MATERIAL SAFETY DATA SHEET

MSDS # KP0001

Revision Date: July 29, 2009
Supersedes: 02/18/09

1. PRODUCT AND COMPANY IDENTIFICATION

Product Names/Powder Grades (Refer to Section 3 for Definition of Groups)	
Group A:	**K118SCW, K11X62, K11Y62, K8X62**
Group B:	**2608Y22, CD630W62, CDEDM636W6, CQ11Y62, G13Y22, K3076Y62, K313X62, K313Y22, K313Y62, KF300SCW, KF306D619, KF306X62, KF306Y24, KF306Y62, KF306Y63, KF306Y64, KF308Y62, KF310Y22, KF310Y61, KF310Y63, KF310Y64, S105Y22, S105Y23, S105Y24, S105Y26, THM, THM-F, THR, THR-S**
Group C:	**2612Y22, AM20, AM40, CDEDM650W6, DM75, DM75P, HGCARB, K3833X62, KF312X62, KF312Y62, KF312Y63, KF312Y64, KF315X62, KF315Y22, KF315Y62, KUF315Y22, KW115Y62, MN1Y62, MN2Y62, MN3MN4Y62, MN4Y62, MN5Y62, MN6Y62, RX2035Y62, RX2035Y62B, S116, SP143Y62, THA-S, THY, X185ML, X185MLBL, X201ML, X201MLBL**
Group D:	**DM40, DM50, DM60V**
Group E:	**DM20**
Chemical Name:	Tungsten Carbide product with Cobalt binder
Synonyms:	Hard Metal, Cemented WC, Tungsten Carbide
Chemical Family:	Metal mixture
Formula:	Not applicable - mixture
Product Use:	Mining tools, Construction tools, Round tools, Metalworking Tools, Metallurgical Products, Powders and Inserts

COMPANY ADDRESS:

North America (NA):
Kennametal Inc.
1600 Technology Way
Latrobe, PA 15650

European Union (EU):
Kennametal Service Center Europe
Wehlauer Str. 73
90766 Fürth Germany

Additional MSDS:
NA: 724-539-5747
EU: +49-911-9735-0
Technical Information:
NA: 724-539-5066
EU: +49-911-9735-0

EMERGENCY TELEPHONE NUMBER:
NA: CHEMTREC 1-800-424-9300
International: CHEMTREC +1-703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

EXPOSURE TO DUST, POWDER, OR FUMES MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION. DUST OR POWDER MAY CAUSE RESPIRATORY SYSTEM DAMAGE. MAY CAUSE AN ALLERGIC SKIN AND/OR RESPIRATORY REACTION. SUSPECT CANCER HAZARD.

Avoid breathing dust. Use only with adequate ventilation. Keep container closed when not in use. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

2. HAZARDS IDENTIFICATION (CONT'D)

CLASSIFICATION AND LABELING FOR POWDER FORM:

GHS Status Pictogram	Classification	Signal Word and Hazard Statements*
	Respiratory Sensitization, Category 1 STOT Repeated, Category 1 Carcinogenicity, Category 2	Danger. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Causes damage to lungs through prolonged or repeated exposure. Warning. Suspected of causing cancer through inhalation.
	Skin Sensitization, Category 1	Warning. May cause an allergic skin reaction.
	Based on particle size, some powders might be classified as Flammable (see product label for flammability classification)	Danger/Warning. Flammable solid.

* For grades containing ≥ 25% Cobalt, Chronic Aquatic Toxicity, Category 4 and "May cause long lasting harmful effects to aquatic life" hazard statement is required.

GHS Precautionary Statements†

Prevention:	P201, P202, P210 (if flammable), P240 (if flammable), P241 (if flammable), P260, P261, P264, P270, P272, P273, P280, P281, P285
Response:	P314, P321, P363, P302+P352, P304+P341, P308+P313, P333+P313, P342+P311, P370+P378 (if flammable)
Storage:	P405
Disposal:	P501

†See Section 16 for definition of Precautionary Statements.

OSHA/WHMIS REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200) and is a controlled product by the WHMIS Hazardous Products Act and Controlled Products Regulations (SOR/88-66).

EU (per EEC Directive 1999/45/EEC):

Danger Symbols: Xn: Harmful
Based on particle size, some powders might be classified as F: Flammable (see product label for flammability classification)

Phrases:
R42/43 May cause sensitization by inhalation or skin contact.
R40 Limited evidence of a carcinogenic effect.
R68/20 Possible risk of irreversible effects through inhalation.
R53 May cause long-term adverse effects in the aquatic environment (only for grades containing greater than 25% cobalt).
R10 Flammable (if flammable – see product label for flammability classification).
S22 Do not breathe dusts.
S24 Avoid contact with skin.
S36/37 Wear suitable protective clothing and gloves.
S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)
S51 Use only in well-ventilated areas
S61 Avoid release to the environment (only for grades containing greater than 25% cobalt). Refer to Sections 6 and 13.
S63 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label

2. HAZARDS IDENTIFICATION (CONT'D)

HAZARD RATINGS:
Hazardous Materials Identification System (HMIS):
*Chronic Health Hazard
**See Bill of Lading for flammability properties

Degree of hazard (0 = low, 4 = extreme)

Health: 3* Flammability: 0 – 2** Reactivity: 0 Personal Protection: E

HUMAN THRESHOLD RESPONSE DATA:
NIOSH Immediately Dangerous to Life or Health (IDLH) Value(s): The IDLH for this product is not known. The IDLH for cobalt is 20 mg/m^3.

POTENTIAL HEALTH EFFECTS

ACUTE EFFECTS:

Eye: Powder or dust may cause irritation consisting of redness, swelling, and pain. May cause conjunctivitis with repeated exposures.

Skin: Material not expected to be absorbed through the skin. Contact with dust or powder may cause irritation consisting of redness and/or swelling. Sensitized persons may experience an allergic reaction when exposed to cobalt.

Inhalation: Material not expected to be inhaled in high concentrations. Inhalation of high concentrations of powder, dust, or fume may cause respiratory and nasal irritation, coughing, and difficulty breathing.

Ingestion: Material not expected to be ingested. Ingestion of large amounts of dust or powder may cause nausea, diarrhea and/or stomach pain.

CHRONIC EFFECTS:

Prolonged or repeated skin contact with powder or dust may cause severe irritation or dermatitis. Prolonged or repeated inhalation of powder, dust or fume may cause severe irritation and possibly lung damage. Chronic exposure to dust or powder may also lead to the development of permanent, severe, obstructive or fibrotic lung disease characterized by coughing, wheezing, and shortness of breath. Repeated contact with powder or dust may cause an allergic skin reaction consisting of itching, redness, swelling, and rash or urticaria (hives) in sensitized individuals. Prolonged or repeated inhalation of powder, dust or fume may cause an allergic type of asthma reaction characterized by wheezing, coughing, and extreme breathing difficulty in sensitized individuals. IARC lists cobalt metal with tungsten carbide as probably carcinogenic to humans (Group 2A).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Exposure to dust or powder may aggravate existing dermatitis, asthma, emphysema, and other respiratory disease.

POTENTIAL ENVIRONMENTAL EFFECTS: None known. Product has not been tested for environmental properties.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	EINECS	Grp. A Wt %	Grp. B Wt %	Grp. C Wt %	Grp. D Wt %	Grp. E Wt %
Tungsten Carbide (WC)	12070-12-1	235-123-0	60 – 100	60 – 100	60 – 100	30 – 60	10 – 30
Cobalt (Co)	7440-48-4	231-158-0	1 – 5	5 – 10	10 – 30	30 – 60	60 – 100

European Union Dangerous Substances Directive (67/548/EEC) Annex I Classification:

Components	EINECS	Hazard Symbol	R-Phrases	S-Phrases
Tungsten Carbide (WC)	235-123-0	None	None	None
Cobalt (Co)	231-158-0	Xn	R42/43, R53	S22, S24, S37, S61

4. FIRST AID MEASURES

PROCEDURES

Eye Contact: In case of contact, flush eyes with plenty of water for at least 15 minutes. If irritation persists, get medical attention.

Skin Contact: In case of contact, wash skin with plenty of water. Remove contaminated clothing and shoes and launder before reuse. If skin irritation develops and persists or recurs, get medical attention.

Inhalation: If symptoms of lung irritation occur (coughing, wheezing or breathing difficulty), remove from exposure area to fresh air immediately. If breathing has stopped perform emergency resuscitation. Keep affected person warm and at rest. Get medical attention.

Ingestion: If swallowed, and person is conscious, immediately give person large amounts of water. Get medical attention. Never give anything by mouth to an unconscious or convulsing person. Induce vomiting only if instructed by a physician.

Note to Physicians: None known. Use general supportive care.

5. FIRE FIGHTING MEASURES

Property	Value	Property	Value
Flash Point (°C):	Not applicable	Burning Rate of Material:	Variable based on powder grade
Lower Explosive Limit:	Not applicable	Auto ignition Temp.:	Not applicable
Upper Explosive Limit:	Not applicable	Flammability Classification	Variable based on powder grade

Unusual Fire and Explosion Hazards: Rarely, under the right specific conditions, finely divided powder or dust from grinding can be a fire and explosion hazard when exposed to high temperatures or ignition sources. Particle size and dispersion in air determine reactivity. When heated to decomposition, may produce metal oxides or fumes.

Extinguishing Media: For localized powder fires, smother with dry sand, dry dolomite, sodium chloride or soda ash. Use fire-extinguishing media appropriate to fight surrounding fire.

Special Firefighting Procedures: Move container from fire area if possible. Cool the sides of containers exposed to flame with water - continue until well after fire is out. For a massive fire in cargo area, use unmanned hose holder or monitor nozzles, or withdraw and let fire burn. Use powdered sodium chloride, or suitable dry powder. Avoid breathing fumes from burning material. Fire-fighting personnel must use proper respiratory protection and protective fire suits including self-contained breathing apparatus with a full face-piece operated in pressure-demand or other positive-pressure mode.

6. ACCIDENTAL RELEASE MEASURES

For transportation-related spills in North America call CHEMTREC at 1-800-424-9300 and Internationally call +1-703-527-3887**.** For spills, using protective equipment as prescribed in Section 8, sweep up with minimum amount of dust generation and place in suitable, clean, dry containers for later disposal or reclamation. Residue should be cleaned up using a high efficiency particulate (HEPA) filter vacuum or wet clean up. Dispose in accordance with Section 13.

7. HANDLING AND STORAGE

Handling:	No smoking, eating, or drinking while using this product. Wash hands thoroughly after handling. Minimize generation of powder/dust and avoid dispersion of dust in air.
Storage:	Container should be tightly closed and stored in a clean, cool area.
Other Precautions:	Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or HEPA vacuuming.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Tungsten Carbide (WC)	
United States[1]:	15 mg/m^3 OSHA PEL (TWA, total dust)[1]; 5 mg/m^3 OSHA PEL (TWA, respirable dust)[1]; 5 mg/m^3 ACGIH TLV (TWA, as W); 10 mg/m^3 ACGIH TLV (STEL, as W)
Croatia:	5 mg/m^3 (MAC); 10 mg/m^3 (STEL)
Finland:	5 mg/m^3 (TWA, as W)
Germany[2]:	4 mg/m^3 DFG MAK (TWA, inhalable dusts, general)[2]; 1.5 mg/m^3 DFG MAK (TWA, respirable dusts, general)[2]
Latvia:	6 mg/m^3 (TWA, aerosol)
Russia:	6 mg/m^3 (TWA, aerosol); Fibrogenic substance; Noxious substance

[1]This substance is regulated by OSHA as a Particulate Not Otherwise Classified (PNOC). The exposure limits listed for both OSHA and ACGIH refer to total dust; the OSHA PEL for the respirable fraction is 5 mg/m^3.
[2] This substance is regulated by the Federal Republic of Germany as a Particulate Not Otherwise Classified (PNOC).

Cobalt (Co)	
United States:	0.1 mg/m^3 OSHA PEL; 0.02 mg/m^3 ACGIH TLV-TWA; ACGIH A3 (Confirmed animal carcinogen with unknown relevance to humans)
Canada Provinces:	Alberta: 0.05 mg/m^3 (TWA) British Columbia: 0.02 mg/m^3 (TWA); 2B (possible human carcinogen) Manitoba and Nova Scotia: 0.02 mg/m^3 (TWA); A3 (confirmed animal carcinogen with unknown relevance to humans) New Brunswick: 0.02 mg/m^3 (TWA); A3 (animal carcinogen) Newfoundland and Prince Edward Island: 0.02 mg/m^3 (TWA) Northwest Territories: 0.1 mg/m^3 (TWA, dust and fume); 0.3 mg/m^3 (STEL, dust and fume) Nunavut: 0.1 mg/m^3 (TWA, metal dust and fume); 0.3 mg/m^3 (STEL, dust and fume) Ontario: 0.02 mg/m^3 (TWAEV, dust and fume) Quebec: 0.02 mg/m^3 (TWAEV, dust and fume); C3 carcinogen (effect detected in animals) Saskatchewan: 0.02 mg/m^3 (TWA); 0.06 mg/m^3 (STEL); Designated chemical substance Yukon: 0.05 mg/m^3 (TWA, dust and fume); 0.15 mg/m^3 (STEL, dust and fume)
Argentina:	0.02 mg/m^3 (TWA); A3 (confirmed animal carcinogen with unknown relevance to humans)
Australia:	0.05 mg/m^3 (TWA, dust and fume); Sensitizer
Austria:	0.1 mg/m^3 (TRK, inhalable fraction); skin and respiratory sensitizer; Group A2 Carcinogen
Belgium:	0.02 mg/m^3 (TWA, dust and fume)
Bulgaria:	0.1 mg/m^3 (TWA); Category 1 (toxic to reproduction); allergenic substance
Chile:	0.016 mg/m^3 (TWA); A3- Animal Carcinogen
China:	0.05 mg/m^3 (TWA); 0.1 mg/m^3 (STEL); possibly carcinogenic to humans
Colombia:	0.02 mg/m^3 (TWA)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION (CONT'D)

Cobalt (Co)- Cont'd	
Croatia:	0.05 mg/m^3 (MAC, aerosol, dust, fume and vapor, as Co); Category 2 (carcinogen as established through laboratory testing; sensitizer
Czech Republic:	0.05 mg/m^3 (TWA); 0.1 mg/m^3 (Ceiling); Sensitizer
Denmark:	0.01 mg/m^3 (TWA, dust, fumes and powder); carcinogen
Egypt:	0.02 mg/m^3 (TWA); confirmed human carcinogen
Estonia:	0.05 mg/m^3 (TWA); Sensitizer
Finland:	0.05 mg/m^3 (TWA)
GCC:	0.02 mg/m^3 (TWA, dust and fume); Category 2 carcinogen
Germany:	Category 2 (considered to be carcinogenic for man); respiratory and skin sensitizer; skin notation
Greece:	0.1 mg/m^3 (TWA, dust and fume)
Hong Kong:	0.02 mg/m^3 (TWA)
Hungary:	0.1 mg/m^3 (TWA); 0.4 mg/m^3 (STEL); Sensitizer
Iceland:	0.02 mg/m^3 (TWA, dust and fume); 0.04 mg/m^3 (Ceiling, dust and fume); Allergenic substance
Indonesia:	0.002 mg/m^3 (NAB); A3 (confirmed animal carcinogen)
Ireland:	0.1 mg/m^3 (TWA); 0.5 mg/m3 (TWA, aerosol); sensitizer
Israel:	0.02 mg/m^3 (TWA)
Japan:	0.05 mg/m^3 (TWA); Group 2B (possibly carcinogenic to humans); Group 1 airway sensitizer; Group 1 skin sensitizer
Korea:	0.02 mg/m^3 (TWA, dust and fume)
Latvia:	0.5 mg/m^3 (TWA, aerosol), Carcinogenic Substance
Lithuania:	0.05 mg/m^3 (TWA/IPRV); sensitizer
Malaysia:	0.02 mg/m^3 (TWA)
Mexico:	0.1 mg/m^3 (TWA, dust, and fume, as Co); A3 – Confirmed animal carcinogen
Netherlands:	0.02 mg/m^3 (TWA, dust and smoke, as Co)
New Zealand:	0.05 mg/m^3 (TWA, dust and fume); A3 (confirmed animal carcinogen with unknown relevance to humans)
Norway:	0.02 mg/m^3 (TWA, smoke), carcinogen, potential reproductive hazard, sensitizing substance
Peru:	0.02 mg/m^3 (TWA)
Philippines:	0.1 mg/m^3 (TWA, metal dust and fume)
Poland:	0.05 mg/m^3 (TWA, fume and dust); 0.2 mg/m^3 (STEL, dust and fume); allergenic substance; corrosive substance; irritant
Portugal:	0.02 mg/m^3 (TWA); A3 (confirmed animal carcinogen with unknown relevance to humans)
Romania:	0.05 mg/m^3 (TWA)
Russia:	0.01 mg/m^3 (TWA, aerosol); 0.05 mg/m^3 (STEL, aerosol); allergenic substance; noxious substance; skin notation
Singapore:	0.02 mg/m^3 (PEL)
Slovak Republic:	0.1 mg/m^3 (TWA); 0.1 mg/m^3 (Ceiling); sensitizer
Slovenia:	0.5 mg/m^3 (TWA); 2 mg/m^3 (STEL)
South Africa:	0.1 mg/m^3 (TWA, dust and fumes); Animal Carcinogen
Spain:	0.02 mg/m^3 (TWA, VLA-ED); sensitizer
Sweden:	0.05 mg/m^3 (TLV, total dust), Sensitizer
Switzerland:	0.1 mg/m^3 (TWA, aerosol and dust, inhalable); category 2C carcinogen; category 3 mutagen; category 2 reproductive toxin; sensitizer
Taiwan:	0.05 mg/m^3 (TWA, dust and fume); 0.15 mg/m^3 (STEL, dust and fume)
United Kingdom:	0.1 mg/m^3 (TWA); 0.3 mg/m^3 (STEL); capable of causing occupational asthma
Venezuela:	0.02 mg/m^3 (TWA); A3 – Animal Carcinogen
Vietnam:	0.05 mg/m^3 (TWA); 0.1 mg/m^3 (STEL)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION (CONT'D)

Additional Exposure Standards:	NIOSH REL (10 hour TWA) for cemented tungsten carbide containing >2% Co is 0.05 mg Co/m^3. NIOSH IDLH for Cobalt dust and fume is 20 mg/m^3.
Engineering Controls:	Provide local exhaust ventilation to maintain exposure levels below the PEL and TLV. Provide safety shower and eyewash.
Eye/Face Protection:	Safety glasses with side shields or goggles are recommended. Contact lenses should not be worn when handling these materials.
Skin Protection:	Wear impervious gloves and other protective clothing (aprons, coveralls) as appropriate to prevent skin contact when using this product. Wash hands thoroughly after handling, especially before eating, drinking, or smoking.
Respiratory Protection:	If exposures above the applicable exposure limits are possible, use an approved half-face or full-face respirator equipped with High Efficiency Particulate (HEPA) filter cartridges.
General Hygiene Considerations:	Do not eat, drink, or smoke while using this product. Wash hands thoroughly after use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Value	Property	Value
Appearance:	Gray powder	*Initial Boiling Point (°F):*	2870°C (5198°F)
Odor:	None	*Boiling Range (°F):*	No data
Odor Threshold:	None	*Melting point:*	1495°C (2723°F)
Molecular Weight:	Mixture	*Specific gravity (g/cc):*	12.0 – 15.5
Physical State:	Solid	*Viscosity (cps):*	Not applicable
pH:	Not applicable	*Flash Point:*	Not applicable
Vapor Pressure (mm Hg):	Not applicable	*Decomposition Temperature:*	Unknown
Solubility in Water (20 °C):	Practically insoluble	*Flammability:*	Variable based on powder grade
Volatiles, Percent by volume:	Not applicable	*Upper/Lower Flammability Limits:*	No data
Vapor Density (air = 1):	Not applicable	*Auto-ignition Temperature:*	No data
Evaporation Rate:	Not Applicable	*Octanol/water partition coefficient:*	No data

10. STABILITY AND REACTIVITY

Stability:	Stable under normal temperatures and pressure.
Conditions to Avoid:	Avoid exposure to heat, sparks, or flame. Avoid dust accumulation.
Materials to Avoid:	Acids, bases, strong oxidizers.
Hazardous Decomposition Products:	When heated to decomposition, may produce metal oxides and fumes.
Hazardous Polymerization:	Will not occur.

11. TOXICOLOGICAL INFORMATION

Potential Exposure Routes:	This product may be encountered through skin contact, eye contact, ingestion, or inhalation of dusts, fumes or powder.

11. TOXICOLOGICAL INFORMATION (CONT'D)

***ACUTE ANIMAL TOXICITY DATA*:**

For Product:		For Components:	
		Tungsten Carbide	**Cobalt**
Oral LD_{50}	> 2 g/kg (rat)	> 2 g/kg (rat)	≥ 6.171 g/kg (rat)
Dermal LD_{50}	> 2 g/kg (rabbit)	> 2 g/kg (rabbit)	No data
Inhalation LC_{50}	Similar product: Harmful	> 5 mg/l (4 hour, rat, ~48% <7 µm)	> 10 mg/L (1 hour, rat)

Skin Corrosion/Irritation: This product is considered a mild skin irritant. Tungsten carbide was not irritating to the skin of rabbits under semi-occlusive conditions.

Serious Eye Damage/Irritation: This product is considered a mild eye irritant. Tungsten carbide is a mild eye irritant.

Respiratory or Skin Sensitization: This product was found to be a respiratory sensitizer when tested in guinea pigs. Cobalt is a respiratory irritant, skin sensitizer, and respiratory sensitizer.

Germ Cell Mutagenicity: There is limited evidence that tungsten carbide and cobalt may be mutagenic in bacteria or animal cells. However, when lymphocytes from workers exposed to hard metal dust were examined, no changes in the DNA were found.

Carcinogenicity: Cobalt metal with tungsten carbide was evaluated by IARC (International Agency for Research on Cancer) as *probably carcinogenic to humans* (Group 2A).

Reproductive, Teratogenicity, or Developmental Effects: This product is not known or reported to cause reproductive or developmental effects. Based on a subchronic animal study, there is no suspicion of a possible impairment of fertility by exposure to tungsten carbide.

STOT- Single Exposure: No data were identified for this product or its constituents.

STOT- Repeated Exposure: Long-term exposure to WC-Co powder/dust is reported to be associated with occupational asthma and a fibrotic lung condition referred to as hardmetal disease.

Intratrachial instillation of tungsten metal and tungsten carbide dust in guinea pigs at 50 mg/week for 3 weeks and repeated intratracheal instillation of tungsten carbide in rats at 10 mg/kg bw found the dusts to be relatively inert. Slightly higher intratracheal doses in guinea pigs (83 mg/kg bw/week) lead to transient reactions with almost complete recovery within one year. Additionally, dust-chamber exposures of animals to tungsten, tungsten oxide, and tungsten carbide at 600 mg/m^3, 1 hour/day for 5 months produced only minor changes.

In subchronic inhalation studies in miniature swine exposed to cobalt metal powder at concentrations of 0.1 or 1.0 mg/m^3 6 hours/day, 5 days/week for 3 months, pulmonary changes (e.g., wheezing; decrease in total lung compliance; and thickening of the pulmonary septa caused by masses of collagen, elastic tissue, and fibroblasts) occurred at exposure levels of 0.1 mg cobalt $metal/m^3$.

Aspiration Hazard: Not relevant. Physical form of solid powder indicates no aspiration hazard potential.

Neurological Effects: This product is not known or reported to cause neurological effects.

Interactions with Other Chemicals Which Enhance Toxicity: No data were identified for this product or its constituents.

12. ECOLOGICAL INFORMATION

No data exists for the product; therefore the data from each of the constituents is presented.

Tungsten Carbide (WC)				
Ecotoxicity		Test		Effects
Acute Effects:	*Danio rerio* (zebra fish)	Static 96-h-LC_{50} (OECD 203)		> 1000 mg/l (nominal)
	Daphnia magna (water flea)	Static 48-h-LC_{50} (OECD 202)		> 1000 mg/l (nominal)
	Desmodesmus subspicatus (green algae)	Static growth rate and biomass 72-h-EC_0 (OECD 201) 72-h-EC_{50} (OECD 201)		 >1 mg/l (nominal) ≥1 mg/l (nominal)
Chronic Effects:	No data on chronic effects are available.			
Toxicity to Microorganisms:	Activated Sludge	Respiration Inhibition	3-h-EC_{50}	>1000 mg/l (nominal)
Mobility:	Insoluble in water (<0.0001 g/l at 25°C). Vapor pressure is very low. Therefore, it is unlikely that volatilization will occur. Substance mobile only in the particulate phase and may be removed from the air by wet or dry deposition/filtration.			
Persistence/Biodegradability:	Metals as a class do not biodegrade.			
Bioaccumulation:	Measured Bioconcentration Factors not available. However due to physical state of WC, bioaccumulation is unlikely to occur.			

Cobalt (Co)			
Ecotoxicity		Test	Effects
Acute Effects:	*Brachydanio rerio* (zebra fish)	Static 96-h-LC_{50} (OECD 203)	> 100 mg/l (nominal)
	Daphnia magna *Daphina sp.* (Water flea)	Static 48-h-NOEC (OECD 202) Static 48-h- LC_{50} (USEPA ECOTOX)	3.2 mg/l (nominal) 100 µg/l
	Selenastrum capricornutum (green algae)	Static growth rate and biomass 72-h-NOEC 72-h-IC_{50}	0.01- 0.015 mg/l (nominal) 0.05- 0.26 mg/l (nominal)
	Cobalt has been assigned a risk phrase of R53 “may cause long-term adverse effects in the aquatic environment” by the European Union following OECD test guidelines.		
Chronic Effects:	No data on chronic effects are available.		
Toxicity to Microorganisms:	No data on toxicity to microorganisms are available.		
Mobility:	Insoluble in water (EPIWIN estimate: 0.0008 g/l at 25°C). Cobalt binds tightly to sediment and soils and may be transported to water sources via runoff. Mobility of cobalt in sediments increases as pH and redox potential decreases.		
Persistence/Biodegradability:	Metals as a class do not biodegrade.		
Bioaccumulation:	Bioaccumulation varies among fish, mollusks, and algae, with respective BCF ranges of 10-1,000; 100-14,000; and 2,300-18,000.		

13. DISPOSAL CONSIDERATIONS

Responsibility for proper waste disposal is with the owner of the waste.
Customers are encouraged to take advantage of the Kennametal Carbide Recycling Program, for information regarding this program the visit http://www.kennametal.com/carbiderecycling/index.jhtml or call 1-Ton-Carbide (1-866-227-2433). This is a valuable material that should be sent to an appropriate reclamation facility, if available. If material cannot be sent to a reclamation facility, dispose of all waste product and containers in accordance with local, state/provincial, federal, and national regulations.

EWC-Code: One of the following 120103 or 120104 or 120114 or 120115 or 120118

The export of residues in form of solid scrap, sludge or powder within EC member states or in OECD countries are regulated under 1013/2006 EC. The material is listed as B1010 (solid tools) or B1031 (sludge and powder).

14. TRANSPORT INFORMATION

DOT / ADR / RID / IMDG / IATA	May be classifiable or regulated. For hazard class refer to Bill of Lading or contact Kennametal Corporate EHS Department at (724) 539-5066 for information on powder classification.

15. REGULATORY INFORMATION

Inventory Status:

All ingredients are either listed on or exempt from listing on the following inventories:

- Australia Inventory of Chemical Substances (AICS)
- Canada Domestic Substances List (DSL)
- China Inventory of Existing chemical Substances (IECSC)
- European Inventory of Existing Chemical Substances (EINECS)
- Korean Existing Chemicals List (ECL)
- Philippines Inventory of Chemicals and Chemical Substances (PICCS)
- Japan Existing and New Chemical Substances (ENCS)
- U.S. Toxic Substances Control Act Inventory (TSCA)

CERCLA:	None			
RCRA:	Cobalt			
SARA 313:	Cobalt (0.1% de minimus)			
SARA 312 Hazard Class:	Health: Acute – Yes, Chronic - Yes	Fire: None	Reactivity: None	Release of Pressure: None
SARA 302 EHS List:	None of the components of this product are listed.			

STATE RIGHT-TO-KNOW STATUS

Component	CA Prop. 65[3]	New Jersey	Pennsylvania	Massachusetts
Tungsten Carbide	Not listed	Listed	Not listed	Not listed
Cobalt	Listed	Listed	Listed	Listed

[3] "WARNING: This product contains detectable amounts of a chemical(s) known to the State of California to cause cancer and/or birth defects or other reproductive harm."

Canada IDL:	Tungsten compounds, n.o.s., Cobalt.
Canada 2006, 2007, 2008 National Pollutant Release Inventory:	Cobalt, Part 1, Group 1 Substance
WHMIS:	D2A, D2B.

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* and the MSDS contains all the information required by the *Controlled Products Regulations.*

Classification and Labeling for Powders (per EEC Directive 1999/45/EEC): *Danger Symbols:* Xn: Harmful

Some powders may be classified as:
F: Flammable (refer to Label)

15. REGULATORY INFORMATION (CONT'D)

Classification and Labeling for Powders (per EEC Directive 1999/45/EEC):	*Phrases:*	R42/43 May cause sensitization by inhalation or skin contact. R40 Limited evidence of a carcinogenic effect. R68/20 Possible risk of irreversible effects through inhalation. R53 May cause long-term adverse effects in the aquatic environment (only for grades containing greater than 25% cobalt). R10 Flammable (if flammable – see product label for flammability classification) S22 Do not breathe dusts. S24 Avoid contact with skin. S36/37 Wear suitable protective clothing and gloves. S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible) S51 Use only in well-ventilated areas S61 Avoid release to the environment (only for grades containing greater than 25% cobalt). Refer to Sections 6 and 13. S63 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label
EU Water Pollution Directive – List II:		Cobalt

Compliance with federal, provincial/state, and local environmental regulations is the responsibility of the owner.

16. OTHER INFORMATION

R- and S-Phrases:	R-42/43 – May cause sensitisation by inhalation and skin contact. R53 – May cause long-term adverse effects in the aquatic environment. S22 – Do not breathe dust. S24 – Avoid contact with skin. S37 – Wear suitable gloves. S61 – Avoid release to the environment. Refer to special instructions/safety data sheets.
PRECAUTIONARY STATEMENTS:	<u>Prevention</u> P201: Obtain special instructions before use. P202: Do not handle until all safety precautions have been read and understood. P210 (if flammable): Keep away from sparks and open flames. – No smoking. P240 (if flammable): Ground/bond container and receiving equipment. P241 (if flammable): Use explosion-proof equipment if dust clouds can occur. P260: Do not breathe dust. P261: Avoid breathing dust. P264: Wash thoroughly after handling. P270: Do not eat, drink, or smoke when using this product. P272: Contaminated work clothing should not be allowed out of the workplace. P273: Avoid release to the environment. P280: Wear impervious protective gloves. P281: Use personal protective equipment as required. P285: In case of inadequate ventilation wear respiratory protection. <u>Response</u> P314: Get medical attention if you feel unwell. P321: Specific treatment (see Section 4 on this MSDS). P363: Wash contaminated clothing before reuse. P302+P352: IF ON SKIN: Wash with plenty of soap and water. P304+P341: IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. P308+P313: If exposed or concerned: Get medical attention. P333+P313: If skin irritation or rash occurs: Get medical attention.

16. OTHER INFORMATION (CONT'D)

PRECAUTIONARY STATEMENTS (CONT'D):	P342+P311: If experiencing respiratory symptoms: Call a POISON CENTER or physician. P370+P378 (if flammable): In case of fire, use dry sand, dry dolomite, sodium chloride, soda ash, or media appropriate to fight surrounding fire. Storage P405: Store locked up. Disposal P501: Dispose of all waste product and containers in accordance with local, state/provincial, federal, and national regulations if material cannot be sent to a reclamation facility.
REVISIONS:	Revised MSDS on July 29, 2009 to conform to ANSI Standard Z400.1-2004; EEC Commission Directive 2001/58/EC; and the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), second revised edition, 2007.
PREPARED BY:	Kennametal Inc.
NOTICE:	This information is intended for industrial use only by our customers. Any use by third parties is at their own risk. This MSDS meets the regulatory requirements and standards for ANSI Standard Z400.1-2004; EEC Commission Directive 2001/58/EC; and the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), second revised edition, 2007. It may not meet the requirements in all other locations. Although Kennametal Inc. has attempted to provide current and accurate information herein, Kennametal Inc. makes no representations regarding the accuracy or completeness of the information and assumes no liability for any loss, damage, injury of any kind which may result from or arise out of the use of or reliance on the information by any person.

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