Technical Data

High Performance Copper Alloy

NKC4419

UNS Alloy No.C64800

JX Metals Corporation

1. Introduction

NKC4419 is a High performance Copper Alloy produced to meet the high electrical conductivity needs of "high-power" electronic connectors. This alloy provides design engineers with a unique combination of properties with high electrical conductivity and good strength, excellent formability compared to other copper alloys of equivalent conductivity. This combination of properties lends the alloy to be used in a wide variety of applications including automotive and electrical connectors.

This technical brochure provides the comprehensive data of high performance copper alloy NKC4419 and should help understand the alloy's features.

＊This data included are nominal numbers.

2. Features

(1) High conductivity and high strength.
(2) Excellent combination of high conductivity, strength and formability.
(3) High stress relaxation resistance.

3. Chemical composition

Table 1 Chemical Composition of NKC4419(wt%)

	Cu	Co	Si
Typical	Bal.	1.9	0.44

4. Physical properties

Table 2 Physical Properties of NKC4419

Electrical Conductivity	65	%IACS(@20℃)
Specific Resistance	27	nΩ・m (@20℃)
Thermal Conductivity	260	W/(m・K)
Coefficient of Thermal Expansion	17.8	$\times 10^{-6}$ / K (25 to 300℃)
Young's Modulus	127	GPa
Density	8.85	g/cm^3

5. Mechanical properties

Table 3　Mechanical Properties of NKC4419

Temper	Tensile strength (MPa)	0.2% yield strength (MPa)	Elongation (%)	Hv
1/4H	600 (520～650)	480 (370～500)	17 (min.10)	180 (160～210)
H	670 (590～720)	650 (570～700)	8 (min.2.0)	200 (180～220)

※Upper numbers → Typical mechanical properties

Lower numbers → Requirements

6. Bend formability

W shaped bending test was performed to evaluate bend formability of NKC4419. The minimum bending radius (MBR) without surface crack is determined (specimen size: thickness×10mm^{w}×30mm^{l}). Table.4 shows MBR／t (Minimum Bend Radius／Thickness). NKC4419 has high strength and good bend formability.Fig.3 shows MBR/t vs thickness. Bend formability enhances more as thickness of specimen is smaller.

Table 4　Bend formability of NKC4419

Temper	MBR ／ t	
	Good way	Bad way
1/4H	0.3	0.0
H	1.7	0.7

Temper 1/4H : Thickness = 0.2mm

Temper H : Thickness = 0.3mm

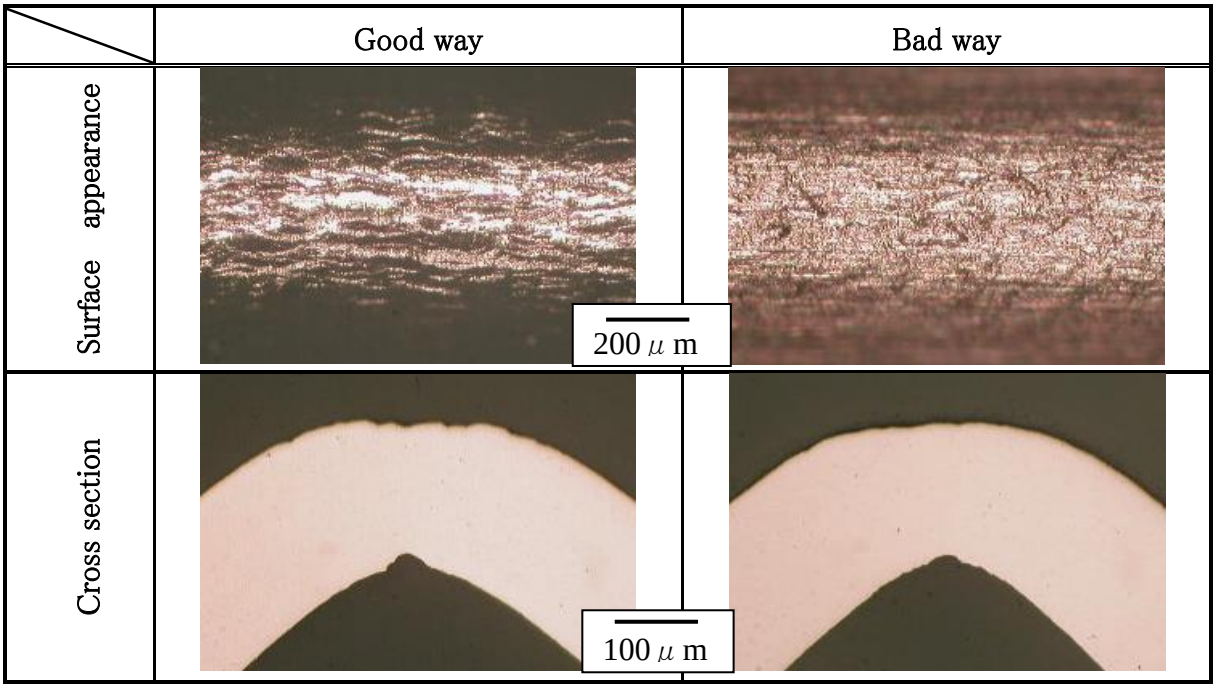


Fig.1 Surface appearances and cross sections of 90° W-shaped bending test specimens.
Temper: 1/4H, Good way : Thickness = 0.2mm , R/t=0.3 , Width =10mm
Temper: 1/4H, Bad way : Thickness = 0.2mm , R/t=0.0 , Width =10mm

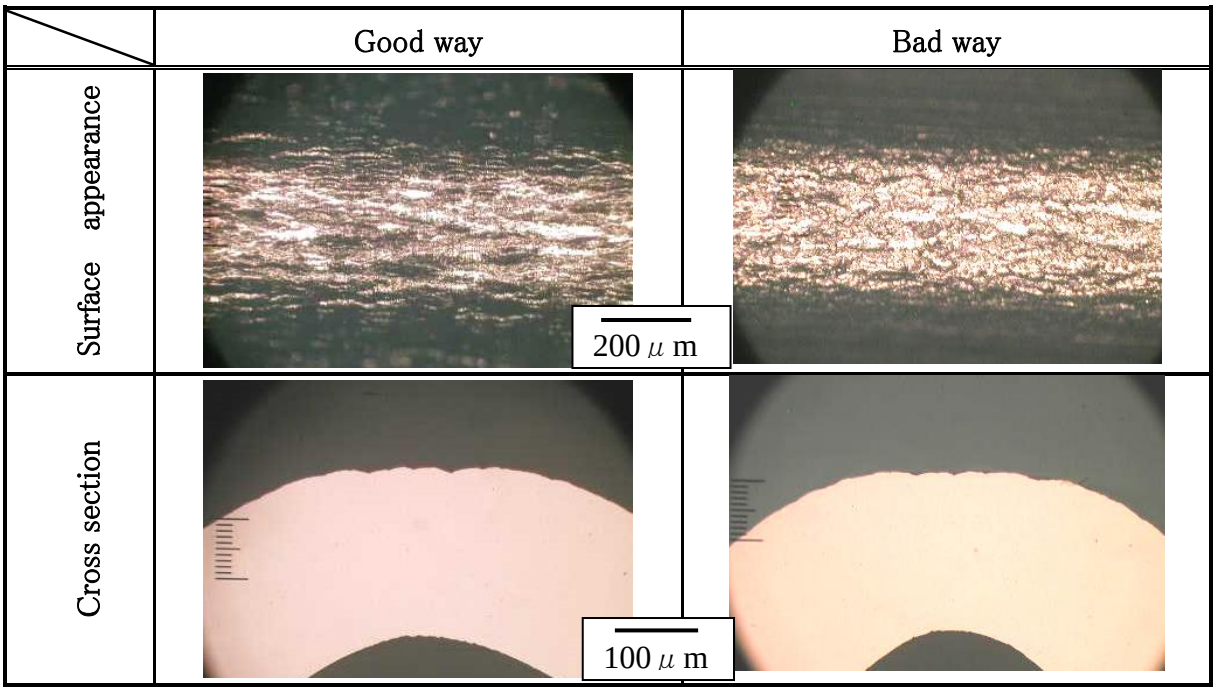


Fig.2 Surface appearances and cross sections of 90° W-shaped bending test specimens.
Temper: H, Good way : Thickness = 0.3mm , R/t=1.7 , Width =10mm
Temper: H, Bad way : Thickness = 0.3mm , R/t=0.7 , Width =10mm

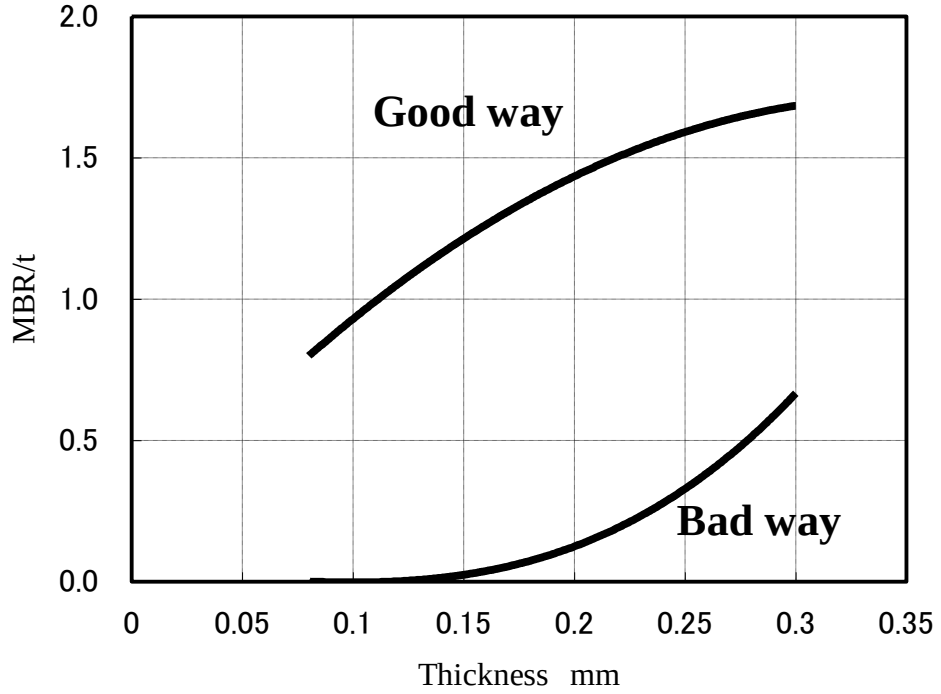


Fig.3 Bend formability variation of NKC4419-H in case changing thickness of specimen

7. Stress relaxation resistance

Stress relaxation resistance is highly important for maintaining the contact force for long period of time or at elevated temperatures. Fig.4 exhibits the stress relaxation resistance of NKC4419-H. It is noted that NKC4419-H maintains over 75% of the initial applied stress after 1000h at 150℃.

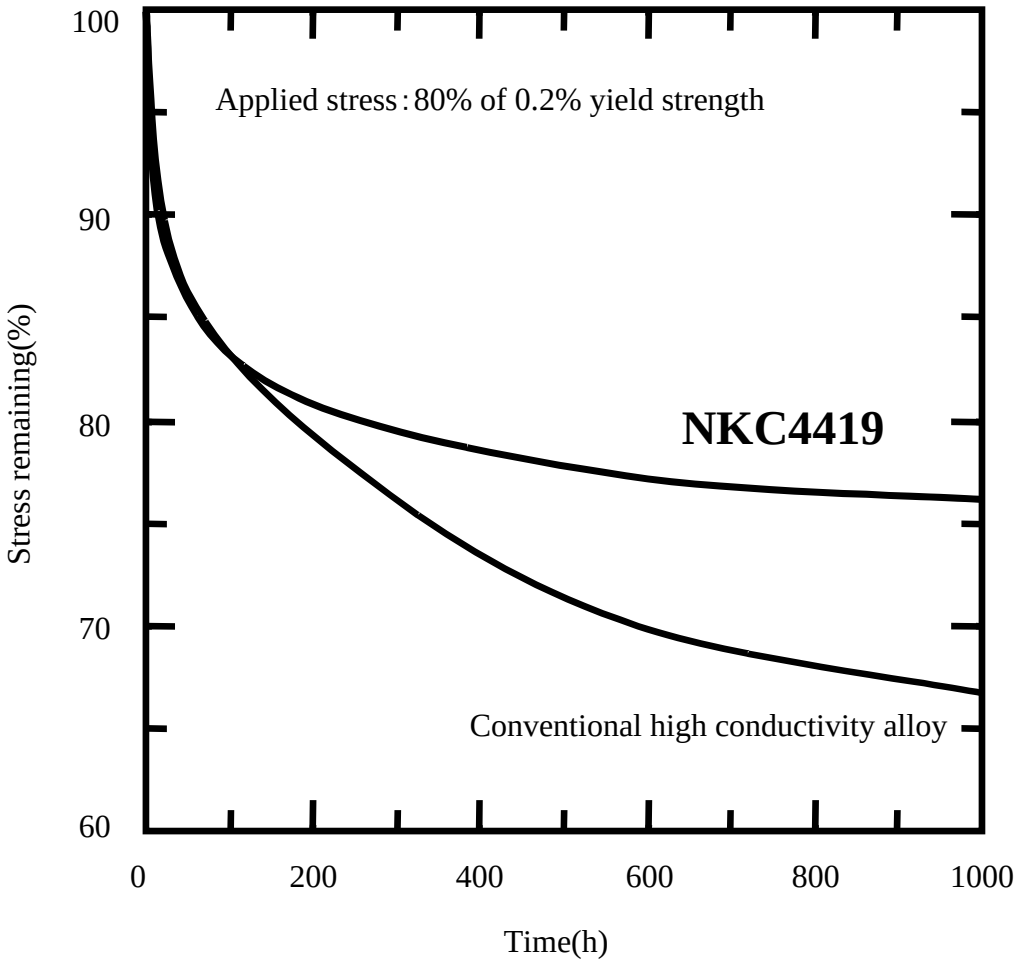
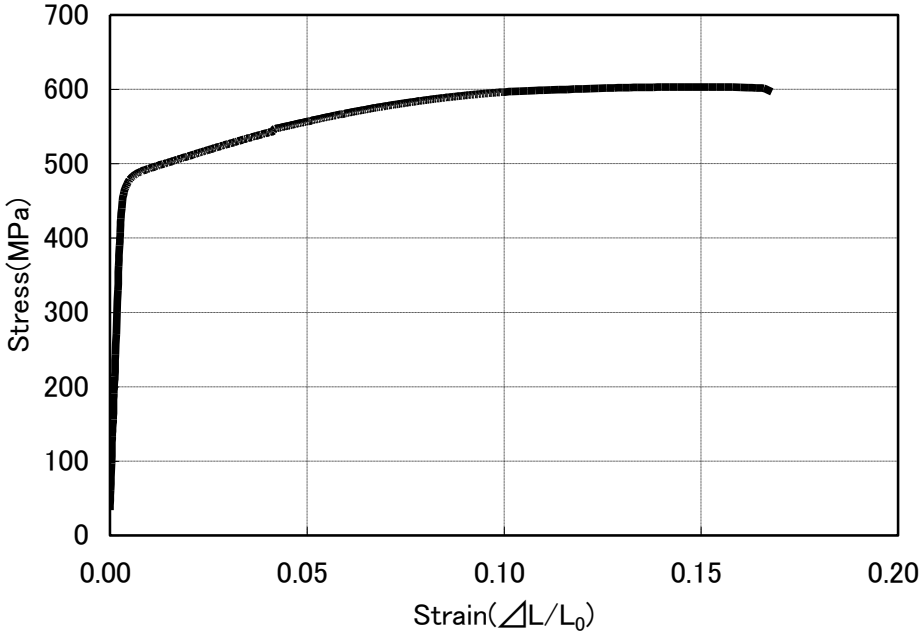


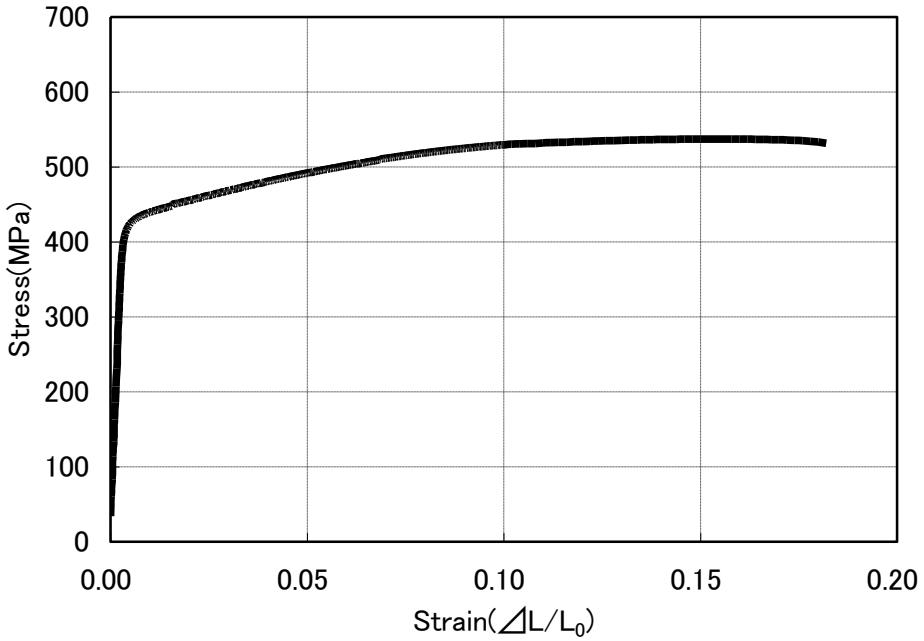
Fig.4 Stress relaxation of connector alloys at 150℃.

8. Stress - Strain curve

Fig.5 show the Stress-Strain curves for NKC4419-1/4H.



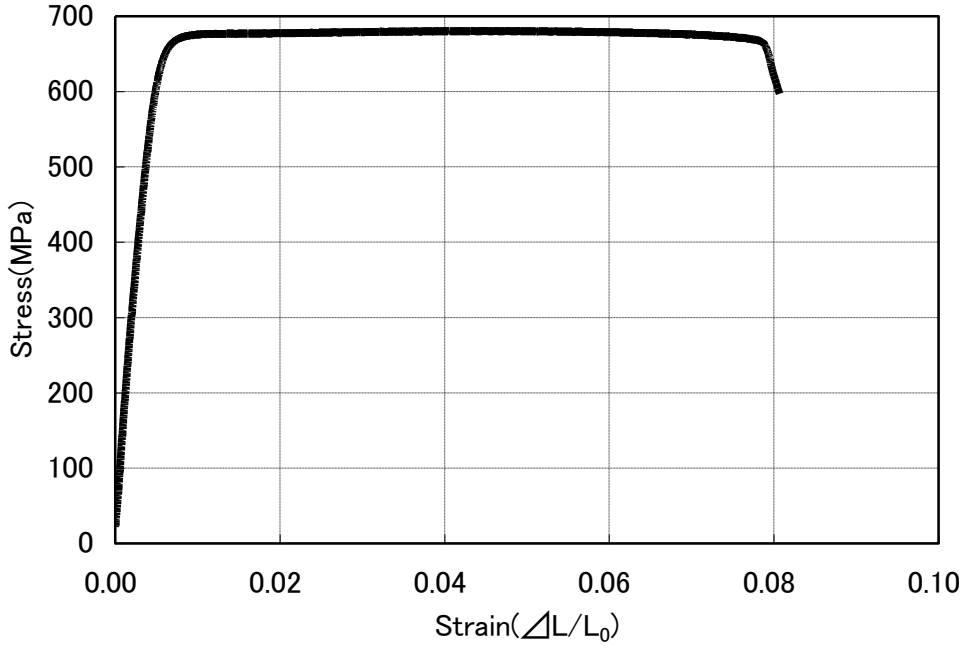
S-S curve (Longitudinal Direction)



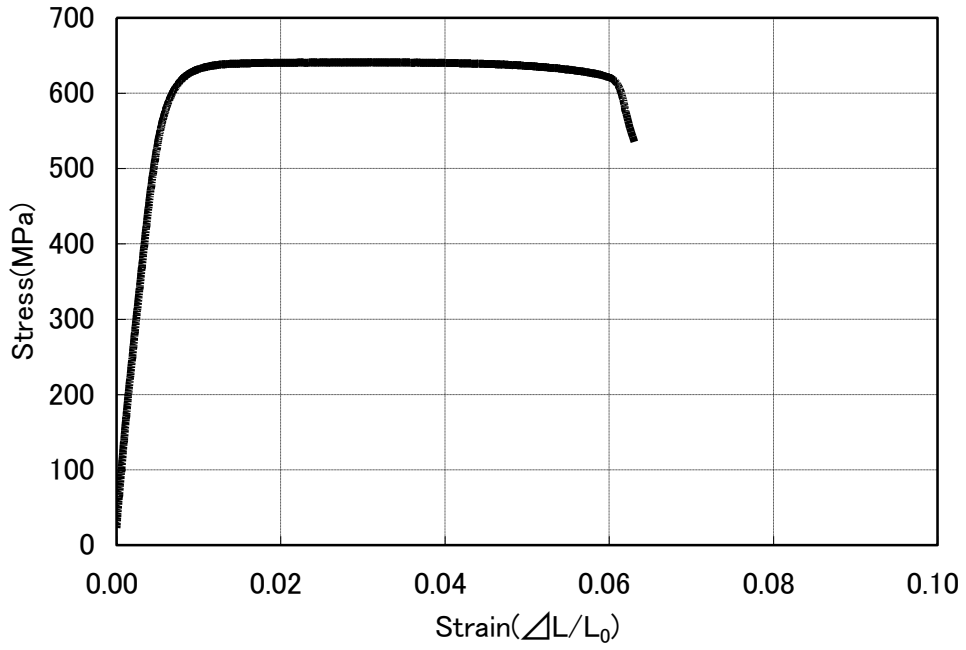
S-S curve (Transverse Direction)

Tensile test (according to JIS-Z-2241)
Specimen : JIS-Z-2201#13B tensile test specimen
Fig. 5　Stress-Strain Curves of NKC4419-1/4H

Fig.6 show the Stress-Strain curves for NKC4419-H.



S-S curve (Longitudinal Direction)



S-S curve (Transverse Direction)

Tensile test (according to JIS-Z-2241)
Specimen : JIS-Z-2201#13B tensile test specimen
Fig. 6　Stress-Strain Curves of NKC4419-H

＜Further Information＞

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