
RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part K

Materials

RULES

2018 AMENDMENT NO.1

Rule No.100 29 June 2018

Resolved by Technical Committee on 31 January 2018

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

“Rules for the survey and construction of steel ships” has been partly amended as follows:

Part K MATERIALS

Chapter 3 ROLLED STEEL

3.1 Rolled Steels for Hull

Paragraph 3.1.8 has been amended as follows.

3.1.8 ~~Surface Inspection and~~ Verification of Dimensions*

~~1~~ ~~Surface inspection and~~ verification of dimensions are the responsibility of the steel manufacturer.

(-2 to -5 are omitted.)

Paragraph 3.1.9 has been amended as follows.

3.1.9 Quality and Repair of Defects*

~~1~~ ~~Verification of internal soundness is the responsibility of the manufacturer.~~

~~2.1~~ ~~The steel is to be reasonably free from segregations and non-metallic inclusions. The finished steel is to be free from internal or surface defects prejudicial to the use of steel for the intended application. The finished material is to have a surface quality in accordance with the following (1) to (6):~~

- (1) The steel is to be free from surface defects prejudicial to the use of the material for the intended application.
- (2) The responsibility for meeting the surface finish requirements rests with the manufacturer of the material, who is to take the necessary manufacturing precautions and is to inspect the products prior to delivery. At that stage, however, rolling or heat treatment scale may conceal surface discontinuities and defects. If, during the subsequent descaling or working operations, the material is found to be defective, the Society may require materials to be repaired or rejected.
- (3) The finished material is to have a surface quality in accordance with standards deemed appropriate by the Society for cases other than those specified in this 3.1.9. Rolled steel bars may comply with manufacturer standards.
- (4) The surface quality inspection method is to be in accordance with recognized national or international standards agreed between purchaser and manufacturer, accepted by the Society.
- (5) Imperfections of a harmless nature, regarded as being inherent of the manufacturing process, are permissible irrespective of their number, provided the maximum permissible limits of Class A of EN 10163 Part 2 or limits specified in a recognized equivalent standard accepted by the Society, are not exceeded and the remaining steel thickness remains in accordance with the requirements in 3.1.8. Total affected area with imperfection not exceeding the specified limits are not to exceed 15% of the total surface in question.
- (6) Defects given in the following (a) or (b) are to be rejected or repaired irrespective of their size

and number.

- (a) Affected areas with imperfections with a depth exceeding the limits of Class A of EN 10163 Part 2 or the maximum permissible limits specified in a recognized equivalent standard accepted by the Society
- (b) Cracks, injurious surface flaws, shells (overlapping material with non-metallic inclusions), sand patches, laminations and sharp edged seams (elongated defects) visually evident on surface and/or edge of plate

~~32~~ ~~The surface defects may be removed by local grinding, provided that the thickness is in no place reduced to less than 93% of the nominal thickness, but in no case by more than 3 mm. Such local grindings are to be carried out in the presence of the Surveyor unless otherwise approved by the Society. The repair of defects is in accordance with the following (1) and (2):~~

- (1) The defects specified in -1(6) may be removed by local grinding provided that the following (a) to (e) are satisfied. The grounded areas are to have a smooth transition to the surrounding surface of the product. Complete elimination of the defect is to be verified by magnetic particle or liquid penetrant testing. The remaining steel thickness is to remain in accordance with the requirements in 3.1.8. Such local grindings are to be carried out in the presence of a surveyor unless otherwise approved by the Society.
 - (a) The nominal product thickness does not be reduced by more than 7% or 3 mm, whichever is the less.
 - (b) Each single grounded area does not exceed 0.25 m².
 - (c) All grounded areas do not exceed 2% of the total surface in question.
 - (d) Grounded areas lying in a distance less than their average breadth to each other are to be regarded as one single area.
 - (e) Grounded areas lying opposite each other on both surfaces do not decrease the product thickness by values exceeding the limits as stated under (a).

~~4~~ ~~Surface defects which cannot be dealt with as above may be repaired by chipping or grinding followed by welding, subject to the approval by the Society, in the presence of the Surveyor unless otherwise approved by the Society, provided:~~

- ~~(1) That after removal of the defect, and before welding, the thickness of the piece is in no place reduced by more than 20% of the nominal thickness;~~
- ~~(2) That the welding is to be carried out by an approved procedure, by the welder qualified by the Society, with approved electrodes, and that welding is ground smooth to the correct nominal thickness; and~~
- ~~(3) That subsequent to the finish grinding, the piece may be required to be normalized or otherwise heat treated at the Surveyor's discretion.~~
- (2) Defects which cannot be dealt with as (1) above may be repaired by chipping or grinding followed by welding, subject to the approval by the Society, provided that the following (a) to (e) are satisfied. Repair of defects is to be followed by magnetic particle or liquid penetrant testing. Such welding repair is to be carried out in the presence of a surveyor unless otherwise approved by the Society. Subsequent to the finish grinding, the piece may be required to be normalized or otherwise heat treated at the surveyor's discretion.
 - (a) The weld preparation is not to reduce the thickness of the product below 80% of nominal thickness. For occasional defects with depths exceeding the 80% limit, special consideration may be given at the surveyor's discretion.
 - (b) Any single welded area is not to exceed 0.125 m² and the sum of all areas is not to exceed 2% of the surface side in question.
 - (c) If weld repair depth exceeds 3 mm, ultrasonic testing may be requested by the Society.
 - (d) The distance between two welded areas is not to be less than their average width.
 - (e) The repair is to be carried out by qualified welders using a procedure for the appropriate

steel grade approved by the Society. The electrodes are to be of low hydrogen type and are to be dried in accordance with the manufacturer's requirements and protected against rehumidification before and during welding.

3 Internal soundness is to be in accordance with the following **(1)** and **(2)**:

(1) Verification of internal soundness is the responsibility of the manufacturer.

(2) If steels are ordered with ultrasonic tests, this is to be made in accordance with an accepted standard at the discretion of the Society.

3.8 High Strength Rolled Steels for Offshore Structures

Paragraph 3.8.8 has been amended as follows.

3.8.8 ~~Surface Inspection and~~ Verification of Dimensions

The requirements specified in **3.1.8** are to apply to ~~surface inspection and~~ verification of dimensions are to be specified in **3.1.8**.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 July 2018.
2. Notwithstanding the amendments to the Rules, the current requirements apply to steels for which the application for survey or approval is submitted to the Society before 1 July 2018 and steels being used on ships for which the date of contract for construction* is before 1 July 2018.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

IACS PR No.29 (Rev.0, July 2009)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.
2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:
 - (1) such alterations do not affect matters related to classification, or
 - (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.
3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.
4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:

This Procedural Requirement applies from 1 July 2009.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part K

Materials

GUIDANCE

2018 AMENDMENT NO.1

Notice No.52 29 June 2018

Resolved by Technical Committee on 31 January 2018

AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

“Guidance for the survey and construction of steel ships” has been partly amended as follows:

Part K MATERIALS

K3 ROLLED STEEL

K3.1 Rolled Steels for Hull

Paragraph K3.1.4 has been amended as follows.

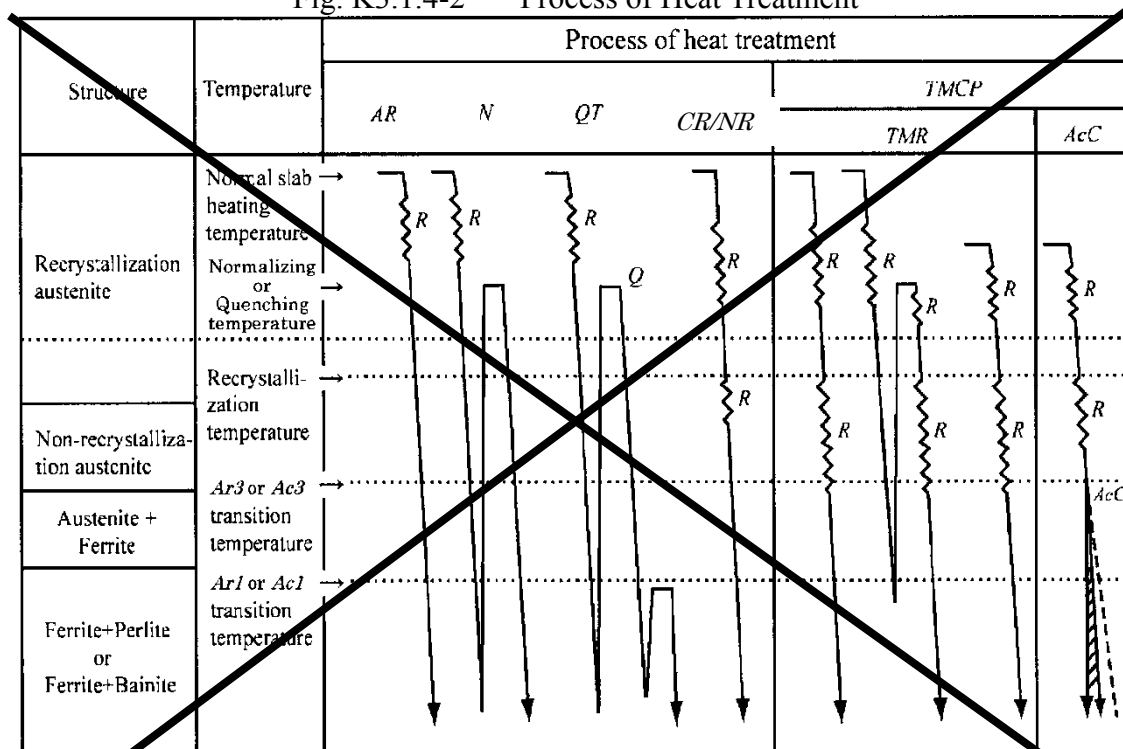
K3.1.4 Heat Treatment

The kind and definition of heat treatment referred to in Remarks (3) in **Table K3.3, Part K of the Rules** are as follows: (Refer to **Fig. K3.1.4-1 and -2**)

- (1) As Rolled (*AR*) involves ~~the rolling of steel at high temperature followed by air cooling~~ steel being air cooled as it is rolled with no further heat treatment. The rolling and finishing temperature are typically in the austenite recrystallization region and above the normalizing temperature.
- (2) Normalizing (*N*) involves heating rolled steel above the critical temperature, A_{c3} , and in the lower end of the austenite recrystallization region for a specific period of time, followed by air cooling.
- (3) Quenching and Tempering (*QT*) involves heating rolled steel in the austenite recrystallization region for a specific period of time, followed by rapid cooling, and shortly thereafter involves heating rolled steel under the critical temperature, A_{c1} , followed by air cooling. The wording “direct quenching after rolling” in **Fig. K3.1.4-1** means that the quenching is rapidly carried out.
- (4) Controlled Rolling (*CR*) (Normalizing Rolling (*NR*)) is one of heat treatment methods in which heating temperature, rolling temperature and rolling reduction are controlled to fine steel structure and improve mechanical properties. The rollings are generally finished in low austenite temperature range between normalizing temperature and A_{r3} transition temperature followed by air cooling.
- (5) Thermo-Mechanical Controlled Processing (*TMCP*) is a kind of heat treatment being based on the strict control of both the steel temperature and rolling reduction and is divided into the following two categories.
 - (a) Thermo-Mechanical Rolling: *TMR*
A kind of controlled rolling, generally a high proportion of rolling reduction is carried out close to or below the A_{r3} transition temperature. The rolling towards the lower end of the austenite-ferrite intercritical duplex phase region may be included into *TMR*.
 - (b) Accelerated Cooling Processing: *AcC*
After completion of thermo-mechanical rolling, homogeneous cooling was made with adequate cooling speed faster than air cooling in the range of A_{r3} transition temperature or below.

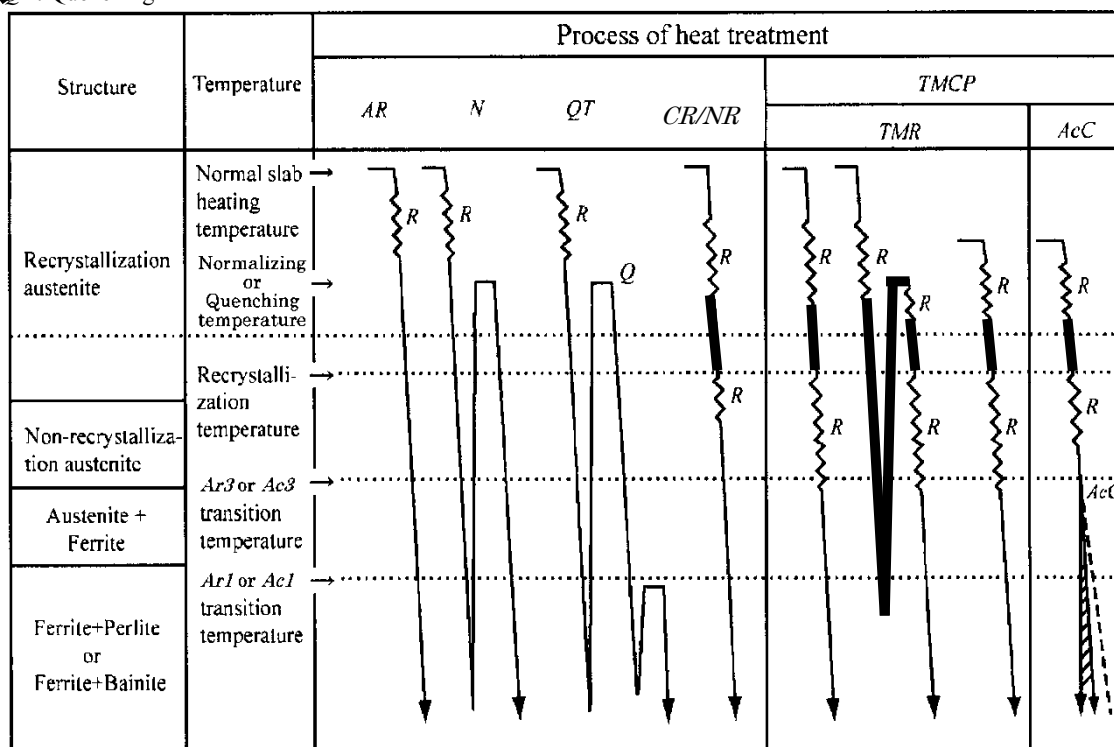
Fig. K3.1.4-2 has been amended as follows.

Fig. K3.1.4-2 Process of Heat Treatment



Note:

R : Reduction
Q : Quenching



Notes:

■ : Delays to allow cooling before finishing rolling process
R : Reduction
Q : Quenching

Title of Paragraph K3.1.8 has been amended as follows.

K3.1.8 ~~Surface Inspection and~~ Verification of Dimensions

The treatment of the requirements in **3.1.8, Part K of the Rules** is to be as follows:
((1) to (3) are omitted.)

Paragraph K3.1.9 has been amended as follows.

K3.1.9 Quality and Repair of Defects

1 The wording “standards deemed appropriate by the Society” specified in **3.1.9-1(3), Part K of the Rules** means the standards specified in *EN 10163* Part 1, Part 2, Part 3 or the equivalent thereto.

2 Surface inspection standards for pitting and scab in imperfections are, in principle, to be in accordance with Japan Shipbuilding Quality Standards (*JSQS*).

3 Affected areas specified in **3.1.9-1(5), Part K of the Rules** are to conform to standards applied by the manufacturer.

4 In the case specified in **3.1.9-2(2), Part K of the Rules**, the manufacturer is to present records of repairs and subsequent inspections which are traceable to each repair to the surveyor upon request.

5 Before repair works prescribed in **3.1.9-42(2), Part K of the Rules**, the following documents are to be submitted to the Society for approval.

- (1) Specifications of repairing procedure which state about kind of surface defects, the way of chipping, grinding and welding, etc.
- (2) Reports on results of tensile test, bend test, impact test, macro-structure inspection and hardness test on test samples repaired according to the procedure specified in above **(1)**

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 July 2018.
2. Notwithstanding the amendments to the Guidance, the current requirements apply to steels for which the application for survey or approval is submitted to the Society before 1 July 2018 and steels being used on ships for which the date of contract for construction* is before 1 July 2018.
* “contract for construction” is defined in the latest version of IACS Procedural Requirement (PR) No.29.

IACS PR No.29 (Rev.0, July 2009)

1. The date of “contract for construction” of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.
2. The date of “contract for construction” of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder. For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a “series of vessels” if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:
 - (1) such alterations do not affect matters related to classification, or
 - (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.
3. If a contract for construction is later amended to include additional vessels or additional options, the date of “contract for construction” for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a “new contract” to which **1.** and **2.** above apply.
4. If a contract for construction is amended to change the ship type, the date of “contract for construction” of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:

This Procedural Requirement applies from 1 July 2009.