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Malleable Iron Castings

可锻铸铁件

(ISO 5922:2005, MOD)

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Malleable Iron Castings

1 Scope

This Standard specifies the classification and designation, technical requirements, test methods, inspection rules, marking of castings, surface protection, packaging, storage and transportation requirements for malleable iron castings.

This Standard is applicable to malleable iron castings cast in sand molds or molds with thermal conductivity equivalent to those of sand molds.

Malleable iron castings cast in other molds may also take this Standard as a reference.

2 Normative References

The clauses of the following documents become clauses of this Standard through the normative references in this Standard. In terms of references with a specified date, all subsequent amendments (excluding errata content) or revisions do not apply to this Standard. However, the various parties that reach an agreement in accordance with this Standard are encouraged to explore whether the latest versions of these documents are applicable. In terms of references without a date, the latest versions apply to this Standard.

GB/T 223.12 Methods for Chemical Analysis of Iron, Steel and Alloy - The Sodium Carbonate Separation - Diphenyl Carbazide Photometric Method for the Determination of Chromium Content

GB/T 223.59 Iron, Steel and Alloy - Determination of Phosphorus Content - Bismuth Phosphomolybdate Blue Spectrophotometric Method and Antimony Phosphomolybdate Blue Spectrophotometric 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 223.63 Methods for Chemical Analysis of Iron, Steel and Alloy - The Sodium (potassium) Periodate Photometric Method for the Determination of Manganese Content (GB/T 223.63-1988, neq ASTM E350:1985)

GB/T 223.68 Methods for Chemical Analysis of Iron, Steel and Alloy - The Potassium Iodate Titration Method after Combustion in the Pipe Furnace for the Determination of Sulfur Content

GB/T 223.69 Iron, Steel and Alloy - Determination of Carbon Contents - Gas-volumetric Method after Combustion in the Pipe Furnace

GB/T 228 Metallic Materials - Tensile Testing at Ambient Temperature (GB/T 228-2002, ISO

6892:1998, EQV)

GB/T 231.1 Metallic Materials - Brinell Hardness Test - Part 1: Test Method (GB/T 231.1-2009, ISO 6506-1:2005, MOD)

GB/T 1031 Geometrical Product Specifications (GPS) - Surface Texture: Profile Method - Surface Roughness Parameters and Their Values

GB/T 1958 Geometrical Product Specifications (GPS) - Geometrical Tolerance - Verification Prescription

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

GB/T 5612 Code for Representing Cast Iron (GB/T 5612-2008, ISO 15931:2004, MOD)

GB/T 6060.1 Roughness Comparison Specimens - Cast Surfaces (GB/T 6060.1-1997, eqv ISO 2632-3:1979)

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

GB/T 11351 Mass Tolerances of Casting

GB/T 25746 Metallographic Test for Malleable Cast Iron

JB/T 5105 Casting Pattern - Pattern Draft

3 Classification and Designation of Malleable Iron Castings

3.1 Classification

Due to the differences in properties and metallographic structure caused by chemical composition and heat treatment process, the malleable iron castings are classified into two categories. The first category: black-heart malleable iron castings and pearlitic malleable iron castings. The second category: white-heart malleable iron castings.

3.1.1 Black-heart malleable iron castings and pearlitic malleable iron castings

The metallographic structure of black-heart malleable iron castings: mainly ferrite matrix + flocculent graphite.

The metallographic structure of pearlitic malleable iron castings: mainly pearlite matrix + flocculent graphite.

3.1.2 White-heart malleable iron castings

The metallographic structure of white-heart malleable iron castings depends on the cross-

through negotiation at the time of order acceptance.

5 Technical Requirements

5.1 Production Mode

The production mode of malleable iron castings can be selected by the supply-side, but it shall be ensured that it reaches the requirements of the order agreement.

5.2 Chemical Composition

The chemical composition of malleable iron castings is selected by the supply-side and is not used as a basis for acceptance inspection. If the demand-side has requirements for chemical composition, then, they shall be stipulated in the order agreement by the demand-side and the supply-side.

5.3 Mechanical Properties

5.3.1 The mechanical properties of malleable iron castings are based on the tensile strength and elongation of tensile specimens as the basis for acceptance inspection. The mechanical properties of tensile specimens shall comply with the stipulations of Table 1 and Table 2.

5.3.2 If the demand-side has requirements for yield strength and hardness, they shall be agreed upon by the demand-side and the supply-side, and shall comply with the stipulations of Table 1 and Table 2.

5.3.3 If the demand-side has requirements for impact properties, the impact test value shall be stipulated in the supply agreement by the demand-side and the supply-side. The inspection method shall comply with the requirements of 6.5.

5.3.4 If the demand-side has requirements for other properties (such as: compression resistance, bending, torsion and elastic modulus, etc.), then, an agreement shall be reached at the time of ordering.

5.4 Metallographic Structure

If the demand-side has specific requirements for the metallographic structure, they shall comply with the demand-side's drawings and technical requirements.

5.5 Surface Quality

5.5.1 The castings shall be cleaned and excess parts shall be trimmed. The removal requirements for pouring and riser residues, adhering sand, oxide scale and inner cavity residues shall comply with the technical specifications or the order agreement between the demand-side and the supply-side.

5.5.2 The roughness of the casting surface shall comply with the stipulations of GB/T 1031 or

GB/T 6060.1, or the requirements of the demand-side's drawings and product technical standards.

5.5.3 When delivered, the castings shall comply with demand-side's rust prevention requirements.

5.6 Geometrical Shape, Machining Allowances and Dimensional Tolerances

5.6.1 The shape and position tolerances of the castings shall comply with the stipulations of GB/T 1958.

5.6.2 The machining allowances and dimensional tolerances of the castings shall comply with the stipulations of GB/T 6414. If there are special requirements, implement them in accordance with the drawings or relevant technical requirements.

5.7 Pattern Draft

The pattern draft of the castings shall comply with the stipulations of JB/T 5105. If there are special requirements, implement them in accordance with the drawings or relevant technical requirements.

5.8 Mass Tolerance

The mass tolerance of the castings shall comply with the stipulations of GB/T 11351. If there are special requirements, implement them in accordance with the drawings or relevant technical requirements.

5.9 Welding

The welding of malleable iron castings shall be carried out in accordance with the agreement between the demand-side and the supply-side. Welded castings must be subject to heat treatment. For KTB 360-12, after welding, heat treatment is not required.

5.10 Repair

Defects that do not affect the functional performance of the castings can be repaired (welding repair and other methods). The technical requirements for repair shall be determined by the demand-side and the supply-side through negotiation.

5.11 Correction

The deformation of the castings generated during heat treatment can be eliminated through the method of correction.

5.12 Special Technical Requirements

When the demand-side has special requirements (such as: wear resistance, pressure resistance, corrosion resistance, surface hot-dip galvanizing, magnetic particle inspection, ultrasonic

6.1.2 Test of tensile properties

The test of tensile properties shall be carried out in accordance with the stipulations of GB/T 228.

6.1.3 Hardness test

When determining the hardness at a determined position on the tensile specimen or casting, it is necessary to remove 1 mm ~ 2 mm from the surface. The hardness test shall be carried out in accordance with the stipulations of GB/T 231.1.

6.2 Analysis of Chemical Composition

The analysis of chemical composition shall be conducted in accordance with GB/T 4336 or GB/T 223.12, GB/T 223.59, GB/T 223.60, GB/T 223.63, GB/T 223.68, GB/T 223.69 or a method recognized by the demand-side and the supply-side.

6.3 Surface Roughness Test

The surface roughness test of malleable iron castings shall be carried out in accordance with the stipulations of GB/T 1031 or GB/T 6060.1.

6.4 Metallographic Examination

The metallographic examination of malleable iron castings shall be carried out in accordance with the stipulations of GB/T 25746-2010.

6.5 Impact Properties Test

The test method of impact properties shall be determined by the demand-side and the supply-side through negotiation, and the test value shall take Appendix A as a reference.

6.6 Determination of Mass Tolerance

The determination of mass tolerance shall be carried out in accordance with the stipulations of GB/T 11351.

7 Inspection Rules

7.1 Rights of Inspection

7.1.1 The castings shall be inspected and accepted by the supply-side's quality department.

7.1.2 The demand-side may inspect the castings.

7.1.3 When requested by the demand-side, the supply-side shall submit inspection records.

7.2 Location of Inspection

7.2.1 Unless the demand-side and the supply-side agree on inspection on the demand-side, the final inspection is generally carried out on the supply-side.

7.2.2 When there is a dispute between the supply-side and the demand-side about the quality of the castings, the inspection can be conducted by a third party that has passed the laboratory qualification recognition.

7.3 Division of Sampling Batches

7.3.1 During non-continuous production, castings poured with molten iron from the same heat (or the same package) and subsequently heat-treated in the same furnace are considered as a sampling batch.

7.3.2 During continuous production, the castings poured within every two hours or the castings heat-treated in the same furnace and with a maximum weight of 2,000 kg per batch are considered as a sampling batch. The division of batches can be determined by the demand-side and the supply-side in accordance with the supply-side's actual production conditions.

7.4 Number of Tests

Each sampling batch shall be subject to at least one tensile test.

7.4.1 Sampling of tensile specimens

For each batch of castings, cast a group of tensile specimens. The tensile specimens and the castings are separately cast under the same conditions, and at least three qualified tensile specimens are cast in each group. The tensile specimens must be marked with the corresponding heat, batch No. and sequence No.

7.4.2 Heat treatment of specimens

The specimens shall be heat-treated in the same furnace as the castings they represent.

7.5 Evaluation of Test Results

7.5.1 Sampling

Collect any tensile specimen from each batch of castings for the tensile test. If the test result reaches the requirements of this Standard, the batch of castings is qualified. If the test result does not comply with the requirements, it is allowed to double the sampling size for a re-inspection.

7.5.2 Validity of test

When the test result does not comply with the requirements due to one of the following reasons, then, the test will be invalid.

a) The tensile specimen is improperly installed on the testing machine, or the testing

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