Designation: F2676 – 16

Standard Test Method for Determining the Protective Performance of an Arc Protective Blanket for Electric Arc Hazards[1]

This standard is issued under the fixed designation F2676; 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 test method is used to evaluate the ability of the arc protective blankets to withstand the effects of arc flash and arc blast in a configuration in which the blanket is hung or anchored near energized equipment. Specifically, this test method is used to determine the arc protective blanket's *(1)* resistance to breakopen, *(2)* mechanical strength, and *(3)* ability to self-extinguish flames following a controlled arc exposure.

1.2 This method is used to determine the performance of arc protective blankets in terms of: maximum arc current level expressed in kA and BTP (BTP) expressed as the product of arc current in kA and arc duration in number of cycles to cause breakopen (kA*cycles). Cycles are on the basis of 60 Hz.

1.3 Blanket test specimens used in this test method are test size blankets of 152 ± 5 cm (60 ± 2 in.) by 122 ± 5 cm (48 ± 2 in.). The test specimen size is for testing purposes only. Commercially available arc protective blankets either larger or smaller than the test specimen size are covered by this standard.

1.4 The arc protective blankets described in this test method are made of flame-resistant materials and are available in varying sizes and configurations based on the application.

1.5 This test method shall be used to measure and describe the properties of materials, products, or assemblies in response to incident thermal (convective and radiant) and pressure energies generated by an electric arc under controlled laboratory conditions.

1.6 The values stated in SI units shall be regarded as standard. The values given in parentheses are mathematical conversion to inch-pound or other units commonly used for arc testing.

1.7 This standard shall not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire assessment, which takes into account all of the factors, which are pertinent to an assessment of the fire hazard of a particular end use.

1.8 *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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautions, see Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D4391 Terminology Relating to The Burning Behavior of Textiles

F819 Terminology Relating to Electrical Protective Equipment for Workers

3. Terminology

3.1 *Definitions:*

3.1.1 *arc, n*—conductive path in air for the electric current caused by ionization of air between two electrodes.

3.1.2 *arc induced fragmentation, n*—molten metal fragments or other fragments emitted from an electric arc.

3.1.3 *arc protective blanket, n*—a flat assembly of fabric(s) with locations for attachment used to protect workers from the effects of arc flash and arc blast.

3.1.4 *arc protective blanket maximum arc current I_{max}, n*—maximum value of RMS arc current that blanket can withstand without breakopen for no less than ten cycles of 60 Hz.

3.1.4.1 *Discussion*—Standard values of the maximum arc current for this test method are 15 kA, 25 kA, or 40 kA.

3.1.5 *arc protective blanket breakopen threshold performance (BTP) , n*—the product of the arc current *I*, kA and arc duration in cycles required for breakopen to occur at this same arc current level.

[1] This test method is under the jurisdiction of ASTM Committee F18 on Electrical Protective Equipment for Workers and is the direct responsibility of Subcommittee F18.65 on Wearing Apparel.

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

3.1.6 *breakopen, n—in electrical arc testing,* a material response evidenced by the formation of one or more holes in the material which may allow thermal energy to pass through the material.

3.1.6.1 *Discussion*—The instant of breakopen will only be visible with a high-speed (HS) camera. The size of the breakopen will quickly expand as the arc blows through the blanket and burns back the edges of the materials. The final size of the breakopen hole is not significant, as it will depend to a great extent on the duration of the arc once the breakopen point is reached. The important measure using the HS camera is the time from arc initiation to the first evidence of arc plasma through the blanket.

3.1.7 *charring, n*—the formation of carbonaceous residue as the result of pyrolysis or incomplete combustion.

3.1.8 *directional arc, n—in arc protective blanket testing,* an arc expanding in direction of the blanket perpendicular to and centered to the blanket plane.

3.1.9 *dripping, n—in arc testing,* a material response evidenced by flowing of a specimen's material of composition and droplets separation from the material.

3.1.10 *embrittlement, n*—the formation of a brittle residue as the result of pyrolysis or incomplete combustion.

3.1.11 *ignition, n*—the initiation of combustion.

3.1.12 *ignitability, n (ignitable, adj)—in electric arc exposure,* the property of a material involving ignition accompanied by heat and light, and continued burning resulting in consumption of at least 25 % of the exposed area of the test specimen.

3.1.13 *mechanical strength, n—for an arc protective blanket,* the ability to remain attached to its support(s) in essentially its original configuration.

3.1.14 *peak arc current, n*—maximum value of the AC arc current, A.

3.1.15 *pressure wave, n*—a certain force over an area created by air movement caused by an electric arc.

3.1.16 *RMS arc current, n*—root mean square of the AC arc current, A.

3.1.17 *shrinkage, n*—a decrease in one or more dimensions of an object or material.

3.2 For definitions of other terms see Terminologies D4391 or F819.

4. Summary of Test Method

4.1 This test method determines resistance to breakopen and mechanical strength under directional arc exposure, ability to self-extinguish flames and the afterflame time of the exposed arc protective blankets. This test method simulates a condition in a vault or substation or energy center where arc protective blanket may be attached to provide protection from the thermal effects and the pressure wave experienced during an electrical arc fault. This test method replicates most severe conditions when the arc is directed and focused on the blanket.

4.2 This test method determines two ratings for arc protective blanket: Maximum Arc Current, I_{max}, and BTP.

4.3 Three nominal values of I_{max} are established in this test method: 15 kA, 25 kA and 40 kA. In this test method each arc protective blanket test specimen is intentionally forced to break open. To be considered arc rated, blanket shall withstand three times at least one of the nominal values of I_{max} without breakopen during at least 10 cycles.

NOTE 1—Additional testing at a higher I_{max} than 40 kA is permitted but the arc protective blanket shall be rated at one of the three nominal values of I_{max} which shall be the official rating.

4.4 BTP is determined as the product of arc current and arc duration causing breakopen. Arc duration is the number of 60 Hz cycles between arc initiation and breakopen of the blanket.

4.5 BTP is determined for at least three different arc current levels. A minimum value of BTP is assigned as arc rating to an arc protective blanket.

4.6 In this test method the arc electrodes configuration is designed so that the arc blast projects directionally towards the test specimen.

4.7 This test method involves observing HS video recordings to determine test specimen breakopen and afterflame time. Each trial is recorded with a HS video camera.

5. Significance and Use

5.1 This test method determines the effectiveness of arc protective blankets in suprressing the combined effects of an arc flash and arc blast.

5.2 The arc exposure energy is produced from controlled phase-to-ground arc fault. The resulting arc flash and blast energy are intentionally directed onto the test specimen to simulate worst case conditions.

5.3 Test results will describe the maximum arc current and product of arc current and cycles at which test specimens block the energy without breakopen, ability to self-extinguish afterflaming, afterflame time and the detection of mechanical attachment failures during testing. Mechanical attachment failure and afterflame time are obtained from visual observations and video recording after each arc exposure.

5.4 This test method maintains the arc protective blanket in a vertical position and does not involve movement except that resulting from the arc exposure.

5.5 In this test method, test specimens are exposed at three arc current levels to determine the test specimen's performance.

NOTE 2—In experimental testing, some blankets increase in protection (in value of kA*cycles to cause breakopen) as the arc current increases and some decrease as shown in Fig. 1. This test method is designed to recognize this behavior and to specify testing over the range of arc current levels including lower levels of 5 kA or 10 kA, or both.

5.6 This test method specifies a standard set of exposure conditions. Different exposure conditions may produce different results.

NOTE 3—In addition to the standard set of exposure conditions, it is permitted to test using other conditions representative of the expected hazard, reported all non-standard test conditions that are used.

6. Apparatus

6.1 *General Arrangement for Testing of Arc Protective Blankets*—The test apparatus shall consist of a vault containing

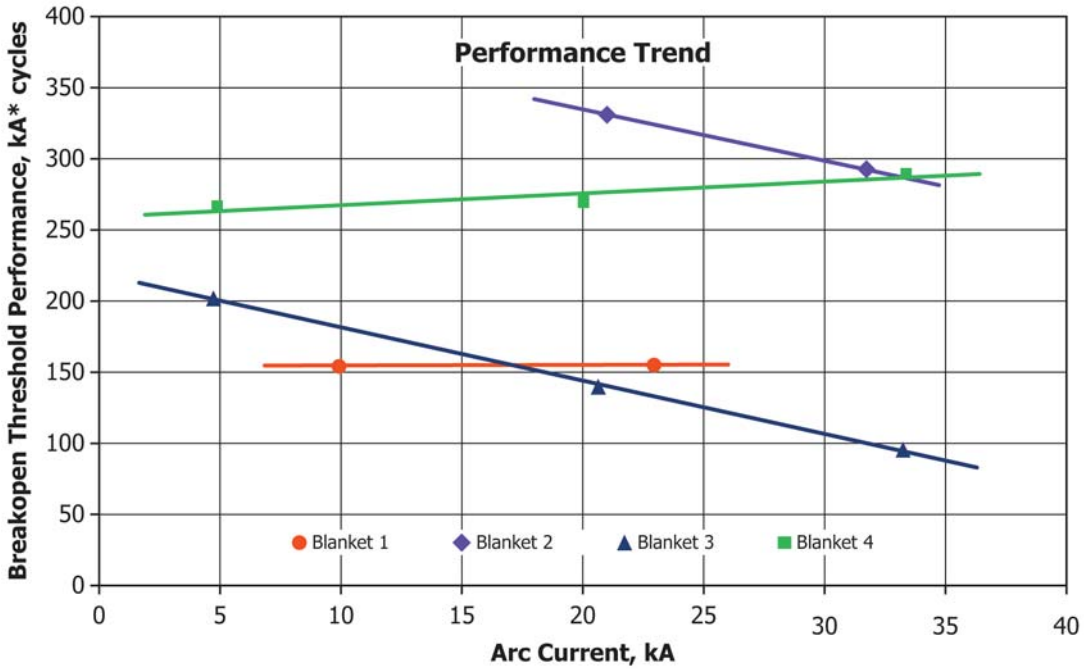

FIG. 1 Example of Performance Trend for Different Blankets

an electrode system and a blanket test specimen holding structure and a HS camera positioned outside the vault. A top view of the test apparatus in Fig. 2 shows the suggested electrode mounting supports.

6.2 *Arrangement of the Vault:*

6.2.1 Internal dimensions of the vault shall be 2.2 ± 0.3 m (7 ± 1 ft) wide, 2.2 ± 0.3 m (7 ± 1 ft) high and 2.2 ± 0.3 m (7 ± 1 ft) deep.

6.2.2 The vault shall have three solid walls (back and two sides), floor and roof and be capable of withstanding the entire range of test conditions.

6.2.3 The front is open for access to electrode system and blanket-holding structure and for providing a view for the HS camera.

6.2.4 The roof, floor and walls of the vault shall have no opening.

6.2.5 The vault may be constructed of concrete or framed plywood finished with non-conductive heat-resistant material.

6.3 *Arrangement of Arc Electrodes and Supply Bus* —Arc electrodes shall be arranged pointing at the center of the test specimen.

6.3.1 Two arc electrodes shall penetrate into the vault through a side wall.

6.3.2 Material and diameter of the arc electrodes shall be copper rod with 18-mm (0.75-in.) diameter.

6.3.3 The arc electrodes shall be positioned horizontally, parallel to each other, equidistant from the floor and the roof in vertical plane and equidistant from back wall and front opening in horizontal plane.

NOTE 4—Electromagnetic forces generated by arc current can bend or move parallel electrodes. In order to keep electrodes parallel, it is recommended to use spacers made of insulating materials.

6.3.4 The spacing between parallel arc electrodes shall be 10 ± 0.6 cm (4 ± 0.25 in.). This spacing is equal to arc gap in this test method.

6.3.5 The arc electrodes shall protrude into the vault for the distance of approximately 30 cm (12 in.) and be terminated to a supply bus outside the vault. The electrode distance to the blanket is 6 in.; this requires to be adjusted before every test.

6.3.6 Care must be taken in the position and configuration of the supply bus or feeding cables to the arc electrodes as not to adversely affect the direction or motion of the arc. For testing purposes, the arc is directed towards the blanket test specimen providing a controlled test exposure. The general arrangement of supply buses and arc electrodes is shown in Fig. 2.

6.4 *Arrangement of Blanket Test Specimen*—The test specimen of the arc protective blanket shall be arranged perpendicular to arc electrodes and at the distance of 15 ± 1 cm (6 ± 0.5 in.), from the tips of the arc electrodes.

6.4.1 The test specimen shall be attached to the blanket holding structure.

6.4.2 The blanket holding structure shall have the dimensions of 183 ± 2.5 cm (72 ± 1 in.) by 152 ± 2.5 cm (60±1 in.).

6.4.3 The blanket holding structure shall be mounded vertically and parallel to the side wall of the vault and at the distance of 46 cm (18 in.) from the side wall.

6.4.4 The blanket holding structure shall be equidistant from the floor and the roof in a vertical plane and equidistant from back wall and front opening in a horizontal plane.

6.4.5 The center of the test specimen shall be aligned with the midpoint of the arc gap.

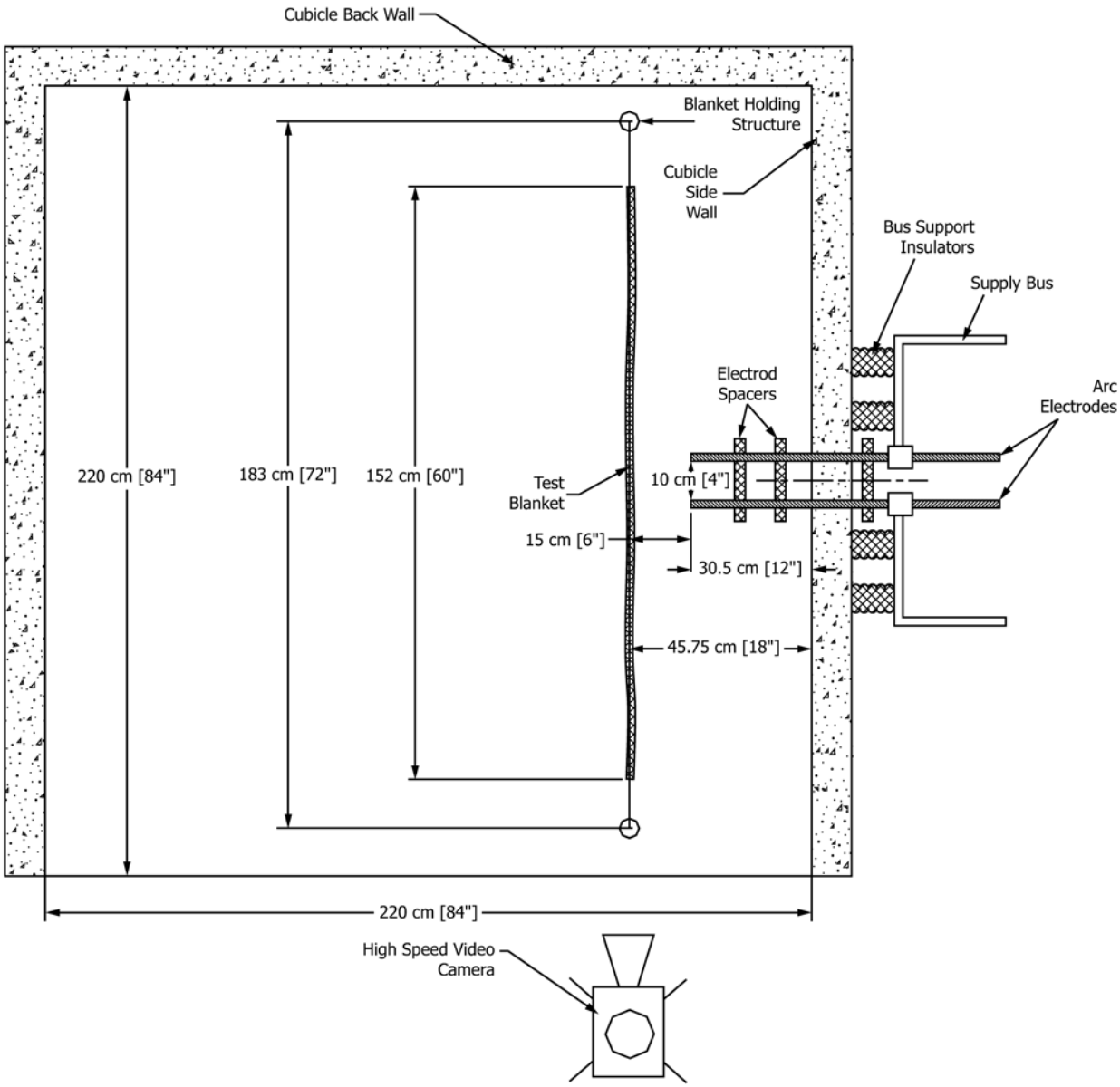

FIG. 2 Test Cubicle Set Up

6.5 *Fuse Wire*—A fuse wire, connecting the ends of electrodes tips, is used to initiate the arc. This wire is consumed during the test. The fuse wire shall be a copper 16 gauge wire.

6.6 *Electric Supply*—The electric supply shall be sufficient to allow for the discharge of an electric arc with a gap of up to 10 cm (4 in.), with alternating arc current from 5 kA up to 50 kA and with arc duration from 0.05 s (3 cycles at 60 Hz) up to 2.5 s (150 cycles at 60 Hz). The arc shall not self extinguish during the test. The X/R ratio fo the test circuit shall be such that the test current contains a DC component resulting in the first peak of the test current having a magnitude of 2.3 times the symmetrical RMS value.

6.7 *Test Circuit Control*—Repeat exposures of the arc currents shall be within the tolerance of the selected test level. The make switch shall be capable of point on wave closing within 0.2 cycles from test to test, such that the closing angle will produce maximum asymmetrical current with an X/R ratio of the test circuit as stated in 6.6. The arc current, arc duration, and arc voltage shall be measured. The arc current, duration, arc voltage and arc energy shall be displayed on a test control monitor in graph form and stored in digital format.

6.8 *Data Acquisition System*—The system shall be capable of recording voltage and current outputs with a resolution of 1 % of the applied voltage and current.

6.8.1 The current and voltage data shall be acquired at a minimum rate of 2000 samples per second.

6.8.2 The arc voltage shall be measured as close as practical to the electrodes.

6.9 *High-Speed (HS) Camera*—The camera shall have a speed of no less than 1000 frames per second. The analyzing software shall be capable of frame by frame steps with a time

index to allow the measurement of time from the arc initiation to the breakopen of the blanket.

NOTE 5—As high speed shall be used to observe the point of breakopen of test specimen and to observe the arc behavior, there are no critical factors and no exact specifications that are necessary for such a camera setting. Observing high intensity arc flash with a HS camera requires some knowledge of such photography and experience to obtain a good image. Neutral density filters are commonly used along with adjustment of the iris of the lens and camera shutter settings to obtain the desired exposure. Several arc exposures may be required to adjust the camera for the best field of view and light exposure.

NOTE 6—An additional video camera is recommended to be used for determining afterflame time if afterflame is not visible on the HS camera. An additional camera shall be positioned next to and provide the same view as the HS camera.

7. Precautions

7.1 The test apparatus discharges large amounts of energy. In addition, the electric arc produces very intense light. Take care to protect personnel working in the area. Position workers behind protective barriers or at a safe distance to prevent electrocution and contact with molten metal. Workers wishing to directly view the test shall use very heavily tinted glasses such as ANSI/ASC Filter Shade 12 welding glasses. If the test is conducted indoors, there shall be a means to ventilate the area to carry away combustion products, smoke, and fumes. Outdoor tests shall be conducted in a manner appropriate to prevent exposure of the test specimen to moisture and wind. Position the leads to the test apparatus to prevent blowout of the electric arc. Insulate the arc electrodes from ground for the appropriate test voltage.

7.2 The test apparatus, arc electrodes become hot during testing. Use protective gloves when handling these hot objects.

7.3 Use care when the specimen ignites or releases combustible gases. An appropriate fire extinguisher should be readily available. Ensure all materials are fully extinguished.

7.4 Immediately after each test, the electric supply shall be shut off from the test apparatus and all other laboratory equipment used to generate the arc. The apparatus and other laboratory equipment shall be isolated and grounded. After data acquisition has been completed, appropriate methods shall be used to ventilate the test area before it is entered by personnel. No one should enter the test area prior to exhausting all smoke and fumes.

8. Sampling and Specimen Preparation

8.1 *Test Specimens for Arc Protective Blanket:*

8.1.1 A minimum of seven test specimens shall be produced from findings, materials, and layers identical to the production arc protective blanket.

8.1.2 Quilting or seaming constructions, or both on the test specimen shall have identical surface orientation and applications as the production arc protective blanket. Quilt patterns that exceeded the test specimen dimensions shall be truncated at the specimen borders. Edge seeming shall be identical to the production arc protective blanket.

8.1.3 The test specimen shall be constructed with finished dimensions of 152 cm (60 in.) by 122 cm (48 in.).

8.1.4 The test specimen shall be replaced after each arc exposure.

8.2 *Attachment for the Test Specimens :*

8.2.1 The style and materials for attachment shall be of the same material and construction as for the production arc protective blanket.

8.2.2 Spacing between attachment points shall be the same as for the production arc protective blanket.

8.3 *Installation of Test Specimens for Testing*—The blanket should be installed tight fitting within the test frame in the same way as the production blanket. As a guide, a deflection of approximately 7 to 10 cm (3 to 4 in.) in the center of the blanket would be observed with a force of 5 kg (11 lb).

8.3.1 During the installation an adjustment of the test specimen tension shall be made manually changing tension in the attachments.

9. Apparatus Care and Maintenance

9.1 This test method is a destructive test for arc protective blanket. Each arc exposure results in burned and fractured blanket and attachment materials accumulated in the vault. Clean the vault, blanket holding structure, and arc electrodes after each arc exposure.

10. Calibration and Standardization

10.1 *Arc Exposure Calibration*—Adjustments of the test station may be required if the current is out of range of the required test levels as indicated in Table 1. The test controller should also be verified to provide the required waveform and duration. The test trials should be performed without a test specimen in place.

10.1.1 *Arc Directionality Calibration :*

10.1.1.1 Arc directionality calibration can be done at the same time with arc exposure calibration or separately following steps 10.1.1.2 through 10.1.1.4.

10.1.1.2 Discharge arc with the arc blast videotaping using HS digital video camera.

10.1.1.3 Review the videotape. Select and print out the frame with the most arc extension. Measure an angle of the arc deviation up or down from the arc electrodes horizontal plain.

10.1.1.4 From the review of the HS camera, the arc should be observed as essential horizontal coming out of the electrodes. The best effort should be made to position the supply bus and feeding cable to minimize the affect on the arc.

10.1.2 *HS Camera Time Base and Exposure Calibration:*

10.1.2.1 Record a 10-cycle calibration arc exposure.

10.1.2.2 Review the video record and measure arc duration.

10.1.2.3 Arc duration time shall be comparable with the time recorded on the data acquisition system within 3 %.

10.1.2.4 The light-exposure level of the camera should allow a good view of the arc without being completely saturated.

TABLE 1 Arc Rating Required Samples

Rated Arc Current I_{max} , kA	Test Arc Current Values, kA and No. of Samples		
15	15 (3)	10 (2)	5 (2)
25	25 (3)	15 (2)	5 (2)
40	40 (3)	25 (2)	5 (2)

11. Procedure

11.1 *General Test Procedure:*

11.1.1 A minimum of seven new test specimens of blankets are required to obtain ratings: maximum arc current and BTP.

11.1.2 The arc shall be projected horizontally towards the center of the test specimen. HS video record shall be used to observe and verify a proper direction of the arc projection.

11.1.3 The center of the test specimen shall be aligned with the midpoint of the arc gap.

11.1.4 Each trial shall be recorded with a HS video camera with a minimum speed of 1000 frames per second (1 millisecond resolution). Time to test specimen breakopen is determined using HS video record. Afterflame time may be determined using a standard video camera.

11.1.5 Each test specimen shall be intentionally tested past the point of breakopen.

11.1.6 In addition to I_{max}, test specimens shall be exposed at two more levels of test arc current. Test values of arc current are shown in Table 1. The practical tolerance on the test current is 1 kA for 15, 25, 40 kA and 500A for 10 and 5 kA.

11.1.7 At least three test specimens shall be exposed at arc current equal to Rated Maximum Arc Current and at least two specimens at each additional current level.

11.1.8 To be considered arc rated, the blanket test specimens shall withstand at least three arc current levels without breakopen for at least 10 cycles.

11.1.9 The value of BTP (product of kA*cycles) shall be calculated for each arc exposure. The average value is calculated for each arc current level exposed.

11.1.10 The lowest of the averages of BTP values resulting from exposures at three different arc current levels is assigned to arc protective blanket as BTP rating.

11.2 *Test Sequence :*

11.2.1 Select an initial arc current level based on the composition of the blanket test specimens. Based on the blanket performance at the initial current, select the three arc current test values from Table 1 based on desired (targeted) Maximum Arc Current I_{max} for the test Blanket.

11.2.2 Adjust test controller to produce arc current equal to desired Maximum Arc Current I_{max} with 10 cycles duration and discharge an arc without test specimen installed. Videotape an arc using the HS video camera.

11.2.3 Review the actual test parameters: symmetrical and peak currents, directionality of arc, and HS camera time base. Test parameters shall meet requirements of 10.1.1.4 and 10.1.2.3.

11.2.4 Install the test specimen following the requirements of 8.3 and take a picture before arc exposure.

11.2.5 Adjust the test controller to produce an arc current equal to a desired rated Maximum Arc Current I_{max}. Duration of an arc current shall be long enough to cause breakopen of the test specimen. Discharge the arc. Videotape an arc exposure using a HS video camera. Inspect conditions of the attachments. Take a picture after exposure showing test specimen condition including attachments.

11.2.6 Review the video record of exposure and determine the time interval between arc initiation and breakopen point of the test specimen in milliseconds. Recalculate time interval into number of cycles.

11.2.7 The test specimen shall withstand the arc without breakopen for at least 10 cycles.

NOTE 7—If arc duration was not long enough to cause breakopen, repeat expose with extended arc duration and a new test specimen installed.

NOTE 8—If arc duration was too long and arc lasted well beyond breakopen point, reduce arc duration to approximately 30 % longer than the time at the breakopen point.

11.2.8 Calculate the value of BTP as a product of the arc current value and the number of cycles causing breakopen for each exposure.

11.2.9 Complete two more arc exposures at the Maximum Arc Current I_{max} level. Discontinue testing at the selected arc current level if time to breakopen is less than 10 cycles.

11.2.10 Adjust the test controller to produce a second level of test arc current and complete two exposures following the requirements of 11.2.6 – 11.2.8.

11.2.11 Adjust the test controller to produce a third level of test arc current and complete two exposures following the requirements of 11.2.6 – 11.2.8.

12. Interpretation of Results

12.1 *Arc Ratings:*

12.1.1 The arc protective blanket is considered arc rated if all seven test specimens withstood 10 cycles without breakopen at three different arc current levels as identified in 11.1.8. The highest of these three arc current levels tested is assigned as Maximum Arc Current I_{max} of arc protective blanket.

12.1.2 BTP (BTP) Rating is the lowest of three average values resulting from exposures at three different arc currents.

12.2 *Mechanical Strength:*

12.2.1 The attachment points shall hold the blanket specimen in place for the duration of the arc. Mechanical rapture of any attachment point is considered a failure with no rating assigned to an arc protective blanket and shall be noted in the report.

12.2.2 If an attachment point failure occurs after the arc is extinguished due to a thermal effect of the arc, and the blanket specimen remains suspended, the test shall be valid. Attachment devices shall not ignite and burn to the point where the attachments fails to secure the blanket specimen to the holding structure. Melting and dripping of attachments is considered a failure with no rating assigned and shall be noted in the report.

12.2.3 1Blanket fragments or projectiles becoming detached and flying away from the blanket test specimen can be a cause for failure of a blanket. For a projectile failure, the blanket fragment shall become detached before the breakopen point of the blanket test specimen.

12.3 *Afterflame Time:*

12.3.1 Afterflame time for the blanket specimen or attachments exceeding 30 s shall cause the test specimen to fail. As the specimen is taken to thermal and mechanical failure, the afterflame should be measured on test exposures with a total arc duration no more than 30 % longer than the time of the breakopen point.

12.4 *Subjective Data*—— Observe and note the effect of the exposure after test specimens have cooled. This may be described by one or more of the following terms described in Section 3: *(1)* breakopen, *(2)* melting, *(3)* dripping, *(4)* charring, *(5)* embrittlement, *(6)* shrinkage and *(7)* ignition.

13. Report

13.1 The report shall include a statement that testing has been performed in accordance with this test method.

13.2 Report the following information:

13.2.1 Arc protective blanket description including the following: *(1)* manufacture, *(2)* part number, *(3)* style, *(4)* construction, *(5)* number of attachment points per test specimen, *(6)* weight of each fabric layer, *(7)* dimensions.

13.2.2 Conditions of each arc exposure, including the following: *(1)* test number, *(2)* RMS arc current, *(3)* peak arc current, *(4)* arc gap, *(5)* arc duration, *(6)* arc energy, and *(7)* plot of arc current.

13.2.3 Test data to include: *(1)* test ID number, *(2)* dimensions of the arc protective blanket, *(3)* distance from the arc electrodes to the arc protective blanket, *(4)* photographs of exposed test specimen, *(5)* video records of each arc exposure, *(6)* I_{max} of the blanket, *(7)* BTP values and averages at three arc current levels for the arc protective blanket, *(8)* condition of attachments, *(9)* afterflame time of the blanket specimen and the attachments for each test exposure, *(10)* subjective data.

13.2.4 Any variation to the prescribed test conditions.

13.3 Report any abnormalities relating to the test apparatus and test controller.

13.4 Return the exposed specimens, plots, test data, and unused specimens to the person requesting the test, in accordance with any prior arrangement. All test specimens shall be marked with an identifying reference to its respective testing number and testing date for test data association and tracking purposes.

14. Precision and Bias

14.1 *Precision:*

14.1.1 An intra-laboratory test program to determine method precision was sponsored and funded by Arc Protective Blanket Manufacturers and Distributors, Consultant Firms, and Utilities and supported by ASTM. The testing was conducted by F18.65 WK 14926 at Kinectrics; Inc., Toronto, Ontario, Canada. The data was generated May 29-30, 2008 at the High Current Testing facility using test apparatus specified in this standard.

14.1.2 No information is presented for measuring the precision and bias for the Maximum Arc Current rating of an arc protective blanket since the test result is not quantitative.

NOTE 9—Maximum Arc Current Rating of the arc protective blanket is pass/fail in nature and no values are measured or calculated.

14.1.3 BTP rating of arc protective blanket is a calculated value.

14.1.4 Six specimens of commercially available arc protective blankets were selected for testing. Specimens one through six were used to determine precision of the BTP.

14.1.5 The results of intra-laboratory precision study are shown in Table 2.

14.1.6 *Repeatability*—The repeatability, *r*, of this test method has been established as the value tabulated in Table 1. Two single test results, obtained in the same laboratory under normal test method procedures that differ by more than this tabulated *r* must be considered as derived from different or nonidentical specimen populations.

14.1.7 *Reproducibility*—The reproducibility of this test method was not established as there is only one testing facility in North America currently capable of performing the test.

14.2 *Bias:*

14.2.1 Values of Breakopen Threshold can be defined only in terms of a test method. There is no independent test method, nor any established standard reference material, by which any bias in this test method can be determined. This test method has no known bias.

15. Keywords

15.1 arc blast; arc flash; arc flash protection; arc protective blankets; arc rating; blanket; breakopen threshold performance; electrical arc protection

TABLE 2 Precision of the Test Method

Parameter	Breakopen Threshold, kA × cycles
Specimen 1	356
Specimen 2	277
Specimen 3	345
Specimen 4	326
Specimen 5	381
Specimen 6	331
Average	336
S_r[A]	34
% CV	10.4
r[B]	97

[A] Repeatability standard deviation (pooled within laboratory standard deviation).
[B] $2.8 \times S_r$.