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**Testing methods for electrostatic
propensity of woven and knitted
fabrics**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Textile Evaluation Technology Council (JTETC)/Japanese Standard Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently, **JIS L 1094:2008** is replaced with this Standard.

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Testing methods for electrostatic propensity of woven and knitted fabrics

Introduction

This Japanese Industrial Standard was established in 1980 and has gone through four revisions including the revision at this time. The last revision was made in 2008, and the revision at this time is to respond to the revisions of standards referred to in this Standard and the actual use of testing methods.

The corresponding International Standard has not been established at this point.

1 Scope

This Standard specifies the testing methods for evaluation of electrostatic propensity of woven and knitted fabrics due to static electricity. And, in this Standard, the surface-leakage resistance measuring method, the clinging measuring method and the calibration of measuring equipment and confirmation of operation are described in Annex A, Annex B and Annex C, respectively.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) listed below shall be applied.

- JIS C 2338 *Pressure-sensitive adhesive polyester tapes for electrical purposes*
- JIS K 6741 *Unplasticized poly (vinyl chloride) (PVC-U) pipes*
- JIS L 0105 *General principles of physical testing methods for textiles*
- JIS L 0208 *Glossary of terms used in textile industry—Testing*
- JIS L 0217 *Care labelling of textile goods*
- JIS L 0803 *Standard adjacent fabrics for staining of colour fastness test*
- JIS L 1096 *Testing methods for woven and knitted fabrics*
- JIS Z 1528 *Pressure sensitive adhesive double coated tapes*
- JIS Z 1539 *Pressure sensitive adhesive polypropylene tapes for packaging*
- JIS Z 8401 *Guide to the rounding of numbers*
- ISO 6330 *Textiles—Domestic washing and drying procedures for textile testing*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS L 0105** and **JIS L 0208** apply.

4 Testing place

Tests shall be carried out in a laboratory kept at $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ temperature, and $(40 \pm 2)\%$ relative humidity.

If tests are carried out under the conditions of other temperature and humidity, that effect shall be mentioned in the test report.

NOTE : The temperature should be measured by using the Assmann psychrometer specified in **JIS Z 8806**, and then the relative humidity should be obtained according to the humidity table based on Sprung formula.

5 Classification of tests

The tests shall be classified into the following four types, and the suitable one shall be selected out of these four depending on the purpose of test.

- a) **Method A (Half-life measuring method)** This method is suitable for evaluating the attenuation characteristics of static electricity on woven and knitted fabrics. Practically, it can evaluate the degree of static cling and/or dust clinging.
- b) **Method B (Friction-charged electrostatic potential measuring method)** This method is suitable for evaluation of the electrostatic potential of static electricity occurred when woven and knitted fabrics are rubbed. Practically, it can evaluate the degree of static cling and/or dust clinging.
- c) **Method C (Frictionally charged electricity-amount measuring method)** This method is suitable for evaluation of the amount of static electricity generated by rubbing woven and knitted fabrics that contain conductive fibres. Practically, it can evaluate the degree of dust clinging and discharge interference.
- d) **Method D (Frictional electricity attenuation measuring method)** This method is a combined method of the friction-charged electrostatic potential measuring method and the frictionally charged electricity-amount measuring method. It can evaluate simultaneously the easiness of generating static electricity and its attenuation characteristics. Practically, it can evaluate the degree of static cling, dust clinging and discharge interference.

6 Taking and preparation of sample and rubbing cloth

6.1 Taking of sample and rubbing cloth

The sample and rubbing cloth shall be taken and prepared in accordance with **6.3** or **6.4** of **JIS L 0105**.

When a test piece contains streaky conductive fibres at regular interval, different results might be given depending on the sampling method, therefore, take the test piece in such a way as to make the conductive fibre be set at the centre of the test piece as shown in figure 1.

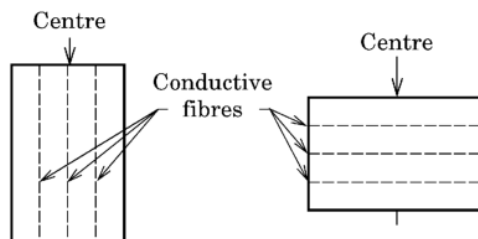


Figure 1 Taking method of test piece with conductive fibres

NOTE : Sample or rubbing cloth shall be taken with care not to be stained as far as possible by such a measure as wearing white gloves.

6.2 Washing of sample

When washing the sample, carry out according to the test method of No. 103 in attached table 1 specified in **JIS L 0217** or, 4 N or 4 M ¹⁾ specified in **ISO 6330**, repeat the procedures from washing to dewatering three times, then wash with warm water at 40 °C for 10 min, dewater ²⁾, again carry out this warm water washing and dewatering, and then dry it naturally.

Moreover, wash only sample or rubbing cloth with warm water excluding a supply cloth for bath ratio adjustment. In this case, adjust the bath ratio to 1 to 300 or more, and carry out reservoir rinsing. But if other washing method or times of washings are adopted, or when not-yet-washed sample is tested, its conditions or that effect shall be mentioned in the test report according to clause 8.

Notes ¹⁾ 4 N or 4 M shall be in accordance with table F.1 of **ISO 6330**.

²⁾ The washing tank and dewatering tank and their periphery should be sufficiently washed with flowing water so that the detergent remained on the washing tank or the dewatering tank may not stain the sample or rubbing cloth.

6.3 Warm-water washing of rubbing cloth

When washing a rubbing cloth, similarly to the method in **6.2**, wash with warm water at 40 °C for 10 min, dewater ²⁾, again carry out this warm water washing and dewatering, and then dry it naturally.

6.4 Adjustment of sample and rubbing cloth

For adjustment of taken sample and rubbing cloth, generally after carrying out the preparatory drying at 70 °C for 1 h, leave them as they are under the state of measuring temperature and humidity specified in clause 4 for at least 24 h. In the case of taking polyvinyl chloride as sample, the temperature shall be 60 °C.

7 Testing methods

7.1 Method A (Half-life measuring method)

7.1.1 Principle

For method A (half-life measuring method), after a test piece is charged at corona discharge field, the time (half-life) until this electrostatic potential is attenuated down to 1/2 is measured.

7.1.2 Apparatus

7.1.2.1 Half-life measuring apparatus The apparatus shall be composed of an impressing part to charge arbitrarily the test piece, high-voltage DC power source for making corona discharge, a turning table to rotate the test piece on it, receiving part to detect potential of test piece, its amplifier, and so on (see figure 2).

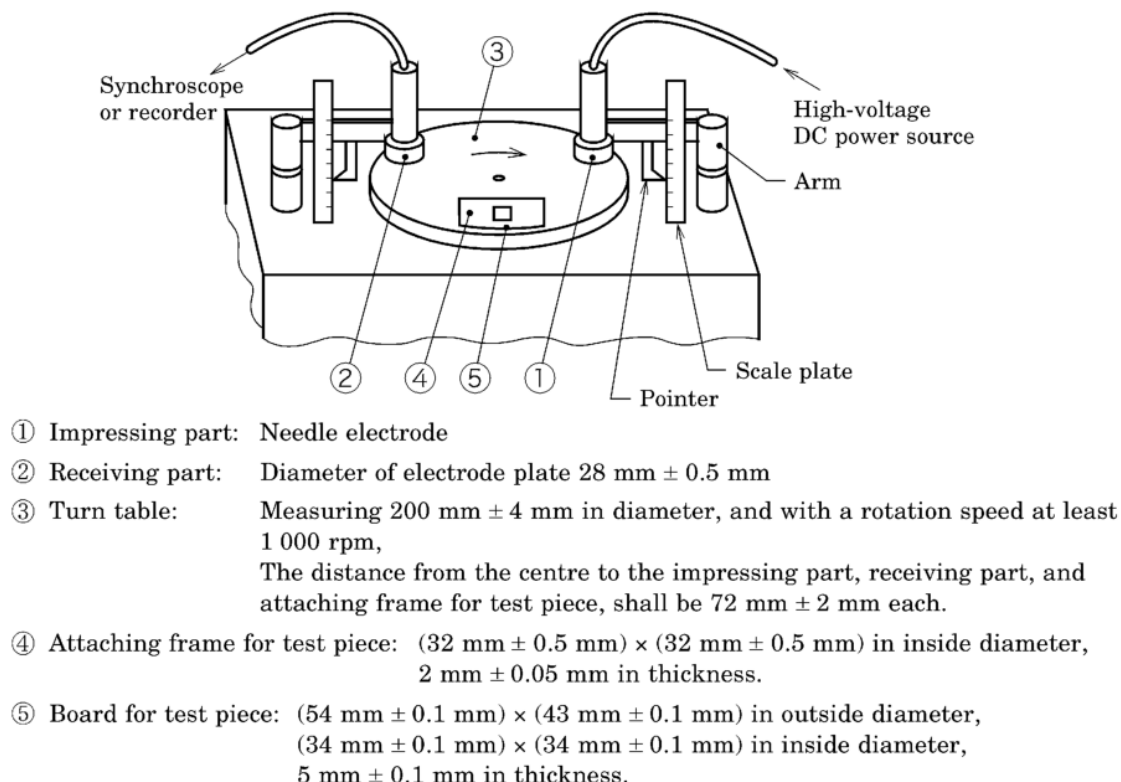


Figure 2 Example of half-life measuring apparatus

7.1.2.2 Recording device Synchroscope or recorder.

7.1.2.3 Electricity removing device Self discharging type or potential impressing type electricity remover.

7.1.3 Operation

The operation shall be carried out as follows.

- a) **Taking and preparation of test piece** Take five test pieces measuring respectively $45\text{ mm} \times 45\text{ mm}$ from the sample specified in clause 6.
- b) **Preparation of apparatus**
 - 1) Connect a half-life measuring apparatus with a recording device specified in 7.1.2.2, set the impressed voltage (–) 10 kV.
 - 2) Next, remove electricity on the test piece using an electricity removing device specified in 7.1.2.3, put it on a board for test piece with its surface upward, and fix it with a attaching frame for test piece.

- 3) Adjust respectively the distance from the end point of needle electrode of impressing part to the surface of the attaching frame for test piece to 18 mm, and the distance from the electrode of receiving part to the surface of the attaching frame for test piece to 13 mm.
- c) **Measurement** While rotating the turn table, impress the voltage of (-) 10 kV for 30 s, stop impressing, and while rotating the turn table as it is, measure the duration (s) until the electrostatic potential is attenuated to 1/2 of its original electrostatic potential. Carry out similarly the test on other four test pieces. However, if the duration needs to make its original electrostatic potential half value is 120 s or more, stop measuring when it reaches 120 s.

7.1.4 Test results

Test results shall be calculated with the mean value of five test pieces, and rounded to two significant figures according to Rule B in **JIS Z 8401**.

7.2 Method B (Friction-charged electrostatic potential measuring method)

7.2.1 Principle

For method B (friction-charged electrostatic potential measuring method), after the test piece is rubbed with rubbing cloth while rotating, the electrostatic potential occurred is measured.

7.2.2 Apparatus and materials

7.2.2.1 Friction-charged electrostatic potential measuring apparatus As shown in figure 3, the apparatus shall be composed of a rotary drum on which test piece is attached, friction device with which static electricity is generated by rubbing a test piece, receiving part to detect generated static electricity, its amplifying part, and so on.

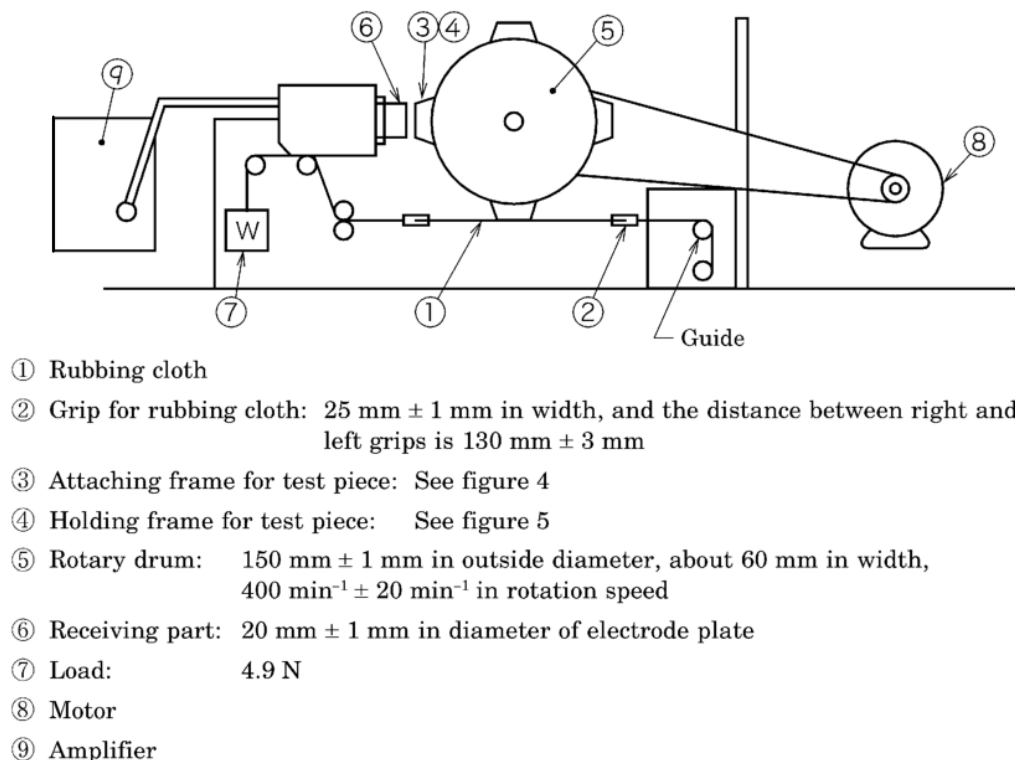


Figure 3 Example of friction-charged electrostatic potential measuring apparatus

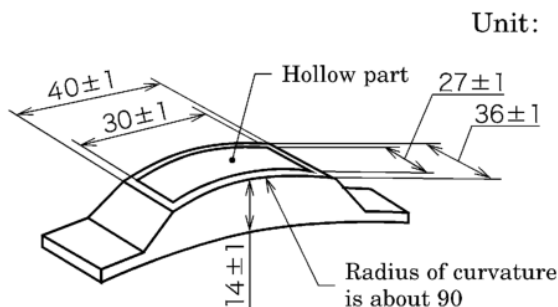


Figure 4 Attaching frame for test piece

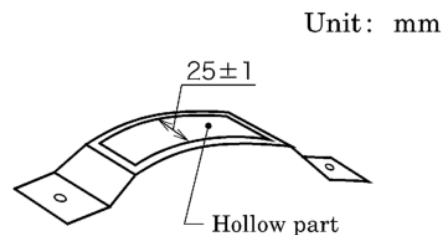


Figure 5 Holding frame for test piece

7.2.2.2 Recording device Oscilloscope or recorder.

7.2.2.3 Electricity removing device Self discharging type or potential impressing type electricity remover.

7.2.2.4 Rubbing cloth Wool (No. 1-1) and cotton (No. 3-1) standard adjacent fabric specified in **JIS L 0803**. When other rubbing cloth is used, the kind of rubbing cloth used shall be mentioned in the test report.

7.2.2.5 Adhesive tape Type 40 specified in **JIS Z 1539**.

7.2.2.6 Double coated adhesive tape Class 1 or Class 3 specified in **JIS Z 1528**.