



## ToughMet® 3 AT Rod, Tube & Forged Rings Data Sheet

ToughMet 3 AT 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 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

### PHYSICAL PROPERTIES

Elastic Modulus	Poisson's Ratio	Electrical Conductivity	Thermal Conductivity	Coefficient of Thermal Expansion	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 16.4 x 10 <sup>-6</sup> m/m/°C	0.325 lb/in <sup>3</sup> 9.00 g/cm <sup>3</sup>	<1.001

### 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	0.595 - 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 - 6.4	101.6 - 164	90	620	110	760	12	22
		6.5 - 8	165 - 203	90	620	110	760	12	22
	AT110	1.625 - 3.9	41 - 101.5	110	760	130	895	10	30
		4 - 7.9	101.6 - 203	110	760	130	895	6	30
		8 - 13	203.2 - 330	110	760	130	895	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	mm
Rod	AT90, AT110	0.595 - 1	15.1 - 25	+0.040/-0	+1.0/-0	72-162	1829-4115
		1.1 - 2	26 - 50	+0.060/-0	+1.5/-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	+/-0.75	72-162	1829-4115
		2.6 - 8	64 - 203			+/- 0.060	+/-1.50		
	AT110	1.625 - 2.5	41 - 63.5			+/- 0.030	+/-0.75		
		2.6 - 7.9	64 - 203			+/- 0.060	+/-1.50		
		8-13	203-330			+/- 0.060	+/-1.50		
Ring <sup>3</sup>	AT	15-80	380-2032	13 min	330 min	Machined Tolerance		9 max	229 max

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.

## SPECIFICATIONS AND STANDARDS

UNS C72900, AMS 4596, AMS4598 NACE MRO175/ISO 15156

## CONTACT INFORMATION

Domestic Sales	Pricing, availability, tolerances, etc	800-521-8800
Technical Service	Properties, application and design assistance, fabrication and processing assistance, etc.	800-375-4205 +(1) 216-692-3108
International Sales World-wide Distribution	Link to US and international distributors and international sales offices	<a href="http://bit.ly/GetToughMet">http://bit.ly/GetToughMet</a>



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### MATERION CORPORATION

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**AD0011\_0414**

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