IPC-TM-650
TEST METHODS MANUAL

Number 2.3.44.2	
Subject Exposure to Alkali 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 method is used for determining the change in one or more functionally relevant parameters in conductive yarn as result of exposure to dilute solutions of organic and mineral alkali.

2 APPLICABLE DOCUMENTS

2.1 International Organization for Standardization (ISO)[1]

ISO 139 Textiles Standard atmospheres for conditioning and testing

ISO 3696 Water For Analytical Laboratory Use

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 Pipette or dropper

4.2 Glass rod, with a rounded end

4.3 Protective equipment

4.4 Flat-bottom glass dish large enough to contain specimen

4.5 One or more of the following alkalis, as specified

4.6 Sodium carbonate solution, containing 100g of anhydrous sodium carbonate Na_2CO_3 per L of water

4.7 Calcium hydroxide paste, containing 1g of calcium hydroxide $Ca(OH)_2$, mixed with 1g to 2g of water.

1 www.iso.org

4.8 Ammonium hydroxide, a solution containing 28% of ammonium hydroxide NH_4OH

4.9 Grade 3 water.

5 PROCEDURE

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

5.1 Sodium Carbonate (pH 11.5 to pH 11.7)

5.1.1 Place the specimen in a clean, dry, flat-bottomed dish.

5.1.2 Using dropper and glass rod, spread and apply enough alkali to cover the yarn completely.

5.1.3 Place the specimen on a flat surface and allow it to dry.

5.1.4 Brush it to remove the sodium carbonate residues.

5.1.5 If brushing is not enough to completely remove the whitish ring caused by spotting with sodium carbonate, rinse the specimen in a glass beaker for 60 seconds with 100 mL of Grade 3 water and allow it to completely dry.

5.1.6 Visually assess the wet area after 10 minutes against the control sample for no signs of white residue, repeat rinsing if necessary.

5.1.7 Visually assess the specimen once completely dry.

5.2 Calcium Hydroxide (pH 12.3 to pH 12.5)

5.2.1 Using dropper and glass rod, spread calcium the hydroxide paste to cover the yarn completely.

5.2.2 Place the specimen on a flat surface and allow it to dry.

5.2.3 Brush it to remove the calcium hydroxide residues.

5.2.4 If brushing is not enough to completely remove the whitish ring caused by spotting with calcium hydroxide, rinse the specimen in a glass beaker for 60 seconds with 100 mL of Grade 3 water and allow to dry.

5.2.5 Visually assess the wet area after 10 minutes against the control sample for no signs of white residue, repeat rinsing if necessary.

5.2.5 Visually assess the specimen once completely dry.

5.3 Ammonium Hydroxide (pH 13.5 to pH 13.7)

5.3.1 Steep the specimen in the glass dish filled with the fresh ammonium hydroxide solution for two minutes.

5.3.2 Place the specimen on a flat surface and allow it to dry without rinsing.

5.3.3 Visually assess the specimen once completely dry against the control sample.

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
- Testing parameters/specifications if variation is possible (e.g., type of solution used)
- Test results, including average values and standard deviations
- Visual inspection before and after exposure
- Any deviation from the procedure as specified

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