

1. GENERAL

In order to improve the corrosion resistance of 7075 sheet, strip and plate, these are clad with a low zinc alloy, 7072. This imparts to Clad 7075 a corrosion resistance equal to that of pure aluminum, although overheating impairs this protective covering. The cladding reduces the strength of 7075 by about 5 percent, but improves the formability to a slight extent. Therefore, only complementary and additional information to that presented for 7075 is given below. This information in turn also applies to bar, sheet, strip and plate of the unclad alloy with the exceptions noted below.

1.01 Commercial Designation. Clad 7075.

1.02 Alternate Designations. Alclad 7075, Clad 75 S, Alclad 75 S (all obsolete).

1.03 Specifications. Table 1.03.

TABLE 1.03

AMS	Form	Military
4039	Plate T651 Condition	
4046	Sheet, plate T6 Condition, Clad 1 side	
4047 B	Sheet, plate, roll tapered, T6 Condition	
4048 C	Sheet, plate, 0 Condition	
4049 C	Sheet, plate, T6 Condition	

1.04 Composition. Table 1.04.

TABLE 1.04

Source	AMS (1)2(3)4(5)			
	Core		Cladding*	
	Min	Max	Min	Max
Copper	1.2	2.0	-	0.10
Magnesium	2.1	2.9	-	0.10
Manganese	-	0.30	-	0.10
Iron	-	0.7	-	0.7
Silicon	-	0.50	-	-
Zinc	5.1	6.1	0.8	1.3
Chromium	0.18	0.40	-	-
Titanium	-	0.20	-	-
Other impurities				
each	-	0.05	-	0.05
total	-	0.15	-	0.15
Aluminum	Balance		Balance	

* The nominal cladding thickness is between 4 and 1.5 percent of the total thickness on each side, depending on the total thickness of the product. Cladding thicknesses greater than 4 percent are obsolete.

1.05 Heat Treatment. Clad 7075 is heat treated under the same conditions as 7075, but the shortest heat treatment time, consistent with securing the required properties, should be used. Prolonged heating or repeated reheat treatments, which cause diffusion of alloying elements into the coating and impair the resistance to corrosion, should be avoided. See Clad 2024 also.

1.06 Hardenability. See 7075.

1.07 Forms and Conditions Available

1.071 Alloy is available in the full commercial range of sizes for sheet, strip and plate.

1.072 Alloy is available in the 0, T6 and T651 Conditions.

1.08 Melting and Casting Practice. See 2024 and Clad 2024.

1.09 Special Considerations

1.091 Effect of directionality on stress strain curves for sheet and plate, in T6 Condition, Fig. 1.091.

1.092 Prolonged heating or repeated reheat treatments cause diffusion of alloying elements into the coating and impair the resistance to corrosion. See Clad 2024.

2. PHYSICAL AND CHEMICAL PROPERTIES

2.01 Thermal Properties

2.013 Thermal conductivity, 75.1 Btu ft per (hr sq ft F).

2.014 Thermal expansion, 0 Condition, 12.9×10^{-6} in per in per F, T6 Condition, 13.1×10^{-6} in per in per F.

2.015 Specific heat, 0.23 Btu per (lb F).

2.02 Other Physical Properties

2.021 Density, 0.101 lb per cu in, 2.80 gr per cu cm.

	Al
5.5	Zn
2.5	Mg
1.6	Cu
0.3	Cr

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3. MECHANICAL PROPERTIES

3.01 Specified Mechanical Properties

3.011 Design properties. See MIL-HDBK-5.

3.012 AMS specified mechanical properties for tapered sheet and plate, Table 3.012.

TABLE 3.012

Source	AMS (3)		
	Al-5.5Zn-2.5Mg-1.6Cu-0.3Cr		
Form	Tapered sheet and plate		
Condition	T6		
Thickness - in	0.040	0.188	0.500
	to	to	to
	0.187	0.499	1.000
F _{tu} , min	-ksi	72	75
F _{ty} , min	-ksi	62	64
e(2 in), min-percent		8	6

3.013 Aluminum Association specified mechanical properties for 0 Condition, Table 3.013

TABLE 3.013

Source	(6, p. 35)			
	Al-5.5Zn-2.5Mg-1.6Cu-0.3Cr*			
Condition	0			
Thickness - in	0.008	0.015**	0.063	0.188
	to	to	to	to
	0.014	0.062	0.187	0.499
Clad Thickness				
Percent per side	4	4	2 1/2	1 1/2
F _{tu} , max	-ksi	36	36	38
F _{ty} , max	-ksi	20	20	21
e(2 in), min-percent		9	10	10

* For thickness of plate ≥ 0.500 inch properties are the same as core material, see 7075.

** 4 percent clad thickness for plate thickness over 0.063 in is obsolete and is only shown for information.

3.014 Aluminum Association specified mechanical properties for T6 and T651 Condition, Table 3.014.

TABLE 3.014

Source	(6, p. 35)				
	Al-5.5Zn-2.5Mg-1.6Cu-0.3Cr* (Clad)				
Form	Sheet and plate				
Condition	T6 and T651				
Thickness - in	0.008	0.012	0.040**	0.063	0.188
	to	to	to	to	to
	0.011	0.039	0.499	0.187	0.499
Clad Thickness-%	4	4	4	2 1/2	1 1/2
F _{tu} , min-ksi	68	70	72	73	75
F _{ty} , min-ksi	58	60	62	63	64
e(2 in), min-percent	5	7	8	8	8

* For thickness of plate ≥ 0.500 inch properties are the same as core material, see 7075.

** 4 percent clad thickness for plate thickness over 0.053 in is obsolete and is only shown for information.

3.02 Mechanical Properties at Room Temperature. See 3.03 also.

3.021 Typical mechanical properties, Table 3.021.

Al
5.5 Zn
2.5 Mg
1.6 Cu
0.3 Cr

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TABLE 3.021
(7, p. 26)

Source	Wrought products		
Form	0	T6	
F_{tu}	typ - ksi	32	76
F_{ty}	typ - ksi	14	67
F_{su}	typ - ksi	22	46
ϵ (2 in),	typ - percent	17	11

- 3.03 Mechanical Properties at Various Temperatures
- 3.031 Short time tension properties
- 3.0311 Complete stress strain curves for sheet in 0 and T6 Conditions at room and elevated temperatures, Fig. 3.0311.
- 3.0312 Stress strain curves for sheet in T6 Condition at room and elevated temperatures, Fig. 3.0312.
- 3.0313 Effect of exposure and test temperature on tensile properties of sheet in T6 Condition, Fig. 3.0313.
- 3.032 Short time properties other than tension
- 3.0321 Stress strain curves in compression for sheet in T6 Condition at room and elevated temperatures, Fig. 3.0321.
- 3.0322 Effect of exposure and test temperature on compressive yield strength of sheet in T6 Condition, Fig. 3.0322.
- 3.0323 Effect of exposure and test temperature on bearing properties of sheet in T6 Condition, Fig. 3.0323.
- 3.0324 Effect of exposure and test temperature on shear strength of sheet in T6 Condition, Fig. 3.0324.
- 3.04 Creep and Creep Rupture Properties
- 3.041 Creep and creep rupture curves for sheet in T6 Condition at 300 F, Fig. 3.041
- 3.042 Short time total strain curves for sheet in T6 Condition at 300 to 600 F, Fig. 3.042.
- 3.043 Master curves for 0.5 percent total strain and creep rupture for sheet in T6 Condition, Fig. 3.043.
- 3.05 Fatigue Properties. Table 3.05 .

TABLE 3.05
(8, p. 142)

Source		Sheet		T6					
Temp F	Method	Stress Ratio		Stress Concentration	Fatigue Strength - ksi at Cycles				
		A	R		10^5	10^6	10^7	10^8	5×10^8
RT	Rot beam	∞	-1	Smooth K=1	29	20	15	13	12.5

- 3.06 Elastic Properties. See Clad 2024 also.
- 3.061 Tangent modulus curves in compression for sheet and plate in T6 Condition at room temperature, Fig. 3.061.
- 3.062 Tangent modulus curves in compression for sheet in T6 Condition at room and elevated temperatures, Fig. 3.062.
- 4. FABRICATION
- 4.01 Forming and Casting
- 4.011 Relationship of holding time to forming temperatures for sheet in T6 Condition, Fig. 4.011.

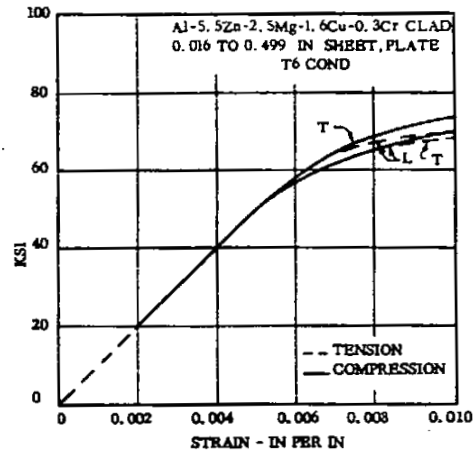


FIG. 1.091 EFFECT OF DIRECTIONALITY ON STRESS STRAIN CURVES FOR SHEET AND PLATE IN T6 CONDITION (9, p. 84)

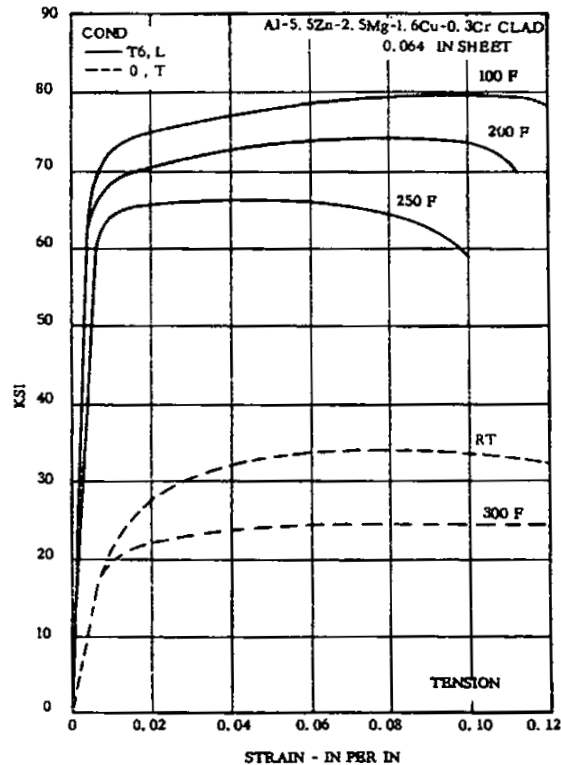


FIG. 3.0311 COMPLETE STRESS STRAIN CURVES FOR SHEET IN 0 AND T6 CONDITIONS AT ROOM AND ELEVATED TEMPERATURES (10, Fig. 19, 20)

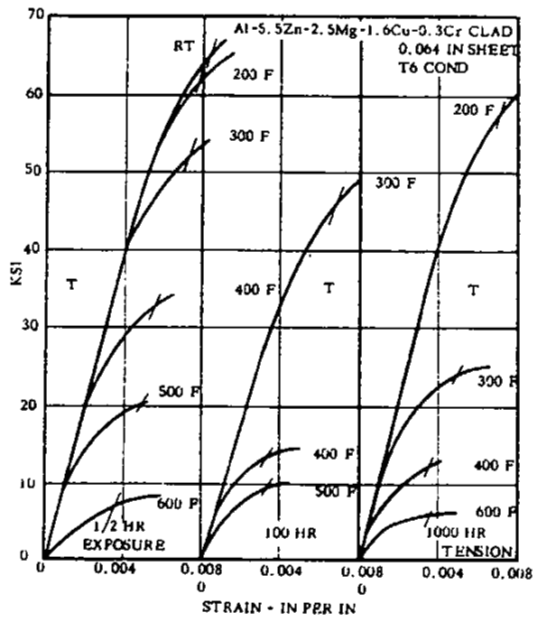
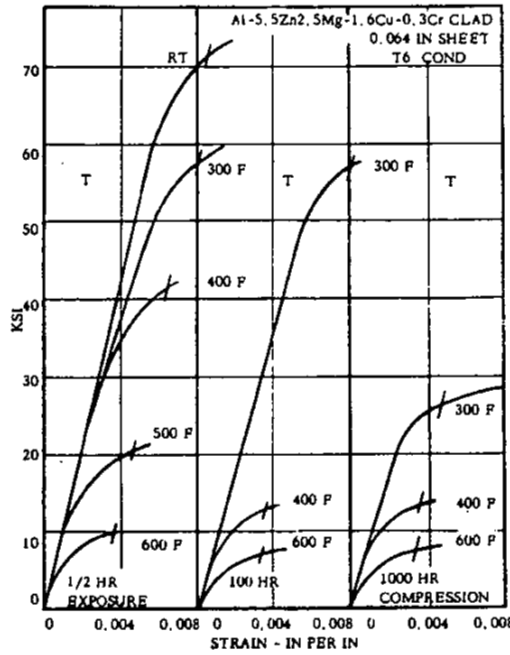


FIG. 3.0312 STRESS STRAIN CURVES FOR SHEET IN T6 CONDITION AT ROOM AND ELEVATED TEMPERATURES

(12, p. 169, 174)



Al
5.5 Zn
2.5 Mg
1.6 Cu
0.3 Cr

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FIG. 3.0321 STRESS STRAIN CURVES IN COMPRESSION FOR SHEET IN T6 CONDITION AT ROOM AND ELEVATED TEMPERATURES

(12, p. 175-180)

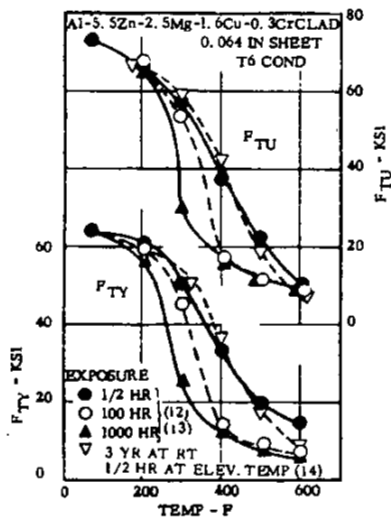


FIG. 3.0313 EFFECT OF EXPOSURE AND TEST TEMPERATURE ON TENSILE PROPERTIES OF SHEET IN T6 CONDITION

(12, p. 101)(13, p. 52)(14, p. 29, 30)

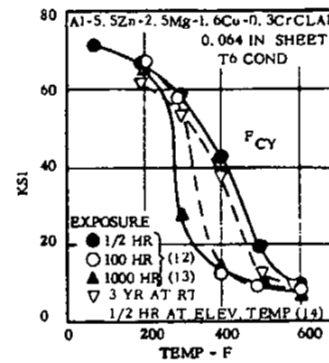


FIG. 3.0322 EFFECT OF EXPOSURE AND TEST TEMPERATURE ON COMPRESSIVE YIELD STRENGTH OF SHEET IN T6 CONDITION

(12, p. 102)(13, p. 52)(14, p. 27)

Al
5.5 Zn
2.5 Mg
1.6 Cu
0.3 Cr
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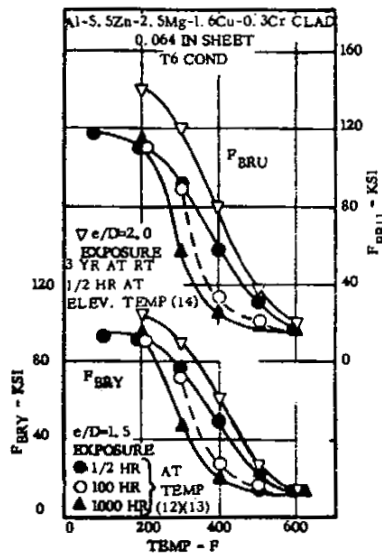


FIG. 3.0323 EFFECT OF EXPOSURE AND TEST TEMPERATURE ON BEARING PROPERTIES OF SHEET IN T6 CONDITION (12, p. 103)(13, p. 52)(14, p. 25)

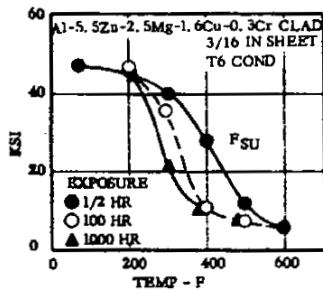


FIG. 3.0324 EFFECT OF EXPOSURE AND TEST TEMPERATURE ON SHEAR STRENGTH OF SHEET IN T6 CONDITION (12, p. 104)(13, p. 52)

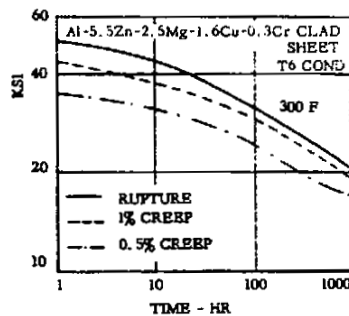


FIG. 3.041 CREEP AND CREEP RUPTURE CURVES FOR SHEET IN T6 CONDITION AT 300 F (15, p. 5)

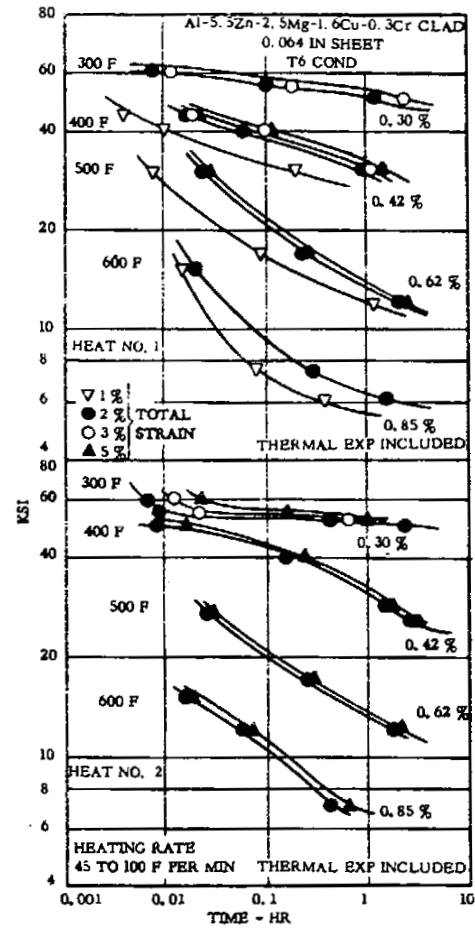


FIG. 3.042 SHORT TIME TOTAL STRAIN CURVES FOR SHEET IN T6 CONDITION AT 300 TO 600 F (16, p. 38-41)

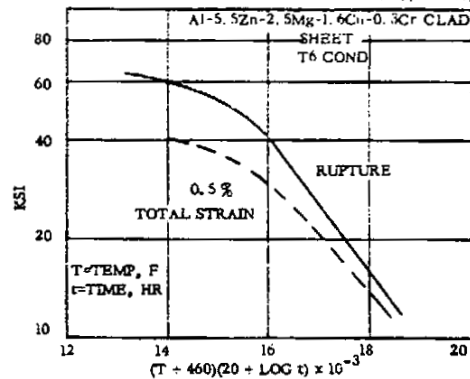


FIG. 3.043 MASTER CURVES FOR 0.5 PERCENT TOTAL STRAIN AND CREEP RUPTURE FOR SHEET IN T6 CONDITION (15, p. 8)

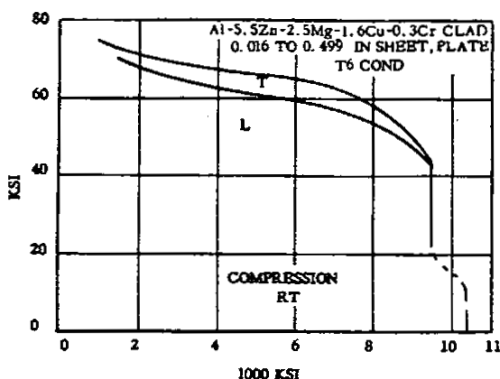


FIG. 3.061 TANGENT MODULUS CURVES IN COMPRESSION FOR SHEET AND PLATE IN T6 CONDITION AT ROOM TEMPERATURE (9, p. 84)

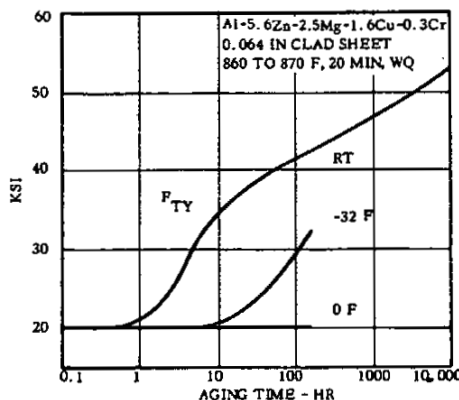


FIG. 4.011 RELATIONSHIP OF HOLDING TIME TO FORMING TEMPERATURES FOR SHEET IN T6 CONDITION (17)

5.5	Zn
2.5	Mg
1.6	Cu
0.3	Cr

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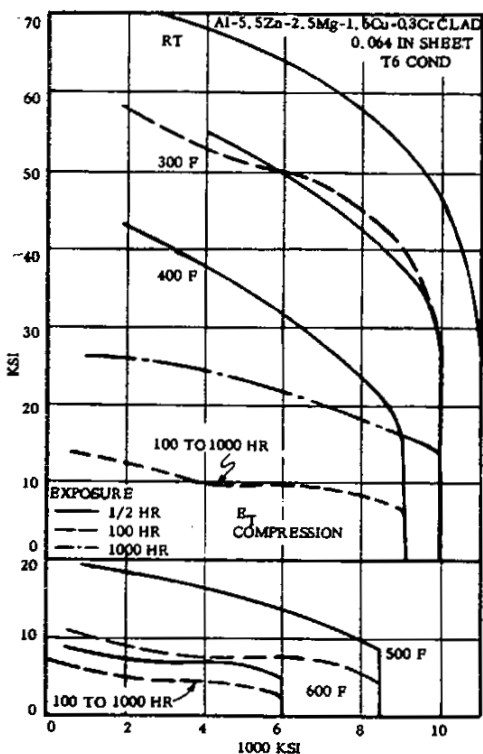


FIG. 3.062 TANGENT MODULUS CURVES IN COMPRESSION FOR SHEET IN T6 CONDITION AT ROOM AND ELEVATED TEMPERATURES (12, p. 185-189)

REFERENCES

- 1 AMS 4039, (April 30, 1960)
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- 3 AMS 4057 B, (Jan. 15, 1957)
- 4 AMS 4048 C, (Aug. 15, 1958)
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- 15 Hyler, W. S. and Crover, H. J., "Materials-Property-Design Criteria for Metals," Pt. 2, WADC TR 55-150, (Nov. 1955)
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