Number	
2.6.32	
Subject	
Climate Exposure of Conductive Yarn Used in E-Textiles Applications (Temperature and Moisture)	
Date	Revision
05/2025	
Gage R&R: ☐ Complete ☑ In Progress ☐ Available ☐ NO	
Originating Task Group: Conductive Yarns for E-Textiles Test Methods Task Group	

IPC-TM-650
TEST METHODS MANUAL

1 SCOPE

This test method is used for determining the change in one or more functionally relevant parameters in conductive yarn as a result of climate exposures under cyclic temperature, cyclic humidity and prolonged exposure.

2 APPLICABLE DOCUMENTS

2.1 International Organization for Standardization (ISO)[1]

ISO 139 Textiles Standard atmospheres for conditioning and testing

3 SPECIMENS

3.1 All test specimens **shall** be conditioned for ≥ 24 hours according to ISO 139.

3.2 Each specimen **shall** be ≥ 50 cm [19.68 in].

3.3 The number of specimens **shall** be at least five.

3.4 The specimens **shall** be collected in a manner that will not affect the physical characteristics of the yarn and by using appropriate cutting tool (scissors, wire cutters, etc.).

3.5 A control specimen **shall** be retained for visual inspection comparison.

4 APPARATUS AND MATERIAL

4.1 Controlled temperature testing chamber (enclosed environmental chamber) capable of heating and cooling within the target range of temperatures at a specified testing speed. If temperature testing at different humidity levels is required, the chamber should be equipped with humidity controls. The size of the chamber **shall** be large enough to hold at least one specimen.

5 PROCEDURE

All testing **shall** be performed at standard lab conditions as specified in ISO 139.

5.1 Procedure for Cyclic Temperature Testing

5.1.1 Set the testing chamber upper and lower temperature limits, fixed humidity level and number of cycles as specified.

5.1.2 Place the samples in the chamber.

5.1.3 Run the cyclic test.

1 www.iso.org

5.1.4 Remove samples from the chamber.

5.1.5 Visually assess the yarn and note all changes that occur after the cyclic test.

5.2 Procedure for Cyclic Humidity Testing

5.2.1 Set the testing chamber upper and lower humidity limits and the fixed temperature level as specified.

5.2.2 Place the samples in the chamber.

5.2.3 Run the cyclic test.

5.2.4 Remove samples from the chamber.

5.2.5 Visually assess the yarn and note all changes that occur after the cyclic test.

5.3 Procedure for Prolonged Exposure

5.3.1 Set the testing chamber fixed temperature and humidity level as specified.

5.3.2 Place the samples in the chamber.

5.3.3 Run the prolonged exposure test.

5.3.4 Remove samples from the chamber.

5.3.5 Visually assess the sample and note all changes that occur after the prolonged exposure test.

6 TEST REPORT

The report **shall** contain the following information:

- Date and time of test
- Test Method number
- Testing location and name of tester
- Environmental test conditions (if different from ISO 139)
- Number of test specimens
- Description of test specimens
- Description/Specifications of testing equipment (type of environmental chamber equipment or high-temperature chamber equipment)
- Testing parameters/specifications if variation is possible (e.g., climate conditions)
- Number of temperature cycles and range
- Testing temperature(s)
- Testing humidity level(s)
- Duration of testing
- Intervals or cycles when functional testing has been conducted
- Visual inspection before and after cycling and exposure
- Any deviation from the procedure as specified
- Test results, including average values and standard deviations

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