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NATIONAL STANDARD OF THE
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ICS 77.040.10

H 22

GB/T 5125-2008

Replacing GB/T 5125-1985

Method for deep drawing cups testing of non-ferrous metals

有色金属冲杯试验方法

Issued on: June 17, 2008

Implemented on: December 01, 2008

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of PRC;

National Standardization Administration.

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Method for deep drawing cups testing of non-ferrous metals

1 Scope

This standard specifies the deep drawing cups testing method for nonferrous metals.

This standard applies to the deep drawing cups testing method for nonferrous metal sheets and strips, which have a thickness of 0.10 mm ~ 3.00 mm for deep drawing at a temperature of 10 °C ~ 35 °C.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

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

GB/T 16825 (all parts) Verification of static uniaxial testing machines

JJG 583 Verification regulation of cupping testing machine

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1

Disc specimen

Disc specimen is a round blank or machined round test piece, which is punched from a thin plate or strip.

3.2

Pressure on edge

The vertical pressure, which is applied by the clamping device on the disc specimen,

- a) The universal testing machine shall be calibrated in accordance with GB/T 16825; it shall have a clamping device for applying and adjusting the blank holding force;
- b) The cup drawing test machine shall be calibrated in accordance with JJG 583.

7.2 Test tools

The test tools are as shown in Figure 1. The following basic requirements shall be met:

- a) The working surface of the punch and die shall be polished; the surface roughness parameter (Ra) shall not exceed 3.2 μm ;
- b) The punch and die shall be made of high-quality alloy steel which has a hardness of HRC58 ~ 60;
- c) The radius transition of the punch and die shall be gentle and smooth;
- d) The main dimensions of the punch and die are as shown in Table 2.

8 Test steps

8.1 According to the thickness of the disc specimen, select the appropriate punch and die according to Table 2. The punch diameter deviation is ${}^{0}_{-0.05} \text{ mm}$, the die diameter deviation is ${}^{+0.05}_{0} \text{ mm}$, the punch or die's fillet radius deviation is $\pm 0.05 \text{ mm}$.

8.2 Install the punch and die; eccentricity is not allowed.

8.3 Apply a small amount of lubricant, such as engine oil, industrial vaseline, etc., to the upper and lower surfaces of the disc specimen.

8.4 Place the disc specimen in the die.

8.5 Adjust the clamping device and apply appropriate pressure to the disc specimen, so that there will be no unstable wrinkles when the disc is stretched, meanwhile it is easy to stamp and form without breaking.

8.6 Move the punch or die at a controllable uniform speed, until the cup is punched out and the cup is not broken.

8.7 Measure the earing peak and earing valley of the cup. The measurement accuracy shall be not less than 0.05 mm.

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