



CLASS GUIDELINE

DNV-CG-0550

Edition December 2024

Maritime services – terms and systematics

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FOREWORD

DNV class guidelines contain methods, technical requirements, principles and acceptance criteria related to classed objects as referred to from the rules.

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CHANGES – CURRENT

This document supersedes the September 2023 edition of DNV-CG-0550.
The numbering and/or title of items containing changes is highlighted in red.

Changes December 2024

<i>Topic</i>	<i>Reference</i>	<i>Description</i>
Design certificates (DC)	Sec.3 [3.2.1]	Corrected definition of design certificates (DC).
Approval letter (AL)	Sec.3 [5.1]	Corrected definition of approval letter (AL).
Design verification report (DVR)	Sec.3 [5.2]	Corrected definition of design verification report (DVR).
Documentation types	Sec.5 [2.3.4]	Updated definition of E040 – Electrical load balance.
	Sec.5 [2.4.1]	Updated definition of F011 - Cyber security design description.
	Sec.5 [2.4.2]	Updated definition of F021 - Description of security capabilities.
	Sec.5 [2.4.3]	Added F030 - System topology.
	Sec.5 [2.4.4]	Updated definition of F031 - Zone and conduit diagram.
	Sec.5 [2.4.5]	Updated definition of F071 - Inventory list.
	Sec.5 [2.4.6]	Updated definition of F141 - Configuration guidelines.
	Sec.5 [2.4.7]	Added F142 - Cyber incident response and recovery manual.
	Sec.5 [2.4.8]	Added F200 - Cyber security documentation for systems.
	Sec.5 [2.4.9]	Added F251 - Cyber security onboard test procedure.
	Sec.5 [2.4.10]	Added F252 - Procedure for test of security capabilities at manufacturer.
	Sec.5 [2.4.11]	Added F253 - Procedure for verification of cyber security functions on board.
	Sec.5 [2.4.12]	Added F257 - Cyber security management system manual.
	Sec.5 [2.4.13]	Added F259 - Description of secure development lifecycle processes.
	Sec.5 [2.5.24]	Added G220 - Reduced mobility plan.
	Sec.5 [2.7.17]	Added I201 - Vessel systems architecture specification.
	Sec.5 [2.15.40]	Updated definition of Z252 – Test procedure at manufacturer.
	Sec.5 [2.15.61]	Added Z274 - Status report.
	Sec.5 [2.15.62]	Added Z275 - Damage report.
	Sec.5 [2.15.63]	Added Z276 - Video.
	Sec.5 [2.15.64]	Added Z277 - Picture.
	Sec.5 [2.15.66]	Updated definition of Z281 – Maintenance record.

<i>Topic</i>	<i>Reference</i>	<i>Description</i>
	Sec.5 [2.15.71]	Added Z286 - Operational record.
	Sec.5 [2.15.72]	Added Z287 - Data record.
	Sec.5 [2.15.75]	Added Z305 - Confirmation.

Editorial corrections

In addition to the above stated changes, editorial corrections may have been made.

CONTENTS

Changes – current.....	3
Section 1 General.....	7
1 Objective.....	7
2 Scope.....	7
3 Application.....	7
Section 2 Service related terms.....	8
1 Objective.....	8
2 Targets.....	8
3 Standards.....	9
4 Documentation.....	10
5 Activity methods.....	10
6 Parties.....	11
7 Authorisation.....	11
Section 3 Deliverables - document types.....	12
1 General.....	12
2 Generic compliance document types.....	12
3 Target related compliance document types.....	13
4 Target and standard related compliance document types.....	16
5 Other deliverables.....	17
Section 4 Content of compliance documents.....	19
1 General.....	19
2 Compliance documents targeting product types.....	19
3 Compliance documents targeting products.....	19
4 Certificates.....	19
Section 5 Documentation types.....	20
1 Introduction.....	20
2 Documentation types.....	21
Section 6 Documentation requirement systematics.....	77
1 Objective.....	77
2 Systematics.....	77
3 Handling of documentation.....	77
4 Requirements to all submitted documentation.....	78

Section 7 Exemption documents.....	80
1 Definition.....	80
2 Content.....	80
Changes – historic.....	81

SECTION 1 GENERAL

1 Objective

The objective of this document is to ensure a consistent use of terms and systematics across DNV maritime's services.

2 Scope

The scope of this document is to provide:

- definition of service related terms
- definition of terms relating to documentation and certification
- general principles for documentation and certificate requirements.

3 Application

This document is primarily aimed at services verifying that a target complies with requirements of a standard. This document may also, fully or partly, be used for advisory services.

This document is a mandatory reference for all of the Society's:

- rules for classification
- statutory interpretations.

SECTION 2 SERVICE RELATED TERMS

1 Objective

The objective of this section is to provide a consistent set of terms and associated definitions for the maritime services delivered by DNV.

2 Targets

2.1 Definition

A target is the focal point of a service or a requirement, e.g. the item that is assessed for compliance with a standard.

2.2 Target levels

Target levels are defined in [Table 1](#).

Table 1 Target levels

Level	Name	Used for	Example
0	Group	- Organising the top level targets.	Product group: all possible product types, product designs and products.
1	Type	<ul style="list-style-type: none"> - Defining classes of targets under each target group. - Setting technical and procedural requirements for each target type. - Defining target type related properties. 	Product type: compressor.
2	Design	<ul style="list-style-type: none"> - Defining designs relating to a target type. - Setting properties related to the target design. - Issuing compliance documents targeting the design. 	Product design: compressor model xyz.
3	Individual	<ul style="list-style-type: none"> - Defining individual targets relating to a target design, and thereby to a target type. - Setting properties related to the individual target. - Issuing compliance documents targeting the individual. 	Product: compressor model xyz serial no. 12345.

2.3 Target groups

Target groups are used for grouping of targets on a high level, based on fundamental characteristics. The level 0 target groups covered by this document are specified in [Table 2](#).

Table 2 Target groups

<i>Code</i>	<i>Name</i>	<i>Description</i>
AG	Asset group	Physical items of substantial value.
PG	Product group	Physical items that may be a part of an asset.
OG	Organisation group	Institutions or associations having a collective goal.
PLG	Personnel group	Human beings.
POG	Process group	Sets of recurrent or periodic activities that interact to produce results.

2.4 Objects

An object is a target belonging to the groups describing physical items, i.e. assets and products.

An object may consist of physical parts, denoted components.

A system is a set of objects working together for a specific purpose.

Guidance note:

Examples:

- a piston ring is a component in a piston
- a piston is a component in an engine
- an engine is a component in a ship
- a ship is a component in a transportation system.

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2.5 Lifecycle phases

Objects will pass through the following lifecycle phases:

- concept
- design
- construction
- operation
- de-commissioning.

3 Standards

3.1 Standard

Within this document, standard is used as a common term for:

- rules, standards and associated service documents issued by the Society
- international and national regulations
- other standards, including customer specifications.

3.2 Standard edition

A standard edition is normally identified by its year of issuance, if needed also by the month of issuance.

4 Documentation

Documentation may be drawings, descriptions, calculations, reports, procedures and similar information describing the design, construction, installation, testing, operation, maintenance or status of a target.

5 Activity methods

5.1 General

When assessing a target, the extent of and methods for verifying compliance will be decided by the Society. The assessment will normally be based on one or several of the activity methods defined in this subsection.

5.2 Documentation review

Documentation review is a systematic and independent review of documentation relating to a target, to verify compliance with requirements to the target given by applicable standards. The documentation review may be for the purpose of:

- qualification of builder or manufacturer
- design assessment
- verification of construction
- verification of procedures, e.g. for production or management
- verification of onboard documentation.

5.3 Survey

Survey is a systematic and independent examination and/or testing of an object, in order to verify compliance with applicable standards.

Guidance note:

Examples of survey activities may be to verify:

- construction in accordance with the verified design
- workmanship in accordance with requirements
- wear and tear within acceptable limitations.

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5.4 Audit

Audit is a systematic and independent examination of data, statements, records, operations and performances of an organisation, person or process, to verify compliance with requirements to the target given by applicable standards.

5.5 Data analysis

Data analysis is an automatic and/or manual analysis of data streams providing information about a target.

Guidance note:

See ISO 19848 *Ships and marine technology - Standard data for shipboard machinery and equipment*.

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6 Parties

Party: a person or an organization.

First party: the party that provides the target.

Second party: a party that has a user interest in the target.

Third party: a party that is independent of the party that provides the target, and of user interests in that target.

7 Authorisation

A third party may perform its services:

- on behalf of governments, based on authorisations
- upon accreditation from a government
- on behalf of itself, this will always be the case when the Society verifies compliance with respect to the Society's rules.

SECTION 3 DELIVERABLES - DOCUMENT TYPES

1 General

1.1 Objective

The objective of this section is to define deliverables resulting from an assessment of a target.

1.2 Compliance document (CD) - definition

A document that is:

- relating to and identifying a target
- validated and signed by the issuing organisation
- referring to at least one standard
- stating that the issuing organisation has established reasonable assurance that the target complies with all or selected requirements of the standards referred to
- based on documentation review, survey, audit and/or data analysis performed upon the target by an authorised representative of the issuing organisation or by other means accepted by the issuing organisation.

1.3 Periodicity

Some compliance documents will have a time limited validity and may be subject to a pre-defined renewal scheme.

2 Generic compliance document types

2.1 General

This subsection defines compliance document types depending on:

- party
- authorisation
- standard adoption status.

2.2 Declaration (D)

A compliance document issued by a first party organisation.

Guidance note 1:

The term 'declaration' may be used also for documents that are not compliance documents, see [Sec.5 \[2.15.74\]](#).

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Guidance note 2:

The Society may issue declarations targeting its own deliverables, e.g. 'declaration of class'.

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2.3 Certificate (C)

A compliance document that is:

- referring to a standard that is ratified or accepted by a government, and
- issued by a third party organisation that is authorised to do so by the government

or

- issued by a third party organisation that is authorised to do so by the organization issuing the standard that the certificate refers to

or

- issued by a third party organisation fulfilling the requirements to an issuing organisation given by the standard that the certificate refers to.

2.4 International certificate (IC)

A certificate referring to a standard that is:

- applicable to the target, and
- adopted as an international convention, entered into force and ratified by the government, or
- entered into force and mandatory under an adopted international convention that has entered into force (international code).

2.5 Statement of compliance (SoC)

A compliance document that:

- is issued by a third party organisation, and
- is not a certificate.

3 Target related compliance document types

3.1 General

A target related compliance document type is a compliance document type applicable to a specific target level of a specific target group, see [Sec.2 \[2\]](#).

3.2 Compliance document types targeting asset designs

3.2.1 Design certificates (DC)

A certificate relating to and identifying the design of an asset or a part of an asset, based upon design assessment.

3.2.2 Design declaration (DD)

A declaration relating to and identifying the design of an asset or part of an asset.

3.3 Compliance document types targeting product designs

3.3.1 Type approval design certificate (TADC)

A certificate relating to and identifying a product design, based upon design assessment.

3.3.2 Type approval certificate (TAC)

A certificate relating to and identifying a product design, based upon:

- design assessment
- production assessment, and/or

- survey of at least one product.

3.3.3 Product design declaration (PDD)

A declaration relating to and identifying a product design.

Guidance note:

'Product design declaration' is also known as 'Maker's confirmation'.

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3.4 Compliance document types targeting products

3.4.1 Product certificate (PC)

A certificate relating to and identifying a product, based upon:

- design assessment
- survey of the product and/or its production process.

The design assessment may be based on a TADC or TAC, see [3.3], or performed on a case-by-case basis. A case-by-case based design assessment may be applied to a series of individual products. In special cases, the design assessment may be waived.

3.4.2 Material certificate (MC)

A certificate:

- relating to and identifying a product
- referring to material related requirements of the referred standards
- based upon survey performed upon the product itself
- stating the results of tests and examinations that have been performed upon the product.

Specific pre-conditions for material certificates referring to the Society's rules for classification apply, see e.g. DNV-RU-SHIP Pt.2 Ch.1 Sec.2 [4.2].

3.4.3 Product declaration (PD)

A declaration relating to and identifying a product, based upon:

- survey of the product and/or its production process.

Guidance note:

Product declarations are also known as 'works certificates' or 'product certificates issued by the manufacturer'.

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3.4.4 Material declaration (MD)

A declaration:

- relating to and identifying a product
- referring to material related requirements of the referred standards
- based upon survey performed upon the product itself
- stating the results of tests and examinations that have been performed upon the product.

Guidance note:

Material declarations issued by manufacturers approved by DNV are also known as 'works certificates' or 'material certificates issued by the manufacturer'.

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Specific pre-conditions for material declarations referring to the Society's rules for classification apply, see e.g. DNV-RU-SHIP Pt.2 Ch.1 Sec.2 [4.2].

3.4.5 Product test report (PTR)

A declaration:

- relating to and identifying a product
- based upon survey performed upon samples from the current production.

3.4.6 Material test report (MTR)

A declaration:

- relating to and identifying a product
- referring to material related requirements of the referred standards
- based upon survey performed upon samples from the current production
- stating the results of tests and examinations that have been performed upon the samples.

3.5 Compliance document types targeting organisations

3.5.1 Approval of manufacturer certificate (AoM-C)

A certificate:

- relating to and identifying a manufacturer
- identifying the product types the certificate is valid for
- when applicable, identifying the product designs the certificate is valid for
- based upon documentation review, audit of the manufacturer and/or survey performed upon manufacturer's facilities and equipment
- stating that the manufacturer is approved to manufacture the referred product types and product designs.

3.5.2 Approval of service supplier certificate (AoSS-C)

A certificate:

- relating to and identifying an organisation providing services as measurements, tests or maintenance
- identifying the service types
- identifying the target types the certificate is valid for
- based upon documentation review, audit of the service supplier and/or survey performed upon service supplier's facilities and equipment
- stating that the service supplier is approved to perform the referred service types upon the referred target types.

3.5.3 Manufacturing survey arrangement certificate (MSA-C)

A certificate:

- relating to and identifying a manufacturer
- identifying the product types the certificate is valid for
- when applicable, identifying the product designs the certificate is valid for
- based upon documentation review, audit of the manufacturer and/or survey performed upon manufacturer's facilities and equipment
- stating that the manufacturer is approved to perform quality control upon the referred product types and product designs.

3.5.4 Welding workshop approval certificate (WWA-C)

A certificate:

- relating to and identifying a welding workshop and its operating organisation
- identifying the welding services the certificate is valid for
- identifying the target types the certificate is valid for

- based upon documentation review, audit of the operating organisation and/or survey performed upon the welding workshop and its equipment
- stating that the welding workshop and its operating organisation is approved to perform the referred welding service types upon the referred target types.

3.6 Compliance document types targeting persons

3.6.1 Welder certificate (WELD-C)

A certificate:

- relating to and identifying a welder
- identifying the welding services the certificate is valid for
- identifying the target types the certificate is valid for
- based upon documentation review, audit of the welder and/or survey performed upon welds made by the welder
- stating that the welder is approved to perform the referred welding service types upon the referred target types.

4 Target and standard related compliance document types

4.1 General

A target and standard related compliance document type is a compliance document type that is:

- applicable to a specific target level of a specific target group, see [Sec.2 \[2\]](#), and
- referring to a specific standard.

As the Society issues compliance documents referring to a high number of standards, this document only lists selected target and standard related compliance document types, see [\[4.2\]](#).

Guidance note:

IACS Rec.75 lists compliance document types targeting vessels and organisations, referring to selected international regulations.

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4.2 Selected target and standard related compliance document types

4.2.1 Class certificate (CL-C)

A certificate targeting an asset and referring to the Society's rules for classification.

4.2.2 Hull construction certificate (HCC)

A certificate targeting an asset and referring to the Society's rules for classification with a scope limited to verifying the structural integrity. The verification consists of design approval, workshop approval, material certification and construction survey of a newbuilding

4.2.3 EU mutual recognition type approval certificate (EUMR-TAC)

A type approval certificate issued by an organisation recognised by EU confirming compliance with commonly agreed design requirements for mutual recognition as laid down in the governing documents of the recognised organisation.

Guidance note:

EU mutual recognition type approval certificates are normally mutually accepted by all EU RO's and covers only agreed components and standards listed at <https://www.euomr.org/>.

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5 Other deliverables

5.1 Approval letter (AL)

A document that is:

- relating to and identifying the design of an object or part of an object
- validated by the issuing organisation
- referring to at least one standard
- stating the result of the issuing organisation's assessment of the target with respect to all or selected requirements of the standards referred to
- based upon review of a specific list of design documentation performed by an authorised representative of the issuing organisation.

Guidance note:

An approval letter may contain comments, e.g. statements that the design must be revised to comply with the referred standards.
An approval letter may conclude that the design does not comply with the referred standards.

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5.2 Design verification report (DVR)

A document that is:

- relating to and identifying the design of an object or part of an object
- validated and signed by the issuing organisation
- referring to at least one standard
- stating the result of the issuing organisation's assessment of the target with respect to all or selected parts of the requirement set or standards referred to
- based upon review of a specific list of design documentation performed by an authorised representative of the issuing organisation.

Guidance note:

A design verification report may contain comments, e.g. statements that the design must be revised to comply with the referred standards.
A design verification report may conclude that the design does not comply with the referred standards.

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5.3 Report (REP)

A document that is:

- relating to and identifying a target
- validated and signed by the issuing organisation
- stating the result of activities performed by an authorised representative of the issuing organisation relating to the target.

5.4 Statement of fact (SoF)

A document that is:

- relating to and identifying a target
- validated and signed by the issuing organisation

- stating the result of an observation performed by an authorised representative of the issuing organisation upon the target.

SECTION 4 CONTENT OF COMPLIANCE DOCUMENTS

1 General

Compliance documents should include:

- compliance document type
- compliance document number / unique identifier
- issuing organisation
- name and signature of originator
- issue date
- target
- referred standard editions

and, where applicable:

- validity period
- comments and limitations.

2 Compliance documents targeting product types

Compliance documents for product types should, in addition to the requirements of [1], include:

- the application, context or function that the product type can be used for.

3 Compliance documents targeting products

Compliance documents for products should, in addition to the requirements of [1], include:

- the application, context or function that the product can be used for
- the asset where the product shall be installed.

4 Certificates

Certificates should, in addition to the requirements of [1] and applicable requirements of [2] and [3], include:

- government or organisation authorising the issuing organisation to issue the certificate.

SECTION 5 DOCUMENTATION TYPES

1 Introduction

1.1 Objective

The objective of this section is to provide definitions of the documentation types used for documentation requirements.

1.2 Organization of the documentation types

The documentation types are organized according to the disciplines listed in [Table 1](#).

Table 1 Disciplines

<i>Code</i>	<i>Title</i>
B	Stability, watertight and weathertight integrity
C	Mechanical
E	Electrical
F	Information technology
G	Safety
H	Hull and structure
I	Instrumentation
M	Materials
N	Navigation
P	Process
Q	Quality management
S	Piping
T	Telecommunications
W	Geotechnical engineering
Z	Multidiscipline

1.3 Documentation types

Each documentation type consists of:

- Code: a letter referring to the discipline and a number. The combination of letter and number provides a unique identification of the documentation type.
- Name: the name of the documentation type.
- Description: a detailed description of the required content of the documentation.

2 Documentation types

2.1 Discipline B – Stability, watertight and weathertight integrity

2.1.1 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 [DNV-CG-0157](#).

2.1.2 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 [DNV-CG-0157](#).

2.1.3 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 [DNV-CG-0157](#).

2.1.4 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.

2.1.5 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 [DNV-CG-0157](#).

2.1.6 B060 – Floodable length calculation / subdivision index calculation

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

2.1.7 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 [DNV-CG-0157](#).

2.1.8 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 [DNV-CG-0157](#).

2.1.9 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 [DNV-CG-0157](#).

2.1.10 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 [DNV-CG-0157](#).

2.1.11 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 [DNV-CG-0157](#).

2.1.12 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.

2.1.13 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.

2.1.14 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.

2.1.15 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 [DNV-CG-0157](#).

2.1.16 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 [DNV-CG-0157](#).

2.1.17 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.

2.1.18 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 LL 511 'Initial Load Line Survey' is the corresponding society's 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.

2.1.19 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.

2.2 Discipline C – Mechanical

2.2.1 C010 – Design criteria

Dimensioning criteria, e.g.:

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

2.2.2 C020 – Assembly or arrangement drawing

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

2.2.3 C030 – Detailed drawing

A drawing showing geometric dimensions, scantlings and arrangement of the object. The drawing shall include:

- 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.

2.2.4 C040 – Design analysis

A document providing:

- objectives
- premises
- assumptions
- conclusions

relating to analysis of:

- static strength
- dynamic strength
- vibration.

2.2.5 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
- E090 - Table of Ex-installation
- M010 - Material specification, metals
- M150 - Non-destructive testing (NDT) plan
- S090 - Specification of piping, valves, flanges and fittings

as applicable for the component.

2.2.6 C070 – Permanent magnet machine documentation

A document providing:

- C020 - Assembly or arrangement drawing, including part list, main dimensions, materials and weld connections.
- C030 - Detailed drawing of rotor shaft, hubs, bolts and other power transmitting parts, for assessment of mechanical strength. Including shrinkage amounts, pull up on taper, surface roughness, bolt pre-tightening, materials, mechanical properties and cleanliness and special heat treatment.
- C040 - Design analysis of permanent magnet fixations.
- E120 - Electrical data sheet, general.
- E180 - Electrical assembly layout.
- Q040 - Quality survey plan (QSP).
- Z050 - Procedure for fastening of permanent magnet fixations.
- Report from test at manufacturer covering impulse testing of windings. Applicable when additional design measures for permanent magnet machines in order to accept redundancy type 3 is required.

2.3 Discipline E – Electrical

2.3.1 E010 – Overall single line diagram

A diagrammatic drawing showing:

- Power system layout with identification of all generators, transformers, switchboards, distribution boards, frequency converters, filters, 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).

2.3.2 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.

2.3.3 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.

2.3.4 E040 – Electrical load 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. Further, when power sources with limited load step capabilities are used (more than 2 steps from 0% to 100% load), the load calculation shall determine the possible load steps in the system compared with the load step capabilities of the power sources.

In addition for battery and uninterruptible power supply (UPS) systems, the following shall be covered:

- power consumption and available power
- available energy and battery back-up time.

The calculation of available battery capacity shall include discharge characteristics for the batteries.

2.3.5 E050 – Single line diagrams / consumer lists for switchboards

A document covering all switchboards and their consumers, providing information on switchboard connections, consumer ratings, cable dimensions and settings of protective devices.

2.3.6 E080 – Discrimination analysis

A document describing the discrimination between electrical protective devices in the distribution system. The document shall include a list of all settings/parameter values for short circuit, overcurrent and earth fault protection. 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.

The document shall cover:

- generator protection
- main switchboard circuits
- emergency switchboard circuits
- battery and UPS systems
- downstream discrimination between different voltage levels under all operating conditions.

2.3.7 E090 – Table of Ex-installation

Table 2 lists information for all equipment installed in hazardous areas, where relevant based on approved Hazardous area classification drawing (G080) and ESD philosophy.

Table 2 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

Information element	Description
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 (C_{eq}) and current versus inductance (L_{eq}) shall be listed for each circuit. The maximum values for the applied safety barrier shall be included
T_E -time	for motors located in a zone 1, certified as <i>increased safe</i> , 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.

2.3.8 E100 – Voltage drop calculations

Calculation of voltage drop at consumer terminals, both stationary values as well as the voltage drop when starting large consumers.

2.3.9 E110 – Cable data sheet and design drawing

A document stating:

- maker
- cable types and number of cores - conductor cross-sections [mm^2]
- 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.

2.3.10 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 on board
- input frequency and voltages, with tolerances
- designed short circuit strength (peak value at half period and symmetrical root mean square).

2.3.11 E130 – Electrical data sheet, semiconductor assemblies

A document stating:

- information about the topology (including convertors, filters, bypass, batteries, etc.)

- description of the semiconductor device, with information of intended use, cooling and type of semiconductor elements
- input and output voltage, frequency, current (true r.m.s) and power, with tolerances
- for power supplies: designed short circuit output capacity
- compliance with the relevant IEC standard.

2.3.12 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 (switchgear making and breaking capacity, circuit protection, cables, busbar, batteries, harmonic filters, etc.).

2.3.13 E150 – Strength calculation with respect to short circuit

A document providing calculations of the busbar strength with corresponding data for bus-bars and supports. Both thermal and mechanical effects shall be considered.

2.3.14 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.

2.3.15 E170 – Electrical schematic drawing

A schematic drawing showing the configuration of the electrical circuits. Information on protection, synchronisation, interlocks, undervoltage trips, remote control circuits etc. shall be included if relevant.

2.3.16 E180 – Electrical assembly layout

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

2.3.17 E190 – Lighting description

A document describing the design of normal, emergency and escape (transitional and battery back-up) lighting for all areas on board.

2.3.18 E200 – Short circuit calculations

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.

Calculation of single phase fault against earth shall be included for systems with earthed neutral.

2.3.19 E210 – Harmonic distortion calculations

Calculation of voltage harmonic distortion for relevant operating modes of the system.

2.3.20 E220 – Electrical system philosophy

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

- description of power sources
- 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
- interlocks and/or restrictions related to functionality or operation of the system
- system behaviour in relevant failure modes
- dead ship recovery arrangement
- blackout recovery arrangement

- if physical separation is required, location of equipment and cable routings shall be included in the system philosophy in order to justify compliance with separation requirements
- if a separate emergency source of power is omitted based on two or more independent main power systems, the system philosophy shall explain how the applicable requirements are met
- description of possible load steps in the system and load step capabilities of power sources
- special design features or alternative solutions not meeting standard design requirements
- system arrangements for permanent magnet (PM) machines used for propulsion and/or power generation
- for additional notations where redundancy is required; description of the redundancy groups and possible operation modes after failure (E.g., for DP).

2.3.21 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.

2.3.22 E240 – Electrical assembly functional description

A document providing the following information, as relevant:

- functional description of local, remote, manual and automatic operation and control (e.g. protection, interlocks, standby start)
- a description of operational modes
- redundancy and failure mode behaviour
- integration versus higher level control system
- redundancy for cooling protection functions, trips and shut downs alarms
- for variable speed drives larger than 1 MW: circuit analysis for identifying components whose failure will result in a thermal or electrical shock hazards in accordance with IEC 61800-5-1 clause 4.2.

2.3.23 E250 – Explosion protected equipment maintenance manual

The manual shall be in accordance with the recommendations in IEC 60079-17 and 60092-502 and shall contain necessary information on:

- overview of classification of hazardous areas, with information about gas groups and temperature class
- records sufficient to enable the certified safe equipment to be maintained in accordance with its type of protection (list and location of equipment, technical information, manufacturer's instructions, spares etc.)
- inspection routines with information about detailing level and time intervals between the inspections, acceptance/rejection criteria
- register of inspections, with information about date of inspections and name(s) of person(s) who carried out the inspection and maintenance work.

2.4 Discipline F - Information technology

2.4.1 F011 - Cyber security design description

Documentation describing the security zones and conduits.

For each security zone, the security profile (SP) of the zone shall be specified. In addition, for each system in the zone the following shall be described:

- brief summary of system functionality, including name and/or designation of system and name of maker or supplier
- location on board and physical access control mechanisms
- purpose, protocols, and data flows for any communication links and networks between systems in the security zone

- any installed anti-virus or anti-malware software
- any wireless communication capabilities or networks
- any applications for remote access or other communication with untrusted networks
- reference to the system's type approval certificate (TAC) covering the required cyber security functions, as applicable
- any compensating countermeasures specified in the system's type approval certificate (TAC)
- reference to user manuals or guidelines provided by the system supplier supporting response to and recovery from cyber incidents (F142).

For each conduit, the security profile (SP) of the conduit shall be specified. In addition, for each conduit the following shall be described:

- any firewalls or other zone boundary protection devices
- purpose, protocols, and data flows for network communication between systems in different security zones
- purpose, protocols, and data flows for any communication between systems in security zones and untrusted networks
- specification of the traffic that is permitted to traverse the zone boundary (e.g. firewall rules).

For each system proposed excluded from the mandatory application of the security requirements, the following shall be described:

- risk assessment demonstrating negligible risk.

2.4.2 F021 - Description of security capabilities

Documentation describing compliance with required security capabilities. The system, including its devices and software applications, shall be described as follows:

- brief summary of system functionality
- purpose, protocols, and data flows for any communication links and networks to other systems or networks
- specification of how each required security capability is implemented in the system, and in its devices and software components
- in case a security capability is deemed not applicable or not relevant, this shall be described and justified
- if the system or any of its components cannot comply with a requirement, proposed compensating countermeasure(s) shall be described
- in case a component in the system is proposed excluded from the mandatory application of the security requirements, a risk assessment demonstrating negligible cyber risk shall be included.

2.4.3 F030 - System topology

Documentation illustrating the physical and logical topology of the system, including and identifying the following:

- all endpoints and network devices, including identification of redundant components
- communication cables (networks, serial links), including communication with I/O units
- communication cables to other networks or systems
- it shall be possible to identify in the physical topology the hardware components that are listed in the inventory list (F071).

The logical topology shall illustrate data flow between software components in the system. The following information shall be identified:

- communication endpoints (e.g. workstations, controllers, servers)
- network devices (switches, routers, firewalls)
- physical and virtual computers
- physical and virtual communication paths
- communication protocols.

If the system is type approved, it shall be possible to verify that the system to be delivered represents the type approved physical and logical topology.

2.4.4 F031 - Zone and conduit diagram

A diagram illustrating how systems and components in the system under consideration (SUC) are grouped into security zones and conduits, including at least the following information:

- illustration of each security zone, including its name and/or designation, security profile, and zone boundaries
- simplified illustration of each system in the security zones, including its name and/or designation and physical location on board
- illustration and designation of communication links and networks between systems in the same security zone
- illustration and designation of network communication between systems in different security zones (conduits)
- illustration and designation of network communication between systems in a security zone and untrusted networks (conduits).

2.4.5 F071 - Inventory list

Documentation specifying hardware and software components and include the information below.

For hardware devices (host devices, embedded devices, networks devices):

- brand and/or manufacturer
- model, type or name
- short description of functionality and purpose
- physical interfaces
- version and patch level of operating system or firmware
- supported communication protocols.

For software components (e.g. applications, utility software):

- designation of the hardware device in which the software is installed
- brand and/or manufacturer
- model, type or name
- short description of functionality and purpose
- version of software.

2.4.6 F141 - Configuration guidelines

Documentation describing recommended and default settings for all configurable security capabilities.

2.4.7 F142 - Cyber incident response and recovery manual

Documentation including procedures or instructions supporting response to and recovery from cyber incidents, covering the following:

- local independent control
- fail-to-safe state
- network isolation
- forensics by use of audit records
- backup and restore
- shutdown, reset, roll-back, and restart.

2.4.8 F200 - Cyber security documentation for systems

Documentation demonstrating compliance with cyber security requirements for a computer-based system.

For systems with type approved security capabilities, including the following documentation:

- F030 - System topology
- F071 - Inventory list
- Z261 - Test report or Z300 - Declaration, demonstrating that hardening of the system and configuration of security capabilities have been carried out by the manufacturer and/or supplier of the system, as per F141.

For systems without type approved security capabilities, including the following documentation:

- F030 - System topology
- F071 - Inventory list
- F021 - Description of security capabilities
- F252 - Procedure for test of security capabilities
- F259 - Description of secure development lifecycle processes
- F141 - Guidelines for configuration of security capabilities
- F142 - Cyber incident response and recovery manual
- F253 - Procedure for verification of security functions on board
- I320 - Software change handling procedure.

2.4.9 F251 - Cyber security onboard test procedure

Documentation describing how to test or demonstrate during the commissioning phase on board that the SUC meets applicable cyber security requirements.

The procedure shall include demonstration of any compensating countermeasures in lieu of any security functions that are not inherently implemented in the systems.

The tests shall cover all systems and components in the SUC, as applicable. The procedure shall describe:

- necessary test setup (i.e. to ensure that the test can be repeated with the same expected result)
- test equipment
- initial condition
- test methodology, detailed test steps
- expected results and acceptance criteria.

2.4.10 F252 - Procedure for test of security capabilities

Documentation describing how to demonstrate the required security capabilities for a system and/or product.

The tests shall cover all components in a system, as applicable. The procedure shall describe:

- necessary test setup (i.e. to ensure that the test can be repeated with the same expected result)
- test equipment
- initial condition
- test methodology, detailed test steps
- expected results and acceptance criteria.

2.4.11 F253 - Procedure for verification of cyber security functions on board

Documentation describing how to verify intended operation of required security functions during test or maintenance periods in the operational phase of the vessel.

The procedure shall specify how to perform the verification and the acceptance criteria, considering both requirements for class notation **Cyber secure** and the owner's cyber security management system.

2.4.12 F257 - Cyber security management system manual

Documentation describing management of the required technical and organizational cyber security countermeasures.

The documentation shall include policies, plans, procedures, instructions, records, or other relevant information documenting the required processes and activities.

The documentation shall enable verification of compliance by document assessment and by audit of the organization.

2.4.13 F259 - Description of secure development lifecycle processes

Documentation describing the processes and controls in accordance with required secure development lifecycle (SDL) practices.

2.5 Discipline G – Safety

2.5.1 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.

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2.5.2 G011 - Safety assessment

A systematic evaluation of safety involving identification and evaluation of hazards and events that could result in loss of life, property damage, environmental damage, or the need to evacuate.

2.5.3 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---o-f---g-u-i-d-a-n-c-e---n-o-t-e---

2.5.4 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.

2.5.5 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 detection 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
- fire-fighter's outfits, breathing air apparatus spare charges and means of recharging
- 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) (vessels built after 2004-01-01) and A.654(16) (vessels built before 2004-01-01). This plan shall be drawn up in the language or languages required by the vessel's flag state and in the English language. The vessel's name or other identification shall be included.

2.5.6 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.

2.5.7 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
- fire integrity of windows in fire class divisions.

2.5.8 G061 – Penetration drawing

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

2.5.9 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
- grade of release
- types of flammable gas, vapour or liquid that may leak
- possible leak [m^3/h].

2.5.10 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.

2.5.11 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.

2.5.12 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 on-board, speed of movement and capacity of evacuation means
- assumptions
- scenario assessments
- possible impacts of accidental events on personnel.

2.5.13 G110 – Dispersion study

An analysis covering gas dispersion from gas vents.

2.5.14 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.

2.5.15 G130 – Cause and effect diagram

A matrix showing all inputs (causes) to a system and all corresponding outputs (effects), including all items that give alarm and automatic shutdown. Where more than one sheet is necessary for the matrix, the cause and effect diagram shall be organised either according to physical areas of the vessel or by natural splits of the corresponding safety system. 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), DD (S012) or D&ID (S013), or overall single line diagrams (E010). Signals shown on more than one cause and effect diagram shall be fully traceable between the diagrams.

Information about fail-safe mode shall be included for all input and output lines, see also Schematic diagrams of input and output circuits (I090).

2.5.16 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.

2.5.17 G150 – Vibration measurement protocol

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

Possible additional positions detected during the survey may be included in the protocol.

2.5.18 G160 – Life-saving 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.

2.5.19 G170 – Safety philosophy

A document that shall be submitted in the initial design phase, providing information on:

- overall principles and functionality for the safety systems handling accidental events, e.g.:
- escape and evacuation
- heating, ventilation and air-conditioning
- fire and gas detection and alarm system
- emergency shutdown system
- fire protection systems
- for the emergency shutdown system the principles for what is causing the various levels and the actions that shall be taken
- description of the functions that shall be implemented as automatic actions, manual action, remote control, local control, emergency control, back-up control/operation
- specification of data exchange between systems and instrumented safety systems
- specification of failure handling and safe states for safety critical equipment
- physical requirements and limitations such as cabinet location and cable routing
- description of power supplies to the instrumented safety systems.

2.5.20 G180 – Shutdown hierarchy

A document showing in a simplified manner:

- the shutdown levels
- what causes that activate the shutdown levels
- the actions that will be taken for each shutdown level.

This is a document showing the same functions as G130 - *Cause and effect diagram*, but in a simplified manner in order to see the principles for the vessel in question.

2.5.21 G190 – System demand report

A report documenting the required demand a system must be able to supply.

2.5.22 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
- Z161 - Operation manual, including release instructions as applicable for the system.

2.5.23 G210 - Wind chill study

Indicating wind chill exposure of personnel on the various exposed areas and the mitigation measures adopted.

2.5.24 G220 - Reduced mobility plan

A drawing based on a general arrangement plan (Z010):

- showing adoption of IMO MSC/Circ.735 items as implemented by flag.

2.6 Discipline H – Hull and structure

2.6.1 H010 – Structural design brief

A description of the design basis for the vessel's structure, including:

General

- a general description of the vessel
- main dimensions
- class notations and certificates
- applicable rules, regulations, standards and codes, including their editions
- technical specifications, e.g. owner requirements.

Design data

- data for e.g. service life, design temperature, loading conditions, weight of equipment and modules, and liquid density
- data for relevant design drafts, e.g.:
 - stillwater loads for applicable design conditions
 - wave scatter diagram or design wave height for applicable design conditions
 - wind loads
 - current loads
 - combination of loads.

Design conditions (limit states)

- ultimate strength (operation heading profile, drafts, etc.)
- fatigue (part time in operation/transit, operation heading profile, drafts, design fatigue factors (DFF), low cycle fatigue)
- accidental (explosion and fire, dropped objects, unintended flooding, extreme weather condition, loss of slender member.

Structural analyses to be performed

- global strength analysis
- longitudinal strength analysis
- area strength analysis
- local strength analysis
- wave load analysis
- fatigue analysis.

Structural code check

- global strength
- local strength
- acceptance criteria
- buckling code

- fatigue.

2.6.2 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 towers, risers
- helicopter loads, landing and parking.

For vessels that may take vehicles on board, as cargo or for cargo handling:

- types of vehicles that can be accommodated, including arrangement of axles and wheels, maximum axle loads and details of wheel and foot print arrangements
- stowing plan including the most unfavourable combination of vehicles that may be positioned on deck.

For vessels where block loading block loading is included in the loading manual (H110/H111):

- extent and magnitude of allowable block loading
- distributed loads.

2.6.3 H030 – Tank and capacity plan

A plan of the vessel with location and identification of spaces and tanks. Information about content, density, volumes, equipment weight, centre of gravity and liquid temperature for all applicable spaces and tanks.

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.

2.6.4 H040 – Structural categorisation plan

A plan showing the material categorisation of the main load bearing structure.

2.6.5 H041 – Structural inspection plan

A plan showing the inspection categorisation of the main load bearing structure.

2.6.6 H042 – Structural construction monitoring (CMON) plan

A plan describing the methods, extent of inspection and acceptance criteria for identified structural areas of attention (AOA). The AOAs are design specific structural details identified as critical from the design phase and from in-service experience, needing special consideration during construction.

The plan shall include:

- a summary of all AOAs
- relevant structural drawings marked with AOAs
- construction tolerances
- alignment verification methods
- fatigue life improvement i.e. weld details, grinding
- remedial methods
- method for reporting
- survey recording and report.

2.6.7 H050 – Structural drawing

A drawing showing the geometric dimensions, scantlings and arrangement of a structural object, including:

- details of parts and openings
- material specifications (see M010 or M030)
- standard details (see H070)
- details of joints, welding procedures, filler metal particulars and specification of heat treatment after welding
- inspection category, if not default category
- procedure for stress relieving of cast steel parts.

2.6.8 H052 – Midship section drawing

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

The following information shall be included on the drawing:

- length of ship L
- greatest moulded breadth B
- moulded depth D
- mean moulded summer draught T
- block coefficient C_B
- maximum service speed V
- class notations.

For vessels that may carry dry bulk cargo, as applicable:

- for each cargo hold M_H : the cargo mass M_H corresponding to the homogeneously loaded condition at maximum draught with 50% consumables
- for each cargo hold M_{Full} : the cargo mass of the hold filled to the top of the hatch coaming with a cargo with the density of the greater of 1.0 t/m^3 and M_H/V_{Full} (volume of cargo hold up to top of the hatch coaming)
- for each cargo hold M_{HD} : the maximum allowable cargo mass in the hold according to design loading conditions with specified holds empty at maximum draught with 50% consumables
- distributed loads for inner bottom of each cargo hold
- distributed loads for deck and all hatch covers
- design steel coil loads in terms of weight, length, diameter and dunnage arrangement
- specification if transverse bulkheads separating cargo holds are watertight.

For vessels that may carry containers, as applicable:

- stack weights of 20 ft and 40 ft containers and mixed stowage, in holds, on hatch covers and on decks
- minimum mass in one typical 40 ft bay on scantling draught.

For vessels with class notations **PC** and **Icebreaker**:

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

For vessels with class notation **Grab**:

- weight of grab.

2.6.9 H053 – Foundation and supporting structure drawing

A structural drawing, see [2.6.7], of the foundation and supporting structure for an object, including:

- fastening details
- the foundation's footprint
- design loads and load point
- for a heavy object, the object's mass and center of gravity.

2.6.10 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. The drawing shall include geometric dimensions, scantlings and material specifications.

The bilge keel and its connections to the hull shall be included.

For class notation **Ice**, **Icebreaker** and **PC**, the following shall be included:

- the upper ice water line (UIWL) and the lower ice water line (LIWL) together with the lines separating the bow, midship and stern regions of the ice belt
- vessel displacement
- propulsion machinery maximum continuous power output
- propulsion machinery minimum power output.

For class notation **BIS**, the following marking and locations shall be included:

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

2.6.11 H061 – Framing plan

A drawing showing the positions and type of stiffeners and primary support members. The drawing shall include geometric dimensions, scantlings and material specifications.

The framing plan is normally a part of shell expansion drawing (H060).

2.6.12 H062 – Longitudinal section drawing

A drawing showing the structural arrangement of primary support members and stiffeners parallel to the vessel's centerline. The drawing shall include geometric dimensions, scantlings and material specifications.

2.6.13 H070 – Standard details

A yard standard (booklet) providing drawings of standard details used in the structure. The corresponding details should be identified on the structural drawings (H050).

2.6.14 H080 – Strength analysis

An analysis report documenting the structural capacity for the specified design conditions, including:

- objective and scope of work
- description of the model
- design basis, design loads, and description of load application
- geometry properties, e.g. scantlings and section modulus
- boundary conditions and assumptions made
- for FE-calculations, description of element types
- calculations results, for FE include result plots and detailed plots of peak stresses
- discussion of the results
- conclusion
- reference documents.

2.6.15 H081 – Global strength analysis

An analysis of the global structural capacity, for the applicable operating, survival, and transit conditions, documented according to the general principles of H080 and including:

- relevant design conditions, e.g. water depth, draughts in operating, survival and transit condition, design wave characteristics, water depth, wind, current, bottom conditions, elevated heights, and air gap

- typical mass distribution conditions, e.g.:
 - permanently installed modules and equipment
 - variable deck loads
 - ballast distribution, including typical and unfavourable conditions
 - mooring and riser loads
 - steel weight of structural parts
- typical load conditions:
 - ultimate limit state (ULS) survival and operating
 - relevant accidental limit states (ALS)
 - fatigue limit state (FLS)
 - transit
- vessel specific load conditions, e.g.:
 - load centre of gravity envelope for maximum elevated weight (self-elevating units)
 - overturning stability (self-elevating units)
 - redundancy after loss of slender member (ALS) (column-stabilized units).

2.6.16 H082 – Longitudinal strength analysis

An analysis of the longitudinal strength of a vessel for all relevant design conditions, presented in a report including:

- objective and scope of work
- design basis, design loads and description of load application
- drafts (e.g. ballasted, loaded)
- cargo capacity
- cargo, ballast and bunker distribution, including mass of cargo in each compartment
- maximum still water bending moments and shear forces
- still water bending moment limits
- wave loading moments and shear forces
- reference documents.

The strength shall be presented as allowable boundary curves for stillwater bending moments and shear forces along the vessel and calculated at each transverse bulkhead, at discontinuities, or at major hull scantlings changes. The allowable boundary strength curves shall when relevant take into account shear force corrections.

2.6.17 H084 – Wave load analysis

A hydrodynamic analysis for calculating the dynamic responses from the waves including:

- environmental design criteria, e.g. design wave condition (significant wave height with corresponding wave periods or wave scatter diagram), wave spectrum, steepness criteria, wave spreading function, wave heading profile and water depth
- design conditions, e.g. draft, mass, centre of gravity, centre of buoyancy, and roll and pitch radius of gyration
- additional damping
- presentation of response amplitude operators (RAO)
- calculated responses, e.g. section loads, motions, accelerations, sea pressure and air gap.

2.6.18 H085 – Fatigue analysis

A report documenting the fatigue life to the extent required, in accordance with applicable rules and standards.

- fatigue methodology

- design life
- applied S-N curves
- stress concentrations
- calculated damage
- in case of global assessment/screening; guidance of how to evaluate local details, e.g. 'allowable SCF plot' or similar.

2.6.19 H086 – Mooring analysis

A coupled analysis of the hull-mooring-riser interaction according to [DNV-OS-C301](#).

2.6.20 H087 - Scantling calculations

A report documenting that the prescriptive local scantling checks are performed in accordance with applicable rules and standards, covering requirements such as:

- load application
- minimum thickness of plates, stiffeners and primary supporting members (PSM)
- plating, stiffeners, PSM and pillars
- intersection of stiffeners and PSM
- superstructure and deckhouse
- simple beam and grill analysis of stiffeners and girders.

2.6.21 H090 – Model test specification

A document describing:

- the objective of the tests
- the test facility
- instrumentation to be used
- details of the planned tests
- number of simulations.

2.6.22 H091 – Model test report

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

2.6.23 H100 – Equipment number calculation

Calculation of equipment number including calculation of areas.

2.6.24 H110 – Preliminary loading manual

A document containing the information listed in H111 while based on preliminary vessel data.

2.6.25 H111 – Final loading manual

A document containing the design loading conditions and ballasting conditions, including asymmetrical conditions where relevant. The loading and ballasting conditions shall be subdivided into departure and arrival conditions, while ballast exchange at sea conditions shall be included if applicable. The loading and ballasting conditions shall be those that the design of the hull scantlings is based upon.

Relevant vessel specifications shall be included, e.g.:

- 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.

For container ships:

- Maximum hull girder still water torsional moment.

For ships with class notation **HC** or **OC**, and for bulk carriers with class notation **CSR** and rule length ≥ 150 m:

- The loading conditions on which the design of the ship has been based, including permissible limits of stillwater bending moments and shear forces.
- The results of calculations of stillwater bending moments, shear forces and where applicable, limitations due to torsional loads.
- Envelope results and permissible limits to stillwater bending moments and shear forces in the hold flooded conditions, where required.
- The cargo holds or combination of holds that might be empty at full draught. If no cargo hold is allowed to be empty on full draught, this shall be clearly stated in the loading manual.
- Maximum allowable and minimum required mass of cargo and double bottom contents of each hold as a function of the draught at mid-hold position.
- Maximum allowable and minimum required mass of cargo and double bottom contents of any two adjacent holds as a function of mean draught in way of these holds. This mean draught may be calculated by averaging the draught of the two mid-hold positions.
- Maximum allowable load on tank top together with specification of the nature of the cargo for cargoes other than bulk cargoes.
- Maximum allowable load on deck and hatch covers. If the vessel is not approved to carry load on deck or hatch covers, this shall be clearly stated in the loading manual.
- The maximum rate of ballast change together with the advice that a load plan shall be agreed with the terminal on the basis of achievable rates of change of ballast.

For vessels with class notation **Icebreaker** or **PC**, design specifications for the operation of the vessel in ice infested waters, e.g.:

- design speed
- instruction for filling of ballast tanks
- astern operation in ice
- design temperature.

2.6.26 H112 – Loading sequence description, preliminary

A document containing the information listed in H114 while based on preliminary vessel data.

2.6.27 H113 - Loading and unloading booklet

A document describing:

- a) The loading conditions on which the design of the ship has been based, including permissible limits of stillwater bending moments and shear forces.
- b) The results of calculations of still-water bending moments, shear forces and where applicable, limitations due to torsional loads.
- c) Envelope results and permissible limits to still-water bending moments and shear forces in the hold flooded conditions are also to be included.
- d) The cargo hold(s) or combination of holds that might be empty at full draught. If no cargo hold is allowed to be empty on full draught, this shall be clearly stated in the loading manual.
- e) Maximum allowable and minimum required mass of cargo and double bottom contents of each hold as a function of the draught at mid-hold position.
- f) Maximum allowable and minimum required mass of cargo and double bottom contents of any two adjacent holds as a function of mean draught in way of these holds. This mean draught may be calculated by averaging the draught of the two mid-hold positions.
- g) Maximum allowable load on tank top together with specification of the nature of the cargo for cargoes other than bulk cargoes.
- h) Maximum allowable load on deck and hatch covers. If the vessel is not approved to carry load on deck or hatch covers, this shall be clearly stated in the loading manual.

- i) The maximum rate of ballast change together with the advice that a load plan shall be agreed with the terminal on the basis of achievable rates of change of ballast.

2.6.28 H114 – Loading sequence description, final

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.

For ships with class notation **HC** or **OC**, and for bulk carriers with class notation **CSR** and rule length ≥ 150 m:

- Maximum allowable and minimum required mass of cargo and double bottom contents of each hold as a function of the draught at mid-hold position.
- Maximum allowable and minimum required mass of cargo and double bottom contents of any two adjacent holds as a function of mean draught in way of these holds. This mean draught may be calculated by averaging the draught of the two mid-hold positions.

2.6.29 H120 – Docking arrangement plan

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

2.6.30 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 of non-destructive testing (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.

2.6.31 H132 – Tank testing plan

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

2.6.32 H133 – Erection and inspection plan

A document describing:

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

2.6.33 H134 – Hole and penetration plan

A drawing or document showing position, type and size and of all holes and cut-outs in the hull structure, including edge reinforcements where relevant.

2.6.34 H140 – Welding tables

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

2.6.35 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.

2.6.36 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.

See IMO MSC.1/Circ.1353.

2.6.37 H190 – Container securing arrangement plan

A document providing details of container securing arrangements for typical container loading conditions, including:

- 1) Vessel main data such as:
 - length between perpendiculars
 - breadth
 - depth
 - design draught
 - maximum service speed
 - metacentric height (GM) used for calculations
 - block coefficient (C_B) based on design draught may be used if it is different from predefined value
 - bilge keel area, if different from predefined value.
- 2) Container stowage plan and design stack weight for all applicable container stowage on deck and in holds
- 3) Typical lashing/securing patterns for each bay.
- 4) Details for container securing equipment including:
 - equipment type designation
 - safe working load (SWL).
- 5) Typical lashing parameters such as:
 - lashing angle
 - lashing length
 - diameter of lashing rod
 - E-modulus, if it is different than standard rule-based value.
- 6) Longitudinal center of gravity for each bay.
- 7) Weight distribution for each bay with details for application of container securing equipment for each typical container stowage arrangement in each typical container loading condition.

2.6.38 H200 – Ship structure access manual

A document describing means of access to carry out overall and close-up inspections and thickness measurements, including for each space:

- 1) Drawings showing the means of access to the space, with appropriate technical specifications and dimensions.
- 2) Drawings showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The drawings shall indicate from where each area in the space can be inspected.
- 3) Drawings showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The drawings 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) Critical structural areas means:
 - areas of high stress and with special fatigue considerations
 - areas that need special attention, e.g. wave impact loading, mechanical impact areas or special materials
 - structural design features that were selected on the basis of special in-service requirements
 - other areas needing special attention during the ship's life.
- 5) 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.
- 6) Instructions for safety guidance when rafting is used for close-up inspections and thickness measurements.
- 7) Instructions for the rigging and use of any portable means of access in a safe manner.
- 8) An inventory of all portable means of access.
- 9) Records of periodical inspections and maintenance of the ship's means of access.

2.6.39 H210 – Protected tank location drawing

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

2.6.40 H220 – Cargo safe access plan

A drawing of all areas where containers are secured, detailing safe access for personnel during container securing operations. The drawing shall provide details of necessary arrangements for conducting cargo stowage and securing in a safe manner, and shall include the following for all areas where personnel work:

- hand rails
- platforms
- walkways
- ladders
- access covers
- location of equipment storage facilities
- lighting fixtures
- container alignment on hatch covers/pedestals
- fittings for specialized containers, such as reefer plugs/receptacles
- first aid stations and emergency access/egress
- gangways
- any other arrangements necessary for the provision of safe access.

2.6.41 H230 – Body plan

A drawing showing lines of each frame, to a scale not larger than 1:100.

2.7 Discipline I – Instrumentation

2.7.1 I010 – Control system philosophy

A description of the design intention of the control system:

- redundancy intentions
- fault tolerance
- operational philosophy (normal and emergency mode of operation, manual and automatic functions)
- safety philosophy (allocation of safety functions, fail safe intentions)
- intended distribution, allocation and segregation of sub-systems and functions
- intended interfaces to other systems.

2.7.2 I020 – Control system functional description

A textual description with necessary supporting drawings, diagrams and figures to cover:

- system configuration and arrangement
- scope of supply
- system functionality covering control, monitoring, alarm and safety functions
- redundancy principles and switching mechanisms
- self-diagnostics and alarming functionalities
- safe states for each function implemented.

2.7.3 I030 – System block diagram (topology)

A schematic drawing showing

- arrangement of all main components
- physical location
- networks and connections between main components
- interfaces with other systems
- redundancy.

2.7.4 I040 – User interface documentation

A description of:

- user interface functionality
- allocation of functions between work stations, operator stations and user interfaces
- command transfer functionality.

2.7.5 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.

2.7.6 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.

2.7.7 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)
- 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.

2.7.8 I080 – Data sheet with environmental specifications

A data sheet showing that a product may operate under specific environmental conditions, e.g. temperature, vibration, humidity, enclosure and electromagnetic compatibility (EMC). See also [DNV-CG-0339](#) and IEC 60945.

2.7.9 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.

2.7.10 I100 – System diagram

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

2.7.11 I110 – List of controlled and monitored points

A list or index identifying all input and output signals to the system containing at least:

- tag number
- service description
- type of signal (e.g. analogue/ digital/...and input/output)
- system allocation to hardware units for all signals (control, safety, alarm, indication)
- alarm and shutdown limits, range
- alarm group (if unattended machinery spaces)
- input/output (I/O) allocation.

2.7.12 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.

2.7.13 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.

2.7.14 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
- software security policy.

2.7.15 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.

2.7.16 I200 – Control and monitoring system documentation

A documentation package providing information corresponding to the following set of documentation types, as relevant:

- I020 - Control system functional description
- I030 - System block diagram (topology)
- I040 - User interface documentation
- I050 - Power supply arrangement
- I110 - List of controlled and monitored points
- I150 - Circuit diagrams
- I320 - Software change handling procedure
- Z090 - Equipment list
- Z252 - Test procedure at manufacturer.

2.7.17 I201 - Vessel systems architecture specification

An overall description with supporting block diagrams or topologies of the vessels overall system architecture covering all integrated control systems, including:

- overview of the total systems architecture
- identification of the manufacturer and type designation for each partial system
- each systems purpose and main functionality
- specification of communication and interfaces between the different systems.

2.7.18 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.

2.7.19 I220 – Interface description

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

2.7.20 I230 – List of application software

A list containing:

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

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

A set of documents as defined in [DNV-RU-SHIP Pt.6 Ch.5 Sec.13 Table 5](#).

2.7.22 I241 – Hardware-in-the-loop test simulator package documentation

A set of documents as defined in [DNV-RU-SHIP Pt.6 Ch.5 Sec.13 Table 6](#).

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

A set of documents as defined in [DNV-RU-SHIP Pt.6 Ch.5 Sec.13 Table 7](#).

2.7.24 I260 – Field instruments periodic test plan

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)
- intervals between recalibration
- expected result (e.g. shutdown)
- fields for recording of tests performed.

2.7.25 I270 – Test conditions

A document describing a predefined set of test conditions that a software system shall be subjected to.

2.7.26 I280 – Reference data

A document providing a set of reference data that shall be used by a software system, during testing and in operation.

2.7.27 I290 – Software design description

A document describing the software for an integrated software dependent system, including:

- the software structure and functionalities
- the interaction (via interfaces) of the software components internally, externally and towards the user
- the data design describing the structures that reside within the software.

2.7.28 I300 – Reliability, availability, maintainability and safety (RAMS) documentation - vessel

Documentation including:

- plan for handling of RAMS related activities (applicable for confidence level 3 only)
- list of regulatory requirements

- list of RAM requirements for the vessel
- RAMS risk analysis (applicable for confidence level 3 only)
- RAMS risk register
- safety assessment report
- RAMS design guidelines and methods for the vessel
- RAM report (applicable for confidence level 3 only)
- RAMS compliance report
- security audit report.

2.7.29 I310 – Reliability, availability, maintainability and safety (RAMS) documentation - system

Documentation including:

- plan for handling of RAMS
- list of regulatory requirements
- list of RAM requirements for the system
- RAMS risk analysis documentation (applicable for confidence level 3 only)
- RAMS risk register
- safety assessment report
- RAMS design guidelines and methods for the system
- RAM report (applicable for confidence level 3 only)
- RAMS compliance report.

2.7.30 I320 – Software change handling procedure

A procedure describing how software changes to the system are proposed, evaluated and implemented using a standardized, systematic approach that ensures traceability, consistency and quality, and that proposed changes are evaluated in terms of their anticipated impact on the entire vessel system.

2.8 Discipline M – Materials

2.8.1 M010 – Material specification, metals

A document describing:

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

2.8.2 M020 – Material specification, fire related properties

A document describing fire related material properties.

2.8.3 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.

2.8.4 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.

2.8.5 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.

2.8.6 M042 – Coating technical file (CTF), initial

A document providing:

For the coating system:

- specification
- copy of type certificate (TC)
- technical data sheets
- material safety data sheets.

For the surface preparation, coating application and inspections:

- inspection agreement between builder, owner 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.)
- procedures for inspection of coating system during vessel construction
- procedures for repair of coating system during vessel construction
- procedures for in-service maintenance and repair of coating system.

See also IMO Res. MSC.215(82), IMO Res. MSC.244(83), MSC.288(87) and MSC.1/Circ.1279.

2.8.7 M043 – Coating technical file (CTF), final

A document providing the content required for M042 and in addition:

- builder's work records of coating application
- coating log issued by the coating inspector
- builder's verified inspection report
- documentation of any changes to the content of the initial CTF that the three parties (builder, owner and the coating manufacturer) agreed upon (e.g. change of responsible coating inspector).

See also IMO Res. MSC.215(82), IMO Res. MSC.244(83), MSC.288(87) and MSC.1/Circ.1279.

2.8.8 M044 – Corrosion resistant steel technical file (TF-COT), initial

A document targeting corrosion resistant steel materials intended to be installed on board, providing:

- 1) copies of approval of manufacturer certificates (AoM-C) and if applicable, copies of relevant type approval certificates (TAC)
- 2) technical data, including:
 - approved welding table (H140) with welding procedures (M060)
 - repair methods recommended by the manufacturer, if any
- 3) records of the application, listing locations with:
 - associated material identification (manufacturer, grade)
 - thickness
- 4) in-operation maintenance, repair and renewal procedures
- 5) list of areas which are not made of corrosion resistant steel and therefore need other measures for protection against corrosion (e.g. pipe supports, ladders, manholes), and relevant details for these measures.

Parts of the required information may alternatively be provided in structural drawings. If so, each type of corrosion resistant steel used together with its location shall be stated on the drawings, and the drawings shall be included in this document.

2.8.9 M045 – Corrosion resistant steel technical file (TF-COT), final

A document providing the content required for M044 and in addition:

- copies of material certificates (MC)
- types of welding consumables to be used.

2.8.10 M050 – Cathodic protection specification, calculation and drawings

A document describing:

- areas to be protected, main structures and attached metallic components [m^2]
- stipulated protective current density demand [mA/m^2] 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.

2.8.11 M060 – Welding procedures (WPS)

A document describing:

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

2.8.12 M061 – Welding procedure qualification record (WPQR)

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.

2.8.13 M062 – Welding repair report

A document describing all details of the repair performed, including but not limited to:

- size and location of defects (sketches or photos)
- method for removal of defects
- size and geometry of bevels after removal of defects (sketches or photos)
- records of heat treatment before welding, where relevant
- non-destructive testing (NDT) report for test before welding
- reference to approved Welding procedures (M060), approved welding consumables and name of qualified welder
- records of pre-heating, post heating and post-weld heat treatment including method, temperature, time, heating and cooling rates, etc.
- non-destructive testing (NDT) report for test after welding
- confirmation of compliance with relevant requirements after repair.

2.8.14 M070 – List of combustible materials

A list of materials providing:

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

2.8.15 M080 – Inventory of hazardous materials (IHM), part I

A document providing for new and existing vessels 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.5.1 to 5.3 and/or *EU Regulation on Ship Recycling EC No.1257/2013* Article 5 and IMO Res. MEPC.269(68) *Guidelines for the Development of the Inventory of Hazardous Materials/2015*.

2.8.16 M081 – Inventory of hazardous materials (IHM), parts I, II and III

A document providing for vessels ready for recycling 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.5.4 and/or *EU Regulation on Ship Recycling EC No.1257/2013* Article 5.7, and IMO Res. MEPC.269(68) *Guidelines for the Development of the Inventory of Hazardous Materials/2015*.

2.8.17 M085 – Hazardous materials documentation – visual and sampling check plan

A document providing specifications of components that may contain hazardous materials listed in the *Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships/2009* App.1 and App.2 and/or *EU Regulation on Ship Recycling EC No.1257/2013* Annex I and II, based on the IMO Res. MEPC.269(68) *Guidelines for the Development of the Inventory of Hazardous Materials/2015* Sec.4.2.7 and indicative list provided in App.5 Sec.2.2. The documentation shall include a description and picture of the sampling or visual check location and in case of sampling, the corresponding laboratory results.

2.8.18 M100 – Hazardous material declarations collection

A collection of Hazardous materials declarations (M101) for a vessel. The declarations shall include quantity and location of the specified hazardous materials on board the vessel.

2.8.19 M101 – Hazardous material declaration

A document provided by the supplier of products installed on board the vessel, demonstrating compliance with IMO Res. MEPC.269(68) *Guidelines for the Development of Inventory of Hazardous Materials/2015* Sec.6. The document shall declare whether or not the materials listed in *Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships/2009* App.1 and 2 and/or *EU Regulation on Ship Recycling EC No.1257/2013* Annex I and II are present. The declaration shall include quantity and location of the specified hazardous materials within the product.

2.8.20 M110 – Supplier's declaration of conformity relating to use of hazardous materials (SDoC) collection

A collection of supplier's declaration of conformity relating to use of hazardous materials (SDoC) (M111) for a vessel.

2.8.21 M111 – Supplier's declaration of conformity relating to use of hazardous materials (SDoC)

A document provided by the supplier of products installed on board the vessel, demonstrating compliance with IMO Res. MEPC.269(68) *Guidelines for the Development of Inventory of Hazardous Materials/2015* Sec.7. The document shall provide assurance that the related Hazardous material declarations (M101) conform to MEPC.269(68) Sec.6.2 and identify the responsible entity, e.g. the supplier who can be a trader, agency 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 products covered by the declaration, e.g. names and product numbers.

2.8.22 M120 – Hazardous materials location plan

A drawing identifying the location of the hazardous materials identified on board the vessel by marking on arrangement plans, e.g. the general arrangement plan or plans for the engine room, navigation bridge, accommodations.

2.8.23 M130 – Colour specification

A document providing colour specifications for an object, by reference to an international colour standard.

2.8.24 M140 Ship recycling plan

A plan for recycling the vessel, complying with the *Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships/2009* Reg.9 and/or *EU Regulation on Ship Recycling EC No.1257/2013* Article 7.

2.8.25 M150 – Non-destructive testing (NDT) plan

A document specifying the methods, extent and criteria for the non-destructive testing that shall be performed upon an object.

2.8.26 M151 – Non-destructive testing (NDT) procedure

A description of all essential parameters and precautions that shall be applied for non-destructively testing of an object, including references to applicable standards, codes and specifications. For required content, see also [DNV-CG-0051 Sec.2 \[6.1\]](#).

2.8.27 M152 – Non-destructive testing (NDT) report

A document referring to a non-destructive testing plan (M150), providing a description of

- the object that has been tested
- where and when the testing has been performed
- who has attended the testing
- all results from the testing, together with any limitation to the testing.

For required content, see also [DNV-CG-0051 Sec.2 \[6.1\]](#).

2.9 Discipline N – Navigation

2.9.1 N010 – Bridge design drawing

A scaled drawing showing the bridge configuration.

2.9.2 N011 – Bridge design drawing, extended

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
- navigation equipment located outside bridge area if related to primary bridge functions
- location of toilet.

2.9.3 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
- the vessel's sides as visible from the bridge wings.

The calculations shall be based on blind sectors outside the wheelhouse.

2.9.4 N021 – Vertical field of vision drawing, extended

Calculations from a position 350 mm abaft the radar at the navigating & maneuvering workstation applying an eye height of 1500 mm shall be provided on scaled drawing showing for all applicable workstations:

- vertical field of vision including calculation of all blind sectors, in worst loading condition
- the vessel's sides as visible from the bridge wings
- a copy of the summary table of loading conditions from the preliminary or final stability manual (B050 or B120).

2.9.5 N030 – Horizontal field of vision drawing

A scaled drawing showing:

- the horizontal field of vision seen from the conning position, the bridge wings and the main steering position blind sectors caused by obstructions outside of the wheelhouse
- clear view arrangement, e.g. wipers.

2.9.6 N031 – Horizontal field of vision drawing, extended

Calculations from a position 350 mm abaft the radar at the navigating and manoeuvring workstation applying an eye height of 1500 mm shall be provided on scaled drawing showing for all applicable workstations:

- the horizontal field of vision seen from all required workstations, including calculation of blind sectors caused by obstructions inside and outside of the wheelhouse
- arrangement of window wipers, fresh water wash, sunscreens and de-misting / de-icing (heating) system on the bridge windows.

2.9.7 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.
- 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.

2.9.8 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.

2.9.9 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.

See IMO Res. A.601(15), App. 3.

2.9.10 N070 – Wheelhouse poster

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

See IMO Res. A.601(15), App. 2.

2.9.11 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.

See IMO Res. A.601(15), App. 1.

2.10 Discipline P – Process

2.10.1 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.

2.10.2 P020 – Sizing calculations

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

2.10.3 P030 – Temperature calculations

Calculations of minimum temperatures in systems where low temperatures may occur in order to verify the correct choice of materials.

2.10.4 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.

2.10.5 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.

2.10.6 P060 – Safety analysis tables

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

2.10.7 P070 – Pressure vessel integrity study

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

2.10.8 P080 – Relief and blowdown system report

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

2.11 Discipline Q – Quality management

2.11.1 Q010 – Quality manual

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

2.11.2 Q020 – Document control procedure

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

2.11.3 Q030 – Corrective action plan

A document describing corrective actions established to close gaps identified in an organisation's processes, including:

- activity identification
- references
- proposed actions
- responsible
- due date
- status
- closing remarks.

2.11.4 Q040 – Quality survey plan (QSP)

A plan that systematically identifies:

- activities related to the classification project, e.g. construction, installation, testing, mechanical completion, pre-commissioning, and commissioning
- the extent of involvement of each party, e.g. builder, owner, Society.

2.12 Discipline S – Piping

2.12.1 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 seven (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.

2.12.2 S011 – Piping and instrumentation diagram (P and ID)

A diagrammatic drawing including the following:

- components including reference identification (tag numbers)
- size of pressure vessels and piping
- materials used in pipes, valve bodies and fittings
- 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
- design and operational data for the components
- input and output signals from safety systems.

2.12.3 S012 – 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.

2.12.4 S013 – Ducting and instrumentation 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.

2.12.5 S014 – Duct routing sketch

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

2.12.6 S015 – Piping system schematic layout

A diagrammatic drawing showing the piping system including:

- location of piping equipment as pumps, filters, pressure vessels and valves
- location of control and monitoring equipment as sensors and safety devices
- types of expansion elements and flexible elements
- identification of plastic pipes
- size of pressure vessels

- design pressures and set points for safety valves
- scope of delivery for manufacturer.

2.12.7 S020 – Pressure drop analysis

A report presenting for a system:

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

2.12.8 S030 – Capacity analysis

A report presenting for a system:

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

2.12.9 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.

2.12.10 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.

2.12.11 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.

2.12.12 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*.

2.12.13 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.

2.12.14 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.

2.12.15 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.

2.12.16 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).

2.12.17 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).

2.12.18 S110 – Shadow diagram

A diagram showing the tank areas covered by direct impingement from the washing machines.

2.12.19 S120 – Heat balance calculation

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

2.12.20 S130 – Filling and discharge time calculation

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

2.12.21 S140 – Procedures and arrangements manual

A manual as defined in MARPOL 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.

2.12.22 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 co-ordinating 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.

2.12.23 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 co-ordinating 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).

2.12.24 S170 – Ship energy efficiency management plan (SEEMP)

A plan as defined in IMO resolution MEPC.282(70).

Part I provides a possible approach for monitoring vessel and fleet efficiency performance over time and options shall be considered when seeking to optimize the performance of the vessel.

Part II provides the methodologies vessels of gross tonnage ≥ 5000 should use to collect the data required pursuant to MARPOL Annex VI Reg.22A and the processes that the vessel should use to report the data to the vessel's Administration or any organization duly authorized by it.

2.12.25 S180 – Energy efficiency existing ships index (EEXI) onboard management manual

A management manual for energy efficiency existing ships index (EEXI).

2.12.26 S190 – Energy efficiency existing ships index (EEXI) technical file

A technical file for energy efficiency existing ships index (EEXI).

2.13 Discipline T – Telecommunications

2.13.1 T010 – Functional description

Documents, 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.

2.13.2 T020 – Block diagram

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

2.13.3 T030 – Antennae arrangement plan

A drawing to scale with port, starboard, aft, forward and plan views, showing the locations of all antennae on the vessel, with relative distances between all antennae.

2.13.4 T040 – Cable diagram

A schematic drawing showing:

- the major inter-relationships between all parts of the system and interfaces with other systems
- the electrical power supply from main, emergency and back-up sources
- the power supply arrangement as a one line cable diagram, including all equipment, and circuit breakers, power supplies, converters, batteries, chargers and internal wiring of consoles, both AC and DC power supplies and all associated fuses
- battery capacity calculations
- the electrical separation between the primary and duplicated equipment.

2.13.5 T060 – Data sheets with environmental specifications

A data sheet showing that a product may operate under specific environmental conditions, e.g. temperature, vibration, humidity, enclosure and electromagnetic compatibility (EMC). See also [DNV-CG-0339](#) and IEC 60945.

2.14 Discipline W – Geotechnical engineering

2.14.1 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.

2.14.2 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.

2.14.3 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.

2.14.4 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).

2.14.5 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.

2.15 Discipline Z – Multidiscipline

2.15.1 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.

For tankers, the following items shall be included as applicable:

- cargo hatches, butterworth hatches and any other openings to cargo tanks
- doors, hatches and any other openings to pump rooms and other hazardous areas
- ventilating pipes and openings for cargo hatches, pump rooms and other hazardous areas
- doors, air locks, hatches, ventilating pipes and openings, hinged scuttles which can be opened, and other openings to non-hazardous spaces adjacent to the cargo area including spaces in and below the forecastle
- cargo pipes and gas return pipes over the deck with shore connections including stern pipes for cargo discharge or pipes for bow loading arrangement.

2.15.2 Z011 – Cable routing drawing

A drawing based on a general arrangement plan (Z010) that:

- identifies physical routing of power, control and communication cables supporting the system or function.

2.15.3 Z012 – Casualty threshold plan

A drawing based on a general arrangement plan (Z010) that:

- identifies spaces provided with a fixed fire extinguishing system, and
- identifies spaces of negligible fire risk, and
- includes all A-class and main vertical zone (MVZ) boundaries, and
- includes all watertight boundaries.

2.15.4 Z013 - Safe area plan

A drawing based on a general arrangement plan (Z010) that:

- identifies safe areas, spaces for medical care and location of food, and
- includes capacity calculations for area and toilettes.

2.15.5 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.

2.15.6 Z040 – Vessel specification

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

2.15.7 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.

2.15.8 Z051 – 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
- environmental conditions.

2.15.9 Z052 – Design basis, metocean criteria

- 1) Combinations of significant wave heights and peak periods along the 100-year contour line for a specified location. Directionality may be considered if sufficient data exist to develop contour lines for from 0° to 360° with a maximum spacing of 30°.
- 2) 1 hour mean wind speed with a return period of 100 year, and wind gust spectrum. Directionality may be considered if sufficient data exist to develop wind speeds with 100 year return periods for directions from 0° to 360° with a maximum spacing of 30°.
- 3) Surface and subsurface current speed with a return period of 10 years. Directionality may be considered if sufficient data exist to develop current speeds with 10 year return periods for directions from 0° to 360°, with a maximum spacing of 30°.
- 4) Current profile.
- 5) Water depths.
- 6) Soil conditions.
- 7) Marine growth, thickness and specific weight.
- 8) Wave spectrum.
- 9) Wave energy distribution: long crested sea unless otherwise is documented.

2.15.10 Z053 – Safe return to port (SRtP) design philosophy

A document providing the basic design intent and operational criteria for the vessel with respect to SRtP, in particular the following:

- main characteristics: basic layout, number of passengers and machinery configuration
- intended operation: area, operation type, safe return to port range, design ambient temperatures, catering level
- approach for SRtP system restoration: level of automation versus manual actions
- preliminary SRtP capabilities: speed and SRtP speed, duration of SRtP voyage, SRtP power balance, SRtP fuel supply, orderly evacuation and abandonment (OEA) power balance
- identification of all systems within the scope of the SRtP regulations
- documentation strategy for SRtP documents: document list, sequence and hierarchy
- approach for SRtP testing.

For further guidance, see [DNV-CG-0004](#).

2.15.11 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.

2.15.12 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.

2.15.13 Z071 – Failure mode and effect analysis (FMEA)

A document where the system response to probable failures are identified and analysed. The main purpose of the FMEA is normally to demonstrate that redundant systems are not degraded beyond acceptable performance criteria after a single failure (or incidents of fire/flooding as applicable).

The FMEA shall normally consist of the following parts:

- General vessel information.

- Specification of acceptance criteria.
- Specification of the overall boundary of the system/unit subject to the FMEA.
- Redundancy design intent, worst case failure design intent, time requirements, and vessel operational modes.
- Specification of all redundant components and single component groups included within the overall system boundary. The relevant system names, main units, compartments (when applicable), and their main intended functions shall be presented in a structured manner, supported with a descriptive narrative text.
- Specification of all assumptions related to systems interfaces and dependencies of external systems.
- Single failure and common cause analysis at unit and subsystem levels, including consequence for the function and eventual manual/automatic corrective actions assumed.
- If applicable, separation design intent and descriptions of the installation of redundant component groups in fire and flooding protected compartments. This also includes pipes, cables and communication lines, and associated equipment.
- Summary and conclusions.
- A test program to support the conclusions shall be included or referred to.
- A compliance statement referring to the overall system boundary, operational modes, tests, and acceptance criterion including time requirements shall be stated for the FMEA.

The requirements to FMEAs for redundant systems differ from traditional bottom up FMEAs in the following respects: Requirement to state the redundancy design intent. Requirements to specification of acceptance criterion to be complied with. Requirements to refer to full scale testing and sea trials to support analysis. Requirements to state compliance with the acceptance criterion. The FMEA documentation shall be self-contained and provide sufficient information to get the necessary overview of the system.

A FMEA on vessel level shall also incorporate or refer to relevant FMEAs on system/component level.

2.15.14 Z072 – Safety description

A document providing identification of all possible safety hazards for a system or component:

- during all modes of operation
- due to internal or external failures.

2.15.15 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).

2.15.16 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.

2.15.17 Z100 – Specification

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

2.15.18 Z101 – Polar water equipment specification

A document describing environmental parameters for equipment exposed to polar conditions. The document shall include information related to the expected operation of the vessel:

- operation modes

- mean daily low temperature (MDLT)
- polar service temperature (PST)
- ice conditions: ice free waters, open water (up to 10% of surface covered by ice) and other (more than 10% of surface covered by ice)
- darkness
- high latitude (above 80°)
- icing
- maximum expected rescue time
- icebreaker escort.

A risk based assessment of exposed equipment relating to closing appliances, machinery, fire fighting, life-saving, navigation and communication shall be included covering:

- additional hazards due to planned polar operations
- qualitative evaluation of probability of failure and associated consequences
- mitigating measures
- conclusion with respect to suitability and compliance with applicable requirements.

2.15.19 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.

2.15.20 Z140 - Risk-based inspection (RBI) analysis

Document(s) describing a structured process used to determine measures (inspection tasks) to mitigate and reduce the risk level to acceptable level. The assessment shall include determination of degradations and failure mechanisms, probability of failure, consequence of failure and risk level.

2.15.21 Z160 – Manual

A document

- relating to an object
- providing information relating to handling of the object.

2.15.22 Z161 – Operation manual

A document relating to an object, intended for regular use on board, providing applicable information on:

- operation modes
- operating instructions for normal and degraded operating modes
- operational limitations
- user interface description
- transfer of control
- redundancy
- 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.

2.15.23 Z162 – Installation manual

A document relating to an object, providing information about installation of the object.

2.15.24 Z163 – Maintenance manual

A document relating to an object, intended for regular use, providing information on:

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

2.15.25 Z164 – Inspection manual

A document relating to an object, 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.

2.15.26 Z165 – Training manual

A document describing training scope and methods.

2.15.27 Z200 – Station keeping capability assessment report

A calculation of the environmental regularity number according to [DNV-RU-SHIP Pt.6 Ch.3 Sec.1 \[10\]](#).

2.15.28 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.

2.15.29 Z202 – Operability plot

A plot showing the maximum sea conditions at which an object can operate safely on board the vessel without exceeding the design limitations of the object. The plot shall be made in polar form giving the limiting significant wave heights in meters and wave directions in degrees.

2.15.30 Z220 – Ship operation manual

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

2.15.31 Z221 – Offshore unit operation manual

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 de-ballasting in intact and damaged conditions.

Position mooring

Limiting operating conditions and corresponding procedures.

Dynamic positioning

Limiting operating conditions and corresponding procedures.

2.15.32 Z222 – Craft operation manual

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.

2.15.33 Z223 – Polar water operational manual (PWOM)

A vessel operation manual as defined by Polar Code Ch.2 and Appendix II.

2.15.34 Z230 – Plan

An intended procedure and schedule for the performance of a task.

2.15.35 Z231 – Voyage plan

A plan describing the intended completion of a voyage.

2.15.36 Z232 - Inspection programme

A programme describing tasks that when performed according to the defined intervals will ensure a verification of the integrity of the object(s) being inspected. The programme shall ensure that degradations can be detected in sufficient time to prevent loss of function. Evaluation and selection of the best inspection method shall be addressed.

The programme shall define:

- what to inspect
- when to inspect
- where to inspect
- how to inspect
- what to report.

2.15.37 Z240 – Policy

A document describing the course or principles of action of an organisation.

2.15.38 Z250 – Procedure

A document describing how a task shall be carried out.

2.15.39 Z251 – Test procedure

A procedure describing the test configuration and test methods, specifying for each test:

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

The tests shall cover normal modes and failure modes.

2.15.40 Z252 – Test procedure at manufacturer

A procedure describing the test configuration and test methods for testing at the manufacturer's works, specifying for each test:

- test environment including a description of any simulators and emulators, if applicable
- initial condition
- how to perform the test
- what to observe during the test and acceptance criteria for each test.

The tests shall cover normal modes and failure modes.

2.15.41 Z253 – Test procedure for quay and sea trial

A procedure describing the test configuration and test methods for testing during quay and sea trial, specifying for each test:

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

The tests shall cover normal modes and failure modes.

2.15.42 Z254 – Commissioning procedure

A procedure describing the test configuration and test methods for testing during commissioning, specifying for each test:

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

The tests shall cover normal modes and failure modes.

Commissioning is a process of assuring that components, equipment and the systems are functioning in accordance with the functional requirements.

2.15.43 Z255 – Measurement procedure

A procedure describing the measurement configuration and methods, specifying:

- what to measure
- initial condition
- how to perform the measurements.

2.15.44 Z256 – Test procedure for integration test

A procedure applicable for testing of integrated or interconnected systems, describing the test configuration and test methods, specifying for each test:

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

2.15.45 Z257 – Ballast water management plan

A procedure 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 associated duties
- information on ballast water management system
- procedure for sampling of the ballast water.

2.15.46 Z258 – Vessel management procedure

A procedure for the management of a vessel.

2.15.47 Z259 – Organisation management procedure

A procedure for the management of an organisation.

2.15.48 Z260 – Report

See [Sec.3 \[5.3\]](#).

2.15.49 Z261 – Test report

A report referring to a test procedure (Z251) or a standard recognised by the Society, providing a description of

- what has been tested
- where and when the testing has been performed
- who has attended the testing
- all results from the testing, together with any limitation to the testing.

2.15.50 Z262 – Report from test at manufacturer

A report referring to a test procedure at manufacturer (Z252) or a standard recognised by the Society, providing a description of

- what has been tested
- where and when the testing has been performed
- who attended the testing
- all results from the testing, together with any limitation to the testing.

2.15.51 Z263 – Report from quay and sea trial

A report referring to a test procedure for quay and sea trial (Z253) or a standard recognised by the Society, providing a description of

- what has been tested
- where and when the testing has been performed
- who attended the testing
- all results from the testing, together with any limitation to the testing.

2.15.52 Z264 – Commissioning report

A report referring to a commissioning procedure (Z254) or a standard recognised by the Society, providing a description of

- what has been commissioned
- where and when the commissioning has been performed
- who attended the commissioning
- all results from the commissioning, together with any limitation to the commissioning.

2.15.53 Z265 – Calculation report

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

2.15.54 Z266 – Measurement report

A report referring to a measurement procedure (Z255) or a standard recognised by the Society, providing a description of

- what has been measured
- where and when the measurements has been performed
- who attended the measurements
- all results from the measurements, together with any limitation to the measurements.

2.15.55 Z267 – Installation report

A report referring to an installation manual (Z162), providing:

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

2.15.56 Z268 – Assessment report

A report documenting the results of an assessment.

2.15.57 Z269 – Audit report

A report documenting the results of an audit.

2.15.58 Z270 – Service report

A report issued by a service supplier describing a service task that has been carried out, and the results of the servicing.

2.15.59 Z271 – Analysis report

A report documenting the results of an analysis.

2.15.60 Z272 – Survey report

A report documenting the results of a survey.

2.15.61 Z274 - Status report

Report documenting status at a give piont in time.

2.15.62 Z275 - Damage report

Documentation relating to an object, providing information on damages/abnormal conditions to/of the object and if not permanently repaired possible temporary repairs, redundancy, and/or necessary temporary operational measures.

2.15.63 Z276 - Video

Video providing information about or evidence of condition, damages, repairs, tests or test results, operations etc.

2.15.64 Z277 - Picture

Picture providing information about or evidence of condition, damages, repairs, tests or test results, operations etc.

2.15.65 Z280 – Record

A set of data recorded for a specific purpose.

2.15.66 Z281 – Maintenance record

A set of data originating from performed service or maintenance activities.

2.15.67 Z282 – Inspection and test record

A set of data originating from performed tests and inspections.

2.15.68 Z283 – Training record

A set of data recording drills, training and familiarization carried out.

2.15.69 Z284 – Calibration record

A set of data or reports documenting that equipment was calibrated.

2.15.70 Z285 – Personnel record

Data and documents related to personnel.

2.15.71 Z286 - Operational record

Record of operational activities e.g. a log book.

2.15.72 Z287 - Data record

Record including e.g. time series, statistical data, metadata data, or back-up data.

2.15.73 Z290 – Organisation chart

A diagram describing the organisational set-up of an organisation.

2.15.74 Z300 – Declaration

An announcement made by the issuing organisation, stating the organisation's policy, position, assessment or description regarding itself or regarding a target owned or operated by the organisation.

2.15.75 Z305 – Confirmation

Confirmation made by the issuing organisation or person signed that of specific action/occurrence has or has not been carried out/taken place.

2.15.76 Z310 – Statement of fact

See [Sec.3 \[5.4\]](#).

2.15.77 Z320 – Register

An authoritative list of one kind of information.

2.15.78 Z321 – 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.

2.15.79 Z322 – Vessel personnel register

Data and documents related to a vessel's crew.

2.15.80 Z330 – Cargo list

A document providing a specification of the cargoes intended to be carried in each cargo compartment.

For dangerous solid bulk cargoes: a specification of cargoes intended to be carried in each cargo hold.

For dangerous goods in packaged form: a specification of goods intended to be carried in each cargo space or hold.

2.15.81 Z350 – Publication

A document made available to the public.

SECTION 6 DOCUMENTATION REQUIREMENT SYSTEMATICS

1 Objective

The objective of this section is to define the term documentation requirement, and to provide general requirements relating to the delivery of corresponding documents.

2 Systematics

2.1 Rights to disclose

The customer warrants that it has the necessary rights to disclose relevant documentation and information to the Society.

2.2 Documentation requirements - info codes

The info codes describes the following:

Table 1 Info codes

<i>Term</i>	<i>Info codes</i>	<i>Description</i>
For approval	AP	The corresponding documents shall be submitted for approval.
For information	FI	The corresponding documents shall be submitted for information.
For examination	EX	The corresponding documents shall be submitted for examination.
Covered by type approval	TA	The corresponding documents are normally covered by the type approval certificate.
Local handling	L	The corresponding documents will be handled by the local office of the Society.
On request	R	The corresponding documents shall be submitted on request only.
As carried out	ACO	The 'as carried out' issue of the corresponding documents shall be submitted.
Vessel specific	VS	The corresponding documents shall be submitted for each vessel.

3 Handling of documentation

3.1 General

Documentation:

- shall be submitted by the Society's customers
- shall be based on the documentation requirements given by the standards applicable to the target
- shall be handled as specified in the standard.

4 Requirements to all submitted documentation

4.1 Scope

The documentation relating to a target shall reflect all requirements that are applicable to the target, i.e. requirements given by:

- main class
- vessel type notations
- additional class notations
- international and national regulations
- other standards.

4.2 Content

4.2.1 Each document shall include, as applicable:

- target covered by the document
- for products, identification of the asset where the product will be installed (if known)
- name of company issuing the document
- name and signature of originator and verifier
- document number
- document title
- issue date
- measurement units used
- revision number
- scale.

4.2.2 The English language shall be used in the documentation, as well as in correspondence between customers and the Society. The possibility of using other languages shall be agreed upon in advance.

4.2.3 SI-units (the International System of Units) shall be used unless otherwise agreed.

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

4.2.5 Any revision of documents shall be marked to identify the revised parts.

4.2.6 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.

4.3 Organisation

4.3.1 The documentation submitted shall cover the information requested through the documentation requirements and any information in excess should be avoided.

4.3.2 A document may cover more than one documentation requirement. A documentation requirement may be covered by more than one submitted document.

4.4 Digital documentation format

4.4.1 Digital documentation should be submitted in PDF format with suitable size. Other formats including three-dimensional models may be submitted upon acceptance from the Society. Documentation should be in monochrome (black and white) unless otherwise required or necessary for the readability. Full readability shall be ensured.

4.4.2 The builder/manufacture is responsible for supplying the Society's local surveyor with paper copy of the documentation if requested.

SECTION 7 EXEMPTION DOCUMENTS

1 Definition

A document that is:

- relating to and identifying a target
- validated and signed by the issuing organisation
- referring to at least one standard
- granting an exemption to one or more requirements of a standard.

Guidance note:

Exemption documents are also known as 'exemption certificates'.

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

2 Content

Exemption documents should include:

- exemption document number / unique identifier
- issuing organisation
- government or organisation authorising the issuing organisation to issue the exemption document
- name and signature of originator
- issue date
- target
- referred standard editions
- validity period
- exemptions.

CHANGES – HISTORIC

September 2023 edition

Changes September 2023

<i>Topic</i>	<i>Reference</i>	<i>Description</i>
Deliverable types	Sec.3	Changed section heading.
	Sec.3 [3.2.1]	Added definition of design certificates.
	Sec.3 [3.2.2]	Added definition of design declaration.
	Sec.3 [3.3.3]	Added definition of product design declaration.
	Sec.3 [3.4.1]	Updated definition of product certificate.
	Sec.3 [3.4.3]	Updated definition of product declaration.
	Sec.3 [3.5]	Added compliance document types targeting organisations.
	Sec.3 [3.6]	Added compliance document types targeting persons.
	Sec.3 [4.2.2]	Added definition of hull construction certificate.
	Sec.3 [5]	New subsection for other deliverables.
Documentation types	Sec.5 [2.3.20]	Updated E220 – Electrical system philosophy.
	Sec.5 [2.4]	Defined documentation types for discipline F - Information technology. 2 new documentation types and 3 documentation types moved from discipline I.
	Sec.5 [2.5.2]	Added G011 - Safety assessment.
	Sec.5 [2.5.5]	Updated definition of G040 - Fire control plan.
	Sec.5 [2.5.7]	Updated definition of G060 - Structural fire protection drawing.
	Sec.5 [2.5.23]	Added G210 - Wind chill study.
	Sec.5 [2.6.14]	Updated definition of H080 - Strength analysis.
	Sec.5 [2.6.18]	Updated definition of H085 - Fatigue analysis.
	Sec.5 [2.6.20]	Added H087 - Scantling calculations.
	Sec.5 [2.6.21]	Added H090 - Model test specification.
	Sec.5 [2.6.22]	Updated H090 - Model test report to H091.
	Sec.5 [2.7]	Changed I011, I031 and I071 to F011, F031 and F071.
	Sec.5 [2.12.2]	Updated definition of S011 - Piping and instrumentation diagram (P and ID).
	Sec.5 [2.12.25]	Added S180 - Energy efficiency existing ships index (EEXI) onboard management manual.
	Sec.5 [2.12.26]	Added S190 Energy efficiency existing ships index (EEXI) technical file.

Topic	Reference	Description
	Previous Sec.5 [2.14.47]	Deleted Z281 – Asset certificate.
	Previous Sec.5 [2.14.48]	Deleted Z282 – Product certificate.
	Previous Sec.5 [2.14.49]	Deleted Z283 – Type approval certificate.
	Sec.5 [2.15.2]	Added Z011 - Cable routing drawing.
	Sec.5 [2.15.3]	Added Z012 - Casualty threshold plan.
	Sec.5 [2.15.4]	Added Z013 - Safe area plan.
	Sec.5 [2.15.20]	Added Z140 - Risk-based inspection (RBI) analysis.
	Sec.5 [2.15.26]	Added Z165 – Training manual.
	Sec.5 [2.15.34]	Added Z230 – Plan.
	Sec.5 [2.15.35]	Added Z231 – Voyage plan.
	Sec.5 [2.15.36]	Added Z232 - Inspection programme.
	Sec.5 [2.15.37]	Added Z240 – Policy.
	Sec.5 [2.15.45]	Re-coded Ballast water management plan to Z257.
	Sec.5 [2.15.46]	Added Z258 – Vessel management procedure.
	Sec.5 [2.15.47]	Added Z259 – Organisation management procedure.
	Sec.5 [2.15.48]	Updated definition of Z260 - Report.
	Sec.5 [2.15.57]	Added Z269 – Audit report.
	Sec.5 [2.15.58]	Added Z270 – Service report.
	Sec.5 [2.15.59]	Added Z271 – Analysis report.
	Sec.5 [2.15.60]	Added Z272 – Survey report.
	Sec.5 [2.15.61]	Re-coded Record to Z280.
	Sec.5 [2.15.62]	Added Z281 – Maintenance record.
	Sec.5 [2.15.63]	Added Z282 – Inspection and test record.
	Sec.5 [2.15.64]	Added Z283 – Training record.
	Sec.5 [2.15.65]	Added Z284 – Calibration record.
	Sec.5 [2.15.66]	Added Z285 – Personnel record.
	Sec.5 [2.15.67]	Added Z290 – Organisation chart.
	Sec.5 [2.15.69]	Added Z310 – Statement of fact.
	Sec.5 [2.15.70]	Added Z320 – Register.
	Sec.5 [2.15.71]	Re-coded Document register to Z321.
	Sec.5 [2.15.72]	Added Z322 – Vessel personnel register.

Topic	Reference	Description
	Sec.5 [2.15.74]	Added Z350 – Publication.
Documentation requirement systematics	Sec.6 Table 1	Defined status 'EX - for examination'.

September 2021 edition

Changes September 2021

Topic	Reference	Description
Rebranding to DNV	All	This document has been revised due to the rebranding of DNV GL to DNV. The following have been updated: the company name, material and certificate designations, and references to other documents in the DNV portfolio. Some of the documents referred to may not yet have been rebranded. If so, please see the relevant DNV GL document. No technical content has been changed.

January 2021 edition

Changes January 2021

Topic	Reference	Description
Objective, scope and application	Sec.1	Revised objective, scope and application, so that the document applies to all types of services. Moved remaining text to other sections, mainly to Sec.2.
Service related terms	Sec.2	Moved definitions of service related terms from Sec.1 to Sec.2. Added 'assets' as a target group more general than vessel.
Compliance document types	Sec.3 [1]	Made section applicable for all types of targets. Revised definitions to cover all types of targets. Added new paragraph covering names and codes. Added new paragraph defining use of the compliance document types.
	Sec.3 [2]	Added new subsection, with types aligned with IACS Rec.75 rev.3.
	Sec.3 [3]	Made subsection applicable for all types of targets. Revised definition of product design and product related compliance document types.
	Sec.3 [4]	Added new section defining target and standard related compliance document types.
Content of compliance documents	Sec.4	Included requirements to content. All other text deleted.

<i>Topic</i>	<i>Reference</i>	<i>Description</i>
Documentation types	Sec.5 [2]	Added new documentation type for foundations. Added new documentation types for cyber security. Deleted types for stability and for hazardous materials. Revised names and/or definitions for stability, hazardous materials and safe return to port.
Documentation requirement systematics	Sec.6	Revised section and updated requirements to formatting of digital documents.
Exemption documents	Sec.7	Added new section, providing definition and requirements to content.

July 2019 edition

This is a new document.

About DNV

DNV is the independent expert in risk management and assurance, operating in more than 100 countries. Through its broad experience and deep expertise DNV advances safety and sustainable performance, sets industry benchmarks, and inspires and invents solutions.

Whether assessing a new ship design, optimizing the performance of a wind farm, analyzing sensor data from a gas pipeline or certifying a food company's supply chain, DNV enables its customers and their stakeholders to make critical decisions with confidence.

Driven by its purpose, to safeguard life, property, and the environment, DNV helps tackle the challenges and global transformations facing its customers and the world today and is a trusted voice for many of the world's most successful and forward-thinking companies.

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