

Jade Precision Engineering

Material Safety Data Sheet

This MSDS covers the Copper Based and Ferrous Based Leadframes supplied by Jade Precision Engineering.

Jade Precision Engineering's Leadframes are non-hazardous in their as-shipped form.

Under normal processing or assembly hazardous dust or fumes are unlikely to be generated.

However, incorrect handling of the product or production scrap may lead to injuries. Operation such as trimming may create hazards to eyes or skin from flying particles of the said operation.

Section I – Product Identification

A) Copper Based (C194, C7025) Leadframe with Silver spot or ring plating

B) Copper Based (C194, C7025) Leadframe with Nickel, Palladium & Gold Flash – Full Plating

C) Ferrous Based Leadframes with Silver spot or ring plating

D) Copper Based (C194, C7025) Leadframe with Silver Spot and Full A2 Plating

Section II: Composition / Information on Ingredient

Type A-1

<u>Ingredient Name</u>	<u>CAS No.</u>	<u>Percentage (by Weight)</u>
Copper (Base Metal) **	7440-50-8	98.50 to 99.00%
Silver (Plating)	7440-22-4	1.00 to 1.50%

Type A-2

<u>Ingredient Name</u>	<u>CAS No.</u>	<u>Percentage (by Weight)</u>
Copper (Base Metal) **	7440-50-8	93.00 to 96.00%
Nickel (Plating)	7440-02-0	3.00 to 5.00%
Gold (Plating)	7440-57-5	1.00 to 2.00%

Type B

<u>Ingredient Name</u>	<u>CAS No.</u>	<u>Percentage (by Weight)</u>
Copper (Base Metal) **	7440-50-8	>99.90%
Nickel (Plating)	7440-02-0	<0.097%
Palladium (Plating)	7440-05-3	<0.002%
Gold (Plating)	7440-57-5	<0.001%

Type C – I (Alloy 42)

<u>Ingredient Name</u>	<u>CAS No.</u>	<u>Percentage (by Weight)</u>
Ferrous (Base Metal – component of Alloy 42)	7439-89-6	up to 56%
Nickel (Base Metal – component of Alloy 42)	7440-02-0	40 to 44%
Carbon (Component of Alloy 42)	7440-44-0	< 0.05%
Manganese (Component of Alloy 42)	7439-96-5	< 0.80%
Silicon (Component of Alloy 42)	7440-21-3	< 0.30%
Sulphur (Component of Alloy 42)	7704-34-9	0.0015 to 0.0045%
Phosphorus (Component of Alloy 42)	7723-14-0	< 0.025%
Cobalt (Component of Alloy 42)	7440-48-4	< 0.50%
Silver (Plating)	7440-22-4	<0.10%

Type C – II (SPCC-SB - Steel)

<u>Ingredient Name</u>	<u>CAS No.</u>	<u>Percentage (by Weight)</u>
Ferrous (Base Metal – component of Steel)	7439-89-6	> 99.40%
Carbon (Component of SPCC-SB)	7440-44-0	< 0.05%
Manganese (Component of SPCC-SB)	7439-96-5	0.02 - 0.40%
Silicon (Component of SPCC-SB)	7440-21-3	< 0.02%
Sulphur (Component of SPCC-SB)	7704-34-9	< 0.02%
Phosphorus (Component of SPCC-SB)	7723-14-0	< 0.018%
Silver (Plating)	7440-22-4	0.02 – 0.30%

Type D

<u>Ingredient Name</u>	<u>CAS No.</u>	<u>Percentage (by Weight)</u>
Copper (Base Metal)**	7440-50-8	98.50 to 99.00%
Silver (Plating)	7440-22-4	1.00 to 1.50%
A2 (Zinc + Chromium)*		0.10 to 0.20%

*The exact percentage of Zinc (7440-66-6) and Chromium (7440-47-3) in A2 is not known.

** Refer Table 1 and 2 for ingredient of C194 and C7025 Copper base material.

Section II: Composition / Information on Ingredient (Continue)

Composition of Copper Base Material

Table 1. C194

Ingredient	CAS No.	Content (%)
Copper (Cu)	7440-50-8	Remainder
Fe	7439-89-6	2.1 – 2.6
Zn	7440-66-6	0.015 – 0.15
P	7723-14-0	Max. 0.03

Table 2. C7025

Ingredient	CAS No.	Content (%)
Copper (Cu)	7440-50-8	Remainder
Nickel (Ni)	7440-02-0	2.2 – 4.2
Silicon (Si)	7440-21-3	0.25 – 1.2
Magnesium (Mg)	7439-95-4	0.05 – 0.30

Section III: Physical & Chemical Properties

Physical State: Solid

Specific Gravity: (H₂O=1.0):8.9 (Predominantly Copper)

Solubility in water: Negligible

Vapor pressure: Not applicable

Volatile Characteristics: Not applicable

Stability: Stable under normal conditions of use. Hazardous polymerization will not occur.

Incompatibility: Avoid Mercury, Acetylene, Chlorine, Hydrogen and Peroxide

Conditions to avoid: Contact with strong acids, alkali or oxidizing agent.

Remarks: Silver and Copper can form unstable acetylides if in contact with acetylene gas.

Section IV: Fire and Explosion

This product creates no fire or explosion hazard when used in normal atmosphere

Flash Point, Auto-ignition Temperature: Not applicable

Influence of heat results in decreasing mechanical strength of the material depending on temperature and time.

Section V: Health Hazards

This product creates no health hazards in their as-shipped form. However, operations producing dust or flumes cause health hazards by airborne particles of metal or metal oxides. Avoid over-exposure by using protection equipment.

Route	Effects
Inhalation	Metallic taste, dryness of throat, sneezing, respiratory tract irritation, mixed pneumoconiosis, chills, metal fume fever, shortness of breath, chest-pain, weakness, fatigue, cough, muscle and joint pain
Ingestion	Health hazard is normally not expected to occur. However, in case of accidental ingestion of crystallized Copper Salts or their solutions, symptoms of poisoning, such as nausea and vomiting will results.
Eye contact	Mechanical irritation
Skin contact	Health hazard is not expected to occur. May cause allergic reactions in some individuals

Carcinogenic effect: Not known.

Section IV: Emergency and First Aid Procedures

Inhalation: Remove victim to fresh air and call doctor

Ingestion: Drink water or milk. Induce vomiting. Call doctor.

Eye contact: Treat as mechanical injury only.

Skin contact: Clean with water and soap only when necessary. Get medical attention if signs or symptoms of allergy appear.

Section VII: Personal Protection Equipment

Respiratory: None needed.

Eye: Use safety glasses with side shields or goggles to prevent injury from flying particles, dust or fume.

Skin: Wear protective clothing to prevent allergic reaction to skin

Section VII- Waste Disposal

Maximize product recovery for re-use or recycle. Follow federal, state and local regulations to ascertain proper disposal procedures.

Section IX: Remark

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Jade Precision Engineering,
Quality Control Department

Dated: 02 August 2006

Document Revision History

Revision	Description of Change	Issue Date
0	New Release	21 Jan 2005
1	Add Type C - Ferrous base leadframes	03 Aug 2005
2	Add Type C – I (Alloy 42) Type C – II (SPCC-SB Steel)	05 Aug 2005
3	Add Type D – Copper based leadframes Silver spot and A2 full plating	29 Aug 2005
4	Add Type A-2 – Copper based leadframes Nickel base-coat and Gold spot plating.	12 Sep 2005
5	Add Table 1 and 2 (Chemical composition of C194 & C7025)	02 Aug 2006