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INDEX TO MATERIAL CODES FOR SECTION 9.0

TITANIUM AND TITANIUM ALLOYS

MATERIALS	MATERIAL CODE
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Ti-5Al-2.5Sn (ELI)	9.2.2
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TABLE 9.1.1-ME1

Alloy Designation: Ti-65A Unalloyed Titanium

Specification: MIL-T-7993 A
Form: Bar
Diameter: Up to 2.54 cm (1.000 in.)
Condition: Annealed

Testing Temperature, K (F)		297 (75)				17 (-430)	
Tension, Longitudinal							
TUS, MN/m^2 (ksi)	Avg	462 (67.0)				1207 (175)	
	Min	449 (65.1)				1151 (167)	
Std. Deviation							
TYS, MN/m^2 (ksi)	Avg	369 (53.5)				861 (125)	
	Min	328 (47.5)				814 (118)	
Std. Deviation							
Elong, percent	Avg	30.0				32.2	
	Min	25				30	
RA, percent	Avg	62.3				49.7	
	Min	59				44	
No. of Spec. (No. of Heats)		5 (1)				8 (1)	
E, GN/m^2 (10^6 psi)	Avg					129 (18.7)	
	Min					124 (18.0)	
No. of Spec. (No. of Heats)						3 (1)	
Poisson's Ratio							
Work Hardening Coef							
NTS, MN/m^2 (ksi)	Avg	581 (84.3)				1151 (167)	
K_t = 6.4	Min	565 (81.9)				1089 (158)	
No. of Spec. (No. of Heats)		5 (1)				5 (1)	
NTS, MN/m^2 (ksi)	Avg						
K_t =	Min						
No. of Spec. (No. of Heats)							
Tension, Transverse							
TUS, MN/m^2 (ksi)	Avg						
	Min						
Std. Deviation							
TYS, MN/m^2 (ksi)	Avg						
	Min						
Std. Deviation							
Elong, percent	Avg						
	Min						
RA, percent	Avg						
	Min						
No. of Spec. (No. of Heats)							
E, GN/m^2 (10^6 psi)	Avg						
	Min						
No. of Spec. (No. of Heats)							
Poisson's Ratio							
Work Hardening Coef							
NTS, MN/m^2 (ksi)	Avg						
K_t =	Min						
No. of Spec. (No. of Heats)							
NTS, MN/m^2 (ksi)	Avg						
K_t =	Min						
No. of Spec. (No. of Heats)							

References: 64373, 78652

TABLE 9.1.1-ME2

Alloy Designation: Ti-65A Unalloyed Titanium

Specification: MIL-T-7993 A
Form: Bar
Thickness, cm (in.): 2.541 to 5.080 (1.001 to 2.000)
Condition: Annealed

Testing Temperature, K (F)		297 (75)	195 (-108)	122 (-240)	77 (-320)		4 (-452)
Tension, Longitudinal							
TUS, MN/m^2 (ksi)	Avg	470 (68.1)	592 (85.8)	762 (110)	962 (140)		1214 (176)
	Min	444 (64.4)	567 (82.2)	717 (104)	949 (138)		
Std. Deviation		14.0 (2.03)	14.4 (2.09)	22.6 (3.28)	11.6 (1.69)		
TYS, MN/m^2 (ksi)	Avg						
	Min						
Std. Deviation							
Elong, percent	Avg	29.5	41.8	57.1	50.6		37.0
	Min	27.9	35.0	51.0	49.3		
RA, percent	Avg	50.9	61.8	70.6	63.2		55.8
	Min	49.0	59.2	65.4	51.4		
No. of Spec. (No. of Heats)		9 (2)	10 (2)	12 (2)	12 (2)		(1)
E, GN/m^2 (10^6 psi)	Avg						
	Min						
No. of Spec. (No. of Heats)							
Poisson's Ratio							
Work Hardening Coef							
NTS, MN/m^2 (ksi)	Avg						
K_t =	Min						
No. of Spec. (No. of Heats)							
NTS, MN/m^2 (ksi)	Avg						
K_t =	Min						
No. of Spec. (No. of Heats)							
Tension, Transverse							
TUS, MN/m^2 (ksi)	Avg						
	Min						
Std. Deviation							
TYS, MN/m^2 (ksi)	Avg						
	Min						
Std. Deviation							
Elong, percent	Avg						
	Min						
RA, percent	Avg						
	Min						
No. of Spec. (No. of Heats)							
E, GN/m^2 (10^6 psi)	Avg						
	Min						
No. of Spec. (No. of Heats)							
Poisson's Ratio							
Work Hardening Coef							
NTS, MN/m^2 (ksi)	Avg						
K_t =	Min						
No. of Spec. (No. of Heats)							
NTS, MN/m^2 (ksi)	Avg						
K_t =	Min						
No. of Spec. (No. of Heats)							

References: 36821, 45464, 56105

TABLE 9.1.1-TR1

Alloy Designation: Titanium

Specification:
Form:
Dimension:
Condition: Annealed

Testing Temperature K (F)	273 (32)	100 (-280)	50 (-370)	20 (-423)	10 (-442)	4 (-452)
Thermal Conductivity						
Watts m^{-1} K^{-1}		30.0	34.5	26.3	13.3	
Btu hr^{-1} ft^{-1} F^{-1}		(17.3)	(19.9)	(15.2)	(7.69)	
No. of Spec.		4	4	4	4	
References: 90170, 90224						
Thermal Expansion (T_{273} to T) Longitudinal						
Percent	0	-0.118	-0.133	-0.134	-0.134	-0.134
No. of Spec.	1	1	1	1	1	1
References: 90208						
Specific Heat						
Joules kg^{-1} K^{-1}	510	295	100	7.0	1.25	0.31
Btu lb^{-1} F^{-1}	(0.122)	(0.0705)	(0.0239)	(0.00167)	(0.000299)	(0.0000740)
No. of Spec.	3	3	3	3	4	4
References: 40911, 42219, 90223						
Electrical Resistivity						
Ohm m	43.0×10^{-8}	9.75×10^{-8}	3.85×10^{-8}	2.20×10^{-8}	2.10×10^{-8}	2.02×10^{-8}
Ohm circular mil ft^{-1}	(259)	(58.6)	(23.2)	(13.2)	(12.6)	(12.2)
No. of Spec.	6	2	2	2	1	1
References: 90206						

TABLE 9.1.2-ME1

Alloy Designation: Ti-75A Unalloyed Titanium

Specification: AMS-4901 D
Form: Sheet
Thickness, cm (in.): Up to 0.099 (0.039)
Condition: Annealed

Testing Temperature, K (F)		297	(75)	195	(-108)	77	(-320)	20	(-423)		
Tension, Longitudinal											
TUS, MN/m^2 (ksi)	Avg	581	(84.3)	754	(109)	1048	(152)	1282	(186)		
	Min	574	(83.2)	752	(109)	1048	(152)	1262	(183)		
Std. Deviation											
TYS, MN/m^2 (ksi)	Avg	466	(67.6)	615	(89.2)	938	(136)	1193	(173)		
	Min	445	(64.5)	605	(87.8)	924	(134)	1172	(170)		
Std. Deviation											
Elong, percent	Avg	25.0		25.0		18		8			
	Min	24.5		24.5		16.5		6.5			
RA, percent	Avg										
	Min										
No. of Spec. (No. of Heats)		3	(1)	3	(1)	3	(1)	3	(1)		
E, GN/m^2 (10^6 psi)	Avg										
	Min										
No. of Spec. (No. of Heats)											
Poisson's Ratio											
Work Hardening Coef											
NTS, MN/m^2 (ksi)	Avg	786	(114)			1096	(159)	876	(127)		
K_t = 6.3	Min	779	(113)			1041	(151)	807	(117)		
No. of Spec. (No. of Heats)		3	(1)			3	(1)	3	(1)		
NTS, MN/m^2 (ksi)	Avg										
K_t =	Min										
No. of Spec. (No. of Heats)											
Tension, Transverse											
TUS, MN/m^2 (ksi)	Avg	587	(85.1)	758	(110)	1055	(153)	1338	(194)		
	Min	585	(84.8)	758	(110)	1055	(153)	1310	(190)		
Std. Deviation											
TYS, MN/m^2 (ksi)	Avg	476	(69.0)	644	(93.4)	965	(140)	1255	(182)		
	Min	474	(68.7)	639	(92.7)	965	(140)	1227	(178)		
Std. Deviation											
Elong, percent	Avg	25.2		20.2		13.8		6.8			
	Min	25.0		20.0		13.5		6.5			
RA, percent	Avg										
	Min										
No. of Spec. (No. of Heats)		2	(1)	2	(1)	2	(1)	2	(1)		
E, GN/m^2 (10^6 psi)	Avg										
	Min										
No. of Spec. (No. of Heats)											
Poisson's Ratio											
Work Hardening Coef											
NTS, MN/m^2 (ksi)	Avg	800	(116)	903	(131)	1124	(163)	882	(128)		
K_t = 6.3	Min	793	(115)	889	(129)	1096	(159)	855	(124)		
No. of Spec. (No. of Heats)		2	(1)	2	(1)	2	(1)	2	(1)		
NTS, MN/m^2 (ksi)	Avg										
K_t =	Min										
No. of Spec. (No. of Heats)											

References: 44291

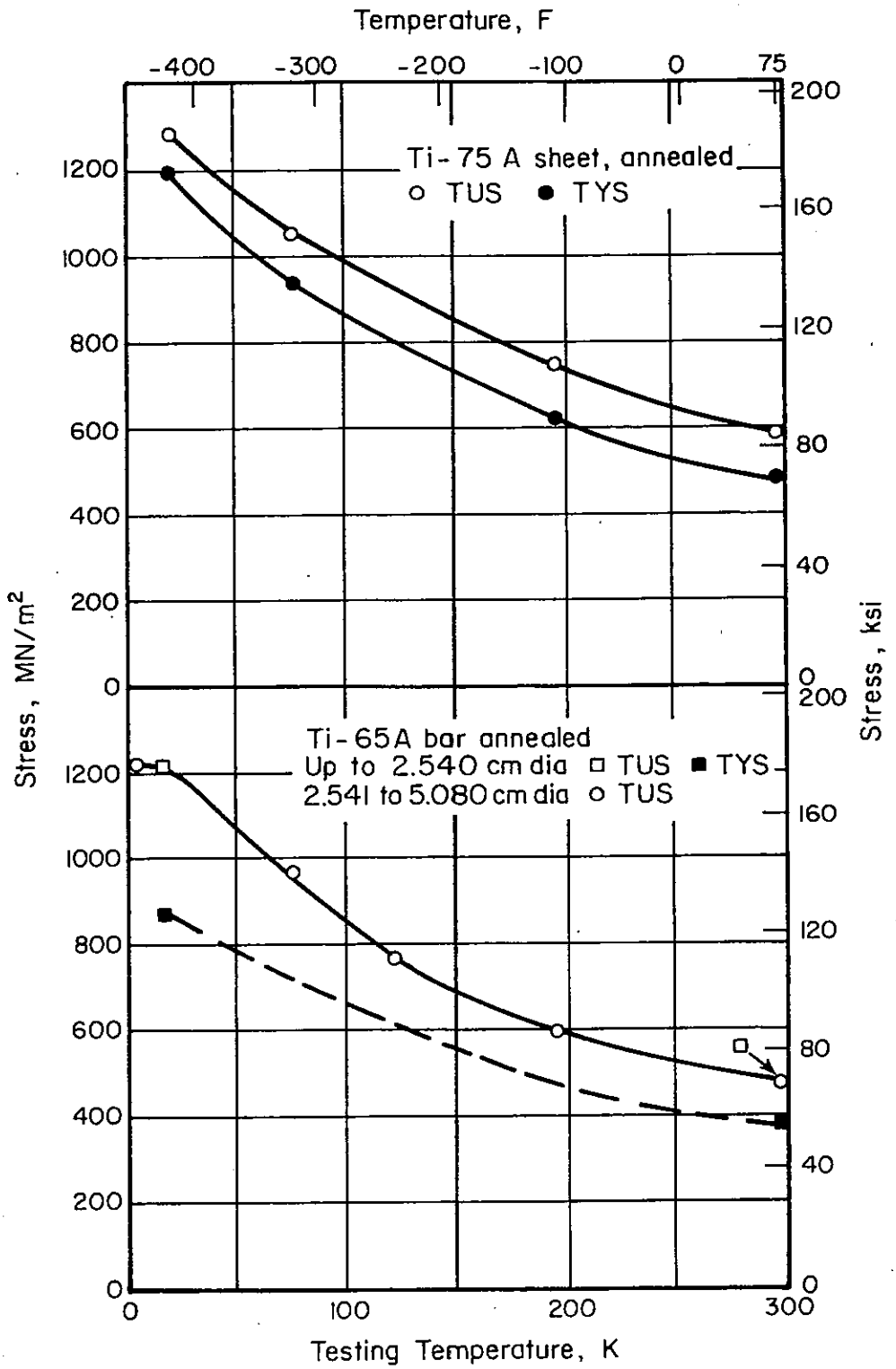

FIGURE 9.1-ME1. EFFECT OF TEMPERATURE ON THE STRENGTH OF UNALLOYED TITANIUM