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JIS

JAPANESE INDUSTRIAL STANDARD

Testing method for resistivity of conductive plastics with a four-point probe array

JIS K 7194—1994

Translated and Published

by

Japanese Standards Association

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Testing method for resistivity of conductive plastics with a four-point probe array

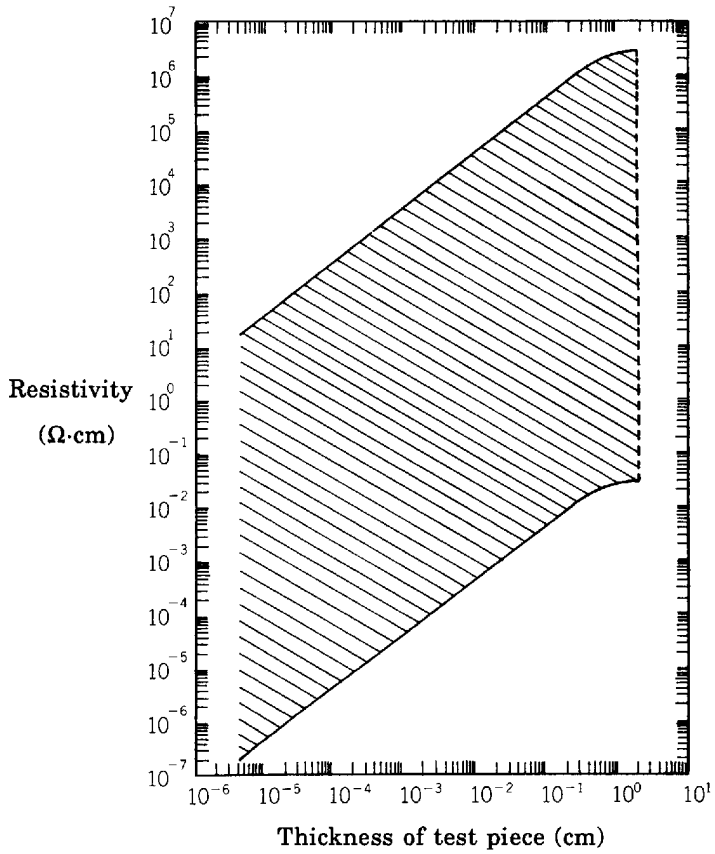
K 7194-1994

1. Scope This Japanese Industrial Standard specifies the testing method for resistivity of conductive plastics with a four-point probe array.

Remarks 1. In case conductive plastics are coated or laminated on an insulating material, this Standard can be applied if a thickness of only conductive plastics or its nominal value is known. If the thickness of the conductive plastics is not known, this Standard can not be applied.

2. Resistivity which can be measured in this Standard is limited within the range of the slant-lined part given in Fig. 1.

Fig. 1. Measurable range of resistivity



3. The following standards are cited in this Standard:

JIS B 7502 Micrometer callipers

JIS B 7507 Vernier, dial and digital callipers

JIS K 6900 Plastics — Vocabulary [ISO 472: 1988]

JIS K 7100 Standard atmospheres for conditioning and testing of plastics

JIS Z 8401 Rules for rounding off of numerical values

2. Definitions For the main terms used in this Standard the definitions in JIS K 6900 apply, and the rest of the terms are as follows:

(1) conductive plastics Plastics conductive by themselves (for example, polyacetylene or the like), those not conductive but mixed with conductive material and molded, or those coated or laminated with conductive material.

(2) four-point probe array A method for obtaining resistance of a test piece by contacting four needle probes (electrodes) with the test piece, and deriving resistance from the current passed through two outside probes and the resulting potential difference between two inside probes.

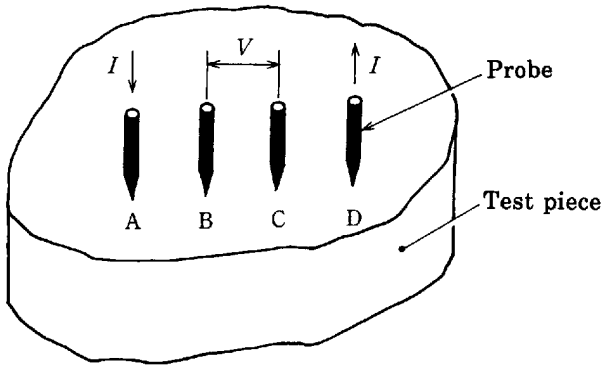
(3) correction factor A factor for correcting resistance measured with a four-point probe array, which is a non-dimensional numerical value determined by the shape and dimensions of a test piece and the position of the probe.

(4) resistivity A product of correction factor, thickness of a test piece, and resistance measured by a four-point probe array, expressed in Ω·cm.

3. Principle for measurement The principle for measurement with a four-point probe array is as follows: Four needle electrodes are linearly placed on a test piece as given in Fig. 2. When a current (I) is passed between the probe A and the probe D, the resulting potential difference (V) between the probe B and the probe C is measured, and the resistance ($\frac{V}{I}$) is obtained.

Then, resistivity (ρ) is calculated by multiplying the obtained resistance (R) by the thickness of the test piece (t) and correction factor (F) (see 8.).

Fig. 2. Principle for measurement with a four-point probe array



4. Conditioning of test piece and temperature and humidity of laboratory

4.1 Conditioning of test piece A test piece shall be, as a rule, conditioned for 24 h or longer before the test under the standard temperature condition grade 2 and standard humidity condition grade 2 which are specified in JIS K 7100 [23 ± 2°C temperature and (50 ± 5) % relative humidity].

4.2 Temperature and humidity of laboratory A test shall be, as a rule, carried out in atmosphere which is sufficiently shielded electromagnetically without mechanical vibration in the temperature and humidity which are specified in 4.1.