Replaces:
RN 860-1:2024-05-03

Delivery conditions for Castings

Grey cast iron

Content

Page

Changes

2025-01-22:

The following changed in comparison to RN 860-1:2024-05-03:
a) updated references
b) Chapter 5 a): correction regarding the authorisation of IACS member societies
c) editorially revised

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 case of dated references, only the referenced edition applies; in 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.

DIN EN 1370	Founding - Examination of surface condition
DIN EN 1559-1	Founding - Technical conditions of delivery - Part 1: General
DIN EN 1559-3	Founding - Technical conditions of delivery - Part 3: Additional requirements for iron castings
DIN EN 1561	Founding - Grey cast irons
DIN EN 10204	Metallic products - Types of inspection documents
DIN EN ISO 6506-1	Metallic materials - Brinell hardness test - Part 1: Test method
DIN EN ISO 6892-1	Metallic materials - Tensile testing - Part 1: Method of test at room temperature
DIN 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
DIN 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 DIN EN 1561. The following material classification applies in general:

Table 1 Materials and part categories

Part category	**DIN 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[1)]:
- ISO 8062-3 tolerance grade DCTG 11

Geometrical tolerances[1)]:
- ISO 8062-3 tolerance grade GCTG 5

Machining allowances[1)]:
- ISO 8062-3 RMAG H

Radioactivity:
- ≤ 0.10 Bq/g

[1)] Unless specified otherwise in drawing or order

4.2 Requirements on part category A

Hardness:
- Brinell hardness according to DIN EN 1561

Tensile strength:
- acc. to DIN EN 1561, table 1, material EN-GJL-200

Samples:
- separately cast test samples according to DIN 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 %

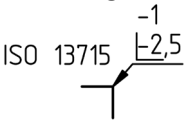
Radius design[1)]: acc. to production specification 0-124-77303

4.3 Surface quality

Surface roughness
- inspection acc. to DIN EN 1370 using BNIF reference samples

Standard:
- raw-cast state: 5 S1 to 6 S1
- mechanically machined surfaces: 2 S2 to 3 S2

Yacht Premium[2)]:
- raw-cast state, outer surfaces: 2 S1 to 3 S1
- raw-cast state, inner surfaces: 5 S1 to 6 S1
- mechanically machined surfaces: 1 S2 to 2 S2
- thermally processed surfaces: 1 S3 to 2 S3

	▪ surface discontinuities:	H < 0.5 mm	
	A smooth, homogeneous surface must be ensured, if necessary, by suitable finishing.		
Surface treatment	▪ comparable to EN ISO 12944-4, shot-blasted		
Standard:	▪ degree of preparation	inside: Sa2½	outside: Sa2½
Yacht Premium[2)]:	▪ degree of preparation	inside: Sa2½	outside: Sa3
Coating:	▪ primed according to RN 79		
Bad spots:	▪ depth ≤ 1/3 x wall thickness and/or size ≤ 1 x wall thickness treatment according to chapter 4.4 ▪ special approval required for: accumulation of minor bad spots and/or for larger bad spots		
Additional requirements:	▪ no production welds ▪ no sand pockets, mineralisation or other impurities ▪ castings are oil-tight and free of cracks ▪ outer edges free of burrs 		

[2)] 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:	▪ measure bad spots, write dimensions clearly and legibly on the casting (indicate length, width, depth, residual wall thickness and position) ▪ photograph model number for identification (housings only) ▪ photograph casting so that bad spot(s) can be localized ▪ make close-ups so that dimensions of bad spot(s) are clearly visible
Information, Approval:	▪ Photographs of casting and/or bad spot(s) and ▪ short description of bad spot(s) (type, position, dimensions etc.) must be sent to the purchasing and the quality assurance departments of REINTJES for an assessment and the decision for further action.

5 Other requirements

a) Steel and forging plant
- certified acc. to: DIN EN ISO 9001 ff.
- approved by at least one member society 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

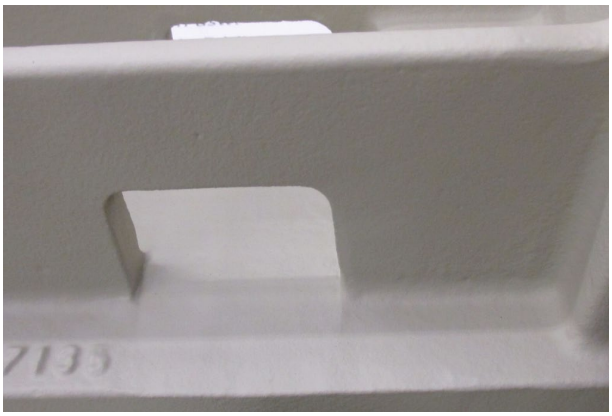
d) Remanent Magnetism
- RN 1567

e) Labelling
- RN 1936

f) Documentation (must be digitally available upon delivery)
- acceptance test certificate 3.1 acc. to DIN 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 DIN 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

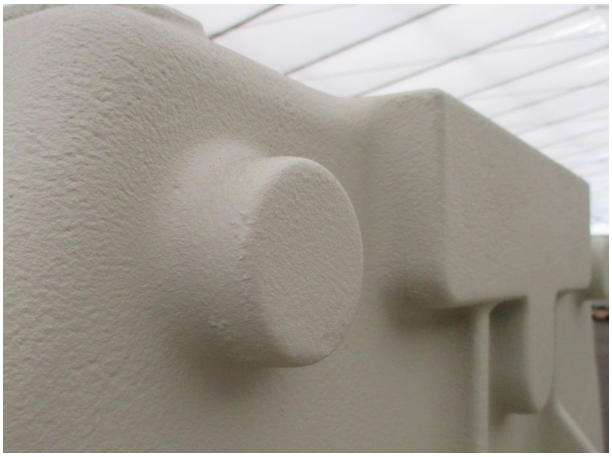
Appendix A Illustrations for Yacht Premium version

OK:



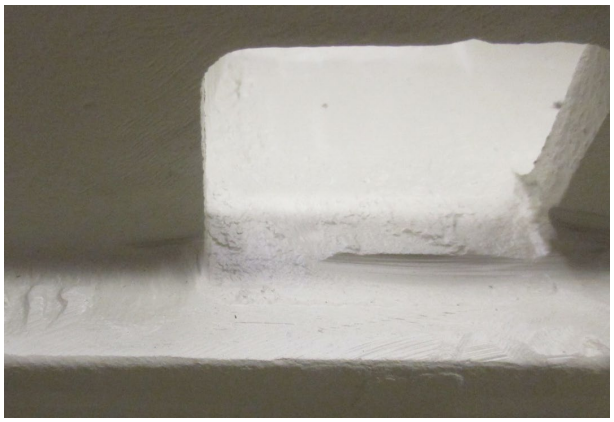
even surface

even surface

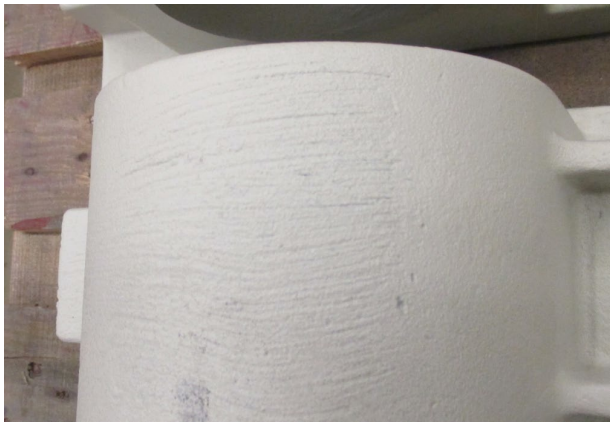


even surface

NOT OK:



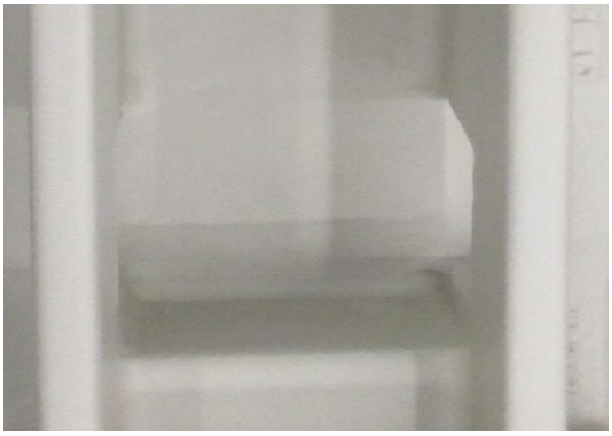
significant machining marks



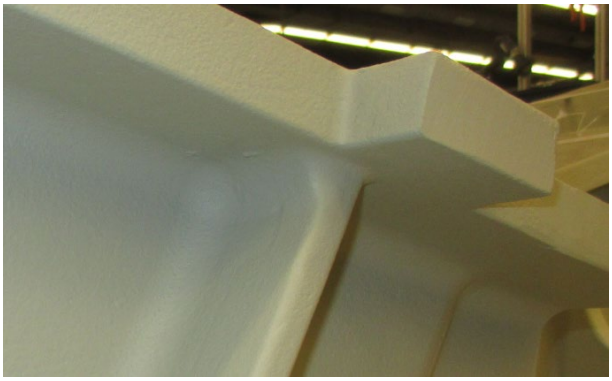
uneven suface

uneven suface

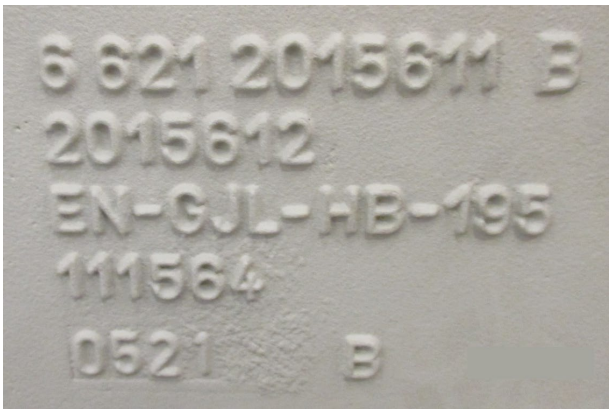
OK:



burr-free transitions



even radii and transitions

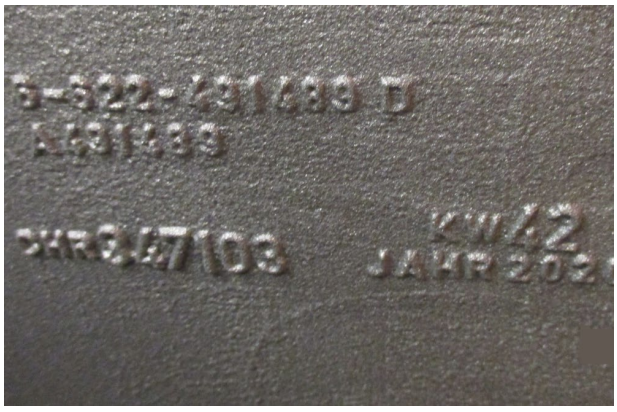


labeling easy to read, even font size

NOT OK:

burr is present

constriction present



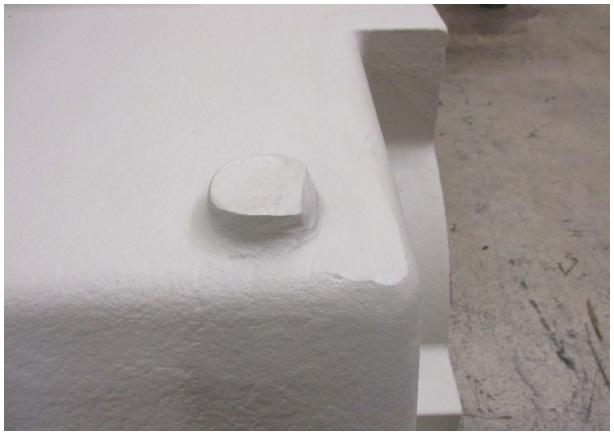
labeling difficult to read, different font sizes

Further examples of poor casting:

porosities

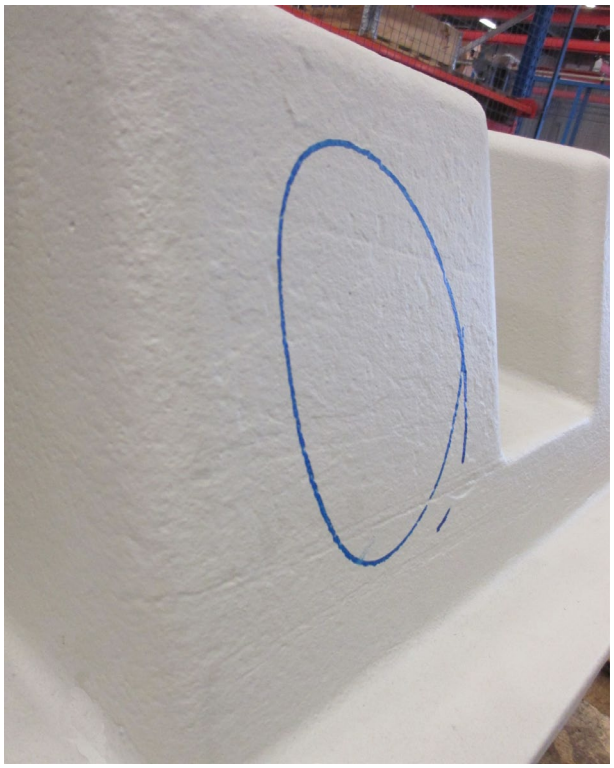
material defects

surface defects



missing material

constriction at the transition, machining marks



very rough surface