TÜRK LOYDU RULE CHANGE SUMMARY

TL NUMBER: 02/2023 JUNE 2023

Latest editions of TL Rules incorporate all rule changes. The latest rule revisions of a published rule are shown with a vertical line. Changes after the publication of the rule are written in red colour.

Please note that within this document added items are written in red and for deleted items strikethrough is applied. After the publication of relevant rule, those revisions are to be indicated with a vertical line. Following Rule Changes presented in English are also implemented into Turkish Version of Rules.

RULE CHANGE SUMMARY

CLASSIFICATION AND SURVEYS

No	Item
01	Section 1
02	Section 2
03	Section 3

CHAPTER 1 - HULL

No	Item
01	Section 21
02	Section 33

CHAPTER 2 - MATERIAL

No	Item
01	Section 5
02	Section 6

CHAPTER 3 - WELDING

No	Item
01	Section 12
02	Section 16

CHAPTER 4 - MACHINERY

No	Item
01	Section 2
02	Section 5
03	Section 7
04	Section 9
05	Section 9
06	Section 11
07	Section 16
08	Section 18

CHAPTER 5 – ELECTRICAL INSTALLATION

No	Item
01	Section 1
02	Section 3
03	Section 7
04	Section 8
05	Section 12
06	Section 16
07	Section 17

08	Section 18
09	Section 20

CHAPTER 8 – CHEMICAL TANKERS

No	Item
01	Section 3

CHAPTER 10 – LIQUEFIED GAS TANKERS

No	Item
01	Section 11

CHAPTER 14 – FISHING VESSELS

No	Item
01	Section 2

CHAPTER 28 - VENTILATION

No	Item
01	Section 01

CHAPTER 34 – TENTATIVE RULES FOR THE CLASSIFICATION OF SPECIAL CRAFTS – PATROL BOAT

No	Item
01	Section 08

CHAPTER 101 – NAVAL SHIP TECHNOLOGY, CLASSIFICATION AND SURVEYS

No	Item
01	Section 2

CHAPTER 102 – NAVAL SHIP TECHNOLOGY, HULL STRUCTURES AND SHIP EQUIPMENT

No	Item
01	Section 6
02	Section 12

CHAPTER 104 – NAVAL SHIP TECHNOLOGY,

PROPULSION PLANTS

No	Item
01	Section 4B

CHAPTER 105 – NAVAL SHIP TECHNOLOGY, ELECTRICAL INSTALLATIONS

No	Item
01	Section 6
02	Section 07
03	Section 17

CHAPTER 107 – NAVAL SHIP TECHNOLOGY, SHIP OPERATION INSTALLATIONS AND AUXILIARY SYSTEMS

No	Item
01	Section 6

CHAPTER 111 – NAVAL SHIP TECHNOLOGY, SUBMARINES

No	Item
01	Section 1

CLASSIFICATION AND SURVEYS

01. Section 1 – Classification

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Generally phrase of “construction rules of TL” and “construction rules” were replaced by “TL Rules”

01. Section 2 – Classification

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Generally phrase of “construction rules of TL” and “construction rules” were replaced by “TL Rules”

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item A.2.2.4 was revised as below:

2.2.4 In statutory matters, when authorized by the flag state concerned and acting on its behalf, the Society applies the IMO Circulars and TL Interpretations (TL- Is) applicable to a vessel, its machinery and equipment, in accordance with the implementation dates and provisions stated in the IMO Circulars and TL- I unless the flag state provides a different interpretation with written instruction to apply or decides otherwise.

2.4.2.3 Ships are to maintain at all times in proper condition complying with international ~~safety and pollution prevention regulations;~~ statutory instruments (e.g. International Convention for the Safety of Life at Sea (SOLAS), Load Lines Convention, International Convention for the Prevention of Pollution from Ships (MARPOL)), flag state regulations, and their applicable amendments.

~~- Load Lines Convention;~~
~~- International Convention for the Safety of Life at Sea, 1974 and its Protocol of 1978;~~
~~- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto;~~
~~- International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code);~~
~~- International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code);~~

~~and applicable Amendments thereto.~~

TL requires the applicable Convention Certificates to be issued by a flag state or **TL** ~~or an organization which is authorized by the flag state~~. Safety Management Certificates in accordance with the provisions of the International Safety Management Code (ISM Code), International Ship Security Certificate in accordance with International Code for the Security of Ships and of Port Facilities (ISPS Code) and Maritime Labour Certificate in accordance with the Maritime Labour Convention, 2006 (MLC) may be issued by an organisation complying with the Code for Recognized Organizations (RO Code) adopted by IMO Resolution MSC.349(92) and authorised by the flag state with which the ship is registered. Cargo Ship Radio Certificates may be issued by an organisation authorised by the flag state with which the ship is registered. Statements of Compliance - Fuel Oil Consumption Reporting (MARPOL Annex VI) may be issued by an organisation that has been authorised by the flag

administration with which the ship is registered. In the case of double or dual-classed ships, Convention Certificates may be issued by the other Society with which the ship is classed provided this is recognised ~~in a formal Dual Class Agreement with~~ by **TL** and provided the other Society is also authorised by the flag state. In the event of a flag state withdrawing any ship's Convention Certificate (referred to in this section) then the **TL** may suspend the ship's class. If a ship is removed from the flag state's Registry for the non-compliance with the Conventions or Classification Requirements referred to here in then the **TL** will suspend the ship's class.

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item D.2.2.4 was revised as below:

2.2.4 **+**, **(+)** or **[+]** construction symbols ~~notations~~ are not present in front of main class notations in case hull, machinery and/or special equipments are not constructed under supervision of **TL** or another recognised classification society but later assigned class by **TL**

03. Section 3 – Surveys

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Generally phrase of "construction rules of TL" and "construction rules" were replaced by "TL Rules"

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item A.11.2.1.1 was revised according to UR Z17 Rev.17 as below:

11.2.1.1 Statutory services

- Firms engaged in servicing inflatable liferafts,
  Inflatable lifejackets, hydrostatic release units, ~~inflatable rescue boats,~~ marine evacuation systems

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Table 3.3 was revised according to UR Z7 Rev.29 as below:

Class renewal survey No.1 Age ≤ 5	**Class renewal survey No.2 5 < Age ≤ 10**	**Class renewal survey No.3 10 < Age ≤ 15**	**Class renewal survey No.4 and subsequent 15 < Age**
1) Suspect areas throughout the vessel.	1) Suspect areas throughout the vessel.	1) Suspect areas throughout the vessel.	1) Suspect areas throughout the vessel.
	2) One transverse section of deck plating ~~in way of a cargo space~~ within the amidships 0.5 L (in way of a cargo space, if applicable).	2) Two transverse sections within the amidships 0.5 L (in way of two ~~different~~ cargo spaces~~.~~ , if applicable)	2) A minimum of three transverse sections ~~in way of cargo spaces~~ within the amidships 0.5 L(in way of a cargo space, if applicable).
		3) All cargo holds hatch covers and coamings (plating and stiffeners).	3) All cargo holds hatch covers and coamings (plating and stiffeners).
		4) Internals in forepeak and after peak ballast tanks.	4) Internals in forepeak and after peak ballast tanks.
			5) All exposed main deck plating full length.
			6) Representative exposed superstructure deck plating (poop, bridge and forecastle deck).
			7) Lowest strake and strakes in way of tween decks of all transverse bulkheads in cargo spaces together with internals in way.
			8) All wind-and-water strakes, port and starboard, full length.
			9) All keel plates full length. Also, additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
			10) Plating of sea chests. Shell plating in way of overboard discharges as considered necessary by the attending surveyor.

Notes:

1. *Thickness measurement locations are to be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.*

2. *Thickness measurements of internals May be specially considered by the surveyor if the hard protective coating is in good condition.*

3. *For ships less than 100 m. in length, the number of transverse sections required at class renewal survey no.3 May be reduced to one (1), and the number of transverse sections required at subsequent class renewal surveys May be reduced to two (2).*

4. *For ships more than 100 m. in length, at class renewal survey no. 3, thickness measurements of exposed deck plating within amidships 0.5 L May be required.*

5. *Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, thickness measurement shall be done of accessible parts of hatch covers structures.*

PART A – CHAPTER 1 - HULL

01. Section 21 – Structural Fire Protection

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Notes were added to items of B.12.3.1.2 and 12.3.2 according to MSC.1/Circ.1655 as below:

……

Note: *The fire insulation should be provided only to the part of the duct and/or sleeve that is on the same side of the division being fire insulated, and be extended for a minimum of 450 mm along the duct and/or sleeve.*

……

Note: *When a duct passing through a division is to be in accordance with SOLAS regulations II-2/9.3.2 and II-2/9.7.3.2, no clearance should be allowed between the duct and the division.*

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Notes were added to items of C.8.3.1.2 and 8.3.2 according to MSC.1/Circ.1655 as below:

……

Note: *The fire insulation should be provided only to the part of the duct and/or sleeve that is on the same side of the division being fire insulated, and be extended for a minimum of 450 mm along the duct and/or sleeve.*

……

Note: *When a duct passing through a division is to be in accordance with SOLAS regulations II-2/9.3.2 and II-2/9.7.3.2, no clearance should be allowed between the duct and the division.*

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item E.2.2.2 was revised according to UI SC120 Rev.2 Corr.1 as below:

2.2.2 TL May permit access doors in boundary bulkheads facing the cargo area or within the 5 m. limits specified in item 2.2.1, to main cargo control stations and to such service spaces used as provision rooms, store rooms and lockers, provided they do not give access directly or indirectly to any other space containing or providing for accommodation, control stations or service spaces such as galleys, pantries or workshops, or similar spaces containing source of vapour ignition. The boundary of such a space are to be insulated to "A-60" class standard, with the exception of the boundary facing the cargo area.

Access to forecastle spaces containing sources of ignition may be permitted through doors facing cargo area provided the doors are located outside hazardous areas as defined in IEC Publication 60092-502.

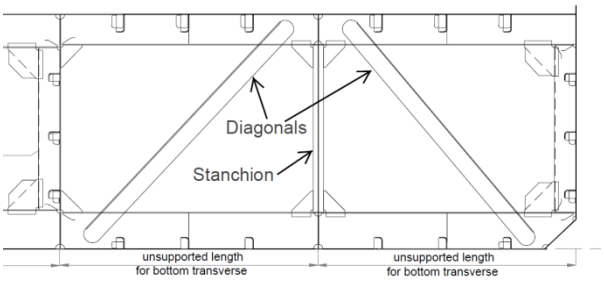
02. Section 33 – - Barges and Pontoons

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item D.1.3 was revised as below:

If a truss arrangement is constructed between deck and bottom structures, unsupported length for bottom transverses can be applied as shown in figure below. Solid sections are to be used in tanks. Diagonals are to be arranged to have angles of inclination of about 45° with the horizontal and to have a sectional area of minimum 50% of that of the associated stanchion.



PART A – CHAPTER 2 - MATERIALS

01. Section 5 - Steel Forgings

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item A.1.1 was revised according to UR W7 Rev.4 as below:

1.1 These rules are applicable to steel forgings intended for hull and machinery applications ~~such as rudder stocks, pintles, propeller shafts, crankshafts, connecting rods, piston rods, gearing, etc~~ as specified in the relevant TL Requirements (e.g. TL-R M72, TL-R M68,etc.) and/or requirements of TL. Where relevant, these rules are also applicable to material for forging stock and to rolled bars intended to be machined into components of simple shape.

Item A.2.2 was revised according to UR W7 Rev.4 as below:

2.2 The steel used in the manufacture of forgings is to be made by a process approved by **TL.** The works at which the steel was produced is to be approved by TL. Where the steel is produced at a separate works to the forging, the steel manufacturer is also to be approved by TL.

Items A.2.9 and 2.10 were added according to UR W7 Rev.4 as below:

2.9 TL- R W28 is applicable to the requirements for welding procedure qualification tests of steel forgings intended to be used for the components of hull construction and marine structures. Requirements for other WPS and qualification thereof, for welder certification and for type approval of welding consumables are at the discretion of **TL**.

2.10 Welders intended to be engaged in fusion welding of steel forgings for hull structures are to be qualified in accordance with TL- R W32: Qualification scheme for welders of hull structural steels.

Tables 5.2 and 5.3 were revised according to UR W7 Rev.4 as below and renumbered as 5.1 and 5.2 and table 5.1 was renumbered as 5.3 and all related references were revised accordingly:

Table 5.2 Chemical composition limits (1) for hull steel forgings (6)

Steel type	C max.	Si max.	Mn	P max.	S max.	Cr(4)	Mo(4)	Ni(4)	Cu(4)	Total residuals
C, C-Mn	0.23 **(2), (3)**	0.45	0.30-1.50	0.035	0.035	0.30 ~~**(4)**~~	0.15 ~~**(4)**~~	0.40 ~~**(4)**~~	0.30	0.85
Alloy	**(5)**	0.45	**(5)**	0.035	0.035	**(5)**	**(5)**	**(5)**	0.30	-

(1) *Composition in percentage mass by mass maximum unless shown as a range.*

(2) *The carbon content May be increased above this level provided that the carbon equivalent (C_{eq}) is not more than 0.41%, calculated using the following formula:*

$$C_{eq} = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15} \ [\%]$$

(3) *The carbon content of C and C-Mn steel forgings not intended for welded construction May be 0.65 maximum.*

(4) *Elements are considered as residual elements.*

(5) *Specification is to be submitted for approval.*

(6) *Rudder stocks and pintles should be of weldable quality.*

Table 5.3 Chemical composition limits (1) for machinery steel forgings

Steel type	C	Si	Mn	P	S	Cr (4)	Mo (4)	Ni (4)	Cu(4) ~~(3)~~	Total residuals
C, C-Mn	~~0.65~~ 0.23 **(2)(3)**	0.45	0.30-1.50	0.035	0.035	0.30 ~~**(3)**~~	0.15 ~~**(3)**~~	0.40 ~~**(3)**~~	0.30	0.85
Alloy (5) ~~(4)~~	0.45	0.45	0.30-1.00	0.035	0.035	Min. 0.40 (6) ~~(5)~~	Min. 0.15 (6) ~~(5)~~	Min. 0.40 (6) ~~(5)~~	0.30	-

(1) *Composition in percentage mass by mass maximum unless shown as a range or as a minimum.*

~~**(2)** *The carbon content of C and C-Mn steel forgings intended for welded construction is to be 0.23 maximum*~~

The carbon content May be increased above this level provided that the carbon equivalent (C_{eq}) is not more than 0.41%.

(3) *The carbon content of C and C-Mn steel forgings not intended for welded construction May be 0.65 maximum*

(4) *Elements are considered as residual elements unless shown as a minimum.*

(5) *Where alloy steel forgings are intended for welded constructions, the proposed chemical composition is subject to approval by **TL**.*

(6) *One or more of the elements is to comply with the minimum content.*

Items A.5.2 and 5.2.2 were revised according to UR W7 Rev.4 as below:

5.2 Except as provided in 5.~~7~~6 and 5.~~8~~7 forgings are to be supplied in one of the following conditions:

5.2.2 Alloy steels

Normalized

Normalized and tempered

Quenched and tempered

For all types of steel the tempering temperature is to be not less than 550ºC. ~~Where forgings for gearing are not intended for surface hardening, lower tempering temperature may be allowed.~~

The delivery condition shall meet the design and application requirements, it is the manufacturers responsibility to select the appropriate heat treatment method to obtain the required mechanical properties. Where forgings for gearing are not intended for surface hardening, lower tempering temperature may be allowed.

Item A.5.3 was deleted according to UR W7 Rev.4 as below and subsequent items were renumbered:

~~**5.3** Alternatively, alloy steel forgings May be supplied in the normalized and tempered condition, in which case the specified mechanical properties are to be agreed with TL.~~

Renumbered item A.5.8 was revised according to UR W7 Rev.4 as below:

5.8 If a forging is locally reheated or any straightening operation is performed after the final heat treatment consideration is to be given to a subsequent stress relieving heat treatment. The manufacturer shall have strict control of this temperature in order to avoid any detrimental effects to the final heat treatment and resultant microstructure and mechanical properties of the forging.

Item 9.2.3 was revised according to UR W7 Rev.4 as below:

9.2.3 Test material, sufficient for the required tests and for possible retest purposes, is to be provided with a cross-sectional area of not less than that part of the forging which it represents. This test material is to be integral with each forging except as provided in 9.2.145 and 9.2.178. Where batch testing is permitted according to 9.2.178, the test material may alternatively be a production part or separately forged. Separately forged test material is to have a reduction ratio similar to that used for the forgings represented.

Item 9.2.6 was revised and Figure 1 was added according to UR W7 Rev.4 as below and subsequent figures were renumbered and all references to related figures were revised accordingly:

9.2.6 ~~Unless otherwise agreed, the longitudinal axis of~~ The test specimens is to be positioned as follows:

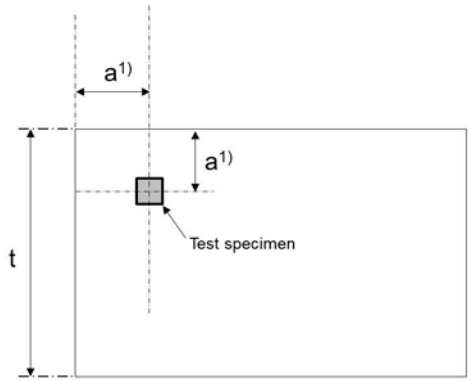
a) For forgings having a thickness, t, or diameter D up to maximum 50 mm, the longitudinal axis of the test specimen is to be located at a distance of t/2 or D/2 below the heat treated surfaces ~~For thickness or diameter up to maximum 50mm, the axis is to be at the mid-thickness or the center of the cross section.~~

b) For forgings having a thickness, t, or diameter D greater than 50mm, the longitudinal axis of the test specimen is to be located at a distance of t/4 or D/4 (mid-radius) or 80mm, whichever is less, below any heat treated surface.

Test specimen is to be located with its longitudinal axis at a distance from any heat-treated surface as shown in Fig. 1. ~~For thickness or diameter greater than 50mm, the axis is to be at one quarter thickness (mid-radius) or 80mm, whichever is less, below any heat treated surface.~~

c) For ring and disc forgings (noting that the test specimen locations for these shaped forgings May be different to elongated or free form forgings), tangential sample shall be taken at t/2 for thickness ≤ 25mm and 12.5mm below the surface for thickness >25mm, in both the vertical and horizontal direction.

Where achievable, for thickness >25mm, no part of the test material shall be closer than 12.5 mm to any heat-treated surface, as shown in Fig. 1.



1) "a" is the distance from the test specimen to heat treated surface based on the above b) or c).

Fig.5.1 Position of the test specimen

Item 9.2.7 was added according to UR W7 Rev.4 as below:

9.2.7 Where the manufacturer can demonstrate that a proposed testing location or orientation is more representative of the required mechanical properties of a component, this May be agreed with TL. In such cases, the heat treatment process, a proposed testing location or orientation, and technical justification shall be submitted to TL for approval.

Except as provided in 9.2.18 the number and direction of tests is to be as items C.5 and D.7.2.

Item A.10 was revised according to UR W7 Rev.4 as below:

10. Inspection

10.1 ~~Before acceptance,~~ All forgings ~~are to be presented to the surveyor for~~ should be subjected to a 100% visual examination of all accessible surfaces by the manufacturer and made available to the Surveyor. Where ~~appropriate~~ applicable, this visual examination is to include the examination of internal surfaces and bores. Unless otherwise agreed the verification of dimensions is the responsibility of the manufacturer.

10.2 When required by the relevant ~~construction rules~~ TL Requirement ,or by the approved procedure for welded composite components appropriate non-destructive testing is also to be carried out before acceptance and the results are to be reported by the manufacturer.

10.3 Where required by the appropriate TL Requirement or TL-G 68, ultrasonic examination is to be carried out after the forgings have been machined to a condition suitable for this type of examination and after the final heat treatment. Both radial and axial scanning are to be carried out where appropriate for the shape and the dimensions of the forgings being examined.

10.4 The method and the extent of inspection, NDT and acceptance criteria are to be agreed with **TL**. TL-G 68 is regarded as an example of an acceptable standard.

For mass produced forgings the extent of examination is to be established at the discretion of TL.

10.5 Unless otherwise agreed, examinations are to be carried out by the manufacturer, although Surveyors may request to be present in order to verify that the examination is being carried out in accordance with the agreed procedure.

10.6 If the forging is supplied in the 'as forged' condition for machining at a separate works, the manufacturer is to ensure that a suitable ultrasonic examination is carried out to verify the internal quality of the forging.

10.7 Where advanced ultrasonic testing methods are applied, e.g. PAUT or TOFD, reference is made to TL-R W34 Advanced non-destructive testing of materials and welds –Dec. 2019, for general approach in adopting and application of these advanced methods.
In such cases, acceptance levels regarding accept/reject criteria may be as per the applicable section in the TL-G 68.

10.8 When required by the conditions of approval for surface hardened forgings (A.5.5), additional test samples are to be processed at the same time as the forgings which they represent. These test samples are subsequently to be sectioned in order to determine the hardness, shape and depth of the locally hardened zone and which are to comply with the requirements of the approved specification.

Item A.12.2 was revised according to UR W7 Rev.4 as below:

12.2 Repair welding of forgings except those subjected to torsional fatigue, such as crankshaft forgings and propeller shaft forgings may be permitted subject to prior approval of **TL**. In such cases, full details of the extent and location of the repair, the proposed welding procedure, heat treatment and subsequent inspection procedures are to be submitted for the approval.

Item A.13.2 was revised according to UR W7 Rev.4 as below:

.....

- ~~Date of test and~~ Test pressure (where applicable).

- Date of final inspection

Item B.4.1 was revised according to UR W7 Rev.4 as below:

4.1 The chemical composition of the forging steels is subject to the limit values in Tables 5.~~2~~1 and 5.~~3~~2.

Item B.5.2 was revised according to UR W7 Rev.4 as below:

5.2 Forgings May be supplied to any specified minimum tensile strength selected within the general limits detailed in Tables 5.6 or 5.7 but subject to any additional requirements of the relevant ~~construction Rules~~ TL Requirements

Tables 5.6 and 5.7 were revised according to UR W7 Rev.4 as below:

Table 5.6 Mechanical properties for hull steel forgings

Steel type	Tensile strength 1) R_m min. N/mm²	Yield stress R_e min. N/mm²	Elongation A5 min. %		Reduction of area Z min. %		Charpy V- notch impact test 2) ~~3)~~		
							Test Temperature (°C)	Minimum average energy (J)	
			Long.	Tang.	Long.	Tang.		Long.	Tang.
C and C-Mn	400	200	26	19	50	35	0	27	18
	440	220	24	18	50	35	0	27	18
	480	240	22	16	45	30	0	27	18
	520	260	21	15	45	30	0	27	18
	560	280	20	14	40	27	0	27	18
	600	300	18	13	40	27	0	27	18
Alloy	550	350	20	14	50	35	0	32	22
	600	400	18	13	50	35	0	32	22
	650	450	17	12	50	35	0	32	22

1) *The following ranges for tensile strength May be additionally specified:*
specified minimum tensile strength: < 600 N/mm² ≥ 600 N/mm²
tensile strength range: 120 N/mm² 150 N/mm²

2) *Special consideration may be given to alternative requirements for Charpy V-notch test, depending on design and application, and subject to agreement by TL.* ~~*Testing at +20°C may be accepted subject to compliance with a specified minimum average energy of 45 J longitudinal or 30 J transverse for all grades.*~~
~~*l = longitudinal, t = transverse*~~

~~**3)** *Test direction shall follow the requirements of 9.2.5*~~

Table 5.7 Mechanical properties for machinery steel forgings ~~2)~~

Steel type	Tensile strength 1) R_m min. N/mm²	Yield stress R_e min. N/mm²	Elongation A5 min. %		Reduction of area Z min. %		Charpy V-notch impact test 2) 4) ~~5)~~			Hardness 3) (Brinell) (Brinell)
			Long.	Tang.	Long.	Tang.	Test temperature (°C)	Minimum average energy (J)		
								Long.	Tang.	
C and C-Mn	400	200	26	19	50	35	AT(5)	27	18	110-150
	440	220	24	18	50	35				125-160
	480	240	22	16	45	30				135-175
	520	260	21	15	45	30				150-185
	560	280	20	14	40	27				160-200
	600	300	18	13	40	27				175-215
	640	320	17	12	40	27				185-230
	680	340	16	12	35	24				200-240
	720	360	15	11	35	24				210-250
	760	380	14	10	35	24				225-265
Alloy	600	360	18	14	50	35				175-215

	700	420	16	12	45	30				205-245
	800	480	14	10	40	27				235-275
	900	630	13	9	40	27				260-320
	1000	700	12	8	35	24				290-365
	1100	770	11	7	35	24				320-385

1) *The following ranges for tensile strength May be additionally specified:*
specified minimum tensile strength: < 900 N/mm² ≥ 900 N/mm²
tensile strength range: 150 N/mm² 200 N/mm²

2) *For materials used for machinery exposed to sea water temperature, such as propeller shafts and shaft bolts, intended for ships with ice class notation ~~except the lowest one,~~ IA Super, IA, IB and IC, Charpy V-notch impact testing is to be carried out for all steel types at –10°C and the average energy value is to be minimum ~~27~~ 20J (longitudinal test). One individual value may be less than the required average value provided that it is not less than 70% of this average value.*

3) *The hardness values are typical and are given for information purposes only.*

~~**4)** *Testing shall be carried out at +20°C.*~~

~~**5)** *Test direction shall follow the requirements of 9.2.5*~~

4) *Special consideration may be given to alternative requirements for Charpy V-notch test, depending on design and application, and subject to agreement by TL.*

5) *AT refers to Ambient Temperature (i.e. 23°C ±5°C), which is specified in ISO 148-1:2016.*

Item B.6.1 was revised according to UR W7 Rev.4 as below:

.....

One set of tests is to be taken from the end of each forging in a longitudinal direction except that, at the discretion of the manufacture, the alternative directions or positions as shown in Fig. 5.2, 5.3 and 5.4 May be used. Where a forging exceeds both 4 tonnes in mass and 3m in length, one set of tests is to be taken from each end. These limits refer to the 'as forged' mass and length but excluding the test material.

Item C.5.1.3 was added according to UR W7 Rev.4 as below and subsequent items were renumbered:

5.1.2 Solid open die forged crankshafts:

5.1.3 Forged Rings (such as slewing rings)

One set of tests is to be taken from each forging in a tangential direction (test positions are shown in Fig. 5.6). Where the finished diameter exceeds 2.5 m or the mass (as heat treated, including test material) exceeds 3 tonnes then two sets of tests are to be taken diametrically opposite positions.

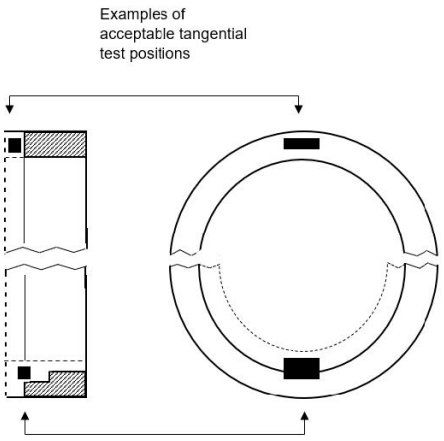


Fig. 5.6 Forged rings

02. Section 6 - Steel Castings

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item A.1 was revised according to UR W8 Rev.3 as below:

1.1 These rules are applicable to C, C-Mn and alloy steel castings intended for hull, machinery, equipment, boilers and piping systems applications ~~such as stern frames, rudder frames, crankshafts, turbine casings, bedplates, etc~~ for ships and offshore units for worldwide services as specified in the relevant **TL** Requirement and/or requirements of **TL**. This Requirement also makes consideration for grades that are intended for fabrication by welding, as well as grades not intended for welding.

~~**1.2** These rules are applicable only to steel castings where the design and acceptance tests are related to mechanical properties at ambient temperature. For other applications, additional requirements May be necessary, especially when the castings are intended for services at low or elevated temperatures.~~

~~**1.3** Alternatively, castings which comply with national or proprietary specifications May be accepted provided such specifications give reasonable equivalence to these rules or otherwise specially approved or required by **TL**.~~

~~**1.4** Specific rules are not given for alloy steel castings and where the use of such materials is proposed full details of the chemical composition, heat treatment, mechanical properties; testing, inspections and rectification are to be submitted for approval of **TL**.~~

1.2 Where required by the relevant parts of the rules, steel castings shall comply with the appropriate specific requirements of B to F. If the specific requirements differ from the general requirements, the specific requirements shall prevail.

Item A.2.5 was revised and A.2.6 added according to UR W8 Rev.3 as below:

2.5 ~~When~~ Joining of two or more castings ~~are joined~~ by welding to form a composite component: Requirements for ~~the proposed~~ welding procedure ~~is to be submitted for approval. Welding procedure~~ qualification tests of steels for hull construction and marine structures are specified in TL-R W28. Welders for hull structural steel castings are to be qualified in accordance with TL-R W32. Requirements for other WPS and qualification thereof, for welders certification and for type approval of welding consumables are at the discretion of TL.

2.6 Temporary welds made for operations such as lifting, handling, staging, etc., are to be in accordance with approved welding procedures and qualified welders, and are to be removed, ground and inspected using suitable NDT methods.

Items A.4.3 and 4.4 were revised according to UR W8 Rev.3 and renumbered as B.4.1 and 4.2 as below:

4.1 ~~For carbon and carbon-manganese steel castings~~ The chemical composition is to comply with the overall limits given in Table 6.1 and Table 6.2 respectively, or, where applicable, the requirements of the approved specification.

4.2 ~~Unless otherwise required~~ Suitable grain refining elements such as aluminium May be used at the discretion of the manufacturer or as agreed with TL. ~~The content of such elements is to be reported.~~

Table 6.1 Chemical composition limits for hull and machinery steel castings [%]:C, C-Mn steels

Steel type	Application	C (max.)	Si (max.)	Mn	S (max.)	P (max.)	Residual elements (max.)				Total residuals (max.)
							Cu	Cr	Ni	Mo	
C, C-Mn	Castings for non-welded construction	0.40**(1)**	0.60	0.50-1.60	~~0.04~~ 0.035	~~0.04~~ 0.035	0.30	0.30	0.40	0.15	0.80
	Castings for welded construction	0.23	0.60	0,50-1.60 ~~max.~~	~~0.015~~ 0.035	~~0.02~~ 0.035	0.30	0.30	0.40	0.15	0.80
(1) *For welded structures for machinery application C ≤ 0.23 or C_{eq} ≤ 0.49*											

Table 6.2 Chemical composition limits for hull and machinery steel castings (%): Alloy steels

Steel type	Application	C (max.)	Si (max.)	Mn	S (max.)	P (max.)	Alloying elements 1) (min.)			
							Cu	Cr	Ni	Mo
Alloy	Castings for non-welded construction	0.45	0.60	0.50-1.60	0.030	0.035	0.30	0.40	0.40	0.15
	Castings for welded construction	alloying element values to be agreed with TL								
1) At least one of the elements shall comply with the minimum content										

Item A.5.1 was revised according to UR W8 Rev.3 as below:

5.1 Castings are to be supplied in one of the following delivery conditions:

(a) Carbon and carbon-manganese steels:

Fully annealed

Normalized

Normalized and tempered

Quenched and tempered

(b) Alloy steels:

Normalized

Normalized and tempered

Quenched and tempered

For all types of steel the tempering temperature is to be not less than 550ºC.

The delivery condition shall meet the design and application requirements. It is the manufacturers responsibility to select the appropriate heat treatment method to obtain the required mechanical properties.

Item A.5.4 was revised according to UR W8 Rev.3 as below:

5.4 If a casting is locally reheated or any straightening operation is performed after the final heat treatment, a subsequent stress relieving heat treatment May be required in order to avoid the possibility of harmful residual stresses. The manufacturer shall have strict control of this temperature in order to avoid any detrimental effects to the final heat treatment and resultant microstructure and mechanical properties of the casting.

Item A.9.2.1 was revised according to UR W8 Rev.3 as below:

9.2.1 Mechanical Tests

Test material, sufficient for the required tests and for possible retest purposes is to be provided for each casting or batch of castings.

9.2.1.1 At least one test ~~sample~~ block is to be provided for each casting. Unless otherwise agreed these test ~~samples~~ blocks are to be either integrally cast or gated to the castings ~~and are to have a thickness of not less than 30 mm~~.

9.2.1.2 The size of the test blocks for mechanical testing is to be such that the heat treatment and microstructure is representative for the section of the casting with the ruling section, i.e. the section for which the specified mechanical properties apply, see also ISO 683-1:2018 and ISO 683-2:2018, respectively.

For C, C-Mn steel castings this is in general to be achieved as follows:
The test block shall have a thickness (t_S) of not less than the ruling section of the casting, or 30 mm, whichever is larger.

For large thickness castings other than stern tube, stern frame, anchor and rudder horn, t_S normally need not to exceed 150 mm. Length and width of the test block is normally to be at least three times t_S, unless otherwise agreed with TL, as shown in Figure 6.1. (Note that longer or wider test blocks May be necessary in order to accommodate the required test specimens.)
For castings for stern tube, stern frame, anchor and rudder horn the test block thickness t_S shall represent the ruling section.

Guidance:
Shorter width or length May be accepted for test blocks where actual casting width or length (t_A) is in the range between t_S and $3t_S$.

Example 1: For a general casting with dimensions 140 x 160 x 1250 mm the required test block size would typically be 140 x 160 x 420 mm (that is: t_S x t_A x $3t_S$).

Example 2: For a stern tube casting with ruling section t_S = 170 mm and width/height/length $t_{A1}/t_{A2}/t_{A3}$ = 1000/600/1800 mm, the required test block size would typically be 170 x 510 x 510 mm (that is: t_S x $3t_S$ x $3t_S$) see Figure 6.2.

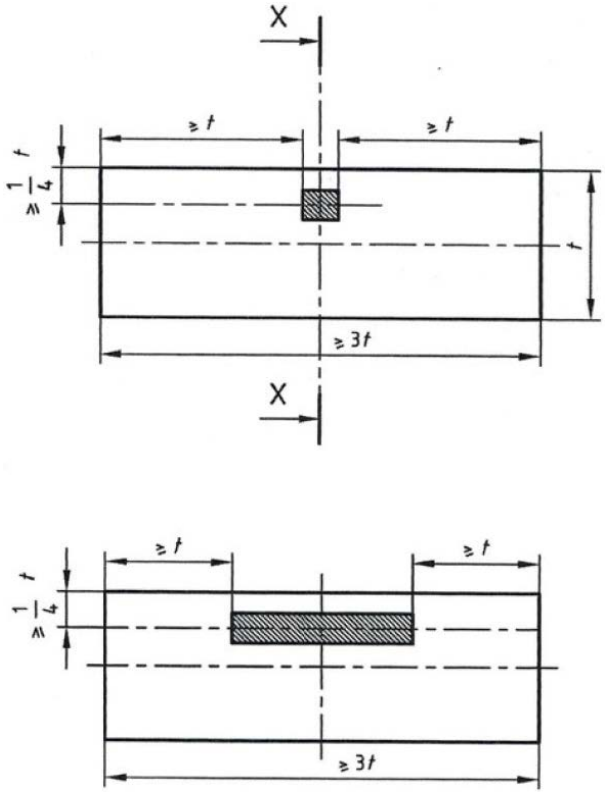


Fig. 6.1: Specimen positions relative to the test block in accordance with ISO 4990:2015

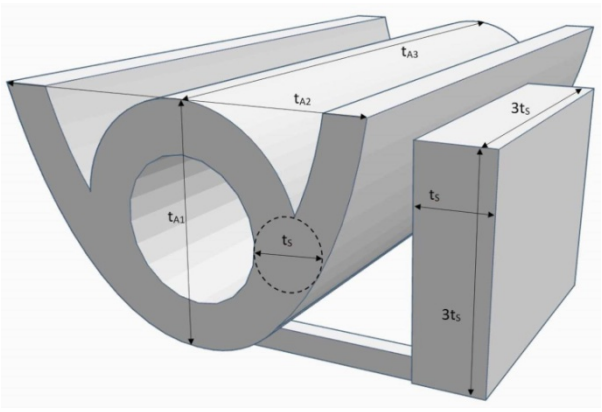


Fig. 6.2: Example 2: test block gated to stern tube casting

For alloy steel castings the manufacturer shall propose dimensions for the test block and demonstrate the representative nature of it.

9.2.1.3 For test blocks with thickness ≤ 56 mm, the longitudinal axis of the test specimens is to be located at ≥ 14 mm from the surface in the thickness direction. For test blocks with thickness > 56 mm, the longitudinal axis of the test specimens is to be located at ≥ ¼ t_S from the surface. Test specimens shall be taken in such a way that no part of the gauge length is machined from material closer than t_S to any of the other surfaces. For impact testing, this requirement shall apply to the complete test specimen - refer to Figure 6.1 for location of test specimens in relation to the test block.

9.2.1.4 The tests are to be performed on a heat-by heat basis. Castings from each heat that undergo the same heat treatment are to be grouped into test batches of up to 4 500 kg. Residual quantities of up to 1250 kg are to be allocated to the preceding test batch. Parts with unit weights > 1000 kg are to be tested individually.

9.2.1.5 Where the casting is of complex design or where the finished mass exceeds 10 tonnes, two cast on test ~~samples~~ blocks are to be provided from the heaviest section, located as far as practicable from each other.

9.2.1.6 Where large castings are made from two or more casts, which are not mixed in a ladle prior to pouring, two or more test ~~samples~~ blocks are to be provided corresponding to the number of casts involved. These are to be integrally cast at locations as widely separated as possible.

9.2.1.7 For castings where the method of manufacture has been specially approved by **TL** in accordance with 2.4, the number and position of test ~~samples~~ blocks is to be agreed with the **TL** having regard to the method of manufacture employed.

9.2.1.8 As an alternative to 9.2.1.1 , where a number of small castings of about the same size, each of which is under 1000 kg in mass, are made from one cast and heat treated in the same furnace charge, a batch testing procedure may be adopted using separately cast test ~~samples~~ blocks of suitable dimensions. At least one test ~~samples~~ block is to be provided for each batch of castings.

9.2.1.9 The test ~~samples~~ blocks are not to be detached from the casting until the specified heat treatment has been completed and they have been properly identified.

9.2.1.10 One tensile test specimen is and one set of impact tests are to be taken from each test block.

9.2.1.11 The preparation of test specimens and the procedures used for mechanical testing are to comply

with the relevant requirements of ~~Section 2~~ TL-R W2. Unless otherwise agreed all tests are to be carried out in the presence of the Surveyors.

Items A.9.2.2.1 and 9.2.2.2 was revised and renumbered as B.5.1 and 5.2 and subsequent items were renumbered and revised according to UR W8 Rev.3 as below:

9.2.2.1 The mechanical properties are to comply with the requirements of Table 6.3 and Table 6.4 respectively appropriate to the specified minimum tensile strength or, where applicable, the requirements of the approved specification.

9.2.2.2 Re-test requirements for tensile tests are to be in accordance with ~~Section 2 (see 9.3)~~ TL-R W2.

9.2.2.3 The additional tests detailed in 9.2.2.2 are to be taken, preferably from the same, but alternatively from another, test sample representative of the casting or batch of castings.

Item A.10.3 was revised according to UR W8 Rev.3 as below:

10.3 When required by the relevant construction Rules, or by the approved procedure for welded composite components, appropriate non-destructive testing is also to be carried out before acceptance and the results are to be reported by the manufacturer. The extent of testing and acceptance criteria is to be agreed with **TL.** TL-G 69 is regarded as an example of an acceptable standard specifying suitable minimum requirements.

Item A.12.1 was revised according to UR W8 Rev.3 as below:

12.1 General

12.1.1 Where castings are to be repaired, the manufacturer shall exercise robust controls of all repair operations regarding the repair of castings, with respect to dimensions, heat treatment, inspection and quality control.

12.1.2 The approval of **TL** is to be obtained where steel castings from which defects were removed are to be used with or without weld repair.

~~Procedure of removal of defect and weld repair is to be in accordance with TL- G 69.~~

12.1.3 Defects and unacceptable indications must be repaired as indicated below:
Defective parts of material may be removed by grinding, or by chipping and grinding, or by arc air-gouging and grinding. Thermal methods of metal removal shall only be allowed before the final heat treatment. All grooves shall have a bottom radius of approximately three times the groove depth and should be smoothly blended to the surface area with a finish equal to that of the adjacent surface.

12.1.4 For NDT of steel castings after repair, see 10.3

.....

12.1.6 Shallow grooves or depressions resulting from the removal of defects may be accepted provided that they will cause no appreciable reduction in the strength of the casting or affect the intended use, and the depth of defect removal is not over 15mm or 10% of wall thickness, whichever is less. The resulting grooves or depressions are to be subsequently ground smooth and complete elimination of the defective material is to be verified by MT or PT. Small surface irregularities sealed by welding are to be treated as weld repairs, see 12.2.

~~**12.1.4** The manufacturer is to maintain full records detailing the extent and location of repairs made to each casting and details of weld procedures and heat treatments applied for repairs. These records are to be available to the surveyor and copies provided on request.~~

Item A.12.2 was revised according to UR W8 Rev.3 as below:

12.2 Weld repairs

~~When it has been agreed that a casting can be repaired by welding,~~ In addition to the requirements given in 12.1 the following ~~requirements~~ apply for weld repairs:

12.2.1 For C and C-Mn steel castings weld repairs shall be suitably classified as major or minor. For alloy steel castings, repair requires approval from TL.

a. Major repairs are those where:
- the depth is greater than 25% of the wall thickness or 25 mm whichever is less, or
- the total weld area on a casting exceeds 0.125 m^2 of the casting surface noting that where a distance between two welds is less than their average width, they are to be considered as one weld.

b. Minor weld repairs: Weld repairs not classified as major are considered as minor and need to be carried out in accordance with a qualified welding procedure.

12.2.2 The following is required for major repairs:

a. Shall be carried out before the final delivery heat treatment condition

b. Shall comply with the requirements in (12.2.4) below

c. Before welding is started, full details of the extent and location of the repair, the proposed welding procedure, heat treatment and subsequent inspection procedures are to be submitted for approval.

12.2.3 The following is required for minor repairs:

a. Shall be carried out before the final delivery heat treatment condition

b. Shall comply with the requirements in (12.2.4) below (also with respect to records, see (12.2.4) f) and g).

c. With the exception of alloy steels, do not require prior approval by TL, except as given in (d)

d. TL may request minor repairs in critical areas to be treated as major repairs.

12.2.4 The following requirements apply for all weld repairs (major and minor):

a. All castings in alloy steels and all castings for crankshafts are to be suitably pre-heated prior to welding. Castings in carbon or carbon-manganese steel may also require to be pre-heated depending on their chemical composition and the dimensions and position of the weld repairs.

b. Welding procedures are to be qualified and shall match the delivery condition of the casting. Qualification of welding procedures shall follow TL rules, or subject to agreement with TL, a recognised standard (e.g. TL-R W28 or ISO 11970:2016).

c. Welding is to be done under cover in positions free from draughts and adverse weather conditions by qualified welders with adequate supervision. As far as possible, all welding is to be carried out in the down hand (flat) position.

d. The welding consumables used are to be of an appropriate composition, giving a weld deposit with mechanical properties similar and in no way inferior to those of the parent castings. Welding procedure tests are to be carried out by the manufacturer to demonstrate that satisfactory mechanical properties can be obtained after heat treatment as detailed in 5.1.

e. After welding has been completed the castings are to be given either a suitable heat treatment in accordance with the requirements of 5.1 or a stress relieving heat treatment at a temperature of not less than 550 ^{o}C for C and C-Mn steel castings. For alloy steel castings, the heat treatment has to be agreed with TL.

The type of heat treatment employed will be dependent on the chemical composition of the casting and the dimensions, position and nature of the repairs and should not affect the properties of the casting.

Subject to prior agreement of **TL**, special consideration may be given to the omission of post weld heat treatment or to the acceptance of local stress-relieving heat treatment where the repaired area is small and machining of the casting has reached an advanced stage.

f. On completion of heat treatment the weld repairs and adjacent material are to be ground smooth and examined by magnetic particle or liquid penetrant testing. Supplementary examination by ultrasonic or radiographic testing may also be required depending on the dimensions and nature of the original defect. Satisfactory results are to be obtained from all forms of non-destructive testing used.

g. The manufacturer is to maintain full records detailing the extent and location of repairs made to each casting and details of weld procedures and heat treatments applied for repairs. These records are to be available to the Surveyor and copies provided on request.

Item A.12.3 was added according to UR W8 Rev.3 as below:

12.3 Recommendation for welding: For steels with C ≥ 0.23 or Ceq ≥ 0.45, the WPQT on which the WPS is based, should be qualified on a base material having a Ceq as follows: the Ceq of the base material should not fall below more than 0.02 of the material to be welded. (Example: WPQT for a material with actual Ceq = 0.50 may be qualified on a material with Ceq ≥ 0.48.)

Item B.1 was revised and existing item A.1.2 and 1.3 was revised added as B.1.1 and 1.2 according to UR W8 Rev.3 as below:

1. Scope

These rules are applicable to C, C-Mn and alloy steel castings ~~made of unalloyed and alloyed grades of cast steel which are~~ intended for ~~the manufacture of components and structural parts in~~ hull and machinery ~~construction~~ applications, e.g. diesel engine components (excluding crankshafts), gears, couplings, and also stem and stern posts, stern tubes, shaft struts, rudder bearings and anchors, for ships and offshore units for worldwide services as specified in the relevant **TL** Requirement and/or requirements of **TL**.

1.1 ~~These rules are applicable only to steel castings where the design and acceptance tests are related to mechanical properties at ambient temperature. For other applications~~ Additional requirements may be necessary, especially when the castings are intended for services at low or elevated temperatures, e.g. for ships with ice-class or for boilers.

Additional requirements will typically be required for castings for offshore units depending on applicable service temperature and environment.

1.2 ~~Alternatively,~~ Similarly, C and C-Mn steel castings and alloy steel castings which comply with national or proprietary specifications may be accepted provided such specifications give reasonable equivalence to these rules or otherwise specially approved or required by **TL.**

Item B.5.1 was replaced by existing item A.9.2.2.1 and existing item A.9.2.2.2 was added as B.5.2 and item 5.3 was revised according to UR W8 Rev.3 as below:

~~9.2.2~~5.1 For grades of cast steel conforming to 2.1 to 2.3; Table 6.3 and Table 6.4 gives the minimum requirements for yield stress, elongation and reduction of area and impact test energy values corresponding to steel types and different strength levels. Where it is proposed to use a steel with a specified minimum tensile strength intermediate to those given, corresponding minimum values for the other properties may be obtained by interpolation.

~~9.2.2~~5.2 Castings May be supplied to any specified minimum tensile strength selected within the general limits detailed in Table 6.3 and Table 6.4, respectively but subject to any additional requirements of the relevant construction Rules.

Table 6.3 Mechanical properties for steel castigs intended for welding

Steel type	Specified minimum tensile strength 1) [N/mm²]	Yield stress [N/mm²] min.	Elongation on 5,65 √So [%] min.	Reduction of area [%] min.	Charpy V-notch impact test 2)	
					Test temperature [°C]	Minimum average energy [J]
C,C-Mn	400 440 480 520 560 600	200 220 240 260 300 320	25 22 20 18 15 13	40 30 27 25 20 20	0	27
Alloy	550	355	18	30	0	27
	600	400	16	30		
	650	450	14	30		
	700	540	12	28		

NOTE

1) A tensile strength range of 150 N/mm² May additionally be specified.

2) Special consideration May be given to alternative requirements for Charpy V-notch impact test, depending on design and .....a

Table 6.4 Mechanical properties for machinery steel castigs not intended for welding

Steel type	Specified minimum tensile strength 1) [N/mm²]	Yield stress [N/mm²] min.	Elongation on 5,65 √So [%] min.	Reduction of area [%] min.	Charpy V-notch impact test 2)	
					Test temperature [°C]	Minimum average energy [J]
C,C-Mn	400 440 480 520 560 600	200 220 240 260 300 320	25 22 20 18 15 13	40 30 27 25 20 20	AT 3)	27
Alloy	550	340	16	35	AT 3)	27
	600	400	16	35		
	650	450	14	32		
	700	540	12	28		

NOTE

1) A tensile strength range of 150 N/mm² May additionally be specified.

2) Special consideration May be given to alternative requirements for Charpy V-notch impact test, depending on design and .....a

3) AT refers to Ambient Temperature (i.e. 23°C±5°C), which is specified in ISO 148-1:2016

5.3 Other grades of cast steel as per 2.4 is to have the characteristic properties of the respective grade according to the standard or the specification. In addition, the minimum requirements specified in Table 6.5 are applicable to castings made of C and CMn cast steels.

Existing item B.5.1 and tables 6.2 and 6.3 was deleted according to UR W8 Rev.3 as below and subsequent tables and references to them renumbered accordingly:

5.1 For grades of cast steel conforming to 2.1 to 2.3, the requirements specified in the respective standards is to apply, see Table 6.2 (grades of cast steel conforming to EN 10293) and Table 6.3 (grades of cast steel conforming to EN 10293).

Table 6.2 Mechanical properties of cast steels conforming to EN 10293

Grade of cast steel	Yield strength R_{eH} [N/mm²] min.	Tensile strength R_m [N/mm²] min.	Elongation A [%] min.	Reduction in area Z [%] min.	Impact energy KV (1) KV [J] (2) min.	
					t ≤ 30 mm(3)	t > 30mm(3)
GS-38	200	380	25	40	35	35
GS-45	230	450	22	31	27	27
GS-52	260	520	18	25	27	22
GS-60	300	600	15	21	27	20

(1) *Testing temperature = Room temperature*
For castings for welded structures in shipbuilding the requirements according to Table 6.3 do apply.
(2) *Average value of 3 tests*
(3) *t = Sample thickness*

Table 6.3 Mechanical properties of cast steels conforming to EN 10293

Grade of cast steel	Heat-treated condition (5)	Wall thickness [mm]	Yield strength R_{eH} (1) [N/mm²] min.	Tensile strength R_m [N/mm²]	Elongation A [%] min.	Impact energy KV [J] (2) min.	Transition temp. T_u [27J] (4)
GS-16 Mn 5	N	up to 50	260	430 - 600	25	65	-25°C
		over 50 to 100	230	430 - 600	25	45	-15°C
GS-20 Mn 5	N	up to 50	300	500 - 650	22	55	-20°C
		over 50 to 100	260	500 - 650	22	40	-10°C
		over 100 to 160	(260) **(3)**	480 - 630	20	35	0°C
		over 160	(240) **(3)**	450 - 600	20	27	RT
GS-20 Mn 5	QT	up to 50	360	500 - 650	24	70	-30°C
		over 50 to 100	300	500 - 650	24	50	-20°C
		over 100 to 160	(280) **(3)**	500 - 650	22	40	-10°C
		over 160	(260) **(3)**	480 - 630	22	30	RT

(1) *If there is no marked yield strength, the 0.2 % proof stress applies.*
(2) *Average value of 3 tests at room temperature (individual value at least 70 %).*
(3) *The values in brackets are only an approximate indication of the minimum yield strength in the casting.*
(4) *Requirements for welded structures for shipbuilding.*
(5) *N = Denotes normalizing*
QT = Denotes quenching and tempering

PART A – CHAPTER 3 - WELDING

01. Section 12 – Welding of Hull Structures

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item F.4.1.2 was revised according to ISO 5173 as below:

…….

- **2 transverse bend test specimens** as before and **2 transverse side bend test specimens** taken at right angles to the butt weld (TSBB) in accordance with ISO 5173 in the case of test pieces over 12 mm thick, or:

- **4 transverse side bend test specimens** (TSBB) in the case of test pieces 20 mm thick and welding processes liable to give rise to segregations, lack of fusion or similar defects inside the weld (e.g. single-side and vertical-down welding).

…….

Item F.4.2.1 and 4.2.2 were revised according to ISO 5173 as below:

…….

- **2 transverse bend test specimens** (one FBB and one RBB) and
  2 transverse side bend test specimens (TSBB), see 4.1.2.

…….

- **2 transverse bend test specimens** with the root in tension (RBB) and **2 transverse side bend test specimens** (TSBB). See 4.1.2.

…….

Item F.4.3 was revised according to ISO 5173 as below:

…….

- **2 transverse bend test specimens** (one FBB and one RBB) and **2 transverse side bend test specimens** (TSBB), see 4.1.2.

…….

02. Section 16 – Welding of Hull Structures

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item F.5.2 was revised according to ISO 5173 as below:

…….

- 2 transverse bend test specimens (1FBB and 1RBB) as before and

  2 transverse side bend test specimens taken at right angles to the butt weld (TSBB) in accordance with ISO 5173 in the case of test pieces over 12 mm thick, or

- 4 transverse side bend test specimens (TSBB) in the case of test pieces more than 20 mm thick and welding processes liable to give rise to segregations, solidification cracking, lack of fusion or similar defects inside the weld (e.g. single-side and vertical-down welding)

  .....

PART B – CHAPTER 4 - MACHINERY

01. Section 2 – Internal Combustion Engines and Air Compressors

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item E.5.3 was revised as below:

5.3 Marking

The entity responsible of assembling the generating set shall install a rating plate marked with at least the following information:

(i) the generating set manufacturer's name or mark;

(ii) the set serial number;

(iii) the set date of manufacture (month/year);

(iv) the rated power (both in kW and KVA) with one of the prefixes COP, PRP (or, only for emergency Generating sets, LTP) as defined in ISO 8528-1~~:2018~~;

02. Section 5 – Main Shafting

Item B.2.3 was revised as below:

2.3 Cleanliness requirements

The steels are to have a degree of cleanliness as shown in Table 5.2 when tested according to ISO 4967~~:2013~~ method A. Representative samples are to be obtained from each heat of forged or rolled products

03. Section 7 – Gears, Couplings

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Table 7.4 was revised according to UR M56 Rev.4 Corr.2 as below:

Table 7.4 Values of the factor K_1 for the calculation of K_v

	K_1

	ISO accuracy grades **(1)**					
	3	4	5	6	7	8
spur gears	2.1	3.9	7.5	14.9	26.8	39.1
helical gears	1.9	3.5	6.7	13.3	23.9	34.8
(1) *ISO accuracy grades according to ~~ISO 1328-2:2020~~ ISO 1328-1:2013. In case of mating gears with different accuracy grades, the grade corresponding to the lower accuracy should be used.*						

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items C.5.3, C.5.4, C.5.5 C.6.11, C.6.12, C.6.13.3, C.7.1, C.7.2.3, C.7.2.4, C.7.2.8 and C.7.2.10 were revised as below:

5.3 Internal dynamic factor K_v

……

For gears other than the above, reference is to be made to Method B outlined in the reference ISO 6336-1~~:2019~~.

……

5.4 Face load distribution factors $K_{H\beta}$ and $K_{F\beta}$

……

The face load distribution factors, $K_{H\beta}$ for contact stress, $K_{F\beta}$ for tooth root bending stress, are to be determined according to the method C outlined in the ISO 6336-1~~:2019~~ standard.

……

5.5 Transverse load factors $K_{H\alpha}$ and $K_{F\alpha}$

……

The load distribution factors, $K_{H\alpha}$ and $K_{F\alpha}$ are to be advised by the manufacturer as supported by his measurements, analysis or experience data or are to be determined according to the Method B outlined in the ISO 6336-1~~:2019~~ standard:

……

6.11 Endurance limit for contact stress, σ_{Hlim}

……

The σ_{Hlim} values correspond to a failure probability of 1% or less. Endurance limit for contact stress σ_{Hlim} is to be determined, in general, making reference to values indicated in ISO 6336-5~~:2016~~, for material quality M_Q

……

6.12 Life factor, Z_N

.....

The life factor, Z_N, is to be determined according to method B outlined in the ISO 6336-2~~:2019~~ standard.

.....

6.13.3 Roughness factor, Z_R

.....

The peak-to-valley roughness determined for the pinion R_{z1} and for the wheel R_{z2} are mean values for the peak-to-valley roughness R_z measured on several tooth flanks (R_z as defined in the ISO 6336-2~~:2019~~)

.....

7.1 Scope and general remarks

.....

- For larger pressure angles and large helix angles, the calculated results should be confirmed by experience as by method A of ISO 6336-3~~:2019~~.

.....

7.2.3. Tooth form factor, Y_F, $Y_{F\alpha}$

.....

For the calculation of h_F, s_{Fn} and α_{Fen}, the procedure outlined in ISO 6336-3~~:2019~~ (Method B) is to be used.

.....

7.2.4 Stress correction factor, Y_S, Y_{Sa}

.....

For the calculation of ρ_F the procedure outlined in ISO 6336-3~~:2019~~ is to be used.

.....

7.2.8 Bending endurance limit, σ_{FE}

For a given material, σ_{FE} is the limit of repeated tooth root stress that can be sustained. For most materials, their stress cycles May be taken at $3x10^6$ as the beginning of the endurance limit according to the reference standard ISO 6336-5~~:2016~~, unless otherwise specified.

.....

7.2.10 Life factor, Y_N

.....

The life factor, Y_N, is to be determined according to Method B outlined in ISO 6336-3~~:2019~~ standard.

04. Section 9 – Steering Gears and Thrusters

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item A.1.3.1 was revised and new item A.1.3.12 was added according to UR M42 Rev.6 as below:

1.3.1 Steering gear control system

Steering gear control system means the equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables required to control the steering gear power actuating system. For the purpose of the requirements, steering wheels, steering levers, and rudder angle feedback linkages are not considered to be part of the control system. Steering gear control system is also understood to cover "the equipment required to control the steering gear power actuating system".

……

1.3.12 Hydraulic locking

Hydraulic locking means all situations where two hydraulic systems (usually identical) oppose each other in such a way that it may lead to loss of steering. It can either be caused by pressure in the two hydraulic systems working against each other or by hydraulic "by-pass" meaning that the systems puncture each other and cause pressure drop on both sides or make it impossible to build up pressure.

05. Section 11 – Windlass and Winches

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item A.1.3 was revised as below:

1.3 Confirmed standards of compliance

The design, construction and testing of windlasses are to conform to an acceptable standard or code of practice. To be considered acceptable, the standard or code of practice is to specify criteria for stresses, performance and testing.

Essential standards presently recognized by **TL** are follows:

- ISO 7825 (~~2017~~) : Deck machinery general requirements
- ISO 4568 (~~2006~~) : Shipbuilding - Sea-going vessels -Windlasses and anchor capstans
- SNAME T & R Bulletin 3-15 ~~(2018):~~ Guide to the Design and Testing of Anchor Windlasses for Merchant Ships
- JIS F6714 ~~(1995)~~: Windlasses

06. Section 16 – Pipe Lines, Valves, Fittings and Pumps

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items B.1.3, B.2.6.7, D.10.2 and D.10.4.5 were revised as below:

1.3 Components attached to machinery which satisfy fire test criteria according to Standard ISO 19921~~:2005~~/19922~~:2005~~ or other standards acceptable to the Administration, and which retain mechanical

properties adequate for the intended installation.

……..

2.6.7 Temperature

Plastic piping system shall meet the design requirements of these guidelines over the range of service temperatures it will experience.

……..

The permissible working temperature depending on the working pressure is to be in accordance with Manufacturer's recommendations, but in each case it is to be at least 20°C lower than the minimum heat distortion/deflection temperature of the pipe material, determined according to ISO 75-2~~:2013~~ method A, or equivalent, e.g ASTM D648-18.

……..

10.2 Design and Construction

Flexible hoses are to be designed and constructed in accordance with recognized National or International standards recognized to the **TL**.

……..

Flexible hose assemblies constructed of non-metallic materials intended for installation in piping systems for flammable media and sea water systems where failure May result in flooding are to be of a fire-resistant type except in cases where such hoses are installed on open decks, as defined in Regulation 9.2.3.3.2.2(10) of SOLAS Chapter II-2 as amended by IMO resolutions up to MSC.421(98) and not used for fuel oil lines. The installation of a shut-off valve immediately upstream of a sea water hose does not satisfy the requirements for fire-resistant type hose. Fire resistance is to be demonstrated by testing to ISO ISO 15540~~:2016~~ and ISO 15541~~:2016~~.

……..

10.4.5 The following standards are accepted by **TL** to be applied for type tests of the expansion joints:

- ISO 6802~~:2018~~ (Rubber and plastics hoses and hose assemblies – Hydraulic impulse test with flexing)
- ISO 6803~~:2017~~ (Rubber or plastics hoses and hose assemblies – Hydraulic-pressure impulse test without flexing)
- ISO 15540~~:2016~~ (Ships and marine technology – Fire resistance of hose assemblies – Test methods)
- ISO 15541~~:2016~~ (Ships and marine technology – Fire resistance of hose assemblies – Requirements for test bench)
- ISO 10380~~:2012~~ (Pipe work – Corrugated metal hoses and hose assemblies.)

Other standards May be accepted where agreed.

Note:

Prototype tests are to be carried out for each size of hose assembly. However, for ranges with more than 3 different diameters, the prototype tests are to be carried out for at least:

• the smallest diameter,

• the largest diameter,

• Intermediate diameters selected based on the principle that prototype tests carried out for a hose assembly with a diameter D are considered valid only for the diameters ranging between 0.5 D and 2 D.

For fire resistance tests the specimens shall be selected in accordance with ISO 15540~~:2016~~.

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items B.2.6.5.2, B.2.6.8, item 33 in Table 16.2, Abbreviations L1W & L2W in Table 16.2, Footnote 8, 10 and 13 in Table 16.2, item B.2.6.22 and item B.2.6.29 were revised according to UR P4 Rev.7 as below:

2.6.5.2 External pressure

(for any installation which May be subject to vacuum conditions inside the pipe or a head of liquid acting on the outside of the pipe; and for any pipe installation required to remain operational in case of flooding damage, as per ~~Regulation of~~ SOLAS ~~Chapter~~ II-1/8-1, ~~as amended by IMO resolutions up to MSC.436(99)~~, or for any pipes that would allow progressive flooding to other compartments through damaged piping or through open ended pipes in the compartments).

……..

2.6.8 Fire endurance

2.6.8.1 Pipes and their associated joints and fittings whose integrity is essential to the safety of ships, including plastic piping required by ~~Regulation 21.4 of~~ SOLAS ~~Chapter~~ II-2/21.4 ~~as amended by IMO Resolutions up to MSC.421(98) (hereinafter the same)~~ to remain operational after a fire casualty, are required to meet the minimum fire endurance requirements of Appendix 1 or 2, as applicable, of IMO Resolution A.753(18), as amended by IMO Resolutions MSC. 313(88) and MSC. 399(95).

2.6.8.2 Unless instructed otherwise by the Flag Administration, fire endurance tests are to be carried out with specimen representative for pipes, joints and fittings **(*)**:

2.6.8.2.1 Pipes:

- for sizes with outer diameter <200 mm the minimum outer diameter and wall thickness **(**)**
- for sizes with outer diameter ≥ 200 mm one test specimen for each category of t/d (D = outer diameter, t = structural wall thickness). A scattering of ±10% for t/D is regarded as the same group. Minimum size approved is equal to the diameter of specimen successfully tested.

2.6.8.2.1 Joints:

- Each type of joint applicable for applied fire endurance level tested on pipe-to-pipe specimen

Footnotes:

(*) *A test specimen incorporating several components of a piping system may be tested in a single test.*

(**) *Test conditions are most demanding for minimum wall thickness and thus larger wall thickness is covered. A key factor determining the fire performance of a pipe component variant is the thickness-to-diameter (t/D) ratio and whether it is larger or smaller than that of the variant which has been fire-tested.*

If fire-protective coatings or layers are included in the variant used in the fire test, only variants with the same or greater thickness of protection, regardless of the (t/D) ratio, shall be qualified by the fire test.

2.6.8.3 Means are to be provided to ensure a constant media pressure inside the test specimen during the fire test as specified in Appendix 1 or 2 of the IMO Res.A.753(18), as amended by IMO Resolutions MSC.313(88) and MSC.399(95). During the test it is not permitted to replace media drained by fresh water or nitrogen.

2.6.8.2~~4~~ Depending on the capability of a piping system to maintain its strength and integrity, there exist three different levels of fire endurance for piping systems.

2.6.8.~~2.1~~4.1 Level 1. Piping having passed the fire endurance test specified in Appendix 1 of IMO Resolution A.753(18), as amended by IMO Resolutions MSC. 313(88) and MSC. 399(95) for a duration of a minimum of one hour without loss of integrity in the dry condition is considered to meet level 1 fire endurance standard (L1).

Level 1W – Piping systems similarto Level 1 systems except these systems do not carry flammable fluid or any gas and a maximum 5% flow loss in the system after exposure is acceptable (L1W).

2.6.8.~~2.2~~4.2 Level 2. Piping having passed the fire endurance test specified in Appendix 1 of IMO Resolution A.753(18), as amended by IMO Resolutions MSC. 313(88) and MSC. 399(95) for a duration of a minimum of 30 minutes in the dry condition is considered to meet level 2 fire endurance standard (L2).

Level 2W – Piping systems similar to Level 2 systems except a maximum 5% flow loss in the system after exposure is acceptable (L2W).

2.6.8.~~2.3~~4.3 Level 3. Piping having passed the fire endurance test specified in Appendix 2 of IMO Resolution A.753 (18) as amended by IMO Resolutions MSC.313(88) and MSC.399(95) for a duration of a minimum of 30 minutes in the wet condition is considered to meet level 3 fire endurance standard (L3).

2.6.8.3~~5~~ Permitted use of piping depending on fire endurance, location and piping system is given in Table 16.2 “Fire Endurance Requirement Matrix”.

2.6.8.4~~6~~ For Safe Return to Port purposes (~~Regulation. 21.4 of~~ SOLAS ~~Chapter~~ II-2/21.4), plastic piping can be considered to remain operational after a fire casualty if the plastic pipes and fittings have been tested to L1 standard.

……

33	Exhaust gas cleaning system effluent line	L3(1)	L3(1)	NA	NA	NA	NA	NA	NA	~~NA~~0	L3 (1,11) NA	~~NA~~0
34	Urea transfer/supply system (SCR installations)	L1(12)	L1(12)	NA	NA	NA	NA	NA	NA	0	L3 (11) NA	0

Table 16.2 Fire endurance requirement matrix for different piping systems (continued)

Abbreviations

L1 Fire endurance test (appendix 1) of IMO Resolution A.753(18), as amended by IMO Resolutions MSC. 313(88) and MSC. 399(95)) in dry conditions, 60 min.

L1W Fire endurance test (item B.2.6.8.~~2~~4)

L2 Fire endurance test (appendix 1) of IMO Resolution A.753(18), as amended by IMO Resolutions MSC. 313(88) and MSC. 399(95)) in dry conditions, 30 min.

L2W Fire endurance test (item B.2.6.8.~~2~~4))

L3 Fire endurance test (appendix 2) of IMO Resolution A.753(18), as amended by IMO Resolutions MSC. 313(88) and MSC. 399(95)) in wet conditions, 30 min.

0 No fire endurance test required.

NA Not applicable

X Metallic materials having a melting point greater than 925 °C.

Location

A Machinery spaces of Category A

B Other machinery spaces and pump rooms

C Cargo pump rooms

D Ro-ro cargo holds

E Other dry cargo holds

F Cargo tanks

G Fuel oil tanks

H Ballast water tanks

I Cofferdams void spaces pipe tunnel and ducts

J Accommodation service and control spaces

K Open decks

For location definitions see TL-R P4.

Footnotes:

(1) *Where non-metallic piping is used, remotely controlled valves to be provided at ship's side. These valves are to be controlled from outside the space.*

(2) *Remote closing valves to be provided at the cargo tanks.*

(3) *When cargo tanks contain flammable liquids with a flash point >60ºC. "O" May replace "NA" or "X".*

(4) *For drains serving only the space concerned, "O" May replace" L1W".*

(5) *When controlling functions are not required by statutory requirements or guidelines, "O" May replace "L1".*

(6) *For pipe between machinery space and deck water seal, "O" May replace "L1".*

(7) *For passenger vessels, "X" is to replace "L1".*

(8) *Scuppers serving open decks in positions 1 and 2, as defined in Regulation 13 of Protocol of 1988 relating to the International Convention on Load Lines, 1966, ~~as amended by IMO Resolutions up to MSC.375(93)~~, should be "X" throughout unless fitted at the upper end with the means of closing capable of being operated from a position above the freeboard deck in order to prevent downflooding.*

(9) *For essential services, such as fuel oil tank heating and ship's whistle, "X" is to replace "O".*

(10) *For tankers where compliance with paragraph 3.6 of regulation 19 of MARPOL Annex I~~, as amended, by IMO Resolutions up to MEPC.314(74)~~ is required, "NA" is to replace "0".*

(11) *L3 in service spaces, NA in accommodation and control spaces*.

(12) *Type Approved plastic piping without fire endurance test (0) is acceptable downstream of the tank valve, provided this valve is metal seated and arranged as fail-to-closed or with quick closing from a safe position outside the space in the event of fire.*

(13) *For Passenger Ships subject to ~~Regulation. 21.4 of~~ SOLAS ~~Chapter~~ II-2/21.4 (Safe return to Port), plastic pipes for services required to remain operative in the part of the ship not affected by the casualty thresholds, such as systems intended to support safe areas, are to be considered essential services. In accordance with MSC.1/Circ.1369, interpretation 12, for Safe Return to Port purposes, plastic piping can be considered to remain operational after a fire casualty if the plastic pipes and fittings have been tested to L1 standard.*

……

2.6.22 Penetrations of fire divisions

Where plastic pipes pass through "A" or "B" class divisions ~~are penetrated for the passage of plastic pipes~~, arrangements are to be made to ensure that the fire ~~resistance~~ endurance is not impaired. These arrangements are to be tested in accordance with Recommendations for fire test procedures for "A" "B" and "F" bulkheads specified in Part 3 of Annex 1 to the 2010 FTP Code ~~(Resolution MSC.307(88) as amended by Resolution MSC.437(99))~~.

……

2.6.29 Testing after installation on board

2.6.29.1 Plastic piping systems for essential services are to be subjected to a test pressure not less than 1.5 times the design pressure ~~of the system~~ or 4 bar whichever is greater. ~~The test pressure shall not be less than 4 bar.~~ Notwithstanding the requirement above, the requirement in 2.6.29.2 may be applied to open ended pipes (drains, effluent, etc.).

2.6.29.2 Piping systems for non-essential services are to be checked for leakage under operational conditions.

2.6.29.3 For piping required to be electrically conductive, ~~the resistance to earth~~ earthing is to be checked, and random resistance testing is to be conducted. Earthing wires should be accessible for inspection.

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item G.11.2.2 was revised according to Rec 151 Rev.1 as below:

11.2.2 Heavy fuel oil cleaning for diesel engines

For cleaning of heavy fuels, purifiers or purifiers combined with automatic filters are to be provided.

For recommendation for fuel oil treatment systems refer to Guideline TL-G 151.

07. Section 18 – Fire Protection and Fire Fighting Equipment

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Footnote (11) was revised according to UI SC245 Rev.1 as below:

(11) *Reference is made to TL- I SC 245 ~~Corr.1~~.*

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Footnote (15) was revised according to UI SC30 Rev.3 as below:

(15) *See MSC/Circ. 1120, as amended "Regulation 10.5: Number of Systems, Appliances, and Extinguishers Required in Machinery Spaces" and ~~or~~ TL- I SC30 for unified interpretation ~~only for information~~.*

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Footnote (21) (item J.3) was revised according to MSC.1/Circ.1315/Rev.1 as below:

(21) *Refer to IMO MSC.1/Circ.1315/Rev.1, "Revised Guidelines for the Approval of Fixed Dry Chemical Powder Fire-Extinguishing Systems for the Protection of Ships carrying Liquefied Gases in Bulk".*

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Table 18.5 was revised according to MSC.1/Circ.1275 & MSC.1/Circ.1275/Corr.1 as below:

Table 18.5 Minimum numbers and distribution of portable fire extinguishers in the various types of spaces

……

Other spaces	Workshops forming part of machinery spaces	1	B or C
	Other machinery spaces (auxiliary spaces, electrical equipment spaces, auto-telephone exchange rooms, air conditioning spaces, BWMR containing UV-type BWMS and other similar spaces)	1 **(7)**	B or C
	Weater deck	0 **(4)**	B
	Ro-ro spaces and vehicle spaces	~~No point of space is more than 20 m walking distance from an extinguisher at each deck level~~ Spaced not more than 20 m apart on both sides of the space at each deck level in each hold or compartment where vehicles are carried **(4) (5)**	B
	Cargo spaces	0 **(4)**	B
	Cargo pump-room and gas compressor room	2	B or C
	Helidecks	In accordance with Section 18, O.1	B

PART B – CHAPTER 5 ELECTRICAL INSTALLATION

01. Section 1 – General Requirements and Instructions

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items K.3.9, K.4.2, 4.2.1 and 4.2.3 were revised as below:

3.9 Explosion protection on tankers

Regarding hazardous areas and approved electrical equipment on tankers see:

- IEC 60092-502~~:1999~~

……

4.2 All electrical and electronic appliances installed on the bridge and vicinity of the bridge other than mandatory navigation and communication equipment having been type tested according to IEC 60945~~:2002~~, as well as loose equipment placed on board by the builders or owners shall have been EMC tested for Conducted and Radiated Emission.

……..

4.2.1 The following are acceptable for the bridge and deck zone test standards:

- IEC 60945~~:2002~~
- IEC 60533~~:2015~~

Equipment need be tested for Conducted and Radiated Emission only.

Note:

Equipment having been type tested for EMC in accordance with other appropriate standards will have to be considered. In particular the level of radiated emission in the frequency band from 156 to 165 MHz and the location of the equipment shall be evaluated.

IEC standard 60533~~:2015~~ gives guidance to type of equipment and applicable tests.

……..

4.2.3 Evidence to be provided

All electrical and electronic appliances installed on the bridge and vicinity of the bridge other than mandatory navigation and communication equipment having been type tested according to IEC 60945~~:2002~~, as well as loose equipment placed on board by the builders or owners shall be listed and be provided with at least the following information. The list and the evidence of equipment are to be kept onboard.

02. Section 3 – Power Supply Installations

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Note (1) in item B.4.2 and item B.4.2.2 were revised as below:

4.2 Generators which are driven by the main propulsion plant but which fail to conform to the conditions stated in 4.1 are not considered to constitute part of the main electrical power **(1)** supply, although they may be used as additional generators and on occasion maintain the entire power supply function provided the following conditions are met:

(1) *Such generator systems are those whose operation does not meet the requirements of IEC 60092-201~~:2019~~, paragraph 8.1.1.*

……..

4.2.2 There are sufficient and adequately rated additional generators fitted, which constitute the main source of electrical power required by SOLAS, meeting the requirements of IEC 60092-201~~:2019~~ paragraph 8.1.1**.**

4.2.2 There are sufficient and adequately rated additional generators fitted, which constitute the main source of electrical power required by SOLAS, meeting the requirements of IEC 60092-201~~:2019~~ paragraph 8.1.1**.**

03. Section 7 – Power Equipment

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items A.6.10 and A.6.11 were revised according to UR E25 Rev.2 as below:

6.10 Failure detection (1)

6.10.1 The most probable failures that May cause reduced or erroneous system performance shall be automatically detected and at least the following failure scenarios shall be considered:

(a) Power supply failure
(b) Earth fault on AC and DC circuits
(c) Loop failures in closed loop systems, both command and feedback loops (normally short circuit, broken connections and earth faults)
(d) Data communication errors
(e) Programmable system failures (Hardware and software failures)
~~**(f)** Hydraulic locking~~
~~**(g)**~~ **(f)** Deviation between rudder order and feedback*
……..

6.11 System response upon failure (1)

6.11.1 The failures (as defined but not limited to those in 6.10.1) likely to cause uncontrolled movements of rudder are detected, the rudder is to stop in the current position without manual intervention or, subject to the discretion of **TL**, is to return to the midship/neutral position. For mechanical failures such as sticking valves and failure of static components (pipes, cylinders), the system response without manual intervention is not mandatory, and the operator can follow instructions on the signboard in case of such failures, in accordance with TL-R M42.13.

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items A.4.1 was revised as below:

4. Switchgear

4.1 Each steering gear motor shall have its own separate switchgear. Combined contactor cabinets are not permitted.

Each steering gear motor starter except from driven by frequency converter shall have an ammeter mounted in the main or emergency switchboard, as applicable, or in the contactor cabinets.

04. Section 8 – High-Voltage Installations

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items B.4.1, D.2.1.1, D.4.3, D.5.1.2 and D.6.1.1 were revised as below:

4. Degrees of Protection

4.1 Each part of the electrical installation is to be provided with a degree of protection appropriate to the location, as a minimum the requirements of IEC 60092-201~~:2019~~ and Table 8.3 are to be complied with, in addition to the provisions of Section 1, Table 1.10.

……..

2.1.1 Switchgear is to be of metal - enclosed type in accordance with IEC 62271-200:2011 or of the insulation - enclosed type in accordance with the IEC 62271-201~~:2014~~.

……..

4.3 Tests

In addition to the tests normally required for rotating machinery, a high frequency high voltage test in accordance with IEC 60034-15~~:2009~~ is to be carried out on the individual coils in order to demonstrate a satisfactory withstand level of the inter-turn insulation to steep fronted switching surges.

……..

5.1.2 Dry-type transformers should be used by preference. They have to comply with IEC 60076-11 ~~:2018~~. Exceptions shall be agreed with **TL.**

……..

6. Cables

6.1 General

6.1.1 High-voltage cables shall conform to IEC 60092-354~~:2020~~ or 60092-353~~:2016~~ or other equivalent standard.

05. Section 12 - Cable Network

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items D.14.1, D.15.1.1.1 and D.15.1.1.2 (c) were revised as below:

14.1 Method 1;

Cables which have been tested in accordance with IEC 60332-3-22~~:2018~~ Category A or a test procedure for cables installed in bunches equivalent thereto.

……..

15.1.1.1 Cables being of a fire resistant type complying with IEC 60331-1~~:2018~~ for cables of greater than 20 mm overall diameter, otherwise IEC 60331-21:1999+AMD1:2009 or IEC 60331-2~~:2018~~ for cables with an overall diameter not exceeding 20 mm, are installed and run continuous to keep the fire integrity within the high fire risk area, see Fig.12.5.

……..

c) *For special cables, requirement in the following standards may be used:*
IEC 60331-23~~:1999~~: Procedures and requirements-

Electric data cables

IEC 60331-25~~:1999~~: Procedures and requirements-

Optical fibre cables

06. Section 16 - Additional Rules for Ships for the Carriage of Motor Vehicles

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items H.1.1 and H.2.1 were revised as below:

H. Permissible Electrical Equipment

1. Inside of the Protection Area (Zone 1)

1.1 Electrical equipment shall be of a certified safe type with Explosion Group IIA and Temperature Class T3 as defined in IEC 60079-10-1:2015. Refer to IEC 60079-14~~:2013~~ for types of protection suitable for use in Zone 1 areas.

……..

2. Above the Protection Area (Zone 2)

2.1 Equipment in accordance with Section 1, K. 3.4.2 is permitted; the surface temperature shall not exceed 200 °C. Electrical equipment shall have an enclosure of at least IP55, or apparatus suitable for use in Zone 2 areas as defined in IEC 60079-10-1:2015. Refer to IEC 60079-14~~:2013~~ for types of protection suitable for use in Zone 2 areas.

07. Section 17 - Additional Rules for Ships for the Carriage of Dangerous Goods

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items B.6 and D.1.3 were revised as below:

6. IEC publication 60092-506~~:2003~~

……..

1.3 For pipes having open ends (e.g., ventilation and bilge pipes, etc.) in a hazardous area, the pipe itself is to be classified as hazardous area. See IEC 60092-506~~:2003~~ table B1, item B.

08. Section 18 - Additional Rules for Bulk Carriers and Single Hold Cargo Ships Other Than Bulk Carriers

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item B.5.1 was revised as below:

5. Tests

5.1 Type test

5.1.1 Water level detector systems should be type tested to demonstrate their robustness and suitability under the appropriate internationally recognized conditions. Refer to IEC 60092-504~~:2016~~ and IEC 60529 for testing. TL-R E 10 may be used as an equivalent test standard to IEC 60092-504~~:2016~~.

09. Section 20 - Electrical Equipment

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items D.4.2.1, D.4.3.2 and F.1.4 were revised as below:

4.2 Design and construction

4.2.1 UPS units are to be constructed in accordance with IEC 62040-1:2017, IEC 62040-2~~:2016~~, IEC 62040-3:2011, IEC 62040-4~~:2013~~ and/or IEC 62040-5 3~~:2016~~, as applicable, or an acceptable and relevant national or international standard. Battery ventilation shall be designed in accordance with Section 2,C.

……..

4.3.2 UPS units utilising valve regulated sealed batteries may be located in compartments with normal electrical equipment, provided the ventilation arrangements are in accordance with the requirements of IEC 62040-1:2017, IEC 62040-2~~:2016,~~ IEC 62040-3:2011, IEC 62040-4~~:2013~~ and/or IEC 62040-5-3~~:2016~~, as applicable, or an acceptable and relevant national or international standard.

……..

1.4 Cables manufactured in accordance with the relevant recommendations of IEC 60092-350~~:2020~~, 60092-352~~:2005~~, 60092-353~~:2016~~, 60092-354~~:2020~~, 60092-360:2014 (*), 60092-370~~:2019~~, 60092-376~~:2017~~ will be accepted by **TL** provided that they are tested to its satisfaction.

PART C – CHAPTER 8 – CHEMICAL TANKERS

01. Section 3 – Ship Arrangements

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item 3.2.3 was revised according to UI SC120 Rev.2 Corr.1 as below:

……..

Access facing the cargo area or in prohibited zones should be restricted to stores for cargo-related and safety equipment, cargo control stations and emergency showers.

Access to forecastle spaces containing sources of ignition may be permitted through doors facing cargo area provided the doors are located outside hazardous areas as defined in IEC Publication 60092-502.

On all chemical tankers, regardless of the type of products to be carried, where a deckhouse is substituted for a superstructure and liquid products could flow along the sides of the house, the house front is to be continued to the sides of the ship in the form of a sill, or a permanent spillage barrier is to be arranged as described in Regulation II-2/56.6 of SOLAS 74(83).

PART C – CHAPTER 10 - LIQUEFIED GAS CARRIERS

01. Section 11 – Fire Protection and Extinction

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Footnote (5) (item 11.4.1) was revised according to MSC.1/Circ.1315/Rev.1 as below:

(5) *R Refer to the Revised Guidelines for the approval of fixed dry chemical powder fire-extinguishing systems for the protection of ships carrying liquefied gases in bulk (MSC.1/Circ.1315/Rev.1).*

PART C – CHAPTER 14 - FISHING VESSELS

01. Section 2 – Closure Conditions, Buoyancy and Stability

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item B.2.1.3 was revised as below:

2.1.3 Fishing vessels with L ≥ 45 m

Doors shall be of the sliding type in:

- Spaces where it is intended to open them at sea and if located with their sills below the deepest operating waterline, unless ~~TL~~ the Administration considers it to be impracticable or unnecessary taking into account the type and operation of the fishing vessel

PART C – CHAPTER 28 - VENTILATION

01. Section 01 - Ventilation

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item D.2.2 was added as below:

2.2.2 Application

These Rules apply to all ship types of seagoing service of length 80 m or more, where the height of the exposed deck, within the forward 0.25 L, in way of the item is less than 0.1 L or 22 m above the summer load waterline, whichever is the lesser.

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item D.5.1.3 was added as below:

5.1.3 They may only be used at the end of the ventilation device.

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item D.5.7.5 was revised as below:

5.7.5 Ducts with a free cross-sectional area exceeding 0.075 m^2 shall be fitted with fire dampers in addition to the requirements of 5.7.4. The fire damper shall operate automatically, but shall also be capable of being closed manually from both sides of the bulkhead or deck. The damper shall be provided with an indicator which shows whether the damper is open or closed. Fire dampers are not required, however, where ducts pass through spaces surrounded by "A" class divisions, without serving those spaces, provided those ducts have the same fire integrity as the dixisions which they pierce.

Revision Date: May 2023

Entry into Force Date: 01 July 2023

Item E.9.3 was revised as below:

9.3 Ventilated spaces with battery charging power up to 2 kW Batteries may be installed in ventilated cabinets and containers arranged in ventilated spaces (excepted rooms mentioned in the Chapter 5 – Electric Rules, Section 2, C.1.~~1~~2)

PART C – CHAPTER 34 - Tentative Rules for the Classification of Special Crafts - Patrol Boat

01. Section 08 – Patrol Boat

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item 7.2.2.1 was revised according to MSC.1/Circ.1275 & MSC.1/Circ.1275/Corr.1 as below:

7.2.2.1 The number and type of extinguishers shall be according to ~~MSC/Circ 1275~~ MSC.1/Circ.1275 with MSC.1/Circ.1275/Corr.1. In any case, for each deck and main engine room at least 1 (one) extinguisher shall be provided.

PART E – CHAPTER 101 – NAVAL SHIP TECHNOLOGY, CLASSIFICATION AND SURVEYS

01. Section 2 – Class Designation

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item B.2.2 was revised as below:

2.2 Machinery

…….

M U The machinery of the submarine including electrical installations complies with requirements of the Rules of **TL**, or other rules considered being equivalent.

[M U] The machinery of the submarine including electrical installations does not fully comply with the requirements of the Rules of **TL**, but functional safety and sea worthness are ensured for the envisaged service.

PART E – CHAPTER 102 – NAVAL SHIP TECHNOLOGY, HULL STRUCTURES AND SHIP EQUIPMENT

01. Section 6 – Longitudinal Strength

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Table 6.4 was revised according to Rec.34 Rev.2 as below:

Table 6.4 ~~Wave scatter diagram~~ Probability of sea-states in the North Atlantic described as occurrence per 100,000 observations

	Mean wave period T_{0m1} [s]							
Significant wave height Hs[m]	**4,5**	**5,5**	**6,5**	**7,5**	**8,5**	**9,5**	**10,5**	**11,5**
0,5	6,82	202	333,61	187,76	45,59	4,74	0,21	0
1,5	0,33	2028,35	12750,82	11693,39	7215,76	3006,8	846,07	160,77
2,5	0	3,38	2805,81	8517,74	7835,85	5885,37	3608,3	1805,81
3,5	0	0	23,06	2742,51	4666,81	4100,83	2936,41	1713,38
4,5	0	0	0	82,06	1759,81	2069,19	1715,42	1151,29
5,5	0	0	0	0,08	149,74	811,81	791,81	609,66
6,5	0	0	0	0	1,02	147,59	305,37	271,71
7,5	0	0	0	0	0	4,77	88,62	107,2
8,5	0	0	0	0	0	0,02	9,4	38,7
9,5	0	0	0	0	0	0	0,2	9,34

10,5	0	0	0	0	0	0	0	0,81
11,5	0	0	0	0	0	0	0	0,02
12,5	0	0	0	0	0	0	0	0
13,5	0	0	0	0	0	0	0	0
14,5	0	0	0	0	0	0	0	0
15,5	0	0	0	0	0	0	0	0
16,5	0	0	0	0	0	0	0	0
17,5	0	0	0	0	0	0	0	0
18,5	0	0	0	0	0	0	0	0
Sum	7,15	2233,73	15913,3	23223,54	21674,58	16031,12	10301,81	5868,69

Mean wave period T_{0m1} [s]									**Sum**
Significant wave height Hs[m]	**12,5**	**13,5**	**14,5**	**15,5**	**16,5**	**17,5**	**18,5**	**19,5**	
0,5	0	0	0	0	0	0	0	0	780,73
1,5	20,63	1,79	0,1	0	0	0	0	0	37724,81
2,5	737,71	246	66,96	14,88	2,7	0,4	0,05	0	31530,96
3,5	814,68	315,65	99,66	25,64	5,38	0,92	0,13	0,01	17445,07
4,5	625,51	275,12	97,96	28,24	6,59	1,24	0,19	0,02	7812,64
5,5	375,67	185,26	73,12	23,09	5,84	1,18	0,19	0,02	3027,47
6,5	190,23	104,79	45,42	15,49	4,16	0,88	0,15	0,02	1086,83
7,5	86,26	53,35	25,36	9,27	2,6	0,56	0,09	0,01	378,09
8,5	36,8	25,95	13,63	5,33	1,55	0,34	0,05	0,01	131,78
9,5	15,15	12,51	7,39	3,12	0,94	0,2	0,03	0	48,88
10,5	5,73	5,96	4,08	1,9	0,6	0,13	0,02	0	19,23
11,5	1,29	2,68	2,23	1,18	0,4	0,08	0,01	0	7,89
12,5	0,11	1,01	1,14	0,72	0,27	0,06	0,01	0	3,32
13,5	0	0,22	0,51	0,42	0,18	0,04	0	0	1,37
14,5	0	0,02	0,19	0,21	0,12	0,03	0	0	0,57
15,5	0	0	0,04	0,09	0,07	0,02	0	0	0,22
16,5	0	0	0	0,03	0,04	0,01	0	0	0,08
17,5	0	0	0	0,01	0,02	0,01	0	0	0,04
18,5	0	0	0	0	0,01	0,01	0	0	0,02
Sum	2909,77	1230,31	437,79	129,62	31,47	6,11	0,92	0,09	100000

The H_s and T_{0m1} values are class midpoints. $T_{0m1}=2\pi\frac{m-1}{m0}$ where m_n is the spectral moment of order n.

02. Section 12 – Rudder and Manoeuvring Arrangement

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item G was revised as below:

G. Design Yield Moment of Rudder Stock

The design yield moment of the rudder stock is to be determined by the following formula:

~~$Q_F = 26{,}64 \cdot 10^6 \frac{D_t^3}{k_r}$~~ $Q_F = 0.02664 \frac{D_t^3}{k_r}$ [Nm]

D_t = stock diameter [mm] according to C.1.

k_r = see A.5.2.

PART E – CHAPTER 104 - NAVAL SHIP TECHNOLOGY, PROPULSION PLANTS

01. Section 4B – Thermal Turbomachinery/Exhaust Gas Turbochargers

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item B.1 and C.2.1 were revised according to UR M73 Rev.1 as below:

B. Design and Installation

1. General

Turbochargers are to be designed to operate at least under the ambient conditions given in TL-R M46 and TL-R M28~~Section 1, D~~. The component lifetime and the alarm level for speed shall be based on 45°C air inlet temperature.

.....

C. Tests

1. Material Tests

.....

2. Containment Test

2.1 The turbocharger has to fulfil containment requirements in case of rotor burst. This requires that at rotor burst no part May penetrate the casing of the turbocharger or escape through the air intake. For documentation purposes (test/calculation), it shall be assumed that the discs disintegrate in the worst possible way.

For category B and C, containment shall be documented by testing. Fulfilment of this requirement can be awarded to a generic range** of turbochargers based on testing of one specific unit. Testing of a large unit is preferred as this is considered conservative for all smaller units in the generic range. In any case, it must be documented (e.g. by calculation) that the selected test unit really is representative for the whole generic range.

The following requirements are applicable for an approval of the type of turbochargers.

***A generic range means a series of turbocharger which are of the same design, but scaled to each other.*

PART E – CHAPTER 105 - NAVAL SHIP TECHNOLOGY, ELECTRICAL INSTALLATIONS

01. Section 6 – Power Electronics

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item G.1.1 was revised as below:

G. Tests

1. General Requirements

1.1 Power electronics assemblies shall be individually tested at the maker's works. A Works Test Report shall be rendered on the tests carried out. Essential equipment from ~~50~~ 100 kW/kVA upwards shall be tested in the presence of a TL Surveyor.

02. Section 07 – Power Equipment

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item A.2.3 was added and numbers of the following items were revised as below:

2. Power supply

2.1 The power supply to the steering gears shall be routed on separate cable trays which lie as far apart as possible.

2.2 A separate power supply circuit leading directly from each power station switchboard via the supply change-over switches or feeding from the main groups shall be provided for each steering gear power unit.

2.3 If there is only one power station, the second incoming feeder shall be taken from the emergency power supply.

2.3~~4~~ Mechanically separated switches shall be provided as incoming circuit breakers.

2.4~~5~~ After an electrical power failure, the steering gear power units must restart automatically when the power is restored.

2.5~~6~~ The power supply to the steering gear shall also comply with the provisions set out in Section 4, H.

2.6~~7~~ The systems shall be so designed that it is possible to put each power unit optionally into individual or combined operation from the bridge or the steering gear compartment. Mechanically separated switches shall be provided for this purpose.

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items A.4.1 was revised as below:

4. Switchgear

4.1 Each steering gear motor shall have its own separate switchgear. Combined contactor cabinets are not permitted.

Each steering gear motor starter except from driven by frequency converter shall have an ammeter mounted in the main or emergency switchboard, as applicable, or in the contactor cabinets.

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item D.6.3.1 was revised as below:

6.3 Auxiliary engines

6.3.1 Main generator sets

If several auxiliary engines are started electrically, at least two mutually independent batteries shall be provided. The use of the main engine starter batteries, ~~if there are any, is permitted~~ are not permitted.

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items A.6.10 and A.6.11 were revised according to UR E25 Rev.2 as below:

6.10 Failure detection (1)

6.10.1 The most probable failures that May cause reduced or erroneous system performance shall be automatically detected and at least the following failure scenarios shall be considered:

(a) Power supply failure
(b) Earth fault on AC and DC circuits
(c) Loop failures in closed loop systems, both command and feedback loops (normally short circuit, broken connections and earth faults)
(d) Data communication errors
(e) Programmable system failures (Hardware and software failures)
~~**(f)** Hydraulic locking~~
~~**(g)**~~ **(f)** Deviation between rudder order and feedback*
……..

6.11 System response upon failure (1)

6.11.1 The failures (as defined but not limited to those in 6.10.1) likely to cause uncontrolled movements of rudder are detected, the rudder is to stop in the current position without manual intervention or, subject to the discretion of **TL**, is to return to the midship/neutral position. For mechanical failures such as sticking valves and failure of static components (pipes, cylinders), the system response without manual intervention is not mandatory, and the operator can follow instructions on the signboard in case of such failures, in accordance with TL-R M42.13.

03. Section 17 – Tests

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Items C.2.1 and C.2.2 were revised as below:

2. Machines, Appliances and Installations Subject to Testing

2.1 For scope of tests of electrical machines, see Section 14, B.

The following machines, appliances and installations are subject to testing:

- Generators and motors for electric propulsion plants, see Section 13, J.
- Generators and motors for essential equipment, P ≥ ~~50~~ 100 kW/ kVA
- Transformers P ≥ 100 kVA
- Autotransformers P ≥ 100 kVA

2.2 Power electronics

For scope of tests, see Section 6, G.

- for electric propulsion plants, see Section 13, J.
- for essential equipment P ≥ ~~50~~ 100 kW/ kVA
- for battery charging P ≥ 2 kW

PART E – CHAPTER 107 - NAVAL SHIP TECHNOLOGY, SHIP OPERATION INSTALLATIONS AND AUXILIARY SYSTEMS

01. Section 6 – Starting Equipment and Air Compressors

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item A.3.2 was revised as below:

3.2 If two or more auxiliary engines are started electrically, at least two mutually independent batteries are to be provided. Where starter batteries for the main engine are fitted, the use of these batteries ~~is acceptable~~ are not permitted.

PART E – CHAPTER 111 – NAVAL SHIP TECHNOLOGY, SUBMARINES

01. Section 1 – Rules for Classification of Submarines

Revision Date: May 2023

Entry into Force Date: 1 July 2023

Item A.2.1 was revised as below:

2. Characters of Classification

2.1 The Character of Classification is:

- for the hull :

  +1 Np **SUBMARINE**

- for the machinery :

  +M~~C~~ U, [M U]

For definition of Class designations, see – Chapter 101 Classification and Surveys, Section 2.

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