



# Standard Specification for Temporary Protective Equipotential Bond Mat To Be Used on De-Energized Equipment<sup>1</sup>

This standard is issued under the fixed designation F2715; 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.

## 1. Scope

1.1 This specification covers the manufacture and testing of the temporary protective equipotential bond mat used on or around de-energized electrical equipment.

1.2 It is common practice for users of protective equipment to prepare complete instructions and regulations to govern in detail the correct use and maintenance of such equipment.

1.3 The use and maintenance of this equipment is beyond the scope of this specification.

1.4 It is recognized that the use of temporary protective equipotential bond mats requires additional equipment for installation and use, typically temporary connecting jumper assemblies.

## 2. Referenced Documents

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

[B33 Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes](#)

[D2261 Test Method for Tearing Strength of Fabrics by the Tongue \(Single Rip\) Procedure \(Constant-Rate-of-Extension Tensile Testing Machine\)](#)

2.2 *Other Standards*:

[Fed Std 191/5100 Strength and Elongation, Breaking of Woven Cloth; Grab Method](#)

[Fed Std 191/5874 Temperature, Low; Effect on Coated Cloth](#)

[Fed Std MVSS302 Flammability of Interior Materials](#)

[A-A-59551 Wire, Electrical, Copper Un-insulated](#)

## 3. Terminology

3.1 *Definitions*:

3.1.1 *bonding, n*—the mechanical interconnection of conductive parts to maintain a common electrical potential.

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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.

3.1.2 *Equipotential Grounding System, n*— temporary grounding system placed in such locations and arranged in such a manner as to minimize the likelihood of workers being exposed to hazardous differences in electrical potential.

3.1.3 *carrier, n*—the main body of the equipotential bond mat on which the flat braid conductor is sewn.

## 4. Classification

4.1 Equipotential bond mats covered under this specification shall be designated as Type I or Type II; Style 1 or Style 2; Grid Conductor 1 to 24 and Carrier Material I or II.

4.1.1 *Type I*, capable of being cascaded (joined together).

4.1.2 *Type II*, without capability of being cascaded.

4.1.3 *Style 1*, exposed conductor termination.

4.1.4 *Style 2*, jacketed conductor termination.

4.1.5 *Grid Conductor*, 1 to 6, in accordance with the normal flat width, or equivalent, of the flat braid conductors combination that makes up the grid conductor and perimeter conductor of the carrier, as shown in [Table 1](#).

4.1.6 *Carrier material I*, slip resistant.

4.1.7 *Carrier material II*, without slip resistance.

## 5. Ordering Information

5.1 Orders for equipotential bond mats under this specification shall include the ASTM designation and the following information:

5.1.1 Quantity,

5.1.2 Type,

5.1.3 Style,

5.1.4 Grid Conductor,

5.1.5 Carrier Material,

5.1.6 Size, specified in length and width dimensions, noting any specific configuration requirements; rectangular, L shape, rectangular shape with access hole in middle, etc.

5.2 The listing of types, styles, grid conductors, carrier material and size is not intended to mean that all shall necessarily be available from the manufacturers; it signifies only that, if made they shall conform to the details of this specification.

**TABLE 1 Bond Mat Conductor Size**

Grid Conductor	Grid, in.	Perimeter, in.
1	1/4	1/4
2	1/4	1/2
3	1/4	3/4
4	1/2	1/2
5	1/2	3/4
6	3/4	3/4

**6. Manufacture and Marking**

6.1 Each equipotential bond mat shall be marked clearly and permanently with the name of the manufacturer or supplier, ASTM F2715, serial number, type, and style.

**7. Chemical and Physical Requirements**

7.1 Equipotential bond mats samples selected in accordance with Section 10 shall conform to the physical and chemical requirements as specified in this section.

*7.2 Carrier Strength:*

7.2.1 *Tensile (Grab)*— Carrier material shall be capable of a tensile (grab) of 1828 – 2037 N (411 – 458 lbf) in accordance with Fed Std 191/5100.

7.2.2 *Tongue Tear*— Carrier material shall be capable of tongue tear of 485 – 516 N (109 – 116 lbf) in accordance with Test Methods D2261.

7.2.3 *Cold Flexure*— Carrier material shall be capable of a low cold crack of -40° C (-40° F) in accordance with Fed Std 191/5874-1978

7.3 Flat braid conductor shall comply with A-A-59551 and Specification B33 requirements and have the properties contained in Table 2 or greater.

7.4 *Carrier Fire Resistance*—The flame resistance of the carrier shall be performed in accordance with Fed Std MVSS302 and shall be self extinguishing.

**8. Dimensions and Permissible Variations**

8.1 Equipotential bond mat size is the combination of grid spacing and perimeter dimensional configurations.

8.2 The length and width of grid spacing shall be 200 by 200 mm (8 by 8 in.), with a permissible variation of ±25 mm (±1 in).

8.3 Thread stitch spacing shall be 6 stitches or more per 25.4 mm (6 stitches or more per 1 in).

8.4 A minimum adequate area must be provided for footing surface of 0.37 m<sup>2</sup> (4 ft<sup>2</sup>) and a minimum of 0.6 m linear (2 ft) in any direction, with a permissible variation of ±25 mm (±1 in).

**TABLE 2 Flat Braid Minimum Specifications**

Nominal Braid Width, mm (in.)	Nominal Thickness, mm (in.)	Strand AWG	No. of Strands	No. Wires Per Strand
6.35(1/4)	0.76(0.03)	36	24	7
12.7 (1/2)	0.76(0.03)	36	48	8
19 (3/4)	1.0(0.04)	36	48	18

**9. Workmanship and Finish**

9.1 Components shall be free of structural defects that affect handling or performance, or both.

9.2 Cosmetic and other surface irregularities which do not affect strength, performance, or handling, or combination thereof, are not cause for rejection.

**10. Sampling**

10.1 A product model represents a manufacturer’s design specification standard according to which the production lot is manufactured.

10.2 A production lot shall consist of all equipotential bond mats of one product model produced at one time.

10.3 A test sample consists of two specimens, selected at random, for each different test specified. When a failure occurs in one specimen from the first sample, a second sample from the same lot shall be selected and tested. If the second sample (two specimens) passes, the lot shall be accepted. If the one specimen from the second sample fails, the lot shall be rejected.

**11. Electrical Test**

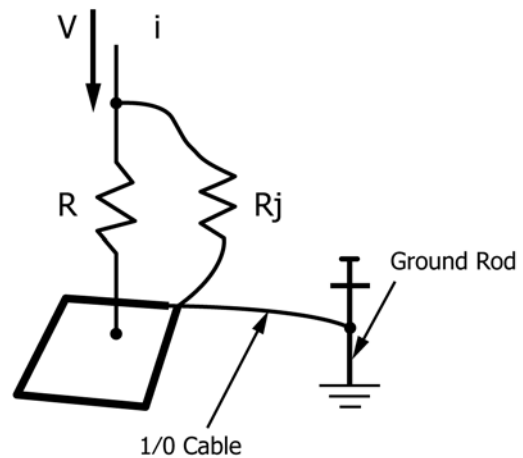
11.1 *Design Test*— The design test that follows shall be made on test samples of each product model to verify that the requirements of this specification are met.

11.1.1 Test set up configuration shall be as specified in Fig. 1.

11.1.2 Test shall be performed with grid both facing up and down.

11.1.3 The equipotential bond mat is to be placed on the earth, laid out flat, with one corner connecting strap attached to the source conductor with a 3 m (10 ft) 1/0 ground cable, with the same corner connected to a ground rod 1.22 m (4 ft) feet in the ground, with a 3 m (10 ft) 1/0 ground cable. The ground rod shall be spaced 3 m (10 ft) from the bond mat.

11.1.4 Connect a 1000 Ω resistor (±10 %) with one lead connected to a 0.3 m by 0.3 m by 11.34 kg (12 in. by 12 in. by 25 lb) steel plate in the center of the equi-potential bond mat and another lead connected to the source conductor.



**FIG. 1 Electrical Design Test**

11.1.5 Energize the source conductor at 8 kV and measure the voltage across or current through, the 1000  $\Omega$  resistor. The voltage across the resistor can be recorded by a digital oscillograph and the readings converted mathematically to current. The test current is to be measured to a precision of  $\pm 3$  %.

11.1.6 Test duration shall be 14.5 cycles minimum.

11.1.7 The voltage across the resistor shall not exceed 5 V and the current shall not exceed 0.005 amps.

#### 11.2 Resistance Test:

11.2.1 Measure the resistance, corner to corner diagonally; the resistance shall be less than 1 milliohm per foot of measured length.

## 12. Acceptance, Rejection and Rehearing

12.1 At the option of the purchaser, a production lot may be subjected to the following:

12.2 Visual inspection for workmanship and finish in accordance with Section 9. Individual equipotential bond mats that do not conform may be rejected.

12.3 Visual inspection for grid spacing, stitch compliance and adherence to manufacturer's design specification in accordance with Section 8. Individual equipotential bond mats that do not conform shall be rejected.

12.4 Chemical and Physical requirements are given in Section 7. Individual equipotential bond mats that do not conform shall be rejected.

12.5 Resistance, corner-to-corner requirements are given in 11.2. Individual equipotential bond mats that do not conform shall be rejected.

12.6 The entire lot of shipment of equipotential bond mats shall be rejected under the following conditions. Rejection

shall be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make a claim for a rehearing.

12.6.1 Rejection shall be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make a claim for a rehearing.

12.7 If electrical, or mechanical testing, or both, are required by a user prior to acceptance, minimum testing shall be done in accordance with this specification for any part or for all of the tests to be performed.

## 13. Certification

13.1 When specified in the purchase order or contract, a manufacturer's or supplier's certification shall be furnished to the purchaser that the equipotential bond mats were manufactured, sampled, tested and inspected in accordance with this specification and found to meet the requirements. When specified in the purchase order or contract, a report of design test shall be furnished.

## 14. Packaging and Package Marking

14.1 The package shall be marked with the name or logo of the manufacturer.

14.2 A packing list indicating manufacturer's product numbers and quantities of each different equipotential bond mat shall be provided with each shipment.

14.3 Each shipment shall be packaged to provide protection of the contents for the mode of transportation.

## 15. Keywords

15.1 bond; equipotential; mat

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