

MATERIAL SAFETY DATA SHEET

1 – COMPANY AND PRODUCT IDENTIFICATION

Product Class: Nickel-Base Alloy
Manufacturer:
 Titanium Industries
 18 Green Pond Road
 Rockaway, NJ 07866

Description: Solid product, various forms and use
Info. Phone: 973-983-1185
Date of Approval: 01/05/2010

2 – COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Number	EC Number	Weight % (est)	OSHA Peel	ACGIH TLV
Nickel	7440-02-0	231-111-4	35 – 80	1 mg/m ³ , metal and insoluble compounds	1.5 mg/m ³ , metal 0.1 mg/m ³ , soluble compounds. 0.2 mg/m ³ , insoluble compounds
Chromium	7440-47-3	231-157-5	5 – 25	1 mg/m ³ , metal and insoluble salts. 0.5 mg/m ³ , Cr (+3) compounds. AL-2.5 ug/m ³ /PEL-5.0 ug/m ³ (as Cr +6) *	0.5mg/m ³ , metal and Cr (+3) compounds. 0.05mg/m ³ , Cr (+6) water soluble compounds. 0.01mg/m ³ , Cr (+6) insoluble compounds
Iron	7439-89-6	215-168-2	<42	10 mg/m ³ , Iron Oxide, fume	5mg/m ³ , Iron Oxide dust and fume
Copper	7440-50-8	231-157-6	<35	0.1mg/m ³ , fume (as Cu). 1mg/m ³ , dust and mist as (Cu).	0.2mg/m ³ , fume as (Cu) 1mg/m ³ , dusts and mists (as Cu)
Cobalt	7440-48-4	231-158-0	<30	0.1mg/m ³ , metal, dust and fume as (Cu)	0.02mg/m ³ , elemental and inorganic compounds (as Co)
Molybdenum	7439-98-7	231-107-2	<17	5mg/m ³ , soluble Mo compounds (as Mo). 15mg/m ³ , insoluble Mo compounds, total dust (as Mo)	0.5mg/m ³ , respirable soluble Mo compounds (as Mo) 10mg/m ³ , insoluble Mo compounds (as Mo)
Niobium	7440-03-1	231-113-5	<6	N/A	N/A
Aluminum	7429-90-5	231-072-3	<5	15mg/m ³ , metal, total dust (as A1). 5mg/m ³ , metal, respirable fraction (as A1)	1mg/m ³ , respirable dust, insoluble compounds
Manganese	7439-96-5	231-105-1	<5	5mg/m ³ Ceiling, Mn compounds and Mn fume (as Mn)	0.2mg/m ³ , elemental and inorganic compounds (as Mn)
Tantalum	7440-25-7	231-135-5	<5	5mg/m ³ , metal and oxide dust as (Ta)	5mg/m ³ , metal and oxide dust (as Ta)
Titanium	7440-32-6	236-675-5	<5	15mg/m ³ , Titanium Dioxide, total dust	10mg/m ³ , Titanium Dioxide, total dust
Tungsten	7440-33-7	231-143-9	<5	15mg/m ³ , total dust (PNOR). 5mg/m ³ , respirable fraction (PNOR) (not regulated)	5mg/m ³ , metal & insoluble W compounds (as W). 1mg/m ³ , soluble W compounds (as W)
Carbon	7440-44-0	231-153-3	0-Trace	N/A	N/A
Silicon	7440-21-3	231-130-8	<1	15mg/m ³ , total dust. 5mg/m ³ , respirable fraction	N/A
Tin	7440-31-5	231-141-8	0-Trace	2mg/m ³ , metal	2mg/m ³ , metal
Vanadium	7440-62-2	231-171-1	0-Trace	0.5mg/m ³ Ceiling, Vanadium Pentoxide, respirable dust. 0.1mg/m ³ Ceiling, Vanadium Pentoxide, respirable fume	0.05mg/m ³ , Vanadium Pentoxide, respirable dust and fume
Boron	1303-86-2	231-151-2	0-Trace	N/A	N/A



Zirconium	7440-67-7	231-176-9	0-Trace	5mg/m ³ , compounds as Zr. 10mg/m ³ STEL	5mg/m ³ , compounds as Zr
Lanthanum	7439-91-0	231-099-9	<1	15mg/m ³	5mg/m ³

NOTE: 1) All exposure limits are 8-hour TWAs unless otherwise specified. 2) As defined by OSHA, STEL (Short Term Exposure Limit) is an employee's fifteen-minute, time-weighted average exposure, which must not be exceeded during a workday. 3) All commercial metals may contain small amounts of various elements in addition to those specified. These small quantities (less than 0.1%) frequently referred to as "trace" or "residual" elements, generally originate in the raw material used.

3 – HAZARDS IDENTIFICATION

GENERAL HAZARD STATEMENT: Solid metallic products distributed by Ti Industries are generally classified as "articles" and do not constitute a hazardous material in solid form under the terms of the OSHA Hazard communication Standard. Any articles manufactured from these solid products would be generally classified as non-hazardous. However, some metallic elements contained in these products have been determined to be toxic and are subject to regulatory controls. These elements can be emitted as airborne contaminants under certain processing conditions such as burning, melting, cutting, sawing, brazing, grinding, milling, machining.

Certain materials and equipment utilized in additional processing of products (cutting/machining fluids, coatings, processing lubricants, cleaning/pickling chemicals, welding fluxes, torch and plasma cutting systems) may constitute a health hazard and should be treated accordingly.

When product is subjected to welding, burning, melting, sawing, brazing, grinding, or other similar processes, potentially hazardous airborne particulate and fumes may be generated. These operations should be performed in well-ventilated areas, and if appropriate, respiratory protection and other PPE should be utilized.

Primary Route of Entry: Inhalation of dust or fume during welding, burning, melting, cutting, brazing, grinding, machining and other operations.

NOTE: The composition of fumes from welding are depended not only on the metal being welded, but also on the welding process and electrodes used. A full health assessment should be performed by a competent health and safety professional for all welding and other operations performed on this product.

Acute Effects of Overexposure:

INHALATION:

- Exposures to high concentrations of metallic fumes or dusts may result in irritation of the respiratory tract and/or sensitization of the lungs and other mucous membranes.
- Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever" (symptoms shown below under SIGNS AND SYMPTOMS OF OVEREXPOSURE).

EYE

- Exposure to high concentrations of fumes or dusts may cause irritation and/or sensitization.

SKIN

- Exposure to dust may cause irritation or sensitization, possibly leading to dermatitis.

INGESTION

- Ingestion of harmful amounts of product as distributed is unlikely due to its solid, insoluble form. Ingestion of dust may cause nausea and/or vomiting. Serious effects may occur if large amounts of dust are swallowed.



Chronic Effects of Overexposure:

EXCESSIVE AND REPEATED EXPOSURES TO FUME OR DUST GENERATED DURING PROCESSING MAY CAUSE:

- Allergic sensitization – dermatitis and asthma
- Lung inflammation and damage
- Nasal perforation and nasal cavity damage
- Eye inflammation
- Central nervous system damage
- Kidney damage
- Liver damage
- Gout – inflammation of the joints (associated with some metals)

CARCINOGENICITY:

- The carcinogenicity of this solid product as a whole has not been tested.
- Individual components and some compounds of these elemental metals have been associated with carcinogenicity by NTP and IARC.

SIGNS AND SYMPTOMS OF OVEREXPOSURE:

- Redness, swelling, itching, and/or irritation of skin and eyes
- Respiratory difficulties – coughing, wheezing, shortness of breath, dyspnea, decreased pulmonary function.
- Metal fume fever – symptoms consist of chills and fever (very similar and easily confused with flu symptoms), a metallic taste in the mouth, dryness, and irritation of the throat. The symptoms occur 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 in the literature.
- Central nervous system effects may show sleepiness, weakness, emotional disturbances, spastic gait, paralysis.
- Kidney damage may be seen as changes in urine output and appearance, lower back pain, and edema (swelling from fluid retention).
- Liver damage may be seen by loss of appetite, jaundice (yellowish skin color) and occasional pain in the upper abdomen on the left side.

4 – FIRST AID MEASURES

INHALATION: If overexposure occurs, immediately remove victim from the adverse environment to fresh air and seek medical attention. If breathing has stopped, certified individuals should perform CPR.

EYE: Immediately flush with large amounts of running water for several minutes. Seek prompt medical attention. If breathing has stopped, certified individuals should perform CPR.

SKIN: If dust gets on skin, wash contaminated area with soap and water. Remove and wash contaminated clothing. If a persistent rash or irritation occurs, seek medical attention.

INGESTION: Get medical attention immediately.

5 – FIRE FIGHTING MEASURES

Flash Point: N/A

Auto ignition Temperature: N/A

Flammability Classification: N/A

Flammable Limits N/A

General Fire Hazard: None for solid product



EXTINGUISHING METHOD: For solid formed product, as appropriate for surrounding fire. A fire involving finely divided particles should be treated as a Class D combustible metal fire. Fire should be extinguished by a properly trained and experienced firefighter. Proper care should be taken in applying extinguishing agent and in allowing to burn itself out.

FIRE FIGHTING EQUIPMENT: For solid formed product, as appropriate for surrounding fire. Positive pressure SCBA and structural firefighter's protective clothing should be used at a minimum for surrounding fire.

UNUSUAL FIRE OR EXPLOSION HAZARDS: This solid formed product does not constitute a fire or explosion hazard. Finely divided, suspended particulates may present a fire and explosion hazard in the presence of an ignition source. In addition, applied coatings may be combustible. For fires involving coated product, consult the appropriate coating MSDS.

Finely divided product (e.g. dust, shavings, etc.) may be combustible. May be ignited by heat, sparks or flames. May burn rapidly with flare burning effect. Fire may produce irritating or poisonous gases. High concentrations of airborne dust in an enclosed area can explode or burn if exposed to a source of ignition. Care should be taken to avoid the generation of airborne dust. Use of water on finely divided product may cause explosive hydrogen gas and heat to be evolved.

EXPLOSION DATA: N/A for solid product

HAZARDOUS COMBUSTION PRODUCTS: N/A for solid formed product. Toxic metal and metallic oxide fumes may be evolved from fires involving finely divided particles and during torch-cutting operations.

6 – ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED: Minimal problems with spills of this product would occur because of its solid form. The following precautions apply to spills involving finely divided particles:

- Shut off ignition sources; no flares, smoking or flames should be in or near hazard area.
- Do not touch or walk through spilled material. Clean up using methods which avoid dust generation.
- Compressed air should not be used to clean up spills; vacuum methods should be employed when possible.
- During cleanup, skin and eye contact and inhalation of dust should be avoided as much as possible.
- Provide local exhaust or dilution ventilation as required.
- Appropriate PPE should be worn during cleanup if exposure limits are exceeded.
- Collect material in compatible and appropriately labeled containers.
- For small dry spills, place material into clean dry container with a clean shovel, and cover loosely; move container from spill area.
- Comply with federal, state and local regulations regarding reporting of spills and waste disposal.

7 – HANDLING AND STORAGE

HANDLING: Avoid breathing of and contact with fumes and dusts during processing. No specific requirements for solid formed product.



STORAGE: Keep away from incompatible materials (*see Section 10, Stability and Reactivity*). No other specific storage procedures are required for solid formed steel products.

8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Local and/or general exhaust ventilation should be used to keep worker exposure below applicable exposure limits during welding, brazing, grinding, machining, and other processes which may generate airborne contaminants.

RESPIRATORY: When engineering or administrative controls cannot maintain exposures below permissible limits during welding, brazing, machining, and other processes which may generate airborne contaminants or while being instituted, use an appropriate NIOSH/MSHA approved respirator. If respiratory protection is required, all appropriate requirements as set forth in 29 CFR 1910.134 must be met (for Canada consult CSA standard Z94.4-M1982 “Selection, care and Use of Respirators” for assistance) a competent health and safety professional should be consulted for respirator selection, fit testing, and training. Use a NIOSH approved positive pressure, air supplied respirator if exposure levels are unknown, or any other circumstance where an air-purifying respirator would not be adequate.

GLOVES: Suitable for protection against physical injury and skin contact during handling and processing.

EYE: Safety glasses or goggles when there is a reasonable probability of flying particles or high levels of airborne dust or fume.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Adequate footwear (safety shoes if necessary) and clothing that protects skin from prolonged or repeated contact. Change clothing if there is a reasonable probability of contamination.

9 – PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: NIF for nickel and titanium product

Vapor Pressure (mm Hg, @ 68°F): Negligible

Vapor Density (AIR = 1): N/A

Melting Point: 2500-2800°F

Appearance and Odor: Silver-gray metallic solid forms, odorless

Specific Gravity (H₂O =1): 7-9

Evaporation Rate: N/A

Solubility in Water: Insoluble

pH: N/A

10 – STABILITY AND REACTIVITY

STABILITY: Stable under normal conditions of use, storage and transport for solid formed product.

CONDITIONS TO AVOID: Contact with incompatible materials. Avoid creating finely divided, concentrated airborne particulates in the presence of ignition sources.

INCOMPATIBLE MATERIALS: Oxidizers. May react with strong acids to form explosive hydrogen gas and heat.

HAZARDOUS DECOMPOSITION PRODUCTS: Extreme heat from fire or processing (e.g. welding, brazing, machining, etc.) may produce toxic or irritating airborne particulate, including metal and metallic oxide fumes. Reaction of some metals with water, steam, acids, etc can evolve hydrogen, which is a highly dangerous fire and explosion hazard.

HAZARDOUS POLYMERIZATION: Will not occur.

11 – TOXICOLOGICAL INFORMATION

Aluminum: Inhalation of finely divided aluminum and aluminum oxide powder has been reported as a cause of pulmonary fibrosis and lung damage. This effect, known as Shaver's Disease, is complicated by the presence in the inhaled air of silica and oxides of iron. May also be implicated in Alzheimer's disease.

Chromium: The health hazards associated with exposure to chromium are dependent upon its oxidation state or valence. The metal form of chromium as it exists in these products is of low toxicity. Animal toxicology studies to airborne concentrations of 0, 0.6 and 3.1 mg/m³ to chromium metal where 60 to 80% of the airborne particulates were 7µm or less in size, revealed no chromium-related effects in the lungs or alveolar macrophage structure or function. Chromium was observed to be readily phagocytosed by alveolar macrophages.

Carcinogenicity: Chromium metal and trivalent chromium (Cr⁺³) compounds are not classifiable as human carcinogens. However, welding, torch cutting, brazing or perhaps grinding of the chromium metal in stainless steel products may generate airborne concentrations of hexavalent chromium, (Cr⁺⁶), a confirmed human carcinogen. IARC lists hexavalent chromium compounds as Group 1 (sufficient evidence for carcinogenicity in humans). NTP lists certain hexavalent chromium compounds as Group 1 (known to be carcinogenic). The American Conference of Governmental Industrial Hygienists (ACGIH) lists hexavalent chromium compounds as A1 (confirmed human carcinogen).

Cobalt: Cobalt dust may cause an asthma-like disease with symptoms ranging from cough, shortness of breath and hypsnea to decreased pulmonary function, nodular fibrosis, permanent disability, and death. Exposure to cobalt may cause weight loss, dermatitis, and respiratory hypersensitivity.

Carcinogenicity: IARC has listed cobalt and cobalt compounds within group 2B (agents which are possibly carcinogenic to humans). ACGIH has placed cobalt and inorganic compounds in category A3 (experimental animal carcinogen – the agent is carcinogenic in experimental animals at a relatively high dose, by route(s), histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure).

Copper: Industrial exposure to copper fumes, dusts, or mists may result in metal fume fever with atrophic changes in nasal mucous membranes. Chronic copper poisoning results in Wilson's Disease, characterized by a hepatic cirrhosis, brain damage, demyelination, renal disease, and copper deposition in the cornea. Copper fume (respirable) has appeared on the ACGIH Notice of Intended Changes (1996 & 1997). The intended ACGIH TLV for respirable copper fume is 0.05mg/m³.

Iron: Excessive exposure of eyes to airborne iron dust can cause conjunctivitis, choroiditis, and retinitis. Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in development of a benign pneumoconiosis, called siderosis, which is observable via x-ray. No physical impairment of lung function has been associated with siderosis. Inhalation of excessive concentrations of iron oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

Manganese: Chronic manganese poisoning may result from prolonged inhalation of manganese dust and fumes. The central nervous system is the chief site of damage from the disease, which may result in permanent disability. Symptoms include languor, sleepiness, weakness, emotional disturbances, spastic gait, recurring leg cramps, and paralysis. A high incidence of pneumonia and other upper respiratory infections has been found in workers exposed to dust or fume of manganese compounds. Manganese compounds are experimental equivocal tumorigenic agents.



Molybdenum: Based on animal experiments, molybdenum and its compounds are highly toxic. Some evidence of liver dysfunction with hyperbilirubinemia have been reported in workmen chronically exposed in a Soviet Mo-Cu plant. In addition, signs of gout have been found in factory workers and among inhabitants of Mo-rich areas of Armenia. The main features were joint pains in the knees, hands, feet, articular deformities, erythema, and edema of the joint areas.

Nickel: Nickel fumes are respiratory irritants and may cause pneumonitis. Exposure to nickel and its compounds may result in the development of a dermatitis known as “nickel itch” in sensitized individuals. The first symptom is usually itching, which occurs up to 7 days before skin eruption occurs. The primary skin eruption is erythematous, or follicular, which may be followed by skin ulceration. Nickel sensitivity, once acquired, appears to persist indefinitely.

Carcinogenicity: Nickel and certain nickel compounds have been listed by NTP as being reasonably anticipated to be carcinogens. IARC has listed nickel compounds within group 1 (there is sufficient evidence for carcinogenicity in humans) and nickel within group 2B (agents which are possibly carcinogenic to humans). Nickel is not regulated as a carcinogen by OSHA (29 CFR 1910 Subpart Z). Based upon epidemiological data, ACGIH (1998) has designated elemental nickel as category A5, not a suspected human carcinogen.

Tantalum: The passivity of Tantalum metal for biological tissues has been amply demonstrated by its longtime use in surgical procedures both in animals and man. No significant toxic effects have been associated with tantalum.

Tin: Acute and Chronic Effects: No effects expected to skin. Dust may cause mechanical abrasion to eyes. Prolonged inhalation of dust or fume may result in a benign pneumoconiosis, producing distinctive changes in the lungs with no apparent disability or complications. Conditions aggravated/target organs: Persons with pre-existing eye, skin or respiratory conditions may be more susceptible.

Titanium: Elemental titanium and titanium dioxide is of a low order of toxicity. Laboratory animals (rats) exposed to titanium dioxide via inhalation have developed small localized areas of dark-colored dusts deposits in the lungs. Excessive exposure in humans may result in slight changes in the lungs.

Tungsten: Tungsten has been shown to act by antagonizing the action of the essential trace element, Molybdenum. Tungsten metal powder administered to animals has been shown in several studies are not totally inert. One study found that guinea pigs treated orally or intravenously with tungsten suffered from anorexia, colic, in coordination of movement, trembling, dyspnea and weight loss. Long industrial experience has indicated no pneumoconiosis to develop among workers exposed solely to tungsten or its insoluble compounds (at air concentrations of the order of 5mg/m³). In NIOSH's criteria document, two Russian studies were cited which indicated an incidence of 9-11% pulmonary fibrosis among employees exposed to tungsten without cobalt co-exposure.

Vanadium: Chronic exposure to Vanadium Pentoxide dust and fumes may cause severe irritation of the eyes, skin, and upper respiratory tract, emphysema, tracheitis, pulmonary edema, bronchial pneumonia and systemic poisoning. Signs and symptoms of greenish-black tongue and an allergic skin rash. The pentavalent Vanadium compounds, such as Vanadium Pentoxide, and vanadates, are more toxic than other forms. A lethal dose by intravenous administration to the rabbit is about 1.5mg/kg. Rats taking 25 ppm in the diet show early signs of poisoning. Vanadium Pentoxide dust at concentrations of 70mg/m³ is fatal to animals within a few hours. One study of Vanadium Pentoxide to five human volunteers found severe upper respiratory tract irritation in the form of persistent productive cough and increased mucous. Vanadium is an experimental equivocal tumorigenic agent for rats.



Zirconium: Acute and Chronic Effects: Dust may cause mechanical irritation to the skin and eyes. Inhalation of dust may cause irritating to the respiratory tract. Ingestion of this product may cause gastrointestinal tract irritation with nausea, vomiting and diarrhea. Prolonged inhalation or repeated inhalation may cause chronic health effects such as bronchitis or pulmonary fibrosis. The toxicological properties of this substance have not been fully investigated.

12 – ECOLOGICAL INFORMATION

N/A for solid steel product in its as shipped form. Articles produced from solid products are not ecological hazard. NIF on specific product to establish its effect if released into the environment in finely divided form. It is believed that finely divided product, based on its components, will be hazardous to fish, animals, plants and the environment if released, the degree of which would depend on the particle size and quantity released. In addition, if particles are small enough, material may be ingested by wildlife, with possible toxic effects. The solid product is not expected to migrate easily into soil or groundwater based upon its insoluble form, however, finely divided material can become mobile in water and contaminate soil and groundwater. This material may persist in the environment for long periods, based upon its corrosion resistant, insoluble, and non-biodegradable properties. In addition, heavy metals may contaminate the food chain and ultimately be consumed by humans. Some components will react with oxygen to form metallic oxides; the rate of oxidation depends upon prevailing conditions. Iron oxidizes most rapidly in moist air. Metallic particulate discharged to a POTW may pass-through or contaminate sewage sludge, may interfere with the treatment system process, and may be non-compliant with a POTW permit or other regulations.

13 – DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: If product as shipped becomes a solid waste, it would not be classified as a hazardous waste, and should be recycled. Product dusts from processing may be classified as a hazardous waste, depending on various properties of the dust (e.g. toxicity, solubility, flammability), which are defined further within 40 CFR 261 and possibly more restricting state and/or local regulations. Solid waste generated from product processing should be classified by a competent environmental professional and disposed, processed, or recycled in accordance with federal, state and local regulations.

14 – TRANSPORT INFORMATION

Hazardous Materials Description/Proper Shipping Name: N/A for solid formed product.

Hazard Class: N/A for solid formed product.

Identification No.: N/A for solid formed product.

15 – REGULATORY INFORMATION

Canadian Federal Regulations (not all-inclusive)

WHMIS CLASSIFICATION: Controlled Product Hazard Class D2B. This MSDS has been prepared in compliance with the Controlled Products Regulations.

Selected U.S. Federal and State Regulations (not all-inclusive)



SARA TITLE III HAZARD CATEGORIZATION: Product (dust and fume) is categorized as an immediate (acute) health hazard and a delayed (chronic) health hazard as defined by 40 CFR 370.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (EHSs): No components are listed as extremely hazardous substances.

SARA TITLE III SECTION 313 REPORTABLE SUBSTANCES: Nickel, Cobalt and Chromium are subject to reporting requirements (Aluminum (qualified as fume or dust), Manganese and Copper are less than 1% minims level).

CERCLA HAZARDOUS SUBSTANCES: Nickel* (threshold 100lbs), Chromium* (threshold 5000lbs), and Copper* (threshold 5000lbs). *Note: CERCLA reporting only if diameter of particles released is less than 100 micrometers.

PENNSYLVANIA R-T-K LIST: Listed components (greater than 0.1% by weight) – Aluminum (E), Manganese (E), Molybdenum, Nickel (E,S) Silicon, Chromium (E,S), Cobalt (E), Tantalum are listed – environmental hazards, S – special hazardous substance.

NEW JERSEY R-T-K ENVIRONMENTAL HAZARDOUS SUBSTANCE LIST: Listed components – Aluminum (as dust and fume), Chromium, Copper, Cobalt, Manganese and Nickel

CALIFORNIA PROPOSTION 65: Listed possible trace (much less than 0.1% by weight) elements known by the state to cause cancer – Arsenic (inorganic), Cadmium, Lead; Listed possible trace elements known by the state to cause reproductive toxicity – Lead; Listed components known by the state to cause cancer – Nickel, Cobalt (metal powder), Listed components known by the state to cause reproductive effects – None.

16 – OTHER INFORMATION

NFPA RATING (for solid formed product): Health 1 Flammability: 0 Reactivity: 0
HMIS RATING (for solid formed product): Health 1 Flammability: 0 Reactivity: 0

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	NIF	No Information Found
CAS	Chemical Abstracts Services	NIOSH	National Institute of Occupational Safety & Health
CFR	Code of Federal Regulations	NTP	National Toxicology Program
CPR	Cardiopulmonary Resuscitation	OSHA	Occupational Safety & Health Administration
EC	European Commission	PEL	Permissible Exposure Limit
EST	Eastern Standard Time	PNOR	Particulate Not Otherwise Regulated
HMIS	Hazardous Materials Identification System	PNOC	Particulate Not Otherwise Classified
IARC	International Agency for Research on Cancer	POTW	Publicly Owned Treatment Works
Mg/m ³	Milligram per cubic meter of air	PPE	Personal Protective Equipment
Mppcf	Million Particles per cubic foot	ppm	Parts per Million
MSDS	Material Safety Data Sheet	SCBA	Self-Contained Breathing Apparatus
MSHA	Mine Safety and Health Administration	STEL	Short Term Exposure Limit
N/A	Not Applicable	TLV	Threshold Limit Value
NFPA	National Fire Protection Association	TWA	Time Weighted Average

NOTE: The percent composition in Section 2 reflects the range that is possible within this GROUP of products. These are not the technical specifications for a particular product. Also, specific grades may not include all of the hazardous ingredients in Section 2.



DISCLAIMER: All information, recommendations, and suggestions appearing herein concerning the product are based upon data believed to be reliable. It is the user's responsibility to determine the safety, toxicity, and suitability for their own use of the product described herein. Since the actual use by others is beyond our control, no guarantee, expressed or implied is made by Titanium Industries to the effects of such use, the results to be obtained, or the safety and toxicity of the product, nor does Titanium Industries assume any liability arising out of use by others of the product referred to herein. Titanium Industries shall not in any event be liable for special, incidental or consequential damages in connection with this MSDS. This MSDS is not intended as a license to operate under, or recommendation to infringe on, any patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

Prepared By: Titanium Industries, Inc.	Revision Date: 01/05/2010	Approval Date: 01/05/2010
Website: www.titanium.com		