Designation: G 95 – 87 (Reapproved 1998)$^{\epsilon 1}$

Standard Test Method for Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method)[1]

This standard is issued under the fixed designation G 95; 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.

ϵ^1 NOTE—Footnotes were corrected editorially in May l998.

1. Scope

1.1 This test method covers accelerated procedures for simultaneously determining comparative characteristics of coating systems applied to steep pipe exterior for the purpose of preventing or mitigating corrosion that may occur in underground service where the pipe will be in contact with natural soils and will receive cathodic protection. They are intended for use with samples of coated pipe taken from commercial production and are applicable to such samples when the coating is characterized by function as an electrical barrier.

1.2 This test method is intended to facilitate testing of coatings where the test cell is cemented to the surface of the coated pipe specimen. This is appropriate when it is impractical to submerge or immerse the test specimen as required by Test Methods G 8, G 42, or G 80. Coating sample configuration such as flat plate and small diameter pipe may be used, provided that the test procedure remains unchanged.[2]

1.3 This test method allows options that must be identified in the report.

1.4 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*

G 8 Test Methods for Cathodic Disbonding of Pipeline Coatings[3]

G 12 Test Method for Nondestructive Measurement of Film Thickness of Pipeline Coatings on Steel[3]

G 42 Test Method for Cathodic Disbonding of Pipeline Coatings Subjected to Elevated Temperatures[3]

G 62 Test Methods for Holiday Detection in Pipeline Coatings[3]

G 80 Test Method for Specific Cathodic Disbonding of Pipeline Coatings[3]

3. Summary of Test Method

3.1 The test method described subjects the coating on the test specimen to electrical stress in a highly conductive alkaline electrolyte. Electrical stress is obtained from an impressed direct-current system. An intentional holiday is to be made in the coating prior to starting of test.

3.1.1 Electrical instrumentation is provided for measuring the current and the potential throughout the test cycle. At the conclusion of the test period, the test specimen is physically examined.

3.1.2 Physical examination is conducted by comparing the extent of loosened or disbonded coating at the intentional holiday in the immersed area with extent of loosened or disbonded coating at a reference holiday made in the coating in an area that was not immersed.

4. Significance and Use

4.1 Damage to pipe coating is almost unavoidable during transportation and construction. Breaks or holidays in pipe coatings may expose the pipe to possible corrosion since, after a pipe has been installed underground, the surrounding earth will be moisture-bearing and will constitute an effective electrolyte. Applied cathodic protection potentials may cause loosening of the coating, beginning at holiday edges. Spontaneous holidays may also be caused by such potentials. This test method provides accelerated conditions for cathodic disbondment to occur and provides a measure of resistance of coatings to this type of action.

4.2 The effects of the test are to be evaluated by physical examinations and monitoring the current drawn by the test specimen. Usually there is no correlation between the two methods of evaluation, but both methods are significant. Physical examination consists of assessing the effective contact of the coating with the metal surface in terms of observed differences in the relative adhesive bond. It is usually found

[1] This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials and Applications and is the direct responsibility of Subcommittee D01.48 on Durability of Pipeline Coatings and Linings.

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[2] For other cathodic disbondment testing procedures, consult Test Methods G 8, G 42, and G 80.

[3] *Annual Book of ASTM Standards,* Vol 06.02.

that the cathodically disbonded area propogates from an area where adhesion is zero to an area where adhesion reaches the original level. An intermediate zone of decreased adhesion may also be present.

4.3 Assumptions associated with test results include:

4.3.1 Maximum adhesion, or bond, is found in the coating that was not immersed in the test liquid, and

4.3.2 Decreased adhesion in the immersed test area is the result of cathodic disbondment.

4.4 Ability to resist disbondment is a desired quality on a comparative basis, but disbondment in this test method is not necessarily an adverse indication of coating performance. The virtue of this test method is that all dielectric-type coatings now in common use will disbond to some degree, thus providing a means of comparing one coating to another.

4.5 The current density appearing in this test method is much greater than that usually required for cathodic protection in natural environments.

5. Apparatus

5.1 *Test Vessel*—A transparent plastic or glass tube that is centered over the intentional holiday and sealed to the test-sample surface with a waterproof sealing material. The cylinder is to be 101.6 mm (4.0 in. nominal diameter) and of sufficient height to contain 127.0 mm (5.0 in.) of electrolyte. Fig. 1 and Fig. 2 apply to this entire section.

NOTE 1—Size of vessel shall remain unchanged. Sealing procedure must be altered to accommodate specimen having a diameter less than 101.60 mm (4 in.).

5.2 *Filter Tube*—Anode assembly shall be constructed utilizing an immersion tube with fritted disk. Length of the tube will be 180 mm (7 in.) and 8 mm (0.315 in.) in diameter. The fritted-disk section shall be 30 mm (1.18 in.) in diameter with a pore size of 10 to 15 µm.

5.3 *Impressed-Current Anode*—Anode shall be of the platinum wire type, 0.51 mm (0.020 in.) - 24 gage diameter. It shall be of sufficient length to extend outside the confines of the test cell and shall be connected to the wire from the power source with a bolted or compression fitting.

5.4 *Anode Assembly*—Anode shall be suspended inside the test vessel so that the tip of the anode assembly closest to the holiday is 25.4 mm (1 in.) above, and the edge of the anode assembly is 12.7 mm (½ in.) offset from the holiday.

5.5 *Reference Electrode*—Saturated Cu-$CuSO_4$ of conventional glass or plastic tube with porous plug construction, preferably not over 19.05 mm (0.750 in.) in diameter, having a potential of −0.316 V with respect to the standard hydrogen

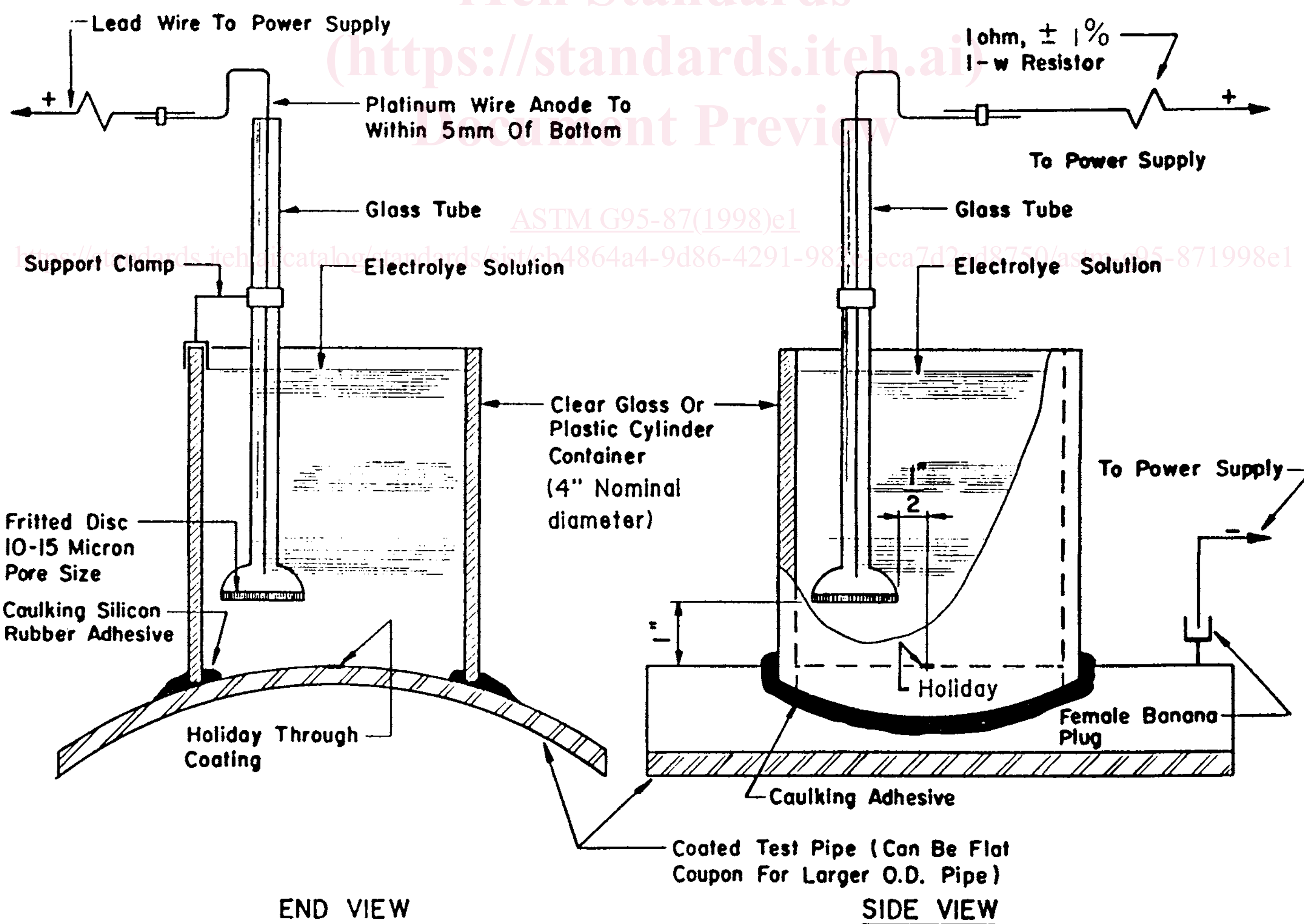

FIG. 1 Typical Test Set Up