

MATERIAL SAFETY DATA SHEET

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Tuffaloy Materials (88-77-Z)

I. GENERAL

A. Trade Names:

1. Tuffaloy - 88 Alloy (RWMA Class 1)
Zirconium Copper
2. Tuffaloy - 77 Alloy (RWMA Class 2)
Chromium Copper
3. Tuffaloy - Z Alloy (RWMA Class 2)
Chromium Zirconium Copper

II. SUMMARY OF HAZARDS

Metal machining or grinding operations may produce fine particulate or dust; heating, melting, welding, or brazing may produce metal fumes and particulates. Inhalation of excessive fume or dust concentrations may result in respiratory tract irritation and/or metal fume fever, and/or A-1 zirconium poisoning; A-2 chromium poisoning; A-3 chromium zirconium poisoning.

III. FIRE AND EXPLOSION

A. Flash Point (method) – N/A

B. Autoignition Temperature – N/A

C. Flammable Limits- Lower, N/A Upper, N/A

D. Fire and Explosion Hazards

Dust hazard exists under favoring conditions of small particle size. Dispersion in air and strong ignition source may result in an explosion.

E. Extinguishing Media

Use dry powder for metal fires. Gently spoon media onto fire. Do not disturb particles.

F. Special Firefighting Procedures

Do not enter fire area without proper protection including pressure-demand, self-contained breathing apparatus.

IV. HEALTH HAZARDS

A. Summary of Acute Hazards:

Respiratory tract, irritation, metal fume fever, eye irritation.

B. Route of Exposure

1. Inhalation

Inhalation of excessive fume or dust concentrations may result in respiratory tract irritation and metal fume fever.

2. Eye Contact

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

3. Skin Absorption

No significant signs or symptoms indicative of any adverse health hazard are expected to occur.

4. Skin Irritation

No significant signs or symptoms indicative of any adverse health hazard are expected to occur.

5. Ingestion

This material may be toxic if swallowed in large quantities.

C. Summary of Chronic Hazards and Special Health Effects

Long term repeated exposures to excessive fume or dust concentrations may result in cadmium intoxication including emphysema, kidney disease, anemia, reproductive effects, birth defects and lung cancer.

V. PROTECTIVE EQUIPMENT AND OTHER CONTROL MEASURES

A. Respiratory

If exposure exceeds the PEL/TVL, use NIOSH/MSHA approved respiratory protection equipment as specified in the NIOSH/OSHA Occupational Health Guidelines for chemical hazards.

B. Eye

Use safety glasses with side shields or goggles to prevent injury from flying particles or high dust concentrations. Use goggles or shield with appropriate light-filtration during welding or cutting operations.

C. Skin

Where use can result in skin contact with particulate, practice good hygiene. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking.

D. Engineering Controls

Use adequate ventilation to keep fume or dust concentration below the occupational exposure limits shown in Section Vi. (Refer to ANSI Z49.1, "Safety in Welding and Cutting" and "OSHA Regulation" CFR 1910.252.)

E. Other Hygienic and Work Practices

Where applicable, use protective gloves to protect against heat or sharp metal edges.

VI. OCCUPATIONAL EXPOSURE LIMITS

1. Tuffaloy - 88 Alloy Zirconium Copper

SUBSTANCE	ACGIH TLV's (2004)		OSHA PEL's (2000)		NIOSH REL's (2003)	
	TWA	STEL/CEIL	TWA	STEL/CEIL	TWA	STEL/CEIL
Copper Fume	0.2	0.1	0.1	N/A	0.1R	II (2)
Copper Dust and Mist, as Cu	1	N/A	1	N/A	1	N/A
Zirconium Fume	5	10	N/A	N/A	N/A	N/A
Zirconium Dust	5	10	5	N/A	5	10

2. Tuffaloy - 77 Alloy Chromium Copper

3. Tuffaloy - Z Alloy Zirconium

SUBSTANCE	ACGIH TLV's (2004)		OSHA PEL's (2000)		NIOSH REL's (2003)	
	TWA	STEL/CEIL	TWA	STEL/CEIL	TWA	STEL/CEIL
Chromium (II) inorganic Compounds, as Cr	N/A	N/A	0.5	N/A	0.5	N/A
Chromium (III) Inorganic Compounds, as Cr	0.5	N/A	0.5	N/A	0.5	N/A
Chromium (VI) Inorganic Compounds, as Cr, Water Soluble	0.05	N/A	N/A	C 0.1* *as CrO ₃	0.001	N/A
Chromium (VI) Inorganic Compounds, as Cr, Water Insoluble	0.01	N/A	N/A	C 0.1* *as CrO ₃	0.001	N/A
Chromium Metal	0.5	N/A	1	N/A	0.5	N/A
Copper Fume	0.2	0.1	0.1	N/A	0.1R	II (2)
Copper Dust and Mist, as Cu	1	N/A	1	N/A	1	N/A
Silicon	10	N/A	15*; 5** *Total Dust **Respirable Fraction	N/A	10*; 5** *Total Dust **Respirable Fraction	N/A
Zirconium	5	10	N/A	N/A	N/A	N/A

VII. EMERGENCY AND FIRST AID

- A. Inhalation
Immediately remove from contaminated area to fresh air. If irritation persists, or if other signs or symptoms develop, seek medical attention.
- B. Eye Contact
Mechanical injury only. Treat as mechanical injury only. Treat as inert foreign body.
- C. Skin Contact
Not expected to present a significant skin contact hazard under anticipated conditions of normal use.
- D. Ingestion
Not expected to present a significant ingestion hazard under anticipated conditions of normal use.
- E. Emergency Medical Treatment Procedures
Metal fume fever may be treated symptomatically.

VIII. SPILL AND DISPOSAL

- A. Precautions if Material is Spilled or Released
No notable environmental hazard is anticipated to be associated with the accidental "release" of this material on land. This material should be recovered from aquatic environments.
- B. Waste Disposal Methods
Maximize product recovery for reuse or recycling. Conditions of use may cause this material to become a solid "hazardous waste" as defined by state or federal laws. Solid waste "leachate" testing may indicate the need for properly permitted disposal of such wastes in compliance with all applicable laws. Conditions of use may also generate liquid wastes with metal concentrations in excess of those permitted through pretreatment or direct discharge requirements. Appropriate analyses should be conducted to ensure compliance with existing wastewater permits.

IX. COMPONENTS

- A. Tuffaloy - 88 Zirconium Copper

<u>Component Name</u>	<u>CAS No.</u>	<u>Carcinogen ##</u>	<u>Composition amount (vol.)</u>
Zirconium	7440-67-7	4	0.10 to 0.20%
Copper	7440-50-8	N/A Remainder	Balance

Listed by: 1 = NTP, 2 = IARC, 3 = OSHA, 4 = Other

- B. Tuffaloy - 77 Chromium Copper
- C. *Tuffaloy - Z Chromium Zirconium Copper

<u>Component Name</u>	<u>CAS No.</u>	<u>Carcinogen ##</u>	<u>Composition amount (vol.)</u>
Cadmium	7440-43-9	1,2,4	0.20 to 0.60%
Nickel	7440-02-0	1,2,4	2.0 to 3.0%
Lead	7439-92-1	2	0.05%
Silicon	7440-21-2	N/A	0.40 to 0.80%
Chromium	7440-47-3	1,2	0.50 to 1.50%
Copper	7440-50-8	N/A	Remainder
Iron	1 5438-3 1-0	N/A	0.10 to 0.15%
Zirconium*	7440-67-7	N/A	0.10 to 0.20%

*Alloy Z Only

X. PHYSICAL AND CHEMICAL DATA

Boiling Point – N/A

Viscosity Units, Temp. (method) – N/A

Dry Point – N/A

Freezing Point – N/A

Vapor Pressure – N/A

Volatile Characteristics – N/A

Specific Gravity (H₂O = 1 at 39.2°) - 8.89 Vapor

Sp. Gr. (Air = 1.0 at 60° - 90° F) – N/A Solubility in

Water – N/A

pH – N/A

Hazardous Polymerization – N/A

Other Chemical Reactivity – N/A

Stability - Stable

Other Physical and Chemical Properties:

Melting/Freezing range 1958 F - 1967 F degrees.

Appearance and Odor

Color - Copper Metallic. Odorless.

Conditions to Avoid

Exposure during storage to strong acids, or oxidizing agents.

Materials to Avoid

Mercury, ammonia and acetylene.

Hazardous Decomposition Products

Toxic gases, aerosols and vapors may be released in a fire involving copper alloys if fumes of other compounds or other contacting materials are involved.

XI. ADDITIONAL PRECAUTIONS

A. Handling, Storage and Decontamination Procedures

Good housekeeping must be practiced during storage, transfer, handling and use to avoid excessive dust accumulation. Apply recommendations of NFPA 491 M for copper alloys.

B. General Comments

Symptoms of metal fume fever may last 24 to 48 hours and may include a sweet or metallic taste in the mouth, dryness and irritation of the throat, cough, shortness of breath, chest pain, nausea, vomiting, weakness, fatigue, muscle and joint pain, chills, sweating and fever.

Salts of metal components have demonstrated mutagenic potential in several bioassays but the health significance of the results is not known. Use good personal hygiene. Wash hands with mild soap and water before eating, drinking, smoking, or before leaving work after contact with metal dust or fume.

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