

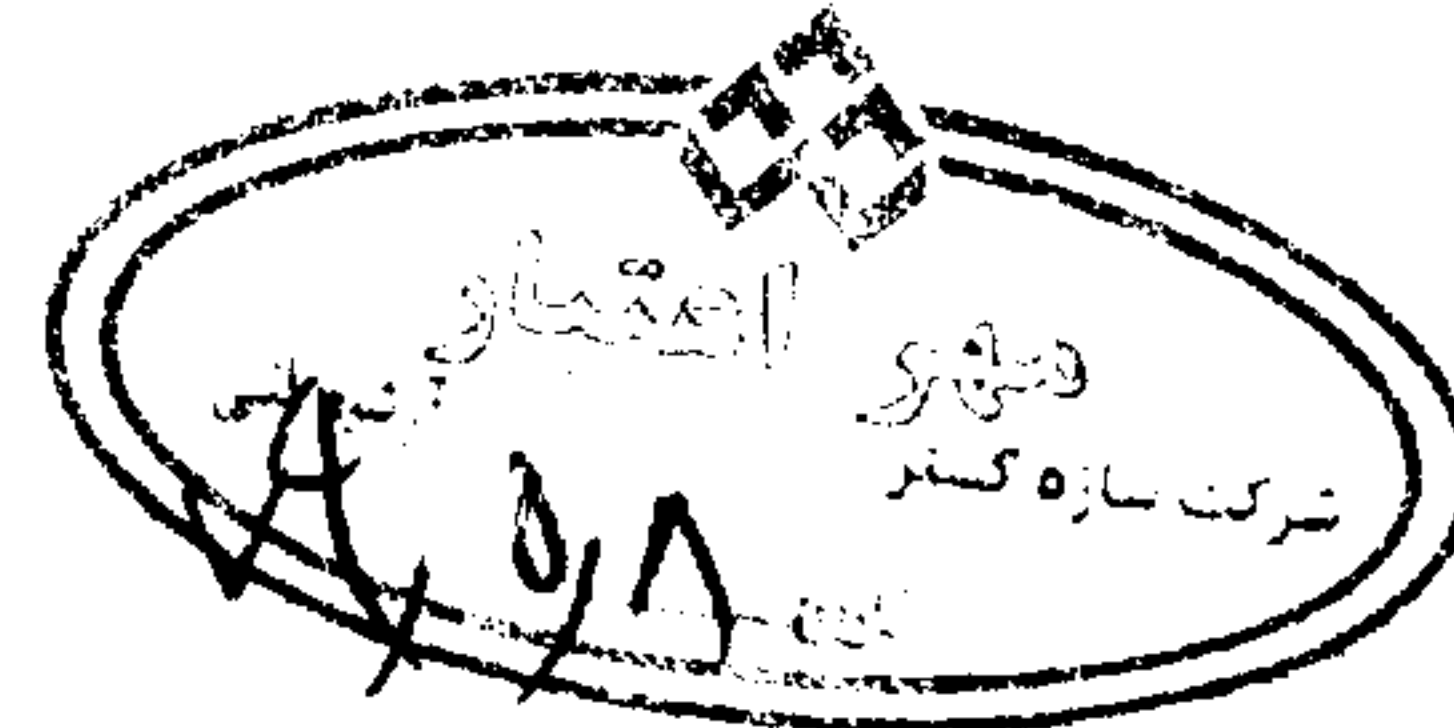
KES

Test Method of General Property for Plastics Materials

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1. Scope of Application

This standard defines the general test method for the plastic material used in the concern company.

2. Definition

The terminology in this standard is based on the KS M 3000 (plastic terminology) if it were not for special directions.

3. General Condition of Test

3.1 Standard state for a laboratory

A test is carried out principally on the condition of a temperature $20 \pm 20^{\circ}\text{C}$ and relative humidity $65 \pm 5\%$ indoor. But, a test can be carried out describing results and conditions on the other state.

3.2 Making a test sample

(1) Forming material

In principal, the condition from purchase to final forming is determined by forming material manufacturer in the case of forming material and making a test sample. For making a test sample by injection molding, the operation is based on ASTM D 1130 and a mold on ASTM D 647.

(2) Sheet and stack plate

It is noticed to suppress the heat radiation from a test sample in the process and make a test sample in a direction of length and width without special directions. But, it is not considered the both edges of forming width and length by 50mm. In the case of exempting both edges by 50mm for a small test material and remaining just one direction, it does not have to test in the vertical direction describing results with it.

(1) Stack bar and stack pipe

Notice to suppress the heat radiation of a test sample in a process and make a test sample.

3.3 Control of a test sample condition

A test condition is controlled by the kinds of plastic material before testing.

Table 1

Operation	Control of condition
A	The test sample of thickness less than 7mm : $(20 \pm 20^{\circ}\text{C}) \times (65 \pm 5\% \text{ RH} \times 40\text{hr in the atmosphere})$ The test sample of thickness more than 7mm : $(20 \pm 20^{\circ}\text{C}) \times (65 \pm 5\% \text{ RH} \times 80\text{hr in the atmosphere})$
B	Take out a test sample after putting it in a oven for $(50 \pm 1^{\circ}\text{C}) \times 48\text{hr}$ The test sample of thickness less than 7mm : in the decigater including Cacl2 for 5hr The test sample of thickness more than 7mm : in the decigater including Cacl2 for 15hr
C	$(35 \pm 1^{\circ}\text{C}) \times (90 \pm 2\% \text{ RH}) \times (96 \pm 2\text{hr})$
D	in the water $(20 \pm 1^{\circ}\text{C}) \times (24 \pm 0.5\text{hr})$
E	in the water $(50 \pm 1^{\circ}\text{C}) \times (48 \pm 0.5\text{hr})$ in the water $(20 \pm 1^{\circ}\text{C}) \times 1\text{hr}$
F	$(20 \pm 1^{\circ}\text{C}) \times (96 \pm 1\% \text{ RH}) \times (\text{test time is given in a test method})$

3.4 Dimension measurement for a test sample

The KS B 5202 (a outside micrometer) which accuracy is 0.01mm or more than is used to measure a test sample without special directions.

The chemical balance of 0.1 mg is used without special directions.

4. Measurement Specific Gravity and Density

4.1 Purpose

This test is carried to determine fluid transposition and the specific gravity and density of a solid by a piconometer.

Specific gravity (20 / 20°C) and density can be calculated by this equation :

$$\text{Density (20°C)} = \text{Specific gravity (20 / 20°C)} \times 0.9982$$

4.2 Making a test sample

The unit of making a test sample is based on ASTM D 1898 for measurement specific gravity.

Notice following items

- (1) In the case of a test sample more than 2 stack or regarding different specific gravity, the parts and the lateral section of sample shape is tested according to a finished product.

Also, a test is carried out making specially from each stack for the test sample possible to be separated into each stack.

- (2) The sample is taken to be divided equally from overall material in the case of regarding that there is possible the difference of specific gravity according to the magnitude of a particle when measuring specific gravity in the use of a piconometer.

4.3 Control of Condition

The control of condition for a test sample in paragraph 3.3, operation A is carried out before testing in the case of specific gravity and density vary too much according to the control of condition

4.4 Method A (Fluid transposition method)

4.4.1 Application

It is applied to the solid plastic which is affected by settling fluid and get wet in settling fluid using distilled water and other fluid.

4.4.2 Equipment

- (1) Chemical balance
- (2) Metal wire : the metal wire which is thin and has corrosiveness resistance and can hold a test sample
- (3) Beaker : the beaker in which settling fluid and a test sample can be put
- (4) Weight : it is used for the test in the case of specific gravity is less than settling fluid and satisfies following items
 - (a) Corrosiveness resistance
 - (b) Specific gravity more than 7.0
 - (c) The weight including a even side
 - (d) The weight which is heavy enough for setting a test sample
 - (e) The weight which has the hole to connect a test sample and metal wire
- (5) Thermometer

The thermometer of error within $\pm 1^{\circ}\text{C}$ is needed in the case of not using operation A in item 3.3 for the control of condition
- (6) Piconometer including a thermometer

It is used to measure the specific gravity of fluid in the case of other fluid as settling fluid except for distilled water
- (7) Constant temperature

It is used to measure the specific gravity of settling fluid which can maintain the temperature within $20 \pm 0.5^{\circ}\text{C}$

4.4.3 Settling fluid

The other fluid different from distilled water is used in the case of that the distilled water which is got rid of bubble by spoiling is used, but a test sample is affected by water or is lighter than water, and has less specific gravity.

Note 1. The characteristics of settling fluid are a test sample can be wet, steam pressure is low, not moisture absorption, wax and tar appearance do not remain completely after evaporation with low viscosity and high ignition point. Also, the test is carried out with the precision of the specific gravity (20 / 20°C) more than 0.1% before and after measuring the specific gravity of a test sample in the case of using the other fluid different from distilled water.

2. Measuring the specific gravity (20 / 20°C) of fluid is calculated taking each piconometer mass for emptiness and filling with distilled water and fluid by the dimension of 0.1mg using a piconometer.

The equation is as follows

$$d = (b - c) / (w - e)$$

In this equation d : Specific gravity (20 / 20°C) of fluid

e : Mass of a empty piconometer (g)

w : Mass of the piconometer filled with distilled water
(20°C) (g)

b : Mass of the piconometer filled with fluid (20 °C) (g)

4.4.4 A test sample

The desirable mass is 1~5g for the unit which is one piece made of thickness more than 1mm and volume more than 1 cm³ including even surface and edge.

Also, it is desirable to satisfy the above condition for a shape and dimension and to be made adequate for testing.

Note It is noticed to suppress density change by friction force or compression force when making a test sample, and not to include oil, grease and other different substance.

4.4.5 Operation

- (1) Measure mass of a test sample accurately by dimension of 0.1mg
- (2) Put in the beaker, remain the temperature of $20 \pm 0.5^{\circ}\text{C}$, and set the beaker not to touch the moving part of a balance
- (3) Connect a test sample and weight to metal wire, settle it in settling fluid and bind the other side of metal wire to a balance
- (4) Suppress the bubble on a test sample and weight, eliminate it using thin metal wire, and measure mass of them accurately by dimension of 0.1mg
- (5) Take mass of just a weight in settling fluid
- (6) Repeat above operation 3times
(repeat above operation by the number of a test sample)

4.4.6 Calculation

The specific gravity is calculated in the following equation

$$\text{Specific gravity (20 / 20}^{\circ}\text{C)} = (a \times b) / (a + b - c)$$

In this equation

- a: Mass of a test sample in the air (*g*)
- b: Mass of the weight connected to metal in settling wire (*g*)
- c: Mass of a test sample and the weight connected to metal wire (*g*)
- d: Mass of settling fluid(20 / 20 $^{\circ}$ C)
(d = 1.0 in the case of using distilled water)

4.5 Method B (piconometer method)

4.5.1 Application

It is applied to measure the specific gravity of plastic powder larger than 20 mesh (860 μ) not porous, flake, and powder cut or a small piece from large thing.

Note The smaller than 20 mesh is affected by static electricity and surface tension and get wet in settling fluid incompletely.

4.5.2 Equipment

- (1) Chemical balance
- (2) piconometer
- (3) Thermometer
- (4) Thermostat
- (5) Vacuum pump : Intake system or vacuum pump which is possible to decompress the fluid of 20°C or 3mmHg
A pump is composed of trap and cock to suppress the flowing backward of water and oil.
- (6) Vacuum decigater : Vacuum decigater, or bell-shape jar which sustain the decompression of atmospheric pressure 1 and can be connected to a vacuum pump

4.5.3 Settling fluid: Refer to settling fluid item in 4.4.3

4.5.4 Operation

- (1) Measure mass of piconometer which is washed and dried by dimension of 0.1mg accurately
- (2) Measure mass of piconometer described (1) after filling with settling water to indication line
- (3) Next dry a piconometer, put in specimen of 1~5g and measure the mass accurately