which are verified to incorporate all alterations approved by the recognized organization or flag State during the construction process;
- .5 procedures for updating the SCF throughout the ship's life;
- .6 net (renewal) scantlings for all the structural constituent parts; and
- .7 minimum hull girder section modulus along the length of the ship which has to be maintained throughout the ship's life.

10.2.2 Description of the process, requirements and criteria to be followed when assessing, documenting and communicating alternative methods as being equivalent to specific rule requirements.

10.2.3 Description of procedures for ensuring that all relevant design and construction information, including correspondence exchanged between shipyard and recognized organization, is available to the owner and flag State during the construction process.

## **10.3 Evaluation criteria**

10.3.1 Do the rules establish requirements for including and updating design specific and critical information, including limitations, in the SCF?

10.3.2 Do the rules establish clear criteria and techniques for assessing alternative methods used in the design? Do the rules require that all equivalencies are documented in the SCF and are made available to the owner and/or flag State?

10.3.3 Do the rules establish procedures to provide all relevant design and construction information, including correspondence exchanged between shipyard and recognized organization, e.g. on net scantlings, corrosion margins used, etc., to be made available to the owner and flag State during the construction process?

## **CONSTRUCTION**

### **11 Construction quality procedures**

#### **11.1 Statement of intent**

Confirm that the rules contain provisions for ensuring that construction tolerances and procedures assumed during rule formulation are implemented during construction.

## **11.2 Information and documentation requirements**

11.2.1 Demonstration that the rules require the shipyard's construction procedures and standards to meet a minimum level of quality. Include the following:

- .1 procedures for specifying the materials and their tracking;
- .2 assembly requirements, including alignment, joining, welding, surface preparation, coating, castings, heat treatment, etc.;
- .3 approval scheme of welding procedures;
- .4 qualification scheme of welders; and
- .5 requirements for yard fit-up and other quality control inspections.

11.2.2 Description of actions taken when a shipyard is determined as not meeting the minimum level of quality construction.

11.2.3 Description of the procedures followed when the "as built" is different than "design". Include the following:

- .1 Criteria for determining when review of the "as built" drawings is required.
- .2 Criteria for determining when re-evaluation for strength and/or fatigue life is required. This should include consideration of net scantlings where appropriate.

11.2.4 Description of the procedures for ensuring that construction tolerances are verified and maintained.

11.2.5 Description of the procedures used to continuously update the rules based on construction and in-service experience.

11.2.6 Description of how the quality construction requirements have been benchmarked with recognized international shipbuilding and repair quality standards.

## **11.3 Evaluation criteria**

11.3.1 Are the construction tolerances used in rule formulations and calculations incorporated in the construction plan and verified during construction?

11.3.2 Do the quality requirements include continuous design improvement based on experience?

11.3.3 Have the rules' quality construction requirements been benchmarked? Do they compare favourably with recognized international shipbuilding and repair quality standards?

## **12 Survey during construction**

### **12.1 Statement of intent**

Confirm that the rules include provisions to ensure that the construction of ships is carried out to an acceptable quality level.

## **12.2 Information and documentation requirements**

12.2.1 Description of the construction survey procedure requirements, including:

- .1 types of surveys (visual, non-destructive examination, etc.) depending on location, materials, welding, casting, coatings, etc.;
- .2 establishment of a construction survey schedule for all assembly stages from the kick-off meeting, through all major construction phases, up to delivery;
- .3 inspection/survey plan, including provisions for critical areas identified during design approval;
- .4 survey criteria for acceptance;
- .5 interaction with shipyard, including notification and documentation of survey results;
- .6 correction procedures to remedy construction defects;
- .7 list of items that would require scheduling or formal surveys;
- .8 qualification of surveyors;
- .9 determination and documentation of areas that need special attention throughout ship's life, including criteria used in making the determination; and
- .10 procedures for determining the number and qualifications of surveyors for a project.

12.2.2 Description of procedures for providing shipowner and/or flag Administration representatives results of construction surveys.

12.2.3 Description of the requirements for testing during survey, including test criteria.

12.2.4 Description of how the construction survey requirements have been benchmarked with recognized international shipbuilding and repair quality standards.

## **12.3 Evaluation criteria**

12.3.1 Do the rules require the development of a Survey Plan that is reviewed during the initial kick-off meeting? Does the survey plan address activities during ship construction sufficient to verify the ship is built in accordance with the appropriate rules or standards and address all elements in 12.2.1?

12.3.2 Do the rules contain provisions that areas of high stress or fatigue risk identified during design approval are surveyed with adequate detail and extent during construction?

12.3.3 Do the rules have procedures to provide for an adequate number of qualified surveyors to carry out proposed surveys in accordance with the size of the project?

12.3.4 Is survey related correspondence between shipyard and recognized organization relating to ship design and construction made available to the owner and flag Administration?

12.3.5 Do the rules include acceptance criteria for all tests required? Are the test criteria based on rule formulation parameters?

12.3.6 Have the rules' construction survey requirements been benchmarked? Do they compare favourably with recognized international shipbuilding and repair quality standards?

**IN-SERVICE CONSIDERATIONS**

**13 Survey and maintenance**

**13.1 Statement of intent**

Verify that the rules provide for spaces of adequate size to facilitate survey and maintenance. Confirm that the rules provide for the identification of areas requiring special attention over the life of the ship based on design parameter selection.

**13.2 Information and documentation requirements**

13.2.1 Description of the rule requirements to provide for spaces of adequate size to facilitate ship survey and maintenance.

13.2.2 Description of rule requirements to identify items for inclusion in an in-service Survey Plan, including:

- .1 areas of high stress and with special fatigue considerations;
- .2 any other areas that need special attention throughout the ship's life, including criteria used in making the determination (e.g. wave impact loading, mechanical impact areas, special materials, etc.); and
- .3 structural design features that were selected on the basis of special in-service requirements.

**13.3 Evaluation criteria**

13.3.1 Do the rules include design requirements to provide for spaces of adequate size for ship survey and maintenance?

13.3.2 Do the rules contain provisions for the identification of areas of high stress or fatigue risk that require monitoring while in service?

13.3.3 Do the rules include provisions for the identification of structural design features selected on the basis of special in-service requirements?

13.3.4 Do the rules include provisions for the identification of any other areas needing special attention during the ship's life?

**14 Structural accessibility**

**14.1 Statement of intent**

Confirm that the rules include provisions to facilitate access for internal structural inspection and thickness measurements.

## **14.2 Information and documentation requirements**

Description of rule requirements to facilitate overall and close-up inspections and thickness measurements of the internal structure. Include the following:

- .1 standards for access; and
- .2 requirements for development of an Access Plan.

## **14.3 Evaluation criteria**

14.3.1 Are there provisions to provide for safe access to critical areas referred to in 13.2.2?

## **RECYCLING CONSIDERATIONS**

## **15 Recycling**

### **15.1 Statement of intent**

Confirm that the rules require the listing of materials used for the construction of the hull structure with a view toward identification of environmentally acceptable or recyclable materials and the development of an inventory list.

### **15.2 Information and documentation requirements**

15.2.1 Description of the rule requirements for listing of materials, including:

- .1 list of materials used for the construction of the hull structure;
- .2 provisions for listing of materials in the Ship Construction File; and
- .3 provisions for documenting changes to any of the above during the ship's service life.

### **15.3 Evaluation criteria**

15.3.1 Do the rules include provisions for the listing of materials used for the construction of the hull structure within the scope of the Standard, including:

- .1 list of materials used for the construction of the hull structure; and
- .2 provisions for listing of materials in the Ship Construction File?

15.3.2 Do the rules include provisions for documenting changes to any of the above during the ship's service life?



<b>3 SELF-ASSESSMENT SUMMARY</b>			
<b>Functional requirement</b>	<b>Fully covered in rules</b>	<b>Not covered in rules</b>	<b>Comments</b>
<b><i>Design</i></b>			
1 Design life			
2 Environmental conditions			
3 Structural strength			
4 Fatigue life			
5 Residual strength			
6 Protection against corrosion			
6.1 Coating life			
6.2 Corrosion addition			
7 Structural redundancy			
8 Watertight and weathertight integrity			
9 Human element considerations			
10 Design transparency			
<b><i>Construction</i></b>			
11 Construction quality procedures			
12 Survey during construction			
<b><i>In-service considerations</i></b>			
13 Survey and maintenance			
14 Structural accessibility			
<b><i>Recycling considerations</i></b>			
15 Recycling			

*Note: The Submitter declares that the above Self-Assessment Summary Table has been compiled without infringing any confidential and/or proprietary information and represents a true self-assessment of the rules submitted for verification with the GBS functional requirements.*



**4 RULE LINKAGE SUMMARY TABLE**

1 (Title and text of the relevant functional requirement)

1.1 (Text of the Statement of intent)

Information and documentation requirement		Regulation submitted (2)	Rule type (3)	Reference (4)
1.2.1	(Text) (1)			

Justification (If applicable) (5):

Evaluation criterion		Summarized comment (7)	Satisfied by rules (8)	Rule linkage (9)
1.3.1	(Text) (6)		(YES/NO)	

Detailed technical explanation (10):

Information and documentation requirement		Regulation submitted (2)	Rule type (3)	Reference (4)
1.2(n)	(Text) (1)			

Justification (If applicable) (5):

Evaluation criterion		Summarized comment (7)	Satisfied by rules (8)	Rule linkage (9)
1.3(n)	(Text) (6)		(YES/NO)	

Detailed technical explanation (10):

*Note: The Submitter declares that the above Rule Linkage Summary Table has been compiled without infringing any confidential and/or proprietary information and represents a true reflection of its rules in relation to the GBS functional requirements.*

**Notes:**

Section 4 of the submission template should be filled for each information and documentation element and its associated evaluation criterion, for each functional requirement.

- (1) Copy text of the relevant information and documentation requirement established in the Guidelines.
- (2) Indicate the file name or internet link or title of the hard copy where the information/documentation provided is found in the documentation package.
- (3) Specify type of information/documentation provided (public rule, internal procedure, unified requirement, guidelines, etc.).
- (4) Indicate the reference in the rules where the information is found.
- (5) Develop the justification required. If a justification is not required, detailed technical explanation should be submitted in any case.
- (6) Copy text of the evaluation criterion established in the Guidelines for the relevant information and documentation requirement.
- (7) Include a short comment explaining why the relevant evaluation criterion is satisfied.
- (8) Indicate if the relevant evaluation criterion is satisfied by rules according to self-assessment.
- (9) Specify all the rules locations where the relevant criterion is applied.
- (10) Provide a technical explanation showing why the evaluation criterion is said to be satisfied or why it is not satisfied.

## **APPENDIX 2**

### **FORMAT FOR GBS AUDIT TEAM REPORTS**

#### **1 EXECUTIVE SUMMARY**

- 1.1 Subject of audit
- 1.2 Scope of verification audit (e.g. audit plan)
- 1.3 Findings of audit
- 1.4 Recommendation of the GBS audit team

#### **2 SUBMISSION OF PARTICULARS**

- 2.1 Submitting Administration(s)
- 2.2 Recognized organization name (if applicable)
- 2.3 Title and revision date of rules submitted
- 2.4 Submission date
- 2.5 Report type: [Interim] [Final]
- 2.6 GBS audit team members

### 3 AUDIT SUMMARY

Functional requirement	Conforming	Not conforming	Summary comment
<b><i>Design</i></b>			
1 Design life			
2 Environmental conditions			
3 Structural strength			
4 Fatigue life			
5 Residual strength			
6 Protection against corrosion			
6.1 Coating life			
6.2 Corrosion addition			
7 Structural redundancy			
8 Watertight and weathertight integrity			
9 Human element considerations			
10 Design transparency			
<b><i>Construction</i></b>			
11 Construction quality procedures			
12 Survey during construction			
<b><i>In-service considerations</i></b>			
13 Survey and maintenance			
14 Structural accessibility			
<b><i>Recycling considerations</i></b>			
15 Recycling			

**4 MODEL FORM FOR AUDIT FINDINGS**

<b>FINDINGS</b>	
<b>Recognized organization:</b>	<b>Functional requirement:</b>
<b>Audit date:</b>	
<b>Non-conformity No.:</b>	<b>Observation No.:</b>
<b>FINDINGS:</b>	
<b>APPLICABLE PROVISION OF THE AUDIT STANDARD:</b>	
<b>Auditor:</b>	<b>Date:</b>
<b>Team leader:</b>	<b>Date:</b>
<b>Recognized organization:</b>	<b>Date received:</b>

### APPENDIX 3

#### FORMAT FOR SUBMISSION ON RECTIFICATION OF NON-CONFORMITY

**Non-conformity No.:** XXXX/YYYY/NCxx (as given in audit report)

Extract from rule linkage summary table (as applicable to show original submission information)

Information and documentation	Regulation submitted	Information/Documentation type	Reference

Justification  
(if applicable):

Evaluation criteria	Summarized comment	Satisfied by information/documentation	Rule linkage

Detailed technical explanation:

**AUDIT FINDINGS** (extract from audit report with details of non-conformity):

**Statement of facts**

**Non-conformity**

**INVESTIGATION AND ACTION TAKEN:**

(list what has been done to address the non-conformity)

**ANNEXES:**

(list and attach the detailed action plan, rule changes/other evidence, rule linkage addressing all non-conformities)

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