

MATERIAL SAFETY DATA SHEET

12/20/00

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Cemented Carbide Product with Cobalt Binder
Synonyms: Hard Metal, Cemented WC, Tungsten Carbide
Manufacturer: M. A. Ford Manufacturing Co. Inc.
Address: P. O. Box 3620, Davenport, IA 52806
Phone: 563-391-6220
Fax:

2. HAZARDOUS INGREDIENTS

Tungsten Carbide	12070-12-1	25.0-97.0
Titanium Carbide	12070-08-5	0.1-15.0
Tantalum Carbide	12070-06-3	0.1-52.0
Chromium Carbide	7440-47-3	0.1-5.1
Cobalt*	7440-48-4	0.0-30.0
Niobium Carbide	12069-94-2	0.0-5.0
Molybdenum Carbide	12069-89-5	0.0-10.0
Hafnium Carbide	12069-85-1	0.0-10.0
Chromium Carbide	12012-35-0	0.0-5.1
Vanadium* Carbide	12070-10-9	0.0-20.0
Nickel*	7440-02-0	0.0-4.0

* SARA Title III, Section 313, Toxic Chemical

** Regulated, under Section 313 as fume or dust

3. PHYSICAL DATA

Boiling Point: 2870 degrees C (5198F)
Melting Point: 1495C (2723F)
Vapor Pressure (mm Hg): NA
Vapor Density (Air = 1): NA
Specific Gravity: (H₂O = 1.0): 11.0 to 15.5 (60 degrees F)
Evaporation Rate (Butyl Acetate = 1.0): NA
Solubility in Water: Practically insoluble
Appearance and Odor: Solid, odorless metal

4. FIRE AND EXPLOSION DATA

Flash Point: NA

Special Fire Fighting Procedures: Powder or LEL/UEL: NA

Unusual Fire & Explosion Hazards: Hard cemented carbide product is not a fire hazard. Dusts generated from grinding may present a fire or explosion hazard

under rare conditions of particle size, dispersion and strong ignition source. Not expected to be a problem under normal handling and use.

Extinguishing Media: Powder fires smother with dry sand, dry dolomite, ABC type fire extinguisher or flood with water.

5. REACTIVITY DATA

Stability: Chemically stable under normal temperature and pressure.

Conditions to Avoid: Avoid exposure to generated dust and/or fume. Contact of dust with strong oxidizers may cause fire or explosion.

Incompatibility (Materials to Avoid): Strong acids, strong oxidizers. Fluorine, chlorine trifluoride, oxides of nitrogen, lead dioxide.

Hazardous Decomposition or Byproducts: Metallic oxides, acrid smoke and irritating fumes.

Hazardous Polymerization: Will not occur

6. HEALTH HAZARD DATA

Primary Route of Exposure: Inhalation of fumes from welding or burning; dusts from grinding or cutting

Routes of Entry: Inhalation: YES Skin: YES Ingestion: YES Eyes: YES

Health Hazards (Acute and Chronic)

Note: Cemented carbides in their usual physical form do not pose any health hazards. However, when subjected to welding, burning, sawing, brazing, grinding, etc. potentially hazardous fumes or dust may be generated. The above operations should be performed in well-ventilated areas. The primary route of exposure is from inhalation of fumes and dusts.

Cobalt is an eye, skin, and mucous membrane irritant and may cause temporary or permanent respiratory disease. Permanent respiratory disease can lead to disability or death. Preexisting pulmonary and skin conditions such as emphysema, asthma, bronchitis and dermatitis may be aggravated by exposure to this material. **(Health effects listed are for exposure to metallurgical powders, dust, or mist from grinding. No health effects have been reported for exposure to this material in solid form.)**

The effects of overexposure to the various metal fumes and dusts which may be generated from this product and the associated health effects from overexposure are as follows:

ROUTES OF OVEREXPOSURE: Grinding cemented carbide products or handling of grinding sludge will produce dust of potentially hazardous ingredients that can be inhaled, swallowed or come in contact with the skin or eyes.

ACUTE: Excessive inhalation of metallic fumes and dusts may be irritating to respiratory passages. Excessive inhalation of fumes from many metals can produce an acute reaction known as “metal fume fever.” Symptoms consist of chills and fever (very similar and easily confused with flu symptoms), a metallic taste in the mouth, and dryness and irritation of the throat. The symptoms come on a few hours after excessive exposures and usually last from 12 to 48 hours. Long-term effects from metal fume fever have not been noted. Iron oxide, copper and manganese have been associated with causing metal fume fever.

High concentrations of metallic fumes and dusts can result in irritation of the eyes, skin, mucous membranes, and other forms of physical irritation.

INHALATION: Irritant/Sensitizer: 20mg(CO)/m3 is immediately dangerous to life and health.

ACUTE OVEREXPOSURE: May cause respiratory tract irritation with wheezing, shortness of breath, fits of coughing which may produce blood and soreness in the chest, and dust accumulation in the lung. May also cause weight loss, bronchitis, asthma, and inflammation of or damage to lung tissue. If ingested may cause abnormally low blood pressure and gastrointestinal irritation with pain, vomiting, and sensations of hotness or nausea. Large doses ingested may cause diarrhea. Severe ingestion exposure may cause heart damage, convulsions, or enlargement of the thyroid.

CHRONIC OVEREXPOSURE: Chronic inhalation of high concentrations of metallic fumes and dusts may cause build-up of dust in the lungs, allergic respiratory reaction, obstructed airways, and lung damage or disease, with symptoms as described in acute exposure. May become sensitized. Previously exposed individuals may be at increased risk. May cause conjunctivitis. Ingestion may adversely affect the pancreas, thyroid gland, heart, or bone marrow.

CARCINOGENICITY:

Cobalt IARC: 2B NTP: NO OSHA REGULATED: NO ACGIH A3.

Chromium IARC: 3* NTP: NO* OSHA REGULATED: NO ACGIH: A4
* (Hexavalent Chromium NTP: 1, IARC: 1)

Nickel IARC: 2B NTP: 2 OSHA REGULATED: NO

NTP = NATIONAL TOXICOLOGY PROGRAM

1: Known to be carcinogenic; sufficient evidence from human studies

2: Reasonably anticipated to be a carcinogen; limited evidence from studies in humans or sufficient evidence from studies in experimental animals.

IARC = International Agency for Research on Cancer

1: Carcinogenic to humans; sufficient evidence of carcinogenicity.

2A: Probably carcinogenic to humans; limited human evidence, sufficient evidence in experimental animals.

2B: Possibly carcinogenic to humans; limited evidence in humans in the absence of sufficient evidence in experimental animals.

3: Not classified as to carcinogenicity to humans.

4: Probably not carcinogenic to humans.

EPA – D

Not classifiable as to human carcinogenicity. Inadequate human and animal evidence of carcinogenicity or no data available.

ACGIH

A3: Confirmed animal carcinogen with unknown relevance to humans.

A4: Not classifiable as human carcinogen.

CHROMIUM: The health hazards associated with exposure to chromium are dependent on its oxidation state. The metal form (chromium as it exists in this product) is of very low toxicity. Welding fume generated from high chromium stainless steel may contain hexavalent chromium. This water soluble hexavalent form is considerably more toxic. Adverse effects of the hexavalent form on the skin may include ulcerations, dermatitis, and allergic skin reactions. Inhalation of hexavalent chromium compounds can result in ulceration and perforation of the mucous membranes of the nasal septum, irritation of the pharynx and larynx, asthmatic bronchitis, bronchospasm and edema. Respiratory symptoms may include coughing and wheezing, shortness of breath and nasal itch. Eye irritation or inflammation may also result. The NTP lists hexavalent chromium as a known human carcinogen. Chromium metal is listed as not classifiable as to carcinogenicity to humans.

CARCINOGENICITY: YES NTP: NO* IARC: 3* OSHA REGULATED: NO
* (Hexavalent Chromium NTP: 1, IARC: 1) ACGIH A4

COBALT: Inhalation of cobalt metal fumes and dust causes irritation of the nose and throat. Cobalt dust may cause an asthma-like disease with symptoms ranging from cough, chronic bronchitis, shortness of breath and labored breathing, to decreased pulmonary function, nodular scarring of the lung tissue, permanent disability and death. Exposure to cobalt may cause weight loss, dermatitis (inflammation of the skin) and respiratory hypersensitivity. Although cobalt is not listed by NTP or OSHA as a carcinogen, some data suggests that cobalt is an experimental carcinogen in laboratory animals. The author finds that the current OSHA limit of 0.1 mg/m³ is not protective of worker health.

CARCINOGENICITY: NA NTP: NO IARC: 2B OSHA REGULATED: NO
ACGIH A3

COLUMBIUM (NIOBIUM): columbium, when inhaled, is retained mainly in the lungs, and secondarily in bones. It interferes with calcium as an activator of enzyme systems. In laboratory animals, inhalation of niobium nitride and/or pentoxide leads to scarring of the lungs at exposure levels of 40 mg/m³.

Columbium is a moderate eye irritant and a powerful skin irritant in laboratory animals.

CARCINOGENICITY: NA NTP: NO IARC: NO OSHA REGULATED: NO

MOLYBDENUM: Dust of metallic molybdenum has caused difficulty breathing, general weakness, dizziness, chest pain, expectoration, fatigue, headache, anorexia, and joint and muscle pain. Molybdenum has caused anemia and poor growth in experimental animals. Molybdenum may also cause pneumoconiosis and irritation to the lungs and eyes. In rats, dusts of metallic molybdenum have caused growth depression and thickening of intraalveolar septa, which contained connective tissue fibers.

CARCINOGENICITY: NA NTP: NO IARC: NO OSHA REGULATED: NO

NICKEL: Nickel fumes are respiratory irritants and have been a known cause of asthma, pneumonia, pulmonary edema and pulmonary fibrosis in welders using nickel alloys. Airborne nickel contaminated dusts are regarded as capable of producing lung cancer. The risk is higher for workers at primary nickel smelters and refineries than for workers exposed to nickel alloys. Skin contact may cause an allergic rash. Nickel itch is the dermatitis resulting from sensitization to nickel. Itching can occur up to 7 days before skin eruption occurs. The primary skin eruption is reddening, or infection of the hair follicles, which may be followed by skin ulceration. Nickel sensitivity, once acquired, is apparently not lost.

CARCINOGENICITY: YES NTP: 2 IARC: 2B OSHA REGULATED: NO

TITANIUM: Elemental titanium is an inert material. Titanium dioxide may be generated in welding fumes from this product. At extremely high concentrations titanium dioxide has induced lung cancer in rats. Titanium dioxide dust is a mild pulmonary, eye and skin irritant. Rats exposed to titanium dioxide developed small focal areas of emphysema which were attributable to large deposits of dust. Excessive exposure in humans may result in slight changes in the lungs. The dusts of titanium dioxide can be placed in the nuisance category.

CARCINOGENICITY: NA NTP: NO IARC: 3* OSHA REGULATED: NO
* (for Titanium Dioxide)

TUNGSTEN: Chronic exposure to tungsten dust has been reported to cause pulmonary fibrosis, characterized by cough, labored breathing, and wheezing. Dermatitis (inflammation of the skin), primarily on the sides of the neck, inner forearm, and the backs of the hands, was also reported. Dusts of tungsten pose a hazard considered to be somewhat greater than that of nuisance dust.

CARCINOGENICITY: NA NTP: NO IARC: NO OSHA REGULATED: NO

VANADIUM: The health hazards associated with exposure to vanadium are dependent on its oxidation state. This product contains elemental vanadium. Elemental vanadium could be oxidized to vanadium pentoxide during welding. The pentoxide form is more toxic than the elemental form. Chronic exposure to vanadium pentoxide dust and fumes may cause severe irritation of the eyes, skin, upper respiratory tract, persistent inflammation of the trachea and bronchi, pulmonary edema, and systemic poisoning. Signs and symptoms of overexposure include: conjunctivitis, nasopharyngitis, cough, labored breathing, rapid heart beat, lung changes, chronic bronchitis, skin pallor, greenish-black tongue and an allergic skin rash.

CARCINOGENICITY: NA NTP: NO IARC: NO OSHA REGULATED: NO

THIS PRODUCT AS A MIXTURE HAS NOT BEEN DETERMINED TO BE CARCINOGENIC. HOWEVER, INDIVIDUAL COMPONENTS, NICKEL, CERTAIN CHROMIUM AND COBALT COMPOUNDS, AND TITANIUM DIOXIDE HAVE BEEN ASSOCIATED WITH CARCINOGENICITY.

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- 3: Not classified as to carcinogenicity to humans.
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EPA – D

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TLV

- A3: Confirmed animal carcinogen with unknown relevance to humans.
- A4: Not classifiable as human carcinogen.

FIRST AID

Eye Contact: If irritation occurs, flush with large amounts of water for at least 15 minutes. If irritation persists, seek medical attention.

Skin Contact: Wash with soap and water. If irritation or rash occurs, thoroughly wash affected area with soap and water and isolate from exposure. If rash persists, seek medical attention.

Inhalation: If large amounts of dust, from this substance are inhaled, move the exposed person to fresh air and seek medical attention.

Ingestion: If ingested, seek medical attention. Give large quantities of water and induce vomiting. **DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT.**

Other: In the event of wound contamination with nickel, the wound should be promptly and thoroughly cleaned. All contaminated wounds should be thoroughly cleaned.

Alloy Elements	Cas. No.	OSHA PEL mg/m3	ACGIH TLV mg/m3	NIOSH REL mg/m3
Chromium	7440-47-3	1	0.5	
Cobalt	7440-48-4	0.1	0.02	
Hafnium Carbide	12069-85-1	0.5 as Hf		0.5 as Hf
Niobium Carbide	12069-94-2	N/E	N/E	N/E
Manganese	7439-96-5	5 (ceiling limit) fume	0.2 (dust) TWA	1 SSTEEL (CO)
Molybdenum	7439-98-7	N/E	10* NIC – 3** NIC – (1)*; (j)	
Nickel	7440-02-0	0 metal 0 insoluble (as Ni)	1.5 0.2	0.015 0.015
Selenium	7782-49-2	0.2 selenium compounds	0.2	0.2
Silicon Carbide	409-21-2	15*, 5**	10	10.0*, 5.0**
Titanium	7440-32-6	N/E	N/E	
Tungsten	7440-33-7	N/E	N/E	
Tungsten Carbide (containing >2% Co as Co)	12070-12-1	N/E	N/E	0.05* * 10 hr
Tungsten Carbide(containing 0.3% Ni as Ni)	12070-12-1	N/E	N/E	0.015* 10 hr Ca
Vanadium as Vanadium Pentoxide as V ₂ O ₅ , respirable dust or fume	7440-62-2	N/E CO.5* CO.1** * respirable dust ** fume	N/E 0.05	CO.505* *15 min total dust as V

N/E None established. Consult with a professional industrial/occupational hygienist. Use established dust/particulates not otherwise classified or respirable limits.

7. PRECAUTIONS FOR SAFE HANDLING & USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: NA

WASTE DISPOSAL METHOD: Dusts, etc. – follow Federal, State, and Local regulations regarding disposal.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Use good housekeeping practices to prevent accumulations of dusts and to keep airborne dust concentrations at a minimum.

8. CONTROL MEASURES – ALWAYS CONSULT A PROFESSIONAL HYGIENIST

RESPIRATORY PROTECTION: If fumes, misting or dust conditions occur, consult a professional industrial hygienist. Provide NIOSH approved respirators. All requirements of OSHA 29CFR1910.134 should be met.

Respirator Recommendations NIOSH

Up to 0.25 mg Co/m³: (APF = 5) Any dust and mist respirator[^]

Up to 0.5 mg Co/m³: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators[^]/(APG = 10) Any dust, mist, and fume respirator[^]/(APF = 10) Any supplied-air respirator^{*}

Up to 1.25 mg Co/m³: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[^]/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter[^]/(APF = 25) Any powered, air-purifying respirator with a dust, mist, and fume filter^{*}

Up to 2.5 mg Co/m³: (APF = 50) Any air purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 20 mg Co/m³: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus NIOSH^{*}

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-

demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape: (APF = 50) Any air purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

[*Note: Respirator for Tungsten carbide (cemented) containing Nickel.]

VENTILATION: Use general or local exhaust ventilation to keep airborne concentrations of dust and fumes below the TLV. Consult a professional industrial hygienist.

GLOVES: Gloves and barrier creams may be necessary to prevent skin sensitization and dermatitis (inflammation of the skin).

EYE PROTECTION: Safety glasses should be worn when grinding or cutting; face shields should be worn when welding or burning.

WORK/HYGIENIC PRACTICES: Do not strike or impact product with hardened steelhammer or similar device because of possible fracture/shattering of product. Product should be pressed if inserted into another metal part or product.

After handling, before eating or smoking, wash hands thoroughly. Wash exposed skin at the end of the work shift. Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or vacuuming with appropriate filters.