Tests available at Touchstone testing laboratory

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١××	Test group	Tests	Standards	let	9 8	M M	MM S	Rock S	5	Glass	oal	ab	효율	Eap is		≦ Comments
F	1 22 6 2 2 m	Tensile testing	ASTM D638/D828/D882/E8/E8M, ISO 37/6892, JIS Z2241	<i>-</i>	/ /	/ /	/ /	./	-/	·/ ·/	-/	-/	<u> </u>	V V		Round, flat bar, smooth, notched,axial, plane strain
l.				1			· ·		*	* *	* ·	v .				
l l		Modulus testing	ASTM C469/C885/C1557/E111/D2769											✓ v		Round and flat bar
		Poisson's ratio	ASTM C469/E132				V V					_	/		· ·	Flat and square bar
		Compression test	ASTM C39/C365/D695/E9	V			V V						/		· /	Round and rectangular, axial, plane strain
	Ambient conditions	Shear test	ASTM B769/C273/C394/D732/D3518/D5379/D7078, ISO 1922	✓	< <	/ /	< <	· /	✓	< <	✓		/		' '	In plane, out of plane, short beam, rail shear
		Bend/Flex test	ASTM C78/C1499/D70/E290, ISO 7439	√	✓	/ /	✓	· V	✓	< <	✓		/		' '	Short beam, long beam, 3 point, 4point, smooth and notched ECN, cantilever
		Torsion test	ASTM A939, ISO 18338	✓		/ /	V V	· /		< <			/		/ /	<1000 inch lb capacity, thin walled tubes and small cros section.
		Tear test	ASTM B871/ E604	✓			V V					✓ .	/		/ /	Khan tear test
		Impact test	ASTM D256/D1832/E23/E2248, ISO 180/8256				√ ✓						/	~	/ /	Notched (Charpy, Izod & Tensile) and smooth bar, <245 ft-Lb energy
		Fatigue testing	ASTM C394/E466/E468/E606/E647/E1681/E2207/E2368/E2760/E2714/E2948. ISO 12110	✓	V V	/ /	V V	· /	✓	V V	✓		/	_	/ /	Load and displacement controlled tensile, flexual, S/N curve, Fatigue crack growth rate
ı		Fracture testing	ASTM B909/C1421/D5045/E399/E740/E1820/E2818, ISO 12134/15653/ 26843	✓	V V	/ /	V V	1	✓	V V	✓	٠,	/	_	1	Mode 1, mode 2, mode 3, elastic and elasto plastic, R curves
ı		Formability	ASTM E190/E517/E646/E2218/, ISO 12004/20482, DIN 1520	V	√						\top					Erichsen cup, limiting dome height, strip draw test, 'r' ratio,'n' value, guided bend test
		Hardness	ASTM A956/E18/E92/E103	1		//	V V	1	/	/ /	/	7	/		17	Brinel, Rockwell, Supercia Rockwell, Vickers, Micro vicker, Knoop, Barcole, Detroit, Shore, etc
_ ∞			ASTM D2670				V V							- + -	+ +	Pin and V block
1 .≒		Friction test Dynamic mechnical analysis	ASTM D5026/D7028				<i>y y</i>		ľ	* *	+*+	*	-	-	+ +	Tensile, flexural, compression, flat samples
s testing			ASTM E21				V V			///	-	/	/	-	+	Flat samples
		Tensile test	ASTWI EZI				V V			V V		•	-	-	+	
	III-b A	Bend / flex test	ACTNA CARRELEGARA ICO 204				V V			7 7		-	+	_	+	Short beam, long beam, 3 point, 4 point, smooth and notched ECN
a	High temperture	Creep test	ASTM C1337/E139, ISO 204							/ /				_	\perp	Tensile. flexural. compression. flat and round specimens
.=		Fatigue testing					< <								\perp	Load and displacement controlled tensile flexual, S/N curve, Fatigue crack growth
1 29		Creep fatigue	ASTM E2714/E2760	✓			< <			< <	✓		\perp		\perp	With and without hold at high temperature, ASTM E2714
Materials		Tensile test	ASTM E1450				✓			✓						Round. flat bar smooth
IΣ		Bend/Flex test					✓			✓						Short bem, long beam, 3 point, 4point, smooth and notched ECN
	Low temperature	Fatigue testing		V	✓	/ /	V V			✓						Load and displacement controlled tesnile flexual, S/N curve, Fatigue crack growth rate
		Fracture test		✓	V V	/	V V			✓	П					Mode 1, mode 2, mode 3, elastic and elasto plastic, R curves
ŀ		Impact test		✓	V V	/ /	V V			✓						Notched (Charpy, Izod & Tensile) and smooth bar
	Environmental testing	Corrosion test	ASTM B117/ B368/F2832/G31/G44/G61/G85	✓	11	/ /	V V	· /	1	11	✓	V .	/	_	/ /	Salt spray, slat fog, acidified salt spray, limited high temperaute aqueous corrosion
ı		Stress corrosion	ASTM G30/G36/G47/G49/G103/G123	V	V V	/ /	V V		П		\Box				1 1	Contant load, constant displcaement, C ring, O ring, Bent bam, tensile
İ		Exfoliation corrosion testing		✓					П		\Box					Only metals and alloy with and without coating
		Extronuction corrosion testing	751111 651/ 660/ 661/													only metals and anot mand mandat coding
ı		Filliform corrosion	ASTM D2803	/	+	+	+	+	\vdash	+	+	\dashv	+	+	+	Only for coated materials
ŀ			ASTM G78	÷	+	+	+	+	\vdash	+	+ +	\dashv		+	1	Only for coaced materials
ŀ		Crevice corrosion	ASTM F3044/G71/G82	+	+	+	\vdash	+	\vdash	+	+	\rightarrow	+	-	+	
I		Galvanic corrosion test	ASTM F3194F1624	/	-	+	+	+	\vdash	+	\vdash	\dashv	+	-	+	to be a second of the second o
ŀ		Hydrgen embrittlement	ASTM F1801	_	_	/ /		_	\vdash	+	+	-	-	_	+	Interrupted load test, pre conditioned and real time conditioning
I		Cossorion fatigue					V V		\vdash	_	+	_		_	+	Tensile and flex mode with and without notch.
		Accelerated weathering	ASTM D4329/ D4587/G154, ISO 4892	✓	✓	/ /	√ ✓					V .	/ /	✓		Mostly for organic coatings

Tests available at Touchstone testing laboratory

			Material group Comments	Comments		
Test groups	Tests	Standards	Metals & alloys Polymer Ceramic PMC CMC CMC CMC CONCrete Glass Graphite Feans Paper board Fiber (Natural & Synthetic, Fabrics Bio materials (Hard tissues Fluids			
	Tensile testing	Customer specific				
ا ق	Compresion testing	Customer specific				
<u>i</u>	Bend/Flex testing	Customer specific				
Mechanical &	Shear testing	Customer specific Customer specific				
Mechanical &	Drop tower testing	Customer specific Customer specific				
Enviroenmental testing	Corrosion resistance Hunidity resistance	Customer specific Customer specific				
	Accelerated weathering	ASTM D4329/ D4587/G154, ISO 4892				
i	Air permeability	ASTM D737/D2692				
	Moistue transmission	ASTM D1653/E96				
	Erosion & wear	ASTM D968/G76/G190/	V V V V V V V V V V V V V Falling sand, Pin and V block test, sand blasting			
	Optical microscopy	ASTM B487/D7658/E3/E883/E2015	V V V V V V V V V V V V V V V White light, polarized light, reflection, transmission, grain contrast, phase contrast			
	Sterop optical microscopy		V V V V V V V V V V V V V V V V V V V			
Maioro otrocotoro	Fluoresence microscopy		V V V V V V V V V V V V V V V V V V V			
Micro structure	Scanning electron microscopy		V V V V V V V V V V			
Chemistry Physical properties	Quantitative microscopy	ASTM D7684/E20/E112/F1877/E2090	V V V V V V V V V V V V V V V V V Grain size, Inclusion content, phase content			
	ICP		V V V V V V V V V V V V V V V V V V V			
Chemistry	EDX		V V V V V V V V V V V V V V V V V V V			
	X Ray (powder diffraction)		V V V V V V V V V V V V V V V Phase analysis, lattice spacing			
	Density	ASTM B962/C693/ D792/D1505	V V V V V V V V V V V V V V V V V M Buoyancy, Gradient column methods, RT			
	Viscosity		✓ Torsional pendulum, <100,000CP, RT			
Physical properties	Electrical resistivity		/ / / 2 & 4 point probe, limited to < 2000 ohms, wire, foil, coatings, rods, RT & LT			
,	Thermal expansion	ASTM D296/E831, ISO 11539	V V V V V V V V V V V V V V V Dilatometry < 550C HT			
	Surface analysis		V V V V V V V V V V V V V V V V V V Topography, roughness, Stereo analysis, surface chemistry, RT			
	Resin flow time	ASTM D3531	V V Mostly polymeric materials and some high viscoty fluids			
Coatings testing	Gel time	ASTM D3532	Mostly polymeric materials and some high viscoty fluids			
Continue testine	Volatile organic (VOC)	ASTM D2369, EPA method 24	Mostly polymeric materials and some high viscoty fluids			
Coatings testing	Coating thickness		✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ Microscopy and magnetic and electromagnetic gages			
	Impact reistance	ASTM D2794	V V V V V V Ball impact			
	Adhesion	ASTM D5179, ISO 4624	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Facing cleavge, Lap shar			
Laminate/adhesive	Wedge tests	ASTM D3762				
· ·	Peel test	ASTM D1781/D1876/D6862	✓ Drum peel type			
	Facing clevage	ASTM E2001				
•	3D printing	•	ABS only			
ecimen Preperation	Machining		✓ ✓ ✓ ✓ ✓ ✓ ✓			
· · ·	Finishing		V V V V V Grinding, polishing, sand blasting			
aterials R & D	Melting, alloying, casting, pr	e heat, hot roll, cold roll& coil. Strip dimensions 6" wide x 0.01" thick. Solu	ution heat treat, age, austenietize, quench, temper. Aluminum, Steel and other metallic materials			