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PEOPLE'S REPUBLIC OF CHINA**

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Replacing GB/T 6595-1986

**Plastics - Test method for fish eye count of polypropylene resin**

塑料 聚丙烯树脂鱼眼测试方法

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### 1 Scope

This document describes the method of testing fish eyes in polypropylene resin film specimens, using a projector and a standard orifice plate; specifies the technical requirements for detecting fish eyes in a continuous uniform motion state, using an image acquisition and analysis system during the preparation of polypropylene resin film, as well as the expression of test results and other technical contents.

This document is applicable to the preparation of film specimens using the casting method and the testing of polypropylene resin fish eyes (method A projector method), as well as the detection of polypropylene resin fish eyes during the film preparation process (method B. dynamic image analysis method); the polypropylene resin film is transparent or translucent.

### 2 Normative references

GB/T 8170

### 3 Terms and definitions

The following terms and definitions apply to this document.

#### 4.1.1 Projector

The magnification of the projector shall not be less than 8 times; the size of the observation board shall not be less than 200 mm x 200 mm.

#### **4.1.2 Projection area**

The projection area is a screen or other suitable flat object with a flat surface, uniform color and no pollution. The projection area is perpendicular to the horizontal plane.

#### **4.1.3 Standard orifice plate**

The material of the standard orifice plate is organic glass or other transparent materials, with a specification of 230 mm x 230 mm x 3 mm, and 3 standard holes with apertures of  $\phi 0.8$  mm,  $\phi 0.4$  mm,  $\phi 0.2$  mm, respectively. It has smooth edges; the aperture distance is about 12 mm. The holes are roughly located in the center of the plate.

#### **4.2.1 Prepare polypropylene film by tape casting method according to the requirements**

of Appendix A.

4.2.2 Start cutting the specimen at 1 m from the end point of the film roll of the film specimen; cut 3 specimens in total. The interval between each specimen is 5 m; the specimen shall be flat and wrinkle-free.

4.2.3 Each specimen consists of 4 layers of film with a size of not less than 250 mm x 250 mm and a thickness of  $0.030 \text{ mm} \pm 0.005 \text{ mm}$ . The 4 layers of film are fixed at one corner.

4.2.4 The test size of each film layer is 190 mm x 200 mm; the total test area of 4 layers of film is 1520 cm<sup>2</sup>.

4.2.5 The test part is more than 30 mm away from the edge of the film. When the film width is not enough, the test size in the length direction of the film can be increased to ensure that the total test area is 1520 cm<sup>2</sup>.

#### **4.3 Preparation**

4.3.1 Prepare the projection area.

4.3.2 Draw a rectangle of 190 mm x 200 mm or equal area on the observation board of the projector. When the observation board is not long enough, draw the rectangle on the stacked film during the test, or use other effective methods to ensure the film test area and area.

#### **4.3.3 Adjust the projector to the appropriate magnification; the projection light shall be**

perpendicular to the projection area.

- Scanning frequency. Adjustable;

- Camera depth of field. Not less than 2 mm.

The distance between the camera and the film shall ensure that the camera is accurately focused; the geometric center of the camera lens, film width and light source are aligned; the length direction of the camera sensor is perpendicular to the film processing direction.

The image acquisition system receives the digital image data transmitted by the camera and collects and stores the data.

#### **5.1.4 Image processing system**

The computer receives the image data and performs image analysis, size measurement, result calculation.

The image processing system can identify images that are not fish eyes.

Check whether the measured fish eye size is accurate according to Appendix B.

#### **5.2.1 Setting the matrix gray level**

Set the matrix gray level according to the instrument manufacturer's recommendations, combined with the actual test conditions and test results.

Note. The matrix gray level is usually 170 (8-bit camera).

#### **5.2.2 Setting the detection limit**

Draw a curve of the relationship between different detection limits and the number of fish eyes. The value corresponding to the inflection point of the curve is the detection limit of the film. Other effective methods can also be used to determine this value, or it can be set according to the recommendations of the instrument manufacturer.

Note. The detection limit is usually 85 (8-bit camera).

#### **5.2.3 Preparation of film**

Prepare the film according to Appendix A.

#### **5.2.4 Film detection**

After the material is fully replaced and the film meets the requirements of 5.2.3, start image acquisition and analysis.

The distance between the edge of the detection area and the edge of the film is not less than 30 mm.

The size of the fish eye is expressed as the equivalent circle diameter. The recommended sizes are  $\phi 0.8$  mm,  $\phi 0.4$  mm,  $\phi 0.2$  mm (consistent with method A). Other sizes can

also be used.

The film detection unit is 1 m<sup>2</sup>; the total area of continuous detection is not less than 5 m<sup>2</sup>. After the detection, the system stops collecting data and outputs the results; saves the image data of the fish eye.

### 5.3 Calculation and representation of results

The number of fish eyes of each size is expressed as the average value of 5 consecutive tests, rounded to one decimal place according to GB/T8170, in the unit of pieces/m<sup>2</sup>.

## 6 Precision

The fish eye test is affected by many factors such as film specimen preparation conditions, fish eye detection equipment, detection conditions. There is no accurate precision test data yet. The content related to precision will be added in the next revision.

## 7 Test report

The test report shall include the following information.

- a) Reference to this document;
- b) Test method used (Method A or Method B);
- c) Sample name;
- d) Film preparation conditions, including melt temperature, cold roller temperature, film pulling speed;
- e) Film thickness;
- f) Film size and area tested;
- g) Sensor resolution (Method B);
- h) Detection width (Method B);
- i) Optical system resolution (Method B);
- j) Light source type and brightness, including parallel light, converging light, divergent light, interference light, etc. (Method B);

The material of the standard circle card for size verification is the same as that of B.2.1.

There are standard circles with diameters of  $\phi 0.8$  mm,  $\phi 0.4$  mm,  $\phi 0.2$  mm on the standard circle card; the allowable deviation of its diameter is  $\pm 5\%$ .

### B.3 Operation steps

#### B.3.1 Distortion verification

B.3.1.1 Make the film pass through the film appearance inspection system at a uniform speed.