

# Heat Discoloration Resistant Nickel Silver HCR-C7521

Nickel silver is a ternary alloy composed of copper (Cu), nickel (Ni), and zinc (Zn).

The addition of nickel enhances spring properties, zinc contributes to increased strength, and copper ensures excellent workability and mechanical performance.

Among JIS-designated alloys, C7521 and C7701 are commonly used in shield cases and similar components.

However, during atmospheric soldering processes, exposure to temperatures exceeding 250° C for approximately five minutes often results in surface discoloration, leading to visual defects. To address this issue, we optimized the processing conditions of C7701 and successfully developed a material that maintains its appearance even after heating at 250–300° C for five minutes.

This enhanced material is referred to as Heat Discoloration Resistant C7521, abbreviated as HCR-C7521.

## Chemical Composition (wt%)

	Cu	Pb	Fe	Zn	Mn	Ni
Composition	62.0–66.0	≤0.03	≤0.25	Res.	0–0.50	16.5–19.5

## Physical Properties

Melting Point	Liquidus Temperature	°C	1,110
	Solidus Temperature	°C	1,070
Specific Heat (20°C)		J/(kg·K)	377
Density (20°C)		g/cm <sup>3</sup>	8.73
Thermal Conductivity (20°C)		W/(m·K)	33
Coefficient of Thermal Expansion (20–300°C)		/K	16.2x10 <sup>-6</sup>
Elastic Modulus		GPa	125
Shear Modulus		GPa	47
Poisson's Ratio		—	0.32
Electrical Conductivity		%IACS	6.0
Electrical Resistivity		μ Ω ·m	287x10 <sup>-3</sup>

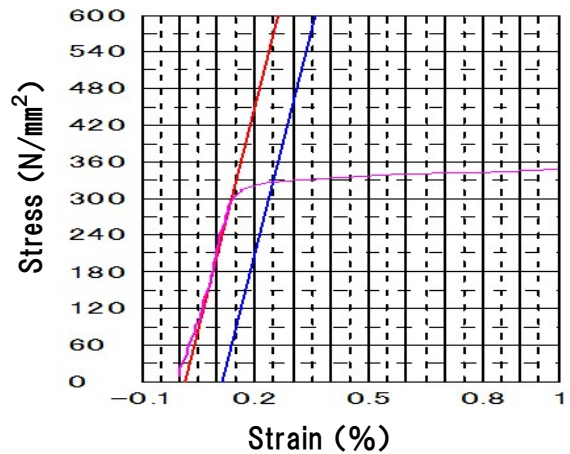
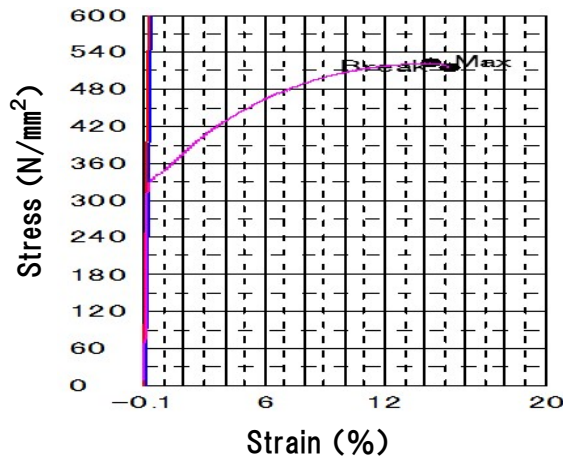
## Mechanical Properties

Applicable thickness(mm)	0.10 - 0.3		≥0.10	≤0.3	
Temper	Tensile Strength MPa	Elongation %	Hardness Hv	Bending Test	
				Angle	Radius
1/2H	440–570	≥5	120–180	90° W	1.0T
H	540–640	≥3 *1	150–210	90° W	2.0T
EH	≥610	—	≥185	—	—

\*1 This applies to materials with a thickness of 0.15 mm or more.

## Stress-Strain Curve

Material: C7521-1/2H, Thickness: 0.20mm, Tensile Strength: 526MPa, 0.2% Proof Strength: 342MPa



Note : Specimen aligned to parallel to the rolling direction

## Heat Resistance Test Results

Discoloration was evaluated using the L\*a\*b\* color space defined by JIS Z8729.

L\*: Lightness (0=black, 100=white)

a\*: Red (+) / Green (-) axis

b\*: Yellow (+) / Blue (-) axis

Higher absolute values of a\* and b\* indicate greater chromatic intensity (saturation).

See Fig 1,  
The diagram illustrates the a\*-b\* plane of the L\*a\*b\* color space. Saturation increases radially from the center.

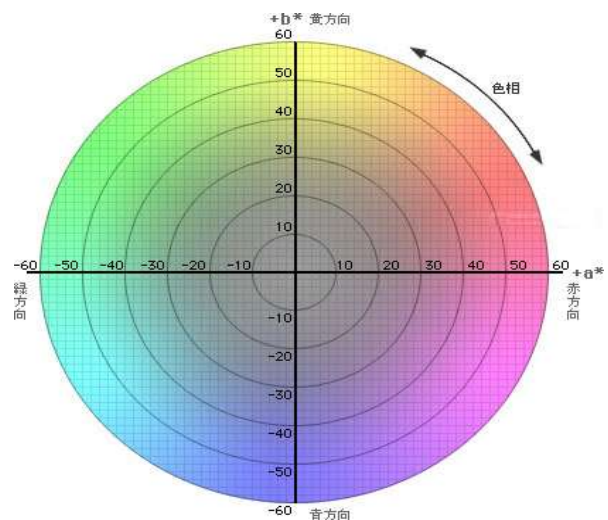
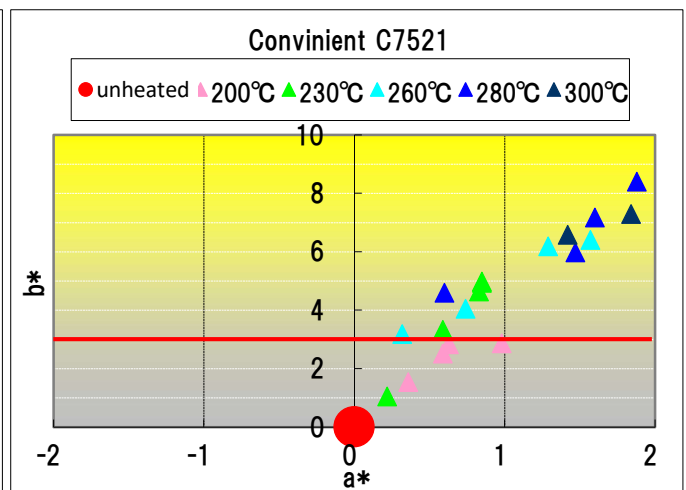
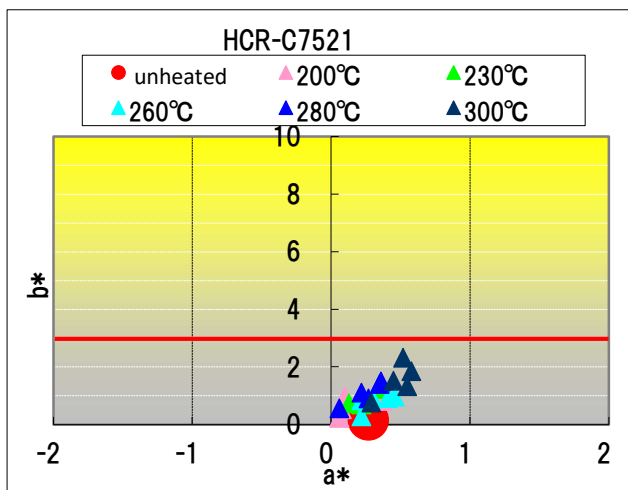


Fig1. Hue and Saturation



Note 1: A color difference of 3 units or more in the a\* and b\* axes is visually perceptible.  
(Crossing the red horizontal threshold indicates noticeable discoloration.)

Note 2: Color change is expressed relative to the reference material unheated, which is defined as zero. The values indicate the degree of deviation for each sample.

## Manufacturing Range

- **Strip**

Thickness: 0.10–0.40mm

Packaging: Pancake coil

- **Sheet**

Thickness: 0.10–0.40mm

Note 1: Detailed specification and available thickness are provided upon request.

Note 2: There are no differences in chemical composition, physical properties, or mechanical characteristics compared to conventional C7521 material.

## Contact Information

For further details, please contact us using the information below.



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# Heat Discoloration Resistant Nickel Silver HCR-C7701

Nickel silver is a ternary alloy composed of copper (Cu), nickel (Ni), and zinc (Zn).

The addition of nickel enhances spring properties, zinc contributes to increased strength, and copper ensures excellent workability and mechanical performance.

Among JIS-designated alloys, C7521 and C7701 are commonly used in shield cases and similar components.

However, during atmospheric soldering processes, exposure to temperatures exceeding 250° C for approximately five minutes often results in surface discoloration, leading to visual defects. To address this issue, we optimized the processing conditions of C7701 and successfully developed a material that maintains its appearance even after heating at 250–300° C for five minutes.

This enhanced material is referred to as Heat Discoloration Resistant C7701, abbreviated as HCR-C7701.

## Chemical Composition (wt%)

	Cu	Pb	Fe	Zn	Mn	Ni
Composition	54.0–58.0	≤0.03	≤0.25	Res.	0–0.50	16.5–19.5

## Physical Properties

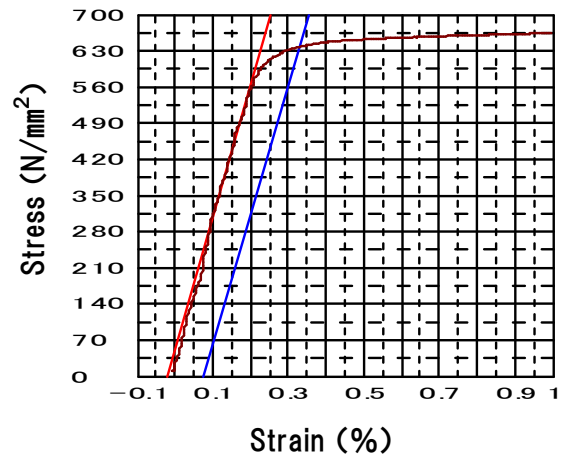
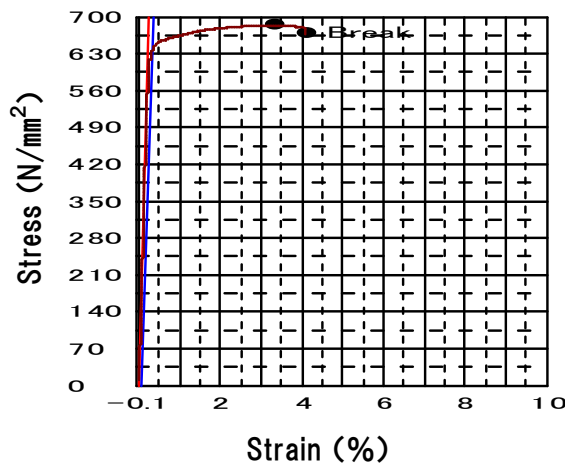
Melting Point	Liquidus Temperature	°C	1,055
	Solidus Temperature	°C	—
Specific Heat (20°C)		J/(kg·K)	377
Density (20°C)		g/cm <sup>3</sup>	8.70
Thermal Conductivity (20°C)		W/(m·K)	29
Coefficient of Thermal Expansion (20–300°C)		/K	16.7x10 <sup>-6</sup>
Elastic Modulus		GPa	125
Shear Modulus		GPa	47
Poisson's Ratio		—	0.32
Electrical Conductivity		%IACS	5.5
Electrical Resistivity		μ Ω ·m	314x10 <sup>-3</sup>

## Mechanical Properties

Applicable thickness(mm)	0.10 – 0.30		≥0.10	≥0.10	≤0.3	
Temper	Tensile Strength	Elongation	Hardness	Elastic limit of a spring	Bending Test	
	MPa	%	Hv	MPa	Angle	Radius
1/2H	540–655	≥8	150–210	≥390	90° W	1.5T
H	630–735	≥4	180–240	≥480	90° W	2.0T
EH	705–805	—	210–260	≥560	90° W	3.0T

## Stress-Strain Curve

Material: C7701-H, Thickness: 0.15mm. Tensile strength: 685MPa, 0.2% Proof Strength: 641MPa



Note : Specimen aligned to parallel to the rolling direction

## Heat Resistance Test Results

Discoloration was evaluated using the L\*a\*b\* color space defined by JIS Z8729.

L\*: Lightness (0=black, 100=white)

a\*: Red (+) / Green (-) axis

b\*: Yellow (+) / Blue (-) axis

Higher absolute values of a\* and b\* indicate greater chromatic intensity (saturation).

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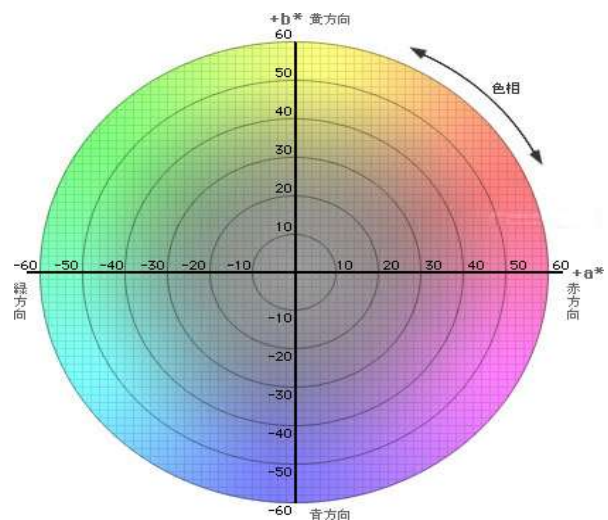
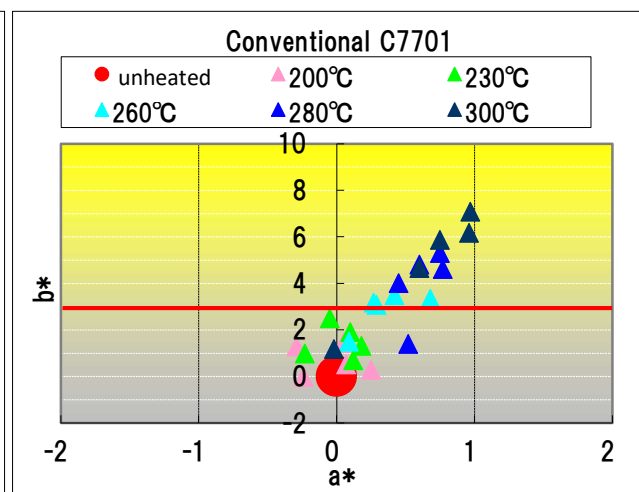
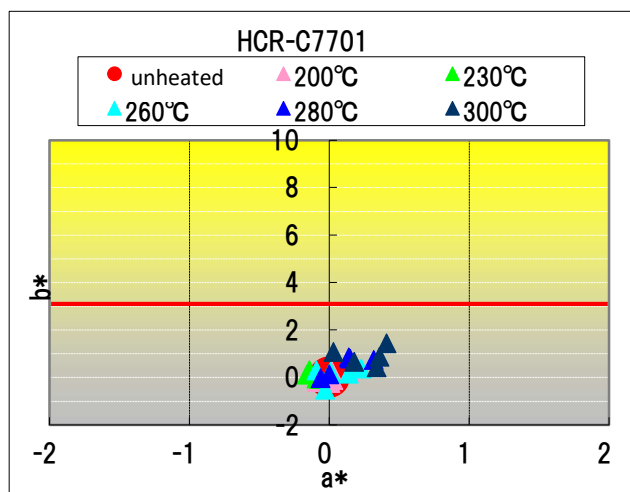


Fig1. Hue and Saturation



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