



Designation: C537 – 87 (Reapproved 2009)

Standard Test Method for Reliability of Glass Coatings on Glassed Steel Reaction Equipment by High Voltage¹

This standard is issued under the fixed designation C537; 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 covers the determination of the reliability of glass coating on metal and is intended for use by manufacturers of equipment that is designed to withstand highly corrosive conditions where a failure of the coating in service would cause extreme damage to the exposed metal. Its use outside the manufacturer's plant is discouraged because improper or indiscriminate testing can cause punctures that are difficult to repair without returning the equipment to the manufacturer's plant. This test method detects not only existing discontinuities in the glass coating, but also areas where the glass may be thin enough to be likely to result in premature failure in service.

1.2 The values stated in SI units are to be regarded as 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 and health practices and determine the applicability of regulatory limitations prior to use. For specific precautionary statements, see Section 7.*

2. Terminology

2.1 Definitions:

2.1.1 *glassed steel, glass-lined steel, or glass-coated steel*—designations generally applied to a class of porcelain enamels that have high resistance to chemical attack at elevated temperatures and pressures.

3. Summary of Test Method

3.1 This test method consists essentially of grounding the metal structure of the equipment to the ground side of a direct-current high-voltage generator and sweeping the glass surface with a high-potential probe on the end of an insulated

handle and cable. Wherever a discontinuity exists or the coating is thin enough (by reason of a concealed bubble or conducting inclusion, etc.) so that the dielectric strength of the remaining glass is less than some preset desired amount, the dielectric strength of air-plus-remaining-glass breaks down and a discharge occurs. Built-in current-limiting devices ensure electrical safety to the operator. A variable voltage control allows selection of a voltage which assures a predetermined minimum thickness of glass.

4. Significance and Use

4.1 The widespread use of glassed-steel equipment in highly corrosive chemical processes has made it necessary to detect weak spots in the coating and repair them before catastrophic failure occurs in service. This test is intended to detect discontinuities and thin areas in a glass coating on metal to ensure that the coating is defect free and has sufficient thickness to withstand the prescribed service conditions. A test voltage may be selected at any desired value up to 20 000 V, thus making the test applicable to a wide range of thickness requirements. When, because of bubbles or defects, the thickness of glass at any spot is less than enough to withstand the applied voltage, a puncture results with an accompanying indication of a defect. Remedial action is then required to repair the defect before the equipment can be used for corrosive service. (When such defects are found before the equipment leaves the manufacturer's plant another application of glass can usually be applied and fired to become an integral part of the coating.)

5. Interferences

5.1 Since the test method is electrical, it is necessary to have a good ground connection between the instrument and the metal substrate of the equipment being tested. It is also necessary that the surface of the glass be reasonably clean and dry. A wet surface will conduct enough of the high voltage to any exposed metal, including the edges of the glass coating, so that an indication of a "contact" may be obtained over a large area instead of at localized spots that can be marked and identified for repair.

¹ This test method is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.12 on Materials for Porcelain Enamel and Ceramic-Metal Systems.

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