

Phosphor bronze and nickel silver sheets and strip

ASADA CORPORATION

<http://www.asada-metal.com/>

Asada Corporation is a specialized trading company
for wires and strips such as steels, wires, piano wires,
hard drawn steel wires, stainless steel wires etc.

Product standards for phosphor bronze materials

Plate and Strip (JIS H 3110-2000)

Chemical composition

Alloy No.		Symbol	Chemical composition %						Specific characteristics and examples of uses
			Sn	P	Fe	Pb	Zn	Cu+Sn+P	
C5111	Plate	C5111 P	3.5 to 4.5	0.03 to 0.35	0.10 max.	0.05 max.	0.20 max.	99.5 min.	Good ductility, fatigue-resistivity and corrosion-resistivity. Normal applications include springs used in electronic and electrical devices, switches, leads, connectors, diaphragms, bellows, fuse clips, slides, bearings, bushings, and percussion instruments, etc. C5191 and C5212 are good for springs. For high elasticity, however, specially prepared phosphor bronze spring material should be used.
	Strip	C5111 R							
C5102	Plate	C5102 P	4.5 to 5.5						
	Strip	C5102 R							
C5191	Plate	C5191 P	5.5 to 7.0						
	Strip	C5191 R							
C5212	Plate	C5212 P	7.0 to 9.0						
	Strip	C5212 R							

Mechanical properties

Alloy No.	Quality grade	Symbol	Tensile test			Bend test			Hardness test	
			Thickness mm	Tensile strength N/mm ² (NOTE 1)	Elongation %	Thickness mm	Bend angle	Inside radius	Thickness mm	Vickers hardness HV (NOTE 2)
C5111	O	C5111 P - O C5111 R - O	0.15 and over. up to and incl. 5.0	295 min.	38 min.	Up to and incl. 1.6	180°	Tightly adhered	—	—
	¼H	C5111 P - ¼H C5111 R - ¼H		345 to 440	25 min.	Up to and incl. 1.6	180° or W	Thickness × 0.5	0.15 min.	80 to 150
	½H	C5111 P - ½H C5111 R - ½H		410 to 510	12 min.	Up to and incl. 1.6	180° or W	Thickness × 1	0.15 min.	120 to 180
	H	C5111 P - H C5111 R - H		490 to 590	7 min.	Up to and incl. 1.6	180° or W	Thickness × 2	0.15 min.	150 to 200
	EH	C5111 P - EH C5111 R - EH	0.15 and over. under 0.2 0.2 and over. up to and incl. 5.0	570 min.	— 3 min.	—	—	—	0.15 min.	170 min.
C5102	O	C5102 P - O C5102 R - O	0.15 and over. up to and incl. 5.0	305 min.	40 min.	Up to and incl. 1.6	180°	Tightly adhered	—	—
	¼H	C5102 P - ¼H C5102 R - ¼H		375 to 470	28 min.	Up to and incl. 1.6	180° or W	Thickness × 0.5	0.15 min.	90 to 160
	½H	C5102 P - ½H C5102 R - ½H		470 to 570	15 min.	Up to and incl. 1.6	180° or W	Thickness × 1	0.15 min.	130 to 190
	H	C5102 P - H C5102 R - H		570 to 665	7 min.	Up to and incl. 1.6	180° or W	Thickness × 2	0.15 min.	170 to 220
	EH	C5102 P - EH C5102 R - EH	0.15 and over. under 0.2 0.2 and over. up to and incl. 5.0	620 min.	— 4 min.	—	—	—	0.15 min.	190 min.
C5191	O	C5191 P - O C5191 R - O	0.15 and over. up to and incl. 5.0	315 min.	42 min.	Up to and incl. 1.6	180° or W	Thickness × 0.5	—	—
	¼H	C5191 P - ¼H C5191 R - ¼H		390 to 510	35 min.	Up to and incl. 1.6	180° or W	Thickness × 1	0.15 min.	100 to 160
	½H	C5191 P - ½H C5191 R - ½H		490 to 610	20 min.	Up to and incl. 1.6	180° or W	Thickness × 1.5	0.15 min.	150 to 205
	H	C5191 P - H C5191 R - H		590 to 685	8 min.	Up to and incl. 1.6	180° or W	Thickness × 2	0.15 min.	180 to 230
	EH	C5191 P - EH C5191 R - EH	0.15 and over. under 0.2 0.2 and over. up to and incl. 5.0	635 min.	— 5 min.	—	—	—	0.15 min.	200 min.
C5212	O	C5212 P - O C5212 R - O	0.15 and over. up to and incl. 5.0	345 min.	45 min.	Up to and incl. 1.6	180° or W	Thickness × 0.5	—	—
	¼H	C5212 P - ¼H C5212 R - ¼H		390 to 510	40 min.	Up to and incl. 1.6	180° or W	Thickness × 1	0.15 min.	100 to 160
	½H	C5212 P - ½H C5212 R - ½H		490 to 610	30 min.	Up to and incl. 1.6	180° or W	Thickness × 1.5	0.15 min.	150 to 205
	H	C5212 P - H C5212 R - H		590 to 705	12 min.	Up to and incl. 1.6	180° or W	Thickness × 3	0.15 min.	180 to 235
	EH	C5212 P - EH C5212 R - EH	0.15 and over. under 0.2 0.2 and over. up to and incl. 5.0	685 min.	— 5 min.	—	—	—	0.15 min.	210 min.

NOTE 1: Effective January 1, 1991, all tensile strength units are expressed using the international System of Units (SI). NOTE 2: Minimum load for test shall be 1.961N.

Plate and Strip for Springs (JIS H 3130-2000)

Chemical composition

Aloy No.	Symbol	Chemical composition %						Specific characteristics and examples of uses
		Sn	P	Fe	Pb	Zn	Cu+Sn+P	
C5210	Sheet	7.0 to 9.0	0.03 to 0.35	0.10 max.	0.05 max.	0.20 max.	99.7 min.	Having good workability, endurance and corrosion resistance. Especially, suitable for high quality spring when low temperature annealed. Temper grade SH is applicable to leaf spring hardly processed bending. Applicable to spring of switch, connector, relay, etc. electronic-electric measuring instruments and apparatus.
	Strip							

Mechanical properties

Alloy No.	Quality grade	Symbol	Tensile test			Bend test			Elastic limit test of spring		Hardness test	
			Thick- ness mm	Tensile strength N/mm ² (NOTE 1)	Elonga- tion %	Thick- ness mm	Bend angle	Inside radius	Thick- ness mm	Elastic limit (Kb 0.1) N/mm ²	Thick- ness mm	Vickers hardness HV (NOTE 2)
C5210	½H	C5210P-½H C5210R-½H	0.15 min.	470 to 610	27 min.	Up to and incl. 1.6	180° or W bending	Thickness × 1.0	0.15 to 1.6 incl.	245 min.	0.15 min.	140 to 205
	H	C5210P-H C5210R-H		590 to 705	20 min.	Up to and incl. 1.6	180° or W bending	Thickness × 1.5		390 min.		185 to 235
	EH	C5210P-EH C5210R-EH		685 to 785	11 min.	Up to and incl. 1.6	180° or W bending	Thickness × 3.0		460 min.		210 to 260
	SH	C5210P-SH C5210R-SH		735 to 835	9 min.	—	—	—		510 min.		230 to 270

NOTE 1: Effective January 1, 1991, all tensile strength and spring thresholds are expressed using the international System of Units (SI). NOTE 2: Minimum load for test shall be 1.961N.

Thickness tolerances for Plate and strip

C5111, C5102, C5191, C5212 (JIS H 3110-2000) Unit: mm

Thickness	Width	Tolerance	
		Up to and incl. 400	Over 400, up to and incl. 650
0.05 and over, up to and incl. 0.08		±0.005	—
Over 0.08 up to and incl. 0.15		±0.010	—
Over 0.15 up to and incl. 0.25		±0.015	—
Over 0.25 up to and incl. 0.4		±0.020	—
Over 0.4 up to and incl. 0.55		±0.025	±0.045
Over 0.55 up to and incl. 0.7		±0.030	±0.05
Over 0.7 up to and incl. 0.9		±0.035	±0.06
Over 0.9 up to and incl. 1.2		±0.040	±0.07
Over 1.2 up to and incl. 1.5		±0.045	±0.08
Over 1.5 up to and incl. 2		±0.05	±0.09
Over 2 up to and incl. 3		±0.06	±0.10
Over 3 up to and incl. 5		±0.08	±0.12
Over 5 up to and incl. 7		±0.10	—

C5210 (JIS H 3130-2000) Unit: mm

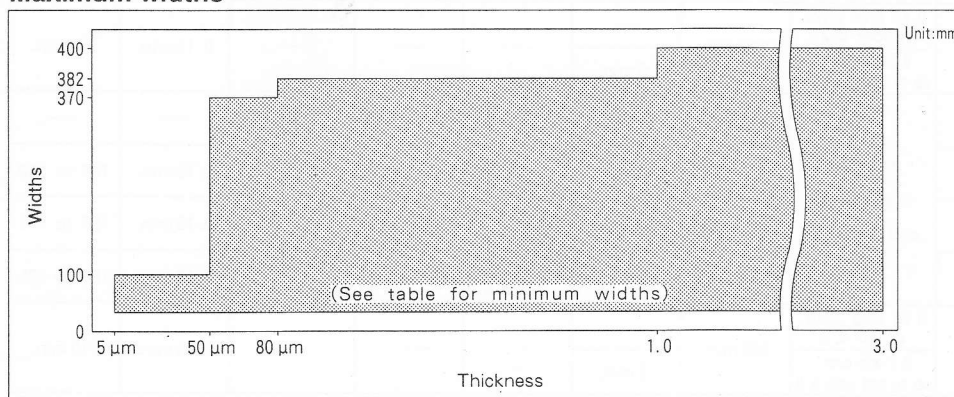
Thickness	Width	Tolerance	
		Up to and incl. 400	
0.05 and over, up to and incl. 0.08		±0.005	
Over 0.08 up to and incl. 0.15		±0.008	
Over 0.15 up to and incl. 0.25		±0.013	
Over 0.25 up to and incl. 0.4		±0.018	
Over 0.4 up to and incl. 0.55		±0.020	
Over 0.55 up to and incl. 0.7		±0.025	
Over 0.7 up to and incl. 0.9		±0.030	
Over 0.9 up to and incl. 1.2		±0.035	
Over 1.2 up to and incl. 1.5		±0.045	
Over 1.5 up to and incl. 2.0		±0.050	

Please consult the manufacturer for non-standard specifications for any of the product standards shown in these pages.

NOTE: Tolerance may be specified on the plus or minus side only, in which case the tolerance should be doubled.

Thickness & Width in HARADA's

Maximum widths



Minimum widths

Unit: mm

Thickness	Min. width
0.005 to 0.019	10
0.02 to 0.15	0.5
0.015 to 0.3	1.0
0.3 to 0.6	2.0
0.6 to 0.8	3.0
0.8 to 1.5	4.0
1.5 to 2.5	5.0
2.5 to 3.0	12