



RULES FOR CLASSIFICATION OF
**Ships / High Speed, Light Craft and
Naval Surface Craft**

PART 0 CHAPTER 3

INTRODUCTION

**Plan Approval Documentation
Types – Definitions**

JULY 2011

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

This chapter presents a description of items that forms the basis for the Society's plan approval of drawings, design documents or records to verify compliance with the rules or statutory requirements.

The present edition of this chapter, dated July 2011, supersedes the January 2011 edition of the same chapter.

The changes take effect 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.

Main changes coming into force 1 July 2011

- **Sec.1 General**

- Included new paragraph B1000 "Ship construction file".

- **Sec.2 Documentation Types**

- Deleted list item "C060 Mechanical component documentation" in C060.

- Added reference to IMO Resolution IMO MSC.1/Circ.1279 in M042.

- Deleted Z020. New title and text in Z030.

- References to Z020 are substituted by Z030.

Main changes coming into force 1 January 2012

- **Sec.2 Documentation Types**

- A new documentation type "H220 – Container safe access plan" has been added.

CONTENTS

Sec. 1 General	9
A. Scope and purpose of the DocReq	9
A 100 DocReq scope	9
A 200 DocReq purpose	9
A 300 Assumptions	9
A 400 Industrial practise	9
A 500 Vessels under conversion	9
A 600 Document coverage	9
B. Organisation of the DocReq	9
B 100 Assignment of the documentation requirements	9
B 200 Documentation types - definitions	9
B 300 Relevance criteria	10
B 400 Yard or manufacturer	10
B 500 For approval or for information	10
B 600 Type approved systems and equipment	10
B 700 Local handling	10
B 800 On request	10
B 900 As carried out	10
B 1000 Ship construction file	10
C. Type approved products	10
C 100 Reference to certificate	10
C 200 Documentation covered by the type approval	10
C 300 Type approved systems	11
D. Organisation of the documentation types	11
D 100	11
E. General requirements for all documentation	11
E 100	11
F. Terminology	12
F 100 Verbal forms	12
F 200 Vessel	12
G. Qualifications	12
G 100	12
Sec. 2 Documentation Types	13
Discipline A – Administration	13
Discipline B – Stability, watertight and weathertight integrity	13
B010 – Lines plan and offset tables	13
B020 – External watertight integrity plan	13
B030 – Internal watertight integrity plan	13
B040 – Stability analysis	13
B050 – Preliminary stability manual	13
B060 – Floodable length calculation and or subdivision index calculation	13
B070 – Preliminary damage stability calculation	13
B080 – Grain heeling moment calculation	13
B090 – Preliminary grain loading manual	13
B100 – Inclining test and lightweight survey procedure	13
B110 – Inclining test or lightweight survey report	13
B120 – Final stability manual	13
B130 – Final damage stability calculation	14
B140 – Final grain loading manual	14
B150 – Damage control plan	14
B160 – Damage control booklet	14
B170 – Stability in the non-displacement mode	14
B200 – Freeboard plan	14
B210 – Record of conditions of assignment of load lines	14
B220 – Freeboard calculation	14
Discipline C – Mechanical	15

C010 – Design criteria	15
C020 – Assembly or arrangement drawing.....	15
C030 – Detailed drawing	15
C040 – Design analysis.....	15
C050 – Non-destructive testing (NDT) plan	15
C060 – Mechanical component documentation	15
Discipline E – Electrical	15
E010 – Overall single line diagram.....	15
E020 – Principal cable routing sketch.....	16
E030 – Cable selection philosophy	16
E040 – Alternating current (AC) power consumption balance.....	16
E050 – Single line diagrams/ consumer list for switchboards	16
E060 – Direct current (DC) power consumption balance	16
E070 – Direct current (DC) power consumer list	16
E080 – Discrimination analysis	16
E090 – Table of Ex-installation	16
E100 – Voltage drop calculations	17
E110 – Cable data sheet and design drawing.....	17
E120 – Electrical data sheet, general	17
E130 – Electrical data sheet, semiconductor assemblies	17
E140 – Assembly schedules and technical data	17
E150 – Strength calculation with respect to short circuit	17
E160 – Internal arc withstanding report.....	17
E170 – Electrical schematic drawing.....	18
E180 – Switchboard layout	18
E190 – Lighting description.....	18
E200 – Short circuit calculation	18
E210 – Harmonic distortion calculations	18
E220 – Electrical system philosophy	18
E230 – Power supply arrangement	18
Discipline F – Information technology	18
Discipline G – Safety	18
G010 – Risk analysis.....	18
G020 – Emergency and preparedness analysis	18
G030 – Design accidental load specification	19
G040 – Fire control plan	19
G050 – Safety plan.....	19
G060 – Structural fire protection drawing	19
G070 – Source of release schedule	20
G080 – Hazardous area classification drawing.....	20
G090 – Area safety chart or fire protection data sheet.....	20
G100 – Escape and evacuation study.....	20
G110 – Dispersion study	20
G120 – Escape route drawing	21
G130 – Cause and effect diagram	21
G140 – Muster list and emergency instructions.....	21
G150 – Vibration analyses protocol.....	21
G160 – Lifesaving arrangement plan.....	21
G200 – Fixed fire extinguishing system documentation.....	21
Discipline H – Hull and structure.....	22
H010 – Structural design brief	22
H020 – Design load plan.....	22
H030 – Tank and capacity plan.....	22
H040 – Structural categorisation plan.....	22
H050 – Structural drawing.....	23
H052 – Midship section drawing	23
H060 – Shell expansion drawing	23
H070 – Standard details	23

H080 – Design analyses	23
H081 – Design analyses – longitudinal strength	24
H082 – Design analyses – transverse strength	24
H090 – Model test documentation	24
H100 – Equipment number calculation	24
H110 – Loading manual	24
H111 – Preliminary loading manual	25
H112 – Loading sequence description	25
H120 – Docking arrangement plan	25
H130 – Fabrication specification	25
H131 – Non-destructive testing (NDT) plan	25
H132 – Tank testing plan	25
H133 – Erection and inspection plan	25
H140 – Welding tables	25
H150 – Facility plan for in-service inspection	26
H160 – Loading computer test conditions	26
H170 – Loading computer stored characteristic data	26
H180 – Cargo securing manual	27
H190 – Container stowage and securing manual	27
H200 – Ship structure access manual	28
H210 – Protected tank location drawing	28
H220 – Container safe access plan	28
Discipline I – Instrumentation	28
I010 – Control system philosophy	28
I020 – Control system functional description	28
I030 – Block diagram	29
I040 – User interface documentation	29
I050 – Power supply arrangement	29
I060 – Principal cable routing sketch	29
I070 – Instrument and equipment list	29
I080 – Data sheet with environmental specifications	29
I090 – Schematic description of input and output circuits	29
I100 – System diagram	29
I110 – List of controlled and monitored points	29
I120 – Radiation hazard (RADHAZ) control document	29
I130 – Electromagnetic compatibility (EMC) management control document	30
I140 – Software quality plan	30
I150 – Circuit diagram	30
I200 – Control and monitoring system documentation	30
I210 – Integration plan	30
I220 – Interface description	30
I230 – List of application software	31
I240 – Hardware-in-the-loop test package documentation	31
I250 – Hardware-in-the-loop test package report	31
I260 – Control and monitoring systems - periodical test procedure	31
Discipline J – Marine operations	31
Discipline M – Materials	31
M010 – Material specification, metals	31
M020 – Material specification, fire related properties	31
M030 – Material specification, non-metallic materials	31
M040 – Coating specification	32
M041 – Coating specification relating to hazardous materials	32
M042 – Coating technical file (CTF)	32
M050 – Cathodic protection specification, calculation and drawings	32
M060 – Welding procedures	33
M061 – Welding procedure qualification record	33
M070 – List of combustible materials	33
M080 – Inventory of hazardous materials	33
M083 – Hazardous materials documentation - PCB	33

M084 – Hazardous materials documentation - ozone depleting substances	33
M085 – Hazardous materials documentation - appendix 2 substances	33
M100 – Material declaration	34
M110 – Declaration of conformity relating to use of hazardous materials	34
M120 – Hazardous materials location plan	34
Discipline N – Navigation	34
N010 – Bridge design drawing	34
N020 – Vertical field of vision drawing	34
N030 – Horizontal field of vision drawing	34
N040 – Nautical workstation arrangement plan	34
N050 – Navigation bridge windows framing arrangement plan	34
N060 – Manoeuvring booklet	35
N070 – Wheelhouse poster	35
N080 – Pilot card	35
Discipline P – Process	35
P010 – Flow diagram	35
P020 – Sizing calculations	35
P030 – Temperature calculations	35
P040 – Materials selection report	35
P050 – Flare heat radiation study	35
P060 – Safety analysis tables	36
P070 – Pressure vessel integrity study	36
P080 – Flare and blowdown system report	36
Discipline Q – Quality management	36
Q010 – Quality manual	36
Q020 – Document control procedure	36
Discipline S – Piping	36
S010 – Piping diagram (PD)	36
S011 – System diagram (P&ID)	36
S020 – Pressure drop analysis	37
S030 – Capacity analysis	37
S040 – Control diagram	37
S041 – Pneumatic control diagram	37
S042 – Hydraulic control diagram	37
S050 – Connections to the shell and to sea chests	37
S060 – Pipe routing sketch	37
S070 – Pipe stress analysis	37
S080 – Thermal stress analysis	37
S090 – Specification of piping, valves, flanges and fittings	37
S100 – Line index	37
S110 – Shadow diagram	38
S120 – Heat balance calculation	38
S130 – Filling and or discharge time calculation	38
S140 – Procedures and arrangements manual	38
S150 – Shipboard oil pollution emergency plan (SOPEP)	38
S160 – Shipboard marine pollution emergency plan for noxious liquid substances (SMPEP)	38
Discipline T – Telecommunications	39
T010 – Functional description	39
T020 – Block diagram	39
T030 – User interface	39
T040 – Power supply arrangement	39
T050 – Principal cable routing sketch	39
T060 – Data sheets with environmental specifications	39
Discipline U – Subsea	39
Discipline V – Heating, ventilation and air conditioning	39
V010 – Ducting diagram (DD)	39
V011 – System diagram (D&ID)	39

V020 – Pressure drop analysis	40
V030 – Capacity calculation	40
V040 – Hydraulic or pneumatic control diagram	40
V050 – Duct routing sketch	40
V060 – Penetration drawings	40
V070 – Flow diagram.....	40
Discipline W – Geotechnology.....	40
W010 – Typical soil conditions	40
W020 – Soil investigation report	40
W030 – Pile foundation design	40
W040 – Gravity foundation design	40
W050 – Anchor foundation design	41
Discipline Y – Pipeline and riser technology	41
Multidiscipline Z	41
Z010 – General arrangement plan.....	41
Z030 – Arrangement plan	41
Z040 – Vessel specification	41
Z041 – Ship construction file.....	41
Z050 – Design philosophy	42
Z060 – Functional description	42
Z070 – Failure mode description	42
Z071 – Failure mode and effect analysis	42
Z080 – Reliability and availability analysis.....	42
Z090 – Equipment list.....	42
Z100 – Specification	43
Z110 – Data sheet.....	43
Z120 – Test procedure at manufacturer	43
Z130 – Report from test at manufacturer	43
Z140 – Test procedure for quay and sea trial.....	43
Z150 – Report from quay and sea trial.....	43
Z160 – Operation manual.....	43
Z170 – Installation manual.....	43
Z180 – Maintenance manual	43
Z200 – Environmental regularity number (ERN) calculation.....	43
Z201 – Position keeping capability plot.....	44
Z210 – Design basis	44
Z220 – Vessel operation manual - Ship	44
Z221 – Vessel operation manual - Offshore	44
Z222 – Vessel operation manual - HS, LC and NSC.....	44
Z230 – Ballast water management plan	45
Z240 – Calculation report	45
Z241 – Measurement report.....	45
Z242 – Installation report.....	45
Z250 – Procedure	45
Z260 – Vessel certificate.....	45
Z270 – Product certificate	45
Z280 – Type approval certificate	46
Z290 – Record.....	46
Z300 – Declaration.....	46
Z310 – Inspection manual	46
Z320 – Document register.....	46

SECTION 1 GENERAL

A. Scope and purpose of the DocReq

A 100 DocReq scope

101 The Nauticus Production System (NPS) DocReq is a compilation of all DNV's documentation requirements related to plan approval. The DocReq covers all regimes as defined in NPS, i.e.:

Table A1 Regimes	
HSLC	High speed, light craft
Naval-H	Naval, HS, LC and NSC rules
Naval-S	Naval, ship rules
Offshore	Offshore
Ship	Ship

The DocReq covers all class related documentation requirements, and documentation requirements related to a selected set of statutory regulations.

A 200 DocReq purpose

201 The purpose of the DocReq is to provide a basis to verify that selected, safety critical parts of the requirements of the applicable DNV rules and statutory regulations are complied with in the design of the vessel. A satisfactory document review is a prerequisite for assignment of DNV class and issue of statutory certificates. The document review shall be complemented by surveys and review of the client's quality system.

A 300 Assumptions

301 The documentation requirements are laid down under the following assumptions:

- The client's capabilities and competence conforms with the project's objectives
- The client operates according to acceptable quality management principles (e.g. ISO 9000)
- A thorough description of the project's conceptual design, through philosophy documents etc., are submitted early in the project.

If DNV does not consider the above assumptions to be fulfilled, additional documentation will be required to be submitted.

A 400 Industrial practise

401 The organisation and content of the documentation requirements is based on DNV's understanding of common industrial practice. Alternative approaches will be considered, provided that the information submitted covers the information requested through the documentation requirements and that unnecessary documentation is avoided.

A 500 Vessels under conversion

501 Documentation requirements applicable for vessels under conversion shall be determined on a case by case basis.

A 600 Document coverage

601 A document may cover more than one function or component. A document may cover more than one documentation type.

B. Organisation of the DocReq

B 100 Assignment of the documentation requirements

101 The documentation requirements are assigned to the functions and components defined in the Generic product model. For a specific vessel, only the documentation requirements assigned to the vessel specific product model will be included.

B 200 Documentation types - definitions

201 The documentation requirements are based on standardised documentation types. The purpose of this document is to provide definitions of the documentation types.

B 300 Relevance criteria

301 Relevance criteria are assigned to each documentation requirement, in order to determine if the documentation requirement is applicable for a specific vessel. The following relevance criteria are used:

- regimes (ref. Table A1)
- class notations including qualifiers
- vessel certificates
- flags
- registries
- vessel purposes
- vessel shapes
- main propulsion principles
- gross tonnage
- age
- newbuilding / class entry.

B 400 Yard or manufacturer

401 Each documentation requirement is marked with Y, M or O, which signifies:

Y: The builder (Yard) is responsible for providing the corresponding documentation. The documentation is reviewed by DNV as a part of the class contract

M: The manufacturer is responsible for providing the corresponding documentation. The documentation is reviewed by DNV as a part of the Certification of Materials and Components (CMC) contracts.

O: The owner is responsible for providing the documentation.

B 500 For approval or for information

501 Each documentation requirement is marked with AP or FI which signifies:

AP: The corresponding documents shall be submitted for approval.

FI: The corresponding documents shall be submitted for information only.

B 600 Type approved systems and equipment

601 Some documentation requirements are marked with TA, which signifies that the corresponding documents shall not be submitted for type approved systems and equipment.

B 700 Local handling

701 Some documentation requirements are marked with L, which signifies that the corresponding documents normally shall be reviewed at the local DNV office only.

B 800 On request

801 Some documentation requirements are marked with R, which signifies that the corresponding documents shall be submitted on request only.

B 900 As carried out

901 Some documentation requirements are marked with ACO, which signifies that the “as carried out” issue of the corresponding documents shall be submitted.

B 1000 Ship construction file

1001 Some documentation requirements are marked with SCF, which signifies that the corresponding documents shall be included in the “Ship construction file”. See also documentation type Z041.

C. Type approved products

C 100 Reference to certificate

101 For type approved systems and equipment, written reference shall be made to the type approval certificate number, the manufacturer's name and product type identification. Copies of the type approval certificates shall not be submitted unless required by 301.

C 200 Documentation covered by the type approval

201 For type approved systems and components, the documents corresponding to documentation requirements marked with 'TA' shall not be submitted. However, the corresponding documents shall be

submitted if:

- The type approval does not cover the design aspects related to the documentation requirement
- The design of the system or component has been modified after the type approval.

C 300 Type approved systems

301 For type approved systems, where different options exist for the configuration, a copy of the type approval certificate shall be submitted, completed with information about the equipment that is incorporated in the design.

D. Organisation of the documentation types

D 100

101 The documentation types defined in this document are organised according to disciplines as defined in NPS, i.e.:

Table D1 Disciplines	
Code	Title
A	Administration
B	Stability, watertight and weathertight integrity
C	Mechanical
E	Electrical
F	Information technology
G	Safety
H	Hull and structure
I	Instrumentation
J	Marine operations
M	Materials
N	Navigation
P	Process
Q	Quality management
S	Piping
T	Telecommunications
U	Subsea
V	Heating, ventilation and air conditioning
W	Geotechnology
Y	Pipeline and riser technology
Z	Multidiscipline

E. General requirements for all documentation

E 100

101 The English language should be used. Other languages may be used upon special agreement.

The documentation may be submitted on paper or as an electronic file. For electronic files, the format and transfer method shall be agreed.

Each drawing shall include a title field stating:

- name of vessel (when known)
- name of document issuing company
- name and signature of originator and verifier
- document no.
- document title
- revision no.
- issue date
- scale
- set of measurement units used in the document, e.g. *System International*.

Symbols used shall be explained, or reference to a standard code shall be given.

Any documents submitted for re-approval or re-examination shall be especially marked to identify the revised parts.

The document title should not include the name of the vessel. The document title should include the function or component covered by the document.

Unique revision numbers shall be allocated to all issues of a document, including the first issue. For documents with multiple sheets, the revision number should be the same for all sheets.

F. Terminology

F 100 Verbal forms

101 *Shall*: Indicates a mandatory requirement to be followed for fulfilment or compliance with the present guideline.

Should: Indicates a recommendation that a certain course of action is preferred or particularly suitable. Alternative courses of action are allowable, but shall be justified and documented.

May: Indicates a permission, or an option, which is permitted.

Can: Requirements with can are conditional and indicate a possibility.

F 200 Vessel

201 The term “vessel” used in this document shall be understood as “ship”, “craft”, “offshore unit” or “offshore installation”, as applicable.

G. Qualifications

G 100

101 All statements and requirements given in this document shall be understood “as applicable” or “as relevant” for the vessel in question. Such qualifications are therefore not included in the definition of the individual documentation types.

SECTION 2

DOCUMENTATION TYPES

Discipline A – Administration

No special documentation types are defined for the administration discipline.

Discipline B – Stability, watertight and weathertight integrity

B010 – Lines plan and offset tables

A document providing information on the hull form including appendages, superstructure and deck houses contributing to the buoyancy in the stability calculations. For details, see Classification Note No. 20.1.

B020 – External watertight integrity plan

A document providing information on all external openings (air pipes, ventilators, hatches, doors, etc.) of volumes affecting stability calculations. This information may be included in the freeboard plan (B200). For details, see Classification Note No. 20.1.

B030 – Internal watertight integrity plan

A document providing information on items affecting damage stability calculations, such as internal subdivision, possibility of progressive flooding from one compartment to another through internal openings, pipes, tunnels or ventilation ducts and pipes, ducts, tunnels in the damage penetration zone specified in the damage assumptions. For details, see Classification Note No. 20.1.

B040 – Stability analysis

A document stating the determination of the limiting maximum allowable vertical centre of gravity (VCG), and eventually other limitations related to floatability and stability.

B050 – Preliminary stability manual

A document providing general stability information, including documentation necessary to demonstrate compliance with the applicable rules and regulations. For details, see Classification Note No. 20.1.

B060 – Floodable length calculation and or subdivision index calculation

A document providing floodable- and permissible length curves, calculation of permeability, criterion of service and factor of subdivision.

B070 – Preliminary damage stability calculation

A document providing all relevant damage stability information, including documentation necessary to demonstrate compliance with the applicable rules and regulations. For details, see Classification Note No. 20.1.

B080 – Grain heeling moment calculation

A document providing the determination of the maximum allowable grain heeling moments, relative to displacement and vertical centre of gravity (VCG). The calculation should contain the mentioned limits, and in addition underlying data related to calculation of grain heeling moments. For details, see Classification Note No. 20.1.

B090 – Preliminary grain loading manual

A document providing general grain stability information, including documentation necessary to demonstrate compliance with the applicable rules and regulations. For details, see Classification Note No. 20.1.

B100 – Inclining test and lightweight survey procedure

A document providing all information for the specific ship necessary to conduct an inclining test or lightweight survey in accordance with the recommendations. For details, see Classification Note No. 20.1.

B110 – Inclining test or lightweight survey report

A document providing the actual records from the inclining test or lightweight survey as well as calculation of lightweight data; weight, longitudinal centre of gravity (LCG) and vertical centre of gravity (VCG). For details, see Classification Note No. 20.1.

B120 – Final stability manual

A document providing the same content as the preliminary stability manual (B050), however updated with

respect to the approved lightweight data and any comments in connection with the preliminary approval.

B130 – Final damage stability calculation

A document that is the revised preliminary damage stability calculation (B070) according to the approved light ship particulars after the inclining test or lightweight survey, and any comments in connection with the preliminary approval.

B140 – Final grain loading manual

A document providing the same content as the preliminary grain loading manual (B090), however updated with respect to the approved lightweight data and any comments in connection with the preliminary approval.

B150 – Damage control plan

A document including inboard profile, plan views of each deck and transverse sections to the extent necessary to show the location and arrangement of all items affecting the vessel's damage stability. For details, see Classification Note No. 20.1.

B160 – Damage control booklet

A document providing the information required for the damage control plan (B150). In addition, the damage control booklet should include general instructions for controlling the effects of damage. For details, see Classification Note No. 20.1.

B170 – Stability in the non-displacement mode

A document describing the stability of a vessel operating in the non-displacement mode. Details shall be agreed on in each separate case and may involve simulations and/or model tests.

B200 – Freeboard plan

A document providing:

- information about deepest draught for the vessel
- arrangement plan showing openings and closing appliances with the purpose of retaining the vessel's external watertight integrity, e.g.:
 - external doors
 - cargo hatches
 - service hatches
 - shell doors and ramps (bow, side and stern)
 - side scuttles and windows
 - sanitary discharges and garbage chutes
 - freeing ports and scuppers
 - sea water inlet and discharge valves
 - air pipes including vent heads
 - ventilators including closing appliances
 - engine room skylights.
- arrangement plan showing equipment for protection of the crew, e.g.:
 - gangways, passageways, under deck passages and life lines
 - guard rails and bulwarks.

B210 – Record of conditions of assignment of load lines

A record of the opening and closing appliances on board the vessel. A form accepted by the Maritime Safety Committee is included in the IMO publication 'Load Lines', 2002 edition, Part 6. Form 44.401a 'Initial Load Line Survey' is the corresponding DNV version.

The record shall be kept on board together with the International Load Line Certificate, and it is the responsibility of the authority that issues the International Load Line Certificate that the record is updated according to the current status for the vessel.

B220 – Freeboard calculation

A calculation showing that the vessel complies with the required minimum freeboard as required by the International Convention on Load Lines Annex I Ch.III.

Discipline C – Mechanical

C010 – Design criteria

Dimensioning criteria, e.g.:

- applied loads, static and dynamic
- rating with respect to power, temperature, pressure, etc.
- environmental conditions.

C020 – Assembly or arrangement drawing

A drawing showing how the parts of a mechanical assembly are arranged together.

C030 – Detailed drawing

A drawing showing geometric dimensions, scantlings and arrangement of the object. The drawing shall include, or a reference shall be made to separate documents covering:

- Details of parts and openings.
- Material specifications (see M010 or M030).
- For important components of welded construction, full details of joints, welding procedures, filler metal particulars and heat treatment after welding specification.
- Fabrication tolerances.

C040 – Design analysis

A document providing:

- objectives
- premises
- assumptions
- conclusions.

relating to analysis of:

- static strength
- dynamic strength
- vibration.

C050 – Non-destructive testing (NDT) plan

A document describing the methods, extent and criteria for the non-destructive testing that shall be performed.

C060 – Mechanical component documentation

The documentation shall be based on a relevant selection from the following documentation types:

- C010 Design criteria
- C020 Assembly or arrangement drawing
- C030 Detailed drawing
- C040 Design analysis
- C050 Non-destructive testing (NDT) plan
- E090 Table of Ex-installation
- M010 Material specification, metals
- S090 Specification of piping, valves, flanges and fittings.

as applicable for the component.

Discipline E – Electrical

E010 – Overall single line diagram

A diagrammatic drawing showing:

- power system layout with identification of all generators, transformers, switchboards, distribution boards, battery systems and major consumers
- system voltages and system earthing
- rating of generators (kVA/kW). If a prime mover is also used for driving other machinery, this shall be stated on the overall single line diagram
- rating of all transformers (kVA) in the distribution system
- ratings of any major consumers (kVA/kW).

E020 – Principal cable routing sketch

A sketch showing the principal cable routing, including principal routing to redundant consumers and routing of emergency power distribution in relation to normal power distribution together with information on fire divisions and high fire risk areas. The information shall be presented as a principal sketch, not as detailed drawings for all cable routings.

E030 – Cable selection philosophy

A document stating criteria for selection and dimensioning of cables with respect to types and sizing for different voltage levels and cable lengths.

E040 – Alternating current (AC) power consumption balance

A document stating the calculated design values for power consumption and available power for operational modes as:

- normal operation
- manoeuvring
- special operations, e.g. dynamic positioning, thruster assisted position mooring, crane operations, cargo handling and drilling
- emergency.

Tripping of non-important consumers shall be identified in the calculation.

E050 – Single line diagrams/ consumer list for switchboards

Single line diagram/ consumer list for all switchboards and consumers, with information on switchboard connection, consumer ratings, cable dimensions and setting of protective devices.

E060 – Direct current (DC) power consumption balance

Calculated design values for power consumption and available battery capacity in emergency mode and during black out. The calculation shall include discharge characteristics for the batteries.

Tripping of non-important consumers shall be identified in the calculation.

E070 – Direct current (DC) power consumer list

A list of battery and UPS (uninterruptible power supply) supplied consumers with indication of redundant consumers.

E080 – Discrimination analysis

A document describing the discrimination for all feeders in the distribution system including a list of all settings of protection for short circuit, overcurrent and earth fault. This calculation shall include main switchboards, emergency switchboards, and all sub-distribution systems including battery and UPS (uninterruptible power supply) systems. The analysis shall state maximum and minimum short circuit currents as well as the generator's decrement curve. If documented by graphical diagrams, these values shall be shown on the diagrams.

E090 – Table of Ex-installation

Table with information for all equipment installed in hazardous areas as required in Ship / HSLC Pt.4 Ch.8 Sec.11 Table B1.

Table B1 Schedule of information on installations in hazardous areas	
<i>Information element</i>	<i>Description</i>
Identification	Tag number or other reference used for marking of the specific equipment. This shall be the same in the documentation as on the physical installation
Equipment type	Descriptive title of equipment, e.g. "cable gland", "fire detector"
Location of equipment	The relevant location of the equipment, according to the hazardous area classification drawing
Manufacturer	Name and nationality of manufacturer
Type designation	Manufacturers' type designation
Certification body, certificate number and type of protection	Identification of certifying body, the Ex certificate number and type of Ex protection
Special conditions	If the certificate number ends with "X" or "U", compliance with the special conditions given in the certificate shall be stated
Is-circuit limits and values	For intrinsic safe circuits the maximum parameters and values contained in the circuit with respect to voltage versus capacitance (Ceq) and current versus inductance (Leq) shall be listed for each circuit. The maximum values for the applied safety barrier shall be included

Table B1 Schedule of information on installations in hazardous areas (Continued)	
<i>Information element</i>	<i>Description</i>
T _E -time	For motors and transformers located in a zone 1, certified as “increased safe”, Ex-e, the T _E -time shall be listed together with the release time of the associated over current protection
IP-rating	Ingress protection rating of the equipment

E100 – Voltage drop calculations

Voltage drop calculations. Both stationary values as well as the voltage drop when starting large consumers can be requested, (e.g. the voltage drop between the main switchboard to the motor terminals when a motor, rated above 30% of the feeding generator(s) or transformer(s) rated power, is started direct on line.

E110 – Cable data sheet and design drawing

For cables that are not type approved:

- maker
- cable types and number of cores - conductor cross-sections (mm²)
- cross sectional drawing
- number of strands in each conductor
- insulation thickness (mm)
- sheath thickness inner and outer (mm)
- braiding core diameter (mm)
- overall diameter (mm)
- field of application
- voltage class root mean square.
- insulating material
- insulating screening
- material inner sheath
- material outer sheath
- material outer braid
- manufacturer’s type test report (Will only be requested from manufacturers without any type approved cables).
- fire test results if relevant

E120 – Electrical data sheet, general

A document stating:

- design values for environmental conditions
- cooling system or ventilation description and design parameters
- IP rating related to intended location onboard
- input frequency and voltages, with tolerances
- designed short circuit strength (peak value at half period and symmetrical root mean square)

E130 – Electrical data sheet, semiconductor assemblies

A document stating:

- description of the semiconductor device, with information of intended use, cooling and type of semiconductor elements
- input and output voltage and frequency, with tolerances
- rating (kVA).

E140 – Assembly schedules and technical data

A document stating:

- internal power cable and busbar dimensions in the equipment
- table with switchgear rating for power circuits (e.g. making and breaking capacity).

E150 – Strength calculation with respect to short circuit

A document providing calculations of the bus-bar strength. Applicable for switchboards rated for short circuit strength in excess of 50 kA only. Both thermal and mechanical effects shall be considered.

E160 – Internal arc withstanding report

A document providing a description of switchboard construction and compartment separation, showing that the assembly will withstand an internal arc, e.g. testing in accordance with IEC 62271-200 Appendix A. Applicable for all high voltage assemblies.

E170 – Electrical schematic drawing

Information on protection, synchronisation, breaker interlocks, undervoltage trips, remote control circuits.

E180 – Switchboard layout

A drawing showing the location of instruments and devices for operation (panel layout).

E190 – Lighting description

A document describing the design of normal, emergency, transitional and battery back-up lighting for all areas onboard.

E200 – Short circuit calculation

A document stating the short circuit levels (peak value and symmetrical root mean square at 0.5 cycle) for all switchboards in the distribution system.

For four-wire systems, single pole earth fault currents shall also be given.

E210 – Harmonic distortion calculations

Content of voltage harmonic distortion when more than 20% of connected load is by semi-conductor assemblies, in relation to connected generating capacity. Harmonic distortion should be given for all operating modes of the system.

E220 – Electrical system philosophy

The system philosophy shall include information on the following - as relevant:

- configuration of the system in all operating modes and subsequent power distribution philosophy for different vessel systems or services (essential, important and emergency services)
- functionality of any system for automatic start and stop of generator prime movers and automatic operation of breakers
- system behaviour in relevant failure modes
- dead ship recovery arrangement
- blackout recovery arrangement.

E230 – Power supply arrangement

A document providing:

- Electrical diagrams, showing the sources and distribution of electric power supply to identified equipment, and their connections to uninterruptible power supply (UPS) or battery and emergency power supplies.
- Specifications for UPS units and batteries.

Discipline F – Information technology

No special documentation types are defined for the information technology discipline.

Discipline G – Safety

G010 – Risk analysis

An analysis including a systematic identification of and categorisation of risk to people, environment, assets and financial interests. The risk analysis shall include criteria for the acceptable levels of risk in the activities.

Guidance note:

The term risk analysis is used in a broad sense. It comprises a number of different methods for risk analysis, both quantitative and qualitative, of technical, operational, human and/or organisational nature. The methods for risk analysis shall be selected to answer the needs of the problems to be analysed. Several methods may be applied in parallel or in combination. Thus possible interaction between technical, human and organisational aspects may be revealed in the assessment of risk.

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

G020 – Emergency and preparedness analysis

A systematic procedure for the purpose of adapting the emergency preparedness of the activities to the defined situations of hazard and accident, in accordance with the specific emergency preparedness requirements for the activity in question.

Guidance note:

This is a systematic process in order to establish an emergency preparedness designed for the characteristics and the

identified requirements for the activity concerned. Such analysis should include an assessment of a possible development of the defined situations of hazard and accident. The purpose shall be to arrive at the most suitable measures to meet the specific emergency preparedness requirements of the activity.

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

G030 – Design accidental load specification

A document providing a summary of loads resulting from the dimensioning accidental events.

Dimensioning accidental event: Accidental event which according to the defined acceptance criteria represents an unacceptable risk, and which consequently serves as basis for design and operation of installations and otherwise for implementation of the activities.

G040 – Fire control plan

An arrangement plan for each deck showing the location, identification and number of:

- control stations
- fire sections enclosed by “A” class divisions
- fire sections enclosed by “B” class divisions
- fire detectors
- manual call points
- fire detection systems
- fire alarm sounders, e.g. bells or loudspeakers
- fire 125 panels
- fixed fire fighting systems including release stations, for accommodation, boiler rooms, engine rooms, paint lockers, cargo spaces and cargo pump rooms, and deck foam on tankers
- portable fire extinguishing appliances
- means of access to compartments, decks, etc., including escape routes
- for ventilation systems, dampers and control stations for fans, stop of forced ventilation and closing of inlets and outlets
- gas detectors
- emergency escape breathing devices (EEBDs) within accommodation and machinery spaces
- fire pumps (main and emergency), fire main, hydrants, hoses and nozzles
- remote stop of fuel oil pumps and quick closing valves for fuel oil tanks
- locations of fire control plans.

The boundaries for and the identification of the fire areas shall be shown.

The symbols used shall be in accordance with IMO Resolutions A.952(23) (ships built after 01.01.2004) and A.654(16) (ships built before 01.01.2004). The legend shall be in the national language and in English. The vessel's name or other identification shall be included.

G050 – Safety plan

An arrangement plan for each deck showing the location of all lifesaving equipment.

- The symbols according to IMO Res. A. 760(18) as amended by IMO Res. MSC. 82(70) or ISO 17631 shall be used.
- The symbols shall be in colour, and all symbols in the referred standards shall be used if the equipment is found on board.
- The muster stations shall be numbered if more than one.
- The safety plan can only be combined with the fire control plan when the number of equipment and symbols are limited and thereby easily readable and tidy.
- The safety plan shall have a clear heading stating “Safety plan”. If combined with the fire control plan, the heading “Fire control and safety plan” shall be used.

G060 – Structural fire protection drawing

A drawing showing the arrangement of the structural fire protection, including:

- method of construction
- categorization of spaces
- horizontal and vertical fire class divisions, including A-0
- main horizontal and vertical fire zones
- draught stops
- typical method of heat bridge insulation
- method of construction of continuous “B” class ceiling or linings contributing to insulation and fire integrity of fire divisions
- fire integrity and type of doors in class divisions, including information if self-closing is arranged.

G070 – Source of release schedule

A schedule of release sources, i.e. points from which a flammable gas, vapour or liquid may be released into the atmosphere, including the following information:

- physical location of source
- identification of the physical item that may leak, e.g. a pipe flange, together with line number, tag number, etc.
- grade of release
- types of flammable gas, vapour or liquid that may leak
- possible leak (m³/h).

G080 – Hazardous area classification drawing

An arrangement plan for each deck showing the location and extent of the hazardous area zones, and the location of:

- air intakes
- exhausts
- ventilation system
- doors
- air locks and openings.

The capacity and type of ventilation, e.g. natural, mechanical or pressurised shall be indicated.

G090 – Area safety chart or fire protection data sheet

For each fire area, a chart detailing:

- fire area identification and location
- area classification
- type of ventilation
- expected personnel occupancy
- area enclosure and fire rating
- hazards
- types and locations of fire detectors
- types and locations of gas detectors
- location of manual call points
- location of manual release points
- active fire protection
- a matrix relating typical input signals from detectors, release points, etc. to typical output actions.

G100 – Escape and evacuation study

A document describing:

For passenger vessels:

Calculation of evacuation capacity from enclosed spaces within each main vertical zone, taking into account all persons using the stairway enclosures in each zone. The calculation shall be used to determine the minimum stairway and door width at each deck level.

For ro-ro passenger vessels:

Evacuation analysis to identify and eliminate congestion which may develop during an abandonment, due to normal movement of passengers and crew along escape routes, including the possibility that crew may need to move along these routes in a direction opposite to the movement of passengers.

For high-speed craft:

Evacuation time calculation showing the intended time used for evacuation into survival craft.

For offshore units and installations:

- escape and evacuation system
- methodology used in the analysis, including scenario definitions
- input data, e.g. number of people onboard, speed of movement and capacity of evacuation means
- assumptions
- scenario assessments
- possible impacts of accidental events on personnel.

G110 – Dispersion study

An analysis covering gas dispersion from gas vents.

G120 – Escape route drawing

Arrangement drawings where the primary and secondary escape routes are shown. The following shall be identified, including dimensions:

- escape routes and their directions
- escape route connections to other levels and areas
- compartments and their functions
- safe areas
- muster stations
- evacuation means
- doors including opening directions
- stairs and ladders, both including inclination, and trunks
- life saving appliances.

G130 – Cause and effect diagram

A matrix showing all inputs (causes) to a system and all corresponding outputs (effects). This documentation type is relevant for safety shutdown systems. Where more than one sheet is necessary for the matrix, the cause and effect diagram shall be organised according to physical areas of the vessel. All causes and effects shall be given a descriptive text, and shall be easily traceable to the corresponding arrangement plans (Z010 or Z030), system diagrams as PD (S010), P&ID (S011) or D&ID (V011), or overall single line diagrams (E010). Information about fail-safe mode shall be included for all input and output lines, see also schematic diagrams of input and output circuits (I090).

G140 – Muster list and emergency instructions

A drawing showing clear instructions that shall be followed in the event of an emergency for every person on board. These instructions shall be drawn up in the language or languages required by the vessel's flag state and in the English language. The muster list shall show:

- sound of general emergency alarm and how the public address system is utilised
- action to be taken by crew and passengers when this alarm is sounded
- the duties assigned to the different members of the crew
- officer(s) responsible for maintenance and readiness of fire fighting, life saving appliances and external communication
- substitutes for key persons
- duties assigned to members of the crew in relation to passengers.

G150 – Vibration analyses protocol

A list of the positions where the vibration level shall be measured, including the corresponding vibration levels.

G160 – Lifesaving arrangement plan

Detailed drawing(s) showing the arrangement of survival- and rescue craft stowage, boarding, release and launching.

- Launching under normal condition and unfavourable conditions of trim of up to 10° and list up to 20° either way, or to the angle at which the ship's weather deck edge becomes submerged shall be shown for maximum and minimum draught.
- If the final trim or list exceeds the values according to the LSA Code paragraph 6.1.1.2, this shall be indicated on the drawing. The launching appliances shall be specially designed, tested and certified for these values.
- The painter for launching of the lifeboat on cargo ships of 20 000 GT or more and rescue boat for all ships when the ship is making headway speed shall be shown.
- The travelling of the rescue boat's keel and davit launched survival craft's keel from stowed position shall be shown.

G200 – Fixed fire extinguishing system documentation

The documentation shall be based on a relevant selection from the following documentation types:

- I200 Control and monitoring system documentation.
- S010 Piping diagram.
- S030 Capacity analysis, including pressure drop calculations and application rates.
- Z030 Arrangement plan.
- Z160 Operation manual, including release instructions as applicable for the system.

Discipline H – Hull and structure

H010 – Structural design brief

A description of the intended procedures to be adopted in the structural design of the vessel. Limit states for the temporary and operational design conditions relevant for class shall be considered.

A summary of the items that should be included are listed below:

Introduction

- general description of the vessel, including main dimensions and draughts
- class notations
- service life of vessel
- position keeping system description
- list of rules, regulations, standards and codes, including revisions, that shall be used in the design process.

Description of analysis models

- global analysis models
- local analysis models
- loadcases to be analysed.

Description of analytical procedures

- evaluation of temporary conditions
- consideration of accidental events
- evaluation of fatigue loads
- air gap evaluation including locations to be considered, damping, asymmetry factors, disturbed (radiated) wave considerations and combined motion response
- establishment of dynamic responses, including methodology, factors and parameters
- inclusion of “built-in” stresses
- consideration of local responses, e.g. those resulting from mooring and riser loads, ballast distribution in pontoon tanks, etc.
- consideration of structural redundancy.

Description of the structural evaluation process

- description of procedures to be utilised for considering global and local responses
- description of fatigue evaluation procedures, including use of design fatigue factors, SN (stress and number of cycles) -curves, basis for stress concentration factors, etc.
- description of procedures to be utilised for code checking.

H020 – Design load plan

A drawing showing:

- deck uniform (lay-down) loads
- major loads from heavy equipment, e.g. modules, cranes, winches, life boat structures, flare tower, risers, etc.

For all vehicles, also cargo handling vehicles:

- type of vehicles including maximum axle load and details of wheel and/or foot print arrangement
- stowing plan including the most unfavourable combination of vehicles that may be positioned on deck.
- Helicopter loads, landing and parking

H030 – Tank and capacity plan

A plan of the vessel with location and identification of spaces and tanks. Information about density, volumes, equipment weight, centre of gravity and liquid temperature. Tank loading criteria for all tanks, including a description of the loading system, with:

- loading arrangements
- height of air pipes
- loading dynamics
- densities
- tank testing pressures.

H040 – Structural categorisation plan

A plan showing the structural categorisation of all main bearing structure.

H050 – Structural drawing

A drawing showing geometric dimensions, scantlings and arrangement of the object. The drawing shall include, or a reference shall be made to separate documents covering:

- Details of parts and openings
- Material specifications (see M010 or M030)
- Standard details (see H070)
- Details of joints, welding procedures, filler metal particulars and heat treatment after welding specification
- Inspection category, if not default category
- Procedure for stress relieving of cast steel parts.

H052 – Midship section drawing

A drawing of the midship transverse section providing information of geometric dimensions, scantlings and material type.

The following information shall be included on the drawing:

- main particulars L, B, D, T, C_B
- maximum service speed V
- class notations.

For class notations **POLAR** and **Icebreaker**, the following shall be included:

- maximum design ramming speed (V_{RAM}) in ice infested waters
- design speed for continuous icebreaking operation (V_B).

H060 – Shell expansion drawing

A drawing showing the shell expansion including load and ballast water lines and the extent of the flat part of bottom and sides. For class notation **ICE**, the following shall be included:

- lines separating forward, amidships and aft ice regions of the ice belt
- displacement in fresh water and output of propulsion machinery.

For survey arrangement **BIS**, the following marking and locations shall be included:

- markings for identification of tanks
- openings in sides and bottom
- bottom plugs, echo sounder etc.

H070 – Standard details

A set of drawings showing standard details used in the structure. Each detail should be identified on the structural drawings (H050).

H080 – Design analyses

The design analyses shall document that the structure fulfils the different design conditions. The design analyses should include:

- objective
- scope
- design basis
- calculations
- discussion of the results
- conclusion
- references.

The following types of analyses may be relevant:

Motion and hydrodynamic load analysis

A summary of those items normally to be included in the design basis:

- environmental design criteria including parameters for all conditions, including:
 - wave description, i.e. sea spectrum, steepness criteria, maximum wave height and wave spreading function
 - wind, current, snow and ice description
 - design temperatures.
- design criteria for temporary phase conditions relevant for class including:

- limiting permanent, variable and environmental criteria
- procedures associated with construction, including major lifting operations
- essential design parameters associated with temporary phases, e.g. mating loadcases, upending, mating weld- up sequences, crushing tube stiffness, transit phases, transit speed, etc.
- criteria in case of accidents
- draughts.
- design criteria for the operational phase conditions including:
 - limiting permanent, variable and environmental load criteria, including survival
 - design loadcase, including global mass distribution
 - draught
 - designing accidental event criteria's
 - mooring actions.
- basis information necessary for the assessment of air gap sufficiency, including:
 - a description of the requirements to be applied
 - basis model test report.

Global analysis

Fatigue analysis

Air gap analysis

Accidental damage analysis

Finite element analysis

- Description of the model
 - geometry
 - element properties, thickness and element axes
 - description of loadcases
 - summary and discussion of results
 - concluding remarks.

H081 – Design analyses – longitudinal strength

All longitudinal strength calculations together with the following information:

- maximum still water bending moments and shear forces
- still water bending moment limits
- mass of light ship and its longitudinal distribution
- buoyancy data
- cargo capacity
- cargo, ballast and bunker distribution, including mass of cargo in each compartment.

H082 – Design analyses – transverse strength

All transverse strength calculations together with the following information:

- maximum still water bending moments and shear forces
- still water bending moment limits
- mass of light ship and its longitudinal distribution
- buoyancy data
- cargo capacity
- cargo, ballast and bunker distribution, including mass of cargo in each compartment.

H090 – Model test documentation

A document containing descriptions of and results from model tests performed.

H100 – Equipment number calculation

Calculation of equipment number including calculation of areas.

H110 – Loading manual

The loading manual should contain the design loading and ballast conditions, subdivided into departure and arrival conditions, and ballast exchange at sea conditions, where applicable, upon which the approval of hull

scantlings is based, see Rules for Classification of Ships Pt.3 Ch.1 Sec.5 B100. Possible specifications are:

- draught limitations (in ballast etc.)
- load specifications for cargo decks
- cargo mass- and cargo angle of repose restrictions
- cargo density- and filling heights for cargo tanks
- restrictions to GM-value.

H111 – Preliminary loading manual

The preliminary loading manual shall contain the information listed in H110 but is based on preliminary ship data and shall be used to determine design loads to be used in strength approval of the vessel.

H112 – Loading sequence description

Relevant loading sequences, with average loading rates, for the following conditions shall be defined:

- homogeneous condition (one and two grade loading)
- alternate conditions.
- relevant part loading conditions

Each step in the loading sequences from commencement of cargo loading to full deadweight is reached, step-wise synchronized with the de-ballasting operation, shall be documented. Each time the loading equipment changes position to a new cargo hold is defined as a step.

For all relevant loading sequences, a summary of all steps shall be included with at least the following information included:

- how much cargo is filled in each cargo hold during the different steps
- how much ballast is discharged from each ballast tank during the different steps
- the maximum still water bending moment and shear force at the end of each step
- the ship's trim and draught at the end of each step.

H120 – Docking arrangement plan

A drawing showing arrangement and size of docking blocks. Relevant weight distribution and calculated load on blocks should be included.

H130 – Fabrication specification

A document describing:

- qualification and acceptance of fabrication procedures and personnel
- correct identification, documentation and use of materials
- inspection of preparatory work (assembly, fit-up form work, reinforcements, preheating, etc.)
- erection sequence
- inspection of fabrication work for compliance with specifications and procedures
- fabrication tolerances
- witnessing NDT, control and testing
- repairs and inspection of repairs
- welding inspection
- methods for ensuring the functionality of examination and testing equipment and of recording and measuring devices vital for the correct functioning of equipment and machinery used in fabrication.

H131 – Non-destructive testing (NDT) plan

A document describing the methods, extent and criteria for the non-destructive testing that shall be performed. Project specific procedures shall be included.

H132 – Tank testing plan

A document defining all tanks that shall be leak or structurally tested, together with applicable testing method.

H133 – Erection and inspection plan

A document describing:

- blocks that shall be fabricated
- blocks fabrication schedule
- structure erection sequence and schedule
- structure inspection schedule.

H140 – Welding tables

A document defining the general weld types that shall be used on the vessel. Weld types and dimensions shall be included.

H150 – Facility plan for in-service inspection

The plan shall show the types of facilities, which are or will be provided to make important structural parts accessible for survey, in accordance with the in-service inspection programme.

H160 – Loading computer test conditions

A document defining four standard representative test loading conditions chosen from the loading manual or stability booklet:

- 1) Light ship condition.
- 2) Ballast or partly loaded condition.
- 3) Fully loaded condition.
- 4) Extreme condition (anticipated worst condition for strength as found in the loading manual).
 - If the vessel is allowed to trade with some hold(s) empty on full draught, the test loading conditions 3 and 4 shall contain an alternate loading condition.
 - For bulk carriers as defined in Pt.5 Ch.2 Sec.5 of the Rules for Classification of Ships, the test loading conditions 3 and 4 shall contain one homogenous and one alternate loading condition, both with intact loading and corresponding hull girder loading in flooded condition.
 - When severe wind and rolling criteria are evaluated, the parameters and the calculations shall be shown in details for the most critical condition. The results shall be shown for all the conditions.
 - When damage stability is evaluated, the results of the evaluation shall be shown for all the relevant test conditions. Damage stability is either to be checked by using an approved limit curve (KG, GM) or by direct damage stability control against residual GZ curve. If the latter is included, detailed calculations shall be given for 3-4 damage cases for one of the test conditions. These damage cases shall demonstrate damage at mid- and in the fore- and aft- part of the ship, and they shall demonstrate damage of empty, partly filled and completely loaded compartments.
- 5) Within the range of these test conditions each compartment shall be loaded at least once. The conditions shall cover the range of draughts from the deepest envisaged loaded condition to the light ballast condition.

Where applicable:

- 6) For bulk carriers which have been designed with a reduced still water bending moment for some specified non-homogeneous conditions as reflected in **BC-A** and or **BC-B*** notations. See also Rules for Classification of Ships Pt.5 Ch.2 Sec.5 A100:
A test condition demonstrating the program's ability to calculate intermediate maximum allowable and minimum required masses in each hold for intermediate stillwater bending moments. See Pt.5 Ch.2 Sec.5. Note that this condition is normally not found in the loading manual.
Where applicable (chosen from loading manual and or stability booklet and or grain loading booklet):
- 7) Grain loading test condition including both completely filled and partly filled holds.
- 8) Grain loading test condition for untrimmed ends.
- 9) Container loading condition, timber loading condition, towing condition, crane lifting condition or others.
- 10) Allowable hold loading both for single and two adjacent holds.
For software that is not type approved, the warnings shall be demonstrated. The following test conditions shall be submitted:
- 11) Test condition where limit(s) for strength is (are) marginally exceeded.
- 12) Test condition where limit(s) for stability is (are) marginally exceeded.
- 13) Test condition where general loading limitation(s) is (are) marginally exceeded.

H170 – Loading computer stored characteristic data

A document defining:

- 1) Main dimensions and, if applicable, the ship's profile.
- 2) The position of the forward and aft perpendiculars.
- 3) The position of the forward and aft draught marks.
- 4) Ship's lightweight and lightweight distribution along the ship's length.
- 5) Lines plans and/or offset tables, or bonjean data at 21 stations in the length between perpendiculars.
- 6) Associated limits for still water shear force, bending moments and torque, as applicable for seagoing, harbour and flooded conditions.
- 7) Number, position and limits of read-out points. The shear force limits shall be especially considered for ships sides and longitudinal bulkheads (See Pt.3 Ch.1 Sec.5 D100 of the Rules for Classification of Ships).

The loading computer shall take into account the local correction of the shear forces for conditions with greater pressure differences on the ship's bottom structure (see Pt.3 Ch.1 Sec.5 D200 to D500 of the Rules for Classification of Ships).

- 8) Where applicable, local permissible limits for single and two adjacent hold loading, i.e. maximum allowable and minimum required mass as a function of the appropriate draught and the maximum weight for each hold.
- 9) Hydrostatic data.
- 10) Cross curves of stability; (KN data)
- 11) Tank data; frame spacing, maximum volume, maximum VCG, TCG, LCG and maximum free surface moments (FSM).
- 12) List of unprotected openings and or margin line and or flooding angle. Where applicable (if installed in the program):
- 13) Tank data as function of sounding and or filling; volume, VCG, TCG, LCG and FSM.
- 14) List of limit values (KG, GM).
- 15) List of weathertight openings /margin line.
- 16) Lists of grain data; tables of volumetric heeling moment for partly filled holds, tables pertaining to cargo holds filled with ends untrimmed, tables of maximum permissible grain heeling moment.
- 17) Group of damage cases.
- 18) Other data as; container data, timber loading data (cross curves), data for calculation of severe wind and rolling criteria.
- 19) Other limitations on loading or draught as given in Loading Manual.

Guidance note:

Table A1 Data for strength limitations to be provided to/or accepted by the Society.
Calculation Data to be provided to/or accepted by the Society
Still Water Shear Force (SWSF).

- a) The read-out points (frame locations) for the SWSF calculations. These points are normally selected at the position of the transverse bulkhead or other obvious boundaries. Additional read-out points may be specified between the bulkheads of long holds or tanks or between container stacks.
- b) Shear force correction factors and method of application.
- c) The permissible seagoing and harbour SWSF limits at the read-out points specified in a). Where appropriate, additional sets of permissible SWSF values may be specified.
Still Water Bending Moment (SWBM)
- d) The read-out points (frame locations) for the SWBM calculations. These points are normally selected at the position of the transverse bulkhead, mid-hold or other obvious boundaries.
- e) The permissible seagoing and harbour SWBM limits at the read-out points specified in a). Where appropriate, additional sets of permissible SWBM values may be specified.
Still Water Torsion Moment (SWTM), where applicable
- f) The read-out points (frame locations) for the SWTM calculations.
- g) The permissible limits at the read-out points specified in a).

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

H180 – Cargo securing manual

A manual covering all relevant aspects of cargo stowage and securing, explaining how to calculate the magnitude and direction of forces involved and outlining the correct application and limitations of the cargo securing devices.

H190 – Container stowage and securing manual

A document containing:

- container stowage and securing plans for specified GM limitations
- inventory lists for all container securing equipment required, including product certificates for each item
- total stack weights for containers on hatch covers and in holds
- container strength ratings
- instructions and sketches showing proper stowing and securing of the containers and use of securing equipment.

H200 – Ship structure access manual

A ship's means of access to carry out overall and close-up inspections and thickness measurements shall be described in a Ship structure access manual approved by the Administration, an updated copy of which shall be kept on board. The Ship structure access manual shall include the following for each space:

- 1) Plans showing the means of access to the space, with appropriate technical specifications and dimensions.
- 2) Plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate from where each area in the space can be inspected.
- 3) Plans showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate the positions of critical structural areas, whether the means of access is permanent or portable and from where each area can be inspected.
- 4) Instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space.
- 5) Instructions for safety guidance when rafting is used for close-up inspections and thickness measurements.
- 6) Instructions for the rigging and use of any portable means of access in a safe manner.
- 7) An inventory of all portable means of access.
- 8) Records of periodical inspections and maintenance of the ship's means of access.

H210 – Protected tank location drawing

A drawing showing the distances between the fuel oil tank boundaries and the bottom and side shell plating. The cross sections with the shortest distances shall be shown.

H220 – Container safe access plan

A drawing of the cargo area showing:

- size and arrangement of working areas
- distances between lashing securing points and containers
- location of storage areas for lashing equipment
- size and arrangement of ladders, steps, passage ways and other means of access
- details of access openings
- details of fencing and other means of fall protection
- specification of anti-slip surfaces and hazard marking in working areas and transit areas.

Discipline I – Instrumentation

I010 – Control system philosophy

A document describing:

- Requirements for distribution/allocation/segregation of sub-systems and functions; e.g. power management, engine control, boiler shutdown, etc.
- Description of functions to be implemented as automatic control, manual control, remote control, local control, emergency control
- Specification of data exchange between systems
- Specification of failure handling and safe states
- Physical requirements and limitations such as cabinet location, cable routing, etc.
- Description of power distribution principles.

I020 – Control system functional description

A document describing:

- system configuration
- scope of supply
- what is controlled and monitored and how
- safe state(s) for each function implemented
- switching mechanisms for systems designed with redundancy.

Additionally for hot back-up systems:

- switching mechanisms for systems designed with redundancy.

I030 – Block diagram

A drawing showing connections between all main components (units, modules) of the system and interfaces with other systems.

I040 – User interface documentation

A document describing the functions allocated to each work and operator station and the arrangement of command transfer between stations.

I050 – Power supply arrangement

A drawing showing the power supply philosophy from main and back-up source (if required):

Electrical supply

A diagram showing the philosophy regarding connection to distribution boards, batteries, converters or uninterruptible power supplies. Cable type, cross sectional area and fuse sizes shall be indicated.

Pneumatic supply

A diagram showing connection to compressors, accumulators, reduction valves, dust filter and moisture filter, pipe ratings and dew point.

Hydraulic supply

A diagram showing connection to hydraulic power units, accumulators, pumps and filters, and pipe ratings.

I060 – Principal cable routing sketch

A sketch showing the physical routing of all cables being a part of the system. The information shall be presented as a principal sketch, not as detailed drawings for all cable routings.

The sketch shall also show how the requirements to ensure electromagnetic compatibility (EMC) are implemented with respect to cable shielding, separation and routing.

I070 – Instrument and equipment list

A list and or index identifying all input and or output signals connected to the control system. The list shall contain at least the following information:

- tag number with cross reference identification to applicable piping, ducting or system diagram
- service description
- system connection (e.g. alarm system, ME protective safety system etc.)
- trip limits (for analogue signals)
- type of signal (digital and or analogue input and or output)
- Ex class (e.g. Eex ia IIB T3), if relevant.

I080 – Data sheet with environmental specifications

A data sheet showing environmental conditions (temperature, vibration, humidity, enclosure and EMC) for a product.

I090 – Schematic description of input and output circuits

For each type of input and output device, a typical electrical schematic drawing. For each individual input and output device, information about fail-safe mode, i.e. normally energised (NE) or normally de-energised (NDE) operation and what kind of line monitoring that is implemented, e.g. line break, short circuit or earth fault.

I100 – System diagram

A schematic drawing showing the layout of the process including all instruments and control devices.

I110 – List of controlled and monitored points

A list describing for each connected sensor:

- tag number
- alarm description
- alarm group
- set-point
- range.

I120 – Radiation hazard (RADHAZ) control document

A document containing relevant technical RADHAZ information. This includes at least analysis of transmitter arrangement and equipment properties limit values, guidelines to workforce, technical solutions, drawings and test results.

I130 – Electromagnetic compatibility (EMC) management control document

A document describing management methodologies and documenting tasks.

The document should as a minimum contain the following information:

- description of the applied procedures to deal with the EMC work in the design and construction phases
- overall vessel EMC requirements and standards (EMC zones with levels and installation procedures for each zone) including emergency shutdown and lightning protection
- installation procedures for shielding integrity between zones
- power distribution requirements and standards
- equipment EMC requirements including standards with testing pass or fail criteria
- a system by system description including special EMC installation requirements and EMC data for all systems.

I140 – Software quality plan

The software life cycle activities shall minimum contain procedures for:

- software and hardware requirements specification
- software and hardware design and development plans
- software verification plans;
- software module testing
- software integration testing
- software validation, both functionality and failure modes
- software and hardware change handling and revision control.

I150 – Circuit diagram

For essential hardwired circuits (for emergency stop, shutdown, interlocking, etc.) details of input and output devices and power source for each circuit.

I200 – Control and monitoring system documentation

The documentation shall be based on a relevant selection from the following documentation types:

- I020 Functional description
- I030 Block diagram
- I040 User interface documentation
- I050 Power supply arrangement
- I080 Data sheet with environmental specifications
- I110 List of controlled and monitored points
- I140 Software quality plan
- I150 Circuit diagram
- Z070 Failure mode description
- Z071 Failure mode and effect analysis
- Z120 Test procedure at manufacturer
- Z140 Test procedure for quay or sea trial
- Z160 Operation manual
- Z170 Installation manual
- Z180 Maintenance manual.

I210 – Integration plan

Specification of the responsible manufacturer for each of the partial systems to be integrated in the total integrated system.

- Specification of manufacturers responsible for the physical networks (field, process, system and administrative)
- Specification of the manufacturer responsible for the interface from each partial system to the relevant physical net.
- For each partial application utilising data from another application or system, the required data quality shall be specified.
- For each partial application providing data to another application the provided data, quality shall be specified.
- A plan for integration testing.

I220 – Interface description

A document specifying the external signals that shall be communicated between integrated systems or components.

I230 – List of application software

A list containing:

- identification of functions implemented in each specific application software
- identification of software version
- modification index.

I240 – Hardware-in-the-loop test package documentation

A set of documents as defined in Rules for Ships Pt.6 Ch.22 Sec.2 Table B1.

I250 – Hardware-in-the-loop test package report

A set of documents as defined in Rules for Ships Pt.6 Ch.22 Sec.2 Table B2.

I260 – Control and monitoring systems - periodical test procedure

A schematic document, preferably a spreadsheet, providing for all field instruments related to the control and monitoring system:

- unique identification (tag number)
- service description
- measuring range and unit
- limits for alarm, slowdown and shutdown test interval
- test method (may be a reference to a detailed description also describing necessary test equipment)
- expected result (e.g. shutdown)
- fields for recording of tests performed.

Discipline J – Marine operations

No special documentation types are defined for the marine operations discipline.

Discipline M – Materials

M010 – Material specification, metals

A document describing:

- scope, references and definitions
- production process, delivery condition and chemical requirements
- mechanical testing and requirements
- inspection and non-destructive testing
- repair
- dimensions and tolerances
- surface protection
- certification and marking.

M020 – Material specification, fire related properties

A document describing fire related material properties.

M030 – Material specification, non-metallic materials

A document describing:

- scope, references and definitions
- chemical composition
- delivery conditions
- production process
- testing and requirements
- inspection and non-destructive testing
- repair
- dimensions and tolerances
- surface protection
- certification and marking.

For reinforced materials, e.g. glass fibre reinforced plastics, in addition:

- type of reinforcement and production process for reinforcing material

- production process of finished, composite material
- inspection and non-destructive testing of finished, composite material
- repair
- dimensions and tolerances of finished material
- surface protection
- certification and marking.

M040 – Coating specification

A document describing as applicable:

- coating types, material and manufacturer's technical data sheets comprising requirements to surface preparation and application, and safety data sheets
- definition of coating system, including number of coats and minimum and maximum variation in dry film thickness
- surface preparation, including preparation of edges and welds, surface cleanliness standard (e.g. blast cleaning to Sa 2.5 as defined by ISO 8501-1. Preparation of steel substrates before application of paint and related products visual assessment of surface cleanliness) and roughness/profile
- removal of contaminations such as oil, salts, dust etc.
- maximum allowable air humidity in relation to air and steel temperatures during surface preparation and coating application
- control and inspection procedures, including acceptance criteria, tests (e.g. surface cleanliness, film thickness and temperature control) and handling of deviations from specified quality
- allocation scheme, describing what type of coating to be applied where, including colours.

M041 – Coating specification relating to hazardous materials

A document providing:

- specifications
- data sheets
- manufacturers' declaration regarding Tributyltin (TBT) content
- manufacturers' declaration regarding heavy metals additives for coatings used on the vessel's structure.

M042 – Coating technical file (CTF)

A document providing:

For the coating system:

- specification
- copy of Type Approval Certificate
- technical data sheets
- material safety data sheets.

For the surface preparation, coating application and inspections:

- inspection agreement between shipyard, shipowner and the coating manufacturer, including coating inspectors' qualifications
- detailed criteria for coating selection, job specifications, inspection, maintenance and repair
- coating technical specification (application procedure, acceptance criteria, inspection procedures etc.)
- record of the shipyard's coating work
- procedures for inspection of coating system during ship construction
- procedures for repair of coating system during ship construction
- coating log issued by the coating inspector
- shipyard's verified inspection report
- procedures for in-service maintenance and repair of coating system.

See also IMO Res. MSC.215(82), IMO Res. MSC.244(83) and MSC.1/Circ.1279.

M050 – Cathodic protection specification, calculation and drawings

A document describing:

- areas to be protected, main structures and attached metallic components (m²)
- stipulated protective current density demand (mA/m²) for coated and not coated surfaces respectively, and total current demand (A) in initial condition and at the end of the design life, based on a recognised standard
- target design life of cathodic protection system
- anode material and manufacturer
- drawings of cathodic protection systems, showing anode types, mass, distribution, location and attachment details for sacrificial or impressed current anodes
- cathodic protection system drawings shall be in compliance with the specification and calculations for the same.

Sacrificial anodes

- calculation of anode mass, distribution, total number, resistance and current capacity in initial and final condition.
- target protective potential to be obtained in initial condition and at the end of the design life.

Impressed current systems

- current capacity of rectifiers and anodes.
- reference electrodes, system control and monitoring arrangement, cabling, and procedures for exchange or renewal of components.

M060 – Welding procedures

A document describing:

- reference to materials
- preparation
- preheating
- method and control of welding
- post-weld heat treatment
- necessary equipment to be used.

M061 – Welding procedure qualification record

A document providing for the qualification test piece:

- a record of the actual parameters employed during welding
- the results from non-destructive testing and mechanical testing.

M070 – List of combustible materials

A list of materials providing:

- material identification
- fire related properties (M020)
- locations
- quantities.

M080 – Inventory of hazardous materials

A document providing a list of hazardous materials contained in vessel's structure or equipment, their location and approximate quantities. See Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009, Annex Reg. 5 for detailed requirements.

M083 – Hazardous materials documentation - PCB

A documentation providing: - a list of components containing Polychlorinated biphenyls (PCBs) and the quantity of PCB. If sampling has been carried out, the documentation shall include sampling location and the corresponding laboratory results.

The document shall typically cover the following systems and components:

- electrical capacitors in light fixtures
- electrical capacitors in one phase motors
- electrical cables
- mastic, sealants, caulking components and waxes
- paints and coatings
- plastics.

M084 – Hazardous materials documentation - ozone depleting substances

A document providing a list of type and quantities of ozone depleting substances sealed in the vessel's equipment or machinery.

The document shall typically cover the following:

- refrigeration systems (provisions, air conditioning etc.)
- fire extinguishing systems
- blowing agent for insulation of liquid natural gas (LNG) carriers.

M085 – Hazardous materials documentation - appendix 2 substances

A document providing specifications of components that may contain hazardous materials listed in Appendix 2 of 'Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009' SR/CONF/45. If sampling has been carried out, the documentation shall include sampling location and the

corresponding laboratory results.

M100 – Material declaration

A document demonstrating compliance with 'Guidelines for the Development of Inventory of Hazardous Materials' MEPC.179(59) Sec. 6. The document shall declare whether or not the materials listed in Appendix 1 and 2 of 'Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009' SR/CONF/45 are present. The declaration shall include quantity and location on board the vessel of the specified hazardous materials.

The document shall include identification of the component covered by the declaration, e.g. product name and number.

M110 – Declaration of conformity relating to use of hazardous materials

A document demonstrating compliance with 'Guidelines for the Development of Inventory of Hazardous Materials' MEPC.179(59), Sec.7. The document shall provide assurance that the related material declarations conform to Sec.6.2 of MEPC 179(59) and identify the responsible entity, e.g. the supplier or manufacturer.

The document shall declare conformity with company policy or conformity with a recognized quality management system. The document shall include identification of the components covered by the declaration, e.g. product names and numbers.

M120 – Hazardous materials location plan

A drawing identifying the location of the hazardous materials identified on board the vessel. The drawing should be based on local arrangement plans (Z030), e.g. for the engine room, navigation bridge, accommodations.

Discipline N – Navigation

N010 – Bridge design drawing

A scaled drawing showing:

- bridge configuration, including entrances and doors
- dimensions of the wheelhouse and bridge wings
- location of all consoles, navigation and manoeuvring equipment within the wheelhouse and on the bridge wings.
- height of front bulwark with windscreens when relevant

N020 – Vertical field of vision drawing

A scaled drawing showing:

- vertical field of vision including calculation of the blind sector forward of the bow, in worst loading condition
- a copy of the summary table of loading conditions from the preliminary or final stability manual (B050 or B120).

N030 – Horizontal field of vision drawing

A scaled drawing showing:

- the horizontal field of vision seen from all required workstations, including blind sectors caused by obstructions
- dimensions and framing of windows
- inclination of windows
- clear view arrangement (wipers, wash, sunscreens and heating).

N040 – Nautical workstation arrangement plan

A scaled drawing showing:

- configuration of workstations and consoles showing their dimensions, shape and the location of all instruments within the consoles including their user interface
- location of toilet.
- for class notations **NAUT-OSV(T)** and **NAUT-OSV(A)** only: Arrangement of chairs related to the consoles including possibilities for adjustment both horizontally as vertically. Priority zones shall be indicated for the workstations for offshore operations.

N050 – Navigation bridge windows framing arrangement plan

A scaled drawing showing:

- dimensions and framing of windows
- details about the size and shape of divisions and stiffeners between windows
- inclination of windows.

N060 – Manoeuvring booklet

A document providing details of the vessel's manoeuvring characteristics and other relevant data relevant for the manoeuvring. The manoeuvring booklet shall include the information shown on the wheelhouse poster (N070) together with other available manoeuvring information.

Guidance note:

The information recommended to be included is specified in IMO Res. A.601(15), Appendix 3.

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

N070 – Wheelhouse poster

A document (poster) providing a summary of manoeuvring information on the ship.

Guidance note:

The information recommended to be included is specified in IMO Res. A.601(15), Appendix 2.

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

N080 – Pilot card

A document containing information about the current condition of the vessel with regard to its loading condition, propulsion and manoeuvring equipment and other relevant equipment.

Guidance note:

The information recommended to be included is specified in IMO Res. A.601(15), Appendix 1.

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

Discipline P – Process

P010 – Flow diagram

A diagrammatic drawing including the following:

- flow summary tables for all major process streams, including heat and mass balances
- all major control loops
- all major equipment
- pressure and temperature in major streams and equipment
- duty of drivers and heat exchangers
- tag numbers of equipment.

P020 – Sizing calculations

Sizing calculations for e.g. relief valves, bursting disks and restriction orifices.

P030 – Temperature calculations

Calculations of minimum temperatures in systems where low temperatures may occur. The calculations shall document correct choice of piping and valve materials.

P040 – Materials selection report

A document describing:

Fluid corrosivity evaluation

Based on design data, the potential corrosivity of all fluids associated with production or processing of oil and or gas shall be assessed.

Special measures for control and monitoring of internal corrosion and erosion

This may include e.g. use of internal coatings or linings, chemical treatment, corrosion probes and fluid analyses.

External corrosion protection

Use of paint coatings shall be specified by reference to generic type, thickness (total and individual layers) and surface preparation.

P050 – Flare heat radiation study

An analysis covering

- flare capacity for dimensioning scenario
- flare tip characteristics
- methodology used in the analysis
- heat radiation calculations
- heat radiation plots.

P060 – Safety analysis tables

Safety analysis tables of process systems according to API RP14C: (American Petroleum Institute: Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms).

P070 – Pressure vessel integrity study

An analysis of the integrity of the pressure vessels during fire and simultaneous depressurising.

P080 – Flare and blowdown system report

An analysis comprising calculations of capacity requirements, back pressure, equipment sizing, depressurising profile, low temperature effects, liquid entrainment, etc.

Discipline Q – Quality management

Q010 – Quality manual

A document stating the quality policy and describing the quality system of an organisation.

Q020 – Document control procedure

A procedure that describes how documents are prepared, received, numbered, identified, distributed, filed and discarded.

Discipline S – Piping

S010 – Piping diagram (PD)

A diagrammatic drawing including the following:

- outside diameters and wall thicknesses of pipes
- materials used in pipes, valve bodies and fittings
- pump type and capacity
- type of valves and fittings
- type of expansion elements
- design pressure if exceeding 7 bar, and design temperature if exceeding 60°C
- hydrostatic test pressure after installation on board, where required.

For plastic pipes shown in system drawings the following information shall be given:

- fire endurance class
- conductive or non-conductive grade
- maximum working pressure and temperature.

S011 – System diagram (P&ID)

A diagrammatic drawing including the following:

- equipment and components including reference identification (tag numbers)
- size of pressure vessels and piping
- piping with line numbers
- pump type and capacity
- type of valves and connections
- type of expansion elements
- location of shutdown and isolation valves
- failure mode of control and shutdown and isolation valves
- hydrostatic test pressure after installation on board, where required
- instrumentation, including safety devices, control and monitoring equipment
- signal lines, sufficient to describe the function
- heat-tracing cables and insulation for pipelines, valves, instruments, vessels, etc.
- maximum differential pressure across centrifugal pumps
- maximum flow through pumps and compressors

— set points for all shutdown and isolation valves and rupture disks.

S020 – Pressure drop analysis

A calculation of the pressure drop in the system during dimensional operation. A comparison of the results with acceptable limits for the pressure drop.

S030 – Capacity analysis

A calculation of the capacity of the system. A comparison of the results with corresponding capacity requirements.

S040 – Control diagram

A schematic diagram showing hydraulic or pneumatic control lines and associated components as actuators, valves and similar. The operational mode that is shown, e.g. normal operation with pressure applied, shall be stated. The failure mode of the components, e.g. close on loss of power, shall be stated.

S041 – Pneumatic control diagram

A schematic diagram showing pneumatic control lines and associated components as actuators, valves and similar. The operational mode that is shown, e.g. normal operation with pressure applied, shall be stated. The failure mode of the components, e.g. close on loss of power, shall be stated.

S042 – Hydraulic control diagram

A schematic diagram showing hydraulic control lines and associated components as actuators, valves and similar. The operational mode that is shown, e.g. normal operation with pressure applied, shall be stated. The failure mode of the components, e.g. close on loss of power, shall be stated.

S050 – Connections to the shell and to sea chests

Drawings showing the arrangement of the connections of piping and associated equipment to the shell and to sea chests. The drawing shall make it possible to assess that the connections and the associated equipment meet the requirements to structural strength and the requirements related to pipe thickness of the International Convention on Load Lines, 1966.

S060 – Pipe routing sketch

A sketch showing the physical routing of the piping. The purpose of the sketch is to provide an overview of the installed piping, not detailed isometrics.

S070 – Pipe stress analysis

A calculation of stresses in the pipes and their supports due to for example expansion, water hammering and surge. An assessment of the pipes and their supports' adequacy with respect to structural strength and fatigue.

S080 – Thermal stress analysis

A calculation of stresses in the pipes and their supports due to thermal effects. An assessment of the pipes and their supports' adequacy with respect to structural strength and fatigue.

S090 – Specification of piping, valves, flanges and fittings

A document describing for each system:

- type of pipe or component
- pipe or component design standard
- dimensions (for pipes, outside diameter and wall thickness)
- design pressure
- design temperature
- materials
- corrosion protection
- test pressure
- piping class (I, II, III).

S100 – Line index

The line index may contain the following information:

- line number (tag code)
- P&ID document number
- stress isometric number
- fabrication and inspection isometrics
- service from tag code
- service to tag code

- test class
- test medium
- test pressure (bar)
- heat tracing °C
- insulation class
- corrosion allowance, critical line
- non-destructive testing class, calculation number
- stress calculation number
- nominal size
- density vapour or liquid
- viscosity vapour or liquid
- liquid fraction
- calculation method
- fluid
- mass flow
- compressibility
- velocity
- pressure drop calculated and allowed
- operating pressure
- design pressure
- operating temperature
- minimum and maximum design temperatures
- operating temperatures
- piping class (I, II, III).

S110 – Shadow diagram

A diagram showing the tank areas covered by direct impingement from the washing machines (not required for tanks or cargo holds without internal structures).

S120 – Heat balance calculation

An analysis comprising calculations of heat input and heat loss in e.g. piping systems and tanks.

S130 – Filling and or discharge time calculation

A calculation of the time required for exchange of tank contents. A comparison of the results with acceptable time limitations.

S140 – Procedures and arrangements manual

A manual as defined in MARPOL 73/78 Annex II Appendix 4, 'Standard format for the procedures and arrangement manual'.

The manual is concerned with the marine environmental aspects of the cleaning of cargo tanks and the discharge of residues and mixtures from these operations.

S150 – Shipboard oil pollution emergency plan (SOPEP)

A plan as defined in MARPOL 73/78 Annex I Reg. 37. The plan shall consist at least of:

- the procedure to be followed by the master or other persons having charge of the ship to report an oil pollution incident
- the list of authorities or persons to be contacted in the event of an oil pollution incident
- a detailed description of the action to be taken immediately by persons on board to reduce or control the discharge of oil following the incident
- the procedures and point of contact on the ship for coordinating shipboard action with national and local authorities in combating the pollution.

See also resolutions MEPC.54(32), MEPC.86(44) and MEPC.85(44), and IMO sales publication IMO-586E.

S160 – Shipboard marine pollution emergency plan for noxious liquid substances (SMPEP)

A plan as defined in MARPOL 73/78 Annex II Reg. 17. The plan shall consist at least of:

- the procedure to be followed by the master or other persons having charge of the ship to report a noxious liquid substances pollution incident
- the list of authorities or persons to be contacted in the event of a noxious liquid substances pollution incident
- a detailed description of the action to be taken immediately by persons on board to reduce or control the discharge of noxious liquid substances following the incident
- the procedures and point of contact on the ship for coordinating shipboard action with national and local authorities in combating the pollution.

The plan may be combined with the shipboard oil pollution emergency plan (SOPEP) (S150). In this case, the title of such a plan shall be 'Shipboard marine pollution emergency plan'. See also resolutions MEPC.85(44) and MEPC 137(53).

Discipline T – Telecommunications

T010 – Functional description

A document, such as operational/installation/design manuals describing:

- all functions incorporated in the system, showing compliance with all applicable functional requirements for the system.
- all interfaces towards other systems, including the information carriers' characteristics
- system hardware.

T020 – Block diagram

A drawing showing the major inter-relationships between all parts of the system and interfaces with other systems.

T030 – User interface

A drawing showing:

- the physical layout and dimensions of the control device
- description of the functions allocated each keyboard or screen
- description of individual screen views, e.g. schematics, colour prints
- description of how menus, etc. are operated
- list of all alarms and operator messages.

Where the alarms or messages are not self-explanatory, additional explanations shall be included.

T040 – Power supply arrangement

A drawing showing the electrical power supply from main and back-up source. The drawing shall show the connection to distribution boards, batteries, converters or uninterruptible power supplies, cable type and cross sectional area and fuse sizes.

T050 – Principal cable routing sketch

A sketch showing the physical routing of all cables being a part of the system. The information shall be presented as a principal sketch, not as detailed drawings for all cable routings.

The sketch shall also show how the requirements to ensure electromagnetic compatibility (EMC) are implemented with respect to cable shielding, separation and routing.

T060 – Data sheets with environmental specifications

Data sheets showing for each key component conformance with the requirements for environmental conditions (ref. DNV CN. 2.4 or IEC60945).

Discipline U – Subsea

No special documentation types are defined for the subsea discipline.

Discipline V – Heating, ventilation and air conditioning

V010 – Ducting diagram (DD)

A drawing showing:

- Arrangement of ventilation ducts and associated components (fans, air conditioning units, fire dampers, penetrations through class divisions etc.)
- Arrangement of air condition units showing which ventilation ducts that are served by each air conditioning unit
- Size and material description of ventilation ducts including fire insulation.

V011 – System diagram (D&ID)

A drawing showing:

- Arrangement of ventilation ducts and associated components (fans, air conditioning units, fire dampers, penetrations through class divisions etc.)
- Arrangement of air condition units showing which ventilation ducts that are served by each air conditioning unit
- Size and material description of ventilation ducts including fire insulation
- Arrangement of means of control for closure of openings and stop of ventilation fans

V020 – Pressure drop analysis

A calculation of the pressure drop in the system during dimensional operation. A comparison of the results with acceptable limits for the pressure drop.

V030 – Capacity calculation

A calculation of the capacity of the system. A comparison of the results with corresponding capacity requirements.

V040 – Hydraulic or pneumatic control diagram

A schematic diagram showing hydraulic or pneumatic control lines and associated components as actuators, valves and similar. The operational mode that is shown shall be stated, e.g. normal operation, with pressure applied. The failure mode for the components shall be stated, e.g. close on loss of power.

V050 – Duct routing sketch

A sketch showing the physical routing of the ducts, including location of dampers. The purpose of the sketch shall provide an overview of the installed ducts, not detailed isometrics.

V060 – Penetration drawings

A drawing including material specifications showing typical arrangements of penetrations for ventilation ducting, pipes or cables through fire divisions.

V070 – Flow diagram

A diagrammatic drawing including the following:

- reference identification (tag numbers) for supply and extract fans
- flow rates for supply and extract fans
- temperature requirements for all serviced areas.

Discipline W – Geotechnology

W010 – Typical soil conditions

A document describing the range of typical soil conditions for which the vessel is intended for. The type of soil and the range of shear strength and stiffness parameters shall be included.

If the vessel is intended for a specific location, a soil investigation report (W020) shall be submitted instead.

W020 – Soil investigation report

A report providing a description of the soil investigations performed on a specific location. An interpretation of the results of the investigation towards soil design parameters, such as general classification parameters, shear strength parameters, deformation properties and other parameters for the foundation type and design.

W030 – Pile foundation design

A document describing:

- soil resistance models for axial and lateral resistance
- total axial capacity
- pile response to acting loads, accounting for interaction effects with vessel
- pile installation studies including pile driveability analyses.

W040 – Gravity foundation design

A document describing:

- stability of foundation
- settlements and displacements
- penetration of skirts
- soil reactions on foundation structure
- soil modelling for dynamic analysis
- filling of voids (under base grouting).

W050 – Anchor foundation design

A document describing:

Pile anchors

Position and orientation of padeye, installation performance, tolerances to verticality, holding capacity (axially and laterally) and required pretension for pull-in of anchor line in soil.

Gravity anchors

See gravity foundation design (W040)

Suction anchors

Position and orientation of padeye, installation performance, i.e. required suction, tolerances to verticality, holding capacity (axially and laterally) and required pretension for pull-in of anchor line in soil.

Fluke anchors

Holding capacity, required installation pretension load and estimated installation drag length.

Drag-in plate anchors

Holding capacity, required installation pretension load and estimated installation drag length.

Other types of plate anchors

Installation procedures, anchor performance during installation and holding capacity.

Discipline Y – Pipeline and riser technology

No special documentation types are defined for the pipeline discipline.

Multidiscipline Z

Z010 – General arrangement plan

A drawing showing the vessel's main dimensions, frame spacing and layout. For each deck, all rooms and all major equipment shall be identified. Side and front views shall be included.

Z030 – Arrangement plan

A drawing showing the arrangement of a specified area or system. All major equipment shown on the drawing shall be identified by tag number and name.

In case of an area, e.g. the engine room, the drawing shall include the main dimensions and layout of the area. All rooms shall be identified by room number and name. Side views and the global location of the area shall be indicated on a miniature general arrangement plan.

Z040 – Vessel specification

The specification of the vessel being referred to by the contract between the owner and the builder.

Z041 – Ship construction file

A file of documents containing:

- as built issues of H050 Structural drawings
- H110 Loading manual
- B120 Final stability manual
- shell doors: Z160 Operation manual
- shell doors: Z180 Maintenance manual
- forgings and castings welded into the structure: Z270 Product certificate
- B200 Freeboard plan or equivalent plans
- H132 Tank testing plan
- M040 Coating specification
- H120 Docking arrangement plan
- H200 Structural access manual, as applicable.

For vessels subject to compliance with the IMO Coating Performance Standard (PSPC):

- M042 Coating technical file (CTF)

For vessels built for in-water survey of the vessel's bottom:

- impressed current system: Z030 Arrangement plan

- markings for identification of tanks on sides and bottom: Z030 Arrangement plan
- openings in sides and bottom below the deepest load waterline, bottom plugs, echo sounder and any other underwater equipment: Z030 Arrangement plan
- measurement of rudder bearing clearances: Z250 Procedure.

Z050 – Design philosophy

A document stating:

- design basis
- rules, regulations, standards and codes with assigned priorities.

System and interfaces

- a description of all functions that are assigned to the system, and all interfaces to other systems
- requirements for the system in order to maintain an acceptable level of safety
- dangerous operations and requirements to corresponding manual actions
- requirements to maintenance
- life cycle related aspects.

Dangerous events

A description of the safety functions incorporated in the system that shall prevent or limit the consequences of dangerous events.

- assessment of the safest status for the system and associated equipment in case of failures in the control system
- consequences for electrical, pneumatic and hydraulic circuits, i.e. selection of normally energised versus normally de-energised circuits.

Z060 – Functional description

A document describing:

- all functions incorporated in the system and their technical realisation
- all interfaces towards other systems, including their technical realisation.

Z070 – Failure mode description

A document describing the effects due to failures in the systems, not failures in the equipment supported by the systems. The following aspects shall be covered:

- list of failures which are subject to assessment, with references to the system documentation
- description of the system response to each of the above failures
- comments to the consequence of each of these failures.

Z071 – Failure mode and effect analysis

A document describing how single failures in single systems will fail to safety and how essential systems in operation will not be lost or degraded beyond acceptable performance criteria.

For single systems:

- a description of the boundaries of the system including power supply
- a list of items which are subject to assessment with a specification of probable failure modes for each item, with references to the system documentation
- a description of the system response to each of the above identified failure modes
- comments to the consequence of each of these failures.

For systems designed with redundancy, the analysis shall be extended to evaluate the effect of the redundancy

- For HS, LC and NSC, see Rules for Classification of High Speed, Light Craft and Naval Surface Craft Pt.0 Ch.4 Sec.2.

Z080 – Reliability and availability analysis

A document providing a qualitative, and a quantitative analysis of the reliability and availability of the system. The qualitative analysis may be the result a hazard and operability study (HAZOP).

Z090 – Equipment list

A list stating for each key component:

- system
- name of manufacturer

- type, etc., necessary to identify the component
- main characteristics, e.g. pressure rating and power consumption
- cross reference identification (tag number) to applicable piping, ducting or system diagram
- reference to type approval certificate
- reference to Ex certificate.

Z100 – Specification

A document describing the design basis and technical specification for a product.

Z110 – Data sheet

A schematic document providing quantified technical parameters for a product, e.g. pressure rating, together with other specific attributes, e.g. Ex classification.

Z120 – Test procedure at manufacturer

Description of test configuration and test simulation methods.

Based upon the functional description, each test shall be described specifying:

- initial condition
- how to perform the test
- what to observe during the test and acceptance criteria for each test.

The tests shall cover all normal modes as well as failure modes identified in the FMEA, including power and communication failures where applicable.

Z130 – Report from test at manufacturer

A document describing all results, and limitations to the tests performed.

Z140 – Test procedure for quay and sea trial

A description of all tests that shall be carried out at the quay or sea trial together with acceptance criteria for each test.

Z150 – Report from quay and sea trial

A document describing all results, and limitations to the tests performed.

Z160 – Operation manual

A document intended for regular use on board, providing information on:

- operation modes
- operating instructions for normal and degraded operating modes
- details of the user interface
- transfer of control
- redundancy
- test facilities
- failure detection and identification facilities, automatic and manual
- data security
- access restrictions
- special areas requiring user attention
- procedures for start-up
- procedures for restoration of functions
- procedures for data back-up where applicable.

Z170 – Installation manual

A document providing information about the installation procedures.

Z180 – Maintenance manual

A document intended for regular use on board providing information on:

- maintenance and periodical testing
- acceptance criteria
- fault identification and repair
- list of the suppliers' service net.

Z200 – Environmental regularity number (ERN) calculation

A calculation of the environmental regularity number according to Rules for Classification of Ships Pt.6 Ch.7 Sec.7.

Z201 – Position keeping capability plot

A graphical description of the vessel's position keeping ability, in the form of plots produced in polar form. The plots shall provide the results of static analyses with coincident forces of wind, waves, and current. In the analysis the vessel shall maintain fixed position and heading, and shall be exposed to forces from current and correlated wind and waves. Thus there shall at the same time be a balance of forces and a balance of moments, i.e. including all moments generated by the thrusters, and those caused by environmental forces. The limiting wind speed where the current, wind and wave forces equals the maximum available thruster forces shall be plotted around the vessel.

Z210 – Design basis

A document describing:

- regulatory basis for the design, i.e. applicable rules, regulations and standards
- design principles applied.

Together with dimensioning criteria, e.g.:

- applied loads, static and dynamic
- rating with respect to power, temperature, pressure, etc.
- environmental conditions.

Z220 – Vessel operation manual - Ship

A document containing limiting operating conditions and essentials related to classification.

Z221 – Vessel operation manual - Offshore

A document containing limiting operating conditions and essentials related to classification. The document shall include the following information:

Operating instructions

Instructions for operation, including precautions to be taken in adverse weather, changing mode of operations, any inherent limitations of operations, etc.

Operation limitations

Pertinent data for each approved mode of operation, including functional and variable loads, environmental conditions, foundation characteristics (for sea bed support vessels only), draught, etc.

Any limitations on the operation of the vessel or the equipment, e.g. cranes, drilling equipment, etc.

Stability

Information shall be included as required under discipline B.

Ballasting system

Documentation for the ballast system and instructions for ballasting and deballasting in intact and damaged conditions.

Position mooring

Limiting operating conditions and corresponding procedures as basis for the additional class notation **POSMOOR**.

Dynamic positioning

Limiting operating conditions and corresponding procedures as a basis for the additional class notation **DYNPOS**.

Z222 – Vessel operation manual - HS, LC and NSC

A document containing limiting operating conditions and essentials related to classification. The document shall include the following information:

- Main particular of craft
- Description of the craft and its equipment
- Intended operational area
- Maximum number of crew and passengers
- Maximum cargo capacity with distribution
- Cargo loading and lashing plan
- Operation speed versus wave height (sea state) and/or acceleration limits
- Operating range as function of service speed
- Procedures for checking the integrity of buoyancy compartments
- List of opening and or doors to be kept closed at sea
- Damage control procedures

- Description and operation of systems (machinery, auxiliary, remote control and warning, electrical, fire protection, radio and navigation aids)
- Loading procedures and limitations
- Details of life saving appliances
- Emergency stations and procedures for evacuation
- Passenger and crew evacuation
- Towing procedures including permissible towing speed and load
- Operation procedures related to safety at high speeds
- Operation procedures related to particular vessel design or support system
- Emergency operation
- Operation of craft in narrow waters
- Instructions for use of safety belts
- Instructions for use of light in crew accommodation during night operation
- Restrictions to number of crew in wheelhouse under way
- Use of survival suits
- Transfer operations in open sea
- Recovery operations for man overboard.

Z230 – Ballast water management plan

A plan complying with the requirements of IMO Res. MEPC. 127(53), “Guidelines for ballast water management and development of ballast water management plans (G4)”.

The content shall cover:

- guidance on the ballast handling
- guidelines on safety aspects
- procedures for disposal of sediment
- identification of the officer in charge and his or her duties
- information on ballast water management system.

Z240 – Calculation report

A document describing assumptions, inputs, boundary conditions, results and conclusions for a calculation that has been carried out.

Z241 – Measurement report

A document providing:

- A reference to a measurement procedure
- A description of what has been measured
- A description of when, where and by whom the measurements have been performed
- The results of the measurements.

Z242 – Installation report

A document describing for an installation object:

- what has been installed
- where it has been installed
- by whom it has been installed
- when it has been installed
- observations during installation that may be of use during operation.

Z250 – Procedure

A document describing how a task shall be carried out.

Z260 – Vessel certificate

A statement issued on basis of survey reports or document review, confirming that the vessel complies with specific rules, regulations or standards.

Z270 – Product certificate

A document relating to an individual specific product and signed by a surveyor of the Society stating:

- conformity with rule requirements
- that tests are carried out on the certified product itself
- that tests are made on samples taken from the certified product itself
- that tests are performed in presence of the surveyor or in accordance with special agreements

Z280 – Type approval certificate

A statement issued on basis of survey reports or document review, confirming that the design of a specific product type or range of product types comply with specific rules, regulations or standards. The term product is used for materials, components or systems.

Z290 – Record

A set of data recorded for a specific purpose, e.g. as basis for the issue of a Vessel certificate (Z260).

Z300 – Declaration

A statement issued by an organisation, providing the organisation's assessment of a specific topic.

Z310 – Inspection manual

A vessel specific document describing inspection scope and methods, including:

- requirements for preparations and execution
- safety precautions
- inspection intervals
- rating and assessment criteria
- reporting procedures and guidance
- areas of attention for inspection.

Z320 – Document register

A register containing the document number and title for all documents that are planned to be issued during a project.

The document register should be a living register also containing information on planned and real issue dates and revision control.