Hi-Performance Alloy Series
Technical Data

High Strength 10%-Tin Phosphor Bronze

Hyper C5240

JX Nippon Mining & Metals Corporation

1.Introduction

JX Nippon Mining & Metals has been supplying numbers of copper alloys.
Recently, NMM has developed new series of alloys, *Hyper Phosphor bronze series*.
On this brochure, *Hyper C5240 Alloy* will be introduced.
Hyper C5240 (C5240HP) is an improved C5240 alloy, which is a phosphor bronze with 10%-Tin. Compared with C5210 alloy, C5240HP has higher tensile strength and has excellent bend formability as well.
These days, many electronic parts, such as switches, connectors, relays are getting smaller and smaller. *Hyper C5240's* high strength and excellent bend formability are the most suitable for the needs of these tendencies.

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

2.Features

(1) *Hyper C5240* has better bend formability in comparison with other alloys of the same strength level.
(2) High yield strength, high spring toughness and high fatigue strength.
(3) Excellent stamp capability makes longer lifetime of press dies.
(4) Same chemical composition as C5240 means easy scrap control.

3.Chemical Composition

Table 1. Chemical Composition of *Hyper C5240 (C5240HP)*

	Cu	Sn	P	Fe	Pb	Cu+Sn+P
Typical	Bal	10.0	0.15	≦0.10	≦0.05	≧99.7

4.Physical Properties

Table 2. Physical Properties of *Hyper C5240 (C5240HP)*

Electric Conductivity	10	%IACS(@20℃)
Specific Resistance	157	nΩ・m(@20℃)
Thermal Conductivity	50	W/mK
Thermal Expansion Coefficient	18.4	$\times 10^{-6}$ (20 to 300℃)
Young's Modulus	100	kN/mm^2
Density	8.78	g/cm^3

5.Mechanical Properties

Relationship between temper of C5240HP and mechanical properties is shown in Table 3. Upper numbers are requirements and lower numbers are typical values.

Table 3. Mechanical Properties of *C5240HP*

Temper	Tensile strength (N/mm^2)	0.2% offset Yield strength (N/mm^2)	Elongation (%)	Hv
C5240HP-H	650～750 (708)	580～690 (617)	11≦ (29.6)	200～240
C5240HP-EH	750～850 (805)	650～790 (755)	9≦ (18.5)	230～270
C5240HP-SH	850～950 (866)	780～920 (813)	5≦ (11.6)	250～290
C5240HP-ESH	950～1050 (990)	900～1030 (940)	1≦	270～310
C5240HP-XSH	1000～1200 (1039)	950～1190 (997)	Rec. (1.1)	290≦

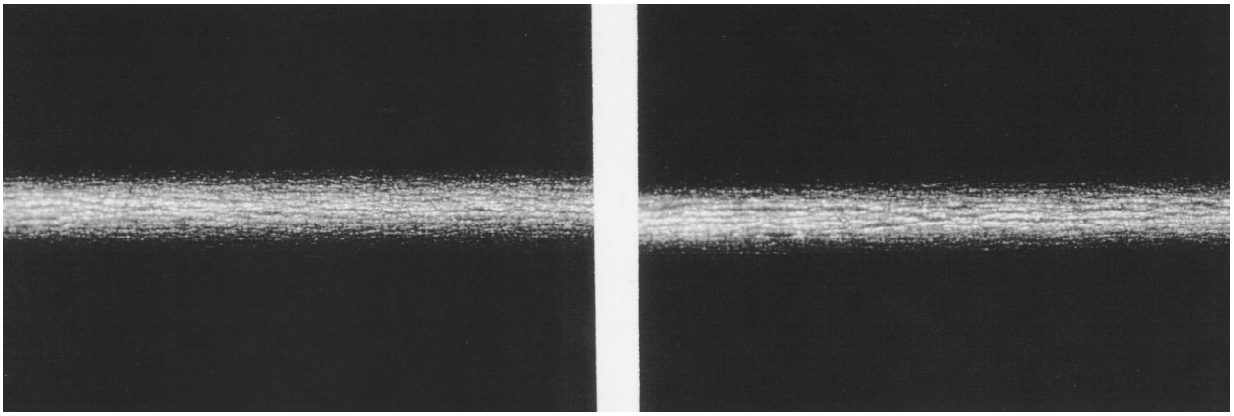
6. Bend Formability

"W" shaped bending test was performed to evaluate bend formability. The minimum bending radius (MBR) without surface crack is determined. Table 4 shows MBR/t value, while fig. 1 shows outside surface.

Table 4. Bend formability of C5240HP

Temper	MBR ／ t	
	good way	bad way
H (TS708)	0	0
EH (TS805)	0	1.0*
SH (TS866)	0	3.0*

*Data of material thickness 0.1mm



EH(TS 805)　R/t=1.0　　EH(TS 849) R/t=2.0

Test Conditions

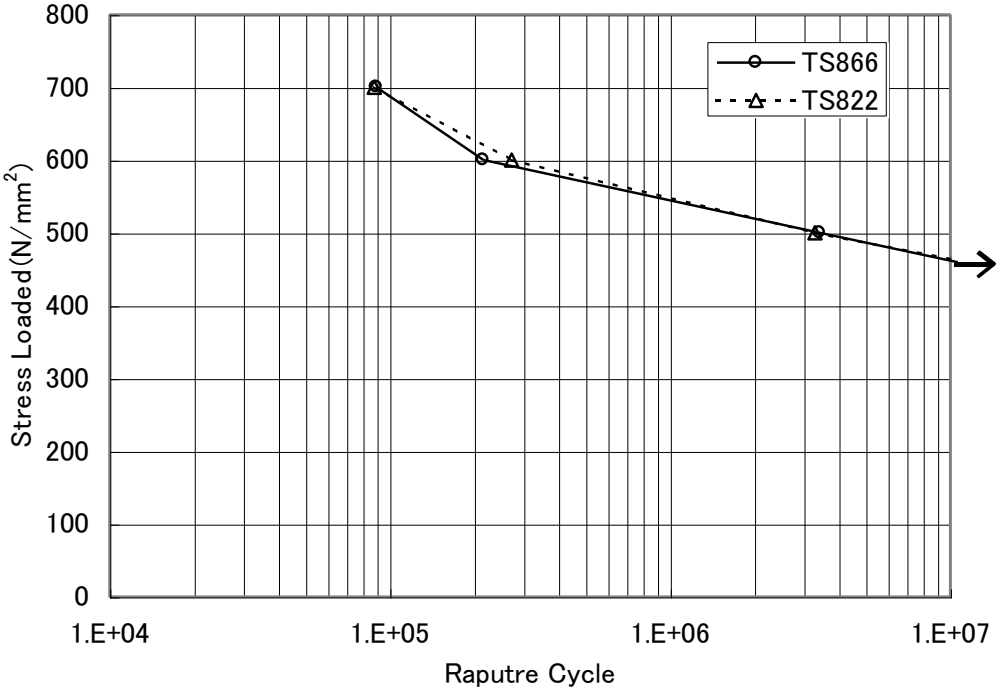
Specimen size:0.1×10mm Number of tests=4

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

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

7.Fatigue Characteristic

Fig. 2 shows results of fatigue tests. *C5240HP* shows high fatigue strength.



Test Conditions:

Amplitude direction : both side　　Specimen size : 0.25mmt×10mmw

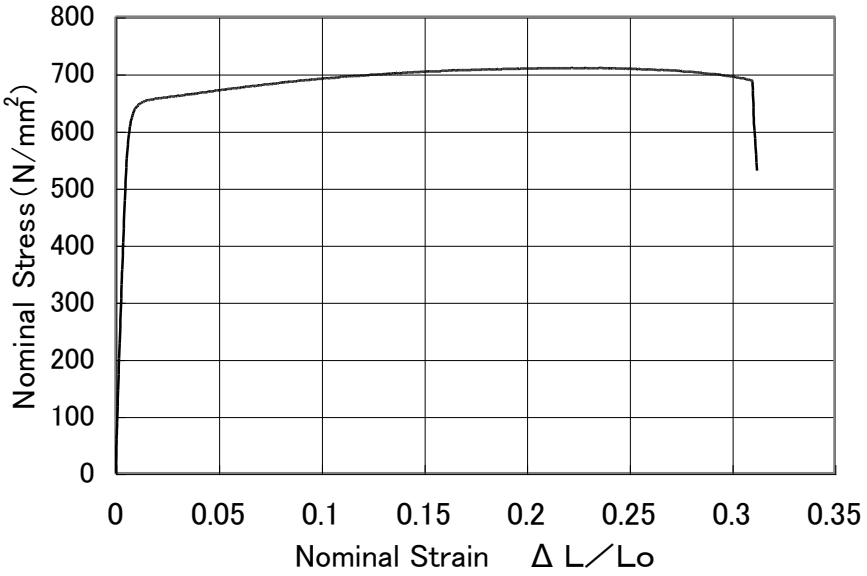
Direction of specimen : good way　　Test method : According to JIS-Z-2273

Number of Test : 4

Fig. 2　Fatigue Strength of *C5240HP*

8. Stress-Strain Curves

Figure 3 through Fig.5show stress-strain curves of each temper of C5240HP.



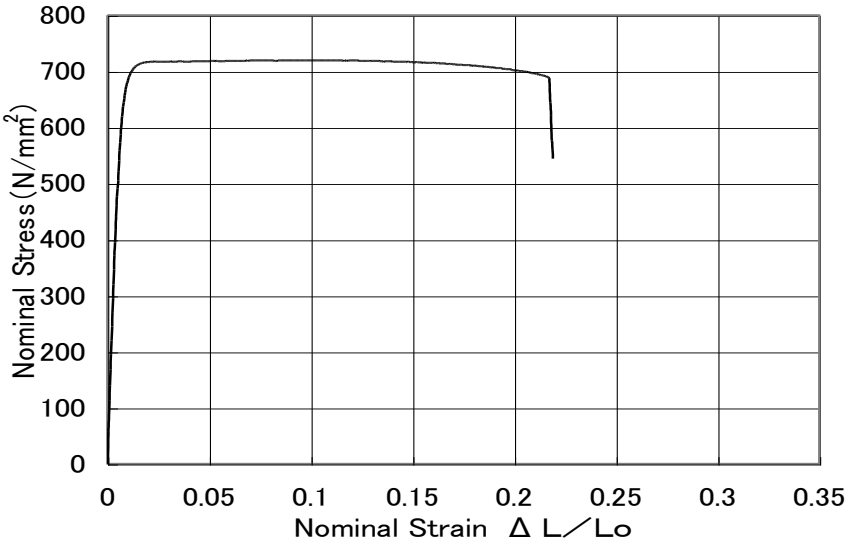


Fig. 3 Strain-Stress curves of C5240HP－H
Upper graph : Longitudinal direction
Lower graph : Transverse direction

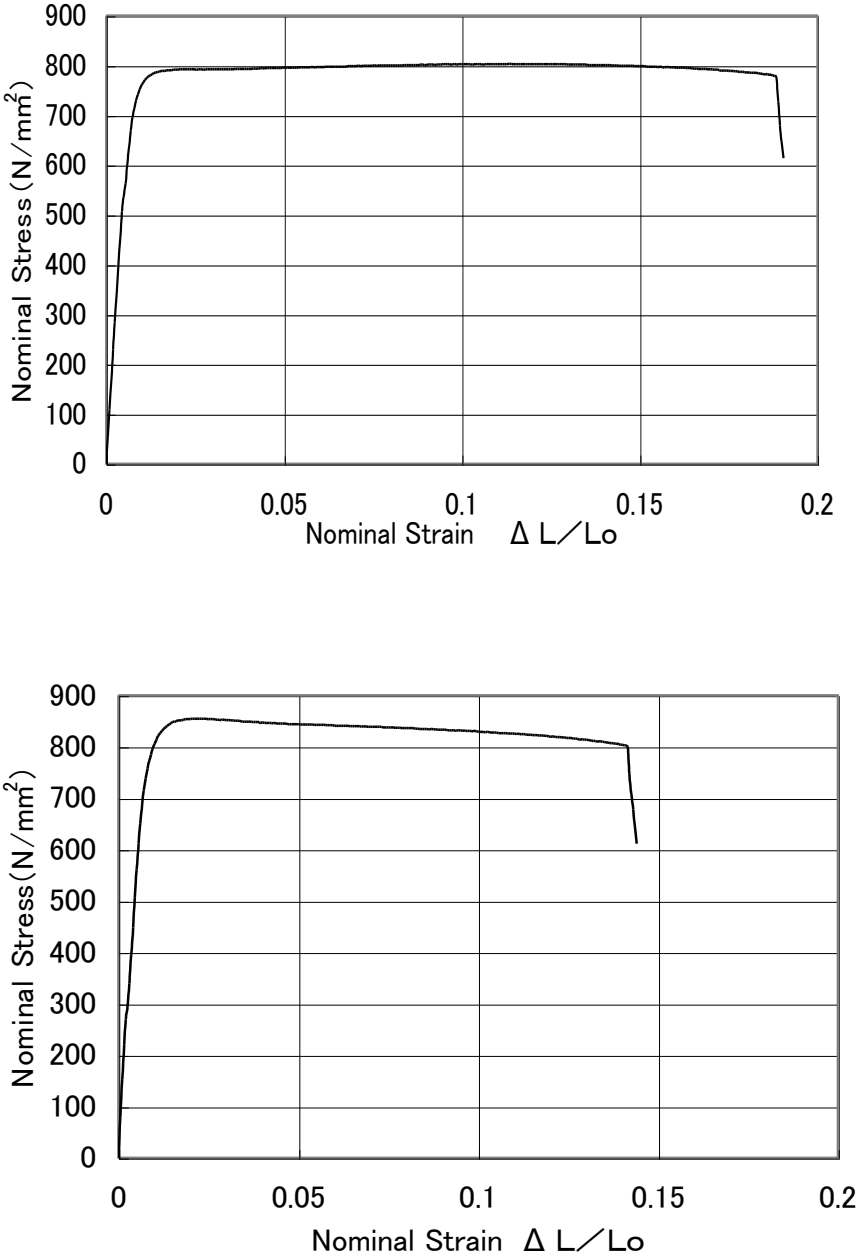
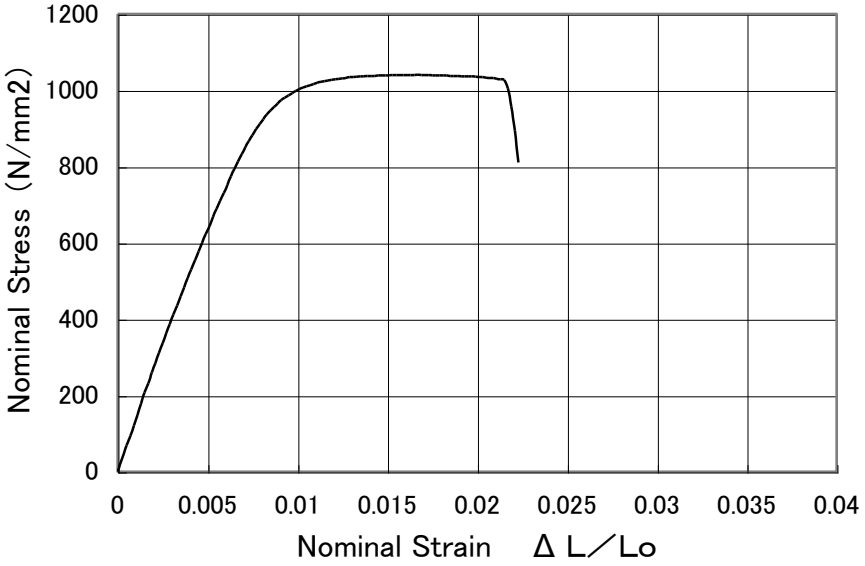


Fig. 4 Strain-Stress curves of C5240HP－EH

Upper graph : Longitudinal direction

Lower graph : Transverse direction



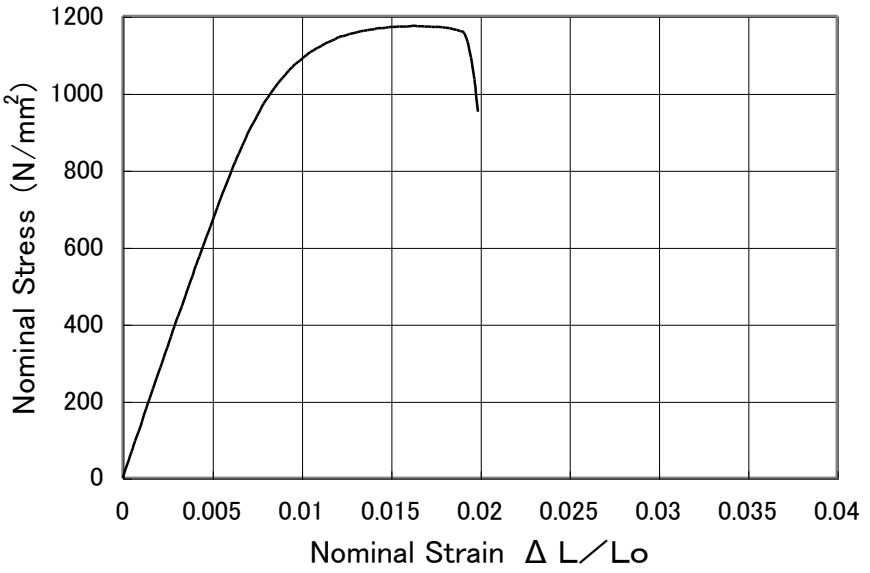


Fig. 5　Strain-Stress curves of　C5240HP－XSH
Upper graph : Longitudinal direction
Lower graph : Transverse direction

＜Further Information＞

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