Material safety Data Sheet	Document No.	LK-MSDS-03E
	Revision Date	2019-03-04
	Revision No.	2
Product name (Brand-name)	Phosphorus Deoxidized Copper	

【 This document has been prepared in accordance with 'Article 41 of Korean Occupational Health and Safety Act' and 'Annex 4. Guidance on the Prepartion of Safety Data Sheet(SDS)' in 'Globally Harmonized System of Classification and Labelling of Chemicals(GHS) - 4th edition(2011) according to 1907/2006/EC (REACH) and 1272/2008/EC (CLP) 】

SECTION 1 : Identification

1.1 GHS Product identifier : Phosphorus Deoxidized Copper
1) C1201 (UNS C12000 or Cu-DLP = Deoxidized Low Phosphorus)
2) C1220 (UNS C12200 or Cu-DHP = Deoxidized High Phosphorus)

1.2 Other means of identification :

No.	UNS/CDA Alloy No.	Type of Copper	KS D 5201/JIS H3100	Typical Composition
1	C12000	Phosphorized, low residual phosphorus	C1201	Cu 99.95%, P 0.01%
2	C12200	Phosphorized, high residual phosphorus	C1220	Cu 99.95%, P 0.03%

※ Categories of this material : Metal > Nonferrous Metal > Copper Alloy (mixture)

1.3 Recommended use of the chemical and restrictions on use :

1.3.1 Recommended use :
- C1201 : busbars, electrical conductors, and applications requiring welding or brazing.
- C1220 : gas and heater lines, oil burner tubing, plumbing pipe and tubing, condenser, evaporator, heat exchanger, dairy, and distiller tubing, steam and water lines, air, gasoline, and hydraulic lines.

1.3.2 Restrictions on use : can not be used such as a pulverization(powder-processing), eating and feeding, inhalation etc. (can not be used for any purpose except common use of nonferrous metal and copper alloy)

1.4 Supplier's details

1.4.1 Manufacturer/Supplier : LEEKU Industrial Co., Ltd. (south Korea)

1.4.2 Address :

1.4.2.1 Head Office and POSEUNG Factory :
42, Poseunggongdan-ro, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea (Republic of)

1.4.2.2 Further information obtainable from : Q.C Team of LEEKU

1.5 Emergency telephone number : Call your local emergency number !
ex) In USA 9-1-1, In Korea or Japan 1-1-9
But, If you are not faced with an emergency situation, you can contact the following.

1.5.1 Company's Technical Information :
- Head Office : +82-31-494-2929(Rep.) (Fax. +82-31-494-2930)
- Q.C Team : +82-70-4687-6565 (Fax. +82-31-647-0729)

1.5.2 Support Hours for KOREA : Monday ~ Friday, 9:00 a.m.- 6:00 p.m., local time

SECTION 2 : Hazard identification

※ 1. Emergency Overview : Copper alloy products in the natural state(solid form) do not present a hazard for emergency response personnel.

2. Potential Health Effects : Copper alloy products in the natural state do not present an inhalation, ingestion, or contact hazard. However, operations such as burning, welding, sawing, brazing, or grinding may release fumes and/or dusts which may present health hazards if occupational exposure limits are exceeded. (irritant)

2.1 Classification of the Globaly Harmonized System(GHS)

2.1.1 Flammable Solids : Category 1

2.1.2 Acute Toxicity (Oral) : Category 4

2.1.3 Specific Target Oragn Toxicity (Single Exposure) : Category 3 (respiratory tract irritation)

2.1.4 Aquatic Hazard (Acute) : Category 1

2.1.5 Aquatic Hazard (Long-term) : Category 1

2.2 GHS label elements, including precautionary statements

2.2.1 Pictograms

2.2.2 Signal word : Danger

2.2.3 Hazard statement codes for physical hazards :

- H250 : Catches fire spontaneously if exposed to air

2.2.4 Hazard statement codes for health hazards :

- H302 : Harmful if swallowed.
- H335 : May cause respiratory irritation. (For dust, fume, gas, mist, vapors, and spray etc.)

2.2.5 Hazard statement codes for environmental hazards :

※ Copper alloy products in the natural state(such as plate, sheet, strip, and rolled bar etc.) do not present a hazard.(Below hazard statement do not apply)

- H400 : Very toxic to aquatic life.
- H410 : Very toxic to aquatic with long lasting effects.

2.2.6 Codification of the precautionary statements for prevention :

- P210 : Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- P222 : Do not allow contact with air.
- P261 : Avoid breathing dust / fume / gas / mist / vapours / spray.
- P264 : Wash ... thoroughly after handling.
- P270 : Do not eat, drink or smoke when using this product.
- P271 : Use only outdoors or in a well-ventilated area.
- P273 : Avoid release to the environment.
- P280 : Wear protective gloves / protective clothing / eye protection / face protection.

2.2.7 Codification of the precautionary statements for response :

- P301+P312 : IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
- P304+P340 : IF INHALED :
  Remove victim to fresh air and keep at rest in a position comfortable for breathing.

- P312 : Immediately call a POISON CENTER or doctor/physician if you feel unwell.
- P330 : Rinse mouth.
- P335 + P334 : Brush off loose particles from skin.
  Immerse in cool water/wrap in wet bandages.
- P370+P378 : In case of fire : Use (carbon dioxide / sand / soil or water spray) for extinction.
- P391 : Collect spillage.

2.2.8 Codification of the precautionary statements for storage :

- P403+P233 : Store in a well-ventilated place. Keep container tightly closed.
- P405 : Store locked up.
- P422 : Store contents under ...
  ... Manufacturer/supplier or the competent authority to specify appropriate liquid or inert gas.

2.2.9 Codification of the precautionary statements for storage :

- P501 : Dispose of contents/container to ...(in accordance with local / regional / national / international regulation(to be specified))

2.3 Other hazards which do not result in classification

2.3.1 Linkely Routes of exposure : Inhalation, Eye contact, Skin Contact

INHALATION : Short-term exposure to fumes/dust may produce irritation of the repiratory system. High concentrations of copper oxide fumes may cause metal fume fever.

EYE : Short-term exposure to fumes/dust may produce irritation.

SKIN : Repeated or prolonged exposure to copper dusts or mists may cause irritant or allergic contact dermatities.

INGESTION : Abdminal pain, nausea, vomiting.

2.3.2 Medical conditions aggravated by exposure : Exposure to fumes or dust may aggravate existing respiratory disease or dermatities.

2.3.3 Target organs : Upper respiratory tract, eyes, skin.

2.3.4 Signs and Symptoms :
Metal fume fever - metallic taste in mouth, dryness, and irritation of the throat, and influenza-like symptoms. The effects may be delayed.

2.3.5 Carcinogenicity

Classification	ACGIH	IARC	NTP
Copper (fume, dust & mist)	No	No	No
Phosphorus (red)	No	No	No

* See Toxicological Information(Section #11).

2.3.6 Potential Environmental effects :
None known. Product has not been tested for environmental propertied.

2.3.7 Hazard ratings Degree of hazard (0 = low, 4 = extreme)

- Hazardous Materials Identification System(HMIS) :

Health : 1	Flammability : 0	Physical Hazard : None

• National Fire Protection Association(NFPA) :

Division	Health (Blue)	Flammability (Red)	Instability/Reactivity (Yellow)	Special (White)
This alloy (Phosphorus deoxidized copper)	Mixture. Not rated.			
Copper (* For element)	1	1	0	-
Phosphorous (Red)	3	1	1	-

SECTION 3 : Composition/information on ingredients

NOTE : This MSDS applies to a range of alloys. For actual compositions refer to the material test report or the alloy specification. All percentages are by weight.

Product Name	Component Name	CAS Name	CAS No.	wt %
C1201	Copper	Metallic Copper	7440-50-8	99.90 min.
	Phosphorus	Red Phosphorus, elemental	7723-14-0	0.004 - 0.015 (Typically 0.008)
C1220	Copper	Metallic Copper	7440-50-8	99.90 min.
	Phosphorus	Red Phosphorus, elemental	7723-14-0	0.015 - 0.040 (Typically 0.027)

※ 1. Each impurity (Pb, Fe etc.) is controlled under 300ppm(0.03wt%)
2. The total impurities are allowed range that does not spoil the above composition table of ingredients or the functional characteristics(processability, etc.) of the products(alloy).
3. Not allowed any impurity which are themselves classified and which contribute to the classification in GHS.

SECTION 4 : First-aid measures

4.1 In case of eye contact :
- Immediately flush out fume and dust particles with large amounts of water for at least 20 minutes, occasionally lifting the upper and lower eyelids.
- If eye irritation develops, call a physician at once.

4.2 In case of skin contact :
- If exposed to dust or fumes, wash skin with plenty of water.
- Remove contaminated clothing and shoes and launder before reuse.
- If skin irritation or rash develops and persists or recurs, get medical attention.

4.3 If inhaled :
- If symptoms of lung irritation occur(coughing, wheezing or breathing difficulty), remove form exposure area to fresh air immediately.

- If breathing has stopped, perform artificial respiration.
- Keep affected person warm and at rest. Get medical attenton or call a physician at once.

4.4 If swallowed :
- Not a likely route of exposure for finished metal alloy. If dust is ingested, immediately drink water to dilute. Consult a physician if symptoms develop.

4.5 Note to physicians :
- There is no specific antidote to the active ingredients in this product.
- Use symptomatic treatment.

4.6 Potential health effects

4.6.1 Acute effects
- Eye : Dust or fume can cause irritation consisting of redness, swelling, and pain. May cause conjunctivitis with repeated exposures.
- Skin : Material not expected to be absorbed through the skin. Contact with dust may cause mild irritation consisting of redness and/or swelling.
- Inhalation : Inhalation of high concentrations of powder, dust, or fume may may cause respiratory and nasal irritation, coughing, and difficulty breathing. Inhalation of high concentrations of metalic copper dusts or fumes may cause nasal irritation and/or nausea, vomiting and stomach pain.
- Ingestion : Ingestion of large amounts of dust may cause nausea, diarrhea and or stomach pain.

4.6.2 Chronic effects : Prolonged or repeated skin contact with dust may cause more severe irritation or dermatitis. Prolonged or repeated inhalation of dust or fume may cause more severe irritation and possibly lung damage.

4.6.3 Medical conditions aggravated by exposure : Exposure to dust or fume may aggravate an existing dermatitis, asthma, emphysema, or other respiratory disease.

4.7 Potential environmental effects : None known. product has not been tested for environmental properties.

SECTION 5 : Fire-fighting measures

5.1 Flammable properties

Property	Value	Property	Value
Explosive	No	Flammable	No
Combustible	No	Pyrophoric	No
Flash Point(℃)	Not applicable	Burnig Rate of Material	Not applicable
Lower Explosive Limit	Not applicable	Autoignition Temp.	Not applicable
Upper Explosive Limit	Not applicable	Flammability Classification (defined by 29 CFR 1910.1200)	Not applicable

5.2 Unusual fire and explosion hazards: Dust may cause an ignitable and/or an explosive atmosphere.

5.3 Extinguishing media : For localized powder fires, smother with dry sand, dry dolomite, sodium chloride or soda ash. Use fire-extinguishing media appropriate to fight surrounding fire.

5.4 Special fire-fighting procedures : None required.

SECTION 6 : Accidental release measures

6.1 Personal precautionsm protective equipment and emergency procedures :

6.1.1 Emergency Overview : Copper alloy products in the natural state do not present a hazard for emergency response personnel.

6.1.2 Potential Health Effects : Copper alloy products in the natural state do not present an inhalation, ingestion, or contact hazard. However, operations such as burning, welding, sawing, brazing, or grinding may release fumes and/or dusts which may present health hazards if occupational exposure limits are exceeded.

6.2 Environmental precautions : see 2.2.5 article in Section 2.

6.3 For dust & mist(or fume) form : This product may be an explosion hazard. Remove all sources of ignition. Dust of fume may be suppressed by the use of a local exhaust system. Dispose of per guidelines under Section 13, Waste Disposal.

6.4 Steps to be taken in the event of spills, leaks, or releases : Not applicable.

SECTION 7 : Handling and Storage

7.1 Precautions for safe handling : Avoid dispersion of dust in air. Particularly in welding, precautions should be taken for airborne contaminants that may originate from components of the welding rod.

7.2 Conditions for safe strorage, including any incompatibilities : No special requirements.

Shelf Life Limitations :	None known.
Incompatible Materials for Packaging :	None known.
Incompatible Materials for Storage or Transport :	None known.

7.3 Other precautions : Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or HEPA vacuuming.

SECTION 8 : Exposure controls/personal protection

8.1 Components with workplace control parameter (exposure guidelines)

CHEMICAL NAME	ACGIH TLV	OSHA PEL	INTERNATIONAL OELS
Copper	0.2mg/m^3(fume), 1mg/m^3 (dusts and mists)	0.1mg/m^3(fume) 1mg/m^3 (dusts vand mists)	Korea : TWA 1mg/m^3 (dusts), TWA : 0.1mg/m^3 (fume), STEL : 2mg/m^3 (dusts and mists) Austria, Belgium, Canada: 0.2 mg/m^3 (fume), 1mg/m^3 (dust) Denmark: 1.0mg/m^3 (dusts and powder) Germany (MAK): 0.1mg/m^3 (fume), 1mg/m^3 (dusts and mists)

CHEMICAL NAME	ACGIH TLV	OSHA PEL	INTERNATIONAL OELS
Phosphorus (Red)	0.02 ppm, 0.1mg/㎥ TWA (USA)	0.1mg/㎥ TWA(8hr)	NIOSH : 0.1mg/㎥ TWA(10hr) Korea : 0.1mg/㎥ Australia : 0.1mg/㎥ Germany : 0.1mg/㎥(total dust), STEL 0.2mg/㎥ (5min, 8 times per shift) UK : 0.1mg/㎥, 10 min STEL 0.3mg/㎥

* 1) TWA : Time Weighted Average, STEL : Short Term Exposure Limit
2) The exposure limits listed for both OSHA and ACGIH refer to total dust; the OSHA PEL for the respirable fraction is 5mg/m^3.

8.2 Appropriate engineering controls / Individual protection measures

Engineering controls: Local exhaust ventilation is recommended if significant dusting occurs or fumes are generated(when welding, burning, sawing, brazing, grinding, or machining when exposure exceeds occupational exposure limits. Otherwise, use general exhaust ventilation.

Eye / Face protection: Use safety glasses or goggles. Other protective equipment should be utilized as required by welding standards.

Skin protection: Wear impervious (cut-resistant) gloves and other protective clothing (aprons, coveralls) as appropriate to prevent skin contact when using this product. If generating a dust, wash thoroughly after handling, especially before eating, drinking, or smoking.

Respiratory protection: Respiratory protection not normally needed. If dusting occurs or fumes are generated above the PEL/TLV, use a NIOSH-approved half-face or full-face respirator equipped with High Efficiency Particulate (HEPA) filter cartridges.

General hygiene considerations: Do not eat, drink, or smoke while using this product in dust form

SECTION 9 : Physical and chemical properties

Property	Product		Each Component	
	C1201 (UNS C12000/C12100[7])	C1220 (UNS C12200, CDA 122)	Copper	Red Phosphorus
Appearance	Salmon-colored, lustrous metal 	Salmon-colored, lustrous metal 	Red powder or solid[1] (change color when exposed to humid air)[1] 	Blackish red triphylite crystal form solid or powder 

Property	Product		Each Component	
	C1201 (UNS C12000/C12100[7])	C1220 (UNS C12200, CDA 122)	Copper	Red Phosphorus
Odour	None	None	Odorless[9]	redolent of garlic[9]
Odour threshold	No data	No data	No data	No data
pH	Not applicable	Not applicable	Not applicable	Not applicable
Melting point/ freezing point	No data (an estimate of about 1083℃[13])	about 1083℃ [7]	1083℃[1]	44.1℃ [9]
Initial boiling point and boiling range	No data	No data	2595℃[1]	280℃ [9]
Flash point	No data	No data	Not applicable	Flammable 30℃[9]
Evaporation rate	No data	No data	No data	Not applicable
Flammability (solid, gas)	No data	No data	Flammable[1]	No data
Upper/lower flammability or explosive limits	No data	No data	No data	Not applicable[9]
Vapour pressure	No data	No data	1mmHg @1628℃[9]	0.026mmHg @20℃[9]
Vapour density	No data	No data	No data	4.42-4.77 [9] (air=1)
Relative density (Specific gravity)	8.94[7]	8.94[7]	8.9[1]	1.83~1.88 [9]
Solubility	No data (Negligible)	No data (Negligible)	insoluble[1]	$0.33X10^{-2}$g/L @15℃[9] (water)
Partition coefficient: n-octanol/water	No data	No data	-0.57 (estimate)[4]	-0.27 (estimate)[4]
Auto-ignition temperature	Not applicable	Not applicable	No data	White : 30℃, Red : 260℃ [9]
Decomposition temperature	Not applicalbe	Not applicalbe	No data	No data
Viscosity	Not applicable (No Data)	Not applicable (No Data)	No data	1.69 cP @50℃[9] (at liquid)
Molecular weight	Not applicable - mixture	Not applicable - mixture	63.55[8]	P_4=123.90 (P=30.97) [9]

SECTION 10 : Stability and reactivity

Stability:	Stable under normal temperatures and pressure.
Conditions to avoid:	None
Incompatible materials:	Mercury, chlorine, Ammonia, Acetylene acids. Contact with strong acids, bases, or oxidizing agents
Hazardous decomposition products:	When heated to decomposition(Metallic dust or fumes may be produced during welding, burning, grinding, and machining), may produce metal oxides and fumes. Inhalation of high concentrations of metal fumes may cause a condition known as "metal fume fever" which is characterized by flu-like symptoms.
Hazardous polymerization and other possibility of hazardous reactions:	Will not occur.

SECTION 11 : Toxicological information

11.1 Potential exposure routes :

11.1.1 For dust : ingestion, inhalation, and eye contact.

11.1.2 For fume : inhalationand eye contact.

11.1.3 For the finished alloy metal (rolled bar, strip, sheet etc) : is not hazardous.

11.2 Acute toxicity data :

Classification		For Components (>1%)	
		Copper	Red Phosphorus
Oral LD_{50}	Believed to be > 5g/kg	LD_{50} 481 mg/kg Rat (OECD TG 401, GLP)	LD_{50} 3.03 ㎎/㎏ Rat
Dermal LD_{50}	Believed to be > 2g/kg	LD_{50} > 2000 ㎎/㎏ Rat (OECD TG 402, GLP)	LD_{50} 100 ㎎/㎏ Rat
Inhalation LC_{50}	Believed to be slightly to moderately toxic	Dust : LC_{50} > 5.11 ㎎/ℓ 4 hr Rat (OECD TG 436, GLP)	That can cause lung congestion. No information on significant side effects
Irritation	Skin	inexcitable (rabbit) (OECD TG 404, GLP)	inexcitable (rabbit)
	Eye	Slightly irritable but not classified (rabbit) (OECD TG 405, GLP)	No data

※ Copper TDLo : 120 μg/kg (human, oral-gastrointestinal effects)
LD_{50} : 0.07 mg/kg (mouse, intraperitoneal)

11.3 Health Hazard Information :

Classification	Copper	Red Phosphorus
Respiratory hypersensitiveness	No data	No data
Dermal hypersensitiveness	inexcitable (guinea pig) (OECD TG 406, GLP)	No data
Carcinogencity		
- Korean Industrial Safety and Health Act	No data	No data
- Korean Ministry of Labor examination	No data	No data
- IARC	No data	No data
- OSHA	No data	No data
- ACGIH	No data	No data
- NTP	No data	No data
- EU CLP	No data	No data
Germ cell mutagenicity	Back mutation test using micro-organisms in a test tube : Negative whether or not the liver metabolite is present. (Similar substance : 7758-99-8, Copper sulfate pentahydrate) (OECD TG 471, GLP) Non-scheduled DNA synthesis test using hepatocytes of rat(male) in vivo, no toxic activity. (Similar substance : 7758-99-8, Copper sulfate pentahydrate) (OECD TG 486, GLP)	No data
Reproductive toxicity	2nd generation genotoxicity test for rats showed that the weight of the spleen was reduced at 1500ppm in the mother's body, and the spleen weight was reduced at 1500ppm in the 1st and 2nd generation. (Similar substance : 7758-99-8, Copper sulfate pentahydrate) (OECD TG 416, GLP) Developmental toxicity test result for rabbits shows death, stomach ulcers, and kidney effects in autopsy : NOAEL(parental toxicity) = 7.5 mg/kg bw/day, weight loss of the young, and slight increase in reabsorption : NOAEL(developmental toxicity) = 15 mg/kg bw/day,	No data

Classification	Copper	Red Phosphorus
Specific target organ toxicity (single exposure)	Fume stimulates upper airway.	No data
Specific target organ toxicity (repeated exposure)	After repeated long-term body toxicity test for rats, lesions in the liver and kidneys and lesions found at the end of the esophagus. LOAEL = 2,000 ppm, NOAEL = 1,000 ppm (Similar substance : 7758-99-8, Copper sulfate pentahydrate) (EU Method B.26, GLP) Inhalation repulsion organotoxicity test for rats shows a reduced lung weight ratio but not a good basis to classify. LOEL = 0.2 mg/㎥ Air (OECD TG 412, GLP)	No data

11.4 Subchronic/Chronic Toxicity : No information for product.
* Lead has caused blood, kidney and nervous system damage in lab oratory animals.

※ Chronic effects :
1) Repeated or prolonged over exposure to copper fume may cause the skin and hair to change color.
2) Repeated or prolonged over exposure to tin dusts or fumes may cause stannosis.

11.5 Carcinogenicity : This product is not known or reported to be carcinogenicity,

11.6 Mutagenicity : This product is not known or reported to be mutagenic.

11.7 Reproductive, teratogenicity, or developmental effects : This product is not known or reported to cause reproductive or developmental effects.

11.8 Neurological effects : This product is not known or reported to cause neurological effects.

11.9 Interactions with other chemicals which enhance toxicity : None known or reported.

SECTION 12 : Ecological information

12.1 Eco-toxicity : No data is available on this product. Individual constituents are as follows :

Claasification	Copper	Red Phosphorus
Fishes	LC_{50} 0.286 ㎎/ℓ 96hr (Oncorhynchus mykiss (0.2864% sewage treatment plant effluent, 0.164 river water ㎎/ℓ)	LC_{50} 0.006 ㎎/ℓ 96hr
Crustacean	EC_{50} 0.0338 ~ 0.792 ㎎/ℓ 48hr (Daphnia magna (OECD TG 202))	EC_{50} 0.03㎎/ℓ 48hr
Alga	NOEC 0.0376 ~ 0.708 ㎎/ℓ 72 hr (Phaeodactylum tricornutum, OECD TG 201)	No data

※ Copper : The toxicity of copper to aquatic organisms varies significantly not only with the species, but also with the physical and chemical characteristicsof the water, such as its temperature, hardness, turbidity and carbondioxide content.

Copper concentrations varying from 0.1 to 1.0 ㎎/ℓ have been found by various investigators to be not toxic for most fish. However, concentrations of 0.015 to 3.0 ㎎/ℓ have been reported as toxic, particularly in soft water to many kinds of fish, crustaceans, mollusks, insects, and plankton.

12.2 Persitance / Degradability : Not biodegradable. Individual constituents are as follows :

Claasification	Copper	Red Phosphorus
Persitance	log Kow -0.57 (estimate)	log Kow -0.27 (estimate)
Degradability	No data	No data

12.3 Bioaccumulative potential : No data is available on this product.
※ Individual constituents are as follows :

Claasification	Copper	Red Phosphorus
Bioaccumulation	BCF 5830	BCF 281000
Biodegradablility	No data	No data

12.4 Mobility in soil : No data is available on this product.
※ Individual constituents are as follows :

Claasification	Copper	Red Phosphorus
Mobility in soil	No data	No data
Other adverse effects	No data	No data

12.5 Other harmful effects : No data is available on this product.

Claasification	Information
Copper	Fishes : Oncorhynchus mykiss: NOEC = 11.4 μg/L 45d Crustacean : Ceriodaphnia sp.: NOEC = 122 μg/Lmortality, 31.6 μg/Lreproduction OECD TG 211 Alga : Chlamydomonas reinhardtii: NOEC = 22 μg/Lgrowth rate 10d OECD TG 201
Red Phosphorus	No data

SECTION 13 : Disposal considerations

※ If this product becomes a waste, it DOES NOT meet the criteria of a hazardous waste as defined under 40 CFR 261, in that it does not exhibit the characteristics of hazardous waste of Subpart C, nor is it listed as a hazardous waste under Subpart D. Care must be taken to prevent environmental contamination from the use of this material. The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes. This product may be a candidate for metal reclamation.

13.1 Disposal Method

Claasification	Information
Copper	Treat by one of the following methods. 1. Use the reaction of neutralizing, oxidizing, and recuperating. Process by means of cohesion, precipitation, surplus, and leaching. 2. Process by evaporation and enrichment. 3. Refine by separating, distillation, extraction, and filtration
Red Phosphorus	Dispose of contents and containers in accordance with the regulations, if specified in the Waste Management Act.

SECTION 14 : Transport information

No data is available(=not regulated) on this product.

※ Reference for each component

< Copper >

1. UN No. 3089
2. UN PSN (Proper Shipping Name) 1) For bulk type product : COPPER STRIP or COPPER FOIL, 2) For powder : METAL POWDER, FLAMMABLE, N.O.S.
3. Hazard class(es) 4.1
4. Packing group 2
5. Environmental Hazards MP (Marine pollutant)
6. Special precautions for user
   - ○ Types of emergency actions in case of fire : F-G
   - ○ Type of emergency action in case of spillage : S-G

< Red Phosphorus >

1. UN No. 1381
2. UN PSN (Proper Shipping Name) PHOSPHORUS, AMORPHOUS
3. Hazard class(es) 4.2 (6.1)
4. Packing group 1
5. Environmental Hazards No Data
6. Special precautions for user
   - ○ Types of emergency actions in case of fire : F-A
   - ○ Type of emergency action in case of spillage : S-J

SECTION 15 : Regulatory information

15.1 Global Inventories

Classification	Copper	Red Phosphorus
TSCA : United States	Included	No data
DSL : Canada	Included	No data
EINECS : European Union	Included	No data

15.2 US Federal

TSCA	The components of this product are listed on the Toxic Substance Control Act inventory.				
CERCLA:	Copper, R.Q.[1)]= 5000 lbs.				
SARA 313:	Copper				
SARA 313 Hazard Class:	Health: For dust or fume only	Acute – Yes, Chronic – Yes	Fire: None	Reactivity: None	Release of Pressure: None
SARA 302 EHS List:	None of the components of this product are listed.				

※ 1) RQ = Reportable Quantity
2) SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
These alloys are not regulated under Section 302 of SARA and 40 CFR 355.
3) 15.3 SARA TITLE III SECTION 311/312 HAZARDOUS CATEGORIZATION (40 CFR 370):
OSHA defines these alloys as hazardous under 29 CFR 1910.1200(d).
4) SARA TITLE III SECTION 313 TOXIC CHEMICALS (40 CFR 372):
These alloys(for UNS C42500) may contain the following toxic chemical(s) subject to reporting requirements under this section of SARA and of 40 CFR 372:

Component	CAS #	% by weight
Copper	7440-50-8	≥ 99.90

5) State Right-to-know status

Classification	*CA Prop. 65 Chemical	NJ Hazardous Substances List	PA Right-to-know List	MA Toxic Substance List	MI Critical Materials Register
Copper	Not listed	Yes	Yes	Yes	Yes

* "WARNING: This product contains detectable amounts of a chemical(s) known to the State of California to cause cancer and/or birth defects or other reproductive harm."

15.3 European Regulations : This material in its massive solid form is not required to be labeled under EC regulations.

15.4 German WGK Classification : Unknown

15.5 Canadian Regualtions :

DSL LIST:	The components of this product are on the DSL or are exempt from reporting under the New Substances Notification Regulations.
IDL:	Copper
WHMIS:	This product is considered to be a manufactured article and therefore not subject to WHMIS requirements.

15.6 Korea

15.6.1 Korea Industrial Safety and Health Act :

Copper	Administered substance	Exposure limits set substance
	Working environment measurement (Measuring cycle : 6 months)	
	Special medical examination (Diagnostic cycle : 12 months)	
Phosphorus	No data	

15.6.2 Korea Chemicals Management Act :

Copper	No data
Phosphorus	No data

15.6.3 Korea Safety Control of Dangerous Substances Act :

Copper	No data
Phosphorus	(If it is applicable) 3rd grade Yellow Phosphorus 20kg

15.6.4 Korea Wastes Control Act :

Copper	Specified Waste
Phosphorus	No data

15.7 Other regulations :

Classification	Copper	Phosphorus
Korea Persistent Organic Pollutants Control Act	Not listed	Not listed
US Federal (OSHA regulation)	Not listed	Not listed
US Federal (CERCLA regulation)	2267.995 kg, 5000 lb	0.453599 kg, 1 lb
US Federal (EPCRA 302 regulation)	Not listed	45.3599 kg, 100 lb
US Federal (EPCRA 304 regulation)	Not listed	0.453599 kg, 1 lb
US Federal (EPCRA 313 regulation)	Listed	Listed
US Federal - Rotterdam Convention	Not listed	Not listed
US Federal - Stockholm Convention	Not listed	Not listed
US Federal - Montreal Protocol	Not listed	Not listed
EU Classification - General	Not listed	F; R11, R16, R52-53
EU Classification - Risk Phrase	Not listed	R11, R16, R52-53
EU Classification - Safety Phrase	Not listed	S2, S7, S43, S61

SECTION 16 : Other information

16.1 Reference

1) ICSC (1993); (http://www.nihs.go.jp/ICSC)
2) HSDB (2003)
3) IUCLID (2000); IUCLID5 Chemical Data Sheet, EC-ECB
4) SRC
5) ACGIH (7th;2001)
6) EHC200 (1998)
7) Metals Handbook (10th;1990) *ASM*
8) IUPAC (1992) *Pure & Appl. Chem.*
9) KISChem (https://icis.me.go.kr/)
10) ECOTOX Database, EPA(https://cfpub.epa.gov/ecotox)
11) TOXNET, U.S. National Library of Medicine(https://toxnet.nlm.nih.gov)
12) Korea Chemical Information System, National Institute of Environmental Research (http://ncis.nier.go.kr)
13) CDA Database (https://www.copper.org)
14) STANDARD MANUAL For Copper and Copper_base Alloy MILL PRODUCTS (3rd; 1958) *CABRA*
15) MatWeb(searchable online database of material properties) (http://www.matweb.com)
16) ACGIH® Threshold Limit Values (TLV®) (2004)
17) Agency for Toxic Substances and Disease Registry (ATSDR):
Toxicological Profile for Copper, September 2002
18) International Agency for Research on Cancer (IARC) Monographs
19) National Library of Medicine (NLM) Databases:
ChemID, Integrated Risk Information (IRIS)
International Toxicity Estimates for Risk (ITER)
Chemical Carcinogenesis Risk Information System (CCRIS)
Hazardous Substances Data Bank (HSDB)
20) National Toxicology Program (NTP) Reports
21) NIOSH Pocket Guide to Chemical Hazards (2003)
22) NIOSH/OSHA Occupational Health Guideline for Copper Fume
23) NIOSH/OSHA Occupational Health Guideline for Copper Dusts and Mists
24) NIOSH/OSHA Occupational Health Guideline for Inorganic Tin Compounds (as Tin)
25) OSHA General Industry Standards (29 CFR 1910)
26) Registry of Toxic Effects of Chemical Substances (RTECS®)

16.2 Disclaimer of expressed and Implied warranties : Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained therein, and assume no esponsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s)

16.3 Issued Date : August 6, 2015

16.4 Revision No. : 2

16.5 Revision Date : March 4, 2019

16.6 Change Log

Rev. No.	Summary of Changes	Date
0	First established.	2015.08.06
1	Supplier's information revised.	2018.01.02
2	Section 2, 9~15 revised.	2019.03.04

< End of MSDS >