

SAFETY DATA SHEET**CEMENTED CARBIDE PRODUCT WITH COBALT/NICKEL BINDER UNCOATED OR COATED**

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Section 1 - Chemical Product and Company Identification

Material Name Cemented Carbide Product with Cobalt/Nickel Binder ,Uncoated or Coated with any of the following:
Chemical Formula Al_2O_3 , AlN, Cr_3C_2 , Co, Mo, Ni, NbC, Ru, TaC, TiC, TiN, WC, VC, Zr.
CAS No. See Section 3
Manufacturer Tungaloy Corporation
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Section 2 - Hazards Identification

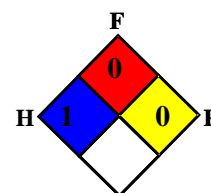
During normal operation and usage, cemented carbide products do not present inhalation, ingestion, or other chemical hazards. However, operations such as grinding, cutting, melting or processing in any other fashion of these products may produce or release dust, fumes or vapors of potentially hazardous ingredients, which can be swallowed, inhaled or come in contact with the skin and/or eyes and may present health hazards, if the exposure limits described in Section 8 are exceeded. These products are cutting tools which may contain sharp edges.

Cutting tools can break during normal usage. To avoid injury, equipment with guards and safety shields should be used.

Classification according Regulation (EC) No 1272/2008 [CLP]: Not applicable for articles.

Classification according to European Directive 67/548/EEC: Not applicable for articles.

Labeling in accordance with EC No 1272/2008 [CLP]: Not applicable for articles.

**Potential Health Effects**

Primary Routes of Entry: Inhalation, ingestion, skin, and/or eye contact.

Under normal conditions, Cemented carbide products are not expected to produce dust of potentially hazardous ingredients which can be inhaled, swallowed, or come in contact with the skin and/or eyes.

Acute Health Effects: Dust from grinding or other non-normal operations can cause irritation of the nose, throat, lungs, eyes, and mucous membranes. Skin exposure can cause an allergic reaction including red rash (cobalt itch).

Chronic Health Effects: Chronic exposure to respirable dust containing cobalt and tungsten carry the potential to cause permanent respiratory diseases, including occupational asthma, interstitial pneumonitis, and fibrosis (hard-metal disease), and emphysema. Symptoms include productive cough, wheezing, dyspnea (upon exertion), soreness of breath, soreness in the chest, nausea, and weight loss. Skin sensitization is also noted in a small percentage of cases. Reports outside of the industry suggest that ingestion of significant amounts of cobalt can cause blood, heart, and other organ effects. Long-term or repeated exposure to dusts may have effects on the central nervous system.

Carcinogenic Assessment:Aluminum oxide

ACGIH A4 - Not classifiable as a human carcinogen.

Cobalt

ACGIH A3 - Confirmed animal carcinogen with unknown relevance to humans.

IARC GROUP 2A - Probably carcinogenic to humans.

Nickel

ACGIH A5 - Not suspected as human carcinogen.

IARC GROUP 2B - Possibly carcinogenic to humans.

NTP 2 - Reasonably anticipated to be a human carcinogen.

Section 3 - Composition / Information on Ingredients

<u>Substance Name</u>	<u>Chemical Formula</u>	<u>CAS No.</u>	<u>EC No.</u>	<u>W/W %</u>	<u>OSHA PEL (mg/m³)</u>	<u>ACGIH TLV-TWA (mg/m³)***</u>
Aluminum Oxide****	Al ₂ O ₃	1344-28-1	215-691-6	0-0.5%****	15 mg/m ³ * 5 mg/m ³ **	10 mg/m ³ * 3 mg/m ³ **
Aluminum Nitride****	AlN	24304-00-5	246-140-8	0-0.5%****	Not established	Not established
Chromium Carbide	Cr ₃ C ₂	12012-35-0	234-576-1	0 – 1%	Not established	Not established
Cobalt	Co	7440-48-4	231-158-0	4 – 15%	0.1 mg/m ³	0.02 mg/m ³
Molybdenum	Mo	7439-98-7	231-107-2	0 – 10%	15.0 mg/m ³ *	10.0 mg/m ³ * 3 mg/m ³ **
Nickel	Ni	7440-02-0	231-111-4	0 – 10%	1.0 mg/m ³ **	1.5 mg/m ³ **
Niobium Carbide	NbC	12069-94-2	235-117-8	0 – 5%	Not Established	Not Established
Ruthenium	Ru	7400-18-8	231-127-1	0 - 1.5%	Not Established	Not Established
Tantalum Carbide	TaC	12070-06-3	235-118-3	0 – 10%	Not Established	Not Established
Titanium Carbide	TiC	12070-08-5	235-120-4	0 – 35%	15.0 mg/m ³ * 5 mg/m ³ **	10.0 mg/m ³ *
Titanium Nitride	TiN	25583-20-4	247-117-5	0 – 20%	Not established	Not established
Tungsten Carbide	WC	12070-12-1	235-123-0	5 – 95%	5.0 mg/m ³ **	5.0 mg/m ³ **
Vanadium Carbide	VC	12070-10-9	235-122-5	0 – 10%	Not established	Not established
Zirconium Carbide	ZrC	12070-14-3	235-125-1	0 - 2 %	5.0 mg/m ³ **	5.0 mg/m ³ **

* Values given "as DUST"

** Values given are "as FUME"

*** Last updating by Threshold Limit Values by ACGIH –2020

****If coated

Substance Name H-Statements

Chromium Carbide Skin Irrit. 2: H315, Eye Irrit. 2: H319, STOT SE 3: H335

Cobalt Acute Tox. 4: H302, Skin Sens. 1: H317, Eye Irrit. 2: H319, Aquatic Resp. Sens. 1: H334, Carc. 1B: H350, Repr. 2: H361, Aquatic Acute 1: H400, Aquatic Chronic 1: H410

Molybdenum Aquatic Chronic 4: H332, H413

Nickel Skin Sens. 1: H317, Carc 1B: H350, STOT RE 1: H372

Zirconium Carbide Flam Sol. 1: H228

Section 4 - First Aid Measure

Inhalation: If symptoms of pulmonary involvement develop (coughing, wheezing, dyspnea, etc.) remove the exposed person to fresh air immediately; restore and/or support his or her breathing as needed. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. If symptoms persist, keep affected person warm and at rest. Seek medical attention immediately.

Eye Contact: If irritation occurs, remove contact lenses at once. Flush eyes immediately, including under the eyelids, gently but thoroughly, with plenty of running water for at least 15 minutes. If irritation persists, seek medical attention.

Skin Contact: If irritation or rash occurs, remove contaminated clothing and thoroughly wash the affected area with soap and water. If irritation or rash persists, seek medical attention.

Ingestion: If swallowing of greater than trace amounts is suspected, seek medical attention immediately. If the person is conscious, immediately give person large amounts of water. Induce vomiting only if specifically instructed by a physician. Caution: Never give anything by mouth to an unconscious or convulsing person.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Section 5 - Fire Fighting Measures

Flash Point	N/A	
Auto-Ignition Temperature	N/A	NFPA 1 : 0 : 0
LEL	---	
UEL	---	

Extinguishing Media: For powder and dust fires, smother with dry sand, dry dolomite, ABC type fire extinguisher or flood with water.

Unusual Fire or Explosion Hazards: Dusts may present a fire or explosion hazard under rare favoring conditions of particle size, dispersion, concentration, a static discharge, or strong ignition source. However, this is not expected to be a problem under normal handling conditions.

Special Fire-Fighting Procedures: For dust fires, smother with dry sand, dry dolomite, ABC type fire extinguisher or flood with water. If fire is in a container, move the container from fire area if possible. Cool container exposed to flame with water from side until well after fire is out. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; or else withdraw and let the fire burn.

Fire-Fighting Equipment: For a powder fire confined to a small area, use a respirator approved for toxic dusts and fumes. For a large fire, fire fighters should use NIOSH/MSHA approved full-face-piece self-contained breathing apparatus (SCBA) operated in positive pressure mode and full turnout gear. See Sections 3 and 8 for specific hazard identification and exposure control measures.

Hazardous Combustion Products: Oxides of aluminum, cobalt, titanium, and tungsten; carbon dioxide and carbon monoxide. See Section 2 for specific hazard identification.

Section 6 - Accidental Release Measure

Spill/Leak Procedures: Do not walk through or otherwise scatter or disperse spilled material. Ventilate area of spill. Clean up area using methods which avoid dust generation such as a high efficiency, particulate air (HEPA) vacuum (with appropriate filter to prevent airborne dust levels which exceed the PEL or TLV), wet dust mop or wet clean-up. Use an appropriate National Institute of Occupational Safety and Health (NIOSH)-approved respirator whenever airborne concentrations of hazardous components exceed exposure limits listed in Section

Section 7 - Handling and Storage

Under normal operating conditions and usage, cemented carbide products do not require special safety precautions beyond the normal safety procedures for handling and using cutting tools, including the use of safety glasses and gloves. However, other non-routine operations such as grinding, welding, cutting, and burning of cemented carbide products may produce dusts or fumes that may require special handling procedures. The procedures described below are especially important for these non-routine operations.

Hygienic Practices: Wash hands thoroughly after handling and before eating, smoking, using the toilet or applying cosmetics. Wash all exposed skin at the end of the work shift. The consumption of food and beverages as well as smoking should be prohibited in areas where hazardous components may be present. Do not shake clothing, rags, or other articles to remove dust. Dust should be removed from clothing, rags or other articles by laundering or vacuuming (with the appropriate filters).

Handling and Storage Precautions: Maintain good housekeeping procedures to prevent dust accumulation, especially during grinding. Avoid dust inhalation and direct skin or eye contact with dust. See Section 3 for specific health hazards. Store in a cool, dry, well-ventilated area. Keep away from sparks or ignition source. Keep away from strong acids and strong oxidizers.

Other Precautions: Always perform clean up operations using methods that avoid dust generation such as a HEPA vacuum, wet dust mop or wet clean-up. Use an appropriate NIOSH-approved respirator whenever airborne concentrations of hazardous components exceed exposure limits listed in Section 2.

Comments: Periodic health monitoring is suggested for individuals regularly exposed to dust or fumes, with particular attention to any potential sensitization effects of such materials.

Section 8 - Exposure Controls/Personal Protection

Threshold values:

Aluminum oxide

ACGIH-TLV 10 mg/m³ (TWA), total dust
 ACGIH-TLV 3 mg/m³ (TWA), respirable fraction
 OSHA-PEL 15 mg/m³, total dust
 OSHA-PEL 5 mg/m³, respirable fraction

Cobalt

ACGIH-TLV 0.02 mg/m³ (TWA)
 OSHA-PEL 0.1 mg/m³

Molybdenum

ACGIH-TLV 10 mg/m³ (TWA), total dust
 ACGIH-TLV 3 mg/m³ (TWA), respirable fraction
 OSHA-PEL 15 mg/m³, total dust

Nickel

ACGIH-TLV 1.5 mg/m³ (TWA), respirable fraction
 OSHA-PEL 1 mg/m³, respirable fraction

Titanium carbide

ACGIH-TLV 10 mg/m³ (TWA), total dust
 OSHA-PEL 15 mg/m³, total dust
 OSHA-PEL 5 mg/m³, respirable fraction

Tungsten Carbide

ACGIH-TLV 5 mg/m³ (TWA), total dust
 OSHA-PEL 5 mg/m³, total dust

Zirconium carbide

ACGIH-TLV 5 mg/m³ (TWA), total dust
 OSHA-PEL 5 mg/m³, total dust

IDLH: (Immediately Dangerous to Life and Health):

Chromium: 25 mg Cr(III)/m³

Cobalt: 20 mg Co/m³

Molybdenum: 5000 mg Mo/m³

Nickel: 10 mg Ni/m³

Ventilation: Provide local exhaust ventilation or general dilution ventilation to maintain exposure levels below TLV - TWA.

Protective Clothing and Equipment: Always wear protective gloves and protective safety eyeglasses with side shields when performing a non-routine operation such as grinding, welding, cutting, and burning cemented carbide products, or when contact with dust is anticipated. Use barrier cream and protective clothing to prevent prolonged or repeated skin contact. Prior to applying barrier cream or use of protective gloves, wash thoroughly. Wear protective eyeglasses with side shields.
 These products are cutting tools which may contain sharp edges. Appropriate precautions should be taken. Cutting tools can break during normal usage. To avoid injury, equipment with guards and safety shields should be used.

Respirator: Use an appropriate NIOSH-approved respirator with a HEPA or similar cartridge if airborne dust concentrations exceed the appropriate PEL or TLV as shown in Section 2. Follow OSHA respirator regulations (29 CFR 1910.134).

Contaminated Clothing and Equipment: Soiled clothing should be laundered separately. Dust should be removed by water wash or vacuuming with the appropriate filters. Do not shake clothing, rags, or other items to remove dust.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State	Solid	Vapor Pressure (mm Hg)	N/A
Color	Dark Gray Metal	Vapor Density (Air = 1)	N/A
Odor	Odorless	pH	N/A
Boiling Point	6000°C	Specific Gravity (H₂O=1)	10.7 to 15.5
Melting Point	2870°C	Percent Volatile by Volume	0
Water Solubility	Insoluble	Evaporation Rate	N/A

Section 10 - Stability and Reactivity

Stability: Stable

Polymerization: Hazardous polymerization cannot occur.

Chemical Incompatibilities: Contact of dust with strong oxidizers may cause fire or explosions.

Conditions to Avoid: Keep away from strong acids.

Hazardous Decomposition Products: None

Section 11 - Toxicological Information

Aluminum oxide: LD₅₀ (Oral Rat) > 5000 mg/kg

Cobalt: LD₅₀ (Oral rat) 550 mg/kg

Nickel: LD₅₀ (Oral rat) 9000 mg/kg

Cobalt: Cobalt fumes or dust may cause pulmonary, skin, eyes, and mucous membrane irritation. Cobalt may be a sensitizing agent for skin and respiratory system. Chronic exposure may affect the heart, pancreas, thyroid gland, or bone marrow.

Aluminum Nitride, Chromium Carbide, Molybdenum, Niobium Carbide, Ruthenium, Tantalum Carbide, Titanium Carbide, Titanium Nitride, Tungsten Carbide, Vanadium Carbide, Zirconium Carbide:

Toxicity has not been quantified. May cause pulmonary and skin sensitization, eyes, and mucous membrane irritation in dust form.

Section 12 - Ecological Information

Aluminum oxide: LC₅₀ 2.3 mg/L (4h)

Cobalt: LC₅₀ 0.05 mg/L (4h)

Nickel: LC₅₀ 10.2 mg/L (1h)

Section 13 - Disposal Consideration

Disposal: Burial at a permitted landfill is recommended. Consider recycling. Follow applicable federal, state, and local regulations.

Section 14 - Transport Information

Sea (IMO / IMDG)	Shipping Name:	Not regulated
Air (ICAO / IATA)	Shipping Name:	Not regulated
European Road / Rail (ADR/RID)	Shipping Name:	Not regulated
U. S. Department of Transportation	Shipping Name:	Not regulated
Canadian Transportation of Dangerous Goods	Shipping Name:	Not regulated

Section 15 - Regulatory Information

EPA and OSHA Designations: Not listed.

Labeling in accordance with EC directives: Not required.

Labeling in accordance with GHS: Not required.

Signal word: Not required.

Risk Phrases: Not required.

Hazard Statements: Not required.

Safety Phrases: Not required.

Precautionary Statements: Not required.

Section 16 - Other Information

Full text of H-statements with No. appearing in section 3:

H228: Flammable solid.

H302: Harmful if swallowed.

H315: Causes skin irritation
H317: May cause an allergic skin reaction.
H319: Causes serious eye irritation.
H332: Harmful if inhaled.
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335: May cause respiratory irritation.
H350: May cause cancer.
H361: Suspected of damaging fertility or the unborn child.
H372: Causes damage to organs through prolonged or repeated exposure.
H400: Very toxic to aquatic life.
H410: Very toxic to aquatic life with long lasting effects.
H413: May cause long lasting harmful effects to aquatic life.

This product, to the best of our knowledge, does not contain and is not manufactured with any Class I or Class II Ozone Depleting Chemicals (ODCs).

Disclaimer: This Material Safety Data Sheet and the information it contains is consistent with recommended applications of these products and anticipated non-routine activities involving the products. It is the user's responsibility to identify and protect against health and safety hazards presented by modification of Cemented Carbide products after manufacture. Individuals handling Cemented Carbide products or powders should be informed of all relevant hazards and recommended safety precautions and should have access to the information contained in this MSDS.

The details contained in this MSDS are believed to be accurate and based on our recent state of knowledge and experience. However, Tungaloy make no claim regarding the accuracy or completeness of the information and assume no liability for any loss, damage or injury of any kind which may result from or arise out of the use of or reliance on the information contained in the MSDS by any person or entity.