

Notice No.1

Rules for the Manufacture, Testing and Certification of Materials July 2018

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: November 2018

Amendments to	Effective date	IACS/IMO implementation (if applicable)
Chapter 2, Section 1	Corrigendum	N/A
Chapter 3, Sections 1, 3 & 8	Corrigenda	N/A
Chapter 4, Section 2	Corrigenda	N/A
Chapter 5, Sections 2 & 4	Corrigenda	N/A
Chapter 6, Section 1	1 January 2019	N/A
Chapter 8, Section 1	Corrigenda	N/A
Chapter 9, Sections 1 & 3	Corrigenda	N/A
Chapter 9, Section 3	1 January 2019	N/A
Chapter 12, Sections 2, 3 & 5	Corrigenda	N/A
Chapter 13, Sections 1, 2 & 4	Corrigenda	N/A
Chapter 14, Section 2	1 January 2019	N/A
Chapter 15, Section 4	1 January 2019	N/A

Chapter 2

Testing Procedures for Metallic Materials

■ Section 1

General requirements for testing

1.4 Re-testing procedures

1.4.5 The additional tests detailed in *Ch 2, 1.4 Re-testing procedures 1.4.1* and *Ch 2, 1.4 Re-testing procedures 1.4.2* are, where possible, to be made on material adjacent to the original samples. For castings, where insufficient material remains in the original test samples, the additional test may be made on other test samples representative of the castings. See also *Ch 2, 1.3 Discarding of test specimens* for discarding of test specimens.

Chapter 3

Rolled Steel Plates, Strip, Sections and Bars

■ Section 1

General requirements

1.3 Corrosion resistant steels for cargo oil tanks of crude oil tankers

1.3.7 The weldability of corrosion resistant steels is similar to conventional normal and higher strength steels. Therefore the welding requirements specified in *Ch 11 Approval of Welding Consumables* to ~~*Ch 11 Approval of Welding Consumables*~~ *Ch 13 Requirements for Welded Construction* are to be adhered with the exception that each corrosion resistant steel is approved with a specified brand of welding consumable and associated welding process.

1.7 Dimensional tolerances

1.7.4 Class C of ISO 7452 may be applied in lieu of *Ch 3, 1.7 Dimensional tolerances 1.7.3*. Where this standard is applied, both the requirements in *Ch 3, 1.7 Dimensional tolerances 1.7.11* and the portion of the footnote of Table B.2 in ISO ~~7542~~ *7452*, that reads; 'Also a minus side of thickness of 0,3 mm is permitted', are not applicable. Additionally, if ISO 7452 is applied, the steel mill is to ensure that the number of measurements and measurement distribution is appropriate to establish that the plates produced are greater than or equal to the specified nominal thickness.

■ Section 3

Higher strength steels for ship and other structural applications

3.1 Scope

Table 3.3.1 Maximum thickness limits

Note 2. Minimum thickness for EH47 is 50 mm. Grade EH47 applies only to thickness greater than 50 mm. The crack arrest properties of EH47 are to be determined as described in Note 1. Where the K_{ca} ESSO test is used and where the thickness of the steel exceeds 80 mm, the required K_{ca} value for the brittle crack arrest steel plate is to be specifically agreed with LR.
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■ Section 8

Plates with specified through thickness properties

8.7 Certification of materials

8.7.2 Steel grade requirements are to comply with *Ch 3, 1 General requirements* to ~~*Ch 3, 1 General requirements*~~ *Ch 3, 7 Austenitic and duplex stainless steels*.

Chapter 4

Steel Castings

■ Section 2

Castings for ship and other structural applications

2.5 Non-destructive examination

2.5.2 The extent and methods of non-destructive examination to be applied to typical hull steel castings are shown in *Figure 4.2.1 Extent of non-destructive evaluation for stern frame castings* to *Figure 4.2.6 Extent of non-destructive evaluation for rudder (lower part) castings* in addition to the areas specified in *Ch 4, 1.7 Visual and non-destructive examination 1.7.9* and *Ch 4, 1.7 Visual and non-destructive examination 1.7.10*.

2.6 Acceptance levels for surface crack detection

2.6.3 The following quality levels recommended for magnetic particle testing (MT) and/or dye penetrant testing (PT) are;

- (b) Level MT2/PT2 – other locations indicated on *Figure 4.2.1 Extent of non-destructive evaluation for stern frame castings* to *Ch 4, 2.5 Non-destructive examination 2.5.2 Figure 4.2.6 Extent of non-destructive evaluation for rudder (lower part) castings*.

2.6.5 Level UT1 is applicable to the following:

- (d) Castings subject to cyclic bending stresses, e.g. rudder horn, rudder castings and rudder stocks, the outer one third of thickness in the zones shown in *Figure 4.2.1 Extent of non-destructive evaluation for stern frame castings* to *Ch 4, 2.5 Non-destructive examination 2.5.2 Figure 4.2.6 Extent of non-destructive evaluation for rudder (lower part) castings*.

2.6.6 Level UT2 is applicable to the following:

- (a) For locations which are not specified in *Ch 4, 2.6 Acceptance levels for surface crack detection 2.6.5*, nominated for ultrasonic testing in *Figure 4.2.1 Extent of non-destructive evaluation for stern frame castings* to *Ch 4, 2.5 Non-destructive examination 2.5.2 Figure 4.2.6 Extent of non-destructive evaluation for rudder (lower part) castings* or on the inspection plan .
- (c) Castings subject to cyclic bending stresses, at the central one third of thickness in the zones shown in *Figure 4.2.1 Extent of non-destructive evaluation for stern frame castings* to *Ch 4, 2.5 Non-destructive examination 2.5.2 Figure 4.2.6 Extent of non-destructive evaluation for rudder (lower part) castings*.

2.6.7 Ultrasonic acceptance criteria for casting areas not nominated in *Figure 4.2.1 Extent of non-destructive evaluation for stern frame castings* to *Ch 4, 2.5 Non-destructive examination 2.5.2 Figure 4.2.6 Extent of non-destructive evaluation for rudder (lower part) castings* will be subject to special consideration based on the anticipated stress levels and the type, size and position of the discontinuity.

Chapter 5 Steel Forgings

■ Section 2 Forgings for ship and other structural applications

2.4 Mechanical tests

2.4.6 For rudder stocks, pintles, and rudder coupling keys and bolts, the minimum specified yield strength is not to be less than 200 N/mm², see Table 13.2.1 Rudder material factor, *k* in Pt 3 Ship Structures (General) of the Rules and Regulations for the Classification of Ships, July 2018.

■ Section 4 Forgings for crankshafts

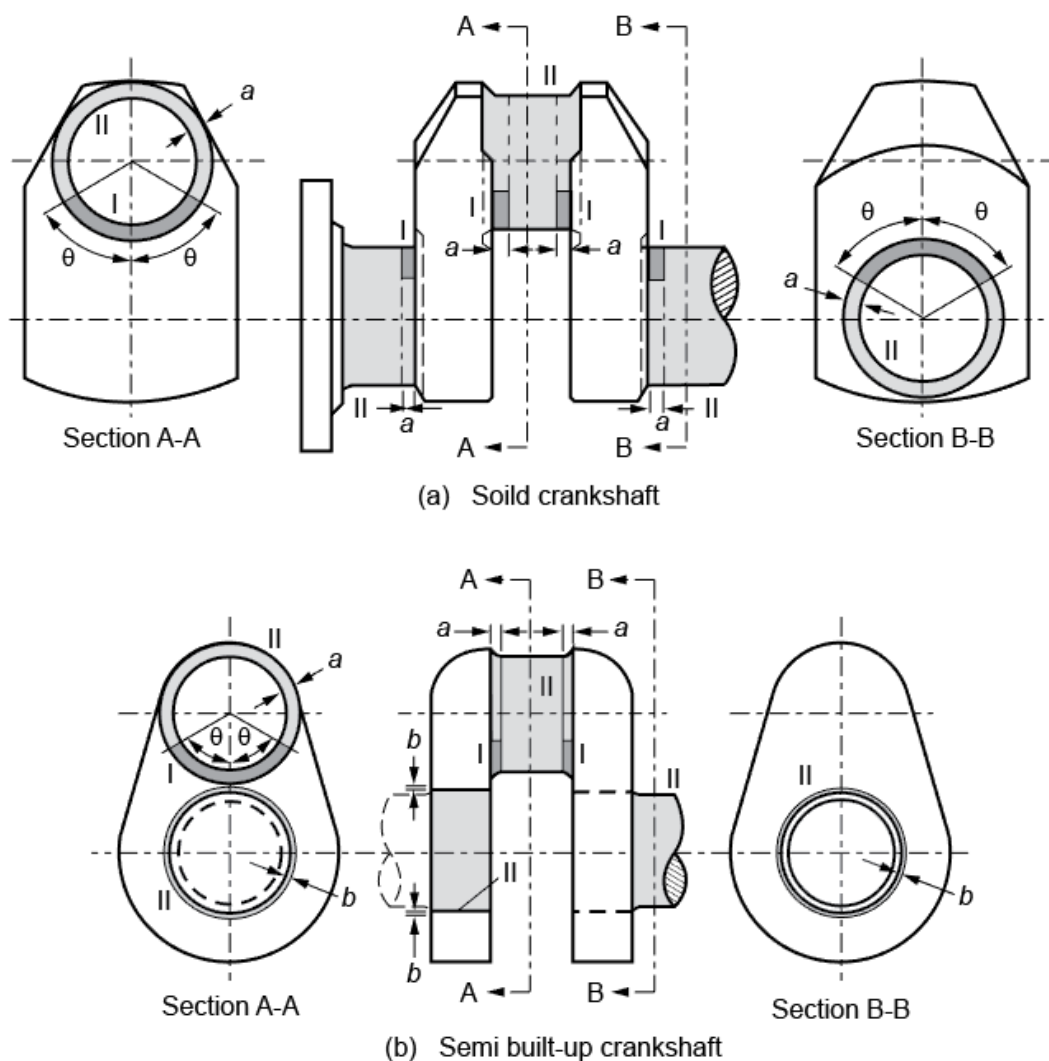
4.5 Mechanical tests

Table 5.4.3 Mechanical properties for acceptance purposes: alloy steel forgings for crankshafts – Quenched and tempered

Tensile strength N/mm ²	Yield stress N/mm ² minimum	Elongation on 5,65 $\sqrt{S_0}$ % minimum		Hardness Brinell
		Long.	Tang.	
900-1150 1100	690	13	9	260-320
950-1100 1150				

4.6 Non-destructive examination

4.6.1 Magnetic particle or dye penetrant testing as detailed in Ch 5, 1.8 Visual and non-destructive examination 1.8.5 and Ch 5, 2.5 Non-destructive examination is to be carried out on all forgings for crankshafts. Where applicable, this is to include all surfaces which have been flame-cut, but not subsequently machined during manufacture. Particular attention is to be given to the testing of the pins, journals and associated fillet radii of solid forged crankshafts and to the pins and fillet radii of combined web and pin forgings. The extent of testing is shown in Figure 5.4.3 Zones for magnetic particle/dye penetrant testing on crankshafts.



NOTES

1. Where the crankpin or journal has oil holes, the circumferential surfaces of the oil are to be treated as Zone I, (see the figure on the right)
2. In the above figures:

$$\theta = 60^\circ$$

$$a = 1,5r$$

$$b = 0,05d \text{ (circumferential surfaces of shrinkage fit)}$$

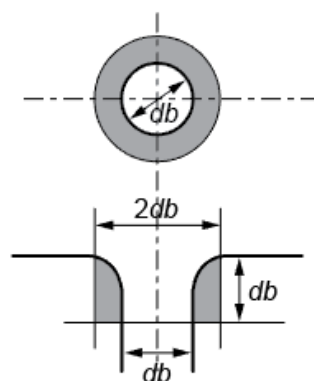
where

r : fillet radius

d : journal diameter

3. Identification of the Zones:

	: Zone I
	: Zone II
	: Zone III



db : Oil hole bore diameter

Figure 5.4.3 Zones for magnetic particle/dye penetrant testing on crankshafts

4.6.2 The manufacturer is to carry out an ultrasonic examination of all forgings as detailed in *Ch 5, 1.8 Visual and non-destructive examination 1.8.8* and *Ch 5, 2.5 Non-destructive examination*. The extent of ultrasonic testing is shown in *Figure 5.4.4 Zones for ultrasonic testing on crankshafts*.

4.6.3 Surface inspection acceptance criteria are to be in accordance with *Ch 5, 2.5 Non-destructive examination Ch 5, 1.8 Visual and non-destructive examination* and with *Table 5.4.4 Surface inspection acceptance for crankshaft forgings – Allowable number and size of indications in a reference area of 225 cm²*. Other acceptance criteria may be applied, providing they meet these minimum criteria, and is to the satisfaction of the Surveyor.

Chapter 6

Steel Pipes and Tubes

■ Section 1

General requirements

1.1 Scope

1.1.7 Pipes for Class III pressure systems are to be manufactured and tested in accordance with the requirements of an acceptable National specification. The manufacturer's test certificate will be acceptable and is to be provided for each consignment of material. Forge butt welded pipes are not acceptable for fuel oil systems, heating coils in oil tanks, primary refrigerant systems and other applications where the pressure exceeds 4,0 bar (0,4 MPa (4,1 kgf/cm²)).

1.10 Hydraulic test

(Part only shown)

1.10.2 The hydraulic test pressure is to be determined from the following formula, except that the maximum test pressure need not exceed 140 bar (143 kgf/cm²) 14 MPa:

$$P = \frac{20st}{D} \quad (P = \frac{200st}{D})$$

$$P = \frac{2st}{D}$$

where

P = test pressure, in bar (kgf/cm²) MPa

s = 80 per cent of the specified minimum yield stress, in N/mm² (kgf/mm²), for ferritic steels and 70 per cent of the specified minimum, 1,0 per cent proof stress, in N/mm² (kgf/mm²), for austenitic steels. These relate to the values specified for acceptance testing at ambient temperature.

Chapter 8

Aluminium Alloys

■ Section 1

Plates, bars and sections

1.7 Test material

1.7.1 ~~Materials of the same product form, (i.e. plates, sections or bars) and~~ Plate with the same thickness and from a single cast or equivalent, are to be presented for test in batches of not more than 2 tonnes, with the exceptions of those given in *Ch 8, 1.7 Test material 1.7.2, and Ch 8, 1.7 Test material 1.7.3 and Ch 8, 1.7 Test material 1.7.4.*

1.7.4 ~~Extrusions, Bars and sections of less than 1 kg/m in nominal weight are to be tested in batches of 1 tonne. Bars and sections with a nominal weight between 1 kg/m and 5 kg/m are to be tested in batches of 2 tonnes. Where the nominal weight is greater than 5 kg/m, one tensile test is to be carried out for every three~~ 3 tonnes produced, or fractions thereof.

Chapter 9 Copper Alloys

■ Section 1 Castings for propellers

1.9 Rectification of defective castings

Table 9.1.3 Allowable number and size of dye penetrant indications in reference area of 100 cm² (see Note 1)

Note 1. The reference area is defined as an area of ~~0,4 m²~~ 0,01 m², which may be square or rectangular, with the major dimension not exceeding 250 mm. The area shall be taken in the most unfavourable location relative to the indication being evaluated.

■ Section 3 Tubes

3.9 Hydraulic test

3.9.2 The hydraulic test pressure is to be determined from the following formula, except that the maximum test pressure need not exceed ~~70 bar~~ 7 MPa:

$$P = \frac{20st}{D} \quad P = \frac{2st}{D}$$

where

- P = test pressure, in ~~bar~~ MPa
 s = 40 for copper-phosphorous
 = 60 for Al-brass and
 = ~~60 for~~ 90/10 copper nickel iron
 = 75 for 70/30 copper nickel iron

Chapter 12

Welding Qualifications

■ Section 2

Welding procedure qualification tests for steels

2.3 Steel test assemblies

2.3.6 The test assembly is to be placed in one of the welding positions shown in *Figure 12.2.4 Plate butt weld test positions* to *Ch 12, 2.3 Steel test assemblies 2.3.6 Figure 12.2.7 Pipe fillet weld test positions*, as specified in the test Welding Procedure Specification (pWPS) and the specified level of preheat applied prior to the start of welding.

■ Section 3

Specific requirements for stainless steel

3.3 Duplex stainless steels

3.3.4 Where the test weld is between a grade of carbon steel and duplex stainless steel, the test requirements of *Ch 12, 3.3 Duplex stainless steels 3.3.3(a)* and *Ch 12, 3.3 Duplex stainless steels 3.3.3(c)* are not required and the ferrite content of the weld and the duplex heat affected zone are to be reported for information.

■ Section 5

Welder qualification tests

5.2 Welder qualification test assemblies

5.2.3 The inspection length of the test weld is to be such as to permit the removal of all the necessary test specimens and for plate tests, but in no case is to be less than 250 mm. The test assembly is to be set in one of the positions as shown in *Figure 12.2.4 Plate butt weld test positions* to *Figure 12.2.7 Pipe fillet weld test positions* appropriate to the welding positions to be approved.

5.3 Examination and testing

Table 12.5.1 Welder qualification test requirements

Note 3. Bend tests are required for gas metal arc welding (GMAW) with solid wire or metal cored cored wire and oxy-acetylene welding.

5.3.7 When bend tests are required, 2 root and 2 face bends are to be tested and where the test thickness exceeds 12 mm, these may be substituted by 4 side bends specimens. The diameter of former to be used is to be in accordance with that specified for welding procedure qualification testing given in *Ch 12, 2.7 Destructive tests for steel butt welds 2.7.6(a)*.

Chapter 13

Requirements for Welded Construction

■ Section 1 General welding requirements

1.13 Rectification of material defects

1.13.4 Surface defects, which cannot be repaired by the above method, may be repaired by welding where permitted by *Ch 3 Rolled Steel Plates, Strip, Sections and Bars* to ~~*Ch 13, 9 Friction stir welding requirements for aluminium alloys*~~ *Ch 9 Copper Alloys*. Such repairs are to be performed in accordance with the requirements of this Section and those specified in *Ch 3 Rolled Steel Plates, Strip, Sections and Bars* to ~~*Ch 13, 9 Friction stir welding requirements for aluminium alloys*~~ *Ch 9 Copper Alloys*.

■ Section 2 Specific requirements for ship hull structure and machinery

2.9 Fillet welds

2.9.3 The calculated fillet leg length may be reduced by 20 per cent, provided that in addition to the requirements of *Ch 13, 2.9 Fillet welds 2.9.2(a)* and *Ch 13, 2.9 Fillet welds 2.9.2-(b)*, the manufacturer is able to consistently meet the following additional requirements:

■ Section 4 Specific requirements for fusion welded pressure vessels

4.13 Extent of NDE for Class 1 pressure vessels

4.13.4 In addition to the acceptance limits stated in *Table 13.2.4 Acceptance criteria for visual testing, magnetic particle and liquid penetrant testing* to ~~*Table 13.2.4 Acceptance criteria for visual testing, magnetic particle and liquid penetrant testing*~~ *Table 13.2.6 Acceptance criteria for ultrasonic testing*, no cracks, lack of fusion, or lack of penetration is permitted.

Chapter 14

Plastics Materials and other Non-Metallic Materials

■ Section 2

Tests on polymers, resins, reinforcements and associated materials

2.16 Repair compounds

(Part only shown)

2.16.4 Materials will not be accepted for the following uses unless specific evidence of their suitability is provided:

- (a) Any component in rubbing contact.
- (b) Any component subject to dynamic cyclic loading.
- (c) Any pressure part in contact with gas or vapour.
- (d) Any pressure part in contact with liquid above ~~3,5 bar~~ 0,35 MPa.

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Chapter 15

Corrosion Prevention

■ Section 4

Cathodic Protection (CP)

4.3 Impressed Current Cathodic Protection (ICCP)

~~4.3.5 All equipment is to be suitable for its intended location. Cables to anodes are not to be led through tanks intended for the storage of low flash point products such as oils. Where cables are led through the cofferdams of storage units for volatile products they are to be enclosed in a substantial steel tube of not less than 10 mm thickness.~~

4.3.5 All equipment is to be suitable for its intended location.

4.3.6 The arrangements for glands, where cables pass through shell boundaries, are to include a small cofferdam.

4.3.7 Cables which pass through ballast tanks are to be enclosed in a steel tube of at least 10 mm thickness.

4.3.8 Cables to anodes are not to pass through tanks intended for the storage of low flash point products, including but not limited to, oils.

4.3.9 Cables which pass through the cofferdams of storage tanks which may contain low flash point products are to be enclosed in a steel tube of at least 10 mm thickness.

Existing 4.3.7 to 4.3.11 have been renumbered 4.3.10 to 4.3.14.