Guidelines For Classification And Construction

Part 9 Naval Ship Technology

Volume 1

Guidelines for Classification and Surveys

2020

Biro Klasifikasi Indonesia

www.bki.co.id

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The following Guidelines come into force on 1st July 2020.

Foreword

With accumulation of experience and know-how practical application in shipbuilding, BKI have been developed this Guidelines for Classification and Survey (Pt.9, Vol.1) 2020 Edition intended for Naval Ship Technology.

This Guidelines accommodate technology, safety standards as basis for classification which consist of 5 Section namely:

Section 1 – Introduction

Section 2 – Classification

Section 3 – Class Designation for Surface Ship

Section 4 – Survey for Surface Ship

Section 5 – General Information and Project Data for Surface Ship.

The whole process of naval class business are pictured clearly on those sections.

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Further queries or comments concerning this Guidelines are welcomed through communication to BKI Head Office.

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Section 1 Introduction to Naval Classification

A. Reasons for Naval Classification

Traditionally, Ministry of Defense were responsible for the design, build, maintenance and operations of their platforms and had systems in place to ensure the safety and fitness for purpose of their platforms. These systems were designed around this model. Originally, Naval ships are not required to comply with international Conventions and Codes, like IMO and other institutions.

Naval Classification is a relative new concept. This included embracing commercial standards and practices which led to commercialization of naval facilities such as drawing offices and dockyards and the outsourcing the design, built and support of naval platforms. This in turn resulted in reduction in naval manpower and loss of in-house expertise and corporate knowledge.

All this changes created a safety impact and therefore navies decided to adopt a regulatory model similar to the commercial one to minimize the risk the new arrangements posed. As part of this model navies embraced the classification process to obtain independent assurance of the material state of their ships and Classification Societies were encouraged to develop Guidelines appropriate for naval ships as the existing commercial Guidelines were not fully appropriate for all type of naval ships, especially units to be engaged in direct combat.

B. The Process

Naval Classification is the Classification of naval surface ships. Classification is a certification process which provides independent assurance of the safety and environmental compliance of a ship or structure based on Class Guidelines and statutory Regulations. Classification covers primarily hull, machinery, electrical systems and automation of the ship as platform for military equipment. Weapons and military sensors are only included as far they are interfering with the platform and are to be delivered with power.

The process employs a regime of reviews, surveys, and tests performed by the Classification Society throughout the life cycle of the naval ship to establish compliance with a set of Guidelines which have been developed by the Classification Society in cooperation with navies, ship designers and ship builders around the world. Continuous feedback and ongoing Research and Development are used for further developing the Guidelines.

The Classification process on the basis of Naval Guidelines involves the following steps:

- selection of appropriate design and build standards (Character of Classification, Class Notations, international and national standards, standards required by the Naval Administration, etc.)
- design reviews to ensure compliance with the selected standards
- approval of manufacturing facilities
- approval of subcontractors
- materials and equipment certification
- approval of procedures

- issue of type approvals
- surveyor authorisation
- surveys during construction to ensure ongoing compliance with the selected standards
- equipment installation and setting to work tests
- harbour and sea trials
- in-service surveys to ensure compliance with the selected standards
- approval of repairs and modifications

After establishing compliance with the selected requirements the ship or structure is assigned the relevant Class Notation and issued a Certificate of Class.

The ship is "kept in Class" if it continues to comply with the relevant requirements to be proven by periodical surveys.

For scope and details of the surveys, see C.

C. Certification

There is also the possibility to entrust BKI in addition and beyond the scope of the Classification Process according to B. with the supervision of design, construction and trials of special systems against a building specification or agreed standard. On special request also analytic investigations concerning naval ships may be performed by BKI and its experienced partners.

If conformity with the specifications or standards defined by the Naval Administration, the Shipyard or other Clients is proven by BKI, a Certificate of Conformity (CoC) may be issued and a corresponding Notation added to the Class Designation

D. Refrigerating Installations

BKI has taken extra care to ensure that its Guidelines, while based on the warship design philosophy adopt also commercial practices in areas that are considered appropriate to take advantage of the efficiencies both in cost and operation such solutions provide.

Naval Classification is only one part of the required full assurance for a naval ship as it covers only the hull, mechanical and electrical systems as well as automation of the platform. The other part is formed by international statutory requirements which are in general not binding for naval ships but may be required by the Naval Administration. Environmental protection as an example can be covered directly by the BKI Naval Guidelines if the Class Notation **EP** shall be assigned.

E. Conclusion

As demonstrated above, the Naval Classification Guidelines of Biro Klasifikasi Indonesia are able and successful to form the missing link between the basic design principles of the Naval Administration and other statutory or operational requirements and the detailing design and construction of an executing shipyard or system contractor.

Section 2 Classification

A. Scope and Application

1. Scope

1.1 The Guidelines for Classification and Surveys of Naval Ships cover the Classification of naval surface ships as defined in 2. and in Section 3, C.

"Classification" essentially means the :

- examination of design documents, construction plans and material specifications in comparison with the applicable Rules, Guidelines and Regulations according to B.
- supervision of construction/fabrication of new buildings or conversions
- supervision of ships in service by regular surveys in order to ascertain that a condition is maintained, which complies with Class requirements.

1.2 Classification covers the ship's hull and machinery including electrical installations as well as special equipment and installations as far as agreed in the building specification between the Naval Administration and the Shipyard. Classification aims primarily at ensuring reliability of the hull structure and machinery systems on board resulting in an adequate level of safety of personnel and environmental protection.

However, Classification is not intended to ensure the effectiveness of the intended missions

1.3 Structures, machinery and equipment determining the type of ship are subject to examination within the scope of Classification, in accordance with the Character of Classification and affixed Notations. Other systems and components may be included in the Classification and/or certification procedure upon request of the Naval Administration.

1.4 Particular systems and components for military use (esp. weapons and their sensors) are normally exempted from Classification, depending also on the indication of the Naval Administration and on legal or contractual restrictions. However, influences from such systems possibly affecting safety of the ship as their platform (e.g. static and dynamic loads, explosion or fire hazards, power supply, etc.) shall be taken into account in the design appraisal for Classification.

1.5 Design appraisal within the Classification procedure will normally include the review or recalculation of stability investigations. This requires the relevant information, on (e.g. combat-related) damages to be taken into account, to be submitted by the Naval Administration.

1.6 It is assumed that all parties involved in the planning and design, materials and components production and installation have the professional qualifications required and/or suitable facilities/equipment for fabrication. This will normally be established or confirmed by means of a certified quality assurance management system in accordance with ISO 9000 series, AQAP or equivalent.

2. Application

2.1 These Guidelines apply to :

– seagoing surface ships and craft

intended for naval activities.

2.2 Classification according to these Guidelines applies primarily to newbuildings constructed under surveillance of BKI. Classification may also be applied to existing ships by a survey for Admission to Class, if sufficient documentation is available, see E.2.

2.3 The rights of interpretation of BKI Technical Rules rest with BKI alone.

3. Confidentialyty

3.1 BKI maintains confidentiality with respect to all documents and other kinds of information received in connection with the orders entrusted to BKI and shall comply with the security procedures agreed upon with the Naval Administration.

3.2 BKI will instruct its personnel engaged in a naval project to follow the security procedures, including the necessary safe handling and storage of confidential information and documentation as agreed upon with the Naval Administration.

B. Rules, Guidelines, and Regulation

1. BKI Requirement

1.1 Classification based on Part 9 Naval Ship Technology (see Table 2.1) will be applied for structural elements and for components of the machinery and electrical installation of naval ships, subject to agreement between the Naval Administration and the Shipyard for the Classification order to BKI.

for weapons and military sensors see A.1.4.

1.2 Additional BKI Rules, Guidance, and Guidelines which may be used for naval ships, without pretension for completeness.

1.3 Ships, not in compliance with 1.1 and 1.2 may be classed, provided that their structural elements or any installations are found to be equivalent for the respective Character of Classification including Notations regarding design, function and safety.

Table 2.1 Guidelines for Classification and Construction of Naval Ship Technology

Pt. 9 Naval Ship Technology	
Volume	Title
2	Guidelines for Hull Structures and Ship Equipment
3	Guidelines for Propulsion Plants
4	Guidelines for Electrical Installations
5	Guidelines for Naval Ships Materials
6	Guidelines for Ship Operation Installations and Auxiliary Systems
7	Guidelines for Automation

2. Other Construction Rules and Maritime Regulations

2.1 The review and appraisal of design and construction particulars by BKI will be exclusively based on rules and guidelines, agreed upon in the specification of the Classification contract between the Naval Administration or the Shipyard and BKI.

2.2 In addition, national construction rules for naval ships may be applied upon agreement with the relevant Administration and if defined in the specification of the Classification contract between the Naval Administration or the Shipyard and BKI.

2.3 The application of national regulations of the respective Flag State to the naval ship under consideration shall be checked by the Naval Administration and the Shipyard and agreed upon in the particular case.

2.4 IMO Conventions, Resolutions, Codes, etc., may be applicable in certain cases and/or for certain aspects, e. g. pollution prevention. Details shall be clarified and laid down in the Classification specification in the particular case.

3. Industry Code, Standards, etc.

Internationally recognized Standards and Codes published by military organisations, national industry organisations or standardisation institutions may be used upon agreement in particular cases as a design and fabrication basis.

4. Date of Contruction and Date of Build

The declaration regarding to “Date of Build” and/or “Date of Construction” shall be following Rules for Classification and Surveys (Pt.1, Vol.I), Sec.2.A.1.2.

C. Definitions

1. Classifications

The term “Classification” is used as defined under A.1.1. Classification is documented by a valid Certificate to be carried on board of the ship.

For validity see D.2.2.

2. Class Designation

The Class designation consists in :

- The Character of Classification, i.e. a sequence of abbreviations indicating the extent of compliance with the applicable Rules and the duration of the Class period.
- Notations, affixed to the Character of Classification, indicating particular features capability, service restrictions or special equipment and in-stallations included in the Classification.

For details see Section 3.

3. Period of Class

Period of Class "p" is the nominal interval [years] between two Class Renewal Surveys, see Section 3, B.1. and Section 4, B.1.4.

4. Naval Administration

Naval Administration is the Government Authority respectively an authorized institution responsible for the definition, purchase and operation of the naval ship. In some cases the above mentioned responsibilities are split up between different Authorities or Institutions.

5. Naval Ship

A naval ship is a vessel designed and operated for naval and related activities commanded by a Navy or Coast Guard.

6. Shipyard

The Shipyard is the contractual partner of the Naval Administration, entrusted with managing the design, construction and equipment of the naval ship, generally together with a series of subcontractors and manufacturers.

7. Building Specification

The building specification is part of the building contract between the Naval Administration and the Shipyard and specifies the technical parameters and all other details for the construction of the naval ship.

8. BKI

BKI means Head Office of Biro Klasifikasi Indonesia in Jakarta-Indonesia.

9. Classification Specification

The Classification specification is part of the Classification contract between the Shipyard and BKI during construction and between the Naval Administration and BKI after delivery. It specifies the Rules, guidelines and regulations forming the technical basis of the Classification as well as scope and necessary details of the Classification and survey procedures and refers to the building specifications as far as necessary.

10. Class Condition

Any unfulfilled condition according to BKI Requirement.

D. Validity of Class

1. Period of Class

1.1 The hull, the machinery as well as special equipment and installations classed have the same period of Class (duration of one Class period), see also Section 3, B.1. The class continues to be valid, provided that hull and machinery are subject to all surveys stipulated and any repairs required are carried out to the satisfaction of BKI, see Sections 4.

1.2 For reassignment of Class after conversions see 3.4.

2. Prerequisities for validity of Class

2.1 The Class assigned by BKI is valid only subject to the conditions stated in the Class Certificate (e.g. range of service, freeboard, main engine output).

Class assignment is conditional upon the ship, including her machinery, being loaded and operated such as to comply with the design concept, and with the applicable rules and regulations.

This also applies to the distribution of loads and ballast, if necessary to the securing of supplies etc., as well as to the operation of the ship in heavy weather.

2.2 If the hull and/or machinery are not subjected to the prescribed surveys on their due dates, ship's Class will be in class condition/suspended or withdrawn for both hull and machinery.

If some special equipment classed is not subjected to the prescribed surveys on their due dates or is no longer intended to be carried on board, the Class for that equipment only will be in class condition/suspended or withdrawn.

2.3 BKI or one of its representations are to be immediately informed about any average, damage or deficiency to the hull, machinery or equipment classed, where these may be of relevance to the ship's Class. A survey will have to be arranged for a date not later than that of the ship's arrival at the next port.

If the survey reveals that the ship's Class has been affected, the ship's Class will be maintained only on condition that the repairs or modifications demanded by BKI are carried out within the period and under the operating conditions specified by the Surveyor. Until full settlement of these demands the Class will be restricted (following Class Suspension Procedure).

2.4 Any damage or excessive wastage beyond allowable limits to side shell frames, their end attachments and/or adjacent shell plating, the deck structure and deck plating, the bottom structure and bottom plating, the watertight or oiltight bulkheads and the hatch covers or coamings that affect a ship's Class, is to be permanently repaired immediately after the survey.

For locations where adequate repair facilities are not available, consideration may be given to allow a ship to proceed directly to a repair yard. This may require temporary repairs for the intended voyage.

Damages or excessive wastage at the areas noted above and not immediately affecting the ship's structural or watertight/weathertight integrity may be temporarily repaired for a period to be defined.

2.5 Spare parts as stipulated in the Construction Rules are to be carried on board and have to be in a condition ensuring usability.

2.6 In exceptional cases, following inspection of hull and machinery, performance of the repairs required for maintenance of the original Class may be dispensed with, if the Naval Administration agrees to the Class and/or the range of service being restricted, or possibly a higher freeboard being assigned.

2.7 Apart from the Class Certificate, any other documentation of significance for Classification is to be kept on board and made available to the Surveyor on request, such as :

- reports on surveys previously performed
- approved drawings and other documentation handed out to the Naval Administration together with the class certificates and containing particulars or instructions of significance in respect of the Classification requirements (e. g. use of higher strength hull structural steel or lists of spare parts)

2.8 Weapons and other systems for military use are exempted from Classification, see A.1.4. However, any changes in such systems that may affect the safety of operations and hence validity of the ship's Class, including its classified installations, shall be notified to BKI in due course. This applies particularly to cases, where system changes lead to structural conversions or important changes in the machinery and electrical installation

2.9 BKI provides a notification system to remind the Naval Administration of surveys becoming due, or of any other matters of interest or urgency in connection with the Classification of the ship. However, in principle it remains the responsibility of the Naval Administration to comply with the Class requirement and to observe the dates for the prescribed surveys.

3. Repairs and Conversions

3.1 Where parts are damaged or worn to such an extent that they no longer comply with the requirements of BKI, they are to be repaired or replaced.

3.2 Maintenance work, repairs and conversions of classed ships and special equipment have to be carried out under the supervision of BKI to ensure maintenance or reassignment of Class.

3.3 The areas affected by repairs or conversion shall be treated in the same way as for new buildings, irrespective of whether the hull, the machinery including the electrical installation, automated systems or other classed equipment are concerned, see also E.1.3.1.2.

3.4 If following major conversions a new Character of Classification and/or new Notations are assigned so that the Class Certificate has to be re-issued, commencement of a new period of Class may be agreed upon.

4. Class Expiry

4.1 Where hull and machinery are not longer complying with the requirements on which Class assignment had been based, or where the Naval Administration refuses to have repairs or modifications required by BKI carried out within a period to be determined from case to case, ship's Class will be in class condition/suspended or withdrawn. The same applies to the Class of special equipment.

4.2 If the Naval Administration is not interested in maintenance of, or readmission to Class of the ship or any of its classed equipment, BKI will have to be informed accordingly. The Class Certificates will have to be returned to BKI.

4.3 If for some reason the Class has expired or has been in class condition/suspended or withdrawn by BKI, this will be indicated in the Register.

4.4 Where following suspension or withdrawal of ship's Class the repairs required by BKI have been carried out and the ship has been subjected to a survey for readmission to Class, the original Class may be reassigned with a new period of Class. Such surveys are to be carried out in accordance with the requirements for a Class Renewal Survey.

5. Laid Up Ship

5.1 The period of Class of hull and machinery will not be interrupted throughout the laying-up period. This means that periodical surveys will have to be carried out as before surveys due, for which dry-docking is required, may be postponed until recommissioning. Apart from this, the requirements of the preceding paragraphs are to be applied.

5.2 Upon expiry of the Class, a survey substituting the Class Renewal Survey will have to be performed. An entry on the Class Renewal will be made in the Class Certificate, with the Notation LAID-UP SHIP, and indicated in the Register.

5.3 At the time of recommissioning a thorough survey of the entire machinery will have to be performed in addition to the outstanding periodical surveys. Depending on the duration of the laying-up period, a sea trial and/or recommissioning trials of specific installations and/or components will have to be carried out.

6. Reclassification Survey after Laid Up

6.1 Where, after suspension/condition of class or withdrawal of Class, the repairs required by BKI have been carried out and the ship has been subjected to a survey for Reclassification, the original Class

may be starting with a new period of Class. Such surveys are generally to be carried out in accordance with the requirements for a Class Renewal Survey, see Sections 4.

6.2 Depending on the duration of the interruption period, parts of the machinery installation may have to be dismantled and sea trials or function tests have to be carried out in excess of the requirements mentioned above. For parts and installations replaced or added in the meantime, the scope of examinations and tests to be carried out for Admission to Class shall be as for newbuildings.

E. Classification Procedures

1. Classification of New Building

1.1 Order for Classification

1.1.1 The written order for Classification is to be submitted to BKI representations by the Shipyard or by the Naval Administration. The order has to be given by the client, who on the basis of the building contract has the duty to observe the Rules of BKI.

1.1.2 Where orders for the production of components are placed with subcontractors, BKI will have to be advised accordingly indicating the scope of the production. The client is responsible for observance of the rules, guidelines and regulations by subcontractors.

1.1.3 Where the order considers particulars already having been approved by BKI (for previous newbuildings) to be used for the Classification, this will have to be specifically stated in the order. Amendments to the Construction Rules having been introduced meanwhile shall be taken into account.

1.2 Examination of Design and Construction Particulars

1.2.1 Particulars/documents for examination such as construction plans, calculations, details on materials, etc. are to be submitted in due time prior to commencement of construction as detailed in the Construction Rules. To facilitate a smooth and efficient approval process they shall be submitted in electronic format.

The particulars to be submitted in English or *Bahasa* shall contain all details required to verify compliance with the Construction Rules. BKI reserves the right to request additional information and particulars to be submitted

1.2.2 The particulars and drawings to be submitted, of components subject to approval, will be examined by BKI. Where applicable, they will be provided with a mark of approval and returned to owner.

1.2.3 Any deviations from the approved documents require to be approved by BKI prior to be carried out.

1.3 Supervision of Construction and Trials

1.3.1 General

.1 BKI will assess the production facilities and procedures of the Shipyard, subcontractors and other manufacturers, to determine whether they meet the requirements of the BKI Rules. In general, approvals based on such assessments are prerequisite for acceptance of products subject to testing.

.2 Materials, components, appliances and Installations subject to inspection are to comply with the relevant rule requirements and are to be presented for inspection by BKI Surveyors, unless otherwise provided as a result of special arrangements agreed upon with BKI.

New installation of materials which contain asbestos, e.g. materials used for hull structure, machinery, electrical installations and equipment, is not permitted for all new and existing ships.

.3 For each inspection, an appointment is to be arranged in time with the BKI representation.

.4 In order to enable the Surveyor to fulfill his duties, he is to be given free access to the ship and the workshop, where part requiring approvals are manufactured, assembled or tested. For performance of the tests required, the Shipyard, subcontractors and other manufacturers are to give the Surveyor any assistance necessary by providing the staff and the equipment needed for such tests.

1.3.2 Supervision of Construction

During the phase of construction of the ship or installation, BKI will satisfy themselves by surveys and inspections that :

- parts for hull, machinery and electrical installations or special equipment subject to approval have been constructed in compliance with the approved drawings and particulars
- all tests and trials stipulated by the Rules for Classification and Construction are performed satisfactorily
- workmanship is in compliance with current engineering Standards and/or BKI Rule requirements
- welded parts are produced by qualified welders having undergone the required regular tests
- Test Certificates have been presented for components requiring approval. The Shipyard, subcontractors or other manufacturers will have to ensure that any parts and materials requiring approval will only be delivered and installed, if the appropriate certificates have been issued
- type-tested appliances and equipment are used, in accordance with the Rule requirements, where individual certificates are not required

1.3.3 Test at the Manufacturer’s works

As far as practicable, the machinery including electrical installations as well as special equipment and installations classed will be subjected to operational trials at the manufacturer's premises to the scope specified in the Construction Rules. This applies also to engines produced in series.

Where the machinery, electrical installation or special equipment and installations are of novel design or have not yet sufficiently proved their efficiency and reliability under actual service conditions on board, BKI may require performance of trials under specified severe conditions.

For refrigeration installations see 1.3.5.

1.3.4 Shipboard Trials

Upon completion of the ship, all hull, machinery including electrical installations as well as special equipment and installations classed will be subjected to operational trials in the presence of the BKI Surveyor prior to and during the sea trials. This will include, e.g :

- tightness, operational and load tests of tanks, hatches and hatch covers, shell ports, ramps, etc.
- operational and/or load tests of the machinery, installations (propulsion plant, electrical installations, steering gear, anchor equipment, etc.) of importance for safe operation.

During a final survey, checks will be made to ensure that any deficiencies found, for instance during the sea trials, have been eliminated.

1.3.5 Refrigerating Installations

.1 Refrigerating machines are to be subjected to operational tests at the manufacturer's works.

.2 Fitting of the refrigerating installation will be supervised by the Surveyor, who will examine the workmanship and perform the prescribed tightness and operational tests.

.3 Upon completion the entire installation will be subjected to operational trials in accordance with the requirements of the Construction Rules.

.4 For refrigerating installations deviating in design from installations in common use, BKI reserve the right to require additional tests to be performed, schedule special survey dates and make special entries in the refrigerating installation certificate and in the Register.

1.4 Reports, Certificates, Documentaions

1.4.1 Testing of materials, components, machinery, etc. at subcontractor's works will be certified by the Surveyor and/or the BKI representation.

1.4.2 Upon completion of the ship and the shipboard trials, the Surveyors will prepare construction reports, on the basis of which BKI will issue the Class Certificate.

1.4.3 The Classification data of each ship will be included in the BKI data file and treated as strictly confidential. An extract of these ship data will be entered in the Register Book published by BKI if the Naval Administration agrees.

1.4.4 Where BKI has been entrusted in addition and beyond the scope of the Rules mentioned under B. with supervision of construction in accordance with the building specification, a Interim Certificate will be issued and a corresponding Notation added to the Class designation, see Section 3, C.1.4.

2. Admission to Class of Existing Ships

2.1 Order for Classification

2.1.1 Orders for the Classification of ships or special equipment not constructed under the supervision of BKI are to be addressed to BKI in writing. The order for Classification is to be accompanied at least by the particulars specified in 2.2 and 2.3, respectively.

2.1.2 BKI is to be informed about the previous Class status and period, as well as about any Conditions of Class (recommendations) imposed by the previous Classification Society.

2.2 Supervision of Construction

The following particulars and/or drawings are to be submitted :

- particulars of the type and main dimensions of the ship, building year, building yard, major conversions, if any, freeboard, stability documentation and details of the anchor equipment
- particulars of the type, output and main data, building year and manufacturer of the main engine(s) and of the auxiliary machinery essential for operational safety, the electrical installations, the automatic/remote-control system, the safety arrangements, the steering gear and the windlasses
- general arrangement, capacity plan, hydrostatic and cross curves, loading manual, where required, midship section, longitudinal and transverse sections, transverse bulkheads, decks, shell expansion, engine and boiler foundations, stem and stern frame, rudder and rudder stock, hatch covers
- machinery arrangement and layout, thrust, intermediate and screw shafts, propellers, main engines, propulsion gears and clutch systems, starting-air receivers, auxiliary boilers and oil fuel burning systems, gas turbines and related systems
- steam and feed-water systems, cooling water and lubricating oil systems, bilge and ballast systems, fuel oil and starting-air systems, air and sounding pipe systems, electrical arrangements and wiring diagrams

- steering gear arrangement and piping system and steering gear manufacturer, make and model information
- torsional vibration calculations of the main shafting system including its branches for ships less than two years old
- instrument and alarm list, fire alarm system, list of automatic safety functions, e.g. slowdowns, shutdowns, etc., function testing plan for ships with unattended machinery spaces and Notation OT
- for ships with built-in tanks, the walls of which do not form part of the shell plating: drawings of these tanks, their safety arrangement, as well as their loading and unloading systems
- for ship type-related equipment and installations the documentation is to be determined from case to case, depending on the scope of Classification agreed and on possible conversions planned at the same time

BKI reserves the right to request additional information depending of ship's type and/or according to Naval Administration requirements.

2.3 Particular for Special Equipment (refrigeration installation, diving systems)

The application for Classification for special equipment (refrigerating installations, diving systems) is to be accompanied by particulars to the extent as indicated in the Construction Rules. Results of the trials under working conditions are to be submitted; if an operational trial has not yet been performed, it will have to be carried out.

2.4 Performance of Admission to Class

2.4.1 The drawings and other particulars of relevance to Classification are checked for compliance with the applicable BKI Rules and/or equivalent other rules.

2.4.2 For Admission to Class the extent of the Classification survey for the hull and machinery installation respectively the special equipment will be especially determined by BKI depending on the ship's age and type. If the result of the survey is satisfactory, BKI Class will be effective after the date of completion.

2.4.3 If the ship and/or her special equipment hold the valid Class of another recognized Classification Society and if sufficient proof has been furnished regarding the Class status, BKI may dispense with the examination of drawings and computations.

In such cases, the period of Class will remain as assigned by the previous Classification Society.

2.4.4 Class certificate will be issued if the relevant drawings and computations are submitted and ship complies with BKI requirements in accordance with Surveyor’s report on the condition of the ship.

2.4.5 Once a ship and/or her equipment have been classed with BKI, the Guidelines in force as well as procedures applicable to ships and/or special equipment constructed under supervision by BKI will apply.

2.4.6 If a sufficient proof of the loosing Society regarding the ship's previous Class status is not as yet available the survey status information provided by the Naval Administration may be used. An "Interim Class Certificate" may be issued after completion of the surveys requested for Admission to Class.

F. Document to be Carried on Board

To allow quick action in case of surveys, special operation and especially in case of damage, the following documentation has to be kept on board and shall be made available to the BKI Surveyor on request :

- Class Certificate all Survey Statements and reports

- Stability Handbook and Loading Manual, if required
- description of corrosion protection system
- "as built'' drawings and other documentation containing particulars or instructions of significance as far as BKI is concerned, e.g. use of special steel, etc.
- list of important testing/monitoring procedures to be followed in connection with validity of Class.

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Section 3 Class Designation for Surface Ships

A. General Definitions

1. Scope

The Class of naval surface ships complying with the BKI Rules is expressed by the "Character of Class", assigned for hull and machinery including electrical installations, see B.

Details about hull, machinery including electrical installations as well as special equipment and installations included in the Classification procedure are indicated by "Notations" affixed to the Character of Class, see C.

2. Class Designation

The following examples show Class designations for hull and machinery of naval ships :

Naval Surface Ship :

Part of the Ship	Character of Class	Notations
Hull	✠ N100 (p) ⓘ P	CORVETTE, AL,
Machinery	✠ SM	OT

B. Character of Class

1. General

The Characters of Class consists of construction symbol, class symbol, anchoring equipment symbol and range of service area symbol.

The Characters of Class for naval surface ships are to be in accordance with Guidance for Class Notation (Pt.0, Vol.B), unless special specified in this Sub-Section.

2. Class Symbol for Naval Ship

Naval ships complying with the Construction Rule requirements for hull, machinery including electrical installation will have the class symbol specified in Table 3.1.

3. Restricted service area for seagoing naval ships

Naval ships complying with the Construction Rule requirements for a restricted service area only will have the symbol specified in Table 3.2.

Table 3.1 Class Symbol

Application	Class Symbol	Definition
Hull	N100 (p)	The ship's hull fully complies with the requirements of the BKI Construction Rules or other rules considered to be equivalent. **p** as a figure is indicating the duration of the nominal Class period [years]. Normally **p** = 5, but BKI may agree to adjustment to the material and maintenance scheme of a Naval Administration. The nominal Class period can be reduced in exceptional cases and for a limited time, if the ship does not fully comply with the Rules but has been allowed to operate under restrictions, e.g. regarding the service range and/or weather conditions
Machinery	SM	The machinery including electrical installations complies with the requirements of the BKI Construction Rules or other rules considered to be equivalent

Table 3.2 Restricted service area symbol

Notation	Service area restriction
P	This area of service of the naval ship is restricted, in general, to operate along the coast, provided that the distance to the nearest port of refuge as well as the offshore distance do not exceed 200 nautical miles.
L	This area of service of the naval ship is restricted, in general, to operate along the coasts, provided that the distance to the nearest port of refuge as well as the offshore distance do not exceed 50 nautical miles. Where a permissible distance of less than 50 nautical miles has been fixed for a ship, the relevant distance will be indicated in the Class Certificate, e. g. **L(20).**
T (Sheltered waters)	This area of service of the naval ship is restricted to operate in shoals, bays, haffs and firths or similar waters, where heavy seas do not occur.
The Notations may possibly be assigned on the basis of the seaway conditions prevailing in the respective service area (e.g. official seaway statistics). Observance of the range of service boundaries is a prerequisite for validity of the Class. BKI may, on request, agree to the range of service being extended for a limited period and/or with certain reservations. This will have to be documented.	

C. Notation for Naval Surface Ships

1. General Indication

1.1 Class notations consists of ship type notation, qualifier and special/additional notation. There are different kinds of Notations, describing particular features, capabilities, or special equipment and installations included in the Classification, as defined in the following.

1.2 The Notations to be affixed to the Character of Class are optional and may be elected by the Naval Administration. The chosen scope of Notations has to be defined in the Classification specification as well as in the building specification.

For the naval supporting vessel will be following Guidance for Class Notation (Pt.0, Vol.B).

1.3 It will be the Naval Administration decision to have the Notations, together with the whole Class designation, included in the published Register of BKI or not, see Section 2, E.1.4.3.

1.4 This Notation will be assigned and the Certificate issued if, in addition to the investigations and surveys usually associated with Classification of the hull/ machinery, BKI has been entrusted with supervising construction, outfitting and trials of the ship regarding conformity with the building specification agreed in the contract between the Naval Administration and the Shipyard, see Section 2, E.1.4.4.

This Notation can only be assigned if the requirements of the building specification are not contrary to or of a lower level than BKI Rules in force.

Note :

If BKI is only entrusted with supervising construction, outfitting and trials of the ship regarding conformity with the building specification agreed upon in the contract between the Naval Administration and the Shipyard, a Certificate of Conformity can be issued without BKI Classification

2. Ship Type Notation

2.1 Generally, the ship type Notation will be assigned according to the indications or suggestions of the Naval Administration.

A relevant descriptive Notation indicating the ship type will be added to the Class designation, such as defined as examples in Table 3.3.

2.2 Where the intended duties of the ship include support functions which may be described by Notations also used for commercial and/or stateoperated non-military craft, such Notations may be assigned instead of or in addition to the Notations referred to under B.3, see Guidance for Class Notation (Pt.0, Vol.B).

An example for such Notations is:

SUPPLY VESSEL

Note

This is applicable also in the case that the ship is armed, e.g. for defence purposes; regarding inclusion of weapons/military systems in the Classification procedure, see Section 2, A.1.3 and A.1.4.

2.3 High speed craft

HSC

Special ship types such as catamarans, SWATH, hydrofoil craft, surface effect ships and air cushion vehicles are designed in accordance with the Rules for High Speed Craft (Pt.3,Vol.III).

HSDE

Additional notation for craft which have been constructed by using elements of Rules for High Speed Craft (Pt.3,Vol.III) and which are not subject to the IMO HSC Code. Details regarding rule application are specified in the Class Certificate.

Table 3.3 Ship type Notations

Notations	Characterization	Underlying Rules
AIRCRAFT CARRIER	Large naval ship with a displacement greater than 10000 tons which is capable of operate with a flight deck, hangar, etc. a greater number of different types of naval aircraft at the same time	Guidelines Naval Ship Technology (Pt.9) Especially: Aircraft carriers Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec. 13
CRUISER	Large naval ship with a displacement greater than 5000 tons which is capable to develop control commanding tasks and mainly sea and air in a mission theatre at the same time.	

Table 3.3 Ship type Notations

Notations	Characterization	Underlying Rules
AMPHIBIOUS WARFARE SHIP	Large marine ship with a displacement above 5000 tons which is capable to operate mainly helicopter and landing craft at the same time, the latter often via stern dock.	Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6)
DESTROYER	Larger naval ship with a displacement above 4000 tons which is capable to develop at least two control tasks at the same time	
FRIGATE	Medium sized naval ship with a displacement above 1500 tons which is capable to develop sea or air or submarine control alternatively	
CORVETTE	Small naval ship with a displacement below than 1500 tons which is capable to undertake limited missions.	Rules for Patrol Boats (Pt.3, Vol.XI)
MINE WARFARE VESSEL	This type includes mine countermeasure vessels, mine hunters and mine laying ship	
PATROL	This type of naval ship is a patrol ship/vessel/ boat/unit with a length **L** ≥ 24 m. If the length **L** would reach about 80 m special agreement with BKI will become necessary for some design aspects. The tasks are similar to patrol boats, but may include a wider range of the possible Activitie	
PATROL BOAT	Small naval, coast guard or police vessel, smaller in size than a corvette, commonly engaged in military patrol and reconnaissance missions, border protection roles, including anti-smuggling, anti-terrorist, anti-piracy, fishery patrols and law enforcement. It is also often used rescue operations and can be diversified in smaller Inshore Patrol Vessels and larger Offshore Patrol Vessels. It is assumed that the length L of a patrol boat/vessel/unit is < 24 m.	

3. Special notation and/or additional notation

3.1 Notation for Hull

3.1.1 Ice Strengthening

.1 Ships, which comply with the requirements of the Construction Rules relating to strengthening for navigation in ice, will have one of the "Ice Class" Notations specified below affixed to the Character of Class. Except for Class Notation **ES,** which on request may be assigned to the hull or the machinery installation only, hull and machinery shall always be assigned the same ice class. If the hull is constructed such as to comply with a higher ice class, this will be indicated in the Technical File.

3.1.2 Notations ES, ES1, ES2, ES3, ES4

Hull and machinery have been designed such as to comply with the requirements for navigation in ice, with index 4 representing the highest Notation. Notations **ES1** to **ES4** correspond to ice classes **IC** to **IA** Super of the Finnish- Swedish Ice Class Rules, as amended (see Finnish Maritime Administration Bulletin Nos. 10 / 10.12. 2008 and 14 / 20.12.2005).

3.1.3 Ambient conditions

Where more severe ambient conditions are expected by the Naval Administration, one of the two Notations defined in Table 3.4 may be affixed to the Character of Class.

3.1.4 Environmental standards

Class Notations **EP** and **BWM** are defined in Table 3.4

Table 3.4 Class Notations for severe ambient conditions and environmental standards

Notations	Characterization	Underlying Rules
AC1 (**A**mbient **C**ondition 1)	The parameter for ship inclination, for ship movement and the limit conditions are increased against the standard requirements.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.1.A.4. Tables 1.1 and 1.2, fourth column Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6), Sec.1.
ACS (**A**mbient **C**onditions **S**pecial)	The special requirements for unusual types and/or tasks of naval ships are agreed upon case by case.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.1.A.4. Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.1.
EP Environmental Passport	Technical requirements for the permissible emissions to the sea and into the air are defined in detail. Optional additional measures may also be documented in the Environmental Passport.	Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.10. Guidance for the Environmental Service System (Pt.7, Vol.F)
BWM	Ballast water discharges from ships are prominently responsible for transferring organisms between geographically separated water bodies. BWM serves the purpose of speeding up and simplifying the process of producing a ballast water management plan to optimize the safe operation of the naval ship.	-

3.1.5 Stabilization in the Seaway

SEAKEEP

If the naval surface ship is designed and equipped with the aim to reduce the movement (heel, trim and roll) in the seaway the Notation **SEAKEEP** may be affixed to the Character of Class. The requirements to be met are specified in the Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6), Sec.2.C. to J.

3.1.6 Application of Rules for seagoing ships

Class Notations **SEA-NH, SEA-NM, SEA-NE, SEA-NQ** are defined in Table 3.5

It has definitely to be specified and agreed with BKI in written form which systems and elements are to be designed, constructed and tested according to the following underlying Rules and not according to the BKI Naval Rules.

Table 3.5 Class Notation SEA-NH, SEA-NM, SEA-NE, SEA-NQ

Notations	Characterization	Underlying Rules
SEA-NH	The requirements for the ship's hull follow BKI Rules for non-naval ships.	Rules for Hull (Pt.1, Vol.II)
SEA-NM	The requirements for the ship's machinery and systems follow BKI Rules for non-naval ships.	Rules for Machinery Installations (Pt.1, Vol.III)
SEA-NE	The requirements for the ships electrical installations and/or automation follow BKI Rules for non-naval ships.	Rules for Electrical Installations (Pt.1, Vol.IV) Rules for Automation (Pt.1, Vol.VII)
SEA-NQ	The requirements for the ship's equipment follow BKI Rules for non-naval ships.	Rules for Hull (Pt.1, Vol.II) Rules for Machinery Installations (Pt.1, Vol.III) and others
Note *Also other BKI Rules and Guidelines in Pt.0 – General, Pt.1 – Sagoing Ship, Pt.3 – Special Ship, Pt.7 – Class Notation may be applied.*		

3.1.7 Laid-up ships

LAID-UP SHIP

If a naval ship is not in operation for a certain time the period of Class will not be interrupted. Upon expiry of Class a survey will be performed and the entry **LAID-UP SHIP** will be made in the Class Certificate and also indicated in the Register. See also Section 2, D.5.

3.1.8 Special considerations for hull structures

The Notations defined in Table 3.6 may be applied to the hull of naval surface ships.

Table 3.6 Special Notations for hull structures

Notations	Characterization	Underlying Rules
HTS (High Tensile Strength) **AL** (Almunium) **FRP** (Fiber Reinforced Plastic)	The use of normal strength hull structural steel will not be specially indicated. If other materials are employed for the hull, this has to be indicated in the Class Certificate. Material selection, design, dimensioning and manufacturing of hull structures made of FRP are to be agreed upon case by case with BKI Head Office.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec. 3
RSD (Rational Ship Design)	Special analysis procedures are applied including: – first principle design procedures by means of e.g. finite element analysis techniques – additional fatigue strength calculations	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec. 4

Table 3.6 Special Notations for hull structures

Notations	Characterization	Underlying Rules
	– calculation of usage factors and assessment of highly stressed structures – determination of explicit corrosion margins of structural members The analysis results will be stored in a date base.	
RSM (Residual Strength)	The construction of the hull fulfils the requirements for residual strength following a defined extent of structural damage due to military effects	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec. 21
ERS (Emergency Response Service)	The geometry and structural data of the ship are made available in a data base to provide the assistance necessary for limiting damages and/or taking the adequate measures in case of average, with the aid of special computer program	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Guidance for Emergency Response Service (Pt.7, Vol.H)
SFP (Structural Fire Protection)	Additional requirements concerning fire-resisting divisions, combustible materials, ventilation, etc. are to be applied.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec. 20
IW **(**In Water surveys**)**	The ship's hull is specially equipped for in-water surveys, i.e. surveys of the underwater part carried out in floating condition instead of dry docking. Fixed markings and inscriptions are not required, but means for the diver to determine his respective position shall be in place.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.1.A.3.2
COLL 1 – COLL 6 **(**Strengthening against Collisions**)**	Ships, the side structure of which are specially	Rules for Hull (Pt.1, Vol.II) Sec. 35

3.1.9 Bridge design

Where ships are to be operated by one person only, or a very limited number of personnel, the workplaces on the bridge shall be arranged according to ergonomic principles.

NAV-O The bridge is designed for ocean area

NAV-OC The bridge is designed for ocean area and coastal waters.

3.1.10 Towing arrangements

TOW

Notation for naval ships which are equipped with towing equipment like towing winches or warping capstans, towing lines or towing hooks, etc. according to the requirements specified in Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9,Vol.6) Sec.5.D. and Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.18 and Electrical Installations (Pt.9, Vol.4) Sec.16.

3.1.11 Carriage of dangerous goods

DG

Notation for naval ships equipped for the carriage of dangerous goods in packaged form according with the Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9,Vol.6).

3.1.12 Notations for special military requirements

.1 Dynamic loads

The Notations for abilities of the naval ship to limit the effects created by dynamic loads are specified in Table 3.7.

Table 3.7 Notations to limit the effect of dynamic loads

Notations	Characterization	Underlying Rules
SHOCK	Designed to withstand shock loads from weapon effects above or below the water surface of a size to be specified by the Naval Administration.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.16.D
NOISE	Designed to operate with a defined noise level to be specified by the Naval Administration.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.16.B.
VIBR	Designed to operate create only a limited influence or vibrations on the fatigue of the hull structures, the mast mounted electronic equipment, etc. and the habitability of the crew.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.16.C.

.2 Flight operations

The Notations for the different abilities to execute flight operations are specified in Table 3.8

Table 3.8 Notations for flight operations

Notations	Characterization	Underlying Rules
FO (Flight operations)	The naval ship is arranged for starts and landing of a greater number of different types of aircraft, for which complete service, like refuelling and maintenance, etc. can be performed in a protected hangar.	Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2) Sec.23 and Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.13
FO (HELIW)	Equipped for helicopter winching operations, landing is not possible. (VERTREP)	
FO (HELIL)	Equipped with helicopter landing deck.	
FO (HELILF)	Equipped with helicopter landing deck and refuelling capabilities.	
FO (DRONE)	Equipped with drone (UAV) handling capabilities.	

.3 Additional Notations for military requirements

Additional Notations for military requirements are specified in Table 3.9

Table 3.9 Notations for special military requirements

Notations	Characterization	Underlying Rules
LA (Lifting Appliances)	Equipped with classified lifting appliances other than those need in connection with RAS.	Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.3
LA (CRANE)	Equipped with classified lifting appliances like cranes, gantry cranes, A-frames etc. which are able to work up to a certain sea state to be defined by the Naval Administration.	
RAS (Replenishment at Sea)	Equipped with installations for the transfer of liquids, such as fuel, oil, water, stores and persons while operating at sea. This Notation may be assigned to the supplying ship as well as to the receiving ship.	Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.4.
NBC (Nuclear, biological and chemical warfare)	Designed and equipped to meet the requirements for protection within a citadel against the fall-out of nuclear, as well as biological and chemical weapons.	Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.11.
DEG (Degaussing)	Equipped with an active system for degaussing (magnetic self-protection) by means of amplified cable windings in the ship which reduce the magnetic signature.	Guidelines for Electrical Installations (Pt.9, Vol.4) Sec. 12.F.
DI (Diving Installations)	Equipped with diving installations for production, bottling and storage of breathing gases.	Guidelines Rules for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.18
EMC (Electromagnetic compatibility)	Special measures are provided for the laying of cables to optimize electromagnetic compatibility.	Guidelines for Electrical Installations (Pt.9, Vol.4) Sec.12
SAM (Storage of Amunition)	Equipped with special measures to store safely ammunition, missilies, torpedos, etc. with minimized risk for the naval ship.	Guidelines for Ship Operation Installlations and Auxiliary Systems (Pt.9, Vol.6) Sec.3.F. and Sec. 9.O.

3.1.13 Analytical investigations

Notations for various analytic investigation for optimization of the design of naval surface ships are defined in Table 3.10.

Table 3.10 Notations for analysis investigations

Notations	Characterization
VA (Vulnerability analysis)	An analytical investigation has been conducted in order to minimize the effects of flooding, fire and damage to the structure of the vessel.
OPSIM (operational simulation)	An analytical investigation has been conducted in order to determine and optimize the behaviour of the ship during special operations e.g. **RAS** and **VERTREP**
ERG (Ergonomic analysis)	An analytical investigation has been conducted in order to determine and optimize the layout of bridges or CIC's with regards to ergonomic aspects.

3.1.14 Novel design

EXP

Ships and equipment have been constructed in accordance with a design, for which sufficient experience is not available. BKI will decide at what intervals the required periodical surveys will have to be carried out. Where experience over a prolonged period of time has proved the efficiency of the design, the Notation **EXP** may be cancelled.

3.2 Notation for Machinery

2.1.3 ICEOPS

Class Notation **ICEOPS** is defined in Table 3.11

Note:

For navigation in the arctic waters of Canada reference is made to the requirements of the Canadian "Arctic Shipping Pollution Prevention Regulations", October 1972. BKI is authorised to issue the relevant"Arctic Pollution Prevention Certificate".

Table 3.11 Class Notations ICEOPS

Notations	Characterization	Underlying Rules
ICEOPS	Ship and machinery equipment is designed for operation in very low temperatures and for minimization of accretion of ice and other relevant problems.	Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9,Vol.6)

3.2.1 Automation

Machinery installations which comply with the Rules of BKI for automated and/or remote-controlled systems, will have the Notations specified in Table 3.12 affixed to the Character of Class (not applicable if Class Notations for high-speed craft have been assigned). Other Notations for a detailed description are possible.

Table 3.12 Notations for machinery with automated or remote controlled systems

Notations	Characterization	Underlying Rules
OT	The machinery installation is fitted with equipment for unattended machinery spaces, so that it does not require to be operated and/or maintained for periods of at least 24 hours.	Guidelines for Automation (Pt.9, Vol.7) Sec. 2.A.
OT-nh	The period during which attendance to and maintenance of equipment is not required, is less than 24 hours, with nh indicating that the machinery space may remain unattended for n hours.	Guidelines for Automation (Pt.9, Vol.7), Sec. 2.B.
RC	Small naval vessels with a length L ≤ 48 m are provided with a system for remote control of the main propulsion plant from the navigation bridge.	Guidelines for Automation (Pt.9, Vol7), Sec. 2.C.

3.2.2 Redundant propulsion and steering systems

Naval ships with propulsion and steering systems which meet the redundancy requirements of BKI obtain one of the Notations specified in Table 3.13 affixed to the Character of Class.

Table 3.13 Notations for redundant propulsion and steering systems

Notations	Characterization	Underlying Rules
RP1x%	The ship has at least two propulsion machines, which are independent or can be disconnected from each other. This also applies to the auxiliary systems which are needed to operate the propulsion machines. No redundancy of propeller, shaft line, gearbox and steering system is required.	Regulation for The Redundant Propulsion and Steering Systems (Pt. 1, Vol. XIII)
RP2x%	This ship has at least two propulsion systems and two steering systems, each of which is independent or can be disconnected from each other. This also applies to each of the auxiliary systems which are needed to operate the propulsion and/or steering systems	
RP3x%	This ship has at least two propulsion systems and two steering systems, each of which is independent or can be disconnected from each other and is installed in separate compartments. This also applies to each of the auxiliary systems which are needed to operate the propulsion and/or steering systems..	
The additional index x% denotes what percentage of the main propulsion power of the ship is provided by redundant ship's propulsion system.		

3.2.3 Dynamic positioning systems

Notations specified in Table 3.14 for ships designed to maintain a desired position within the normal excursions of the control system under defined environmental conditions. The Class Notation required for a particular operation, and the desired system reliability should be agreed between the Naval Administration and BKI on an analysis of a conseqwuence of a loss of position

Table 3.14 Notations for dynamic positioning systems

Notations	Characterization	Underlying Rules
DP 0	Loss of position may occur (only functionality)	Guidelines for Propulsion Plants (Pt.9, Vol.3), Sec.7.I.I Rules for Dynamic Positioning Systems (Pt.4, Vol.II)
DP 1	Loss of position may occur, meets IMO Class 1 (non-redundant)	
DP 2	No loss of position in the event of a single fault in an active component, meets IMO Class 2 (redundant)	
DP 3	No loss of position in the event of a sinBKIe fault in an active or static components, meets IMO Class 3 (redundant installation in separate components)	
Note: For **DP 2** and **DP 3** a redundancy concept document (FMEA of basic design) with worst case failure design intent is to be submitted in due time.		

3.2.4 Condition monitoring of propeller shaft at stern tube

CM-PS

Where the propeller shaft runs within the stern tube in oil, the possibility exists, to prolong the intervals between shaft withdrawals, if the requirement according to the Guidelines for Propulsion Plants (Pt.9, Vol.3), Section 5, D.5.6 are fulfilled.

3.2.5 Novel designs

EXP

The machinery installations or essential parts have been constructed in accordance with a design, for which sufficient experience is not available. BKI will decide at what intervals the required periodical surveys will have to be carried out. Where experience over a prolonged period of time has proved the efficiency of the design, the Notation **EXP** may be cancelled.

4. Overview of possible Notations for naval surface ships

Table 3.15 gives an overview for the various Notations which may be assigned to naval surface ships. Additional information is given in the respective Section.

Table 3.15 Summary of Notations for naval surface ships

Pt.9, Vol.1 Classification and Surveys	Pt.9, Vol.2 Hull Structure and Ship Equipment	Pt.9, Vol.3 Propulsion Plants	Pt.9, Vol.4 / 7 Electrical Installations / Automation	Pt.9, Vol.6 Ship Operations, Installations and Auxiliary Systems
Ship type: **AIRCRAFT CARRIER** **CRUISER** **AMPHIBIOUS WARFARE SHIP** **DESTROYER** **FRIGATE** **CORVETTE** **MINE WARFARE VESSEL** **PATROL** **PATROL BOAT** **SUPPLY VESSEL** High speed craft: **HSC** **HSDE** Seagoing ships: **SEA-NH, SEA-NM, SEA-NE, SEA-NQ** Novel design: **EXP** Bridge Design: **NAV-O / NAV-OC** Laid-up ships: **LAID-UP SHIP**	Ambient conditions: **AC1** **ACS** Material: **HTS** **AL** **FRP** Navigation in ice: **ES, ES1, ES2, ES3, ES4** Restricted service area: **P** **L** **T** Rational ship design: **RSD** Residual strength after military effects: **RSM** Emergency Response Service: **ERS** Structural fire protection: **SFP** In-water survey: **IW** Dynamic loads: **SHOCK, NOISE** **VIBR** Bridge design: **NAV-O** **NAV-OC** Novel design: **EXP**	Redundant propulsion: **RP1 x %** **RP2 x %** **RP3 x %** Dynamic positioning: **DP0** **DP1** **DP2** **DP3** Novel design: **EXP**	Automation: **OT** **OT-nh** Remote control: **RC** Degaussing: **DEG** Electromagnetic compatibility: **EMC** Dangerous goods: **DG**	Flight operation: **FO** **FO (HELIW)** **FO (HELIL)** **FO (HELILF)** **FO (DRONE)** Lifting appliances: **LA** Lifting appliances at sea state: **LA(CRANE)** Replenishment at sea: **RAS** NBC protection: **NBC** Diving systems: **DI** Operation in ice: **ICEOPS** Environmental Passport: **EP** **+ EP** Ballast water management: **BWM** Stabilization in the seaway: **SEAKEEP** Condition monitoring stern tube: **CM-PS** Towing arrangements: **TOW** Ammunition storage: **SAM**

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Section 4 Surveys for Surface Ships

A. General Indications

1. Surveys for maintenance of Class

1.1 For maintenance of Class, the regular periodical and non periodical surveys of hull and machinery, including electrical installations as well as special equipment and installations agreed to be in the scope of Classification have to be performed as detailed in the following, see also Section 2, D.2.2.

For other surveys performed by BKI see 4.

1.2 Surveys required for maintenance of Class, e.g. in the case of repairs of, or modifications to any parts subject to Classification, are to be agreed with BKI Head Office in due time, so that the measures envisaged may be assessed and supervised by local BKI representations as required.

1.3 The Surveyors are to be given access at any time to the ship and/or to the workshops, so that they may perform their duties. See also Section 2, E.1.3.3. In this connection all areas to be surveyed have to be cleared, cleaned and are to be made gas-free, as deemed necessary by the Surveyor.Deviations from the Construction Rules may be approved where there are special reasons.

The Class Certificate and other documents related to Classification and carried on board, are to be made available to the Surveyor on request.

1.4 Surveys conducted during a voyage may be agreed and credited to periodical surveys due. The prerequisites, procedure and specific conditions to be met, e.g. weather, will be fixed case by case. The decision as to feasibility of the survey may only be taken in agreement with the Surveyor.

1.5 BKI will inform the Naval Administration about the status of Class, indicating the last recognized surveys and the next due dates. However, even if not provided with such information, the Naval Administration is obliged to have the surveys stipulated by the present Rules performed.

1.6 Upon request BKI may agree to testing, monitoring and analysis procedures as a supplement to or equivalent substitute for conventional survey and inspection such as by uncovering/opening up of components, see also B.1.5.6.

1.7 BKI reserves the right for given reasons, e. g. in the light of special experience gained during operation, to extend the scope of survey and/or inspection or to carry that out with two Surveyors, if needed.

1.8 BKI reserves the right to demand surveys to be held between the due dates of regular surveys, if this is necessary, see B.2.

1.9 If a ship has to be surveyed in a port beyond the reach of a BKI Surveyor (also in the events of force majeure or of armed conflicts); BKI Head Office will have to be notified by formal letter attached with related evidence. Upon checking of the facts, the further procedure will then be decided on.

In extraordinary cases and with BKI Head Office agreement, it is possible to call for an external expert, whose report is, however, subject to examination by BKI, who will decide on whether or not the ship will have to be resurveyed.

2. Selection of Surveyors

On principle, the acting Surveyors will be chosen by BKI. However, the Naval Administration is free to have any findings of surveys and decisions resulting there from, which deem to be doubtful, checked by other BKI Surveyors upon special request to Head Office.

3. Documentation of surveys, confirmation of Class

3.1 The records of each survey, as well as any requirements upon which maintenance of Class has been made conditional, will be entered into the respective Survey Statement. By his signature in the Certificate and other documents the Surveyor only certifies what he himself has seen and checked during the particular survey.

3.2 The reports prepared by the Surveyor will be sent to BKI Head Office. If there are no objections, the results will be documented in the BKI Register, see Section 2, E.1.4.3, and the confirmation of Class effected by the Surveyor in the Certificate will acquire final validity.

3.3 In the Register the dates of the surveys will be indicated, such as Class Renewal, intermediate and annual Class surveys, boiler surveys, surveys in connection with continuous Class Renewal, bottom and propeller shaft surveys. Records on periodical repeat tests on steam boilers will be also entered in special Test Certificates, which are to be kept on board.

3.4 A confirmation of class effected by the Surveyor relates to the kind of survey referred to in the report and is valid under the reservation that examination will not give cause for any objections, see 3.2.

3.5 On request, the Class may be confirmed in writing by a separate Certificate. However such Certificates are valid only if issued by BKI Head Office.

3.6 Where defects are repaired provisionally only, or where the Surveyor does not consider immediate repair or replacement necessary, the ship's Class may be confirmed for a limited period by making an entry in the Survey Statement of the Certificate of Classification. Cancellation of such limitations will also have to be indicated in the Survey Statement, see also Section 2, D.2.4.

4. Surveys required by the Naval Administration

4.1 Where surveys are requested by the Naval Administration on account of international conventions and/or of corresponding laws and regulations of a Flag State, BKI will carry them out by order or within the framework of the contract between BKI and the Naval Administration based on the respective provisions.

This includes surveys according to SOLAS 74, LLC66/68 or MARPOL 73/78. Where possible, such surveys will be carried out simultaneously with the Class surveys.

4.2 BKI will also undertake on request other surveys and checks stipulated by additional regulations and requirements of the flag state. Such surveys are subject to agreements made in each individual case and/or to the regulations of the country concerned.

4.3 All activities outlined in 4.1 and 4.2 and, where applicable, issuance of relevant certificates are likewise subject to the general conditions of Section 1.

4.4 If for some reason a ship's Class has expired or has been withdrawn by BKI, all certificates according 4.1 issued by BKI will automatically become void. If subsequently the Class is renewed or reassigned, the validity of these certificates may be revived within the scope of their original period of validity, provided that all surveys meanwhile having fallen due have been carried.

5. External service suppliers

Personnel or firms engaged in services affecting Classification and statutory work are subject to approval by BKI, see Rules for Approval Manufacturers Services Supplier (Pt. 1, Vol XI).

6. Calibration of measuring equipment

The inspection, measuring and test equipment used in workshops, shipyards and on board ships, which may form the basis for Surveyor's decisions affecting

Classification or statutory work, shall be appropriate for the services to be performed. The firms shall individually identify and calibrate each unit of such equipment to a recognized national or international standard[1].

B. Surveys for Maintenance of Class, Definitions, Schedule

1. Periodical surveys

1.1. General

1.1.1 The periodical surveys listed in the following are to be conducted for the hull, machinery including electrical installations as well as special equipment and installations included in the Classification of the ship.

If for some obvious reason, e.g. a temporary out of service condition of certain equipment, parts included in the Classification cannot be surveyed, this will be noted in the Survey Statement.

For scope and details of the surveys, see C.

1.1.2 Where Flag State regulations are applicable which impose inspection intervals deviating from the Class related intervals, the intervals will be harmonized in the individual case to reduce the number of single surveys, where possible.

1.2 Annual surveys

1.2.1 Annual surveys are to be conducted at nominal intervals of 12 months, as from the date of commencement of the Class period **p** indicated in the Class Certificate, see C.1.

1.2.2 The survey has to be carried out within a time interval of 3 (three) months before to 3 (three) months after the day at which one year of the current Class period expires.

1.3 Intermediate surveys

Extended annual surveys are referred to as intermediate surveys, see C.2.

[1] For requirements, see IACS UR Z19

The intermediate survey falls due at half the nominal time interval between two Class Renewal Surveys (i.e. Class period **p**/2). If **p** is an uneven number of years, the survey may be carried out on the occasion of the preceding or following annual survey. If **p** is an even number of years, the intermediate survey replaces the annual survey.

1.4 Class Renewal Surveys

1.4.1 Class Renewal Surveys also called special surveys are to be carried out for the ship's hull machinery, including the electrical plant and, for any special equipment classed at the intervals **p** indicated by the Character of Classification.

In exceptional cases extension of the Class period by 3 (three) month at the most may be granted by BKI Head Office upon request.

1.4.2 A Class Renewal Survey may be carried out in several parts. The survey may be commenced at the last annual survey during the Class period and must have been completed by the end of the Class period. Considering 1.2.2, the total survey period of the Class Renewal Survey shall not exceed 15 months. Regarding dry docking, see 1.10.

1.4.3 The periodical surveys and inspections of propulsion systems and machinery as per 1.6 and 1.7 form an integral part of the surveys required for Class Renewal, unless otherwise specified in the following.

1.4.4 Class Renewals for the hull are numbered in the sequence I, II, III, etc. Class Renewal IV and subsequent ones correspond to Class Renewal III. Regarding their scope see C.3.2. A survey planning meeting is to be held prior to the upcoming survey, see also D.1.2.

1.4.5 The new period of Class will commence:

- with the following day, after which the previous Class expires, provided that the Class Renewal Survey has been completed within the 3 months preceding that date. This applies also to a granted extension of the Class period by 3 months at the most.
- with the date on which the Class Renewal Survey has been completed, if this is the case more than 3 months before expiry of the previous Class.

1.5 Continuous Class Renewal Surveys

1.5.1 On request of the Naval Administration, the surveys required for Class Renewal may be split, according to a schedule to be agreed, such as to extend over the entire period of Class so that about 20 % of all surveys required for Class Renewal will be completed every year.

This means that all areas subject to survey as defined by BKI Head Office are to be surveyed at least once per Class period, unless closer intervals are prescribed by the Naval Administration or relevant standards, see Section 2.B.3. The time interval between two subsequent surveys of each individual area or part shall not exceed **p** years.

For ships more than 10 years of age, the ballast tanks are to be internally examined twice in each five year class period, i.e. once within the scope of the intermediate survey and once within the scope of the Continuous Class Renewal Survey (hull).

The survey in dry dock for Continuous Class Renewal (hull) may be held at any time within the **p** year Class period provided all the requirements of 1.8 are also complied with.

1.5.2 Regarding the duration of the period of Class and due dates of surveys, the requirements as per 1.4.1 and 1.4.4 remain mandatory.

1.5.3 Continuous Class Renewal may be separately requested for hull, machinery as well as special equipment and installations.

1.5.4 Surveys held within the Continuous Class Renewal procedure may be combined with annual and intermediate surveys in a reasonable manner. However, the requirements for annual and intermediate surveys remain mandatory.

1.5.5 At the end of the Class period, for the purpose of Class Renewal, a final survey will be performed, during which the Surveyors will satisfy themselves as to whether all areas required to be surveyed have been surveyed throughout and with satisfactory results. If there are special reasons, a Surveyor may inspect individual parts again.

1.5.6 Surveys based on Planned Maintenance System

.1 On request of the Naval Administration, an optimized Continuous Class Renewal system may be agreed upon as outlined in the following for ships the machinery of which is maintained with the aid of an approved, computer assisted maintenance system. The Naval Administration will introduce a Planned Maintenance System comprising at least the survey scopes/systems as covered by the normal Continuous Class Renewal system.

.2 For approval by BKI, the following documentation shall be submitted :

- detailed description of the maintenance system, indicating the flow of information
- list of components/systems to be covered by the optimized Continuous Class Renewal system (inventory content)
- indication of intervals for each of the maintenance measures in general
- list of maintenance intervals (time between overhaul TBO) and of the expected lifetime (LT) of the main and auxiliary machinery components essential for operation, taking into account manufacturers' recommendations and specific operational requirements
- list of instructions (Maintenance Procedures) underlying the maintenance concept
- description of maintenance documentation (reports containing important operational information, component condition, offset sheets, measures carried out)
- documentation on the maintenance strategy applied prior to filing of the application

.3 Within the scope of a shipboard survey the BKI Surveyor will confirm that :

- the current maintenance system complies with the approved documentation
- the current maintenance system takes into account, without reservations, the specific service conditions
- the maintenance documentation permits conclusions to be drawn as to the construction condition and operability of the machinery
- the personnel in charge of operation of the machinery is properly qualified and hold the necessary qualification certificates

1.5.7 Surveys based on Condition Monitoring System

Machinery or technical installations, which are subject to a Condition Monitoring System, may be surveyed in line with the requirements and prerequisites described in the Guidelines for Machinery Condition Monitoring (Pt.1, Vol.3). Prerequisite for this special Survey Arrangement CM is the existence of a

computerized Planned Maintenance System (PMS). The elements of the PMS considering the machinery components or part of them covered by Condition Monitoring shall be approved by BKI according to 1.5.6.

The Condition Monitoring System is not limited to the equipment used to determine the machinery's condition, but includes also the applied procedures and schedules for data collection and analysis.

If the Condition Monitoring information are giving evidence to the Surveyor that the machinery, or part of it, is in an acceptable running condition, he may grant a waiver from dismantling of the machinery, or part of it, for direct inspection. Any item of the installation or machinery not covered by the Survey Arrangement CM shall be surveyed and credited in the conventional way.

1.5.8 Class extension

See 1.4.1.

1.6 Periodical surveys of propeller shafts and tube shafts, propellers and other systems

See Rules for Classification and Surveys (Pt.1, Vol.I) Sec.3.B.1.10

1.7 Periodical surveys and tests of individual machinery items

1.7.1 The periodical surveys of individual machinery items or installations listed below are to be carried out in addition to those prescribed in 1.4 and C.1.3 for maintenance of class.

1.7.2 Auxiliary steam boiler plants

.1 Steam boilers are to be subjected to the following examinations and tests at regular intervals . The term 'steam boilers' includes exhaust gas boilers and warm water and hot water generators (except where they are heated by steam or liquids).

.2 External inspection

Boilers are to be subjected at annual intervals to an external inspection in accordance with the BKI inspetion programme.

For the external inspection a time window of ± 3 months is applicable.

.3 Internal inspection

Steam boilers are to be subjected to internal inspections at least twice in every Class period. On no acount the maximum interval between two internal inspections shall exceed 3 years.

.4 An extension of the internal inspection of the boiler up to 3 months can be granted under excetional circumstances. The extension may be granted by BKI after the following is satisfactorily carried out:

- external inspection of the boiler
- functional test of the boiler safety valves
- functional test of the boiler protective devices
- review of the following records since the last internal inspection:
- operational documentation
- maintenance documentation
- repairs carried out
- records of water analysis

1.7.3 Steam pipes

.1 Steam pipes are to be examined regularly every **p** years, possibly in connection with a class renewal survey. Starting from Class Renewal II the steam pipes are to be examined as to their internal and, where advisable, as to their external condition as well, employing non-destructive testing methods, where necessary, see C.5.3.

.2 Steam pipes with service temperatures exceeding 500 °C are to be examined for expansion at **p** year intervals, starting from class Renewal II, at the latest.

1.7.4 Pressure vessels

.1 Pressure vessels which are subject to survey by BKI according to the Construction Rules, are to be examined internally and externally every **p** years, possibly in connection with a Class Renewal Survey.

.2 Pressure vessels having a product of pressure [bar] by cubic capacity [l] of $p \cdot l \leq 200$ are to be surveyed on the occasion of checking of the pertinent piping system.

.3 Periodical tests of CO_2 cylinders and other gas cylinders for fire extinguishing purposes are to be carried out at intervals not exceeding 2**p** years, as follows:

At least 10 % of the gas cylinders provided are to be subjected to an internal inspection and hydrostatic test. If one or more gas cylinders fail, a total of 50 % of the gas cylinders provided are to be subjected to an internal inspection and hydrostatic test. If further gas cylinders fail at the extended test, all gas cylinders are to be subjected to foregoing tests. In any case, all gas cylinders having failed shall be replaced by new ones.

Irrespective thereof, on the occasion of recharging CO_2 cylinders, and other gas cylinders are to be tested, if the last test dates back 10 years or more.

.4 Low pressure CO_2 bulk storage containers are subject to internal survey if the content has been re-leased and the container is more than 5 years old but not more frequently than once within five years.

.5 In the case of vessels for powder extinguishing agents, periodical pressure tests may be dispensed with, provided that their internal inspection does not reveal any deficiencies.

.6 Receivers in hydraulic or pneumatic control systems are to be examined during maintenance and repairs at the system; air receivers with a product of pressure by cubic capacity $\mathbf{p} \cdot l \geq 1000$ (**p** in bar) are to be subjected to an internal inspection at least once during each class period and/or at intervals not exceeding 5 years.

.7 The intervals between surveys as referred to may be reduced, depending on the findings.

1.7.5 Automation equipment

.1 For confirmation of the Class Notation, machinery having been assigned the Notations **OT** or **OTnh** is to be inspected in accordance with BKI Survey programmes during Annual, Intermediate or Class Renewal Surveys, respectively.

1.8 Bottom surveys

1.8.1 Naval ships are generally to be subjected to a bottom survey twice during the Class period. As a matter of principle, Class Renewal includes the second bottom survey. The first required bottom survey shall be planned as follows:

For **p** 5, the bottom survey may be carried out in connection with the second or third regular annual survey within the Class period, but not later than 36 months after the last bottom survey.

For **p** 6, the bottom survey should be carried out on the occasion of the intermediate survey, but not later than 39 months after the last bottom survey.

For **p** other than 5 and 6, the bottom survey should be carried out at least two (2) times during class period.

In exceptional circumstances[2], an extension of examination of the ship's bottom of 3 months beyond the due date can be granted.

1.8.2 Bottom surveys will generally have to be carried out in dry dock. For inwater surveys see 1.9. Bottom surveys serve the purpose of periodical checking the underwater hull, the openings and closures in the shell relating to machinery systems and externally arranged components of the steering and propulsion systems. For details, see C.4. and C.6.

1.8.3 If a bottom survey is intended to be credited to a Class Renewal, all checking of hull and machinery prescribed for the respective Class Renewal and usually requiring dry docking will have to be carried out.

A bottom survey for Class Renewal may be carried out up to 15 months before completion of the Class Renewal Survey, see 1.4.

1.8.4 It is also expected that for each bottom survey performed in addition to the bottom surveys stipulated by the Classification requirements a BKI Surveyor will be called to attend.

1.8.5 Bottom surveys at an "Extended dry dock interval" can be credited as **IW** survey during Intermediate and Class Renewal Surveys in terms of the 1,5**p** years interval, see 1.10.

1.9 In water surveys

1.9.1 For ships assigned the Class Notation **IW**, an in water survey performed with the assistance of approved divers may be recognized as a substitute for every second periodical bottom survey in a dry dock, see C.4.

1.9.2 On request and in exceptional cases only, in water surveys with the assistance of approved divers may also be carried out as a substitute for every second bottom survey in a dry dock for ships not carrying the Class Notation **IW**. In any such case BKI Head Office is to be informed. The relevant permission will be endorsed in the annex to the Class Certificate.

1.9.3 Special consideration should be given to ships aged 15 years and over, prior to permission being granted to carry out an in water survey in lieu of a bottom survey in dry dock.

1.10 Extended dry dock interval

The "Extended dry dock interval" applies also to naval ships.

1.10.1 The "Extended dry dock interval" for 1,5**p** class years is limited from the delivery of the ship to the age of 15 years.

1.10.2 At the 7,5 years interval it is possible to perform the first two forthcoming bottom surveys as underwater survey in the scope of an in water survey. The third bottom survey at 1,5**p** years has to be performed in dry dock. The interval is independent whether the bottom survey will be performed at an Intermediate or Class Renewal Survey.

1.10.3 The Naval Administration has the possibility to join the "Extended dry dock interval" from delivery of the ship or between the years to an age of 10 years. The interval of bottom survey will be adapted

[2] Exceptional circumstances", e.g. means unavailability of drydocking facilities, unavailability of repair facilities, unavailability of essential materials, equipment or spare parts, or delays incurred by action taken to avoid severe weather conditions.

according to the date of entry. The necessary bottom surveys with in-water survey and dry docking will be performed in accordance with interval created by date of entry.

1.10.4 Necessary requirements for implementation of the "Extended dry dock interval":

- Planned Maintenance System Hull according to the Rules for Classification and Surveys (Pt.1, Vol.I), Sec. 3.B.1.8.
- Planned Maintenance System Machinery according to Guidance for Planned Maintenance Program (Pt.7, Vol.E).
- Shaft bearing and sealing system of approved design and regular monitoring procedures implemented
- Hull, rudder and shafting systems to be inspectable during in water survey

The extended Dry Docking Scheme is in any case subject to approval by the Naval Administration.

2. Non periodical surveys

2.1 Damage and repair surveys

Damage and repair surveys fall due whenever the ship's hull, machinery or electrical installations, as well as special equipment classed have suffered a damage which might affect validity of Class, or if damage may be assumed to have occurred as a consequence of an average or some other event, see Section 2, D.2.3.

2.2 Voyage repairs and maintenance

Where repairs to hull, machinery or equipment, which affect or may affect Classification are to be carried out by a riding crew during a voyage, they are to be planned well in advance. A complete repair procedure including the extent of proposed repair and the need for Surveyor's attendance during the voyage is to be submitted to and agreed upon with BKI. Failure to notify BKI in advance of the repairs may result in suspension of the ship's Class.

The above is not intended to include maintenance and overhaul to hull, machinery and equipment in accordance with the recommended manufacturer's procedures and established marine practice and which does not require the BKI's approval, however, any repair as a result of such maintenance and overhauls which affects or may affect classification is to be noted in the ship's log and submitted to the attending Surveyor for use in determining further survey requirements.

2.3 Conversion surveys

In the case of conversions of a ship's hull or machinery, surveys are to be conducted in accordance with the relevant approved particulars, as in the case of new buildings, see Section 2, D.3.

2.4 Extraordinary surveys

BKI reserves the right to require extraordinary surveys to be held independently of any regular surveys. Such surveys may become necessary for examining the ship's technical condition and are understood to be a part of BKI's Quality Assurance System.

3. Special equipment

Periodical surveys and tests of special equipment covered by the Class, such as diving installations, fire fighting installations, incinerators or sea water desalination systems, are to be carried out in accordance with the respective programmes fixed or to be fixed by BKI for such special equipment characteristic of a particular type of ship.

For refrigerating installations see F.

For diving installations see G.

For towing gear see H.

4. Additional Safety Measures

For all concerned ships the strength of the small hatches and their securing devices fitted on the exposed fore deck, are to comply with additional requirements[3] for these structures.

The strength requirements to resist sea forces of items, such as air and ventilator pipes and their closing appliances, and the securing of windlasses located within the forward quarter length, are to comply with additional requirements[4] for fore deck fittings and equipment.

C. Performance and Scope of Periodical Surveys

1. Annual surveys

1.1 General

Unless a dry docking survey is due, see B.1.8, annual surveys may be carried out with the ship afloat.

1.2 Hull structure and related equipment

1.2.1 The main structural elements of the hull are to be subjected to a general visual inspection, as far as accessible. Engine rooms, storages and service spaces, ro ro decks are to be surveyed at on demand, depending on the ship type and the age and general condition of the ship. Where damages or excessive wastage affecting the Class are suspected, the Surveyor is entitled to carry out further investigations.

1.2.2 Hatches and covers, bulkhead doors, ramps and any openings in the outer shell shall be surveyed at each opportunity arising, but at least once a year, regarding structural integrity as well as tightness and operability of all closures.

Additionally to the overall survey the following structural members of bow, side and stern doors are to be thoroughly inspected:

- all hinges and the pertinent hydraulic cylinders in way of their securing points
- all securing elements of the locking devices and stoppers

Bow, side and stern doors with a clear opening of less than 12 m^2 are to be checked as per the surveyor's instructions for their operability and unobjectionable technical condition. Car decks are to be surveyed in respect of operational safety, technical condition and accident prevention.

1.2.3 The rudder and manoeuvring arrangement and the anchor equipment are to be checked for visible damages. For the related machinery and for operability, see 1.3.

1.2.4 For ballast tanks, in the case of substantial corrosion[5] damages, annual surveys may be required, see 2.2.1.

[3] Additional requirements see UR S 26 of IACS
[4] Additional requirements see UR S 27 of IACS
[5] "Substantial Corrosion" is an extreme of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75 % of allowable margins, but within acceptable limits

1.3 Machinery

The machinery including electrical installations will be subjected to the following surveys and operational checks :

- general inspection of machinery and boiler rooms, with special regard to the propulsion system, the auxiliary engines, possible fire and explosion sources, and checking of emergency exits as to their free passage
- external inspection of boilers and pressure vessels, with their appliances and safety devices. For details regarding boilers, see 5.2.
- inspection and checking of the remote control, quick closing/stopping devices of pumps, valves, ventilators, etc.
- random checking of the remote control and automation equipment
- inspection and checking of the main and auxiliary steering gear, including their appliances and control systems
- checking of all communication systems between bridge and machinery, boiler and steering gear rooms
- inspection of the bilge system, including remote control actuators and bilge filling level monitors
- checking of the main and emergency power supply systems, including the switch gear and other important electrical installations
- survey of explosion proof installations
- checking of further permanently installed installations to the Surveyor's discretion, e.g. provision cooling plant, air conditioning, incinerating plant, etc.
- For Class Notation **CM PS** the stern tube lubrication oil system has to be surveyed and the correct performance of oil sampling, evaluation of the temperature of the stern tube bearings and the evaluation of the oil consumption as well as the results of the required measurements according **CM PS** record file (F 21.3.58) have to be checked and confirmed in the relevant forms of the record file.

1.4 Fire extinguishing and fire alarm systems

1.4.1 The following items/systems are subject to inspection and/or testing, where applicable:

- fire mains system, including at least 20 % of hoses and nozzles
- gas fire extinguishing system
- dry powder fire extinguishing system
- foam fire extinguishing system
- sprinkler system, including water mist sprinkler System, if applicable
- water and/or foam drencher system
- any other fixed fire extinguishing system provided
- portable fire extinguishers, mobile fire extinguishers, including portable foam application units
- fire detection and alarm systems
- emergency stops for ventilation fans, boiler forced draft fans, fuel transfer pumps, fuel oil purifiers
- quick closing fuel valves
- fire closures, fire dampers, etc.
- fire fighter's outfits

1.4.2 Additional requirements

.1 Fixed fire extinguishing systems

Fixed fire extinguishing systems, such as gas, foam, dry powder or water mist systems, are subject to maintenance by approved or recognized specialists every 2 years. Water spray systems supplied by the fire main and consisting solely of an isolating valve and open nozzles may be excluded from this requirement and may be subjected to the shipborne maintenance scheme (e.g. for paint store).

On the occasion of these inspections all CO_2 hose assemblies shall be subjected to a visual check. All CO_2 hose assemblies shall be replaced by type approved CO_2 hose assemblies not later than 10 years from the date of manufacture.

.2 Pressure vessels

Pressure vessels of fixed gas based fire extinguishing systems are subject to level checks every 2 years. These checks may be performed by the ship's staff, provided that the results are recorded and an entry is made into the ship's log.

In the event of loss of more than 10 % of CO_2, respectively more than 5 % of other extinguishing gases, charging is to be arranged for.

For periodical testing, see 3.3.5.

.3 Fixed foam fire extinguishing systems

Foam concentrate for fixed foam firexti nguishing systems is to be examined not later than 3 years after filling into the system, and yearly thereafter. The examination is to be performed by the manufacturers or by an independent laboratory. Reports are to be presented to the Surveyor. Manufacturers' certificates stating the properties of the foam concentrate shall be available onboard for reference of the Surveyor.

.4 Portable foam applicator units

The foam concentrate for the portable foam applicator units is to be renewed on the occasion of every 5 years.

.5 Portable and mobile fire extinguishers

Portable fire extinguishers and mobile fire extinguishers are subject to periodical inspections in accordance with the manufacturer's instructions and shall be serviced at intervals not exceeding one year.

Inspection and service shall only be undertaken by, or under the supervision of, a person with demonstrable competence and should follow the inspection guide in Table 9.1.3 of IMO Res. A.951(23). Each fire extinguisher is to be provided with a label showing the date of inspection and name and signature of the competent person.

At least one portable fire extinguisher of each type manufactured in the same year shall be test discharged as part of a fire drill at 5 yearly intervals. Fire extinguishers used shall be provided with a visual indication of discharge. Instructions for recharging fire extinguishers are to be supplied by the manufacturer and be available for use on board.

All portable fire extinguishers together with propellant cartridges, if any, shall be hydraulically tested in accordance with the recognized standard or the manufacturer's instruction at intervals not exceeding 10 years.

Records of inspections at fire extinguishers are to be kept on board. They shall show the date of inspection, the type of maintenance carried out and whether or not a pressure test was performed.

.6 More extensive regulations of the Naval Administration regarding other inspection intervals/performance of the tests should be observed.

1.5 Bridge control stand

On the occasion of the annual survey an operational test of the relevant equipment is to be performed on board of ships assigned the Class Notation NAV O or NAV OC.

1.6 Equipment related to the Notation NBC

Equipment and provisions, such as closures, ventilation systems, filters, sensors, alarms, etc., serving the protection against nuclear, biological or chemical fall out, shall be surveyed according to the instructions established by the parties involved.

2. Intermediate surveys

2.1 General

2.1.1 Intermediate surveys shall include all the inspections and checks required for annual surveys. Additionally, the following requirements shall be observed.

2.1.2 The requirements apply to naval ships in general. Additional requirements may have to be observed for particular ship types, due to request of the Naval Administration or in connection with manufacturer's recommendations for special equipment.

2.2 Hull structure

2.2.1 Ballast tanks

.1 In ships aged p to 2p years, selected ballast tanks are to be examined for corrosion damages and/or damages to their coatings. Depending on the survey result, and in particular in the case of poor hard protective coating condition[6], if soft coating[7] or semi hard coating has been applied, or if when built the tanks were not provided with a hard protective coating, the survey is to be extended to additional tanks of the same type.

.2 If the hard protective coating in ballast tanks except the double bottom tanks is found to be in poor condition[6], but is not renewed, if soft coating[7] or semi hard coating has been applied, or if when built, the tanks were not provided with a hard protective coating, or if corrosion respectively other defects are found, maintenance of Class is to be subject to the tanks in question being examined at annual intervals, and thickness measurements carried out as considered necessary.

Also in case of double bottom tanks, annual surveys may have to be carried out.

Semi hard coatings in ballast tanks, if already applied, will not be accepted from the next special or intermediate survey commenced on or after 1 July 2010, whichever comes first, with respect to waiving the annual internal examination of ballast tanks as required in above.

.3 In ships aged 2p years and over, during the intermediate survey, selected ballast tanks are to be examined for damages to the hull structural elements and to the hard protective coating, if applicable the procedure as outlined in 2.2.1.2 shall be followed.

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[6] Poor condition: breakdown of protective coating over 20 % or more of areas, or hard scale at 10 % or more areas under consideration

[7] “soft coating” means: Solvent-free coating on base of wool grease, grease, mineral oils and/or wax that remains soft so that it wears off when touched.

.4 If such inspections reveal no visible structural defects, the examination may be limited to a verification that the corrosion protection system remains efficient.

.5 If the hard protective coating is to be partly or totally renewed, only approved coating is applicable in case of a repair. The whole working procedure including the surface preparation has to be documented.

.6 Compartments and rooms normally not accessible, or accessible only after special preparations, may be required to be opened for inspection, depending on the ship's age and available information about service conditions.

2.2.2 Bow, side and stern doors

Additional crack tests shall be carried out at structural members of bow, side and stern doors as per 1.2.2.

Essentially, the crack tests will cover :

- main joining welds and their interfacial areas both on the ship's hull and on the doors
- highly stressed areas in way of the centres of rotation of the hinges, at the Surveyor's discretion
- highly stressed areas of the locking devices and their stoppers, at the Surveyor's discretion

repair welding

For crack detection the dye penetration method or the magnetic particle inspection method shall be employed, and a test protocol is to be prepared.

2.3 Machinery and electrical installations

2.3.1 Measurements

The following measurements are generally to be performed and/or proved by up to date protocols that they have been carried out :

- crank web deflection, main engine(s)
- crank web deflection, auxiliary diesel engine(s) (where relevant)
- axial thrust bearing clearance of shafting system(s)
- axial thrust bearing clearance of main and auxiliary gas turbine rotors (where applicable)
- insulation resistance of generators and electrical motors, including cabling and switch gear

2.3.2 Operational tests

In addition to the requirements under 2.3.1 the following system components are to be subjected to operational tests:

- emergency generating set, including emergency switchboard (where applicable)
- emergency bilge valve(s)
- bilge, ventilation and monitoring systems for the carriage of dangerous goods
- drainage facilities of starting air and control air receivers
- general operational test of the machinery and electrical installation to demonstrate unrestricted operability, as indicated by the Surveyor

2.3.3 Automation equipment

The automation equipment is to be checked according to B.1.7.5.

2.3.4 Elastic mounting of deck houses

Elastic mounting of deckhouses have to be thoroughly checked for the general condition and operability of:

- the spring elements (possibly pre stressing of screwed connections)
- the insulation
- the securing devices to prevent shifting and lifting
- the pipe and cable connections to the hull

If damages are suspected, mountings not easily accessible are to be dismounted and examined in detail.

3. Class Renewal Surveys

3.1 General

3.1.1 In addition to the surveys and checks to be carried out on occasion of the annual and intermediate surveys, for Class Renewal the following requirements shall be observed.

3.1.2 The Class Renewal Survey is in principle to be held when the ship is in dry dock or on a slipway, unless a dry docking survey has already been carried out within the admissible period, see B.1.8. The ship is to be placed on blocks of sufficient height so that the keel, the bottom plating, the rudder and any other installations at the bottom can be examined in a satisfactory manner.

3.1.3 For surveys normally requiring dry docking, and where the Notation IW has been assigned, the requirements according to B.1.9 have to be observed.

3.2 Hull structure

3.2.1 Class Renewal I

Class Renewal I has to be performed at the end of the first Class period **p**. For definition see B.1.4.2.

.1 Hull, general

At the Surveyor's discretion, the survey on principle covers the whole hull structure, particularly those areas which from experience are known to be exposed to fatigue and corrosion, such as openings in the shell and in the deck including doors and hatch coamings and covers, tanks, engine foundations and ends of superstructures. As a matter of principle, all machinery spaces, dry spaces, store rooms, pipe tunnels, cofferdams and void spaces are to be examined, in cluding the piping systems.

.2 Preparation for inspection

All spaces required to be inspected are to be cleared, cleaned and ventilated where necessary at the Surveyor's discretion so that all structural parts, such as frames, floor plates, stringers, inner bottom, etc. can be examined. For tanks, see 3.2.1.3.

Where soft[7] or semi hard coating has been applied, safe access is to be provided for the surveyor to verify the effectiveness of coating and to assess the internal structure. When safe access cannot be provided, it may be necessary to remove this soft or semi hard coating, at least partially.

Where ships have no double bottom, it is left to the Surveyor's discretion to have portions of the bottom ceiling of each watertight compartment removed on either side of the ship, especially near the centre line girder and in way of the bilge pipes and sounding pipes, so that the bottom structure below may be examined.

Where ships have a double bottom, the ceiling is to be removed at several points, at the Surveyor's discretion.

Where the structural elements are covered, the Surveyor may require parts of the covering to be removed. If deemed necessary by the Surveyor, defective cement and asphalt covering is to be removed.

The steel work is to be examined before painting or before the cement or other coverings are renewed.

.3 Tank surveys

In principle all ballast tanks are to be inspected; if applicable; the procedure as outlined in 2.2.1.2 shall be followed.

If the inspection reveals no visible structural defects, the examination may be limited to a verification that the protective coatings remain efficient.

Fuel oil, lubricating oil and fresh water tanks need not to be emptied, if their tightness can be verified by an external examination while they are completely filled and there is no reason for doubt as to their unobjectionable condition. However, fore and after peak are in any case subject to internal examinations at each Class Renewal Survey, see also Table 4.1.

.4 Tightness tests

Each compartment of the double bottom and all tanks, the boundary plating of which forms part of the ship's main structure, are to be subjected to pressure tests. Fuel oil, lubricating oil and fresh water tanks may be tested by filling with the respective liquid.

The test pressure applied is to correspond to a head of water up to the top of the overflow/air pipe or up to the hatch of a tank, where applicable, whichever is higher.

The tightness of pipe tunnels outside the inner bottom, and of void spaces, may be tested by air pressure. Air pressure testing of other spaces is to be agreed with the Surveyor from case to case. The overpressure shall not exceed 0,2 bar.

Table 4.1 Minimum requirements for internal examination at Hull Class Renewal Surveys of structural fuel oil, lube oil and fresh water tanks

Class Renewal Survey [No.] and ship's age [years]				
Tank [1,2]	I. age < p	II. p < age < 2p	III. 2p < age < 3p	IV. and subsequent, age > 3p
Fuel oil bunker tanks (engine rooms)	None	None	One	One
Lube oil	None	None	None	One
Fresh water	None	One	All	All

[1] If a selection of tanks is accepted to be examined, then different tanks are to be examined at each Class Renewal Survey, on a rotational basis.

[2] Fore peak tanks and after peak tanks are subject to internal examination at each Class Renewal Survey.

.5 Thickness measurements

If the Surveyor has reason to suspect premature in admissible corrosion, he may require the rust to be removed from parts of the structure and thickness measurements to be carried out, see D.

.6 Rudder, equipment, deck openings, etc.

The Class Renewal Survey also covers other parts essential for the operation and safety of the ship, such as rudder and steering gear, watertight doors, sluice valves, air and sounding pipes, gas freeing and safety arrangements of cargo tanks, life boat davits, companionways, hatches, scuppers and water drain pipes with their valves, fire protecting arrangements, masts, anchors, anchor chains and hawsers.

Doors, if any, are to be checked, see 2.2.2.

The rudder, rudder couplings and bearings, as well as the stock are to be surveyed in mounted condition, the rudder clearance to be measured and documented. The steering gear is to be subjected to an operational trial.

If considered necessary in view of the inspection results, the rudder and/or parts of the steering gear may have to be dismantled.

.7 Engine room structure

The engine room structure is to be examined. Particular attention is to be given to tank tops, shell plating in way of tank tops, brackets connecting side shell frames and tank tops, engine room bulkheads in way of tank top and the bilge wells. Where wastage is evident or suspected, thickness measurements are to be carried out.

.8 Loading instruments and loading manual

Where necessary for the ship, at each Class Renewal, the satisfactory operation of the approved loading computer systems is to be tested in the presence of a BKI Surveyor using the approved test conditions according to Guidelines for Certification of Loading Computer System (Pt.4, Vol.1).

At least 3 test conditions are to be checked, and the results may not deviate from the approved figures by more than 5 %.

The weights of the cargo, ballast, fuel, etc. are to be read in step by step.

Where necessary for the ship, the Surveyor has to check that the approved Loading Manual is on board.

3.2.2 Class Renewal II (age of ship p to 2p years)

.1 The requirements for the second Class Renewal include those for Class Renewal I. Additionally, the following investigations are to be carried out.

.2 The structural parts behind ceilings, floor coverings and insulation are to be examined, as required by the Surveyor and depending on the general condition of the ship, see 3.2.1.2.

.3 In principle, all tanks are to be examined internally. Lubricating oil and fresh water tanks are to be at least examined at random examinations, as required by the Surveyor, see also Table 4.1. In the case of seawater ballast tanks the procedure as outlined in 2.2.1.2 shall be followed, if applicable. Peak tanks see 3.2.1.3.

.4 The chain cables are to be ranged so that they can be examined for wear and damages throughout their length. The mean diameter of the anchor chain cables is to be determined on at least 3 links per length.

.5 For thickness measurements, see D.

.6 Where hull structural members are made of steel with yield strength of 460 N/mm^2 and above, additional ultrasonic testing of the butt welds is to be carried out according to the provisions of the BKI Supplementary Rules for Application of Steel with yield strength of 460 N/mm^2.

3.2.3 Class Renewal III and subsequent ones (Age of ship over 2p years)

.1 The requirements for the third and the subsequent Class Renewals include those for the Class Renewal II. Additionally, the following investigations are to be carried out.

.2 Ceilings, linings and insulation of all spaces adjacent to the shell plating and the inner bottom shall be removed, as indicated by the Surveyor, to enable the steel structure to be examined in detail. For Class Renewals IV and subsequent ones the inner bottom ceilings are to be completely removed and the tank top is to be carefully cleaned, such as to enable proper assessment of the tank top's condition.

.3 The wall lining underneath windows in the outer shell is to be lifted as required by the Surveyor so that the structure behind may be examined.

.4 All tanks are to be examined internally. The fuel oil, lubricating oil and fresh water tanks are to be examined internally and tested to the maximum working overpressure, at the Surveyor's discretion, see 3.2.1.3 and Table 4.1. In the case of seawater ballast tanks the procedure as outlined in 2.2.1.2 shall be followed, if applicable.

.5 The rudder body is to be examined. The connections to the rudder stock and, if fitted, to the pintle and pertinent securing devices are to be inspected. For clearances, see 6.2.2.

The rudder stock is to be surveyed as far as accessible. If deemed necessary in view of findings during this external inspection, the stock is to be dismantled. In way of the bearings, stock and pintle are to be examined for corrosion.

.6 The weight of the anchors is to be checked.

3.3 Machinery including electrical installations

3.3.1 General

.1 Except for individual machinery components as indicated in the following, the scope of all Class Renewal Surveys related to the machinery including electrical installations is identical. If the Continuous Class Renewal system is applied, the indications according to B.1.5 are to be observed.

.2 Surveys requiring dry docking

While the ship is in dry dock, the sea inlet and discharge valves are to be examined as to their condition and to be opened up and overhauled once within a Class period p.

Bow thrusters and positioning equipment are to be subjected to a general survey, and to trials upon floating of the ship.

For propeller(s), propeller and stern tube shaft(s), see 4.

3.3.2 Propulsion system

.1 Inspection of the propulsion system is mainly to cover:

- intermediate shafts and bearings, including thrust bearings
- gearing
- mechanical and flexible couplings
- turning gear
- the main propulsion engines or gas turbines, see 3.3.2.2 and 3.3.2.3; for auxiliary engines see 3.3.3

For electrically driven propellers, see 3.3.8

Spring elements made of rubber ring with or with out plies of fabric of rubber ring clutches with or without plies of fabric and under shear load, and other rubber or fibre reinforced plastic couplings are to be renewed, if required on account of negative inspection results.

.2 Main propulsion engines

The following components are to be inspected and checked in the dismantled condition, where deemed necessary by the Surveyor:

- cylinders, cylinder covers, pistons, piston rods and bolts, cross heads, crankshaft and all bearings
- camshaft, with drive and bearings
- tie rods, frame, foundation and fastening elements
- injection system, attached pumps and compressors, superchargers, suction and exhaust lines, charging air coolers, filters, monitoring, control, protective and safety devices, starting, reversing and manoeuvring equipment

Note

In case of medium speed diesel engines, dismantling and replacement of main and crank bearings may be postponed until the service life limits have been reached. The acceptable intervals between overhauls are determined by BKI Head Office.

.3 Main propulsion gas turbines

On occasion of each Class Renewal, the vibration behaviour of the main propulsion gas turbines is to be investigated, possibly by regular checks during operation. Depending on the result and as required by the Surveyor, the turbine casing(s) will have to be opened up and the rotor(s), bearings, etc. inspected in detail.

The safety arrangements of the turbines are to be tested.

3.3.3 Auxiliary engines

For all essential auxiliary engines, the survey scope is identical to that applying to the main engines. A reduction in the scope of survey may be agreed to upon examination of the maintenance protocols.

3.3.4 Steam boilers

.1 For internal and external inspections of boilers, see 5.2.

.2 Steam pipes and heating coils shall be examined according to agreed procedures.

3.3.5 Pressure vessels

.1 Pressure vessels are to be inspected internally and externally.

Pressure vessels for which pressure [bar] times cubic capacity [l] is less than or equal to 200 are to be surveyed on the occasion of checking of the pertinent piping system.

.2 Where pressure vessels cannot be satisfactorily examined internally and where their unobjectionable condition cannot be clearly stated during the internal inspection, approved non destructive test methods and/or hydraulic pressure tests are to be carried out.

The hydraulic pressure test is to be performed at a test pressure of 1,5 times the maximum allowable working pressure. If the maximum allowable working pressure is less than 2,0 bar, then the test pressure should be at least 1,0 bar more than the maximum allowable working pressure. Pressure vessels manufactured in accordance with DIN Standard 4810 are, subject to that Standard, to be tested to 1,3 times the admissible working pressure. The test pressure must in no case exceed the initial test pressure.

3.3.6 Auxiliary machinery, equipment and piping

The following machinery components are to be inspected and tested in dismantled condition, where deemed necessary by the Surveyor:

- all pumps of the essential systems
- air compressors, including safety devices
- separators, filters and valves
- coolers, pre heaters, see 3.3.5
- main and auxiliary steering gear
- anchor and other windlasses, including drives
- piping, pipe connections, compensators and hoses
- emergency drain valves and bilge piping systems
- tank filling level indicators
- installations preventing the ingress of water into open spaces
- freshwater distillation plant, where provided
- oil purifier and sewage systems
- additional systems and components, where deemed necessary by the Surveyor, as well as special equipment and installations if included in the scope of Classification

3.3.7 Automation equipment

The monitoring equipment and the automated functions of the machinery installation are to be subjected to operational trials under service conditions in port. The bridge remote control equipment of the propulsion system will be examined as required.

Details are given in the BKI survey programme OT , see also 2.3.3.

3.3.8 Electrical installations

.1 Propulsion machinery

If the ship is propelled by electrical machinery, the propulsion motors, the propulsion generators and exciters, particularly the windings of these machines, and their ventilating systems are to be examined and tested. Checking of the electric switch gear for operability is to cover also the protective, safety and interlocking devices. The electric cables and their connections are to be inspected. The insulation resistance of all electric machinery and equipment is to be tested.

.2 Dynamic positioning systems

Dynamic positioning systems according to Section 3, C.3.2.3, including control systems, are to be subjected to operational tests.

.3 Auxiliary machinery

The electrical machinery and equipment, including the generators, the motors of the essential services, the switch gear including its protective and interlocking devices, as well as the cable network are to be inspected externally. The insulation resistance is to be measured.

.4 Explosion protection

Electrical installations, including machinery and equipment located in spaces in which there is a risk of inflammable gas or vapour/air mixtures accumulating, spaces with explosive and ammunition are to be checked as to the explosion protection provided.

3.3.9 Pipes in tanks

Where pipes are led through tanks, they are to be examined and, if required by the Surveyor, subjected to hydraulic tests, if for the respective tanks an internal examination is required according to.3. Depending on the results obtained, thickness measurements may be required. If heating coils are installed, pressure testing is required.

3.3.10 Fire-extinguishing and fire alarm systems

.1 General requirements

Proof is to be furnished to the Surveyor that the entire fire extinguishing equipment is ready for operation and in a satisfactory condition. For details and trials, see 1.4.

Emergency exits/escapes are to be inspected.

CO_2 cylinders see 5.4.3 and for due dates B.1.7.4.

On the occasion of every Class Renewal Survey all CO_2 hose assemblies shall be subjected to a visual check. All CO_2 hose assemblies shall be replaced by type approved CO_2 hose assemblies not later than 2**p** years from the date of manufacture.

.2 Periodical tests of CO_2 cylinders for fire extinguishing purposes are to be carried out at intervals not exceeding 2**p** years. At least 10 % of the gas cylinders provided are to be subjected to an internal inspection and hydrostatic test. Irrespective thereof, on the occasion of recharging CO_2 cylinders are to be tested, if the last test dates back 2**p** years or more. Following a hydraulic pressure test, the vessels or bottles are to be carefully dried.

.3 In the case of vessels for powder extinguishing agents, periodical pressure tests may be dispensed with, provided that their internal inspection does not reveal any deficiencies.

.4 The intervals between surveys as referred to may be reduced, depending on the findings.

3.3.11 For automation equipment see 5.5.

3.3.12 Dangerous goods

In ships carrying the Class Notation **DG** the equipment for the carriage of dangerous goods, e.g. special fire fighting, alarm, ventilation and explosion protection equipment is to be surveyed as required.

3.3.13 Spare parts

Spare parts are to be checked for completeness as per the Rule requirements and/or according to the lists approved by BKI and kept in the ship's files, as well as for their operability.

3.3.14 Trials

Upon completion of the surveys for Class Renewal, the Surveyor shall be satisfied that the entire machinery installation including electrical installations and steering gear, as well as special equipment and installations are operable without any restrictions. In case of doubt, trials and/or operational tests may be necessary.

4. Periodical surveys of propeller shafts and tube shafts, propellers and other systems

The periodical surveys and tests of propeller shafts and tube shafts, propellers and other systems defined in B.1.6 are to be performed as follows.

4.1 Propeller shafts and tube shafts

See Rules for Classification and Surveys (Pt.1, Vol.I) Sec.3.B.1.10

5. Periodical surveys and tests of individual machinery items

5.1 The periodical surveys and tests of individual machinery items defined in B.1.7 are to be performed as outlined below.

5.2 Steam boilers

5.2.1 External inspection

External inspection including functional test of the safety and protective devices as well as the test of the safety valves is to be carried out annually.

The operability and general condition of the entire boiler, including its valves and fittings, pumps, piping, insulation, foundation, control and regulating systems and its protective and safety equipment, are to be examined. Also, the boiler records, operating instructions and qualifications of the operating personnel are to be checked.

For exhaust gas boilers, the safety valves are to be functional tested by the Chief Technical Officer at sea within the boiler external survey window. This test is to be recorded in the log book for review by the attending Surveyor prior to crediting the Annual Survey of Machinery.

5.2.2 Internal inspection

Where deemed necessary by the Surveyor, the boiler is to be cleaned on the water and flue gas and exhaust gas sides, if required, its outside surfaces are to be exposed as well, so that all walls subject to pressure may be examined.

At each survey the boilers, superheaters and economizers are to be examined on water and steam side as well as flue gas or exhaust gas side. Boiler mountings and safety valves are to be examined at each survey. They are to be opened up as considered necessary by the Surveyor.

The set pressure and the function of the safety valves are to be verified during each internal boiler inspection. For exhaust gas boilers, if steam pressure cannot be raised at port, the safety valves are to be adjusted at the test bench. The correct set pressure is to be verified by the Chief Technical Officer at sea and the results to be recorded in the log book for review by BKI.

Review of the following records since the last boiler survey is to be carried out as part of the survey:

- operational documentation
- maintenance documentation
- repairs carried out
- records of water analysis

Where the design of the boiler does not permit an adequate internal inspection, hydraulic tests may be required. It is left to the Surveyor's discretion to have the internal inspection supplemented by hydraulic tests, if considered necessary on account of the general condition/appearance of the boiler.

Where there are doubts concerning the thickness of the boiler walls, measurements shall be made using a recognised gauging method. Depending on the results, the allowable working pressure for future operation is to be determined.

The hydraulic pressure test is to be carried out to a test pressure of 1,5 times the allowable working pressure. If the maximum allowable working pressure is less than 2,0 bar, the test pressure shall be at least 1,0 bar above the maximum allowable working pressure. In no case the test pressure should exceed the test pressure applied during the constructional check and hydrostatic pressure test of the boiler after completion.

5.2.3 Extraordinary inspection

Beyond the above mentioned periodical inspections extraordinary inspections including non destructive tests and hydraulic pressure tests may be required at the Surveyor's discretion, e.g. in case of damages, repairs and maintenance work.

5.3 Steam pipes/heating coils

5.3.1 Steam pipes with steam temperatures of up to 350 °C and with outside diameters of more than 75 mm, are to be examined at random. Examinations of the internal condition of the pipelines, especially of pipe bends, or additional more detailed examinations may be required. Instead of the internal inspection, a hydraulic test may be affected to a pressure equal to 1,5 times the design pressure, but not exceeding that of the prescribed test pressure for the pertinent boiler plant.

5.3.2 In the case of steam pipes with steam temperatures exceeding 350 °C (at least two) selected individual parts of pipes are to be dismounted from each piping system (main steam pipe and auxiliary steam pipes of each service group) having an outside diameter exceeding 32 mm. Approximately 10 % of the welding seams at bends, flanges or tee branches are to be subjected to an inspection for cracks by recognized non destructive test methods.

Before being used again, removed screws of flanged joints are to be inspected for their general condition and cracks and renewed, if necessary.

5.3.3 Steam pipes designed to resist steam temperatures exceeding 500 °C and welded piping systems are to be examined as follows:

Flanged pipes in accordance with B.1.7.3.2; however, the inspection for cracks has to cover at least 20 % of the welded seams.

If internal examination of welded piping systems through the inspection holes appears to be inadequate or if their reliable assessment is not possible even by ultrasonic testing or an equivalent examination method, it may be necessary to cut out certain parts of pipes. At least 20 % of the welding seams are to be inspected for cracks.

Removed screws of flanged joints, see above 5.3.2.

5.3.4 Heating coils in oil tanks and vessels are to be subjected to a pressure test to 1,5 times the allowable working pressure.

The same applies to heating coils in cargo tanks.

5.4 Pressure vessels

5.4.1 Subject to B.1.7.4, pressure vessels are to be inspected internally and externally.

5.4.2 Supplementary tests

Where pressure vessels cannot be satisfactorily examined internally and where their unobjectionable condition cannot be clearly recognized during the internal inspection, recognized non destructive test methods are to be applied and/or hydraulic pressure tests are to be carried out.

The hydraulic pressure test is to be performed at a test pressure of 1,5 times the maximum allowable working pressure. If the maximum allowable working pressure is less than 2,0 bar, then the test pressure should be at least 1,0 bar more than the maximum allowable working pressure. Pressure vessels manufactured in accordance with DIN Standard 4810 are subject to that Standard, to be tested to 1,3 times the admissible working pressure. The test pressure shall in no case exceed the initial test pressure.

5.4.3 CO_2 low pressure fire extinguishing systems.

The surfaces are to be checked for corrosion at the Surveyor's discretion.

Insulated vessels are to be exposed at some selected points, such as to offer a general impression of the vessel's external condition.

Following a hydraulic pressure test, the vessels and/or bottles are to be carefully dried, see also B.1.7.4.4.

5.5 Automation equipment

The monitoring equipment and the automated functions of the machinery installation are to be subjected to operational trials according to B.1.7.5. The bridge remote control equipment of the propulsion system will be examined as required.

6. Dry docking surveys

6.1 General

For the survey the ship is to be placed on sufficiently high and secure blocks, so that all necessary examinations can be carried out. It may be necessary to clean the bottom and outer shell and/or remove rust from some areas.

6.2 Hull bottom survey

6.2.1 The survey covers an examination of the bottom and side plates of the shell plating, including any attachments, the rudder, the scuppers and water drain pipes, including their closures.

6.2.2 Steering gear

The rudder, rudder couplings and bearings, as well as stocks and pintles, are to be surveyed in place, the rudder clearance is to be measured and documented. The steering gear is to be subjected to an operational trial. If considered necessary in view of the inspection results, the rudder or parts of the steering gear will have to be dismantled.

Bow thrusters are normally to be inspected in place.

6.2.3 Machinery and propulsion systems

.1 For propeller(s), propeller shaft(s), stern tube(s), see 4.2.

.2 Sea and discharge valves including those of special equipment, if any are to be checked as to their condition during each dry docking survey and to be opened up and overhauled once within a period of Class.

7. In-water surveys

7.1 Approvals

7.1.1 The diving firm assisting in in water surveys has to be approved by BKI for this purpose according to Rules for Approval Manufacturers Services Supplier (Pt. 1, Vol XI).

7.1.2 The validity of the approval will depend on the continued qualification for satisfactorily carrying out the work required. The approval will have to be renewed after a period not exceeding 3 years.

7.2 Performance of survey

7.2.1 Unless accessible from outside with the aid of the ship's trim and/or heel, underwater parts are to be surveyed and/or relevant maintenance work is to be carried out with assistance by a diver whose performance is controlled by a Surveyor, using an underwater camera with monitor, communication and recording systems.

7.2.2 Surveys of the underwater body are to be carried out in sufficiently clear and calm waters.

The ship should be in light ship condition.

The shell sides below the water line and the bottom shall be free from fouling.

7.2.3 The underwater pictures on the surface monitor screen shall offer reliable technical information such as to enable the Surveyor to judge the parts and/ or the areas surveyed.

7.2.4 Documentation suited for video reproduction including voice is to be made available to BKI.

7.3 Additional examinations

7.3.1 Where, for instance, grounding is assumed to have taken place, the Surveyor may demand individual parts of the underwater body to be additionally inspected from inside.

7.3.2 If during the in water survey damages are found which can be assessed reliably only in dry dock or require immediate repair, the ship is to be dry docked. If the coating of the underwater body is in a condition which may cause corrosion damages affecting ship's Class to occur before the next dry docking, the ship is to be dry docked.

D. Thickness Measurements and Corrosion Tolerances

1. General

1.1 The thickness of structural elements is checked by measurements, in order to assess whether or not the values stipulated in the Construction Rules are observed, taking into account the admissible tolerances. Unless severe corrosion has occurred owing to particular service conditions, thickness measurements will not be required until Class Renewal II, see C.2.2.1 and C.3.2.1.5.

1.2 Thickness measurements are to be carried out in accordance with recognized methods and by authorized personnel or companies, see 2. Rust and contamination are to be removed from the components to be examined. The Surveyor is entitled to require check measurements or more detailed

measurements to be performed in his presence. The thickness measurements are to be witnessed by the Surveyor on board to the extent necessary to control the process.

The scope of thickness measurement as well as the reporting shall be fixed in a survey planning meeting between the Surveyor, representatives of the Naval Administration and the approved thickness measurement operator/firm well in advance of measurements and prior to commencing the survey.

Special attention should be given for areas affected by weapons, like missile launchers, automatic guns, etc.

2. Authorization

2.1 The personnel or the company entrusted with thickness measurements as well as the procedure for documentation shall be approved by BKI for this purpose.

2.2 The validity of the approval will depend on the continued qualification. The approval will have to be renewed after a period not exceeding 3 years.

3. Scope of measurements

3.1 Main hull structural elements

In Class Renewal II and all subsequent ones the plate thickness of the main hull (essential longitudinal and transverse) structural elements are to be checked by measurements. The number of measurements depends on the ship's maintenance condition and is left to the Surveyor's discretion. The minimum requirements for thickness measurements on the occasion of Class Renewal Surveys are stated in Table 4.2, depending on the ship's age. Respective thickness measurements to determine the general level of corrosion are to be carried out.

3.2 The extent of thickness measurements may be reduced, in comparison with those stated in Table 4.2, the Surveyor satisfies himself that there is no structural diminution, and the protective coating, where applied, continues to be effective.

The Surveyor may extend the scope of the thickness measurement as deemed necessary. This applies especially to areas with substantial corrosion.

Transverse sections should be chosen where largest corrosion rates are suspected to occur or are revealed by deck plating measurements.

3.3 Seawater ballast tanks

In the case of major corrosion damages, the structural elements of seawater ballast tanks are to be checked by thickness measurements, see C.2.2.1.

3.4 Where special reasons exist, the Surveyor may demand thickness measurements to be carried out already on the occasion of Class Renewal I, also outside the area of 0,5 L amidships, see C.3.2.1.5. The same applies in the case of conversion or repair of a ship.

3.5 In order to be used as a basis for Class Renewal, thickness measurements should, as far as practicable, be carried out already on the occasion of the $p-1$, i.e. fourth respectively fifth annual survey respectively $2p-1$ for Class Renewal II.

3.6 Hull equipment

In Class Renewal II and all subsequent Class Renewals the cross sectional areas of the anchor chain cables are to be determined (chains Renewal II + anchors Renewal II). The mean diameters of the anchor chain

cables are to be determined by representative measurements, approx. 3 links per length of 27,5 m, made at the ends of the links where the wear is greatest.

4. Corrosion and wear tolerances

4.1 General

Where thickness measurements according to 3. result in corrosion and wear values exceeding those stated in the following, the respective hull structural elements will have to be renewed.

BKI reserves the right where applicable to modify the indicated values according to 4.3 and 4.5.3 referring to the maximum permissible large surface corrosion allowances.

Where reduced material thickness was admitted for the new building (effective system of corrosion prevention), the permissible corrosion allowances are to be based on the unreduced rule thickness.

4.2 Longitudinal strength

Maximum permissible reduction of midship section modulus: 10 %.

4.3 Local strength

4.3.1 Steel

Where applicable, the maximum permissible large surface reduction t_k of plate thickness and web thickness of profiles is :

- t_k = 0,5 mm in general
- t_k = 0,7 mm for lubrication oil, gas oil or equivalent tanks
- t_k = 1,0 mm for water ballast tanks
- t_k = as agreed with BKI in case of special applications

If t_k = 0,0 mm, the fabrication tolerances as defined in Rules for Materials (Pt.1, Vol.V), shall not be exceeded. Maximum permissible locally limited reduction of thickness: 0,1 t.

4.3.2 Aluminium alloys

If the measures for corrosion protection described in the Guidelines for Hull Structures and Ship Equipment (Pt.9, Vol.2), Sec. 3.F. are fully applied, the corrosion reduction t_k can be assumed as 0,0 mm for the aluminium alloys defined in D. of the same Section. In no case the fabrication tolerances as defined in the Rules for Materials (Pt.1, Vol.V), Sec. 1 shall be exceeded.

4.4 Anchor equipment

Maximum permissible reduction of the mean diameter of chain links: 12 %.

Maximum permissible reduction in weight of anchors: 10 %.

4.5 High speed craft

4.5.1 For naval vessels with Class Notation **HSC** or **HSDE** (see Section 3, C.2.3) which are designed as high speed (seagoing) craft according to the Rules for High Speed Craft (Pt.3, Vol.III), the following corrosion and wear tolerances apply.

4.5.2 Longitudinal strength

Maximum permissible reduction of midship section modulus: 10 %.

4.5.3 Local strength

Where applicable, the maximum permissible large surface reduction t_k of plate thickness and web thickness of profiles is:

for t < 10,5 mm : t_k = 0,5 mm

for t > 10,5 mm : t_k = 0,03 t + 0,2 mm, max. 1,0 mm

Tank bottoms : t_k = 1,0 mm

Maximum permissible locally limited reduction of thickness: 0,1 t.

If the measures for corrosion prevention described in the Rules for High Speed Craft (Pt.3, Vol.III), Sec. 3, C3.1.5 are fully applied, the corrosion reduction t_k can be assumed as 0,0 mm for steel. The requirements for aluminium alloys are defined in Section 3, C.3.1.8. In no case the under thickness tolerances as defined in C.3.2.2.2 and C.3.2.3.3 shall be exceeded.

4.5.4 For anchor chain cables the maximum permissible reduction of the mean diameter of chain links is 10 %.

E. Damage and Repair Surveys

1. Where damage has occurred to the ship's hull, machinery including electrical installations or special equipment and installations, the automatic/ remote control systems, etc., the damaged parts are to be made accessible for inspection in such a way that the kind and extent of the damage can be thoroughly examined and ascertained, see also Section 2, D.2.3.

In the case of grounding, dry docking or, alternatively, an in water survey is required.

2. The repair measures are to be agreed with the Surveyor such as to render possible confirmation of the Class without reservations upon completion of the repairs. In general, a Class confirmation with Conditions of Class, e. g. in the case of a preliminary repair ("emergency repair"), requires to be approved by BKI Head Office.

3. Surveys conducted in the course of repairs are to be based on the latest experience and instructions by BKI. In exceptional cases advice is to be obtained from BKI Head Office, in particular where doubts exist as to the cause of damage.

4. For older ships, in the case of repairs and/or replacement of parts subject to Classification, as a matter of principle, the Construction Rules in force during their period of construction continue to be applicable.

This does not apply in the case of modifications required to the structure in the light of new knowledge gained from damage analyses, with a view to avoiding recurrence of similar damages.

5. Regarding the materials employed and certificates required, the requirements for new buildings are applicable, see Section 2, D.3.

6. Regarding damages or excessive wastage beyond allowable limits that affect the ship's Class, see Section 2, D.2.4.

F. Refrigerating Installations

For the surveying requirements of refrigerating installations see Rules for Classification of Surveys (Pt.1, Vol.I) Sec.2A.2.6.

G. Diving Systems

For surveys diving systems, diving simulators and diver pressure chambers see the Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.18.

H. Towing Gear

If Class Notation **TOW** (see Section 3, C.3.1.10) shall be assigned, see Guidelines for Ship Operation Installations and Auxiliary Systems (Pt.9, Vol.6) Sec.5.D. and Rules for Hull Structures (Pt.1, Vol.II), Sec.27

Table 4.2 Class Renewal Survey (Hull) Minimum Requirements for Thickness Measurements

Class Renewal Survey [No.] and ship's age [years]			
I. age ≤ p	II. p < age ≤ 2p	III. 2p < age ≤ 3p	IV. and subsequent, age > 3p
Suspect Areas through the ship			
	One transverse section within 0,5 **L** amidships	Two transverse sections within 0,5 **L** amidships	Three transverse sections within 0,5 **L** amidships [1]
		All exposed main deck plating within 0,5 **L** amidships	All exposed main deck plating full length
		All wind- and water strakes within 0,5 **L** amidships	All wind and water strakes full length
		Internals in forepeak and after peak tanks	Internals in forepeak and after peak tanks
		Lowest strake and strakes in way of tween decks ofselected transverse bulkheads together with internals in way	Lowest strake and strakes in way of tween decks of selected transverse bulkheads together with internals in way
			Representative exposed superstructure deck plating
			All keel plates full length. Also , additional bottomplates in way of cofferdams,machinery space and aft ands of tanks
			Plating of sea chests. Shell plating in way of overboard discharges as considered necessary by the Surveyor

[1] For ship seagoing ships with **L** ≤ 100 m only two sections may be investigated.

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Section 5 General Information and Project Data for Surface Ships

A. Scope

In order to estimate the scope of Classification and Services of naval surface ships, BKI needs to be provided with the following general information and data as far as already available in the initial phase of the project.

B. Basic Design Data for Initial Information

1. Functional military demands

Relevant information covers:

- planned type of ship, see Section 3, C.
- military tasks, such as:
  - general patrol
  - anti air warfare
  - anti submarine warfare
  - flight operations
  - military transport
  - landing operations
  - mine warfare, etc.

2. Detailed military demands

The detailed military demands include:

- military loads caused by the weapons and sensors, etc. of the naval ship and influencing the hull girder strength
- extent/location of storage rooms for explosives
- military loads for transport tasks, if any
- acoustic and electromagnetic demands
- equipment and materials causing radiation hazards
- shock strength demands
- special demand to withstand local impacts
- residual strength demands
- damage control zones
- fire resisting divisions
- extent of NBC (nuclear-biological-chemical) citadel, if requested

– scope of redundancies for main propulsion and auxiliaries
– replenishment at sea
– planned duty conditions, like action stations, combat readiness, cruise, etc.

3. Basic surface ship parameters

The basic parameters are:

– main design parameters
– area of operation
– operational profile
– ambient conditions
– intact and damage stability requirements
– materials for construction including special properties, corrosion protection measures, etc.
– expected lifetime [years]

4. Regulations

Additional international and national regulations, as well as regulations of the Naval Administration to be applied.

5. Building specification

Preliminary building specification or technical part of a building contract, if already available.

6. Strength calculations

Intended direct strength calculations of the hull structures, as well as extent and type of software to be used, are to be stated.

On request, BKI may perform selected direct strength calculations.

7. Updates and changes

Updates and changes of all relevant design assumptions shall be forwarded to BKI.

C. Main Ship Parameters

1. General

For the definition of parameters only SI units (metric system) should be used.

2. Principal dimensions

2.1 Length

The length **L** of the ship is the length from the moulded side of the plate stem to the fore side of the stern or transom measured on the waterline at draught **T**. Other forms of stem are to be specially considered.

2.2 Length L

The length over all LOA is the distance between the most forward and most aft element of the ship, permanent outfit included, measured parallel to the design waterline.

2.3 Breadth B

The breadth **B** is the maximum moulded breadth at the design waterline.

2.4 Breadth B_{MAX}

The breadth B_{MAX} is the greatest moulded breadth of the ship. For ships with unusual cross section the breadth will be specially considered.

2.5 Depth H

The depth **H** is the vertical distance, at the middle of the length **L**, from the moulded base line to top of the deck beam at side on the uppermost continuous deck.

2.6 Draught T

The draught **T** is the vertical distance, at the middle of the length **L**, from base line to deepest design waterline, as estimated for the lifetime of the ship.

2.7 Draught T_{MAX}

The draught T_{MAX} is the vertical distance between the lowest point of the immersed hull including appendages (e.g. domes, rudders, propellers, thrusters, etc.) and the design waterline, movable parts considered retracted.

3. Ship speed

3.1 Rated speed v_0

Expected maximum, continuous ahead speed [kn] of the ship in calm water at the draught **T** when the total available rated driving power is exclusively used for propulsion purposes.

3.2 Maximum speed v_{max}

Expected maximum ahead speed [kn] of the ship in calm water at the draught **T,** when the total available maximum driving power is exclusively used for propulsion purposes. This speed is related to an overload condition, permissible only for a defined and relatively short time period.

3.3 Cruising speed v_M

Expected economic, continuous ahead cruising speed [kn] of the ship, in calm water at the draught **T,** which provides the maximum radius of action.

4. Rated driving power

The rated driving power [kW] is defined as continuous power to be delivered by the propulsion machinery when running at rated speed

5. Auxiliary electrical power

The auxiliary electrical power [kVA] is defined as the continuous electrical power which is not directly used for propulsion of the ship at continuous speed v_0, but for driving all kinds of auxiliary devices and equipment. The degree of redundancy shall be defined in the building specification.

D. Production Standard

A production standard which considers the special requirements for the manufacturing of naval ships has to be defined by the Shipyard and accepted by BKI.

E. Documents to be Submitted for Approval

1. Before the start of manufacture, plans of the total system and drawings of all components subject to compulsory inspection specified in Table 5.1 are to be submitted to BKI for approval in accordance with the agreement between BKI and Naval Administration. To facilitate a smooth and efficient approval process they should be submitted in electronic format.

2. All documents have to be submitted to BKI in English or *Bahasa*

3. The drawings shall contain all the data necessary to check the design and loading of the equipment. Wherever necessary, calculations relating to components and descriptions of the system are to be submitted.

4. Calculations shall contain all necessary information concerning reference documents (parts of the specification, relevant drawings, etc.). Literature used for the calculations has to be cited, important but not commonly known sources shall be added in copy.

The choice of computer programs according to "State of the Art" is free. The programs may be checked by BKI through comparative calculations with predefined test examples. A generally valid approval for a computer program is, however, not given by BKI.

The calculations have to be compiled in a way which allows identifying and checking all steps of the calculations in an easy way.

Comprehensive quantities of output data shall be presented in graphic form.

5. BKI reserves the right to request additional documentation if the submitted one is insufficient for an assessment.

6. Once the documents submitted have been approved by BKI, they become binding on the manufacturer. Any subsequent modifications require BKI's consent before they are implemented.

Table 5.1 Documentation to be submitted for Classification of naval surface ships

Serial No.	Description
General Requirement	
1.1	General arrangement plan
1.2	Deck plan
1.3	Technical specification
1.4	Lines plan
1.5	Material specification for hull
1.6	List of submitted drawings
1.7	Midship section
Hull Structures and Ship Equipment	
	Hull
2.1	Midship section
2.2	Other typical sections
2.3	Bottom structure
2.4	Engine room structure (including engine foundations)
2.5	Shell expansion plan
2.6	Ice strengthening, if applicable
2.7	Decks
2.8	Superstructure and deckhouse
2.9	Bulkheads
2.10	Tank arrangement plan
2.11	Rudder body
2.12	Rudder stock
2.13	Rudder bearings, pintles and couplings, etc.
2.14	Large openings
2.15	Special foundations
2.16	Welded joints for steel or aluminium
2.17	Coating plan
2.18	NDT-plan (Non-Destructive-Testing)
2.19	Equipment number and anchoring equipment
2.20	Mooring equipment
	Supporting calculations (Structure)
3.1	Design loads summarized in a load plan
3.2	Distribution of still water shear forces and bending moments
3.3	Longitudinal strength calculation
3.4	Geometry properties of significant hull girder cross sections
3.5	Local stress calculations, if applicable
3.6	Finite element analysis, if applicable
3.7	Fatigue stress calculations, if applicable
3.8	Shock calculations, if applicable
3.9	Residual strength, if applicable
	Safety requirements for the hull
4.1	Closing appliances
4.2	Information to calculation of freeboard:
	- arrangement and detail of exterior doors
	- arrangement of watertight doors
	- arrangements and details of hatches
	- arrangement and details of air pipes and ventilators
	- arrangement and details of side shell penetration by scuppers and discharges
	- details of hawse pipes and chain lockers
	- arrangement and details of side scuttles, windows and skylights
	- arrangement and details of deck drainage
4.3	Bulwarks and guardrails

Table 5.2 Documentation to be submitted for Classification of naval surface ships *(continued)*

Serial No.	Description
4.4	Arrangement and details of shell doors
4.5	Watertight integrity plan
4.6	General stability information
4.7	Intact stability calculations
4.8	Damage stability calculations
4.9	Damage control plan
4.10	Inclining test, report and evaluation
4.11	Structural fire protection
4.12	Documentation on storage rooms and transport lines for explosives (ammunition, missiles, etc.)
4.13	Rigging plan
4.14	Masts
4.15	Specification of standing rigging
4.16	Specification of further equipment
Machinery Installations	
	General Layout
5.0	General arrangement of machinery spaces
	Internal Combustion Engines
5.1	Data on main parameters for each type of internal engine to be used
5.2	Detailed drawings of the complete engine, including cross/longitudinal sections
5.3	Documentation on provisions or additional equipment for low load operation of the engines, if applicable
5.4	Documentation on changes to already approved types of engines
	Gas turbines and exhaust gas turbochargers
6.1	Assembly drawings and cross sections
6.2	Detailed drawings of main components
6.3	Documentation on the fuel and lubricating systems (incl. circuits, control and safety devices)
6.4	Documentation on the starting system
6.5	Data concerning operation conditions
6.6	Proof of sufficient safety for critical components (incl. results for trials on turbine components)
6.7	Data concerning welding conditions for welded components
	Power transmission and propulsion systems
7.1	General drawings of the entire shafting
7.2	Component parts transmitting torque (shafting, couplings, bearings, etc.)
7.3	Propeller shaft brackets
7.4	Stern tube arrangement
7.5	Cast resin mount
7.6	Shaft alignment calculation
7.7	Assembly and sectional drawings of gears and couplings (calculation, part list)
7.8	Design drawings of transverse of propeller in main propulsion (for engine output in excess of 300 kW
7.9	Design drawings of transverse thrust systems (for engine output in excess of 100 kW), is applicable
7.10	General drawings, sectional drawings and functional characteristics of controllable pitch propeller unit
7.11	Rudder propeller/ azimuthing propulsors, if applicable
	Other documents
8.1	Operation and maintenance manuals, if applicable
8.2	Spare parts list
8.3	Trial programs (FAT, HAT, SAT)
Electrical Installations	
	Power plant
9.1	Details of the scope and type of electrical plant

Table 5.2 Documentation to be submitted for Classification of naval surface ships *(continued)*

Serial No.	Description
9.2	Details about the construction of electrical equipment in hazardous areas
9.3	General layout for electrical power generation and distribution
9.4	Details on generators and UPS units
9.5	Details on hazardous areas
9.6	Short circuit calculation
9.7	Electrical power balance
9.8	Details on main and emergency switchgear, main distribution boards
9.9	Details on lighting network
9.10	Details on feeding of weapons and sensors
9.11	Details on concept to avoid radiation hazards
9.12	Documentation on switchgear, monitoring and controls for the refrigerating plant
9.13	Main cableways for different voltage systems
9.14	Details on electromagnetic compatibility measures
9.15	Bulkhead/deck/penetrations
9.16	Cable layout/list
	Manoeuvring system
10.1	Details on steering gear drive and control systems
10.2	Details on azimuthing propulsors
10.3	Details lateral thrust systems
10.4	Controllable pitch propeller system, if applicable
10.5	Details on dynamic positioning system, if applicable
	Lighting
11.1	General lighting arrangement
11.2	Primary lighting
11.3	Secondary lighting
11.4	Transitional lighting
11.5	Escape, evacuation and rescue lighting
11.6	Portable lighting
11.7	Operational lighting, if applicable
11.8	Documentation lighting, if applicable
	Control and alarm system
12.1	Monitoring and safety systems for machinery
12.2	Starting arrangements for main and auxiliary engines
12.3	Control and regulation for essential equipment and drives
12.4	Documentation on general and special alarm systems
12.5	Documentation on position and navigation lights
12.6	Documentation on fire and CO_2 alarm systems
12.7	Documentation on watertight and fire door operation and position monitoring system
12.8	Documentation on tank level indicators, alarm, shut-off facilities
12.9	Documentation on gas and NBC (nuclear-biological-chemical) detection systems, if applicable
12.10	Documentation on all essential intercommunication systems
	Board computer
13.1	Hardware and software documentation on computers (as relevant for classification)
	Propulsion
14.1	Electrical propulsion plants
	Automation
15.1	General layout and arrangement
15.2	Description of functional relationships
15.3	Software documentation
15.4	List of sensor types and location of the monitoring system
15.5	Safety programmes giving details of limit values
15.6	Details of bridge arrangement
	Other Document

Table 5.2 Documentation to be submitted for Classification of naval surface ships *(continued)*

Serial No.	Description
16.1	Operation and maintenance manuals, if required
16.2	Spare parts list
16.3	Trial programs (FAT, HAT, SAT)
Auxiliary Systems and Equipment	
	Pressure vessels
17.1	List of pressure vessels and equipment
	Auxiliary steam boilers
18.1	Design drawings for all pressurized parts of the steam boiler
18.2	Documentation on strength calculations
18.3	Documentation on types and location of the fittings of the boiler
18.4	Description of the installation of the boiler plant in the naval ship
18.5	Cross sections of every burner type to be used
	Tanks and piping
19.1	Details on fuel and oil tanks
19.2	Diagrammatic plants of all piping systems
19.3	Details on remotely controlled valves
19.4	Supply and transfer for replenishment at sea system, if applicable
19.5	Manipulation systems for liquids
19.6	Aircraft refuelling system, if applicable
	Fire-extinguishing system Fire control plan, diagrammatic plants, detailed drawings and documents for:
20.1	General water fire-extinguishing equipment
20.2	CO_2 fire-extinguishing system or systems using other gases
20.3	Portable and mobile fire-extinguishers
20.4	Foam extinguishing systems
20.5	Pressure water spraying systems
20.6	Fire-extinguishing systems for special rooms, like paint lockers, fight decks and hangars, etc
20.7	Systems for carriage of dangerous goods in packaged form
20.8	Quick flooding system for ammunition and weapon rooms
20.9	NBC spraying system, if applicable
20.10	Cooling system for reduction of infrared signature, if applicable
20.11	Water drainage system
	Equipment Assembly and general drawings, diagrams of hydraulic and electrical equipment, details of all important load transmitting components for:
21.1	Steering gear
21.2	Azimuthing propulsors, if applicable
21.3	Anchor windlasses
21.4	Fire door control system
21.5	Replenishment at sea system
21.6	Manipulation systems, lifts, etc.
21.7	Aircraft handling system
21.8	Hydraulic systems for special devices, if safety-relevant
	Other Document
22.1	Operation and maintenance manuals, if required
22.2	Spare parts list
22.3	Trails programs (FAT, HAT, SAT)