



# ALLOY GUIDE

NOTE: THE INFORMATION PROVIDED IS FOR REFERENCE ONLY.

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Email: sales@eaglemetals.com  
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Eagle Alloy #	COPPERS									BRASSES						TIN BRASS
	101	102	110	122	151	19010	19210	194	197	210	220	230	240	260	268	425
ASTM B	152	152	152	152	747	422	465	465	465	36	36	36	36	36	36	591
ALLOY NAME AND NOMINAL COMPOSITION	OF COPPER (Certified) 99.99 Cu MIN .001 Oxygen MAX	OF COPPER (Non-Certified) 99.9 Cu MIN .001 Oxygen MAX	ETP COPPER 99.9 Cu MIN .05 Oxygen MAX	DEOXIDIZED COPPER (DHP) 99.9 Cu MIN	ZHC R COPPER 99.9 Cu .1 Zr	XP-150 COPPER NICKEL SILICON 98.5 Cu 1.6 Ni .2 Si	XP-10 COPPER IRON 99.85 Cu 0.1 Fe	HSM <sup>®</sup> COPPER 97.5 Cu 2.35 Fe .03 P .12 Zn	OLIN 197 99 Cu .6 Fe .2 P .05 Mg	GILDING METAL 95 Cu 5 Zn	COMMERCIAL BRONZE 90 Cu 10 Zn	RED BRASS 85 Cu 15 Zn	LOW BRASS 80 Cu 20 Zn	CARTRIDGE BRASS 70 Cu 30 Zn	YELLOW BRASS 66 Cu 34 Zn	TIN BRASS 2% 88.5 Cu 9.5 Zn 2 Sn

PHYSICAL PROPERTIES																	
DENSITY	A	.323	.323	.323	.323	.323	.322	.323	.322	.319	.320	.318	.316	.313	.308	.306	.317
MOD. OF ELAST.	B	17	17	17	17	17	18.5	17	17.5	17	17	17	16	16	15	15	16
ELECTRICAL COND.	C	101	101	101	85	95	60	80-90L	60	80	56	44	37	32	28	27	28
THERMAL COND.	D	226	226	226	196	208	149	201	150	185	135	109	92	81	70	67	69
COEF. OF THERM. EXP.	E	9.8	9.8	9.8	9.8	9.8	9.3	9.8	9.8	9.6	10.0	10.2	10.4	10.6	11.1	11.3	10.2

MECHANICAL PROPERTIES																
ANNEALED	TENSILE	F	26-38	37-40		35-54	40-63	43-53	34-40	36-42	39-47	44-54	45-61	41-61	41-47	
	YIELD	G	6-13	9-12		17-32	22-59	16-30	5-15	8-17	8-19	12-29	10-33	23 NOM	13-22	
	ELONG	H	20-50	35-37		25 MIN	10-36	20 MIN	42-48	46-49	43-48	43-58	40-67	53 NOM	35-50	
	ROCKWELL	I		47-52			40-53		15-20	15-36	15-44	15-51	16-60	43 NOM	28-55	
1/4 HARD	TENSILE		34-42	40-45		40-55			37-47	40-50	44-54	48-58	49-59	49-59	45-59	
	YIELD		26-39	28-44		20-35			15-46	19-47	23-48	18-40	21-46	34 NOM	20-54	
	ELONG		13-33	13-32		20 MIN			15-45	15-40	15-39	18-35	34-59	42 NOM	16-40	
	ROCKWELL		18-51	38-54					34-51	38-53	42-57	42-57	43-57	54 NOM	45-65	
1/2 HARD	TENSILE		37-46	43-51		47-60	53-63	53-63	42-52	47-57	51-61	55-65	57-67	55-65	57-69	
	YIELD		30-44	40-50		44-59	49-61	36-60	37-51	42-53	43-54	35-50	42-60	44 NOM	51-66	
	ELONG		8-32	4-21		5 MIN	6-29	6-29	5-29	5-20	8-21	12-25	19-42	31 NOM	10-27	
	ROCKWELL		43-57	50-59			52-63	B 66 NOM	46-57	52-61	56-64	56-64	56-66	65 NOM	63-69	
3/4 HARD	TENSILE		41-50	47-56	67-77	52-62			46-56	52-62	57-67	61-71	64-74	62-72	62-74	
	YIELD		39-48	46-54	50 MIN	50-62			45-55	49-59	51-60	45-58	55-69	53 NOM	58-70	
	ELONG		5-24	2-9	12 MIN	4 MIN			2-17	3-10	4-12	6-15	8-25	20 NOM	5-20	
	ROCKWELL		47-59	56-62					52-60	58-64	63-68	63-68	65-70		66-71	
HARD	TENSILE		43-52	53-62	71-81	56-66	60-70	60-70	50-59	57-66	63-72	68-77	71-81	68-78	70-82	
	YIELD		41-50	51-59	60 MIN	54-66	53-68	53-68	49-58	53-63	57-69	65-74	67-78	57 NOM	67-80	
	ELONG		3-16	2-6	10 MIN	3 MIN	3-11	2-12	2-8	2-6	5-9	4-8	6-14	12 NOM	4-10	
	ROCKWELL		54-62	59-64			61-68	B 69 NOM	57-62	62-66	67-71	68-72	70-73	70 NOM	70-74	
EXTRA HARD	TENSILE		47-56	59-65	75-86	60-70	67-73	67-73	56-64	64-72	72-80	78-87	83-92	79-89	76-88	
	YIELD		46-55	57-63	64 MIN	58-70	64-71	64-71	55-63	60-67	65-71	65-72	79-87	67 NOM	73-85	
	ELONG		3-5	1 MIN	8 MIN	2 MIN	2-3	2-10	2 MAX	1-3	3-5	2-3	2-5	4 NOM	2-8	
	ROCKWELL		56-64	63-65			67-69	B 72 NOM	62-66	67-71	70-74	72-75	74-76	74 NOM	71-75	
SPRING	TENSILE		50-58	64-71	84 MIN	64 MIN	70-76	70-76	60-68	69-77	78-86	85-93	91-100	86-95	84-94	
	YIELD		48-57	62-68	74 MIN	62 MIN	67-74	67-74	59-67	65-71	69-76	71-81	82-91	71 NOM	81-99	
	ELONG		2-4	1 MIN	6 MIN	1 MIN	2-3	2-8	2 MAX	1-2	3-4	1-2	1-2	3 NOM	1-4	
	ROCKWELL		60-66	65 MIN			68-69	B 74 NOM	64-68	70-72	74-76	75-77	76-78	76 NOM	73-77	
EXTRA SPRING	TENSILE		52 MIN			66 MIN	73-80	73-80	61-69	72-80	82-90	89-97	95-104	90-99	92 MIN	
	YIELD		51 MIN			64 MIN	70-77	70-78	60-68	67-74	73-80	73-84	86-93	73 NOM	87 MIN	
	ELONG		3 MAX			1 MIN	1 MIN	1 MIN	2 MAX	1 MAX	2 MIN	1 MAX	1-2	2 MAX	1 MIN	
	ROCKWELL		61 MIN				69-70	B 72 NOM	65-69	71-73	75-77	76-78	77-79		76 MIN	

- A Lbs. per cu. in. at 68°F (Annealed) (x27.68 gms./cu. cm. at 20°C)
- B x10<sup>6</sup> PSI, tension
- C % IACS at 68°F (20°C) as annealed
- D BTU per sq. ft. per ft. per hr. per F° at 68° F (20°C)
- E Inches/inch<sup>2</sup> x Fx10<sup>-6</sup> from 68°F to 572°F (20°C TO 300°C)
- F x 1000 PSI
- G x 1000 PSI (0.2% offset)
- H % in 2 inches
- I .020" gauge and above (30T scale). Hardness data for Reference only.
- J Annealed Properties dependent upon grain size.
- K Properties listed for tempers TMO3, TMO4, TMO6, TMO8
- L Electrical Conductivity 80 min 19210, 90 min XP10

CONTACT MILL FOR SPECIAL: 1-GRAIN SIZE 2-FORMABILITY 3-PROPERTIES

Elongation for design purposes.

■ = RT -75°C    ■ = 125°C - 150°C    ■ = 150°C+



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Eagle Alloy #	PHOSPHOR BRONZES				COPPER NICKELS							NICKEL SILVERS					
	510	511	519	521	64725	7025	7026	706	715	725	727	735	752	762	770		
ASTM B	103	103	103	103	422	422	422	122	122	122	740	122	122	122	122		
ALLOY NAME AND NOMINAL COMPOSITION	PHOSPHOR BRONZE 5% A 94.9 Cu 5 Sn 0.1 P	PHOSPHOR BRONZE 4% 95.9 Cu 4 Sn 0.1 P	PHOSPHOR BRONZE 6% 93.9 Cu 6 Sn 0.1 P	PHOSPHOR BRONZE 8% C 91.9 Cu 8 Sn 0.1 P	MAX251C 96 Cu 2 Ni 1 Zn .5 Sn .5 Si	K COPPER NICKEL 96.2 Cu 3 Ni .65 Si	K COPPER NICKEL 97 Cu 2 Ni .45 Si	COPPER NICKEL 10% 88.6 Cu 10 Ni 1.4 Fe	COPPER NICKEL 30% 69.4 Cu 30 Ni .6 Fe	COPPER NICKEL TIN 88.2 Cu 9.5 Ni 2.3 Sn	NICLAFOR 1000 85 Cu 9 Ni 6 Sn	NICKEL SILVER 18% 72 Cu 10 Zn 18 Ni	NICKEL SILVER 18% 65 Cu 17 Zn 18 Ni	NICKEL SILVER 12% 59 Cu 29 Zn 12 Ni	NICKEL SILVER 18% 55 Cu 27 Zn 18 Ni		
PHYSICAL PROPERTIES																	
DENSITY	A	.320	.320	.318	.318	.317	.318	.320	.323	.323	.321	.322	.319	.316	.310	.314	
MOD. OF ELAST.	B	16	16	17	16	19	19	19	18	22	20	17	18	18	18	18	
ELECTRICAL COND.	C	15	20	15	13	37	40	40	9	4.6	11	9	8	6	9	5.5	
THERMAL COND.	D	40	48.4	35	36	9.2	9.0	9.0	26	17	31	53.6	21.5	19	24	17	
COEF. OF THERM. EXP.	E	9.9	9.9	10.1	10.1	9.5	9.8	10.0	9.5	9.0	9.2	17.15	9.0	9.0	9.0	9.3	
MECHANICAL PROPERTIES																	
ANNEALED	TENSILE	F	46-56	46-54	48-60	56-65	90-110	80-100	43-50	52 MIN	45-65	60-80	50-68	53-63	57-75	61-76	
	YIELD	G	19-29	16-28	28-40	23-35	65 MIN	65 MIN	13-25	20 MIN	18-25	23-33	15-60	18-32	21-51	23-41	
J	ELONG	H	48-62	45-49	50-60	60-67	10 MIN	10 MIN	33-37	30 MIN	34-36	30	11-37	29-42	32-49	39-48	
	ROCKWELL	I	34-47	29-46		45-57			15-45	31-58	32-58		43-67	39-60	44-67	39-65	
1/4 HARD	TENSILE		49-61	46-58	53-66	63-75		90-105	51-67	58-72	55-75	72-95	56-69	58-72	65-81	69-87	
	YIELD		22-52	20-50	40-55	35-62		75 MIN	42-65	25-69	73 MAX	48-64	28-58	26-64	35-70	44-83	
	ELONG		32-50	25-47	35-55	40-60		6 MIN	3-21	5-30	5 MIN	12	10-25	14-35	20-50	11-41	
	ROCKWELL		43-63	35-65		59-71			52-70	57-64	72 MAX		60-70	49-67	57-74	63-75	
1/2 HARD	TENSILE		58-73	55-70	61-76	69-84	70-93	95-120	90-110	58-72	66-80	65-80	82-108	63-75	66-80	75-91	78-95
	YIELD		47-68	42-70	55-70	51-75	69-91	85 MIN	85 MIN	55-71	60-78	59-78	57-80	49-69	48-78	60-88	64-93
	ELONG		10-38	12-31	15-40	25-49	8 MIN	7 MIN	4 MIN	2-9	3-10	3-17	6	3-16	6-22	6-30	5-24
	ROCKWELL		53-69	52-71		63-75				61-72	67-72	62-75		67-72	62-72	69-77	71-78
3/4 HARD	TENSILE		68-79	67-82	7286	80-92		100-125					69-79	74-86	83-98	88-101	
	YIELD		61-75	64-80	67-83	70-85		95 MIN					59-73	69-82	73-91	84-100	
	ELONG		10-20	6-15	12-16	18-32		5 MIN					2-5	4-12	4-16	3-13	
	ROCKWELL		66-73	66-74		71-78							67-73	66-74	72-78	73-78	
HARD	TENSILE		76-91	72-87	78-93	85-100	87-101		71-83	75-88	75-90	97-125	73-84	78-91	90-105	92-107	
	YIELD		74-88	70-83	73-90	78-95	78-100		69-81	73-84	73-88	77-100	67-78	75-90	82-103	90-106	
	ELONG		7-11	2-12	8-11	12-30	5 MIN		1-2	2-4	1-5	3	1-3	3-7	3-6	3-6	
	ROCKWELL		71-75	69-75		73-80			67-74	71-75	66-75		71-74	70-76	76-79	76-80	
EXTRA HARD	TENSILE		88-103	84-99	91-106	97-112	92-107		73-85	80-92	80-95		79-90	86-98	101-114	102-115	
	YIELD		85-102	81-96	88-103	92-107	84-106		71-82	78-88	78-93		72-81	85-97	93-113	101-114	
	ELONG		2-6	1-6	2-5	10-17	3 MIN		1-2	2-3	1-3		1-2	3-4	1-3	1-2	
	ROCKWELL		74-78	73-78		77-82			71-77	72-76	70-80		73-75	74-79	79-81	79-82	
SPRING	TENSILE		95-110	91-105	98-113	105-119	101-113		78-88	84-94	85-100	110-140	85-93	90-101	109-122	108-120	
	YIELD		92-108	88-101	96-111	100-113	95-113		76 MIN	81-90	83-97	95-115	74-84	88-99	101-120	107-118	
	ELONG		1-3	1-5	1-3	3-9	2 MIN		1 MAX	1-2	1-2	2	1 MAX	1-2	1 MAX	1 MAX	
	ROCKWELL		76-80	75-79		78-83			72-78	73-76	72-80		74-76	75-80	80 MIN	80 MIN	
EXTRA SPRING	TENSILE		100-114	96-109	102-117	110-122	110 MIN				90-105	115-150	88 MIN	96 MIN	114 MIN	116 MIN	
	YIELD		98-110	92-104	100-115	105-116	107 MIN				88-102	105-125	78 MIN	95 MIN	102 MIN	115 MIN	
	ELONG		1-3	1-4	1 MIN	2-6	1 MIN				1 MAX		1 MAX	2 MAX	1 MAX	1 MAX	
	ROCKWELL		77-81	76-80		79-83					76-80		74 MIN	76 MIN	81 MIN	81 MIN	

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