

Section 1: Identification

Product Name:	Diamond Carbide D, V, VC, VSP, 100		
Issue Date:	July 1, 2001		
Revision Date:	April 28, 2015 (supersedes all previous issues)		
Synonyms:	Diamond Carbide 40, 45, 50, 55, 60 w/Sintered Tungsten Carbide		
CAS Number(s):	See section 3		
Product Usage:	Hardfacing Powders and Rods		
Manufacturer:	Rankin Industries / PMA Division 400 S. Rockefeller Ave. Ontario, CA 91761	Phone: Fax: E-Mail: Web Site:	909-483-3222 909-483-3233 sales@rankin.com www.broco-rankin.com
Transportation Emergency Number:	Emergency Response & Training Solutions 1-800-924-6804 1-440-349-2700 CIN #: 3730		

Section 2: Hazard(s) Identification

The term "hazardous" should be interpreted as a term required and defined in the OSHA Hazard Communications Standard (29 CFR Part 1910.1200) and does not necessarily imply the existence of any hazard. These products as shipped are stable, nonhazardous, nonflammable, nonexplosive and nonreactive.

Hazardous Decomposition Products

Exposure limit: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and electrodes used. Other conditions that also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating, or galvanizing), the number of welders and the volume of work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities.)

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Fume and gas decomposition products and not the ingredients in the electrode, are important. The concentration of a given fume or gas component may decrease or increase by many times the original concentration in the powder. Also, new compounds not in the electrode may form. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the material shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of these products would include complex oxides of iron, manganese and silicon; secondarily complex oxides of chromium, nickel, molybdenum, titanium, calcium, sodium and potassium.

The present OSHA PEL for hexavalent chromium (CR+6) is 0.05 mg/m³ that will result in a significant reduction from the 5mg/m³ general welding fume (NOC) level. The limit of 0.05 mg/m³ for hexavalent chromium in these electrodes comes from the limit shown in OSHA table Z-2, which is for 0.1 mg of CrO₃ + which calculates to 0.05 mg of Cr+6/m³.

OSH PEL for nickel metal and soluble compounds is 1 mg/m³. The ACGIH TLV for nickel metal is 1 mg/m³ and TLV for soluble compounds is 0.1 mg/m³. These limitations will also result in a significant reduction from the 5 mg/m³ general welding fume (NOC) level.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet if worn or in the worker's breathing zone. See ANI/AWS Fl.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes" available from the American Welding Society, P.O. Box 351040, Miami, FL 33135.

WARNING: This product may contain or may produce a chemical known to the State of California to cause cancer. (California Health & Safety Code 25249.5 et seq.)

Section 3: Composition / Information on Ingredients

Components of mixture*	CAS Number	Weight percentage**
Nickel	7440-02-0	Balance
Chromium	7440-47-3	6 – 16
Boron	7440-42-8	1 – 4
Iron	7439-89-6	2 – 5
Silicon	7440-21-3	1 – 5
Tungsten Carbide	12070-12-1	20 – 97.7
Cobalt	7440-48-4	1 – 4
Tantalum Carbide	12070-06-3	0.1 – 12
Titanium Carbide	12070-08-5	0.1 – 10.5
Niobium Carbide	12069-94-2	0.1 – 5

*This material is a homogenous metallic alloy of the components listed above.

**This is a general reporting range and is not a product specification.

Exposure limits: See Section 8.

Section 4: First Aid Measures

Exposure Route	Acute	Chronic (delayed)
Eye contact	Eye irritation. Flush with water for 15 minutes or until all particles are removed.	If irritation persists, seek medical attention.
Skin contact	Itching, irritation or rash. Remove contaminated clothing. Wash skin with mild soap and water.	If irritation or rash persists, seek medical attention.
Inhalation	Difficulty breathing, coughing, metal fume fever. Remove exposed person to fresh air. If not breathing administer CPR.	If symptoms persist seek medical attention.
Ingestion	Rinse mouth. If large amount, induce vomiting. Seek medical advice.	Seek medical attention.

Never give anything by mouth to an unconscious person. Treat symptomatically and supportively.

Section 5: Firefighting Measures

Suitable Extinguishing Media: Material is not readily combustible. Do not use water on metal fires, use dry chemical, dry sand or carbon dioxide to smother fire.

Specific Hazards during a Fire: Material may break down in fire and may produce toxic decomposition products associated with ingredients. Extreme oxidizing conditions may cause formation of metal oxides. These oxides may be carcinogens.

Protective Equipment: SCBA and full protective gear is recommended for firefighting.

Section 6: Accidental Release Measures

Metal scrap should be picked up using normal procedures, avoiding contact with sharp edges. Metal particulates, shavings, powders and granules should be cleaned up. Use a wet, sweeping action, taking care to avoid creating dust. Vacuum only with HEPA filtered equipment. Do not use compressed air for clean-up. Some fine metal powders may ignite or explode under specific conditions. Trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel. For exposure to particulate levels above regulated levels, use rubber or nitrile gloves, chemically resistant suit and boots, and air purifying respirator with a HEPA filter. Sweep-up the spilled solid and place all spill residues in a double plastic bag and seal.

Section 7: Handling and Storage

- General and/or point ventilation system with dust collection is recommended to ensure exposure to airborne dust is maintained below allowable exposure limits.
- Wear PPE such as work gloves (or vinyl/latex gloves), safety glasses/goggles. Respiratory protection is recommended, but is required only when exposure limits have been exceeded.
- Wash hands after use before eating or smoking.
- Do not eat or smoke in area where material is being used.
- Store in tightly closed container. For best results, keep product above the ambient dew point temperature.
- Not a shelf life limited material.

Section 8: Exposure Controls / Personal Protection

Exposure Limits:

Components of mixture	CAS Number	OSHA PEL	ACGIH TLV
Nickel	7440-02-0	1.0 mg/m ³	1.5 mg/m ³
Chromium	7440-47-3	1.0 mg/m ³	0.5 mg/m ³
Boron	7440-42-8	15 mg/m ³ (5 mg/m ³ respirable)	10 mg/m ³ as boron oxide
Iron	7439-89-6	10 mg/m ³ as oxide fume	5 mg/m ³ as respirable oxide
Silicon	7440-21-3	15 mg/m ³ (5 mg/m ³ respirable)	10 mg/m ³
Tungsten Carbide	12070-12-1	15 mg/m ³	10 mg/m ³
Cobalt	7440-48-4	0.1 mg/m ³	0.2 mg/m ³
Tantalum Carbide	12070-06-3	5 mg/m ³	5 mg/m ³
Titanium Carbide	12070-08-5	5 mg/m ³	None
Niobium Carbide	12069-94-2	5 mg/m ³	5 mg/m ³

Engineering Controls:

- Local exhaust ventilation may be necessary to control air contaminants to their exposure limits.
- Provide mechanical ventilation for confined spaces or if method of use warrants.

Personal Protective Equipment:

- Gloves – work gloves or non-permeable gloves such as vinyl or latex.
- Eyes – safety glasses/goggles or face shield.
- Clothing – Cover-all, lab coat or normal work clothing.
- Respirator – NIOSH N-95 or N-100 filtering face-piece (dusk mask) or equivalent alternative is recommended for up to 10 times the exposure limits.

Section 9: Physical and Chemical Properties

Physical State	Silver / Grey metallic powder or bare rod
Odor	Odorless
Odor Threshold	Not applicable
PH	Not applicable
Melting Point / Freezing Point	1900°F - 2000°F
Boiling Point	Not determined
Flash Point	Not determined
Evaporation Rate (butyl acetate = 1)	None
Flammability	Non-flammable
LFL (LEL) lower flammability (explosive) limit	Not applicable
UFL (UEL) upper flammability (explosive) limit	Not applicable
Vapor Pressure	Not applicable
Vapor Density	Not applicable
Specific Gravity (Bulk Density)	Not available
Solubility	Not soluble
Partition Coefficient (n-octanol/water)	Not determined
Autoignition Temperature	Not available
Decomposition Temperature	Not available
% VOC's	0%

Section 10: Stability and Reactivity

- **Chemical Stability:** This material is stable.
- **Possibility of Hazardous Reactions:** Hazardous polymerization will not occur.
- **Conditions to Avoid:** None
- **Incompatible Materials:** Strong acids and/or oxidizers.
- **Hazardous Decomposition Products:** Intense heat may produce carbon monoxide and/or carbon dioxide and oxidizing conditions may produce oxides of the ingredients shown in Section 3. Oxides of these ingredients may be carcinogenic.

Section 11: Toxicological Information

Electric arc welding or oxy fuel welding may create one or more of the following health hazards:

FUMES AND GASES: can be dangerous to your health. COMMON ENTRY IS BY INHALATION.

SHORT TERM (ACUTE): over exposure to welding fumes may result in discomforts such as: dizziness, nausea, dryness or irritation of nose, throat, or eyes.

Chromates present in the fume can cause irritation of the respiratory system, damage to lungs and asthma-like symptoms.

Nickel compounds in the fume can cause metallic taste, nausea, tightness in the chest, fever and allergic reactions.

Fluorides can cause pulmonary edema bronchitis.

LONG TERM (CHRONIC): over exposure to welding fumes can lead to siderosis (iron deposits in the lung) and affect pulmonary function.

Long term over exposure to manganese compounds may affect the central nervous system. Symptoms include muscular weakness and tremors similar to Parkinson's disease. Behavioral changes and changes in handwriting may also appear. Employees exposed to manganese compounds should get quarterly medical examinations for early detection of manganism.

Studies have shown that production workers exposed to hexavalent chromium compounds have an increased incidence of lung cancers. Chromates may cause an ulceration and perforation of the nasal septum. Liver damage and allergic skin rash have been reported. Chromium VI compounds are required by OSHA to be considered carcinogenic.

Long term over exposure to nickel compounds may cause lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers. Nickel and its compounds are considered as carcinogenic as required by OSHA.

Repeated over exposure to fluoride fumes may cause serious bone erosion and excessive calcification of the bones and ligaments of the ribs, pelvis and spinal column. Fluorides may also cause skin rash.

Shielding gases such as argon, helium and carbon dioxide are asphyxiates and adequate ventilation must be provided.

THRESHOLD LIMIT VALUE – The ACGIH 1985-86 recommended limit for welding fumes not otherwise classified (NOC) is 5 mg/m³. TLV-TWA's should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents that may modify this TLV-TWA.

ARC RAYS - can injure eyes and burn skin.

HEAT RAYS – (infrared radiation from flame or hot metal) can injure eyes.

ELECTRICAL SHOCK – can kill.

NOISE – can damage hearing.

CARCINOGENICITY – Chromium and nickel and their compounds are on the IARC (International Agency for Research on Cancer) list and the NTP (National Toxicology Program) list as posing a carcinogenic risk to humans.

***This product contains a chemical known to the State of California to cause cancer.**

Section 12: Ecological Information

- **Aquatic Toxicity:** Acute – None, Chronic – GHS Category 4

Section 13: Disposal Consideration

- Material should be recycled to reclaim scrap metal value.
- If recycling is not possible, dispose of in accordance with local, state, and federal regulations for industrial wastes of this form.

Section 14: Transport Information

DOT Classification	Not regulated unless greater than 100 lbs. per inner container.
UN Identification Number	Not regulated unless greater than 100 lbs. per inner container.
DOT Shipping Description	Not applicable unless greater than 100 lbs. per inner container.

Section 15: Regulatory Information

Toxic Substances Control Act (TSCA)	All ingredients are listed on the TSCA inventory of chemical substances.
Superfund Amendments & Reauthorization Act (SARA)	This product contains Nickel and Chromium.
Resource Conservation & Recovery Act (RCRA)	This material is not a hazardous waste. It is Recyclable.
RoHS & REACH	None

Hazard Codifications & Labeling Requirements

- H317 – May cause an allergic skin reaction (nickel).
- H351 – Suspected of causing cancer (nickel, chromium).
- H370 – Target organ (acute), respiratory apparatus, kidney.
- H372 – Target organ (chronic), respiratory apparatus.

Section 16: Other Information

NFPA Numbers (estimated)	Health: 1	Flammability: 1	Reactivity: 0
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WHMIS Category: Class D, Division 2: Nickel and Chromium



The information supplied herein follows the guidelines of WHMIS, GHS, OSHA Hazard Communication Standard 29 CFR 1910.1200 and California Proposition 65, to the best of our knowledge, is accurate and complete. The recommended hygiene and handling practices are believed to be appropriate for the use of this material. However, it is up to the end user to review this information and establish their own procedures and guidelines, based upon their particular application(s). Rankin Industries assumes no responsibility for damage or injury resulting from the end use of this product.