

**RULES
FOR THE CLASSIFICATION OF
SHIPS**

*Part 7 – MACHINERY INSTALLATION
January 2020*

*Amendments No. 2
July 2022*

CROATIAN REGISTER OF SHIPPING

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By the decision of the General Committee of Croatian Register of Shipping,

Amendments No. 2 to the
RULES FOR THE CLASSIFICATION OF SHIPS
Part 7 – MACHINERY INSTALLATION

have been adopted on 27th June and shall enter into force on 1st July 2022

INTRODUCTORY NOTES

These amendments shall be read together with the requirements in the Rules for the Classification of Ships, Part 7 – Machinery Installation, edition January 2020, as amended by Amendments No. 1, edition January 2021.

Table 1 contains review of amendments, where items changed or added in relating to previous edition are given, with short description of each modification or addition. All major changes throughout the text are shaded.

This Part of the Rules includes the requirements of the following international Organisations:

International Maritime Organization (IMO)

Conventions: International Convention for the Safety of Life at Sea 1974 (SOLAS 1974) and all subsequent amendments up to and including the 2011 amendments (MSC.317/89).
Protocol of 1988 relating to the International Convention for the Safety of Life at Sea 1974, as amended (SOLAS PROT 1988).

Circulars: MSC.1/Circ 1203 (2006)

International Association of Classification Societies (IACS)

Unified Requirements (UR):

K3 (Corr. 2, 1998), M25 (Rev. 4, 2017), M34 (1980), M40 (1981), M46 (Rev. 2, 2018),
M52 (Rev.2 2019), M62 (2002), M68 (Rev.3, 2021)

Unified Interpretations (UI):

SC16 (Rev. 2, 2006), SC17 (Rev. 2, 2005), SC95 (1994), SC184 (Rev. 1, 2005),
SC242 (corr. 1, Aug 2011, reinstated)

Recommendations (Rec.):

No. 26 (Rev. 1, 2006), No. 27 (Rev. 1, 2006), No. 28 (Rev. 1, 2006), No. 29 (Rev. 1, 2006),
No. 30 (Rev. 1, 2006)

TABLE 1 – REVIEW OF AMENDMENTS

This review comprises amendments in relation to the Rules for the Classification of Ships, Part 7 – Machinery Installation, edition January 2020, as amended by Amendments No. 1, edition January 2021.

<i>ITEM</i>	<i>DESCRIPTION OF THE AMENDMENTS</i>
10 QUALITATIVE FAILURE ANALYSIS FOR PROPULSION AND STEERING ON PASSENGER SHIPS	
Section 10	Existing Section 10 - Qualitative failure analysis for propulsion and steering on passenger ships has been deleted.
ANNEX A - SPECIAL APPROVAL OF ALLOY STEEL USED FOR INTERMEDIATE SHAFT MATERIAL	
Annex A	Existing item 2 and 3 has been amended.

10 QUALITATIVE FAILURE ANALYSIS FOR PROPULSION AND STEERING ON PASSENGER SHIPS

■ **Section 10 QUALITATIVE FAILURE ANALYSIS FOR PROPULSION AND STEERING ON PASSENGER SHIPS**, has been deleted due to cancellation of IACS UR M69

ANNEX A – SPECIAL APPROVAL OF ALLOY STEEL USED FOR INTERMEDIATE SHAFT MATERIAL

■ ANNEX A – SPECIAL APPROVAL OF ALLOY STEEL USED FOR INTERMEDIATE SHAFT MATERIAL has been amended and should be read as follows:

1 APPLICATION

This Annex is applied to the approval of alloy steel which has a minimum specified tensile strength greater than 800 N/mm², but less than 950 N/mm² intended for use as intermediate shaft material.

2 TORSIONAL FATIGUE TEST

A torsional fatigue test is to be performed to verify that the material exhibits similar fatigue life as conventional steels. The torsional fatigue strength of said material is to be equal to or greater than the permissible torsional vibration stress τ_{dop} given by the formulae in 4.2.2.

The test is to be carried out with notched and unnotched specimens respectively. For calculation of the stress concentration factor of the notched specimen, fatigue strength reduction factor β should be evaluated in consideration of the severest torsional stress concentration in the design criteria.

2.1 Test conditions

Test conditions are to be in accordance with Table 2.1. Mean surface roughness is to be <0,2 $\mu\text{m Ra}$ with the absence of localised machining marks verified by visual examination at low magnification (x20) as required by Section 8.4 of ISO 1352:2011. Test procedures are to be in accordance with Section 10 of ISO 1352:2011.

Table 2.1
Test condition

Loading type	Torsion
Stress ratio	R= -1
Load waveform	Constant-amplitude sinusoidal
Evaluation	S-N curve
Number of cycles for test termination	1 x 10 ⁷ cycles

2.2 Acceptance criteria

Measured high-cycle torsional fatigue strength τ_{C1} and low-cycle torsional fatigue strength τ_{C2} are to be equal to or greater than the values given by the following formulae:

$$\tau_{C1} \geq \tau_{dop2} = \frac{R_m + 160}{6} \cdot C_K \cdot C_D$$

$$\tau_{C2} \geq 1.7 \cdot \frac{1}{\sqrt{C_K}} \cdot \tau_{C1}$$

C_K = factor for the particular shaft design features, see 4.2.2

α_t = stress concentration factor, see 4.2.2.4 (For unnotched specimen, 1.0.)

C_D = size factor, see 4.2.2.1

R_m = specified minimum tensile strength in N/mm² of the shaft material

3 CLEANLINESS REQUIREMENTS

The steels are to have a degree of cleanliness as shown in Table 3 when tested according to ISO 4967:2013 method A. Representative samples are to be obtained from each heat of forged or rolled products.

PART 7**AMENDMENTS No. 2**

The steels are generally to comply with the minimum requirements of IACS UR W7 Table 2, with particular attention given to minimising the concentrations of sulphur, phosphorus and oxygen in order to achieve the cleanliness requirements. The specific steel composition is required to be approved by the *Register*.

Table 3
Cleanliness requirements

Inclusion group	Series	Limiting chart diagram index <i>i</i>
Type A	Fine	1
	Thick	1
Type B	Fine	1,5
	Thick	1
Type C	Fine	1
	Thick	1
Type D	Fine	1
	Thick	1
Type DS	-	1

4 INSPECTION

The ultrasonic testing required by IACS UR W7 is to be carried out prior to acceptance. The acceptance criteria are to be in accordance with IACS Recommendation No. 68 or a recognized national or international standard.