Advanced Ceramics Property Measurements

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Introduction

Mechanical and physical properties of ceramic bodies can be difficult to measure correctly unless the proper techniques are used. The Advanced Ceramics Committee of ASTM, C-28, has developed dozens of consensus test standards and practices to measure various properties of a ceramic monolith, composite, or coating. The standards give the "what, how, how not, and why" for measurement of many mechanical, physical, thermal, and performance properties. Using these standards will provide accurate, reliable, and complete data for rigorous comparisons with other test results from your test lab, or another. The C-28 Committee has involved academics, producers, and users of ceramics to write and continually update more than 45 standards since the committee's inception in 1986. Included in this poster is a complete collection of standards in one volume.

For further information

The C28 Committee and Standards for Ceramics

For further information

Acknowledgments

We thank the more than 90 industry, government, and academic committee members from many countries (~25% non-USA) who have volunteered many hours to develop these standards via work in six technical and four administrative subcommittees.

C28 Advanced Ceramic Standards

Visit the C28 website (http://www.astm.org/COMMIT/COMMITTEE/C28.htm) to purchase C28 standards or join the C28 committee.

Monolithics

- C 1499 Flexural strength
- C 1231 Flexural strength (High Temp)
- C 1368 Slow Crack Growth (Dynamic Fatigue)
- C 1485 Slow Crack Growth (High Temp)
- C 1376 Slow Crack Growth (Stress Rupture)
- C 1364 Flexural strength (Bend)

Composites, Coatings, Porous Ceramics

- C 1408 Flexural strength
- C 1232 Fractograph C 1678 Fracture Mirror
- C 1382 X-ray hardness
- C 1327 Vickers hardness

Powders

- C 1274 Porosity, BET
- C 1282 Particle size, Centrifugal Sed.
- C 1394 N, N, O, On silicon wafer

NDE and Design

- C 1239 Shear test
- C 1683 Wafer Scoring

Terms, Workshops, Education

- C 1212 Monolithic C 1312 (Ceramic matrixes)
- C 1257 Filament Tensile strength and Elastic modulus

Standardization: Tangible Benefits

Comparisons Among Authors And Helping to Interpret Data

- Standardized Fracture Toughness Tests (C1421) insure correct comparisons of different authors' results

Standard sized circular disks could be used to determine Poisson’s ratio and Young’s modulus via C1259 and biaxial scaling via C1499 as well as the slow crack growth parameters, n and A, via C1368. This allowed efficient understanding of the behavior of the material.

Standardization: Tangible Benefits

F 1973: Standard Specification for High Purity Dense Yttria Tetragonal Zirconium Oxide Polycrystal (Y-TZP) for Surgical Implant Applications

ASTM Committee F-04, Surgical and Medical Devices and the U.S. Food and Drug Administration used generic C-28 Advanced Ceramics for their new standard

"The average flexural strength shall be 800 MPa or greater by 4 point bending in accordance with ASTM C 1198
"The minimum elastic modulus shall be 200 GPa in accordance with C 1198 or C 1259"

"If Weibull modulus is tested, it shall be tested in accordance with C 1320"