

Your Experienced Partner

Superior Technical Ceramics (STC) has been a recognized leader in the aerospace and defense industries for over 40 years. We are an ITAR registered, AS9100 and ISO 9001 certified Small Business. We create specialized ceramic components in partnership with the nation's most prominent aerospace and defense participants.

AS9100 & ISO 9001



ITAR REGISTERED



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Our Services Include

- Materials Design Consulting
- Proprietary Materials Development
- Prototype Manufacturing
- Toll Processing
- Volume Manufacturing for Full Product Life-Cycle Support
- Proof of Concept through Production
- Specializing in Complex Shapes & Exacting Tolerances

Engine, Exhaust and Propulsion Components:

- Blades, Vanes & Valves
- Tubes & Rods
- Combustion Liners
- Engine Monitoring Components
- Fuel System Components
- Rupture Discs
- Igniters, Leads, Nozzles & Shrouds

Sensor Components:

- High Temperature Sensor Assemblies
- Thermocouple Housing
- Turbine Sensors
- Gas Sensor Components
- Sonar Components

Analytical Instrumentation Components:

- Altimeters Components
- Fire Detection Components
- Vibration Sensor Components
- Satellite Positioning Components
- Gyroscope Components
- Turbine Sensors
- Resistors
- Explosive & Chemical Detection

Guidance and Navigation Components:

- Laser Components
- Radomes
- Missile Guidance Components
- Radar Components
- Infrared Navigation Components

Custom Development and Commercialization:

- Proprietary Ceramic Material Processing
- Ceramic Toll Processing
- Ceramic Matrix Composite (CMC) Machining
- Advanced Ceramic Optical Windows & Domes
- Ballistic Transparent Ceramics

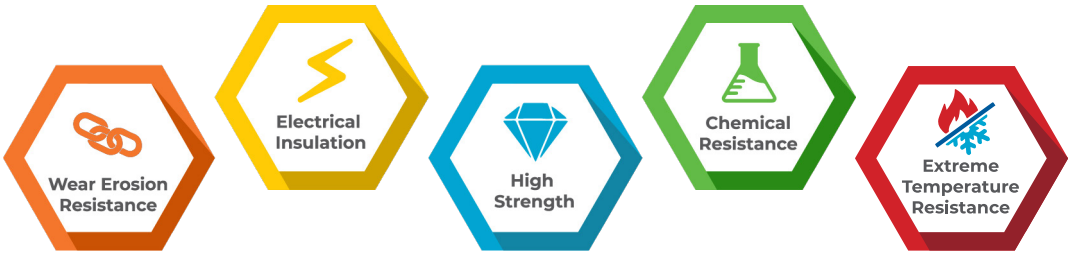
Electrical Components:

- Antennas
- High Voltage Feed-Throughs
- Capacitors
- Lighting Components
- Connectors

Technical Ceramic Solutions for the Aerospace & Defense Industry

A Broad Spectrum of Ceramic Material Solutions

We have experience in working with technical ceramics materials, including [Alumina \(74-99.96%\)](#), [Zirconia Toughened Alumina \(ZTA\)](#), [Zirconia \(YTZP, MSZ, CSZ\)](#) . The unique attributes of each material allow our engineers to solve individual industry challenges, all while providing cost effective solutions.



Materials Property Chart

Additional specialty materials may be available upon request

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Property		ASTM Method	Units	AL74 74%	AL94 94%	AL96 96%	AL98 98%	AL998 99.8%	ZTA-14	MSZ (Magnesia Stabilized)	YTZP (Yttria Stabilized)
General	Crystal Size (Average)	Thin Section	Microns	13	11	8	7	6	6	30	1
	Color	--	--	White	Ivory	White or Purple	White	Ivory	White	Ivory or Yellow	Ivory
	Gas Permeability	F 134	atms-cc/sec	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰	gas tight <10 ⁻¹⁰
	Water Absorption	C 373	%	0	0	0	0	0	0	0	0
Mechanical	Density	C 373	g/cc	3.00	3.68	3.72	3.78	3.89	4.20	5.60	6.02
	Hardness	C 1327	GPa (kg/mm ²)	10.5 (1075)	10.1 (1012)	11.6 (1158)	12.7 (1300)	13.5 (1354)	14.5 (1478)	11.7 (1200)	12.5 (1250)
	Fracture Toughness	C 1421 Notch	MPam ^{1/2}	2 - 5	4 - 5	3 - 5	3 - 5	3 - 5	6	12	10
	Flexural Strength (MOR) (4 point) @ 25 °C	C 1161	MPa (psi x 10 ³)	241 (35)	319 (46)	322 (47)	316 (46)	298 (43)	586 (85)	620 (90)	951 (138)
	Compressive Strength @ 25 °C	C 773	MPa (psi x 10 ³)	1378 (200)	1753 (254)	1534 (222)	2241 (325)	1668 (242)	2758 (400)	1862 (270)	2485 (360)
	Elastic Modulus	C 1259	GPa (psi x 10 ⁶)	172 (25)	312 (45)	319 (46)	346 (50)	383 (56)	338 (49)	206 (29.8)	210 (30)
	Poisson's Ratio	C 1259	--	0.22	0.22	0.21	0.19	0.21	0.23	0.28	0.3
Thermal	C.T.E. 40 - 200 °C	E 228	x 10 ⁻⁶ /C	5.5	6.5	6.5	6.9	6.3	6.0	8.9	6.9
	C.T.E. 40 - 500 °C	E 228	x 10 ⁻⁶ /C	5.8	7.2	7.4	7.8	7.1	7.0	9.7	8.1
	C.T.E. 40 - 800 °C	E 228	x 10 ⁻⁶ /C	6.3	8.1	8.0	8.4	7.6	7.1	10	10.5
	Thermal Conductivity @ 25 °C	E 1461	W/m K	4	24	28	28	32	24	3	2.2
Electrical	Dielectric Strength (.125" Thick)	D 149	V/mil	225	250	250	300	305	250	300	240
	Dielectric Constant @ 1 MHz	D 150	--	7	9.2	8.1	9.6	9.9	12.5	22.7	30
	Dielectric Loss Tangent @ 1 MHz	D 150	--	0.0012	0.0003	0.0001	0.0004	0.0005	0.0006	0.0016	0.001
	Volume Resistivity, 25° C	D 257	ohms-cm	<1 x 10 ¹³	1 x 10 ¹³	2 x 10 ¹³	1 x 10 ¹³	1 x 10 ¹³	1 x 10 ¹⁴	>1 x10 ¹³	1 x10 ¹³
	Volume Resistivity, 300° C	D 257	ohms-cm	4 x 10 ¹⁰	9 x 10 ¹²	3 x 10 ¹³	1 x 10 ¹¹	7 x 10 ¹²	1 x 10 ¹⁰	5 x 10 ⁷	1 x 10 ¹⁰
	Volume Resistivity, 500° C	D 257	ohms-cm	3 x 10 ⁷	4 x 10 ¹⁰	8 x 10 ¹¹	3 x 10 ⁸	2 x 10 ¹¹	2 x 10 ⁹	1 x 10 ⁷	1 x 10 ⁶
	Volume Resistivity, 700° C	D 257	ohms-cm	2 x 10 ⁶	9 x 10 ⁹	2 x 10 ¹¹	1 x 10 ⁷	4 x 10 ⁹	2 x 10 ⁸	2 x 10 ⁶	5 x 10 ³

Alumina - All Around Material Solution

Alumina has versatile material properties making it a goto solution for diverse types of [aerospace and defense](#) applications. Its high strength along with excellent electrical, temperature and corrosion resistance makes it an excellent choice for use in analytical instrumentation, guidance and navigation, engine and sensor applications. Alumina is also easily metallized and brazed to produce vacuum tight ceramic to metal assemblies for air and space applications.

Zirconia Toughened Alumina for Greater Strength & Durability

Zirconia Toughened Alumina (ZTA) is an excellent choice for applications requiring greater toughness and higher strength than Alumina alone, while maintaining the corrosion resistance of Alumina. This material is used in similar applications as Alumina, but where pressures demand greater material strength and durability. ZTA can also be metalized and brazed, similar to Alumina, to offer unique possibilities when designing assemblies.

Zirconia Materials for Robust Mechanical Properties and Thermal Performance

The Zirconia family of materials provides toughness and durability in extreme environments that often require extended life performance. YTZP offers superior strength, MSZ excellent toughness, and CSZ is a tough material similar to MSZ but with proven low temperature chemical resistance in both extreme acidic and basic environments. Zirconia's low thermal conductivity also offers opportunities for thermal management applications.

Engineering. Partnership. Solutions.

We specialize in providing highly technical, custom solutions for Energy Industry equipment applications. We are able to offer our customers deep expertise in the specific material properties of given ceramic materials, and matching them to specific use cases. Please contact us to discuss your unique challenges.



Ceramic Engineering Insight



We bring 120 years of ceramics engineering experience to our customers. Our engineers' expertise provides guidance in material selection, design-to-manufacture geometry and cost effective production.

Contact Us with Your Material Challenges:

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Proven Experience in Quality Documentation Assurance



The performance of a ceramic component is dependent on the consistency and quality of its material properties. That's why we control every aspect of manufacturing; from raw material through to finished component. Powder preparation, forming, green machining, sintering and diamond grinding are all governed by the same principles of total quality management.

Responsive Service Culture



In the larger world of ceramics, we're a mid-sized firm located in Vermont. We pride ourselves on providing direct access to our key team members and quick response times for our customers.

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