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Standard Specification for Metallized Surfaces on Ceramic [1]

This standard is issued under the fixed designation F 44; 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 specification covers requirements for powdered refractory metal coatings produced with or without additives. These coatings are applied to ceramic bodies in order to join ceramic bodies to metals or to other metallized ceramics by means of brazing or soldering. Included in this specification are requirements for a secondary metallic layer which is usually applied over the refractory metal layer.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

E 3 Methods of Preparation of Metallographic Specimens[2]

F 19 Test Method for Tension and Vacuum Testing Metallized Ceramic Seals[3]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *ceramics*—as referred to in this specification are understood to be inorganic, nonmetallic materials, the major phase of which must be crystalline. A glassy intercrystalline matrix may be present as one of the minor phases.

3.1.2 *metallizing— on a ceramic*, is a process whereby a sintered matrix of metal particles firmly adheres to the ceramic.

3.1.3 *refractory metals*—those metals with melting points equal to or higher than that of chromium. Therefore, this group includes chromium, columbium, molybdenum, rhenium, tantalum, and tungsten.

4. Ordering Information

4.1 The manufacturer and purchaser shall agree upon specific quality levels as outlined in the following sections:

4.1.1 Uniformity of metallizing (Section 5),

4.1.2 Thickness of metallizing (Section 6),

4.1.3 Secondary metal layer on the metallizing (Section 9),

4.1.4 Values for bond strength (Section 10), and

4.1.5 Vacuum tightness of brazed metallized ceramic assemblies (dependent on allowable use of manufacturer's product) (Section 11).

5. Uniformity of Metallizing

5.1 Either of the following two levels of quality may be agreed upon between manufacturer and purchaser, depending upon end use, seal area, and geometry.

5.2 *Level A—Less Demanding Application*:

5.2.1 Thin areas where the ceramic substrate can usually be seen without magnification through the metallizing will be acceptable only if all of the following conditions are met:

5.2.1.1 There are no more than two such areas on any one coated band, spot, or pattern detail.

5.2.1.2 Their extremities are no closer than 10 % of the total band length to each other.

5.2.1.3 They are no wider than 10 % of the width of the band but not exceeding 1 mm.

5.2.1.4 Their cumulative length does not exceed 25 % of the total band length.

5.2.2 Defects such as brush marks, screen marks, marks in the metallizing left by foreign matter such as lint, dust, etc., and pits or blisters, will be acceptable if they meet the four conditions outlined in 5.2.1.1 through 5.2.1.4. Such defects will also be acceptable if their raised edges do not interfere with proper assembly of the joint.

5.2.3 Projections on metallized surfaces, such as oversized particles or agglomerates will be objectionable if they interfere with assembly.

5.2.4 Continuous coatings over sharp edges or corners with a radius less than 1/32 in. (0.8 mm) will not be required unless by specific agreement between manufacturer and purchaser.

5.3 *Level B—Demanding Application*:

5.3.1 Thin areas will be unacceptable where the ceramic substrate can be seen through the metallizing when examined at 40× magnification.

5.3.2 Defects through which the underlying ceramic can be observed, such as brush or screen marks, marks left by foreign matter such as lint or dust, and pits or chips, will be acceptable only if all of the following conditions are met:

[1] This specification is under the jurisdiction of ASTM Committee F1 on Electronics and is the direct responsibility of Subcommittee F01.03 on Metallic Materials.

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[2] *Annual Book of ASTM Standards*, Vol 03.01.

[3] *Annual Book of ASTM Standards*, Vol 10.04.