

Ministry of Employment and Labor	물질안전보건자료 (Material Safety Data Sheet)	Occupational Safety & Health Agency
		AA01219-0000000007

1. Product and company identification

a) Product Name: (to indicate the same name or code as shown in label)	Free Cutting Brass (C3601,C3602,C3603,C3604,C36000,C38500,CuZn39Pb3)
b) Recommended use of the chemical and restrictions on use	
Recommended use of the chemical	Bolts, nuts, valves, lighters, watches, camera parts, etc.
restrictions on use	N/D
c) Manufacturer/Supplier/Distributor Information	
division	producer
Name	DAECHANG CO.,LTD.
Address	391, Gongdan 1-daero, Siheung-si, Gyeonggi-do, Republic of KOREA
Emergency phone number	0314963000
d) Manufacturer/Supplier Additional Information	
N/D	

2. Hazards identification

a) Hazard.Risk Classification
Carcinogenicity : Category 1A
Reproductive toxicity : Category 1A
Specific target organ toxicity(Repeated exposure) : Category 2
Acute aquatic toxicity : Category 1
Chronic aquatic toxicity : Category 1

b) Label elements including precautionary statements

Symbol	
--------	--

Signal Word Risk

Hazard.Risk Statement	H350 : May cause cancer.
	H360 : May damage fertility or the unborn child.
	H373 : May cause damage to organs through prolonged or repeated exposure.
	H400 : Very toxic to aquatic life
	H410 : Very toxic to aquatic life with long lasting effects.

Precautionary Statement	Precautionary	P201 : Obtain special instructions before use.
		P202 : Do not handle until all safety precautions have been read and understood.
		P260 : Handle and store contents under inert gas Protect from moisture.
		P273 : Avoid release to the environment.
		P280 : Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
	Response	P308+P313 : IF exposed or concerned: Get medical advice/ attention.
		P314 : Get medical advice/attention if you feel unwell.
		P391 : Collect spillage.
	Storage	P405 : Store locked up.
	Disposal	P501 : Dispose of contents/container to related regulations.

c) Other risks/hazards that are not included in the main sex/hazard designations (e.g., many dust explosions)

In the case of dust, powder, and fine particles, there is a possibility of an explosion when in contact with an ignition source.

3. Composition/Information on ingredients

Alloy No.	Chemical Name	Other name	CAS number	Content (%)
C3601	Copper	-	7440-50-8	59.0-63.0
	Lead	-	7439-92-1	1.8-3.7
	Zinc	-	7440-66-6	33.3-39.2
C3602	Copper	-	7440-50-8	59.0-63.0
	Lead	-	7439-92-1	1.8-3.7
	Zinc	-	7440-66-6	33.3-39.2
C3603	Copper	-	7440-50-8	57.0-61.0
	Lead	-	7439-92-1	1.8-3.7
	Zinc	-	7440-66-6	35.3-41.2
C3604	Copper	-	7440-50-8	57.0-61.0
	Lead	-	7439-92-1	1.8-3.7
	Zinc	-	7440-66-6	35.3-41.2
C36000	Copper	-	7440-50-8	60.0-63.0
	Lead	-	7439-92-1	2.5-3.0
	Zinc	-	7440-66-6	34.0-37.5
C38500	Copper	-	7440-50-8	55.0-59.0
	Lead	-	7439-92-1	2.5-3.5
	Zinc	-	7440-66-6	37.5-41.5
CuZn39Pb3	Copper	-	7440-50-8	57.0-59.0
	Lead	-	7439-92-1	2.5-3.5
	Zinc	-	7440-66-6	37.5-40.5

4. First aid measures

A. Eye contact

Get medical advice/attention if you feel unwell.

Get emergency medical action.

In case of contact with the substance, immediately flush skin and eyes with running water for at least 20 minutes.

IF exposed or concerned: Get medical advice/attention.

B. Skin contact

Remove contaminated clothing and shoes and restrict entry to contaminated area

In case of contact with the substance, immediately flush skin and eyes with running water for at least 20 minutes.

C. Inhalation

Keep victim warm and quiet.

Get medical advice/attention

Get medical advice/attention if you feel unwell.

D. Ingestion

Get medical advice/attention

Do not use mouth-to-mouth method if victim ingested or inhaled the substance;

give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Get medical advice/attention if you feel unwell.

E. Indication of immediate medical attention and notes for physician

Exposures require specialized first aid with contact and medical follow-up .

Make sure medical personnel are aware of the substance and take protective measures.

5. Fire-Fighting measures

a) Suitable (and unsuitable) extinguishing media

Using dry sand or soil during nitrogen digestion

Using alcohol foam, carbon dioxide or water spray for digestion related to this substance

Unsuitable extinguishing media : high pressure water

b) Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products)

May be ignited by heat, sparks or flames.

Inhalation of material may be harmful.

Containers may explode when heated.

c) Special protective equipment and precautions for fire fighters

Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.

Rescuers should wear appropriate protective equipment.

Fire involving Tanks; Always stay away from tanks engulfed in fire

Runoff from fire control or dilution water may cause pollution.

Dike fire-control water for later disposal; do not scatter the material

a) Suitable (and unsuitable) extinguishing media

Move containers from fire area if you can do it without risk

Extinguish the fire by leaving the area and maintaining a safe distance.

Fire involving Tanks; In case of large fires, use unmanned fire extinguishing equipment and, if this is not possible, try to evacuate and burn.

Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank

6. Accidental release measures

a) Personal precautions, protective equipment and emergency procedures

Clean up spills immediately, observing precautions in Protective Equipment section

Keep unnecessary and unprotected personnel from entering.

Restrict entry into contaminated areas.

Wear protective gloves/protective clothing/eye protection/face protection.

b) Environmental precautions and protective procedures

Prevent entry to waterways

Dig a trench and cover it with wet sand or soil.

c) Methods and materials for containment and cleaning up

Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.

Avoid release to the environment.

Collect spillage.

7. Handling and storage

a) Precautions for safe handling

Please work with reference to engineering controls and personal protective equipment.

Do not handle until all safety precautions have been read and understood.

Please note that materials and conditions to avoid.

Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

Obtain special instructions before use.

Keep away from heat, hot surfaces, sparks, flames, and other sources of ignition. no smoking

Avoid release to the environment

Do not eat, drink or smoke when using this product

a) Precautions for safe handling

Do not handle until all safety precautions have been read and understood.

b) Conditions for safe storage (including any incompatibilities)

Store in cool and dry place

Empty drums should be completely drained, properly bunged, and promptly returned to a drum control, or properly placed

Store in a closed container.

Keep away from food and drinking water

Store locked up.

8. Exposure controls & personal protection

a) Control parameters (e.g. occupational exposure limit values, biological limit values)

Domestic regulations	Copper - TWA : 1 mg/m ³ , STEL : 2 mg/m ³
	Lead - TWA : 0.05 mg/m ³ , STEL : -
	Zinc - TWA : N/D , STEL : N/D
ACGIH regulations	Copper - TWA : 0.2mg/m ³ -Fum, 1mg/m ³ -Dust , STEL : N/D
	Lead - TWA : 0.05mg/m ³ , STEL : N/D
	Zinc - TWA : N/D , STEL : N/D
Biological exposure index	Copper - N/D
	Lead - 30ug/100mL Lead in blood(Sampling Time:Not critical)
	Zinc - N/D
Other exposure index	Copper - N/D
	Lead - N/D
	Zinc - N/D

b) Appropriate engineering controls

Use fair separation, local exhaust or keep air levels below exposure standards

c) Personal protective equipment

Respiratory protection	Wear respiratory protection certified by the Korea Occupational Safety and Health Agency appropriate for the physical and chemical characteristics of the exposed substance.
Eye protection	Use chemical protection glasses and safety glasses.
Hand protection	Wear suitable chemical resistant gloves.
Body protection	Wear suitable chemical-resistant protective clothing.

9. Physical and chemical properties

product properties

Division		information
a) Appearance	physical state	solid
	color	Yellow
b) Odour		odorless
c) Odour threshold		N/D
d). pH		N/D
e) Melting point/freezing point		899 °C
f) Initial boiling point and boiling range		N/D
g) Flash point		N/D
h) Evaporation rate		N/D
i) Flammability (solid, gas)		Zinc: Non-flammable (less than 20um ~ less than 40um) (ECHA)
j) Upper/lower flammability or explosive limits		N/D
k) Vapor pressure		N/D

Division	information
l) Solubility	Insoluble
m) Vapor density	N/D
n) Relative density	8.50 (water=1)
o) Partition coefficient: n-octanol/water	N/D
p) Auto-ignition temperature	Zinc: Not classified as pyrophoric (Nr 4, section 14.4.2.2.4.) (ECHA)
q) Decomposition temperature	N/D
Division	information
r) Viscosity	N/D
s) Molecular mass	N/D

properties of each component

Ingredients	Division		information
Copper	a) Appearance	physical state	solid
		color	Red
	b) Odour		odorless
	c) Odour threshold		N/D
	d). pH		N/D
	e) Melting point/freezing point		about 1069 °C
	f) Initial boiling point and boiling range		2,595°C
	g) Flash point		N/D
	h) Evaporation rate		N/D
	i) Flammability (solid, gas)		Not flammable
	j) Upper/lower flammability or explosive limits		N/D
	k) Vapor pressure		N/D
	l) Solubility		< 1 mg/l (30°C)
	m) Vapor density		N/D
	n) Relative density		8.78
	o) Partition coefficient: n-octanol/water		-0.57 (estimate)
	p) Auto-ignition temperature		N/D
	q) Decomposition temperature		N/D
	r) Viscosity		N/D
	s) Molecular mass		63.55

properties of each component

Ingredients	Division		information
Lead	a) Appearance	physical state	solid
		color	Blue gray
	b) Odour		odorless
	c) Odour threshold		N/D
	d). pH		N/D
	e) Meting point/freezing point		about 326°C (1,013 hPa)
	f) Initial boiling point and boiling range		>600°C (1,013 hPa)
	g) Flash point		N/D
	h) Evaporation rate		N/D
	i) Flammability (solid, gas)		Not flammable
	j) Upper/lower flammability or explosive limits		N/D
	k) Vapor pressure		N/D
	l) Solubility		185mg/L(20°C, Ph)
	m) Vapor density		N/D
	n) Relative density		11.45
	o) Partition coefficient: n-octanol/water		N/D
	p) Auto-ignition temperature		N/D
	q) Decomposition temperature		N/D
	r) Viscosity		N/D
	s) Molecular mass		N/D
Zinc	a) Appearance	physical state	solid
		color	Gray
	b) Odour		odorless
	c) Odour threshold		N/D
	d). pH		N/D
	e) Meting point/freezing point		409°C (1,013hPa)
	f) Initial boiling point and boiling range		907 °C
	g) Flash point		N/D
	h) Evaporation rate		N/D
	i) Flammability (solid, gas)		Not flammable
	j) Upper/lower flammability or explosive limits		N/D
	k) Vapor pressure		N/D

Ingredients	Division	information
Zinc	l) Solubility	N/D
	m) Vapor density	N/D
	n) Relative density	7.1
	o) Partition coefficient: n-octanol/water	N/D
	p) Auto-ignition temperature	460 °C (Applicable to fine powder, etc.)
	q) Decomposition temperature	N/D
	r) Viscosity	N/D
	s) Molecular mass	N/D

10. Stability and reactivity

a) Chemical stability and possibility of hazardous reactions

May decompose at high temperatures into forming toxic gases

Stable at room temperature, normal pressure and normal use

In case of fire, irritating and toxic gas may be generated.

Inhalation of material may be harmful.

Containers may explode when heated

b) Conditions to avoid (e.g. static discharge, shock or vibration, etc)

Ignition sources (heat, sparks or flames)

c) Incompatible materials

Combustible substances, acids, oxidizing agents, alkalis

d) Hazardous decomposition products

Irritating, corrosive and/or toxic gases

11. Toxicological information

a) Information on the likely routes of exposure

product	N/D
Copper	N/D
Lead	N/D
Zinc	N/D

b) Health hazards information

Acute toxic	oral	product	N/D
		Copper	LD50 >2500mg/kg rat(male)(OECD Guideline 423)(read-across: Copper oxide)(ECHA)
		Lead	LD50 >2000mg/kg rat (OECD Guideline 423)(ECHA)
		Zinc	LD50 >2000 mg/kg bw rat (OECD Guideline 401)(ECHA)

b) Health hazards information

Acute toxic	Percutaneous	product	N/D
		Copper	LD50 >2000mg/kg rat(OECD Guideline 402)(read-across: Copper oxide)(ECHA)
		Lead	LD50 >2000mg/kg rat (OECD Guideline 402)(ECHA)
		Zinc	N/D
	Inhalation	product	N/D
		Copper	Dust/mist LC50 >5.11mg/L 4hr rat (OECD Guideline 436)(Coated copper flakes)(ECHA)
		Lead	Aerosol LC50 >5.05mg/L 4hr rat (OECD Guideline 403)(ECHA)
		Zinc	Dust LC50 >5.41mg/L 4hr rat (OECD Guideline 403)(ECHA)
Skin corrosive/irritant	product	N/D	
	Copper	No irritation observed (Species: rabbit) (OECD Guideline 404)(read-across: Copper oxide)(ECHA)	
	Lead	Except for mild erythema, no irritating symptoms were found (species: rabbit) (OECD Guideline 404) (ECHA)	
	Zinc	Not classified as an irritant (Species: rabbit) (ECHA)	
Serious eye damage/eye irritation	product	N/D	
	Copper	No irritation observed (Species: rabbit) (OECD Guideline 405) (read-across: Copper oxide) (ECHA)	
	Lead	Not classified as an irritant (species: rabbit) (OECD Guideline 405) (ECHA)	
	Zinc	Not classified as an irritant (species: rabbit) (OECD Guideline 405) (ECHA)	
Respiratory sensitization	product	N/D	
	Copper	N/D	
	Lead	N/D	
	Zinc	N/D	
Skin sensitization	product	N/D	
	Copper	Not sensitizing (species: guinea pig) (OECD Guideline 406) (analog: Copper oxide) (ECHA)	
	Lead	Not sensitizing (species: guinea pig)(OECD Guideline 406)(ECHA)	
	Zinc	N/D	
Carcinogenicity	IARC	product	N/D
		Copper	N/D
		Lead	2B
		Zinc	N/D
	NTP	product	N/D
		Copper	N/D
		Lead	R
		Zinc	N/D

b) Health hazards information

Carcinogenicity	OSHA	product	N/D
		Copper	N/D
		Lead	N/D
		Zinc	N/D
	ACGIH	product	N/D
		Copper	N/D
		Lead	A3
		Zinc	N/D
	OCCUPATIONAL SAFETY AND HEALTH ACT	product	N/D
		Copper	N/D
		Lead	Specially controlled substances
		Zinc	N/D
	Notification of Ministry of Employment	product	N/D
		Copper	N/D
		Lead	1B (Lead and its inorganic compounds) 2 (Lead metal)
		Zinc	N/D
	EU CLP	product	N/D
		Copper	N/D
		Lead	N/D
		Zinc	N/D
Germ Cell Mutagenicity	product		N/D
	Copper		in vitro- gene mutation study in bacteria results :NEGATIVE(Species: S. typhimurium TA 1535, TA 1537, TA 98 and TA 100 and S. typhimurium TA 1538)(OECDGuideline 471)(ECHA)(read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA) in vivo- mammalian somatic cell study: cytogenicity / erythrocyte micronucleus results NEGATIVE(Species: mouse)(EU Method B.12)(read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA)
	Lead		N/D
	Zinc		N/D
Reproductive toxicity	product		N/D
	Copper		As a result of the second generation reproductive toxicity test, no reproductive toxicity was observed at any concentration (species: rat) (OECD Guideline 416) (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8) (ECHA) As a result of the developmental toxicity test, the mean fetal weight was slightly lower and the incidence of skeletal mutation was slightly increased, but was not related to teratogenesis, preimplantation loss, or fetal death 6 mg/kg (Species: rabbit) (OECD Guideline 414) (read-across: copper (1+) hydroxide CAS No. 1344-69-0) (ECHA)

b) Health hazards information

Reproductive toxicity	Lead	Fertility test results showed that testosterone production could inhibit spermatogenesis in the pre-meiosis stage. At all test doses, ascorbic acid in the testes was significantly reduced, and seminiferous tubule diameter and sperm count were statistically significantly reduced (Species: rat) (ECHA) As a result of the developmental toxicity test, if metal ions are continuously present in early embryonic development, adaptation to the organizing effect may occur in sexual differentiation, which may include mechanisms similar to those in response to continuous lead exposure, delayed reproductive development, Continuous exposure to heavy metals is required for testosterone concentration to be suppressed (species: rat) (ECHA) EU CLP Category 1A
	Zinc	N/D
Specific Target Organ Toxicity (Single Exposure)	product	N/D
	Copper	As a result of the dermal acute toxicity test, no clinical signs indicative of harmful or serious toxicity were observed, no deaths were found (read-across: Copper sulphate pentahydrate) (ECHA)
	Lead	No clinical observations related to acute toxicity test (ECHA)
	Zinc	N/D
Specific Target Organ Toxicity (Repeated Exposure)	product	N/D
	Copper	Oral (subchronic)- LOAELs for liver damage were 1000 ppm (cancer) and 2000 ppm (male),and results for kidney damage were considered toxicologically insignificant due to their species-specific tendencies (species: rat). (EU Method B.26) (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8) (ECHA)Inhalation (subacute)- Not classified as no serious effects were observed as a result of the test (Species: rat) (OECD Guideline 412) (read-across: Copper oxide) (ECHA)
	Lead	An aqueous concentration of 0.03 mg/l of oral (chronic)-lead may be considered safe for public health and may be recommended for inclusion in public health standards for drinking water (species: rat) (ECHA) Inhalation (Chronic) - A locally expressed immune response is essential for the host's defense against antigens and pathogens deposited in the lungs, and contaminants capable of inhibiting this effect can harm the health of the host. Air pollutants have been shown to reduce animal resistance to subsequent infection and pulmonary immunity (Species: mouse) (ECHA)
	Zinc	N/D
Aspiration Hazard	product	N/D
	Copper	N/D
	Lead	N/D
	Zinc	N/D

12. Ecological information

a) Aquatic and terrestrial ecotoxicity

Fish	product	N/D
	Copper	LC50 38.4~256.2µg/L 96hr Pimephales promelas (read-across: copper sulfate CAS No. 7758-98-7)(ECHA)
	Lead	LC50 1170µg/L 96hr Oncorhynchus mykiss (ECHA)
	Zinc	LC50 439µg/L 96hr (ECHA)

a) Aquatic and terrestrial ecotoxicity

Crustacean	product	N/D
	Copper	48hr-EC50 7.7~430ug/L Daphnia magna (OECD202) (Copper(II)chloride dihydrate)
	Lead	48hr-EC50 26ug/L Ceriodaphnia dubia (Lead nitrate)(US EPA(1993)
	Zinc	48hr-LC50 0.413mg/L Daphnia magna (US EPA EPA 821-R-02-012)
Algae	product	N/D
	Copper	EC50 32~245µg/L 72hr Pseudokirchneriella subcapitata (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA)
	Lead	EC50 123µg/L 72hr Pseudokirchneriella subcapitata (ECHA)
	Zinc	N/D

b) Persistence and degradability

Persistence	product	N/D
	Copper	N/D
	Lead	N/D
	Zinc	N/D
degradability	product	N/D
	Copper	N/D
	Lead	N/D
	Zinc	N/D

c) Bioaccumulative potential

bioaccumulation	product	N/D
	Copper	N/D
	Lead	BCF 1553 (ECHA)
	Zinc	N/D
biodegradability	product	N/D
	Copper	N/D
	Lead	N/D
	Zinc	N/D

d. Mobility in soil

product	N/D
Copper	N/D
Lead	N/D
Zinc	N/D

e. Other hazardous effect

product	N/D
Copper	Fish: NOEC 57.8, 109µg/L 96hr 32day Cyprinodon variegatus (OECD Guideline 210) (read-across: Copper (II) chloride dihydrate CAS No. 10125-13-0)(ECHA) Crustacean: NOEC 21.5~181µg/L 21day Daphnia magna (OECD Guideline 211) (read-across: Copper sulphate CAS No. 7758-98-7)(ECHA) Algae: NOEC 37.6~170.8µg/L 72hr Pseudokirchneriella subcapitata (read-across: copper chloride)(OECD Guideline 201)(ECHA)
Lead	N/D
Zinc	Fish: NOEC 50µg/L 5month Phoxinus phoxinus (ECHA) Crustacean: NOEC 25µg/L 1week Ceriodaphnia dubia (ECHA) Algae: NOEC 50µg/L 3day Pseudokirchneriella subcapitata (OECD Guideline 201)(ECHA)

13. Disposal considerations

a) Disposal method

Waste must be disposed of in accordance with federal, state and local environmental control regulations

b) Disposal precaution (including the disposal method of contaminated container and packaging)

Dispose of contents/container in accordance with relevant regulation.

Refer to manufacturer or supplier for information on recovery or recycling.

14. Transport information

a) UN number

N/D

b) UN proper shipping name

N/D

c) Transport hazard class

N/D

d) Packing group

e) Marine pollution

Not applicable

f) Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises

Emergency measures in case of fire N/D

Emergency measures in case of spill N/D

15. Regulatory information

- a) Industrial Safety and Health Act
Hazardous substances subject to management (mixtures containing more than 1% of hazardous substances subject to management) (Copper,Lead ,Zinc)
Substances subject to work environment measurement (mixtures containing more than 1% of substances subject to work environment measurement)(Copper,Lead ,Zinc)
Harmful factors subject to special medical examination (mixture containing 1% or more of harmful factors subject to special medical examination) (Copper,Lead ,Zinc)
Substances for which exposure standards are set (Copper,Lead)

Substances for which acceptance criteria are set (Lead)
- b) Toxic Chemical Control Act
Restricted Substance (06-5-8: Contains lead and concealed silver of 0.06% or more)Restricted Substance (06-5-8: Contains lead and silver of 0.06% or more of silver)(Lead)
- c) Dangerous Material Safety Control Act
Not applicable
- d) Wastes Management Act
industrial waste
- e) Other requirements in domestic and other countries

Domestic regulations	N/D
	U.S.A Regulatory information OSHA regulation : N/A CERCLA regulation : Copper(2270 kg (5000 lb) Lead(4.54 kg (10 lb)) EPCRA regulation: N/A
foreign regulations	EPCRA 304 regulation : N/A
	EPCRA 313 regulation : Copper(regulated),Lead(regulated),Zinc(regulated)
	Rotterdam Convention : N/A
	Stockholm Convention : N/A
	Montreal Protocol : N/A EU Classification information : Copper(Aquatic Chronic 2(H411))

16. Other information

- a) Information source and references

9. Physical and chemical properties: CAMEO Chemicals (vapor pressure), ECHA Registered substances (specific gravity, properties), melting point/freezing point, spontaneous ignition temperature, EPISUITE (n-octanol/water partition coefficient (Kow)), HSDB (odor, color) , initial boiling point and boiling point range), ICSC (solubility), pubchem (molecular weight), Zinc (flammability, pyrophoric, water reactivity) (ECHA)
11. Information on toxicity: ECHA (reproductive toxicity, oral, dermal, other adverse effects, germ cell mutagenicity, serious eye damage or irritation, specific target organ toxicity (repeated exposure), skin sensitization, skin corrosion or irritation. inhalation)
12. Environmental impact: ECHA (crustaceans, fish, Algae)
- b) Issuing date
2013-04-12
- c) Revision number and date
Revision 5 date : 2023-12-15
number :
- d) others
N/D