

W30 Normal and higher strength corrosion resistant steels for cargo oil tanks

(Feb
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W30.1 Scope

W30.1.1 These requirements apply to normal and higher strength Corrosion Resistant steels when such steel is used as the alternative means of corrosion protection for cargo oil tanks as specified in the performance standard MSC.289 (87) of Regulation 3-11, Part A-1, Chapter II-1 of the SOLAS Convention (Corrosion protection of cargo oil tanks of crude oil tankers).

W30.1.2 The requirements are primarily intended to apply to steel products with a thickness as follows:

For steel plates and wide flats;

- All Grades: Up to 50 mm in thickness

For sections and bars;

- All Grades: Up to 50mm in thickness

W30.1.3 Normal and higher strength Corrosion Resistant steels as defined within this UR, are steels whose corrosion resistance performance in the bottom or top of the internal cargo oil tank is tested and approved to satisfy the requirements in MSC.289 (87) in addition to other relevant requirements for ship material, structural strength and construction. It is not intended that such steels be used for corrosion resistant applications in other areas of a vessel that are outside of those specified in the performance standard MSC.289 (87) of Regulation 3-11, Part A-1, Chapter II-1 of the SOLAS Convention.

W30.1.4 Since Corrosion Resistant Steels are similar to the ship steels as specified in UR W11, the basic requirements of UR W11 apply to these steels except where modified by this UR.

Note:

1. This UR is to be uniformly implemented by IACS Societies on ships contracted for construction on or after 1 January 2014 and when the application for certification of steel plates is dated on or after 1 January 2014.
2. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.
3. This UR may be used as guidance of application prior to 1 January 2014.

W30
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W30.1.5 The weldability of Corrosion Resistant Steels is similar to those given in UR W11, therefore welding requirements specified in UR W17 Approval of consumables for welding normal and higher strength hull structural steels and UR W28 Welding procedure qualification tests of steels for hull construction and marine structures also apply except as modified by this UR.

W30.2 Approval

W30.2.1 All materials are to be manufactured at works which have been approved by the Classification Society for steel in accordance with UR W11.

W30.2.2 Corrosion tests are to be carried out in accordance with Appendix A. Approval can be given for application in one of the following areas of a cargo oil tank:

- (a) Lower surface of strength deck and surrounding structures;
- (b) Upper surface of inner bottom plating and surrounding structures;
- (c) For both strength deck and inner bottom plating

W30.2.3 It is the manufacturer's responsibility to assure that effective process and production controls in operation are adhered to within the manufacturing specifications. If the process or production controls are changed in any way, or any product fails to meet specifications, the manufacturer is to issue a report explaining the reasons, and, in the instance of product which fails to meet specifications, the measures to prevent recurrence. The complete report is to be submitted to the Surveyor along with such additional information as the Surveyor may require. Each affected piece is to be tested to the Surveyor's satisfaction. The frequency of testing for subsequent products is at the discretion of the Society.

W30.3 Method of Manufacture

W30.3.1 Method of manufacture, deoxidation practice and rolling practice is to be in accordance with UR W11.

W30.4 Chemical Composition

W30.4.1 The chemical composition of samples taken from each ladle of each cast is to be determined by the manufacturer in an adequately equipped and competently staffed laboratory and is to be in accordance with the appropriate requirements of UR W11.

W30.4.2 The manufacturer will establish a relationship of all the chemical elements which affect the corrosion resistance, the chemical elements added or controlled to achieve this are to be specifically verified for acceptance. Verification is to be based on the ladle analysis of the steel.

W30.4.3 The manufacturer's declared analysis will be accepted subject to periodic random checks as required by the Surveyor.

W30.4.4 The carbon equivalent is to be in accordance with UR W11.

W30.5 Condition of Supply

W30.5.1 All materials are to be supplied in one of the supply conditions specified in UR W11.

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(cont)**W30.6 Mechanical Properties**

W30.6.1 Tensile testing and Charpy V-notch Impact Testing is to be carried out in accordance with UR W11.

W30.7 Freedom from Defects

W30.7.1 The steel is to be reasonably free from segregations and non-metallic inclusions. The finished material is to have a workmanlike finish and is to be free from internal and surface defects prejudicial to the use of the material for the intended application.

W30.7.2 The acceptance criteria for surface finish and procedures for the repair of defects, as detailed in Recommendation, No 12, "Guidance for the Surface Finish of Hot Rolled Steel Plates and Wide Flats" are to be observed.

W30.8 Tolerances

W30.8.1 Unless otherwise agreed or specially required the thickness tolerances in Unified Requirement W13 "Allowable under thickness tolerances of steel plates and wide flats" are applicable.

W30.9 Identification of Materials

W30.9.1 The steelmaker is to adopt a system for the identification of ingots, slabs and finished pieces which will enable the material to be traced to its original cast.

W30.9.2 The Surveyor is to be given full facilities for so tracing the material when required.

W30.10 Testing and Inspection**W30.10.1 Facilities for Inspection**

- (a) The manufacturer is to afford the Surveyor all necessary facilities and access to all relevant parts of the works to enable him to verify that the approved process is adhered to, for the selection of test materials, and the witnessing of tests, as required by the Rules, and for verifying the accuracy of the testing equipment.

W30.10.2 Testing Procedures

- (a) The prescribed tests and inspections are to be carried out at the place of manufacture before dispatch. The test specimens and procedures are to be in accordance with UR W2. All the test specimens are to be selected and stamped by the Surveyor and tested in his presence, unless otherwise agreed.

W30.10.3 Through Thickness Tensile Tests

- (a) If plates and wide flats with thickness of 15 mm and over are ordered with through thickness properties, the through thickness tensile test in accordance with UR W14 is to be carried out.

W30.10.4 Ultrasonic Inspection

- (a) If plates and wide flats are ordered with ultrasonic inspection, this is to be made in accordance with an accepted standard at the discretion of the Classification Society.

W30
(cont)**W30.10.5 Surface Inspection and Dimensions**

- (a) Surface inspection and verification of dimensions are the responsibility of the steel maker. The acceptance by the Classification Society's Surveyor shall not absolve the steel maker from this responsibility.

W30.11 Test Material

W30.11.1 Definitions and requirements for test samples are to be in accordance with UR W11.

W30.12 Test Specimens

W30.12.1 Mechanical Test Specimens.

The dimensions, orientation and location of the tensile and Charpy V-notch test specimens within the test samples are to be in accordance with UR W2 and UR W11.

W30.13 Number of Test Specimens

W30.13.1 Number of Tensile and Charpy V-notch Impact test specimens are to be in accordance with UR W11.

W30.14 Retest Procedures

W30.14.1 To be in accordance with UR W11.

W30.15 Branding

W30.15.1 Every finished piece is to be clearly marked by the maker in at least one place with the Classification Society's brand and the following particulars:

- (i) Unified identification mark for the grade of steel (e.g. [A36]).
- (ii) Steel plates that have complied with these requirements will be marked with a designation by adding a corrosion designation to the unified identification mark for the grade of steel. Example of designation:
A36 RCB
- (iii) The corrosion resistant steel is to be designated according to its area of application as follows:
 - Lower surface of strength deck and surrounding structures; **RCU**
 - Upper surface of inner bottom plating and surrounding structures; **RCB**
 - For both strength deck and inner bottom plating; **RCW**
- (iv) When required by the Classification Society, material supplied in the thermo mechanically controlled process condition is to have the letters TM added after the identification mark but before the corrosion designation.
(e.g. [E36 TM RCU Z35]).
- (v) Name or initials to identify the steelworks.

W30
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- (vi) Cast or other number to identify the piece.
- (vii) If required by the purchaser, his order number or other identification marks.

W30.15.2 The above particulars, but excluding the manufacturer's name or trade marks where this is embossed on finished products are to be encircled with paint or otherwise marked so as to be clearly legible.

W30.15.3 Where a number of light materials are securely fastened together in bundles the manufacturer may, subject to the agreement of the Classification Society, brand only the top piece of each bundle, or alternatively, a firmly fastened durable label containing the brand may be attached to each bundle.

W30.15.4 In the event that any material bearing the Classification Society's brand fails to comply with the test requirements, the brand is to be unmistakably defaced by the manufacturer.

W30.16 Documentation

W30.16.1 The Surveyor is to verify certificates before the material is accepted by the society.

W30.16.2 The number of copies required are to be specified by the society.

W30.16.3 The certificate is to be supplied in either electronic or paper format as required by the Classification Society.

W30.16.4 The Classification Society may require separate documents for each grade of steel.

W30.16.5 The certificate is to contain, in addition to the description, dimensions, etc., of the material, at least the following particulars:

- (i) Purchaser's order number and if known the hull number for which the material is intended.
- (ii) Identification of the cast and piece including, where appropriate, the test specimen number.
- (iii) Identification of the steelworks.
- (iv) Identification of the grade of steel [and the manufacturer's brand name].
- (v) Ladle analysis (for elements specified in UR W11).
- (vi) If the steel is approved in accordance with 4.2, the weight percentage of each element added or intentionally controlled for improving corrosion resistance.
- (vii) Condition of supply when other than as rolled i.e. normalised, controlled rolled or thermo mechanically rolled.
- (viii) Test Results

W30
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W30.16.6 Before the test certificates are signed by the Surveyor, the manufacturer is required to furnish him with a written declaration stating that the material has been made by an approved process and that it has been subjected to and has withstood satisfactorily the required tests in the presence of the Surveyor or his authorized deputy. The name of the Classification Society is to appear on the test certificate. The following form of declaration will be accepted if stamped or printed on each test certificate or shipping statement with the name of the steelworks and initialled for the makers by an authorized official:

"We hereby certify that the material has been made by an approved process and has been satisfactorily tested in accordance with the Rules of the Classification Society."

W30.16.7 In the case of electronic certification the society is to agree upon a procedure with the steel mill to ensure release is authorised by the Surveyor.

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Appendix A**A1. Additional Approval Procedure for Corrosion Resistant Steel****1. Scope**

1.1 Approval is to be carried out in accordance with the requirements of the Appendices to UR W11 together with the additional requirements for corrosion testing specified in this Appendix.

1.2 The corrosion tests and assessment criteria are to be in accordance with the Appendix of the Annex to Performance Standard for Alternative Means of Corrosion Protection for Cargo Oil Tanks of Crude Oil Tankers (MSC.289 (87)).

2. Application for approval

2.1 The manufacturer has to submit to the Society a request for approval, which is to include the following:

- (a) Corrosion test plan and details of equipment and test environments.
- (b) Technical data related to product assessment criteria for confirming corrosion resistance.
- (c) The technical background explaining how the variation in added and controlled elements improves corrosion resistance.
- (d) The grades, the brand name and maximum thickness of corrosion resistant steel to be approved. Designations for corrosion resistant steels are given in Table 2.1
- (e) The welding processes and the brand name of the welding consumables to be used for approval.

3. Approval of test plan

3.1 The test program submitted by the manufacturer is to be reviewed by the Society, if found satisfactory, it will be approved and returned to the manufacturer for acceptance prior to tests being carried out. Tests that need to be witnessed by the society Surveyor will be identified.

3.2 Method for selection of test samples is to satisfy the following:

3.2.1 The numbers of test samples is to be in accordance with the requirements of the Appendix of the Annex to Performance Standard for Alternative Means of Corrosion Protection for Cargo Oil Tanks of Crude Oil Tankers (MSC.289 (87)).

3.2.2 The number of casts and test samples selected are to be sufficient to make it possible to confirm the validity of interaction effects and/or the control range (upper limit, lower limit) of the elements which are added or intentionally controlled, for improving the corrosion resistance. Where agreed, this may be supported with data submitted by the manufacturer.

3.2.3 Additional tests may be required by the Society when reviewing the test program against the paragraph 3.2.2

W30

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Table 2.1 Designations for Corrosion Resistant Steels

Type of steel	Location where steel is effective	Corrosion Resistant Designation
Rolled steel for hull	For strength deck, ullage space	RCU
	For inner bottom	RCB
	For both strength deck and inner bottom plating	RCW

3.3 In addition to paragraph 3.2 above, the Society may require additional tests in the following cases:

- (a) When the Society determines that the control range is set by the theoretical analysis of each element based on existing data, the number of corrosion resistance tests conducted in accordance with the Appendix of the Annex to Performance Standard for Alternative Means of Corrosion Protection for Cargo Oil Tanks (MSC.289 (87)) is too few to adequately confirm the validity of the control range of chemical composition;
- (b) When the Society determines that the data of the corrosion resistance test result obtained for setting the control range of chemical composition varies too widely;
- (c) When the Society determines that the validity of the corrosion resistance test result for setting the control range of chemical composition is insufficient, or has some flaws;
- (d) When the Society's surveyor has not attended the corrosion resistance tests for setting the control range of chemical composition, and the Society determines that additional testing is necessary in order to confirm the validity of the test result data; and
- (e) When the Society determines that it is necessary, for reasons other than cases (a) to (d) above.

Remarks: The chemical composition of the corrosion resistant steel is to be within the range specified for rolled steel for hull. Elements to be added for improving the corrosion resistance and for which content is not specified are to be generally within 1% in total.

4. Carrying out the approval test

4.1 The manufacturer is to carry out the approval test in accordance with the approved test plan.

5. Attendance of the Society's Surveyor for Test

5.1 The Society's Surveyor is to be present, as a rule, when the test samples for the approval test are being identified and for approval tests, see also 3.1.

6. Test Results

6.1 After completion of the approval test, the manufacturer is to produce the report of the approval test and submit it to the Society.

W30
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6.2 The Society will give approval for corrosion resistant steel where approval tests are considered by the society to have given satisfactory results based on the data submitted in accordance with the provisions of this Appendix.

6.3 The certificate is to contain the manufacturer's name, the period of validity of the certificate, the grades and thickness of the steel approved, welding methods and welding consumables approved.

7. Assessment Criteria for Results of Corrosion Resistance Tests of Welded Joint

7.1 The results will be assessed by the Classification Society in accordance with the acceptance criteria specified in the Appendix of the Annex to Performance Standard for Alternative Means of Corrosion Protection for Cargo Oil Tanks (MSC.289 (87)).

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