TOUGHMET®3
ALLIAGE CUNI15SN8
C72900
C96900
BARRES, TUBES ET FILS

STAINLESS

High performance Alloys - Medical - Aerospace - Microtechnics - Motorsport - Industry

GENERALITIES

ToughMet® 3 *is a beryllium-free copper alloy that hardens by spinodal decomposition during heat treatment. This alloy can be an alternative to CuBe2 as it combines high mechanical properties, high resistance to friction, seizure, wear and corrosion.*

This alloy is produced and processed by MATERION in the USA.

Stainless has a range of sizes and grades in stock to suit your application needs.

This product can also be custom made or cut into slugs by our service centres.

APPLICATIONS

ToughMet®3 has very good corrosion resistance, low coefficients of friction and very high hardness for a copper alloy. It is heat resistant up to 300°C depending on the condition.

Aeronautics: joint rings subject to high loads, screws, ball joint elements, hinge parts.
Others: oil research probes, connecting rod bearings, pins and ball joints for construction equipment.

STANDARDS AND DESIGNATIONS

ToughMet®3 – CuNi15Sn8 – C72900 (state AT et TS)
C96900 (state CX)

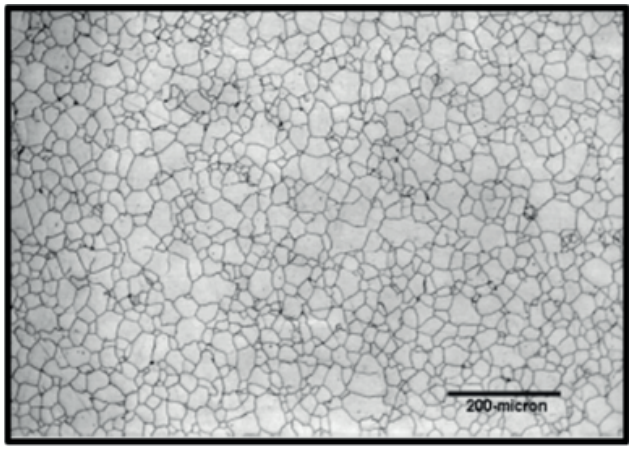
Bars: AMS 4596, AMS 4597 – ASTM B929
Flats: AMS 4595 – ASTM B505 (state CX)
Tubes: AMS 4598

TYPICAL CHEMICAL ANALYSIS (mass %)

	Nickel	Zinn	Iron	Copper
MIN	14.50	5.50	---	BALANCE
MAX	15.50	6.50	0.50	

METALLURGY

The grade is fine-grained and homogeneous in the AT and TS states. The typical microstructure in the AT state is shown opposite:



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PHYSICAL PROPERTIES AT 20°C

Density.....8.94 g.cm-3
Coefficient of thermal expansion (between 20 et 200°C).....16.4 x 10^{-6} m/m.°C
Young's modulus......105- 200 x 10^{3} MPa
Thermal conductivity.....38 $W.m^{-1}K^{-1}$
Electrical conductivity.....5 to 8% IACS depending on condition
Non-magnetic grade (relative magnetic permeability <1.001)

MECHANICAL PROPERTIES OF THE BARS

TougMet®3 is available in a variety of states and processing modes, allowing for different sizes and resistance levels:

- ToughMet®3 AT (AT90 or AT110) is obtained by hot rolling then heat treatment
- ToughMet®3 TS (TS160U, TS95, ...) is obtained by hot rolling, cold rolling and heat treatment
- ToughMet®3 CX (CX90 or CX105) is obtained by casting followed by heat treatment. The foundry also allows us to solutions for preformed parts (please contact us)

ToughMet®3 AT :

Shapes	Temper: producer/ASTM designation	Diameter or thickness (mm)	UTS (Mpa)	YS 0.2% (Mpa)	E%	Hardness
Bars	AT90 / TX 00	38-100	>720	>620	>15	>26 HRC
		100-229	>720	>620	>12	>26 HRC
	AT110 / TX 00	18-100	>910	>760	>10	>30 HRC
		100-229	>875	>760	>6	>30 HRC
Tubes	AT 90 / TX 00	41-102 side >6,4	>760	>620	>15	>22HRC
		102-203 side >6,4	>760	>620	>12	>22HRC
	AT 110 / TX 00	41-102 side >6,4	>860	>760	>10	>30 HRC
		102-203 side <6,4	>880	>760	>6	>30 HRC
		206-330 side <75	>880	>760	>5	>30 HRC
Flats	AT 110 / TX 00	3,8-120	>860	>760	>6	>90 HRB

ToughMet®3 TS :

Shapes	Temper: producer/ASTM designation	Diameter or thickness (mm)	UTS (Mpa)	YS 0.2% (Mpa)	E%	Hardness
Bars/ Wires	TS160U/TS	0,76-6,35	>1100	>1034	>5	>32 HRC
		6,35-10	>1100	>1034	>7	>32 HRC
Bars	TS95/TS	19-152	>725	>655	>18	>93 HRC
	TS120U/TS	19-152	>825	>755	>15	>22 HRC
	TS130U/TS	19-152	>965	>895	>10	>24 HRC
	TS160U/TS	10-19	>1140	>1035	>7	>34HRC
		19-41	>1140	>1035	>5	>34HRC
		41-152	>1105	>1035	>3	>34HRC
Tubes	TS 105/TS	Diam ext : 38-76	>830	>725	>15	>22HRC
	TS 105/TS		>1089	>1034	>5	>22HRC

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ToughMet®3 CX :

Shapes	Temper: producer/ASTM designation	Diameter or thickness (mm)	UTS (Mpa)	YS 0.2% (Mpa)	E%	Hardness
Bars	CX 90 / TX 00	38-89	>720	>620	>6	>27 HRC
	CX 105 / TX 00	38-89	>760	>720	>4	>30 HRC
Tubes	CX 90	Ep paroi :12,7-101	>720	>620	>6	>27 HRC
	CX 105		>760	>720	>4	>30 HRC

Note:
The thickness of the tube is 10-25% of the outside diameter of the tube.

PROCESSIES

Machinability
ToughMet® 3 is a poorer conductor of heat than standard copper alloys, so it is advisable to use sufficient coolant to remove heat. A positive rake angle is strongly recommended.

Heat treatments
All products supplied in ToughMet®3 are already heat treated at the factory and can be used without additional heat treatment.

CORROSION RESISTANCE

ToughMet®3 alloy is highly resistant to corrosion in marine environments. It complies with NACE MR0175/ ISO 15156. The alloy has excellent resistance to pitting and is not susceptible to hydrogen embrittlement.

STANDARD SHAPE

- Round bars, tubes, wire and flats in treated condition - Surface ground or peeled.
- Other formats: Coils (see associated data sheets)

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