Hi-Performance Alloy Series

Technical Data

High Strength 3%-Titanium Copper

Hyper Titanium Copper (C1990HP)

JX Metals Corporation

1.Introduction

JX has been supplying numbers of copper alloys.
Recently, JX has developed new series of copper alloys, which were named *Hi-Performance Alloy Series*.
On this brochure, *Hyper Titanium Copper Alloy (C1990HP)* in the series is introduced.
C1990HP has high tensile strength as well as excellent bend formability, while chemical composition stays same as conventional titanium copper Alloy (CDA C19900).
You will be satisfied, we are sure, to find excellent characteristics of *C1990HP* for electronic materials such as switches, connectors, relays etc.

*Technical Data on this brochure shows typical value not guarantied one.

2.Features

(1) *C1990HP* has almost as same yield strength, spring toughness and fatigue strength as mill-Hardened Beryllium Copper for spring applications.
(2) Excellent bend formability provides severe bending design.
(3) Same chemical composition as conventional titanium copper means easy scrap control and including no poison elements.

3.Chemical Composition

Table 1. Typical chemical composition of *C1990HP*

	Ti	Cu+Ti
Typical	2.9～3.5%	≧99.5%

4.Physical Properties

Table 2. Physical Properties of *C1990HP*

Electric Conductivity	12	%IACS(@20℃)
Specific Resistance	144	nΩ·m(@20℃)
Thermal Conductivity	54	W/mK
Thermal Expansion Coefficient	18.6	$\times 10^{-6}$ (20 to 450℃)
Young's Modulus	127	kN/mm^2
Density	8.70	g/cm^3

5.Mechanical Properties

Table 3. Mechanical Properties of *C1990HP (lower numbers are typical values)*

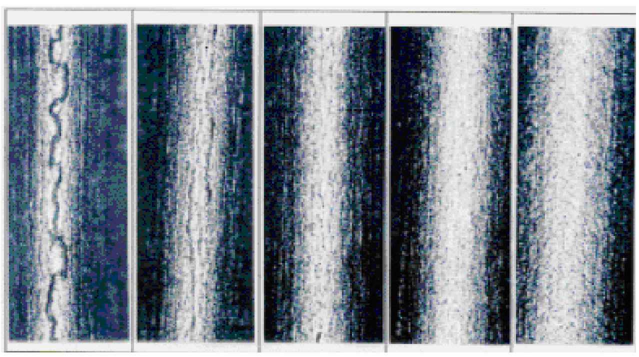
Temper	Tensile Strength (N/mm^2)	0.2% offset Yield Strength (N/mm^2)	Elongation (%)	Vickers hardness	Comment
EH(conventional)	*885～1080*	*800～ 900*	*≧ 5.0 (10.0)*	*≧280 (300)*	Comparison
C1990HP-EH	*885～1080*	*780～ 930*	*≧10.0 (17.0)*	*≧280 (300)*	Hyper Titanium Copper Alloy
C1990HP-SH	*910～1110*	*810～ 960*	*≧8.0 (14.0)*	*≧300 (320)*	
C1990HP-ESH	*1000～1180*	*950～1100*	––– *(3.0)*	*≧320 (340)*	
C1990HP-XSH	*1050～1300*	*1000～1200*	–––	–––	

6.Bend Formability

“W” shaped bending test was performed to evaluate bend formability. The minimum bend radius (MBR) without surface crack is determined. Table 4 shows MBR/t value, while fig. 1 shows outside surface. It is apparent that *C1990HP* gives much better bend formability.

Table 4. Minimum Bend Radius (MBR) of *C1990HP*

	MBR/t		Comment
	good way	bad way	
EH(conventional)	*1.0*	*4.0*	comparison
C1990HP-EH	*0*	*1.0*	Hyper Titanium Copper Alloy
C1990HP-SH	*0*	*2.0*	
C1990HP-ESH	*2.0*	*≧5.0*	



R/t 0.0 1.0 2.0 3.0 4.0

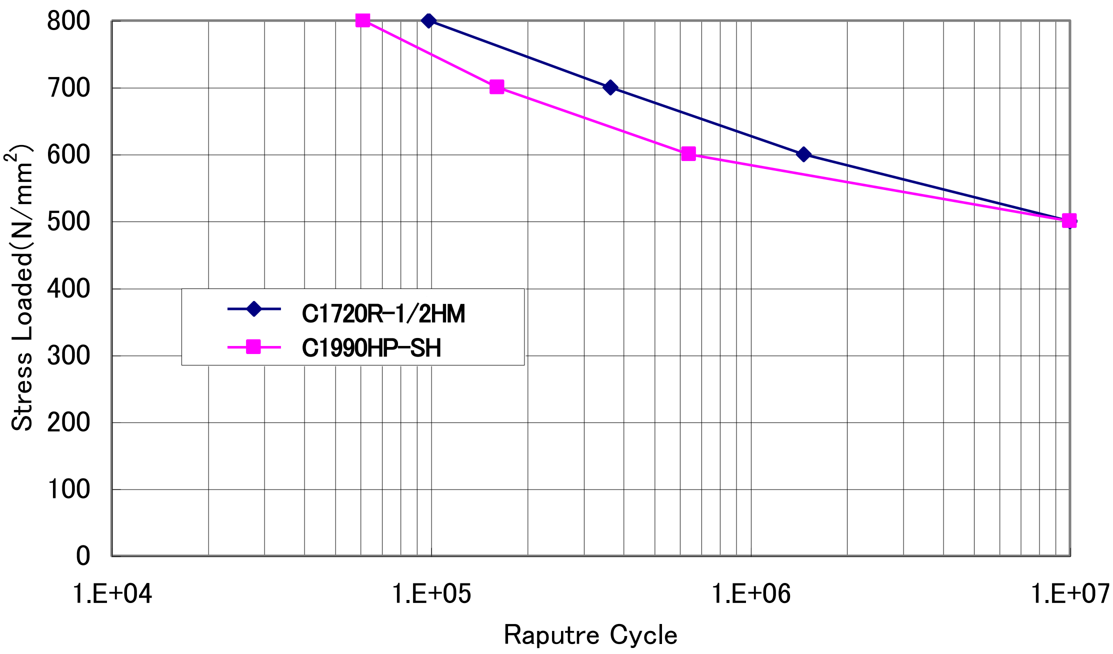
C1990HP-SH, bad way, Specimen size : 0.5 X 10mm, Number of tests = 4

90° “W” shaped bending test (According to JIS-H-3130)

Fig. 1 Surface appearance of “W” shaped bending test specimen

7.Fatigue Characteristic

Fatigue Characteristic is important when material is used as spring application such as connectors. Fig. 2 shows results of fatigue tests. *C1990HP* has almost as same fatigue strength as Beryllium Copper.



Amplitude direction : both sides

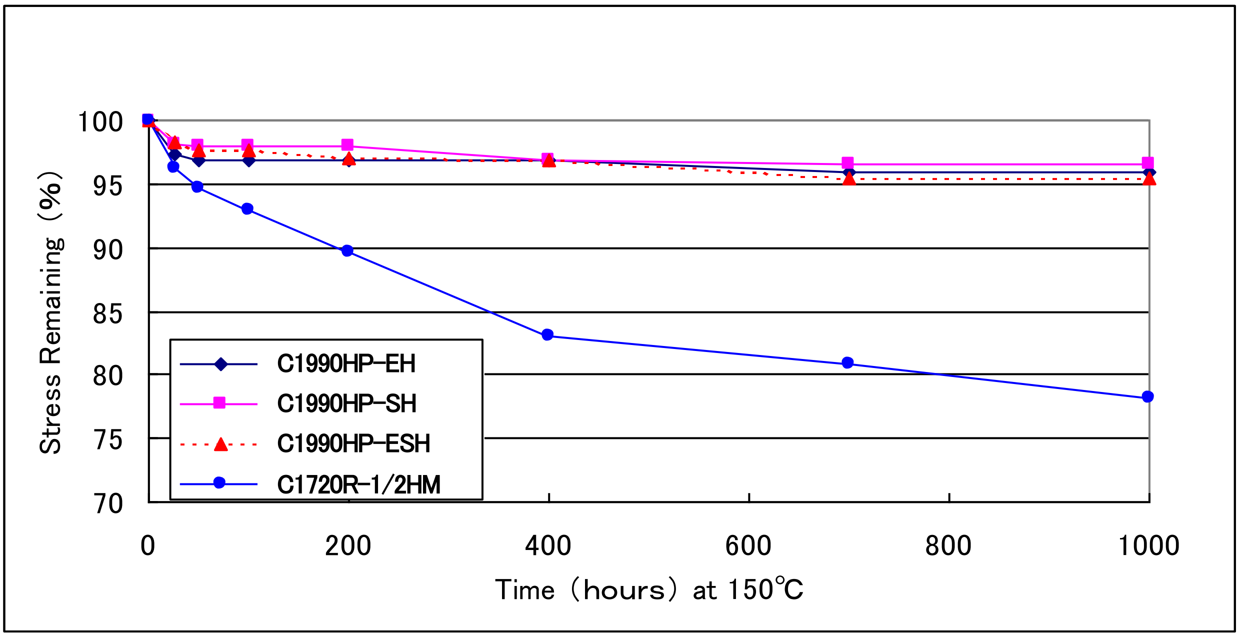
Size of specimen : 0.25mmt × 10mmw direction of specimen : good way

Testing method : According to JIS-Z-2273

Fig. 2 Comparison of Fatigue Strength

8.Stress Relaxation Resistance

For connector system application, it becomes very important to maintain contact force over long period at elevated temperature. Fig.3 shows data of stress relaxation test to evaluate materials' such ability. *C1990HP* maintains 95% of initial load for 1,000hours at 150℃. It is apparent that *C1990HP* gives much better stress relaxation resistance than beryllium copper .



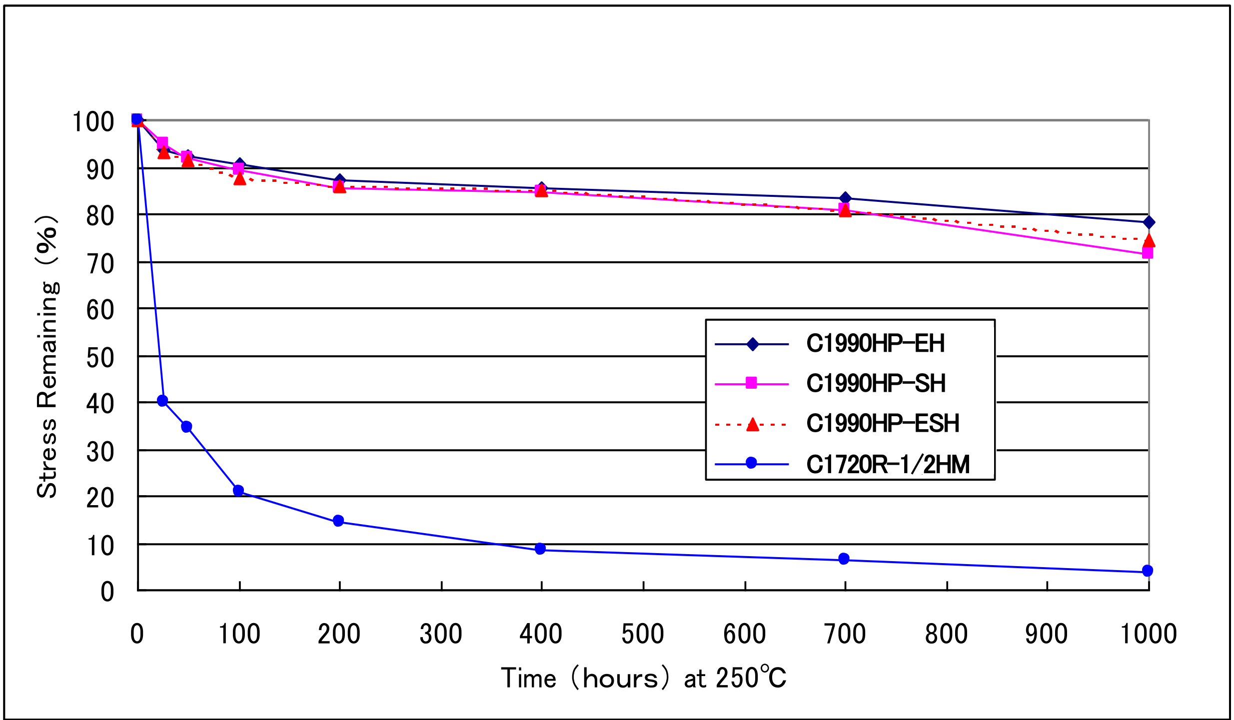


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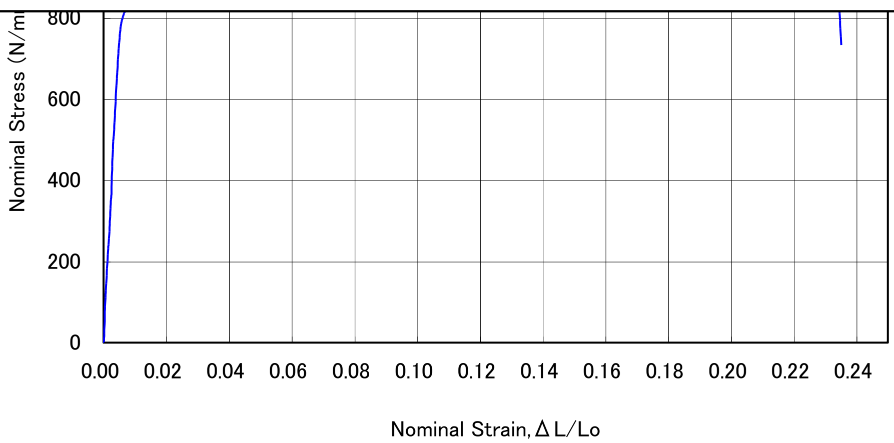
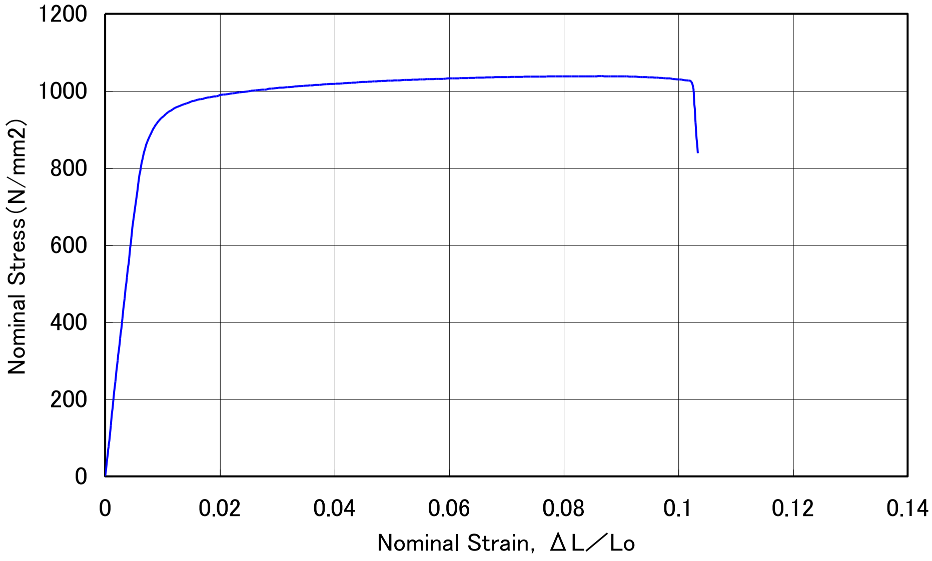
Fig. 4, 5



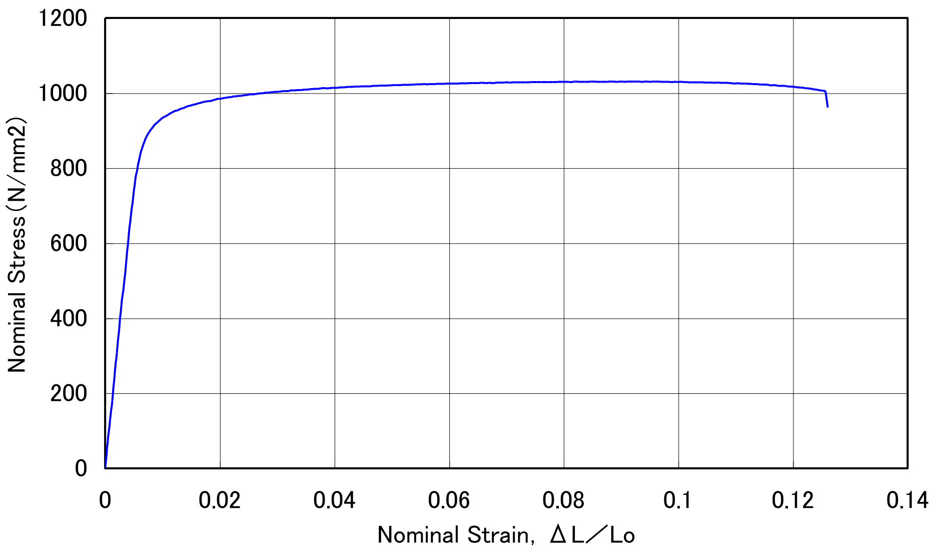
S-S curve (temper EH, transverse to rolling)

Tensile test (according to JIS-Z-2241)
Specimen : JIS-Z-2201#5 tensile test specimen
Number of tests : 2

Fig. 4 Stress-Strain Curves



S-S curve (temper SH, longitude to rolling)



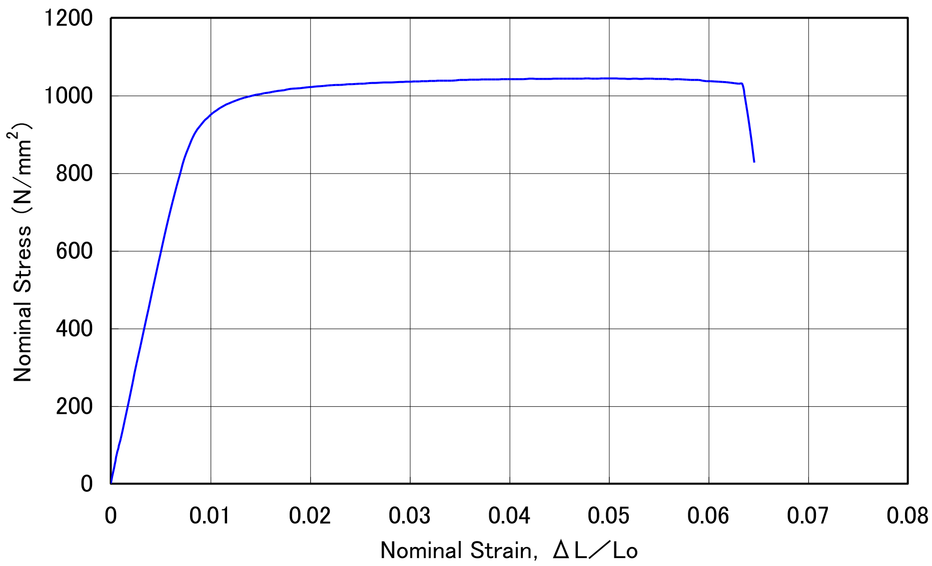
S-S curve (temper SH, transverse to rolling)

Tensile test (according to JIS-Z-2241)

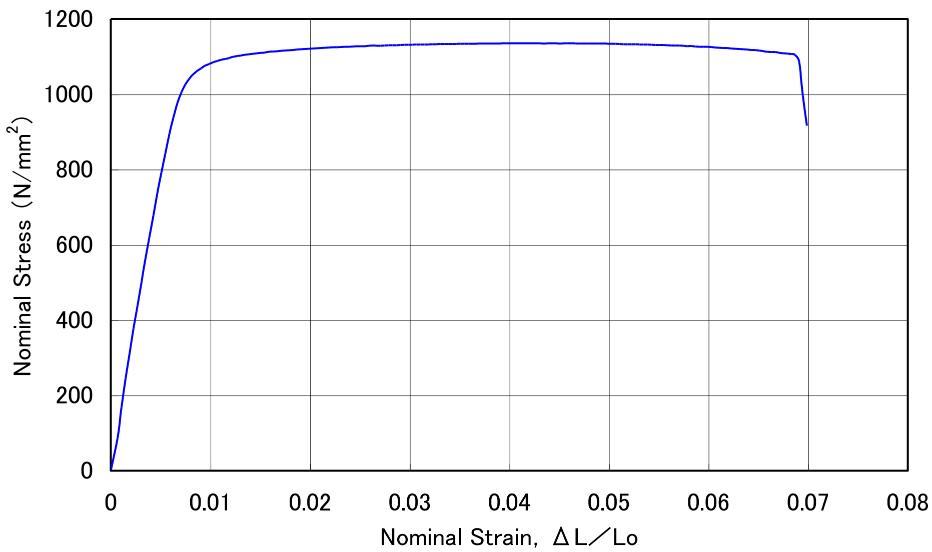
Specimen : JIS-Z-2201#5 tensile test specimen

Number of tests : 2

Fig. 5 Stress-Strain Curves



S-S curve (temper ESH, longitude to rolling)



S-S curve (temper ESH, transverse to rolling)

Tensile test (according to JIS-Z-2241)

Specimen : JIS-Z-2201#5 tensile test specimen

Number of tests : 2

Fig. 6 Stress-Strain Curves

＜Further Information＞

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