

PMX Alloy #	101	102	110	122	XP 5	151	MSP1	XP125 BLUE	XP150 RED	XP10	19210	194	210	220	230	240	260	268
ASTM Spec #	B152	B152	B152	B152		B747		B422	B422	B465	B465	B465	B36	B36	B36	B36	B36	B36
UNS No./CDA No.	C10100	C10200	C11000	C12200		C15100	C18665	C19010	C19010		C19210	C19400	C21000	C22000	C23000	C24000	C26000	C26800
Common Name	Oxygen Free Electronic OFHC	Oxygen Free Copper OFHC	ETP Copper Electrolytic Tough Pitch	Deoxidized Copper (DHP) Plus Deoxidized Copper	PMX High Precision Alloy	PMX High Precision Alloy	MSP1 High Precision Alloy	PMX High Precision XP125	PMX High Precision XP150	PMX High Precision Copper Iron	PMX High Precision Copper Iron	PMX High Precision Copper Iron	Gilding Metal	Commercial Bronze	Red Brass	Low Brass	Cartridge Brass	Yellow Brass

Chemistry

	Cu	O	Zn	Sn	Ni	Fe	P	Si	Zr	Mg									
Copper	99.99	99.95	99.9	99.9	99.95	99.8	99.3	98.2	98.2	99.9	99.9	97.5	95	90	85	80	70	66	
Oxygen	.0005	.001	.05		.005														
Zinc																			
Tin																			
Nickel								1.3	1.3										
Iron										.1	.1	2.35							
Phosphorus				.275	.003		.005	.03	.032	.032	.032	.032							
Silicon								.25	.25										
Zirconium						.1						.1							
Magnesium							.7												

Physical Properties

Density lb/cu. in. @ 68°F	.323	.323	.323	.323	.323	.323	.323	.323	.322	.323	.323	.322	.320	.318	.316	.313	.308	.306	
Modulus of Elasticity x 1000 Ksi (10 ⁶ psi)	17	17	17	17	17	17	17	19	19	17	17	17	17	17	17	16	16	15	
Electrical Conductivity % I.A.C.S. @ 68° F (Annealed)	101	101	101	85	99	95	63	60	52	90	80	60	56	44	37	32	28	27	
Thermal Conductivity Btu/sq.ft./ft/hr./°F @ 68° F	226	226	226	196	221	208	264	149	149	201	201	150	135	109	92	81	70	67	
Coef. of Thermal Expansion X 10 ⁶ in./in./°F (68° to 572°F)	9.8	9.8	9.8	9.8	9.8	9.8	9.6	9.3	9.3	9.8	9.8	9.7	10	10.2	10.4	10.6	11.1	11.3	

Tensile Strength

x Ksi (Kgf/mm²=Ksi x .7031)

Annealed (SOXX) (TM00)	26-33	26-33	26-33	26-33	26-33	37-42	57			39-54	39-54	40-63	34-40	36-43	39-48	44-54	45-61	46-61	
1/4 Hard (H01) (TM00S)	34-42	34-42	34-42	34-42	34-42	40-45	52-65	52-64		40-55	40-55		37-47	40-50	44-54	48-58	49-59	49-59	
1/2 Hard (H02) (TM02)	37-46	37-46	37-46	37-46	37-46	43-51	61-74	60-70		47-60	47-60	53-63	42-52	47-57	51-61	55-65	57-67	55-65	
3/4 Hard (H03) (TM03)	41-50	41-50	41-50	41-50	41-50	47-56		67-77	67-77	52-62	52-62		46-56	52-62	57-67	61-71	64-74	62-72	
Hard (H04) (TM04)	43-52	43-52	43-52	43-52	43-52	53-62	69-82	71-81	71-81	56-66	56-66	60-70	50-59	57-66	63-72	68-77	71-81	68-78	
Extra Hard (H06) (TM06)	47-56	47-56	47-56	47-56	47-56	59-65	78-91	75-86	75-86	60-70	60-70	67-73	56-64	64-72	72-80	78-77	83-92	79-89	
Spring (H08) (TM08)	50-58	50-58	50-58	50-58	50-58	64-71	85 min	84 min	84 min	64 min	64 min	70-76	60-68	69-77	78-86	85-93	91-100	86-95	
Extra Spring (H10)	52 min	52 min	52 min	52 min	52 min					66 min	66 min	73-80	61-69	72-80	82-90	89-97	95-104	90-99	

Yield Strength

x Ksi (0.2% offset)(Kgf/mm²=Ksi x .7031) Nominal Values

Annealed (SOXX) (TM00)	10	11	11	11	11	8				30	30	38	10	12	13	20	21	23	
1/4 Hard (H01) (TM00S)	31	31	31	31	31	35	51	40 min		28	28		30	33	36	41	33	34	
1/2 Hard (H02) (TM02)	37	37	37	37	37	38	62	54 min		52	52	45	44	47	47	54	46	44	
3/4 Hard (H03) (TM03)	43	43	43	43	43	50		62 min	50 min	56	56		50	53	59	58	62	53	
Hard (H04) (TM04)	45	45	45	45	45	56	72	66 min	60 min	60	60	60	53	57	66	63	72	57	
Extra Hard (H06) (TM06)	50	50	50	50	50	60	80	72 min	64 min	64	64	67	59	63	74	67	83	67	
Spring (H08) (TM08)	52	52	52	52	52	66	78 min	78 min	74 min	62 min	62 min	70	62	68	78	74	86	71	
Extra Spring (H10)	54 min	54 min	54 min	54 min	54 min					64 min	64 min	73 min	64	70	80	79	90	73	

Elongation

(% in 2 inches) Nominal or Indicated

Annealed (SOXX) (TM00)	35	35	35	35	35	38	25			32	32	23	44	44	43	52	55	53	
1/4 Hard (H01) (TM00S)	23	23	23	23	23	22	15	10		20	20		30	27	27	26	46	42	
1/2 Hard (H02) (TM02)	20	20	20	20	20	15	10	8		5	5	17	17	13	14	19	30	31	
3/4 Hard (H03) (TM03)	14	14	14	14	14	8		6	12 min	4	4		9	8	7	10	16	20	
Hard (H04) (TM04)	9	9	9	9	9	4	7	5	10 min	3	3	7	5	4	5	6	10	12	
Extra Hard (H06) (TM06)	4	4	4	4	4	2	5	5	8 min	2	2	4	2	2	5	3	4	4	
Spring (H08) (TM08)	3	3	3	3	3	1 min		4	6 min	1	1	2	2 max	1	4 max	1	1	3	
Extra Spring (H10)	3 max	3 max	3 max	3 max	3 max					1 max	1 max	2 max	2 max	2 max	2 max	2 max	3 max	2 max	

■ = RT - 75°C

■ = 105 - 125°C

■ = 125 - 150°C

■ = 150°C +

NOTE: The above data is for comparative purposes and is not intended to replace more definitive specifications.

PMX Alloy #	422	425	510	511	519	521	XP55	MAX251C	7026	XP175	706	715	725	752	762	770
ASTM Spec #	B591	B591	B103	B103	B103	B103			B422	B422	B122	B122	B122	B122	B122	B122
UNS No./CDA No.	C42200	C42500	C51000	C51100	C51900	C52100	C61550	C64725	C70260	C70265	C70600	C71500	C72500	C75200	C76200	C77000
Common Name	Tin Brass 1%	Tin Brass 2%	Phosphor Bronze 5%	Phosphor Bronze 4%	Phosphor Bronze 6%	Phosphor Bronze 8%	PMX High Precision Aluminum Bronze	PMX High Precision Alloy MAX251C	PMX High Precision Alloy CuNi2Si	PMX High Precision Alloy Modified CuNiSi	Copper Nickel 10%	Copper Nickel 30%	Copper Nickel Tin	Nickel Silver 65-18	Nickel-Silver 70-12	Nickel-Silver 59-18

Chemistry

Copper	Cu	87.5	88.5	94.9	95.9	93.8	91.9	92	96	97.6	97	88.6	69.5	88.2	65	59	55
Oxygen	O																
Zinc	Zn	11.5	9.5						1.0		.30 max				17	29	27
Tin	Sn	1	2.0	5.0	4	6.0	8.0		.50		.42			2.3			
Nickel	Ni							2.0	2.0	2.0	2.0	10	30	9.5	18	12	18
Iron	Fe											1.4	.50				
Phosphorus	P			.1	.1	.20	.1										
Silicon	Si								.50	.4	.4						
Magnesium	Mg																
Aluminum	Al						6.0										

Physical Properties

Density lb/cu. in. @68°F		.318	.317	.320	.320	.319	.318	.283	.317	.319	.319	.323	.323	.321	.316	.310	.314
Modulus of Elasticity x 1000 ksi (10 ⁶ psi)		16	16	16	16	16	16	16	19	19	19	18	22	20	18	18	18
Electrical Conductivity % I.A.C.S. @ 68° F (Annealed)		31	28	15	20	14	13	12.6	37	40	40	9	4.6	11	6	9	5.5
Thermal Conductivity Btu/sq.ft./ft./hr./F @ 68° F		75	69	40	48	38	36	33.6	9.2	9.0	9.0	26	17	31	19	24	17
Coef. of Thermal Expansion X 10 ⁶ in./in./F (68° to 572°F)		10.2	10.2	9.9	9.9	10.0	10.1		9.5	10.0	10.0	9.5	9.0	9.2	9.0	9.0	9.3

Tensile Strength

x Ksi (Kgf/mm²=Ksi x .7031)

Annealed (SOXX) (TM00)	41-49	40-50	46-56	46-54	46-58	56-65	60-85		85-95	85-95	43-50	52 min	45-65	53-63	57-75	61-76
1/4 Hard (H01) (TM00S)	47-57	49-59	49-61	46-58	57-74	63-75	75-90		90-105	90-105	51-67	58-72	55-75	58-72	65-81	69-87
1/2 Hard (H02) (TM02)	54-65	57-69	58-73	55-70	64-79	69-84	85-100	70-93	95-105	95-105	58-72	66-80	65-80	66-80	75-91	78-95
3/4 Hard (H03) (TM03)	60-72	62-74	68-79	67-82	70-85	80-92	95-110			105-120				74-86	83-98	88-101
Hard (H04) (TM04)	67-79	70-82	76-91	72-87	80-96	85-100	105-120	87-101		110-125	71-83	75-88	75-90	78-91	90-105	92-109
Extra Hard (H06) (TM06)	75-85	76-88	88-103	84-99	92-112	97-112	110 min	92-107			73-85	80-92	80-95	86-98	99-114	102-117
Spring (H08) (TM08)	82-92	84-94	95-110	91-105	105-116	105-119		101-113			78-88	84-94	85-100	90-101	107-122	108-123
Extra Spring (H10)	88 min	92 min	100-114	96-109	110-120	110-122		110 min					90-105	96 min	114 min	116 min

Yield Strength

x Ksi (0.2% offset)(Kgf/mm²=Ksi x .7031) Nominal or Range

Annealed (SOXX) (TM00)	19	17	24	22	24	29	40		65 min	65 min	19	28	21	25	36	32
1/4 Hard (H01) (TM00S)	38	37	37	35	48	48	60		75 min	75 min	53	47	73 max	45	52	63
1/2 Hard (H02) (TM02)	55	58	57	56	60	63	74	69-91	90-100	90-100	63	68	68	63	70	78
3/4 Hard (H03) (TM03)	64	64	68	72	75	77	88			95-115				75	82	92
Hard (H04) (TM04)	71	72	81	76	83	86	99	78-100		100-120	75	78	80	82	89	98
Extra Hard (H06) (TM06)	75	79	93	88	88	99	112	84-106			76	83	85	91	98	107
Spring (H08) (TM08)	82	90	100	94	105	106		95-113			76 min	86	90	93	105	112
Extra Spring (H10)	82 min	87 min	104 min	98 min	110 min	110 min		107 min					95 min	95 min	102 min	115 min

Elongation

(% in 2 inches) Nominal or Indicated

Annealed (SOXX) (TM00)	45	48	55	47	42	63	45		10 min	10 min	35	30	35	35	40	43
1/4 Hard (H01) (TM00S)	29	38	41	36	35	42	35		6 min	6 min	20	21	5 min	20	35	26
1/2 Hard (H02) (TM02)	16	20	24	21	20	33	25	8	5 min	5 min	12	10	10	8	18	14
3/4 Hard (H03) (TM03)	7	15	15	10	12	23	14			2 min				4	10	8
Hard (H04) (TM04)	4	9	8	7	10	15	10	5		1 min	3	3	3	3	4	3
Extra Hard (H06) (TM06)	2	6	4	4	5	7	8	3			2	2	2	2	2	2
Spring (H08) (TM08)	2	4	3	3	3	6		2			1	2	1 min	1	2	2
Extra Spring (H10)	2 max	2 max	2 max	2 max	2 max	4 max		1 max					1 max	1 max	1 max	1 max

= RT - 75°C

= 105 - 125°C

= 125 - 150°C

= 150°C +