



RULES FOR CLASSIFICATION OF **Ships**

PART 0 CHAPTER 1

INTRODUCTION

User Information, Current Rule Chapters and Index

JULY 2011

*This chapter has been amended since the main revision (July 2011), most recently in August 2011.
See "Changes" on page 3.*

The content of this service document is the subject of intellectual property rights reserved by Det Norske Veritas AS (DNV). The user accepts that it is prohibited by anyone else but DNV and/or its licensees to offer and/or perform classification, certification and/or verification services, including the issuance of certificates and/or declarations of conformity, wholly or partly, on the basis of and/or pursuant to this document whether free of charge or chargeable, without DNV's prior written consent. DNV is not responsible for the consequences arising from any use of this document by others.

FOREWORD

DET NORSKE VERITAS (DNV) is an autonomous and independent foundation with the objectives of safeguarding life, property and the environment, at sea and onshore. DNV undertakes classification, certification, and other verification and consultancy services relating to quality of ships, offshore units and installations, and onshore industries worldwide, and carries out research in relation to these functions.

The Rules lay down technical and procedural requirements related to obtaining and retaining a Class Certificate. It is used as a contractual document and includes both requirements and acceptance criteria.

The electronic pdf version of this document found through <http://www.dnv.com> is the officially binding version
© Det Norske Veritas AS July 2011

Any comments may be sent by e-mail to rules@dnv.com
For subscription orders or information about subscription terms, please use distribution@dnv.com
Computer Typesetting (Adobe Frame Maker) by Det Norske Veritas

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million.
In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

CHANGES

General

The present edition of the rules includes additions and amendments approved by the Executive Committee as of June 2011, and supersedes the January 2011 edition of the same chapter.

The rule changes come into force as indicated below.

Text affected by the main rule changes is highlighted in red colour in the electronic pdf version. However, where the changes involve a whole chapter, section or sub-section, only the title may be in red colour.

This chapter is valid until superseded by a revised chapter.

Amendments August 2011

- **Sec.2 Current Rule Chapters**

— Table 1 was amended in order to include the August 2011 update of Pt.4 Ch.1.

Main changes in Pt.0 Ch.1 coming into force 1 July 2011

- **Sec.2 Current Rule Chapters**

— In Table 1, a new note 3) has been added for Pt.6 Ch.8 concerning use of rule editions for class notations **NAUT - OC** or **AW**.

CONTENTS

Sec. 1 General	5
A. Introduction	5
A 100 Introduction chapters	5
B. The Rules	5
B 100 Purpose.....	5
B 200 Rules parts.....	5
B 300 Publication of the rules	5
B 400 Updating.....	5
B 500 Numbering and cross references.....	6
B 600 Definitions	6
B 700 Units.....	6
B 800 Indexes and tables of contents	7
C. Service documents other than Rules for Ships and HSLC/NSC	7
C 100 General.....	7
D. Other DNV Rules	7
D 100 General.....	7
Sec. 2 Current Rule Chapters	8
Sec. 3 Systematic Index.....	10
A. Introduction	10
A 100 General.....	10

SECTION 1 GENERAL

A. Introduction

A 100 Introduction chapters

101 The Introduction Part 0 contains three chapters:

- Chapter 1: User Information, Current Rule Chapters and Index
- 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.

B. The Rules

B 100 Purpose

101 The Rules lay down technical and procedural requirements related to obtaining and retaining a Class Certificate. It is used as a contractual document and includes both requirements and acceptance criteria.

B 200 Rules parts

201 The Rules for Classification of Ships are published in eight parts (Pt.). Each part consists of chapters (Ch.) available as separate pdf files. 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 given in Sec.2 of this chapter.

202 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.

B 300 Publication of the rules

301 The rules are available for free download as electronic pdf version through <http://www.dnv.com>. A list of all DNV Publications can be found on the same site.

302 CDs can be purchased through DNV's webshop; <http://webshop.dnv.com>.

B 400 Updating

401 The rules will normally be published twice yearly, in January and in July, due to updates.

402 If a chapter has been updated, the document will normally be given a new edition date.

The corresponding Adobe PDF file will be made available through <http://www.dnv.com> and the date of the column "A" of Table 1 in Sec.2 will be updated.

403 If there is a need for amendments to the document; i.e. editorial and clarification corrections only, the electronic file will be updated, but the edition date will be retained. However, a new Adobe PDF file will be generated and made available through <http://www.dnv.com>. The date of the PDF file will appear in column "B" of Table 1 in Sec.2.

404 The updates including amendments to each chapter will be described briefly on page 3 of that document.

B 500 Numbering and cross references

501 A combination of digits and letters is used for easy reference, e.g. Pt.3 Ch.1 Sec.1 A100.

<i>Level</i>	<i>Reference example</i>	<i>Principle</i>
Part Chapter Section	Pt.3 Ch.1 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

502 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.

503 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.

504 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:

- a) From part to part, e.g. *see* Pt.2 Ch.1 (i.e. down to chapter).
- b) 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.
- c) 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 600 Definitions

601 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 any of the three general levels, proper reference is made.

602 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.

603 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.

604 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 700 Units

701 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		
<i>Quantity</i>	<i>Symbol</i>	<i>Name</i>
Length	m cm mm	metre centimetre millimetre
Mass	kg t	kilogram tonne
Time	s	second
Electric current	A	ampere

Table B2 Derived SI-units		
<i>Quantity</i>	<i>Symbol</i>	<i>Name/definition</i>
Frequency	Hz	hertz = 1/s
Force	N kN	newton = kgm/s ² kilonewton
Pressure	kN/m ² bar	= kPa, kilopascal = 10 ⁵ Pa
Stress	N/mm ²	= MPa, megapascal
Bending moment Torsional moment	Nm kNm	= J, joule
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	
<i>SI-unit</i>	<i>TS-conversion relation</i>
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 800 Index and table of contents

801 A master index has been prepared for the complete rules in the form of a systematic index, see Sec.3. The systematic index gives reference to sections and subsections within each part and chapter. The master index will be updated as required when chapters are revised.

802 A table of contents is given within each chapter providing a complete list of sections, appendices and sub-sections and their respective page numbers.

C. Service documents other than Rules for Ships and HSLC/NSC

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 on our web site; <http://www.dnv.com> and listed in the DNV Publication List available through the same site.

D. Other DNV Rules

D 100 General

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

SECTION 2 CURRENT RULE CHAPTERS

Table 1 Current rule chapters			
<i>Current Rule Chapters</i>		A <i>Current Edition</i>	B <i>Amendments; i.e. editorial corrections and clarifications only</i>
PART 0	INTRODUCTION		
Chapter 1	User Information, Current Rule Chapters and Index	July 2011	
Chapter 2	Introduction to Ship Classification	January 2003	July 2011
Chapter 3 ¹⁾	Plan Approval Documentation Types – Definitions	July 2011	
PART 1	GENERAL REGULATIONS		
Chapter 1	General Regulations	July 2011	
Chapter 2	Class Notations	July 2011	
PART 2	MATERIALS AND WELDING		
Chapter 1 ¹⁾	General Requirements for Materials	January 2011	July 2011
Chapter 2 ¹⁾	Metallic Materials	July 2011	
Chapter 3 ¹⁾	Fabrication and Testing of Structures	July 2010	July 2011
PART 3	HULL AND EQUIPMENT - MAIN CLASS		
Chapter 1	Hull Structural Design, Ships with Length 100 metres and above	July 2011	
Chapter 2	Hull Structural Design, Ships with Length less than 100 metres	July 2011	
Chapter 3	Hull Equipment and Safety	July 2011	
PART 4	MACHINERY AND SYSTEMS - MAIN CLASS		
Chapter 1	Machinery Systems, General	July 2011	August 2011
Chapter 2 ¹⁾	Rotating Machinery, General	January 2011 ²⁾	July 2011
Chapter 3 ¹⁾	Rotating Machinery, Drivers	January 2009	July 2011
Chapter 4 ¹⁾	Rotating Machinery, Power Transmission	July 2011	
Chapter 5 ¹⁾	Rotating Machinery, Driven Units	July 2011	
Chapter 6	Piping Systems	July 2011	
Chapter 7 ¹⁾	Pressure Vessels	January 2011	July 2011
Chapter 8 ¹⁾	Electrical Installations	January 2011	July 2011
Chapter 9 ¹⁾	Control and Monitoring Systems	July 2011	
Chapter 10	Fire Safety	January 2011 ²⁾	July 2011
Chapter 14 ¹⁾	Steering Gear	January 2011 ²⁾	July 2011
PART 5	SPECIAL SERVICE AND TYPE - ADDITIONAL CLASS		
Chapter 1	Ships for Navigation in Ice	July 2011	
Chapter 2	Passenger and Dry Cargo Ships	July 2011	
Chapter 3	Oil Carriers	July 2011	
Chapter 4	Chemical Carriers	July 2011	
Chapter 5	Liquefied Gas Carriers	July 2011	
Chapter 6	Fishing Vessels	July 2011	
Chapter 7	Offshore Service Vessels, Tugs and Special Ships	July 2011	
Chapter 8	Slop Reception and Processing Facilities	January 2011 ²⁾	July 2011
Chapter 10	Ships for Carriage of Refrigerated Cargoes and Containers	January 2011 ²⁾	July 2011
Chapter 11	Carriage of Dangerous Goods	July 2011	
Chapter 12	Comfort Class	January 2011 ²⁾	July 2011
Chapter 13	Carriage of Potable Water	January 2011 ²⁾	July 2011
Chapter 14 ¹⁾	Naval and Naval Support Vessels	July 2011	
Chapter 15	Compressed Natural Gas Carriers	July 2011	
Chapter 16	Diving Support Vessels and Diving Systems	July 2011	
PART 6	SPECIAL EQUIPMENT AND SYSTEMS - ADDITIONAL CLASS		
Chapter 1	Miscellaneous Notations	July 2011	
Chapter 2	Redundant Propulsion	July 2011	
Chapter 3	Periodically Unattended Machinery Space	July 2011	
Chapter 4	Additional Fire Protection (F-AMC)	January 2011	July 2011

Table 1 Current rule chapters (Continued)			
<i>Current Rule Chapters</i>		A <i>Current Edition</i>	B <i>Amendments; i.e. editorial corrections and clarifications only</i>
Chapter 6	Centralised Cargo Control for Liquid Cargoes	January 2003	July 2011
Chapter 7	Dynamic Positioning Systems	July 2011	
Chapter 8 ³⁾	Nautical Safety	July 2011	
Chapter 9	Loading Computer Systems (LCS) for Stability and Longitudinal Strength	January 2011 ²⁾	July 2011
Chapter 10	Vapour Control Systems	January 2011 ²⁾	July 2011
Chapter 11 ¹⁾	Hull Monitoring Systems	January 2011 ²⁾	July 2011
Chapter 12	Environmental Class	January 2011	July 2011
Chapter 13 ¹⁾	Gas Fuelled Engine Installations	January 2011 ²⁾	July 2011
Chapter 14	Fuel Treatment and Conditioning Systems	July 2006	July 2011
Chapter 15	Vibration Class	January 2011 ²⁾	July 2011
Chapter 16	NAV-O Class Notation	January 2007	July 2011
Chapter 17 ¹⁾	Safety of Navigation for Naval Vessels	January 2005	July 2011
Chapter 18	Ballast Water Management	July 2010	July 2011
Chapter 19	Alternative Propulsion	July 2010	July 2011
Chapter 20	Nautical Safety - Offshore Service Vessels	January 2011	July 2011
Chapter 22	Enhanced System Verification (ESV)	January 2011 ²⁾	July 2011
Chapter 23 ¹⁾	Fuel Cell Installations	July 2008	July 2011
Chapter 24	SILENT Class Notation	January 2010	July 2011
Chapter 25	Systems and Arrangement for meeting Regulations in Emission Control Areas (ECA)	January 2010	July 2011
Chapter 26	Dynamic Positioning System - Enhanced Reliability DYNPOS-ER	January 2011	July 2011
Chapter 27 ¹⁾	Recycling	July 2010	July 2011
PART 7	SHIPS IN OPERATION		
Chapter 1	Survey Requirements	July 2011	
Chapter 2	Retroactive Requirements	January 2011 ²⁾	July 2011
Chapter 3 ¹⁾	Management of Safety and Environmental Protection (SEP)	July 2006	July 2011
PART 8	IACS COMMON STRUCTURAL RULES		
Chapter 1	Common Structural Rules for Double Hull Oil Tankers with Length 150 metres and above	July 2010	July 2011
Chapter 2	Common Structural Rules for Bulk Carriers with Length 90 metres and above	July 2010	July 2011
<p>1) Chapters that are common to the Rules for Classification of Ships and the Rules for Classification of High Speed, Light Craft and Naval Surface Craft.</p> <p>2) Rule chapters that were given a new date due to discontinuity of “Amendments and Corrections” (previous Sec.3) in January 2011, but the chapters may also have additional amendments, as described under “Main changes” in each individual chapter.</p> <p>3) Class notations NAUT-OC or AW may be based on one of the following rule editions:</p> <p>— July 2004</p> <p>— Edition in force at contract date as listed above.</p> <p>When building yard proposes to use the July 2004 edition, this shall be in full agreement with future vessel owner.</p>			

SECTION 3 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 subsections within each part and chapter.

PART 0 CHAPTER 1

User Information, Current Rule Chapters and Index

Sec. 1 General

- A. Introduction
- B. The Rules
- C. Service documents other than Rules for Ships and HSLC/NSC
- D. Other DNV Rules

Sec. 2 Current Rule Chapters

Sec. 3 Systematic Index

- A. Introduction

PART 0 CHAPTER 2

Introduction to Ship Classification

Sec. 1 Rule Preamble

- A. Introduction
- B. The Classification System
- C. Remuneration
- D. Classification Support

PART 0 CHAPTER 3

Plan Approval Documentation Types – Definitions

Sec. 1 General

- A. Scope and purpose of the DocReq
- B. Organisation of the DocReq
- C. Type approved products
- D. Organisation of the documentation types
- E. General requirements for all documentation
- F. Terminology
- G. Qualifications

Sec. 2 Documentation Types

- Discipline A – Administration
- Discipline B – Stability, watertight and weathertight integrity
- Discipline C – Mechanical
- Discipline E – Electrical
- Discipline F – Information technology
- Discipline G – Safety
- Discipline H – Hull and structure
- Discipline I – Instrumentation
- Discipline J – Marine operations
- Discipline M – Materials
- Discipline N – Navigation
- Discipline P – Process
- Discipline Q – Quality management
- Discipline S – Piping
- Discipline T – Telecommunications
- Discipline U – Subsea
- Discipline V – Heating, ventilation and air conditioning
- Discipline W – Geotechnology
- Discipline Y – Pipeline and riser technology
- Multidiscipline Z

PART 1 CHAPTER 1**General Regulations****Sec. 1 Classification Principles**

- A. General
- B. The Classification Concept
- C. Appeals
- D. Statutory Certification

Sec. 2 Assignment of Class

- A. Assignment of Class - New Vessels
- B. Assignment of Class - Existing Vessels
- C. The Class Certificate
- D. The Register of Vessels

Sec. 3 Retention of Class

- A. Conditions for Retention of Class
- B. Classification Society Involvement
- C. Endorsement and Renewal of the Class Certificate
- D. Suspension and Withdrawal of Class
- E. Change of Owner or Manager
- F. Force Majeure

Sec. 4 Certification of Materials, Components and Systems

- A. General
- B. The Classification Involvement
- C. Suspension and Withdrawal of Certificates

Sec. 5 Legal Provisions

- A. Liability and Jurisdiction

PART 1 CHAPTER 2**Class Notations****Sec. 1 Class Notations**

- A. General
- B. Mandatory Class Notations
- C. Optional Class Notations

Sec. 2 Historical Class Notations

- A. Class Notations no longer used for newbuildings

PART 2 CHAPTER 1**General Requirements for Materials****Sec. 1 Manufacture, Survey and Certification**

- A. General
- B. Testing and Inspection
- C. Identification and Certification

Sec. 2 Testing Procedures

- A. General
- B. Test Methods

PART 2 CHAPTER 2**Metallic Materials****Sec. 1 Rolled Steel for Structural Application**

- A. General Requirements
- B. Normal Strength Steel
- C. High Strength Steel
- D. Extra High Strength Steel
- E. Plates with Through Thickness Properties

Sec. 2 Rolled Steel for Boilers, Pressure Vessels and Special Applications

- A. General
- B. Steel for Boilers and Pressure Vessels
- C. Steel for Low Temperature Service
- D. Stainless Steel
- E. Testing
- F. Inspection, Dimensional Tolerances and Surface Condition

Sec. 3 Clad Steel Plates

- A. General
- B. Base Material
- C. Cladding Metal
- D. Testing
- E. Repair and Rejection
- F. Identification of Materials

Sec. 4 Steel Pipes

- A. General Requirements
- B. Pressure Pipes
- C. Stainless Steel Pipes
- D. Pipes for Low-temperature Service
- E. Boiler and Superheater Tubes
- F. Piping Fittings

Sec. 5 Steel Forgings

- A. General Requirements
- B. Forgings for Hull Structures and Equipment
- C. Forgings for Shafting and Machinery
- D. Forgings for Crankshafts
- E. Forgings for Gearing
- F. Forgings for Boilers, Pressure Vessels and Piping Systems
- G. Ferritic Steel Forgings for Low Temperature Service
- H. Stainless Steel Forgings

Sec. 6 Bars for Chain Cables

- A. General
- B. Testing
- C. Inspection, Tolerances and Repair
- D. Identification and Certification

Sec. 7 Steel Castings

- A. General Requirements
- B. Castings for Hull Structures and Equipment
- C. Castings for Machinery
- D. Castings for Propellers
- E. Castings for Boilers, Pressure Vessels and Piping Systems
- F. Ferritic Steel Castings for Low Temperature Service
- G. Stainless Steel Castings

Sec. 8 Iron Castings

- A. General
- B. Nodular Cast Iron
- C. Grey Cast Iron

Sec. 9 Aluminium Alloys

- A. Wrought Aluminium Alloys

Sec. 10 Copper Alloy Castings

- A. General Requirements
- B. Castings for Valves, Fittings and General Application
- C. Castings for Propellers

Sec. 11 Non-ferrous Tubes

- A. Copper and Copper Alloy Tubes
- B. Titanium and Titanium Alloy Tubes

PART 2 CHAPTER 3

Fabrication and Testing of Ship Structures

Sec. 1 General Requirements

- A. General
- B. Definitions
- C. Documentation Requirements

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 (Duplex)

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. Introduction
- B. Class Notation **NAUTICUS (Newbuilding)**
- C. Class Notation **PLUS**
- D. Class Notation **COAT-1** and **COAT-2**
- E. Class Notation **CSA**
- 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. Welding, Mounting and 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. 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

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

App. A Tentative Function Based Rules for Machinery Systems, 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 Systems
- E. Starting Arrangement for Engines with Electric Starter
- F. Electric Power Distribution
- G. Protection
- H. Control of Electric Equipment
- 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 Control gear 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. 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. Fibre 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

App. A List of Alarms and Monitoring Parameters

- A. General

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
- E. Materials

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_1 , t_2)
- D. Additional Requirements for Class Notation **WINTERIZED ARCTIC** ($..$, $..$)

Sec. 7 DAT(-X°C)

- A. General
- B. Material Selection

Sec. 8 Polar Class

- 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. Additional Requirements for Hull Structure
- H. Optional Class Notations **EC** and **EL-2**

Sec. 6 Container Carriers

- A. General
- B. Longitudinal and Local Strength
- C. Cellular Container Hold Structures
- D. Arrangements for Stowing and Lashing of Containers
- E. Strength Evaluation of Container Securing Arrangements

- F. Signboards
- G. Non-Weathertight Arrangement for Weather Deck Hatch Covers
- H. Safe Access to Containers

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
- B. Side Structure
- C. Longitudinal Strength of Hull Girder in Flooded Condition
- 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

Sec. 11 Great Lakes Bulk Carriers

- A. General
- B. Requirements
- C. Longitudinal Strength
- D. Hull Structures
- E. Anchoring and mooring equipment
- F. Openings and Closing Appliances

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 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 Arrangements

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

- A. 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. 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

Offshore Service Vessels, Tugs and Special Ships

Sec. 1 Introduction

- A. General
- B. Definitions
- C. Documentation

Sec. 2 Offshore Service Vessels

- A. General
- B. Hull Arrangement and Strength
- C. Systems and Equipment
- D. Intact Stability
- E. Enhanced Strength

Sec. 3 Offshore Service Vessels for Anchor Handling and Towing

- A. General
- B. Hull Strength
- C. Anchor Handling and Towing Arrangement
- D. Stability and Watertight Integrity

Sec. 4 Platform Supply

- A. General
- B. Cargo Handling Arrangement

Sec. 5 Damage Stability for Offshore Service Vessels

- A. General
- B. Damage Stability

Sec. 6 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. 7 Fire Fighters

- A. General
- B. Basic Requirements
- C. Protection of the Vessel against External Heat Radiation
- D. Water Monitor System
- E. Foam Monitor System (Qualifier III)
- F. Pumps and Piping
- G. Mobile Fire Fighting Equipment
- H. Firefighter's Outfit
- I. Stability and Watertight Integrity

Sec. 8 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. 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 Recovered Oil Reception and Transportation

- A. General
- B. Basic Requirements
- C. Hazardous and Non-Hazardous Areas
- D. Arrangement and Equipment
- E. Operational Instructions

Sec. 11 Special Purpose Ships

- A. Classification
- B. Requirements

Sec. 12 Tugs

- A. General
- B. Hull Arrangement and Strength
- C. Systems and Equipment
- D. Towing Arrangement
- E. Stability

Sec. 13 Escort Vessels

- A. General
- B. Arrangement and Design
- C. Steering Force and Manoeuvring
- D. Stability
- E. Full Scale Testing

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
- J. Safety

Sec. 15 Pushers

- A. General
- B. Hull Strength
- C. Rudder and Steering Gear

D. Equipment

Sec. 16 Pusher/Barge Units

- A. General
- B. Arrangement
- C. Hull Strength
- D. Equipment
- E. Machinery, Bilge System, Fire Extinguishing Plant

Sec. 17 Crane Vessels

- A. General
- B. Hull Arrangement and Strength
- C. Crane with Substructure
- D. Stability and Watertight Integrity

Sec. 18 Dredgers

- A. General
- B. Hull Arrangement and Strength

Sec. 19 Cable Laying Vessels

- A. General
- B. Hull Arrangements and Strength
- C. Anchoring and Mooring Equipment
- D. Cable Laying Equipment and Installations

Sec. 20 Pipe Laying Vessels

- A. General
- B. Hull Arrangement and Strength
- C. Anchoring and Mooring Equipment
- D. Pipe Laying Equipment and Installations

Sec. 21 Semi-Submersible Heavy Transport Vessels

- A. General
- B. Hull Arrangement and Strength
- C. Load Line
- D. Stability
- E. Fire Safety
- F. Life Saving Appliances
- G. Nautical Safety and Communication
- H. Miscellaneous Requirements

Sec. 22 Wind Turbine Installation Vessels

- A. General
- B. Technical requirements

Sec. 23 Windfarm Maintenance

- A. General
- B. Technical 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 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 5 CHAPTER 16

Diving Support Vessels and Diving Systems

Sec. 1 General Requirements

- A. General

- B. Stability, Floatation and Position Keeping
- C. Quality Management
- D. Pre-Classification
- E. Inspection and Testing
- F. Marking and Signboards

Sec. 2 Design Philosophy and Premises

- A. Location and arrangement of the diving system onboard
- B. External and Internal Environmental Conditions
- C. System Design Principles

Sec. 3 Supporting Structures

- A. General

Sec. 4 Life Support

- A. Piping
- B. Gas Storage

Sec. 5 Power Provisions, Control and Communications

- A. Electrical Systems
- B. Communication

Sec. 6 Fire Protection

- A. Fire Prevention
- B. Fire Detection and Alarm System
- C. Fire Extinguishing
- D. Miscellaneous Equipment

Sec. 7 Hyperbaric Evacuation

- A. General

Sec. 8 Handling of non-DNV Certified Diving Systems

- A. General

Sec. 9 Classification of Diving Systems

- 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 Cranes

- A. General
- B. Design Loads
- C. Overturning and Sliding
- D. Testing
- E. Stability

Sec. 4 Deicing and Anti-Icing Systems

- A. General
- B. Stability and Watertight Integrity
- C. Anti-icing and Deicing Arrangements and Equipment

Sec. 5 Additional Oil Pollution Prevention Measures - Fuel Oil Systems

- A. General
- B. Arrangement of Fuel Oil Tanks
- C. Sundry

Sec. 6 CRANE(N) – Verification For Compliance With Norwegian Shelf Regulations

- A. Principal and procedures

- B. Design and Manufacturing Requirements
- C. Classification in Operation - General Provisions for Periodical Surveys

PART 6 CHAPTER 2

Redundant Propulsion

Sec. 1 General

- A. Introduction
- B. References
- C. Procedural Requirements

Sec. 2 TECHNICAL REQUIREMENTS

- A. System design
- 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 1000 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 Systems
- C. Testing of Boiler Plant

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
- F. Main Extinguishing Systems
- G. Portable Fire Extinguishers
- H. Firefighter's Outfit

Sec. 4 Cargo Decks and Cargo Spaces

- A. Introduction
- B. Tankers for Oil, Tankers for Chemicals
- C. Tankers for Liquefied Gas (LNG, LPG)
- D. General Cargo Carriers and Dry Bulk Cargo Carriers
- E. Ships with Ro-Ro Decks (Car Carriers, General Ro-Ro Ships, Ferries)
- F. Container Carriers

PART 6 CHAPTER 6**Centralised Cargo Control for Liquid Cargoes****Sec. 1 General Requirements**

- A. Classification
- B. Documentation

Sec. 2 Arrangements for Centralised Operation and Surveillance

- A. General
- B. Arrangement of Piping Systems
- C. Monitoring and Remote Control Systems

Sec. 3 Information System

- A. General.

App. A Compatibility Guide

- A. General.
- B. Application of the Compatibility Chart.

PART 6 CHAPTER 7**Dynamic Positioning Systems****Sec. 1 General Requirements**

- A. Introduction
- B. Definitions
- C. Certification
- D. Documentation
- E. Survey and Test upon Completion

Sec. 2 General Arrangement

- A. General
- B. Redundancy and Failure Modes
- C. System Arrangement
- D. Internal Communication

Sec. 3 Control Systems

- A. General Requirements
- B. Independent joystick control system
- C. DP-control system
- D. Thruster control mode selection
- E. Positioning Reference Systems
- F. Sensors
- G. Display Units
- H. Monitoring

Sec. 4 Thruster Systems

- A. General

Sec. 5 Power Systems

- A. General
- B. Number and capacity of generators
- C. Power management
- D. Main and distribution switchboards arrangement
- E. Control System Power Supply (applies to **DYNPOS-AUT**, **DYNPOS-AUTR**, **DYNPOS-AUTRO**, **DPS 1**, **DPS 2** and **DPS 3**)

Sec. 6 Auxiliary Systems

- A. For **DYNPOS-AUTR**, **DYNPOS-AUTRO** and **DPS 3**
- B. Auxiliary Systems for **DPS 2**

Sec. 7 Environmental Regularity Numbers (This section applies to the DYNPOS- series)

- A. Concept Description

PART 6 CHAPTER 8

Nautical Safety

Sec. 1 General

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

Sec. 2 Design of Workplace

- A. General
- B. Bridge Design
- C. Wheelhouse Arrangement and Workstation Configuration
- D. Workstations for Primary Bridge Functions - Location of Equipment
- E. Additional Workstations
- F. Requirements Specific for Class Notation **NAUT-AW** and/or qualifier **(ICS)**

Sec. 3 Workplace Environment

- A. General
- B. Environmental factors
- C. Lighting
- D. Safety of personnel

Sec. 4 Bridge Equipment - Carriage Requirements

- A. General
- B. Basic Bridge Equipment
- C. Additional Bridge Equipment - **NAUT-AW**
- D. Network based Integration - **(ICS)**

Sec. 5 Bridge Equipment - General Requirements

- A. General
- B. Location of Equipment
- C. Electrical Power Supply
- D. Integration and Interfaces
- E. Human machine interface
- F. Software

Sec. 6 Bridge Equipment - Specific Requirements

- A. General
- B. Steering Control Systems
- C. Heading Information System
- D. Speed Information System
- E. Collision Avoidance - Decision Support Systems
- F. Grounding Avoidance - Decision Support Systems
- G. Weather Surveillance systems
- H. Bridge Navigational Watch Alarm System (BNWAS)
- I. Alarm Management System
- J. Nautical Internal Communication Systems
- K. Track control system (TCS) – **NAUT-AW**
- L. Conning information display (CID) – **NAUT-AW**

Sec. 7 Network Based Integration of Navigation Systems (ICS)

- A. General
- B. Multi-Function-Displays (MFD)
- C. Human-Machine Interface (HMI)
- D. ICS Network
- E. Malfunctions and restoration
- F. Testing
- G. Documentation
- H. Quality System

Sec. 8 Ship Manoeuvring Characteristics

- A. General
- B. Trials and Predictions
- C. Course-keeping ability
- D. Provision of Manoeuvring Information
- E. Presentation of Manoeuvring Information

Sec. 9 Qualifications and Operational Procedures

- A. General
- B. Watch keeping arrangement
- C. Qualifications
- D. Bridge Watch Procedures

Sec. 10 Bridge Equipment - On-board Tests

- A. General
- B. On board Testing of Bridge Equipment

PART 6 CHAPTER 9**Loading Computer Systems (LCS) for Stability and Longitudinal Strength****Sec. 1 General Requirements**

- A. Classification

Sec. 2 Approval

- A. Documentation to Submit for Approval

Sec. 3 Certification

- A. Certification

Sec. 4 Additional Class Notation LCS-DC

- A. Application
- B. General Requirements
- C. Testing

PART 6 CHAPTER 10**Vapour Control Systems****Sec. 1 General Requirements**

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

Sec. 2 Vapour Piping Systems

- A. Material
- B. Vapour Collection Piping
- C. Capacity

Sec. 3 Instrumentation

- A. Cargo Gauging
- B. Cargo Tank Level Alarms
- C. Vapour Pressure Alarms

Sec. 4 Vapour Balancing

- A. General
- B. Design and Equipment

Sec. 5 Operational Instructions

- A. Instruction Manual

App. A Operational Limitations and Conditions to be Reflected in the Instruction Manual

- A. General

App. B List of Cargoes — Vapour Control

- A. General

PART 6 CHAPTER 11**Hull Monitoring Systems****Sec. 1 General Requirements**

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

Sec. 2 Component Requirements

- A. Component Requirements
- B. Sensors
- C. Signal Conditioning Units

Sec. 3 System Design

- A. System Requirements

- B. Primary Elements
- C. Data Processing
- D. User Interfaces
- E. Data Storage
- F. Extent of Monitoring

Sec. 4 Installation and Testing

- A. General
- B. Approval and Testing Procedure

PART 6 CHAPTER 12

Environmental Class

Sec. 1 General

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

Sec. 2 Class notation CLEAN

- A. Introduction
- B. Emissions to Air
- C. Discharges to Sea
- D. Other Aspects

Sec. 3 Class notation CLEAN DESIGN

- A. Introduction
- B. Emissions to Air
- C. Discharges to Sea
- D. Construction and Design
- E. Other Aspects

Sec. 4 Electrical shore connections

- A. General
- B. System requirements
- C. Installation requirements
- D. Cable
- E. Port requirements
- F. Cable and cable management
- G. Certificate of compliance

PART 6 CHAPTER 13

Gas Fuelled Engine Installations

Sec. 1 General Requirements

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

Sec. 2 Materials

- A. General

Sec. 3 Arrangement and System Design

- A. Location and Separation of Spaces
- B. Arrangement of Entrances and Other Openings
- C. General Gas Pipe Design
- D. System Configuration
- E. Gas supply system arrangement
- F. Gas Supply System in Machinery Spaces
- G. Gas Fuel Storage Tanks
- H. *Fuel Bunkering System*
- I. Ventilation Systems
- J. Nitrogen Installations

Sec. 4 Fire Safety

- A. General
- B. *Fire Protection*
- C. *Fire Extinction*
- D. *Fire Detection and Alarm Systems*
- E. Spark arresters

Sec. 5 Electrical Systems

- A. General
- B. Area classification
- C. Inspection and testing
- D. Maintenance

Sec. 6 Control, Monitoring and Safety Systems

- A. *General*
- B. Monitoring
- C. Gas Detection
- D. Signboards

Sec. 7 Compressors and Gas Engines

- A. Gas Compressors
- B. Gas Engine Design

Sec. 8 Manufacture, Workmanship and Testing

- A. *Gas Tanks*
- B. Gas Piping Systems

PART 6 CHAPTER 14**Fuel Treatment and Conditioning Systems****Sec. 1 General Requirements**

- A. Fuel Treatment System
- B. Definitions
- C. Documentation
- D. General Requirements

Sec. 2 System Arrangements and Components

- A. System for Storage and Transfer of Fuel
- B. Fuel Oil Settling and Daily Service Tanks
- C. Fuel Treatment System

Sec. 3 Instrumentation and Automation

- A. General

Sec. 4 Testing and Survey

- A. General

PART 6 CHAPTER 15**Vibration Class****Sec. 1 General Requirements**

- A. Classification
- B. Applications
- C. Definitions
- D. Documentation
- E. References

Sec. 2 Vibration Criteria

- A. General
- B. Structural Vibration
- C. Vibration in Machinery and Components

Sec. 3 Measurements

- A. General
- B. Test Procedure
- C. Test Conditions
- D. Reporting

PART 6 CHAPTER 16**NAV-O Class Notation****Sec. 1 General Regulations and Information**

- A. Application
- B. Scope
- C. Definitions

Sec. 2 Documents

- A. Document for Information

Sec. 3 Bridge Configuration

- A. Workstations
- B. Field of Vision and Structural Arrangements

Sec. 4 Bridge Equipment

- A. General
- B. Equipment

Sec. 5 Requirements for Instruments and or Equipment

- A. General
- B. Monitoring Systems and or Alarms

PART 6 CHAPTER 17

Safety of Navigation for Naval Vessels

Sec. 1 General Requirements

- A. Classification

Sec. 2 Design of Workplace

- A. General
- B. Bridge and Workstation Arrangement
- C. Bridge Configuration
- D. Requirements Specific for SOLAS Vessels
- E. Requirements Specific for HSC Code Vessels

Sec. 3 Bridge Working Environment

- A. Requirements for Bridge Working Environment

Sec. 4 Carriage Requirements for Navigational Systems and Equipment

- A. General
- B. Carriage Requirements

PART 6 CHAPTER 18

Ballast Water Management

Sec. 1 General Requirements

- A. Classification
- B. References
- C. Documentation

Sec. 2 General Requirements

- A. Requirements Applicable to all Ships

Sec. 3 Ballast Water Exchange - Class Notation BWM-E () and BWM-EP ()

- A. Introduction
- B. Requirements
- C. Requirements applicable to ships using flow-through method, class notation **BWM-E (f)**
- D. Requirements applicable to ships using dilution method, class notation **BWM-E (d)**
- E. Additional requirements for Class Notation **BWM-EP ()**

Sec. 4 Treatment Systems - Class Notation BWM-T

- A. Introduction
- B. Pumping and Piping System for ballast
- C. Ballast Water Treatment Systems

PART 6 CHAPTER 19

Alternative Propulsion

Sec. 1 General Requirements

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

Sec. 2 System Design

- A. General
- B. System Configuration
- C. Auxiliary Systems
- D. Propulsion, Steering and Auxiliary Control System
- E. Separation Requirements for **AP-3(a%)(+)**

PART 6 CHAPTER 20**Nautical Safety – Offshore Service Vessels****Sec. 1 General**

- A. Objectives and Safety Philosophy
- B. Scope of the Rules
- C. Definitions
- D. Class Notations
- E. Documentation for Approval
- F. Documentation for Information
- G. Functional Tests

Sec. 2 Bridge Design and Configuration

- A. General
- B. Workstations
- C. Visibility
- D. Working Environment

Sec. 3 Workstation Arrangement

- A. Requirements for the Various Workstations
- B. Workstations for Primary Bridge Functions
- C. Workstation for Navigation
- D. Workstation for Navigation Support
- E. Workstation for Offshore Operations
- F. Workstation for Ship Handling
- G. Workstation for Aft Support
- H. Workstation for Fire Fighting (FiFi)
- I. Workstation for Rescue Operations
- J. Workstation for Communication
- K. Workstation for Safety Monitoring and Emergency Operations

Sec. 4 Bridge Equipment

- A. General Bridge Equipment Requirements
- B. Equipment Requirements
- C. Electrical Power Supply

Sec. 5 Ergonomics and Human-Machine Interface

- A. Human - Machine Interface
- B. Controls
- C. Presentation of Information
- D. Readability of Information

Sec. 6 Bridge Equipment Tests

- A. On Board Testing of Bridge Equipment

PART 6 CHAPTER 22**Enhanced System Verification (ESV)****Sec. 1 General**

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

Sec. 2 Hardware-in-the-loop Testing

- A. General
- B. Documentation
- C. Tests
- D. HIL Test-packages

PART 6 CHAPTER 23**Fuel Cell Installations****Sec. 1 General Requirements**

- A. Classification
- B. Definitions
- C. Documentation
- D. Certification
- E. Operation and Maintenance Manuals

Sec. 2 Design Principles for FC-POWER Notation

- A. Design Principles

Sec. 3 Materials

- A. General
- B. Special Requirements for Different Fuels

Sec. 4 Arrangement and System Design

- A. Location and Separation of Spaces
- B. Arrangement of Entrances and Other Openings
- C. General Pipe Design
- D. System Configuration
- E. FC fuel Supply System In Fuel Cell Spaces
- F. FC Fuel Storage
- G. FC Fuel Tank Design
- H. Fuel Bunkering System and Distribution System outside Machinery Spaces
- I. Ventilation System

Sec. 5 Fire Safety

- A. General
- B. Fire Protection
- C. Fire Extinction
- D. Fire Detection and Alarm Systems

Sec. 6 Electrical Systems

- A. General
- B. Area Classification
- C. Inspection and Testing of Electrical Equipment in Hazardous Area
- D. Maintenance of Electrical Equipment in Hazardous Area

Sec. 7 Control, Monitoring and Safety Systems

- A. General
- B. Monitoring
- C. Gas Detection
- D. Safety Functions of Gas Supply Systems

Sec. 8 Compressors

- A. FC Fuel Compressors

Sec. 9 Manufacture, Workmanship and Testing

- A. Liquefied Gas Tank
- B. FC Fuel Piping Systems
- C. Onboard Testing of FC Plant

PART 6 CHAPTER 24

SILENT Class Notation

Sec. 1 General Requirements

- A. Introduction
- B. Definitions
- C. Documentation Requirements

Sec. 2 Underwater Noise

- A. General
- B. Underwater Noise Requirements

Sec. 3 Measurements and Testing

- A. General
- B. Reporting

App. A Measurement Procedure

- A. Scope
- B. Test Procedures
- C. Recording of Data

PART 6 CHAPTER 25

Systems and Arrangement for Meeting Regulations in Emission Control Areas (ECA)

Sec. 1 General Requirements

- A. Application

Sec. 2 Systems and Arrangements

- A. Fuel Oil Tank Arrangements
- B. Fuel Oil System Arrangements
- C. Lubrication Oil System Arrangements
- D. Instrumentation

Sec. 3 Machinery Components

A. General

Sec. 4 Operational Requirements

A. General

Sec. 5 Surveys and Testing

A. General

PART 6 CHAPTER 26**Dynamic Positioning System - Enhanced Reliability DYNPOS-ER****Sec. 1 General Requirements**

- A. Introduction
- B. Definitions
- C. Certification
- D. Documentation
- E. Survey and Test upon Completion

Sec. 2 General Arrangement

- A. General
- B. Redundancy and Failure Modes
- C. System Arrangement
- D. Internal Communication

Sec. 3 Control System

- A. General Requirements
- B. Automatic control systems
- C. Thruster control mode selection
- D. Positioning Reference System
- E. Sensors
- F. Display and indication
- G. Monitoring

Sec. 4 Thruster Systems

A. General

Sec. 5 Power Systems

- A. General
- B. Control System Power Supply

Sec. 6 Auxiliary Systems

A. General

Sec. 7 Capability plots and Environmental Regularity Numbers

- A. Capability plots
- B. Environmental Regularity Numbers (ern)

PART 6 CHAPTER 27**Recycling****Sec. 1 General Requirements**

- A. Introduction
- B. References
- C. General Requirements

Sec. 2 Class Notation Recyclable

- A. Introduction
- B. Requirements

PART 7 CHAPTER 1**Survey Requirements****Sec. 1 General Requirements**

- A. General
- B. Hull and Equipment
- C. Machinery and Systems

Sec. 2 Annual Surveys Extent – Main Class

- A. General Requirements
- B. Hull and Equipment
- C. Machinery and Systems

Sec. 3 Intermediate Surveys Extent – Main Class

- A. General Requirements
- B. Hull and Equipment
- C. Machinery and Systems

Sec. 4 Renewal Surveys Extent – Main Class

- A. General Requirements
- B. Hull and Equipment
- C. Machinery and Systems
- D. Tables of Close-Up Examination and Thickness Measurements
- E. Table of survey methods for machinery

Sec. 5 Miscellaneous Main Class Surveys

- A. Bottom Surveys
- B. Propeller Shaft Survey
- C. Propeller Connection Survey
- D. Survey of Geared Thrusters for Main Propulsion and Dynamic Positioning Systems
- E. Survey of Podded Thrusters for Main Propulsion and dynamic positioning systems
- F. Boiler Survey
- G. Thermal Oil Heater Survey

Sec. 6 Optional Class Notation Surveys

- A. Fire Fighting Installations
- B. Well Stimulation Installations
- C. Reception Systems for Recovered Oil
- D. Refrigerated Cargo Plants
- E. Arrangement for Carriage of Dangerous Goods
- F. Cranes
- G. Cable Laying Installations
- H. Helicopter Decks
- I. Diving Systems
- J. De-icing or Anti-icing Systems
- K. Additional Fire Protection Arrangements
- L. Dynamic Positioning Systems
- M. Nautical Safety
- N. Hull Monitoring Systems
- O. Vapour Control Systems
- P. Clean Ships
- Q. Tailshaft Monitoring
- R. Fuel Treatment and Condition Systems
- S. Loading Computers for Damage Control
- T. Arrangements for Carriage of Refrigerated Containers
- U. Vibration Class
- V. Ballast Water Management
- W. Alternative Propulsion
- X. Winterized Vessels
- Y. Periodically unattended machinery spaces **E0** and **ECO**

Sec. 7 Optional Class Notation Surveys – Continued

- A. **Naval** and **Naval Support(...)**
- B. **NAUTICUS(Operation)**
- C. Special Purpose Ships (**SPS**)
- D. Easy Cleaning and Easy Loading
- E. **NAUT- NAVY**
- F. Nuclear, Biological and Chemical Protection (**NBC**)
- G. **SILENT**
- H. Enhanced System Verification - **SiO**
- I. **Tug, Towing, Anchor Handling, AHTS**
- J. Recycling
- K. Dynamic Positioning Systems – Enhanced Reliability, **DYNPOS-ER**

Sec. 8 Alternative Survey Arrangements

- A. General
- B. Hull Survey Arrangements
- C. Machinery Survey Arrangements

Sec. 9 Surveys Performed by Approved Companies

- A. Surveys by Approved Companies or Service Suppliers

PART 7 CHAPTER 2
Retroactive Requirements**Sec. 1 Bulk Carriers**

- A. Corrugated Transverse Watertight Bulkhead considering Cargo Hold Flooding
- B. Limit to Hold Loading considering Hold Flooding
- C. Damage Stability
- D. Loading Information
- E. Detection of Water Ingress into Cargo Holds, Ballast and Dry Spaces and Availability of Drainage
- F. Renewal Criteria for Side Shell Frames and Brackets in Single Side Skin Bulk Carriers, which were not built in accordance with the Society's Rules July 1998 or subsequent Rules
- G. Cargo Hatch Cover Securing Arrangements for Bulk Carriers not Built in accordance with UR S21 (Rev.3)

Sec. 2 Miscellaneous Requirements

- A. Ice Class **ICE-1A** and **ICE-1A*** - Minimum Power Requirement
- B. Fore Deck Fittings
- C. Existing Convention Ships – Oil Fuel Arrangement
- D. Water level detectors on single hold cargo ships
- E. Ice Class Draught Marks and Warning Triangle

PART 7 CHAPTER 3
Management of Safety and Environmental Protection (SEP)**Sec. 1 Safety and Environmental Protection (SEP) Classification**

- A. General
- B. Scope and Application
- C. Classification and Notation
- D. Classification

Sec. 2 Safety and Environmental Protection (SEP) Management System

- A. Leadership and Administration
- B. Leadership Training
- C. Planned Inspection and Maintenance
- D. Critical Operation and Condition Analysis and Controls
- E. Incidents
- F. Emergency Preparedness
- G. Safety Rules and Work Permits
- H. Knowledge and Skill Training
- I. Personal Protective Equipment
- J. Occupational Health and Hygiene
- K. SEP Management System Review and Evaluation
- L. Engineering Management, New-buildings, Major Repairs and Acquisitions
- M. Personal Communication
- N. Safety Meetings
- O. Personnel Recruitment and Orientation
- P. Purchasing and Sub-Contractor Management

PART 8 CHAPTER 1
Common Structural Rules for Double Hull Oil Tankers with Length 150 metres and above**Sec. 1 Introduction**

- 1 Introduction to Common Structural Rules for Oil Tankers

Sec. 2 Rule Principles

- 1 Introduction
- 2 General Assumptions
- 3 Design Basis
- 4 Design Principles
- 5 Application of Principles

Sec. 3 Rule Application

- 1 Notations
- 2 Documentation, Plans and Data Requirements
- 3 Scope of Approval
- 4 Equivalence Procedure
- 5 Calculation and Evaluation of Scantling Requirements

Sec. 4 Basic Information

- 1 Definitions
- 2 Structural Idealisation

3 Structure Design Details

Sec. 5 Structural Arrangement

- 1 General
- 2 Watertight Subdivision
- 3 Double Hull Arrangement
- 4 Separation of Spaces
- 5 Access Arrangements

Sec. 6 Materials and Welding

- 1 Steel Grades
- 2 Corrosion Protection Including Coatings
- 3 Corrosion Additions
- 4 Fabrication
- 5 Weld Design and Dimensions

Sec. 7 Loads

- 1 Introduction
- 2 Static Load Components
- 3 Dynamic Load Components
- 4 Sloshing and Impact Loads
- 5 Accidental Loads
- 6 Combination of Loads

Sec. 8 Scantling Requirements

- 1 Longitudinal Strength
- 2 Cargo Tank Region
- 3 Forward of the Forward Cargo Tank
- 4 Machinery Space
- 5 Aft End
- 6 Evaluation of Structure for Sloshing and Impact Loads
- 7 Application of Scantling Requirements to Other Structure

Sec. 9 Design Verification

- 1 Hull Girder Ultimate Strength
- 2 Strength Assessment (FEM)
- 3 Fatigue Strength

Sec. 10 Buckling and Ultimate Strength

- 1 General
- 2 Stiffness and Proportions
- 3 Prescriptive Buckling Requirements
- 4 Advanced Buckling Analyses

Sec. 11 General Requirements

- 1 Hull Openings and Closing Arrangements
- 2 Crew Protection
- 3 Support Structure and Structural Appendages
- 4 Equipment
- 5 Testing Procedures

Sec. 12 Ship in Operation Renewal Criteria

- 1 Allowable Thickness Diminution for Hull Structure

App. A Hull Girder Ultimate Strength

- 1 General
- 2 Calculation of Hull Girder Ultimate Capacity
- 3 Alternative Methods

App. B Structural Strength Assessment

- 1 General
- 2 Cargo Tank Structural Strength Analysis
- 3 Local Fine Mesh Structural Strength Analysis
- 4 Evaluation of Hot Spot Stress for Fatigue Analysis

App. C Fatigue Strength Assessment

- 1 Nominal Stress Approach
- 2 Hot Spot Stress (FE Based) Approach

App. D Buckling Strength Assessment

- 1 Advanced Buckling Analysis
- 2 Advanced Buckling Analysis Method
- 3 Application and Structural Modelling Principles
- 4 Assessment Criteria
- 5 Strength Assessment (FEM) – Buckling Procedure
- 6 Ultimate Hull Girder Strength Assessment

PART 8 CHAPTER 2**Common Structural Rules for Bulk Carriers with Length 90 metres and above****Chapter 1****General Principles****Sec. 1 Application**

- 1 General
- 2 Rule application
- 3 Class Notations

Sec. 2 Verification of Compliance

- 1 General
- 2 Documentation to be submitted
- 3 Computer programs

Sec. 3 Functional Requirements

- 1 General
- 2 Definition of functional requirements
- 3 Other regulations
- 4 Workmanship
- 5 Structural Details

Sec. 4 Symbols and Definitions

- 1 Primary symbols and units
- 2 Symbols
- 3 Definitions
- 4 Reference co-ordinate system

Chapter 2**General Arrangement Design****Sec. 1 Subdivision Arrangement**

- 1 Number and arrangement of transverse watertight bulkheads
- 2 Collision bulkhead
- 3 After peak, machinery space bulkheads and stern tubes
- 4 Number and arrangement of tank bulkheads
- 5 Arrangement of transverse watertight bulkheads
- 6 Openings in watertight bulkheads

Sec. 2 Compartment Arrangement

- 1 Definitions
- 2 Cofferdams
- 3 Double bottoms
- 4 Compartment forward of the collision bulkhead
- 5 Minimum bow height
- 6 Shaft tunnels
- 7 Watertight ventilators and trunks
- 8 Fuel oil tanks

Sec. 3 Access Arrangement

- 1 General
- 2 Technical provisions for means of access

- 3 Shaft tunnels
- 4 Access to steering gear compartment

Chapter 3

Structural Design Principles

Sec. 1 Material

- 1 General
- 2 Hull structural steel
- 3 Steels for forging and casting
- 4 Aluminium alloy structures
- 5 Other materials and products

Sec. 2 Net Scantling Approach

Symbols

- 1 General philosophy
- 2 Application criteria
- 3 Net scantling approach

Sec. 3 Corrosion Additions

Symbols

- 1 Corrosion additions

Sec. 4 Limit States

- 1 General
- 2 Strength criteria
- 3 Strength check against impact loads

Sec. 5 Corrosion Protection

- 1 General
- 2 Sacrificial anodes
- 3 Protection of inner bottom by ceiling

Sec. 6 Structural Arrangement Principles

Symbols

- 1 Application
- 2 General principles
- 3 Plating
- 4 Ordinary stiffener
- 5 Primary supporting members
- 6 Double bottom
- 7 Double Side structure
- 8 Single side structure
- 9 Deck structure
- 10 Bulkhead structure
- 11 Pillars

Chapter 4

Design Loads

Sec. 1 General

- 1 General

Sec. 2 Ship Motions and Accelerations

Symbols

- 1 General
- 2 Ship absolute motions and accelerations
- 3 Ship relative accelerations

Sec. 3 Hull Girder Loads

Symbols

- 1 General
- 2 Still water loads
- 3 Wave loads

Sec. 4 Load Cases

Symbols

- 1 General
- 2 Load cases

Sec. 5 External Pressures

Symbols

- 1 External sea pressures on side shell and bottom
- 2 External pressures on exposed decks
- 3 External pressures on superstructure and deckhouses
- 4 Pressure in bow area
- 5 External pressures on hatch covers

Sec. 6 Internal Pressures and Forces

Symbols

- 1 Lateral pressure due to dry bulk cargo
- 2 Lateral pressure due to liquid
- 3 Lateral pressures and forces in flooded condition
- 4 Testing lateral pressure

Sec. 7 Loading Conditions

Symbols

- 1 Application
- 2 General
- 3 Design loading conditions for local strength
- 4 Design loading conditions for direct strength analysis

Sec. 8 Loading Manual and Loading Instrument

- 1 General
- 2 Loading manual
- 3 Loading instrument
- 4 Annual and class renewal survey
- 5 Guidance for loading/unloading sequences

App. 1 Hold Mass Curves

Symbols

- 1 General
- 2 Maximum and minimum masses of cargo in each hold
- 3 Maximum and minimum masses of cargo of two adjacent holds

App. 2 Standard Loading Condition for Direct Strength Analysis

App. 3 Standard Loading Condition for fatigue assessment

Chapter 5

Hull Girder Strength

Sec. 1 Yielding Check

Symbols

- 1 Strength characteristics of the hull girder transverse sections
- 2 Hull girder stresses
- 3 Checking criteria
- 4 Section modulus and moment of inertia
- 5 Permissible still water bending moment and shear force

Sec. 2 Ultimate Strength Check

- 1 Application
- 2 Hull girder ultimate strength check

App. 1 Hull Girder Ultimate Strength

Symbols

- 1 Hull girder ultimate strength check
- 2 Criteria for the calculation of the curve $M-\chi$

Chapter 6

Hull Scantlings

Sec. 1 Plating

Symbols

- 1 General
- 2 General requirements
- 3 Strength check of plating subjected to lateral pressure

Sec. 2 Ordinary Stiffeners

Symbols

- 1 General
- 2 General requirements
- 3 Yielding check
- 4 Web stiffeners of primary supporting members

Sec. 3 Buckling and Ultimate Strength of Ordinary Stiffeners and Stiffened Panels

Symbols

- 1 General
- 2 Application
- 3 Buckling criteria of elementary plate panels
- 4 Buckling criteria of partial and total panels
- 5 Effective width of attached plating
- 6 Transverse vertically corrugated watertight bulkhead in flooded conditions

Sec. 4 Primary Supporting Members

Symbols

- 1 General
- 2 Scantling of primary supporting members for ships of less than 150 m in length L
- 3 Additional requirements for primary supporting members of **BC-A** and **BC-B** ships
- 4 Pillars

App. 1 Buckling and Ultimate Strength

- 1 Application of Ch 6, Sec 3

Chapter 7

Direct Strength Analysis

Sec. 1 Direct Strength Assessment of the Primary Supporting Members

- 1 General

Sec. 2 Global strength FE analysis of cargo hold structures

Symbols

- 1 General
- 2 Analysis model
- 3 Analysis criteria

Sec. 3 Detailed Stress Assessment

- 1 General
- 2 Analysis model
- 3 Analysis criteria

Sec. 4 Hot Spot Stress Analysis for Fatigue Strength Assessment

- 1 General
- 2 Analysis model
- 3 Hot spot stress

App. 1 longitudinal Extent of the Finite Element Models

- 1 Longitudinal extent
- 2 Typical Mesh

App. 2 Displacement Based Buckling Assessment in Finite Element Analysis

Symbols

- 1 Introduction
- 2 Displacement Method

Chapter 8**Fatigue Check of Structural Details****Sec. 1 General Consideration**

- 1 General
- 2 Definitions
- 3 Loading

Sec. 2 Fatigue Strength Assessment

Symbols

- 1 General
- 2 Equivalent notch stress range
- 3 Calculation of fatigue damage
- 4 Fatigue strength criteria

Sec. 3 Stress Assessment of Primary Members

Symbols

- 1 General
- 2 Hot spot stress range
- 3 Hot spot mean stress

Sec. 4 Stress Assessment Of Stiffeners

Symbols

- 1 General
- 2 Hot spot stress range
- 3 Hot spot mean stress

Sec. 5 Stress Assessment of Hatch Corners

- 1 General
- 2 Nominal stress range
- 3 Hot spot stress

App. 1 Cross Sectional Properties For Torsion

- 1 Calculation Formulae
- 2 Example calculation for a single side hull cross section

Chapter 9**Other Structures****Sec. 1 Fore Part**

Symbols

- 1 General
- 2 Arrangement
- 3 Load model
- 4 Scantlings
- 5 Strengthening of flat bottom forward area
- 6 Stem
- 7 Forecastle

Sec. 2 Aft Part

Symbols

- 1 General
- 2 Load model
- 3 Aft peak
- 4 Scantlings
- 5 Connection of hull structures with the rudder horn
- 6 Sternframes

Sec. 3 Machinery Space

Symbols

- 1 General
- 2 Double bottom
- 3 Side
- 4 Platforms
- 5 Pillaring
- 6 Machinery casing

7 Main machinery seating

Sec. 4 Superstructures and Deckhouses

Symbols

- 1 General
- 2 Arrangement
- 3 Load model
- 4 Scantlings
- 5 End bulkheads of superstructure and deckhouse

Sec. 5 Hatch Covers

Symbols

- 1 General
- 2 Arrangements
- 3 Width of attached plating
- 4 Load model
- 5 Strength check
- 6 Hatch coamings
- 7 Weathertightness, closing arrangement, securing devices and stoppers
- 8 Drainage
- 9 Small hatches fitted on the exposed fore deck

Sec. 6 Arrangement of Hull and Superstructure Openings

Symbols

- 1 General
- 2 External openings
- 3 Side scuttles, windows and skylights
- 4 Discharges
- 5 Freeing ports
- 6 Machinery space openings
- 7 Companionway
- 8 Ventilators
- 9 Tank cleaning openings

Chapter 10

Hull Outfitting

Sec. 1 Rudder and Manoeuvring Arrangement

Symbols

- 1 General
- 2 Rudder force and torque
- 3 Scantlings of the rudder stock
- 4 Rudder couplings
- 5 Rudder body, rudder bearings
- 6 Design yield moment of rudder stock
- 7 Stopper, locking device
- 8 Propeller nozzles
- 9 Rudder horn and sole piece scantlings
- 10 Rudder coupling flanges
- 11 Azimuth propulsion system

Sec. 2 Bulwarks and Guard Rails

- 1 General
- 2 Bulwarks
- 3 Guard rails

Sec. 3 Equipment

Symbols

- 1 General
- 2 Equipment number
- 3 Equipment

Chapter 11

Construction and Testing

Sec. 1 Construction

- 1 Structural details

Sec. 2 Welding

- 1 General
- 2 Types of welded connections
- 3 Connection details

Sec. 3 Testing of Compartments

- 1 General
- 2 Testing methods
- 3 Testing requirements

Chapter 12

Additional Class Notations

Sec. 1 GRAB Additional Class Notation

Symbols

- 1 Basic concepts
- 2 Scantlings

Chapter 13

Ships in Operation, Renewal Criteria

Sec. 1 Maintenance of Class

- 1 General

Sec. 2 Thickness Measurements and Acceptance Criteria

Symbols

- 1 Application
- 2 Rule requirements for the extent of measurements and the determination of locations
- 3 Acceptance Criteria