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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 37400.5-2019

**Heavy machinery general technical specification - Part 5:
Non-ferrous metal castings**

重型机械通用技术条件 第5部分：有色金属铸件

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1 Scope

Part 5 of China's general technical specification for heavy machinery, covering non-ferrous castings. It specifies the technical requirements, the test methods, the inspection rules and the marking, quality certificates and packaging. Non-ferrous castings in a heavy machine are almost all bearing components: the bronze and brass bushes, slippers, nuts and liners that carry sliding loads against steel. They exist because two steel surfaces sliding under load seize, and a softer bearing metal does not - it embeds the particles that would otherwise score the shaft, it conforms slightly to misalignment, and if it fails it is the cheap part that is destroyed rather than the expensive one. The alloys are chosen for that duty: tin bronzes for high loads and low speeds, leaded bronzes where lubrication is marginal, aluminium bronzes where strength matters more than conformability. What the standard has to control is the soundness of a casting whose whole working surface will be machined away to a fraction of a millimetre.

This part of GB/T 37400 specifies the technical requirements, test methods, inspection rules, marks, quality certificates and packaging of nonferrous metal castings. This part applies to copper and copper alloy castings, aluminum alloy castings, zinc alloy castings produced by sand, metal, and centrifugal casting methods for heavy machinery. Other nonferrous metal castings can also be used by reference.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 228.1 Metallic materials - Tensile testing - Part 1: Method of test at room temperature

GB/T 231.1 Metallic materials - Brinell hardness test - Part 1: Test method

GB/T 1173-2013 Casting aluminum alloy

GB/T 1175-1997 Casting zinc alloy

GB/T 1176-2013 Casting copper and copper alloys

GB/T 5678 Sampling methods of spectrochemical analysis for cast alloys

GB/T 6060.1 Surface roughness comparison specimen - Part 1: Casting surface

GB/T 6414 Castings - Dimensional tolerances and geometrical tolerances and machining allowances

GB/T 37400.13 Heavy mechanical general technical specification - Part 13: Packaging

3.7.8 If the casting must be inspected for internal defects, it shall be clearly specified in the drawing or order agreement.

3.7.9 For castings that require airtightness or contain liquids, the airtightness or permeability test shall be carried out according to the drawings or order agreement.

3.7.10 If there are other requirements on the casting surface, it shall be clearly specified in the drawing or order agreement.

3.8 Repair of defects

3.8.1 If the defect is in the following situations, it shall not be repaired:

- a) Pressure-bearing or sealing parts in contact with flammable, explosive or highly toxic substances;
- b) Locations subject to high temperature, high pressure, strong corrosion;
- c) Threaded parts, the main load-bearing parts of heavy loads;
- d) Cold partitions on castings and severe defects such as sand holes, blisters, slag holes, shrinkage and slag inclusions.

3.8.2 Except for the conditions specified in 3.8.1, if welding repairs are required and can be performed on castings, it needs to be weld-repaired or repaired by other feasible methods. The defects can be removed by grinding; the size of the casting after grinding shall meet the requirements of the dimensional tolerance of the casting.

3.8.3 When performing welding repair, the surface shall be carefully cleaned and the welding process shall be worked out. The welding-repair area shall be free from defects such as cracks, lack of penetration, lack of welding. The castings shall be welded in the as-cast state. For the castings that need to be welded after heat treatment, the heat

treatment shall be performed in the original state after welding. For the heat-treated castings, it shall re-inspect the performance of single-cast or attached casting samples.

3.8.4 If the casting is deformed, it can be corrected. After correction, it shall check its geometry and the presence of cracks.

3.8.5 When the repaired parts of castings have requirements for water pressure and airtightness, relevant tests shall be carried out at

1.2 times the specified test pressure after repair. for inspection.

5.2.3 When the same alloy in different smelting furnaces is poured into a casting, if it meets the requirements of 5.2.2, it can be regarded as a batch for inspection. Otherwise, the mechanical properties of the single-cast samples shall be checked for each melting furnace.

5.3 Specimens

5.3.1 The shape and size of single-cast samples of copper and copper alloy castings shall comply with the provisions in Appendix A of GB/T 1176-2013.

5.3.2 The shape and size of single-cast samples of aluminum alloy castings shall comply with the provisions in Appendix B of GB/T 1173-2013.

5.3.3 The shape and size of single-cast samples of zinc alloy castings shall comply with the provisions of

4.4 in GB/T 1175-1997.

5.3.4 The casting mold of the single-cast sample shall use the same casting material as the casting, meanwhile it shall be poured in the same batch as the casting. For castings that need to be supplied after heat treatment, single-cast samples shall be heat-treated together with the casting.

5.3.5 If the test result is unqualified due to the defect of the sample, it shall take sample again for testing. If there is no spare sample, it can take sample from the main sample. The cutting position and size from the main sample shall be agreed between the supplier and the purchaser.

5.3.6 The average value of the tensile strength of the main sample shall not be less than 80% of the single-cast sample; the elongation shall not be less than 50% of the single-cast sample.

5.4 Number of tests, evaluation and re-inspection of test result

5.4.1 The number of tests for chemical composition and mechanical properties is one sample per batch. If there are special requirements for the number of tests, it shall be decided by the supplier and the buyer through consultation.

5.4.2 It requires one group (2 pcs) of samples for chemical composition. It allows to test one piece at the first time. If one of them meets the requirements, the batch of castings will be qualified. If the analysis results of the two samples are both unqualified, the batch of castings is unqualified.

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