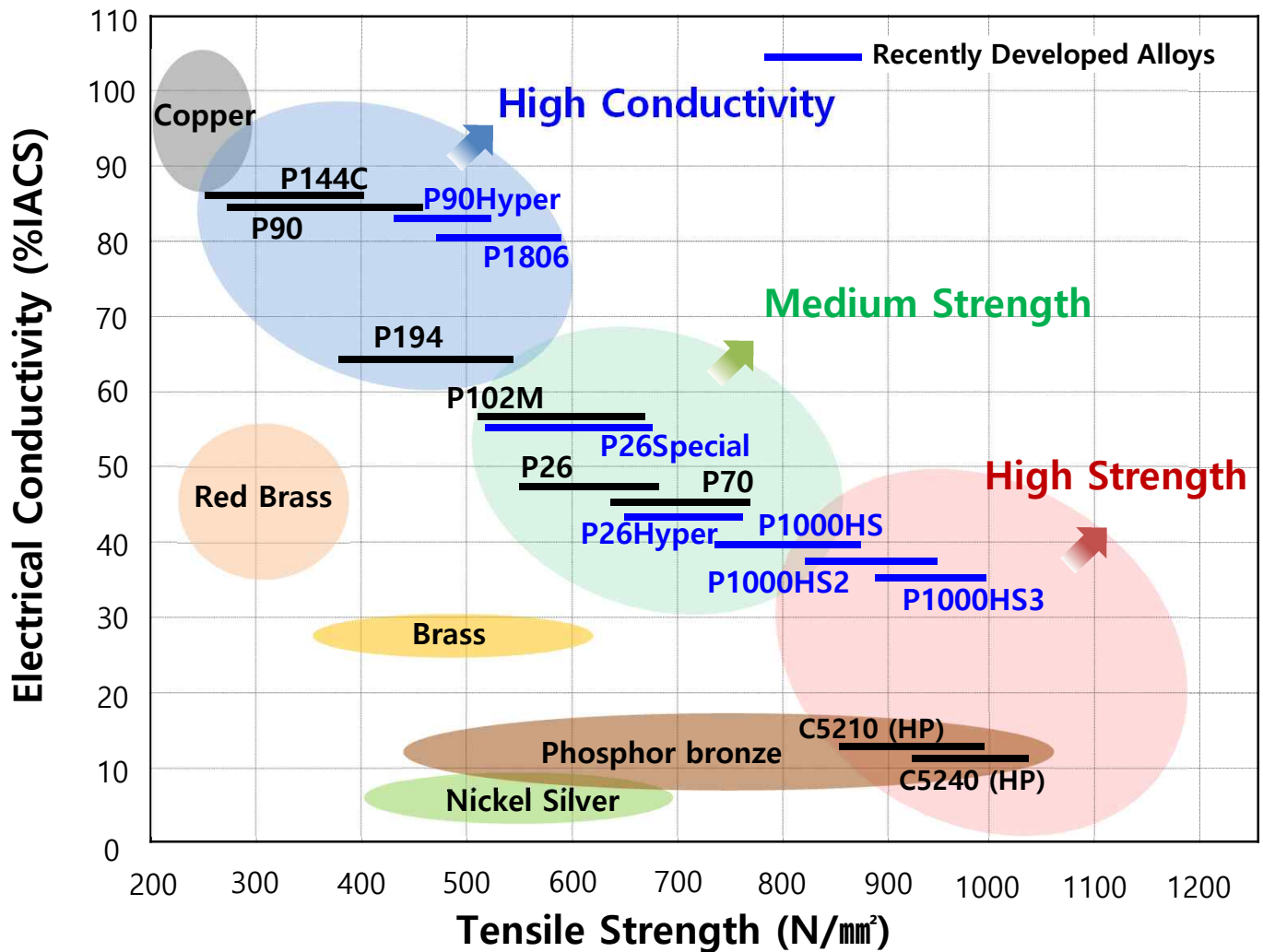


Copper Alloy Products

Alloys Map (Strip & Sheets)

2024



Copper Alloy Products (Strip & Sheets)

- | | | |
|--------------------------|-------------------|---------------------|
| ▪ <u>Copper</u> | ▪ <u>P102M</u> | ▪ <u>P26HYPER</u> |
| ▪ <u>Red Brass</u> | ▪ <u>P90</u> | ▪ <u>P26Special</u> |
| ▪ <u>Brass</u> | ▪ <u>P90HYPER</u> | ▪ <u>P1000HS</u> |
| ▪ <u>Phosphor Bronze</u> | ▪ <u>P194</u> | ▪ <u>P1000HS2</u> |
| ▪ <u>Nickel Silver</u> | ▪ <u>P194HSL</u> | ▪ <u>P1000HS3</u> |
| ▪ <u>P144C</u> | ▪ <u>P425</u> | ▪ <u>P70</u> |
| ▪ <u>P1806</u> | ▪ <u>P26</u> | |

PONGSAN

Strip & Sheet Products

Alloy	UNS No.	JIS No.	Page
Oxygen-Free Copper, OFC	C10200	C1020	3
Tough Pitch Copper, TP	C11000	C1100	6
Phosphorus Deoxidized (Low P), DLP	C10300	-	9
Phosphorus Deoxidized (High P). DP	C12200	C1220	12
Red Brass (RB1)	C21000	C2100	15
Red Brass (RB2)	C22000	C2200	18
Red Brass (RB3)	C23000	C2300	21
Brass (B1)	C26000	C2600	24
Brass (BA)	C26800	C2680	27
Brass (B2)	C27200	C2720	30
Brass (B3)	C28000	C2801	33
Phosphor Bronze (PB1A)	C51100	C5111	36
Phosphor Bronze (PB1B)	C51000	C5102	39
Phosphor Bronze (PB2)	C51900	C5191	42
Phosphor Bronze (PB3)	C52100	C5212	45
Phosphor Bronze (Spring)	C52100	C5210	48
Phosphor Bronze (Super Spring)	C52400	C5240	51
Nickel Silver (NS1)	C73500	-	54
Nickel Silver (NS2)	C74500	C7451	57
Nickel Silver (NS3)	C75200	C7521	60
Nickel Silver (Spring)	C77000	C7701	63
P1240 Nickel Silver	-	-	66
P144C	C14410	C1441	69
P1806	C18060	-	72
P102M	C19015	-	75
P90	C19210	C1921	78
P90HYPER	C19217	-	81
P194	C19400	C1940	84
P194HSL	C19400	C1940	87
P425	C42500	C4250	90
P26	C64750	-	93
P26HYPER	C64750	-	96
P26Special	C19005	-	99
P1000HS	C64751	-	102
P1000HS2	C64752	-	105
P1000HS3	C64752	-	108
P70	C70250	-	111

C1020 Oxygen-Free Copper

UNS No. C10200

Features

C1020 is a high purity, oxygen free, non phosphorus-deoxidized copper that does not contain in vacuum evaporating elements.

- High electrical and thermal conductivity.
- Good welding and excellent soldering properties.
- Excellent hot and cold forming properties.

Typical Applications

- | | | |
|-------------------------|--------------|---------------------|
| • Automotive Rectifiers | • Coaxial | • Cable |
| • Tubes | • Bus bars | • Wire |
| • Heat sinks | • Conductors | • Sputtering target |

Chemical Composition (wt%)

Cu	≥ 99.99
O	< 0.001

Physical Properties

Melting Temperature	°C	1083
Specific Gravity	-	8.94
Thermal Conductivity	W/(m·K)	391
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.6
Modulus of Elasticity	GPa	117
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	101

Mechanical Properties

Temper		O	1/4H	1/2H	H
Tensile Strength	MPa	≥195	215-285	235-315	≥275
Elongation	%	≥35	≥25	≥15	-
Hardness	Hv	-	55-100	75-120	≥80
0.2% Yield Strength	MPa	Max 140	≥180	≥220	≥250

Bending Properties

r/t (Minimum Bending Radius / thickness)

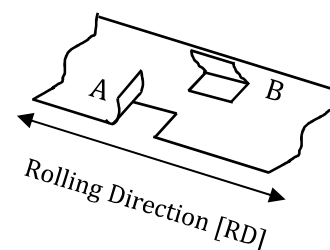
Temper		O	1/4H	1/2H	H
90°	Good way	0.0	0.0	0.0	0.0
	Bad way	0.0	0.0	0.0	0.5
180°	Good way	0.0	0.0	0.5	1.0
	Bad way	0.0	0.0	0.5	1.0

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

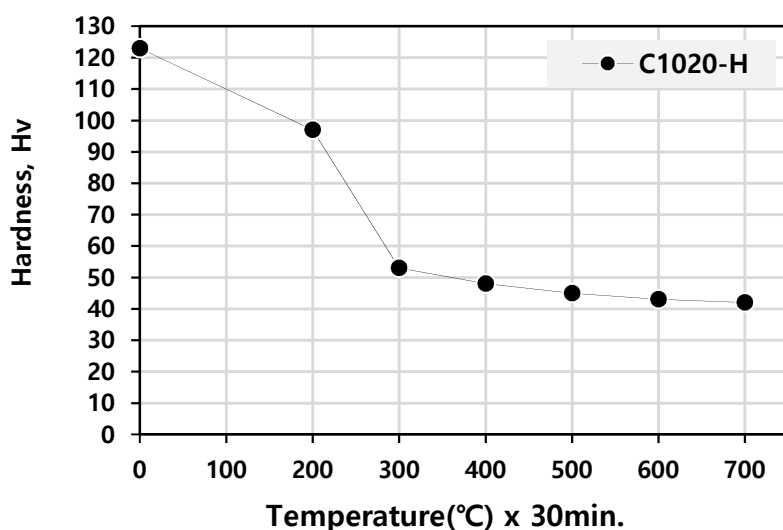
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

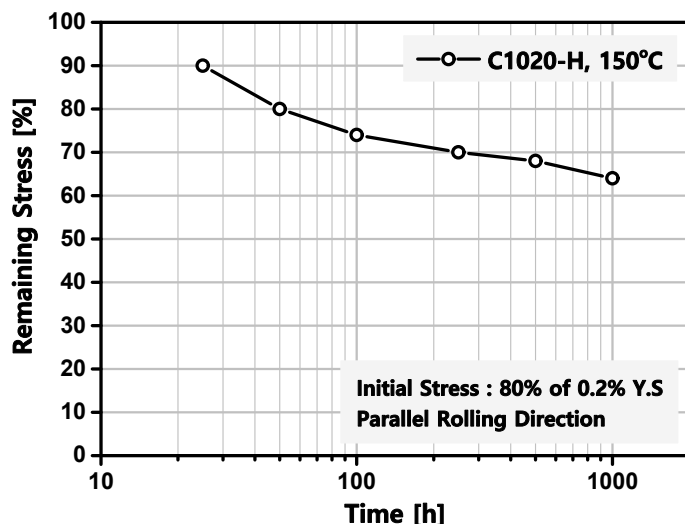


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

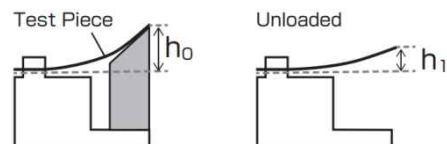


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Resistant to : industrial atmosphere, industrial and water, pure water vapour, non oxidizing acids, alkalis, neutral saline solutions.

Not resistant to : oxidizing acids, hydrous ammonia and halogenated gases, hydrogen sulfide, seawater, especially with flow rates.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Fail
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C1100 Tough Pitch Copper

UNS No. C11000

Features

C1100 is about 99.9% purity of copper.

- High electrical and thermal conductivity.
- Good drawability
- Corrosion resistance and weather resistance

Typical Applications

- Automotive Radiators
- Automotive Gaskets
- Heat sinks
- Electrical Transformer Coils
- Bus bars
- Switches
- Heat Exchangers
- Terminals
- Terminal Connectors

Chemical Composition (wt%)

Cu	≥ 99.9
----	--------

Physical Properties

Melting Temperature	°C	1083
Specific Gravity	-	8.91
Thermal Conductivity	W/(m·K)	391
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.6
Modulus of Elasticity	GPa	117
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	100

Mechanical Properties

Temper		O	1/4H	1/2H	H
Tensile Strength	MPa	≥195	215-285	235-315	≥275
Elongation	%	≥35	≥25	≥15	-
Hardness	Hv	-	55-100	75-120	≥80
0.2% Yield Strength	MPa	-	-	-	-

Bending Properties

r/t (Minimum Bending Radius / thickness)

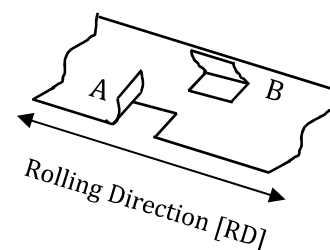
	Temper	O	1/4H	1/2H	H
90°	Good way	0.0	0.0	0.0	1.0
	Bad way	0.0	0.0	0.5	2.0
180°	Good way	0.0	0.0	0.5	1.5
	Bad way	0.0	0.0	1.0	2.5

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

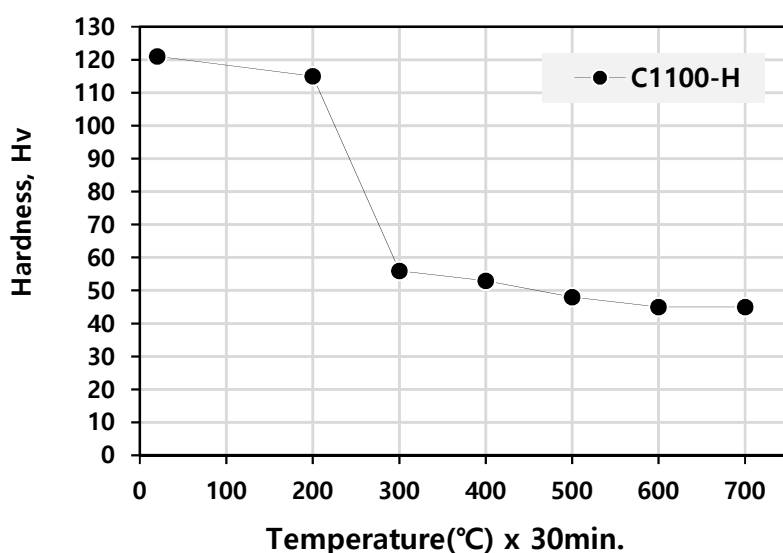
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

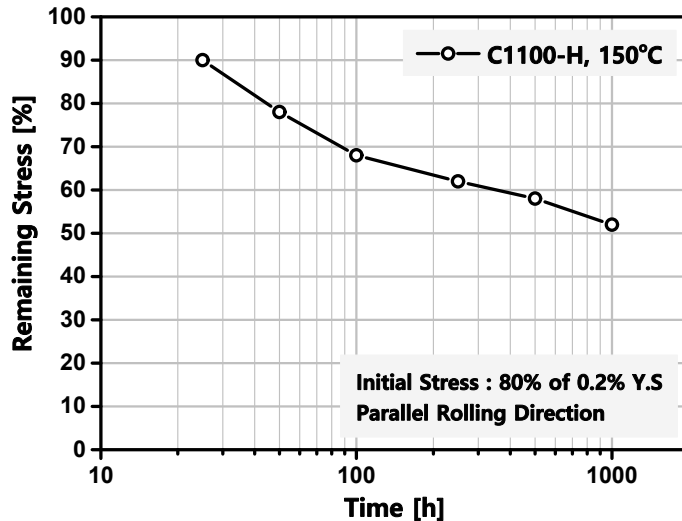


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

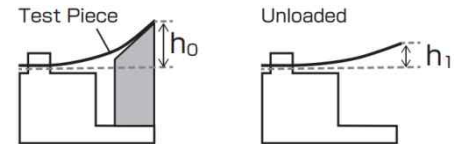


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Resistant to : industrial atmosphere, industrial and drinking water, pure water vapour, non oxidizing acids, alkalis, neutral saline solutions.

Not resistant to : oxidizing acids, hydrous ammonia and halogenated gases, hydrogen sulfide, seawater, especially with high flow rates.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Not Recommended
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Good		

C1030 Phosphorus Deoxidized (Low P)

UNS No. C10300

Features

C1030 is a high purity, low level residual phosphorus, deoxidized copper.

- High electrical and thermal conductivity.
- Good welding and soldering properties.
- Excellent hot and cold forming properties.

Typical Applications

- High Frequency Cable
- Tubular Bus
- Commutators
- Tubular Bus
- Bus bars
- Switches
- Electrical Conductors
- Terminals
- Billet Mold Tube

Chemical Composition (wt%)

Cu	≥ 99.5
P	0.001~0.005

Physical Properties

Melting Temperature	°C	1083
Specific Gravity	-	8.94
Thermal Conductivity	W/(m·K)	386
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.6
Modulus of Elasticity	GPa	117
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	99

Mechanical Properties

Temper		O	1/2H
Tensile Strength	MPa	≥196	294-363
Elongation	%	≥33	≥4
Hardness	Hv	45~55	100-120
0.2% Yield Strength	MPa	-	-

C1030 Phosphorus Deoxidized (Low P) **POONGSAN**

Bending Properties

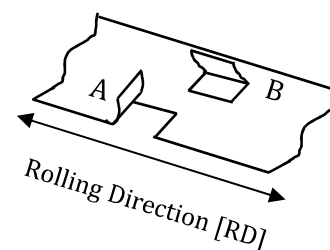
r/t (Minimum Bending Radius / thickness)

Temper		O	1/2H
90°	Good way	0.0	0.0
	Bad way	0.0	0.0
180°	Good way	0.0	0.5
	Bad way	0.0	0.5

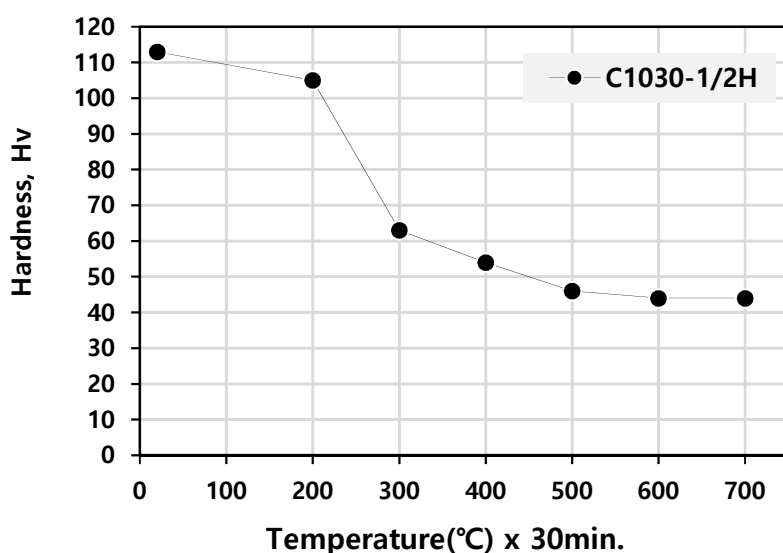
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)



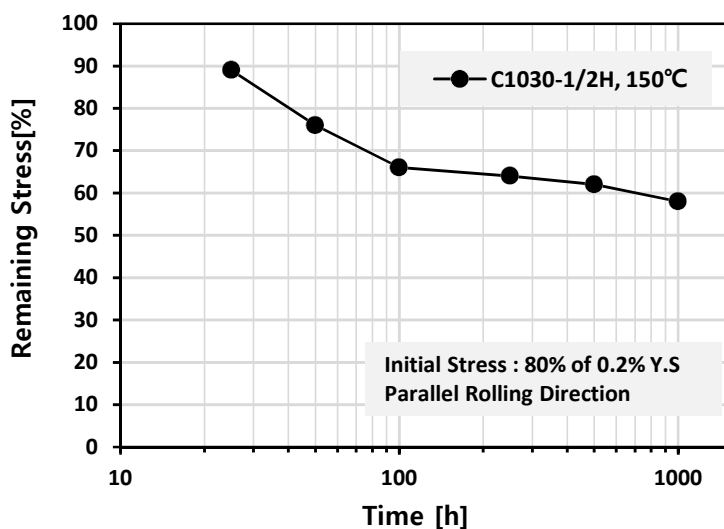
Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

C1030 Phosphorus Deoxidized (Low P) **PONGSAN**

Stress Relaxation Resistance

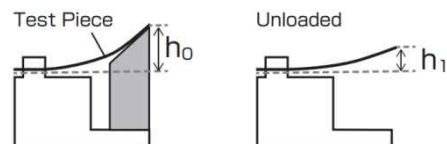


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Resistant to : industrial atmosphere, industrial and drinking water, pure water vapour, non oxidizing acids, alkalis, neutral saline solutions.

Not resistant to : oxidizing acids, hydrous ammonia and halogenated gases, hydrogen sulfide, seawater, especially with high flow rates.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Excellent
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C1220 Phosphorus Deoxidized (High P)

UNS No. C12200

Features

C1220 is a phosphorus-deoxidized copper with a limited, high amount of residual Phosphorus, high electrical and thermal conductivity.

- Excellent welding and soldering properties.
- Excellent hot and cold forming properties.

Typical Applications

- Radiators
- Gaskets
- Connectors
- Switches
- Rotating Bands
- Heat Exchanger Shells
- Casting Molds
- Marine Oil Coolers

Chemical Composition (wt%)

Cu	≥ 99.9
P	0.015~0.040

Physical Properties

Melting Temperature	°C	1083
Specific Gravity	-	8.94
Thermal Conductivity	W/(m·K)	339
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.6
Modulus of Elasticity	GPa	117
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	85

Mechanical Properties

Temper		O	1/4H	1/2H	H
Tensile Strength	MPa	≥195	215-285	235-315	≥275
Elongation	%	≥35	≥25	≥15	-
Hardness	Hv	-	55-100	75-120	≥80
0.2% Yield Strength	MPa	-	-	-	-

C1220 Phosphorus Deoxidized (High P) POONGSAN

Bending Properties

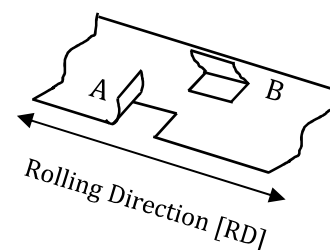
r/t (Minimum Bending Radius / thickness)

	Temper	O	1/4H	1/2H	H
90°	Good way	0.0	0.0	0.0	0.0
	Bad way	0.0	0.0	0.0	0.0
180°	Good way	0.0	0.0	0.5	1.0
	Bad way	0.0	0.0	0.5	1.0

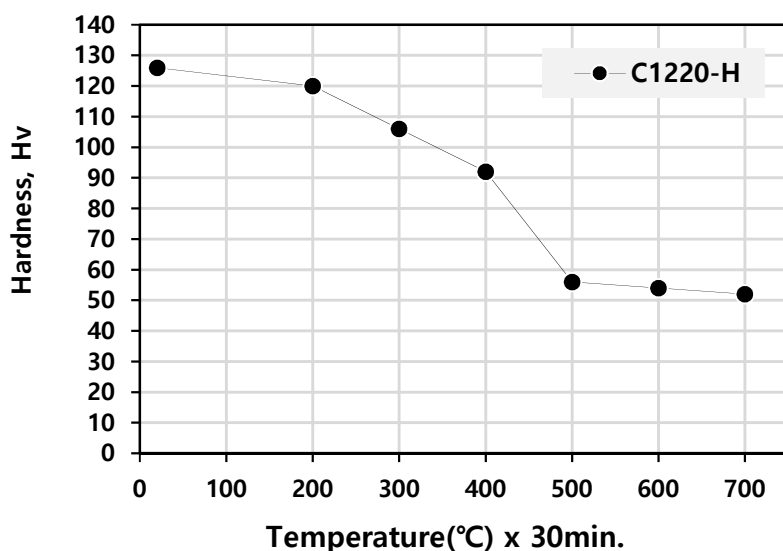
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

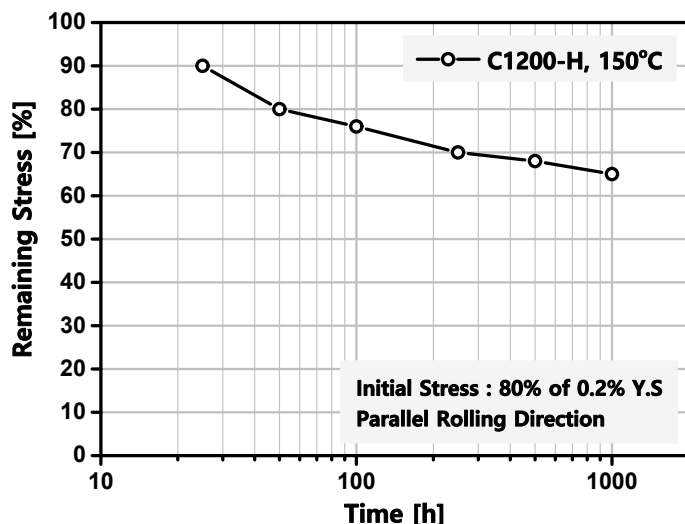


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

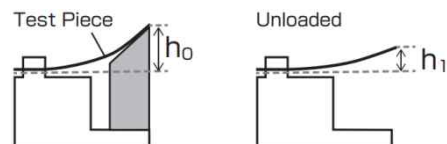


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Resistant to : industrial atmosphere, industrial and drinking water, pure water vapour, non oxidizing acids, alkalis, neutral saline solutions.

Not resistant to : oxidizing acids, hydrous ammonia and halogenated gases, hydrogen sulfide, seawater, especially with high flow rates.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Excellent
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C2100 Red Brass (RB1)

UNS No. C21000

Features

C2100 is low-cost alloy which is often selected to engineers for applications including coin, connectors, fuse caps. The combination of middle conductivity and improved strength make C2100 a valuable option for electrical applications.

- High corrosion resistance in atmosphere, fresh water and seawater
- Good plasticity

Typical Applications

- Coin
- Emblems
- Jewelry
- Connector
- Rotor Bars, Ac Motors
- Fuse Caps
- Bullet Jackets

Chemical Composition (wt%)

Cu	94-96
Zn	Balance
Pb	≤0.05
Fe	≤0.05

Physical Properties

Melting Temperature	°C	1066
Specific Gravity	-	8.86
Thermal Conductivity	W/(m·K)	234
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.0
Modulus of Elasticity	GPa	117
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	56

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	225-305	265-345	≥340
Elongation	%	≥23	≥18	-
Hardness	Hv	45-75	75-110	≥110
0.2% Yield Strength	MPa	≤130	≥200	≥280

Bending Properties

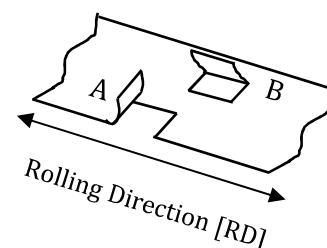
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	1/2H	H
90°	Good way	0.0	0.0	0.5
	Bad way	0.0	0.0	1.0
180°	Good way	0.0	0.0	1.5
	Bad way	0.0	0.0	2.0

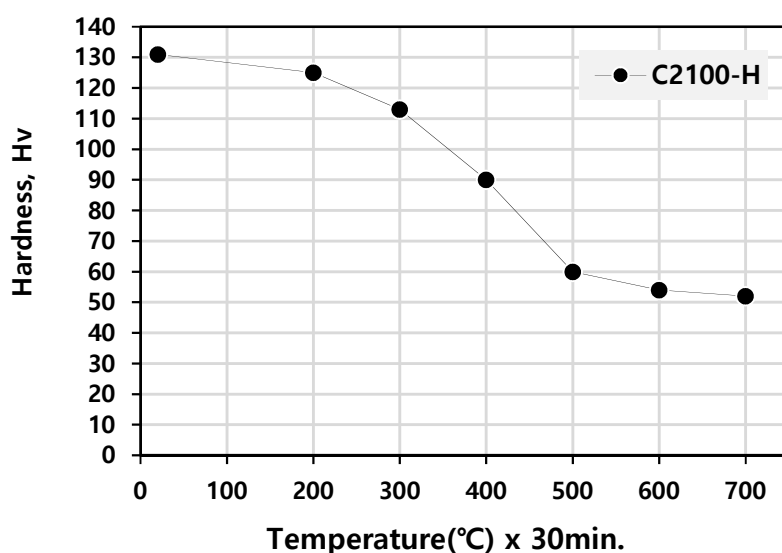
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

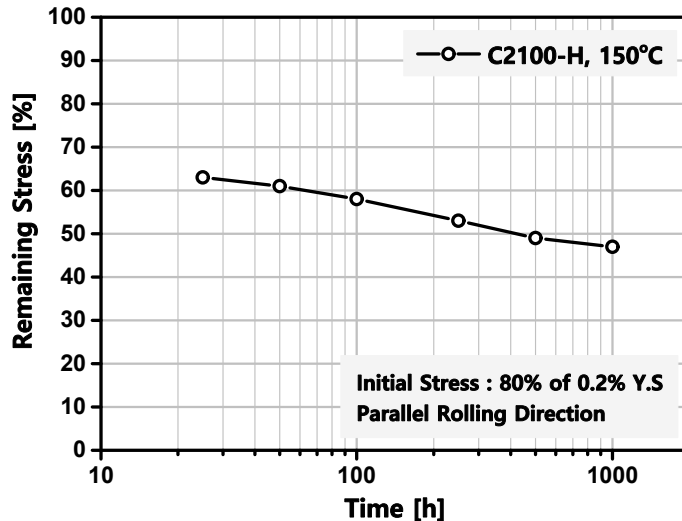


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

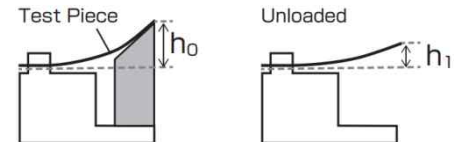


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C2100 has good resistance to stress corrosion cracking and largely resistant to industrial atmosphere but not resistant to oxidizing acids.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Good	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Not recommended
Brazing	Excellent		

C2200 Red Brass (RB2)

UNS No. C22000

Features

C2200 alloy derives its name from its rich bronze color. It offers a unique properties that make it excellent for applications requiring resistance to corrosion. C2200 offers a unique set of properties that make it great for applications requiring resistance to corrosion.

- Unique color
- Good resistance to air, water

Typical Applications

- Gaskets
- Bolts
- Chain Links
- Ball Point Pens
- Rotor Bar – AC Motors
- Costume Jewelry
- Compacts
- Cable Wrap

Chemical Composition (wt%)

Cu	89-91
Zn	Balance
Pb	≤0.05
Fe	≤0.05

Physical Properties

Melting Temperature	°C	1043
Specific Gravity	-	8.8
Thermal Conductivity	W/(m·K)	189
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.4
Modulus of Elasticity	GPa	117
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	44

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	255-335	285-365	≥350
Elongation	%	≥25	≥20	-
Hardness	Hv	50-80	80-110	≥110
0.2% Yield Strength	MPa	≤140	≥200	≥290

Bending Properties

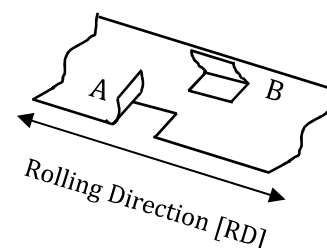
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	1/2H	H
90°	Good way	0.0	0.0	0.5
	Bad way	0.0	0.0	1.0
180°	Good way	0.0	0.5	2.5
	Bad way	0.0	0.5	2.0

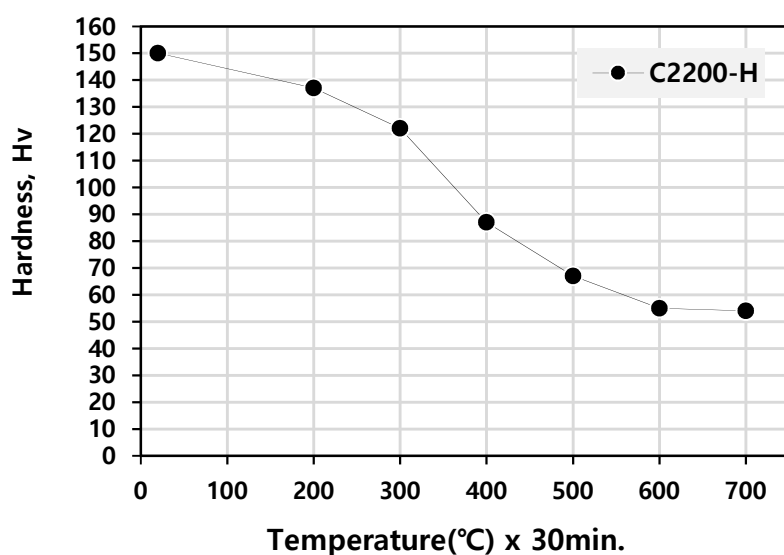
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

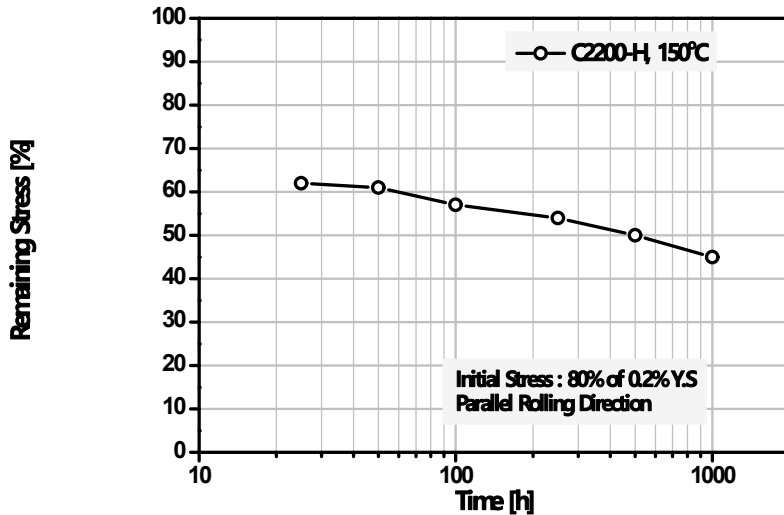


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

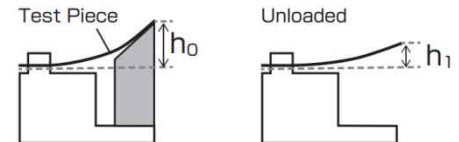


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Good resistance to : fresh water, neutral or alkaline saline solutions, organic compounds

Not resistant to : acids, hydrous sulphur compounds,

Low sensitivity to stress corrosion cracking

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Good	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C2300 Red Brass (RB3)

UNS No. C23000

Features

C2300 has highly resistant to stress corrosion cracking. It is commonly known as a choice for a wide range of applications. This material also has middle strength and is readily formed making it great for many industrial applications.

- Good corrosion resistance
- Good Formability

Typical Applications

- Badges
- Fire Extinguisher Cases
- Pump lines
- Zippers
- Sockets
- Pipe Nipples
- Rotor Bars, AC motors
- Heat Exchangers
- Radiator Cores

Chemical Composition (wt%)

Cu	84-86
Zn	Balance
Pb	≤0.05
Fe	≤0.05

Physical Properties

Melting Temperature	°C	1027
Specific Gravity	-	8.75
Thermal Conductivity	W/(m·K)	159
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.7
Modulus of Elasticity	GPa	117
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	37

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	275-355	305-380	≥355
Elongation	%	≥28	≥23	-
Hardness	Hv	55-85	85-115	≥115
0.2% Yield Strength	MPa	≤170	≥150	≥250

Bending Properties

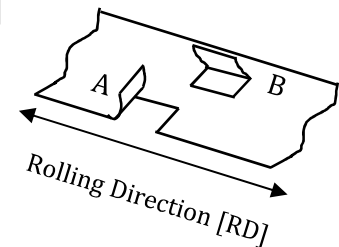
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	1/2H	H
90°	Good way	0.0	0.0	1.0
	Bad way	0.0	0.5	1.5
180°	Good way	0.5	1.0	3.5
	Bad way	0.5	2.0	5.0

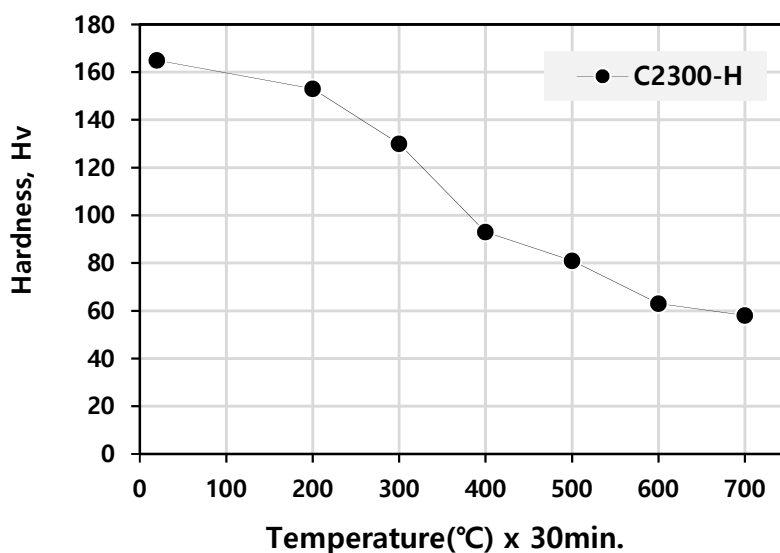
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

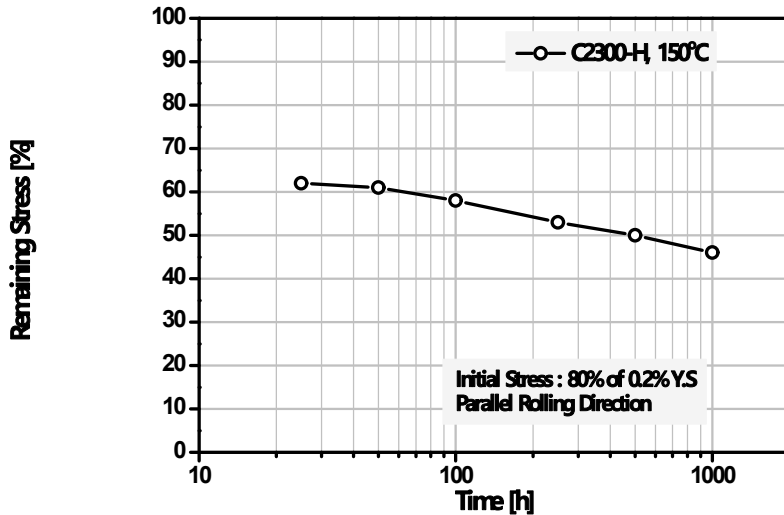


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

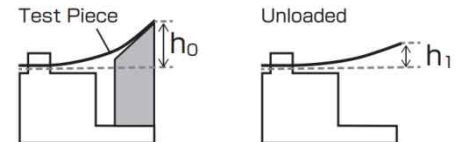


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Good resistance to : fresh water, neutral or alkaline saline solutions, organic compounds

Not resistant to : acids, hydrous sulphur compounds

Low sensitivity to stress corrosion cracking

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Good	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C2600 Brass (B1)

UNS No. C26000

Features

C2600 cartridge have excellent workability. These alloys are usually cold formed and machined.

- Good formability
- Good hot forming

Typical Applications

- Terminal connectors
- Fasteners (Pins, Rivets)
- Radiator
- Ammunition cartridge cases

Chemical Composition (wt%)

Cu	68.5-71.5
Zn	Balance
Pb	≤0.05
Fe	≤0.05

Physical Properties

Melting Temperature	°C	954
Specific Gravity	-	8.53
Thermal Conductivity	W/(m·K)	121
Coefficient of Thermal Expansion	10 ⁻⁶ /K	20.0
Modulus of Elasticity	GPa	110
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	28

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	355-450	410-540	520-620
Elongation	%	≥23	≥20	≥6
Hardness	Hv	85-145	140-160	145-200
0.2% Yield Strength	MPa	170-260	260-430	430-480

Bending Properties

r/t (Minimum Bending Radius / thickness)

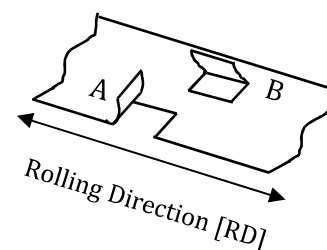
	Temper	1/2H	H	EH
90°	Good way	0.0	0.0	0.0
	Bad way	0.0	1.0	1.0
180°	Good way	0.0	0.0	-
	Bad way	0.0	0.5	2.5

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

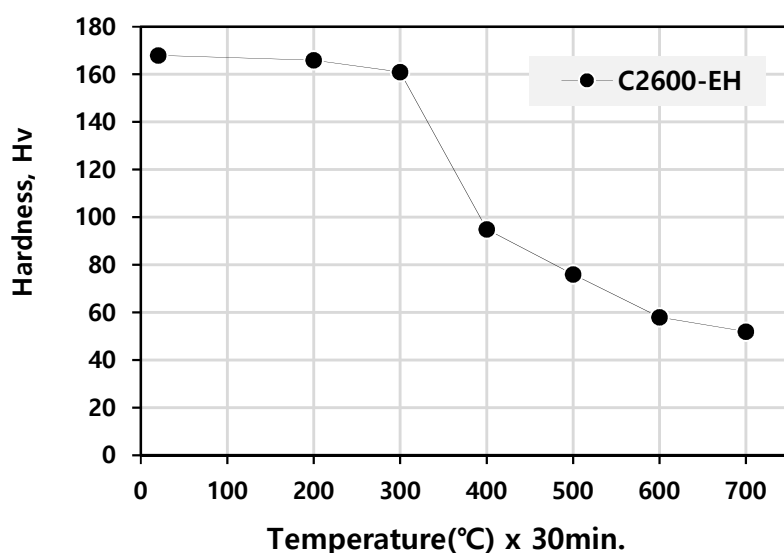
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

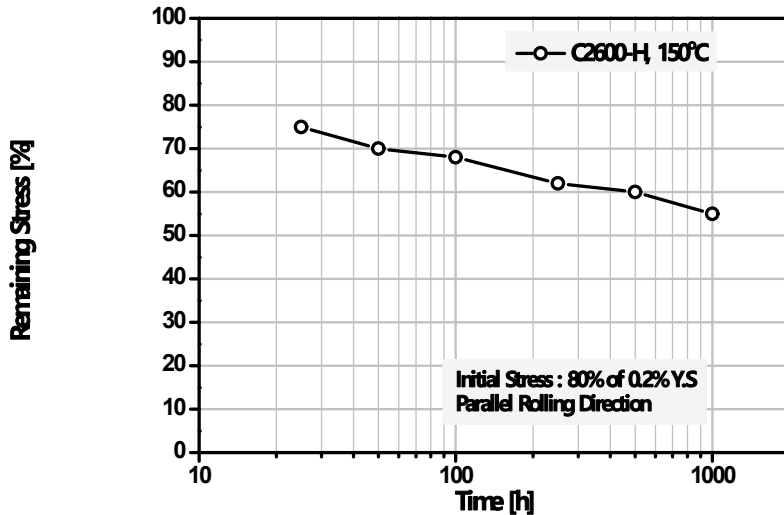


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

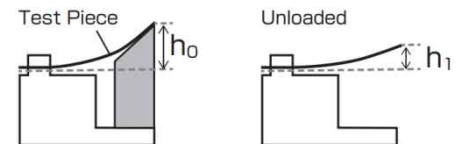


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Excellent : cryogenic, room temperatures, aluminum hydroxide, barium carbonate, lime, magnesium hydroxide, atmosphere (Rural), carbon tetrachloride

Fair : potassium hydroxide, sodium bicarbonate, sodium hydroxide, ethyl chloride, fatty acid

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Fair	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C2680 Brass (BA)

UNS No. C26800

Features

C2680 has combination of excellent cold forming properties with mechanical strength. It also has good hot forming properties, excellent soldering and brazing properties.

- Good formability, hot forming
- Excellent soldering, brazing

Typical Applications

- Connector
- Switch
- Radiator

Chemical Composition (wt%)

Cu	64-68
Zn	Balance
Pb	≤0.05
Fe	≤0.05

Physical Properties

Melting Temperature	°C	932
Specific Gravity	-	8.47
Thermal Conductivity	W/(m·K)	116
Coefficient of Thermal Expansion	10 ⁻⁶ /K	20.3
Modulus of Elasticity	GPa	103
Poisson's Ratio	-	0.35
Electrical Conductivity	%IACS	27

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	355-450	420-500	≥500
Elongation	%	≥23	6	3
Hardness	Hv	85-125	125-155	≥155
0.2% Yield Strength	MPa	170	300	450

Bending Properties

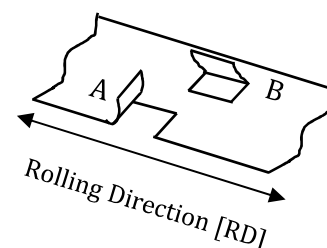
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0.0	0.0	0.5
	Bad way	0.0	0.0	0.5
180°	Good way	0.0	-	-
	Bad way	0.0	-	-

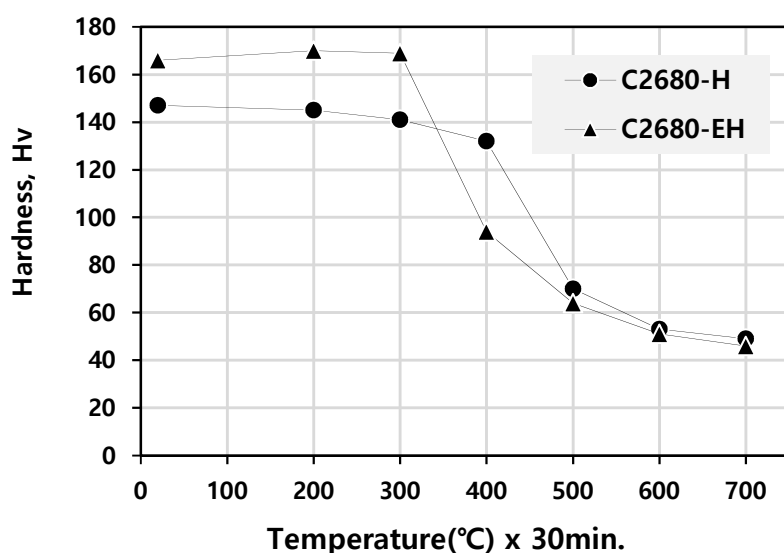
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

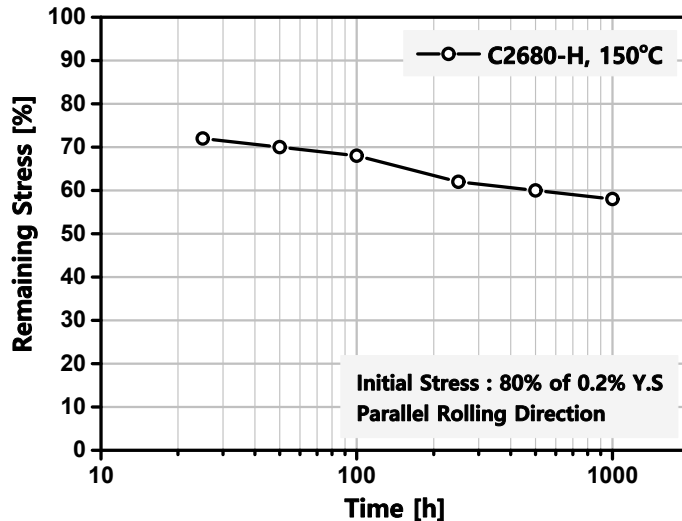


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

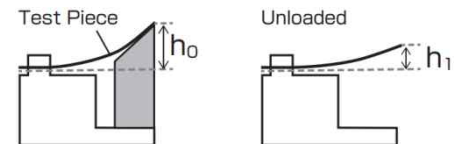


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Excellent - water, water vapor, different saline solutions

Fair - acids, hydrous sulphur components, hydrous ammonia in non-stress-relieved condition

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C2720 Brass (B2)

UNS No. C27200

Features

C2720 has good corrosion resistance and formability which suitable for fasteners, cold headed parts or heat exchanger shells.

- Good corrosion resistance
- Good Formability

Typical Applications

- Connector
- Switch
- Radiator

Chemical Composition (wt%)

Cu	62-64
Zn	Balance
Pb	≤0.07
Fe	≤0.07

Physical Properties

Melting Temperature	°C	916
Specific Gravity	-	8.44
Thermal Conductivity	W/(m·K)	116
Coefficient of Thermal Expansion	10 ⁻⁶ /K	20.5
Modulus of Elasticity	GPa	103
Poisson's Ratio	-	0.35
Electrical Conductivity	%IACS	27

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	325-420	355-440	≥410
Elongation	%	≥30	≥28	8
Hardness	Hv	75-125	95-125	120-155
0.2% Yield Strength	MPa	≤170	170	300

Bending Properties

r/t (Minimum Bending Radius / thickness)

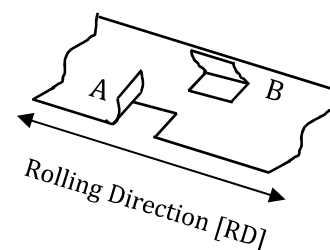
	Temper	1/4H	1/2H	H
90°	Good way	0.0	0.0	0.0
	Bad way	0.0	0.0	0.0
180°	Good way	0.0	0.0	-
	Bad way	0.0	0.0	-

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

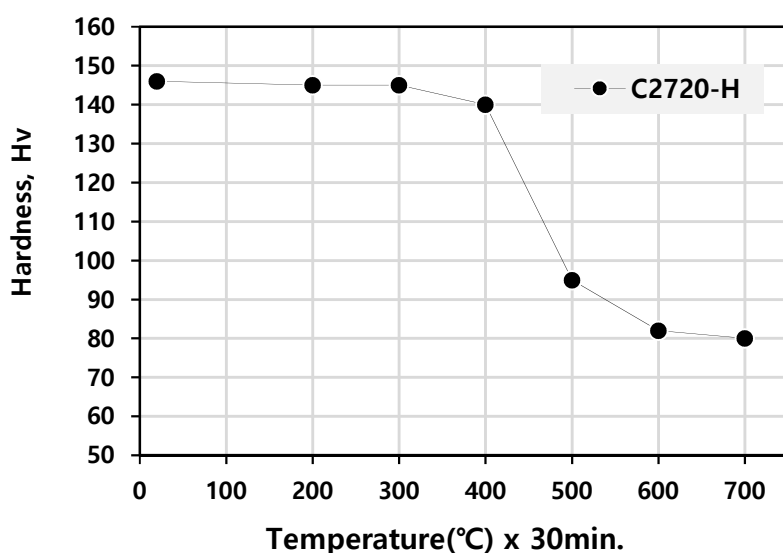
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

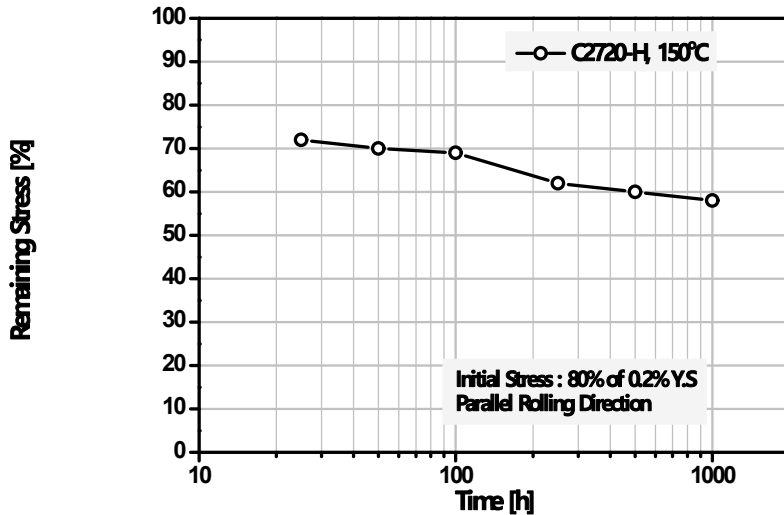


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

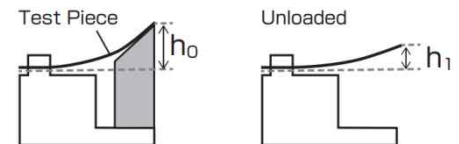


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Good - water, water vapor, saline solutions, organic liquids, atmosphere

Fair - acids, hydrous sulphur components

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Good	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C2801 Brass (B3)

UNS No. C28000

Features

C2801 is a kind of Muntz Metal. Muntz Metal= 60% copper + 40% Zinc + small amount of iron
It has high hot formability and strength but low ductility.

- Good hot forming ability
- High strength

Typical Applications

- Connector
- Switch
- Keys

Chemical Composition (wt%)

Cu	59-62
Zn	Balance
Pb	≤0.10
Fe	≤0.07

Physical Properties

Melting Temperature	°C	904
Specific Gravity	-	8.39
Thermal Conductivity	W/(m·K)	123
Coefficient of Thermal Expansion	10 ⁻⁶ /K	20.9
Modulus of Elasticity	GPa	103
Poisson's Ratio	-	0.35
Electrical Conductivity	%IACS	28

Mechanical Properties

Temper		O	1/2H	H
Tensile Strength	MPa	340-420	420-480	≥470
Elongation	%	33	15	8
Hardness	Hv	85-115	110-140	≥140
0.2% Yield Strength	MPa	≤240	≥200	≥390

Bending Properties

r/t (Minimum Bending Radius / thickness)

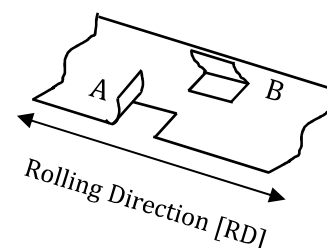
	Temper	O	1/2H	H
90°	Good way	0.0	0.0	0.0
	Bad way	0.0	0.0	0.0
180°	Good way	0.0	0.0	-
	Bad way	0.0	0.0	-

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

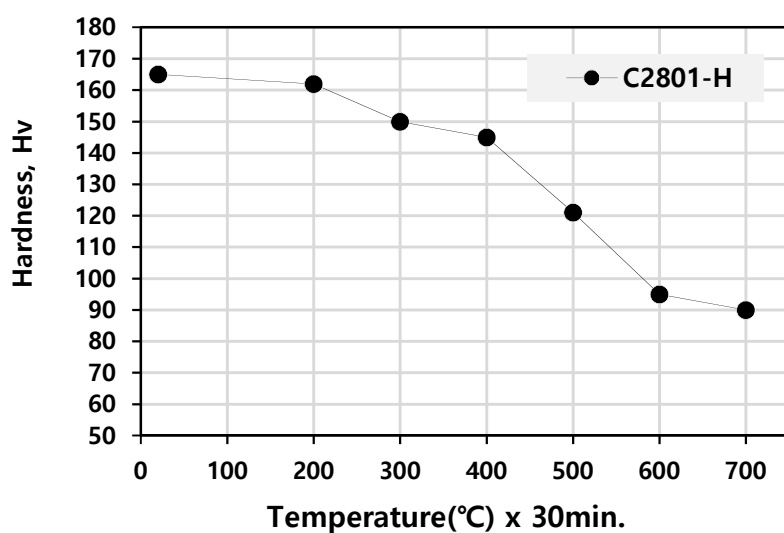
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

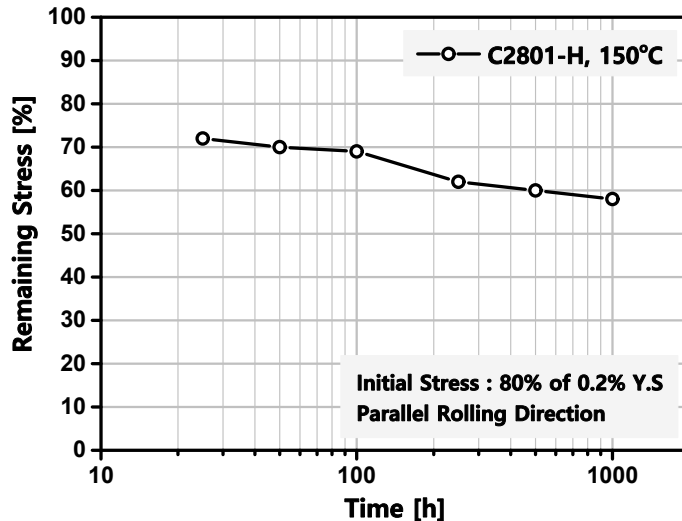


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

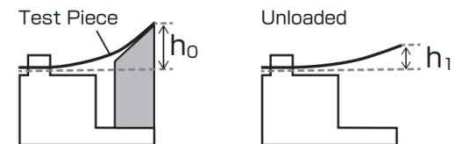


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

Excellent - aluminum hydroxide, Lime, dry carbon tetrachloride, hydrogen, oxygen

Fair - fatty acid, potassium hydroxide, sodium bicarbonate, ethyl chloride, organic acid

'Dezincification' and 'Stress Corrosion Cracking(SCC)' may occur.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Fair	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

C5111 Phosphor Bronze (PB1A)

UNS No. C51100

Features

C5111 offers high strength and ductility, and excellent spring characteristics. It also has excellent resistance to corrosion and stress relief. Good soldering and brazing characteristics. It is suitable for applications requiring both strength and conductivity, and enables miniaturization of connectors.

- High strength and good corrosion resistance

Typical Applications

- Connectors
- Bridge Bearing Plates
- Lock Washers
- Fuse Clips
- Switch Parts
- Fasteners
- Terminals
- Springs

Chemical Composition (wt%)

Cu	Balance
Sn	3.5-4.9
P	0.03-0.35

Physical Properties

Melting Temperature	°C	1063
Specific Gravity	-	8.86
Thermal Conductivity	W/(m·K)	84
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.8
Modulus of Elasticity	GPa	110
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	20

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	410-510	490-590	≥570
Elongation	%	≥12	≥7	≥3
Hardness	Hv	120-180	150-200	≥170
0.2% Yield Strength	MPa	≥350	≥440	≥520

Bending Properties

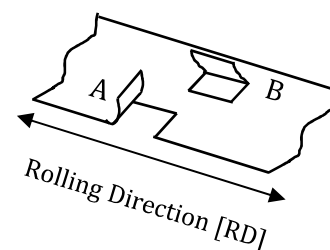
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	H	EH
90°	Good way	0	0	0
	Bad way	0	1.0	2.5
180°	Good way	0	0.5	1.5
	Bad way	0.5	2.0	3.5

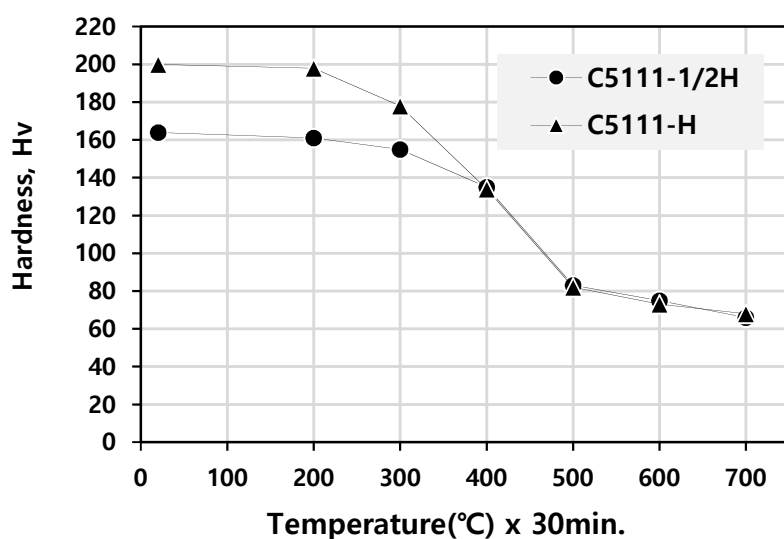
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

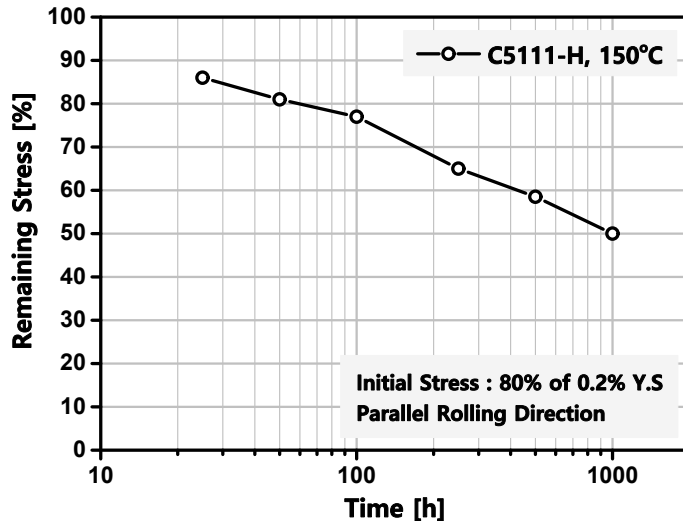


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

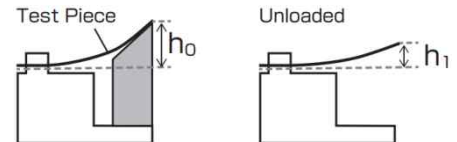


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C5111 has good resistance in seawater and industrial atmosphere.

as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Fair
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Fair
Brazing	Excellent		

C5102 Phosphor Bronze (PB1B)

UNS No. C51000

Features

C5102 offers high strength and ductility, and excellent spring characteristics. It also has excellent resistance to corrosion and stress relief. Good soldering and brazing characteristics. C5102 alloy is widely used phosphor bronze, and its applications are connectors, connector springs, springs and electrical and mechanical parts.

- High strength and good corrosion resistance

Typical Applications

- Connectors
- Bridge Bearing Plates
- Lock Washers
- Fuse Clips
- Switch Parts
- Fasteners
- Terminals
- Springs

Chemical Composition (wt%)

Cu	Balance
Sn	4.2-5.8
P	0.03-0.35

Physical Properties

Melting Temperature	°C	1049
Specific Gravity	-	8.86
Thermal Conductivity	W/(m·K)	69
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.8
Modulus of Elasticity	GPa	110
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	15

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	470-570	570-665	620-710
Elongation	%	≥15	≥7	≥4
Hardness	Hv	130-190	170-220	190-230
0.2% Yield Strength	MPa	≥420	≥500	≥570

Bending Properties

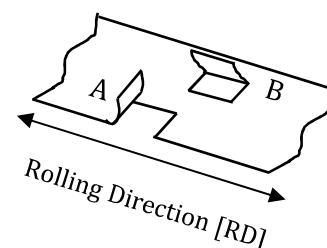
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0	0	0
	Bad way	0	1.0	2.0
180°	Good way	0	0.5	1.0
	Bad way	1.0	2.0	3.0

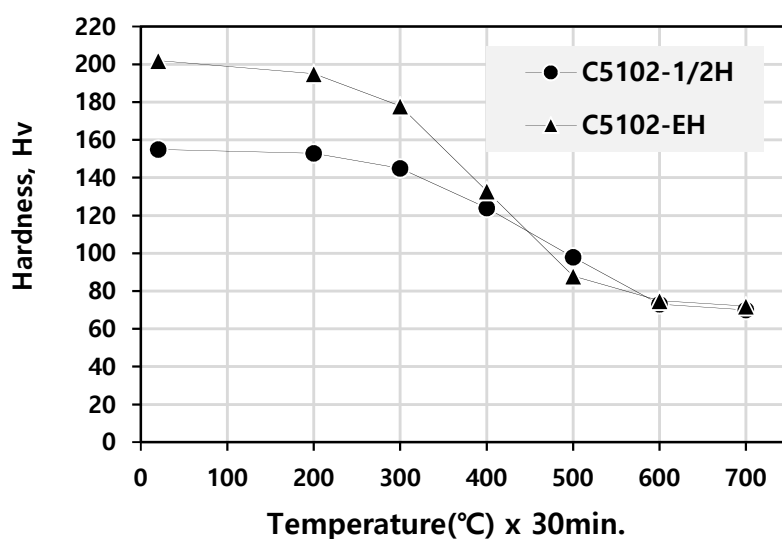
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

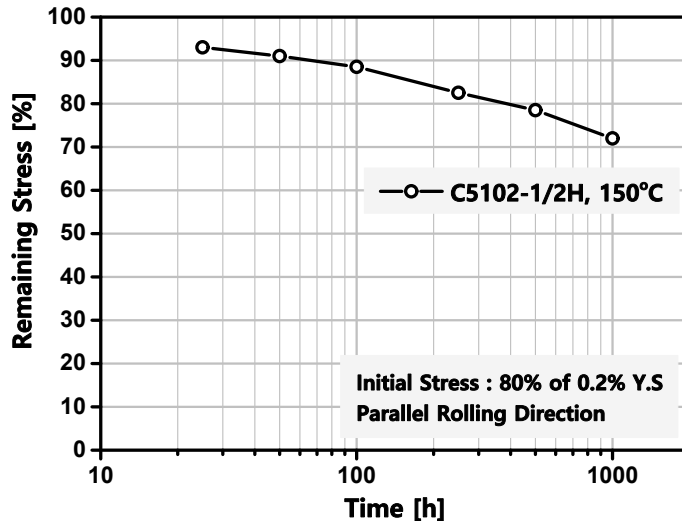


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

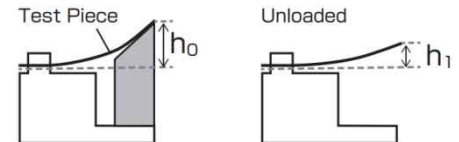


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C5102 has good resistance in seawater and industrial atmosphere. as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Fair
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Fair
Brazing	Excellent		

C5191 Phosphor Bronze (PB2)

UNS No. C51900

Features

C5191 offers high strength and ductility, and excellent spring characteristics. It also has excellent resistance to corrosion and stress relief. Good soldering and brazing characteristics. Due to its high tin content, it has high strength and excellent spring properties it is Used for all kinds of springs.

- High strength and good corrosion resistance

Typical Applications

- Connectors
- Terminals
- Wire Brushes
- Electrical Flexing Contact Blades
- Switch Parts
- Fasteners

Chemical Composition (wt%)

Cu	Balance
Sn	5.0-7.0
P	0.03-0.35

Physical Properties

Melting Temperature	°C	1045
Specific Gravity	-	8.83
Thermal Conductivity	W/(m·K)	67
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18
Modulus of Elasticity	GPa	105
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	13

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	490-610	590-685	635-720
Elongation	%	≥20	≥8	≥5
Hardness	Hv	150-205	180-230	200-240
0.2% Yield Strength	MPa	≥450	≥520	≥590

Bending Properties

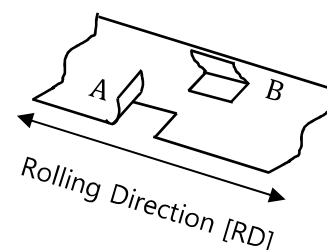
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0	0	0
	Bad way	0	0	1.0
180°	Good way	0.5	1.0	2.0
	Bad way	1.5	2.0	3.5

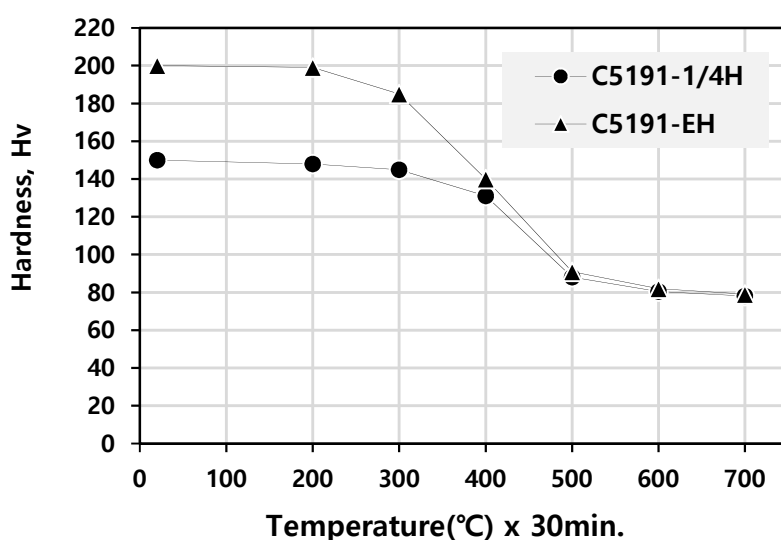
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

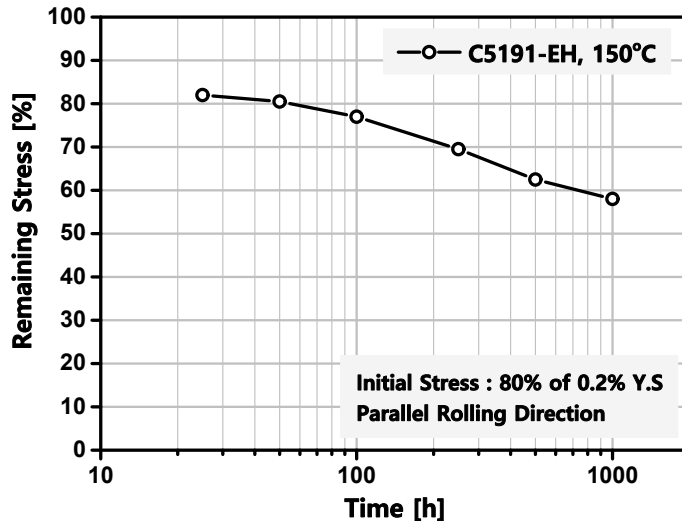


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

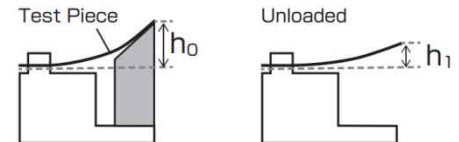


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C5191 has good resistance in seawater and industrial atmosphere. as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Fair
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Poor
Brazing	Excellent		

C5212 Phosphor Bronze (PB3)

UNS No. C52100

Features

C5212 is a hardened copper alloy containing 8% tin. It has high strength and springiness compared with low content bronze. The alloy also has excellent corrosion resistance and can easily be soldered. Applications include electrical components and connectors, springs, bushings and bearings, and electrical and mechanical engineering.

- High strength and high elasticity

Typical Applications

- Connector
- Contact Springs
- Switch
- Slide bearings
- Relay spring

Chemical Composition (wt%)

Cu	Balance
Sn	7.0-9.0
P	0.03-0.35
Zn	≤0.2
Pb	≤0.02
Fe	≤0.1
Cu+Sn+P	≥99.5

Physical Properties

Melting Temperature	°C	1027
Specific Gravity	-	8.8
Thermal Conductivity	W/(m·K)	62
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.2
Modulus of Elasticity	GPa	110
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	13

Mechanical Properties

Temper		O	1/4H	1/2H	H	EH
Tensile Strength	MPa	≥345	390-510	490-610	590-705	≥685
Elongation	%	≥45	≥40	≥30	≥12	≥5
Hardness	Hv	-	100-160	150-205	180-235	≥210
0.2% Yield Strength	MPa	-	320-480	410-530	520-635	≥645

Bending Properties

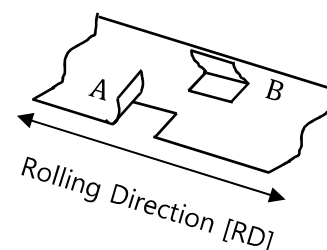
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0.0	0.5	1.0
	Bad way	0.0	1.5	2.5
180°	Good way	0.0	2.0	3.0
	Bad way	0.0	3.0	4.0

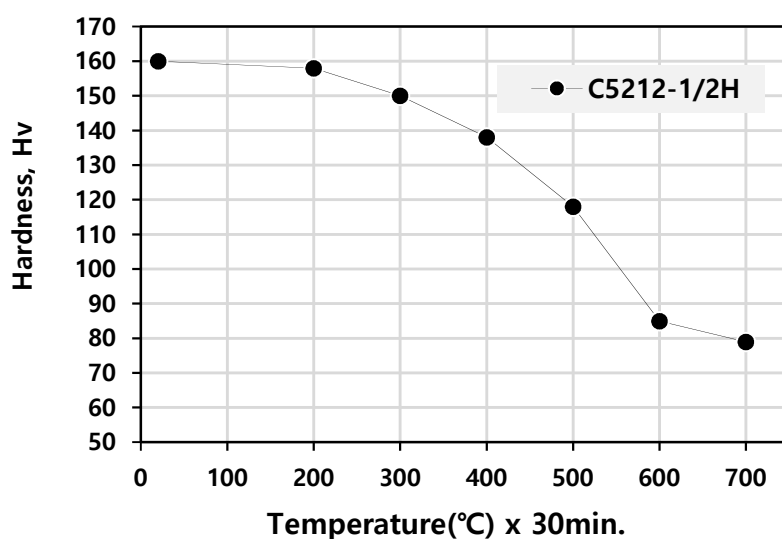
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

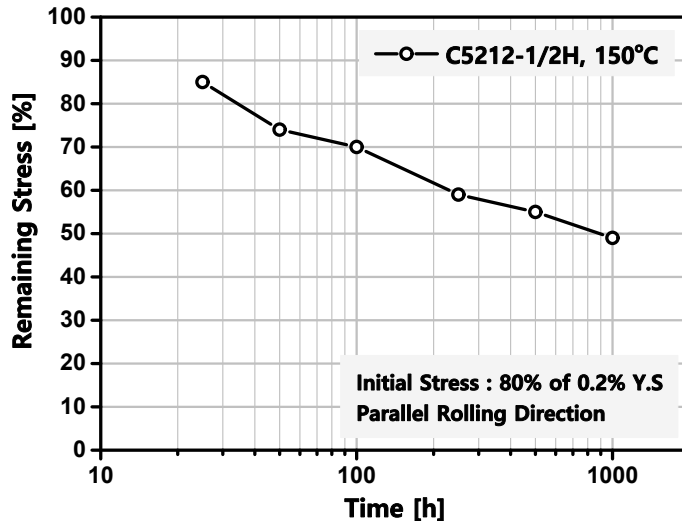


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

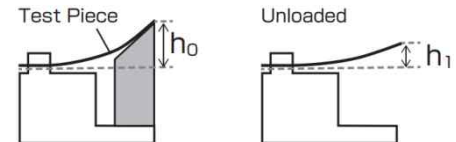


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C5212 is a corrosion-resistant alloy for seawater and has corrosion resistance not only to the general atmosphere but also to marine air, seawater, non-oxidizing acid, alkaline solution and neutral salt solution.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Fair
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Fair
Brazing	Excellent		

C5210 Phosphor Bronze (Spring)

UNS No. C52100

Features

C5210 is a hardened copper alloy containing 8% tin. It has high strength and springiness compared with low content bronze. The alloy also has excellent corrosion resistance and can easily be soldered. Applications include electrical components and connectors, springs, bushings and bearings, and electrical and mechanical engineering.

- High strength and high elasticity

Typical Applications

- Connector
- Automotive switch
- Relay spring

Chemical Composition (wt%)

Cu	Balance
Sn	7.0-9.0
P	0.03-0.35
Zn	≤0.2
Pb	≤0.02
Fe	≤0.1
Cu+Sn+P	≥99.7

Physical Properties

Melting Temperature	°C	1027
Specific Gravity	-	8.8
Thermal Conductivity	W/(m·K)	62
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.2
Modulus of Elasticity	GPa	110
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	13

Mechanical Properties

Temper		1/2H	H	EH	SH	ESH	XSH
Tensile Strength	MPa	470-610	590-705	685-785	735-835	770-885	835-1000
Elongation	%	≥27	≥20	≥11	≥9	≥5	≥1
Hardness	Hv	140-205	185-225	210-260	230-270	245-285	-
0.2% Yield Strength	MPa	390-530	510-625	625-725	700-800	740-855	800-970

Bending Properties

r/t (Minimum Bending Radius / thickness)

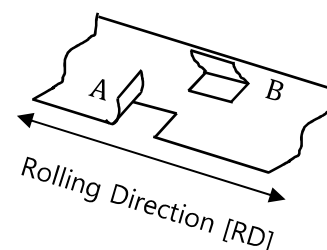
	Temper	H	EH	SH
90°	Good way	0.0	0.0	0.5
	Bad way	0.0	0.5	2.0
180°	Good way	0.0	2.0	3.0
	Bad way	0.0	3.0	4.0

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

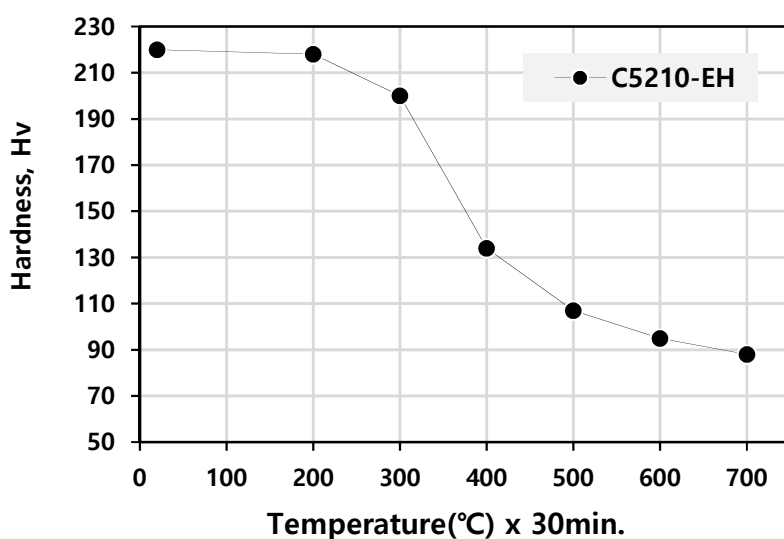
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

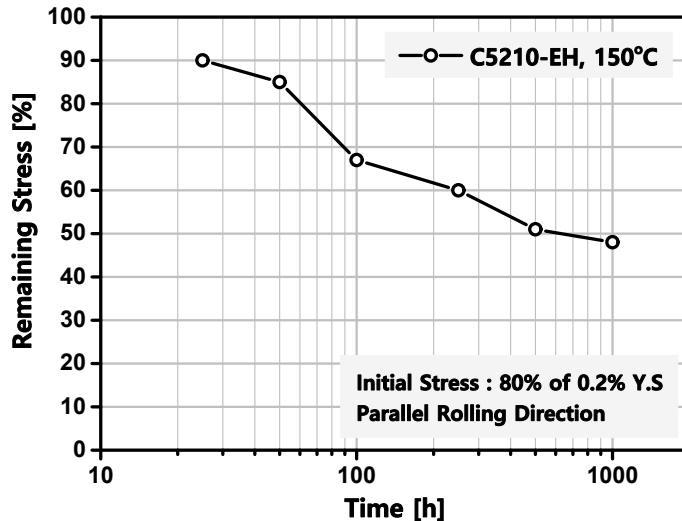


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

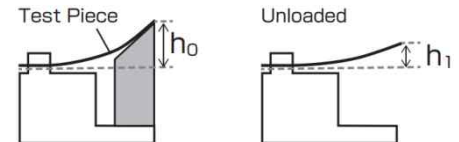


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C5210 is a corrosion-resistant alloy for seawater and has corrosion resistance not only to the general atmosphere but also to marine air, seawater, non-oxidizing acid, alkaline solution and neutral salt solution.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Fair
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Fair
Brazing	Excellent		

C5240 Phosphor Bronze (Super Spring) POONGSAN

UNS No. C52400

Features

C5240 is a hardened copper alloy containing 10% tin. It has high strength and springiness compared with low content bronze. The alloy also has excellent corrosion resistance and can easily be soldered.

- Good Solderability, and plating-ability
- High elasticity

Typical Applications

- Connector
- Spring Contacts
- Spring
- Bushings
- Bearings

Chemical Composition (wt%)

Cu	Balance
Sn	9.0-11.0
P	0.05-0.35
Zn	≤0.2
Pb	≤0.02
Fe	≤0.1

Physical Properties

Melting Temperature	°C	999
Specific Gravity	-	8.78
Thermal Conductivity	W/(m·K)	50
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.4
Modulus of Elasticity	GPa	110
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	11

Mechanical Properties

Temper		H	EH	SH	ESH	XSH
Tensile Strength	MPa	650-750	750-850	850-950	950-1050	1000-1200
Elongation	%	≥11	≥9	≥5	≥1	-
Hardness	Hv	200-240	230-270	250-290	270-310	≥290
0.2% Yield Strength	MPa	580-690	650-790	780-920	900-1030	950-1190

C5240 Phosphor Bronze (Super Spring) **PONGSAN**

Bending Properties

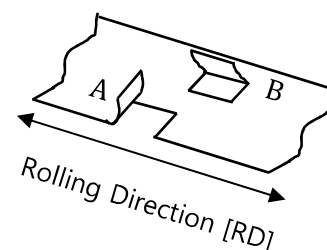
r/t (Minimum Bending Radius / thickness)

	Temper	H	EH	SH
90°	Good way	0.0	0.0	1.0
	Bad way	0.0	1.0	3.0
180°	Good way	1.0	2.0	-
	Bad way	2.0	3.0	-

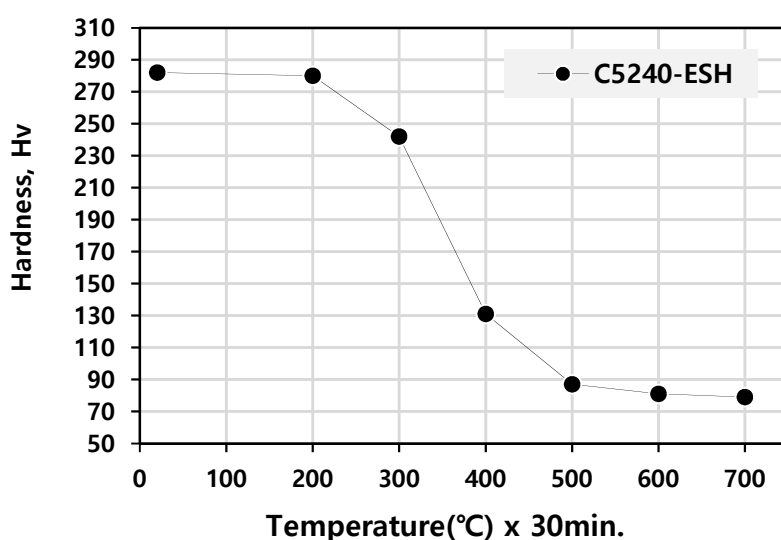
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)



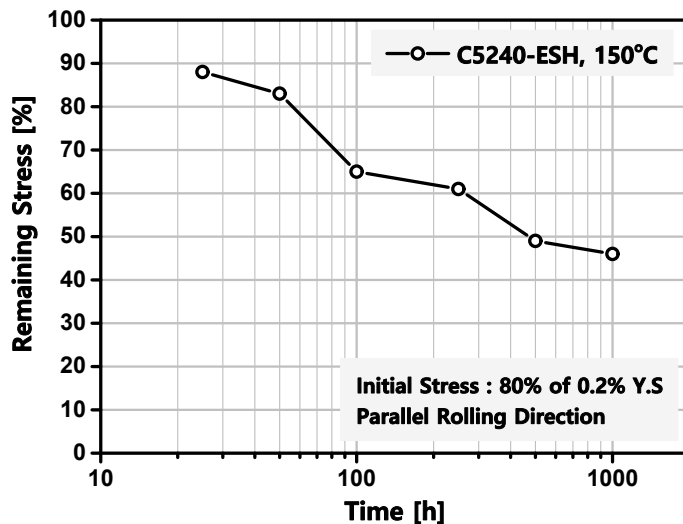
Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

C5240 Phosphor Bronze (Super Spring) POONGSAN

Stress Relaxation Resistance

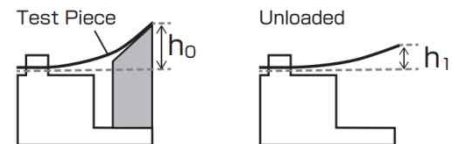


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C5240 is a corrosion-resistant alloy for seawater and has corrosion resistance not only to the general atmosphere but also to marine air, seawater, non-oxidizing acid, alkaline solution and neutral salt solution.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Fair
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Fair
Brazing	Excellent		

C7351 Nickel Silver (NS1)

UNS No. C73500

Features

Nickel Silver is the generic name for any of the range of bright metal alloys composed of copper, nickel, and zinc. Nickel Silver alloys, sometimes called German Silver, derive their name from their bright silvery appearance although they contain no real silver. Nickel silver is an ideal alloy in the use of printed circuit board shielding due to its electrical conductivity and excellent solderability.

Typical Applications

- Electromagnetic shielding
- Electric contacts
- Contact springs
- Deep drawing parts
- Leaf spring for relays
- connector
- Coins
- Security keys

Chemical Composition (wt%)

Cu	70-75
Zn	Balance
Ni	16.5-19.5
Fe	≤0.25
Mn	0-0.5
Pb	≤0.03

Physical Properties

Melting Temperature	°C	1135
Specific Gravity	-	8.8
Thermal Conductivity	W/(m·K)	36
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16
Modulus of Elasticity	GPa	124
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	6.5

Mechanical Properties

Temper		O	1/2H
Tensile Strength	MPa	≥325	390-510
Elongation	%	≥20	≥5
Hardness	Hv	-	105-155
0.2% Yield Strength	MPa	-	-

Bending Properties

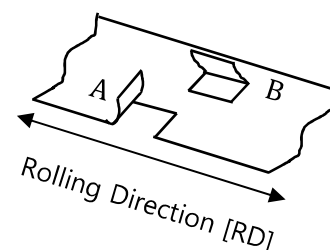
r/t (Minimum Bending Radius / thickness)

	Temper	O	1/2H
90°	Good way	0.0	0.5
	Bad way	0.0	0.5
180°	Good way	0.0	1.0
	Bad way	0.0	1.0

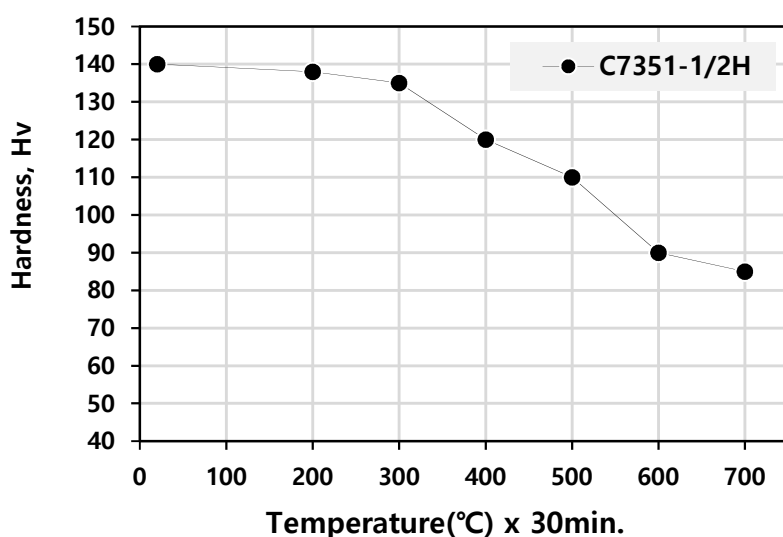
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

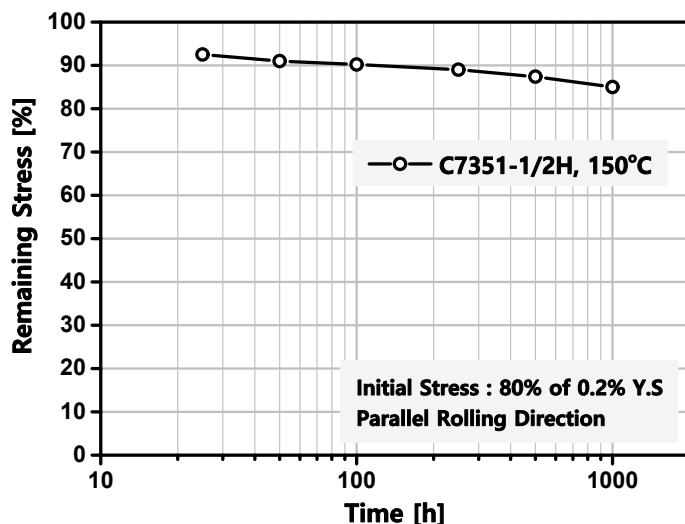


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

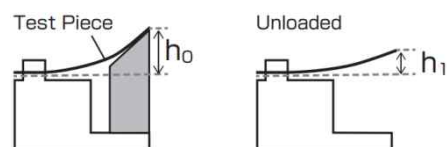


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C7351 has good resistance to atmospheric influences, organic compound, neutral and alkaline saline solutions, but weak to oxidizing acids and hydrous ammonia.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Nor Recommended
Brazing	Excellent		

C7451 Nickel Silver (NS2)

UNS No. C74500

Features

Nickel Silver is the generic name for any of the range of bright metal alloys composed of copper, nickel, and zinc. Nickel Silver alloys, sometimes called German Silver, derive their name from their bright silvery appearance although they contain no real silver. Nickel silver is an ideal alloy in the use of printed circuit board shielding due to its electrical conductivity and excellent solderability.

Typical Applications

- Electromagnetic shielding
- Deep drawing parts
- Coins
- Electric contacts
- Leaf spring for relays
- Security keys
- Contact springs
- connector

Chemical Composition (wt%)

Cu	63-67
Zn	Balance
Ni	8.5-11.0
Fe	≤0.25
Mn	0-0.5
Pb	≤0.03

Physical Properties

Melting Temperature	°C	1021
Specific Gravity	-	8.69
Thermal Conductivity	W/(m·K)	45
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16.4
Modulus of Elasticity	GPa	121
Poisson's Ratio	-	0.34
Electrical Conductivity	%IACS	9

Mechanical Properties

Temper		O	1/2H
Tensile Strength	MPa	≥325	390-510
Elongation	%	≥20	≥5
Hardness	Hv	-	105-155
0.2% Yield Strength	MPa	-	-

Bending Properties

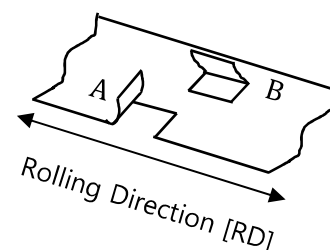
r/t (Minimum Bending Radius / thickness)

	Temper	O	1/2H
90°	Good way	0.0	0.5
	Bad way	0.0	0.5
180°	Good way	0.0	1.0
	Bad way	0.0	1.0

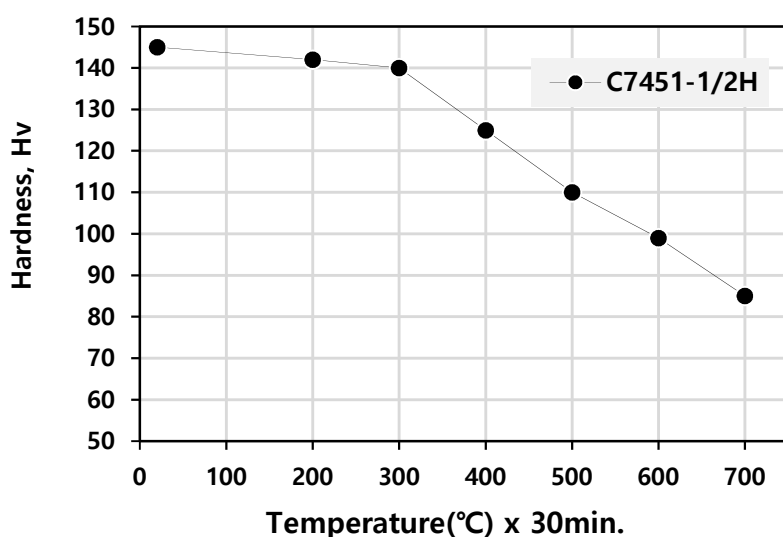
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

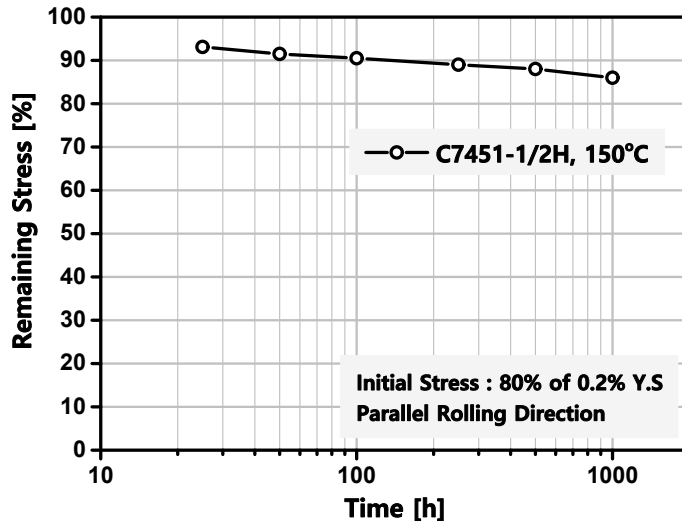


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

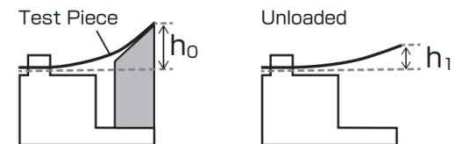


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C7451 has good resistance to atmospheric influences, organic compound, neutral and alkaline saline solutions, but weak to oxidizing acids and hydrous ammonia.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Nor Recommended
Brazing	Excellent		

C7521 Nickel Silver (NS3)

UNS No. C75200

Features

Nickel Silver is the generic name for any of the range of bright metal alloys composed of copper, nickel, and zinc. Nickel Silver alloys, sometimes called German Silver, derive their name from their bright silvery appearance although they contain no real silver. Nickel silver is an ideal alloy in the use of printed circuit board shielding due to its electrical conductivity and excellent solderability.

Typical Applications

- Electromagnetic shielding
- Deep drawing parts
- Coins
- Electric contacts
- Leaf spring for relays
- Security keys
- Contact springs
- connector

Chemical Composition (wt%)

Cu	62.0-66.0
Zn	Balance
Ni	16.5-19.5
Fe	≤0.25
Mn	0-0.5
Pb	≤0.03

Physical Properties

Melting Temperature	°C	1071
Specific Gravity	-	8.73
Thermal Conductivity	W/(m·K)	33
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16.2
Modulus of Elasticity	GPa	124
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	6

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	400-495	455-550	510-595
Elongation	%	≥ 24	≥ 14	≥ 8
Hardness	Hv	130-160	150-180	170-210
0.2% Yield Strength	MPa	≥ 180	≥ 330	≥ 475

Bending Properties

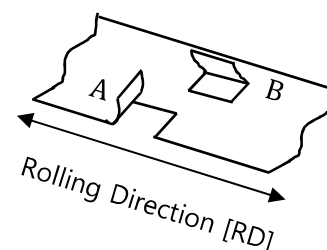
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	1/2H	H
90°	Good way	0.0	0.5	1.0
	Bad way	0.0	0.5	1.0
180°	Good way	0.0	1.0	2.0
	Bad way	0.0	1.0	2.0

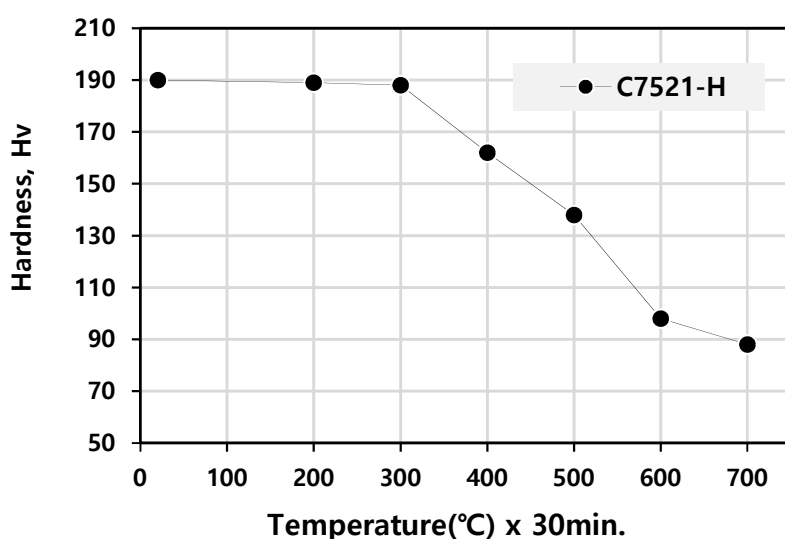
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

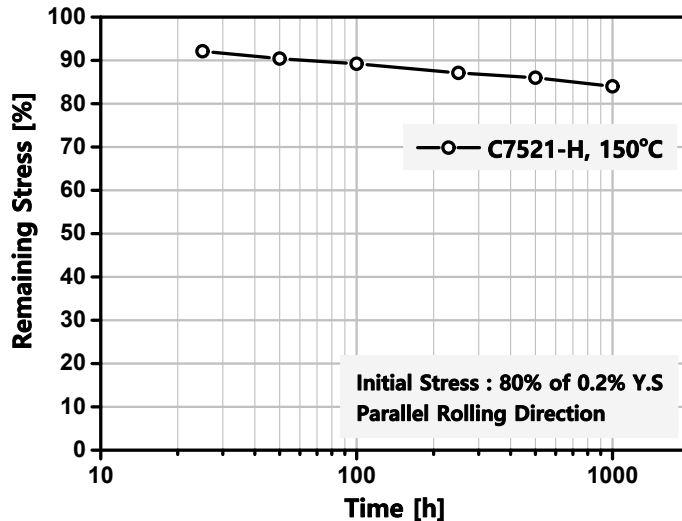


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

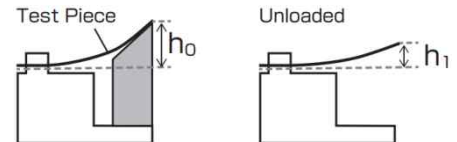


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C7521 has good resistance to atmospheric influences, organic compound, neutral and alkaline saline solutions, but weak to oxidizing acids and hydrous ammonia.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Nor Recommended
Brazing	Excellent		

C7701 Nickel Silver (Spring)

UNS No. C77000

Features

Nickel Silver is the generic name for any of the range of bright metal alloys composed of copper, nickel, and zinc. Nickel Silver alloys, sometimes called German Silver, derive their name from their bright silvery appearance although they contain no real silver. Nickel silver is an ideal alloy in the use of printed circuit board shielding due to its electrical conductivity and excellent solderability.

Typical Applications

- Electromagnetic shielding
- Deep drawing parts
- Coins
- Electric contacts
- Leaf spring for relays
- Security keys
- Contact springs
- connector

Chemical Composition (wt%)

Cu	54.0-58.0
Zn	Balance
Ni	16.5-19.5
Fe	≤ 0.25
Mn	0-0.5
Pb	≤0.03

Physical Properties

Melting Temperature	°C	1043
Specific Gravity	-	8.70
Thermal Conductivity	W/(m·K)	32
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16.7
Modulus of Elasticity	GPa	124
Poisson's Ratio	-	0.34
Electrical Conductivity	%IACS	5.5

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	470-540	540-630	600-700
Elongation	%	≥ 11	≥ 5	≥ 2
Hardness	Hv	135-180	170-200	190-220
0.2% Yield Strength	MPa	≥ 280	≥ 450	≥ 550

Bending Properties

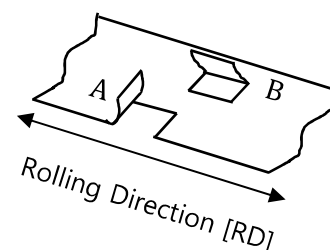
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	1/2H	H
90°	Good way	0.0	1.0	1.5
	Bad way	0.0	1.0	1.5
180°	Good way	0.5	1.5	2.0
	Bad way	0.5	1.5	2.0

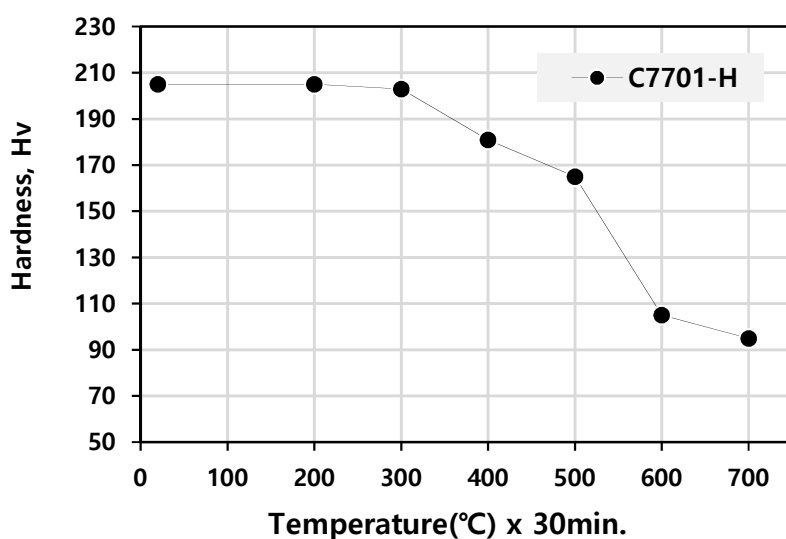
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

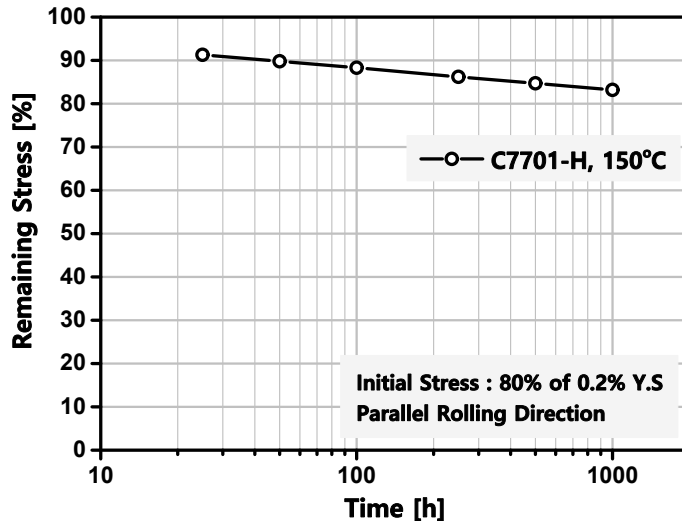


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

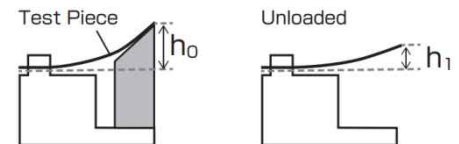


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

C7701 has good resistance to atmospheric influences, organic compound, neutral and alkaline saline solutions, but weak to oxidizing acids and hydrous ammonia.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Good	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Poor	Gas Shielded Arc Welding	Fair
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

Features

Nickel Silver is the generic name for any of the range of bright metal alloys composed of copper, nickel, and zinc. Nickel Silver alloys, sometimes called German Silver, derive their name from their bright silvery appearance although they contain no real silver. Nickel silver is an ideal alloy in the use of printed circuit board shielding due to its electrical conductivity and excellent solderability.

Typical Applications

- Security keys
- Coins
- Contact springs
- Electric contacts
- Leaf spring for relays

Chemical Composition (wt%)

Cu	Balance
Zn	35.0-39.0
Ni	9.0-13.0
Mn	0.20-0.40
Fe	≤0.30
Pb	≤0.02

Physical Properties

Melting Temperature	°C	980
Specific Gravity	-	8.54
Thermal Conductivity	W/(m·K)	38
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.1
Modulus of Elasticity	GPa	138
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	7

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	480-550	550-640	600-700
Elongation	%	≥ 28	≥ 18	≥ 8
Hardness	Hv	135-185	170-200	190-210
0.2% Yield Strength	MPa	≥ 280	≥ 450	≥ 550

Bending Properties

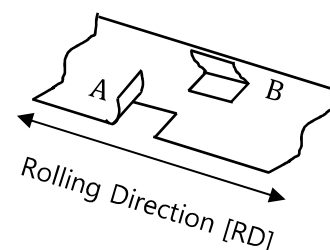
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	1/2H	H
90°	Good way	0	0.5	1.0
	Bad way	0	0.5	1.0
180°	Good way	-	-	-
	Bad way	-	-	-

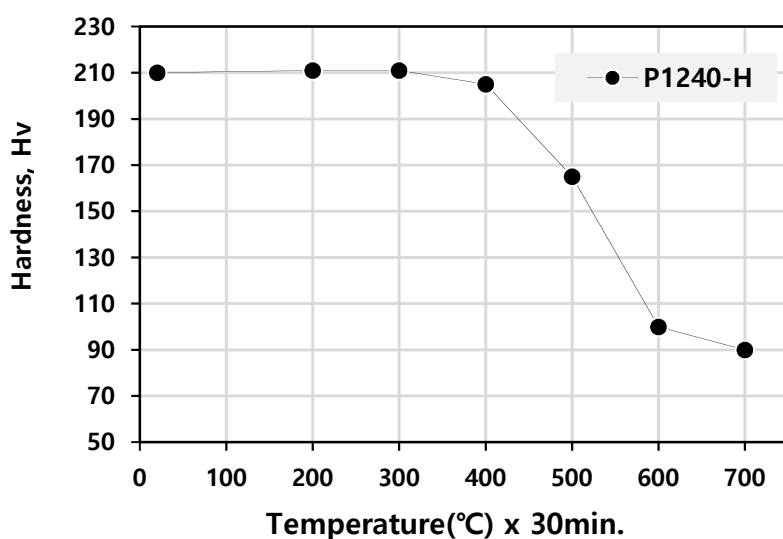
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

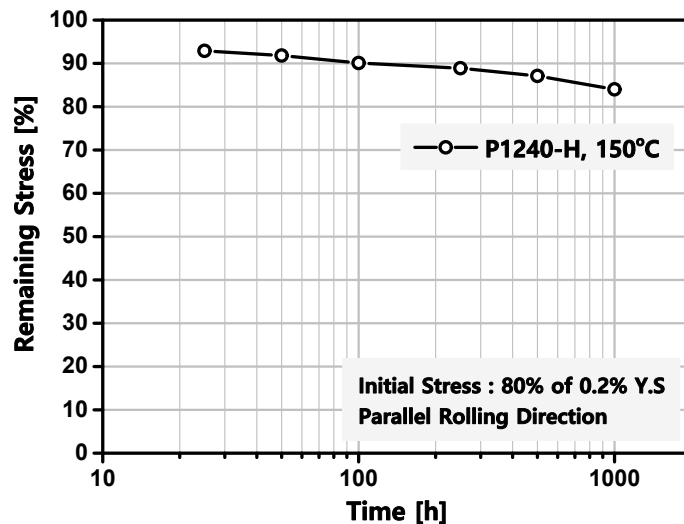


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

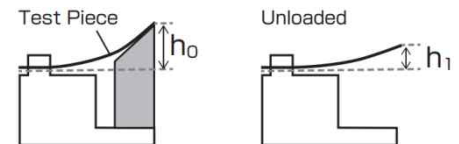


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P1240 has good resistance to atmospheric influences, organic compound, neutral and alkaline saline solutions, but weak to oxidizing acids and hydrous ammonia.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

UNS No. C14410

Features

The P144C is an alloy with excellent electrical conductivity, excellent strength and corrosion resistance by adding a small amount of Sn and P

- Excellent electrical conductivity of 85%IACS
- Good strength and corrosion resistance

Typical Applications

- Lead Frame
- Connector
- Relay
- Switches and Relays
- Terminals

Chemical Composition (wt%)

Cu	Balance
Sn	0.1-0.2
P	0.005-0.02

Physical Properties

Melting Temperature	°C	1083
Specific Gravity	-	8.9
Thermal Conductivity	W/(m·K)	360
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.3
Modulus of Elasticity	GPa	118
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	85

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	245-345	275-400	345-440
Elongation	%	≥10	≥2	-
Hardness	Hv	60-120	90-125	100-135
0.2% Yield Strength	MPa	200-315	235-360	305-400

Bending Properties

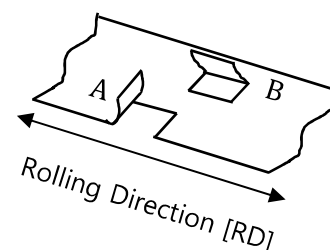
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0	0	1
	Bad way	0	0	1.0
180°	Good way	0	0.5	2
	Bad way	0	1	2

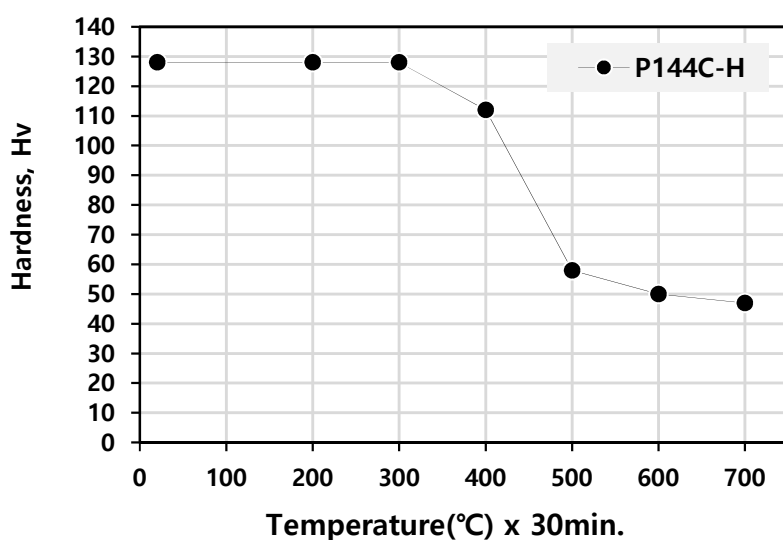
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

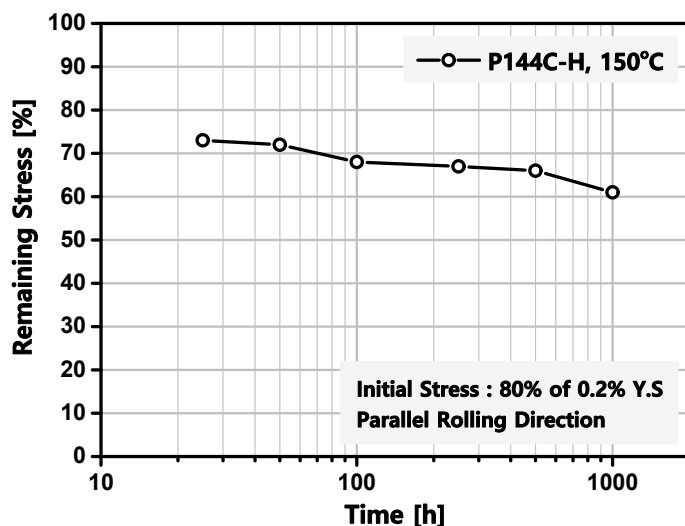


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

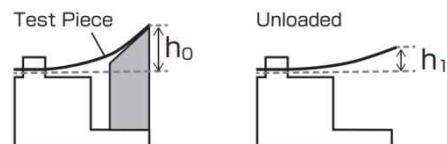


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P144C has good resistance in natural and industrial atmosphere.

as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Good	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Good
Brazing	Excellent		

UNS No. C18060

Features

P1806 is a CuCrCoSi alloy that can be hardened by cold forming and by precipitation.

This alloy provides a good balance of high electrical conductivity and good strength

- Good electrical conductivity and strength
- High thermal softening resistance

Typical Applications

- Lead frame
- Automotive switch
- Relay spring
- Connector
- Shield can

Chemical Composition (wt%)

Cu	Balance
Cr	0.20-0.40
Co	0.01-0.15
Si	0.01-0.15
Sn	≤ 0.10

Physical Properties

Melting Temperature	°C	1081
Specific Gravity	-	8.9
Thermal Conductivity	W/(m·K)	310
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16.9
Modulus of Elasticity	GPa	133
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	80

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	430-520	500-570	540-600
Elongation	%	≥4	≥2	≥2
Hardness	Hv	110-160	130-180	≥150
0.2% Yield Strength	MPa	340-500	400-540	480-580

Bending Properties

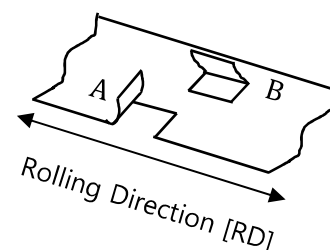
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0.0	0.5	1.0
	Bad way	0.5	1.0	1.5
180°	Good way	0.5	1.0	1.5
	Bad way	1.0	2.0	3.0

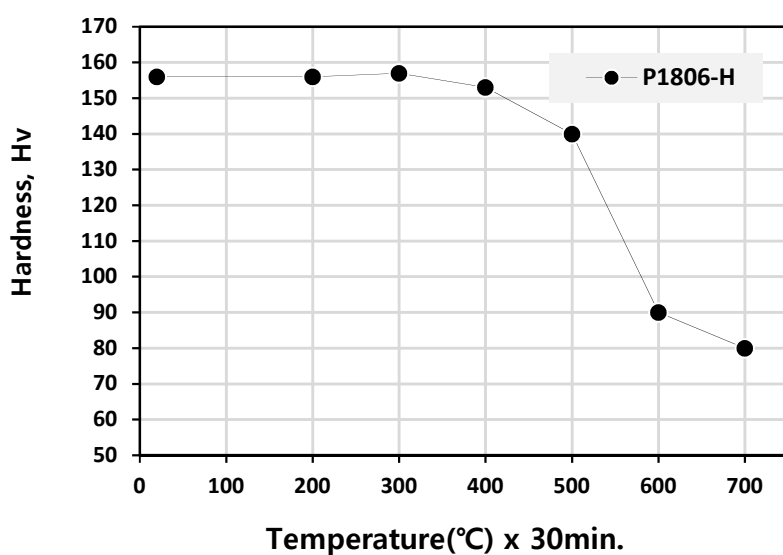
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

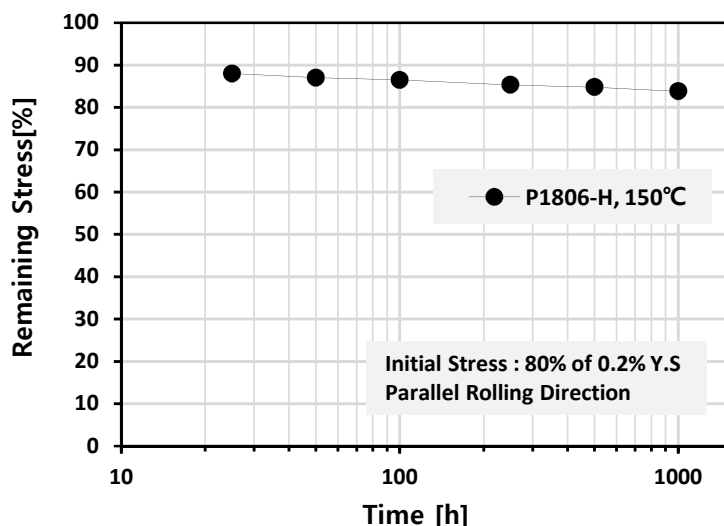


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

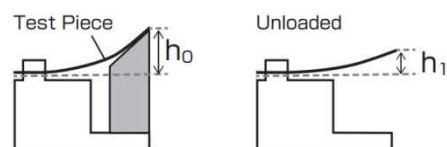


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P1806 has good resistance in natural and industrial atmosphere.

as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Not Recommended
Soldering	Good	Coated Metal Arc Welding	Excellent
Brazing	Good		

UNS No. C19015

Features

P102M is a typical precipitation-hardening type of copper alloy which incorporates an optimum mix of other elements such as Ni, Si, Mg and P. It has excellent mechanical properties and electrical conductivity.

- High strength and good conductivity
- High Thermal Softening Resistance

Typical Applications

- Connector
- Automotive switch
- Relay spring
- Lead frame
- Shield can

Chemical Composition (wt%)

Cu	Balance
Ni	0.8-1.8
Si	0.15-0.35
P	0.01-0.05
Mg	0.02-0.15

Physical Properties

Melting Temperature	°C	1062
Specific Gravity	-	8.91
Thermal Conductivity	W/(m·K)	258
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16.9
Modulus of Elasticity	GPa	128
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	50

Mechanical Properties

Temper		1/2H	H	EH	SH
Tensile Strength	MPa	430-490	490-560	540-620	≥610
Elongation	%	≥10	≥8	≥6	≥5
Hardness	Hv	125-150	135-180	150-190	≥160
0.2% Yield Strength	MPa	360	400	470	520

Bending Properties

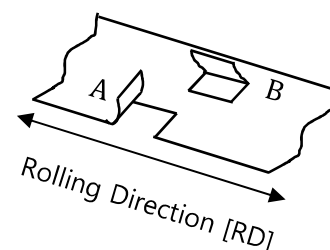
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH	SH
90°	Good way	0.0	0.5	0.5	1.0
	Bad way	0.5	0.5	1.0	1.5
180°	Good way	0.5	1.5	1.5	2.0
	Bad way	1.0	2.0	2.5	3.0

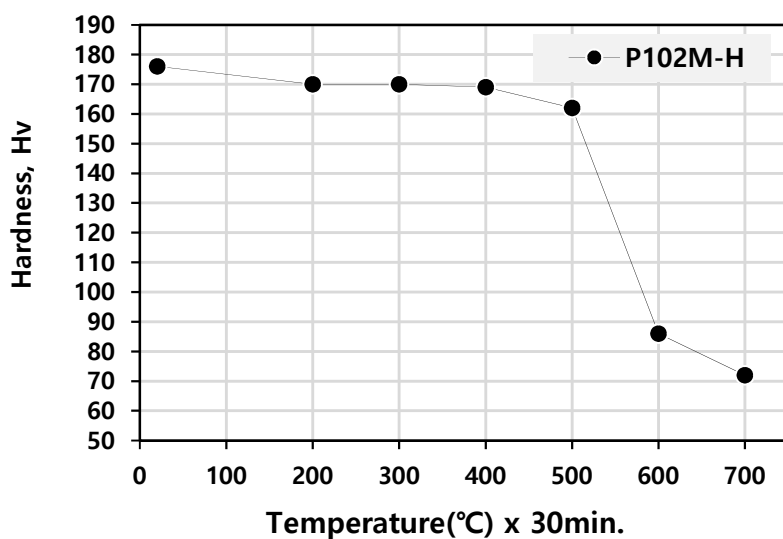
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

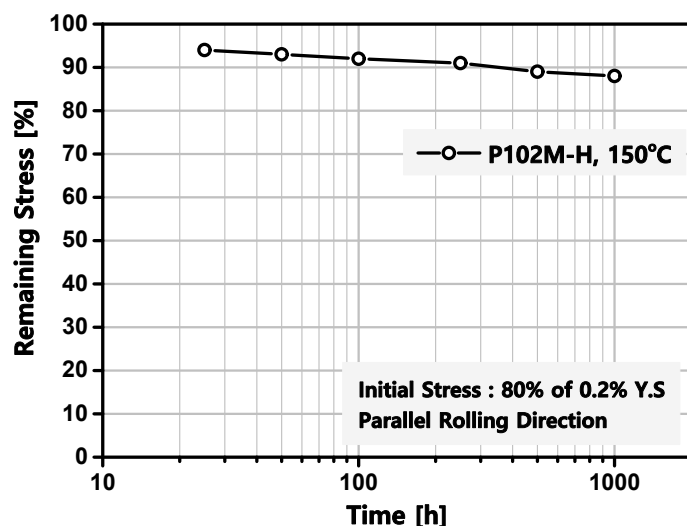


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

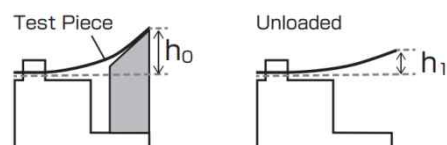


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P102M has good resistance in natural and industrial atmosphere.

as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Good	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Good
Soldering	Good	Coated Metal Arc Welding	Fair
Brazing	Good		

UNS No. C19210

Features

P90 has small amount of iron and phosphorus in copper and is hardened by Fe_2P precipitates in copper matrix. It has a very high conductivity combined with excellent cold forming properties. Softening resistance of low strength tempers is good.

Typical Applications

- IC Lead Frame
- Air Conditioning Tubing
- Transistor
- Bus Bar
- Heat Sink
- Cooling Fins for Radiators
- Heat Spreader

Chemical Composition (wt%)

Cu	Balance
Fe	0.05-0.15
P	0.025-0.04
other	≤0.5

Physical Properties

Melting Temperature	°C	1082
Specific Gravity	-	8.9
Thermal Conductivity	W/(m·K)	350
Coefficient of Thermal Expansion	$10^{-6}/\text{K}$	16.9
Modulus of Elasticity	GPa	125
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	85

Mechanical Properties

Temper		1/4H	1/2H	H
Tensile Strength	MPa	295-370	350-430	390-440
Elongation	%	≥15	≥6	≥4
Hardness	Hv	85-110	100-125	120-140
0.2% Yield Strength	MPa	≥260	≥300	≥350

Bending Properties

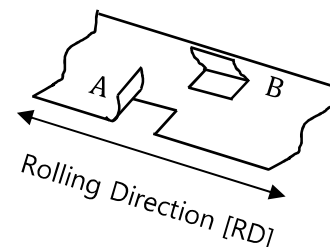
r/t (Minimum Bending Radius / thickness)

	Temper	1/4H	1/2H	H
90°	Good way	0.0	0.0	0.5
	Bad way	0.0	0.0	1.0
180°	Good way	0.0	0.0	1.0
	Bad way	0.0	0.5	1.5

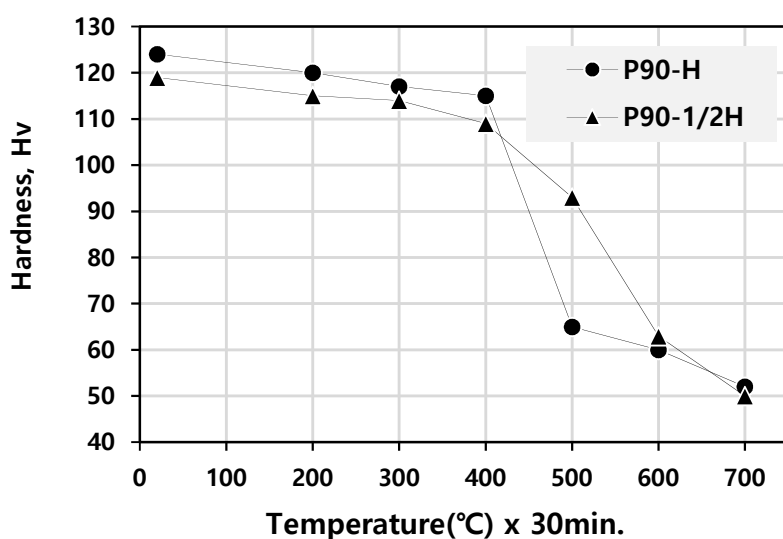
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

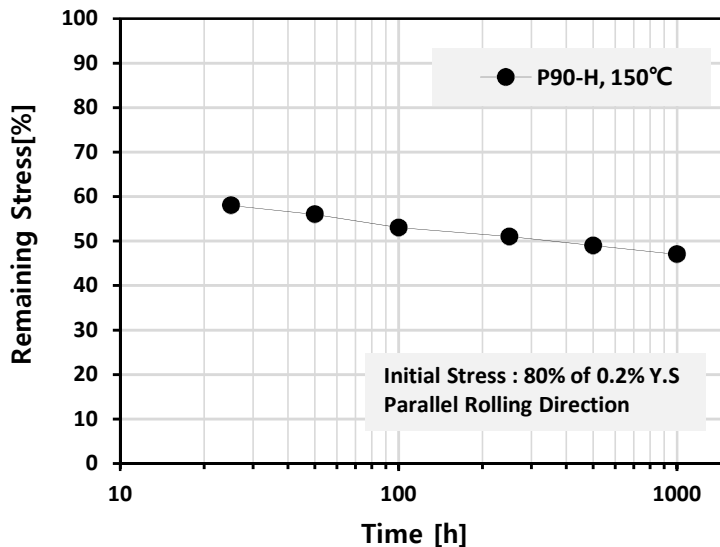


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

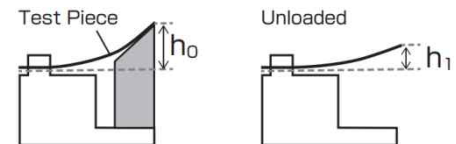


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P90 has good resistance to corrosion in industrial and marine atmospheres.

It is insensitive to stress corrosion cracking. However, it is susceptible to attack in the presence of ammonia, sulphur, hydrogen sulphide and mercury.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Not Recommended
Soldering	Excellent	Coated Metal Arc Welding	Excellent
Brazing	Excellent		

UNS No. C19217

Features

P90Hyper has small amount of iron, phosphorus and manganese in copper and is hardened by $(\text{Fe,Mn})_2\text{P}$ precipitates in copper matrix. It has a very high conductivity combined with excellent cold forming properties. Softening resistance of low strength tempers is good. P90Hyper has higher strength than P90.

Typical Applications

- IC Lead Frame
- Discrete TR
- Cu-Clip
- Connector
- Display Panel
- Sensor
- Transistor

Chemical Composition (wt%)

Cu	Balance
Fe	0.09-0.15
P	0.05-0.07
Mn	0.08-0.14

Physical Properties

Melting Temperature	°C	1082
Specific Gravity	-	8.9
Thermal Conductivity	W/(m·K)	330
Coefficient of Thermal Expansion	$10^{-6}/\text{K}$	16.9
Modulus of Elasticity	GPa	125
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	85

Mechanical Properties

Temper		H	SH
Tensile Strength	MPa	400-480	470-560
Elongation	%	≥4	≥2
Hardness	Hv	120-145	140-160
0.2% Yield Strength	MPa	≥350	≥400

Bending Properties

r/t (Minimum Bending Radius / thickness)

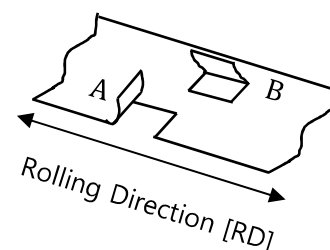
	Temper	H	SH
90°	Good way	0.0	0.0
	Bad way	0.0	0.5
180°	Good way	0.5	1.0
	Bad way	1.0	1.5

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

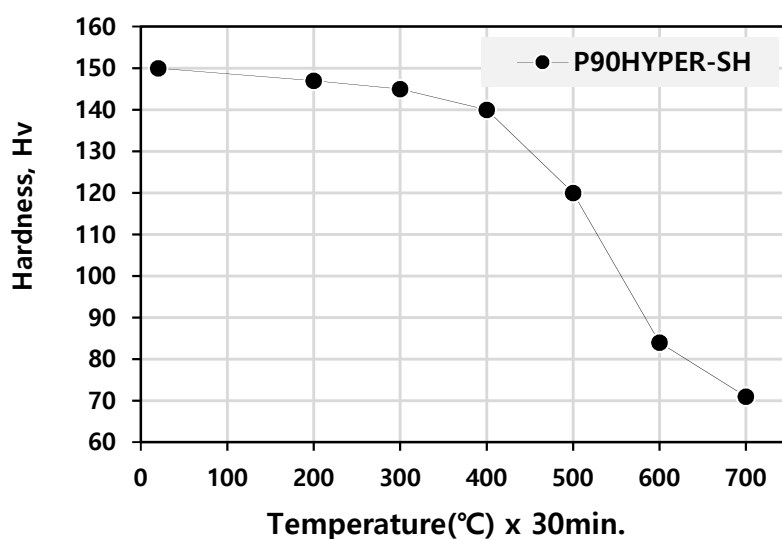
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

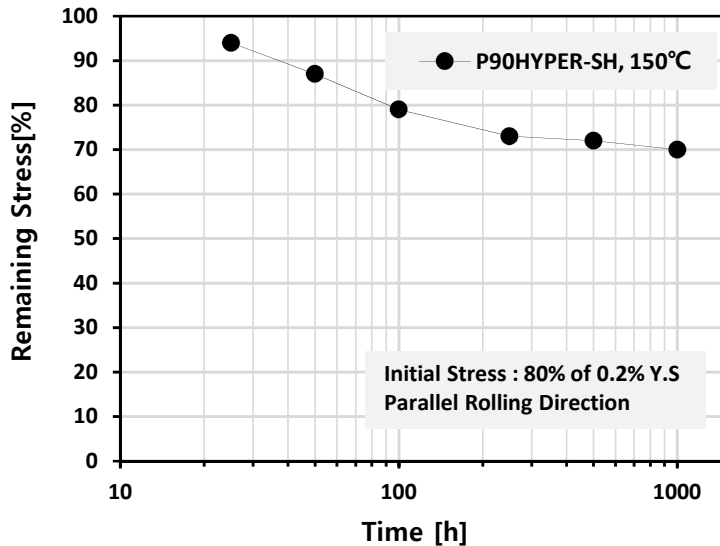


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

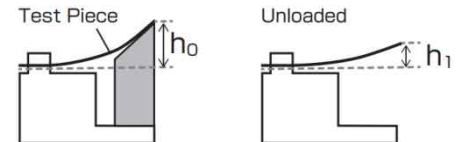


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P90Hyper has good resistance to corrosion in industrial and marine atmospheres.

It is insensitive to stress corrosion cracking. However, it is susceptible to attack in the presence of ammonia, sulphur, hydrogen sulphide and mercury.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Not Recommended
Soldering	Excellent	Coated Metal Arc Welding	Excellent
Brazing	Excellent		

UNS No. C19400

Features

P194 is a medium strength alloy, with fine Fe precipitations. It combines high conductivity with medium strength, heat resistance and good relaxation properties.

- High Strength and good electrical, thermal conductivity
- Good Solderability

Typical Applications

- Lead frames
- Automotive Connectors
- Contact Spring
- Electrical Connectors
- Shield can

Chemical Composition (wt%)

Cu	Balance
Fe	2.1-2.6
Zn	0.05-0.20
P	0.015-0.15
Pb	≤0.03

Physical Properties

Melting Temperature	°C	1088
Specific Gravity	-	8.91
Thermal Conductivity	W/(m·K)	260
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.6
Modulus of Elasticity	GPa	121
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	65

Mechanical Properties

Temper		1/2H	H	SH	ESH	ESH*
Tensile Strength	MPa	360-430	410-480	480-520	500-550	530-570
Elongation	%	≥6	≥4	≥4	-	≥4
Hardness	Hv	115-135	125-145	140-160	145-165	150-170
0.2% Yield Strength	MPa	≥270	≥360	≥420	≥440	≥470

* Heat treatment use

Bending Properties

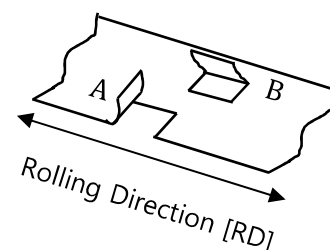
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	SH	ESH
90°	Good way	0.0	0.5	1.0	2.0
	Bad way	0.0	1.0	2.0	3.0
180°	Good way	0.0	1.0	2.0	3.0
	Bad way	0.5	1.5	3.0	4.0

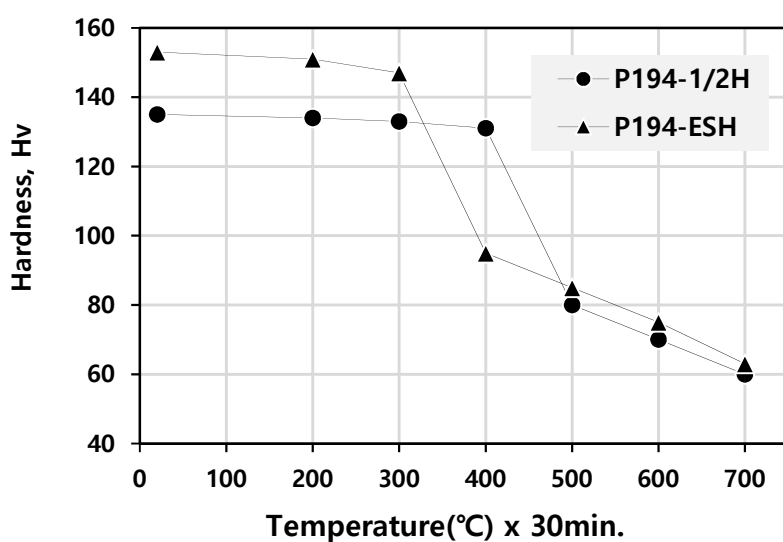
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

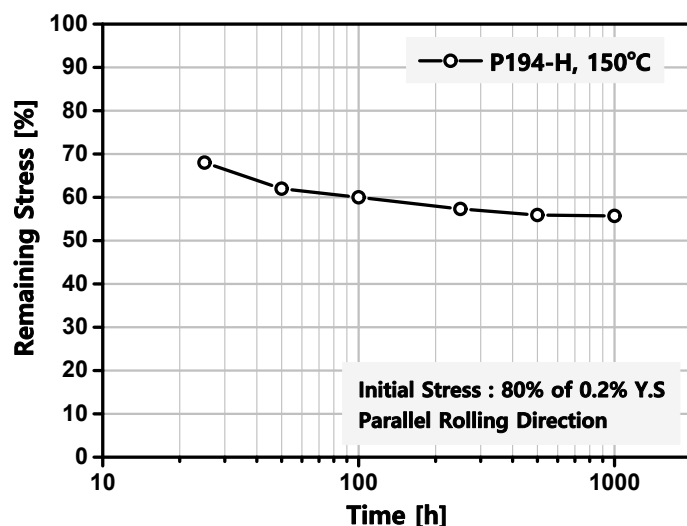


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

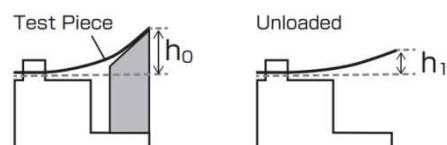


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P194 has good resistance in natural and industrial atmosphere.
as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Excellent
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

UNS No. C19400

Features

P194HSL has higher strength than P194. It combines high conductivity with medium strength, heat resistance and good relaxation properties.

- High Strength and good electrical, thermal conductivity
- Good Softening Resistance

Typical Applications

- Lead frames
- Automotive Connectors
- LED frame
- Electrical Connectors
- Shield can

Chemical Composition (wt%)

Cu	Balance
Fe	2.1-2.6
Zn	0.05-0.20
P	0.015-0.15
Pb	≤0.03

Physical Properties

Melting Temperature	°C	1088
Specific Gravity	-	8.97
Thermal Conductivity	W/(m·K)	259
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.6
Modulus of Elasticity	GPa	121
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	55

Mechanical Properties

Temper		ESH
Tensile Strength	MPa	560-640
Elongation	%	≥4
Hardness	Hv	155-180
0.2% Yield Strength	MPa	≥440

Bending Properties

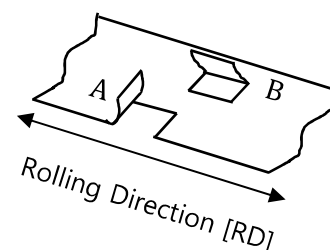
r/t (Minimum Bending Radius / thickness)

	Temper	ESH
90°	Good way	2.0
	Bad way	3.0
180°	Good way	3.0
	Bad way	4.0

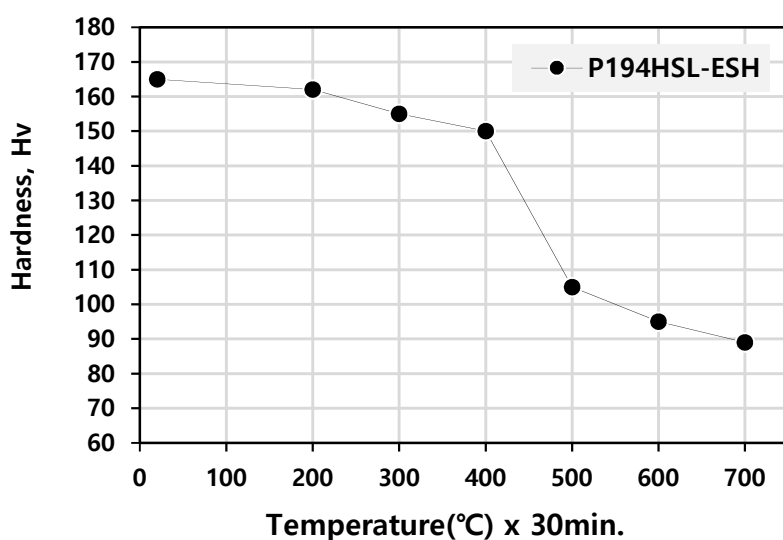
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

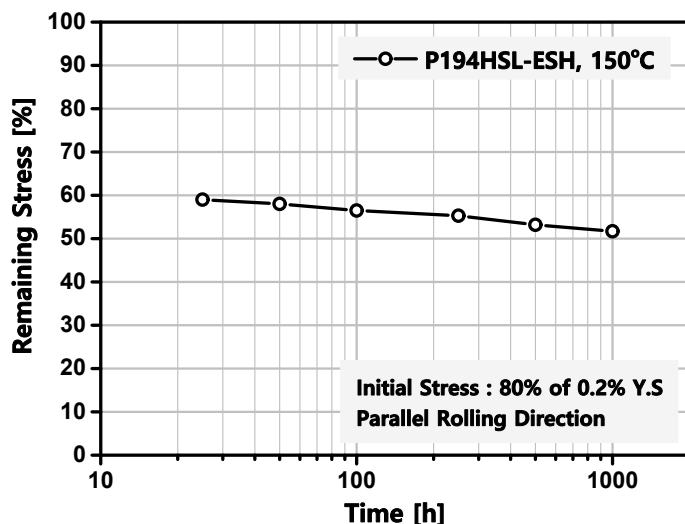


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

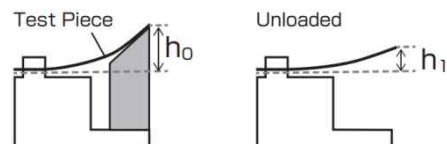


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P194HSL has good resistance in natural and industrial atmosphere.

as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Excellent
Soldering	Excellent	Coated Metal Arc Welding	Not Recommended
Brazing	Excellent		

UNS No. C42500

Features

P425 is a dispersion and solid solution strengthening alloy with mid-strength and mid-conductivity characteristics developed for use in electronic parts and automobile connector.

- Good cold forming properties
- Good conductivity combined with high strength and hardness
- Corrosion resistance, especially against seawater and industrial atmosphere

Typical Applications

- Automotive : Switches and Relays, Contacts, Connectors, Terminals, Junction box
- Electrical : Switches and Relays, Contacts, Connectors, Terminals

Chemical Composition (wt%)

Cu	87-90
Zn	Balance
Sn	1.5-3.0
P	≤0.35

Physical Properties

Melting Temperature	°C	1030
Specific Gravity	-	8.78
Thermal Conductivity	W/(m·K)	120
Coefficient of Thermal Expansion	10 ⁻⁶ /K	18.4
Modulus of Elasticity	GPa	110
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	28

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	390-480	480-570	≥520
Elongation	%	≥15	-	-
Hardness	Hv	110-170	140-200	≥150
0.2% Yield Strength	MPa	≥200	≥400	≥440

Bending Properties

r/t (Minimum Bending Radius / thickness)

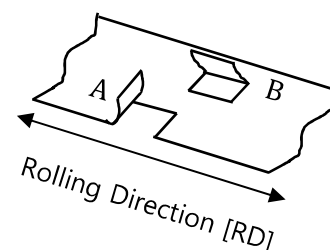
	Temper	1/2H	H	EH
90°	Good way	0.0	0.0	0.0
	Bad way	0.0	0.5	1.0
180°	Good way	1.0	1.5	2.0
	Bad way	1.5	2.0	2.5

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

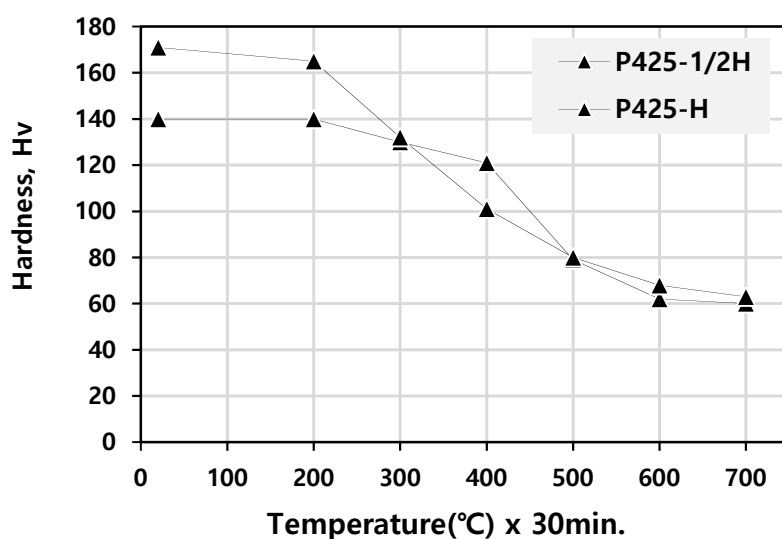
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

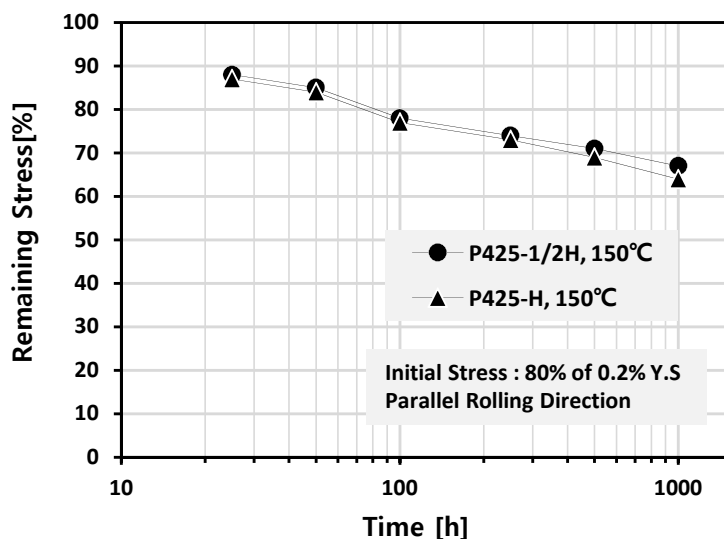


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

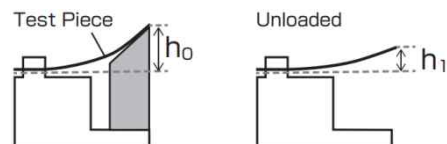


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P425 is resistant to industrial and drinking water, aqueous and alkaline solutions (not oxidizing), pure water vapor (steam), non oxidizing acids (without oxygen in solution) and salts, neutral saline solutions. Stress corrosion cracking susceptibility is low.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent
Capacity for Being Hot Formed	Less suitable
Soldering	Excellent
Brazing	Excellent

Oxyacetylene Welding	Good
Gas Shielded Arc Welding	Excellent
Coated Metal Arc Welding	Not suitable

UNS No. C64750

Features

P26 are precipitation hardening alloys that form Ni₂Si intermetallic compounds to form required properties.

- High strength and good conductivity.
- High Thermal Resistance
- Good Formability and High Bend-Fatigue Resistance, Reliability and Stability

Typical Applications

- Switches and Relays
- Electronic sockets
- Press fit
- Wire-to-wire connector
- Automobile switch
- Terminals
- Pitch/small connector
- Relay spring

Chemical Composition (wt%)

Cu	Balance
Ni	1.0-3.0
Si	0.1-0.7
Sn	0.05-0.8

Physical Properties

Melting Temperature	°C	1078
Specific Gravity	-	8.91
Thermal Conductivity	W/(m·K)	184
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16.4
Modulus of Elasticity	GPa	135
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	45

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	451-588	588-657	≥657
Elongation	%	≥8	≥8	≥3
Hardness	Hv	135-180	175-200	≥200
0.2% Yield Strength	MPa	410-548	540-617	≥617

Bending Properties

r/t (Minimum Bending Radius / thickness)

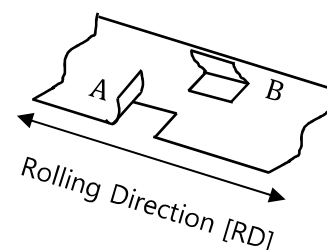
	Temper	1/2H	H	EH
90°	Good way	0	0	0
	Bad way	0	0	0.5
180°	Good way	0	0.5	1.0
	Bad way	0	0.5	1.0

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

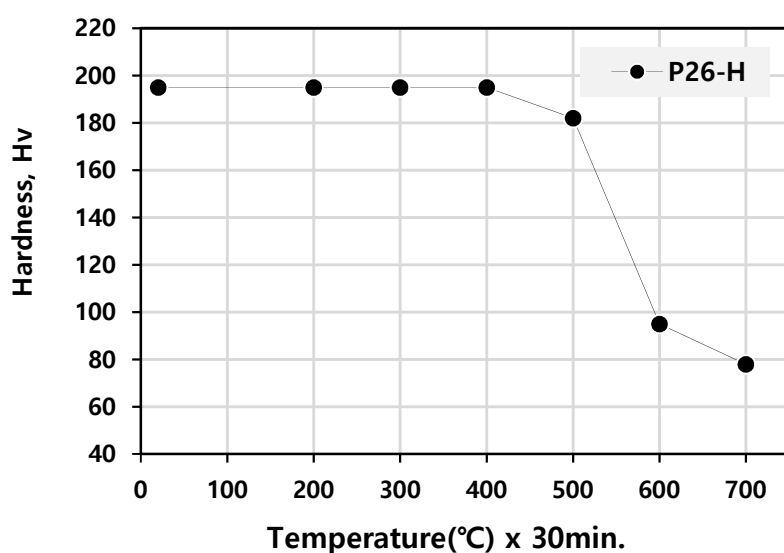
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

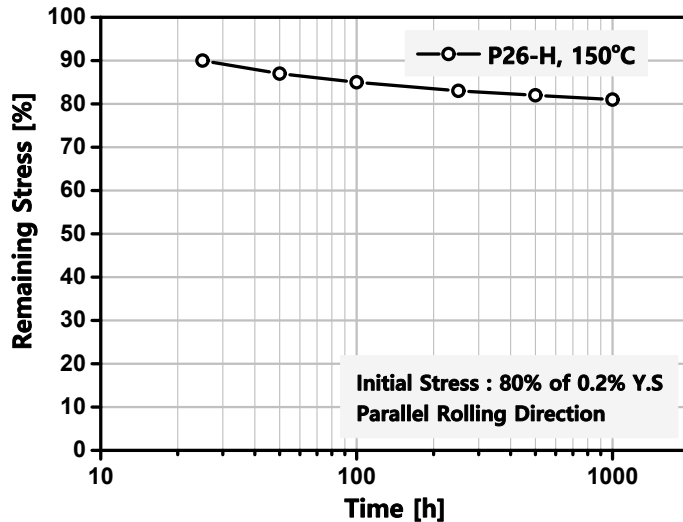


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

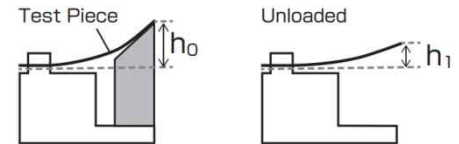


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P26 has good resistance in natural and industrial atmosphere. as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Good
Brazing	Excellent		

UNS No. C64750

Features

P26HYPER is an alloy which has a good balance of strength and electrical conductivity with excellent bending workability

- Good balance of strength and electrical conductivity
- Improved bending workability by control of crystal structure
- Optimized spring limit by control of aging and stress relief treatment

Typical Applications

- Terminals
- Wire-to-wire connector
- Pitch/small connector
- Contacts
- Automobile switch
- Relay spring
- Switches

Chemical Composition (wt%)

Cu	Balance
Ni	2.0-2.5
Si	0.4-0.8
Sn	0.02-0.4
P	<0.02

Physical Properties

Melting Temperature	°C	1078
Specific Gravity	-	8.9
Thermal Conductivity	W/(m·K)	165
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.1
Modulus of Elasticity	GPa	130
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	40

Mechanical Properties

Temper		1/2H	H	EH
Tensile Strength	MPa	650-710	700-750	750-800
Elongation	%	≥8	≥8	≥3
Hardness	Hv	190-220	210-235	235-255
0.2% Yield Strength	MPa	610-670	640-710	710-760

Bending Properties

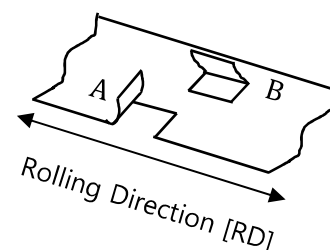
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0	0	0.5
	Bad way	0	0.5	1.0
180°	Good way	0.5	1	1.5
	Bad way	0.5	1	1.5

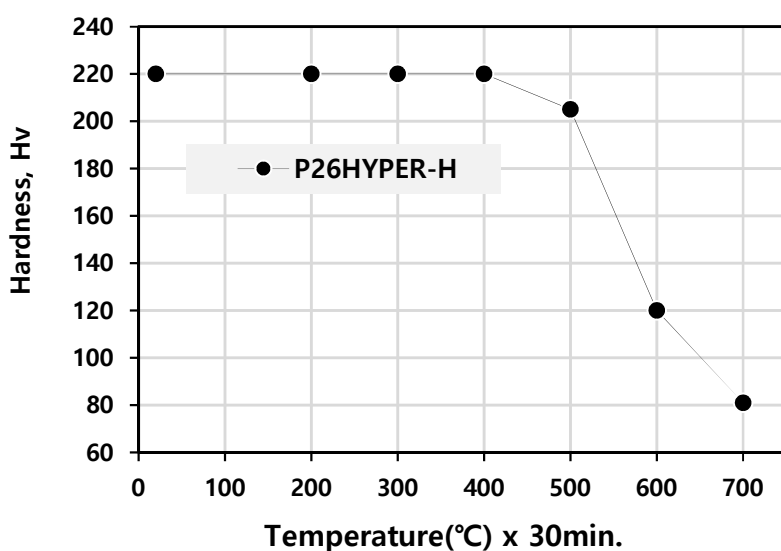
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

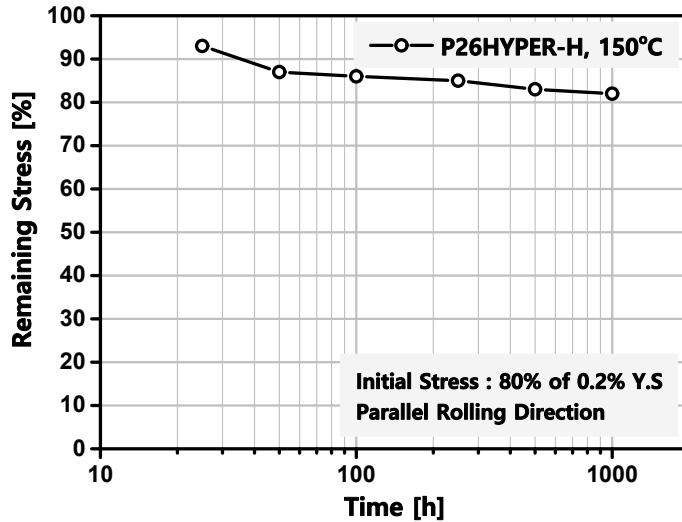


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

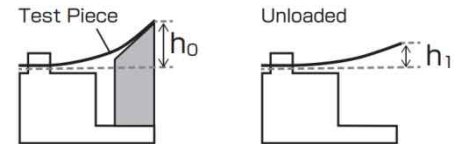


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P26HYPER has good resistance in natural and industrial atmosphere. as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Good	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Good
Brazing	Excellent		

UNS No. C19005

Features

P19005 is an alloy which has a good balance of strength and electrical conductivity with excellent bending workability

- Good balance of strength and electrical conductivity
- Improved bending workability by control of crystal structure
- High thermal resistance

Typical Applications

- Terminals
- Wire-to-wire connector
- Pitch/small connector
- Contacts
- Automobile switch
- Relay spring
- Switches

Chemical Composition (wt%)

Cu	Balance
Ni	1.4-1.7
Si	0.2-0.35
Sn	0.02-0.3
Zn	0.2-0.7
P	<0.03

Physical Properties

Melting Temperature	°C	1062
Specific Gravity	-	8.85
Thermal Conductivity	W/(m·K)	190
Coefficient of Thermal Expansion	10 ⁻⁶ /K	16.8
Modulus of Elasticity	GPa	125
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	>45

Mechanical Properties

Temper		1/2H	H	EH	SH
Tensile Strength	MPa	450-590	590-630	630-660	>650
Elongation	%	≥12	≥8	≥6	≥5
Hardness	Hv	135-165	145-180	170-200	180-220
0.2% Yield Strength	MPa	400-470	460-520	520-600	560-640

Bending Properties

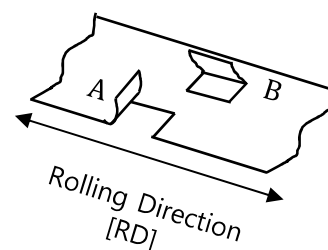
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH	SH
90°	Good way	0	0	0	0.5
	Bad way	0	0	0.5	1.0
180°	Good way	0	0.5	1.0	2.0
	Bad way	0	0.5	1.0	2.0

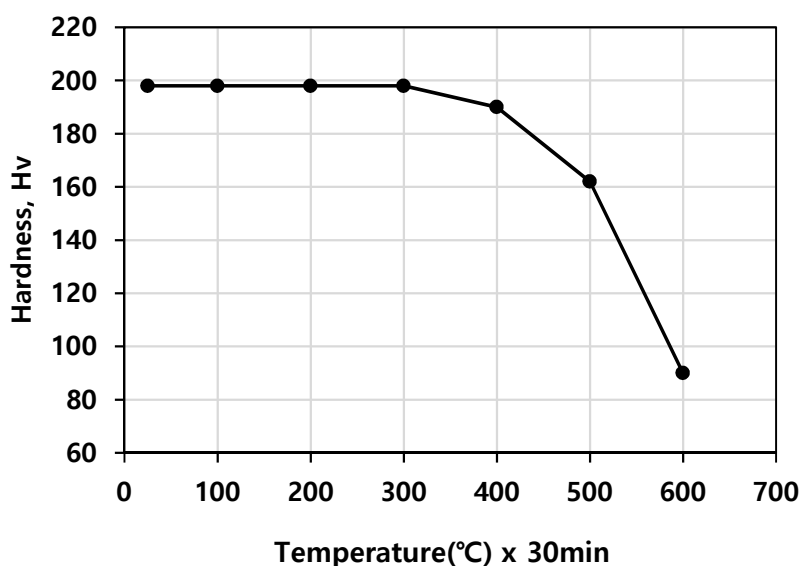
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

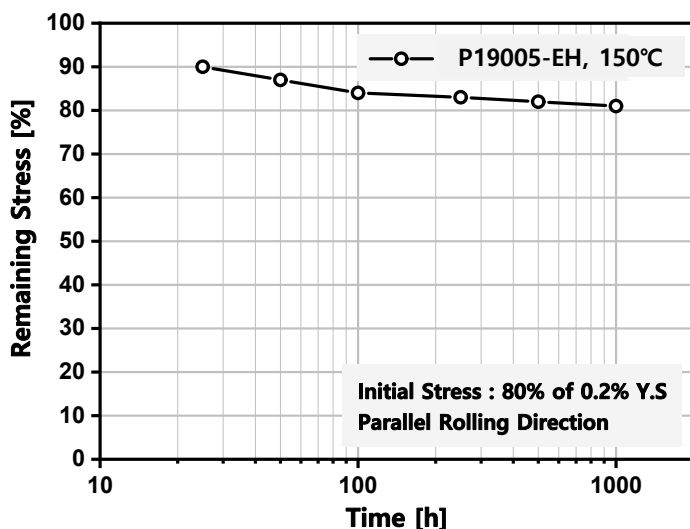


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

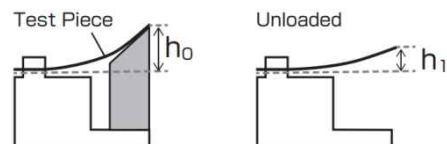


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P19005 has good resistance in natural and industrial atmosphere.

as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Good
Brazing	Excellent		

UNS No. C64751

Features

P1000HS is a Corson(Cu-Ni-Si) alloy that can be hardened by precipitation and by cold rolling. This alloy provides a good combination of high strength, medium electrical conductivity and good bending formability

- High strength & medium level conductivity
- Excellent elastic strength and thermal properties

Typical Applications

- Board-to-Board connector
- Wire-to-wire connector
- Pitch/small connector
- Electronic sockets
- Automobile switch
- Relay spring
- Mobile phone parts

Chemical Composition (wt%)

Cu	Balance
Ni	2.5-2.9
Si	0.5-0.8
Sn	0.1-0.4
P	<0.02

Physical Properties

Melting Temperature	°C	1075
Specific Gravity	-	8.89
Thermal Conductivity	W/(m·K)	160 200 (1/2H)
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.3
Modulus of Elasticity	GPa	130
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	40 48(1/2H)

Mechanical Properties

Temper		1/2H	H	EH	SH
Tensile Strength	MPa	700-800	760-870	800-900	850-950
Elongation	%	≥8	≥2	≥1	≥1
Hardness	Hv	210-245	230-265	235-275	250-295
0.2% Yield Strength	MPa	600-740	720-840	760-880	800-900

Bending Properties

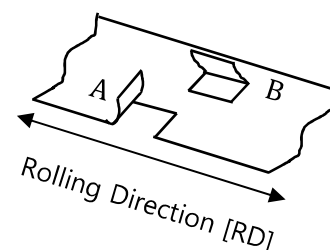
r/t (Minimum Bending Radius / thickness)

	Temper	1/2H	H	EH
90°	Good way	0.5	1.0	1.5
	Bad way	1.0	1.5	2.5
180°	Good way	0.5	1.0	1.5
	Bad way	1.0	1.5	3.0

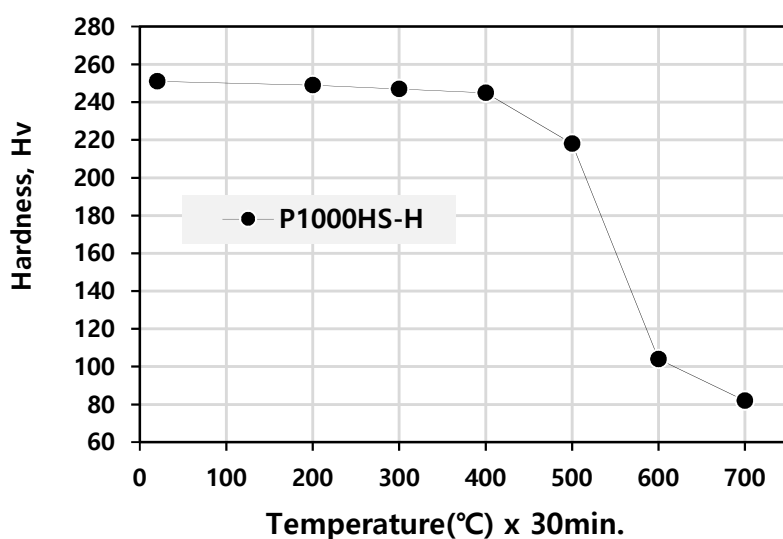
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

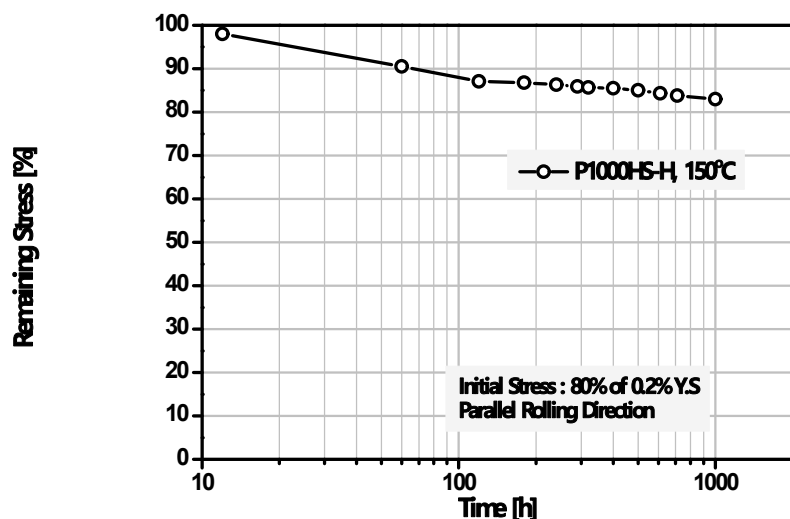


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

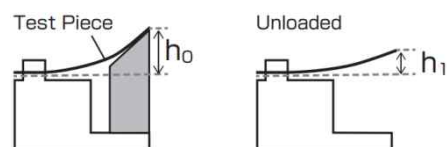


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P1000HS is resistant to pure water vapor and non oxidizing acids and alkalis as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Fair	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Good
Brazing	Excellent		

UNS No. C64752

Features

P1000HS2 is a Corson(Cu-Ni-Si) alloy that can be hardened by precipitation and by cold rolling. This alloy provides a good combination of high strength, medium electrical conductivity and good bending formability.

- High strength & medium level conductivity
- Excellent elastic strength and thermal properties

Typical Applications

- Board-to-Board connector
- Wire-to-wire connector
- Pitch/small connector
- Electronic sockets
- Automobile switch
- Relay spring
- Mobile phone parts

Chemical Composition (wt%)

Cu	Balance
Ni	2.8-3.2
Si	0.6-0.9
Sn	0.1-0.4
P	<0.02

Physical Properties

Melting Temperature	°C	1078
Specific Gravity	-	8.86
Thermal Conductivity	W/(m·K)	150
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.3
Modulus of Elasticity	GPa	130
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	37

Mechanical Properties

Temper		H	EH	SH
Tensile Strength	MPa	780-880	830-930	880-1000
Elongation	%	≥5	≥1	≥1
Hardness	Hv	235-270	240-290	270-310
0.2% Yield Strength	MPa	740-860	800-910	850-980

Bending Properties

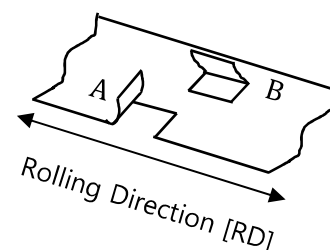
r/t (Minimum Bending Radius / thickness)

	Temper	H	EH	SH
90°	Good way	0.5	2.0	2.5
	Bad way	1.0	3.5	5.0
180°	Good way	1.5	2.0	-
	Bad way	2.5	3.5	-

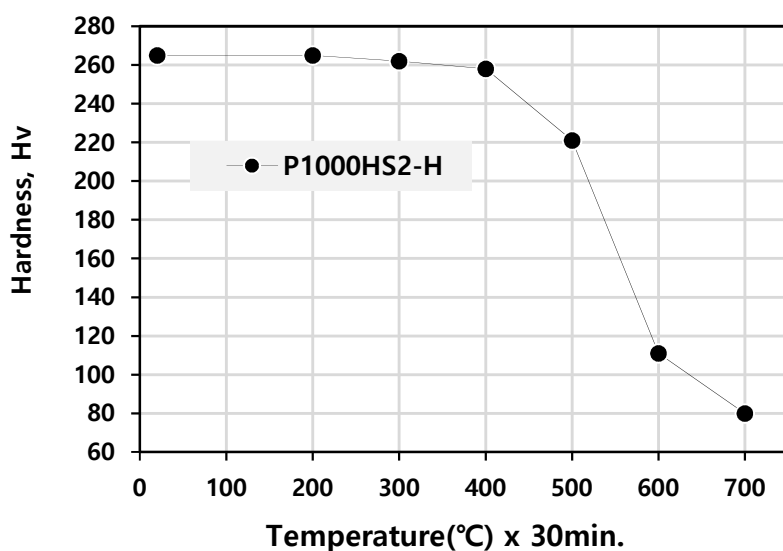
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

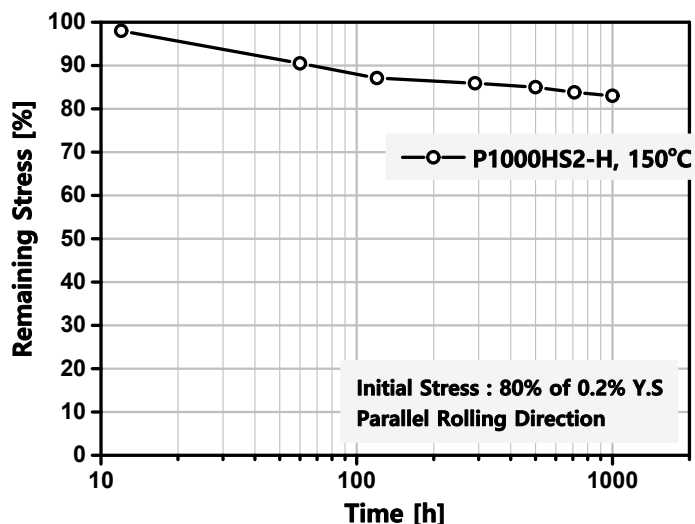


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

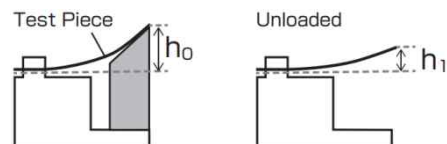


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P1000HS2 is resistant to pure water vapor and non oxidizing acids and alkalis as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent
Capacity for Being Hot Formed	Fair
Soldering	Excellent
Brazing	Excellent

Oxyacetylene Welding	Good
Gas Shielded Arc Welding	Good
Coated Metal Arc Welding	Good

UNS No. C64752

Features

P1000HS3 is a Corson(Cu-Ni-Si) alloy that can be hardened by precipitation and by cold rolling. This alloy provides a good combination of high strength, medium electrical conductivity and good bending formability.

- High strength & medium level conductivity
- Excellent elastic strength and thermal properties

Typical Applications

- Board-to-Board connector
- Wire-to-wire connector
- Pitch/small connector
- Electronic sockets
- Automobile switch
- Relay spring
- Mobile phone parts

Chemical Composition (wt%)

Cu	Balance
Ni	3.2-3.6
Si	0.7-1.0
Sn	0.1-0.4
P	<0.02

Physical Properties

Melting Temperature	°C	1080
Specific Gravity	-	8.82
Thermal Conductivity	W/(m·K)	140
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.3
Modulus of Elasticity	GPa	130
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	35

Mechanical Properties

Temper		H	EH	SH
Tensile Strength	MPa	850-950	900-1000	950-1050
Elongation	%	≥5	≥1	≥1
Hardness	Hv	250-295	265-310	280-330
0.2% Yield Strength	MPa	800-900	860-980	910-1030

Bending Properties

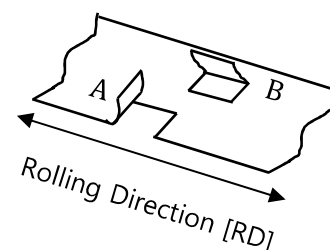
r/t (Minimum Bending Radius / thickness)

	Temper	H	EH	SH
90°	Good way	1.5	2.5	-
	Bad way	2.0	5.0	-
180°	Good way	-	-	-
	Bad way	-	-	-

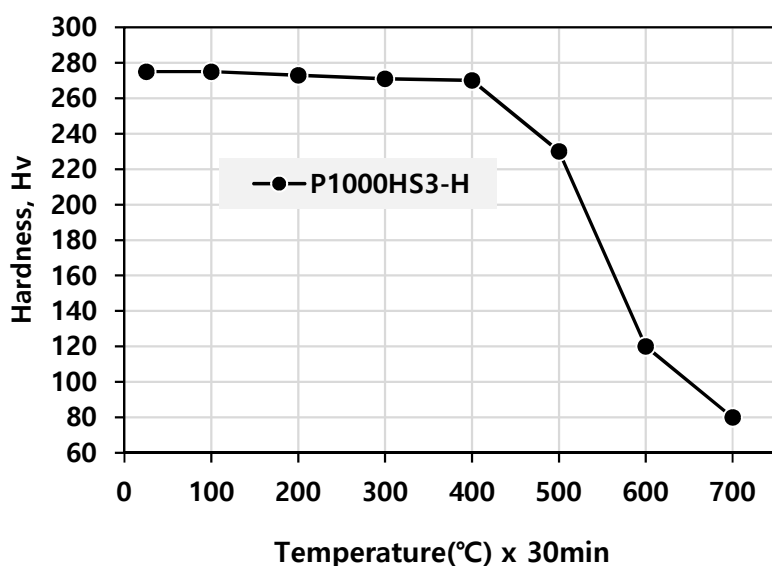
- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

Bending Direction

- A : Good Way**
(Transverse to RD)
- B : Bad Way**
(Parallel to RD)

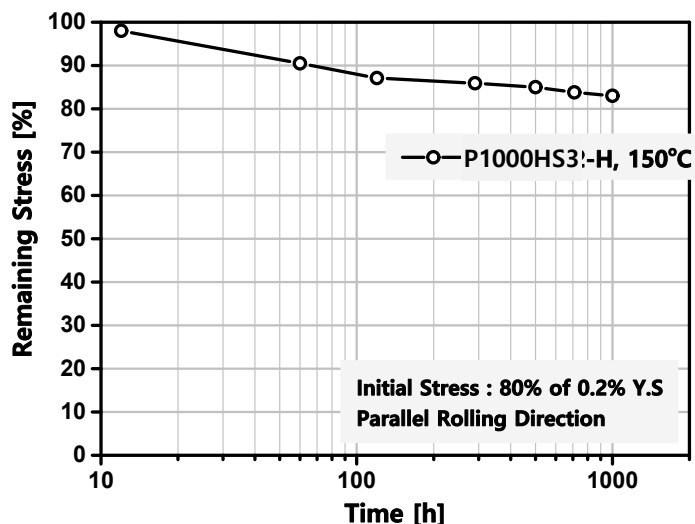


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

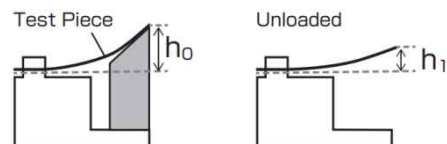


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P1000HS3 is resistant to pure water vapor and non oxidizing acids and alkalis as well as neutral saline solutions. The material is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Excellent	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Fair	Gas Shielded Arc Welding	Good
Soldering	Excellent	Coated Metal Arc Welding	Good
Brazing	Excellent		

UNS No. C70250

Features

P70 is Corson Alloy consisting of high mechanical strength, high electrical conductivity and excellent thermal resistance. P70 satisfied with UNS C7025, is best suited for in IT & electrical components.

- Excellent bend ability, excellent hot and cold forming properties
- High strength and a good corrosion resistance

Typical Applications

- Automotive Switches
- Automotive Contacts
- Connectors
- Lead Frame
- LED
- Terminals
- Relay spring

Chemical Composition (wt%)

Cu	Balance
Ni	2.2-4.2
Si	0.25-1.2
Mg	0.05-0.3
P	0.02-0.16

Physical Properties

Melting Temperature	°C	1095
Specific Gravity	-	8.82
Thermal Conductivity	W/(m·K)	168
Coefficient of Thermal Expansion	10 ⁻⁶ /K	17.6
Modulus of Elasticity	GPa	131
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	45

Mechanical Properties

Temper		1/2H	H
Tensile Strength	MPa	607-726	710-810
Elongation	%	≥6	≥6
Hardness	Hv	180-220	≥210
0.2% Yield Strength	MPa	≥500	≥670

Bending Properties

r/t (Minimum Bending Radius / thickness)

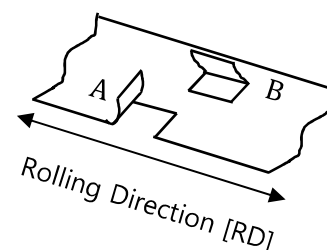
	Temper	1/2H	H
90°	Good way	0.0	0.5
	Bad way	0.0	0.5
180°	Good way	1.0	2.0
	Bad way	1.0	2.0

- Strip thickness $\leq 0.5\text{mm}$
- Test sample width 10mm

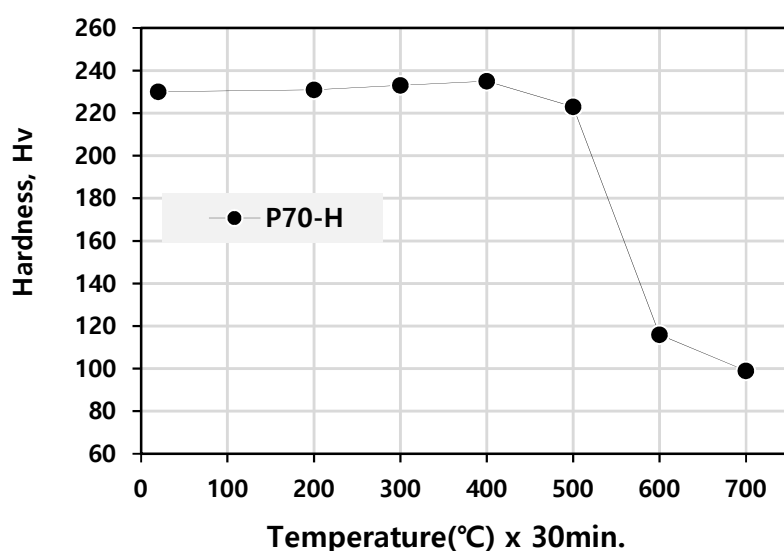
Bending Direction

A : Good Way
(Transverse to RD)

B : Bad Way
(Parallel to RD)

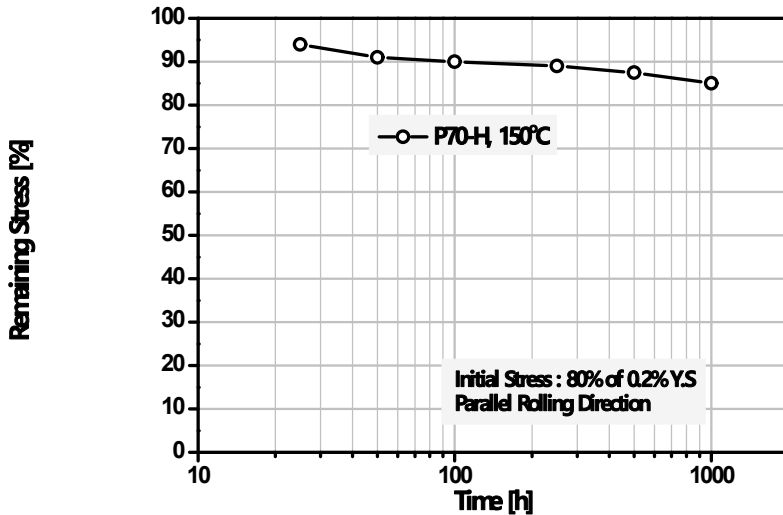


Softening Resistance



- Vickers hardness after heat treatment (30minute). The diagram shows typical values.

Stress Relaxation Resistance

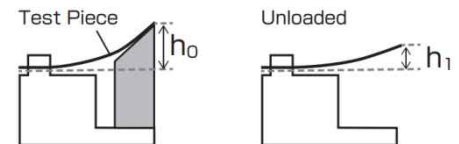


• Test Method

Cantilever bending test equipment.

• Remaining Stress (%)

$$= (h_0 - h_1) / h_0 \times 100$$



Initial Stress is 80% of Yield Strength

Corrosion Resistance

P70 has good corrosion resistance in natural atmosphere.
It is insensitive to stress corrosion cracking.

Fatigue Strength

The highest stress that can be applied for a certain number of cycles without fracture is the fatigue strength. The standard fatigue strength for copper alloys is that reported for 100,000,000 cycles. It is about 1/3 of the tensile strength.

Fabrication Properties

Capacity for Being Cold Worked	Good	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Excellent	Gas Shielded Arc Welding	Good
Soldering	Good	Coated Metal Arc Welding	Fair
Brazing	Good		