GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 77.120.20

J 31

GB/T 1177-2018

Replace GB/T 1177-1991

Casting magnesium alloys

铸造锌合金

Issued on: July 13, 2018 **Implemented on: August 01, 2018**

Issued by: State Administration for Market Regulation;
Standardization Administration Committee.

Table of Contents

Casting magnesium alloys

1 Scope

This Standard specifies the designations and codes, technical requirements, test methods and inspection rules of casting magnesium alloys.

This Standard is applicable to sand and metal casting magnesium alloys.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

GB/T 228.2, *Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature*

GB/T 2039, *Metallic materials - Creep and stress-rupture test in tension*

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

GB/T 8063, *Designation of cast nonferrous metals and their alloys*

GB/T 8170, *Rules of rounding off for numerical values & expression and judgement of limiting values*

GB/T 13748.1, *Chemical analysis methods of magnesium and magnesium alloys - Part 1: Determination of aluminum content*

GB/T 13748.4, *Chemical analysis methods of magnesium and magnesium alloys - Part 4: Determination of manganese content - Periodate spectrophotometric method*

GB/T 13748.6, *Chemical analysis methods of magnesium and magnesium alloys - Determination of silver content - Determination of silver content - Flame atomic absorption spectrophotometric method*

GB/T 13748.7, *Chemical analysis methods of magnesium and magnesium*

represented by RE). The main alloy element is followed by a number indicating its nominal content (nominal content is the trimmed value of the average content of the element). If the nominal content of the alloy element is not less than 1, this number is expressed as an integer. If the nominal content of the alloy element is less than 1, generally no number shall be indicated. In the front of the alloy designation, the letter "Z" (the first letter of "casting" in Chinese pinyin) is used to indicate the casting alloy.

3.1.3 If there are more than two alloy elements, it is not necessary to list all the alloy elements in the designation except for the alloy elements which are essential to the characteristics of the alloy.

3.1.4 The main alloy elements in the designation are arranged in descending order of nominal content. When the nominal content is equal, they are arranged in alphabetical order according to their chemical symbols.

3.2 Alloy codes

The alloy code in this Standard consists of the letters "Z" and "M" (they are the first letters of the Chinese alphabet for "casting" and "magnesium") and the numbers after it, where the number indicates the sequence number of the alloy. For ZM5A, the letter "A" indicates that the magnesium ingot used in the alloy is a high-purity magnesium ingot produced by distillation.

3.3 Alloy state codes

F - Casting state;

T1 - Artificial aging;

T2 – Annealing;

T4 - Solution treatment plus natural aging;

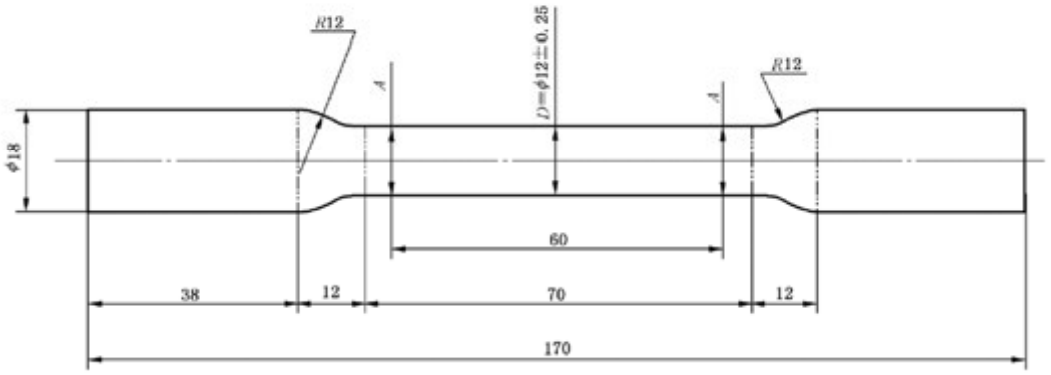
T6 - Solution treatment plus full artificial aging.

4 Technical requirements

4.1 Chemical composition

The chemical composition of casting magnesium alloy shall comply with the provisions of Table 1. The ones with upper and lower limits in the table are the primary components. When it only has one value, it shall be the upper limit allowed for non-primary components.

mm



NOTE 1: Allow to shorten the tip size of the specimen.

NTOE 2: From size A to size D, it gradually becomes smaller. Part D shall be in smooth transition.

Figure 1 -- Shae and size of san single casting specimen

4.2.4 Sand single casting specimen shall be completely covered by the same sand type for casting. Do not allow any form of additional chilling. In order to ensure the quality of single casting specimen, refer to Annex B for the casting form and the pouring riser system diagram of the recommended sand single casting specimen.

5 Test methods

5.1 Chemical composition

5.1.1 The analysis method of alloy chemical composition is according to GB/T 13748.1, GB/T 13748.4, GB/T 13748.6 ~ GB/T 13748.12, GB/T 13748.14, GB/T 13748.15, GB/T 13748.20 ~ GB/T 13748.22. Other test methods are allowed under the condition of ensuring the accuracy of the analysis.

5.1.2 When the analysis result is controversial, it shall be in accordance with GB/T 13748.1, GB/T 13748.4, GB/T 13748.6 ~ GB/T 13748.12, GB/T 13748.14, GB/T 13748.15, GB/T 13748.20 ~ GB/T 13748.22 for arbitration.

5.2 Mechanical properties

The tensile test at room temperature is carried out in accordance with the provisions of GB/T 228.1. The tensile test at high temperature is carried out in accordance with the provisions of GB/T 228.2. The creep test is carried out in accordance with the provisions of GB/T 2039.

6 Inspection rules

6.1 Batching

The same smelting furnace and the same heat treatment state are as one inspection batch. The same smelting furnace but without heat treatment are also used as an inspection batch.

6.2 Sampling method

6.2.1 Chemical composition

For alloys of same smelting furnace, before the casting or at the half of casting duration of all castings, perform casting of chemical composition specimen. Spectral specimen and sampling method for alloy chemical composition are carried out in accordance with the provisions of GB/T 5678.

6.2.2 Mechanical properties

6.2.2.1 For alloys of same smelting furnace, before the casting or at the half of casting duration of all castings, perform casting of chemical composition specimen.

6.2.2.2 Single casting specimen can be tested with cast skin. The burrs and cutting parts on the specimen shall be cleaned up. It also allows the single casting specimen to be mechanically processed to determine the mechanical properties of the alloy.

6.2.2.3 Whether sand casting or metal casting, sand single casting specimen can be used to test the mechanical properties of the alloy.

6.3 Determination and re-inspection

6.3.1 When the chemical composition of the alloy is unqualified for the first time, the re-sampling is allowed to analyze the unqualified elements. If the second analysis still fails, the chemical composition of this batch of alloys shall be unqualified.

6.3.2 For alloys of same batch, send three single casting specimens in casting state or heat treatment state at the first time to determine mechanical properties. When the mechanical properties of two or more specimens comply with the provisions of Table 2, the mechanical properties of this batch of alloys shall be qualified. If the first inspection of single casting specimen in heat treatment state fails, it may conduct sampling after heat treatment is repeated for inspection. Should it still fail, the third heat treatment is allowed. If the test results still fail, the mechanical properties of this batch of alloys shall be unqualified.

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------