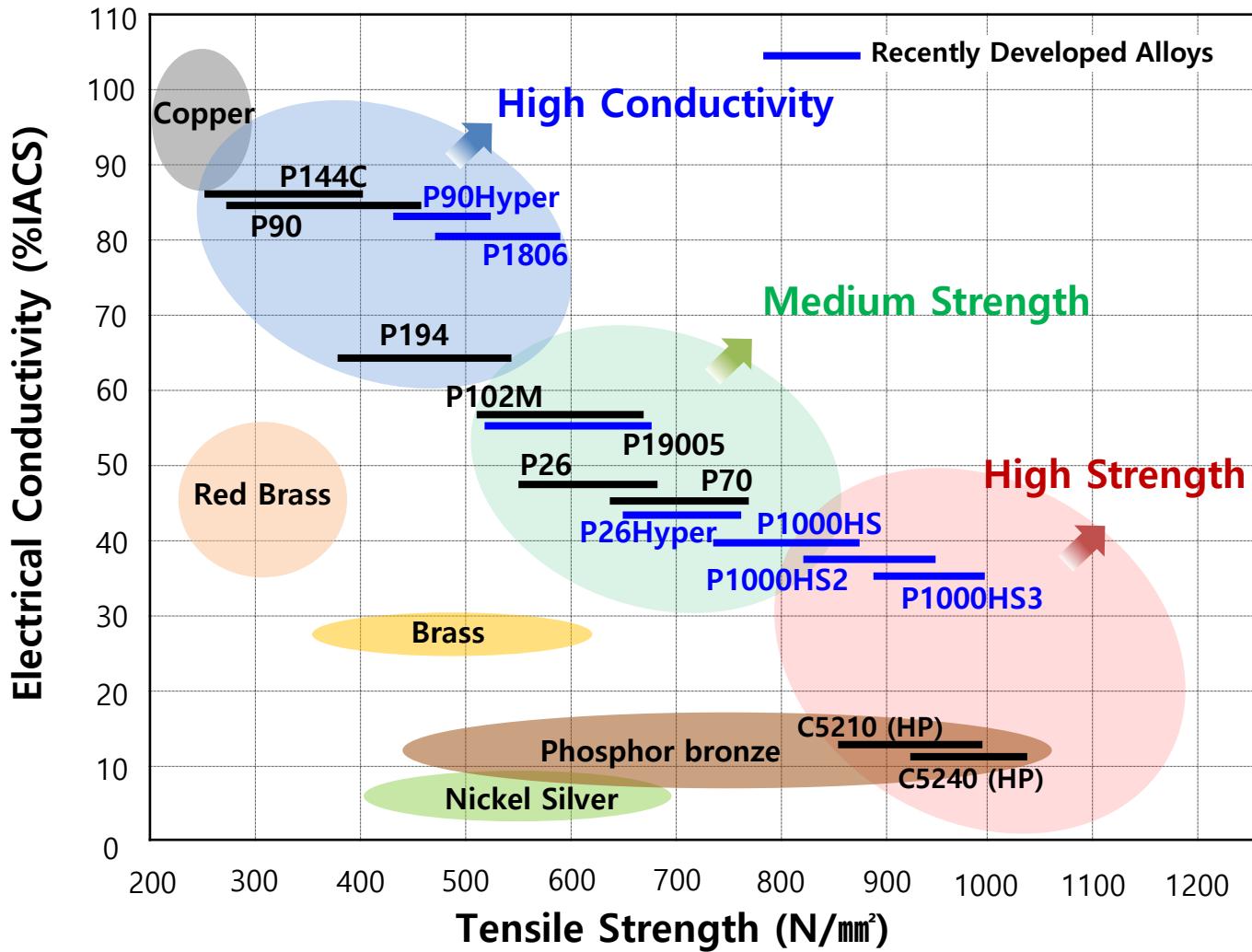


# Copper Alloy Products

Alloys Map (Strip & Sheets)

2025



Copper Alloy Products (Strip & Sheets)

- Copper
- Red Brass
- Brass
- Phosphor Bronze
- Nickel Silver
- P144C
- P1806
- P102M
- P90
- P90HYPER
- P194
- P194HSL
- P425
- P26
- P26HYPER
- P19005
- P1000HS
- P1000HS2
- P1000HS3
- P70

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
P19005	C19005	-	99
P1000HS	C64751	-	102
P1000HS2	C64752	-	105
P1000HS3	C64752	-	108
P70	C70250	-	111

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 <sup>-6</sup> /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
Elongation	%	≥35	≥25	≥15
Hardness	Hv	-	55-100	75-120
0.2% Yield Strength	MPa	Max 140	≥180	≥250
				≥320

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

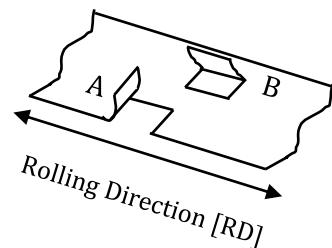
Temper	O	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0	0.0
	<b>Bad way</b>	0.0	0.0	0.5
180°	<b>Good way</b>	0.0	0.0	0.5
	<b>Bad way</b>	0.0	0.0	1.0

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

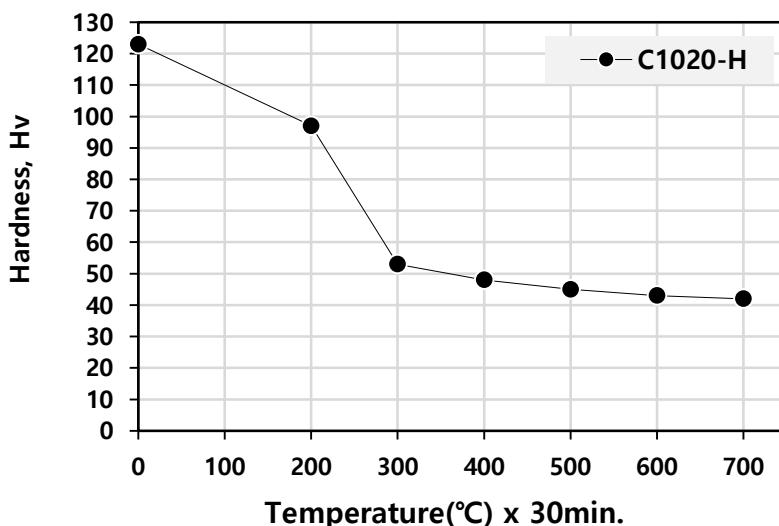
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

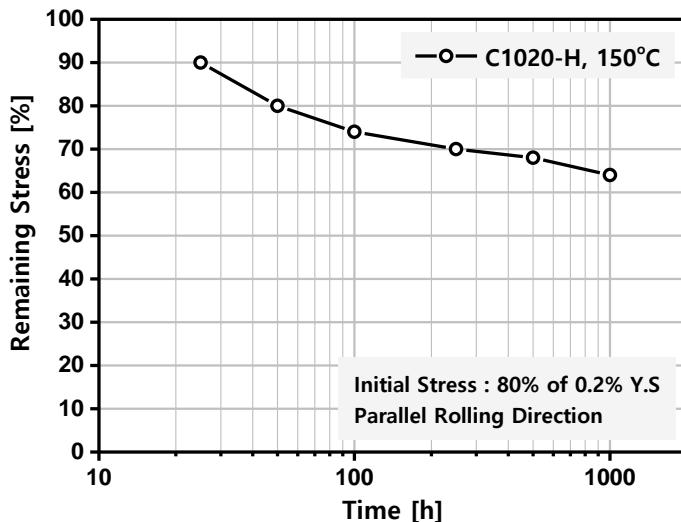


## Softening Resistance



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

## Stress Relaxation Resistance

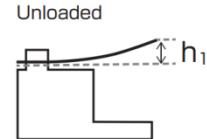
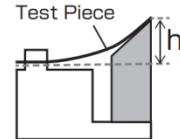


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

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

## Chemical Composition (wt%)

Cu	≥ 99.9
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## Physical Properties

Melting Temperature	°C	1083
Specific Gravity	-	8.91
Thermal Conductivity	W/(m·K)	391
Coefficient of Thermal Expansion	10 <sup>-6</sup> /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
Elongation	%	≥35	≥25	≥15
Hardness	Hv	-	55-100	75-120
0.2% Yield Strength	MPa	-	-	-

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

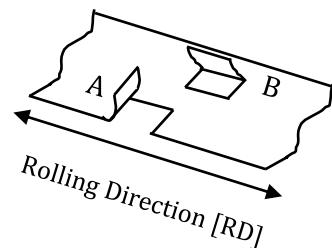
Temper	O	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0	0.0
	<b>Bad way</b>	0.0	0.0	0.5
180°	<b>Good way</b>	0.0	0.0	0.5
	<b>Bad way</b>	0.0	0.0	1.0

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

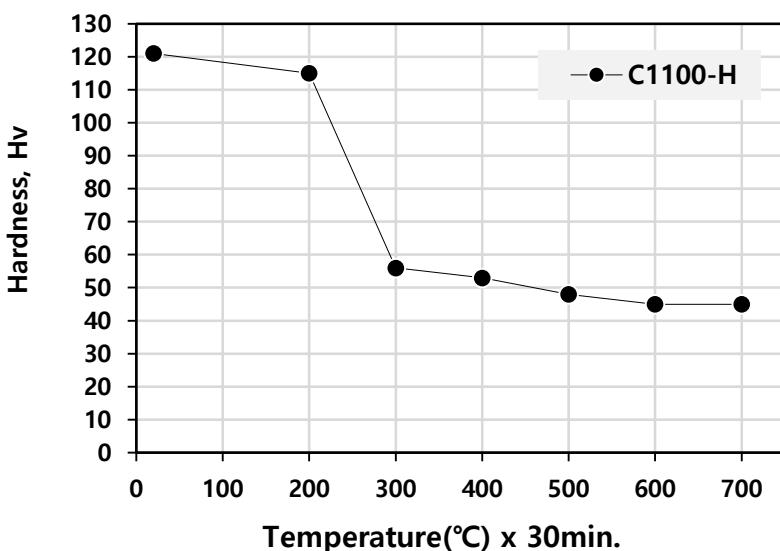
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

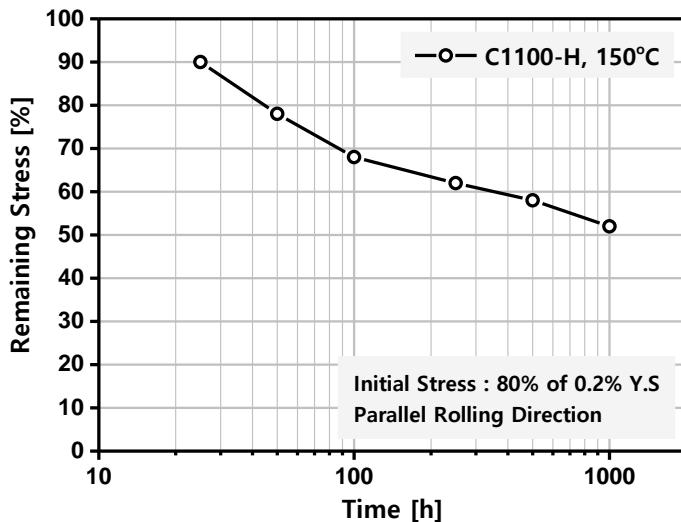


## Softening Resistance



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

## Stress Relaxation Resistance

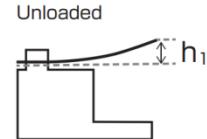
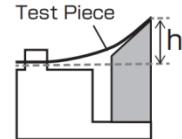


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

## 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	• Electrical Conductors
• Tubular Bus	• Bus bars	• Terminals
• Commutators	• Switches	• 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 <sup>-6</sup> /K	17.6

### Modulus of Elasticity

### Poisson's Ratio

### Electrical Conductivity

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

### Mechanical Properties

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

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

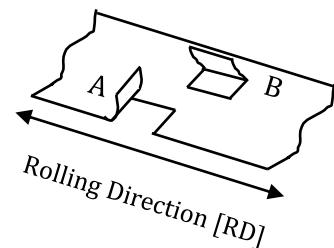
Temper	O	1/2H
90°	Good way	0.0
	Bad way	0.0
180°	Good way	0.0
	Bad way	0.5

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

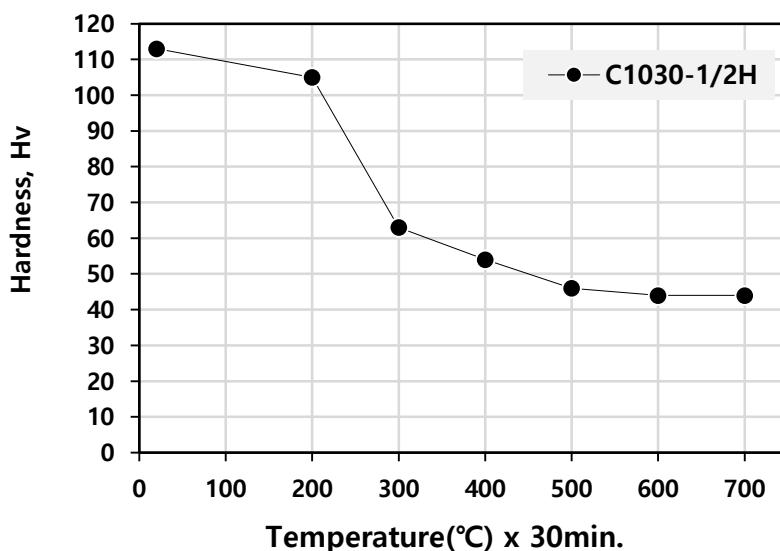
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

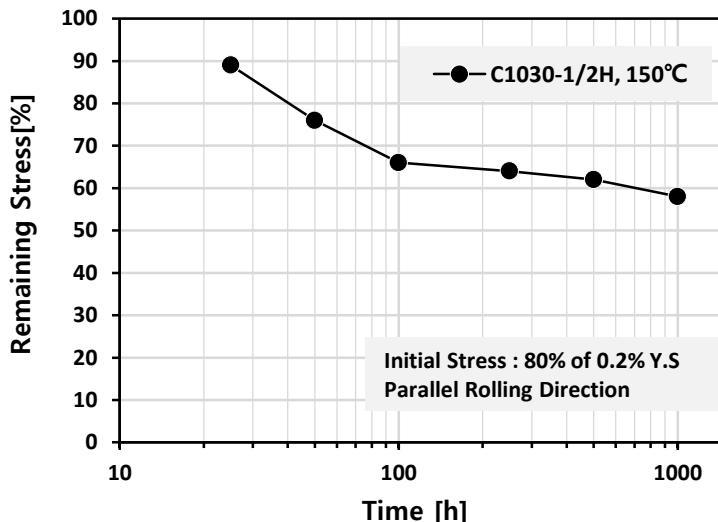


## Softening Resistance



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

## Stress Relaxation Resistance

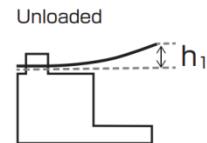
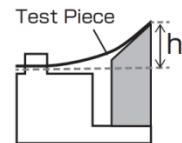


- **Test Method**

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		

## 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 <sup>-6</sup> /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
Elongation	%	≥35	≥25	≥15
Hardness	Hv	-	55-100	75-120
0.2% Yield Strength	MPa	-	-	-

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

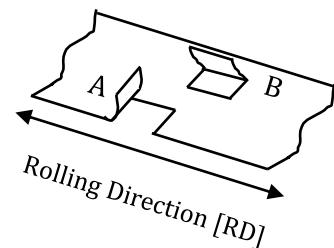
Temper	O	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0	0.0
	<b>Bad way</b>	0.0	0.0	0.0
180°	<b>Good way</b>	0.0	0.0	0.5
	<b>Bad way</b>	0.0	0.0	0.5

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

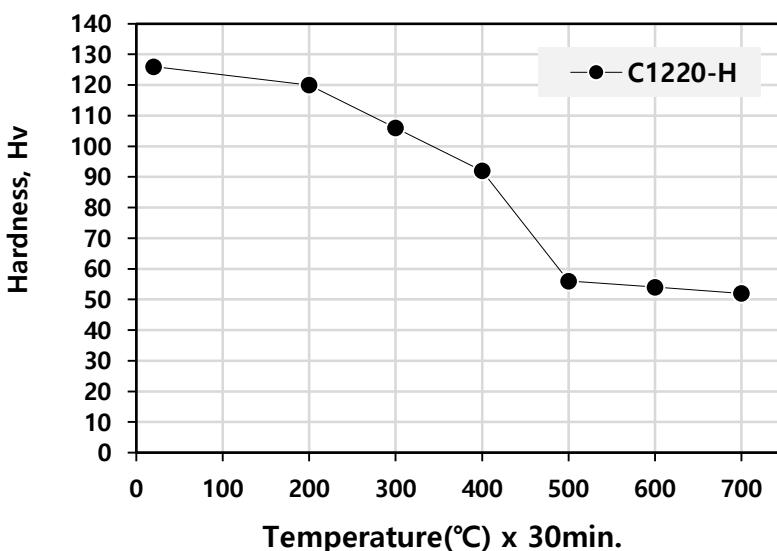
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

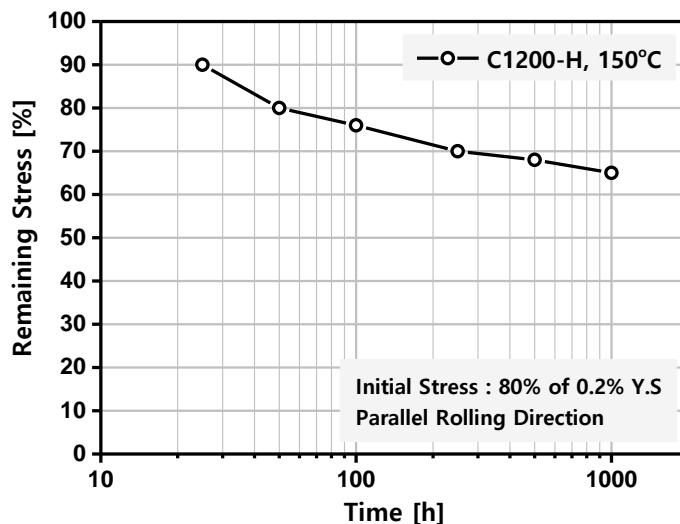


## Softening Resistance



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

## Stress Relaxation Resistance

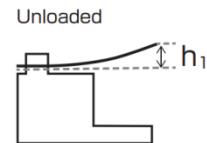
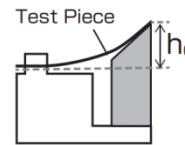


- **Test Method**

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		

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 <sup>-6</sup> /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)

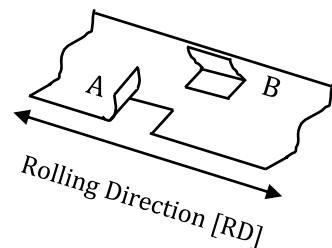
Temper	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.0
180°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.0

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

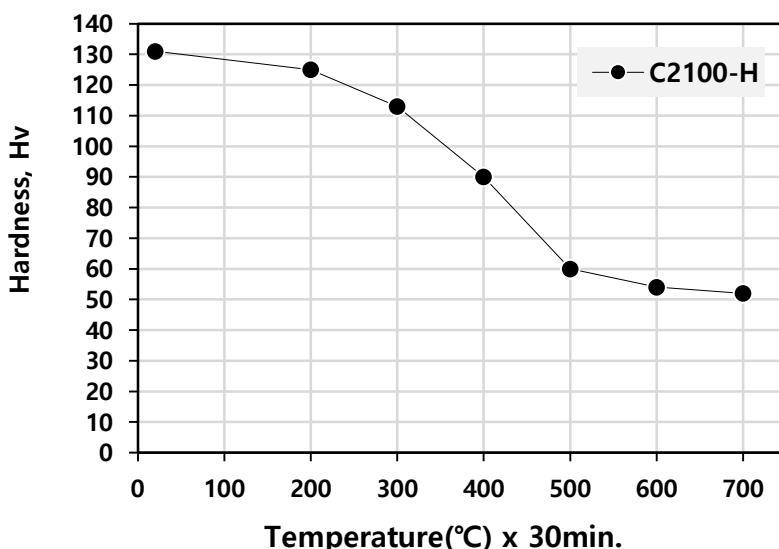
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

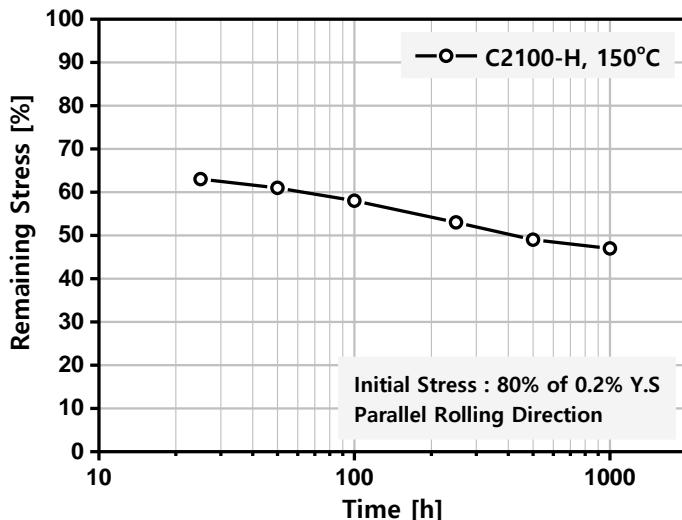


## Softening Resistance



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

## Stress Relaxation Resistance

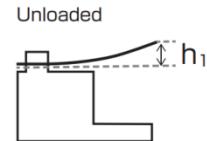
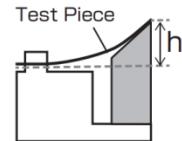


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

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 <sup>-6</sup> /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)

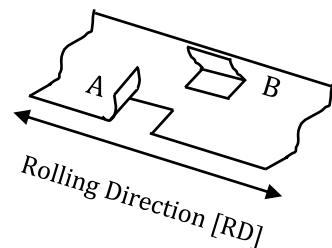
Temper	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.0
180°	<b>Good way</b>	0.0	0.5
	<b>Bad way</b>	0.0	0.5

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

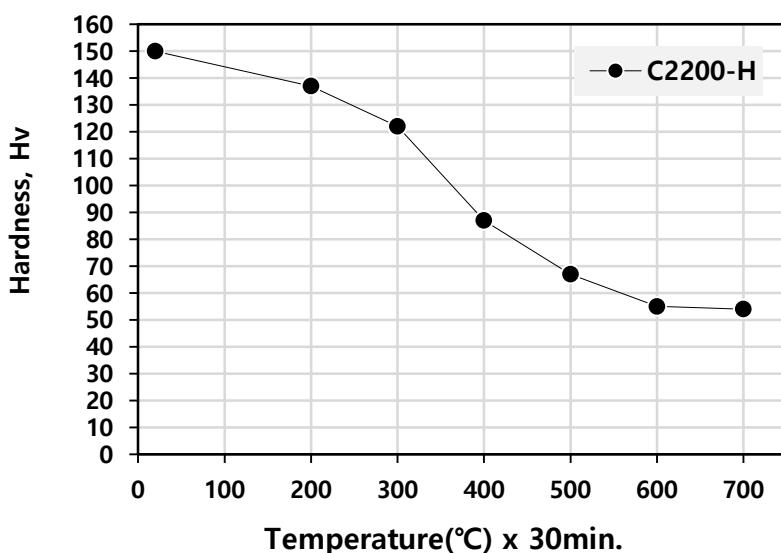
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

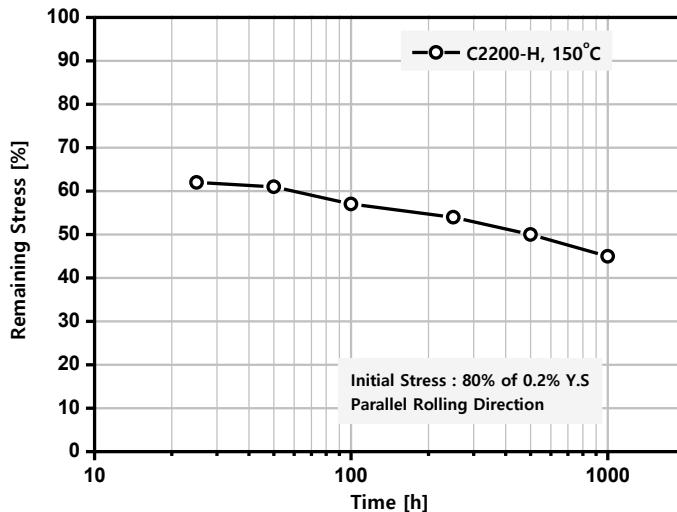


## Softening Resistance



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

## Stress Relaxation Resistance

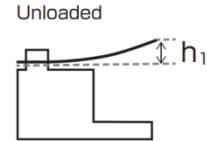
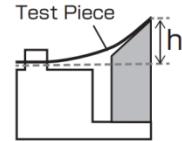


- **Test Method**

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		

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	• Zippers	• Rotor Bars, AC motors
• Fire Extinguisher Cases	• Sockets	• Heat Exchangers
• Pump lines	• Pipe Nipples	• 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 <sup>-6</sup> /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)

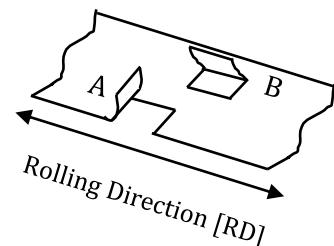
Temper	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.5
180°	<b>Good way</b>	0.5	1.0
	<b>Bad way</b>	0.5	2.0

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

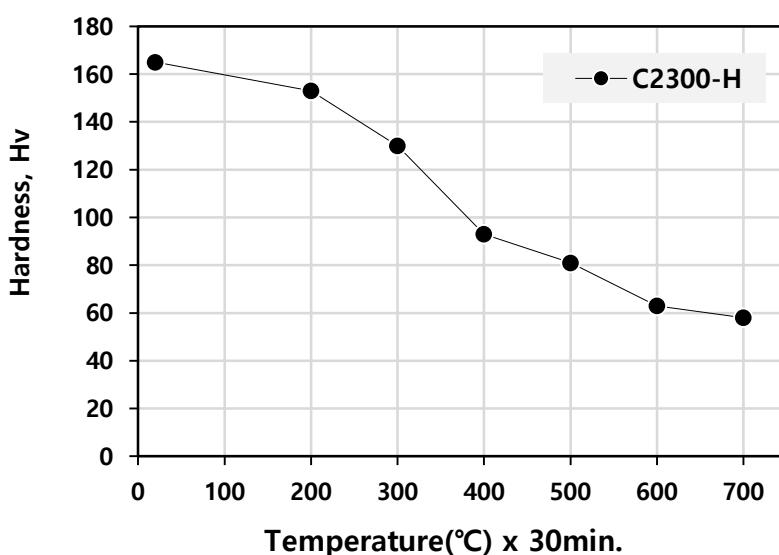
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

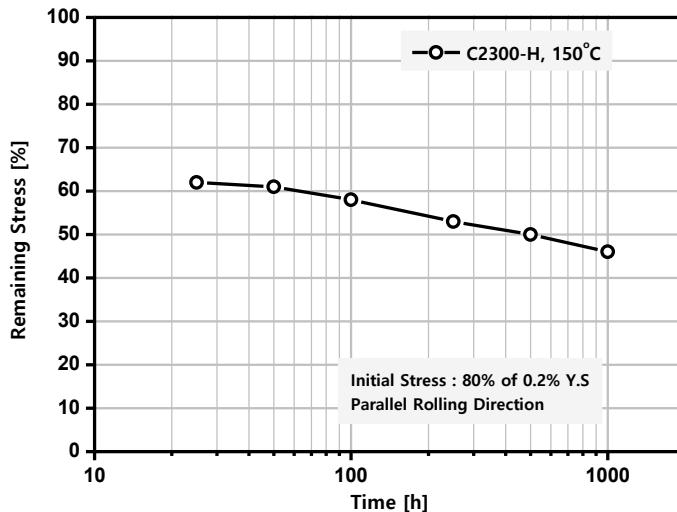


## Softening Resistance



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

## Stress Relaxation Resistance

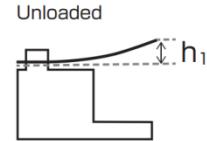
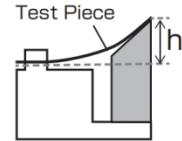


- **Test Method**

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		

## 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 <sup>-6</sup> /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)

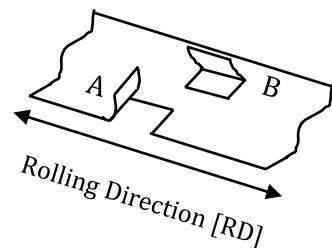
Temper	1/2H	H	EH
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	1.0
180°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	2.5

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

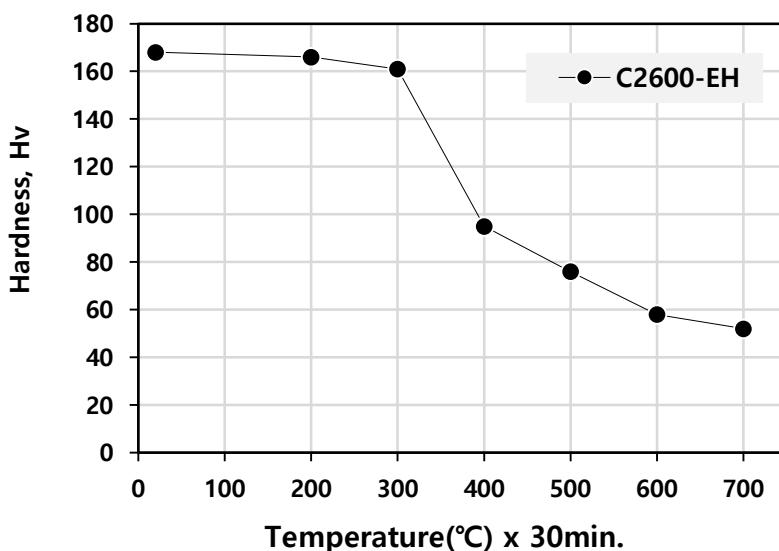
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

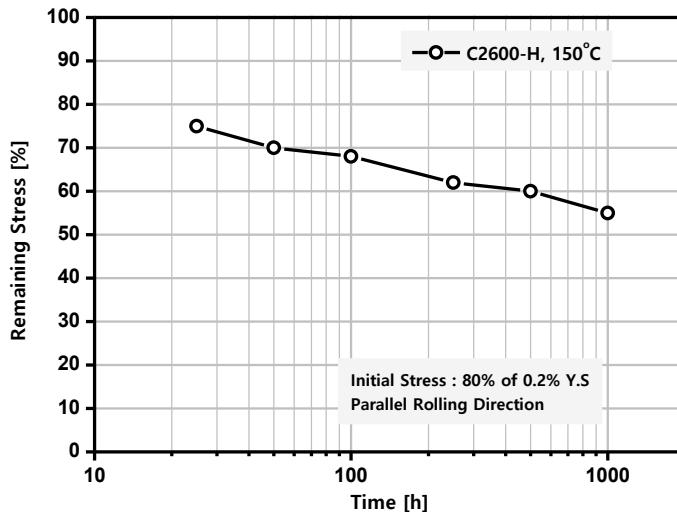


## Softening Resistance



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

## Stress Relaxation Resistance

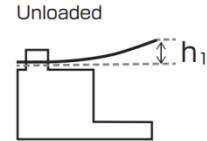
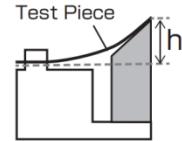


### • Test Method

Cantilever bending test equipment.

### • Remaining Stress (%)

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

## 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 <sup>-6</sup> /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)

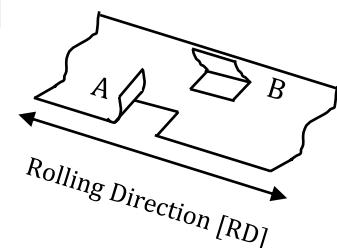
Temper	1/2H	H	EH
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.0
180°	<b>Good way</b>	0.0	-
	<b>Bad way</b>	0.0	-

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

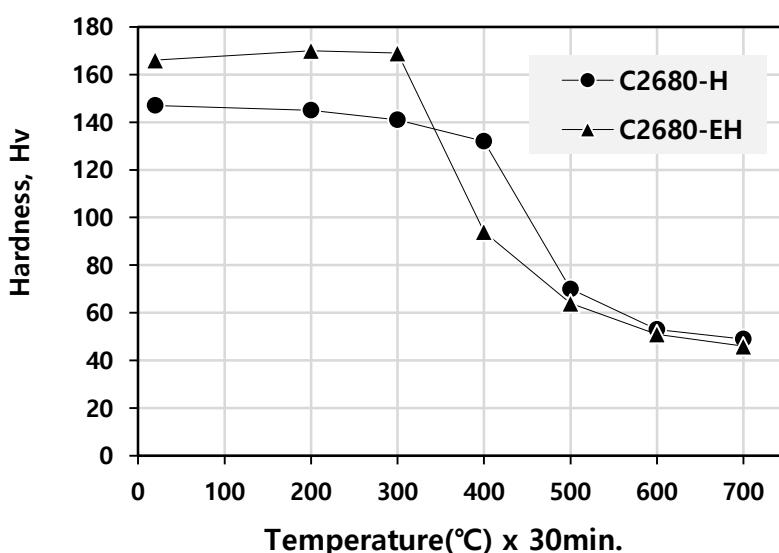
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

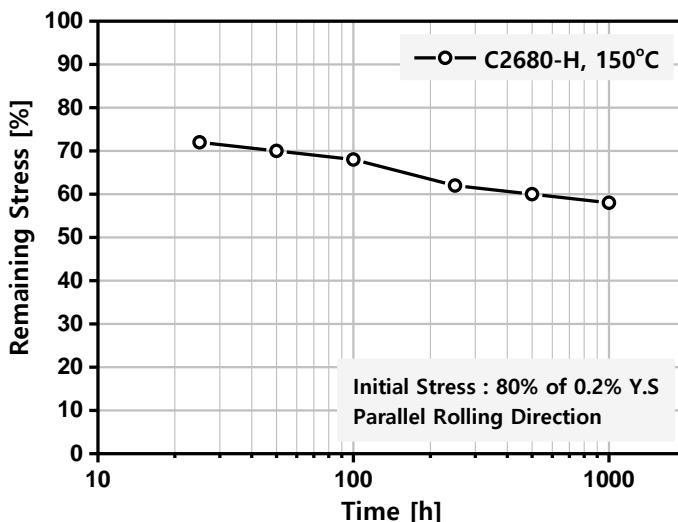


## Softening Resistance



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

## Stress Relaxation Resistance

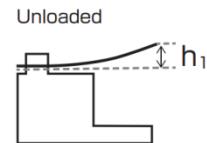
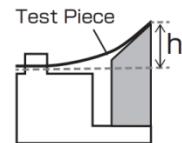


- **Test Method**

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		

## 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 <sup>-6</sup> /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)

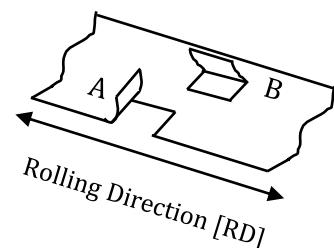
Temper	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.0
180°	<b>Good way</b>	0.0	-
	<b>Bad way</b>	0.0	-

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

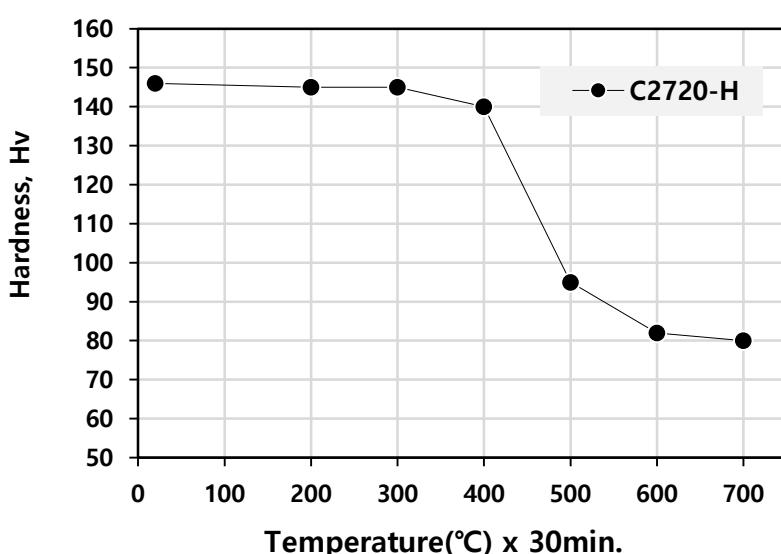
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

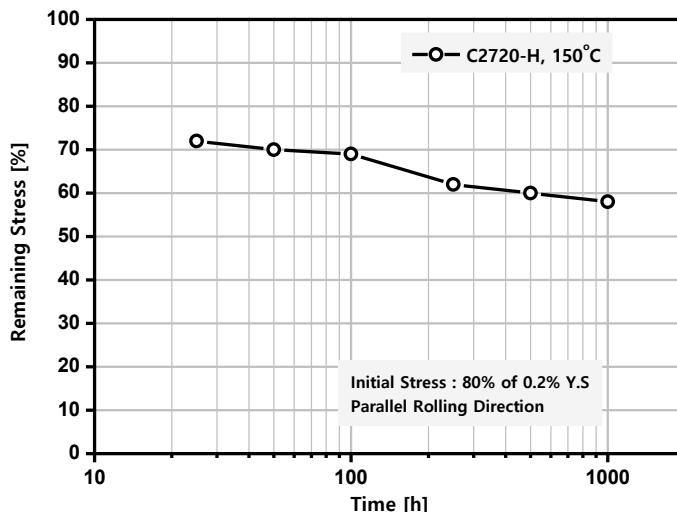


## Softening Resistance



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

## Stress Relaxation Resistance

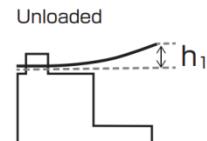
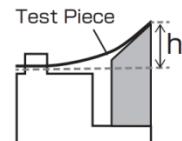


- **Test Method**

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		

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 <sup>-6</sup> /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)

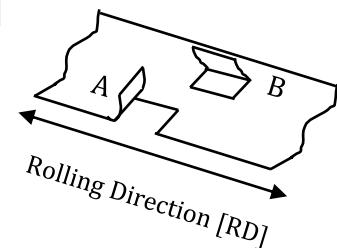
Temper	O	1/2H	H
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.0
180°	<b>Good way</b>	0.0	-
	<b>Bad way</b>	0.0	-

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

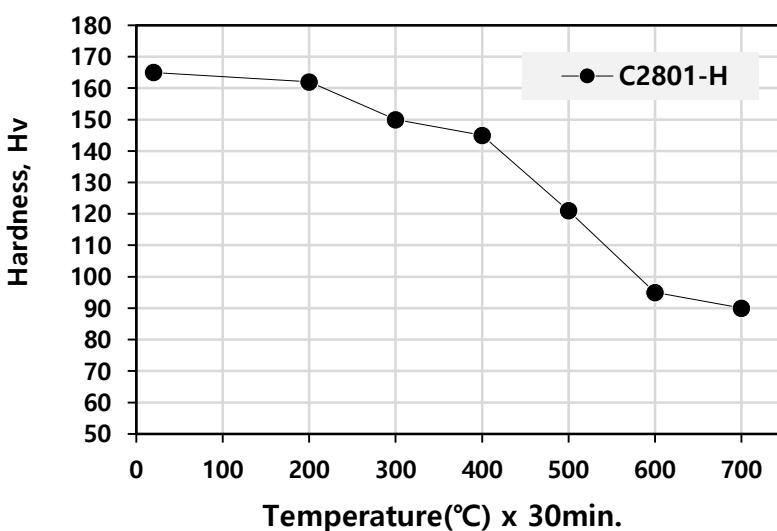
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

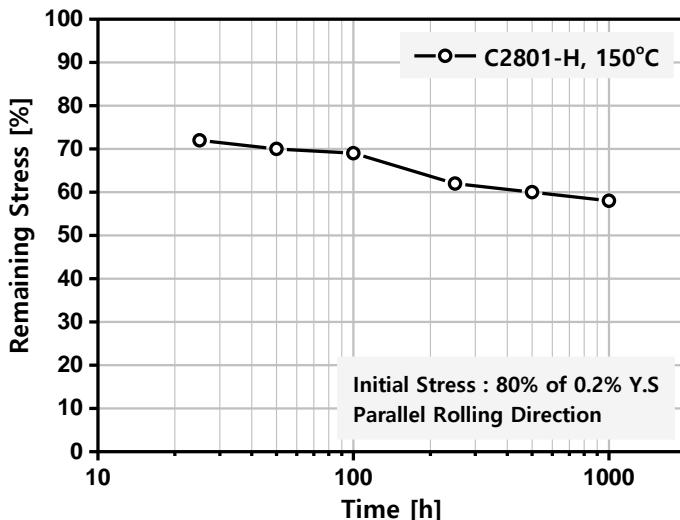


## Softening Resistance



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

## Stress Relaxation Resistance

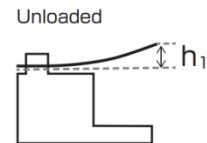
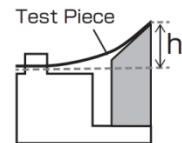


- **Test Method**

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		

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

## 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 <sup>-6</sup> /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)

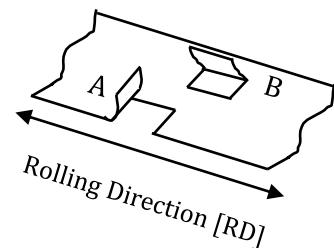
Temper	1/4H	H	EH
90°	Good way	0	0
	Bad way	0	1.0
180°	Good way	0	0.5
	Bad way	0.5	2.0
			3.5

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

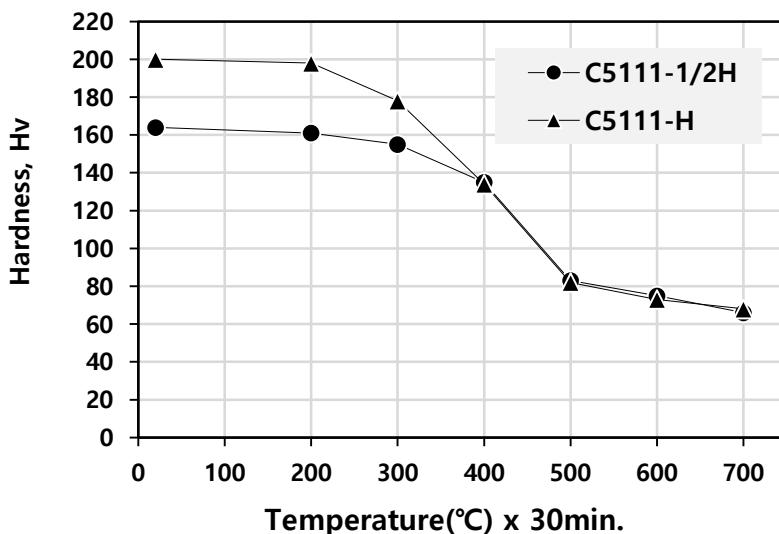
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

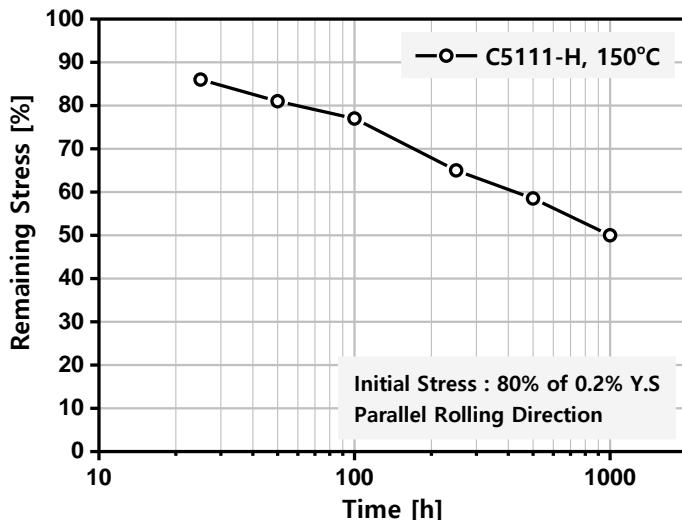


## Softening Resistance



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

## Stress Relaxation Resistance

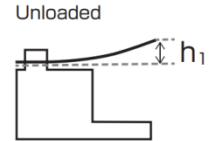
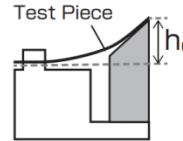


- **Test Method**

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		

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

## 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 <sup>-6</sup> /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)

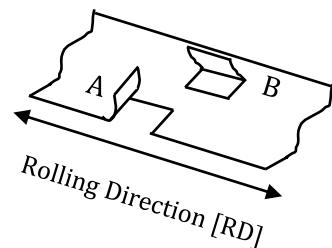
Temper	1/2H	H	EH
90°	Good way	0	0
	Bad way	0	1.0
180°	Good way	0	0.5
	Bad way	1.0	2.0

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

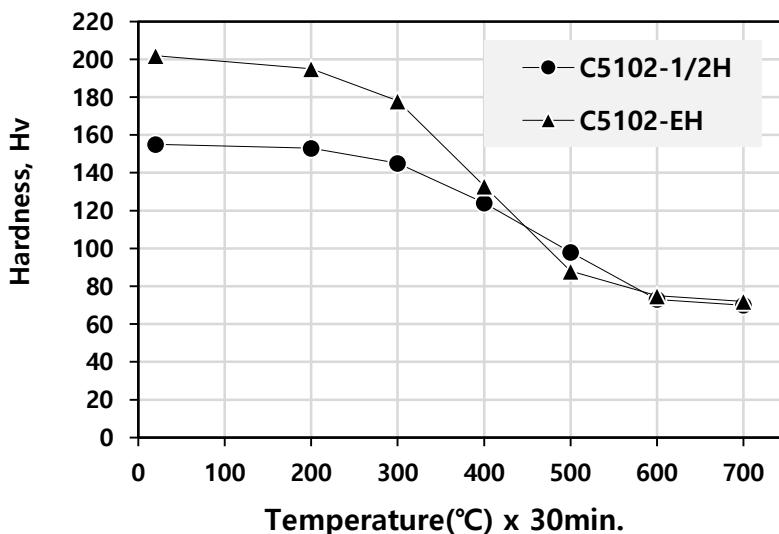
### Bending Direction

A : Good Way  
(Transverse to RD)

B : Bad Way  
(Parallel to RD)

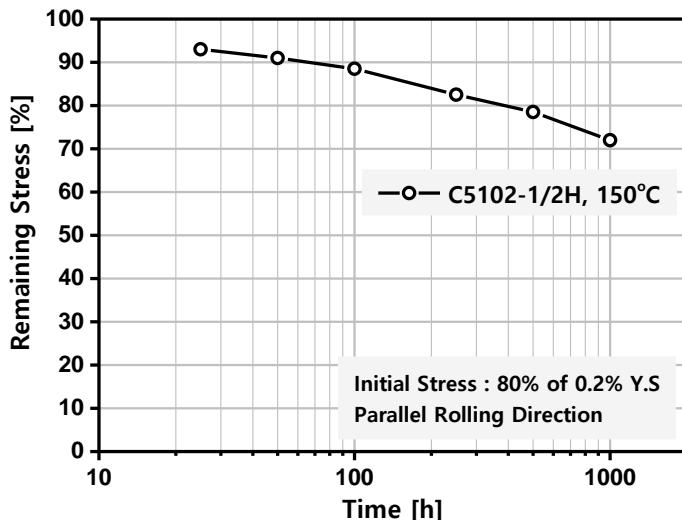


## Softening Resistance



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

## Stress Relaxation Resistance

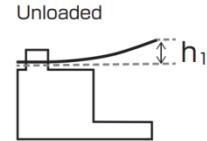
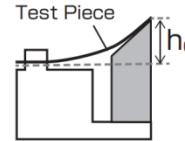


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

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	• Electrical Flexing Contact Blades
• Terminals	• Switch Parts
• Wire Brushes	• 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 <sup>-6</sup> /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)

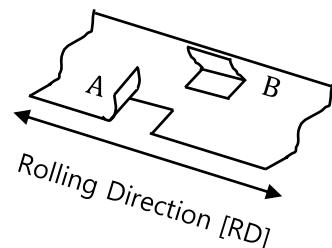
Temper	1/2H	H	EH
90°	Good way	0	0
	Bad way	0	1.0
180°	Good way	0.5	1.0
	Bad way	1.5	2.0

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

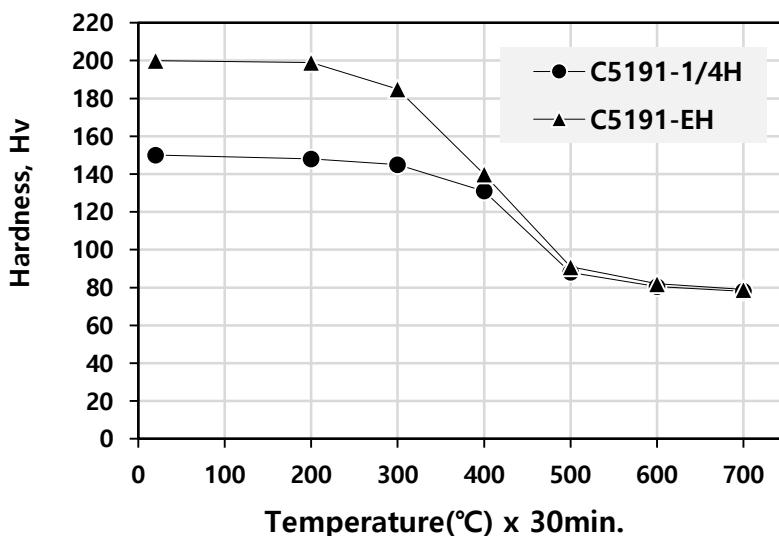
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

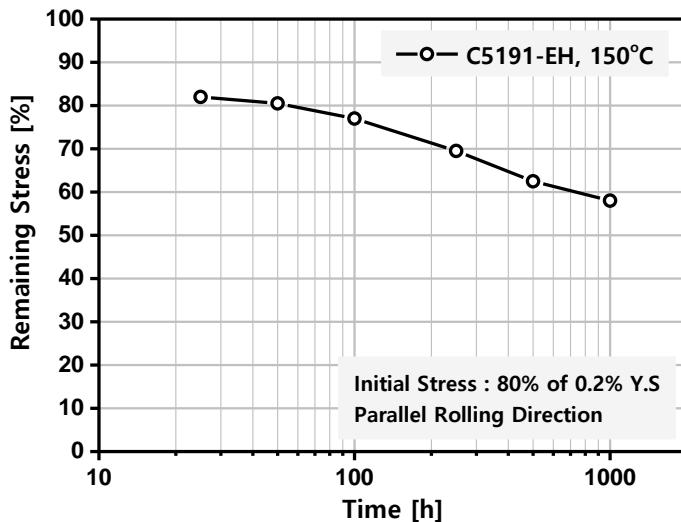


## Softening Resistance



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

## Stress Relaxation Resistance

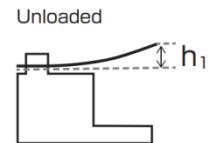
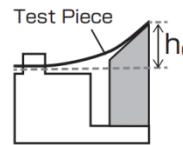


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

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 <sup>-6</sup> /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
Elongation	%	≥45	≥40	≥30	≥12
Hardness	Hv	-	100-160	150-205	180-235
0.2% Yield Strength	MPa	-	320-480	410-530	520-635

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

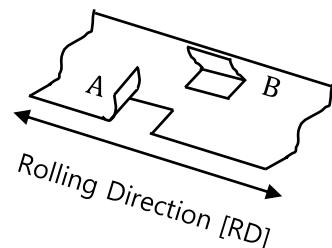
Temper	1/2H	H	EH
90°	<b>Good way</b>	0.0	0.5
	<b>Bad way</b>	0.0	1.5
180°	<b>Good way</b>	0.0	2.0
	<b>Bad way</b>	0.0	3.0

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

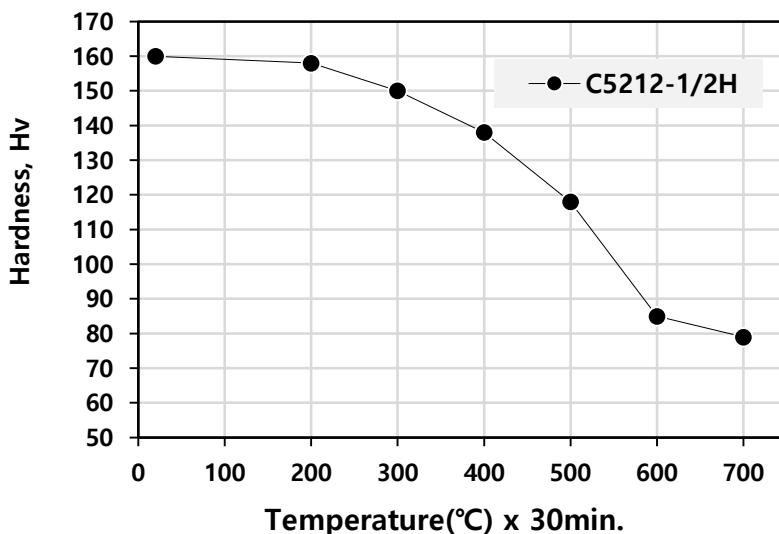
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

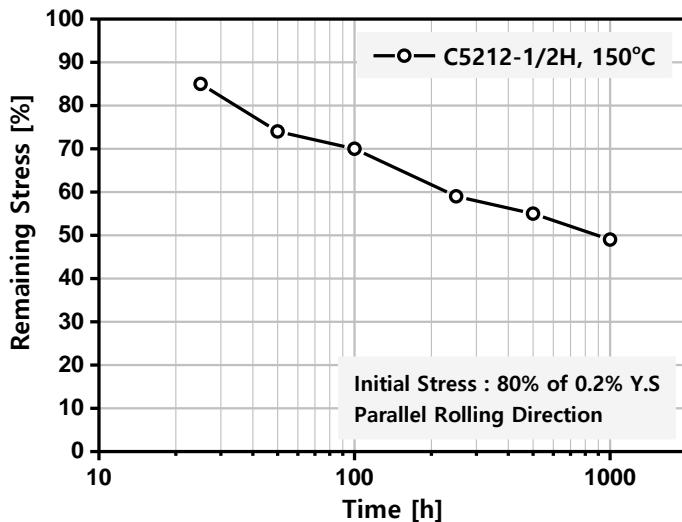


## Softening Resistance



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

## Stress Relaxation Resistance

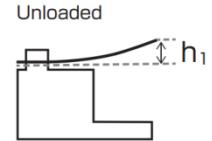
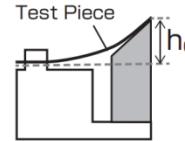


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

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 <sup>-6</sup> /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)

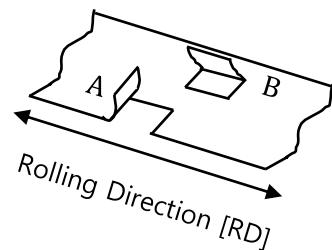
Temper	H	EH	SH
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.5
180°	<b>Good way</b>	0.0	2.0
	<b>Bad way</b>	0.0	3.0

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

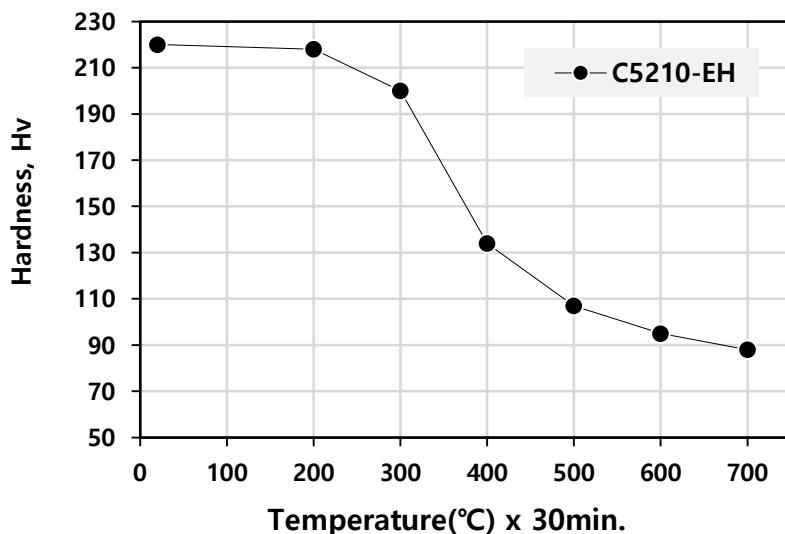
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

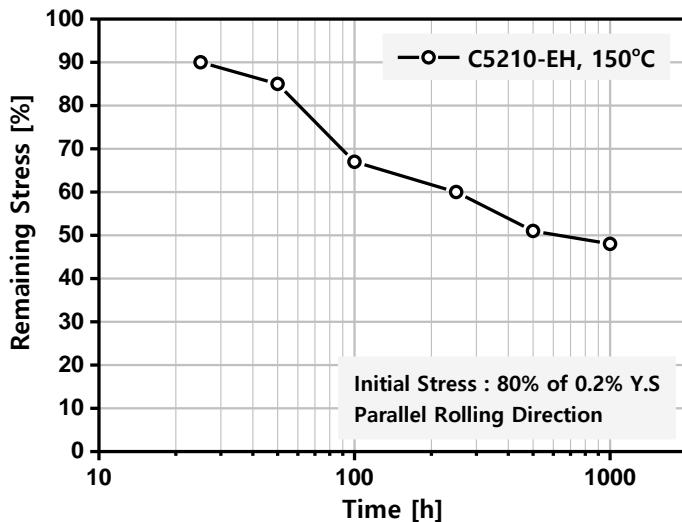


## Softening Resistance



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

## Stress Relaxation Resistance

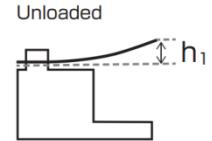
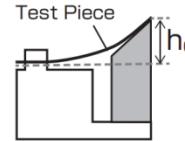


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

## 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
- Bushings
- Spring Contacts
- Bearings
- Spring

### 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 <sup>-6</sup> /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

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

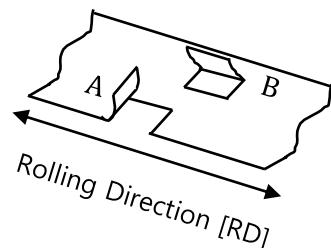
Temper	H	EH	SH
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	1.0
180°	<b>Good way</b>	1.0	2.0
	<b>Bad way</b>	2.0	3.0

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

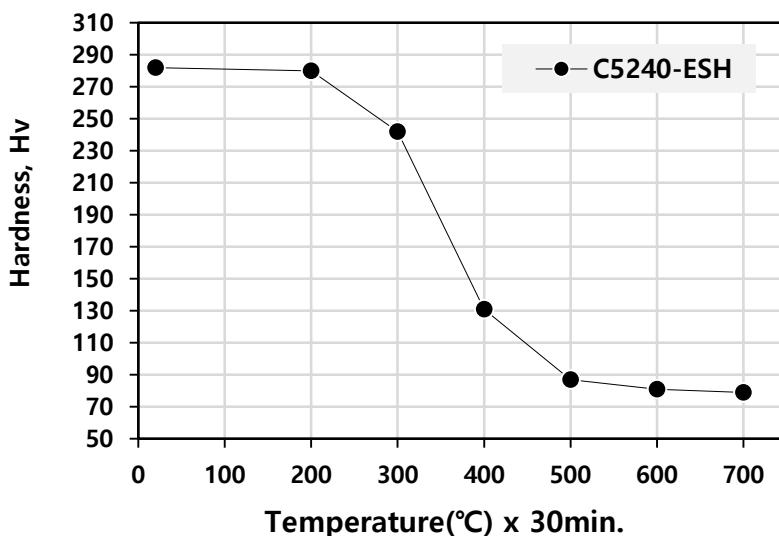
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

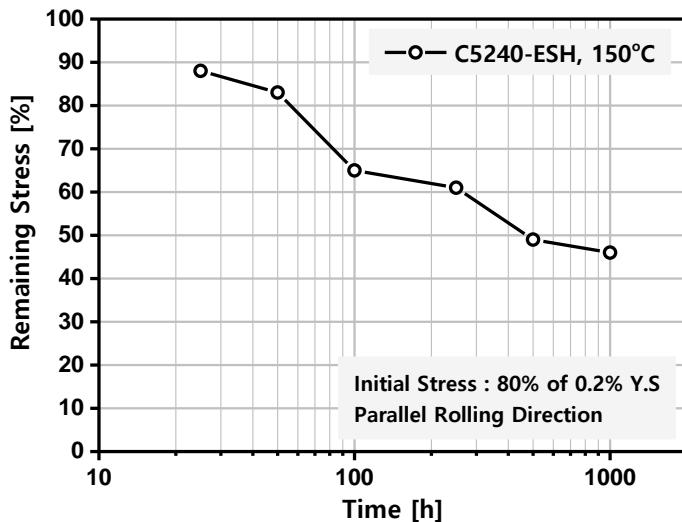


## Softening Resistance



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

## Stress Relaxation Resistance

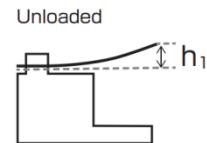
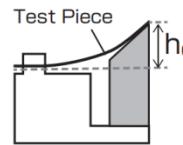


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		

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

## 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 <sup>-6</sup> /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
Elongation	%	≥20
Hardness	Hv	-
0.2% Yield Strength	MPa	≥

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

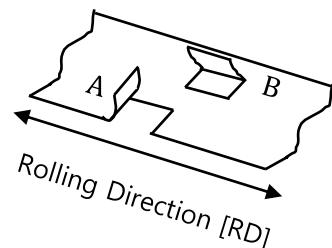
Temper	O	1/2H
90°	<b>Good way</b>	0.0
	<b>Bad way</b>	0.0
180°	<b>Good way</b>	0.0
	<b>Bad way</b>	0.0

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

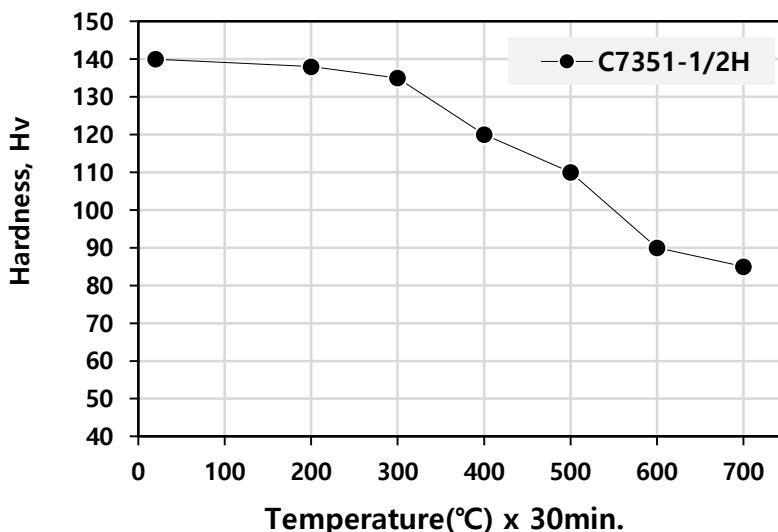
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

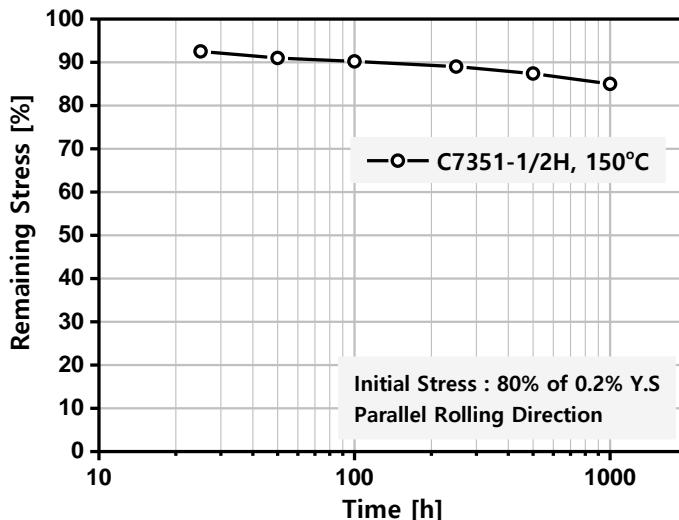


## Softening Resistance



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

## Stress Relaxation Resistance

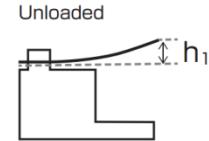
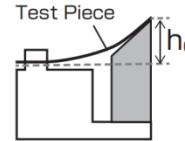


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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	Not Recommended
Brazing	Excellent		

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 <sup>-6</sup> /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
Elongation	%	≥20
Hardness	Hv	-
0.2% Yield Strength	MPa	≥

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

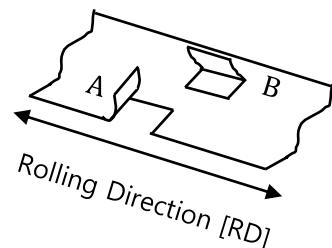
Temper	O	1/2H
90°	<b>Good way</b>	0.0
	<b>Bad way</b>	0.0
180°	<b>Good way</b>	0.0
	<b>Bad way</b>	0.0

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

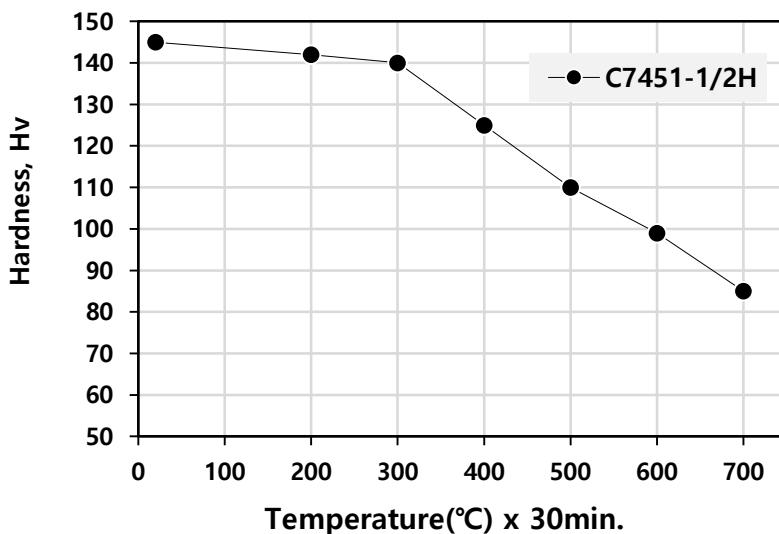
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

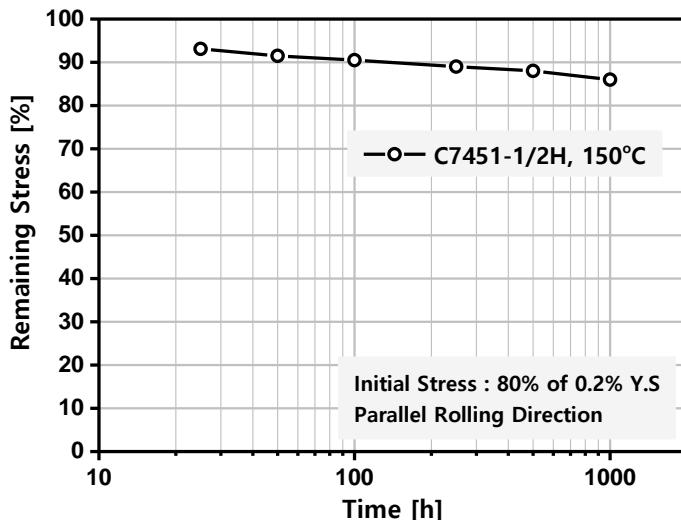


## Softening Resistance



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

## Stress Relaxation Resistance

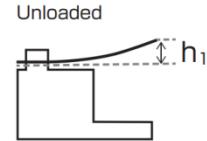
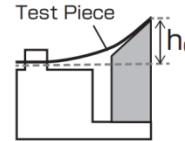


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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	Not Recommended
Brazing	Excellent		

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 <sup>-6</sup> /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	≥ 310	≥ 435	≥ 515

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

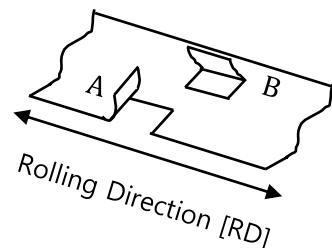
Temper	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.5
	<b>Bad way</b>	0.0	0.5
180°	<b>Good way</b>	0.0	1.0
	<b>Bad way</b>	0.0	1.0

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

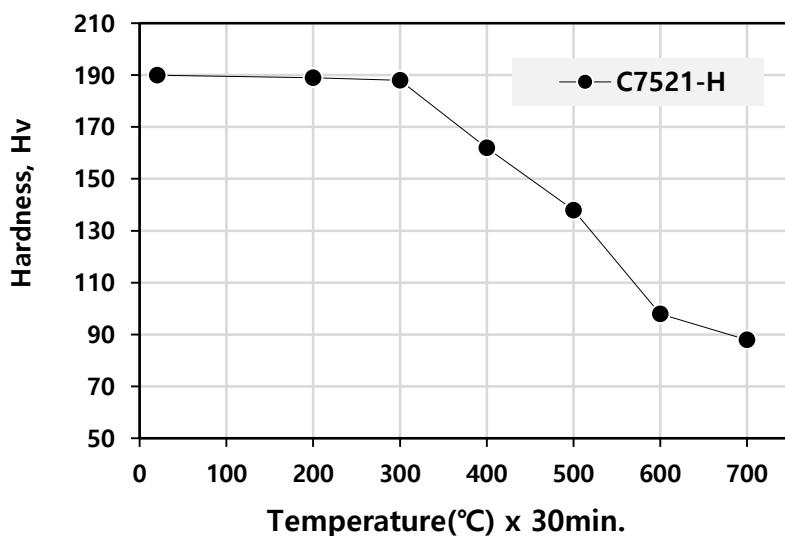
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

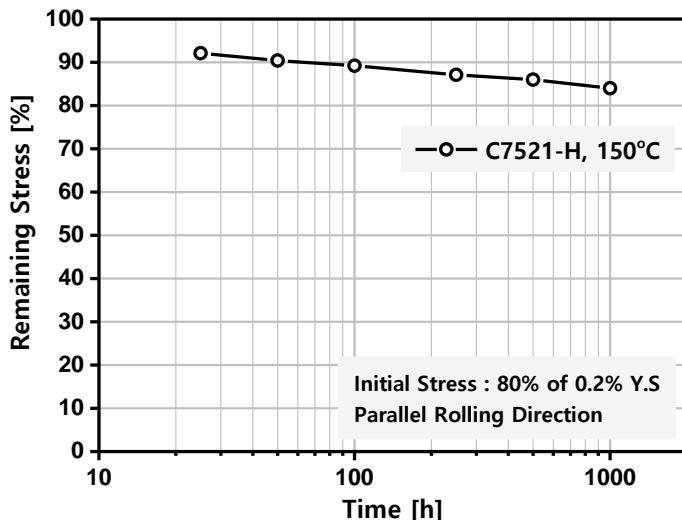


## Softening Resistance



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

## Stress Relaxation Resistance

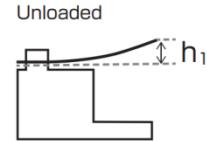
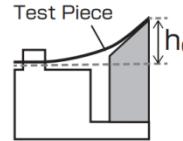


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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	Not Recommended
Brazing	Excellent		

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 <sup>-6</sup> /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)

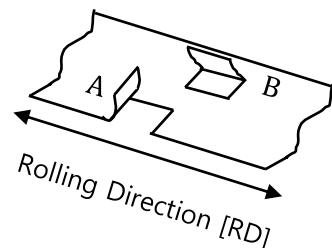
Temper	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	1.0
	<b>Bad way</b>	0.0	1.0
180°	<b>Good way</b>	0.5	1.5
	<b>Bad way</b>	0.5	1.5

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

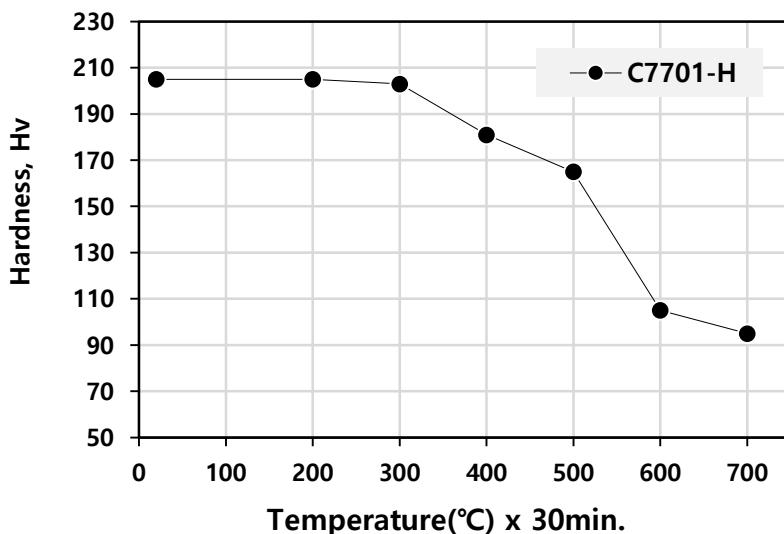
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

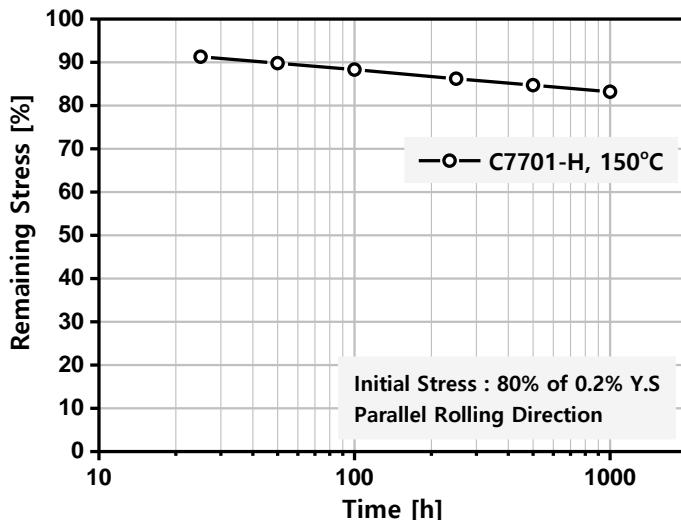


## Softening Resistance



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

## Stress Relaxation Resistance

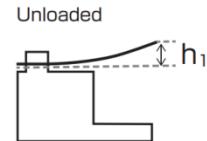
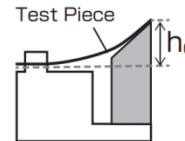


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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

## 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 <sup>-6</sup> /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)

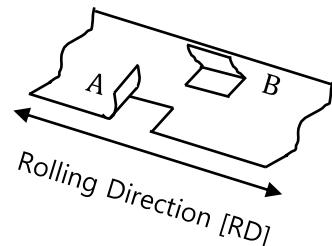
Temper		1/4H	1/2H	H
90°	<b>Good way</b>	0	0.5	1.0
	<b>Bad way</b>	0	0.5	1.0
180°	<b>Good way</b>	-	-	-
	<b>Bad way</b>	-	-	-

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

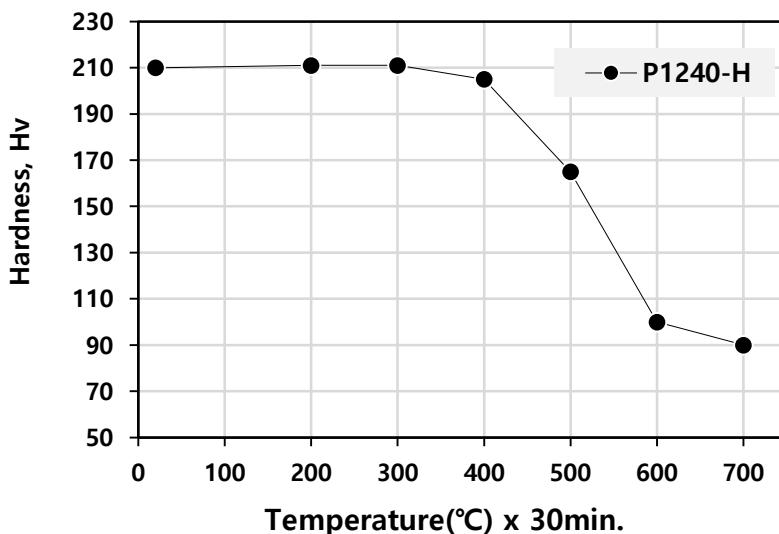
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

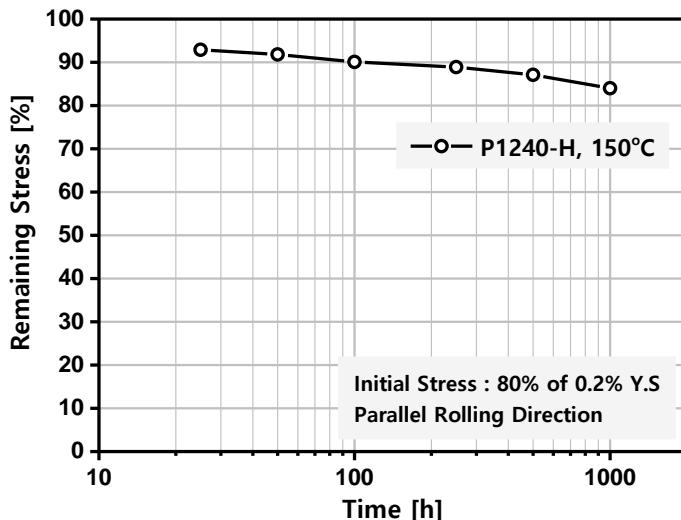


## Softening Resistance



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

## Stress Relaxation Resistance

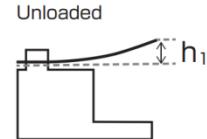
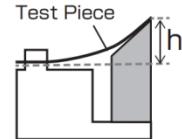


- **Test Method**

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
- Switches and Relays
- Connector
- Terminals
- Relay

### 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 <sup>-6</sup> /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)

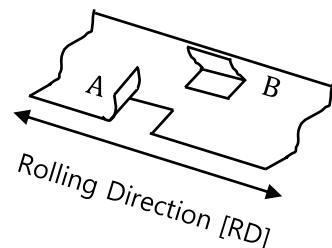
Temper	1/2H	H	EH
90°	<b>Good way</b>	0	0
	<b>Bad way</b>	0	1.0
180°	<b>Good way</b>	0	0.5
	<b>Bad way</b>	0	2

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

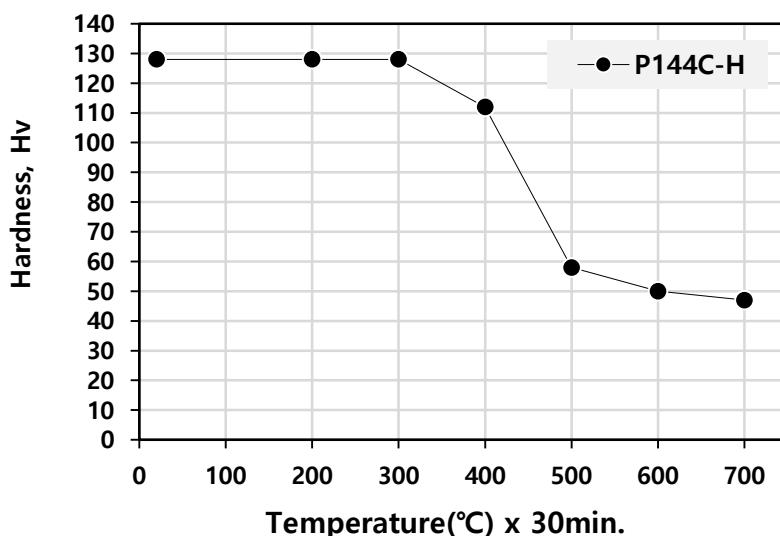
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

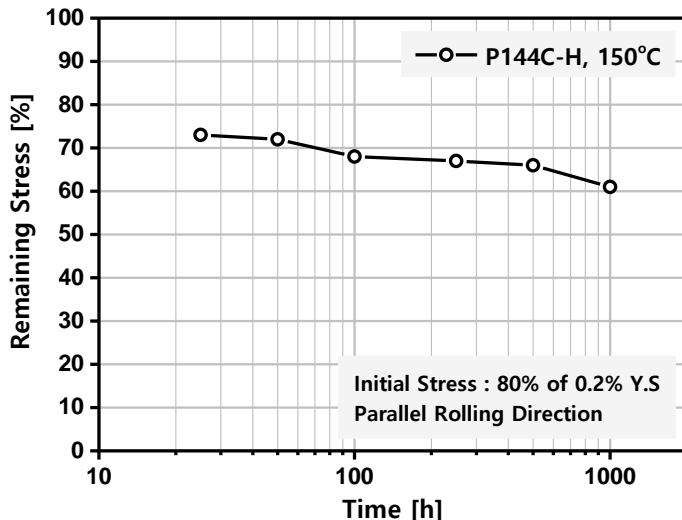


## Softening Resistance



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

## Stress Relaxation Resistance

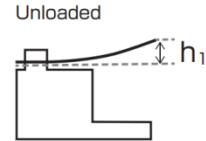
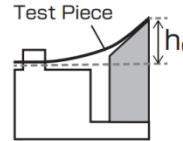


- **Test Method**

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
- Connector
- Automotive switch
- Shield can
- Relay spring

### 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 <sup>-6</sup> /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)

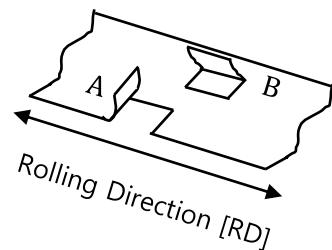
Temper	1/2H	H	EH
90°	<b>Good way</b>	0.0	0.5
	<b>Bad way</b>	0.5	1.0
180°	<b>Good way</b>	0.5	1.0
	<b>Bad way</b>	1.0	2.0
			3.0

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

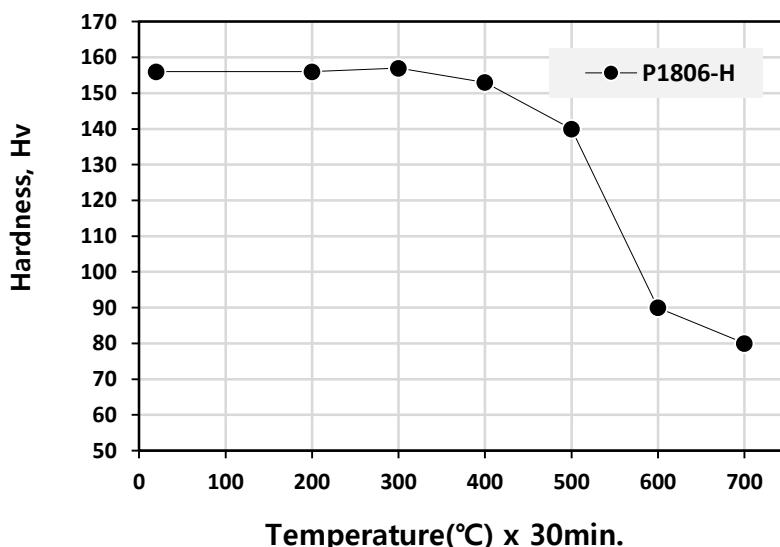
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

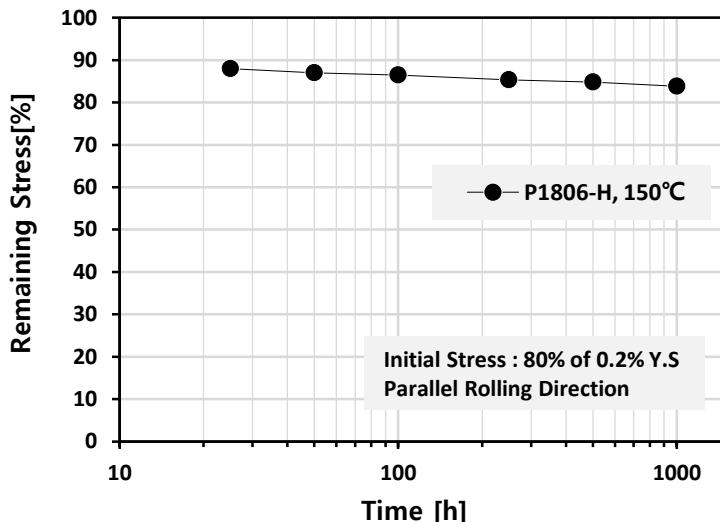


## Softening Resistance



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

## Stress Relaxation Resistance

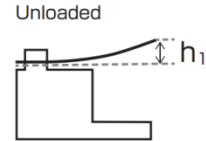
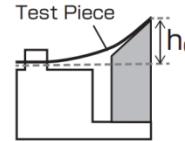


- **Test Method**

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

### 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 <sup>-6</sup> /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)

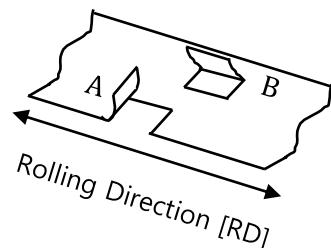
Temper	1/2H	H	EH	SH
90°	<b>Good way</b>	0.0	0.5	0.5
	<b>Bad way</b>	0.5	0.5	1.0
180°	<b>Good way</b>	0.5	1.5	1.5
	<b>Bad way</b>	1.0	2.0	2.5

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

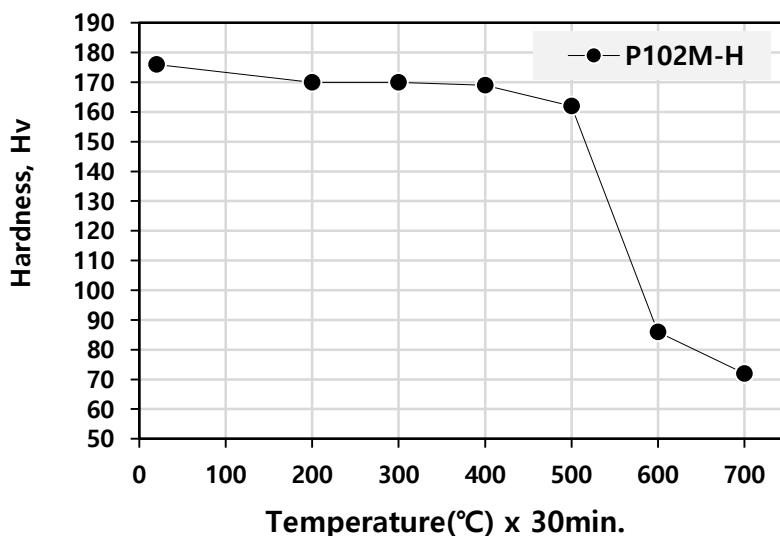
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

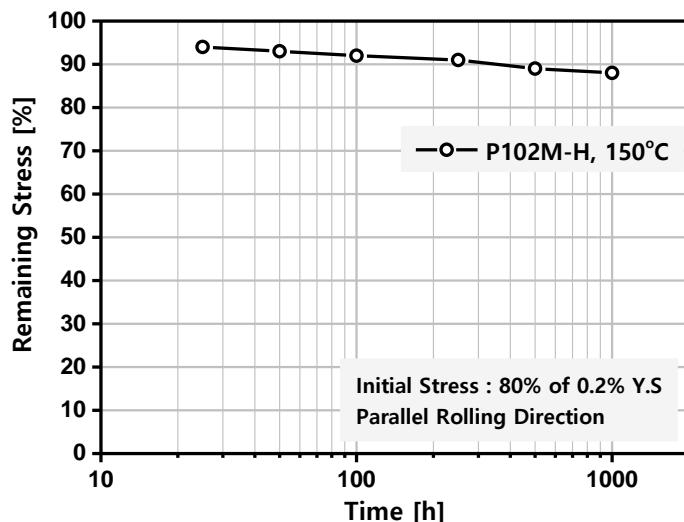


## Softening Resistance



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

## Stress Relaxation Resistance

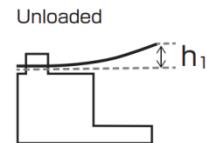
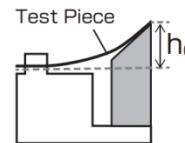


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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	$\leq 0.5$

## Physical Properties

Melting Temperature	°C	1082
Specific Gravity	-	8.9
Thermal Conductivity	W/(m·K)	350
Coefficient of Thermal Expansion	$10^{-6}/K$	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	%	$\geq 15$	$\geq 6$	$\geq 4$
Hardness	Hv	85-110	100-125	120-140
0.2% Yield Strength	MPa	$\geq 260$	$\geq 300$	$\geq 350$

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

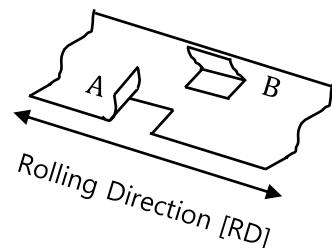
Temper	1/4H	1/2H	H
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.0
180°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.5

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

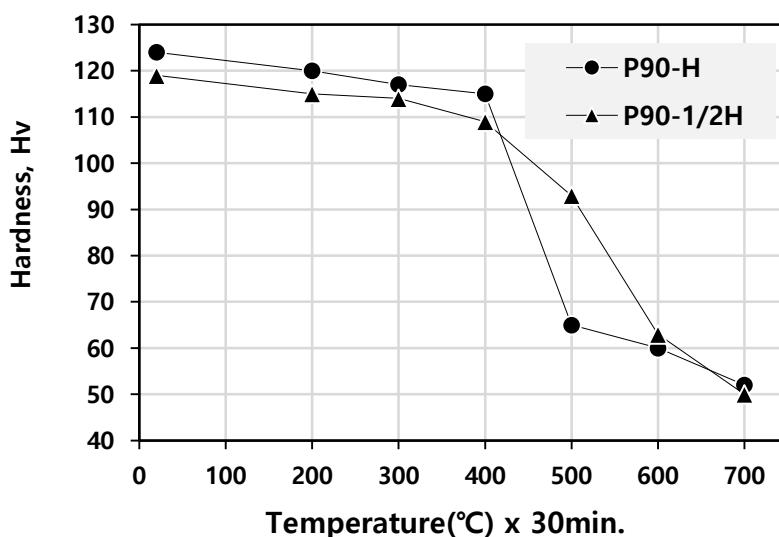
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

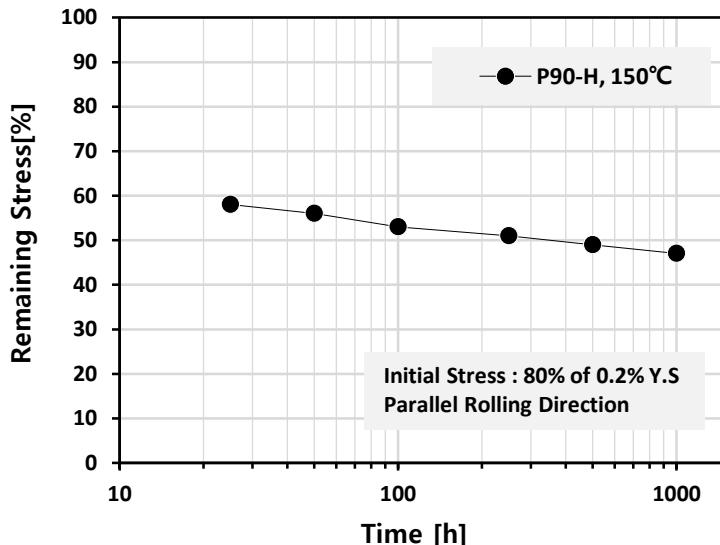


## Softening Resistance



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

## Stress Relaxation Resistance

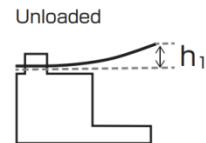
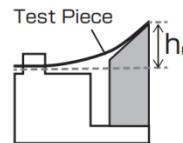


### • Test Method

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  $(\text{Fe}, \text{Mn})_2\text{P}$  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
- Connector
- Transistor
- Discrete TR
- Display Panel
- Cu-Clip
- Sensor

### 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)

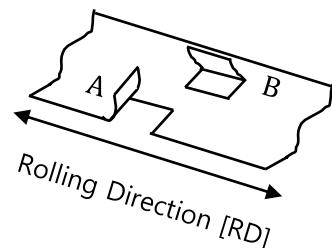
Temper	H	SH
90°	<b>Good way</b>	0.0
	<b>Bad way</b>	0.0
180°	<b>Good way</b>	0.5
	<b>Bad way</b>	1.0

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

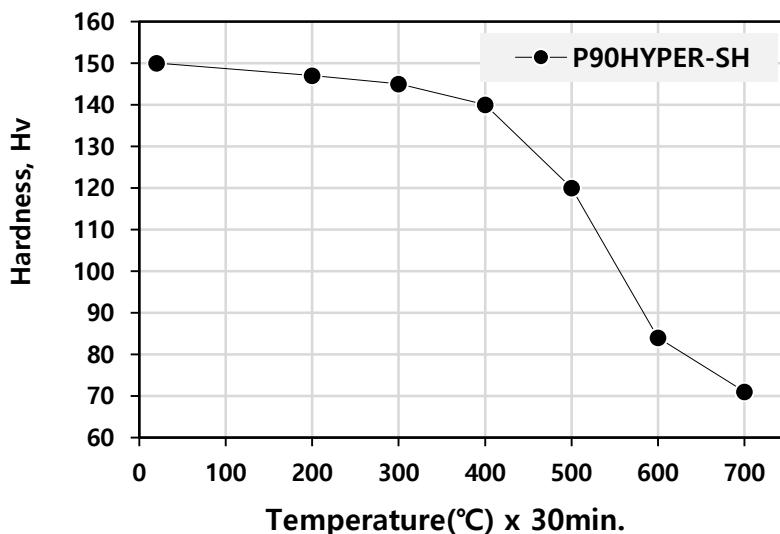
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

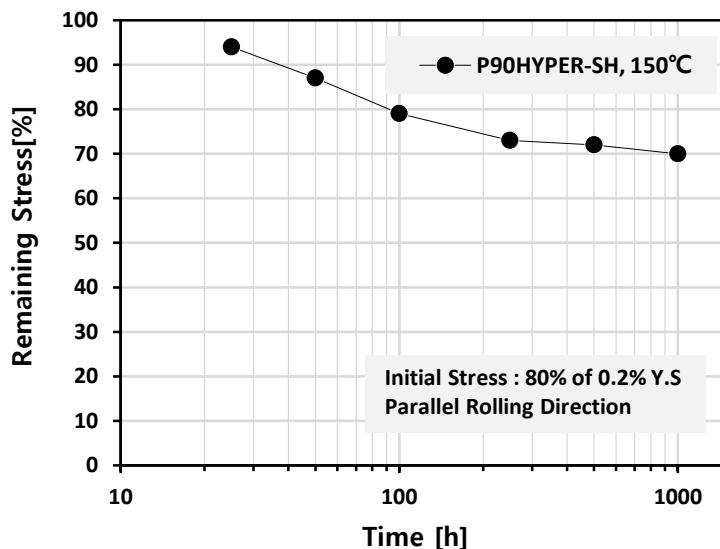


## Softening Resistance



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

## Stress Relaxation Resistance

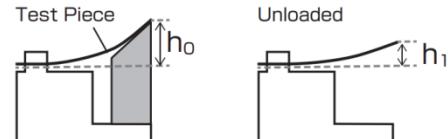


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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

## 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 <sup>-6</sup> /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)

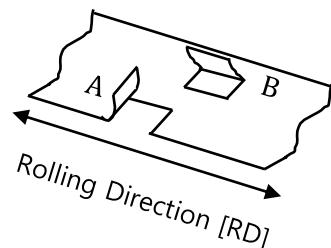
Temper	1/2H	H	SH	ESH
90°	<b>Good way</b>	0.0	0.5	1.0
	<b>Bad way</b>	0.0	1.0	2.0
180°	<b>Good way</b>	0.0	1.0	2.0
	<b>Bad way</b>	0.5	1.5	3.0

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

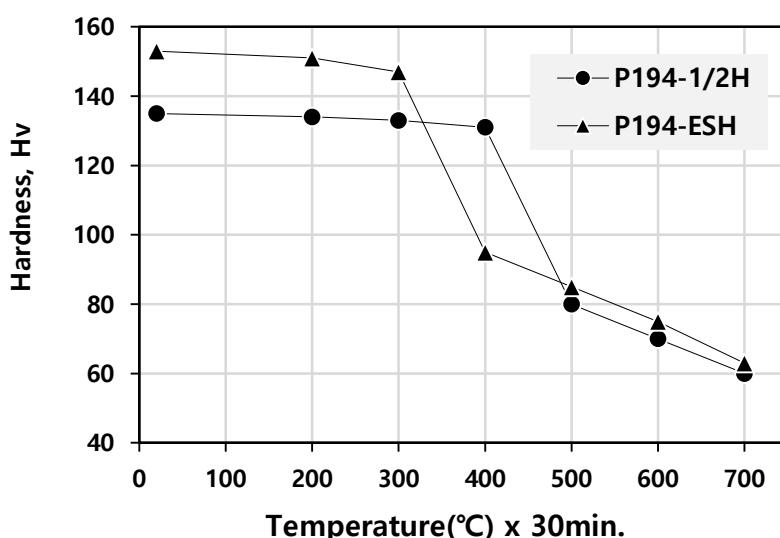
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

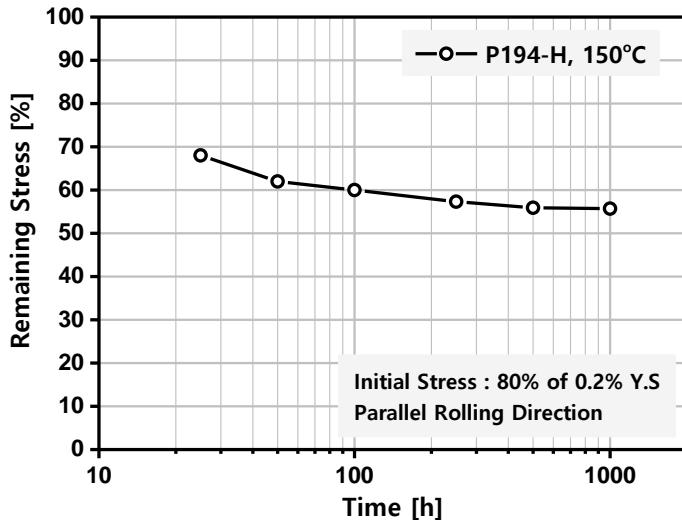


## Softening Resistance



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

## Stress Relaxation Resistance

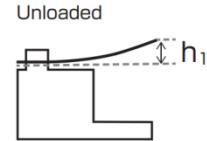
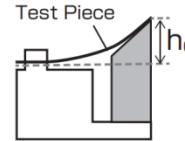


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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

### 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 <sup>-6</sup> /K	17.6
Modulus of Elasticity	GPa	121
Poisson's Ratio	-	0.33
Electrical Conductivity	%IACS	55

### Mechanical Properties

Temper	ESH
Tensile Strength	MPa
Elongation	%
Hardness	Hv
0.2% Yield Strength	MPa

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

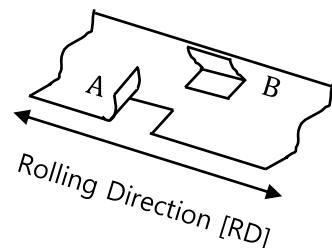
Temper	ESH
90°	Good way
	Bad way
180°	Good way
	Bad way

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

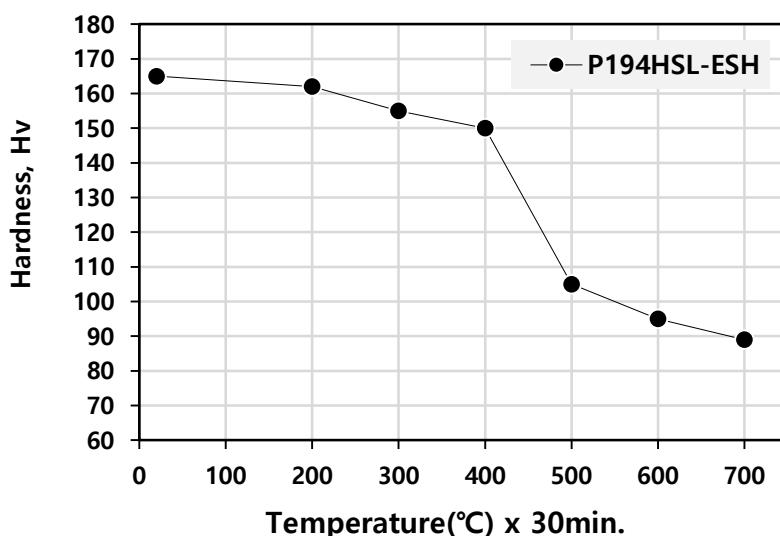
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

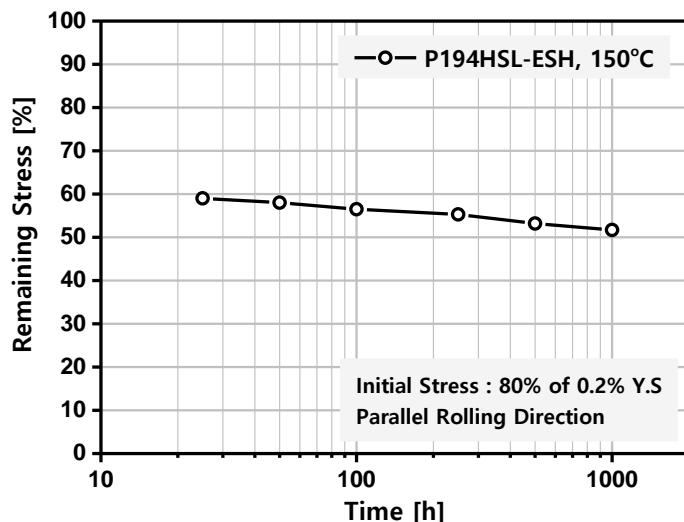


## Softening Resistance



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

## Stress Relaxation Resistance

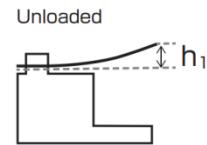
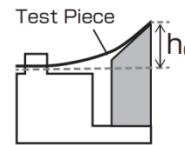


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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 <sup>-6</sup> /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)

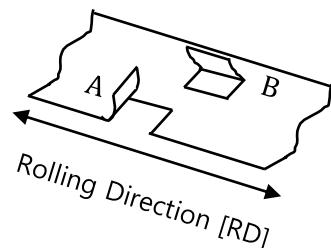
Temper	1/2H	H	EH
90°	<b>Good way</b>	0.0	0.0
	<b>Bad way</b>	0.0	0.5
180°	<b>Good way</b>	1.0	1.5
	<b>Bad way</b>	1.5	2.0

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

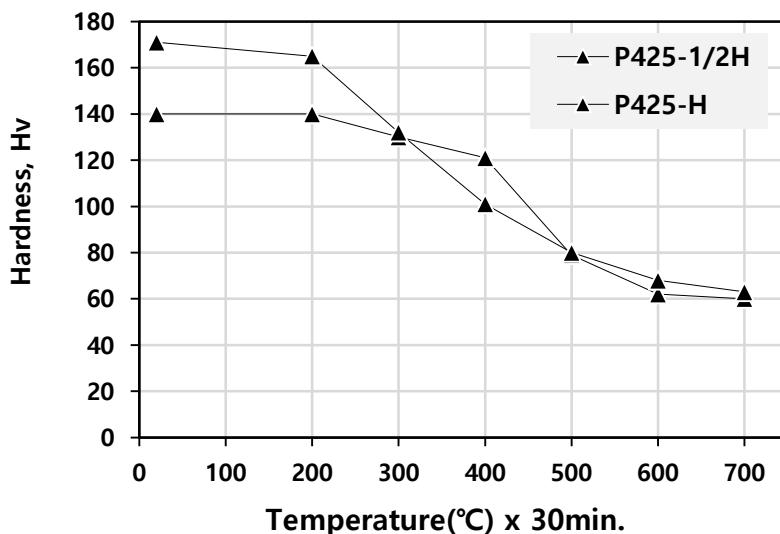
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

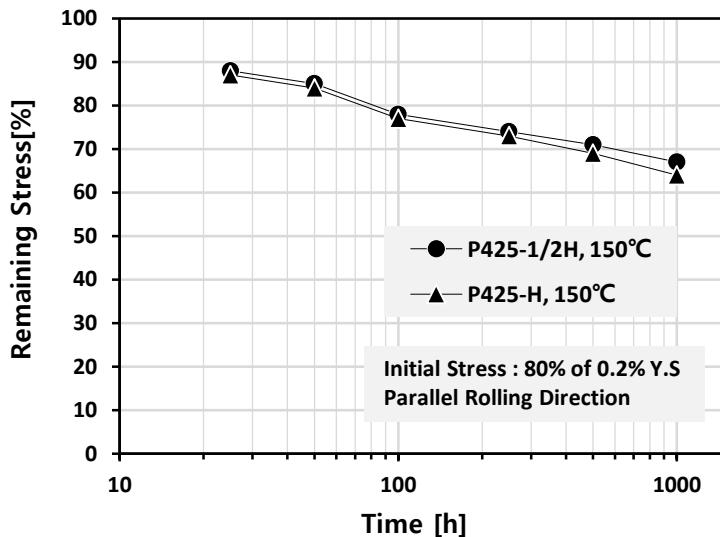


## Softening Resistance



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

## Stress Relaxation Resistance

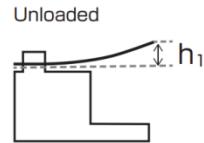
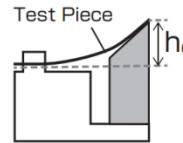


### • Test Method

Cantilever bending test equipment.

### • Remaining Stress (%)

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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	Oxyacetylene Welding	Good
Capacity for Being Hot Formed	Less suitable	Gas Shielded Arc Welding	Excellent
Soldering	Excellent	Coated Metal Arc Welding	Not suitable
Brazing	Excellent		

## UNS No. C64750

## Features

P26 are precipitation hardening alloys that form Ni<sub>2</sub>Si 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	• Wire-to-wire connector	• Pitch/small connector
• Electronic sockets	• Automobile switch	• Relay spring
• Press fit	• Terminals	

## Chemical Composition (wt%)

Cu	Balance
Ni	0.5-3.0
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 <sup>-6</sup> /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)

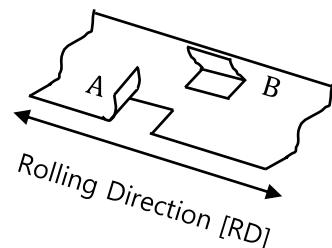
Temper	1/2H	H	EH
90°	<b>Good way</b>	0	0
	<b>Bad way</b>	0	0.5
180°	<b>Good way</b>	0	0.5
	<b>Bad way</b>	0	1.0

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

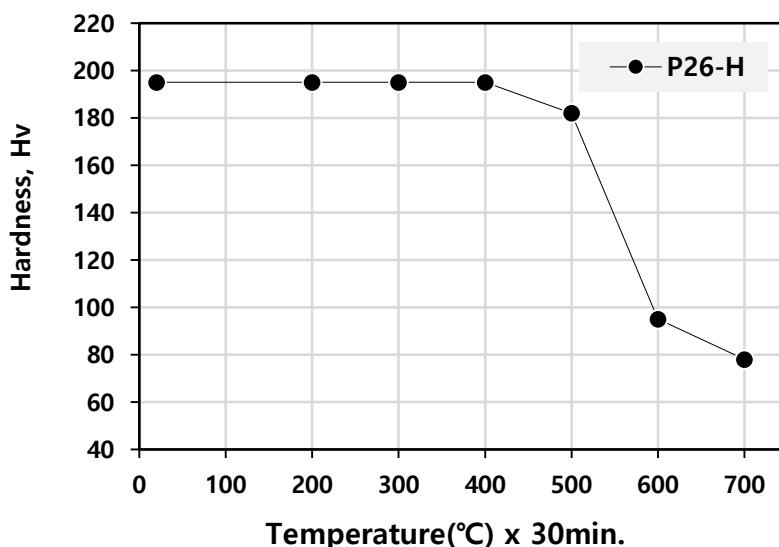
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

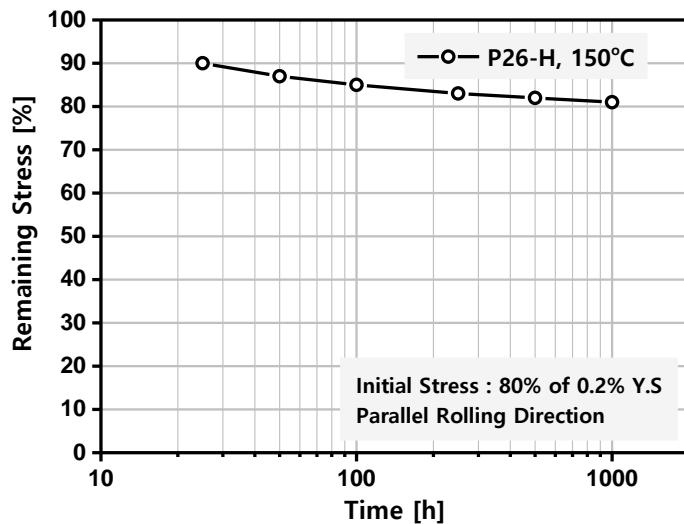


## Softening Resistance



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

## Stress Relaxation Resistance

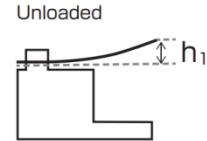
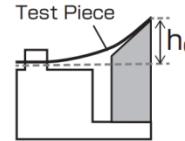


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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 <sup>-6</sup> /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)

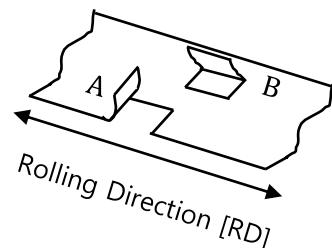
Temper	1/2H	H	EH
90°	<b>Good way</b>	0	0
	<b>Bad way</b>	0	0.5
180°	<b>Good way</b>	0.5	1
	<b>Bad way</b>	0.5	1.5

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

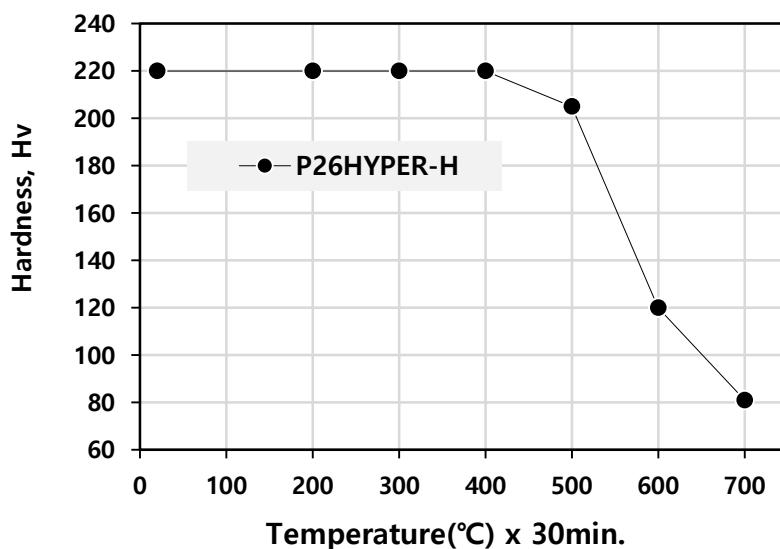
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

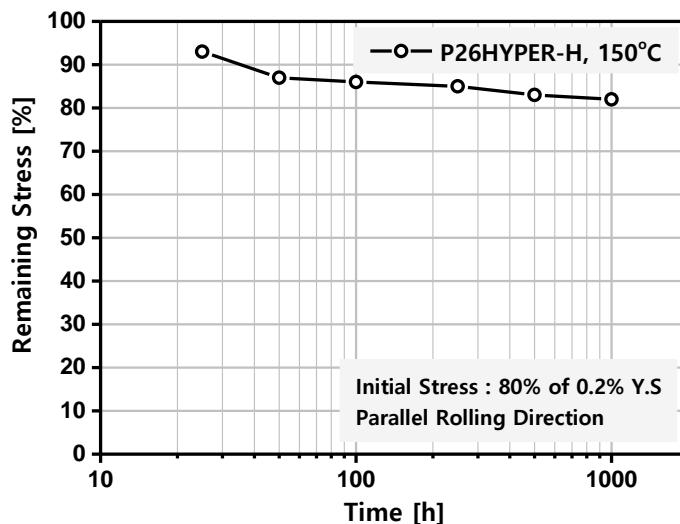


## Softening Resistance



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

## Stress Relaxation Resistance

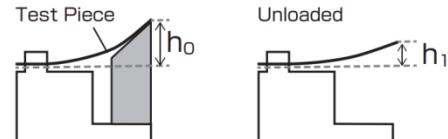


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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 <sup>-6</sup> /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)

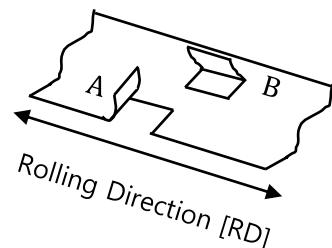
Temper	1/2H	H	EH	SH
90°	<b>Good way</b>	0	0	0
	<b>Bad way</b>	0	0	0.5
180°	<b>Good way</b>	0	0.5	1.0
	<b>Bad way</b>	0	0.5	2.0

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

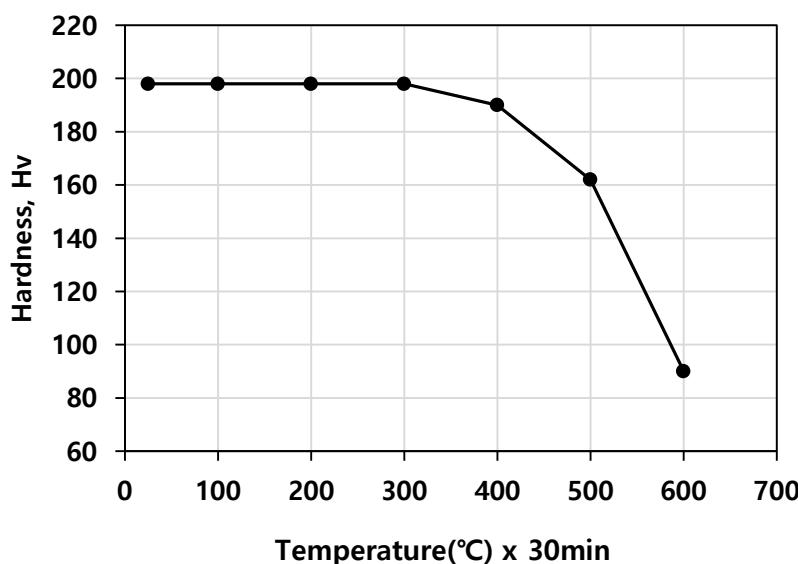
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

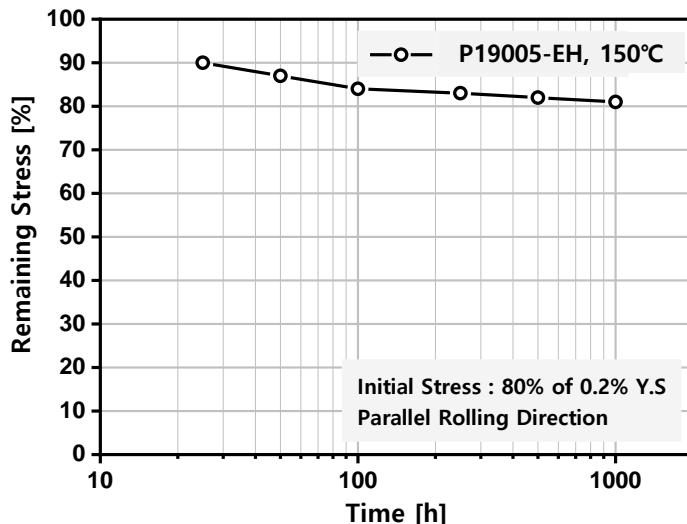


## Softening Resistance



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

## Stress Relaxation Resistance

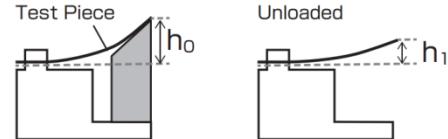


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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 <sup>-6</sup> /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)

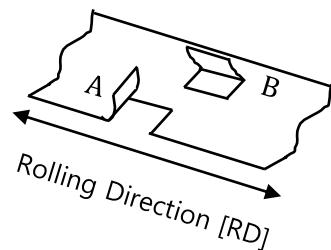
Temper	1/2H	H	EH
90°	<b>Good way</b>	0.5	1.0
	<b>Bad way</b>	1.0	1.5
180°	<b>Good way</b>	0.5	1.0
	<b>Bad way</b>	1.0	1.5

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

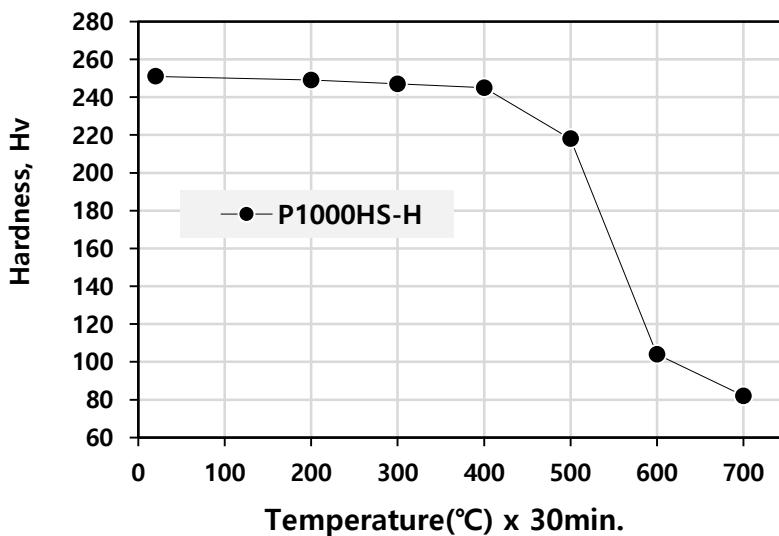
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

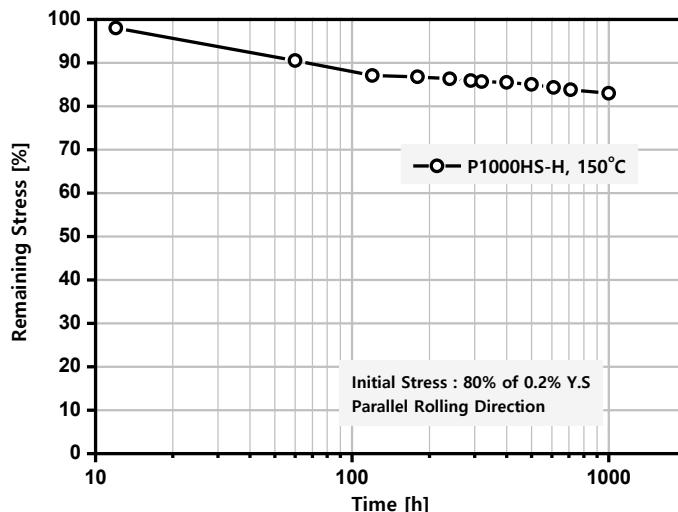


## Softening Resistance



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

## Stress Relaxation Resistance

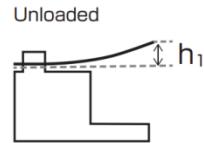
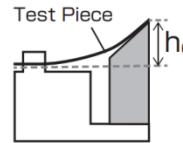


### Test Method

Cantilever bending test equipment.

### Remaining Stress (%)

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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

### 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 <sup>-6</sup> /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)

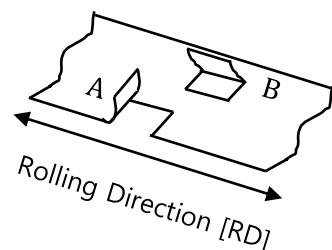
Temper	H	EH	SH
90°	<b>Good way</b>	0.5	2.0
	<b>Bad way</b>	1.0	3.5
180°	<b>Good way</b>	1.5	2.0
	<b>Bad way</b>	2.5	3.5

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

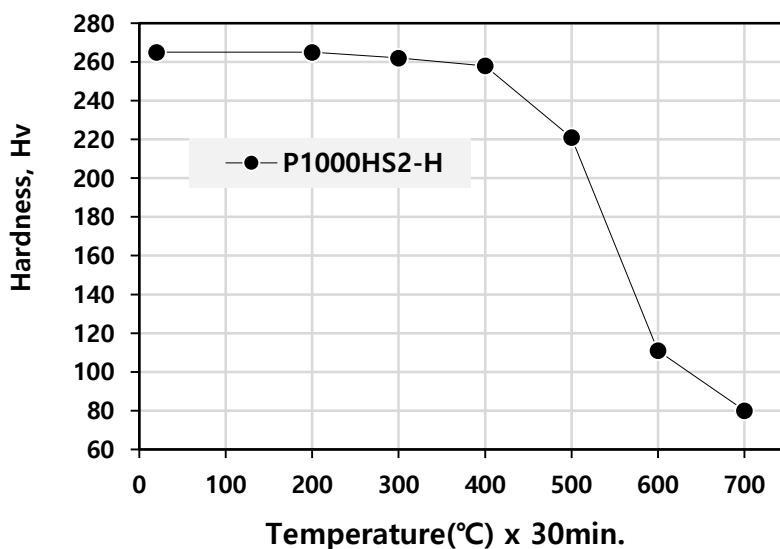
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

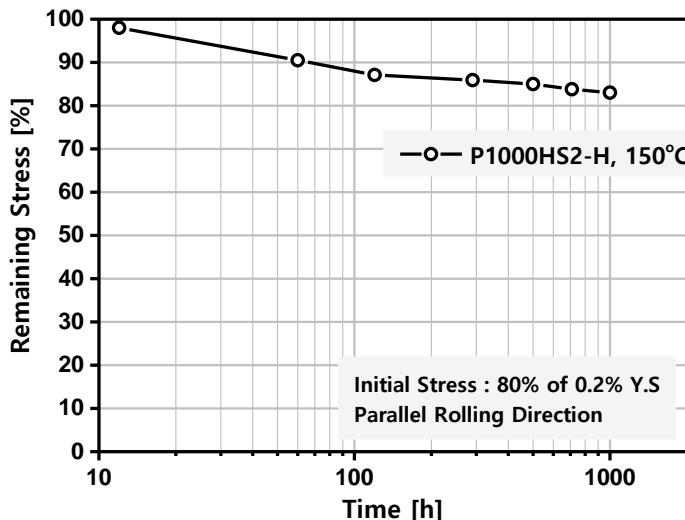


## Softening Resistance



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

## Stress Relaxation Resistance

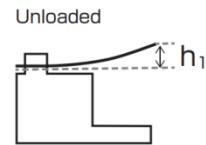
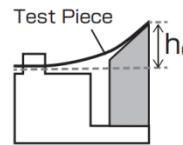


- **Test Method**

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	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

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

## 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 <sup>-6</sup> /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
Elongation	%	≥5	≥1
Hardness	Hv	250-295	265-310
0.2% Yield Strength	MPa	800-900	860-980
			910-1030

## Bending Properties

### r/t (Minimum Bending Radius / thickness)

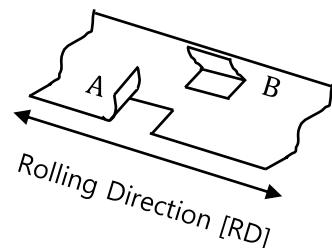
Temper	H	EH	SH
90°	<b>Good way</b>	1.5	2.5
	<b>Bad way</b>	2.0	5.0
180°	<b>Good way</b>	-	-
	<b>Bad way</b>	-	-

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

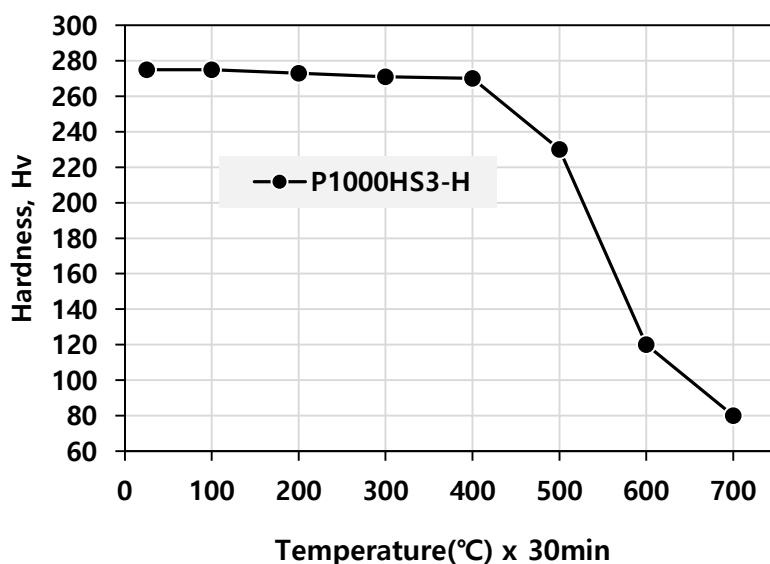
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

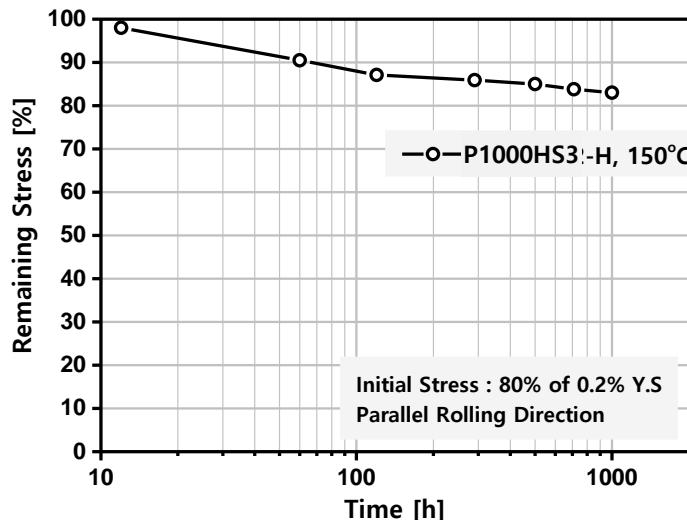


## Softening Resistance



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

## Stress Relaxation Resistance

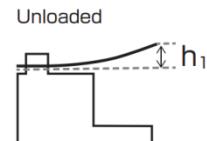
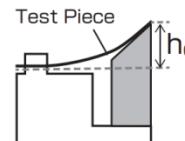


- **Test Method**

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

## 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 <sup>-6</sup> /K	176
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)

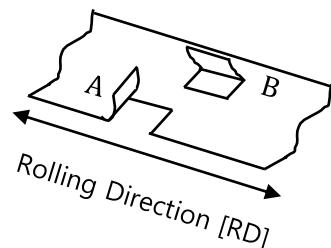
Temper	1/2H	H
90°	<b>Good way</b>	0.0
	<b>Bad way</b>	0.0
180°	<b>Good way</b>	1.0
	<b>Bad way</b>	1.0

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

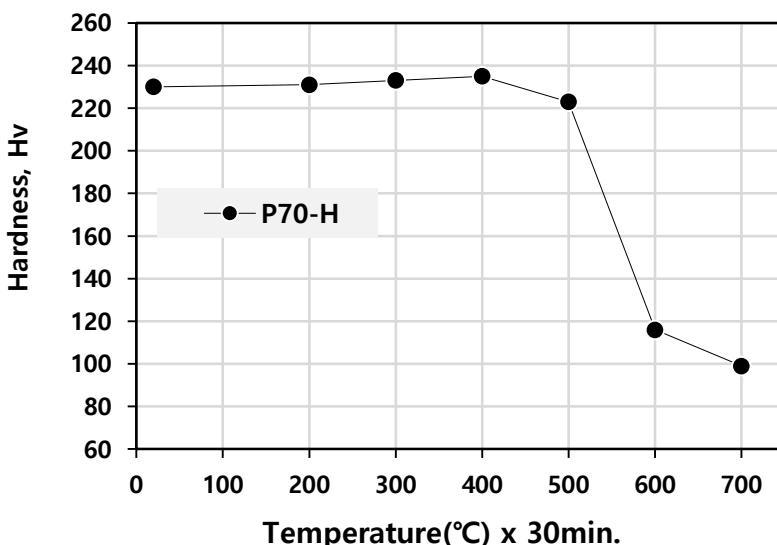
### Bending Direction

**A : Good Way**  
(Transverse to RD)

**B : Bad Way**  
(Parallel to RD)

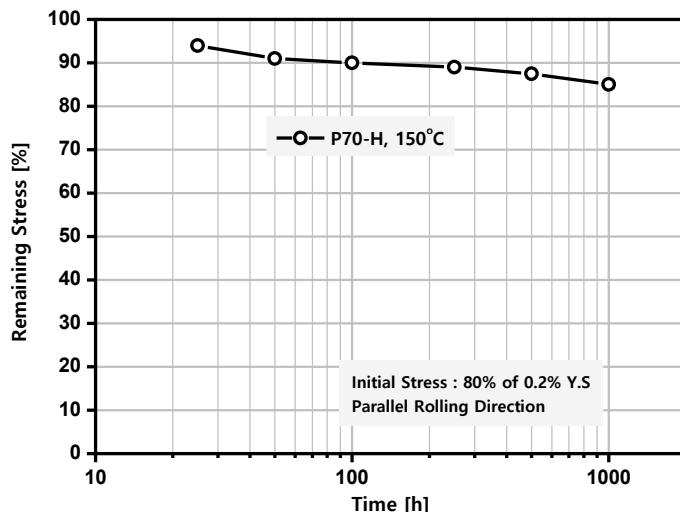


## Softening Resistance



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

## Stress Relaxation Resistance

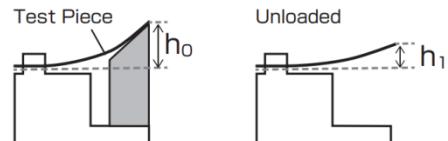


- **Test Method**

Cantilever bending test equipment.

- **Remaining Stress (%)**

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



Initial Stress is 80% of Yield Strength

## Corrosion Resistance

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		