This product (wrought copper and copper alloy) are solid metal products, and the obligation to submit SDS documents according to the Japanese Pollutant Release and Transfer Register (PRTR) law and the Japanese Industrial Safety and Health Law (for chemical substances) does not apply.

1. Chemical product and company identification

1-1. Name of chemical substance (Product Name): See table below.

(Sheet, strip, bar, wire and pipe: pure copper and copper alloy of 2 or 3 elements targeting only copper element)

Alloy Group	Corresponding JIS No.	Alloy Name	Alloy No.	Shape	Substance Classification
Cu Group	H 3100 H 3250 H 3260 H 3300 H 3320 H 3510	Oxygen-free copper	C1011, C1020	sheet, strip, bar, wire, pipe	single
		Tough pitch copper	C1100		
		Phosphorus-deoxidized copper	C1201, C1220, C1221		
		High strength copper	C1565, C1862, C5010		
		Copper for printing	C1401		
		Tin bearing copper	C1441		
Cu-Ti Group	H 3130	Copper-titanium alloys	C1990	sheet, strip,	Mixture (alloy)
Cu-Zn Group	H 3100 H 3250 H 3300 H 3320	Copper for detonators	C2051	sheet, strip, bar, wire, pipe	Mixture (alloy)
		Red brass	C2100, C2200, C2300, C2400		
		Brass	C2600, C2680, C2700, C2720, C2800, C2801		
Cu-Fe-Zn-Al Group	H 3100	Aluminum bronze	C6140	sheet, strip,	Mixture (alloy)
Cu-Zn-Al-As Group	H3300	Brass for condensers	C6870, C6871	pipe	Mixture (alloy)

Sample

1-2. Company information

Company name:

Address: (Postal code)

Department: Supervisors: (Position:)

Tel: , Fax:

Emergency Tel number:

[Creation date: DD/MM/YY)

2. Hazards identification

This product (wrought copper and copper alloy) is a molded product, and so is outside the scope of GHS classification. Further, as there is no alloy information, GHS classification information in units of the configuration elements are referenced for the description.

2-1: Copper GHS classification

Physical hazards:

Explosives:	Outside scope of classification
Flammable gases:	Outside scope of classification
Flammable aerosols:	Outside scope of classification
Oxidizing gases:	Outside scope of classification
Gases under pressure:	Outside scope of classification
Flammable liquids:	Outside scope of classification
Flammable solids:	Cannot classify
Self-reactive substances and mixtures:	Outside scope of classification
Pyrophoric liquids:	Outside scope of classification
Pyrophoric solids:	Cannot classify
Self-heating substances and mixtures:	Cannot classify
Substances and mixtures which, in contact with water, emit flammable gases:	Cannot classify
Oxidizing liquids:	Outside scope of classification
Oxidizing solids:	Outside scope of classification
Organic peroxides:	Outside scope of classification
Corrosive to metals:	Cannot classify

Health hazards:

Acute toxicity (oral):	Cannot classify
Acute toxicity (dermal):	Cannot classify
Acute toxicity (inhalation: gases):	Outside scope of classification
Acute toxicity (inhalation: vapors):	Outside scope of classification
Acute toxicity (inhalation: dusts):	Cannot classify
Acute toxicity (inhalation: mists):	Cannot classify
Skin corrosion/irritation:	Cannot classify
Serious eye damage/eye irritation:	Cannot classify
Respiratory sensitization:	Cannot classify
Skin sensitization:	Cannot classify
Germ cell mutagenicity:	Cannot classify
Carcinogenicity:	Outside classification
Reproductive toxicity:	Cannot classify
Specific target organ toxicity - single exposure:	

		Class 3 (airway irritant)
	Specific target organ toxicity - repeated exposure:	
		Class 1 (liver)
	Aspiration hazard:	Cannot classify
Environmental hazards:	Acute aquatic toxicity:	Cannot classify
	Chronic aquatic toxicity:	Class 4

Label elements

Pictgram

Signal word: Danger

Hazard statement: Risk of irritation to respiratory organs

Liver damage due to long-term or repeated exposure

Risk of harm due to long-term effects

Precautionary statement: [Prevention]

Do not inhale the dust.

Avoid discharging into the environment.

[Response]

If inhaled, move to a location with fresh air, and rest in a posture that facilitates breathing.

If feeling unwell, consult a physician to receive diagnosis and treatment.

[Disposal]

Recycling is possible, so if recovering and discarding, entrust the work to a waste disposal specialist who is licensed by the prefectural governor.

2-2. Cobalt: GHS classification

Physical hazards:

Explosives:	Outside scope of classification
Flammable gases:	Outside scope of classification
Flammable aerosols:	Outside scope of classification
Oxidizing gases:	Outside scope of classification
Gases under pressure:	Outside scope of classification
Flammable liquids:	Outside scope of classification
Flammable solids:	Cannot classify

	Self-reactive substances and mixtures:	Outside scope of classification
	Pyrophoric liquids:	Outside scope of classification
	Pyrophoric solids:	Cannot classify
	Self-heating substances and mixtures:	Cannot classify
	Substances and mixtures which, in contact with water, emit flammable gases:	Cannot classify
	Oxidizing liquids:	Outside scope of classification
	Oxidizing solids:	Outside scope of classification
	Organic peroxides:	Outside scope of classification
	Corrosive to metals:	Cannot classify
Health hazards:	Acute toxicity (oral):	Outside classification
	Acute toxicity (dermal):	Cannot classify
	Acute toxicity (inhalation: gases):	Outside scope of classification
	Acute toxicity (inhalation: vapors):	Cannot classify
	Acute toxicity (inhalation: dusts):	Cannot classify
	Acute toxicity (inhalation: mists):	Outside classification
	Skin corrosion/irritation:	Cannot classify
	Serious eye damage/eye irritation:	Cannot classify
	Respiratory sensitization:	Class 1
	Skin sensitization:	Class 1
	Germ cell mutagenicity:	Class 2
	Carcinogenicity:	Class 2
	Reproductive toxicity:	Class 2
	Specific target organ toxicity - single exposure:	Class 3 (airway irritant)
	Specific target organ toxicity - repeated exposure:	Class 1 (respiratory organs)
	Aspiration hazard:	Cannot classify
Environmental hazards:	Acute aquatic toxicity:	Cannot classify
	Chronic aquatic toxicity:	Class 4

Label elements

Pictogram

Precautionary statement: [Prevention]

Do not inhale dust.

Avoid discharging into the environment.

[Response]

If inhaled, move to a location with fresh air, and rest in a posture that facilitates respiration.

If feeling unwell, consult a physician and receive treatment.

[Disposal]

Recycling is possible, so if recovering and discarding, entrust the work to a waste disposal specialist who is licensed by the prefectural governor.

2-3. Tin:

GHS classification: Using April 20, 2006 (Damage to the Environment: March 31, 2006), GHS Classification Manual (February 10, 2006)

Physical hazards:

Explosives:	Outside scope of classification
Flammable gases:	Outside scope of classification
Flammable aerosols:	Outside scope of classification
Oxidizing gases:	Outside scope of classification
Gases under pressure:	Outside scope of classification
Flammable liquids:	Outside scope of classification
Flammable solids:	Cannot classify
Self-reactive substances and mixtures:	Outside scope of classification
Pyrophoric liquids:	Outside scope of classification
Pyrophoric solids:	Cannot classify
Self-heating substances and mixtures:	Cannot classify
Substances and mixtures which, in contact with water, emit flammable gases:	Cannot classify
Oxidizing liquids:	Outside scope of classification
Oxidizing solids:	Outside scope of classification
Organic peroxides:	Outside scope of classification
Corrosive to metals:	Cannot classify

Health hazards:

Acute toxicity (oral):	Cannot classify
Acute toxicity (dermal):	Cannot classify
Acute toxicity (inhalation: gases):	Outside scope of classification

	Acute toxicity (inhalation: vapors):	Cannot classify
	Acute toxicity (inhalation: dusts):	Cannot classify
	Acute toxicity (inhalation: mists):	Outside scope of classification
	Skin corrosion/irritation:	Cannot classify
	Serious eye damage/eye irritation:	Cannot classify
	Respiratory sensitization:	Cannot classify
	Skin sensitization:	Cannot classify
	Germ cell mutagenicity:	Cannot classify
	Carcinogenicity:	Cannot classify
	Reproductive toxicity:	Cannot classify
	Specific target organ toxicity - single exposure:	Cannot classify
	Specific target organ toxicity - repeated exposure:	Class 1 (lung)
	Aspiration hazard:	Cannot classify
Environmental hazards:	Acute aquatic toxicity:	Cannot classify
	Chronic aquatic toxicity:	Cannot classify

Label elements

Pictogram

Signal word: Danger

Hazard statement: Lung damage due to long-term or repeated exposure

Precautionary statement: [Prevention]

Do not inhale dust, fumes, vapor, or spray.

Wash hands thoroughly after handling.

When using the product, do not eat, drink, or smoke.

[Response]

If inhaled, move to a location with fresh air, and rest in a posture that facilitates respiration.

If feeling unwell, consult a physician and receive treatment.

[Disposal]

Recycling is possible, so if recovering and discarding, entrust the work to a waste disposal specialist who is licensed by the prefectural governor.

3. Composition/information on ingredients

3-1. Substance or mixtures: See the table in 1-1.

3-2. Chemical name: Alloys and alloy name are shown in the table in 1-1.

Chemical composition: See the table below

3-3. Chemical formula or structural formula: None

3-4. Ordinance No. (PRTR Law and Industrial Safety and Health Law): See the table below

3-5. CAS No.: See the table below

3-6. Official publication reference No.: N/A

3.2. Components	3.2 Composition (mass %)	3.4 Ordinance No. (Only Substances Subject to SDS Publication)				3.5. CAS No.
		PRTR Law		Industrial Safety and Health Law		
		0.1% max	1% max	0.1% max	1% max	
Copper (Cu)	99.99 min	---	---	379	---	7440-50-8
Phosphorus (P)	0.062 min	---	---	---	---	7723-14-0
Titanium (Ti)	3.5 min	---	---	---	---	7440-32-6
Lead (Pb)	0.1 min	---	---	---	---	7439-92-1
Iron (Fe)	3.5 min	---	---	---	---	7439-89-6
Zinc (Zn)	Remnant	---	---	---	---	7440-66-6
Aluminum (Al)	8.0 min	---	---	---	---	7429-90-5
Manganese (Mn)	0.1 min	---	---	---	---	7439-96-5
Arsenic (As)	0.06 min	---	---	---	---	7440-38-2
Silicon (Si)	0.50 min	---	---	---	---	7440-21-3
Tin (Sn)	0.72 min	---	---	322	---	7440-31-5
Nickel (Ni)	0.06 min	---	---	---	---	7440-02-0
Cobalt (Co)	0.21 min	---	---	172	---	7440-48-4

4. First-aid measures

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

4-1. Copper

If inhaled: Move the victim to a location with fresh air, and make sure they rest in a pose that facilitates respiration.

If feeling unwell, consult a physician and receive treatment.

If on skin: Remove contaminated clothing.

Wash skin promptly.

If feeling unwell, consult a physician and receive treatment.

Wash contaminated clothing before reuse.

If in eyes: Irrigate carefully for several minutes with water. Next, if wearing contact lenses that can be removed easily, remove the contact lenses. Thereafter, continue to wash.

Consult a physician and receive treatment.

If swallowed: Rise out the mouth promptly, and immediately consult a physician for treatment.

Anticipated acute effects and anticipated delayed effects:

If inhaled: Cough, headache, shortness of breath, pharyngeal pain, stomach pain, nausea, and vomiting.

If on skin: Reddening

If in eyes: Reddening, pain

Delayed symptom: Metal fume fever

Protection for first-aid providers:

First-aid providers must wear protective equipment appropriate for the circumstances.

Special notes to an attending physician:

Rest and medical observation over time are indispensable.

4-2. Cobalt

If inhaled: Move the victim to a location with fresh air, and make sure they rest in a pose that facilitates respiration.

Consult a physician and receive treatment.

If on skin: Wash skin promptly.

Wash away using large quantities of soap and water.

Consult a physician and receive treatment.

Wash contaminated clothing before reuse.

If in eyes: Irrigate carefully for several minutes with water.

Consult a physician and receive treatment.

If swallowed: Rise out the mouth.

Consult a physician and receive treatment.

Anticipated acute effects and anticipated delayed effects:

If inhaled: Cough, feeling of smothering, shortness of breath and asthma. Onset of symptoms may be delayed.

If on skin: Irritation and allergen reaction. Onset of symptoms may be delayed.

If in eyes: Irritation, reddening and drying

If ingested orally: Stomach pain and vomiting

Protection for first-aid providers:

First-aid providers must wear protective equipment appropriate for the circumstances.

Special notes to an attending physician:

Rest and medical observation over time are indispensable.

4-3. Tin

If inhaled: Move the victim to a location with fresh air, and make sure they rest in a pose that facilitates respiration.

Consult a physician.

Special treatment (In the event that the victim needs antidote, see the supplementary instruction.)

If on skin: Wash skin promptly.

Consult a physician.

Wash contaminated clothing before reuse.

If in eyes: Irrigate carefully for several minutes with water.

Consult a physician.

Special treatment (In the event that the victim needs first-aid treatment, see the supplementary instruction)

If swallowed: Rise out the mouth.

Consult a physician.

Special treatment (In the event that the victim needs first-aid treatment, see the supplementary instruction)

Anticipated acute effects and anticipated delayed effects:

If inhaled: Vapor and mist irritate lung and upper respiratory tract.

If on skin: Irritation

If in eyes: Irritation

5. Fires-fighting measures

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

5-1. Copper

Extinguishing media: Special powder retardants and dry sand

Unsuitable extinguishing media:

Water jet, foam extinguisher, and CO_2

Specific hazards: There is a risk of irritant, poisonous, or corrosive gas or fumes being emitted by fire.

Using water on metal fires may emit hydrogen gas.

Specific extinguishing methods:

Move the container from the region on fire if there is no danger.

Ideally, sealant methods and oxygen starvation methods should be used for metal fires.

Protection of firefighters: When firefighting, wear suitable breathing equipment and chemical protective clothing.

5-2. Cobalt

Extinguishing media: Special powder retardants, soda ash, caustic lime and dry sand

Unsuitable extinguishing media:

CO_2, sprinkling of water and foam extinguisher

Specific hazards: There is a risk of the container exploding when heated.

There is a risk of irritant, corrosive, or poisonous gas being emitted due to fire.

Specific extinguishing methods:

Move the container from the region on fire if there is no danger.

Ideally, sealant methods and oxygen starvation methods should be used.

Protection of firefighters: When firefighting, wear suitable breathing equipment and chemical protective clothing.

5-3. Tin

Extinguishing media: Special powder retardants and dry sand 1)

Unsuitable extinguishing media:

Prohibit other extinguisher. 1)

Specific hazards: The substance is flammable. 1)

There is a risk of the dust explosion when it is powdered state.

React violently with strong oxidant. 1)

Specific extinguishing methods:

When firefighting, keep enough space to perform.

Move the container from the region on fire if there is no danger.

If it is impossible to move the container, cool the container to sprinkle water to/around

it.

After fire extinction, cool the container with a lot of water.

Protection of firefighters: When firefighting, wear suitable breathing equipment and (heat-resistant) chemical protective clothing.

6. Accidental release measures

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

6-1. Copper

Personnel precautions, protective equipment, and emergency procedures:

Prohibit admission to all non-essential personnel.

Do not touch or walk through any leaking material.

Workers must wear protective equipment (See “8. Exposure prevention and protection measures”), avoid gas and fume inhalation, and contact with the eyes and skin.

Environmental precautions:

Be careful not to discharge into rivers, or to affect the environment.

Recovery and neutralization:

Sweep together any spills and collect in a sealable container before discarding

Methods and materials for containment and methods for cleaning up:

Stop the leak if there is no danger.

Secondary disaster prevention measures:

Promptly remove all ignition sources and flammable substances. (Smoking, fireworks, and naked flames in the vicinity are prohibited.)

Prevent inflow to drainage ditches, sewers, basements, or sealed locations.

6-2. Cobalt

Personnel precautions, protective equipment, and emergency procedures:

Immediately move to a suitable distance in all directions as a leakage area.

Prohibit admission to all non-essential personnel.

Workers must wear protective equipment (See “8. Exposure prevention and protection measures”), avoid gas and fume inhalation, and contact with the eyes and skin.

Do not touch or walk through any leaking material.

Environmental precautions:

Do not discharge into the environment.

Be careful not to discharge into rivers, or to affect the environment.

Recovery and neutralization:

Collect leaks using clean, static-proof tools, and recover in a sealable container before implementing disposal processing.

Methods and materials for containment and methods for cleaning up:

Stop the leak if there is no danger.

Secondary disaster prevention measures:

Promptly remove all ignition sources. (Prohibit smoking, fireworks, and naked flames in the vicinity.)

Prevent inflow to drainage ditches, sewers, cellars, or sealed locations.

6-3. Tin

Personnel precautions, protective equipment, and emergency procedures:

Do not touch or walk through any leaking material.

Immediately move to a suitable distance in all directions as a leakage area.

Prohibit admission to all non-essential personnel.

Workers must wear protective equipment (See “8. Exposure prevention and protection measures”), avoid gas and fume inhalation, and contact with the eyes and skin.

If the fire does not break out even though leaking occurs, workers must wear sealed and impervious protective clothing

Stay upwind.

Depart from lowland.

Do not touch the broken container or leaking when workers don’t wear protective equipments.

Environmental precautions:

Be careful not to discharge into rivers, or to affect the environment.

Do not discharge into the environment.

Recovery and neutralization:

If leaks are small amount, collect leaks using clean, static-proof tools, and recover in a clean & dry container with loosely covered before implementing disposal processing.

If leaks are big amount, wet with water and enclose with protection fence before

implementing disposal processing.

Methods and materials for containment and methods for cleaning up:

Stop the leak if there is no danger.

Secondary disaster prevention measures:

Promptly remove all ignition sources. (Prohibit smoking, fireworks, and naked flames in the vicinity.)

Clean up floor often to prevent slip.

7. Handling and storage

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

7-1. Copper

<Handling>

Technical measures: Install equipment measures as described in “8. Exposure controls and personal protection”, and wear protective equipment.

Local / total ventilation: Implement local ventilation and total ventilation as described in “8. Exposure controls and personal protection”.

Precautions for safe handling:

Conforming to “2. Hazards identification”.

Prevention of contact: Refer to “10. Stability and reactivity”.

<Storage>

Incompatible materials: Refer to “10. Stability and reactivity”.

Storage conditions: Avoid locations with sudden temperature changes and high humidity when storing.

Container and packing materials:

Although there are no packing or container regulations, place in a sealable, undamaged container.

7-2. Cobalt

<Handling>

Technical measures: Install equipment measures as described in “8. Exposure controls and personal protection”, and wear protective equipment.

Local / total ventilation: Implement local ventilation and total ventilation as described in “8. Exposure controls and personal protection”.

Precautions for safe handling:

Obtain the user manual before use.

Do not handle until all safety precautions and readings are understood.

Prohibit the use of high-temperature devices, sparks, and naked flames in the vicinity.

Implement ventilation to make sure the airborne concentration remains below the exposure limit.

Do not inhale dust or fumes.

Do not touch, inhale, or drink.

Do not remove contaminated clothing from the worksite.

When using the product, do not eat, drink, or smoke.

Use only in outside or well-ventilated location.

Wash hands thoroughly after handling.

Avoid discharging into the environment.

Prevention of contact: Refer to “10. Stability and reactivity”.

<Storage>

Incompatible materials: Refer to “10. Stability and reactivity”.

Storage conditions: Avoid locations with sudden temperature changes and high humidity when storing.

Container and packing materials:

Use a container designated by the United Nations Recommendations on the Transport of Dangerous Goods.

7-3. Tin

<Handling>

Technical measures: Install equipment measures as described in “8. Exposure controls and personal protection”, and wear protective equipment.

Local / total ventilation: Implement local ventilation and total ventilation as described in “8. Exposure controls and personal protection”.

Precautions for safe handling:

Prohibit the use of high-temperature devices, sparks, and naked flames in the vicinity.

There is a risk that the explosion happens in the case of a fire, make people evacuate according to the area.

Avoid rough handling such as dust, shock and friction.

Use only in outside or well-ventilated location.

Do not touch, inhale, or drink.

Do not let the substances contact the eye.

Do not inhale dust.

Do not inhale fumes.

Do not inhale mists.

Do not inhale spray.

Wash hands thoroughly after handling.

Contact avoidance: Refer to “10. Stability and reactivity”.

<Storage>

Incompatible materials: Refer to “10. Stability and reactivity”.

Storage conditions: Avoid locations with sudden temperature changes and high humidity when storing.

Container and packing materials:

Although there are no packing or container regulations, place in a sealable, undamaged container.

8. Exposure controls and personal protection

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

8-1. Copper

Administrative level: Not specified.

Permissible limit (Exposure limits and biological exposure indices)

・Japan Society for Occupational Health (2005 version):

Not specified.

・ACGIH (2005 version): TLV-TWA 0.2 mg/m^3 (as fumes)

TLV-TWA 1 mg/m^3 (as dust or mist)

Facility measures: To maintain the concentrations in air at or below the recommended tolerable concentrations, seal all processes, and use local air filters and other equipment countermeasures.

Protective equipment

・Respiratory protection: Wear suitable respirator protective equipment.

・Hand protection: Wear suitable protective gloves.

・Eye protection: Protective goggles (regular glasses, regular glasses with lateral plates, or goggles)

・Skin and body protection:

Wear protective equipment such as protective clothing and safety boots, etc.

8-2. Cobalt

Administrative level: Not specified.

Permissible limit (Exposure limits and biological exposure indices)

・Japan Society for Occupational Health (2005 version):

0.05mg/m^3 (as Cobalt)

・ACGIH (2005 version): TLV-TWA 0.02mg/m^3 (as Cobalt)

Facility measures: To maintain the concentrations in air at or below the recommended tolerable concentrations, seal all processes, and use local air filters and other equipment countermeasures.

Protective equipment

・Respiratory protection: Wear suitable respirator protective equipment.

・Hand protection: Wear suitable protective gloves.

・Eye protection: Wear suitable eye protective equipment.

・Skin and body protection:

Use suitable protective clothing and masks as necessary.

Hygiene measures: When using the product, do not eat, drink, or smoke.

Wash hands thoroughly after handling.

8-3. Tin

Administrative level: Not specified.

Permissible limit (Exposure limits and biological exposure indices)

・Japan Society for Occupational Health (2005 version):

Not specified.

・ACGIH (2005 version): TLV-TWA 2 mg/m^3

Facility measures: To maintain the concentrations in air at or below the recommended tolerable concentrations, seal all processes, and use local air filters and other equipment countermeasures.

Protective equipment

・Respiratory protection: Wear designated respirator protective equipment.

・Hand protection: Wear suitable protective gloves.

・Eye protection: Wear suitable eye protective equipment.

・Skin and body protection:

Use suitable protective clothing and masks as necessary.

Hygiene measures: Wash hands thoroughly after handling.

9. Physical and chemical properties: Fields marked with "---" in the table indicates no data.

a) Product nomenclature characteristics

	Oxygen-free copper Phosphorus-deoxidized copper etc. High strength copper	Copper-titanium alloys	Brass Red brass	Aluminum bronze	Brass for condensers
9-1. Appearance of a chemical product ・physical state and colour	Lustrous red-pink solid	Lustrous copper solid	Lustrous poppy red solid	Lustrous gold solid	Lustrous silver-white solid
・form	Depends on product shape	Depends on product shape	Depends on product shape	Depends on product shape	Depends on product shape
・odour	None	None	None	None	None
9-2. pH, with indication of the concentrations	---	---	---	---	---
9-4. Decomposition temperature	---	---	---	---	---
9-5. Flashpoint	---	---	---	---	---
9-6. Upper/lower flammability	---	---	---	---	---
9-7. Explosive limit	---	---	---	---	---
9-11. Solubility(ies)	---	---	---	---	---
9-12. N-octanol/water partition coefficient	---	---	---	---	---
9-13. Other data (Radioactivity, bulk density, etc.)	---	---	---	---	---

b) Alloy characteristics

	Oxygen-free copper, Tough pitch copper, Phosphorus-deoxidized copper, Copper for printing, Tin bearing copper							
	C1011	C1020	C1100	C1201	C1220	C1221	C1401	C1441
9-3. Melting point (ºC)	1083	1083	1083	1083	1083	1083	---	1083
9-10. Relative density	8.94	8.94	8.89-.94	8.94	8.94	8.94	---	8.90

	Copper-titanium alloys	High strength copper		
	C1990	C1565	C1862	C5010
9-3. Melting point (ºC)	1070	1079	1075	1067
9-10. Relative density	8.70	8.94	8.94	8.82

	Copper for detonators, Red brass, Brass										
	C 2051	C 2100	C 2200	C 2300	C 2400	C 2600	C 2680	C 2700	C 2720	C 2800	C 2801
9-3. Melting point (ºC)	---	1065	1045	1025	1000	955	930	930	930	905	905
9-10. Relative density	---	8.86	8.80	8.75	8.67	8.53	8.47	8.47	8.47	8.39	8.39

	Aluminum bronze	Brass for condensers	
	C6140	C6870	C6871

9-3. Melting point (ºC)	1045	970	970
9-10. Relative density	7.89	8.33	8.33

c) Configuration Element Characteristics

	Cu	P	Ti	Pb	Fe	Zn	Al	Mn	As	Si
9-8. Vapor pressure (Pa)	---	---	---	---	---	---	---	---	---	---
9-9. Vapor temperature (Boiling point) (ºC)	2582	280	3085	1750	2860	907	2520	2060	610 sublimation	3270

	Co	Sn	Ni
9-8. Vapor pressure (Pa)	---	---	---
9-9. Vapor temperature (Boiling point) (ºC)	2877	2480	2837

10. Stability and reactivity

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

10-1. Copper

Stability: Turns green when exposed to damp air.

Compounds sensitive to shock are formed by acetylene compounds, ethylene oxides, and azides.

Possibility of hazardous reactions:

Reacts with oxides (chlorates, bromates, and iodates, etc.), so there is a risk of explosion.

Conditions to avoid: Contact with humidity and hazardous mixtures.

Incompatible materials: Acetylene compounds, ethylene oxides, azides, oxides (chlorates, bromates, and iodates, etc.)

Hazardous decomposition products:

CO, CO_2, and copper fumes when burned.

10-2. Cobalt

Stability: Comparatively stable when heated and contact with water.

Spontaneously combustible in the air.

Possibility of hazardous reactions:

React with strong oxidant.

React violently with oxygen, so there is a risk of fire and explosion.

React with acid to form hydrogen.

Conditions to avoid: Contact with hazardous mixtures.

Incompatible materials: Strong oxidants, acids

Hazardous decomposition products:

CO, CO_2, and hydrogen chloride etc. when burned.

10-3. Tin

Stability: Stable at normal temperature in the air.

Insensitive to oxygen and does not change in color at normal temperature in the air.

It does not oxidized in less or equal to 200 ºC. It produces SnO2 film in over 200 ºC.

Possibility of hazardous reactions:

React with strong oxidant, acid, strong base analog, halogen and sulfur.

React violently with halogen to form stannic halide.

React moderately with alkalies in a low temperature. React rapidly with alkalies in a high temperature.

Conditions to avoid: Spreading of dust.

Incompatible materials: Strong oxidants, acids, strong base analog, halogen, sulfur etc.

Hazardous decomposition products:

N/A (element)

11. Toxicological information

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

11-1. Copper

Acute toxicity: Oral: Rabbits LDL_0 120 μg/kg[3)]

Skin irritation/corrosion: Contact with skin causes reddening symptoms.[14)]

Eye damage/irritation: Contact with eyes causes reddening. Causes painful symptoms.[14)]

Acts as an irritant.[10)]

Respiratory or skin sensitization:

Respiratory organ sensitization: no data.

Skin sensitization: The Japan Society for occupational health classified this as skin sensitization group 2 (a substance thought probably to sensitize humans), but The Japanese Society for Dermatoallergology and Contact Dermatitis has no classification.

Reproductive cell mutagenicity:

No data.

Carcinogenicity: EPA classifies this as group D (substance that cannot be classified as carcinogenic to humans).

Reproductive toxicity: No data.

Specific target organ toxicity (single exposure):

Fumes irritate the upper airway.[13)]

Thought to be an airway irritant.

Risk of irritation to the respiratory organs (class 3)

Specific target organ toxicity (repeated exposure):

Hepatomegaly identified in workers exposed to high airborne concentrations (estimated ingestion 200 mg/day).[11)]

Liver damage due to long-term or repeated exposure (class 1)

Aspiration hazard: No data.

11-2. Cobalt

Acute toxicity: Oral: LD_{50} of oral administration experiments using rats

Outside classification, based on 6171 mg/kg [4)].

Percutaneous: No data.

Inhalation (gas): As this is a solid according to GHS definitions, gas inhalation is not considered, and the substance cannot be classified.

Inhalation (vapor): No data.

Inhalation (mist): Cannot classify (There are not enough data.)

Skin irritation/corrosion: No data.

Eye damage/irritation: No data.

Respiratory or skin sensitization:

Respiratory organ sensitization: Class 1. This was classified as an airway sensitizer by Japanese Society of Occupational and Environmental Allergy.

There is a risk of allergy, asthma or breathing difficulty if it is inhaled.

Skin sensitization: Class 1. This was classified as an airway sensitizer by Japanese Society of Occupational and Environmental Allergy.

Risk of causing allergic skin reaction

Reproductive cell mutagenicity:

No data.

Carcinogenicity: Class 2. Deemed outside classification as the substance is already classified as A3 (cobalt and inorganic compounds)[6] by the ACGIH, as 2B (cobalt and cobalt compounds)[10] by IARC , as 2B (cobalt and cobalt compounds)[4] by Japan Society for Occupational Health.

Suspected risk of carcinogenesis

ACGIH A3 (carcinogenic material in animals)

IARC group 2B (might be carcinogenic in humans)

Reproductive toxicity: Class 2. There are no descriptions about toxicity to parent animals. However, there are descriptions regarding to the histological change of orchis or decrease in probability of survival.[8,10]

Suspected risk of malign influence on reproductive functions or fetus

Specific target organ toxicity (single exposure):

Class 3 (airway irritant). It is thought that it has an airway irritant to humans because there are descriptions about respiratory tract irritation.[8]

Risk of irritation to respiratory organs

Specific target organ toxicity (repeated exposure):

Class 1 (respiratory organ). Respiratory organs and heart are thought to be marker organs because there are descriptions about irritation to respiratory organs, lung function failure, wheezing, asthma, pneumonia, fibrous response, cardiomyopathy, cardiac chamber function failure, auxocardia and cardiac failure by cobalt exposure among workers. However, the effect to heart is to be deemed as indirect and didn't adopt it.

Damage to the respiratory organs due to long-term or repeated exposure

Aspiration hazard: No data.

11-3. Tin

Acute toxicity:	Oral:	No information.
	Percutaneous:	No information.
	Inhalation (gas):	Solid according to GHS definitions.
	Inhalation (vapor):	No data.
	Inhalation (dust, mist):	No data.

Skin irritation/corrosion: No information.

Eye damage/irritation: No information to be decided on.

Respiratory or skin sensitization:

No information.

Reproductive cell mutagenicity:

No data.

Carcinogenicity: No information to be decided on.

Reproductive toxicity: No information.

Specific target organ toxicity (single exposure):

It does not thought as respiratory tract irritation in GHS Classification nevertheless ICSC (2004) describe “may cause mechanical irritation to the respiratory tract.” because it is thought as physical effect of general dust.

Specific target organ toxicity (repeated exposure):

There seemed pneumoconiosis among workers who inhale metallic tin according to 2 data of EHC15.

Aspiration hazard: No data.

12. Ecological information

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

12-1. Copper

Acute aquatic environmental harm:

Cannot classify due to insufficient data.

Chronic aquatic environmental harm:

Despite the existence of L(E)C_{50}≤100 mg/L data, as this is a metal and its actions in water are unknown, it was designated class 4.

12-2. Cobalt

Acute aquatic environmental harm:

Cannot classify due to insufficient data.

Chronic aquatic environmental harm:

Despite the existence of LC_{50}≤100 mg/L data, as this is a metal and its actions in water are unknown, it was designated class 4. Risk of harm due to long-term effects

12-3. Tin

Acute aquatic environmental harm:

Cannot classify due to No data.

Chronic aquatic environmental harm:

Cannot classify due to No data.

13. Disposal considerations

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

13-1. Copper

Waste from residues: Follow the relevant laws and local disposal regulations. Entrust disposal to and industrial waste contractor or local public body that is authorized by the prefectural governor where available. If outsourcing waste disposal, thoroughly notify the contractors of the dangers and harmfulness before outsourcing.

Contaminated containers and contaminated packaging:

Either clean and recycle the containers, or dispose of them suitably according to the relevant laws and regulations, and local government standards.

When disposing of empty containers, make sure to discard the contents completely.

13-2. Cobalt

Waste from residues: Follow the relevant laws and local disposal regulations. Entrust disposal to and industrial waste contractor or local public body that is authorized by the prefectural governor where available. If outsourcing waste disposal, thoroughly notify the contractors of the dangers and harmfulness before outsourcing. Substances in an elemental state can be reused, so recover them.

Contaminated containers and contaminated packaging:

Either clean and recycle the containers, or dispose of them suitably according to the relevant laws and regulations, and local government standards.

When disposing of empty containers, make sure to discard the contents completely.

13-3. Tin

Waste from residues: Follow the relevant laws and local disposal regulations. Entrust disposal to and industrial waste contractor or local public body that is authorized by the prefectural governor where available. If outsourcing waste disposal, thoroughly notify the contractors of the dangers and harmfulness before outsourcing. Avoid discharging waste liquid and washing wastewater into rivers or landfill.

Contaminated containers and contaminated packaging:

Either clean and recycle the containers, or dispose of them suitably according to the relevant laws and regulations, and local government standards.

When disposing of empty containers, make sure to discard the contents completely.

14. Transport information

There is no information for mixtures (alloys), so information in units of the configuration elements are referenced for the description.

14-1. Copper

<International regulations>

Information on marine transport regulation:	Non-dangerous substance
・UN number:	Not applicable
Information on air transport regulation:	Non-dangerous substance
・UN number:	Not applicable

<Japanese regulations>

Information on road transport regulation:	No special regulations
Information on marine transport regulation:	Non-dangerous substance
Information on air transport regulation:	Non-dangerous substance

14-2. Cobalt

<International regulations>

Information on marine transport regulation:	As according to IMO regulation
・UN number:	1383
・UN proper shipping name:	Pyrophoric alloy (n.o.s.)
・Class:	4.2
・Packing group:	Ⅰ
・UN number:	3089
・UN proper shipping name:	Metallic powder (flammable, n.o.s.)
・Class:	4.1
・Packing group:	Ⅱ
・Marine pollutant:	Not applicable
Information on air transport regulation:	As according to the ICAO/IATA regulation
・UN number:	1383

・UN proper shipping name:	Pyrophoric alloy (n.o.s.)
・Class:	4.2
・Packing group:	Ⅰ
・UN number:	3089
・UN proper shipping name:	Metallic powder (flammable, n.o.s.)
・Class:	4.1
・Packing group:	Ⅱ

<Japanese regulations>

Information on road transport regulation:	No regulations
Information on marine transport regulation:	As according to the regulations of the Ship Safety Act
・UN number:	1383
・UN proper shipping name:	Metallic powder (flammable, n.o.s.)
・Class:	4.2
・Packing group:	Ⅰ
・Marine pollutant:	Not applicable
・UN number:	3089
・UN proper shipping name:	Metallic powder (flammable, n.o.s.)
・Class:	4.1
・Packing group:	Ⅱ
・Marine pollutant:	Not applicable
Information on air transport regulation:	As according to the regulations of the Civil Aeronautics Act
・UN number:	1383 (Transportation is prohibited.)
・UN number:	3089
・UN proper shipping name:	Metallic powder (flammable, n.o.s.)
・Class:	4.1
・Packing group:	Ⅱ
	Make sure to prevent unpiling avoiding direct daylight and loading up not to damaged/ corroded/ leaked during the transportation. Need yellow card during the transportation.

14-3. Tin

<International regulations>

Information on marine transport regulation:	Non-dangerous substance

・UN number: Not applicable

Information on air transport regulation: Non-dangerous substance

・UN number: Not applicable

<Japanese regulations>

Information on road transport regulation: Not applicable

Information on marine transport regulation: Non-dangerous substance

・Marine pollutant: Not applicable

Information on air transport regulation: Non-dangerous substance

15. Regulatory information

This product (copper and copper alloy) are solid metal products, and the obligation to submit SDS documents according to the Pollutant Release and Transfer Register (PRTR) law and the Industrial Safety and Health Law (for chemical substances) does not apply.

The configuration element unit information is described below for reference.

15-1. Copper

Occupational Health and Safety Law (OHSL):

Materials to be notified

(Law Paragraph 57, and edict Paragraph 18.2 Table 9)

(Edict No. 379)

15-2. Cobalt

Occupational Health and Safety Law (OHSL):

Materials to Be Notified

(Law paragraph 57, and edict paragraph 18.2 Table 9)

(Edict No. 172)

Law concerning reporting, etc., of releases to the environment of specific chemical substances and promoting improvements in their management:

Type 1 designated chemical substance

Pollutant Release and Transfer (PRTR) Law:

(Law Paragraph 2.2, edict paragraph 1, Appendix Table 1)

(Edict No. 100)

Ship safety law: Flammable materials and pyrophoric substances

(Hazard regulation No. 2, paragraph 3, separate hazard report Table 1)

Flammable materials and flammable substances

(Hazard regulation No. 2, paragraph 3, separate hazard report Table 1)

Civil aeronautics act: Transportation is prohibited. (Flammable materials and pyrophoric substances)

(Hazard regulation paragraph 194, separate hazard report Table 1)

Flammable materials and flammable substances

(Hazard regulation paragraph 194, separate hazard report Table 1)

15-3. Tin

Occupational Health and Safety Law (OHSL):

Materials to be notified

(Law paragraph 57, and edict paragraph 18.2 Table 9)

(Edict No. 322)

16. Other information (References)

16-1. Copper

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1) Ullmanns (E) (5th edition, 1995)

2) Contamination Dangers Handbook (2nd edition, 1997)

3) RTECS (2005)

4) ICSC (J) (1993)

5) Sax (8th edition, 1992)

6) Lange (14th edition 1992)

7) Gangolli (1st edition 1993) vol. 2

8) Lide (85th edition, 2004-2005)

9) SRC (Access on Jul 2005)

10) PATTY (4th edition, 1994)

11) EHC200 (1998)

12) EPA (IRIS (Access on Jul 2005))

13) ACGIH (7th edition, 2001)

14) Handbook of Danger and Harmful Chemical Substances, Japan Industrial Safety and Health Association (1992)

15) Booklet of the Threshold Limit Values and Biological Exposure Indices, 6th edition; Japan Chemical Industry

Ecology-Toxicology & Information Center (2004)

16) GHS Classification Results (Sumika Technical Information Service, Inc.)

17) Japan Chemical Industry Association, "Emergency Measures and Policies, Container Yellow Card (Labeling)"

18) Japan Chemical Industry Association, "Chemical Substances Control Law Regulations Search System" (CD-ROM) (2005)

19) Japan Chemical Database Ltd., "Comprehensive Chemicals Database" (2005)

20) Safety Database (revised and expanded supplementary edition, 1997)

21) JETOC, “Collection of Existing Chemical Substance Safety Inspection Data for the Chemical Substances Control Law”

22) Ministry of the Environment, “Chemical Substances Ecological Impact Tests”

16-2. Cobalt

<References>

1) ICSC (2004)

2) RTECS (2004)

3) SIDS (2003)

4) Japan Society for Occupational Health (2005)

5) Ministry of the Environment Risk Evaluations Vol. 3 (2004)

6) ACGIH (7th edition, 2001)

7) NTP DB (Access on February 2006)

8) ATSDR (2004)

9) EPA (1998)

10) IARC (1991)

11) JETOC, “Collection of Existing Chemical Substance Safety Inspection Data for the Chemical Substances Control Law”

12) Handbook of Danger and Harmful Chemical Substances, Japan Industrial Safety and Health Association (1992)

13) GHS Classification Results (NITE)

14) Japan Chemical Industry Association, "Emergency Measures and Policies, Container Yellow Card (Labeling)"

15) Japan Chemical Industry Association, "Chemical Substances Control Law Regulations Search System" (CD-ROM) (2005)

16) Japan Chemical Database Ltd., "Comprehensive Chemicals Database" (2005)

17) Amoore, J. E. and Haulata, E., Journal of Applied Toxicology, 3(6) 272 (1983)

<Accident examples>

No information

16-3. Tin

<References>

1) ICSC (2004)

2) Hommel (1991)

3) Weiss (2nd, 1985)

4) HSDB (2003)

5) Hazardous material DB (2nd, 1993)

6) ESC SYRESS

7) ACGIH (2001)

8) DFGOT vol. 6 (1994)

9) RTECS (2004)

10) ACGIH-TLV (2005)

11) NTP (11th, 2005)

12) Howard (1997)

13) UNRTDG (13th,2004)

14) SIDS (2002)

15) ECETOC TR4 (1982)

16) SRC (2005)

17) GESTIS (2005)

18) PATTY (5th, 2001)

19) AQUIRE (2003)

20) Merck (13th, 2001)

21) CERI hazard database (1998)

22) BUA68 (1991)

23) TOXCENTER (Access on Feb 2005)

24) Sax (11th, 2004)

25) ECETOC TR48 (1998)

26) IUCLID (2000)

27) IARC Vol.71 (1999)

28) ACGIH (2003)

29) RTECS (VZ200000) HSDB Full record

30) Japan Society for Occupational Health recommendations (2005)

31) IARC39 (1986)

32) IRIS (1998)

33) EHC 15 (1980)

34) EHC(J) 134 (1997)

35) Renzo (3rd, 1986)

36) Fluxing material pocketbook (1997)

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43) CAMD (Access on May 2005)

44) J Occup Health 45: 137 – 139 (2003)

45) Eur Resper J. 25 (1): 201 – 204 (2005)

46) DFGOT Vol.12 (1999)

47) NICNAS (1999)

48) EU Annex Ⅰ (2005)

49) Lide (85th, 2004)

50) EU – RAR (2005)

51) HSDB (2005)

52) ICSC (1999)

53) Report of Ministry of Health, Labour and Welfare (2005)

54) ESIS Data Base (2005)

The Safety Data Sheet is supplied to workers handling hazardous chemical products as reference information to assure safe handling. Make sure the workers engaged in handling understand the importance of suitable measures depending the on individual handling circumstances, etc., and that they are themselves responsible for referencing the SDS before use. Consequently, this datasheet is not a guarantee of safety.

Category, title and chemical composition of wrought Copper (JIS product) which SDS issue targets to only copper

Category	The former title	Shape					Chemical composition													
		Sheet	Strip	Bar	Wire	Pipe	Cu	Pb	Fe	Sn	Zn	Al	As	Be	Mn	Ni	Si	P	Ti	Other specification
C1011	Oxygen-free copper for electron devices	○	○	○	○	○	≥99.99	≤0.001	---	---	≤0.0001	---	---	---	---	Bi≤0.001 Cd≤0.0001	Hg≤0.0001 Or≤0.001	≤0.0003	---	S≤0.0018 Te≤0.001 Se≤0.001
C1020	Oxygen-free copper	○	○	○		○	≥99.96	---	---	---	---	---	---	---	---	---	---	---	---	---
C1100	Tough pitch copper 1 Copper for printing 11	○	○	○	○	○	≥99.90	---	---	---	---	---	---	---	---	---	---	---	---	---
C1201	Phosphorous deoxidized copper 1A	○	○	○	○	○	≥99.90	---	---	---	---	---	---	---	---	---	---	≥0.004 0.015<	---	---
C1220	Phosphorous deoxidized copper 1B	○	○	○	○	○	≥99.90	---	---	---	---	---	---	---	---	---	---	0.015 -0.040	---	---
C1221	Phosphorous deoxidized copper 2	○	○				≥99.75 (99.8)	---	---	---	---	---	---	---	---	---	---	0.004 -0.040	---	---
C1565	High strength copper					○	≥99.90											0.020 -0.040	---	Co: 0.040 -0.055
C1862	High strength copper					○	≥99.40			0.07 -0.12	0.02 -0.10					0.02 -0.06		0.046 -0.062	---	Co: 0.16 -0.21
C5010	High strength copper					○	≥99.20			0.58 -0.72								0.015 -0.040	---	---
C1401	Copper for printing 12	○					≥99.30	---	---	---	---	---	---	---	---	0.10 -0.20	---	---	---	---
C1441	Tin bearing copper	○	○				≥99.7	≤0.03	≤0.02	0.10 -0.20	≤0.10	---	---	---	---	---	---	0.001 -0.02	---	---
C1990	Copper-titanium alloys	○	○				---	---	---	---	---	---	---	---	---	---	---	---	2.9 -3.5	Cu+Ti ≥99.5
C2051	Copper for detonators		○				98.0 -99.0	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---
C2100	Red brass 1	○	○		○		94.0 -96.0	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---
C2200	Red brass 2	○	○		○	○	89.0 -91.0	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---
C2300	Red brass 3	○	○		○	○	84.0 -86.0	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---
C2400	Red brass 4	○	○		○		78.5 -81.5	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---

Category, title and chemical composition of wrought Copper (JIS product) which SDS issue targets to only copper

Category	The former title	Shape					Chemical composition													
		Sheet	Strip	Bar	Wire	Pipe	Cu	Pb	Fe	Sn	Zn	Al	As	Be	Mn	Ni	Si	P	Ti	Other specification
C2600	Paper-manufacture brass 1 Brass 1	○	○	○	○	○ weld	68.5 -71.5	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---
C2680	Brass 2A	○	○			weld	64.0 -68.0	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---
C2700	Paper-manufacture brass 2 Brass 2			○	○	○	63.0 -67.0	≤0.05	≤0.05	---	remnant	---	---	---	---	---	---	---	---	---
C2720	Brass 2B	○	○		○		62.0 -64.0	≤0.07	≤0.07	---	remnant	---	---	---	---	---	---	---	---	---
C2800	Paper-manufacture brass 3 Brass 3			○	○	○	59.0 -63.0	≤0.10	≤0.07	---	remnant	---	---	---	---	---	---	---	---	---
C2801	Brass 3	○	○				59.0 -62.0	≤0.10	≤0.07	---	remnant	---	---	---	---	---	---	---	---	---
C6140	---	○					88.0 -92.5	≤0.01	1.5 -3.5	---	≤0.20	6.8 -8.0	---	---	≤1.0	---	---	≤0.015	---	Cu+Pb+Fe+ Zn+Mn+Al+ P ≥99.5
C6870	Brass for condensers 4					○	76.0 -79.0	≤0.05	≤0.05	---	remnant	1.8 -2.5	0.02 -0.06	---	---	---	---	---	---	---
C6871	Brass for condensers 2					○	76.0 -79.0	≤0.05	≤0.05	---	remnant	1.8 -2.5	0.02 -0.06	---	---	---	0.02 -0.50	---	---	---

Note × in the former code (Plate: P, Strip: R, Drawn rod: BD, Wire: W, Tube: T)