



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

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**Metal—Inspection method of microstructure**

**金属显微镜组织检验方法**

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# **Metal—Inspection method of microstructure**

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## **1 Subject Contents and Scope of Application**

This standard specifies the specimen preparation, specimen grinding, specimen etching, microstructure inspection, microphotograph, and test record for the inspection of metal microstructure.

This standard applies to the operation methods with metaloscope for inspection of metal microstructure.

## **2 Specimen Preparation**

### 2.1 Specimen Choice

The cutting direction, location, and quantity of the test specimen shall be determined based on the metal manufacture method, inspection objective, technical conditions or the provisions agreed upon by relevant parties.

The lateral section perpendicular to the forging and rolling direction can be used to research the metal microstructure from surface to core, microstructure status, grain fineness grade, carbide network, surface defect depth, oxide layer depth, decarburized layer depth, corrosion layer depth, chemical conversion treatment, and plating thickness.

The longitudinal section parallel to the forging and rolling direction can be used to research the deformation extent of non-metallic impurity, grain distortion extent, plastic deformation extent, various microstructures after deformation, and overall condition of heat treatment.

To check the breakage cause of the metal, it may take the specimen from the breakage location or from the normal location around the breakage location for comparison.

### 2.2 Specimen Size

It's preferable that the specimen size is  $<400\text{mm}^2$  in ground area and 15~20mm in height.

### 2.3 Specimen Cutting

The test specimen may be cut by handsaw, grinding wheel cutter, microtome, chemical cutter, electric spark cutter or by means of cutting, sawing, planing, lathing, or milling. It also may be cut by gas cutting as necessary. The specimen for stiff and brittle metal can be cut by means of hammering. No matter which cutting means is applied, cautions shall be taken to prevent the cutting means influencing the metal microstructure, such as the deformation and overheating. Depending on the different cutting means applied, measure shall be taken to remove such influence from the cutting edges. In addition, the precaution can be taken during the cutting, such as water cooling.

### 2.4 Specimen Cleaning

The specimen may be cleaned by ultrasonic. The contamination of oil stain, dirt, and rust on the surfaces of the specimen can be removed by suitable solvent. Any metal plating that may impair the sequent corrosion of base metal shall be removed before the grinding.

### 2.5 Specimen Embedment

If the specimen is too thin (such as thin sheet, slim linear metal, or slim pipe), too soft, or vulnerable to rupture or it's required to inspect the marginal microstructure or in order to facilitate to grind the specimen on automatic grinder and polishing machine, one of the following methods can be applied to embed the specimen. However, the embedment method applied shall not alter the original microstructure.

#### 2.5.1 Mechanical embedment method

Embed the specimen into the steel ring or steel clamp, as shown in Figure 1, Figure 2, and Figure 3.



Figure 1

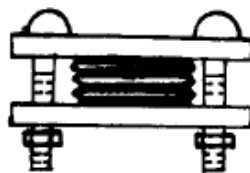


Figure 2

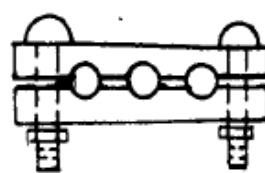


Figure 3

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