

## Delivery conditions for Castings

### Grey cast iron

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### Changes

2024-05-03:

The following changed in comparison to RN 860-1:2023-07-27:

- a) Chapter 3, Table 1: Coupling carrier removed from part category C
- b) Chapter 5, f: Wording for required certificates clarified
- c) editorially revised

Responsible Division: EK	Editor: M. Förste	Approval: see doc. workflow	Technical reference: C. Eschert	Page: 1 / 8
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## 1 Scope

This factory standard applies in addition to the standards for raw castings of grey cast iron quoted in chapter 2 and has priority over the standards listed below.

## 2 References

The following documents, cited in part or in whole, shall apply for the use of this standard. In the case of dated references, only the referenced edition applies; in the case of undated references, the latest edition of the referenced document (including all amendments) applies. The applicable version of the standards listed below shall apply to all contents not covered by this factory standard.

EN 1370	Founding – Examination of surface condition
EN 1559-1	Founding – Technical conditions of delivery – Part 1: General
EN 1559-3	Founding – Technical conditions of delivery – Part 3: Additional requirements for iron castings
EN 1561	Founding – Grey cast irons
EN 10204	Metallic products – Types of inspection documents
EN ISO 6506-1	Metallic materials - Brinell hardness test - Part 1: Test method
EN ISO 6892-1	Metallic materials - Tensile testing - Part 1: Method of test at room temperature
EN ISO 8062-3	Geometrical product specifications (GPS) – Dimensional and geometrical tolerances for moulded parts – Part 3: General dimensional and geometrical tolerances and machining allowances for castings
EN ISO 12944-4	Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 4: Types of surface and surface preparation
RN 72	Packaging and Preservation; Supply parts for production
RN 79	Colour Coatings
RN 1567	Remanent magnetism in components
RN 1936	Labelling; Raw material, parts and gearboxes
0-123-73126	HB measuring points
0-124-77303	Production specification radius design

### 3 Part categories

Materials for parts made of cast iron with lamellar graphite (grey cast iron) are specified according to EN 1561. The following material classification applies in general:

**Table 1 Materials and part categories**

Part category	EN 1561 designation
A) Housings with classification according to hardness values	EN-GJL-HB195 (5.1304)
B) Bushings and other small parts with classification according to tensile strength	EN-GJL-200 (5.1300)
C) Bearing housings etc. with classification according to tensile strength	EN-GJL-250 (5.1301)

## 4 Requirements

### 4.1 General requirements

- Heat treatment:
- residual stresses in the casting must be minimised (controlled cooling in the mould is preferable to stress relieving)
  - the casting must be stress-relieved on delivery
- General tolerances<sup>1)</sup>:
- ISO 8062-3 tolerance grade DCTG11
- Geometrical tolerances<sup>1)</sup>:
- ISO 8062-3 tolerance grade GCTG5
- Machining allowances<sup>1)</sup>:
- ISO 8062-3 grade H, RMA
- Radioactivity:
- $\leq 0.10$  Bq/g

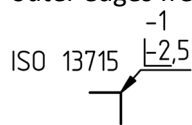
<sup>1)</sup> Unless specified otherwise in drawing or order

### 4.2 Requirements on part category A

- Hardness:
- Brinell hardness according to EN 1561
- Tensile strength:
- acc. to EN 1561, table 1, material EN-GJL-200
- Samples:
- separately cast test samples according to EN 1561 for the preparation of the material certificate acc. to chapter 5 f)
- Chemical composition:
- **C** and **Si** depending on the required strength and hardness values
  - **Mn** > 0.5 %; **P** < 0.5 %
- Radius design<sup>1)</sup>: acc. to production specification 0-124-77303

### 4.3 Surface quality

- Surface roughness
- |                               |  |
|-------------------------------|--|
| Standard:                     | <ul style="list-style-type: none"> <li>▪ inspection acc. to EN 1370 using BNIF reference samples</li> <li>▪ raw-cast state: 5 S1 to 6 S1</li> <li>▪ mechanically machined surfaces: 2 S2 to 3 S2</li> </ul>  |
| Yacht Premium <sup>2)</sup> : | <ul style="list-style-type: none"> <li>▪ raw-cast state, outer surfaces: 2 S1 to 3 S1</li> <li>▪ raw-cast state, inner surfaces: 5 S1 to 6 S1</li> <li>▪ mechanically machined surfaces: 1 S2 to 2 S2</li> <li>▪ thermally processed surfaces: 1 S3 to 2 S3</li> </ul> |

	surface discontinuities:	H < 0.5 mm	
	A smooth, homogeneous surface must be ensured, if necessary by suitable finishing.		
Surface treatment	▪ shot-blasted acc. to EN ISO 12944-4		
Standard:	▪ degree of preparation	inside: Sa2½	outside: Sa2½
Yacht Premium <sup>2)</sup> :	▪ degree of preparation	inside: Sa2½	outside: Sa3
Coating:	▪ primed according to RN 79		
Bad spots:	<ul style="list-style-type: none"> <li>▪ depth ≤ 1/3 x wall thickness and/or size ≤ 1 x wall thickness treatment according to chapter 4.4</li> <li>▪ special approval required for: accumulation of minor bad spots and/or for larger bad spots</li> </ul>		
Additional requirements:	<ul style="list-style-type: none"> <li>▪ no production welds</li> <li>▪ no sand pockets, mineralisation or other impurities</li> <li>▪ castings are oil-tight and free of cracks</li> <li>▪ outer edges free of burrs</li> </ul>		
			

<sup>2)</sup> Order designation for housings in Yacht Premium finish: Housing RN 860-1 YP

#### 4.4 Treatment of bad spots by manufacturer

Repair:	▪ do not fill bad spots, but grind them properly (no visible impurities, shrink holes etc., minimized notch effect)
Documentation:	<ul style="list-style-type: none"> <li>▪ measure bad spots, write dimensions clearly and legibly on the casting (indicate length, width, depth, residual wall thickness and position)</li> <li>▪ photograph model number for identification (housings only)</li> <li>▪ photograph casting so that bad spot(s) can be localized</li> <li>▪ make close-ups so that dimensions of bad spot(s) are clearly visible</li> </ul>
Information, Approval:	<ul style="list-style-type: none"> <li>▪ Photographs of casting and/or bad spot(s) and</li> <li>▪ short description of bad spot(s) (type, position, dimensions etc.)</li> </ul>

must be sent to the purchasing and quality assurance departments of REINTJES for an assessment and the decision for further action

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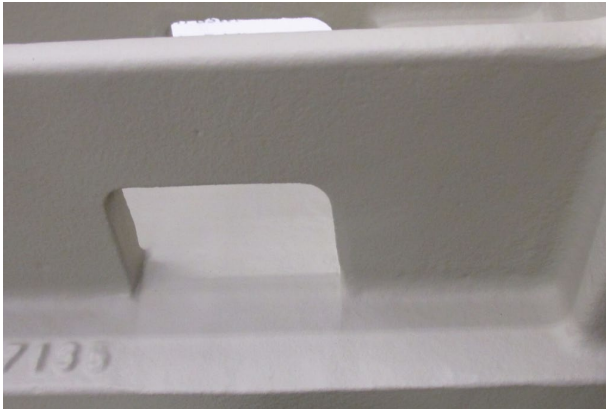
## 5 Other requirements

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- a) Steel and forging plant
- certified acc. to: [DIN EN ISO 9001 ff.](#)
  - approved by at least two member societies of IACS
- 
- b) Measurement of hardness and tensile strength
- part category A [always](#)
  - part categories B, C [on special request only](#)
- 
- c) Packaging and Preservation
- [RN 72](#)
- 
- d) Remanent Magnetism
- [RN 1567](#)
- 
- e) Labelling
- [RN 1936](#)
- 
- f) Documentation (must be digitally available upon delivery)
- inspection certificate 3.1 in accordance with EN 10204 with details of melt number, chemical composition, Brinell hardness and tensile strength (for part category A and coupling carriers)
  - test certificate 2.2 in accordance with EN 10204 for part categories B and C
  - REINTJES quality control plan (geometric dimensions)
  - drawings (only if requested in the order):
    - initial sample acceptance drawing
    - inspection drawing 0-123-73126 for HB measuring points (only for part category A)
  - evidence of radioactivity and remanent magnetism

### Appendix A Illustrations for Yacht Premium version

OK:



uniform surface

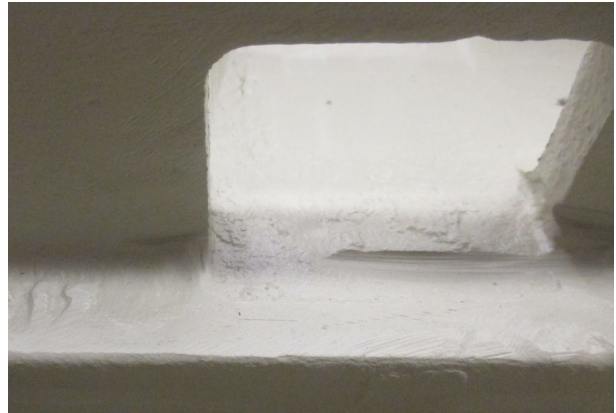


uniform surface



uniform surface

NOT OK:



significant machining marks

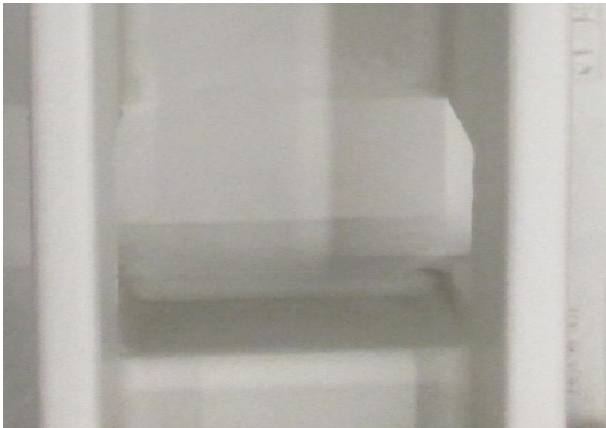


uneven surface



uneven surface

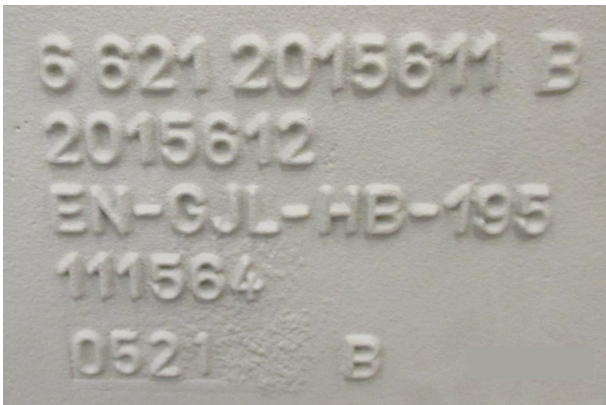
OK:



burr-free transitions



uniform radii and transitions



labeling easy to read, even font size

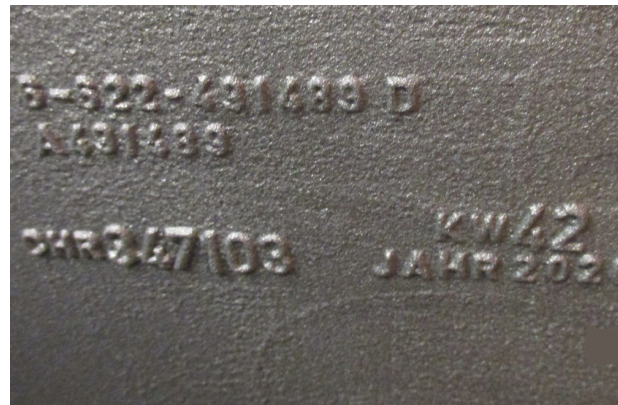
NOT OK:



burr is present



constriction present



labeling difficult to read, different font sizes

Further examples of poor casting:



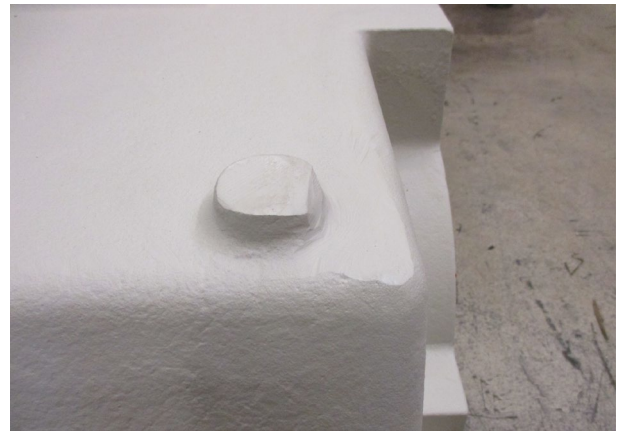
porosities



material defects



surface defects



missing material



constriction at the transition, machining marks



very rough surface