IPC-TM-650
TEST METHODS MANUAL

Number 2.5.38	
Subject Fusing Current for Conductive Yarn	
Date 05/2025	Revision
Gage R&R: ☐ Complete ☑ In Progress ☐ Available ☐ NO	
Originating Task Group: Conductive Yarns for E-Textiles Test Methods Task Group	

1 SCOPE

This test specifies a method for determining the current required to achieve fusing of conductive yarns.

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 Electrodes, connection from AC/DC voltage supply

4.2 AC/DC voltage supply that can increase current at a rate of 1 mA/second.

4.3 Linear resistance measurement devices in accordance with IPC-TM-650, Method 2.5.39.

4.4 Nonconductive work surface.

5 PROCEDURE

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

5.1 Clip both ends of the conductive yarn with electrodes attached to the voltage supply. The effective length of the measurement **shall** be 100 mm.

5.2 Secure the conductive yarn so that it does not slacken.

1 www.iso.org

5.3 Apply DC or AC voltage before the test starts to precondition the specimen. The initial current **shall** read 1 mA. This preconditioned state **shall** last ≥10 seconds.

5.4 Increase the current at a rate of 1 mA/second.

5.5 The test is completed when the yarn either melts or fuses.

5.6 Record the current at time of fusing.

5.7 Repeat process for all other specimens

6 TEST REPORT

The test report **shall** include the following information:

- Date and time of test
- Test Method number
- Environmental test conditions (if different from ISO 139)
- Number of test specimens
- Description of test specimens
- Description/Specifications of testing equipment
- Test results, including average values and standard deviations
- Visual inspection before and after completion
- Any deviation from the procedure as specified

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