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.

Alloy Group	Corresponding JIS No.	Alloy Name	Alloy No.	Shape	Substance Classification
Cu-Fe-Al-Mn-Ni Group	H3100	Aluminum bronze	C6161, C6280, C6301	Sheet	Mixture (alloy)
	H3250		C6161, C6191, C6241	bar	
Cu-Fe-Al-Ni Group	H3100	Cupronickel	C7060, C7150	Sheet	Mixture (alloy)
	H3300		C7060, C7100, C7150, C7164	Pipe	

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 metales:	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

Pictogram

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. Nickel: 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 elements

Pictogram

Signal word: Danger

Hazard statement: Inhalation risks causing allergies, asthma, or breathing difficulties

Risk of causing allergic skin reaction

Suspected risk of cancer

Damage to respiratory organs and kidneys

Respiratory organ damage due to long-term or repeated exposure

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

Precautionary statement: [Prevention]

Wear suitable protective gloves, goggles, and face masks.

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

Wash hands thoroughly after handling.

If there is insufficient ventilation, wear suitable protective equipment for respiration.

Wear suitable personal protective equipment.

Avoid discharging into the environment.

Do not remove contaminated clothing from the worksite.

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

[Response]

If the substance adheres to the skin, wash using copious amounts of soap and water.

Wash contaminated clothing before reuse.

If there is adhesion to skin, and if skin irritation or rash occurs, consult a physician for diagnosis and treatment.

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

If inhaled, or if respiratory symptoms manifest, contact a physician.

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

If exposed, consult a physician.

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.

2-4. 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: a) Cu-Fe-Al-Mn-Ni (Aluminum bronze)

b) Cu-Fe-Mn-Ni (Cupronickel)

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

a) Aluminum bronze

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		
	C6161	C6191	C6241	C6280	C6301	0.1% max	1% max	0.1% max	1% max	
Copper (Cu)	83.0 to 90.0	81.0 to 88.0	80.0 to 87.0	78.0 to 85.0	77.0 to 84.0	---	---	379	---	7440-50-8
Iron (Fe)	2.0 to 4.0	3.0 to 5.0	3.0 to 5.0	1.5 to 3.5	3.5 to 6.0	---	---	---	---	7439-89-6

Aluminum (Al)	7.0 to 10.0	8.5 to 11.0	9.0 to 12.0	8.0 to 11.0	8.5 to 10.5	---	---	---	---	7429-90-5
Manganese (Mn)	0.50 to 2.0	0.50 to 2.0	0.50 to 2.0	0.50 to 2.0	0.50 to 2.0	---	412	---	550	7439-96-5
Nickel (Ni)	0.50 to 2.0	0.50 to 2.0	0.50 to 2.0	4.0 to 7.0	4.0 to 6.0	---	308	418	---	7440-02-0

b) Cupronickel

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		
	C7060	C7100	C7150	C7164	0.1% max	1% max	0.1% max	1% max	
Copper (Cu)					---	---	379	---	7440-50-8
Iron (Fe)	1.0 to 1.8	0.5 to 1.0	0.40 to 1.0	1.7 to 2.3	---	---	---	---	7439-89-6
Manganese (Mn)	0.52 to 1.0	0.20 to 1.0	0.20 to 1.0	1.5 to 2.5	---	412	---	550	7439-96-5
Nickel (Ni)	9.0 to 11.0	19.0 to 23.0	29.0 to 33.0	29.0 to 32.0	---	308	418	---	7440-02-0
Lead (Pb)	0.05max	0.05max	0.05max	0.05max	---	304	411	---	7439-92-1
Zinc (Zn)	0.50max	0.50max	0.50max	0.50max	---	---	---	---	7440-66-6

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. Nickel

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: Adhesion to 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: :

No data.

Most important signs and symptoms :

No data.

Protection for first-aid providers :

No data.

Special notes to an attending physician:

No data.

4-4. 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. Nickel

Extinguishing media: Water mist, foam retardant, powder retardant, carbon gas, dry sands.

Unsuitable extinguishing media:

Water jet.

Specific hazards: The substance is not flammable and will not itself burn, but heating may cause degradation and emit corrosive and/or poisonous mist.

Metal nickel is stabilized against oxidation using an ordinary oxidation membrane, but a fresh metal surface without an oxidation membrane will be rapidly oxidized by the air. Consequently, there is a risk that freshly powdered metal nickel will ignite upon contact with air.

Specific extinguishing methods:

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

Protection of firefighters: Wear suitable respiratory equipment and (flame-resistant) protective clothing.

5-4. 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 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 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. Nickel

Personnel precautions, protective equipment, and emergency procedures:

Remove all ignition sources.

Prohibit admission to all non-essential personnel.

Ventilate before entering a sealed location.

Environmental precautions:

Do not discharge into the environment.

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

Recovery and neutralization:

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

Methods and materials for containment and methods for cleaning up:

Dampen with water, and reduce airborne dust to prevent dispersal.

Secondary disaster prevention measures:

Cover with a plastic sheet to prevent dispersal.

6-4. 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 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:

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 touch, inhale, or drink.

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

Wash hands thoroughly after handling.

Avoid discharging into the environment.

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. Nickel

<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:

No data.

Prevention of contact: No data.

<Storage>

Technical measures: No special technical measures are required.

Incompatible materials: No data.

Storage conditions: Lock the storage location.

Container and packing materials:

No data.

7-4. 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:

Obtain the user manual before use.

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

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

Do not touch, inhale, or drink.

Do not inhale dust or fumes.

Wash hands thoroughly after handling.

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. Nickel

Administrative level: Not set

Permissible limit (Exposure limits, biological exposure indices)

・Japan Society for Occupational Health (2007 version):

1 mg/m^3

・ACGIH (2007 version): TWA 1.5 mg/m^3 (inhalable particles)

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

stored and handled. To prevent exposure, install sealable devices or localized ventilators.

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:

Wear suitable protective clothes.

Hygiene measures: Wash hands thoroughly after handling.

8-4. 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.

a) Product nomenclature characteristics

	Aluminum Bronze	Cupronickel
9-1.Appearance of a chemical product, ・physical state and colour, ・form ・odour	 Lustrous golden solid Depends on product form None	 Lustrous silver-white solid Depends on product form None
9-2. pH, with indication of the Concentration	---	---
9-4. Decomposition temperature	---	---
9-5. Flashpoint	---	---
9-6. Upper/lower flammability	---	---
9-7. Explosive limits	---	---
9-11. Solubility(ies)	---	---
9-12. n-octanol /water partition coefficient	---	---
9-13. Other Data (Radioactivity, bulk Density, Etc.)	---	---

b) Alloy characteristics

	Aluminum Bronze					Cupronickel			
	C6161	C6191	C6241	C6280	C6301	C7060	C7100	C7150	C7164
9-3. Melting point (ºC)	---	1040	1025	---	1035	1100	1150	1170	---
9-10. Relative density	---	7.50	7.45	---	7.58	8.94	8.94	8.94	---

c) Configuration element characteristics

	Cu	Fe	Al	Mn	Ni	Pb	Zn
9-8. Vapor pressure (Pa)	---	---	---	---	---	---	---
9-9. Boiling point (ºC)	2582	2860	2520	2060	2910	1750	907

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. Nickel

Stability:	Thought to be stable when stored and handled according to the laws and regulations
Possibility of hazardous reactions:	Metal nickel is stable against oxidation using an ordinary oxidation membrane, but a fresh metal surface without an oxidation membrane will be rapidly oxidized by the air. Consequently, there is a risk that freshly powdered metal nickel will ignite upon contact with air.
Conditions to avoided:	No data.
Incompatible materials:	No data.
Hazardous decomposition products:	No data.

10-4. 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. Nickel

Acute toxicity:	Oral:	Rat LD_{50}>9000 mg/kg (ECETOC TR No. 33 (1989)) is outside classification.
	Dermal:	No data
	Inhalation (gas):	Solid according to GHS definitions.
	Inhalation (vapor):	No data.
	Inhalation (dust):	Deemed unclassifiable as there is no test data using animals. Nevertheless, cases have been reported of death due to respiratory distress syndrome after 13 days inhalation exposure that was estimated to have a concentration of 382 mg Ni/m^3 for 90 minutes (ATSDR (2005)).
	Inhalation (mist):	Solid according to GHS definitions.

Skin irritation/corrosion: No data.

Eye damage/irritation : No data.

Respiratory or skin sensitization:

Respiratory organ sensitization: (One) case of rhinitis has been identified in humans, and an irritation reaction has been observed in the trachea. (NITE initial risk evaluations ver. 1.0, No. 69 (2008)). Further, as this was classified as an airway sensitizer (group 2) in the tolerable concentration recommendations from The Japan Society for Occupational Health (2008), and as an airway sensitizer by The Japanese Society of Occupational and Environmental Allergy (2004) and DFG (MAK/BAT No. 43 (2007)), the substance was designated as class 1.

Skin sensitization: There are reports of hives (NITE initial risk evaluations ver. 1.0, No. 69 (2008); EHC No. 108 (1991)), contact dermatitis (NITE initial risk evaluations ver. 1.0, No. 69 (2008); EHC No. 108 (1991); IARC vol. 49 (1990)), and positive reactions (NITE initial risk evaluations ver. 1.0, No. 69 (2008); EHC No. 108 (1991)) in batch

tests. Further, as this was classified as a skin sensitizer (group 1) in the tolerable concentration recommendations from The Japan Society for Occupational Health (2008), and as a skin sensitizer by The Japanese Society of Occupational and Environmental Allergy (2004) and DFG (MAK/BAT No. 43 (2007)), the substance was designated as class 1.

Reproductive cell mutagenicity:

Although the results of chromosome abnormalities in alveolar macrophages due to inhalation exposure in rats is positive (NITE initial risk evaluations ver. 1.0, No. 69 (2008)), this was a special testing system. In addition, this as deemed unclassifiable as there is no *in vivo* test data. Further, in vitro mutagenicity tests: Chromosome abnormality tests using human lymphocytes (IARC vol. 49 (1990)) and sudden mutation tests using the human lymphoblast TK6 (detailed risk evaluation series 19 (2006)) were negative.

Carcinogenicity: As the existing classification are as follows: IARC is 2B (IARC), NTP is R (NTP (2005)), and EU is Carcinoma category 3; R40 (EU (2007)), the substance was classified as class 2. Further, the occurrence of either cancer or sarcoma can be seen in carcinogenesis tests using inhalation, subcutaneous, intramuscular, intrathoracic, and intraperitoneal administration in rats. (NITE initial risk evaluations ver. 1.0, No. 69 (2008), IARC vol. 49 (1990); detailed risk evaluation series 19 (2006).)

Reproductive toxicity: From descriptions that birthweight is reduced and stillborn births in the last trimester of pregnancy increase at concentrations up to 250 ppm through oral administration in rats (Teratogenic (12^{th}, 2007)), and deaths increase and a number of cases of teratogenicity were observed before implantation (Teratogenic (12^{th}, 2007)), it is thought that there are occurrence toxicity effects at does that do not reveal general toxicity in the parent animals, and so this substance was classified as class 1B.

Specific target organ toxicity (single exposure):

Failure of the alveolar epithelial cells occurred at doses of 0.5 mg or greater with inhalation exposure tests in male rats (single tracheal administration. (NITE initial risk evaluations ver. 1.0, No. 69 (2008).) Further, as there are descriptions that “inhalation exposure in humans causes “Failure and edema in the alveoli walls in the alveolar regions, and conspicuous renal tubular necrosis in the kidneys” (ATSDR(2005)), this substance was designated class 1 (respiratory organs and kidneys).

Specific target organ toxicity (repeated exposure):

Pulmonary alveolar proteinosis (PAP) and pulmonary granulomatous inflammation were observed in females, and wet lung mononuclear cells were observed in males, at doses of 1 mg/m^3 (0.001 mg/L) or greater, which is equivalent to class 1 of the inhalation exposure tests (OECD TG 413) for 13 weeks using rats. (NITE initial risk evaluations ver. 1.0, No. 69 (2008).) Further, as pleurisy, pneumonia, pulmonary congestion, and edema were observed in inhalation exposure tests for 21 months in rats (CaPSAR (1994)) at doses of 15 mg/m^3 (0.015 mg/L), which is equivalent to class 1 in the guidance, and pneumonia was caused at 1 mg/m^3 (0.001 mg/L) in inhalation exposure tests for six months using rabbits, this substance was designated class 1 (respiratory organs). Meanwhile, changes such as ataxia, irregular breathing, a fall in body temperature, salivation, and limb discoloration were observed with doses of 100 mg/kg/day in 90-day forced oral tests in rats, and although comparatively mild, the symptoms were also observed at 35 mg/kg/day. In addition, as there are reports of 100% fatalities at concentrations of 100 mg/kg/day (IRIS 1996), the substance was designated class 2 (CNS). Further, the EU classification is T; R48/23.

Aspiration hazard: No data.

11-4. 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:

Respiratory organ sensitization: No information.

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. Nickel

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.

12-4. 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. Nickel

Waste from residues:

Before disposal, render as harmless and stable as possible, and neutralize, etc., to reduce to a low hazard level. 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.

13-4. 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. Nickel

<International regulations>

Information on marine transport regulation:	As according to the IMO regulation
・UN number:	3089
・Product name:	Metallic powder (flammable)
・Class:	4.1
・Packing group:	II, III

・Marine pollutant: Not applicable

Information on air transport regulation: As according to the ICAO/IATA regulation

・UN number: 3089

・Product name: Metallic powder (flammable)

・Class: 4.1

・Packing group: II, III

<Japanese regulations>

Information on road transport regulation: Not applicable

Information on marine transport regulation: As according to the regulations of the Ship Safety Act.

・UN number: 3089

・Product name: Metallic powder (flammable)

・Class: 4.1

・Packing group: II, III

・Marine pollutant: Not applicable

Information on air transport regulation: As according to the regulations of the Civil Aeronautics Act.

・UN number: 3089

・Product name: Metallic powder (flammable)

・Class: 4.1

・Packing group : II, III

14-4. 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. Nickel

Occupational Health and Safety Law (OHSL):

Materials to Be Notified

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

(Edict No. 418)

Air pollution control Act: Harmful airborne substances

(Paragraph 2.13, submitted to the central environment council 18 October 1996)

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. 308)

Labor standards law: Carcinogenic chemical substances

(Law paragraph 75.2, edict paragraph 35 Table 1.2.7)

15-4. 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

<References>

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. Manganese

<References>

1) ICSC (2003)

2) Sax (11th edition, 2004)

3) Chemical Dictionary (1994)

4) RTECS (2004)

5) DFGOT vol. 12 (1999)

6) CICAD 12 (1999)

7) CICAD 63 (2004)

8) ATSDR (2005)

9) EPA (1996)

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)

18) ACGIH (2005)

16-3. Nickel

<References>

1) ICSC (2004)

2) Merck (13th edition, 2001)

3) ECETOC TR33 (1989)

4) Japan Society for Occupational Health (2005)

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

6) CaPSAR (1994)

7) NTP (2005)

8) ATSDR (2005)

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)

18) ACGIH (2005)

16-4. Lead

<References>

1) ICSC (2002)

2) Merck (13th edition, 2001)

3) IMDG (2004)

4) Hommel (1991)

5) SRC (2005)

6) HSDB (2003)

7) Lange (16th edition, 2005)

8) Patty, 5th edition (2001)

9) IUCLID (2000)

10) ACGIH, 7th edition (2001)

11) RTECS (2005)

12) HSDB (2001)

13) SITTIG (47th edition, 2002)

14) ICSC (J) (1997)

15) Chapman (2005)

16) Lange (16th edition, 2005)

17) GESTICS (2005)

18) Howard (1997)

19) Weiss (2nd edition, 1985)

20) DFGOT, vol. 17 (2002)

21) Verschueren (4th edition, 2003)

22) CERI Hazard Data Collection (2002)

23) IARC Monographs Supplement 7 (1987)

24) SIDS (1997)

25) ECETOCTR (1998)

26) ATSDR (1998)

27) CaPSAR (1999)

28) SIDS (1997)

29) Sax (11th edition, 2004)

30) Japan Society for Occupational Health recommendations (2004)

31) Dictionary of Organic Compounds

32) IRIS (2004)

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

35) EHC174 (1995)

36) EU-Annex I

37) EHC3 (1977)

The Materials 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.