



# RULES FOR CLASSIFICATION OF **SHIPS**

INTRODUCTION

PART 0 CHAPTER 1

## **USER INFORMATION, AMENDMENTS AND INDEXES**

JULY 2009

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# CHANGES IN THE RULES

## The following rule chapters are new as of July 2009

Pt.6 Ch.22 Enhanced System Verification

## The following rule chapters have been revised and reprinted as of July 2009:

Pt.0 Ch.1 User Information, Amendments and Indexes  
Pt.0 Ch.3 Plan Approval Documentation Types – Definitions  
Pt.1 Ch.1 General Regulations  
Pt.1 Ch.2 Class Notations  
Pt.3 Ch.1 Hull Structural Design, Ships with Length 100 metres and above  
Pt.3 Ch.3 Hull Equipment and Safety  
Pt.5 Ch.1 Ships for Navigation in Ice  
Pt.5 Ch.7 Tugs, Supply Vessels and Other Offshore/Harbour Vessels  
Pt.6 Ch.3 Periodically Unattended Machinery Space  
Pt.7 Ch.1 Survey Requirements

## The following rule chapters have been revised as of July 2009, but not reprinted:

The changes and coming into force dates are shown in Sec.3 B101. The main changes are described below.

- **Pt.2 Ch.2 Metallic Materials**
  - In Sec.5 Table C2, footnote 2) has been amended.
  - In Sec.7 Table D2, footnote 1) has been amended.
- **Pt.2 Ch.3 Fabrication and Testing of Structures**
  - Throughout the chapter, the wording “IACS members” has been changed to “classification society”.
  - Item G301 in Sec.6 has been modified in order to replace the class notations **PLUS-1** and **PLUS-2** with the class notation **PLUS** (tentative rules since January 2008).
- **Pt.5 Ch.2 Passenger and Dry Cargo Ships**
  - In Sec.2 A300, the document requirements have been changed covering “Failure Analysis Report” for propulsion and steering.
- **Pt.5 Ch.5 Liquefied Gas Carriers**
  - The requirement in Sec.5 H401 has been aligned with the requirement for tank type A (Sec.5 E). Allowable stress in static condi-

tion has been changed from 60% of (static + dynamic) to 70%.

- **Pt.6 Ch.12 Environmental Class**
  - Throughout the chapter, the wording “IACS member society” has been changed to “recognized classification society”.
- **Pt.6 Ch.21 Dynamic Positioning Systems - Class Entry Options**
  - In Sec.1 A102, Guidance note, the wording “an IACS member society” has been changed to “a recognized classification society”.
- **Pt.7 Ch.2 Retroactive Requirements**
  - In Sec.2, item B102 has been modified.

## The following rule chapters have been subject to significant editorial changes taking effect immediately:

The amendments are shown in Sec.3 B101. The main changes are described below.

- **Pt.4 Ch.4 Rotating Machinery, Power Transmission**
  - In Sec.1, item E301, the list-item reading “where one interchangeable sensor is fitted one spare sensor shall be stored on board”, has been deleted
  - In Sec.1, item F105 concerning rope guard requirements, has been deleted.
- **Pt.4 Ch.5 Rotating Machinery, Driven Units**
  - In Sec.3, item B203 concerning rope guard requirements, has been deleted.
- **Pt.5 Ch.2 Passenger and Dry Cargo Ships**
  - In Sec.4 C301: Formula for  $k_w$  has been amended.
- **Pt.5 Ch.12 Comfort Class**
  - In Sec.3, Table B2 and Figures 1 and 2 have been amended.
  - The “n-values” (number of cabins) in Sec.3 C201 have been modified.

## Previous Amendments, Corrections and Clarifications

Previous amendments, some corrections and clarifications are also found in Sec.3.

Comments to the rules may be sent by e-mail to [rules@dnv.com](mailto:rules@dnv.com)

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Comprehensive information about DNV and the Society's services is found at the Web site <http://www.dnv.com>

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## SECTION 1 CURRENT RULE BOOKLETS

### A. Print Version

#### A 100 Available booklets

##### 101 Current booklets

Table A1 shows an overview of the parts and chapters (booklets) making up the rules.

Pt.0 to Pt.7 are published in three ring binders, designated Volume 1, 2 and 3. In the ring binders, the booklets are distributed as follows:

Volume 1: Pt.0, Pt.1, Pt.2 and Pt.3  
Volume 2: Pt.4 and Pt.5 Ch.1 to Ch.4  
Volume 3: Pt.5 Ch.5 to Ch.15, Pt.6 and Pt.7.

Pt.8 is published in two stand-alone volumes, Volume 4 and 5 as follows:

Volume 4: Pt.8 Ch.1  
Volume 5: Pt.8 Ch.2

For each booklet, the date of the latest issue in print is shown in column A of Table A1. Column X shows the dates of the previous printed issues.

##### 102 Booklets that have been amended but not re-printed

Since their last issue, booklets may have been subject to amendments without being re-printed. This will appear in column B of Table A1. Such amendments, as well as their date of

introduction and coming into force date, can be found in Sec.3. See also Sec.2 B800.

When using the printed version of the current booklets, the completeness of the requirements of each chapter can only be ensured by taking into account any amendments published in Sec.3.

### B. Electronic Version

#### B 100 Booklets available electronically

##### 101 Printable booklets

Adobe PDF files for print copies of any of the booklets may be obtained from the DNV webshop (<http://webshop.dnv.com/global/>) and from the CD issues (see Sec.2 D400).

##### 102 Booklets that have been amended but not re-printed

In cases where a booklet has been amended but not re-printed ("Yes" appears in column B of Table A1), the printable booklet will include all related amendments and corrections from Sec.3 inserted into the body of the text.

The date when the booklet was last issued in print will be retained in the printable booklet, but the following statement will appear on the front page:

*This booklet includes the relevant amendments and corrections shown in the July 2009 version of Pt.0 Ch.1 Sec.3.*

Column C of Table A1 shows the latest update of the Adobe PDF file.

| Table A1 Current rule booklets |  |                                 |                                       |   |  |
|--------------------------------|--|---------------------------------|---------------------------------------|---|--|
| Current Rule Booklets          |  | X<br>Previous issue<br>in print | A<br>Date of latest<br>issue in print | B<br>Booklets<br>amended<br>but not<br>re-printed | C<br>Latest update<br>of the Adobe<br>PDF file |
| <b>PART 0</b>                  | <b>INTRODUCTION</b>  |                                 |                                       |   |  |
| Chapter 1                      | User Information, Amendments and Indexes                       | January 2009                    | July 2009                             |   | July 2009                                      |
| Chapter 2                      | Introduction to Ship Classification                            | January 2002                    | January 2003                          |   | January 2003                                   |
| Chapter 3 <sup>1)</sup>        | Plan Approval Documentation Types – Definitions                | July 2008                       | July 2009                             |   | July 2009                                      |
| <b>PART 1</b>                  | <b>GENERAL REGULATIONS</b>                                     |                                 |                                       |   |  |
| Chapter 1                      | General Regulations  | January 2009                    | July 2009                             |   | July 2009                                      |
| Chapter 2                      | Class Notations  | January 2009                    | July 2009                             |   | July 2009                                      |
| <b>PART 2</b>                  | <b>MATERIALS AND WELDING</b>                                   |                                 |                                       |   |  |
| Chapter 1 <sup>1)</sup>        | General Requirements for Materials                             | January 2003                    | July 2007                             |   | July 2007                                      |
| Chapter 2 <sup>1)</sup>        | Metallic Materials   | January 2005                    | July 2007                             | Yes   | July 2009                                      |
| Chapter 3 <sup>1)</sup>        | Fabrication and Testing of Structures                          | January 2003                    | January 2005                          | Yes   | July 2009                                      |
| <b>PART 3</b>                  | <b>HULL AND EQUIPMENT - MAIN CLASS</b>                         |                                 |                                       |   |  |
| Chapter 1                      | Hull Structural Design, Ships with Length 100 metres and above | January 2009                    | July 2009                             |   | July 2009                                      |
| Chapter 2                      | Hull Structural Design, Ships with Length less than 100 metres | January 2008                    | January 2009                          | Yes   | July 2009                                      |
| Chapter 3                      | Hull Equipment and Safety                                      | January 2009                    | July 2009                             |   | July 2009                                      |
| <b>PART 4</b>                  | <b>MACHINERY AND SYSTEMS - MAIN CLASS</b>                      |                                 |                                       |   |  |
| Chapter 1                      | Machinery Systems, General                                     | January 2003                    | January 2005                          | Yes   | January 2008                                   |
| Chapter 2 <sup>1)</sup>        | Rotating Machinery, General                                    | January 2003                    | January 2006                          | Yes   | January 2009                                   |
| Chapter 3 <sup>1)</sup>        | Rotating Machinery, Drivers                                    | July 2007                       | January 2009                          |   | January 2009                                   |
| Chapter 4 <sup>1)</sup>        | Rotating Machinery, Power Transmission                         | January 2007                    | July 2008                             | Yes   | July 2009                                      |
| Chapter 5 <sup>1)</sup>        | Rotating Machinery, Driven Units                               | January 2006                    | January 2007                          | Yes   | July 2009                                      |
| Chapter 6                      | Piping Systems   | July 2006                       | July 2008                             |   | July 2008                                      |
| Chapter 7 <sup>1)</sup>        | Pressure Vessels   | January 2003                    | January 2009                          |   | January 2009                                   |
| Chapter 8 <sup>2)</sup>        | Electrical Installations                                       | July 2007                       | January 2008                          |   | January 2008                                   |

| <b>Table A1 Current rule booklets (Continued)</b>  |  |  |  |  |  |
|--|--|--|--|--|--|
| <i>Current Rule Booklets</i>   |  | <b>X</b><br><i>Previous issue<br/>in print</i> | <b>A</b><br><i>Date of latest<br/>issue in print</i> | <b>B</b><br><i>Booklets<br/>amended<br/>but not<br/>re-printed</i> | <b>C</b><br><i>Latest update<br/>of the Adobe<br/>PDF file</i> |
| Chapter 9 <sup>1)</sup>  | Control and Monitoring Systems   | January 2005                                   | January 2008   |  | January 2008   |
| Chapter 10   | Fire Safety  | July 2006                                      | July 2008  |  | July 2008  |
| Chapter 14 <sup>1)</sup>   | Steering Gear  | –  | January 2005   | Yes  | July 2008  |
| <b>PART 5 SPECIAL SERVICE AND TYPE - ADDITIONAL CLASS</b>  |  |  |  |  |  |
| Chapter 1  | Ships for Navigation in Ice  | January 2009                                   | July 2009  |  | July 2009  |
| Chapter 2  | Passenger and Dry Cargo Ships  | July 2007                                      | January 2009   | Yes  | July 2009  |
| Chapter 3  | Oil Carriers   | July 2006                                      | January 2009   |  | January 2009   |
| Chapter 4  | Chemical Carriers  | January 2003                                   | July 2006  | Yes  | July 2008  |
| Chapter 5  | Liquefied Gas Carriers   | January 2007                                   | January 2008   | Yes  | July 2009  |
| Chapter 6  | Fishing Vessels  | July 1995                                      | January 2003   | Yes  | January 2009   |
| Chapter 7  | Tugs, Supply Vessels and Other Offshore/Harbour Vessels                              | July 2007                                      | July 2009  |  | July 2009  |
| Chapter 8  | Slop Reception and Processing Facilities   | January 1986                                   | January 2003   | Yes  | January 2004   |
| Chapter 10   | Ships for Carriage of Refrigerated Cargoes and Containers                            | January 2003                                   | July 2007  | Yes  | January 2008   |
| Chapter 11   | Carriage of Dangerous Goods  | January 2003                                   | July 2006  | Yes  | January 2009   |
| Chapter 12   | Comfort Class  | January 2003                                   | January 2009   | Yes  | July 2009  |
| Chapter 13   | Carriage of Potable Water  | January 1996                                   | January 2003   | Yes  | January 2004   |
| Chapter 14 <sup>1)</sup>   | Naval and Naval Support Vessels  | January 2005                                   | July 2007  | Yes  | January 2009   |
| Chapter 15   | Compressed Natural Gas Carriers  | January 2006                                   | January 2008   |  | January 2008   |
| <b>PART 6 SPECIAL EQUIPMENT AND SYSTEMS - ADDITIONAL CLASS</b>   |  |  |  |  |  |
| Chapter 1  | Miscellaneous Notations  | January 2006                                   | January 2009   |  | January 2009   |
| Chapter 2  | Redundant Propulsion   | January 2002                                   | January 2003   | Yes  | July 2006  |
| Chapter 3  | Periodically Unattended Machinery Space  | July 2008                                      | July 2009  |  | July 2009  |
| Chapter 4  | Additional Fire Protection ( <b>F-AMC</b> )  | January 2003                                   | July 2006  | Yes  | January 2007   |
| Chapter 6  | Centralised Cargo Control for Liquid Cargoes   | January 1998                                   | January 2003   |  | January 2003   |
| Chapter 7  | Dynamic Positioning Systems  | January 2004                                   | January 2008   |  | January 2008   |
| Chapter 8  | Nautical Safety  | January 2003                                   | July 2004  | Yes  | July 2008  |
| Chapter 9  | Loading Computer Systems (LCS) for Stability and Longitudinal Strength               | January 2003                                   | January 2005   | Yes  | July 2008  |
| Chapter 10   | Vapour Control Systems   | July 1994                                      | January 2003   | Yes  | July 2007  |
| Chapter 11 <sup>1)</sup>   | Hull Monitoring Systems  | January 2003                                   | January 2005   | Yes  | January 2008   |
| Chapter 12   | Environmental Class  | July 2005                                      | July 2008  | Yes  | July 2009  |
| Chapter 13 <sup>1)</sup>   | Gas Fuelled Engine Installations   | January 2005                                   | January 2007   |  | January 2007   |
| Chapter 14   | Fuel Treatment and Conditioning Systems  | January 2003                                   | July 2006  |  | July 2006  |
| Chapter 15   | Vibration Class  | –  | July 2004  | Yes  | July 2006  |
| Chapter 16   | <b>NAV-O</b> Class Notation  | January 2004                                   | January 2007   |  | January 2007   |
| Chapter 17 <sup>1)</sup>   | Safety of Navigation for Naval Vessels   | –  | January 2005   |  | January 2005   |
| Chapter 18   | Ballast Water Management   | –  | July 2005  | Yes  | January 2007   |
| Chapter 19   | Emergency Propulsion   | –  | January 2006   | Yes  | July 2006  |
| Chapter 20   | Nautical Safety - Offshore Service Vessels   | –  | July 2006  | Yes  | July 2008  |
| Chapter 21   | Dynamic Positioning Systems - Class Entry Options                                    | –  | January 2008   | Yes  | July 2009  |
| Chapter 22   | Enhanced System Verification ( <b>ESV</b> )  | –  | July 2009  |  | July 2009  |
| Chapter 23 <sup>1)</sup>   | Fuel Cell Installations  | –  | July 2008  |  | July 2008  |
| <b>PART 7 SHIPS IN OPERATION</b>   |  |  |  |  |  |
| Chapter 1  | Survey Requirements  | January 2009                                   | July 2009  |  | July 2009  |
| Chapter 2  | Retroactive Requirements   | July 2006                                      | July 2007  | Yes  | July 2009  |
| Chapter 3 <sup>1)</sup>  | Management of Safety and Environmental Protection (SEP)                              | January 2003                                   | July 2006  |  | July 2006  |
| <b>PART 8 IACS COMMON STRUCTURAL RULES</b>   |  |  |  |  |  |
| Chapter 1 <sup>3)</sup>  | Common Structural Rules for Double Hull Oil Tankers with Length 150 metres and above | January 2007                                   | January 2008   | Yes  | July 2009  |
| Chapter 2 <sup>3)</sup>  | Common Structural Rules for Bulk Carriers with Length 90 metres and above            | January 2006                                   | January 2008   | Yes  | July 2009  |
| <sup>1)</sup> Booklets that are common to the Rules for Classification of Ships and the Rules for Classification of High Speed, Light Craft and Naval Surface Craft.<br><sup>2)</sup> Booklet that is common to the Rules for Classification of Ships, the Rules for Classification of High Speed, Light Craft and Naval Surface Craft and the DNV Offshore Code, DNV-OS-D201 Sec.2 to Sec.13 inclusive.<br><sup>3)</sup> Booklets that are not included in the ring binders, but are issued as stand-alone publications. Amendments and corrections to these booklets are not published in Sec.3, but may be obtained from: <a href="http://www.iacs.org.uk/publications/">http://www.iacs.org.uk/publications/</a> . |  |  |  |  |  |

## SECTION 2 INSTRUCTIONS TO USERS

### A. Introduction

#### A 100 Introduction booklets

**101** The Introduction Part 0 contains three chapters or booklets:

- Chapter 1: User Information, Amendments and Indexes
- Chapter 2: Introduction to Ship Classification
- Chapter 3: Plan Approval Documentation Types – Definitions.

They are included as guidance for the users and shall not be considered as parts of the rule requirements, except the amendments and corrections contained in Sec.3, see B802.

#### A 200 Present booklet

**201** This booklet includes information on:

- editorial details such as disposition of rule parts, numbering and cross references, units and definitions, etc. (see B100 to B700)
- how amendments are undertaken (see B800 and B900)
- DNV publication services supporting classification (see C)
- class related DNV computer programs (see D)
- amendments and corrections (see Sec.3)
- systematic and alphabetical index (see Sec.4 and Sec.5, respectively).

### B. The Rules

#### B 100 Rules parts

**101** The Rules for Classification of Ships are published in eight parts (Pt.). Each part consists of chapters (Ch.) appearing as separate booklets. The eight parts are:

|      |  |
|------|--|
| Pt.1 | General Regulations                              |
| Pt.2 | Materials and Welding                            |
| Pt.3 | Hull and Equipment - Main Class                  |
| Pt.4 | Machinery and Systems - Main Class               |
| Pt.5 | Special Service and Type - Additional Class      |
| Pt.6 | Special Equipment and Systems - Additional Class |
| Pt.7 | Ships in Operation                               |
| Pt.8 | IACS Common Structural Rules                     |

Pt.1 and Pt.2 contain general regulations, Pt.3 to Pt.6 cover newbuilding requirements and Pt.7 deals with ships in operation. Pt.8 includes IACS Common Structural Rules for double hull oil tankers and bulk carriers.

A review of updated rule chapters is printed in Sec.1 of this booklet.

**102** The first section in each chapter will normally be termed General Requirements and will contain subsections covering such aspects as application of the rules, definitions of symbols and terms, list of documentation etc.

**103** Each subsequent section in the chapter will begin at the top of the page.

**104** Relevant requirements in Pt.1 to 4 shall be satisfied for the assignment of main class. The requirements stated in Pt.5 to 6 are applicable to additional class and are in general complete for the relevant notation. This implies that requirements regarding e.g. electrical installations may be found in Pt.4, 5 or 6 depending on the class notation in question.

The common structural rules in Pt.8 cover double hull oil tankers with length 150 m and above, as well as bulk carriers with length 90 m and above, and involve both main and additional class requirements.

#### B 200 Publication of the rules

**201** The rules are available on a purchase or subscription basis. Rule chapters (booklets) may also be purchased individually. See the DNV Publication List found on the DNV web site <http://exchange.dnv.com>

**202** The introduction booklets and Pt.1 to Pt.7 of the rules are published in three ring binders.

**203** The mechanism in the binder provides for two stages of opening. The half open position is recommended for general reading and use of the rules. The full open position should only be used for insertion of new chapters or removal of old chapters. Every effort has been made to deliver a high quality binder. Defective binders may be returned to the Society for a free replacement. Additional binders for working files, historical files, etc., may be supplied at a nominal charge.

**204** The two rule chapters in Pt.8 are not included in the ring binders, but are published as two stand-alone booklets, respectively:

- Ch.1 Common Structural Rules for Double Hull Oil Tankers with Length 150 metres and above
- Ch.2 Common Structural Rules for Bulk Carriers with Length 90 metres and above.

#### B 300 Updating

**301** The introduction booklet and the rule chapter list in the front of the ring binders give the current status of the rules in the form of dates relevant to each chapter. Both will be issued with each set of amendments. It is important that the users check that the date on the front page of the relevant rule chapter corresponds with that given in Sec.1 Table A1. Amendments to the rules will normally be published twice yearly, in January and in July, see also Sec.1 A102 and B102.

**302** The changes introduced in the latest edition of each chapter will be stated on the page immediately after the front page.

#### B 400 Numbering and cross references

**401** A combination of digits and letters is used for easy reference. It is felt that this combination provides better visibility with regard to levels, and is easier to handle than a five digit string, e.g. Pt.3 Ch.1 Sec.1 A100.

| Level                      | Reference example     | Principle                    |
|----------------------------|-----------------------|------------------------------|
| Part<br>Chapter<br>Section | Pt.3<br>Ch.1<br>Sec.1 | always a number              |
| Sub-section                | A                     | always a letter              |
| Sub-section element        | A100                  | always a letter and a number |
| Item                       | 101                   | always a number              |

**402** Figures are numbered in increasing order within each section, e.g. Fig.1, Fig.2 etc. The figure number and title are given immediately under the figure.

**403** Tables are numbered in increasing order within each subsection, e.g. Table A1, Table A2 etc. The table number and title are placed in the top left hand corner of the table.

**404** Each chapter is written as self-contained as possible.

Cross references are generally given at the highest level consistent with feasibility to find the subject matter:

- From part to part, e.g. *see* Pt.2 Ch.1 (i.e. down to chapter).
- From chapter to chapter within the same part, e.g. *see* Ch.1 Sec.3 (i.e. down to section). Reference to subsection, e.g. Ch.1 Sec.3 A may be used where necessary for clarity.
- Within a chapter,
  - e.g. section to section, *see* Sec.4 A100 (i.e. down to item)
  - e.g. within a section, *see* A103
  - e.g. within a subsection, *see* 103.

## B 500 Definitions

**501** Symbols and terms are in general defined at one of three levels in the rules. A definition given at higher level is normally not repeated at a lower level, and references are not made to the definitions at higher level. When a symbol or term is defined elsewhere than in either of the three general levels, proper reference is made.

**502** The first (higher) level of definitions is given in a separate subsection in Sec.1 of the chapter in which the symbol or term is used. This level defines symbols and terms which are generally applied in the chapter or booklet.

**503** The second (intermediate) level of definitions is given in subsection A of the section in which the symbol or term is used. This level normally defines symbols and terms occurring in various connections within the section.

**504** The third (lower) level of definitions is given in connection with the formula or expression in which the symbol or term is used. The definition is normally given immediately following the formula and in any case within the same item as the formula.

## B 600 Units

**601** The units generally used in the rules are the SI-units (International System of Units). Commonly used base and multiple units are given in Table B1. Some derived units and their conversion relation to the TS-units (Technical Metric System of Units) are given in Tables B2 and B3, respectively. When other units are used these are particularly stated.

| Table B1 Base or multiple SI-units |        |            |
|------------------------------------|--------|------------|
| Quantity                           | Symbol | Name       |
| Length                             | m      | metre      |
|                                    | cm     | centimetre |
|                                    | mm     | millimetre |
| Mass                               | kg     | kilogram   |
|                                    | t      | tonne      |
| Time                               | s      | second     |
| Electric current                   | A      | ampere     |

| Table B2 Derived SI-units          |                   |                             |
|------------------------------------|-------------------|-----------------------------|
| Quantity                           | Symbol            | Name/definition             |
| Frequency                          | Hz                | hertz = 1/s                 |
| Force                              | N                 | newton = kgm/s <sup>2</sup> |
|                                    | kN                | kilonewton                  |
| Pressure                           | kN/m <sup>2</sup> | = kPa, kilopascal           |
|                                    | bar               | = 10 <sup>5</sup> Pa        |
| Stress                             | N/mm <sup>2</sup> | = MPa, megapascal           |
| Bending moment<br>Torsional moment | Nm                | = J, joule                  |
|                                    | kNm               |                             |
| Work, energy                       | J                 | joule = Nm                  |
| Heat                               | kJ                | kilojoule                   |
| Power                              | kW                | kilowatt                    |
| Heat flow rate                     | W                 | watt                        |
| Temperature                        | °C                | centigrade                  |

| Table B3 SI/TS Conversion relation |                        |
|------------------------------------|------------------------|
| SI-unit                            | TS-conversion relation |
| 1 N                                | 0.1020 kp              |
| 1 kN/m                             | 1.020 kp/cm            |
| 1 N/mm                             | 1.020 kp/cm            |
| 1 Nm                               | 0.1020 kpm             |
| 1 J                                | 0.1020 kpm             |
| 1 kJ                               | 0.2388 kcal            |
| 1 kW                               | 1.36 Hp                |
| 1 W                                | 0.860 kcal/h           |

## B 700 Indexes and tables of contents

**701** Master indexes has been prepared for the complete rules in the form of a systematic index and an alphabetical index. These indexes are presented in Sec.4 and 5 respectively.

The systematic index gives reference to sections and subsections within each part and chapter whereas the alphabetical index gives reference to the page number within appropriate part and chapter, e.g. Pt.3 Ch.1 Page 14. Note that each chapter is page numbered from 1.

The master index will be updated as required when chapters are amended.

**702** Two levels of table of contents are given at the beginning of each chapter. A table of sections only is given on the front page of the chapter, providing the starting page number for each section within the chapter. A complete table of sections, subsections and main items is also included giving page number references at subsection level.

## B 800 Amendments

**801** Technical amendments to the rules are the results of formal proposals from the technical staff of the Society. They are based on practical experience from ships in operation as well as comprehensive theoretical studies, research and development. These proposals are always discussed with regional technical committees consisting of representatives of shipbuilders, marine engine builders, steel manufacturers, shipowners, maritime governmental bodies, insurance company associations and technical universities before being submitted to the Board for a decision.

**802** Amendments to the rules may be undertaken at any time, but will normally be published twice a year, in January and July, and will be forwarded to subscribers of the rules as revised chapters or in Pt.0 Ch.1 Sec.3.

**803** The superseded chapters may be filed in a separate binder for future reference.

## B 900 Reprints from the rules

**901** Reprints from the rules are available from the Society on request. There is currently no subscription scheme for reprints. While the Society will publish details of amendments to the rules in the press and in its own magazines, no special notification of amendments to buyers of reprints will be undertaken.

## C. Class Related Publications

### C 100 General

**101** In an effort to aid the various parties involved in the classification of ships, the Society has issued a number of supporting publications which are described below. Reference is also made to the DNV Publication List found on the DNV web site: <http://exchange.dnv.com>

**102** Guidelines and Classification Notes are available as a complementary volumes to the rules, on a purchase or subscription basis. The Guidelines and Classification Notes may



also be purchased individually.

Any of the other publications listed may be purchased individually

**103** Products which shall be approved for installation on-board a vessel classed with the Society may be granted type approval. The Society has issued Registers of Approved Manufacturers and Type Approved Products containing the names of manufacturers and types of products which have been granted approval. The approval is time limited and updated lists are normally published annually.

## C 200 Guidelines

**201** Guidelines are publications which give information and advice on technical and formal matters related to the design, building, operating, maintenance and repair of vessels and other objects, as well as the services rendered by the Society in this connection. Aspects concerning classification may be included in the publication.

A list of current Guidelines is given in Table C1.

## C 300 Classification Notes

**301** Classification Notes are publications which give practical information on classification of ships and other objects. Examples of design solutions, calculation methods, specifications of test procedures, as well as acceptable repair methods for some components are given as interpretations of the more general rule requirements.

A list of current Classification Notes is given in Table C2.

## C 400 Standards for Certification

**401** Standards for Certification are publications which contain principles, accept criteria and practical information related to the Society's consideration of objects, personnel, organizations, services and operations, in connection with issuance of certificates or declarations, which are not necessarily related to classification.

A list of current Standards for Certification (previously called Certification Notes) is given in Table C3.

## C 500 Registers of Approved Manufacturers and Type Approved Products

**501** Registers of Approved Manufacturers, see Table C4.

**502** Registers of Type Approved Products, see Table C5.

**503** The registers are normally updated annually.

## C 600 Recommended Practices

**601** Recommended Practices (RP) are issued as a supplement to DNV Rules for Classification or DNV Offshore Standards and other recognised codes used by the industry. RPs form a part of the technical basis for DNV classification and verification services as well as offering DNV's interpretation of good engineering practice for general use by the industry. A list of Recommended Practices is given in Table C6.

## C 700 Statutory Interpretations

**701** This publication presents the Society's interpretations of adopted resolutions on matters arising from implementing the requirements of IMO Conventions or Recommendations. Such adopted resolutions can involve uniform interpretations of Convention Regulations or IMO Resolutions on those matters which in the Convention are left to the satisfaction of the Administration or vaguely worded.

The publication covers only some relevant topics and shall under no circumstances be taken as the Society's complete guideline to statutory interpretations.

**Table C1 Guidelines and Recommended Practices**

|        |  |
|--------|--|
| No. 1  | Design and Classification of Roll on/Roll off Ships                                  |
| No. 7  | Safety and Quality Management Guidelines   |
| No. 9  | Advisory Service Condition Survey Programme  |
| No. 10 | Guide for Ultrasonic Thickness Measurements of Ships Classed with Det Norske Veritas |
| No. 11 | Renewal Survey, Survey Planning  |
| No. 15 | Erosion and Corrosion in Piping Systems for Sea Water                                |
| No. 18 | Delivery of Courses in Maritime Education and Training Institutions                  |
| No. 19 | Qualification and Approval of Hybrid Laser-Arc Welding in Shipbuilding               |
| No. 20 | Corrosion Protection of Ships, (Recommended Practice)                                |
| No. 21 | Fishing Vessel Safety Certificate  |
| No. 22 | Lay-up of Vessels  |

**Table C2 Classification Notes**

|          |  |
|----------|--|
| No. 4.3  | Repair of Surface/Dimension by means of Metal Coating                                |
| No. 7    | Non-Destructive Testing  |
| No. 8    | Conversion of Ships  |
| No. 10.2 | Guidance for Condition Monitoring  |
| No. 20.1 | Stability Documentation - Ships Newbuildings   |
| No. 21.1 | Approval and Certification of the Software of Loading Computer Systems               |
| No. 30.1 | Buckling Strength Analysis of Bars and Frames, and Spherical Shells                  |
| No. 30.2 | Strength Analysis of LNG Carriers With Spherical Tanks (For internal use only)       |
| No. 30.3 | Buckling Criteria of LNG Spherical Cargo Tank Containment Systems - Skirt and Sphere |
| No. 30.4 | Foundations  |
| No. 30.6 | Structural Reliability Analysis of Marine Structures                                 |
| No. 30.7 | Fatigue Assessment of Ship Structures  |
| No. 30.8 | Strength Analysis of Hull Structures in High Speed and Light Craft                   |
| No. 30.9 | Sloshing Analysis of LNG Membrane Tanks  |
| No. 31.1 | Strength Analysis of Hull Structures in Bulk Carriers                                |
| No. 31.2 | Strength Analysis of Hull Structures in Roll on/Roll off Ships and Car Carriers      |
| No. 31.3 | Strength Analysis of Hull Structures in Tankers                                      |
| No. 31.5 | Strength Analysis of Main Structures of Self-Elevating Units                         |
| No. 31.7 | Strength Analysis of Hull Structures in Container Ships                              |
| No. 31.8 | Direct Strength Analysis of Hull Structures in Passenger Ships                       |
| No. 31.9 | Strength Analysis of Hull Structure in Liquefied Gas Carriers with Membrane Tanks    |
| No. 32.1 | Strength Analysis of Rudder Arrangements   |
| No. 32.2 | Container Securing   |
| No. 33.1 | Corrosion Prevention of Tanks and Holds  |
| No. 34.1 | CSA - Direct Analysis of Ship Structures   |
| No. 34.2 | PLUS - Extended Fatigue Analysis Of Ship Details                                     |
| No. 41.2 | Calculation of Gear Rating for Marine Transmission                                   |
| No. 41.3 | Calculation of Crankshafts for Diesel Engines  |
| No. 41.4 | Calculation of Shafts in Marine Applications   |
| No. 41.5 | Calculation of Marine Propellers   |
| No. 41.6 | Schematic Principles for Steering Gear Hydraulics                                    |
| No. 45.1 | Electromagnetic Compatibility  |
| No. 57.1 | Shock Testing of Equipment and Systems - Naval Applications                          |
| No. 61.1 | Cargo Vapour Recovery Systems  |

| <b>Table C2 Classification Notes (Continued)</b> |   |
|--|---|
| No. 61.2   | LNG Boil-Off Re-Liquefaction Plant and Gas Combustion Units           |
| No. 61.3   | Regasification Vessels  |
| No. 62.1   | Guidance for the Environmental Class Notations Clean and Clean Design |
| No. 72.1   | Allowable Thickness Diminution for Hull Structure                     |

| <b>Table C3 Standards for Certification</b>            |  |
|--|--|
| <i>Series No. 1 Certification Services</i>             |  |
| No. 1.1  | General Description of the CMC-Services  |
| No. 1.2  | Type Approval  |
| <i>Series No. 2 Approval Schemes</i>                   |  |
| No. 2.4  | Environmental Test Specification for Instrumentation and Automation Equipment  |
| No. 2.7-1  | Offshore Containers  |
| No. 2.7-2  | Offshore Service Containers  |
| No. 2.7-3  | Portable Offshore Units  |
| No. 2.9  | Approval Programmes – Components, Manufacturers, Service Suppliers. These programmes are now available at no cost as downloadable Adobe Acrobat PDF files at DNV website: <a href="http://exchange.dnv.com">exchange.dnv.com</a> . |
| No. 2.10   | Diesel Engine Driven Power Plants – Certification, Testing and Inspection  |
| No. 2.11   | Certification of Gas Burning Internal Combustion Engine Installations  |
| No. 2.12   | Type Approval of Marine Equipment on Behalf of Maritime and Coastguard Agency (MCA)  |
| No. 2.14   | Maritime Simulator Systems   |
| No. 2.15   | Engine International Air Pollution Prevention (EIAPP)- Certification according to MARPOL Annex VI, Reg. 13 and the NOx Technical Code  |
| No. 2.16   | Specifications for Redundancy in Position Keeping Ability  |
| No. 2.19   | Portable Fire Extinguishers for the Norwegian Market   |
| No. 2.20   | Lifeboats and Rescue Boats   |
| No. 2.21   | Craft  |
| No. 2.22   | Lifting Appliances   |
| <i>Series No. 3 Competence Related Services</i>        |  |
| Certification of Competence Management Systems         |  |
| No. 3.101  | Competence Management Systems  |
| Certification of Maritime Education and Training (MET) |  |
| No. 3.201  | Learning Programmes  |
| No. 3.301  | Competence of Ships' Superintendents   |
| No. 3.302  | Competence of Shipboard LNG Cargo Operators  |
| No. 3.303  | STCW Basic Safety for Seafarers  |
| No. 3.304  | Competence of Ship's Electrical Officers and Engineers   |
| No. 3.305  | Competence of Shore-Side Personnel Handling Dangerous Goods  |
| No. 3.306  | Competence of Ships' Officers for Hull Inspections   |
| No. 3.307  | Ship-Handling Competence Requirements for Berthing and Un-Berthing Large Vessels   |
| No. 3.310  | Competence of Tender Operators   |
| No. 3.312  | Competence of Officers for Navigation in Ice   |
| No. 3.317  | Competence of Shipboard Cargo Operators Crude Oil Tankers  |
| No. 3.318  | Competence of Shipboard Cargo Operators Product Tankers  |
| No. 3.319  | Competence of Shipboard Cargo Operators Chemical Tankers   |
| No. 3.401  | Maritime Academies   |
| No. 3.402  | Maritime Training Centres  |

| <b>Table C3 Standards for Certification (Continued)</b> |   |
|---|---|
| No. 3.403   | Maritime Simulator Centres  |
| No. 3.404   | Crew Manning Offices, Private Recruitment and Placement Services                |
| <i>Series No. 4 Environment Services</i>                |   |
| No. 4.1   | Management Systems for Safe and Environmentally Sound Ship Recycling Facilities |

| <b>Table C4 Register of Approved Manufacturers</b>   |  |
|--|--|
| Approved Service Suppliers.<br>See DNV web site: <a href="http://exchange.dnv.com">http://exchange.dnv.com</a> |  |

| <b>Table C5 Register of Type Approved Products</b>                             |  |
|--|--|
| Containers, Cargo Handling, Lifting Appliances and Miscellaneous Equipment (S) |  |
| Drilling and Well Control Equipment (D)  |  |
| Electrical Equipment and Systems (E)   |  |
| EU Pressure Equipment Directive 97/23/EC (PED-B)                               |  |
| EU Recreational Craft Directive - Module B (RCD-B)                             |  |
| Fire Safety (F)  |  |
| Instrumentation and Automation (A)   |  |
| Life Saving Appliances (LB)  |  |
| Machinery Components (M)   |  |
| Machinery Plan Maintenance Systems (M-PMS)                                     |  |
| Mechanical Equipment and Piping (P)  |  |
| Non-Metallic Materials (K)   |  |
| Welding Consumables (W)  |  |
| See DNV web site <a href="http://exchange.dnv.com">http://exchange.dnv.com</a> |  |

| <b>Table C6 Recommended Practices</b> |   |
|---------------------------------------|---|
| DNV-RP-A203                           | Qualification Procedures for New Technology                         |
| DNV-RP-B101                           | Corrosion Protection of Floating Production and Storage Units       |
| DNV-RP-B401                           | Cathodic Protection Design  |
| DNV-RP-C101                           | Allowable Thickness Diminution for Hull Structure of Offshore Ships |
| DNV-RP-C102                           | Structural Design of Offshore Ships                                 |
| DNV-RP-C103                           | Column Stabilised Units   |
| DNV-RP-C201                           | Buckling Strength of Plated Structure                               |
| DNV-RP-C202                           | Buckling Strength of Shells   |
| DNV-RP-C203                           | Fatigue Design of Offshore Steel Structures                         |
| DNV-RP-C204                           | Design against Accidental Loads                                     |
| DNV-RP-C205                           | Environmental Conditions and Environmental Loads                    |
| DNV-RP-C206                           | Fatigue Methodology for Offshore Ships                              |
| DNV-RP-C207                           | Statistical Representation of Soil Data                             |
| DNV-RP-D101                           | Structural Analysis of Piping Systems                               |
| DNV-RP-D201                           | Integrated Software Dependent Systems                               |
| DNV-RP-E101                           | Recertification of Well Control Equipment                           |
| DNV-RP-E301                           | Design and Installation of Fluke Anchors in Clay                    |
| DNV-RP-E302                           | Design and Installation of Plate Anchors in Clay                    |
| DNV-RP-E303                           | Geotechnical Design and Installation of Suction Anchors in Clay     |
| DNV-RP-E304                           | Damage Assessment of Fibre Ropes for Offshore Mooring               |
| DNV-RP-E401                           | Survey of Diving Systems (available only in Adobe PDF)              |
| DNV-RP-E402                           | Naval Rescue Submersibles (available only in pdf)                   |
| DNV-RP-E403                           | Hyperbaric Evacuation Systems                                       |
| DNV-RP-F101                           | Corroded Pipelines  |
| DNV-RP-F102                           | Pipeline Field Joint Coating and Field Repair of Linepipe Coating   |

| <b>Table C6 Recommended Practices (Continued)</b> |   |
|---|---|
| DNV-RP-F103                                       | Cathodic Protection of Submarine Pipelines by Galvanic Anodes                       |
| DNV-RP-F105                                       | Free Spanning Pipelines   |
| DNV-RP-F106                                       | Factory Applied External Pipeline Coatings for Corrosion Control                    |
| DNV-RP-F107                                       | Risk Assessment of Pipeline Protection  |
| DNV-RP-F108                                       | Fracture Control for Pipeline Installation Method Introducing Cyclic Plastic Strain |
| DNV-RP-F109                                       | On-Bottom Stability Design of Submarine Pipelines                                   |
| DNV-RP-F110                                       | Global Buckling of Submarine Pipelines  |
| DNV-RP-F111                                       | Interference between Trawl Gear and Pipelines                                       |
| DNV-RP-F112                                       | Design of Duplex Stainless Steel Subsea Equipment Exposed to Cathodic Protection    |
| DNV-RP-F113                                       | Pipeline Subsea Repair  |
| DNV-RP-F201                                       | Design of Titanium Risers   |
| DNV-RP-F202                                       | Composite Risers  |
| DNV-RP-F203                                       | Riser Interference  |
| DNV-RP-F204                                       | Riser Fatigue   |
| DNV-RP-F205                                       | Global Performance Analysis of Deepwater Floating Structures                        |
| DNV-RP-F206                                       | Riser Integrity Management  |
| DNV-RP-F301                                       | Subsea Separator Structural Design  |
| DNV-RP-G101                                       | Risk Based Inspection of Offshore Topsides Static Mechanical Equipment              |
| DNV-RP-G103                                       | Non-intrusive Inspection (available only in Adobe PDF)                              |
| DNV-RP-H101                                       | Risk Management in Marine and Subsea Operations                                     |
| DNV-RP-H102                                       | Marine Operations during Removal of Offshore Installations                          |
| DNV-RP-H103                                       | Modelling and Analysis of Marine Operations   |
| DNV-RP-O401                                       | Safety and Reliability of Subsea Systems  |
| DNV-RP-O501                                       | Erosive Wear in Piping Systems  |

## D. Computer Programs

### D 100 General

**101** Computers, networks and information systems play an increasingly important role in the evaluation of designs, the following-up of newbuildings and ships in operation, as well as the continuous learning and knowledge sharing process of the classification society. As the shipping industry shifts from paper-based production to digital production, also digital exchange of information becomes important, both within the individual company and between companies.

### D 200 NAUTICUS

**201** NAUTICUS is the information and analysis system for the DNV classification activity. With its life cycle product model approach the system accumulates and makes available information about a ship from design to scrapping. Object orientation enables intelligent linking and efficient processing of this information, while graphical user interfaces with task oriented views make the information easily accessible for the end-user. With a wide area computer network the information is available throughout the DNV organisation, and Internet links accommodate external users.

**202** With NAUTICUS, DNV aims at improved knowledge sharing and decision support, which means enhanced, faster and consistent high level services to DNV's customers throughout the world.

**203** Ship modelling, analysis and rule checking applications are available to external users as the software is released. Nor-

mally, new versions will be released once a year, following the cycles of the rule editions.

**204** NAUTICUS HULL provides an efficient analysis tool for the naval architect who may work with familiar hull elements in a user-friendly graphical environment, having access to a wide range of analysis options that are re-using the same digital model of the ship. In addition to the traditional rule checking there are direct calculation options for fatigue life, ultimate hull girder capacity, oil spill after structural damage, life cycle costs for different hull designs and maintenance schemes, as well as the broad range of features offered by the SESAM system (see 300).

**205** Rule Check, which is one of the NAUTICUS HULL packages, covers inter alia rule checking of section scantlings, such as hull girder strength, local strength, and buckling of plates and stiffeners. In addition there are dedicated programs for various rule checking and structural analysis according to the DNV Rules.

**206** NAUTICUS MACHINERY provides an effective analysis package to shipbuilders and component manufacturers. The software focuses on rotating machinery components (propeller, shaft, couplings, gears and engines) and the related systems. In addition to traditional rule check tools the package consist of advanced system analysis tools such as shaft alignment, whirling and axial vibration calculations. Some of the tools are linked to DNV Rules for calculation methods and allowable safety factors, while other tools are based on well established engineering methods or recognized standards, e.g. IACS unified requirements, CIMAC or ISO.

**207** NAUTICUS HULL and NAUTICUS MACHINERY may be ordered from the local DNV office or from DNV Software, NO-1322 Høvik, Norway, tel: +47 67 57 76 50 or fax: +47 67 57 72 72, e-mail: software.nauticus@dnv.com.

**208** NAUTICUS incorporates the ship related parts of the general purpose finite element program SESAM (see 300).

### D 300 SESAM

**301** SESAM includes integrated program packages for extensive analysis of marine and offshore structures, as:

- ships
- floating offshore units (column stabilised and self-elevating)
- tension leg platforms
- fixed steel and concrete platforms
- FPSO's.

For these structures the analysis may include integrated calculation of loads, response, capacity and checking against codes, etc.

**302** SESAM is developed by DNV Software in cooperation with leading organisations in the maritime and offshore industries. The SESAM system is available from DNV Software, NO-1322 Høvik, Norway, tel: +47 67 57 76 50 or fax +47 67 57 72 72, e-mail: software.sesam@dnv.com.

### D 400 DNV Electronic Rule Book

**401** The DNV Electronic Rule Book contains the present Rules for Classification of Ships and is issued at each revision of the rules. It comprises the complete and updated edition:

- all chapters are consolidated and up-to-date
- amendments and corrections in Sec.3 are consistently incorporated at their proper place.

**402** The Electronic Rule Book has powerful means to rapidly find items of specific interest. Rule extracts may be printed, or copied to documents.

**403** The Electronic Rule Book CD-ROM may be ordered from your local DNV station or from the DNV distribution department, NO-1322 Høvik, Norway or fax: +47 67 57 93 20.

## **D 500 DNV Exchange**

**501** DNV Exchange is a PC and web-based class information service for shipowners. The system provides reliable, up-to-date information on class and survey status, certificates, conditions of class and a wealth of other information for management and technical staff alike. Shipboard installations are also available.

**502** Information included in the current system comprises:

- Full classification status of your vessels in the form of charts, warning lamps and tables. Owner's Page is included as a simple means for owners to monitor additional surveys, audits, certificates, etc. which are not covered by the class.
- An information bank describing DNV's primary class and statutory services. Access to DNV Rules for Classification of Ships may also be obtained - and the first CD-ROM is supplied free of charge for installation with DNV Exchange.
- Experience-based information from DNV's records in the form of all updated issues of Casualty Information. Further, there are pointers to the latest updates in the DNV rules, and IMO Requirements Timescale lookup tool.
- Search for any DNV employee, office or department, using maps, hierarchical menus and alphabetic searches.

**503** A version of DNV Exchange will also provide access to the information available from the additional class notation

## **NAUTICUS.**

**504** The current Internet based version of "DNV Exchange Basic" provides access to class status information, DNV Directory, Service Suppliers publications and Service Experience such as Casualty Information. This version is available free of charge to all owners.

**505** Data is extracted daily from DNV's databases and made available on DNV's Exchange home page on the Internet, protected by username and password (<http://exchange.dnv.com>). On request, data may also be sent by e-mail or on diskette.

**506** For more information on DNV Exchange, please contact DNV Software, NO- Høvik, Norway, tel: +47 67 57 76 50, fax: +47 67 57 99 11, e-mail: [dnv.exchange@dnv.com](mailto:dnv.exchange@dnv.com)

## **E. Other DNV Rules**

### **E 100 General**

**101** DNV has developed and publish rules for objects other than ships. Reference is made to the DNV Publication List found on the DNV web site: <http://exchange.dnv.com>

## SECTION 3 AMENDMENTS AND CORRECTIONS

### A. Introduction

#### A 100 General

**101** This section includes amendments approved by the Board, but not yet incorporated in the printed version of the current rule chapters. The coming into force dates of these amendments are given in B, and a review of the main amendments are found on the inside of the front cover of this booklet.

In addition, editorial changes of the text may be included.

**102** Editorial changes, such as detected errors, corrections and clarifications of text, are defined as those changes that have no underlying formal proposal (see Sec.2 B800).

### B. Amendments and Corrections

#### B 100 General

**101** For each involved rule chapter (booklet), the amendments and corrections are recorded with the following information:

- The publishing date of the latest concurrent amendments and corrections (listed first).
- The relevant section, page and the coming into force date. Editorial changes are shown with just section and page (immediately effective).
- Previous concurrent amendments and corrections historically listed, starting with the most recent publication date.

|      |      |           |           |       |       |                          |  |
|------|------|-----------|-----------|-------|-------|--------------------------|--|
| NV D | 0.21 | 0.10-0.35 | Min. 0.60 | 0.035 | 0.035 | -                        | For $t \leq 25$ mm: Killed                     |
| NV E | 0.18 | 0.10-0.35 | Min. 0.70 | 0.035 | 0.035 | Min. 0.020 <sup>6)</sup> | For $t > 25$ mm: Killed and fine grain treated |
|      |      |           |           |       |       | Min. 0.020 <sup>6)</sup> | Killed and fine grain treated                  |

#### Pt.2 Ch.3

#### Published July 2009

#### General, into force: July 2009

*Throughout the chapter, the wording “IACS members” has been changed to “classification society”.*

#### Sec.6 Page 26, into force: July 2009

*Item G301 has been replaced by:*

**301** Special building tolerances and/or weld finish as a result of operations in harsh environment and/or vessels with increased target design life, relating to class notation **PLUS**, ref Pt.3 Ch.1 Sec.15 and Sec.16 (Rules for Classification of Ships), shall be readily included in the fabrication instructions and procedures, see Sec.1.

#### Published July 2008

#### Sec.8 Page 29, into force: July 2008

*In Table B1, the contents of the cell covering*

*“Tanks containing liquid and the structures forming boundaries of tanks containing liquid”/“Structural test pressure”*

*has been replaced by:*

#### Pt.2 Ch.2

#### Published July 2009

#### Sec.5 Page 37, into force January 2010

*In Table C2, footnote 2) has been changed to:*

- 2) For propeller shafts intended for ships with class notations covered under Pt.5 Ch.1 Sec.3, Sec.4 and Sec.8, Charpy V-notch impact testing shall be carried out in the longitudinal direction for all steel types at minus 10°C and the average energy value shall be minimum 27 J.

#### Sec.7 Page 51, into force January 2010

*In Table D2, footnote 1) has been changed to:*

- 1) Testing is required only for class notations covered under Pt.5 Ch.1 Sec.3, Sec.4 and Sec.8.

#### Published January 2008

#### Sec.1 Page 11

*In Table B1, the rows covering NV D and NV E have been corrected as follows:*

The greater of the following:

- head of water up to top of overflow
- 2.4 m head of water above highest point of tank. For FRP tanks: 1.0 m above highest point of tank
- pressure valve opening pressure.

#### Sec.8 Page 30, into force: July 2008

*In Table B1, tablenote 2) has been amended as follows:*

- 2) Structural testing need not be repeated for subsequent vessels in a series of identical newbuildings, unless surveyors deem the repetition necessary. This relaxation does not apply to cargo space boundaries for vessels with the class notation **Tanker for Chemical ESP**.

#### Published July 2006

#### Sec.8 Page 29, into force: July 2006

*The first sentence of item B302 has been replaced by:*

Leak testing shall be carried out on all weld connections of tank boundaries, pipe penetrations and erection joints on tank boundaries, except for automatic weld joints and FCAW semi automatic full penetration butt welds of erection joints.

**Published January 2006**

**Sec.8 Page 30, into force: January 2006**

*In Table B1, the footnote 2) has been replaced with:*

- 2) Structural testing need not be repeated for subsequent vessels in a series of identical newbuildings, unless surveyors deem the repetition necessary. This relaxation does not apply to cargo space boundaries for vessels with the class notation **Tanker for Chemicals ESP** or for liquified gas carriers fitted with membrane or semi-membrane tanks.

**Published July 2005**

**Chapter title**

*The chapter title has been changed to:*

**Fabrication and Testing of Structures**

**Pt.3 Ch.2**

**Published July 2009**

**Sec.2 Page 11**

*The footnote in Table B2 has been changed to:*

- \*) Single strakes required to be of Class IV within 0.4L amidships are to have breadths not less than  $800 + 5L$  (mm), need not be greater than 1800 (mm), unless limited by the geometry of the ship's design.

**Sec.3 Page 18**

*Item B901 has been changed as follows:*

**901** The rules do not give any requirements to prevent harmful vibrations in global or local structural elements.

**Pt.4 Ch.1**

**Published January 2008**

**Sec.1 Page 6**

*A new item B118 has been added (moved from Pt.4 Ch.9 B104).*

**Sec.3 Page 8, into force: July 2008**

*Item A410 has been replaced by:*

**410** Hydraulic power units shall be provided with adequate shielding in order to avoid potential oil leakage, or spray coming into contact with any sources of ignition.

*Items A411, A412 and A413 have been deleted and new item A411 has been included as follows (Guidance note in previous A413 has been retained):*

**411** When purifiers for heated fuel oil are not located in a separate room, consideration shall be given with regard to their location, ventilation conditions, containment of possible leakage and shielding from ignition sources.

For machinery spaces of category A above 500 m<sup>3</sup>, the purifiers shall be protected by a fixed local application fire-extinguishing system.

**Guidance note:**

Reference is made to SOLAS Ch.II-2/Reg.10.5.6 and IMO MSC/Circ.913 for requirements regarding the fixed local application fire-extinguishing system.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

**Published July 2006**

**Sec.1 Page 5**

*In item A101, the reference to Pt.3 Ch.3 Sec.11 has been changed to Pt.3 Ch.3 Sec.10.*

**Sec.3 Page 8**

*In item A301, the reference to Pt.3 Ch.3 Sec.11 has been changed to Pt.3 Ch.3 Sec.10.*

**Published July 2005**

**Sec.1 Page 6**

*In items B116 and B117, the words "upon failure" has been deleted.*

**Pt.4 Ch.2**

**Published January 2009**

**Sec.3 Page 8**

*Item A201 has been replaced by:*

**201** A material specification is as a minimum to contain the following:

- type of material
- chemical composition
- production method (cast, hot rolled, separately forged, blank cut out of a forged bar of specified size, etc.)
- type of heat treatment
- minimum mechanical properties (which normally includes impact energy Charpy-V for quenched and tempered steels)
- an NDT specification containing:
  - method of NDT
  - extent
  - acceptance criteria

High stress areas, and in particular, zones with stress risers, such as:

- keyways
- holes
- splines
- teeth

and

- shrinkage surfaces,

shall be included in the NDT specification.

For surfaces with specified hardness exceeding 400 HV, the extent of NDT shall be 100%.

All NDT work shall be performed according to a written procedure. The procedure shall be in compliance with Classification Notes 7, or other recognised standards. The surveyor may require that the procedure is approved or qualified for the work.

Unless otherwise specified in these rules or approved manufacturer's specification, acceptance criteria from the following documents can be used for NDT of machinery components:

For forged components:

IACS Recommendation no.68, Inspection zone 1

For cast components:

IACS Recommendation no.69, Quality level 1

For welds: ISO 5817 Level B.

The extent of material testing and documentation thereof is specified for the various components dealt with in Ch.3 to Ch.5.

**Guidance note:**

The objective and scope of quality control for materials, material testing and documentation thereof is to verify that the relevant properties as specified by the designer and accepted by the Society are obtained.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

(See also changes to item A201 below, published January 2008.)

**Published July 2008**

**Sec.3 Page 8**

In item A202, the reference in the first footnote "Sec.5 A" has been replaced by "Pt.2 Ch.2 Sec.5 A900".

**Published January 2008**

**Sec.3 Page 8, into force: January 2008**

In item A201, the following paragraphs have been inserted after the list items:

All NDT work shall be performed according to a written procedure. The procedure shall be in compliance with Classification Notes 7, or other recognised standards. The surveyor may require that the procedure is approved or qualified for the work.

Unless otherwise specified in these rules or approved manufacturer's specification, acceptance criteria from the following documents can be used for NDT of machinery components:

For forged components:

IACS Recommendation no.68, Inspection zone 1

For cast components:

IACS Recommendation no.69, Quality level 1

For welds: ISO 5817 Level B.

Item A202 has been replaced by:

**202** Material specifications including material testing and documentation may refer to any of the following:

- Pt.2 Ch.2 \*)
- any national standard
- works internal standards (provided implemented in the quality system).

If reference is made to standards that are not considered as "well known", then full details of these standards shall be submitted for approval.

Whenever a material standard deviates from Pt.2 Ch.2, then it may be required that the deviation is justified by use of the principle of equivalency.

The principles given in Pt.2 Ch.1 apply also when national or work internal standards are referred to.

\*) The surface defect acceptance in Sec.5 A (linear indication of 1.5 mm) is not permitted in areas of high dynamic stresses such as e.g. crankshaft fillets and oil holes, gear teeth, shaft details in direct coupled diesel plants.

\*) The use of carbon or carbon-manganese steels for large components is limited to a specified tensile strength of 600 MPa.

**Published January 2007**

**Sec.4 Page 10, into force: July 2007**

Sub-section element A100 has been replaced by:

**A 100 Speed governing of generating sets**

**101** Prime movers for driving generators of the main and emergency sources of electrical power shall be fitted with a speed governor which will prevent transient frequency variations in the electrical network in excess of  $\pm 10\%$  of the rated frequency with a recovery time to steady state conditions not exceeding 5 seconds, when the maximum electrical step load is switched on or off.

In the case when a step load equivalent to the rated output of a generator is switched off, a transient speed variation in excess of 10% of the rated speed may be acceptable, provided this does not cause the intervention of the overspeed device as required by Ch.3 Sec.1 E300.

(IACS UR M3.2.1)

**102** At all loads between no load and rated power the permanent speed variation shall not deviate to a value that may be detrimental to the reliability of any electric consumer.

**Guidance note:**

$\pm 5\%$  of the rated speed is considered as a safe value.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

**103** Prime movers shall be selected in such a way that they will meet the load demand within the ship's mains.

Application of electrical load shall be possible with three load steps and shall be such that prime movers – running at no load – can suddenly be loaded to 1/3 of the rated power of the generator followed by the next 1/3 after an interval sufficient to restore the speed to a steady state condition. Finally, the sudden load step from 2/3 to full load applies. Additionally, the prime mover shall be able to take a sudden application of not less than 1/3 of full load when running at any part load below 2/3 of full power. Steady state conditions shall be achieved in not more than 5 seconds.

Steady state conditions are those at which the envelope of speed variation does not exceed  $\pm 1\%$  of the declared speed at the new power.

**104** Prime movers, which cannot fulfil the requirement in 103, are only accepted when the system is so designed that all electrical power demand is served with the rate of load applications applicable for the specific prime mover installation.

**105** When generator sets are running in parallel, it shall be ensured that, in case of loss of any of these generating sets, the remaining ones are kept in operation to permit propulsion and steering and to ensure safety.

**106** Emergency generator sets must satisfy the governor conditions as per 101 and 102, even when:

- a) their total consumer load is applied suddenly, or
- b) their total consumer load is applied in steps, subject to:
  - the total load is supplied within 45 s since power failure on the main switchboard
  - the maximum step load is declared and demonstrated
  - the power distribution system is designed such that the declared maximum step loading is not exceeded
  - the compliance of time delays and loading sequence with the above shall be demonstrated at ship's trials.

(IACS UR M3.2.4)

**107** For A.C. generating sets operating in parallel, the governing characteristics of the prime movers shall be such that within the limits of 20% and 100% total load the load on any generating set will not normally differ from its proportionate share of the total load by more than 15% of the rated power of

the largest machine or 25% of the rated power of the individual machine in question, whichever is the less.

For an A.C. generating set intended to operate in parallel, facilities shall be provided to adjust the governor sufficiently fine to permit an adjustment of load not exceeding 5% of the rated load at normal frequency.

(IACS UR M3.2.6)

#### Pt.4 Ch.4

##### Published July 2009

##### Sec.1 Page 18, into force: July 2009

*In item E301, the list-item reading “where one interchangeable sensor is fitted one spare sensor shall be stored on board”, has been deleted*

##### Sec.1 Page 20, into force: July 2009

*Item F105 concerning rope guard requirements, has been deleted.*

##### Published January 2009

##### Sec.1 Page 17

*Item B703 has been replaced by:*

**703** The following calculation procedure may be used for spline connections provided:

- Involute “half depth” splines with 30° pressure angle. (“half depth” means common tooth height equal one module).
- Mainly torque transmission, i.e. no significant additional support force. In the case of e.g. an external gear mesh force the outer member shall be supported at each end of the splines and the support shall be a tight fit. Otherwise special considerations shall be taken.
- The length to diameter ratio of the splines shall be so that torsional deflections or bending (due to external forces) deflections corresponding to a misalignment beyond 1 micron per mm spline length are avoided.
- Flank alignment tolerance shall be 0.5 micron per mm spline length for each of the male and female members.

Flank pressure criterion:

$$1 d^2 > 6\,000 K_A T_0 / HV$$

Shear stress criterion:

$$1 d^2 > 10^4 K_A T_0 / \sigma_y$$

l = the spline length (mm)

d = the pitch diameter (mm)

HV = the flank hardness of the softer member

$\sigma_y$  = the yield strength of the core material (minimum of the two members)

*(The previous latter part of item B703 has been moved to Pt.4 Ch.2*

##### Sec.2 Page 31

*In item C206 list item 1) has been replaced by:*

- 1) The case depths shall be checked on a coupon that follows the entire heat treatment process. The coupons shall be of the same type of material as the actual gears to be certified and may be of a standard size. The correlation between these small coupons and the representative coupons mentioned in 204 shall be documented by means of comparison measurements and included in a MSA.

If small coupons are used, e.g. standard size of Ø 30-35 mm, and no approved correlation to the actual gear size exists, the following correlation shall be used (applicable

for the hardness profile of the flanks with material ISO 683-11 - 18CrNiMo7 and EN 10084 - 18CrNiMo7-6):

For gears with  $m_n > 5$  (mm):

- i)  $t_{550} = (1 - (m_n - 5)/85) \cdot \text{measured depth to 550 HV (mm)}$
- ii)  $t_{400} = t_{550} \cdot (1.6 - (m_n - 5)/100)$  (mm)
- iii) Core hardness = 0.8 · measured core hardness of coupon (HV)
- iv) If corrected core hardness < 300 HV then  $t_{300} = 1.35 \cdot t_{400}$  (mm)

The grinding amount shall be subtracted from the depths in i), ii) and iv).

For gears with  $m_n \leq 5$  (mm):

The grinding amount shall be subtracted from the measured hardness depths.

#### Pt.4 Ch.5

##### Published July 2009

##### Sec.1 Page 8

*In item C108, the reference to Pt.5 Ch.1 Sec.3 J305 has been deleted.*

##### Sec.3 Page 16, into force: July 2009

*Item B203 concerning rope guard requirements, has been deleted.*

##### Published January 2009

##### Sec.1 Page 22

*In item B103, the reference to Ch.6 Sec.5 J has been changed to Ch.6 Sec.5 I300.*

##### Published July 2008

##### Sec.4 Page 22, into force: July 2008

*A new item B108 has been added as follows:*

**108** Compressors for instrument- and control air receivers shall deliver sufficient air for the intended instruments. The compressors shall be provided with proper filtering equipment in order to deliver air free from oil, moisture and other contamination according to Pt.4 Ch.6 Sec.5 I204 of the Rules for Classification of Ships.

##### Published January 2008

##### Sec.2 Page 12, into force: January 2008

*Item C202 has been deleted. Existing C203 has been renumbered C202.*

##### Sec.3 Page 16, into force: January 2008

*In Table A1, the following amendments have been introduced:*

*The table title has been changed to:*

##### Table A1 - Plans and particulars to be submitted for approval

*The following changes to rows have been made:*

*Row 5, left column:* Structural drawings (gear housing) and connections to the tunnel or nozzle including material specification and NDT specification

*Row 12, left column:* Steering column including material specification and NDT specification



**Published July 2007****Sec.1 Page 5****Main changes Page 2**

*Under Sec.1 “Propellers”, the second list element has been replaced by:*

- Sub-section element B100: A correction in guidance note for fatigue testing of propeller materials has been performed.

*Table A1 has been updated as follows:*

| <b>Table A1 Documentation</b>                                     |   |                             |   |
|---|---|-----------------------------|---|
| <i>Application</i>  | <i>Documentation requirement</i>  | <i>Status <sup>5)</sup></i> | <i>Reference to design requirements</i>                               |
| Mono-block fixed pitch propellers                                 | Propeller drawing   | A                           | See Classification Note 41.5  |
| Built-up fixed pitch propellers and controllable pitch propellers | Blade drawing   | A                           | See Classification Note 41.5  |
|   | Drawing of blade fitting mechanism  | A                           | See B400  |
|   | Hub drawing   | A                           | See B300 and Classification Note 41.5                                 |
|   | Propeller assembly drawing  | I                           |   |
| Controllable pitch propellers                                     | Drawing of components in pitch control mechanism  | A                           | See B300 and Classification Note 41.5                                 |
|   | Hydraulic diagram <sup>1)</sup>   | A                           | See F300 and Ch.6 Sec.5 H100 of the Rules for Classification of Ships |
|   | Operation manual <sup>2)</sup>  | I                           | See E102  |
| All propellers  | Drawing of propeller fitting to shaft   | A                           | See Ch.4 Sec.1  |
|   | Installation manual <sup>3)</sup>   | UR                          |   |
|   | Documentation for the control and monitoring system, including set-points and delays. <sup>3)</sup> | A                           | See E100  |
| Free wheeling propeller   | Arrangement drawing of free wheeling propeller  | I                           | See F200  |

1) Including permissible operating servo pressures, specification of oil filter, and specification of minimum degree of oil cleanliness according to a recognised standard (for instance ISO 4406:1999 and ISO 16889:1999).  
2) Only in case pitch adjustment is used as load control of prime mover.  
3) Installation manual shall follow each delivery.  
4) For requirements to documentation types, see Ch.9.  
5) Status: For approval (A), For information (I), Upon request (UR).

**Sec.1 Page 8**

*Under C108, the list was updated with the following element:*

- for propellers running in nozzle or tunnel:  
extreme radius of blades (for controllable pitch propellers with outer section at zero pitch).

**403** System hydraulic oil to be in accordance with maker's specification.

**Pt.4 Ch.14****Published July 2008****Sec.1 Page 9**

*Item D101 has been updated as follows:*

**101** The complete propeller shall be statically balanced in accordance with specified ISO 484 tolerance class (or equivalent) in presence of a surveyor. Dynamic balancing may be required for propulsion propellers with tip speed exceeding 60 m/s. For built-up propellers, the required static balancing may be replaced by an individual control of blade weight and gravity centre position. The manufacturer shall demonstrate that the assembled propeller will be within the specified limits.

**Sec.1 Page 10**

*Item H301 has been replaced by:*

**301** For pitch marking, see C104.

*Item H400 Hydraulic piping has been amended as follows:*

**401** Pipes shall have a suitable location and be properly clamped. Inspection and testing shall be possible.

**402** The hydraulic system shall be flushed after assembly to a degree of cleanliness as specified by the maker.

**Sec.1 Page 12**

*In item B1115, the last paragraph has been replaced by:*

For single actuator steering gear intended for tankers of 10 000 gross tonnage and upwards, but less than 100 000 deadweight tons (see B802), A and B shall be according to Appendix A.

**Published January 2007****Sec.1 Page 18**

*In item C201 the last paragraph has been deleted and a new item C204 has been added as follows:*

**204** The control and monitoring systems for:

- steering gears

shall be certified according to Ch.9.

**Published July 2005****Sec.1 Page 5**

*In item A106, The unit for  $T_{des}$ , has been corrected to “kNm”.*

#### Sec.1 Page 7

In Table A1, the following next to last row has been added:

|   |    |  |
|---|----|--|
| Functional failure analysis of steering gear and control system | UR |  |
|---|----|--|

#### Sec.1 Page 8

In items B201 and B202, The text “bolts and keys” has been changed to “bolts, pins and keys”.

#### Sec.1 Page 8

In item B203, the last item has been changed as follows:

= 1.0 when calculating with additional load as described in 1108, or when calculating at internal test pressure,  $P_{test}$ , or bolts with significant pre stress.

#### Sec.1 Page 9, into force: July 2005

In item B401, the Guidance note concerning prediction and verification of manoeuvring capacity has been deleted.

#### Sec.1 Page 11

The reference in item B1107 has been corrected to: 1108-1118.

#### Sec.1 Page 14

In item B1203 i), a reference to 1207 has been added at the end of the definition of  $p_b$ .

#### Sec.1 Page 16

The reference in item B1207 has been corrected to: 103-105 and 1121.

#### Sec.1 Page 16

In item B1212, the variable “i” has been removed from the second equation as follows:

$$\sigma_p = \frac{S_c T - k_{key} T_{fr}}{\frac{d_m}{2} L_{eff} h_{eff}} 10^6 \quad [N/mm^2]$$

#### Sec.1 Page 17

Item B1301 has been amended as follows:

**1301** Suitable stopping arrangements, mechanically limiting the maximum rudder angle, shall be provided.

The stoppers may be an integrated part of the rudder actuator. In such case strength of stopper and relevant load carrying parts of actuator shall be evaluated for load from MTR. The load shall be distributed on active stoppers.

For calculation purposes the number of active stoppers shall not be taken higher than three. See also requirement for rudder angle limiter in E505.

#### Sec.1 Page 18

A new item B1406 has been added as follows:

**1406** Steering gear included under DP-control shall be provided with an arrangement enabling the measurement of wear of the vertical bearing.

#### Sec.1 Page 20

The rule reference in item E504 e) has been changed to: Ch.9 Sec.2 B and Sec.3 A204.

#### Sec.1 Page 21

Item E702 has been amended as follows:

**702** All alarms associated with steering gear faults are to be indicated on the navigating bridge and in machinery space. The alarm indicators on bridge shall be readily observable from main steering stand.

#### Sec.1 Page 21

In item E703, 5th line, the word “control” has been replaced by “indicating”.

#### Sec.1 Page 21

Table E1 has been replaced by a new table as follows:

| Table E1 – Control and monitoring of steering gear |                             |   |                                 |  |
|--|-----------------------------|---|---------------------------------|--|
| System/Item  | Gr 1<br>Indication<br>Alarm | Gr 2<br>Automatic start<br>of stand-by pump<br>with alarm | Gr 3<br>Shut down<br>with alarm | Comment  |
| <b>1.0 General</b>                                 |                             |   |                                 |  |
| Rudder position                                    | IR, IL                      |   |                                 | Local and on bridge  |
| Auto pilot   | A                           |   |                                 | Indication at bridge and machinery space for “running”.  |
| Hydraulic locking                                  | A                           |   |                                 | Shall identify failed system   |
| <b>Power actuating system</b>                      |                             |   |                                 |  |
| El. Power failure                                  | A                           |   |                                 | Indication at bridge and machinery space for “running”.  |
| El. Phase failure                                  | A                           |   |                                 |  |
| El. Motor overload                                 | A                           |   |                                 |  |
| Hydraulic oil - Temperature                        | HA, IL                      |   |                                 | Applies for steering gears under DP control only. Sensor shall normally be located in oil inlet to actuator. |
| <b>Hydraulic system oil tank</b>                   |                             |   |                                 |  |
| Hydraulic system oil tank Level                    | LA                          |   |                                 | 1)   |
| Storage tank level                                 | IL                          |   |                                 |  |
| <b>Steering gear control system</b>                |                             |   |                                 |  |
| Power failure                                      | A                           |   |                                 |  |

**Table E1 – Control and monitoring of steering gear (Continued)**

|  |    |  |             |
|--|----|--|-------------|
| Disconnection of bridge control  | IR |  |             |
| Control failure  | A  |  | See E504 e) |
| Gr 1 Sensor(s) for indication and alarm.<br>Gr 2 Sensor for automatic start of standby pump<br>Gr 3 Sensor for shut down<br><br>IL = Local indication (presentation of values), i. e. in vicinity of the monitored component<br>IR = Remote indication (presentation of values), i. e. on bridge or other manoeuvring stand<br>A = Alarm activated for logical value<br>LA = Alarm for low value<br>HA = Alarm for high value<br><br>1) Low level alarm in separate steering gear control system oil tanks may be substituted by low pressure alarm. It is provided that each of the systems is able to control the main steering gear alone, and that oil leakage in one system has no effect on the other one. |    |  |             |

**Pt.5 Ch.2****Published July 2009****Sec.2 Page 9, into force: January 2010**

The title of sub-section A300 now reads “Documentation requirements” and item A301 has been changed as follows:

**301** Documentation shall be submitted as required by Table A1.

**Table A1 Documentation requirements**

| Object                                | Documentation type              | Additional description  | For approval (AP) or For information (FI) |
|---------------------------------------|---------------------------------|---|---|
| Decks exposed to vehicles             | H020 – Design load plan         |   | FI  |
| Glass roofs                           | Z240 – Calculation report       | Strength calculations.  | FI  |
| Longitudinal and transverse bulkheads | C030 – Detailed drawing         | Connections between door frames and bulk-heads.   | FI  |
| Propulsion and steering               | Z070 – Failure mode description | The report shall be submitted prior to approval of detail design plans. See also IACS UR M69. | FI  |

In addition, a new item A302 has been inserted as follows:

**302** For a full definition of the documentation types, see Pt.0 Ch.3.

The subsequent item has been renumbered.

**Sec.4 Page 31, into force: July 2009**

In item C301 the formula for  $k_w$  has been corrected as follows:

$$k_w = 1.3 - \frac{4.2}{\left(\frac{a}{s} + 1.8\right)^2}$$

**Pt.5 Ch.4****Published July 2008****Sec.2 Page 11**

Item E101, the reference has been corrected to Pt.5 Ch.3 Sec.2 C500.

**Sec.3 Page 12, into force: July 2008**

A new item B104 has been added as follows:

**104** Except for **Ship type 1**, suction wells in cargo tanks may protrude into the double bottom below the boundary line defined by the distance given in 102 provided that such wells are as small as practicable and the protrusion below the inner bottom plating does not exceed 25% of the depth of the double bottom or 350 mm, whichever is less.

Where there is no double bottom, the protrusion of the suction well of independent tanks below the upper limit of bottom

damage shall not exceed 350 mm.

**Sec.11 Page 27, into force: January 2009**

In item B206, the last paragraph has been deleted and new items B207 and B208 have been inserted as follows:

**207** The foam concentrate shall be type approved, and delivered with a declaration of conformity and a declaration of the main characteristics (sedimentation, pH-value, expansion ratio, drainage time and volumetric mass and date of production).

**208** Alcohol resistant fluorine protein based foam concentrates is subjected to a chemical stability test with acetone before pouring into foam tank and a new chemical stability test after installation onboard (preferably as long as possible but not less than after 14 days after installation onboard).

**Guidance note:**

For test programme and requirements see Appendix A of Type Approval Program 474.65.

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

The subsequent items have been renumbered.

**Published January 2008****Sec.1 Page 10**

Item D302 and item D303 have been replaced by:

**302** The distance between the ship's shell plating (bottom and side) shall comply with the distances given in Sec.3 B102 for Ship type 2 and B103 for Ship type 3.

**303** Drainage sumps will be considered in each separate case.

### Published January 2007

#### Sec.11 Page 27, into force: January 2007

*Under item B206, the last paragraph has been replaced by:*

The foam concentrate shall be type approved, and delivered on board the vessel with a declaration of the main characteristics (sedimentation, pH-value, expansion ration, drainage time, volumetric mass and date of production).

#### Sec.15 Page 36

*Under item C703, list item 4), the second long dash list item (involving asbestos) has been removed.*

*The following paragraph has been added at the end of item C703:*

The use of asbestos is generally prohibited (see Pt.4 Ch.1 Sec.2 A200).

### Pt.5 Ch.5

### Published July 2009

#### Sec.5 Page 35, into force: January 2010

*In item H401, the paragraph following Table H3 has been changed to:*

Nominal stresses for the load condition A600 shall not exceed 70% of the values given in Table H1 to Table H3.

### Published January 2009

#### Sec.5 Page 31

*In item C105 a new Guidance note has been inserted as follows:*

##### Guidance note:

Methods for strength analysis of hull structure in liquefied gas carriers with membrane tanks are given in Classification Note No. 31.9.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

### Published July 2008

#### Sec.14 Page 66

*In item A102, a new guidance note has been added as follows:*

##### Guidance note:

For LNG Carriers the performance of the cargo system should be verified during first loading and discharging, ref. IGC Code 4.10.14 and IACS Unified Interpretation GC 13 (Jan 2008) "Examination before and after the first loaded voyage".

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

#### Sec.16 Page 74, into force: January 2009

*In item C103, the Guidance note has been replaced by:*

##### Guidance note:

To demonstrate acceptability of dual fuel of gas only operation during manoeuvring, testing under varying loads should be carried out.

The details of the testing will depend on the design and functionality of the combustion control and burner management system.

As a guide, the following manoeuvring tests may be considered:

- From full ahead and "gas-only" or "dual fuel" mode, reduce stepwise to a load just above the auto change over limit to fuel only, and run at this load for approximately 3 min.
- Increase stepwise to full ahead.

- From full ahead, reduce directly to a load just above the limit for auto transfer to "fuel-only" and run at this load for approximately 3 min.
- Increase again directly to full ahead.
- From full ahead and "gas only" operation reduced stepwise to stop.
- Check auto transfer to dual fuel as applicable.
- After approximately 3 minutes stop, go to slow astern and increase stepwise to half astern.
- Run for approximately 3 minutes and then to stop.
- After 3 minutes stop, go direct to half ahead.

In addition to the above manoeuvring tests, demonstrations of auto transfer "gas only" to "dual fuel" and from "dual fuel" to "oil only" for various fault conditions should be carried out.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

### Pt.5 Ch.6

### Published January 2009

#### Sec.6 Page 15

*In item B101, the reference to Pt.3 Ch.2 Sec.11 has been changed to Pt.3 Ch.3 Sec.6.*

### Published January 2007

#### Sec.1 Page 7

*In item G101, the reference to Pt.4 Ch.10 has been changed to Pt.4 Ch.10 Sec.2.*

#### Sec.1 Page 8

*Item G201 has been replaced by:*

**201** Fire pumps and water distribution systems shall comply with the requirements in SOLAS Ch. II-2 for cargo ships.

*Item G301 has been replaced by:*

**301** The arrangement of fire protection and fire-extinguishing appliances in machinery spaces shall comply with the requirements in SOLAS Ch. II-2 for cargo ships.

*Item G401 has been replaced by:*

**401** Fishing vessels shall be provided with at least two sets of firefighter's outfits.

*Item G501 has been replaced by:*

**501** Structural fire protection shall comply with the requirements in SOLAS Ch. II-2 for cargo ships.

*Item G601 has been replaced by:*

**601** Portable fire extinguishers shall be provided in accordance with the requirements in SOLAS Ch. II-2 for cargo ships.

### Published July 2006

#### Sec.5 Page 14

*In item A102, third paragraph, the reference to Pt.3 Ch.3 Sec.11 has been changed to Pt.3 Ch.3 Sec.10.*

### Published July 2004

#### Sec.1 Page 7, into force: January 2005

*Under item G101, replace the reference Pt.3 Ch.3 Sec.10 H with:*

Pt.4 Ch.10.

**Sec.5 Page 14, into force: January 2005**

*Under item A102 2nd paragraph, replace the reference Pt.3 Ch.3 Sec.12 C100 with:*

Pt.3 Ch.3 Sec.11 C100.

**Published January 2004**

**Sec.1 Page 5, into force: July 2004**

*Replace item C103 with:*

**103** The monitoring system for the bilge wells shall be approved by the Society.

For requirements for documentation, see Pt.4 Ch.9.

**Pt.5 Ch.8**

**Published January 2004**

**Sec.1 Page 5, into force: July 2004**

*Replace item A302 with:*

**302** The following control and monitoring systems shall be approved by the Society:

- oil separating system
- fire extinguishing system
- fire detection system
- inert gas system.

For requirements for documentation, see Pt.4 Ch.9.

*Insert the new sub-section element A400:*

**A400 Certification control and monitoring system**

**401** The following control and monitoring system shall be certified according to Pt.4 Ch.9:

- oil separating system
- fire detection system
- inert gas system.

**Pt.5 Ch.10**

**Published January 2008**

**Sec.2 Page 7**

*In item B101, the reference in the second bullet point has been replaced by: Pt.2 Ch.2 Sec.4 B.*

**Pt.5 Ch.11**

**Published January 2009**

**Sec.2 Page 10**

*Item B801 has been replaced by:*

**801** Two portable fire extinguishers, each having a capacity of not less than 6 kg of dry powder or equivalent, should be provided when dangerous goods are carried on the weather deck, in open ro-ro spaces and vehicle spaces, and in cargo spaces as appropriate.

(MSC.1/1275)

These extinguishers are in addition to any portable fire extinguishers required elsewhere in the rules.

**Pt.5 Ch.12**

**Published July 2009**

**Sec.3 Page 11, into force: July 2009**

*Item A310 has been amended and now reads:*

**310** *Air temperature control span:* A measure of the temperature interval of which each designated space is able to satisfy. Each designated space should be able to change from the lower to the higher temperature within two hours. However for special areas, this temperature control span time criteria may be evaluated separately.

**Sec.3 Page 12, into force: July 2009**

*Table B2 has been amended and now reads:*

| <b>Table B2 Air properties and quality at different localities and comfort standard</b> |                       |  |                          |                      |  |                      |                                   |                                     |
|---|-----------------------|--|--------------------------|----------------------|--|----------------------|-----------------------------------|-------------------------------------|
| Designated space type   | Comfort rating number | Minimum air temperature control span <sup>1)</sup> |                          | Maximum air velocity | Minimum fresh air supply quantity per person <sup>2)</sup> |                      | Vertical air temperature gradient | Relative humidity -RH <sup>3)</sup> |
|   | (crn)                 | 10°C and below (outside)                           | 45°C and above (outside) |                      |  |                      |                                   |                                     |
|   |                       | Min./Max. limit (°C)                               | Min./Max. limit (°C)     | m/s                  | litres/s   | m <sup>3</sup> /hour | °C                                | %                                   |
| A   | <b>1</b>              | 18 - 24  | 22 - 28                  | 0.25                 | 10   | 36.0                 | 2.0                               | 30 - 60                             |
|   | <b>2</b>              | 19.5 - 24  | 23.5 - 28                | 0.35                 | 9  | 32.4                 | 2.5                               | 20 - 60                             |
|   | <b>3</b>              | 21 - 24  | 25 - 28                  | 0.40                 | 8  | 28.8                 | 3.0                               | < 65                                |
| B   | <b>1</b>              | 18 - 24  | 22 - 28                  | 0.15                 | 12   | 43.2                 | 2.0                               | 30 - 60                             |
|   | <b>2</b>              | 19.5 - 24  | 23.5 - 28                | 0.25                 | 10   | 36.0                 | 2.5                               | 20 - 60                             |
|   | <b>3</b>              | 21 - 24  | 25 - 28                  | 0.35                 | 8  | 28.8                 | 3.0                               | < 65                                |
| C   | <b>1</b>              | 20 - 24  | 23 - 28                  | 0.20                 | 10   | 36.0                 | 2.0                               | 30 - 60                             |
|   | <b>2</b>              | 21 - 24  | 24 - 28                  | 0.25                 | 9  | 32.4                 | 3.0                               | 20 - 60                             |
|   | <b>3</b>              | 22 - 24  | 25 - 28                  | 0.35                 | 8  | 28.8                 | 3.5                               | < 65                                |
| D   | <b>1</b>              | 20 - 24  | 23 - 28                  | 0.25                 | 10   | 36.0                 | 2.0                               | 30 - 60                             |
|   | <b>2</b>              | 21 - 24  | 24 - 28                  | 0.30                 | 9  | 32.4                 | 3.0                               | 20 - 60                             |
|   | <b>3</b>              | 22 - 24  | 25 - 28                  | 0.40                 | 8  | 28.8                 | 3.5                               | < 65                                |

1) For outside temperatures between 10°C and 45°C, the control span is to comply with the graphs shown in figs. 1 and 2

2) The number of persons to be considered for cabins is normally the number of beds. For special cabins this may be disregarded. The reason for the deviations is to be documented. The number of persons to be considered in public spaces is the same as the location is designed for.

3) Any relative humidity is to be within the range for all outdoor conditions the HVAC system is designed for. It is not necessary to meet the whole range during the specified design condition.

Sec.3 Page 13, into force: July 2009  
*Figures 1 and 2 have been amended and now reads as follows:*

**Temperature control span, designated space type A and B**

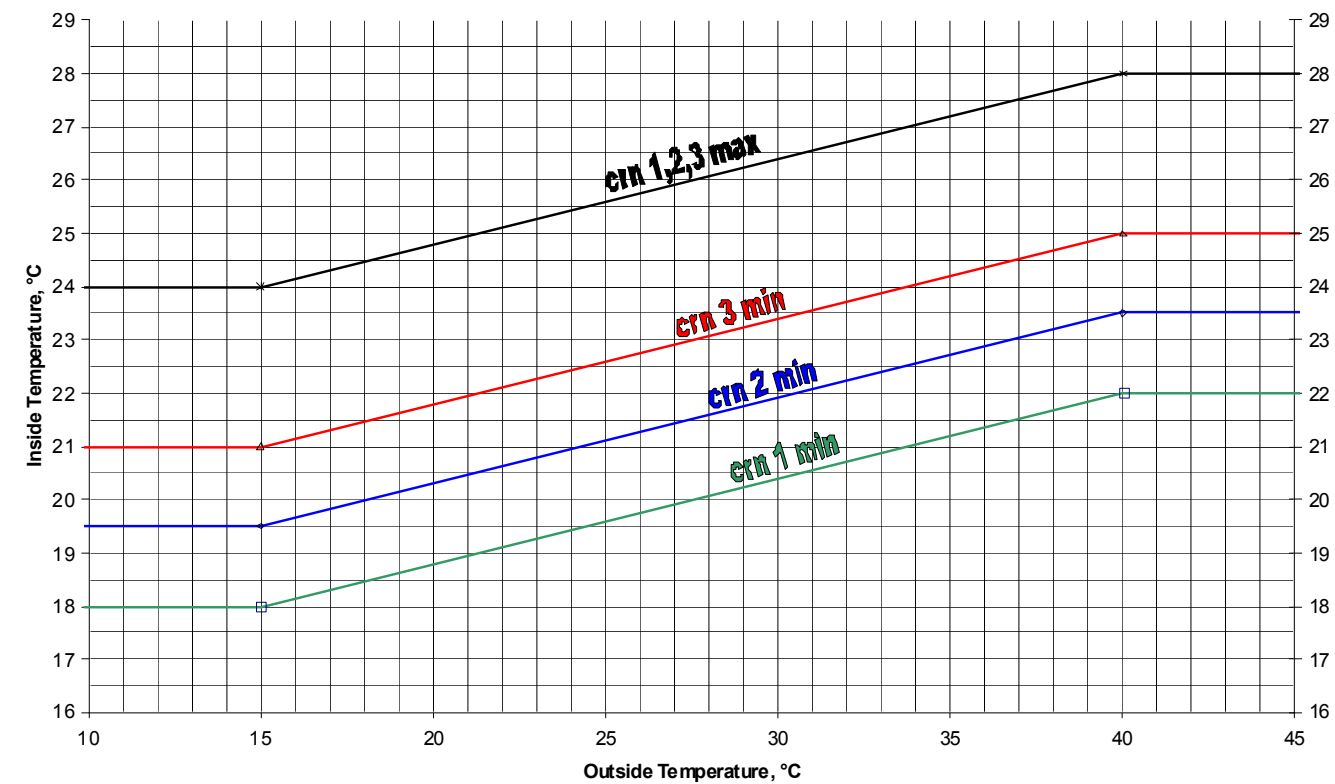


Fig. 1

**Temperature control span, designated space type C and D.**

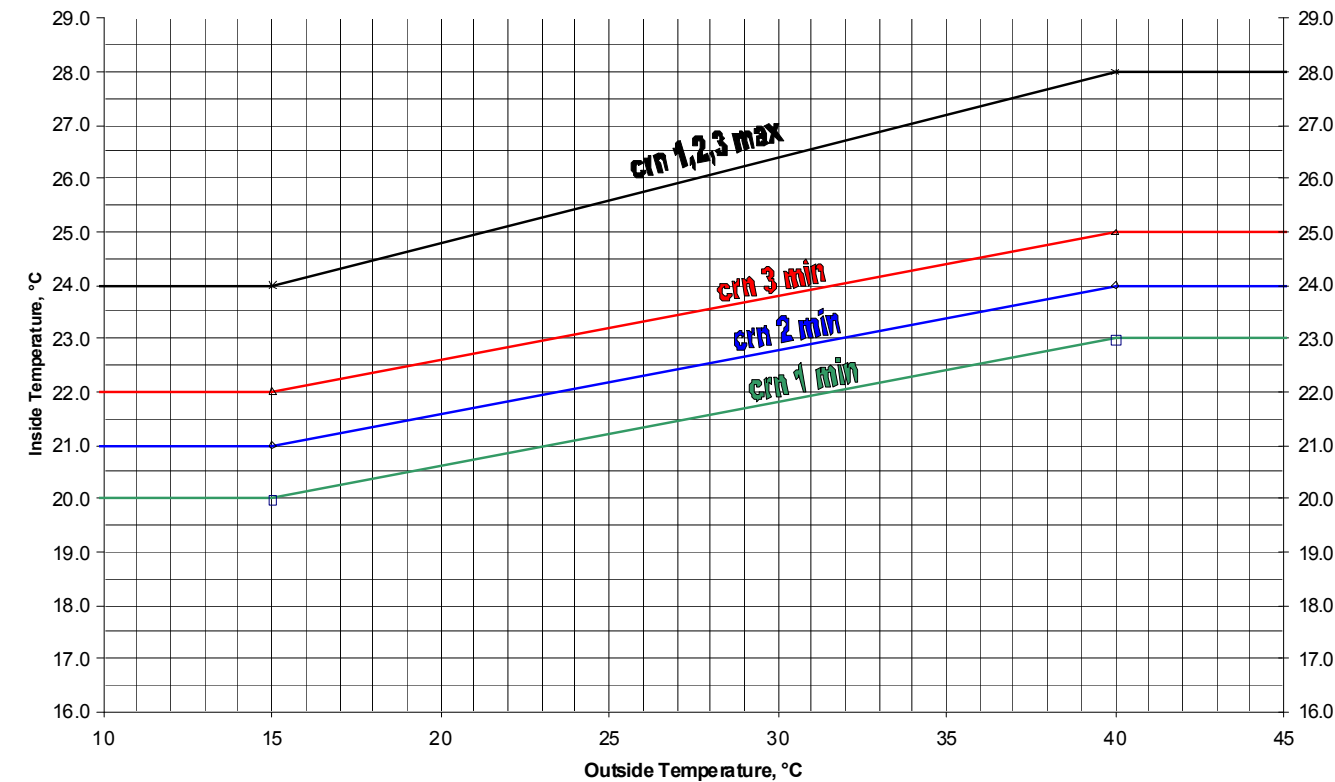


Fig. 2

**Sec.3 Page 14, into force: July 2009**

*Under item C201, the “n - values” have been changed as follows:*

|                         |  |
|-------------------------|--|
| For $n < 10$            | Measurements in all cabins             |
| For $10 \leq n \leq 40$ | Measurements in min.10 cabins          |
| For $n \geq 41$         | Measurements in min.25% of all cabins. |

**Pt.5 Ch.13**

**Published January 2004**

**Sec.1 Page 5, into force: July 2004**

*Replace item B103 with:*

**103** The following control and monitoring system shall be approved by the Society:

— water quality instrument.

For requirements for documentation, see Pt.4 Ch.9.

*Delete Table B1.*

**Pt.5 Ch.14**

**Published January 2009**

**Sec.12 Page 52, into force: January 2009**

*Item J203 has been replaced by:*

**203** A minimum of 1 rescue boat shall be provided. The rescue boat shall meet the requirement in the LSA Code as amended for fast rescue boats. The Society may exempt from the requirement to carry a fast rescue boat if it considers the vessel's manoeuvrability makes it possible to retrieve a person over board with a rescue boat as specified in the LSA Code.

**Published July 2008**

**Sec.11 Page 45**

*In item A206, the reference to Pt.0 Ch.3 has been corrected to Pt.0 Ch.6.*

*In item B303, the reference to Pt.0 Ch.3 has been corrected to Pt.0 Ch.6.*

**Pt.6 Ch.2**

**Published July 2006**

**Sec.2 Page 7, into force: January 2007**

*Item C401 has been replaced by:*

**401** Cooling water systems for **RP** and **RPS** notations shall comply with main class rules, while also taking into consideration the requirements for component redundancy as given in A200.

For vessels with class notation **Passenger ship** or **Ferry** notation, sea water suction shall be arranged from separate sea chests located in the bottom of the ship, in addition to a high sea chest located at one side.

The two low sea chests shall have separate ventilation arrangements.

*(The amendment concerning C401 published in January 2006 has been replaced by the above amendment.)*

**Pt.6 Ch.4**

**Published January 2007**

**Sec.3 Page 11**

*Item G101 has been replaced by:*

**101** Only approved 12 kg powder or 9 l foam portable extinguishers shall be installed in the category A machinery spaces.

**Pt.6 Ch.8**

**Published July 2008**

**Sec.8 Page 45**

*In the Guidance note in item C101, the reference to IMO Resolution A.605(15), Appendix 1, has been corrected to:*

A.601(15), Appendix 1.

**Published January 2008**

**Sec.3 Page 24, into force: January 2008**

*Item A101 has been replaced by:*

**101** Ships requesting class notation **NAUT-OC** or **NAUT-AW** shall comply with the rules in this section.

**Published July 2007**

**Sec.6 Page 39**

*In item I201, a new list item has been inserted in the second list:*

— heading and/or track control

**Published July 2006**

**Sec.4 Page 30**

*In Table C1, second last row, the reference to Pt.3 Ch.3 Sec.11 has been changed to Pt.3 Ch.3 Sec.10.*

**Sec.6 Page 40**

*In item J201, item J202, and item J203, the reference to Pt.3 Ch.3 Sec.11 has been changed to Pt.3 Ch.3 Sec.10.*

**Published July 2005**

**Sec.4 Page 28, into force: July 2005**

*Sub-section element B1400 has been deleted.*

**Sec.4 Page 30**

*In Table C1, the last row has been deleted.*

**Pt.6 Ch.9**

**Published July 2008**

**Sec.1 Page 5**

*Item A207 has been replaced by:*

**207** On-line loading computers shall, if connected to the ship's network, comply with the requirements of Pt.4 Ch.9 Sec.4 for computer based systems.

**Published January 2007**

**Sec.3 Page 12, into force: January 2007**

*In item A206 the last sentence has been deleted and item A208 has been deleted in its entirety. The subsequent items have been re-numbered accordingly.*

**Published July 2005**

**Sec.1 Page 5, into force: July 2005**

*Sub-section element A100 has been replaced by:  
(A101 and A102 first paragraph, A103 and A104 are unchanged)*

**A 100 Application**

**101** A loading computer system is a computer based system for calculation and control of loading conditions for compliance with the applicable stability requirements and longitudinal and local strength requirements. The loading computer system consists of software (calculation program) and the computer (hardware) on which it runs.

**Guidance note:**

The DNV expression "loading computer system" covers the IACS expression "Loading instrument", and the IACS definition thereof: "A loading instrument is an instrument, which unless stated otherwise is digital, by means of which it can be easily and quickly ascertained that, at specified read-out points, the still water bending moments, shear forces, and the still water torsion moments and lateral loads, where applicable, in any load or ballast condition will not exceed the specified permissible values."

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

**102** The requirements of this chapter apply to ships equipped with a loading computer system.

**103** Ships for which a loading computer system calculating hull strength is required, is defined in Pt.3 Ch.1 Sec.5, subsections A and F, and in Pt.3 Ch.2 Sec.4 E.

**104** The stability software, if installed onboard, shall cover all stability requirements applicable to the ship, except as given in 105.

**105** For installations onboard ships contracted prior to 2005-07-01 the following apply:

If the loading computer system does not check all the stability requirements as applicable for the ship and cargo type, the users are to be informed accordingly. The requirements not checked are to be displayed on the screen for the actual loading condition, and to be included when printouts are made.

(IACS UR L5)

**Pt.6 Ch.10**

**Published July 2007**

**Sec.3 Page 7**

*In item B202, "and" has been replaced by "an" in the third line from the bottom of the last list item.*

**Published January 2004**

**Sec.1 Page 5, into force: July 2004**

*Replace item C102 with:*

**102** The following control and monitoring systems shall be approved by the Society:

- cargo tank level monitoring system
- vapour Pressure monitoring system.

For requirements for documentation, see Pt.4 Ch.9.

**Published July 2003**

**Sec.1 Page 5**

*In item A202 the text concerning class notation **VCS** (vapour control systems) has been amended as follows:*

**202** Ships meeting requirements for vapour balancing according to Sec.4 will have the letter **B** added to the **VCS-1** or **VCS-2** class notations.

**Pt.6 Ch.11**

**Published January 2008**

**Sec.3 Page 13**

*In Table F1, in the row covering "Double bottom bending", the text of the remarks column has been replaced by:*

- 7 For Bulk Carriers with class notation **BC-B**, **BC-A** or **BC-B\***, one strain sensor in inner bottom of each hold.

**Pt.6 Ch.12**

**Published July 2009**

**General, into force: July 2009**

*Throughout the chapter, the wording "IACS member society" has been changed to "recognized classification society".*

**Pt.6 Ch.15**

**Published July 2006**

**Sec.1 Page 5, into force: January 2007**

*In item A103, first paragraph, both references have been replaced by: Pt.7 Ch.1 Sec.4 C. In the Guidance note the reference has been changed to: Pt.7 Ch.1 Sec.8 C.*

**Published July 2005**

**Sec.2 Page 7, into force: July 2005**

*Table C3 and Table C4 have been replaced by:*

| Table C3 Diesel engines > 200 rpm   |                     |
|---|---------------------|
| Velocity  |                     |
| 4 – 200 Hz  |                     |
| Firmly mounted  | Resiliently mounted |
| 15 mm/s   | 25 mm/s             |
| To be measured on the engine block top and bottom. 20% overshoot of the above criteria allowed for non continuous running in the operating speed range. |                     |

| Table C4 Turbochargers   |          |              |
|--|----------|--------------|
| 4 – 200 Hz   |          |              |
| Total combined power from cylinder group serving one turbocharger  | Velocity | Acceleration |
| Below 5 MW   | 45 mm/s  | 2.5 g        |
| 5 - 10 MW  | 50 mm/s  | 2.0 g        |
| Above 10 MW  | 55 mm/s  | 1.5 g        |
| To be measured at the top of compressor casing. 20% overshoot of the above criteria allowed for non continuous running in the operating speed range. |          |              |



*In Table C9, the title has been changed to:*

**Table C9 Electric motors, separators, motor driven hydraulic pumps, fans not installed on reciprocating engines**

**Pt.6 Ch.18**

**Published January 2007**

**Sec.1 Page 5, into force: January 2007**

*Item A201 and item A202 have been replaced by:*

**201** Vessels complying with the requirements in this chapter may be given one or combinations of the additional class notations:

|                   |  |
|-------------------|--|
| <b>BWM-E ( )</b>  | Ballast water exchange, where the letter(s) in the bracket denote the method for exchange that has been applied, see 202.                                  |
| <b>BWM-EP ( )</b> | Ballast water enhanced exchange-performance, where the letter(s) in the bracket denote the method for exchange that has been applied, see 202 and Sec.3 E. |
| <b>BWM-T</b>      | Ballast water treatment.   |
| <b>BWM-TP</b>     | Ballast water treatment (prototype).   |

**202** The class notations **BWM-E ( )** and **BWM-EP ( )** are applicable to vessels complying with the Convention by means of ballast water exchange. The exchange of the ballast water could take place either by the sequential method, dilution method or by the flow through method. The applied method is indicated by the letters in the bracket:

|          |   |
|----------|---|
| <b>d</b> | for dilution method                       |
| <b>s</b> | for sequential method                     |
| <b>f</b> | for flow-through method (see Sec.3 E103). |

*Under item C102, the second Guidance note has been replaced by:*

**Guidance note 2:**

For details on sampling points refer to the Guideline for ballast water sampling.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

*Item C104 has been replaced by:*

**104** For vessels with the notation **BWM-EP ( )** the following additional documentation shall be submitted:

*For approval:*

- Arrangement of Ballast Water overflow system, if applicable.

*Under item C105, the Guidance note has been replaced by:*

**Guidance note:**

A Certificate of type Approval should be in the format shown in the Guidelines for Approval of Ballast Water Management Systems.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

**Sec.1 Page 6, into force: January 2007**

*Under item C106, the last list item has been replaced by:*

- Copy of Statement of Compliance issued by Administration confirming that the vessel has a Prototype Ballast Water Treatment Technologies Programme in accordance with the Guidelines for Approval and Oversight of Prototype Ballast Water Treatment Technology Programmes.

**Sec.3 Page 8, into force: January 2007**

*The section title has been changed to:*

**CLASS NOTATION BWM-E ( ) AND BWM-EP ( )**

*Under item A101, the Guidance note has been replaced by:*

**Guidance note:**

The class notations **BWM-E ( )** and **BWM-EP ( )** will be withdrawn when the ballast water exchange has been phased out.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

*Item B203, sub-section element B400 and item B701 have been deleted. Subsequent items have been re-numbered.*

**Sec.3 Page 9, into force: January 2007**

*Under item C102, the first paragraph has been replaced by:*

The flow-through method with water flowing over the deck is not permitted for ships with class notations referred to in Pt.5 Ch.1 Sec.3 to Sec.6 and Ch.1 Sec.5.

*Item D101 has been deleted. The subsequent item has been re-numbered.*

*A new sub-section E has been added as follows:*

## **E. Additional requirements for Class Notation BWM-EP ( )**

### **General**

**101** On ships classed for navigation in ice according to Pt.5 Ch.1 Sec.3 and Sec.6, ship side ballast discharge valves placed above the assigned lightest load line shall be arranged with adequate heating arrangements

**102** For class notation **BWM-EP (s)** for sequential method, the capacity of each ballast pump is, in general, to be capable of providing ballast water exchange of the largest dedicated ballast water tank or group of tanks that are undergoing simultaneous exchange (whichever is the greater volume), as per the approved BWM plan, within three hours.

**Guidance note:**

In special cases with large ballast water tanks/spaces the duration may be considered from case to case taking into account the duration of the ballast water exchange process, provided the whole ballast water exchange process is shorter than 24 hours.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

For cargo holds used for the carriage of water ballast will require an extended period of time and is normally to be completed within twenty four hours by one pump.

**103** The flow-through method with water flowing over the deck is not permitted for ships with class notation **BWM-EP (f)**

**Guidance note:**

The use of collecting pipes, internal overflow pipes or interconnecting pipe/trunk arrangements between tanks may be used to avoid water flowing over the deck.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

**104** For class notation **BWM-EP (d)** for dilution method, arrangements shall be made to automatically maintaining the ballast water level in the tanks at a constant level. These arrangements shall include the provision of a manual emergency stop for any operating ballast pump, in case of valve malfunction or incorrect control actions.

## Pt.6 Ch.19

Published July 2006

### Sec.1 Page 5

*The Guidance note in item A102 has been changed to:*

**Guidance note:**

Accordingly it is not intended that the ship may leave harbour without doing repair work after any single failure, except in emergency.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

## Pt.6 Ch.20

Published July 2008

### Sec.1 Page 7

*In item C163, the term “supply vessels” has been replaced by “service vessels”.*

Published January 2008

### Sec.3 Page 27, into force: January 2008

*A new paragraph has been added to F207 as follows:*

The total arc of blind sectors within the required 180° field of vision at the workstation for offshore operations shall not exceed 20°.

## Pt.6 Ch.21

Published July 2009

### Sec.1 Page 5, into force: July 2009

*In item A102, Guidance note, the wording “an IACS member society” has been changed to “a recognized classification society”.*

## Pt.7 Ch.2

Published July 2009

### Sec.2 Page 22, into force: January 2010

*Item B102 has been changed to:*

**102** The requirements shall, at the latest, be complied with as follows:

- for ships which will be 15 years of age or more on 1 January 2004 by the due date of the first intermediate or renewal survey after that date
- for ships which will be 10 years of age or more on 1 January 2004 by the due date of the first renewal survey after that date
- for ships which will be less than 10 years of age on 1 January 2004 by the date on which the ship reaches 10 years of age.

(IACS UR S26 and S27)

Published January 2008

### Sec.1 Page 16, into force: July 2008

*In item F203b), a new paragraph has been added at the end:*

The value of  $t_m$  shall be based on Zone B according to IACS URZ10.2, Annex V, see Fig.12.

*Item F207 has been replaced by:*

### **207** Bending check criteria for frames and brackets

When lower end brackets were not fitted with flanges at the design stage, flanges shall be fitted so as to meet the bending strength requirements in 305. The full width of the bracket flange shall extend up and beyond the point at which the frame flange reaches full width. Adequate back-up structure in the hopper shall be ensured, and the bracket shall be aligned with the bracket structure.

Where the length or depth of the lower bracket does not meet the requirements in the Society's rules from July 1998 to January 2003 (IACS UR S12 Rev.3), a bending strength check in accordance with 305 shall be carried out and renewals or reinforcements of frames and/or brackets effected as required therein.

The bending check need not to be carried out in the case the bracket geometry is modified so as to comply with Pt.5 Ch.2 Sec.8 (IACS URS12 Rev.3).

*In item F208, the following new paragraph has been inserted (as fourth paragraph):*

When zone B is made up of different plate thicknesses, the requirements shall be based on the lesser thickness.

### Sec.1 Page 17, into force: July 2008

*A new item F213 has been added as follows:*

### **213** Renewal of damaged frames

In case of renewal of a damaged frame already complying with these rules (IACS URS31), the following requirements apply:

- The conditions accepted in compliance with these rules shall, as a minimum, be restored.
- For localised damage, the extension of the renewal shall be carried out according to the standard practice of the individual classification society.

*In item F302, the following new paragraph and related list have been inserted (as second paragraph):*

The following loading conditions shall be considered:

- Homogeneous heavy cargo (density greater than 1.78 t/m<sup>3</sup>)
- Homogeneous light cargo (density less than 1.78 t/m<sup>3</sup>)
- Non homogeneous heavy cargo, if allowed
- Multi port loading/unloading conditions need not to be considered.

## SECTION 4 SYSTEMATIC INDEX

### A. Introduction

#### A 100 General

**101** This master index has been prepared for the complete Rules for Classification of Ships in the form of a systematic index. The systematic index gives reference to sections and sub-sections within each part and chapter.

### B. Systematic index

#### B 100 General

**101** The systematic index has been corrected for the amendments and corrections mentioned in Sec.3.

**102** The current systematic index is as follows:

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- Discipline J – Marine operations
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- G. Stainless Steel Castings

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- B. Definitions
- C. Documentation

#### **Sec. 2 Requirements for Builders of Ship Structures**

- A. General
- B. Survey Arrangement
- C. Workmanship and Supervision

#### **Sec. 3 Qualification of Welders**

- A. General
- B. Qualification testing and certification

#### **Sec. 4 Welding Consumables**

- A. General

#### **Sec. 5 Welding Procedures**

- A. General
- B. Welding Procedure Specification
- C. Welding Procedure Test Assembly and Sampling of Test Pieces
- D. Non Destructive Testing of Test Assemblies
- E. Destructive Testing
- F. Validity of Approved Welding Procedures
- G. Additional Requirements WPQT for Liquefied Gas Systems
- H. Additional Requirements WPQT for Ferritic-Austenitic Stainless Steel
- I. Additional Requirements WPQT for Austenitic Stainless Steel
- J. Welding procedures for aluminium
- K. Testing

#### **Sec. 6 Fabrication and Tolerances**

- A. General
- B. Material Identification
- C. Approval of Shop Primers
- D. Welding Environment
- E. Cutting, Forming, Assembly and Welding
- F. Repairs
- G. Inspection and Tolerances

#### **Sec. 7 Non Destructive Testing of Welds**

- A. General
- B. NDT Procedures
- C. Personnel Qualifications
- D. Extent of NDT
- E. Acceptance Criteria for NDT

#### **Sec. 8 Structural and Tightness Testing**

- A. General
- B. Testing

## **PART 3 CHAPTER 1**

### **Hull Structural Design Ships with Length 100 Metres and above**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Ships Built for In-Water Survey of the Ship's Bottom and Related Items

#### **Sec. 2 Materials**

- A. General
- B. Hull Structure Steel
- C. Alternative Structural Materials
- D. Corrosion Additions for Steel Ships

#### **Sec. 3 Design Principles**

- A. Subdivision and Arrangement
- B. Structural Design Principles
- C. Local Design

#### **Sec. 4 Design Loads**

- A. General
- B. Ship Motions and Accelerations
- C. Pressures and Forces

#### **Sec. 5 Longitudinal Strength**

- A. General
- B. Still Water and Wave Induced Hull Girder Bending Moments and Shear Forces
- C. Bending Strength and Stiffness
- D. Shear Strength
- E. Openings in Longitudinal Strength Members
- F. Loading Guidance Information

#### **Sec. 6 Bottom Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Arrangement of Double Bottom
- E. Double Bottom Girder System below Cargo Holds and Tanks
- F. Single Bottom Girders
- G. Girders in Peaks
- H. Special Requirements

#### **Sec. 7 Side Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Girders
- E. Special Requirements

#### **Sec. 8 Deck Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Girders
- E. Special Requirements

#### **Sec. 9 Bulkhead Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Girders
- E. Special Requirements

#### **Sec. 10 Superstructure Ends, Deckhouse Sides and Ends, Bulwarks**

- A. General
- B. Structural Arrangement and Details
- C. Design Loads
- D. Scantlings

#### **Sec. 11 Welding and Weld Connections**

- A. General
- B. Types of Welded Joints
- C. Size of Weld Connections

#### **Sec. 12 Direct Strength Calculations**

- A. General
- B. Calculation Methods
- C. Global Analysis
- D. Cargo Hold or Tank Analysis
- E. Frame and Girder Analysis
- F. Local Structure Analysis

#### **Sec. 13 Buckling Control**

- A. General
- B. Plating
- C. Stiffeners and Pillars

#### **Sec. 14 Structures for High Temperature Cargo**

- A. General
- B. Materials and Material Protection
- C. Ship Arrangement
- D. Load Conditions
- E. Scantlings of the Cargo area
- F. Type of Cargoes

#### **Sec. 15 Special Requirements - Additional Class**

- A. General
- B. Class Notation **NAUTICUS (Newbuilding)**
- C. Class Notation **PLUS**
- D. Class Notation **COAT-1** and **COAT-2**
- E. Class Notation **CSA-FLS** and **CSA-2**
- F. Class Notation **COAT-PSPC(X)**

#### **Sec. 16 Fatigue Control**

- A. General

#### **App. A Elastic Buckling and Ultimate Strength**

- A. Introduction
- B. Calculation Procedure

## **PART 3 CHAPTER 2**

### **Hull Structural Design Ships with Length less than 100 Metres**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation

#### **Sec. 2 Materials**

- A. General
- B. Hull Structure Steel
- C. Alternative Structural Materials
- D. Corrosion Additions for Steel Ships

#### **Sec. 3 Design Principles**

- A. Subdivision and Arrangement
- B. Structural Design Principles
- C. Local Design

#### **Sec. 4 Longitudinal Strength**

- A. General
- B. Vertical Bending Moments
- C. Bending Strength and Stiffness
- D. Openings in Longitudinal Strength Members
- E. Loading Guidance Information

#### **Sec. 5 Bottom Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Arrangement of Double Bottom
- E. Single Bottom Girders
- F. Peak Tank Girders

G. Special Requirements

**Sec. 6 Side Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Girders
- E. Special Requirements

**Sec. 7 Deck Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Girders
- E. Special Requirements

**Sec. 8 Bulkhead Structures**

- A. General
- B. Design Loads
- C. Plating and Stiffeners
- D. Girders
- E. Special Requirements

**Sec. 9 Pillars and Supporting Bulkheads**

- A. General

**Sec. 10 Superstructure Ends, Deckhouse Sides and Ends, Bulwarks**

- A. General
- B. Structural Arrangement and Details
- C. Design Loads
- D. Scantlings

**Sec. 11 Welding and Weld Connections**

- A. General
- B. Types of Welded Joints
- C. Size of Weld Connections

**Sec. 12 Buckling Control**

- A. General
- B. Plating Subject to Longitudinal Compressive Bending Stresses
- C. Deck Plating Acting as Effective Flange for Deck Girders
- D. Longitudinals Subject to Longitudinal Compressive Stresses

**App. A Approximate Calculations**

- A. Stillwater Bending Moment for Hull Girder

**App. B Diagrams of Section Moduli and Moments of Inertia**

- A. Built Sections (Diagram A)
- B. Built Sections Nomogram (Diagram B)
- C. Flat Bars, Angles and Bulbs (Diagram C and Table C1)
- D. Corrugated Bulkhead (Diagram D)
- E. Swedged Plating (Diagram E)

**PART 3 CHAPTER 3**

**Hull Equipment and Safety**

**Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation

**Sec. 2 Sternframes, Rudders and Steering**

- A. General
- B. Materials
- C. Arrangement and Details
- D. Design Loads and Stress Analysis
- E. Sternframes and Rudder Horns
- F. Rudders
- G. Rudder Stocks and Shafts

- H. Propeller Nozzles
- I. Propeller Shaft Brackets
- J. Testing

**Sec. 3 Anchoring and Mooring Equipment**

- A. General
- B. Structural Arrangement for Anchoring Equipment
- C. Equipment Specification
- D. Anchors
- E. Anchor Chain Cables
- F. Windlass and Chain Stoppers
- G. Towlines and Mooring Lines

**Sec. 4 Masts and Rigging**

- A. General
- B. Materials and Welding
- C. Arrangement and Support
- D. Design and Scantlings

**Sec. 5 Foundations for Deck Machinery, Towing Equipment and Lifting Appliances**

- A. Crane and Lifting Appliances
- B. Foundations for Winches, Windlasses and other Pulling Accessories
- C. Shipboard Fittings and Supporting Hull Structures Associated with Towing and Mooring on Conventional Vessels

**Sec. 6 Openings and Closing Appliances**

- A. General
- B. Access Openings in Superstructures and Freeboard Deck
- C. Side and Stern Doors
- D. Hatchway Coamings
- E. Hatch Covers
- F. Hatchway Tightness Arrangement and Closing Devices
- G. Internal Doors and Hatches for Watertight Integrity
- H. Ventilators
- I. Tank Access, Ullage and Ventilation Openings
- J. Machinery Space Openings
- K. Scuppers, Inlets and Discharges
- L. Side Scuttles, Windows and Skylights
- M. Freeing Ports
- N. Special Requirements for Type A Ships
- O. Retractable Bottom Equipment
- P. Box Coolers

**Sec. 7 Corrosion Prevention**

- A. General
- B. Corrosion prevention systems

**Sec. 8 Protection of the Crew**

- A. Protection of the Crew

**Sec. 9 Stability**

- A. Application, Definitions and Document Requirements
- B. Surveys and Tests
- C. General Requirements
- D. Intact Stability Criteria
- E. Damage Stability
- F. Determination of Lightweight Data

**Sec. 10 Internal Communication**

- A. General Requirements
- B. Ship Requirements - Main Class Cargo Ship and Passenger Vessels
- C. Ship Requirements - Additional Class

**PART 4 CHAPTER 1**

**Machinery Systems, General**

**Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Certification

## **Sec. 2 Materials**

### **A. General**

## **Sec. 3 Design Principles**

- A. Arrangement
- B. Construction and Function
- C. Reliability and Availability
- D. Personnel Protection

## **Sec. 4 Control of Machinery**

- A. Control and Monitoring

## **Sec. 5 Spare Parts**

- A. General

## **PART 4 CHAPTER 2**

### **Rotating Machinery, General**

#### **Sec. 1 Introduction**

- A. General

#### **Sec. 2 Certification Principles**

- A. General
- B. The Certification Process
- C. Alternative Survey Arrangements

#### **Sec. 3 Design and Documentation**

- A. General
- B. Special Materials and Processes

#### **Sec. 4 Electric Power Generation**

- A. General

## **PART 4 CHAPTER 3**

### **Rotating Machinery, Drivers**

#### **Sec. 1 Diesel Engines**

- A. General
- B. Design
- C. Testing and Inspection
- D. Workshop Testing
- E. Control and Monitoring
- F. Arrangement
- G. Vibration
- H. Installation Inspections
- I. Shipboard Testing

#### **Sec. 2 Gas Turbines**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control and Monitoring
- F. Arrangement
- G. System Vibration
- H. Installation Inspections
- I. Shipboard Testing

#### **Sec. 3 Steam Turbines**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control and Monitoring
- F. Arrangement
- G. Vibrations
- H. Installation Inspections
- I. Shipboard Testing

## **PART 4 CHAPTER 4**

### **Rotating Machinery, Power Transmission**

#### **Sec. 1 Shafting**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control and Monitoring
- F. Arrangement
- G. Vibration
- H. Installation Inspection
- I. Shipboard Testing

#### **Sec. 2 Gear Transmissions**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control and Monitoring
- F. Arrangement
- G. Vibration
- H. Installation Inspection
- I. Shipboard Testing

#### **Sec. 3 Clutches**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control, Alarm and Safety Functions and Indication
- F. Arrangement
- G. Vibration
- H. Installation Inspection
- I. Shipboard Testing

#### **Sec. 4 Bending Compliant Couplings**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control, Alarm, Safety Functions and Indication
- F. Arrangement
- G. Vibration
- H. Installation Inspection
- I. Shipboard Testing

#### **Sec. 5 Torsionally Elastic Couplings**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control, Alarm, Safety Functions and Indication
- F. Arrangement
- G. Vibration
- H. Installation Inspection
- I. Shipboard Testing

## **PART 4 CHAPTER 5**

### **Rotating Machinery, Driven Units**

#### **Sec. 1 Propellers**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control and Monitoring
- F. Arrangement
- G. Vibration
- H. Installation Inspection
- I. Shipboard Testing

## **Sec. 2 Water Jets**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control, Alarm, Safety Functions and Indications
- F. Arrangement
- G. Vibration
- H. Installation Survey
- I. Shipboard Testing

## **Sec. 3 Podded and Geared Thrusters**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control, Alarm, Safety Functions and Indication
- F. Arrangement
- G. Vibration
- H. Installation Inspection
- I. Shipboard testing

## **Sec. 4 Compressors**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Control and Monitoring
- F. Arrangement Onboard
- G. Vibration
- H. Installation Inspection

## **PART 4 CHAPTER 6 Piping Systems**

### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Signboards

### **Sec. 2 Materials**

- A. Piping Systems

### **Sec. 3 Design Principles**

- A. Arrangement

### **Sec. 4 Ship Piping Systems**

- A. General
- B. Basic Requirements for Drainage of Compartments and Tanks
- C. Drainage of Cargo Holds
- D. Drainage of Cargo Deck Spaces
- E. Drainage of Dry Compartments other than Machinery Spaces of Category A and Cargo Holds
- F. Drainage of Machinery Spaces of Category A
- G. Drainage of Barges and Pontoons
- H. Bilge Pumping and Piping
- I. Ballast System and Drainage of Tanks
- J. Remotely Controlled Bilge and Ballast Systems
- K. Air, Overflow and Sounding Pipes
- L. Tanks for Liquid Cargoes other than Mineral Oils with Flash Point Above 60°C (Closed Cup)
- M. Oil Pollution Prevention

### **Sec. 5 Machinery Piping Systems**

- A. General
- B. Cooling Systems
- C. Lubricating Oil System
- D. Fuel Oil Systems
- E. Thermal Oil Systems
- F. Feed Water and Condensate Systems
- G. Steam Systems

### **H. Hydraulic Systems**

### **I. Pneumatic Systems**

## **Sec. 6 Pipes, Pumps, Valves, Flexible Hoses and Detachable Pipe Connections etc.**

- A. Pipes
- B. Pumps and Fans or Blowers
- C. Valves
- D. Flexible Hoses
- E. Detachable Pipe Connections
- F. Socket Welded Joints and Slip-on Sleeve Welded Joints

## **Sec. 7 Manufacture, Workmanship, Inspection and Testing**

- A. Welding
- B. Brazing of Copper and Copper Alloys
- C. Pipe Bending
- D. Joining of Plastic Pipes
- E. Hydrostatic Tests of Piping
- F. Functional Testing

## **PART 4 CHAPTER 7 Pressure Vessels**

### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Cylinders for Hydraulic Systems
- E. Cylinders for Fire Extinguishing System
- F. Signboards

### **Sec. 2 Materials**

- A. Material Requirements

### **Sec. 3 Arrangement**

- A. Boilers and Pressure Vessels
- B. Thermal-oil Installations
- C. Exhaust Gas Boiler or Economisers

### **Sec. 4 General Design Requirements**

- A. General
- B. Design Criteria
- C. Scantlings of Shells and Flat and Dished Ends
- D. Openings and Compensations
- E. Covers for Inspection Openings and Manholes
- F. Heat Exchanger Tubes

### **Sec. 5 Particular Design Requirements for Boilers**

- A. Shells and Headers of Cylindrical Sections
- B. Headers of Rectangular or Irregular Sections
- C. Dished Ends
- D. Flat Plates Supported by Stays
- E. Furnaces and Fireboxes of Cylindrical Form, Uptakes, Cross-tubes and Ogee Rings
- F. Stays
- G. Tubes
- H. Access and Inspection Openings

### **Sec. 6 Mountings and Fittings**

- A. General
- B. Safety Valves
- C. Stop Valves and Check Valves
- D. Blow-down Valves and Test Valves for Boiler Water
- E. Gauges

### **Sec. 7 Instrumentation and Automation**

- A. General
- B. Boilers
- C. Exhaust Gas Boilers or Economisers
- D. Water Heaters
- E. Thermal-oil Heaters



## **Sec. 8 Manufacture, Workmanship and Testing**

- A. Manufacture
- B. Workmanship
- C. Heat Treatment
- D. Testing
- E. Marking

## **App. A Types and Minimum Dimensions of the Inspection Openings in Boilers and Pressure Vessels**

- A. Definitions and Dimensions

## **PART 4 CHAPTER 8 Electrical Installations**

### **Sec. 1 Service Description**

- A. Application
- B. Verification Scheme

### **Sec. 2 System Design**

- A. General
- B. Main Electric Power Supply System
- C. Emergency Power Supply System
- D. Battery Installation
- E. Starting Arrangement for Engines with Electric Starter
- F. Electric Power Distribution
- G. Protection
- H. Control
- I. Vessel Arrangement
- J. Cable Selection

### **Sec. 3 Equipment in General**

- A. General Requirements
- B. Environmental Requirements
- C. Equipment Ratings
- D. Mechanical and Electrical Properties
- E. Marking and Signboards
- F. Insulation

### **Sec. 4 Switchgear and Controlgear Assemblies**

- A. Construction
- B. Power Circuits
- C. Control and Protection Circuits
- D. Inspection and Testing

### **Sec. 5 Rotating Machines**

- A. General
- B. Additional Requirements for Generators
- C. Inspection and Testing

### **Sec. 6 Power Transformers**

- A. General
- B. Inspection and Testing

### **Sec. 7 Semi-conductor Converters**

- A. General Requirements
- B. Semi-conductor Converters for Power Supply
- C. Semi-conductor Converters for Motor Drives
- D. Inspection and Testing

### **Sec. 8 Miscellaneous Equipment**

- A. General

### **Sec. 9 Cables**

- A. Application
- B. General Cable Construction
- C. High Voltage Cables
- D. Low Voltage Power Cables
- E. Control and Instrumentation Cables
- F. Data Communication Cables
- G. Fiber Optic Cables
- H. Inspection and Testing

### **Sec. 10 Installation**

- A. General Requirements

- B. Equipment
- C. Cables
- D. Inspection and Testing

## **Sec. 11 Hazardous Areas Installations**

- A. General
- B. Documentation
- C. Equipment Selection
- D. Installation Requirements

## **Sec. 12 Electric Propulsion**

- A. General
- B. Verification

## **Sec. 13 Definitions**

- A. Definitions

## **PART 4 CHAPTER 9 Control and Monitoring Systems**

### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Tests

### **Sec. 2 Design Principles**

- A. System Configuration
- B. Response to Failures

### **Sec. 3 System Design**

- A. System Elements
- B. General Requirements

### **Sec. 4 Additional Requirements for Computer Based Systems**

- A. General Requirements
- B. System Software
- C. Control System Networks and Data Communication Links

### **Sec. 5 Component Design and Installation**

- A. General
- B. Environmental Conditions, Instrumentation
- C. Electrical and Electronic Equipment

### **Sec. 6 User Interface**

- A. General
- B. Workstation Design and Arrangement
- C. User Input Device and Display Unit Design
- D. Screen Based Systems

## **PART 4 CHAPTER 10 Fire Safety**

### **Sec. 1 General Requirements**

- A. Application
- B. Scope of Work
- C. Submission of Documentation
- D. Applicable referenced Regulations

### **Sec. 2 Fire Safety Measures for Cargo Ships of less than 500 Gross Tonnage**

- A. General
- B. Suppression of Fire
- C. Escape

### **Sec. 3 Fire Safety Measures for Cargo Ships of 500 Gross Tonnage and above**

- A. General
- B. Fire Control Plans

### **Sec. 4 Fire Safety Measures for Issuance of SOLAS Safety Certificates**

- A. General

## **PART 4 CHAPTER 14**

### **Steering Gear**

#### **Sec. 1 Steering Gear**

- A. General
- B. Design
- C. Inspection and Testing
- D. Workshop Testing
- E. Power Supply, Control and Monitoring
- F. Arrangement for Installation Onboard
- G. (Intentionally left blank)
- H. Installation
- I. Shipboard Testing

#### **App. A Additional Requirements for Non-Duplicated Rudder Actuators**

- A. General
- B. Design
- C. Inspection and Testing

## **PART 5 CHAPTER 1**

### **Ships for Navigation in Ice**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Marking and on Board Documentation

#### **Sec. 2 Basic Ice Strengthening**

- A. General
- B. Structural Requirements for the Class Notation **ICE-C**
- C. Machinery
- D. Requirements for the Class Notation **ICE-E**

#### **Sec. 3 Ice Strengthening for the Northern Baltic**

- A. General
- B. Design Loads
- C. Shell Plating
- D. Frames
- E. Ice Stringers
- F. Web Frames
- G. Bilge Keels
- H. Special Arrangement and Strengthening Forward
- I. Special Arrangement and Strengthening Aft
- J. Propulsion Machinery
- K. Miscellaneous Machinery Requirements
- L. Guidelines for Strength Analysis of the Propeller Blade using Finite Element Method

#### **Sec. 4 Vessels for Arctic and Ice Breaking Service**

- A. General
- B. Materials and Corrosion Protection
- C. Ship Design and Arrangement
- D. Design Loads
- E. Global Strength
- F. Local Strength
- G. Hull Appendages and Steering Gears
- H. Welding
- I. Machinery Systems
- J. Propulsion Machinery and Propellers
- K. Thrusters
- L. Stability and Watertight Integrity

#### **Sec. 5 Sealers**

- A. General
- B. Strength of Hull and Superstructures
- C. Sternframe, Rudder and Steering Gear
- D. Anchoring and Mooring Equipment
- E. Machinery

#### **Sec. 6 Winterization**

- A. General

- B. Requirements for **WINTERIZED BASIC**
- C. Additional Requirements for Class Notation **WINTERIZED COLD (t<sub>1</sub>, t<sub>2</sub>)**
- D. Additional Requirements for Class Notation **WINTERIZED ARCTIC (.., ..)**

#### **Sec. 7 DAT(-X°C)**

- A. General
- B. Material Selection

#### **Sec. 8 IACS Unified Requirements For Polar Ships (Tentative Rules)**

- A. General
- B. Design Ice Loads – Hull
- C. Local Strength Requirements
- D. Longitudinal Strength
- E. Appendages
- F. Direct Calculations
- G. Welding
- H. Materials and Corrosion Protection
- I. Ice Interaction Loads – Machinery
- J. Design – Machinery
- K. Stability and Watertight Integrity

#### **App. A Guidelines for Strength Analysis of the Propeller Blade using Finite Element Method**

- A. Guidelines for Strength Analysis of the Propeller Blade using Finite Element Method

## **PART 5 CHAPTER 2**

### **Passenger and Dry Cargo Ships**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation

#### **Sec. 2 Passenger Ships**

- A. General
- B. Hull Arrangement and Strength
- C. Machinery and Systems
- D. Emergency Source of Electrical Power and Emergency Installations
- E. Fire Safety Measures for Passenger Ships
- F. Stability and Watertight Integrity

#### **Sec. 3 Ferries**

- A. General
- B. Hull Arrangement and Strength
- C. Openings and Closing Appliances
- D. Bow Doors
- E. Inlets and Drainage Arrangement
- F. Stability
- G. Life Saving Appliances and Arrangements

#### **Sec. 4 General Cargo Carriers**

- A. General
- B. Hull Arrangement and Strength
- C. Permanent Decks for Wheel Loading
- D. Detection of Water Ingress in Single Hold Cargo Ships

#### **Sec. 5 Dry Bulk Cargo Carriers**

- A. General
- B. Design Loads
- C. Bulk Carriers (full breadth holds)
- D. Ore Carriers (holds between longitudinal bulkheads)
- E. Detection of Water Ingress into Cargo Holds Ballast and Dry Spaces, and Availability of Drainage forward Spaces
- F. Requirements for the Fitting of a Forecastle for Bulk Carriers, Ore Carriers and Combination Carriers
- G. Access
- H. Optional Class Notations **EC** and **EL-1** and **EL-2**

## **Sec. 6 Container Carriers**

- A. General
- B. Longitudinal and Local Strength
- C. Cellular Container Hold Structures
- D. Materials and Welding
- E. Type Approval, Testing and Marking of Container Securing Equipment and Support Fittings
- F. Arrangements for Stowing and Lashing of Containers
- G. Strength Evaluation of Container Securing Arrangements
- H. Signboards
- I. Non-Weathertight Arrangement for Weather Deck Hatch Covers

## **Sec. 7 Car Carriers**

- A. General
- B. Hull Strength
- C. Strength of Car Decks
- D. Stowing Arrangement for Deck Pontoons not in Use (Class Notation **MCDK**)

## **Sec. 8 Enhanced Strength for Bulk Carriers**

- A. Additional Requirements for Loading Conditions, Loading Manuals and Loading Instruments for Bulk Carriers, Ore Carriers and Combination Carriers
- B. Side Structure
- C. Longitudinal Strength of Hull Girder in Flooded Condition for Bulk Carriers
- D. Corrugated Transverse Watertight Bulkheads, Considering Hold Flooding
- E. Limit to Hold Loading, Considering Hold Flooding
- F. Evaluation of Scantlings of Hatch Covers and Hatch Coamings of Cargo Holds of Bulk Carriers, Ore Carriers and Combination Carriers

## **Sec. 9 Ships Specialised for the Carriage of a Single Type of Dry Bulk Cargo**

- A. General

## **Sec. 10 Carriage of Refrigerated Containers**

- A. Classification
- B. Operational Performance
- C. Documentation
- D. Ventilation and Hold Temperature
- E. Electrical Installations
- F. Instrumentation and Control System
- G. Hold Access
- H. Inspection and Testing

## **PART 5 CHAPTER 3 Oil Carriers**

### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Surveys and Testing
- E. Signboards

### **Sec. 2 Materials and Hull Strength**

- A. General
- B. Materials and Corrosion Prevention
- C. Hull Strength
- D. Direct Strength Calculations

### **Sec. 3 Ship Arrangement and Stability**

- A. Intact and Damage Stability
- B. Location and Separation of Spaces
- C. Tank and Pump Room Arrangement
- D. Arrangement of Access and Openings to Spaces and Tanks
- E. Guard Rails and Bulwarks
- F. Cofferdams and Pipe Tunnels
- G. Diesel Engines for Emergency Fire Pumps
- H. Chain Locker and Anchor Windlass

- I. Equipment in Tanks and Cofferdams
- J. Surface Metal Temperatures in Hazardous Areas

## **Sec. 4 Piping Systems in Cargo Area**

- A. Piping Materials
- B. Bilge, Ballast and Fuel Oil Systems
- C. Cargo Systems
- D. Cargo Heating
- E. Bow and Stern Loading and Unloading Arrangements

## **Sec. 5 Gas-freeing and Venting of Cargo Tanks**

- A. Gas-freeing of Cargo Tanks
- B. Cargo Tank Venting Systems

## **Sec. 6 Ventilation Systems within the Cargo Area outside the Cargo Tanks**

- A. Ventilation Systems
- B. Ventilation Arrangement and Capacity Requirements

## **Sec. 7 Fire Protection and Extinction**

- A. Fire Safety Measures for Tankers

## **Sec. 8 Area Classification and Electrical Installations**

- A. General
- B. Electrical Installations in Hazardous Areas
- C. Area Classification
- D. Inspection and Testing
- E. Maintenance
- F. Signboards

## **Sec. 9 Instrumentation and Automation**

- A. General Requirements
- B. Cargo Valve and Pump Control
- C. Cargo Tank Level Measurement
- D. Cargo Tank Overflow Protection
- E. Oil and Water Interface Detector
- F. Gas Detection in Cargo Pump Room
- G. Explosimeters and Gas Detectors
- H. Installation Requirements for Analysing Units

## **Sec. 10 Ships for Alternate Carriage of Oil Cargo and Dry Cargo**

- A. General
- B. Cargo Area Arrangement and Systems
- C. Gas Measuring Equipment
- D. Instructions

## **Sec. 11 Inert Gas Plants**

- A. General
- B. Materials
- C. Arrangement and General Design
- D. Inert Gas Production and Treatment
- E. Instrumentation
- F. Survey and Testing

## **Sec. 12 Protected Slop Tank**

- A. General
- B. Arrangement and Systems
- C. Signboards and Instructions

## **Sec. 13 Crude Oil Washing Arrangements**

- A. General

## **Sec. 14 Offshore Loading Arrangements**

- A. General
- B. Materials
- C. Arrangement and General Design
- D. Control and Monitoring
- E. Bow Loading Area Safety Installations
- F. STL Room Safety Installations
- G. Operation Manual
- H. Tests after Installation

## **Sec. 15 Single Point Moorings**

- A. General

- B. Materials
- C. Arrangement and General Design

#### **App. A List of Cargoes**

- A. List of Oil Cargoes
- B. Cargoes other than Oils

### **PART 5 CHAPTER 4 Chemical Carriers**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Tank Types
- E. Filling Limits for Cargo Tanks
- F. Signboards
- G. Cargo Information
- H. Procedures and Arrangements Manual

#### **Sec. 2 Materials and Hull Strength**

- A. General
- B. Hull
- C. Cargo Tanks
- D. Cargo Piping
- E. Hull Strength

#### **Sec. 3 Ship Arrangement and Damage Stability**

- A. Damage Stability
- B. Cargo Tank Location
- C. Location and Separation of Spaces
- D. Arrangement of Entrances and Other Openings
- E. Guard Rails and Bulwarks
- F. Cargo Pump Rooms, Cofferdams and Pipe Tunnels
- G. Diesel Engines Driving Emergency Fire Pumps, etc
- H. Chain Locker and Windlass
- I. Anodes, Washing Machines and Other Fittings in Tanks and Cofferdams
- J. Slop Tanks
- K. Stowage of Cargo Samples

#### **Sec. 4 Arrangement in Hold Spaces**

- A. General
- B. Gas Pressure Relief Devices
- C. Sealing around Tanks
- D. Earth Connections

#### **Sec. 5 Scantlings and Testing of Cargo Tanks**

- A. Scantlings of Cargo Tanks
- B. Requirements for Testing of Welds and Non-Destructive Testing

#### **Sec. 6 Piping Systems in the Cargo Area**

- A. Pumping and Piping Systems for Bilge, Ballast and Fuel Oil
- B. Cargo Piping System
- C. Stripping of Cargo Tank and Cargo Lines
- D. Discharge of Contaminated Water
- E. Stern loading and unloading arrangements
- F. Cargo Hoses

#### **Sec. 7 Cargo Heating and Cooling Arrangements**

- A. Cargo Heating and Cooling Arrangements

#### **Sec. 8 Marking of Tanks, Pipes and Valves**

- A. General

#### **Sec. 9 Gas freeing and Venting of Cargo Tanks**

- A. Gas Freeing of Cargo Tanks
- B. Tank Venting Systems

#### **Sec. 10 Mechanical Ventilation in the Cargo Area Outside the Cargo Tanks**

- A. System Requirements

- B. Ventilation Arrangement and Capacity Requirements

#### **Sec. 11 Fire Protection and Extinction**

- A. General
- B. Fire Extinguishing

#### **Sec. 12 Area Classification and Electrical Installations**

- A. General
- B. Electrical Installations in Hazardous Areas
- C. Area Classification
- D. Inspection and Testing
- E. Maintenance
- F. Signboards

#### **Sec. 13 Instrumentation and Automation**

- A. General Requirements
- B. Alarm, Indicating and Recording Systems

#### **Sec. 14 Tests after Installation**

- A. General

#### **Sec. 15 Additional Requirements for Certain Cargoes**

- A. General Requirements
- B. Additional Requirements for Certain Groups of Products
- C. Additional Requirements for Certain Chemicals

#### **Sec. 16 Inert Gas Plants**

- A. General
- B. Materials, Arrangement and Design

#### **Sec. 17 Personnel Protection**

- A. General Requirements
- B. Safety Equipment
- C. Medical First-aid Equipment
- D. Decontamination Showers and Eye Washes

### **PART 5 CHAPTER 5 Liquefied Gas Carriers**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Tank Types
- E. Signboards

#### **Sec. 2 Materials and Hull Strength**

- A. General
- B. Temperatures for Selection of Materials
- C. Hull Materials
- D. Materials for Cargo Piping, Cargo Tanks, Cargo Process Pressure Vessels and Secondary Barriers
- E. Documentation of Material Quality and Testing of Pipe and Pipe Fittings
- F. Hull Strength

#### **Sec. 3 Damage Stability and Ship Arrangements**

- A. Damage Stability and Location of Cargo Tanks
- B. Location and Separation of Spaces
- C. Arrangement of Entrances and other Openings
- D. Guard Rails and Bulwarks
- E. Diesel Engines Driving Emergency Fire Pumps or Similar Equipment
- F. Chain Locker and Windlass
- G. Anodes, Washing Machines and other Fittings in Tanks and Cofferdams

#### **Sec. 4 Arrangements and Environmental Control in Hold Spaces**

- A. General Requirements
- B. Secondary Barrier
- C. Gas Pressure Relief Devices
- D. Environmental Control within the Hold Space
- E. Sealing around Tanks

F. Earth Connections

**Sec. 5 Scantlings and Testing of Cargo Tanks**

- A. General
- B. Integral Tanks
- C. Membrane Tanks
- D. Semi-Membrane Tanks
- E. Independent Tanks Type A
- F. Independent Tanks Type B
- G. Independent Tanks Type B, Primarily Constructed of Bodies of Revolution
- H. Independent Tanks Type B, Constructed Mainly of Plane Surfaces
- I. Independent Tanks Type C
- J. Internal Insulation Tanks
- K. Welding Procedure Tests
- L. Weld Production Tests
- M. Requirements for Weld Types and Non-Destructive Testing (NDT)
- N. Testing of Tanks

**Sec. 6 Piping Systems in Cargo Area**

- A. General
- B. Pumping and Piping Systems for Bilge, Ballast and Fuel Oil
- C. Cargo Piping Systems
- D. Cargo Hoses
- E. Bow or Stern Loading and Unloading Arrangements
- F. Vapour Return Connections
- G. Certification of Pumps
- H. Certification of Valves

**Sec. 7 Cargo Pressure and Temperature Control, Cargo Heating Arrangements, Insulation**

- A. Cargo Pressure and Temperature Control
- B. Cargo Heating Arrangements
- C. Insulation for Tanks, Hold Spaces and Pipelines

**Sec. 8 Marking of Tanks, Pipes and Valves**

- A. General
- B. Marking

**Sec. 9 Gas-Freeing and Venting of Cargo Tanks and Piping System**

- A. Gas-Freeing
- B. Tank Venting Systems
- C. Certification of Pressure Relief Valves

**Sec. 10 Mechanical Ventilation in Cargo Area**

- A. System Requirements
- B. Ventilation Arrangement and Capacity Requirements

**Sec. 11 Fire Protection and Extinction**

- A. General
- B. Fire Extinction

**Sec. 12 Area Classification and Electrical Installations**

- A. General
- B. Electrical Installations in Cargo Area and Adjacent to this Area
- C. Area Classification
- D. Inspection and testing
- E. Maintenance
- F. Signboards

**Sec. 13 Instrumentation and Automation**

- A. General Requirements
- B. Indicating and Alarm Systems

**Sec. 14 Tests after Installation**

- A. General Requirements

**Sec. 15 Additional Requirements for Certain Cargoes**

- A. General Requirements
- B. Additional Requirements for Some Liquefied Gases

**Sec. 16 Gas Operated Propulsion Machinery**

- A. General
- B. Gas Supply to Boilers and Engines, Arrangement of Engine and Boiler Rooms. Electrical Equipment
- C. Gas Fired Boiler Installations
- D. Gas-Operated Engine Installations

**Sec. 17 Filling Limits for Cargo Tanks**

- A. Filling Limits for Cargo Tanks

**Sec. 18 Inert Gas Plants**

- A. General

**Sec. 19 Personnel Protection**

- A. General
- B. First-aid Equipment
- C. Personnel Protection Requirements for Individual Products

**App. A List of Cargoes (Tanker for Liquefied Gas)**

- A. List of Cargoes

**PART 5 CHAPTER 6**

**Fishing Vessels**

**Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Signboards
- E. Hull Arrangement
- F. Stability
- G. Fire Safety

**Sec. 2 Design Requirements**

- A. General
- B. Fishing Vessel
- C. Stern Trawler

**Sec. 3 Bilge and Drainage Arrangement**

- A. Arrangement

**Sec. 4 Cargo Holds for Fish in Bulk**

- A. General
- B. Bulkhead Arrangement and Strength

**Sec. 5 Prevention of 'tween Deck Flooding**

- A. 'Tween Deck with Side Openings
- B. Enclosed 'Tween Deck

**Sec. 6 Freeboard, Opening and Closing Appliances**

- A. Freeboard
- B. Openings and Closing Appliances

**Sec. 7 Stability and Bow Height for Vessels with Class Notation (N)**

- A. General
- B. Bow Height

**PART 5 CHAPTER 7**

**Tugs, Supply Vessels and other Offshore/Harbour Vessels**

**Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation

**Sec. 2 Tugs**

- A. General
- B. Hull Arrangement and Strength
- C. Sternframe, Rudder and Steering Gear
- D. Towing Arrangement
- E. Stability and Watertight Integrity

### **Sec. 3 Supply Vessels**

- A. General
- B. Hull Arrangement and Strength
- C. Cargo Handling Arrangement
- D. Intact Stability
- E. Notation **Supply Vessel**

### **Sec. 4 Additional Class Notation SF. Damage Stability for Offshore Service Vessels**

- A. General
- B. Damage Stability

### **Sec. 5 Fire Fighters**

- A. General
- B. Basic Requirements
- C. Protection of the Vessel against External Heat Radiation (Class Notation **Fire Fighter I**)
- D. Water Monitor System
- E. Foam Monitor System. (Class notation **III**)
- F. Pumps and Piping
- G. Mobile Fire Fighting Equipment
- H. Firefighter's Outfit
- I. Stability and Watertight Integrity

### **Sec. 6 Pipe Laying Vessels**

- A. General
- B. Hull Arrangement and Strength
- C. Anchoring and Mooring Equipment
- D. Pipe Laying Equipment and Installations
- E. Stability and Floatability

### **Sec. 7 Crane Vessels**

- A. General
- B. Hull Arrangement and Strength
- C. Crane with Substructure
- D. Stability and Watertight Integrity

### **Sec. 8 Dredgers**

- A. General
- B. Hull Arrangement and Strength

### **Sec. 9 Well Stimulation Vessels**

- A. Classification
- B. Arrangement
- C. Ventilation
- D. Electrical Equipment, Instrumentation and Emergency Shutdown System
- E. Liquid Nitrogen System
- F. Acid System
- G. Personnel Protection
- H. Intact and Damage Stability
- I. Operation Manual

### **Sec. 10 Offshore Service Vessels for Transportation of Low Flashpoint Liquids**

- A. General
- B. Vessel Arrangement
- C. Piping System in Cargo Area
- D. Gas-freeing, Inerting and Venting of Cargo Tanks
- E. Ventilation System within the Cargo Area
- F. Fire Protection and Extinction
- G. Electrical Installations
- H. Instrumentation and Control System
- I. Signboards and Instructions

### **Sec. 11 Recovered Oil Reception and Transportation**

- A. General
- B. Basic Requirements
- C. Hazardous and Non-Hazardous Areas
- D. Arrangement and Equipment
- E. Operational Instructions

### **Sec. 12 Pushers**

- A. General
- B. Hull Strength
- C. Rudder and Steering Gear
- D. Equipment

### **Sec. 13 Pusher/Barge Units**

- A. General
- B. Arrangement
- C. Hull Strength
- D. Equipment
- E. Machinery, Bilge System, Fire Extinguishing Plant

### **Sec. 14 Barges**

- A. General
- B. Arrangement
- C. Hull Strength
- D. Hatches and Deck Openings
- E. Steering Arrangement
- F. Equipment
- G. Machinery and Electrical Installations
- H. Drainage
- I. Stability

### **Sec. 15 Escort Vessels**

- A. General
- B. Arrangement and Design
- C. Steering Force and Manoeuvring
- D. Stability
- E. Full Scale Testing

### **Sec. 16 Cable Laying Vessels**

- A. General
- B. Hull Arrangements and Strength
- C. Anchoring and Mooring Equipment
- D. Cable Laying Equipment and Installations
- E. Stability and Watertight Integrity

### **Sec. 17 Standby Vessels**

- A. General
- B. Hull arrangement and strength
- C. Rescue Arrangement, Survivors' Accommodation and Safety Equipment
- D. Care of Personal
- E. Intact and Damage Stability
- F. Steel Deckhouses and Superstructures (Class Notation **Standby Vessel (S)**)

### **Sec. 18 Optional Class Notation SPS (Special Purpose Ships)**

- A. Classification
- B. Requirements

## **PART 5 CHAPTER 8**

### **Slop Reception and Processing Facilities**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Assumptions

#### **Sec. 2 Hull Structures, Piping Arrangement, Separating System and Fire Protection**

- A. Hull Strength and Arrangement
- B. Arrangement for Transfer of Oily Water and Oil Residues
- C. Separating System
- D. Oil Content Monitoring
- E. Protection against Fire and Explosion

#### **Sec. 3 Operational Instructions and Log Book**

- A. Instruction Materials
- B. Safety and Oily Water/Oil Residues Log Book

## **PART 5 CHAPTER 10**

### **Ships for Carriage of Refrigerated Cargoes and Containers**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Operational Performance
- C. Documentation

#### **Sec. 2 Materials**

- A. Hull Structures
- B. Refrigerating Plant
- C. Refrigerated Chambers

#### **Sec. 3 Refrigerating Plant**

- A. Design Criteria
- B. Machinery
- C. Electrical Installations
- D. Accessories
- E. Instrumentation and Automation

#### **Sec. 4 Refrigerated Chambers. Construction, Insulation and Instrumentation**

- A. Arrangement and Design
- B. Insulation Construction
- C. Protection against Moisture
- D. Air Circulation System and Drainage, Air, Sounding and Water Pipes
- E. Equipment for Temperature Measurements. Gas Indication Equipment

#### **Sec. 5 Controlled Atmosphere**

- A. General
- B. Arrangement and System
- C. Operational Performance
- D. Nitrogen Generator. Carbon Dioxide Scrubbers
- E. Electrical Installations
- F. Instrumentation
- G. Instruction Manual. Personnel Protection Equipment

#### **Sec. 6 Tests**

- A. Pressure Tests of Components
- B. Pressure Tests after Assembly
- C. Function and Capacity Testing of the Completed Installation
- D. Testing of CA installations

## **PART 5 CHAPTER 11**

### **Carriage of Dangerous Goods**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Documentation
- C. Definitions

#### **Sec. 2 Requirements for Carriage of Dangerous Goods in Various Types of Cargo Spaces**

- A. General
- B. Requirements applicable for various classes of dangerous goods
- C. Minimum Requirements for Cargo Spaces Intended for Packaged Goods
- D. Minimum Requirements for Cargo Spaces Intended for Solid Bulk Cargoes

## **PART 5 CHAPTER 12**

### **Comfort Class**

#### **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation

#### **Sec. 2 Noise and Vibration**

- A. General
- B. Noise and Vibration Requirements
- C. Certification and Testing, Noise
- D. Certification and Testing, Vibration
- E. Test Conditions

#### **Sec. 3 Indoor Climate**

- A. General
- B. Requirements for On Board Climate
- C. Certification and Testing
- D. System Requirements

#### **App. A Guidelines for Handling of Excessive Noise and Vibration Levels**

- A. Introduction
- B. Excessive Vibration Levels
- C. Excessive Noise Levels
- D. Scaling or Weighting of the Measurements in Cabins

## **PART 5 CHAPTER 13**

### **Carriage of Potable Water**

#### **Sec. 1 General Requirements**

- A. General
- B. Documentation
- C. Surveys and Testing

#### **Sec. 2 Requirements for Carriage of Potable Water**

- A. Materials
- B. Tank Arrangement
- C. Piping System
- D. Water Quality

## **PART 5 CHAPTER 14**

### **Naval and Naval Support Vessels**

#### **Sec. 1 General Regulations**

- A. Introduction
- B. Examination Principles
- C. Definitions
- D. Classification of Newbuildings
- E. Deviations from the Rules

#### **Sec. 2 Arrangements**

- A. Deck Arrangements
- B. Watertight Compartments
- C. Zones
- D. Accommodation (for HS, LC and NSC)
- E. Stores (for HS, LC and NSC)

#### **Sec. 3 Design Loads**

- A. General Requirements
- B. Hull Girder Loads (for HS, LC and NSC)
- C. Local Loads (for HS, LC and NSC)
- D. Operational Loads
- E. Accidental Loads

#### **Sec. 4 Structural Strength**

- A. General Requirements
- B. Structural Arrangement
- C. Local Strength
- D. Global Strength
- E. Weld Connections
- F. Buckling (for HS, LC and NSC)
- G. Direct Strength Calculations

#### **Sec. 5 Stability, Watertight and Weathertight Integrity**

- A. General
- B. Freeboard, External Watertight Integrity (for HS, LC and NSC)
- C. Intact Stability Requirements

D. Internal Watertight Integrity

**Sec. 6 Piping Systems**

- A. General
- B. Design Principles
- C. Pipes, Pumps, Valves, Flexible Hoses and Detachable Pipe Connections
- D. Manufacture, Workmanship, Inspection and Testing
- E. Marking
- F. Machinery Piping Systems
- G. Vessel Piping System

**Sec. 7 Machinery, Propulsion and Positioning**

- A. General Requirements
- B. Operational Conditions
- C. Arrangement and System Design
- D. Component Specific Requirements

**Sec. 8 Electric Power Generation and Transfer**

- A. General Requirements
- B. Design Principles
- C. System Design
- D. Switchgear and Control Gear Assemblies
- E. Rotating Machinery
- F. Miscellaneous Equipment
- G. Installation and Testing
- H. Electric Propulsion

**Sec. 9 Control and Monitoring**

- A. General Requirements
- B. Documentation
- C. System Design
- D. Component Design and Installation
- E. Alarm System
- F. Damage Control System
- G. Monitoring and control
- H. Control Systems

**Sec. 10 Fire Safety**

- A. General
- B. Rule References and Definitions
- C. Documentation
- D. Structure
- E. Fire Control Zones
- F. Fire Integrity of Bulkheads and Decks
- G. Means of Escape
- H. Ventilation Systems
- I. Material Requirements
- J. Fire Detection System
- K. Fixed Fire-extinguishing System
- L. Fire-extinguishing Equipment
- M. Fire Pumps and Fire Main
- N. Firefighter's Outfit
- O. Other Spaces
- P. Helicopter Facilities
- Q. Fire Control Plans

**Sec. 11 Fire Safety Requirements for FRP Naval Vessels**

- A. General Requirements
- B. Structural Fire Protection, Materials and Arrangements
- C. Ventilation
- D. Fire Detection System
- E. Fire Extinguishing Systems and Hazardous spaces
- F. Fire Pumps, Fire Main and Portable Extinguishers
- G. Sprinkler System
- H. Firefighter's outfit
- I. Additional Fire Protection (optional)

**Sec. 12 Safe Evacuation of Personnel**

- A. General and Definitions
- B. Communications
- C. Personal Life-saving Appliances
- D. Muster List, Emergency Instructions and Manuals
- E. Operating Instructions

F. Survival Craft Stowage

- G. Survival Craft and Rescue Boat Embarkation and Recovery Arrangements
- H. Line-throwing Appliance
- I. Operational Readiness, Maintenance and Inspections
- J. Survival Craft and Rescue Boats
- K. Additional Requirements for Equipment

**Sec. 13 Radiation Hazards**

- A. General
- B. Definitions
- C. Documentation
- D. Design Principles
- E. Installation
- F. Testing

**Sec. 14 Electromagnetic Compatibility**

- A. General
- B. Definitions
- C. Documentation
- D. Design Principles
- E. Installation
- F. Testing

**Sec. 15 Storage Rooms for Explosives**

- A. General
- B. Basic Requirements
- C. Arrangements
- D. Structure
- E. Fire Safety
- F. Radiation Hazards
- G. Signboards

**PART 5 CHAPTER 15**

**Compressed Natural Gas Carriers**

**Sec. 1 General Requirements**

- A. General
- B. Definitions
- C. Documentation

**Sec. 2 Materials**

- A. General

**Sec. 3 Damage Stability and Ship Arrangements**

- A. General

**Sec. 4 Arrangements and Environmental Control in Hold Spaces**

- A. General

**Sec. 5 Scantling and Testing of Cargo Tanks**

- A. General
- B. Coiled Type Cargo Tank
- C. Cylinder Type Cargo Tank
- D. Composite Type Cargo Tank

**Sec. 6 Piping Systems in the Cargo Area**

- A. General

**Sec. 7 Overpressure Protection of the Cargo Tank and Cargo Piping System**

- A. General

**Sec. 8 Gas-freeing of Cargo Containment System and Piping System**

- A. General

**Sec. 9 Mechanical Ventilation in Cargo Area**

- A. General

**Sec. 10 Fire Protection and Extinction**

- A. General



## **Sec. 11 Electrical Installations**

A. General

## **Sec. 12 Control and Monitoring**

A. General

## **Sec. 13 Tests after Installation**

A. General

## **Sec. 14 Filling Limits for Cargo Tanks**

A. General

## **Sec. 15 Gas Specification**

A. General

## **Sec. 16 In Service Inspection**

A. General

## **PART 6 CHAPTER 1**

### **Miscellaneous Notations**

## **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation

## **Sec. 2 Helicopter Installations**

- A. General
- B. Design Loads and Load Combinations
- C. Structural Strength
- D. Miscellaneous
- E. Requirements for Vessel Safety (**HELDK-S**)
- F. Requirements for Helicopter Safety (**HELDK-SH**)
- G. Requirements for Helicopter Refuelling and Hangar Facilities (**HELDK-SHF**)
- H. (**CAA-N**)
- I. Certification and Testing

## **Sec. 3 Shipboard Cranes**

- A. General
- B. Design Loads
- C. Overturning and Sliding
- D. Testing
- E. Stability

## **Sec. 4 Diving Systems**

- A. General
- B. Position Keeping
- C. Diving System Arrangement Layout and Location
- D. Electrical Systems
- E. Fire Prevention, Detection and Extinction
- F. Sanitary Systems for **DSV-BOUNCE** and **DSV-SAT** systems
- G. Testing
- H. Stability and Floatability
- I. Hyperbaric Evacuation Systems

## **Sec. 5 Deicing and Anti-Icing Systems**

- A. General
- B. Stability and Watertight Integrity
- C. Anti-icing and Deicing Arrangements and Equipment

## **Sec. 6 Additional Oil Pollution Prevention Measures - Fuel Oil Systems**

- A. General
- B. Arrangement of Fuel Oil Tanks
- C. Sundry

## **PART 6 CHAPTER 2**

### **Redundant Propulsion**

## **Sec. 1 General Requirements**

- A. Classification

B. Documentation

C. Certification

D. Tests

## **Sec. 2 System Design**

- A. General
- B. System Configuration
- C. Auxiliary Systems
- D. Propulsion, Steering and Auxiliary Control System
- E. Separation Requirements for RPS

## **PART 6 CHAPTER 3**

### **Periodically Unattended Machinery Space**

## **Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Periodical Test

## **Sec. 2 System Arrangement**

- A. General
- B. Automatic Control System
- C. Alarm System
- D. Safety System
- E. Fire Safety and Fire Detection and Alarm System

## **Sec. 3 Class Notation E0**

- A. Extent of Monitoring
- B. Arrangement on the Bridge
- C. Arrangement in the Engine Room
- D. Control of Propulsion Machinery from the Navigation Bridge (SOLAS Ch. II-1/49)
- E. Electric Power Supply
- F. Fire Safety
- G. Special Requirements for Ships less than 300 Gross Tonnage with Propulsive Output less than 1 000 kW per Engine

## **Sec. 4 Class Notation ECO**

- A. General Requirements
- B. Control Station
- C. System Arrangement
- D. Extent of Monitoring

## **Sec. 5 Survey**

- A. General
- B. Testing of Remote Control System. Guidance
- C. Testing of Boiler Plant. Guidance

## **PART 6 CHAPTER 4**

### **Additional Fire Protection (F-AMC)**

## **Sec. 1 General Requirements**

- A. Classification
- B. Documentation
- C. Manuals
- D. Firefighter's Outfit

## **Sec. 2 Accommodation**

- A. General
- B. Fire Integrity
- C. Fire Detection and Alarm System
- D. Portable Fire Extinguishers
- E. Hose Reel System
- F. Firefighter's Outfit

## **Sec. 3 Machinery Spaces**

- A. General
- B. Oil Systems
- C. Hot Surfaces
- D. Fire Detection and Confirmation
- E. Local Extinguishing Systems
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- G. Portable Fire Extinguishers
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**101** This master index has been prepared for the complete Rules for Classification of Ships.

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