



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.*

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FOREWORD

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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.

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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This chapter is valid until superseded by a revised chapter.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**.

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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.

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

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- A. Cargo Heating and Cooling Arrangements

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- G. Independent Tanks Type B, Primarily Constructed of Bodies of Revolution
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- B. Pumping and Piping Systems for Bilge, Ballast and Fuel Oil
- C. Cargo Piping Systems
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- A. Cargo Pressure and Temperature Control
- B. Cargo Heating Arrangements
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- A. Gas-Freeing
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- E. Equipment for Temperature Measurements. Gas Indication Equipment

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-

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- 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
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- B. Structural Fire Protection, Materials and Arrangements
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- A. General

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- A. General

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- B. Coiled Type Cargo Tank
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- A. General

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- A. General

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- A. General

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- A. General

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- A. General

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- B. Stability, Floatation and Position Keeping
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- D. Pre-Classification
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- C. System Design Principles

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- A. Fire Prevention
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- A. General

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- A. General

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- A. General

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- B. Design Loads and Load Combinations
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- D. Miscellaneous
- E. Requirements for Vessel Safety (**HELDK-S**)
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- B. References
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- D. Propulsion, Steering and Auxiliary Control System
- E. Separation Requirements for **RPS**

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- E. Fire Safety and Fire Detection and Alarm System

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- 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

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- B. Oil Systems
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- 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)
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- A. General
- B. Arrangement of Piping Systems
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- A. General.

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

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- A. General
- B. Redundancy and Failure Modes
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- A. General Requirements
- B. Independent joystick control system
- C. DP-control system
- D. Thruster control mode selection
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- F. Sensors
- G. Display Units
- H. Monitoring

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- A. General

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- 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**)

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- A. For **DYNPOS-AUTR**, **DYNPOS-AUTRO** and **DPS 3**
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- A. Concept Description

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- B. Definitions
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- 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)**

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

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- A. General
- B. Basic Bridge Equipment
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- B. Location of Equipment
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- A. General
- B. Steering Control Systems
- C. Heading Information System
- D. Speed Information System
- E. Collision Avoidance - Decision Support Systems
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- G. Weather Surveillance systems
- H. Bridge Navigational Watch Alarm System (BNWAS)
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- K. Track control system (TCS) – NAUT-AW
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- E. Malfunctions and restoration
- F. Testing
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- A. General
- B. Trials and Predictions
- C. Course-keeping ability
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- A. General
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- A. Classification

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- A. Documentation to Submit for Approval

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- A. Certification

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- B. Definitions.
- C. Documentation

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- B. Vapour Collection Piping
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- A. Cargo Gauging
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- A. General
- B. Design and Equipment

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- A. Instruction Manual

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- A. General

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- A. General

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

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- A. System Requirements

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

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- A. General
- B. Approval and Testing Procedure

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- B. Definitions
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- A. Introduction
- B. Emissions to Air
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- D. Other Aspects

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

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- A. General
- B. System requirements
- C. Installation requirements
- D. Cable
- E. Port requirements
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- A. Classification
- B. Definitions
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- A. General

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- 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

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- A. General
- B. Area classification
- C. Inspection and testing
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- A. *General*
- B. Monitoring
- C. Gas Detection
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- A. Gas Compressors
- B. Gas Engine Design

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- A. *Gas Tanks*
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- 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

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- A. General

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

Sec. 2 Vibration Criteria

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

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- A. General
- B. Test Procedure
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- 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
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- A. General
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- 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)**
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- B. Workstations for Primary Bridge Functions
- C. Workstation for Navigation
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- G. Workstation for Aft Support
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- A. General Bridge Equipment Requirements
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Sec. 2 Design Principles for FC-POWER Notation

- A. Design Principles

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- A. General Requirements
- B. Hull and Equipment
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- D. Tables of Close-Up Examination and Thickness Measurements
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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
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- C. Reception Systems for Recovered Oil
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- E. Arrangement for Carriage of Dangerous Goods
- F. Cranes
- G. Cable Laying Installations
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- 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
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- 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
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- 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)

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- A. Ice Class **ICE-1A** and **ICE-1A*** - Minimum Power Requirement
- B. Fore Deck Fittings
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- D. Water level detectors on single hold cargo ships
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- A. General
- B. Scope and Application
- C. Classification and Notation
- D. Classification

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- A. Leadership and Administration
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- 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
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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

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

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- 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
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- 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

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- 1 Hull Girder Ultimate Strength
- 2 Strength Assessment (FEM)
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- 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
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- 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
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- 4 Assessment Criteria
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- 1 General
- 2 Rule application
- 3 Class Notations

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- 2 Documentation to be submitted
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- 2 Definition of functional requirements
- 3 Other regulations
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- 5 Structural Details

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- 1 Primary symbols and units
- 2 Symbols
- 3 Definitions
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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
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Sec. 3 Access Arrangement

- 1 General
- 2 Technical provisions for means of access

- 3 Shaft tunnels
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- 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

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

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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

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Sec. 1 General

- 1 General

Sec. 2 Ship Motions and Accelerations

Symbols

- 1 General
- 2 Ship absolute motions and accelerations
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Sec. 3 Hull Girder Loads

Symbols

- 1 General
- 2 Still water loads
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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

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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

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Sec. 1 Yielding Check

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- 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 $M-\chi$

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

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- 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

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Sec. 1 Direct Strength Assessment of the Primary Supporting Members

- 1 General

Sec. 2 Global strength FE analysis of cargo hold structures

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- 1 General
- 2 Analysis model
- 3 Analysis criteria

Sec. 3 Detailed Stress Assessment

- 1 General
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Sec. 4 Hot Spot Stress Analysis for Fatigue Strength Assessment

- 1 General
- 2 Analysis model
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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

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- 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

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Symbols

- 1 General
- 2 Hot spot stress range
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Sec. 5 Stress Assessment of Hatch Corners

- 1 General
- 2 Nominal stress range
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App. 1 Cross Sectional Properties For Torsion

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

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

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

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Symbols

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

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- 1 General
- 2 External openings
- 3 Side scuttles, windows and skylights
- 4 Discharges
- 5 Freeing ports
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Sec. 1 Rudder and Manoeuvring Arrangement

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- 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
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- 11 Azimuth propulsion system

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- 1 General
- 2 Bulwarks
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Symbols

- 1 General
- 2 Equipment number
- 3 Equipment

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1 Structural details

Sec. 2 Welding

1 General

2 Types of welded connections

3 Connection details

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Chapter 13

Ships in Operation, Renewal Criteria

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1 General

Sec. 2 Thickness Measurements and Acceptance Criteria

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2 Rule requirements for the extent of measurements and the determination of locations

3 Acceptance Criteria