

# MATERIAL SAFETY DATA SHEET

## 1. PRODUCT NAME AND COMPANY

### 1.1 Product name

Copper and copper alloys in forms of bar, billet, blank, cake, extrude, plate, profile, rod, sheet, strip, tube, wire.

### Trade name

Oxygen free copper OFE-OK®, OF-OK®

Outokumpu High purity copper 6N-OK, 5N-OK

Deoxidized copper DHP

Nordic Brown™, DHP copper with dark, natural oxide layer

Silver bearing oxygen free copper HK001, HK002, HK003, HK01, HK005, HK015, HK02, HK025, HK045, HK400

Silver bearing deoxidized copper HK012

Zirconium bearing copper ZrK

Tellurium bearing copper TE-OK®

Aluminium bronzes Ap 105, Ap 106, Ap 108, Ap 110, Ap 205

Cupronickels NK 5, NK 25, NK 102, NK 103, NK 110, NK 130

Nickel silvers Uh 109, Uh 112, Uh 118, Uh 418

Tin bronzes Tp 201, Tp 101, Tp 205/102, Tp 205/103, Tp 105, Tp 107, Tp 206/106,

Tp 306/114, Tp 208/107, Tp 108

Silicon bronzes Pp 102, Pp 103

Manganese bronzes Mp 110, Mp 214

Unalloyed brasses Ms 95, Ms 90, Ms 88, Ms 85, Ms 80, Ms 72, Ms 70, Ms 65, Ms 63

Special brasses Ms 497, Ms 576, NiMS

Nordic Green™, chemical treatment of oxidized DHP-copper to achieve green patina layer on copper surface. (for further information on Nordic Green™ contact the manufacturer)

### 1.2 Identification of the company

#### 1.2.1 Manufacturer

Outokumpu Poricopper Oy

#### 1.2.2 Address

P.O. Box 60

FIN-28101 Pori, Finland

Tel. +358-2-626 6111

#### 1.2.3 Information in case of emergency

Myrkytystietokeskus,

Stenbäckinkatu 11

00290 Helsinki

Tel. (09) 4711

## 2. COMPOSITION AND CLASSIFICATION

### 2.1 Description

Reddish, yellowish or greyish solid metal, colour depends on alloying elements.

### 2.2 Composition and information on the substances

Substance	Weight %	CAS No	Danger symbol	R-phrases
Copper	63-99,9999	7440-50-8	n.a.	n.a.
Aluminium	max 11,0	7429-90-5	n.a.	n.a.
Chromium	max 0,2	7440-47-3	n.a.	n.a.
Hydrogen*			n.a.	n.a.
Iron	max 4,0	7439-89-6	n.a.	n.a.
Manganese	max 15	7439-96-5	n.a.	n.a.
Nitrogen*			n.a.	n.a.
Nickel	max 32	7440-02-0	Xn	40-43
Oxygen*		17778-80-2	n.a.	n.a.
Phosphorus	max 0,06	7723-14-0	n.a.	n.a.
Silicon	max 0,7	7440-21-3	n.a.	n.a.
Silver	max 0,95	7440-22-4	Xn	-
Sulfur*			n.a.	n.a.
Tin	max 8,75	7440-31-5	n.a.	n.a.
Tellurium	max 0,7	13494-80-9	Xn (harmful)	20/22
Zinc	max 37	7440-66-6	n.a.	n.a.
Zirconium	max 0,9	7440-67-7	n.a.	n.a.

n.a. = not applicable

\* = in compounds on the surface of prepatinated copper

## 3. HAZARDS IDENTIFICATION

There is a danger of splashing in handling melt metal especially in case of moist raw material. Copper products in solid state do not present an inhalation ingestion or contact hazard. However, operations such as melting, welding, sawing, brazing and grinding may result in the following effects in the case of overexposure.

### 3.1 Effects of overexposure

#### 3.1.1 Metal fumes

Inhalation of excessive fume or dust concentrations may result in shiver, metal taste in mouth, headache, respiratory tract irritation and metal fume fever. Smoke is irritating to skin and eyes. Prolonged and repeated exposure may cause hemolysis, raising of the blood pressure and damage to kidney and liver.

#### 3.1.2 Metal dust

Mechanical irritation may result from an accumulation of dust particles in the eye.

## 4. FIRST AID MEASURES

#### 4.1 Special instructions

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#### 4.2 Inhalation

Move victim to fresh air. If not breathing, give artificial respiration or oxygen. Call a physician.

#### 4.3 Contact with the skin

In case of irritation or sensitization of the skin, immediately wash skin with copious amounts of water. Wash contaminated clothing before reuse. Wash hands before eating or smoking.

#### 4.4 Contact with the eyes

Flush thoroughly with copious amounts of water for 15 minutes. Call a physician.

#### 4.5 Ingestion

Wash out mouth with water. Induce vomiting if conscious. Call a physician.

### 5. FIRE-EXTINGUISHING MEDIA

Copper is not flammable. However in the form of dust the explosion hazard is slight when exposed to flame.

#### 5.1 Suitable extinguishing media

Foam, carbon dioxide (CO<sub>2</sub>), dry chemicals.

#### 5.2 Fire-extinguishers that should not be used

Water with molten copper.

#### 5.3 Explosion hazards

Molten copper explodes on contact with water. Copper also forms a potentially explosive reaction with the following substances: acetylene compounds, ammonium nitrate, 3-bromopropyne, ethylene oxide and lead acid.

### 6. ACCIDENTAL RELEASE MEASURES

Shut off all sources of ignition. If dust is released sweeping is preferred. Place material in closed containers. Do not use compressed air for cleaning. Wear gloves and approved respiratory protection if possibility of dust, mist and fume exposure exists.

Copper-containing waste is normally collected to recycle copper. Should waste disposal be deemed necessary, follow Federal, State or Local regulations.

## 7. HANDLING AND STORAGE

### 7.1 Handling

Do not breathe dust or smoke. Avoid activities that raise dust or smoke. Avoid contact with the eyes and skin. Wash hands thoroughly after handling.

### 7.2 Storage

To be stored in normal dry warehouse.

## 8. EXPOSURE CONTROL / PERSONAL PROTECTION

### 8.1 Technical instructions for exposure control

Provide sufficient ventilation to maintain the concentration of dust below the admissible limit values.

### 8.2 Threshold limit values

#### 8.2.1 OSHA (8h TWA)

Dust and Mist as Cu 1 mg/m<sup>3</sup>

Copper fume 0,1 mg/m<sup>3</sup>

Tellurium 0,1 mg/m<sup>3</sup>

#### 8.2.2 ACGIH (8h TWA)

Dust and Mist as Cu 1 mg/m<sup>3</sup>

Copper Fume 0,2 mg/m<sup>3</sup>

Aluminium 10 mg/m<sup>3</sup> (dust)

Chromium 0,5 mg/m<sup>3</sup>

Iron oxide Fe<sup>2</sup>O<sup>3</sup> 5 mg/m<sup>3</sup> (dust and fumes)

Manganese 0,2 mg/m<sup>3</sup>

Nickel 0,1 mg/m<sup>3</sup>

Phosphorus 0,1 mg/m<sup>3</sup> (dust)

Silicon 10 mg/m<sup>3</sup>

Silver 0,1 mg/m<sup>3</sup>

Tellurium and compounds 0,1 mg/m<sup>3</sup> (dust)

Tin 2 mg/m<sup>3</sup>

Zinc 5 mg/m<sup>3</sup>

Zirconium compounds as Zr 5 mg/m<sup>3</sup>

### 8.3 Instructions for personal protection

#### 8.3.1 Special instructions and individual hygiene

When handling molten copper, protective clothing against melt splashing, face shield, protective gloves and respirator if needed must be used. Avoid ingestion and inhalation of dust and fumes. Do not eat, drink or smoke during use and wash hands before eating, drinking or smoking.

### 8.3.2 Respiratory protection

NIOSH/MSHA approved respirator for dust, fume and mist.

### 8.3.3 Hand protection

Protective gloves against melt splashing.

### 8.3.4 Eye protection

Safety glasses or face shield in exposure to dust, fume or mist and when handling melt.

### 8.3.5 Skin protection

Protective clothing against melt splashing. Wear trouser legs outside boots to avoid melt entrance in the boots.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Appearance and colour

Solid form, reddish, gold, bronze or silver depending on alloy

### 9.2 pH-value

Not applicable for solid metal.

### 9.3 State transformation properties

#### 9.3.1 Boiling point

Pure copper 2595 °C

#### 9.3.2 Melting range of alloys

1051-1083 °C

### 9.4 Flashing point

### 9.5 Flammability

Finely divided powder may be flammable.

### 9.6 Self-flashing temperature

### 9.7 Explosion hazard

### 9.8 Explosion limit

Lower

Higher

### 9.9 Oxidative properties

### 9.10 Vapor pressure

### 9.11 Density

7,6 - 8,95 g/cm<sup>3</sup> depending on copper alloy

#### 9.12 Solubility

Insoluble in water.

### 10. STABILITY AND REACTIVITY

#### 10.1 Stability

Copper and copper alloys stable under normal conditions

#### 10.2 Materials to avoid

Acetylene compounds, ammonia, ammonium chloride, ammonium hydroxide, ammonium nitrate, black liquor, 3-bromopropyne, chlorine (moist), chromic acid, copper chloride, copper nitrate, ethylene oxide, ferric chloride, ferric sulfate, hydrocyanic acid, hydrogen peroxide (>10%), hydrogen sulfide, lead acid, lime sulfur, mercury or its salts, nitric acid, picric acid, potassium cyanide, potassium dichromate, silver salts, sodium cyanide, sodium dichromate, sodium sulfide, sodium thiosulfate, sulfur (molten), sulfur chloride.

#### 10.3 Hazardous decomposition products

Copper and copper alloys may produce an explosive reaction with the following substances: acetylene compounds, ammonium nitrate, 3-bromopropyne, ethylene oxide and lead acid. At temperatures above melting point metallic oxide fumes may be evolved. When welding and brazing, dust and fume may also be emitted. Metal machining and grinding operations may produce fine particles and dust.

### 11. TOXICOLOGICAL INFORMATION

#### 11.1 Acute toxicity

##### 11.1.1 Inhalation

Copper fumes or dusts may result in respiratory tract irritation, metal fume fever, shivers, metal taste in mouth, headache.

##### 11.1.2 Contact with the skin

Smoke may be irritating to skin and mucous membrane.

##### 11.1.3 Contact with the eyes

Smoke may be irritating to eyes.

##### 11.1.4 Ingestion

Ingestion may result in irritation of the bowels.

#### 11.2 Irritation and corrosibility

Possibility of irritation of the bowels by swallowing, the eyes, skin and mucous membranes.

#### 11.3 Sensitation

Copper is not classified as a sensitive agent.

#### 11.4 Chronical toxicity

Prolonged or repeated exposure to copper fumes or dusts may cause hemolysis, raising of the blood pressure and damage to kidney and liver.

### **12. ECOTOXICOLOGICAL INFORMATION**

#### 12.1 Stability in environment

##### 12.1.1 Biological decomposition

##### 12.1.2 Chemical decomposition

Copper and copper alloys react with the following medium: acetylene compounds, ammonia, ammonium chloride, ammonium hydroxide, ammonium nitrate, black liquor, 3-bromopropyne, chlorine (moist), chromic acid, copper chloride, copper nitrate, ethylene oxide, ferric chloride, ferric sulfate, hydrocyanic acid, hydrogen peroxide (>10%), hydrogen sulfide, lead azide, lime sulfur, mercury or its salts, nitric acid, picric acid, potassium cyanide, potassium dichromate, silver salts, sodium cyanide, sodium dichromate, sodium sulfide, sodium thiosulfate, sulfur (molten), sulfur chloride.

### **13. DISPOSAL CONSIDERATION**

The material is 100 % recyclable and must be sent for remelting. The procedure is organised according to Federal, State or Local regulations.

### **14. TRANSPORT INFORMATION**

Copper products must be protected against humidity during transportation.

### **15. LEGAL INFORMATION REGARDING CHEMICALS**

### **16. REMAINING INFORMATION**

#### 16.1 Purpose of use

##### 16.1.1 Purpose of use in verbal

Electric, electronic, heat transformation, corrosion-resistant and other industrial applications, roofing, coinage.

##### 16.2 Operation instructions

##### 16.3 Other information

Explanation of terms

ACGIH	American Conference of Government Industrial Hygienists
CAS No	Chemical Abstracts Service Number
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
TWA	Time Weighted Average

#### 16.4 For further information contact

Outokumpu Poricopper Oy  
P.O. Box 60  
FIN-28101 Pori  
Finland

#### 16.5 References

Material safety data sheets of alloying elements provided by suppliers  
Copper Development Association Technical Data TN27 High Conductivity Coppers  
Metals Handbook, Ninth Edition, Vol. 2, the ASM Handbook Committee

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