



Copper Alloy Guide

		Coppers						Brasses										
CDA No.		101	102	110	151	194	195	197	210	220	230	240	260					
ALLOY NAME AND NOMINAL COMPOSITION		COPPER COFE 99.99 .001 Oxygen Max		OF 99.95 .001 Oxygen Max	COPPER 99.9 .05 Oxygen Max	ZHC® COPPER 99.9 Cu .1Zr	HSM® COPPER 97.5 Cu 2.35 Fe .03 P .12 Zn	STRESCON® COPPER 97 Cu 1.5 Fe .1 P .8 Co .6 Sn	HIGH PERFORMANCE COPPER 98.8 Cu .8 Fe .2 P .1 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
DENSITY (1)		.323	.323	.322	.323	.322	.322	.321	.320	.318	.316	.313	.308					
MOD. OF ELAST. (2)		17	17	17	17	17.5	17.3	17.2	17	17	17	16	16					
ELECTRICAL COND. (3)		101	101	101	95	60	45	80	56	44	37	32	28					
THERMAL COND. (4)		226	226	226	208	150	115	185	135	109	92	81	70					
COEF. OF THERM. EXP. (5)		9.8	9.8	9.8	9.8	9.8	9.4	17.3	10.0	10.2	10.4	10.6	11.1					
ANNEALED	Tensile (6)	26-38		37-42	40-63	50-60	45-53	34-40	36-42	39-47	44-54	45-61						
	Yield (7)	6-13		9-12	22-59	21-35	16-30	5-15	8-17	8-19	12-29	10-33						
	Elong. (8)	20-50		35-37	10-36	22-31	20 Min	42-48	46-49	43-48	43-58	40-67						
	Rockwell (9)	15T-47-57		15T-55-65	40-53	47-57		15-20	15-36	15-44	15-51	16-60						
1/4 HARD	Tensile	34-42		40-45		60-72		37-47	40-50	44-54	48-58	49-59						
	Yield	26-39		28-44		45-70		15-46	19-47	23-46	18-40	21-46						
	Elong.	13-33		13-32		5-23		15-45	15-40	15-39	18-35	34-59						
	Rockwell	18-51		38-54		61-71		34-51	38-53	42-57	42-57	43-57						
1/2 HARD	Tensile	37-46		43-51	53-63	68-78	53-63	42-52	47-57	51-61	55-65	57-67						
	Yield	30-44		40-50	49-61	66-76	36-60	37-51	42-53	43-54	35-50	42-60						
	Elong.	8-32		4-21	6-29	3-9	6-29	5-29	5-20	8-21	12-25	19-42						
	Rockwell	43-57		50-59	52-63	69-73	62-68	46-57	52-61	56-64	56-64	56-66						
3/4 HARD	Tensile	41-50		47-56		75-85		46-56	52-62	57-67	61-71	64-74						
	Yield	39-48		46-54		72-82		45-55	49-59	51-60	48-58	55-69						
	Elong.	5-24		2-9		2-5		2-17	3-10	4-12	6-15	8-25						
	Rockwell	47-59		56-62		72-74		52-60	58-64	63-68	63-68	65-70						
HARD	Tensile	43-52		53-62	60-70	82-90	60-70	50-59	57-66	63-72	68-77	71-81						
	Yield	41-50		51-59	53-68	79-87	53-68	49-58	53-63	60-69	65-74	67-78						
	Elong.	3-16		2-6	3-11	2-3	2-12	2-8	2-6	5-9	4-8	6-14						
	Rockwell	54-62		59-64	61-68	73-75	65-70	57-62	62-66	67-71	68-72	70-73						
EXTRA HARD	Tensile	47-56		59-65	67-73		67-73	56-64	64-72	72-80	78-87	83-92						
	Yield	46-55		57-63	64-71		64-71	55-63	60-67	65-71	65-72	79-87						
	Elong.	3-5		1 Min	2-3		2-10	2 Max	1-3	3-5	2-3	2-5						
	Rockwell	56-64		63-65	67-69		68-71	62-66	67-71	70-74	72-75	74-76						
SPRING	Tensile	50-58		64-71	70-76	88-97	70-76	60-68	69-77	78-86	85-93	91-100						
	Yield	48-57		62-68	67-74	85-92	67-74	59-67	65-71	69-76	71-81	82-91						
	Elong.	2-4		1 Min	2-3	1-3	2-8	2 Max	1-2	3-4	1-2	1-2						
	Rockwell	60-66		65 Min	68-69	74-77	69-72	64-68	70-72	74-76	75-77	76-78						
EXTRA SPRING	Tensile	52 Min			77-83	97 Min	73-80	61-69	72-80	82-90	89-97	95-104						
	Yield	51 Min			70-77	94 Min	70-77	60-68	67-74	73-80	73-84	86-93						
	Elong.	3 Max			2 MAX	2 Max	1 Min	2 Max	1 Max	2 Min	1 Max	1-2						
	Rockwell	61 Min			69-70	77 Min	70-74	65-69	71-73	75-77	76-78	77-79						

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CDA No.	Phosphor Bronzes					Cupro Nickel & Nickel Silvers				Nickel Iron	
	425	510	511	519	521	715	725	752	770	42	
ALLOY NAME AND NOMINAL COMPOSITION	LUBALLOY-X 88.5 Cu 9.5 Zn 2 Sn	PHOSPHOR BRONZE 5% A 94.9 Cu 5 Sn 0.1P	PHOSPHOR BRONZE 4% 95.9 Cu 4 Sn 0.1P	PHOSPHOR BRONZE 6% 93.9 Cu 6 Sn 0.1P (Global Spec)	PHOSPHOR BRONZE 8% C 91.9 Cu 8 Sn 0.1P	COPPER NICKEL 30% 69.4 Cu 30 Ni 0.6 Fe	COPPER NICKEL TIN ALLOY 88.2 Cu 9.5 Ni 2.3 Sn	NICKEL SILVER 18% 65 Cu 17 Zn 18 Ni	NICKEL SILVER 18% 55 Cu 27 Zn 18 Ni	NICKEL IRON 42.0 Ni .02 C .15 Si .80 Mn Balance Fe	
DENSITY (1)	.317	.320	.320	.320	.318	.323	.321	.316	.314	.293	
MOD. OF ELAST. (2)	16	16	16	17	16	22	20	18	18	21	
ELECTRICAL COND. (3)	28	15	20	15	13	4.6	11	6	5.5	2.4	
THERMAL COND. (4)	69	40	48.4	35	36	17	31	19	17	6.2	
COEF. OF THERM. EXP. (5)	10.2	9.9	9.9	10.1	10.1	9.0	9.2	9.0	9.3	2.3	
ANNEALED	Tensile (6)	41-47	46-56	46-54	48-60	56-65	52 Min	45-65	53-63	61-76	68-77
	Yield (7)	13-22	19-29	16-28	28-40	23-35	30 Min	18-25	18-32	23-41	30-45
1/4 HARD	Elong. (8)	47 Min	48-62	45-49	50-60	60-67	30 Min	34-36	29-42	39-48	27-34
	Rockwell (9)	F65-79	34-47	29-46		45-57		50 Max	39-60	39-65	54-65
1/2 HARD	Tensile	49-59	49-61	46-58	53-66	63-75	58-72	55-75	58-72	69-87	78-89
	Yield	20-54	22-52	20-50	40-55	35-62	25-69	73 Max	26-64	44-83	52-87
3/4 HARD	Elong.	27-47	32-50	25-47	35-55	40-60	5-30	5 Min	14-35	11-41	9-20
	Rockwell	45-67	43-63	35-65		59-71	57-64	72 Max	49-67	63-75	62-72
HARD	Tensile	57-69	58-73	55-70	61-76	69-84	66-80	65-80	66-80	78-95	90-105
	Yield	51-66	47-68	42-70	55-70	51-75	60-78	59-78	48-78	64-93	88-103
EXTRA HARD	Elong.	13-27	10-38	12-31	15-40	25-49	3-10	3-17	6-22	5-24	3-7
	Rockwell	63-72	53-69	52-71		63-75	67-72	62-75	62-72	71-78	72-79
SPRING	Tensile	62-74	68-79	67-82	72-86	80-92			74-86	88-101	100-120
	Yield	58-70	61-75	64-80	67-83	70-85			69-82	84-100	94-117
EXTRA SPRING	Elong.	10-21	10-20	6-15	12-16	18-32			4-12	3-13	1-2
	Rockwell	66-73	66-73	66-74		71-78			66-74	73-78	75-82
TENSILE	Tensile	70-82	76-91	72-87	78-93	85-100	75-88	75-90	78-91	92-107	121 Min
	Yield	66-79	74-88	70-83	73-90	78-95	73-84	73-88	75-90	90-106	118 Min
ELONG.	Elong.	6-13	7-13	2-12	8-11	12-30	2-4	1-5	3-7	3-6	1
	Rockwell	70-76	71-75	69-75		73-80	71-75	66-75	70-76	76-80	80 Min
TENSILE	Tensile	76-88	88-103	84-99	91-106	97-112	80-92	80-95	86-98	102-115	
	Yield	73-85	85-102	81-96	88-103	92-107	78-88	78-93	85-97	101-114	
ELONG.	Elong.	5-8	2-6	1-6	2-5	10-17	2-3	1-3	3-4	1-2	
	Rockwell	71-77	74-78	73-78		77-82	72-76	70-80	74-79	79-82	
TENSILE	Tensile	84-94	95-110	91-105	98-113	105-119	84-94	85-100	90-101	108-120	
	Yield	81-89	92-108	88-101	96-111	100-113	81-90	83-97	88-99	107-118	
ELONG.	Elong.	3-5	1-3	1-5	3 NOM	3-9	1-2	1-2	1-2	1 Max	
	Rockwell	73-78	76-80	75-79		78-83	73-76	72-80	75-80	80 Min	
TENSILE	Tensile	92 Min	100-114	96-109	102-117	110-122		90-105	96 Min	116 Min	
	Yield	87 Min	98-110	92-104	100-115	105-116		88-102	95 Min	115 Min	
ELONG.	Elong.	2 Max	1-3	1-4	1 NOM	2-6		1 Max	2 Max	1 Max	
	Rockwell	76 Min	77-81	76-80		79-83		76-80	76 Min	81 Min	

(1) Lbs. per cu. in at 68°F (annealed) (x 27.68 gms./cu. cm. at 20°C) (2) 10⁶ PSI, tension (3) % IACS at 68°F (20°C) as annealed (4) BTU per sq. ft. per ft. per hr. per F° at 68°F (20°C) (5) Inches/inch/°F x 10⁶ from 68°F to 572°F (20°C to 300°C) (6) x 1000 PSI (7) x 1000 PSI (0.2% offset) (8) % in 2 inches (9) .020" gauge and above (30T scale)

Properties are provided for reference only, and are valid for gauges .008" and above. Certain properties are reprinted with permission of Olin Corp. For information on the following alloys – 42, 14415, 14420, 52180, 73500 and 76200 – please consult the mill.