

## MATERIAL SAFETY DATA SHEET

### CEMENTED CARBIDE PRODUCT WITH COBALT/NICKEL BINDER

Date Created: January 26, 1992

Latest Revision No: 8

Latest Revision: May 14, 2008

#### Section 1 - Chemical Product and Company Identification

|                         |                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Material Name</b>    | Cemented Carbide Product with Cobalt/Nickel Binder                                                                                    |
| <b>Chemical Formula</b> | Co, Cr <sub>3</sub> C <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub> , Mo, NbC, Ni, TaC, TiC, TiAlN, TiCN, VC, WC (See also Section 2) |
| <b>CAS No.</b>          | See Section 2                                                                                                                         |
| <b>Manufacturer</b>     | Iscar Ltd., Box 11, Tefen 24959 ISRAEL. Tel: +972 4 997 0311. Fax: +972 4 987 3741                                                    |

#### Section 2 - 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/m<sup>3</sup>)</u> | <u>ACGIH TLV- (mg/m<sup>3</sup>)</u> |
|---------------------------|--------------------------------|----------------|-----------------|--------------|------------------------------------|--------------------------------------|
| Aluminum Oxide            | Al <sub>2</sub> O <sub>3</sub> | 1344-28-1      | 215-691-6       | 0-0.5%****   | 15 mg/m <sup>3</sup> ****          | 10 mg/m <sup>3</sup>                 |
| Chromium Carbide          | Cr <sub>3</sub> C <sub>2</sub> | 12012-35-0     | 234-576-1       | 0 – 1%*      | 0.5 mg/m <sup>3</sup> **           | 0.5 mg/m <sup>3</sup> **             |
| Cobalt                    | Co                             | 7440-48-4      | 231-158-0       | 4 – 15%*     | 0.1 mg/m <sup>3</sup>              | 0.02 mg/m <sup>3</sup>               |
| Molybdenum                | Mo                             | 7439-98-7      | 231-107-2       | 0 – 10%*     | 15.0 mg/m <sup>3</sup>             | 10.0 mg/m <sup>3</sup>               |
| Nickel                    | Ni                             | 7440-02-0      | 231-111-4       | 0 – 10%*     | 1.0 mg/m <sup>3</sup> **           | 1.5 mg/m <sup>3</sup> **             |
| Niobium Carbide           | NbC                            | 12069-94-2     | 235-117-8       | 0 – 5%*      | Not Established                    | 5.0 mg/m <sup>3</sup>                |
| Tantalum Carbide          | TaC                            | 12070-06-3     | 235-118-3       | 0 – 15%*     | 5.0 mg/m <sup>3</sup> **           | 5.0 mg/m <sup>3</sup> **             |
| Titanium Aluminum Nitride | TiAlN                          | N/A            | N/A             | 0-0.5%****   | Not established                    | Not established                      |
| Titanium Carbide          | TiC                            | 12070-08-5     | 235-120-4       | 0 – 10%*     | Not established                    | Not established                      |
| Titanium Carbo-Nitride    | TiCN                           | 12627-33-7     | Not Established | 0 – 50%*     | Not established                    | Not established                      |
| Tungsten Carbide          | WC                             | 12070-12-1     | 235-123-0       | 10 – 95%*    | 5.0 mg/m <sup>3</sup> **           | 5.0 mg/m <sup>3</sup> **             |
| Vanadium Carbide          | VC                             | 12070-10-9     | 235-122-5       | 0 – 10%*     | Not established                    | Not established                      |

\* Depends on grade specifications

\*\* Values given are "as metal"

\*\*\* Last updating by Threshold Limit Values by ACGIH –2007

\*\*\*\*If coated

| <u>Substance Name</u> | <u>R-Phrases</u> |
|-----------------------|------------------|
| Cobalt                | R42/43, R53      |
| Molybdenum            | R11              |
| Nickel                | R43, R40         |
| Vanadium carbide      | R20/21/22        |

#### Section 3 - 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 2 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.

#### Potential Health Effects

##### Risk Phrases

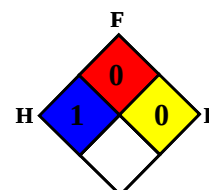
R40: Limited evidence of a carcinogenic effect.

R42/43: May cause sensitization by inhalation and skin contact.

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

Wet or dry grinding of cemented carbide products will 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 human carcinogen.

Chromium

IARC GROUP 3 -Unclassifiable as to carcinogenicity to humans.

Cobalt

ACGIH A3 - Confirmed animal carcinogen.

IARC GROUP 2B - Possibly 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 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

- |                                  |     |                       |
|----------------------------------|-----|-----------------------|
| <b>Flash Point</b>               | N/A |                       |
| <b>Auto-Ignition Temperature</b> | N/A | <b>NFPA 1 : 0 : 0</b> |
| <b>LEL</b>                       | --- |                       |
| <b>UEL</b>                       | --- |                       |
- 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; else withdraw and let 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 3 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.

#### Safety Phrases

S53: Avoid exposure - obtain special instructions before use.  
S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible.)  
S22: Do not breathe dust.  
S36/37/39: Wear suitable protective clothing and gloves.

**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/m<sup>3</sup> (TWA)  
OSHA-PEL 15 mg/m<sup>3</sup> (TWA), total dust  
OSHA-PEL 5 mg/m<sup>3</sup> (TWA), respirable fraction  
MAK-GER 1.5 mg/m<sup>3</sup> (TWA), respirable, fume

##### Cobalt

ACGIH-TLV 0.02 mg/m<sup>3</sup> (TWA)  
OSHA-PEL 0.1 mg/m<sup>3</sup> (TWA)  
NIOSH-REL 0.05 mg/m<sup>3</sup> (TWA)

##### Tantalum carbide (As Ta)

ACGIH-TLV 5 mg/m<sup>3</sup> (TWA)  
OSHA-PEL 5 mg/m<sup>3</sup> (TWA)  
MAK-GER 1.5 mg/m<sup>3</sup> (TWA), respirable  
NIOSH-REL 5 mg/m<sup>3</sup> (TWA), 10 mg/m<sup>3</sup> (STEL)

##### Tungsten carbide

ACGIH-TLV 5 mg/m<sup>3</sup> (TWA), 10 mg/m<sup>3</sup> (STEL)  
NIOSH-REL 0.015 mg/m<sup>3</sup> (TWA)

##### Chromium carbide (As Cr)

ACGIH-TLV 0.5 mg/m<sup>3</sup> (TWA)  
OSHA-PEL 0.5 mg/m<sup>3</sup> (TWA)  
NIOSH-REL 0.5 mg/m<sup>3</sup> (TWA)

##### Molybdenum

ACGIH-TLV 3 mg/m<sup>3</sup> (TWA), respirable  
ACGIH-TLV 10 mg/m<sup>3</sup> (TWA), inhalable  
OSHA-PEL 15 mg/m<sup>3</sup> (TWA), total dust

##### Nickel

ACGIH-TLV 1.5 mg/m<sup>3</sup> (TWA), inhalable  
OSHA-PEL 1 mg/m<sup>3</sup> (TWA)  
NIOSH-REL 0.015 mg/m<sup>3</sup> (TWA)

**IDLH: (Immediately Dangerous to Life and Health):****Nickel:** 10 mg Ni/m<sup>3</sup> NIOSH 1995**Cobalt:** 20 mg Co/m<sup>3</sup> NIOSH 1995**Chromium:** 250 mg Cr/m<sup>3</sup> NIOSH 1995**Molybdenum:** 5000 mg Mo/m<sup>3</sup> NIOSH 1995 (insoluble compound, as Mo)**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 |                 |                                            |              |
|----------------------------------------------|-----------------|--------------------------------------------|--------------|
| <b>Physical State</b>                        | Solid           | <b>Vapor Pressure (mm Hg)</b>              | N/A          |
| <b>Color</b>                                 | Dark Gray Metal | <b>Vapor Density (Air = 1)</b>             | N/A          |
| <b>Odor</b>                                  | Odorless        | <b>pH</b>                                  | N/A          |
| <b>Boiling Point</b>                         | 6000°C          | <b>Specific Gravity (H<sub>2</sub>O=1)</b> | 10.7 to 15.5 |
| <b>Melting Point</b>                         | 2870°C          | <b>Percent Volatile by Volume</b>          | 0            |
| <b>Water Solubility</b>                      | Insoluble       | <b>Evaporation Rate</b>                    | 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:** LD<sub>50</sub> (Intraperitoneal mouse) > 3600 mg/kg      **Nickel:** LD<sub>50</sub> (Intraperitoneal rat) 250 mg/kg**Cobalt:** LD<sub>50</sub> (Oral rat) 6171 mg/kgLD<sub>50</sub> (Intraperitoneal rat) 100 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.

**Chromium Carbide, Tungsten Carbide, Titanium Carbide, Tantalum Carbide, Niobium Carbide, Vanadium Carbide:** Toxicity has not been quantified. May cause pulmonary and skin sensitization, eyes and mucous membrane irritation in dust form.

| Section 12 - Ecological Information |
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Ecological testing has not been conducted on this product.

| Section 13 - Disposal Consideration |
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**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**

Symbol and indicating of hazard:

Xn - Harmful


**Risk Phrases**

- R40: Limited evidence of a carcinogenic effect.
- R42/43: May cause sensitization by inhalation and skin contact.

**Safety Phrases**

- S53: Avoid exposure - obtain special instructions before use.
- S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label whenever possible.)
- S22: Do not breathe dust.
- S36/37/39: Wear suitable protective clothing and gloves.

**Section 16 - Other Information**
**Full text of R-phrases with No. appearing in section 2:**

- R11: Highly flammable.
- R20/21/22: Harmful by inhalation, in contact with skin and if swallowed.
- R40: Limited evidence of a carcinogenic effect.
- R43: May cause sensitization by skin contact.
- R42/43: May cause sensitization by inhalation and skin contact.
- R53: May cause long-term adverse effects in the aquatic environment.

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, ISCAR LTD. and INT'L METALWORKING COMPANIES (IMC Group) 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.*