

**Material Safety
Data Sheet**

**Products: Metal Bonded Diamond
Segments & Tools**

I General Information	
<p>Terra Diamond Industrial 1910 South Fremont Drive Salt Lake City, Utah 84104</p>	<p>Manufacturer: TDI, Terra Diamond Industrial Phone: (801) 977-0054 Date of Preparation/Revision: February 2003 Trade Name & Synonyms: Metal Bonded Diamond Segments & Diamond Tools - All Specifications</p>

II Hazardous Ingredients				
Metal Bonds may contain one or more of the following principal Hazardous Components per 29 CFR 1910/1200 (G) (4)	CAS Number	OSHA PEL mg/m 3	ACGIH TLV mg/m 3	Carcinogen (Y/N)
Boron	7440-42-8	NAIF	NAIF	N
Carbon	7440-44-0	NAIF	NAIF	N
Chromium	7440-47-3	1.0	0.5	Y
Chromium Boride	12007-16-8	NAIF	NAIF	Y
Cobalt	7440-48-4	0.1	0.05	N
Copper	7440-50-8	1.0	1.0	N
Iron	7439-89-6	NAIF	NAIF	N
Manganese	7439-96-5	5.0	5.0	N
Molybdenum	7439-98-7	15.0	10.0	N
Nickel	7440-02-0	1.0	1.0	Y
Niobium Carbide	12069-94-2	NAIF	NAIF	N
Phosphorus	7723-14-0	0.1	0.1	N
Silicon	7440-21-3	15.0	10.0	N
Tantalum Carbide	12070-06-3	NAIF	NAIF	N
Tin	7440-31-5	2.0	2.0	N
Titanium Carbide	12070-08-5	NAIF	NAIF	N
Titanium Hydride	7704-98-5	NAIF	NAIF	N
Tungsten	7440-33-7	NAIF	5.0	N
Tungsten Carbide	12070-12-1	NAIF	NAIF	N
Zinc	7440-66-6	NAIF	NAIF	N
Particulate not otherwise classified	NAIF	15.0	10.0	N

III Physical Data			
Boiling Point (F)	N/A	Specific Gravity	2-18
Vapor Pressure (mmHg)	N/A	Percent Volatile by volume (%)	N/A
Vapor Density (Air=1)	N/A	Evaporation Rte (Water = 1)	N/A
Solubility in Water	N/A	PH	N/A
Appearance & Odor	METALLIC, NO ODOR	Melting Point	630 C - 1200 C

IV Fire & Explosion Hazard Data			
Flash Point (F)	N/A	Auto ignition Temperature	
Flammable Limits	N/A	LEL	N/A
Extinguishing Media	N/A	UEL	N/A
Special Fire Fighting Procedures: N/A			
Unusual Fire & Explosion Hazards: N/A			

V Route of Entry / Health Effects / First Aid	
INHALATION	Sawing, Drilling or grinding operations may produce fine particulate or dust. Heating, melting, welding, cutting or brazing may produce metal fumes and particles. Inhalation of dust or fumes from this product is hazardous to health.
Boron	Nuisance particulate: no known health effects
Chromium, Chromium Boride	Chromium dust can cause irritation of the nose, throat and mucous membranes as well as soreness of the nose and throat. May aggravate pre-existing lung disorders. The IARC has determined that chromium and certain chromium compounds are casually associated with cancer in humans but the compounds responsible for the carcinogenic effects in humans cannot be specified. Thus chromium in all forms must be identified as carcinogen under OSHA (29 CFR 1910.1200). The ACGIH has concluded that only specific water insoluble hexavalent chromium compounds are carcinogenic to man. There are reports of a nodular type of pulmonary disease with impairment of lung function. Chromates may cause an ulceration and perforation of the nasal septum. Liver damage and allergic skin rash have been reported.
Cobalt	20mg (Co) / m3 is immediately dangerous to life and health. Inhalation in the form of metallurgical powder or dust or mist from grinding may cause irritation of the nose and throat. Acute overexposure may cause shortness of breath, asthma, dyspnea on exertion, wheezing, interstitial pneumonitis, and / or lung densities. Chronic overexposure may cause pneumoconiosis, sensitization of the respiratory tract, obstructed airways syndrome, interstitial lung disease, and density of the lung with symptoms as described in acute overexposure. Cobalt has not been classified as a known or suspected carcinogen by NTP or OSHA. Cobalt and compounds were classified as group 2B (possibly carcinogenic to humans) by LARC. Cobalt has been listed as a suspected carcinogen on the NIOSH toxic substance list.
Copper	Acute overexposure can produce an acute reaction known as "metal fume fever". Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms) which come on in a few hours after large exposure. Chronic overexposure to copper may result in anemia, kidney and liver damage.
Iron	Acute overexposure may cause mucous membrane irritation. Chronic overexposure may cause respiratory irritation, siderfibrrosis, bronchitis, benign, pneumoconiosis and siderosis.

Manganese	Manganese affects the central nervous system. Inhalation of high concentrations of manganese cause an influenza like illness (metal fume fever). Symptoms are usually insidious and may include headache, restless sleep, change in personality, lack of coordination of voluntary muscles, irritability and pathologic laughter. Secondary symptoms include visual hallucinations, double vision, impaired hearing, uncontrollable impulses, mental confusion and euphoria.
Molybdenum	References available at this time do not report ill health effects as a result of acute or chronic overexposure to molybdenum metal. Chronic respiratory disease may be aggravated by exposure to dust or fumes.
Nickel	Acute overexposure may cause respiratory irritation, cough, pneumonitis, and fever. Pulmonary edema may be a delayed symptom. Pulmonary sensitization reaction or anaphylaxis may occur in previously exposed individuals. Chronic overexposure may cause mucous membrane irritation and pulmonary sensitization. The NTP has listed nickel as a possible cancer hazard. The LARC concluded there was sufficient evidence that nickel and certain nickel compounds were carcinogenic to humans. The IARC could not state with certainty which forms of nickel are human carcinogens but said "metallic nickel seems less likely to be so than nickel subsulfide or nickel oxides". The inhalation of nickel powder has not resulted in an increased incidence of malignant tumors in rodents. Studies of workers exposed to nickel powder and to dust and fume generated in the production of nickel alloys and of stainless steel have not indicated a respiratory cancer hazard. Inhalation may cause irritation to upper respiratory tract. Respiratory irritation and pneumonitis; several nickel compounds including nickel oxide are suspected lung and nasal carcinogens.
Tin	Acute overexposure may cause irritation of the eyes, nose, throat and skin. May cause irritation of the respiratory tract. Chronic overexposure to tin dust or fume can cause a condition of lungs known as stannosis resulting in benign lung tumors.
Titanium Carbide	Acute overexposure may be considered a nuisance dust and may result in simple dust accumulation in the lungs. Chronic overexposure may cause fibrosis of pneumoconiosis.
Titanium Hydride	Acute overexposure: Irritation of respiratory system.
Tungsten	Irritant. Acute overexposure may cause irritating cough. Overexposure may cause pulmonary fibrosis.
Tungsten Carbide	Acute overexposure may cause coughing, dyspnea, soreness in the chest, weight loss, hemoptysis, bronchitis and asthma. May also cause pulmonary fibrosis. Radiological changes may be noticed in lungs. Chronic overexposure may cause "hard metal lung" with symptoms as described in acute overexposure. Previously exposed individuals may be at an increased risk.
Zinc	Acute overexposure to high levels of zinc vapor (zinc oxide fumes) may result in tightness of the chest, metallic taste, cough, dizziness, fever, chills, headache, nausea, and dry throat. Overexposure may produce symptoms known as metal fume fever or "zinc shakes"; and acute, self-limiting condition without recognized complications. Symptoms of metal fume fever include: chills, fever, muscular pain, nausea and vomiting. Chronic overexposure to zinc may cause respiratory tract irritation with nasopharyngitis and laryngitis.
Particulate not otherwise classified	Acute and Chronic inhalation of nuisance dusts may lead to chronic bronchitis, emphysema and bronchial asthma.

INGESTION	Sawing Drilling Grinding & Brazing - No known cases of blades, corebits, grinding heads or segments being ingested. Ingestion NOT RECOMMENDED. If ingested seek medical attention
SKIN	Dust generated during sawing, drilling & grinding may cause skin irritation.
Chromium, Chromium Boride	Repeated or prolonged contact with certain chromium compounds can cause eczematous dermatitis.
Cobalt	Acute overexposure may cause sensitization dermatitis in persons who are previously exposed. A rash may develop. Usually in the flexor area or the elbows, neck and face. Chronic overexposure may cause contact dermatitis. Sensitization dermatitis may follow inhalation or prolonged contact.
Iron	None reported in humans.
Nickel	Acute overexposure may cause swelling and irritation. Skin sensitization may occur in previously exposed individuals. Chronic exposure may cause sensitization dermatitis. Repeated contact is not likely to cause absorption with skin in toxic quantities.
Titanium Hydride Tin	None reported in humans
Niobium Carbide, Tantalum Carbide, Titanium Carbide	None reported in humans
Tungsten	Irritant: Acute overexposure may cause irritation and redness. Chronic overexposure may cause dermatitis.
Niobium Carbide	Acute overexposure may cause respiratory irritation.
Phosphorous	Inhalation of phosphorus vapors may cause respiratory tract irritation. Chronic exposure to phosphorus may cause gastrointestinal distress, anemia, and garlic breath. A classical effect of chronic phosphorus is necrosis of the jaw. Inhalation of dust may be irritant to pre-existing respiratory conditions.
Silicon	May produce X-ray changes in the lungs without disability
Tantalum Carbide	None reported in humans
Tungsten Carbide	Acute overexposure may cause irritation with dermatitis, eczema, and itching. May also cause sensitization dermatitis if previously exposed. Chronic overexposure may cause contact dermatitis.
EYES	DUST MAY CAUSE EYE IRRITATION
Chromium, Chromium boride, Tin Titanium Hydride	May cause irritation.
Cobalt Iron Nickel	Acute overexposure may cause irritation with redness, pain and itching. Chronic overexposure may cause conjunctivitis.

Niobium Carbide Tantalum Carbide Titanium Carbide Tungsten Carbide	
Tungsten	Acute overexposure may cause irritation, redness and conjunctivitis. Chronic overexposure may cause conjunctivitis.
FIRST AID	
INHALATION	If symptoms of pulmonary involvement develop (coughing, wheezing, shortness of breath), remove from exposure area to fresh air immediately. If breathing has stopped perform artificial respiration. Keep affected person warm and at rest. Get medical attention immediately.
INGESTION	If dust has been swallowed and person is conscious immediately give person large amounts of water. After water has been swallowed, induce vomiting. Do not attempt to make an unconscious person drink or vomit. Get medical attention immediately.
SKIN	If irritation or rash occurs, remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of material remains (approximately 15 - 20 minutes). Get medical attention.
EYES	If irritation occurs, wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of material remains (approximately 15-20 minutes). Get medical attention immediately.

VI Environmental Protection Procedures	
Some of the materials may be subject to the reporting requirements of Section 313 of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372	
SPILL RESPONSE : N/A	
WATER DISPOSAL METHOD: Disposal should be made in compliance with federal, state, and local environmental regulations.	

VII Special Precautions	
Eye Protection	Safety glasses with side shields or goggles are recommended to prevent possible incursion by airborne dust.
Respiratory Protection (Safety Type)	NIOSH approved respirators for dust, mists and fumes if airborne levels exceed occupational exposure limits.
Skin Protection	Protective gloves recommended. Wear appropriate protective clothing and equipment.
Ventilation Recommended	Local exhaust when cutting, grinding, brazing or welding to assure health exposure limits are not exceeded. Periodic air quality testing is needed to ensure adherence to acceptable limits.

VIII Special Precautions

HYGIENIC PRACTICES IN HANDLING & STORAGE : NAIF

PRECAUTIONS FOR REPAIR & MAINTENANCE OF CONTAMINATED EQUIPMENT: NAIF

OTHER PRECAUTION: NAIF

THIS MSDS WAS DEVELOPED FROM INFORMATION ON THE CONSTITUENT SUBSTANCES OF THESE PRODUCTS FROM TEST DATA ON THE PRODUCTS THEMSELVES.

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GLOSSARY OF TERMS

ACGISH	American Conference on Governmental Industrial Hygienists
ANSI	American National Standard Institute
IARC	International Agency for Research on Cancer
N/A	Not Applicable
NAIF	No Applicable Information Found
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
PEL	Permissible Exposure Limit
TLV	Threshold Limit Values