This product (wrought copper and copper alloy) are solid metal products, and the obligation to submit MSDS 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.

Alloy group	Corresponding JIS No.	Alloy name	Alloy No.	Shape	Substance classification
Cu-Fe-Zn-Al-Mn Group	H3250	High strength brass	C6782, C6783	Bar	Mixture (alloy)

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.

2-1Copper : 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
	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

Nerve 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. Manganese: 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):	Cannot classify
	Skin corrosion/irritation:	Class 3
	Serious eye damage/eye irritation:	Class 2B
	Respiratory sensitization:	Cannot classify
	Germ cell mutagenicity:	Cannot classify
	Carcinogenicity:	Outside classification
	Reproductive toxicity:	Class 1B
	Specific target organ toxicity - single exposure:	Class 1 (respiratory organs)
	Specific target organ toxicity - repeated exposure:	Class 1 (respiratory organs and nervous system)
	Aspiration hazard:	Cannot classify
Environmental hazards:	Acute aquatic toxicity:	Cannot classify
	Chronic aquatic toxicity:	Class 4

Label element

Pictogram

Signal word: Danger

Hazard statement: Mild skin irritation

Eye irritant

Risk of malign influence on reproductive functions or fetus

Damage to respiratory organs

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

Risk of harm to aquatic life forms due to long-term effects

Precautionary statement:

[Prevention]

Use personal protective equipment and breathing apparatus as necessary to avoid exposure.

Do not inhale dust or fumes.

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

Wash hands thoroughly after handling.

Avoid discharging into the environment.

[Response]

If there is adhesion to skin, and if skin irritation occurs, consult a physician for

diagnosis and treatment.

Wash hands thoroughly after handling.

If the substance contacts the eye, irrigate with water thoroughly for several minutes. Next, if wearing contact lenses that can be removed easily, remove the contact lenses. Thereafter, continue to wash.

If eye irritation persists, consult a physician to receive diagnosis and treatment.

If feeling unwell, consult a physician and receive treatment.

[Storage]

Lock the storage location.

[Disposal]

Entrust disposal of containers and contents to a specialist disposal processor who is licensed by the prefectural governor.

2-3. Lead: 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:	Outside classification
Self-reactive substances and mixtures:	Outside scope of classification
Pyrophoric liquids:	Outside scope of classification
Pyrophoric solids:	Outside classification
Self-heating substances and mixtures:	Outside classification
Substances and mixtures which, in contact with water, emit flammable gases:	Outside classification
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
	Germ cell mutagenicity:	Class 2
	Carcinogenicity:	Class 2
	Reproductive toxicity:	Class 1A
	Specific target organ toxicity - single exposure:	Cannot classify
	Specific target organ toxicity - repeated exposure:	Class 1 (Hematopoietic system, central nervous system, peripheral nervous system, cardiovascular system, immune system)
	Aspiration hazard:	Cannot classify
Environmental Hazards:	Acute aquatic toxicity:	Cannot classify
	Chronic aquatic toxicity:	Cannot classify

Label element

Pictogram

Signal Word: Danger

Hazard Statement: Suspected risk of genetic disease

Suspected risk of cancer

Risk of malign influence on reproductive functions or fetus

Damage to the hematopoietic system, kidneys, central nervous system, peripheral nervous system, cardiovascular system, and immune system due to long-term or repeated exposure

Precautionary statement:

[Prevention]

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

Use suitable protective equipment and ventilation equipment to avoid exposure.

Do not inhale the dust.

Wash hands thoroughly after handling.

Avoid discharging into the environment.

[Response]

If exposed or fear exposure, consult a physician and receive diagnosis treatment.

If feeling unwell, consult a physician and receive treatment.

[Storage]

Lock the storage location.

[Disposal]

Entrust disposal of containers and contents to a specialist disposal processor who is licensed by the prefectural governor.

3. Composition/information on ingredients

3-1. Substance or mixtures: Mixture (alloy)

3-2. Chemical name: Cu-Fe-Zn-Al-Mn (High strength brass)

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. Elements	3.2 Composition (mass%)		3.4 Ordinance No. (Only substances subject to MSDS publication)				3.5. CAS No.
			PRTR Law		Industrial safety and health law		
	C6782	C6783	0.1%max	1%max	0.1%max	1%max	
Copper (Cu)	56.0 to 60.5	55.0 to 59.0	---	---	379	---	7440-50-8
Iron (Fe)	0.10 to 1.0	0.20 to 1.5	---	---	---	---	7439-89-6
Zinc (Zn)	Remainder	Remainder	---	---	---	---	7440-66-6
Aluminum (Al)	0.20 to 2.0	0.20 to 2.0	---	---	---	---	7429-90-5
Manganese (Mn)	0.50 to 2.5	1.0 to 3.0	---	412	---	550	7439-96-5
Lead (Pb)	0.50 max	0.50 max	---	304	411	---	7439-92-1

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: Eye and skin reddening, eye pain, cough, headache, shortness of breath, pharyngeal pain, stomach pain, nausea, and vomiting. 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. Manganese

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.
Wash away using large quantities of soap and water.
Consult a physician and receive treatment.

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, shortness of breath, bronchitis, and pneumonia.

Onset of symptoms may be delayed.

If skin contact is made: Irritation and reddening.

If on eyes: Irritation.

If ingested orally: Stomach pain and nausea.

Most important signs and symptoms:

No description.

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. Lead

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:

Stomach cramps, drowsiness, headache, nausea, vomiting, fatigue, wheezing, pallor, hemoglobinuria, and lethargy

Most important signs and symptoms: No description.

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.

5. Fire-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 (heat-resistant) chemical protective clothing.

5-2. Manganese

Extinguishing media: Special powder retardants, dry sand, and graphite powder.

Unsuitable extinguishing media: CO_2, water sprays, foam extinguisher.

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

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

Contact with water, water vapor, and CO_2 causes violent reaction.

There is a risk that dust or mist may form explosive vapors.

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 (heat-resistant) chemical protective clothing.

5-3. Lead

Extinguishing media: The product itself is not flammable.

Unsuitable extinguishing media: Rod infusers, foam extinguisher, and CO_2.

Specific hazards: There is a risk of irritant or poisonous gas being emitted due to fire.

Specific extinguishing methods:

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

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 and materials 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. Manganese

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.

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.

Stay upwind.

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 and materials 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. Lead

Physical 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:

Wipe up any leaks and collect in a sealable empty container before implementing disposal processing.

Methods and materials for containment and methods and materials for cleaning up:

Stop the leak if there is no danger.

Secondary disaster prevention measures:

Residue on the floor risks slipping, so process assiduously.

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.

7-2. Manganese

<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>

Technical measures: Store hazardous materials in their storage location, and install the lighting, illumination, and ventilation necessary for handling.

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

Storage conditions: Securely seal the containers, and store in a cool, well-ventilated location.

Store away from heat, sparks, naked flames, and other ignition sources.

No smoking.

Store away from substances that are dangerous when mixed.

Lock the storage location.

Container and packing materials:

Place in a sealable, undamaged container. For powders, however, use a container designated by the United Nations Recommendations on the Transport of Dangerous Goods.

7-3. Lead

<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>

Technical measures: Technical measures are not required.

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

Safe storage conditions: Store away from oxidants.

Lock the storage location.

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, 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. Manganese

Administrative level: 0.2 mg/m^3 (as manganese)

Permissible limit (Exposure limits, biological exposure indices)

・Japan society for occupational health (2005 version):

0.3 mg/m^3 (as inhalable dust and manganese)

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

Facility measures: Use explosion-proof electrical, ventilation, and lighting equipment.

If dust occurs, install localized ventilators.

Install air conditioning if dust or fumes are caused during high-temperature processes.

Install eyewash containers and safety showers in worksites where the substance is stored and handled.

Protective equipment

・Respiratory protection: Wear suitable respirator protective equipment.

・Hand protection: Wear suitable protective gloves.

・Eye protection: Wear suitable eye protective equipment.

Protective goggles (regular glasses, regular glasses with lateral plates, or goggles)

・Skin and body protection: Use suitable protective clothing and masks as necessary.

Hygiene measures: Wash hands thoroughly after handling.

8-3. Lead

Administrative level: 0.05 mg/m^3 (lead and its compounds, as lead)

Permissible limit (Exposure limits, biological exposure indices)

・Japan society for occupational health (2005 version):

0.1 mg/m^3 lead and its compounds, excluding alkyl lead, as lead

・ACGIH (2005 version): TLV-TWA 0.05 mg/m^3 (A3; BEI lead and its inorganic compounds, as lead)

Facility measures: Install eyewash containers and safety showers in worksites where the substance is stored and handled.

Implement ventilation to make sure the airborne concentration remains below the recommended tolerable concentration.

Protective equipment

・Respiratory protection: Wear suitable respirator protective equipment.

・Hand protection: Wear suitable protective gloves.

・Eye protection: Wear protective equipment for eyes and face.

・Skin and body protection: Wear protective equipment such as protective clothing and safety boots, etc.

Hygiene measures: Wash hands thoroughly after handling.

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

	C6782	C6783
9-1.Appearance of a chemical product, ・Physical state and colour, ・Form ・Odour	Lustrous golden solid Depends on product form None	
9-2. pH, with indication of the concentration	---	---
9-3. Melting point (ºC)	900	900
9-4. Decomposition temperature	---	---
9-5. Flashpoint	---	---
9-6. Upper/lower flammability	---	---
9-7. Explosive limits	---	---
9-8. Vapor pressure (Pa)	---	---
9-9. Boiling point (ºC)	2582(Cu), 2860(Fe), 907(Zn) 2520(Al), 2060(Mn), 1750(Pb)	
9-10.Relative density	8.3	8.3
9-11. Solubility(ies)	---	---
9-12. n-octanol /water partition coefficient	---	---
9-13. Other Data (Radioactivity, bulk density, etc.)	---	---

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. Manganese

Stability:	Comparatively stable under normal handling conditions. Emits poisonous fumes when heated.
Possibility of hazardous reactions:	Reacts violently with non-metals in particular (chlorine, fluorine, oxygen, etc.) at high temperatures, so there is a danger of fire and explosion. Reacts violently with hydrogen peroxide, bromine pentafluoride, and aluminum dust, so there is a danger of fire and explosion. Reacts with boron, carbon, silicon, phosphor, sulfur, and oxides. Reacts explosively with nitric acid and ammonium nitrate. Powders react with water and water vapor to form nitrogen.
Conditions to avoid:	Mixing the powder or granules in air may cause dust explosions. Mixing and contact at high temperatures and with dangerous contaminants.
Incompatible materials:	Strong oxidants, strong acids, hydrogen peroxide, bromine pentafluoride, nitrogen dioxide, non-metals, aluminum dust, etc.
Hazardous decomposition products:	Causes irritating, corrosive, and poisonous gas and fumes when heated.

10-3. Lead

Stability:	Reacts with pure water and weak organic acids in the presence of oxygen.
Possibility of hazardous reactions:	No dangerous or harmful reactions under normal conditions. Reacts with concentrated nitric acid at high temperatures, boiling concentrated chlorine, and concentrated sulfuric acid. Reacts with fluorine and chlorine at room temperature.
Conditions to avoided:	Mixing powder or granules with air may cause dust explosions.
Incompatible materials:	Oxidants.
Hazardous decomposition products:	May emit poisonous fumes or gas when heated.

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)]

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

Aspiration hazard: No data.

11-2. Manganese

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

Outside classification, based on 9000 mg/kg [4)].

Dermal: 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): No data.

Skin irritation/corrosion: Although there is no 4-hour application test, classified as class 3 from the description of the results of skin irritation tests using rabbits that “Application for 24 hours showed mild irritation”[4)].

Mild skin irritation

Eye damage/irritation t: Classified as class 2b from the description of the results of eye irritation tests using rabbits that “Showed mild irritation”[4)].

Eye irritant.

Respiratory or skin sensitization:

Respiratory organ sensitization: No data

Skin sensitization: No data

Reproductive cell mutagenicity:

Deemed unclassifiable as there are no trans-generational mutagenicity tests, no germ cell/somatic cell *in vivo* mutagenicity tests, no germ cell/somatic cell *in vivo* genotoxicity tests, and no (strongly) positive results of multiple markers in *in vitro* mutagenicity tests[5].

Carcinogenicity: Deemed outside classification as the substance is already classified as D[9] by the EPA.

Reproductive toxicity: In teratogenicity tests on mice, the administration method was intraperitoneal, and there are no descriptions of general toxicity in the parents, but as embryonic lethality and abnormal fetuses (exencephaly) was observed[6], the substance was classified as class 1B according to specialist judgment.

Risk of malign influence on reproductive functions or fetus

Specific target organ toxicity (single exposure):

From the description that "Acute exposure to manganese dust (particularly MnO_2 and Mn_3O_4) causes an inflammatory reaction in the lungs and induces lung function failure over time. Lung toxicity increases infections such as bronchitis, etc., and effectively causes manganese pneumonia"[6], it is thought that the respiratory organs are marker organs. From the above, the substance was classified as class 1 (respiratory organs).

Damage to respiratory organs.

Specific target organ toxicity (repeated exposure):

From the description "The most common inorganic substances containing manganese are manganese dioxide, manganese carbonate, manganese silicate, and manganese trioxide. Normally, exposure to excess manganese compounds for 14 days or less (i.e., shorter periods), or for one year (i.e., medium term) affects the respiratory organs and nervous system, and is not thought to affect other organs"[6), 7)], the marker organs are thought to be the respiratory organs and nervous system. From the above, the substance was classified as class 1 (respiratory organs and nervous system).

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

Aspiration hazard: No data.

11-3. Lead

Acute toxicity: Oral: No information.

Dermal: No information.

Inhalation (dust): No information.

Skin irritation/corrosion: No information.

Eye damage/irritation: No information.

Respiratory or skin sensitization:

Reproductive cell mutagenicity:

Results have been obtained that contradict the chromosome abnormalities in the peripheral blood lymphocytes of people who work with lead, but as there are reports of chromosome abnormalities and micronucleus induction effects in lead itself[23), 37), 20), 10)], the substance was designated class 2.

Carcinogenicity: Classified as B[23), 30)] and A3[10)], and as B2 by the EPA.

Suspected risk of carcinogenesis (class 2)

IARC group 2 (might be carcinogenic in humans)

Reproductive toxicity: Designated class 1A as there are reports of cases of human exposure affecting spermatogenesis[37), 20), 8), 23)], and reports that ovulation function failure has been observed in cases of exposure among female EHC workers.

Although there are reports of connections to cognitive function development impairment in newborns[10), 20), 8), 23)], and connections to increased spontaneous abortions[20), 8)], no clear conclusions have been obtained.

Risk of malign influence on reproductive functions or fetus (class 1A)

Specific target organ toxicity (single exposure):

Despite reports of cases in which renal function failure has been identified in humans with acute poisoning[20)], the same source also reports that there was no renal failure in subsequent epidemiological surveys.

Specific target organ toxicity (repeated exposure):

From reports that the marker organs are the hematopoietic system, nervous system, and the kidneys and the cardiovascular system[20)], reports that heme synthesis impairment, nephropathy, and encephalopathy have been observed in cases of human exposure[37), 10), 8), 23)], reports of the peripheral nerves and central nervous functions have been affected in cases of human exposure[37), 10), 8)], reports of effects such as hypertension on the cardiovascular system in cases of human exposure[37), 10)], and reports that immunosuppressive actions have been observed in cases of human

exposure[8)], the marker organs are thought to be the hematopoietic system, liver, CNS, peripheral nervous system, cardiovascular system, and immune system, all of which have been designated class 1.

Although there are descriptions of case reports of reduced thyroid gland and adrenal functions in EHC, both these case reports are from before 1970, and there have been no similar reports subsequently, and as DFGOT describes no effects on the thyroid gland[20)], the thyroid and adrenal glands are not thought to be marker organs.

Impairment of the hematopoietic system, kidneys, CNS, peripheral nervous system, cardiovascular system, and immune system due to long-term or repeated exposure (class 1)

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. Manganese

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 to aquatic life forms due to long-term effects

12-3. Lead

Acute aquatic environmental harm:

No information.

Chronic aquatic environmental harm:

No information.

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 container 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. Manganese

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.

・Roasting-and-reduction process:

In the case of large quantities, dispose of as metal manganese using the roasting-and-reduction process.

・Solidification separation process:

Solidify using cement, and then verify that the elution amount is at or below the evaluation standard before burying.

Contaminated container 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. Lead

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 container and contaminated packaging:

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

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. Manganese

<International regulations>

Information on marine transport regulation:	As according to the IMO regulation
・UN number:	3208
・UN proper shipping name:	Metallic substance (water-reactive, n.o.s.)
・Class:	4.3
・Packing group:	I-III
・Marine pollutant:	Not applicable
Information on air transport regulation:	As according to the ICAO/IATA regulation
・UN number:	3208

・UN proper shipping name: Metallic substance (water-reactive, n.o.s.)

・Class: 4.3

・Packing group: I-III

<Japanese regulations>

Information on road transport regulation: No regulations.

Information on marine transport regulation: As according to the regulations of the ship safety act.
(Limited to powders only)

・UN number: 3208

・Product name: Metallic substance (water reactive) (Except for products which are listed separately.)

・Class: 4.3

・Packing group: I-III

・Marine pollutant: Not applicable.

Information on air transport regulation: As according to the regulations of the civil aeronautics act.
(Limited to powders only)

・UN number: 3208

・Product name: Metallic substance (water reactive) (Except for products which are listed separately.)

・Class: 4.3

・Packing group: I-III

14-3. Lead

<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 regulations.

Information on marine transport regulation: Non-dangerous substance.

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 MSDS 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. Manganese

Occupational health and safety law (OHSL):

Materials to be notified

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

(Edict No. 550)

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. 412)

Ship safety law: Flammable materials and flammable substances

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

(Limited to powders.)

Civil aeronautics act: Flammable materials and flammable substances

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

(Limited to powders.)

15-3. Lead

Occupational health and safety law (OHSL):

Materials to be notified

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

(Edict No. 411)

Lead (Edict table No. 4 and lead poisoning prevention regulations paragraph

1.1)

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. 304)

Labor standards law: Toxic chemicals

(Law paragraph 75.2, edict paragraph 35 table 1.2.4)

Air pollution control act: Harmful substance

(Edict paragraph 1)

Water pollution prevention act: Harmful substance

(Edict paragraph 2, ministerial ordinance for sewage standards paragraph 1)

Soil contamination countermeasures act:

Special harmful substance

(Law paragraph 2.1, edict paragraph 1)

16. Other Information

16-1. Copper

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16-2. Manganese

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16-3. Lead

<References>

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2) Merck (13th edition, 2001)

3) IMDG (2004)

4) Hommel (1991)

5) SRC (2005)

6) HSDB (2003)

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13) SITTIG (47th edition, 2002)

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15) Chapman (2005)

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17) GESTICS (2005)

18) Howard (1997)

19) Weiss (2nd edition, 1985)

20) DFGOT, vol. 17 (2002)

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32) IRIS (2004)

33) Ministry of the environment risk evaluations Vol. 3 (2004)

35) EHC174 (1995)

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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 MSDS before use. Consequently, this datasheet is not a guarantee of safety.