

Advanced Ceramic Sentinel



An Information Summary for the ASTM Committee C28 on Advanced Ceramics

July 2010

Scope of Committee C28

The promotion of knowledge, stimulation of research and development of standards (classifications, specifications, nomenclature, test methods, guides, and practices) relating to processing, properties, characterization, and performance of advanced ceramic materials.

This committee works in concert with other technical committees (e.g., D30 "Composite Materials," E07 "Non Destructive Testing," E08 "Fatigue and Fracture," E28 "Mechanical Testing," F04 "Medical and Surgical Materials and Devices", and G02 "Wear and Erosion") and other national and international organizations having mutual or related interests.

What Committee C28 Does

Committee C28 develops and maintains standards for monolithic and composite advanced ceramics. An advanced ceramic is a highly-engineered, high-performance predominately non-metallic, inorganic, ceramic material having specific functional attributes. The C28 standards cover methods for testing bulk and constituent (powders, fibres, etc.) properties, thermal and physical properties, strengths and strength distributions, and performance under varying environmental, thermal, and mechanical conditions. The scope of application of the methods ranges from quality control through design data generation.

The Committee's primary objective is the development of technically rigorous standards which

are accessible to the general industrial laboratory and consequently are widely accepted and used in the design, production, and utilization of advanced ceramics.

While the committee's roots are in energy-related industries and programs, C28 supports the needs of automotive, aerospace, electronic, medical and other industries requiring advanced ceramics. Some specific applications include nano-ceramics, bio-ceramics, coatings, electronics, sensors/actuators, porous substrates and fuel cells. C28 actively pursues standards development to support these emerging applications.

Committee C28 coordinates its work with other organizations with mutual interests in advanced ceramics. The membership represents an international group of people interested in furthering advanced ceramic technology.

In addition to standards development, C28 sponsors symposia providing a forum for the timely transfer of technical information relevant to the design, analysis, processing, fabrication, and characterization of monolithic and composite advanced ceramics. Special workshops and technical presentations are often held to identify specific industrial needs and support the technical development of new standards.

The Committee meets twice a year in with an on-site meeting and a Web-teleconference. The Committee is self-regulated by committee-approved by-laws under the auspices of ASTM International

COMMITTEE C28 - ADVANCED CERAMICS

2010 Officers and Committee Structure

Chair: Jonathan Salem, NASA Glenn
Vice Chair: John Helfinstine, Corning (Ret.)
Recording Secretary: Stephen Gonczyk, Gateway Materials Technology
Membership Secretary: Prof. Zhigang Xu, NC A & T State University

C28.90
Executive

C28.92
Education / Outreach

C28.93
Awards

C28.94
ISO TC 206 TAG

C28.95
Long Range Planning

C28.01
Mechanical
Properties and
Reliability

C28.03
Physical Properties
and NDE

C28.04
Ceramic
Applications

C28.07
Ceramic Matrix
Composites

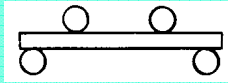
C28.91
Nomenclature and
Editorial



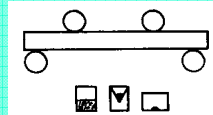
ASTM C28 Advanced Ceramic Standards

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

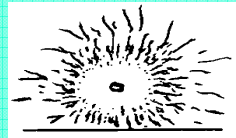
Monolithics



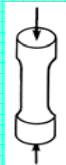
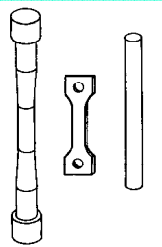
- C 1161 Flexural strength
- C 1211 Flexural strength (High Temp)
- C 1368 Slow Crack Growth (Dynamic Fatigue)
- C 1465 Slow Crack Growth (High Temp)
- C 1576 Slow Crack Growth (Stress Rupture)
- C 1684 Flexural strength (Rods)



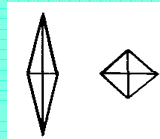
C 1421 Fracture Toughness



C 1322 Fractography
C 1678 Fracture Mirror



C 1424 Compression strength

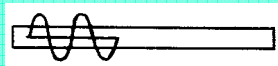


C 1326 Knoop hardness
C 1327 Vickers hardness

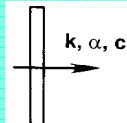
- C 1273 Tensile strength
- C 1366 Tensile strength (High T.)
- C 1291 Creep, Creep Rupture
- C 1361 Cyclic fatigue



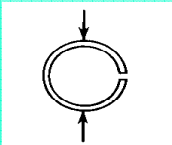
C 1499 Biaxial strength



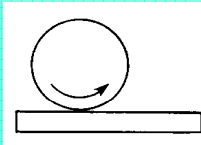
C 1198 Elastic Modulus - continuous
C 1259 Elastic modulus - impulse



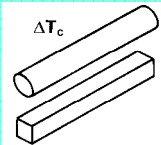
C 1470 Thermal Guide



C 1323 C-ring strength

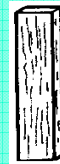


C 1495 Grinding

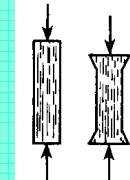


C 1525 Thermal shock

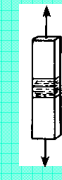
Composites, Coatings, Porous Ceramics



- C 1275 CFCC Tensile strength
- C 1359 Tensile strength (Hi Temp)
- C 1337 Creep, Creep Rupture
- C 1360 Cyclic fatigue



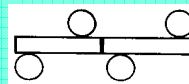
C 1358 CFCC Compression



C 1468 CFCC Tensile Trans thickness



C 1557 Filament Tensile Strength and Elastic modulus



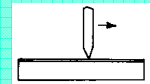
C 1469 Joint strength



C 1341 CFCC Flexure strength
C 1674 Honeycomb Flex strength

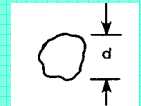


C 1292 CFCC Shear strength
C 1425 Shear strength (HiTemp)

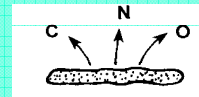


C 1624 Coatings - Scratch Adhesion

Powders



- C 1274 Particle size, BET
- C 1282 Particle size, Centrifugal Sed

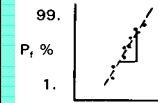


C 1494 C, N, O in silicon nitride

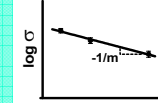
Subcommittees

- .01 Mech. Prop. + Reliability
- .03 Physical Prop. + NDE
- .04 Applications
- .07 Ceramic Matrix Composites
- .91 Terminology
- .94 ISO TAG

NDE and Design



C 1239 Weibull



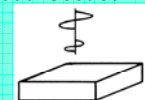
C 1683 Weibull Scaling



C 1212 Seeded voids
C 1336 Seeded inclusions



C 1175 NDE Guide

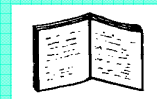


C 1331 Ultrasonic velocity
C 1332 Ultrasonic attenuation

Terms, Workshops, Education



- STP 1201 Life Prediction
- STP 1309 Composites
- STP 1392 Composites
- STP 1409 Fracture



C 1145 Terminology

ASTM C28 standards are found in Vol. 15.01.

Subcommittee Details

C28.01 Mechanical Properties & Reliability

C28.01 Chair: [George Quinn](#)

American Dental Association

e-mail: george.quinn@nist.gov

C28.01 Scope:

Develops standards for mechanical properties and reliability (short term and long term) of monolithic advanced ceramics in a number of areas including flexural strength, tensile strength, compressive strength, cyclic fatigue, creep and creep rupture, hardness, and fracture toughness.

C28.01 Standards*:

[C1161-02c\(08\)](#) Test Method for Flexural Strength of Advanced Ceramics at Ambient Temperature

[C1198-09](#) Test Method for Dynamic Young's Modulus, Shear Modulus, and Poisson's Ratio for Advanced Ceramics by Sonic Resonance

[C1211-02 \(08\)](#) Test Method for Flexural Strength of Advanced Ceramics at Elevated Temperature

[C1239-07](#) Practice for Reporting Uniaxial Strength Data and Estimating Weibull Distribution Parameters for Advanced Ceramics

[C1259-08e1](#) Test Method for Dynamic Young's Modulus, Shear Modulus, and Poisson's Ratio for Advanced Ceramics by Impulse Excitation of Vibration

[C1273-05](#) Test Method for Tensile Strength of Monolithic Advanced Ceramics at Ambient Temperatures

[C1291-00a \(05\)](#) Test Method for Elevated Temperature Tensile Creep Strain, Creep Strain Rate, and Creep Time-to-Failure for Advanced Monolithic Ceramics

[C1322-05be1](#) Practice for Fractography and Characterization of Fracture Origins in Advanced Ceramics

[C1326-08e1](#) Test Method for Knoop Indentation Hardness of Advanced Ceramics

[C1327-08](#) Test Method for Vickers Indentation Hardness of Advanced Ceramics

[C1361-01\(07\)](#) Practice for Constant-Amplitude, Axial, Tension-Tension Cyclic Fatigue of Advanced Ceramics at Ambient Temperatures

[C1366-04 \(09\)](#) Test Method for Tensile Strength of Monolithic Advanced Ceramics at Elevated Temperatures

[C1368-06](#) Test Method for Determination of Slow Crack Growth Parameters of Advanced Ceramics by Constant Stress-Rate Flexural Testing at Ambient Temperature

[C1421-09](#) Test Methods for the Determination of Fracture Toughness of Advanced Ceramics

[C1424-04](#) Test Method for Compressive Strength of Monolithic Advanced Ceramics at Ambient Temperatures

[C1465-08](#) Test Method for Determination of Slow Crack Growth Parameters of Advanced Ceramics by Constant Stress-Rate Flexural Testing at Elevated Temperature

[C1495-07](#) Test Method for Effect of Surface Grinding on Flexure Strength of Advanced Ceramics

[C1499-09](#) Test Method for Monotonic Equibiaxial Flexural Strength Testing of Advanced Ceramics at Ambient Temperature

[C1525-04 \(09\)](#) Test Method for Determination of Thermal Shock Resistance for Advanced Ceramics by Water Quenching

[C1576-05](#) Test Method for Determination of Slow Crack Growth Parameters of Advanced Ceramics by Constant Stress Flexural Testing (Stress Rupture) at Ambient Temperature

[C1683-08e1](#) Standard Practice for Size Scaling of Tensile Strengths Using Weibull Statistics for Advanced Ceramics

[C1684-08](#) Standard Test Method for Flexural Strength of Advanced Ceramics at Ambient Temperature -Cylindrical Rods

C28.03 Physical Properties & NDE

C28.03 Chair: [Matthias Thommes](#)

Quantachrome Instruments

e-mail: matthias.thommes@quantachrome.com

C28.03 Scope:

Develops standards for physical, chemical, micro-structural, and non-destructive characterization of powder and bulk advanced ceramics.

C28.03 Standards:

[C1175-99A \(04\)](#) Guide to Test Methods for Nondestructive Testing of Advanced Ceramics

[C1212-98 \(04\)](#) Practice for Fabricating Ceramic Reference Specimens Containing Seeded Voids

[C1274-00 \(06\)](#) Test Method for Advanced Ceramic Specific Surface Area by Physical Adsorption

[C1282-08](#) Test Method for Determination of Particle Size Distribution of Advanced Ceramics by Centrifugal Photo-sedimentation

[C1331-01 \(07\)](#) Practice for Measuring Ultrasonic Velocity in Advanced Ceramics with the Broadband Pulse-Echo Cross-Correlation Method

[C1332-01 \(07\)](#) Test Method for Measurement of Ultrasonic Attenuation Coefficients of Advanced Ceramics by the Pulse-Echo Contact Technique

[C1336-96 \(08\)](#) Practice for Fabricating Non-Oxide Ceramic Reference Specimens Containing Seeded Inclusions

[C1470-06](#) Guide for Testing the Thermal Properties of Advanced Ceramics

[C1494-01 \(07\)](#) Test Method for Determination of Mass Fraction of Carbon, Nitrogen, and Oxygen in Silicon Nitride Powder

[C1678-10](#) Standard Practice for Fractographic Analysis of Fracture Mirror Sizes in Ceramics and Glasses

C28.04 Applications

C28.04 Chair: [Randy Stafford](#)

Cummins Inc.

e-mail: randy.j.stafford@cummins.com

C28.04 Scope:

Develops standards (including guides, specifications, practices, test methods) for various engineering applications of advanced ceramics as required.

C28.04 Task Groups

C28.04.01 Nano-ceramics

C28.04.02 Coatings

C28.04.03 Electronics

C28.04.04 Porous

C28.04.05 Fuel cells

C28.04.06 Armor

C28.04.07 Sensors/actuators

C28.04.08 Thermal Systems

C28.04 Standards:

[C1323-10](#) Test Method for Ultimate Strength of Advanced Ceramics with Diametrically Compressed C-Ring Specimens at Ambient Temperature

[C1624-05](#) Test Method for Adhesion Strength and Mechanical Failure Modes of Ceramic Coatings by Quantitative Single Point Scratch Testing

[C1674-08](#) Standard Test Method for Flexural Strength of Advanced Ceramics with Engineered Porosity (Honeycomb Cellular Channels) at Ambient Temperatures

C28.07 Ceramic Matrix Composites

C28.07 Chair: [Yutai Kato](#)

Oak Ridge National Laboratory
Nuclear Material Science and Technology Group
e-mail: katohy@ornl.gov

C28.07 Scope:

Develops standards for determination of the thermo-mechanical properties and performance of ceramic matrix composites including tension, compression, shear, flexure, cyclic fatigue, creep/creep rupture, ceramic fibers, interfacial properties, thermo-mechanical fatigue, environmental effects, and structural/component testing.

C28.07 Standards:

[C1275-00 \(05\)](#) Test Method for Monotonic Tensile Behavior of Continuous Fiber-Reinforced Advanced Ceramics with Solid Rectangular Cross-Section at Ambient Temperatures

[C1292-00 \(05\)](#) Test Method for Shear Strength of Continuous Fiber-Reinforced Advanced Ceramics at Ambient Temperatures

[C1337-96 \(05\)](#) Test Method for Creep and Creep Rupture of Continuous Fiber-Reinforced Ceramic Composites under Tensile Loading at Elevated Temperature

[C1341-06](#) Test Method for Flexural Properties of Continuous Fiber-Reinforced Advanced Ceramic Composites

[C1358-05](#) Test Method for Monotonic Compressive Strength Testing of Continuous Fiber-Reinforced Advanced Ceramics with Solid Rectangular Cross-Section Specimens at Ambient Temperatures

[C1359-05](#) Test Method for Monotonic Tensile Strength Testing of Continuous Fiber-Reinforced Advanced Ceramics with Solid Rectangular Cross-Section Specimens at Elevated Temperatures

[C1360-01\(07\)](#) Practice for Constant-Amplitude, Axial, Tension-Tension Cyclic Fatigue of Continuous Fiber-Reinforced Advanced Ceramics at Ambient Temperatures

[C1425-05](#) Test Method for Interlaminar Shear Strength of 1-D and 2-D CFCCs at Elevated Temperatures

[C1468-06](#) Test Method for Transthickness Tensile Strength of Continuous Fiber-Reinforced Advanced Ceramics at Ambient Temperatures

[C1469-00 \(05\)](#) Test Method for Shear Strength of Joints of Advanced Ceramics at Ambient Temperature

[C1557-03 \(08\)](#) Test Method for Tensile Strength and Young's Modulus Fibers

C28.90 Executive Subcommittee

C28.90 Chair: [Jonathan Salem](#)

NASA-Glenn Research
e-mail: Jonathan.A.Salem@grc.nasa.gov

C28.90 Scope:

Manages administrative matters of main committee C28 through its membership comprised of the committee and subcommittee officers of C28.

C28.91 Nomenclature and Editorial

C28.91 Chair: [Jonathan Salem](#)

NASA-Glenn Research Center
e-mail: Jonathan.A.Salem@grc.nasa.gov

C28.91 Scope:

Compiles nomenclature and terminology used in the various standards of C28.

C28.91 Standards:

[C1145-06 \(91\)](#) Terminology on Advanced Ceramics

[C1286-94](#) ~~Withdrawn 2001~~ Classification Advanced Ceramics

C28.92 Education and Outreach

C28.92 Chair: [John Helfinstine](#)

Corning (Retired)
e-mail: veakin@earthlink.net

C28.92 Scope:

Develops and supports efforts for education and outreach for the C28 committee.

C28.92 Documents:

[Advanced Ceramic Sentinel](#)

C28.93 Awards

C28.93 Chair: [John Helfinstine](#)

Corning (Retired)
e-mail: veakin@earthlink.net

C28.93 Scope:

Accepts/acts on nominations for various awards

C28.94 ISO TC206 TAG

C28.94 Acting Chair:

[Stephen Gonczy](#)
Gateway Materials Technology
e-mail: gatewaymt@aol.com

C28.94 Scope:

Acts as the Technical Advisory Group (TAG) to the American National Standards Institute (ANSI) on international standards for ceramics. Coordinates C28 activities with the International Organization for Standardization (ISO) Technical Committee (TC) 206 on Fine (Technical, Advanced) Ceramics.

ISO/TC206 Standards Link:

http://www.iso.org/iso/standards_development/technical_committees/other_bodies/iso_technical_committee.htm?committees=54756

C28.95 Long Range Planning

C28.95 Chair: [John Helfinstine](#)

Corning (Retired)
e-mail: veakin@earthlink.net

C28.95 Scope:

Proposes, facilitates and promotes long range planning activities consistent with the mission, goals and objectives of the Committee and its subcommittees.

Documents:

[Committee C28 Strategic Plan](#)

Symposia Publications

[STP 1201](#)

Life Prediction Methodologies and Data for Ceramic Materials

[STP 1309](#)

Thermal and Mechanical Test Methods and Behavior of Continuous-Fiber Ceramic Composites

[STP 1392](#)

Mechanical, Thermal and Environmental Testing and Performance of Ceramic Composites and Components

[STP 1409](#)

Fracture Resistance Testing of Monolithic and Composite Brittle Materials

Future C28 Meetings

2011 -- January 22-23
In conjunction w/ ACerS International Meeting
Daytona Beach, FL

2011 – 2d week of July
WEB/Teleconference
Contact Staff Manager for Details

Main Committee Officers (2010-2011)

Chair

[Jonathan A. Salem](#)
NASA Glenn Research Center
21000 Brookpark Road / Ms 49-7
Cleveland, OH 44135 U.S.A
Tel: 216-433-3313
e-mail: gatewaymt@aol.com

Vice Chair

[John Helfinstine](#)
2890 Downing St.
Big Flats, NY 14814 U.S.A.
Tel: 6075628236;
e-mail: veakin@earthlink.net

Recording Secretary

[Stephen T. Gonczy](#)
Gateway Materials Technology, Inc.
221 South Emerson
Mount Prospect, IL 60056 U.S.A.
Tel: 847-870-1621; Fax: 847-870-1624
e-mail: gatewaymt@aol.com

Membership Secretary

[Devdas Pai](#)
North Carolina A & T State University
3670 Village Springs Dr
High Point NC 27265 U.S.A.
Tel: 336-256-2104
e-mail: zhigang@ncat.edu

ASTM Administration

C28 Staff Manager -- Joe Koury
ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959 U.S.A.
Tel: 610-832-9804; FAX: 610-832-7033
e-mail: jkoury@astm.org

Administrative Assistant -- Kelly Ann Paul
ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959 U.S.A.
Tel: 610-832-9712; FAX: 610-832-9666
e-mail: kpaul@astm.org

Members at Large

Kristin Breder
Saint Gobain Abrasives
One Bond Street, P.O. Box 15008
Worcester, MA 01615 U.S.A.
Tel: 508-795-4147; Fax: 508-795-4283
e-mail: Kristin.Breder@saint-gobain.com

Roger Morrell
National Physical Laboratory
Centre for Materials Management and Technology
Teddington, Middlesex, TW11 0LW, U.K.
Tel: +44 20 8943 6381; FAX: +44 20 8943 2989
e-mail: roger.morrell@npl.co.uk

George D. Quinn
American Dental Association
Bldg 224 Stop 854-9
Gaithersburg, MD 20899 U.S.A.
Tel: 301-975-5765
e-mail: george.quinn@nist.gov

ISO/TC 206 Secretary

Shuji Sakaguchi
Secretary of ISO/TC 206
Research Institute of Instrumentation Frontier
National Institute of Advanced Industrial Science and
Technology
2266-98, Shimo-Shidami, Moriyama-ku, Nagoya
463-8560, JAPAN
Tel: +81-52-736-7219 FAX: +81-52-736-7224
e-mail: s.sakaguchi@aist.go.jp