

## Mechanical tests offered by AAC

AAC offers mechanical tests on different material classes from metals, plastics, ceramics, composites to honeycomb panels in a wide temperature range from 4K (-269°C) up to 1800°C on sample and component level. Therefore, different static and dynamic testing facilities, equipment, fixtures and measurement systems are available.

Mechanical Testing Equipment @ AAC	
Quasi-static Universal Testing Machine	Shimadzu AG10TC - Load capacity: 100 kN
Quasi-static Universal Testing Machine	Messphysik Beta 200 - Load capacity: 200 kN
Stress Corrosion Cracking Facility	Load Frames: 12 for 20 kN, 6 for 70 kN, 3 for 100 kN
Servo-hydraulic Test Machine	W&B - Load capacity: 70 kN, Maximum frequency: 70 Hz
Instrumented fall tower	Instron Dynatup 9250HV – max Energy: 1000 J

Accessory for Mechanical Testing @ AAC	
Temperature Chamber	Instron – Temperature range: -160°C to 600°C for both quasistatic machines
Split furnace	Temperature up to 1100°C attached to 100 kN machine
Split furnace	Temperature up to 1300°C attached to 70 kN servo-hydraulic machine
Mobile induction heating system	Power 8kW
LN2 cryostats	Tests at – 196°C for quasi-static and servo-hydraulic test machines
LHe cryostat	Tests at -269°C for 200 kN quasi-static machine

Measurement systems for Mechanical Testing @ AAC	
Load cells	From 200N to 200 kN
Clip-on extensometers	Longitudinal and transverse strain measurement from 10 mm to 25 mm nominal length, crack open displacement sensors: Temperature range from -269°C till 250°C High temperature extensometer 20 mm nominal length – temperature till 1800°C
Tactile sensors	Measurement ranges: +/- 5 mm and +/- 2mm

HBM MGC+	Measurement of up to 16 strain gauges, 2 tactile sensors, 2 load cells, PT100 sensors
Temperature measurement	Lake Shore with Si-Diodes: -269°C - RT, Keithley with PT100 Temperature sensors: -196°C till 600°C, Pyrometers: Impac 300°C – 1300°C
Acoustic Emission	Acoustic Emission system from Physical Acoustics (8 AE channels / 4 multiplexed signal generation channels / 8 parametric channels)

Offered mechanical tests @ AAC			
Material class	Test type	Standard(s)	Environment
Metal	Tensile	ASTM-E8, ASTM-E21, ASTM-E1450, DIN EN ISO 6892-2, DIN 50125,	4K, 77K, -160°C – 1300°C
	Compression	ASTM-E9,	4K, 77K, -160°C – 250°C
	Shear	ASTM B 769	4K, 77K, -160°C – 250°C
	Pin-Type Bearing Test	ASTM E 238	4K, 77K, -160°C – 250°C
	Charpy impact	DIN EN ISO 179-2, ASTM D256	77K, RT
	KIC, J-Integral	ASTM-E1820	4K, 77K, -160°C – 250°C
	Fatigue	ASTM E466, ASTM-E606, BS EN 6072,	77K, -55°C, RT – (1300°C)
	Fatigue crack growths	ASTM-E647	4K, 77K, -160°C – 250°C
	Stress corrosion cracking	ECSS-Q-ST-70-37c, ASTM-G44,	RT
Plastics	Tensile	DIN EN ISO 527	4K, 77K, -160°C – 250°C
	Compression	ASTM D695, DIN EN ISO 604	4K, 77K, -160°C – 250°C
	Flexural	ASTM D790, DIN EN ISO 178	4K, 77K, -160°C – 250°C
	KIC, J-Integral	ASTM D5045, ASTM D6068	4K, 77K, -160°C – 250°C
Composites	Tensile	ASTM D3039, DIN 65378, DIN EN 2597, DIN EN ISO 527-4, DIN EN ISO 527-5	4K, 77K, -160°C – 250°C
	Compression	ASTM D3410, ASTM D695, DIN 65375, DIN EN 2850, EN ISO 14126, SACMA SRM 1R	4K, 77K, -160°C – 250°C
	Flexural	ASTM D790, ASTM D6272,	4K, 77K, -160°C – 250°C
	Interlaminar Shear	ASTM D2344, DIN EN 2377, DIN EN 2563	4K, 77K, -160°C – 250°C

	In plane shear	ASTM D3846, ASTM D4255, ASTM D5379, ASTM D7078, DIN EN 6031	4K, 77K, -160°C – 250°C
	G1C	ASTM D5528, DIN 65563, DIN EN 6033	RT
	G2C	ASTM D7905	RT
	Bearing	ASTM D5961, DIN 65562	4K, 77K, -160°C – 250°C
	Fatigue	ASTM D3479	RT
	Compression after impact	ASTM D7136, ASTM D7137, ISO 18352	77K, RT
Adhesive	Lap-shear	ASTM D3163, ASTM D3528, ASTM D5868	4K, 77K, -160°C – 250°C
	Peel adhesion	ASTM D3330, ASTM D903	RT
Honeycomb (panels)	Flatwise tension	ASTM-C297	4K, 77K, -160°C – 250°C
	Flatwise compression	ASTM-C365	4K, 77K, -160°C – 250°C
	Edgewise compression	ASTM-C364	77K, -160°C – 250°C
	Shear	ASTM-C273	4K, 77K, -160°C – 250°C
	Insert testing	ECSS-E-HB-32-22A	77K, -160°C – 250°C
Ceramics	Flexural	ASTM C 1161	4K, 77K, -160°C – 1300°C
	KIC	ASTM C 1421	4K, 77K, -160°C – 1300°C

Beside the tests listed above, AAC offers specialized mechanical tests on components and subcomponents based on the requirement of our customers.