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Replacing GB/T 6967-1986

Martensitic Stainless Steel Castings for General Engineering Application

工程结构用中、高强度不锈钢铸件

(ISO 11972:1998, Corrosion-resistant cast steels for general application;
ISO 4990:2003, Steel castings – General technical delivery requirements, MOD)

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Standardization Administration of the People's Republic of China.

Table of Contents

Foreword

This standard is modified in relation to ISO 11972:1998 "Corrosion-resistant cast steels for general applications" and ISO 4990:2003 "Steel castings - General technical delivery requirements"; and it refers to the partial provisions of foreign standards such as DIN EN 10293:2005 "Steel castings for general engineering uses".

This standard is modified in relation to the combination of ISO 3755:1991 and ISO 4990:2003; the differences on main technical contents are as follows:

- The biggish editorial changes were done on structure; Chapter 6 and 7 in ISO 11972,1998 were modified; the heat treatment process was changed to be determined by supplier in Chapter 6; the supplementary requirements in Chapter 7 was modified as the Chapter 3 in this standard. Table 1 - Permissible deviations of check analysis with respect to the specified composition range and the Table 2 - Alternative material designation identification in ISO 4990:2003 were deleted; the mechanical property test block specification, sampling position and dimension in Appendix 8 were modified. This standard replaces GB/T 6967 - 1986 "Medium and high strength stainless steel castings for engineering structure purposes"; being compared to GB/T 6967-1986, the main technical content revisions are as follows:

- Two Ultra-low carbon high strength stainless steel cast brand ZG04Crl3Ni4Mo and ZG04Crl3Ni5Mo were increased; ZG06Crl3Ni6Mo was deleted.

- Low temperature impact absorbing energy and cold bent performance requirements were added;

- The Purity degree requirements for molten steel were added;

- High strength and high tenacity stainless steel cast designations that adopt refining process were added.

This standard shall be under the jurisdiction of and proposed by the National Technical Committee on Foundry of Standardization Administration of China.

Drafting organizations of this standard: Shenyang Research Institute of Foundry and KOCEL GROUP Co., Ltd.

Participating drafting organizations of this standard: Dongfang Electric Machinery Co., Ltd., China First Heavy Industries Tianjin R&D Center, China National Erzhong Group Company and Harbin electric machinery Co., Ltd. (HEC).

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Martensitic Stainless Steel Castings for General Engineering Application

1 Scope

This standard specifies the technical requirements, test methods, inspection rules, mark, packing, storage and transportation of high strength martensitic stainless steel in engineering structure uses.

This standard is applicable to the high strength martensitic stainless steel cast in engineering structure uses.

2 Normative References

The following standards contain the provisions which, through reference in this text, constitute the provisions of this standard. For dated reference, the subsequent modification or revisions of these publications do not apply. However, all parties who reach an agreement according to this standard are encouraged to study whether the latest edition of these documents is applicable. For undated references, the latest edition of the normative document is applicable to this standard.

GB/T 222 Permissible Tolerances for Chemical Composition of Steel Products

GB/T 223.3 Methods for Chemical Analysis of Iron, Steel and Alloy - The Diantipyrylmethane Phosphomolybdate Gravimetric Method for the Determination of Phosphorus Content

GB/T 223.4 Alloyed Steel - Determination of Manganese Content - Potentiometric or Visual Titration Method

GB/T 223.60 Methods for Chemical Analysis of Iron, Steel and Alloy - The Perchloric Acid Dehydration Gravimetric Method for the Determination of Silicon Content

GB/T 228 Metallic Materials - Tensile Testing at Ambient Temperature

GB/T 229 Metallic Materials - Charpy Pendulum Impact Test Method

GB/T 231.1 Metallic Materials - Brinell Hardness Test - Part 1: Test Method

GB/T 231.2 Metallic Brinell Hardness Test - Part 2: Verification and Calibration of Hardness Testers

GB/T 231.3 Metallic Brinell Hardness Test - Part 3: Calibration of Hardness Reference Blocks

GB/T 4336 Standard Test Method for Spark Discharge Atomic Emission Spectrometric Analysis of Carbon and Low-alloy Steel (Routine Method)

GB/T 5677 Radiographic Testing for Steel Castings (GB/T 5677-2007, ISO 4993:1987, IDT)

GB/T 6060.1 Roughness Comparison Specimens Cast Surfaces

GB/T 6414-1999 Castings - System of Dimensional Tolerances and Machining Allowances (GB/T 6414 - 1999, eqv ISO 8062:1994)

GB/T 7233 Methods for Ultrasonic Testing and for Specifying Quality Levels of Steel Castings

GB/T 9443 Penetrant Testing for Steel Castings

GB/T 9444 Magnetic Particle Testing for Steel Castings

3 Order Requirements

3.1 The adoptive standard, material designation, quantity, corresponding technical requirements, examination item and supply status shall be specified definitely in the order contract or order agreement by demanders; the order pattern shall be provided to suppliers.

3.2 The additional requirements beyond this standard proposed by demanders shall be confirmed basing on the agreement of both the supplier and the purchaser.

4 Technical Requirements

4.1 Chemical composition

4.1.1 The chemical composition of each cast steel designation shall be in accordance with those specified in Table1.

4.1.2 Unless otherwise specified, the residual element content shall not be regarded as the acceptance criterion.

4.1.3 For ZG04Crl3Ni4Mo and ZG04Crl3Ni5Mo, the gas content of refined molten steel shall be controlled as: [H]≤3 × 10^{-6}, [N] ≤200X10^{-6}, [O]≤100×10^{-6}, unless otherwise specified, the gas content shall not be regarded as the acceptance criterion.

shall be recognized by the demander.

4.4.4 The scalding of biggish defects shall be agreed by the demander.

4.4.5 That the depth of pits which are prepared for scalding is more than 20% of casting section thickness or 25 mm (take the smaller among two) or there is leakage for hydraulic test of pressure-bearing cast shall be regarded as the biggish defect.

4.4.6 Stress relief heat treatment shall be carried out after the scalding of biggish defects; the scalding shall be inspected according to the detection standard of the cast and qualified scalding shall be confirmed.

4.5 Dimensional Tolerances for Castings and surface roughness

4.5.1 Dimensional Tolerances for Castings and machining allowance shall meet the pattern or order agreement; if there are no provisions in the pattern or order agreement, Dimensional Tolerances for Castings and machining allowance shall meet the provisions of GB/T 6414.

4.5.2 The cast surface roughness shall meet the provisions of GB/T 6060.1.

4.6 Cast surface quality

Burr shall be repaired and casting head shall be removed for cast; the burnt on sand and oxide skin on surface shall be removed.

5 Test Methods

5.1 Chemical composition

Chemical analysis sample method shall be carried out according to GB/T 222; spectral analysis shall be carried out according to GB/T 4336; chemical composition arbitrary analysis shall be carried out according to GB/T 223.

5.2 Tensile Test

Tensile test shall be carried out according to GB/T 228.

5.3 Impact Test

Impact test shall be carried out according to GB/T 229.

5.4 Hardness Test

Hardness test shall be carried out according to GB/T 231.1~223.3.

5.5 Non-destructive Testing

one sample result which is unqualified in the second inspection, the supplier may do according to 6.4.

6.3.2 Three spare impact samples shall be taken from the same furnace order; the result and original result are added and the average value shall be calculated again. If the new average value is in accordance with those specified in Table 2, the impact value for this batch of cast is still qualified; otherwise the supplier may do according to 6.4.

6.4 Re-heat treatment

If the re-inspection result for mechanical property is still not in accordance with those specified in Table 2, the heat treat for cast and test block shall be done again; then the test shall be done according to 6.2.4 and GB/T 6967-20092.5 again; the times of re-heat treatment shall not exceed 2 (except tempering) if it's not through the agreement of the demander.

6.5 Non-destructive testing

The penetration, magnetic particle, ultrasonic wave or radiography may be adopted for cast inspection according to the order requirements of demanders. The required testing method, part and acceptance standard are determined by both parties.

7 Mark, Packing, Storage and Transportation

7.1 Mark and quality certificate

7.1.1 The following marks or parts from them shall be made on the non-finish surfaces for each cast:

a) Supplier mark;

b) Batch number;

c) Other marks required by demanders.

If marks could not be worked out on the casts, marks could be printed on the label attached to each batch of casts.

7.1.2 Ex works casts shall be attached with inspection certificate; the certificate shall include:

a) Supplier name;

b) Cast Number or batch number;

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