Safety Data Sheet (SDS①)	SDS № P.1

1. Identification

1-1. Name of chemical substances, etc. (product name)

Alloy name	Corresponding JIS H no.	Alloy no.	Form	Category of substance	Content of chemical composition
Oxygen free copper	JIS H3300 JIS H3510	C1020, C1011	Tube	Single substance	As shown in the table P.27
Tough pitch copper	JIS H3300	C1100			
Phosphorus deoxidized copper		C1201,C1220			
High strength copper -MA5J -HRS35LT -KHRT		C1565 (MA5J), C1862 (HRS35LT) C5010 (KHRT)			
AG3	-----	-----			

1-2. Company information

Company name: Kobelco & Materials Copper Tube, Ltd. Hatano Plant

Address: 65 Hirasawa Hatano-city, Kanagawa-PREF. 257-0015 Japan

Department: Quality Assurance Section

Telephone: +81-463-82-2600 Fax: +81-463-82-7540

[Revised (3) on: 25th September, 2015]

2. Hazard Classification

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

2-1 Copper: GHS classification

Physical hazard	Explosives	Not applicable
	Flammable Gases	Not applicable
	Flammable aerosols	Not applicable
	Oxidizing gases	Not applicable
	Compressed gases	Not applicable
	Flammable liquids	Not applicable
	Flammable solids	Not classifiable
	Self-reactive substances and mixtures	Not applicable
	Pyrophoric liquids	Not applicable
	Pyrophoric solids	Not classifiable
	Self-heating substances and mixtures	Not classifiable

Substances and mixtures that, in contact with water, emit flammable gases

		Not classifiable
	Oxidizing liquids	Not applicable
	Oxidizing solids	Not applicable
	Organic peroxides	Not applicable
	Corrosive to metals	Not classifiable
Health hazards	Acute toxicity (oral)	Not classifiable
	Acute toxicity (dermal)	Not classifiable
	Acute toxicity (inhalation: gases)	Not applicable
	Acute toxicity (inhalation: vapor)	Not classifiable
	Acute toxicity (inhalation: dust)	Not classifiable
	Acute toxicity (inhalation: mist)	Not classifiable
	Skin corrosion/irritation	Not classifiable
	Serious eye damage/irritation	Not classifiable
	Respiratory sensitization	Not classifiable
	Skin sensitization	Not classifiable
	Germ cell mutagenicity	Not classifiable
	Carcinogenicity	Unclassified
	Toxic to reproduction	Not classifiable
	Specific target organ toxicity, systemic toxicity (single exposure)	
		Category 3 (respiratory tract irritation)
		Label elements 
	Specific target organ toxicity, systemic toxicity (repeated exposure)	
		Category 1 (liver)
		Label elements 
	Aspiration hazard	Not classifiable
Environmental hazard	Hazardous to the aquatic environment (acute)	
		Not classifiable
	Hazardous to the aquatic environment (chronic)	Category 4
		No diagram

2-2 Cobalt: GHS classification

Physical hazard	Explosives	Not applicable
	Flammable Gases	Not applicable
	Flammable aerosols	Not applicable
	Oxidizing gases	Not applicable
	Compressed gases	Not applicable
	Flammable liquids	Not applicable
	Flammable solids	Not classifiable
	Self-reactive substances and mixtures	Not applicable
	Pyrophoric liquids	Not applicable
	Pyrophoric solids	Not classifiable
	Self-heating substances and mixtures	Not classifiable
	Substances and mixtures that, in contact with water, emit flammable gases	Not classifiable
	Oxidizing liquids	Not applicable
	Oxidizing solids	Not applicable
	Organic peroxides	Not applicable
	Corrosive to metals	Not classifiable
Health hazards	Acute toxicity (oral)	Unclassified
	Acute toxicity (dermal)	Not classifiable
	Acute toxicity (inhalation: gases)	Not applicable
	Acute toxicity (inhalation: vapor)	Not classifiable
	Acute toxicity (inhalation: dust)	Not classifiable
	Acute toxicity (inhalation: mist)	Unclassified
	Skin corrosion/irritation	Not classifiable
	Serious eye damage/irritation	Not classifiable
	Respiratory sensitization	Category 1
		Label elements 
	Skin sensitization	Category 1
		Label elements 
	Germ cell mutagenicity	Category 2
		Label elements 
	Carcinogenicity	Category 2
		Label elements 

	Toxic to reproduction	Category 2
		Label elements 
Specific target organ toxicity, systemic toxicity (single exposure)		Category 3 (respiratory tract irritation)
		Label elements 
Specific target organ toxicity, systemic toxicity (repeated exposure)		Category 1 (respiratory organs)
		Label elements 
	Aspiration hazard	Not classifiable
Environmental hazard	Hazardous to the aquatic environment (acute)	
		Not classifiable
	Hazardous to the aquatic environment (chronic)	Category 4
		No diagram

2-3 Tin: GHS classification

Physical hazard	Explosives	Not applicable
	Flammable Gases	Not applicable
	Flammable aerosols	Not applicable
	Oxidizing gases	Not applicable
	Compressed gases	Not applicable
	Flammable liquids	Not applicable
	Flammable solids	Not classifiable
	Self-reactive substances and mixtures	Not applicable
	Pyrophoric liquids	Not applicable
	Pyrophoric solids	Not classifiable
	Self-heating substances and mixtures	Not classifiable
	Substances and mixtures that, in contact with water, emit flammable gases	
		Not classifiable
	Oxidizing liquids	Not applicable
	Oxidizing solids	Not applicable
	Organic peroxides	Not applicable
	Corrosive to metals	Unclassifiable
Health hazards	Acute toxicity (oral)	Not classifiable
	Acute toxicity (dermal)	Not classifiable
	Acute toxicity (inhalation: gases)	Not applicable
	Acute toxicity (inhalation: vapor)	Not classifiable
	Acute toxicity (inhalation: dust, mist)	Not classifiable (dust)

	Acute toxicity (inhalation: dust, mist)	Not applicable (mist)
	Skin corrosion/irritation	Not classifiable
	Serious eye damage/irritation	Not classifiable
	Respiratory sensitization	Not classifiable
	Skin sensitization	Not classifiable
	Germ cell mutagenicity	Not classifiable
	Carcinogenicity	Not classifiable
	Toxic to reproduction	Not classifiable
	Specific target organ toxicity, systemic toxicity (single exposure)	Unclassifiable
	Specific target organ toxicity, systemic toxicity (repeated exposure)	Category 1 (lungs)
	Label elements	
	Aspiration hazard	Not classifiable
Environmental hazard	Hazardous to the aquatic environment (acute)	No information
	Hazardous to the aquatic environment (chronic)	No information

3. Composition/Information on Ingredients

3-1. Single substance or mixture	: Shown in the table in Section 1-1.
3-2. Chemical name	: The alloy types and names are shown in the 27 page.
Ingredients and content	: As shown in the table below.
3-3. Chemical formula or structural formula	: None
3-4. Ordinance no. (PRTR Law, ISHA)	: As shown in the 27 page.
3-5. CAS no.	: As shown in the 27 page.

4. First-Aid Measures

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

4-1. Copper

If inhaled	Remove the victim to fresh air, and keep the victim calm in a position comfortable for breathing. Seek medical advice if the victim feels sick.
If on skin	Remove contaminated clothing. Immediately wash the skin. Seek medical attention and treatment if the victim feels sick. Wash the contaminated clothes before reusing.
If in eyes	Wash the eyes carefully with water for a few minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention and treatment.
If swallowed	Immediately rinse mouth with water, and seek medical advice.
Expected acute and delayed symptoms	Redness of eyes and skin, ocular pain, cough, headache, shortness of breath, sore throat, abdominal pain, nausea, vomiting. Delayed symptom: Metal fume fever
Protection for First-aid providers	First-aid providers must wear protective equipment appropriate for the circumstances.
Special precautions for physicians	The victim requires rest and medical follow-up observation.

4-2. Cobalt

If inhaled	Remove the victim to fresh air, and keep the victim calm in a position comfortable for breathing. Seek medical attention and treatment.
If on skin	Immediately wash the skin. Wash with a large amount of water and soap. Seek medical attention and treatment. Wash the contaminated clothes before reusing.
If in eyes	Wash the eyes carefully with water for a few minutes. Seek medical attention and treatment.
If swallowed	Rinse mouth with water. Seek medical attention and treatment.
Expected acute and delayed symptoms	Inhalation: coughing, difficulty breathing, shortness of breath,

	asthma-like reactions. The symptoms may have delayed onset. Skin: Irritation, allergic reactions. The symptoms may have delayed onset. Eye: Irritation, redness, dryness of skin. Ingestion: Abdominal pain, vomiting
Protection for First-aid providers	First-aid providers must wear protective equipment appropriate for the circumstances.
Special precautions for physicians	The victim requires rest and medical follow-up observation.

4-3. Tin

If inhaled	Remove the victim to fresh air, and keep the victim calm in a position comfortable for breathing. Seek medical advice. Special measures (If emergency administration of an antidote is required, refer to the supplementary first-aid instructions)
If on skin	Immediately wash the skin. Seek medical advice. Wash the contaminated clothes before reusing.
If in eyes	Wash the eyes carefully with water for a few minutes. Seek medical advice. Special measures (If emergency treatment is required, refer to the supplementary first-aid instructions)
If swallowed	Rinse mouth with water. Seek medical advice. Special measures (If emergency treatment is required, refer to the supplementary first-aid instructions)
Expected acute and delayed symptoms	If inhaled: Vapor and mist irritate the lungs and upper trachea. If on skin: Irritates the skin. If in eyes: Irritates the mucosa.

5. Fire-Fighting Measures

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

5-1. Copper

Extinguishing media	Special powder extinguisher, dry sand.
Incompatible extinguishing media	Water jet, foam extinguisher, CO_2.
Specific hazards	May product irritative, toxic, or corrosive gases and fumes in fire. Using water on a metal fire may produce hydrogen gas.
Specific fire-fighting measures	Remove the containers from the area of the fire if not dangerous to do so. It is desirable to use sealing and suffocation methods in extinguishing a metal fire.
Protection of firefighters	Wear appropriate air respirators and chemical protective clothing for fire fighting.

5-2. Cobalt

Extinguishing media	Special powder extinguisher, soda ash, lime, dry sand.
Incompatible extinguishing media	CO_2, water spray, form extinguisher.
Specific hazards	Containers may explode when heated. May produce irritative, corrosive, or toxic gases and fumes in fire.
Specific fire-fighting measures	Remove the containers from the area of the fire if not dangerous to do so. It is desirable to use sealing and suffocation methods in extinguishing the fire.
Protection of firefighters	Wear appropriate air respirators and chemical protective clothing for fire fighting.

5-3. Tin

Extinguishing media:	Special powder extinguisher, dry sand. 1)
Incompatible extinguishing media:	Use of other extinguishers is prohibited. 1)
Specific hazards:	The substance is flammable. 1) If the substance is in powder form, the dust may cause an explosion. Reacts with strong oxidizers 1)
Specific fire-fighting measures	Fire should be extinguished from a distance and only close enough for effective fire fighting. Remove the containers from the area of the fire if not dangerous to do so. If the containers are not movable, cool the container by pouring water on and around the containers. After the fire is extinguished, continue to pour a large amount of water to cool the containers sufficiently.
Protection of firefighters	Wear complete protective clothing (heat-resistant), including appropriate air respirators.

6. Accidental Release Measures

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

6-1. Copper

Personal precautions, protective equipment, and emergency measures	Prohibit unauthorized access. Do not touch the spillage or walk in it. The personnel working on the spillage must wear appropriate clothing (refer to the section 8 “Exposure Control/Personal Protection") and avoid contact with eyes and skin, as well as the inhalation of gases and fumes.
Environmental precautions	Avoid discharging into waterways as it has an impact on the environment.
Retrieval and neutralization	Collect the spillage into an empty sealable container and dispose of it afterwards.

Methods and apparatus for containment and cleaning

Stop the spillage if not dangerous to do so.

Prevention of secondary disasters

Quickly remove all sources of fire as well as flammable substances. (Prohibit smoking, sparks, and fire nearby)

Prevent release to drainage, sewer, basements, and enclosed locations.

6-2. Cobalt

Personal precautions, protective equipment, and emergency measures

Prohibit unauthorized access.

Do not touch the spillage or walk in it.

The personnel working on the spillage must wear appropriate clothing (refer to the section 8 “Exposure Control/Personal Protection") and avoid contact with eyes and skin, as well as the inhalation of gases and fumes.

Environmental precautions:

The substance must not be released into the environment.

Avoid discharging into waterways as it has an impact on the environment.

Retrieval and neutralization

Collect the spillage into an empty sealable container using a clean antistatic equipment and dispose of it afterwards.

Methods and apparatus for containment and cleaning

Stop the spillage if not dangerous to do so.

Prevention of secondary disasters

Quickly remove all sources of fire. (Prohibit smoking, sparks, and fire nearby)

Prevent release to drainage, sewer, basements, and enclosed locations.

6-3. Tin

Personal precautions, protective equipment, and emergency measures

Do not touch the spillage or walk in it.

Immediately isolate the area around the spillage at an appropriate distance in all directions.

Prohibit unauthorized access.

The personnel working on the spillage must wear appropriate clothing (refer to the section 8 “Exposure Controls/Personal Protection") and avoid contact with eyes and skin, as well as the inhalation of gases.

If fire is not occurring with the spillage, wear highly sealed and no-permeable protective clothing.

Stay on the windward side.

Keep away from low grounds.

Broken containers or the spillage must not be touched without wearing appropriate protective clothing.

Environmental precautions:

Avoid discharging into waterways as it has an impact on the environment.

The substance must not be released into the environment.

Retrieval and neutralization

If the amount of spillage is small, collect the spillage into a dry, clean container using a clean antistatic equipment, cover the top loosely, and dispose of it afterwards.

If there is a large amount of spillage, wet with water and set up protective fences, then dispose of it afterwards.

Methods and apparatus for containment and cleaning, prevention of secondary disasters

Stop the spillage if not dangerous to do so.
Quickly remove all sources of fire. (Prohibit smoking, sparks, and fire nearby)
The removal process should be conducted carefully, as the substance remaining on the floor surface may cause slipping.

7. Handling and Storage

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

7-1. Copper

<Handling>

Technical measures	Carry out facility measures described in the section 8 "Exposure Controls/Personal Protection" and wear protective equipment.
Local exhaust ventilation and general ventilation	Local exhaust ventilation and general ventilation are to be carried out as described in the section 8 "Exposure Controls/Personal Protection."
Safety precautions	Do not eat, drink, or smoke when using this product. Carry out antistatic measures and use conductive protective clothing and conductive safety shoes. The product must only be used outdoors or in a well-ventilated location. Do not touch, inhale, or ingest. Do not inhale dust or fumes. Wash the hands thoroughly after handling.
Avoiding of contact	Refer to section 10 "Safety and Reactivity."

<Storage>

Technical measures	Storage location must be equipped with lighting, illumination, and ventilation facility necessary for the storage and handling of dangerous goods.
Incompatible materials	Refer to section 10 "Safety and Reactivity."
Storage conditions	Container must be sealed and stored in a well-ventilated, cool place. The product must be stored away from sources of fire, such as heat, sparks, and open flame. - Smoking is prohibited. The product must be stored away from incompatible materials. The product must be stored in a locked location.
Containers and packaging materials	No regulations are set out regarding packaging and containers; however, the product should be stored in a sealable, non-broken container.

7-2. Cobalt

<Handling>

Technical measures	Carry out facility measures described in the section 8 “Exposure Controls/Personal Protection” and wear protective equipment.
Local exhaust ventilation and general ventilation	Local exhaust ventilation and general ventilation are to be carried out as described in the section 8 “Exposure Controls/Personal Protection.”
Safety precautions	An instruction manual for the product must be obtained before use. Do not handle the product until all safety precautions are read and understood. High temperature materials, sparks, and fire must not be used around the product. Ventilate exhaust in order to keep the concentration of the product in the air below the exposure limit. Avoid inhalation of gases and fumes. Do not touch, inhale, or ingest. Do not take contaminated clothing out of the worksite. Do not eat, drink, or smoke when using this product. The product must only be used outdoors or in a well-ventilated location. Wash the hands thoroughly after handling. The substance must not be released into the environment.
Avoiding of contact	Refer to section 10 “Safety and Reactivity.”

<Storage>

Technical measures	Storage location must be equipped with lighting, illumination, and ventilation facility necessary for the storage and handling of dangerous goods.
Incompatible materials	Refer to section 10 “Safety and Reactivity.”
Storage conditions	Container must be sealed when storing. Container must be sealed and stored in a well-ventilated, cool place. The product must be stored away from incompatible materials. The product must be stored in a locked location.
Containers and packaging materials	Containers set out in the UN laws on transport must be used.

7-3. Tin

<Handling>

Technical measures	Carry out facility measures described in section 8 “Exposure Controls/Personal Protection” and wear protective equipment.
Local exhaust ventilation and general ventilation	Local exhaust ventilation and general ventilation are to be

	carried out as described in section 8 "Exposure Controls/Personal Protection."
Safety precautions	High temperature materials, sparks, and fire must not be used around the product. Risk of explosion in fire. The product must be removed from the area of the fire. Handle the product carefully so flying of dust, shock, or rubbing does not occur. The product must only be used outdoors or in a well-ventilated location. Do not touch, inhale, or ingest. Avoid contact with eyes. Do not inhale dust. Do not inhale fumes. Do not inhale mist. Do not inhale sprays. Wash the hands thoroughly after handling.
Avoiding of contact	Refer to section 10 "Safety and Reactivity."

<Storage>

Technical measures	The walls, pillars, and floors of the storage location must be fireproof, and beams are to be made of noncombustible materials. The roof of the storage location must be made noncombustible materials and covered with light noncombustible materials, such as metal sheets. The storage location must not have ceilings. The floor of the storage location must be built to avoid flowing in of water or permeation of water. Storage location must be equipped with lighting, illumination, and ventilation facility necessary for the storage and handling of dangerous goods.
Incompatible materials	Refer to section 10 "Safety and Reactivity."
Storage conditions	Store away from sources of fire, such as heat, sparks, and open flame. Smoking is prohibited. Store away from oxidizers. Store in a cool, well-ventilated place. Container must be sealed when storing. The product must be stored in a locked location.
Containers and packaging materials	No regulations are set out regarding packaging and containers; however, the product should be stored in a sealable, non-broken container.

8. Exposure Controls/Personal Protection

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

8-1. Copper

Administrative level	Not specified.

Permissible exposure limit (exposure limit, Biological Exposure Indices)

Japan Society for Occupational Health (2005 Edition)

Not specified.

ACGIH (2005 edition) TLV-TWA 0.2 mg/m^3 (As fume)

TLV-TWA 0.1 mg/m^3 (As dust, mist)

Facility measures: Use appropriate explosion-proof electric, ventilation, and illumination devices.

Measures must be taken to prevent sparks from static electricity.

In order to keep the concentration of the substance in the air below the recommended administrative level, facility measures, such as enclosed processes and local exhaust ventilation must be carried out.

The worksite where the substance is stored or handled must be equipped with eye washing and safety shower facilities.

Protective equipment

Respiratory protection: Wear appropriate respiratory protection.

Hand protection: Wear appropriate hand protection.

Eye protection: Protective glasses (standard glasses, standard glasses with side board, goggle-type)

Skin and body protection: Wear protective equipment such as protective clothing and safety shoes.

Hygiene measures: Do not eat, drink, or smoke when using this product.

Wash the hands thoroughly after handling.

8-2. Cobalt

Administrative level: Not specified.

Permissible exposure limit (exposure limit, Biological Exposure Indices)

Japan Society for Occupational Health (2005 Edition)

Permissible exposure limit: 0.05 mg/m^3 (as Co)

ACGIH (2005 edition) TLV-TWA: 0.02 mg/m^3 (As Co)

Facility measures: If dust is produced, local exhaust ventilation must be installed.

If dust or fumes are produced in high-temperature processes, ventilation devices must be installed.

The worksite where the substance is stored or handled must be equipped with eye washing and safety shower facilities.

Protective equipment

Respiratory protection: Wear appropriate respiratory protection.

Hand protection: Wear appropriate hand protection.

Eye protection: Wear appropriate eye protection.

Skin and body protection: Use appropriate protective clothing and masks as required.

Hygiene measures: Do not eat, drink, or smoke when using this product.

Wash the hands thoroughly after handling.

8-3. Tin

Administrative level: Not specified.

Permissible exposure limit (exposure limit, Biological Exposure Indices)

Japan Society for Occupational Health (2005 Edition)	Not specified.
ACGIH (2005 edition)	TLV-TWA 2 mg/m^3 (As Sn)
Facility measures	Use appropriate explosion-proof electric, ventilation and illumination devices. The worksite where the substance is stored or handled must be equipped with eye washing and safety shower facilities. Ventilate exhaust in order to keep the concentration of the product in the air below the exposure limit. If dust or fumes are produced in high-temperature processes, ventilation devices must be installed to keep the contamination substances in the air below the administrative level.
Protective equipment	
Respiratory protection	Wear appropriate respiratory protection.
Hand protection	Wear appropriate hand protection.
Eye protection	Wear appropriate eye protection. Wear safety glasses. If there is a risk that the substance may come in contact with the eyes or face due to scattering or spraying, general chemical splash goggles and face shields must be worn.
Skin and body protection	Wear appropriate face protection. Wear appropriate protective clothing and boots.
Hygiene measures:	Wash the hands thoroughly after handling.

9. Physical and Chemical Properties: the dash (-) shows no information is available.

a) Description for each product name

	Oxygen-free copper, Tough pitch copper, Phosphorus deoxidized copper, High strength copper, AG3
9-1. Physical state and color	Lustrous red-pink solid.
Form	Same as the form of the product.
Odor	None
9-2. pH and concentration	-
9-4. Decomposition temperature	-
9-5. Flash point	-
9-6. Auto-ignition temperature	-
9-7. Explosion properties	-
9-11. Solubility in solvents	-
9-12. Octanol/water partition coefficient	-
9-13. Other data (Radioactivity, bulk density, etc.)	-

b) Descriptions for alloy type（Melting point, Density）

As shown in the 27 page.

c) Description for the constituting elements

As shown in the 27 page.

10. Stability and Reactivity

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

10-1. Copper

Safety	Develops green color when exposed to moist air. Produces shock-sensitive compounds when in contact with acetylene compounds, ethylenoxide, and azides.
Possibility of hazardous reactions	Risk of explosion when reacted with oxidizers (chlorates, bromates, iodates, etc.).
Conditions to avoid	Contact with moisture and incompatible substances.
Incompatible substances	Acetylene compounds, ethylenoxide, azides, oxidizers (chlorates, bromates, iodates, etc.)
Hazardous decomposition products	From combustion: Carbon monoxide, carbon dioxide, copper fume.

10-2. Cobalt

Safety	Stable when heated or in contact with water.

	Auto-ignition occurs in air.
Possibility of hazardous reactions	Reacts with strong oxidizers. Reacts violently with oxygen, with risk of fire or explosion. Reacts violently with acids and produces hydrogen.
Conditions to avoid	Contact with incompatible substances.
Incompatible substances	Strong oxidizers and acids
Hazardous decomposition products	From combustion: Carbon monoxide, carbon dioxide, hydrogen chloride, etc.

10-3. Tin

Safety	Stable at room temperature and in air. The affinity to oxygen is low, and the color of the substance does not change in dry air at room temperature. Not oxidized at or below 200°C. In higher temperature, SnO_2 membrane is formed on the surface.
Possibility of hazardous reactions	Reacts with strong oxidizers, acids, strong bases, halogens, sulfur, etc. Reacts quickly with halogen to produce tin halide. Reacts slowly with alkali at low temperature, and rapidly at high temperature.
Conditions to avoid	Scattering of dust
Incompatible substances	Strong oxidizers, acids, strong bases, halogens, sulfur, etc.
Hazardous decomposition products	None applicable (elements)

11. Toxicological Information

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

11-1. Copper

Acute toxicity	Oral rabbits LDL_0 120 μg/kg [3)]
Skin corrosion/irritation	Causes redness when in contact with skin. [14)]
Serious eye damage/eye irritation	Causes redness when in contact with the eye. Causes pain. [14)] Causes irritation. [10)]
Respiratory or skin sensitization	Respiratory sensitization: No data available. Skin sensitization: Classified as Group 2 for skin sensitization (substance that may cause sensitization in humans) by Japan Society for Occupational Health, and not classified by Japanese Society for Contact Dermatitis.
Germ cell mutagenicity	No data available.
Carcinogenicity	Classified as Group D (substances that cannot be classified as having carcinogenicity in humans) by EPA.
Reproductive toxicity	No data available
Specific target organ toxicity, systemic toxicity (single exposure)	The fume irritates upper trachea. [13)] Considered to cause respiratory tract irritation. May cause respiratory irritation (Category3)

Specific target organ toxicity, systemic toxicity (repeated exposure)

Hepatomegaly was observed in a worker exposed to a high concentration of the substance in the air (estimated amount of 200 mg/day)[11)]

Liver disorders from long-term or repeated exposure (Category 1)

Aspiration hazard: No data available.

11-2. Cobalt

Acute toxicity

Oral	Set as unclassified, based on the results of oral administration test with rats (LD_{50} = 6171 mg/kg [2)])
Dermal	No data
Inhalation (gas)	As the substance is defined as solid in GHS, it was not expected to be inhaled as gas. Therefore, the substance was set as not applicable for classification.
Inhalation (vapor)	No data available
Inhalation (mist)	Unclassifiable due to insufficient data.

Skin corrosion/irritation: No data available

Serious eye damage/eye irritation: No data available

Respiratory or skin sensitization

Respiratory sensitization: Classified as Category 1, as the substance is classified by the special committee of Japan Society of Occupational and Environmental Allergy as having airways sensitization.

May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin sensitization: Classified as Category 1, as the substance is classified by the special committee of Japan Society of Occupational and Environmental Allergy as having airways sensitization.

May cause an allergic skin reaction.

Germ cell mutagenicity: No data available.

Carcinogenicity

Classified as Category 2, as the substance was classified A3 by ACGIH (as cobalt and inorganic compounds) [6)],

Group 2B by IARC (as cobalt and cobalt compounds) [10)], and 2B by Japan Society for Occupational Health (as cobalt and cobalt compounds). [4)]

Suspected of causing cancer

ACGIH A3 (carcinogenic in animals)

IARC Group 2B (may have carcinogenicity in humans)

Toxic to reproduction

There is no description on the general toxicity to parent animals. However, the substance was classified as Category 2 due to the reports on the histological changes to testes and the decrease in the survival rate of the subsequent generation. [8),10)]

Suspected of damaging fertility or the unborn child.

Specific target organ toxicity, systemic toxicity (single exposure)

The substance was considered to cause respiratory tract irritation from the descriptions on the bronchi irritation. [8)]

For this reason, the classification was set as Category 3 (respiratory tract irritation).

May cause respiratory irritation

Specific target organ toxicity, systemic toxicity (repeated exposure)

For humans, the substance was reported to cause irritation of respiratory tract, decrease in lung function, wheezing, asthma, pneumonia, fibrosis, cardiomyopathy, impact on the ventricular functions, cardiomegaly, as well as cardiac failure caused by occupational exposure to cobalt. [8)]

From these descriptions, the target organ was thought to be respiratory organs and the heart. However, the effect on the heart was thought to be only secondary, and therefore was not included in this item. From the above reasons, the classification was set as Category 1 (respiratory organs).

Respiratory disorders from long-term or repeated exposure

Aspiration hazard: No data available.

11-3. Tin

Acute toxicity	Oral	No information
	Dermal	No information
	Inhalation (dust)	No information

Skin corrosion/irritation	No information
Serious eye damage/eye irritation	No definite data available
Respiratory sensitization	No information
Skin sensitization	No information
Germ cell mutagenicity:	No data available.
Carcinogenicity	No definite data available
Toxic to reproduction	No information

Specific target organ toxicity, systemic toxicity (single exposure)

No definite data available

Specific target organ toxicity, systemic toxicity (repeated exposure)

Coniosis was observed in workers handling metallic tin. [33)]

Long-term exposure to this substance may cause benign coniosis (stannosis). [1)]

Organ damage from long-term or repeated exposure (Category 1) (Lungs)

Long-term or repeated exposure causes renal disorders.

Long-term or repeated exposure causes lung disorders.

Aspiration hazard: No data available.

12. Ecological Information

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

12-1. Copper

Hazardous to the aquatic environment (acute)

Unclassifiable due to insufficient data.

Hazardous to the aquatic environment (chronic)

Although there is a data which states L(E) $C_{50} \leq 100$ mg/L, the substance was classified as Category 4, as it is metal and its behavior in water is not known.

12-2. Cobalt

Hazardous to the aquatic environment (acute)

Unclassifiable due to insufficient data.

Hazardous to the aquatic environment (chronic)

Although there is a data which states $LC_{50} \leq 100$ mg/L, the substance was classified as Category 4, as the behavior of the substance in water as metals is not known.

May cause long long-term harmful effects

12-3. Tin — No information

13. Disposal Considerations

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

13-1. Copper

Residual waste — The substances should be disposed of in accordance with relevant legislation and local regulations. If certain industrial waste processors are licensed by prefectural premiers, or if local public bodies are in charge of processing these wastes, the waste processing should be consigned to these parties. When consigning the processing of wastes, this should be done after the waste processors are sufficiently notified of the risks and hazards.

Contaminated containers and packaging — The containers should be either washed and recycled or be disposed of in an appropriate manner, according to the relevant legislations and local regulations. When disposing of empty containers, the contents must be removed completely.

13-2. Cobalt

Residual waste — The substances should be disposed of in accordance with relevant legislation and local regulations. If certain industrial waste processors are licensed by prefectural premiers, or if local public bodies are in charge of processing these wastes, the waste processing should be consigned to these parties. When consigning the processing of wastes, this should be done after

the waste processors are sufficiently notified of the risks and hazards. The substance in element form is to be retrieved for reuse.

Contaminated containers and packaging

The containers should either be washed and recycled or disposed of in an appropriate manner, according to the relevant legislations and local regulations. When disposing of empty containers, the contents must be removed completely.

13-3. Tin

Residual waste

The substances should be disposed of in accordance with relevant legislation and local regulations. If certain industrial waste processors are licensed by prefectural premiers, or if local public bodies are in charge of processing these wastes, the waste processing should be consigned to these parties. When consigning the processing of wastes, this should be done after the waste processors are sufficiently notified of the risks and hazards. Do not discharge the waste liquid containing this substance and waste liquid after washing directly into waterways or bury or dispose of the unprocessed products.

Contaminated containers and packaging

The containers should either be washed and recycled or disposed of in an appropriate manner, according to the relevant legislations and local regulations. When disposing of empty containers, the contents must be removed completely. The method of disposing of spray cans differ for each local government. Disposal must be conducted according to the regulations of the relevant local government.

14. Transport Information

Since no regulations exist for the product as alloys, the regulations for the constitutive elements applicable for ISHA (Copper, Cobalt, Tin) are described below. (JCSCL not applicable)

14-1. Copper

<International regulations>

Information on marine transport regulations	Non-dangerous goods
Information on air transport regulations	Non-dangerous goods

<Domestic regulations>

Information on road transport regulations	No specific regulations have been set out.
Information on marine transport regulations	Non-dangerous goods
Information on air transport regulations	Non-dangerous goods

<Special safety measures>

When transporting, avoid direct sunlight and the breakage, corrosion, and leakage of containers and make sure that the load is prevented from collapsing. The product must not be transported with food or animal feed. Heavy loads must not be

place on top of the product.

14-2. Cobalt

<International regulations>

Information on marine transport regulations As according to the IMO regulations.

UN No.	1383
Proper Shipping Name	PYROPHORIC ALLOY, N.O.S.
Class	4.2
Packing Group	I
UN No. 3089	
Proper Shipping Name	METAL POWDER, FLAMMABLE, N.O.S.
Class	4.1
Packing Group	II
Marine Pollutant	Not applicable

Information of air transport regulations As according to the ICAO/IATA regulations.

UN No.	1383
Proper Shipping Name	Pyrophoric alloy, N.O.S.
Class	4.2
Packing Group	I
UN No.	3089
Proper Shipping Name	Metal powder, flammable, N.O.S.
Class	4.1
Packing Group	II

<Domestic regulations>

Information on road transport regulations No regulations available

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

UN Number	1383
Product Name	Pyrophoric alloy (except for products which are listed separately.)
Class	4.2
Packing group	I
Marine pollutant	Not applicable
UN Number	3089
Product Name	Metal powder (flammable) (except for products which are listed separately.)
Class	4.1
Packing group	II
Marine pollutant	Not applicable

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

UN Number	1383 (Transport prohibited)
UN Number	3089
Product Name	Metal powder (flammable) (except for products which are listed separately.)
Class	4.1

Packing group II

When transporting, avoid direct sunlight and the breakage, corrosion, and leakage of containers and make sure that the load is prevented from collapsing. Yellow cards are required for transporting this product.

14-3. Tin

<International regulations>

Information on marine transport regulations Non-dangerous goods
Marine Pollutant: Not applicable
Information on air transport regulations Non-dangerous goods

<Domestic regulations>

Information on road transport regulations Not applicable
Information on marine transport regulations Non-dangerous goods
Marine pollutant: Not applicable
Information on air transport regulations Non-dangerous goods

<Special safety measures> Dangerous goods must be loaded so that the goods or the transport container containing the dangerous goods do not fall, invert, or break. Transport the dangerous goods so that the goods or the container containing the dangers goods do not rub against each other or roll. If there is a risk of disaster (such as significant spillage of dangerous goods) during the transport of the dangerous goods, first-aid measures to prevent disasters must be taken. Also, fire stations and other relevant authorities must be contacted.

15. Regulatory Information

15-1. Copper

Occupational Safety and Health Act Hazardous substances for which the names, etc., must be notified
(Article 57-2, Enforcement Ordinance Article 18-2 attachment table no. 9)
(Ordinance number 379)

15-2. Cobalt

Occupational Safety and Health Act Hazardous substances for which the names, etc., must be notified
(Article 57-2, Enforcement Ordinance Article 18-2 attachment table no. 9)
(Ordinance number 172)

Law Concerning Reporting, etc. of Release of Specific Chemical Substances to the Environment and Promotion of the Improvement of Their Management (PRTRs)

Type 1 designated chemicals
(Article 2-2, Enforcement Ordinance Article 1 attachment table no.1)
(Ordinance number 100)

Ship Safety Act Flammable substance, pyrophoric substance

(Article 2, 3,attachment table of dangerous goods no. 1)
Flammable substances, flammable substance
Regulations for the carriage and storage of dangerous goods in ship
(Article 2, 3, attachment table of dangerous goods no. 1)

Civil Aeronautics Act — Transport prohibited (Flammable substance, pyrophoric substance)
(Enforcement Ordinance Article 194, attachment table of dangerous goods no. 1)
Flammable substances, flammable substance
(Enforcement Ordinance Article 194, attachment table of dangerous goods no. 1)

15-3. Tin

Occupational Safety and Health Act — Hazardous substances for which the names, etc., must be notified
(Article 57-2, Enforcement Ordinance Article 18-2 attachment table no. 9)
(Ordinance number 322)

16. Other Information (References, etc.)

Japan Copper and Brass Association webpage

Japan Advance Information Center of Safety and Health webpage

Ministry of the Environment webpage

National Institute of Technology and Evaluation webpage

Copper alloy data book (Japan Copper and Brass Association)

16-1. Copper

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15) Carcinogenicity Classification and Criteria 6th Edition, Japan Chemical Industry Ecology-Toxicology & Information Center (2004)
16) GHS Classification Results (Sumika Technical Information Service, Inc.)
17) Japan Chemical Industry Association "Container Yellow Card on the Guidance for Emergency First-Aid (label

format)"
18) Japan Chemical Industry Association "Chemical Regulation Search System" (CD-ROM) (2005)
19) Japan Chemical Database Ltd. "Complete Chemical Database" (2005)
20) Safety DB (Revised and extended edition, 1997)
21) JETOC "Safety Check Data Collection for the Existing Chemicals in JCSCL"
22) Ministry of the Environment "Project on the Study of Chemical Impact on Environment"

16-2. Cobalt

<References>

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2) RTECS (2004)
3) SIDS (2003)
4) Japan Society for Occupational Health (2005)
5) Ministry of the Environments, Risk Evaluation Vol. 3 (2004)
6) ACGIH (7th, 2001)
7) NTP DB (Access on February 2006)
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13) GHS Classification Results (NITE)
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<Disaster cases>

No information

16-3. Tin

<References>

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2) Hommel (1991)
3) Weiss (2nd. 1985)
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5) Dangerous Goods DB (2nd. 1993)
6) ESC SYRESS
7) ACGIH (2001)
8) DFGOT vol. 6 (1994)
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10) ACGIH-TLV (2005)
11) NTP (11th, 2005)
12) Howard (1997)
13) UNRTDG (13th, 2004)
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54) ESIS Data Base(2005)

Product safety data sheets are provided to the companies handling hazardous chemical product, as reference information to ensure safe handling. We ask the companies handling these chemical products to please understand that the sheet must be used as a reference for the conduct of appropriate measures suitable for the individual handling circumstance. These actions are to be carried out under the company's own responsibility. This data sheet itself is not a document to assure safety in handling these products.

Safety Data Sheet (SDS①)	SDS № P.26

Revision №.	Contents of revision	Date
0	New dawned	7th.Feb.2011
1	Added the Content of chemical composition	1st.Jan,2013
2	Delete KALT and Picoless	3rd.Mar.2014
3	Change the title 【Material Safety Data Sheet (MSDS)→Safety Data Sheet (SDS)】	25th.Sep. 2015

17. Content of chemical composition (wt%)

Alloy name	Alloy №.	Melting point (℃)	Density (g/cm³)	Cu	P	Mn	Pb	Zn	Bi	Cd	Hg	O	S	Se	Te	Sn	Ni	Co	Zr	Cu+Ag	Ag
Oxygen free copperr	C1020	1083	8.94	99.96 min.																	
Oxygen free copper	C1011	1083	8.94	99.99 min.	0.0003 max.		0.001 max.	0.0001 max.	0.001 max.	0.0001 max.	0.0001 max.	0.001 max.	0.0018 max.	0.001 max.	0.001 max.						
Tough pitch copper	C1100	1083	8.94	99.90 min.																	
Phosphorus deoxidized copper	C1220	1083	8.94	99.90 min.	0.015 to 0.040																
Phosphorus deoxidized copper	C1201	1083	8.94	99.90 min.	0.004 or over to and excl. 0.015																
High strength copper	C1565 (MA5J)	1079	8.94	99.90 min.	0.020 to 0.040													0.040 to 0.055			
High strength copper	C1862 (HRS35LT)	1075	8.94	99.40 min	0.046 to 0.062			0.02to 0.10								0.07 to 0.12	0.02 to 0.06	0.16 to 0.21			
High strength copper	C5010 (KHRT)	1067	8.94	99.20 min.	0.015 to 0.040 min											0.58to 0.72min					
AG3	-----	1083	8.94																	99.96 min.	0.027 to 0.040
Ordinance no	PRTR Law			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	ISHA (0.1%≦)			379												322		172			
CAS No.				7440-50-8	7723-14-0	7439-96-5	7439-92-1	7440-66-6	7440-69-9	7440-43-9	7439-97-6	7782-44-7	7704-34-9	7782-49-2	13494-80-9	7440-31-5	7440-02-0	7440-48-4	7440-67-7	--	7440-22-4
Vapor temperature (boiling point) (℃)				2582	280.5	2061	1749	907	1564	767	356.73	−182.96	444.6	685	988	231.93	2913	2927	4409	--	2162