



**MATERION**



**High strength alloys** for exploration, drilling,  
completion and production

**TOUGHMET®** | **ALLOY 25**

## UNIQUE PROPERTY COMBINATIONS MAKE TOUGHMET® 3 ALLOY AND ALLOY 25 the materials of choice in the oil and gas industry.

Ideal for instrument housings, bearings, couplings and actuator stems, these alloys extend the reach and accuracy of drilling tools and increase the reliability of well control, completion and production.



### TOUGHMET® ALLOYS

ToughMet copper-nickel-tin alloys are engineered to provide attributes beyond those typically found in high-strength copper alloys, especially in the high temperature, high pressure regime.

ToughMet materials retain their strength at elevated temperatures and resist most sour environments. Some ToughMet alloy tempers combine high levels of fracture toughness with strength.

In addition to rod, bar, sheet and plate, ToughMet alloys are also offered in large diameter bar form, which offers very consistent properties throughout cross sections of the material in diameters more than double regular ToughMet alloy size ranges.

#### Advantages:

- High strength
- High fatigue strength
- High hardness
- Anti-galling
- Lower friction
- Non-magnetic
- Corrosion, erosion and wear resistance
- Resiliency
- Excellent machinability

### ALLOY 25

Alloy 25 is a high-strength copper beryllium alloy that can be age hardened to property combinations tailored for individual application requirements.

Alloy 25 offers high material strength even in large cross sections and the best thermal and electrical conductivity capability available in a high-strength material.

#### Advantages:

- High strength
- High fatigue strength
- High hardness
- Anti-galling
- Lower friction
- Non-magnetic
- Corrosion, erosion and and wear resistance
- Resiliency
- Excellent machinability
- Thermal and electrical conductivity

## PHYSICAL PROPERTIES

	Density, lbs/in <sup>3</sup> (g/cm <sup>3</sup> )	Elastic Modulus MSI (GPa)	Relative Magnetic Permeability	Thermal Conductivity, BTU/ft/hr/°F (W/m/K)	Poisson's Ratio	Nominal Composition
ToughMet 3	0.325 (9.00)	21 (144)	<1.001	22 (38)	0.33	Cu – 15 Ni – 8 Sn
Alloy 25	0.302 (8.36)	19 (131)	<1.001	60 (105)	0.30	Cu – 1.9 Be – 0.2 Co

Properties are specified for the fully heat treated condition

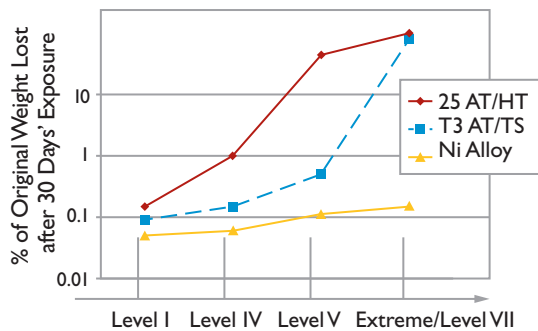
## MINIMUM MECHANICAL PROPERTIES\*

	Tensile Strength, ksi (MPa)	Yield Strength, ksi (MPa)	Elongation, %	Hardness
ToughMet 3 CX105	99 (683)	95 (652)	4	HRC 30
ToughMet 3 AT110	125 (875)	110 (760)	6	HRC 30
ToughMet 3 TS130	140 (965)	130 (895)	10	HRC 24
ToughMet 3 TS150	158 (1090)	150 (1035)	5	HRC 36
ToughMet 3 TS160U	160 (1105)	150 (1035)	3	HRC 34
Alloy 25 AT	165 (1138)	140 (965)	3	HRC 37
Alloy 25 HT	172 (1186)	145 (1000)	3	HRC 37
Alloy 25 AT/HT Oilfield	155 (1069)	140 (965)	6	HRC 37

## IMPROVED TOUGHNESS TEMPER\*

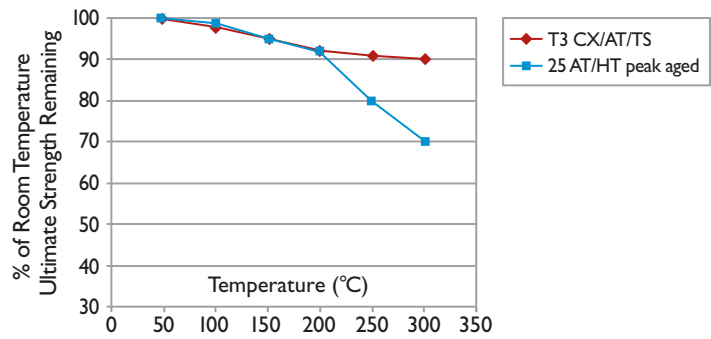
	Tensile Strength, ksi (MPa)	Yield Strength, ksi (MPa)	Elongation, %	Hardness	CVN ft-lbs
Alloy 25 DSTO-1	140 (965)	110 (760)	10	HRC 26	11 avg**
Alloy 25 DSTO-2	135 (931)	100 (690)	12	HRC 26	11 avg**
ToughMet 3 TS 95	106 (731)	95 (652)	18	HRB 97	30 avg (24 min)
ToughMet 3 TS105	120 (827)	105 (724)	15	HRC 22	
ToughMet 3 TS120U	120 (827)	110 (760)	15	HRC 24	10 min*

## CORROSION RESISTANCE



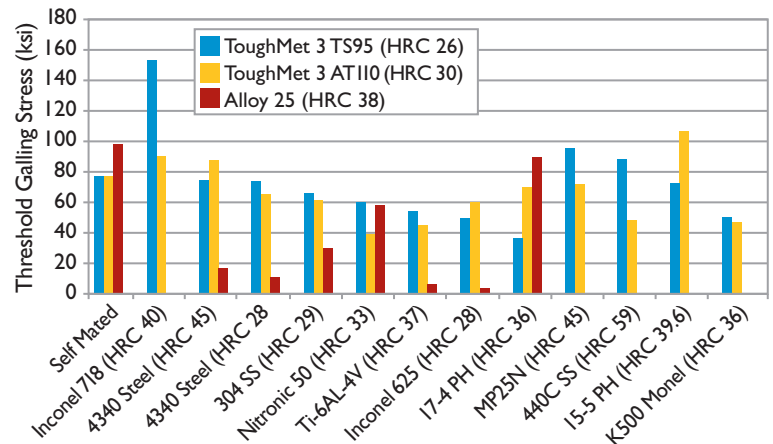
General corrosion rates in NACE standard environments

## TEMPERATURE RESISTANCE



Strength at temperature after 30-minute exposure

## GALLING RESISTANCE (ASTM G98)

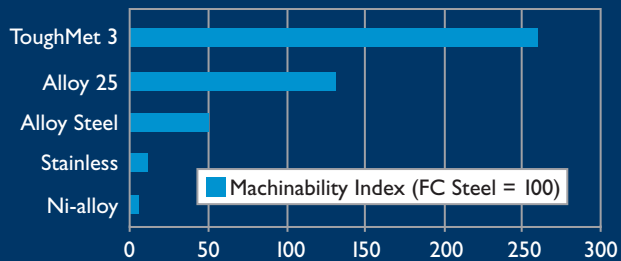




# TOUGHMET® | ALLOY 25

ToughMet and Alloy 25 materials are available in a wide range of sizes and shapes. Design flexibility and excellent machinability deliver the best total cost solution for high-performance oil and gas components.

## MACHINABILITY (ASTM E618)



Recommended machining practices may be found on our website.

## AVAILABLE FORMS

	Availability (Rod, Tube, Plate, Shape)
ToughMet 3 CX105	R, T, P, S
ToughMet 3 AT110	R, T, P
ToughMet 3 TSI30	R
ToughMet 3 TSI50	R, T
ToughMet 3 TSI60U	R, T
Alloy 25 AT	R, T, P
Alloy 25 HT	R, T, P
Alloy 25 AT/HT Oilfield	R, T, P

## IMPROVED TOUGHNESS TEMPERS

	Availability (Rod, Tube, Plate, Shape)
Alloy 25 DSTO-1	R, T
Alloy 25 DSTO-2	R, T
ToughMet 3 TS95	R, T
ToughMet 3 TSI05	T
ToughMet 3 TSI20U	R, T



For more information, please call 1-216-383-6800 or visit [materion.com/oilandgas](http://materion.com/oilandgas).



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