SCM Metal Products, Inc.
2601 Weck Drive
Research Triangle Park, North Carolina, 27709
Telephone: 919/544-8090
FAX: 919/544-7996

GlidCop® Product Information

No.: A.05.02

Grade: AL-15, AL-25, AL-60
Subject: Elevated Temperature Modulus of Elasticity (E)

Source: SCM Metal Products, Inc.
Date: 20 January 1993
Reference: Sandia Report - "The Effect of High Temperature Braze Thermal Cycles on Mechanical Properties of a Dispersion Strengthened Copper Alloy", August 1987, J.J. Stephens and D.T. Schmale.

Note: The information on the following pages has been mathematically derived from the following expression:

$$E\ (MPa) = 1.251 \times 10^5 - 18.58T - 0.0872T^2 + 4.368 \times 10^{-5}T^3$$

where: T = temperature (°C)

The above equation, and graphical representations of this equation on the following pages (A.05.02.A and A.05.02.B) may be used as a conservative estimate of the modulus of elasticity at elevated temperatures. This expression, originally derived to predict the behavior of pure copper, has been found to be generally applicable to copper alloys.

Source of equation: C.R. Barrett, O.D. Sherby; Trans. AIME; 230; 1322 (1964)

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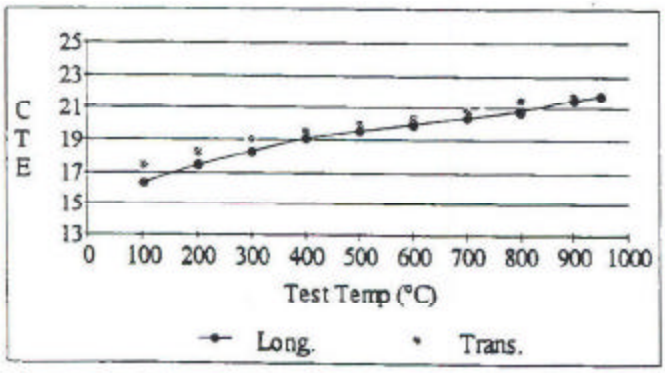
GlidCop® Product Information

No.: A.03.03

Grade: AL-15 LOX
Subject: Coefficient of Thermal Expansion
Form: 1/2" x 6 3/8" (13 x 162 mm) Extruded Flat
Condition Tested: As-Extruded

Source: SCM Metal Products, Inc.
Date: 16 April 1993
Reference: Project #930215. Tests performed in the longitudinal (L), and transverse (T) directions.

Test Temperature °C (°F)	Direction	Mean CTE ppm/°C	ppm/°F
100 (212)	L	16.4	9.1
	T	17.1	9.5
200 (212)	L	17.5	9.7
	T	18.0	10.0
300 (572)	L	18.3	10.2
	T	18.5	10.3
400 (752)	L	19.1	10.6
	T	19.0	10.5
500 (932)	L	19.6	10.9
	T	19.2	10.7
600 (1112)	L	20.0	11.1
	T	19.6	10.9
700 (1292)	L	20.4	11.3
	T	19.8	11.0
800 (1472)	L	20.8	11.6
	T	20.0	11.1
900 (1652)	L	21.5	11.9
	T	20.3	11.3
950 (1742)	L	21.8	12.1
	T	20.4	11.4



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GlidCop® Product Information

No.: B.02.09

Grade: AL-15 LOX
Subject: Elevated Temperature Mechanical Properties
Form: 5/8" (16 mm) Diameter Extruded and Drawn Bar
Condition Tested: Stress Relief Heat Treated

Source: SSCM Metal Products, Inc.
Date: 14 August 1992
Reference: Project #032790
Drawn from 1 1/4" (32 mm) diameter extuded bar.

Test Temp. F° (C°)	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elong. % in 1"
75 (24)	60 (414)	51 (352)	26
400 (204)	47 (324)	43 (297)	21
600 (283)	41 (283)	38 (262)	15
800 (427)	35 (241)	33 (228)	11
1000 (538)	31 (214)	29 (200)	7

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GlidCop® Product Information

No.: B.02.14

Grade: AL-15 LOX
Subject: Elevated Temperature Mechanical Properties
Form: 1/2" X 6 3/8" (13 X 162 mm) Extruded Flats
Condition Tested: As-Extruded

Source: SCM Metal Products,Inc.
Date: 25 March 1994
Reference: Tests performed at Westmoreland, using round cross-section tensile specimens machined from the longitudinal (L) and transverse (T) directions.
Reference projects #940222.

Test Temp. F° (C°)	Direction	UTS ksi (MPa)	0.2% ksi (MPa)	Elong. % in 1"
68 (20)	L	61 (421)	49 (338)	27
	T	61 (421)	50 (345)	26
302 (150)	L	50 (345)	42 (290)	29
	T	50 (345)	42 (290)	26
482 (250)	L	42 (290)	35 (241)	29
	T	40 (276)	31 (214)	24
932 (500)	L	25 (172)	19 (131)	26
	T	19 (131)	12 (83)	10
1382 (750)	L	11 (76)	7 (48)	23
	T	7 (48)	4 (28)	10
1652 (900)	L	4 (28)	3 (21)	--
	T	2 (14)	1 (7)	--

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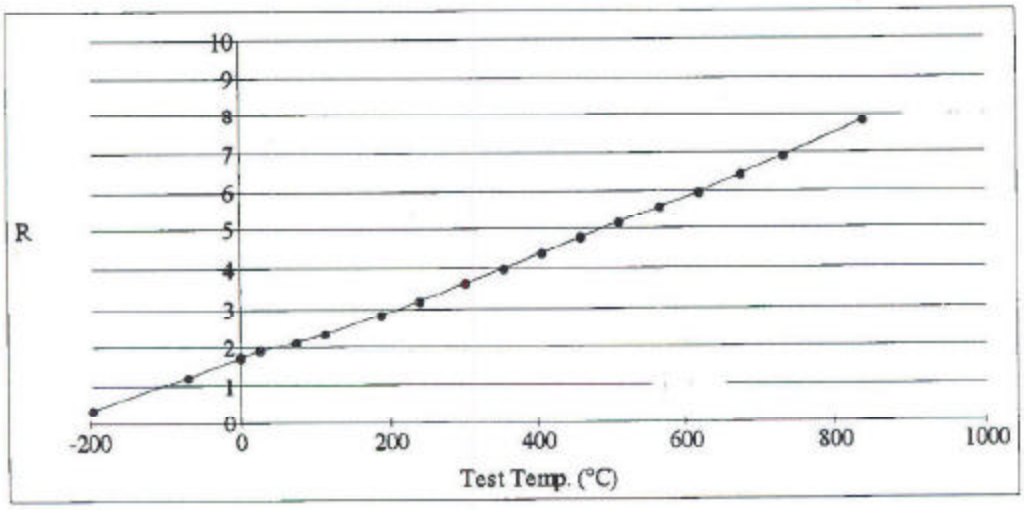
GlidCop® Product Information

No.: A.01.01

Grade: AL-15 LOX
Subject: Electrical Conductivity
Form: Rolled Strip
Condition Tested: Stress Relief Heat Treated

Source: SCM Metal Products, Inc.
Date: 29 May 1992
Reference: Projects #920113 and #920430

Temperature °C(°F)	Electrical Conductivity (%IACS)	Resistivity (microhm-cm)
-196(-321)	465	0.38
-70(-108)	143	1.23
0(32)	101	1.75
26(79)	92	1.92
74(165)	82	2.13
113(235)	73	2.36
188(370)	62	2.84
240(464)	55	3.19
302(576)	48	3.64
354(669)	44	3.99
406(763)	40	4.37
459(858)	37	4.78
511(952)	34	5.16
567(1053)	32	5.58
620(1148)	30	5.98
676(1249)	28	6.43
734(1353)	26	6.90
840(1544)	23	7.80



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GlidCop® Product Information

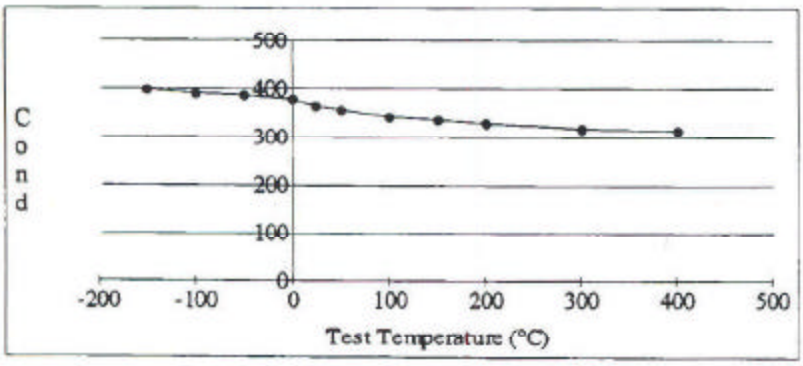
No.: A.02.01

Grade: AL-15 LOX
Subject: Thermal Conductivity
Form: 1/2" (13 mm) Plate Rolled from HIP Consolidated Slab
Condition Tested: As-Rolled (75% Cold Work)

Source: Princeton Plasma Physics Laboratory
(Materials Research and Engineering Corp.)
Date: 23 August 1989
Reference:

Temperature C°(°F)	Thermal Conductivity W/(m·C°)	Btu/ft/hr/°
-150(-238)	398	230
-100(-148)	390	225
-50(-58)	387	224
0(32)	379	219
23(73)	365	211
50(122)	357	206
100(212)	343	198
150(302)	337	195
200(392)	330	191
300(572)	319	184
400(752)	316	183

1 Watt/(meter·°C) = 1.7296 Btu/ft/hr/°F



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