

JIS

JAPANESE INDUSTRIAL STANDARD

**Testing methods for particle
density of fine ceramic powder**

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Testing methods for particle density
of fine ceramic powder

R 1620-1995

1. Scope This Japanese Industrial Standard specifies the testing methods for the particle density of fine ceramic powder by pycnometry, hanging method, and gas substitution method.

Remarks 1. The following standards are cited in this Standard.

- JIS K 8101 Ethanol (99.5)
- JIS K 8271 Xylene
- JIS K 8810 1-butanol
- JIS R 3503 Glass apparatus for chemical analysis
- JIS R 6003 Methods for sampling of abrasive grains
- JIS Z 8401 Rules for rounding off of numerical values
- JIS Z 8804 Methods of measuring specific gravity of liquid

2. The units and numerical values given in { } in this Standard are based on the traditional units and are appended for informative reference.

2. Definitions For main terms used in this standard, the following definitions apply.

- (1) particle density Density of an individual of a powder particle. When a closed space is provided inside, the space is considered as a part of the individual.
- (2) pycnometry A method wherein particle density is measured by using a pycnometer.
- (3) hanging method A method wherein a container containing a sample is hung in liquid, and particle density is measured from its buoyancy.
- (4) gas substitution method A method wherein particle density is measured by using Boyle's law relating to gas.

3. Preparation of measurement

3.1 Sampling of sample A sample shall be sampled so as to represent the powder to be measured. The sampling method shall conform to the requirements specified in JIS R 6003. When reduction is required, a riffle is used or a conical quartering shall apply.

3.2 Drying of sample The sampled sample is thoroughly dried in an air bath at about 200°C, and cooled in a desiccator to room temperature. In the case of powder requiring long time for drying, the sample is thoroughly spreaded, and stirred lightly once or twice midway through drying.

3.3 Preparation of immersion liquid or gas For immersion liquid for pycnometry and hanging method, that which causes neither reaction on a sample nor dissolution shall be selected.

The gas used for the gas substitution method shall be pure helium gas of at least 99.99% purity.

Remarks 1. Xylene specified in JIS K 8271 shall be standard for immersion liquid. When reaction on powder, dissolving therein, etc. are not caused, distilled water, at least grade 1 of ethanol (99.5) specified in JIS K 8101; or 1-butanol specified in JIS K 8810 may be used.

2. For the immersion liquid in the hanging method, that wherein powder does not suspend shall be selected.

4. Measuring method

4.1 Classification of methods A measuring method shall be in accordance with any one of the following three methods.

- (1) Pycnometry
- (2) Hanging method
- (3) Gas substitution method

4.2 Pycnometry

4.2.1 Apparatus The apparatus shall be as follows.

- (1) Measuring container A measuring container shall be a pycnometer made of thin glass, and its approximate dimensions shall be 12 mm in inner diameter of inlet, 45 mm in outer diameter of drum part, and 50 mm in height of drum part (see Attached Figure 1).
- (2) Vacuum container A vacuum container can contain a pycnometer in capacity, has a structure wherein its inside conditions can be observed, and can be connected to a vacuum pump, which shall be used.
- (3) Vacuum pump A vacuum pump capable of reducing pressure to at most 666.5 Pa{5 mmHg} shall be used.
- (4) Vacuum gauge A vacuum gauge which can measure to 0 kPa to 26.66 kPa{0 mmHg to 200 mmHg} and is equipped with a graduation of at most 1.333 kPa{10 mmHg}, shall be used.