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## Standard Guide for In-Service Inspection, Maintenance, and Electrical Testing of Hand-Held Live-Line Insulating Tools (Fiberglass-Reinforced Plastic (FRP))<sup>1</sup>

This standard is issued under the fixed designation F3121/F3121M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—In the last line of 6.4.11, “0.083  $\mu$ A per foot at 50 Hz” was corrected editorially to “0.83  $\mu$ A per foot at 50 Hz” in March 2020.

### 1. Scope

1.1 This guide provides recommendations for in-service inspection, maintenance, and electrical testing of hand-held insulating live-line tools.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**F711 Specification for Fiberglass-Reinforced Plastic (FRP) Rod and Tube Used in Live Line Tools**

### 3. Significance and Use

3.1 Compliance with this guide should confirm known and acceptable quality of hand-held insulating live-line tools manufactured using fiberglass meeting Specification **F711**. The guidance herein is to be considered as a minimum requirement.

3.2 The user of this type of protective equipment should be knowledgeable of and instructed in the correct and safe inspection and use of this equipment.

### 4. Job Site Procedures

4.1 *Field Care, Handling, and Storage*—When not in use, hand-held insulating live-line tools should be stored where they will remain dry, clean, and where they are not subject to abuse. Hand-held insulating live-line tools used for energized-line maintenance should not be laid directly on the ground to avoid contamination or wetting. Hand-held insulating live-line tools should be placed on clean, dry tarpaulins, on moisture-proof blankets, on tool racks, or stick bags, or leaned against dry supports. When transporting hand-held insulating live-line tools, ventilated containers should be provided to prevent damage to the surfaces of them, or they should be mounted on racks in trucks or trailers. These racks should be well padded and so constructed that the hand-held insulating live-line tools are held firmly in place to prevent abrasive or bumping action against any surface that would damage the glossy surface.

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee **F18** on Electrical Protective Equipment for Workers and is the direct responsibility of Subcommittee **F18.35** on Tools & Equipment.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4.2 *Daily Inspection and Checking*—Hand-held insulating live-line tools should be visually inspected and wiped clean before use each day. Hand-held insulating live-line tools showing evidence of being mechanically or electrically compromised, such as a tingling or fuzzy sensation experienced by the user when the hand-held insulating tool is near or in contact with energized apparatus should be removed from service and evaluated for repair.

4.2.1 If any of the following observations are present, the hand-held insulating live-line tools should be removed from service and returned to the laboratory or shop for repair and electrical testing.

4.2.1.1 *Visual Inspection—Mechanical Stress:*

- (1) Cuts, scratches, nicks, gouges, dents (through the finish), or delamination in the stick surface.
- (2) Damaged, bent, worn, loose, or cracked components.
- (3) Elongated or deformed rivet ends, roll pins or fasteners.
- (4) A loss or deterioration of the glossy surface.
- (5) Improper storage or improper exposure to weather.

4.2.1.2 *Visual Inspection—Electrical Stress:*

- (1) Evidence of electrical tracking, burn marks, or blisters caused from heat.

**5. Cleaning and Waxing**

5.1 Before each use, hand-held insulating live-line tools should be wiped clean with an absorbent paper towel or a clean, absorbent cloth.

5.2 If simple wiping does not remove the contaminant, refer to the manufacturer’s cleaning instructions and then follow by waxing (carnauba or manufacturer recommended wax) or wiping with a silicone-treated cloth approved by manufacturer.

5.3 Waxing or use of silicone cloth is not necessary after every use, but rather as needed to maintain a glossy surface that will cause any moisture or water to bead on the surface. Before the hand-held insulating live-line tool is rewaxed, the surface should always be cleaned with a solvent or cleaner recommended by the manufacturer. Hollow tubes should be cleaned on the inside.

5.4 Waxing or use of silicone cloth imparts a glossy finish to the surface of the insulated tool and improves the electrical integrity by providing a protective barrier against contaminants.

**6. Periodic Inspection and Testing**

6.1 Hand-held insulating live-line tools used for primary employee protection should be removed from service every two years for examination, cleaning, repair, and testing according to this section. Use one of the following sections for the electrical testing: 6.3, 6.4, 6.5, or 6.6. Any hand-held insulating live-line tool that is rejected should be removed from service, repaired and retested, or disposed of.

6.2 *Visual Inspection Procedure*—See 4.2 for inspection procedure.

6.3 *Segmented Test Method Metering Every Segment—(Unguarded Electrodes):*

6.3.1 The test apparatus should be designed to provide the operator full protection in the performance of his duties and provide reliable means of de-energizing and grounding the high-voltage circuit. Isolate the test equipment and specimen to guard against accidental contact by persons in the vicinity.

6.3.2 Test the entire insulating length of the hand-held insulating live-line tool in accordance with Table 1.

6.3.3 Ensure that the test contacts (electrodes) are of any conductive material that will provide contact around the circumference of the test specimen (see Fig. 1). If parallel testing is performed the electrodes around the hand-held insulating live-line tool should maintain contact on the circumference of the tool. Bundle testing is not permitted.

6.3.4 Before installing a test specimen into the apparatus, a baseline leakage test should be performed that takes into account the capacitive coupling between electrodes (tester geometry) and the specific atmospheric conditions at the testing location. Baseline leakage of more than 150 μA is cause to check and repair your test apparatus. This baseline test establishes the leakage level that is inherent in the test apparatus. Repeat this procedure at least every 4 h.

6.3.5 Spray the test segment with distilled water to wet its surface thoroughly. Conductivity of the water should be 3.0 micromhos/cm or less. A clean spray applicator, adjusted to a fine mist, is suitable for this purpose.

**TABLE 1 Hand-Held Insulating Live-Line Tool Testing – Single meter for multiple segments**

| Fiberglass-Reinforced Plastic (FRP) |                        |           |
|-------------------------------------|------------------------|-----------|
| Segment Length                      | AC/DC Test Voltage, kV | Test Time |
| 152.4-mm [6-in.] segments           | 37.5                   | 5 min     |
| 304.8-mm [12-in.] segments          | 75                     | 3 min     |