

## ToughMet® 3 AT Alloy Rod, Tube & Forged Rings

Materion's ToughMet 3 AT alloy is a wrought, spinodally hardened copper alloy engineered for high strength and hardness. It resists mechanical wear, galling, stress relaxation, corrosion and erosion. ToughMet 3 alloy retains its strength at elevated temperature. It is non-magnetic and easy to machine into complex components.

### Chemical Composition (Weight Percent)

Nickel	Tin	Copper
15	8	Balance

### Typical Physical Properties

Elastic Modulus	Poisson's Ratio	Electrical Conductivity	Thermal Conductivity	Coefficient of Thermal Expansion (20 to 200° C)	Density	Magnetic Permeability
21 x 10 <sup>6</sup> psi 144 kN/mm <sup>2</sup>	0.33	< 7% IACS < 4 MS/m	22 Btu/ft/hr/°F 38 W/m/°C	9.1 x 10 <sup>-6</sup> in/in/°F 16.6 x 10 <sup>-6</sup> m/m/°C	0.325 lb/in <sup>3</sup> 9.0 g/cm <sup>3</sup>	≤ 1.001

## Typical Minimum Mechanical Properties

Form	Temper	Diameter		0.2% Offset Yield Strength		Ultimate Tensile Strength		Elongation	Hardness
		Inch	mm	ksi	N/mm <sup>2</sup>	ksi	N/mm <sup>2</sup>	%(in 4D)	HRC
Rod	AT90	1 - 3.9	25.4 - 101.5	90	620	110	760	15	26
		4 - 9	101.6 - 228.6	90	620	110	760	12	26
	AT110	0.50 - 3.9	15.1 - 101.5	110	760	132	910	10	30
		4 - 9	101.6 - 228.6	110	760	127	875	6	30
Tube	AT90	1.625 - 3.9	41 - 101.5	90	620	110	760	15	22
		4 - 8	101.6 - 203	90	620	110	760	12	22
	AT110	1.1 - 8.75	28 - 22	104	717	131	903	8	30
		8.76 - 13.6	223.2 - 345	108	745	130	896	5	30
Rings	AT	15 - 80	380 - 2032	105	724	110	758	4	28

## Standard Tolerances Rod

Form	Temper	Diameter		Diameter Tolerance <sup>2</sup>		Length <sup>1</sup>	
		inch	mm	inch	mm	inch	inch
Rod	AT90, AT110	0.50 - 1	15.1 - 25	+ 0.040/-0	+ 1.0 /-0	72 - 162	1829 - 4115
		1.1 - 2	26 - 50	+ 0.060/-0	+ 0.15/-0		
		2.1 - 3	51 - 75	+ 0.100/-0	+ 2.5/-0		
		3.1 - 3.5	76 - 90	+ 0.140/-0	+ 3.5/-0		
		3.6 - 4	91 - 100	+ 0.240/-0	+ 6.0/-0		
		4.1 - 9	101 - 229	+ 0.240/-0	+ 6.0/-0		

## Standard Tolerances Tube

Form	Temper	Outside Diameter		Inner Diameter		Diameter Tolerance <sup>2</sup>		Length <sup>1</sup>	
		inch	mm	inch	mm	inch	mm	inch	mm
Tube	AT90	1.625 - 2.5	41 - 63.5	Wall Thickness 10-20% of Outside Diameter <sup>4</sup>		+/- 0.030	+/- 0.750	72 - 162	1829 - 4115
		2.6 - 8	64 - 203			+/- 0.060	+/- 0.150		
	AT110	1.625 - 2.5	41 - 63.5			+/- 0.030	+/- 0.750		
		2.6 - 7.9	64 - 203			+/- 0.060	+/- 0.150		
		8 - 13	203 - 330			+/- 0.060	+/- 0.150	28 max.	771 max.
	Ring <sup>3</sup>	AT	15 - 80			380 - 2032	13 min.	330 min.	Machined Tolerance

1. Check with mill for special length requests.
2. Check with mill for tighter tolerance.
3. Rings are constrained by a 10,000 lb (4535 kg) maximum weight.
4. This is just a guideline. Check with mill if this does not meet your requirement.

## Surface and Finishing

Surface: Mill hardened finish.

## Industry Standards and Specifications

UNS# C72900, AMS 4596 (rod and bar), AMS 4598 (tube)

### Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.

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