



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

GB/T 38786-2020

**Testing method for cleanliness of magnesium and magnesium
alloy ingots**

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1 Scope

This Standard specifies appearance inspection, chemical composition, cleanliness testing and test report for magnesium and magnesium alloy ingots.

This Standard is applicable to cleanliness testing of magnesium and magnesium alloy ingots.

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 3499, Magnesium ingots

GB/T 5153, Designation and composition of wrought magnesium and magnesium alloys

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

GB/T 19078, Magnesium alloys ingots for castings

ISO 2470-1, Paper, board and pulps - Measurement of diffuse blue reflectance factor - Part 1: Indoor daylight conditions (ISO brightness)

ISO 8287, Magnesium and magnesium alloys - Unalloyed magnesium -Chemical composition

ISO 16220, Magnesium and magnesium alloys - Magnesium alloy ingots and castings

3 Appearance inspection

Visually inspect the impurities or surface contamination on the surface of magnesium and magnesium alloy ingots.

4 Chemical composition

The chemical composition of magnesium and magnesium alloy ingots shall meet the requirements of GB/T 3499, GB/T 5153, GB/T 19078, ISO 8287 and

ISO 16220. Unspecified alloy designations or the composition range of alloying elements shall be negotiated between the supplier and the purchaser.

5.1 Principle of cleanliness testing

The principle of cleanliness testing is based on the provisions on brightness testing in ISO 2470-1. Diffuse reflection light from a standard testing machine illuminates the fracture. The beam reflected from the fracture surface, through a designated glass filter, is measured by a photodetector that responds to different effective wavelengths OR photodiode array. Then from the photodetector or from the photodiode array that uses the appropriate weighting function, directly test the fracture brightness. For the samples prepared with the same material under standard experimental conditions, use that the brightness of the fracture surface of the sample measured by the brightness tester is inversely proportional to the number of defects on the fracture, through the tested fracture brightness value, to access the cleanliness of materials.

5.2.2 Sampling mould: is made of steel or cast iron; no pores, rust and residue

on the surface of the cavity; the shape of the inner cavity shall be cast with a smooth, uniform surface and a size that meets the requirements of brightness testing; the mould-taking mould shall adopt the size and shape as shown in

Figure 1; except for the 29.5mm diameter of the neck area (the minimum size

required for testing by the tester), the remaining dimensions can be modified but it shall ensure the sample feeding.

5.2.3 Fracture tool: a tool to interrupt the brightness testing sample at the neck

area. The tool can be freely designed. But it shall ensure that the sample can be interrupted at the neck area. The fracture tool shall adopt the shape shown in Figure 2.

5.2.4 Brightness tester: a brightness tester that can meet the testing

requirements shall be selected, in accordance with the requirements of ISO 2470-1.

5.3.2 Sample preparation: The sample shall be taken directly from the ingot or

molten metal. When the sample is taken directly from the ingot, avoid areas with casting defects such as holes, porosity, shrinkage holes. When the sample is taken directly from the molten metal, ensure that the molten metal is poured into the preheated sampling mould (5.2.2) at a uniform and gentle flow rate.

The preheating temperature of the sampling mould is not less than 150°C. After the sample is completely solidified, take out the sample.

5.3.3 Number of samples: The number of samples is at least 3, or it is stipulated

in the contract by the supplier and the purchaser.

5.4 Test steps

Use the fracture tool (5.2.3) to break the sample at the neck area. Then immediately perform the brightness testing of sample fracture on the brightness tester. The number of measurements depends on the rotation angle, as shown in Table 1. The brightness value of each sample is the average of the brightness testing results obtained at various angles.

Table 1 -- Number of measurements corresponding to rotation angles

Number of measurements	Rotation angle at each testing
8	0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°

5.5 Test data processing

Fracture brightness value is the average value of fracture brightness values of all tested samples. It is rounded off according to the numerical rounding rules specified in GB/T 8170. See Annex C for the assessment of cleanliness of magnesium and magnesium alloy ingots.

5.6 Others

If it is difficult to obtain full-size samples by machining or casting, agreed between the supplier and the purchaser, brightness testing can be carried out by directly breaking the ingot or casting. In this case, the diameter of the neck fracture shall meet mm and be recorded in the inspection report.