



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

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**Test method for thermal conductivity of plastics by means of
the guarded hot plate
(English Translation)**

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1 Definitions

1.1

Heat flux Φ . The amount of heat passing through a surface per unit time, measured in W.

1.2 Heat flux density q . The amount of heat passing through a unit area of a surface per unit

time, measured in W/m^2 .

1.3 Thermal conductivity λ . The heat flux per unit area per unit temperature gradient

perpendicular to the unit area under steady-state conditions, measured in $W/(m \cdot K)$.

2 Principle

2.1

This method is based on the principle of unidirectional stable heat conduction. When the upper and lower surfaces of the specimen are at different stable temperatures, the heat flux through the specimen's effective heat transfer area, as well as the temperature difference and thickness between the two surfaces, are measured to calculate the thermal conductivity.

3 Specimen

3.1

The specimen shall be a homogeneous hard material, with both surfaces smooth and parallel, free of cracks or other defects. For flat specimens, the unevenness is required to be within 0.5 mm/m.

When testing soft materials or granular materials, a wooden frame is required, and the specimen shall be generally homogeneous.

3.2

The specimen shall be a representative portion of the product, either cut directly from the product or prepared according to the product standard.

3.2.1

For specimens measured by the double-plate thermal conductivity testers, they shall be as similar as possible.

3.3

The specimen shall be circular or square, with a diameter or side length equal to that of the guarded hot plate and a thickness of no less than 5 mm. The maximum thickness is determined by the instrument and shall not exceed 1/8 of its diameter or side length.

3.4 Before testing, the specimen shall be conditioned according to the product standard. If no

product standard available, the specimen shall be conditioned for 24 h according to the conditions specified in GB 2918-1982 Plastics - Standard Atmospheres for Conditioning and Testing.

3.5 Each set of specimens shall consist of at least two specimens.

4.1 Test Environment. It shall comply with the normal temperature and humidity requirements

specified in GB 2918-1982.

4.2 Test conditions

Hot plate temperature. Below 333 K.

Cold plate temperature. Room temperature or the desired temperature.

The temperature difference between the hot and cold plates shall be no less than 10 K, and the temperature gradient across the specimen shall be between 400 K/m and 2000 K/m.

NOTE: If no anti-dew protection measures are in place, the cold plate temperature shall be at least 5 K above the ambient dew point.

5 Test Instrument

The instrument required by this method is a flat-plate thermal conductivity meter with a guarded hot plate. It consists of a hot plate (including a main hot plate and a guarded hot plate), a cold plate, a temperature measuring instrument, and a calorimeter.

5.1 Hot plate. The main hot plate shall have a diameter of at least 100 mm; and the minimum

width of the guarded hot plate shall be at least 1/4 of the hot plate's side length or diameter. A suitable gap shall be provided between the main and guarded hot plates, with the flat area of the gap not exceeding 8% of the main hot plate's area. The hot plates shall be flat and smooth, with surface unevenness within 0.25 mm/m. Temperature shall be uniform, with temperature fluctuations on the main hot plate not exceeding 2% of the temperature difference between the two sides of the specimen; on the guarded hot plate, not exceeding 5%. An average temperature balance detector shall be located between the main and guarded hot plates.

5.2 Cold plate. It shall have the same dimensions and unevenness requirements as the hot plate.