
Piston head - as printed.


Timing wheel - glass bead blasted.

A2024-RAM2

(High Strength and Ductile Aluminum)

Product Information

Elementum 3D's 2024 Aluminum Metal-Matrix Composite (MMC) with two percent ceramic provides excellent strength, good ductility along with the wear resistance of ceramic reinforcing phases. A2024-RAM2 is suitable for many applications and is an outstanding additive material solution for structural components. It is heat treatable like wrought 2024 aluminum.

Physical and Chemical Properties

Material composition: Proprietary A2024 w/2% ceramic (E3D-T6 Condition)

Theoretical maximum density: 2.81 g/cm³

Printed relative density: > 99.7%

Ultimate tensile strength[1]: 72 ± 2 ksi (497 MPa)

Yield strength[1]: 55 ± 4 ksi (384 MPa)

Elongation[1]: 10 ± 2 %

Hardness[2]: 80 ± 2 HRB

Modulus of elasticity[3]: 11.4 ± 0.2 Msi (79 GPa)

Deposition rate[4]: 1.6 in^3/hr (7.13 mm^3/s)

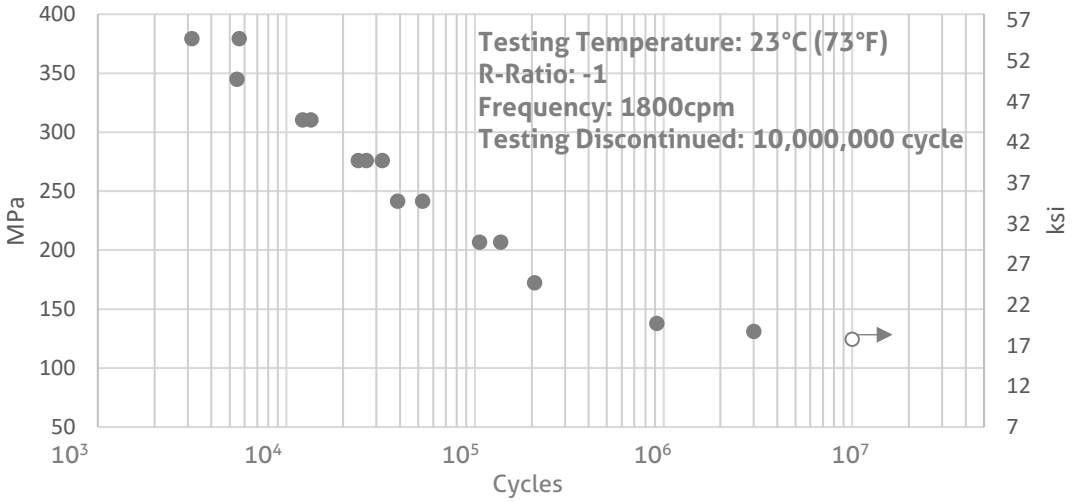
Thermal conductivity[5]: 94 W/m·K (4.52 BTU/hr·in·°F)

(NOTE: Laser Flash is not the ideal method for measuring thermal conductivity in composite materials. Measurement result is lower than reality.)

Surface roughness as built[6]:

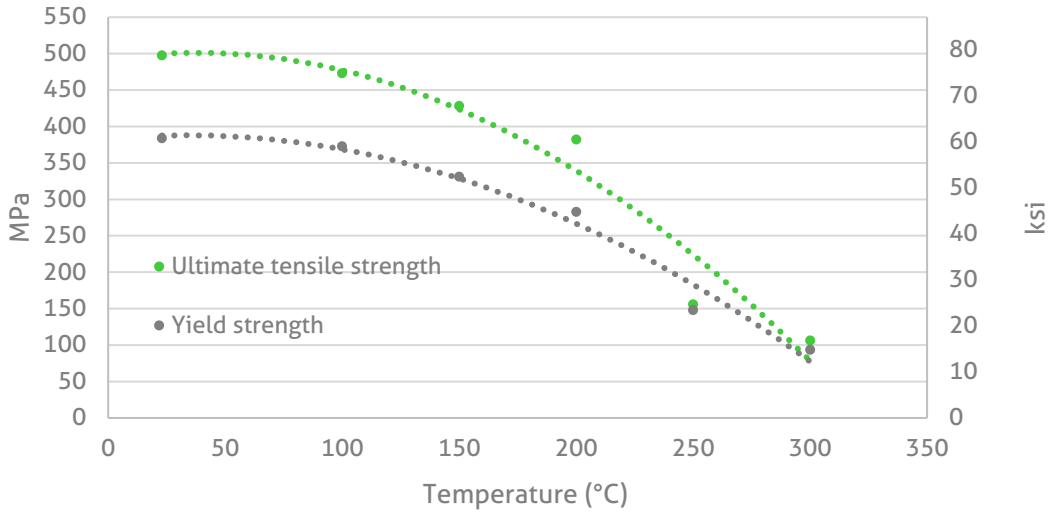
Angle	Upskin		Downskin	
Deg. °	Ra µm	Ra µin	Ra µm	Ra µin
0 (top)	1.86±0.25	73±10		
40	4.95±0.29	195±11	14.05±3.12	553±123
45	5.41±1.37	213±54	9.22±0.52	363±21
50	7.41±3.13	292±123	9.00±1.01	354±40
90 (vertical)	4.79±1.43	189±56		

Fatigue[7]:



Elevated Temperature Testing[8]:

Testing temperature		Ultimate tensile Strength		Yield strength		Elongation
°C	°F	MPa	ksi	MPa	ksi	%
23	**73**	**497±14**	**72.1±2.0**	**384±28**	**55.6±4.0**	**10±2**
100	212	473±14	68.5±2.1	373±38	54.0±5.6	12±2
150	302	428±16	32.0±2.3	349±15	50.7±2.2	17±2
200	392	382±9	55.4±1.3	298±5	43.2±0.7	19±2
250	482	156±30	22.6±4.4	148±28	21.4±4.0	27±4
300	572	106±10	15.4±1.4	93±17	13.6±2.4	31±10



[1]ASTM E8, [2]ASTM E18,[3]ASTM E494-15 (ultrasonic velocity), [4]Deposition rate calculation is for comparison purposes on an EOS M290 and does not include recoating time, laser migration time, contour exposures, etc., [5]ASTM E1461 [6]Surface roughness determined by stylus profilometry. [7]ASTM E466, [8]ASTM E21,

All stated values are approximate values. All details given above are our current knowledge and experience, and are dependent on the equipment, parameters, and operating conditions. The data provided in this document is subject to change and only intended as general information on a material set that is continually improving and developing. The data does not provide a sufficient basis for engineering parts. All samples were produced on an EOS M290. All tensile tests were performed at third party certified test labs such as Westmoreland Mechanical Testing & Research and Product Evaluations Systems.

Please contact us at sales@elementum3d.com for additional information.