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**Metallograph of cast aluminum alloys -**

**Part 3: Cast aluminum alloys pinhole**

铸造铝合金金相 第3部分: 铸造铝合金针孔

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# Metallograph of cast aluminum alloys -

## Part 3: Cast aluminum alloys pinhole

### 1 Scope

This part of JB/T 7946 specifies the terms and definitions, the cutting and preparation of the specimens, the test methods and the evaluation of the results of the pinholes of cast aluminum alloys.

This part applies to the evaluation of the pinhole of cast aluminum alloys.

### 2 Normative references

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

GB/T 5611 Foundry terminology

### 3 Terms and definitions

The terms and definitions as defined in GB/T 5611 as well as the following terms and definitions apply to this document.

#### 3.1

##### **Pinhole degree**

Indicates the pinhole's severity level.

Note: Judging according to the number and diameter of pinholes in the range of 1 cm<sup>2</sup> on the surface of the sample.

### 4 Cutting and preparation of specimen

#### 4.1 Cutting of specimen

The metallographic specimen is usually taken from the thick part where the

casting is solidified slowly, it may also be cut out from the designated part of the casting according to the technical documents.

## 4.2 Preparation of specimen

**4.2.1** The surface of the specimen can be machined or polished on 400# ~ 600# sandpaper. The surface roughness Ra is not more than 1.6  $\mu\text{m}$ .

**4.2.2** The surface of the specimen shall be free from dirt or impurities. If present, the surface of the specimen shall be treated by the use of alcohol, acetone or gasoline.

**4.2.3** The surface of the machined specimen can be directly judged by the level of pinhole. It is also possible to chemically corrode the surface of the specimen and then measure the pinhole level after polishing. After polishing, at room temperature, use the 10% ~ 15% (mass fraction) aqueous sodium hydroxide solution to corrode the surface of the specimen, until a black film is formed on the surface to be inspected. The ratio of the amount of corrosive agent to the volume of the immersed part of the specimen shall be not less than 10. For corrosive agents that have been used for a long time, it shall appropriately extend the corrosion time and replace the new corrosive agents regularly.

**4.2.4** After corrosion, first use water to rinse the specimen. Then use a 20% ~ 25% (mass fraction) aqueous solution of nitric acid to remove the black film on the surface. Use water to rinse it again. Dry it.

## 5 Test methods and results assessment

**5.1** It shall assess the pinhole of the surface to be inspected under conditions of good illumination. Depending on the quality of the machining, the optimum illumination angle shall be  $10^\circ \sim 15^\circ$  with respect to the direction opposite to the inspection direction. It shall not assess the surface under scattered lighting conditions.

**5.2** Use a magnifying glass which has a magnification of not more than 10 times for inspection (only when measuring the diameter of the pinhole). Define a 10 mm  $\times$  10 mm area in the most-dense area of the pinholes, check the number and diameter of the pinholes.

**5.3** According to the test results, according to the grading standard, determine the pinhole degree. The description of grading is as shown in Table 1.

**5.4** The pinhole degree is determined according to the grading criteria listed in Table 1. Use the worst degree of sampling as the test result.

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