Designation: D6365 – 99 (Reapproved 2011)

Standard Practice for the Nondestructive Testing of Geomembrane Seams using the Spark Test[1]

This standard is issued under the fixed designation D6365; 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 practice covers the nondestructive testing of field seams in geomembranes using the spark test. A suspect area is indicated by the generation of a spark. The test is applicable to seams made by the extrusion method, seams made by using welding tape (a strip of the same type of material as the geomembrane, that is welded over adjacent sections of geomembrane to create a seam), or seams where it is practical to insert a conductive material in the seam just prior to or during fabrication.

1.2 The spark test may produce an electrical spark and therefore can only be used where an electrical spark would not create a hazard.

1.3 Unless the voltages and distances prescribed are carefully adhered to, a "false positive" indication may result. This false positive occurs when the arc distance is too large for the voltage applied at the time and conditions of testing.

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.5 *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 health and safety practices and to determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D4439 Terminology for Geosynthetics

D4491 Test Methods for Water Permeability of Geotextiles by Permittivity

3. Terminology

3.1 *Definitions:*

3.1.1 *geomembrane, n*—an essentially impermeable geosynthetic composed of one or more synthetic sheets.

3.1.1.1 *Discussion*—In geotechnical engineering, essentially impermeable means that no measurable liquid flows through a geosynthetic when tested in accordance with Test Methods D4491.

3.1.2 *seam, n*—a permanent joining of two or more materials.

3.2 For definition of other terms, see Terminology D4439.

4. Summary of Practice

4.1 To use this practice a conductive material is inserted into the field seam just prior to or during fabrication. The conductive material in the seam is connected to the negative terminal of the test apparatus, and a positive voltage is applied across the seam edge. A suspect area in the seam is indicated by a spark from the voltage source to the conductive material.

5. Significance and Use

5.1 Spark testing of geomembrane field seams is particularly useful in locations where other nondestructive test methods are not practical, for example in tight corners or a circumferential seam around a pipe.

6. Apparatus

6.1 The test apparatus consists of a high–voltage, low–current source with a negative terminal for ground and a positive terminal for a voltage applicator. A voltage applicator may consist of a handle and wire brush, conductive neoprene squeegee, or other suitable applicator.

6.2 The range of the high voltage source is typically 20 000 to 35 000 V.

6.2.1 The voltage required to cause a discharge (spark) between the positive electrode and the negative electrode wire is expressed by the formula.

$$V = K\sqrt{D} \quad (1)$$

where:

V = test voltage,

[1] This practice is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.10 on Geomembranes.

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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.

K = a constant $(V/(mm)^{1/2})$, and
D = the distance from the edge of the extrusion bead on the lower panel to the conductive material in mm.

6.2.2 If the voltage is not adequate due to underestimating D, a false positive test (a seam with a suspect area resulting in no spark and testing as a good seam) may result.

6.2.3 Good results have been obtained using the test voltages and distances given in Table 1.

6.2.4 The conductive material should be located 8 to 15 mm from the edge of the extrusion bead on the bottom geomembrane to be a successful test.

7. Procedure

7.1 Before or as the seam is fabricated a continuous electrically conductive material is inserted in the lapped area of the panels 2 to 5 mm (0.1 to 0.2 in.) from the edge of the top panel of membrane. See Fig. 1.

7.2 Prior to testing, it is necessary to connect the conductive material installed in the field seam to the negative terminal of the voltage source or a separate ground.

TABLE 1 TEST VOLTAGE FOR VARIOUS EXPECTED DISTANCES[A]

Expected Distance D (in.)	Expected Distance D (mm)	Test Voltage (V)
0.250	6	20 000
0.375	10	25 000
0.500	13	28 000
0.625	16	31 000
0.750	19	35 000

[A]Constant K = 7900 volts/$(mm)^{1/2}$

7.3 Set the voltage source to a voltage needed for the expected distance. Typical distances and the required voltages are given in Table 1. The user should verify the test voltage is adequate using a trial seam with a simulated defect prior to testing and also to verify that the test voltage will not damage the geomembrane.

7.4 Check that the field seams and areas adjacent to the seams are dry prior to testing.

7.5 Place the voltage applicator (such as a wire brush or conductive neoprene squeegee) connected to the positive terminal of the voltage source, in contact with the geomembrane at the seam.

7.6 Move the voltage applicator along the seam at a uniform rate of 6 to 9 m per minute. The voltage applicator must make intimate contact with the seam being inspected.

7.7 As the test progresses, the generation of a spark indicates a suspect area in the seam. It is desirable that equipment has an audible tone signal that occurs when a spark is generated.

7.8 The suspect area is marked for repair.

8. Report

8.1 Report the following information:

8.1.1 Identification of the geomembrane material, including the type of polymer, manufacturer, thickness, reinforced or nonreinforced sheeting, seam type used, ambient temperature, date of seam fabrication, date of seam evaluation, seam tested and results of seam evaluation.

8.1.2 Voltage used.

9. Keywords

9.1 geomembrane; nondestructive; seams; testing

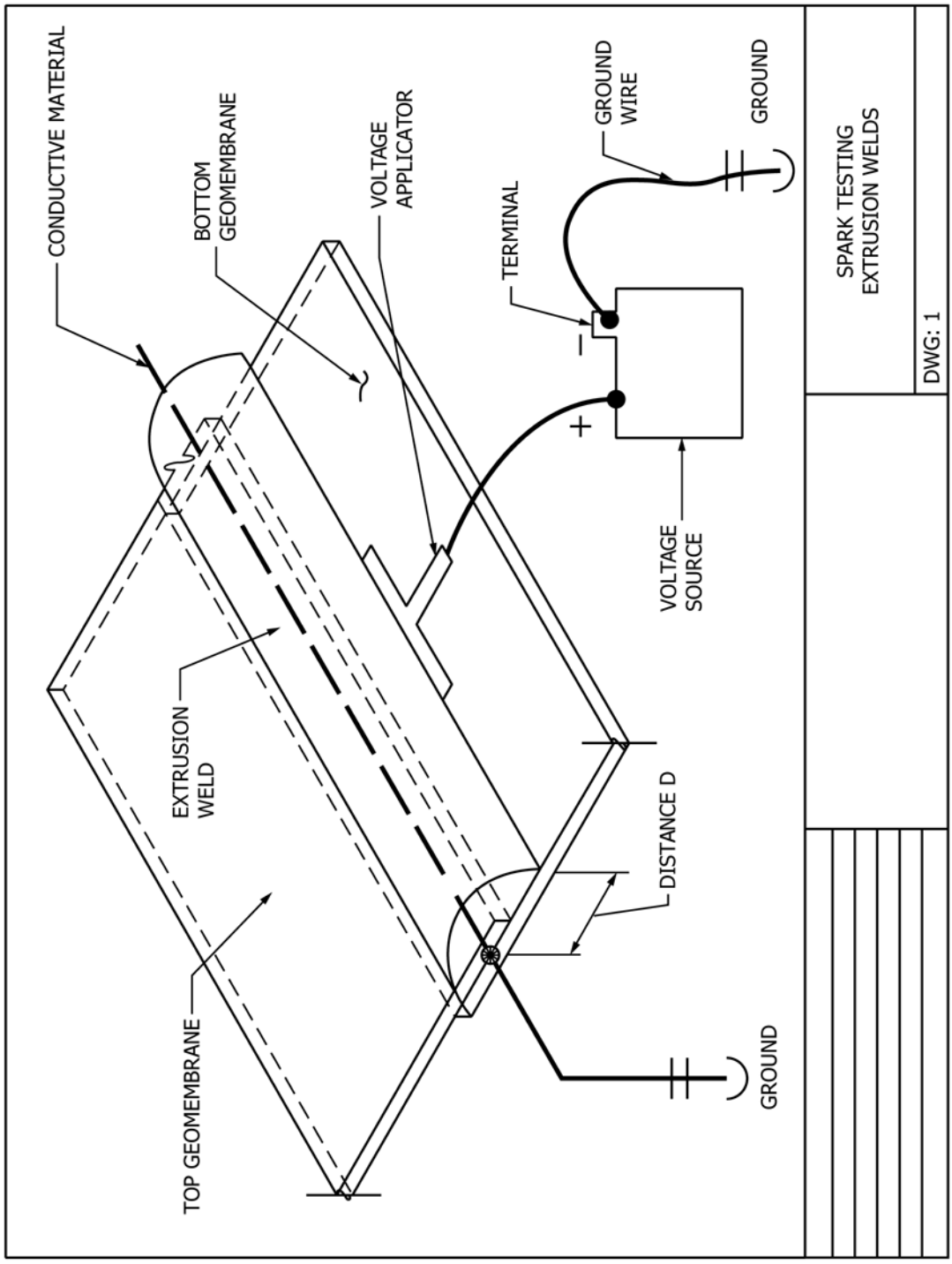
CONDUCTIVE MATERIAL
BOTTOM GEOMEMBRANE
VOLTAGE APPLICATOR
TERMINAL
GROUND WIRE
GROUND
EXTRUSION WELD
TOP GEOMEMBRANE
DISTANCE D
VOLTAGE SOURCE
GROUND
SPARK TESTING EXTRUSION WELDS
DWG: 1

FIG. 1