



Designation: F3647 – 24

Standard Guide for In-Service Care of Temporary Insulating Plastic Guard (Cover-Up) Equipment for Protection of Workers¹

This standard is issued under the fixed designation F3647; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the in-service care, inspection, testing, and use voltage of insulating plastic guards (cover-up) for the electrical protection of workers.

1.2 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard.

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:*²

F712 Test Methods and Specifications for Electrically Insulating Plastic Guard Equipment for Protection of Workers
F819 Terminology Relating to Electrical Protective Equipment for Workers

2.2 *ANSI Standard:*³

C39.5 Safety Requirements for Electrical and Electronic Measuring and Controlling Instrumentation

3. Terminology

3.1 *Definitions*—For definitions of other terms, refer to Terminology F819.

¹ This guide is under the jurisdiction of ASTM Committee F18 on Electrical Protective Equipment for Workers and is the direct responsibility of Subcommittee F18.25 on Insulating Cover-Up Equipment.

Current edition approved Nov. 1, 2024. Published November 2024. DOI: 10.1520/F3647-24.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 1180 Avenue of the Americas, 10th Floor, New York, NY 10036, <http://www.ansi.org>.

3.1.1 *insulating plastic guards, n*—plastic guard equipment and guard systems used by workers for temporary insulation on electric power circuits, including overhead and underground applications.

4. Significance and Use

4.1 This guide covers care, storage, inspection, and testing. Work practices vary from user to user and are dependent on many factors. Factors may include, but are not limited to, operating system voltages, configuration of lines and equipment, work procedures, techniques, and weather conditions. It is the responsibility of the user to prepare complete instructions necessary to meet applicable regulations governing the use of insulating plastic guards. Instructions should include electrical testing and inspection procedures. The use of insulating plastic guards should be in accordance with the manufacturer's instructions or recommendations.

5. Field Care and Storage

5.1 *Storage*—Exposure of insulating plastic guards to chemicals, contaminants, or ultraviolet (UV) light, or combinations thereof, for long periods can lead to the reduction of dielectric or mechanical strength, or both, of the materials. Store insulating plastic guards in a clean, dry condition and in a manner to help prevent cracking or damage.

5.2 *Transportation*—Transport insulating plastic guards in a manner that will mitigate contamination and damage.

6. Visual Inspection

6.1 Before use and installation on energized conductors and equipment, visually inspect for surface contamination, wire cuts, abrasion, or cracking. Contaminated specimens should be cleaned in accordance with the manufacturers' recommendations. Visible cracks or bruises along the body of the rigid cover should not be present. Minor surface imperfections that do not affect insulating properties are not cause for rejection. Fading of the color of the guarding may indicate excess exposure to UV light or deterioration of the product. If the extent of damage warrants, remove the guard from service.

7. Electrical Testing

7.1 Users that establish a testing program for insulating plastic guards should include a test frequency and record-keeping practices. When electrical testing is performed, it should align with Test Methods and Specifications **F712** as denoted in **Table 1**.

7.2 *Testing Configuration*—The test configuration for each type of equipment consists of an inner electrode and an outer electrode. The inner electrode would typically be energized to the voltage as specified in **Table 1** and the outer electrode would typically be connected to ground potential. Some testing equipment has the outer electrode energized to the test voltage and the inner electrode connected to ground potential. It is the responsibility of the test requestor to determine the acceptability of the test configuration.

7.2.1 *Inner Electrode*—In accordance with **Tables 2 and 3**. The length should be sufficient to extend past the ends of the guard or guard assemblies where appropriate.

7.2.2 *Outer Electrode*—A conductive material with size and location as indicated in **Table 2**.

7.3 *Cleaning before Electrical Tests*—Insulating plastic guards should be cleaned before testing to remove surface contamination and prevent flashover during testing.

7.4 Procedure:

7.4.1 **Warning**—The test apparatus should be designed to afford the operators full protection in the performance of their duties. A reliable means of de-energizing and grounding the high-voltage circuit should be provided. It is particularly important to incorporate a positive means of grounding the high-voltage section of DC test apparatus because of the likely presence of high-voltage capacitance charges at the conclusion of the test (see ANSI C39.5).

7.4.2 Contaminated specimens should be cleaned in accordance with the manufacturers' recommendations.

7.4.3 When testing multiple or identical specimens, or both, identify each specimen tested.

7.4.4 Refer to **Tables 2 and 3** to determine the electrodes appropriate for the guard and type of test to be run.

7.4.5 Connect a safety ground to the de-energized bus. Set up the inner electrode of size and type indicated in **Tables 2 and 3** and install a specimen on it.

7.4.6 Install the outer electrode as indicated in **Table 2**.

7.4.7 Remove the safety ground and apply voltage at a rate of approximately 1000 V/s AC or 3000 V/s DC.

7.4.8 At the termination of the test period, decrease the voltage approximately 1000 V/s AC or 3000 V/s DC until 50 % of the test value is reached, at which point the power supply may be de-energized.

7.4.9 Connect a safety ground, remove the outer electrode, and examine the specimen.

7.5 AC Test Voltage Supply and Regulation:

7.5.1 The voltage supply and its control equipment should be of such size and design that, with the items under test in the circuit, the crest factor (ratio of maximum to mean effective) of the test voltage should not differ by more than 5 % from that of a sinusoidal wave over the upper half of the range of the test voltage.

7.5.2 The accuracy of the voltage measuring circuit should be within ± 1 kV of the test voltage. The AC voltage applied to the test specimen should be measured with either an AC voltmeter (root mean square (RMS) or average responding) or a peak responding voltmeter calibrated to pk/SQRT2 using one of the following methods: (1) a voltmeter used in conjunction with a calibrated instrument transformer connected directly across the high-voltage circuit, (2) a calibrated electrostatic voltmeter connected directly across the high-voltage circuit, or (3) an AC voltmeter connected in series with appropriate high-voltage type resistors directly across the high-voltage circuit. To ensure the continued accuracy of the test voltage as indicated by the test equipment voltmeter, calibrate the test equipment at least annually with traceability to National Institute of Standards and Technology (NIST).

7.5.3 The crest factor may be checked using a peak-reading voltmeter connected directly across the high-voltage circuit.

7.6 DC Test Voltage Supply and Regulation:

7.6.1 The DC test voltage can be obtained from a source capable of supplying a DC voltage whose peak-to-peak AC ripple component does not exceed 2 % of the average voltage value under no-load conditions.

7.6.2 Measure the DC test voltage by a method that provides the average value of the voltage applied to the test specimen. It is recommended that the voltage be measured by a DC meter connected in series with appropriate high-voltage-type resistors across the high-voltage circuit. The accuracy of the voltage-measuring circuit should be within ± 1 kV of the test voltage. Calibrate the test equipment at least annually with traceability to NIST.

TABLE 1 Withstand Voltage Proof Test^A

Class	Rating, kV	Max Use 60 Hz	Proof Test Withstand Voltage (In-Service Testing)		Duration, min	Criteria
	0-0 ^A	0-Ground	0-Ground kV			
			60 Hz	DC		
2	14.6	8.4	13.0	18	1	No flashover other than momentary as a result of too-close spacing of electrode
3	26.4	15.3	24.0	34	1	
4	36.6	21.1	32.0	45	1	
5	48.3	27.0	42.0	60	0.5	
6	72.5	41.8	64.0	91	0.25	

^A Cover-up materials are tested at values greater than the maximum use phase to ground values. The maximum use phase to phase values relate to guarded phase to guarded phase. The units are not rated for bare phase to guarded phase potentials.