Designation: C1212 – 98(Reapproved 2010)

Standard Practice for Fabricating Ceramic Reference Specimens Containing Seeded Voids[1]

This standard is issued under the fixed designation C1212; 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 describes procedures for fabricating both green and sintered test bars of silicon carbide and silicon nitride containing both internal and surface voids at prescribed locations.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B311 Test Method for Density of Powder Metallurgy (PM) Materials Containing Less Than Two Percent Porosity

C373 Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *green specimen*—a ceramic specimen formed as originally compacted prior to high-temperature densification.

3.1.2 *internal void*—a cavity in a specimen with no connection to the external surface.

3.1.3 *seeded voids*—intentionally placed discontinuities at prescribed locations in reference specimens.

3.1.4 *sintered specimen*—formed ceramic specimen after firing to densify and remove solvents or binders.

3.1.5 *surface void*—a pit or cavity connected to the external surface of a specimen.

4. Significance and Use

4.1 This practice describes a method of fabricating known discontinuities in a ceramic specimen. Such specimens are needed and used in nondestructive examination to demonstrate sensitivity and resolution and to assist in establishing proper examination parameters.

5. Apparatus

5.1 *Aeroduster*, moisture-free.

5.2 *Die*, capable of exerting a pressure of up to 120 MPa, that will not contaminate the compacted material.

5.3 *Optical Magnifier*, capable of providing 10 to 30X magnification.

5.4 *Tubing*, latex, thin-wall, capable of withstanding isopress.

5.5 *Carver Press* or similiar type of appartus capable of exerting the necessary pressure to consolidate the sample.

5.6 *Cold Isostatic Press*, capable of maintaining 500 MPa.

5.7 *Vacuum Oven or Furnace* which can maintain a temperature of 525°C.

5.8 *Imaging Equipment* with the capability of producing a hard copy output of the image (that is, 35mm camera, CCD camera outputted to a video printer, a stereo microscope with 4 X 5 instamatic film, etc.).

5.9 *Sintering Furnaces* capable of reaching temperatures of 1400–2200°C. Depending on the ceramic system chosen, the furnace may be required to operate in a vacuum and/or under inert gas atmospheres at pressures as high as 200 MPa.

5.10 Commercial or similar device capable of measuring within .01 mg. Measuring densities according to Archimedes principle requires the use of a sample holder suspended in water attached to the scale.

6. Materials

6.1 *Silicon Carbide or Silicon Nitride Powders,* of appropriate purity and particle size, prepared with sintering aids and

[1] This practice is under the jurisdiction of ASTM Committee C28 on Advanced Ceramics and is the direct responsibility of Subcommittee C28.03 on Physical Properties and Non-Destructive Evaluation.

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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.