

COORSTEK®

Ceramic Armor
Superior Lightweight Protection





Alumina aircraft armor tile array

Broad range of materials for many applications

CoorsTek® offers an unparalleled selection of extreme-duty, advanced ceramics. We help you select the best-fit material for your application and budget.

Advanced ceramic vehicle tiles

Exceptionally well-suited for vehicular applications, CoorsTek produces lightweight technical ceramic tiles using tight-tolerance standards, high-purity formulations, and controlled microstructures to ensure a consistently reliable defense to unexpected threats.

Shapes and sizes for all needs

CoorsTek offers CeraShield™ advanced ceramic vehicle tiles in a variety of shapes and sizes. Choose from square or hexagon shapes at various imperial and metric measurements, or let our specialists help you select custom shapes, thicknesses, and configurations.

Modular assembly

CoorsTek provides assembly services to form multiple tiles into custom panels of complex shapes and configurations — including holes & cutouts. Perfect for aircraft, armored vehicles, and executive vehicles, our panels provide a custom fit and superior performance.

Vacuum-bonding capabilities

CoorsTek has perfected bonding processes to perform under some of the harshest industrial environments on the planet. Our specialized process bonds the ceramic to a variety of customer-specified substrate materials for a thoroughly robust and integrated solution.

Next-generation ceramic torso plates

CoorsTek offers lightweight, superior-quality torso plates in a wide variety of shapes, sizes, thicknesses, and materials including:

CeraShield™ high-density aluminum oxides

- Using this traditional monolithic plate material, CoorsTek offers high-volume, multi-facility production capacity
- Standard sizes and shapes including all SAPI sizes
- Custom thicknesses available from 1mm and up

CeraShield and Cercom® silicon carbides

- Superior hardness for advanced threats
- Lower weight with higher performance benefits

CeraShield and Cercom boron carbides

- Lowest density for ultra-lightweight designs

Many sizes and shapes are offered in all CeraShield and Cercom materials. Custom shapes, sizes, and thicknesses are readily manufactured to customer specifications.



CeraShield RB B4C armor plates

Contact us for more information
 +1 303 271 7100 or info@coorstek.com

CERASHIELD™ AND CERCOM® ARMOR CERAMICS																			
			CERASHIELD AD-90	CERASHIELD Z-PLUS™ 94	CERASHIELD AD-96	CERASHIELD FG-98	CERASHIELD CAP 4	CERASHIELD CAP 3	CERASHIELD SC-DS	CERASHIELD SC-RB	CERASHIELD RB B4C	CERCOM PAD B4C	CERCOM PAD EBON-A	CERCOM PAD SIC-B4C	CERCOM PAD SIC-N	CERCOM PAD SIC X-1	CERCOM PAD B ₄ C-SIC	CERCOM PAD SPINEL	CERCOM PAD TIB2
PROPERTY	UNITS	TEST	90% Alumina	Zirconia-Impr. Alumina	96% Alumina	98% Alumina	98.5% Alumina	99.5% Alumina	Direct-Sintered Silicon Carbide	Reaction-Bonded Silicon Carbide	Reaction-Bonded Boron Carbide	Pressure Assisted Densification Boron Carbide	Pressure Assisted Densification Black Alumina	Pressure Assisted Densification SiC with Boron Carbide	Pressure Assisted Densification Silicon Carbide	Pressure Assisted Densification Ballistic-Grade Silicon Carbide	Pressure Assisted Densification Boron Carbide w/ Silicon Carbide	Pressure Assisted Densification Spinel	Pressure Assisted Densification Titanium Diboride
Density	gm/cc	ASTM-C 20	3.60	3.70	3.72	3.80	3.80	3.90	3.15	3.10	2.65	2.49	3.93	3.05	3.20	3.23	2.63	3.58	4.48
Flexural Strength (MOR), 20°C	MPa (psi X 10 ³)	ASTM-F417	338 (49)	352 (51)	358 (52)	375 (54)	375 (54)	379 (55)	480 (70)	462 (67)	250 (36)	450 (65)	600 (88)	450 (65)	570 (85)	580 (84)	320 (46)	125 (18)	275 (40)
Elastic Modulus, 20°C	GPa (psi X 10 ⁶)	ASTM-C848	276 (40)	303 (44)	303 (44)	350 (51)	350 (51)	370 (54)	410 (59)	393 (57)	379 (55)	430 (62)	390 (56)	450 (65)	460 (67)	455 (66)	455 (66)	275 (40)	555 (80)
Poisson's Ratio, 20°C	-	ASTM-C848	0.22	0.21	0.21	0.22	0.22	0.22	0.21	0.19	0.18	0.16	0.22	0.16	0.14	0.14	0.16	0.26	0.11
Compressive Strength, 20° C	MPa (psi X 10 ³)	ASTM-C773	2482 (360)	2103 (305)	2068 (300)	2500 (363)	2500 (363)	2600 (377)	3500 (507)	2500 (363)	1721 (250)	3070 (445)	-	-	3410 (494)	-	-	-	4820 (700)
Hardness	GPa (kg/mm ²)	KNOOP 1000 gm ROCKWELL45N	10.4 (1058) 75	11.5 (1175) 78	11.5 (1175) 78	13.7 (1400) 82	13.7 (1400) 82	14.1 (1440) 83	26 (2800) 90	24.5 (2500) -	25.5 (2600) -	25.5 (2750) -	14.2 (1450) -	26.4 (2700) -	23.5 (2400) -	23.5 (2400) -	24.5 (2500) -	16.1 (1650) -	26.4 (2700) -
Fracture Toughness, K _{Ic}	MPa m ^{1/2}	Notched Beam	3.0 - 4.0	4.0 - 5.0	4.0 - 5.0	4.0 - 5.0	4.0 - 5.0	4.0 - 5.0	3.0 - 4.0	3.0 - 4.0	3.0 - 4.0	2.5 - 3.0	4.0 - 5.0	3.0	4.0 - 5.0	4.0 - 5.0	3.0	1.5 - 2.0	6.9
Thermal Conductivity, 20°C	W/m K	ASTM-C408	16.7	22.4	24.7	27.5	27.5	30.0	150.0	100.0	50.0	45.0	-	-	130.0	120.0	-	15.0	-
CTE, 25-1000°C	1 X 10 ⁻⁶ / °C	ASTM-C372	8.1	8.2	8.2	8.2	8.2	8.2	3.5	3.5	4.5	4.9	8.1	4.6	4.5	4.5	4.8	7.9	8.0

Ceramics for Advanced Armor

Proven performance for advanced armor

CoorsTek CeraShield and Cercom ceramics offer many advantages over conventional materials. Specially formulated ceramic armor materials provide:

- Low weight
- High hardness
- Controlled, uniform microstructure
- Dimensional stability over a wide temperature range
- Compatibility for use in finished armor systems with proven ballistic performance for National Institute of Justice (N.I.J.) and international design standards (C).



Variety of materials for a wide range of applications

CoorsTek offers a broad selection of CeraShield and Cercom materials for specific ballistic applications:

- High-density aluminum oxides
- Zirconia-toughened aluminas
- Boron carbides
- Silicon carbides

Advanced manufacturing capabilities

With state-of-the-art forming methods and statistically controlled processing, CoorsTek ensures leading-edge, low-cost manufacturing. Advanced capabilities in green machining and precision grinding enable extreme customization of design to meet the most demanding applications.

Expert design assistance for amazing performance

CoorsTek engineers offer assistance:

- Selecting the best material for individual applications
- Designing for manufacturability:
 - Optimized performance
 - Competitive manufacturing costs

Quality with a passion for excellence

CoorsTek OpX™ Operational Excellence quality and manufacturing system blends proven, best-practice techniques like Lean, Six Sigma, on-line SPC, and ISO 9000-2000 certification to ensure exceptional product quality and traceability.

Technical ceramics for over 100 years

Since 1910, CoorsTek has solved technical challenges for innovative customers. With armor tile production dating back to the 1960's, our long-term experience, broad range of materials, variety of cost-effective manufacturing techniques, and unparalleled capacity provide peace of mind for manufacturers around the globe.

Leaders in technical ceramics

A recognized worldwide leader in the engineering and manufacturing of technical ceramics, CoorsTek provides advanced materials and design configurations for ballistic-grade ceramics used in appliqué and integrated armor systems. Call us today at +1 303 271 7100 for assistance.



The chart is intended to illustrate typical properties. Engineering data is representative. Property values vary somewhat with method of manufacture, size, and shape of part. Any suggested applications are not made as a representation or warranty that the material will ultimately be suitable for such applications. The customer is ultimately responsible for all design and material suitability decisions. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty for which CoorsTek assumes legal responsibility. ANY WARRANTY OR REPRESENTATION FOR WHICH COORSTEK IS RESPONSIBLE SHALL BE SUBJECT TO A SEPARATELY NEGOTIATED AGREEMENT. (C)CeraShield armor ceramics are not rated by the National Institute of Justice (N.I.J.). Manufacturers of finished ceramic armor systems have achieved N.I.J. Level III and IV ratings for complete armor systems incorporating CeraShield armor ceramic components. CoorsTek and Cercom are registered trademarks of CoorsTek, Inc. CeraShield and OpX are trademarks of CoorsTek, Inc.

COORSTEK

coorstek.com

Americas

+1 303 271 7100 tel
+1 855 929 7100 toll free in USA
www.coorstek.com
solar@coorstek.com

Europe

+49 160 530 3768
infoeurope@coorstek.com

Japan

+1 81 3 5437 8411
japaninfo@coorstek.com

China

+86 21 6232 1125
info_shanghai@coorstek.com

Korea

+82 31 613 2946
koreainfo@coorstek.com