

**Section 1: Identification of the Substance/Mixture and of the Company/Undertaking**

**1.1 Product identifier**

**Product Name** • Titanium Alloy and Castings

**1.2 Relevant identified uses of the substance or mixture and uses advised against**

**Relevant identified use(s)** • Aircraft Engine Blades and Vanes Industrial Gas Turbine Components for power generation

**1.3 Details of the supplier of the safety data sheet**

**Manufacturer** • PCC Structural, Inc.  
4600 SE Harney Drive  
Portland, OR 97206  
United States

**1.4 Emergency telephone number**

**Manufacturer** • 800-424-9300 - CHEMTREC

**Section 2: Hazards Identification**

**EU/EEC**

According to: Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]

According to: EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

**2.1 Classification of the substance or mixture**

**CLP** • Products do not present an inhalation, ingestion or skin contact health hazard under normal handling and use as it is in a metallic form. However, processes such as welding, grinding, burning, melting, or otherwise generating dust, fumes and gases may present a health hazard.

Skin Irritation 2 - H315

Reproductive Toxicity 2 - H361

**DSD/DPD**

• Irritant (Xi)

Substances Toxic To Reproduction - Category 3

R38, R63

**2.2 Label Elements**

**CLP**

**WARNING**



**Hazard statements** • H315 - Causes skin irritation  
• H361 - Suspected of damaging fertility or the unborn child.

**Precautionary statements**

**Prevention** • P201 - Obtain special instructions before use.  
• P202 - Do not handle until all safety precautions have been read and understood.  
• P264 - Wash thoroughly after handling.  
• P281 - Use personal protective equipment as required.

**Response** • P302+P352 - IF ON SKIN: Wash with plenty of soap and water.  
• P362 - Take off contaminated clothing and wash before reuse.  
• P321 - Specific treatment, see supplemental first aid information.  
• P332+P313 - If skin irritation occurs: Get medical advice/attention.  
• P308+P313 - IF exposed or concerned: Get medical advice/attention.

**Storage/Disposal** • P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

**DSD/DPD**



**Risk phrases** • R38 - Irritating to skin.  
• R63 - Possible risk of harm to the unborn child.

**Safety phrases** • S37 - Wear suitable gloves.

**2.3 Other Hazards**

**CLP** • May form combustible dust concentrations in air.  
According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

**DSD/DPD** • May form combustible dust concentrations in air.  
According to European Directive 1999/45/EC this material is considered dangerous.

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**United States (US)**

According to: OSHA 29 CFR 1910.1200 HCS

**2.1 Classification of the substance or mixture**

**OSHA HCS 2012** • Products do not present an inhalation, ingestion or skin contact health hazard under normal handling and use as it is in a metallic form. However, processes such as welding, grinding, burning, melting, or otherwise generating dust, fumes and gases may present a health hazard.  
Skin Irritation 2  
Reproductive Toxicity 2  
Specific Target Organ Toxicity Repeated Exposure 1  
Combustible Dust

**2.2 Label elements**

OSHA HCS 2012

**DANGER**



**Hazard statements** • Causes skin irritation  
Suspected of damaging fertility or the unborn child.  
Causes damage to organs through prolonged or repeated exposure.  
May form combustible dust concentrations in air.

### Precautionary statements

**Prevention** • Obtain special instructions before use.  
Do not handle until all safety precautions have been read and understood.  
Do not breathe dust.  
Wash thoroughly after handling.  
Do not eat, drink or smoke when using this product.  
Wear protective gloves, clothing, and eye/face protection, .

**Response** • If on skin: Wash with plenty of water .  
Take off contaminated clothing and wash before reuse.  
Specific treatment, see supplemental first aid information.  
If skin irritation occurs: Get medical advice/attention.  
If exposed or concerned: Get medical advice/attention.

**Storage/Disposal** • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## 2.3 Other hazards

**OSHA HCS 2012** • Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

## Section 3 - Composition/Information on Ingredients

### 3.1 Substances

• Material does not meet the criteria of a substance.

### 3.2 Mixtures

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Titanium	CAS:7440-32-6 EINECS:231-142-3	59.8% TO 97%	NDA	EU DSD/DPD: Repr. Cat. 3, R63 EU CLP: Repr. 2, H361 OSHA HCS 2012: Repr. 2	NDA
Vanadium	CAS:7440-62-2 EC Number:231-171-1	0% TO 15%	NDA	EU DSD/DPD: Xi, R38 EU CLP: Skin Irrit. 2, H319 OSHA HCS 2012: Skin Irrit. 2	NDA

Molybdenum	CAS:7439-98-7 EC Number:231-107-2	0% TO 6%	NDA	EU DSD/DPD: Xi; R36/37/38 EU CLP: Skin Irrit. 2, H319; Eye Irrit. 2, H315; STOT SE 3: Resp. Irrit., H335 OSHA HCS 2012: Skin Irrit. 2; Eye Irrit. 2; STOT SE 3: Resp. Irrit.	NDA
Chromium	CAS:7440-47-3 EC Number:231-157-5	0% TO 6%	NDA	EU DSD/DPD: Xi, R37 EU CLP: STOT SE 3: Resp. Irrit., H335 OSHA HCS 2012: STOT SE 3: Resp. Irrit.	NDA
Aluminum	CAS:7429-90-5 EC Number:231-072-3	3% TO 6%	NDA	EU DSD/DPD: F, R11; R15 EU CLP: Flam. Sol. 1, H228; Water-react. 2, H261 OSHA HCS 2012: Flam. Sol. 1; Water-react. 2; Comb. Dust; STOT RE 1 (Lungs, Inhl)	NDA
Zirconium	CAS:7440-67-7 EC Number:231-176-9 EU Index:040-001-00-3	0% TO 4%	NDA	EU DSD/DPD: Annex VI, Table 3.2: F, R15, R17 EU CLP: Annex VI, Table 3.1: Water-react. 1, H260; Pyr. Sol. 1, H250 OSHA HCS 2012: Not Classified	NDA
Tin	CAS:7440-31-5 EINECS:231-141-8	0% TO 3%	NDA	EU DSD/DPD: Xi, R36/38; Xn, R48/20 EU CLP: Eye Irrit. 2, H315; STOT SE 3: Resp. Irrit., H335; STOT RE 2 (Lungs, Inhl), H373 OSHA HCS 2012: Eye Irrit. 2; STOT SE 3: Resp. Irrit.; STOT RE 2 (Lungs, Inhl)	NDA
Iron	CAS:7439-89-6 EC Number:231-096-4	0% TO 0.2%	Ingestion/Oral-Rat LD50 • 750 mg/kg	EU DSD/DPD: Xn; R22; R53 EU CLP: Acute Tox. 4, H302; Aquatic Chronic 4, H413 OSHA HCS 2012: Acute Tox. 4 (orl)	NDA

See Section 16 for full text of H-statements and R-phrases.

## Section 4 - First Aid Measures

### 4.1 Description of first aid measures

- Inhalation** • Move victim to fresh air. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. If signs/symptoms continue, get medical attention.
- Skin** • In case of contact with substance, immediately flush skin with running water for at least 20 minutes. If skin irritation occurs: Get medical advice/attention.
- Eye** • In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.
- Ingestion** • Rinse mouth. Do not give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

### 4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

### 4.3 Indication of any immediate medical attention and special treatment needed

- Notes to Physician** • All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

## Section 5 - Firefighting Measures

### 5.1 Extinguishing media

- Suitable Extinguishing Media** • Use special mixtures of dry chemical, or sand.  
Use Class D extinguishers, if dust is generated and ignited.

**Unsuitable Extinguishing** • Do not use water.  
**Media**

## 5.2 Special hazards arising from the substance or mixture

**Unusual Fire and Explosion Hazards** • Solid, massive form of material is not combustible.  
Fire and explosion hazards are moderate when material is in the form of dust and exposed to heat or flames, or by chemical reaction.  
Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

**Hazardous Combustion Products** • No data available

## 5.3 Advice for firefighters

- Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

## Section 6 - Accidental Release Measures

### 6.1 Personal precautions, protective equipment and emergency procedures

**Personal Precautions** • Special precautions are not necessary for solid castings. If large quantities of dust are spilled: Ventilate enclosed areas. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

**Emergency Procedures** • Use normal clean up procedures. Contain spill and monitor for excessive dust accumulation. Avoid unnecessary personnel and equipment traffic in the spill area.

### 6.2 Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

### 6.3 Methods and material for containment and cleaning up

**Containment/Clean-up Measures** • Avoid generating dust.  
Use clean nonsparking tools to collect material.  
Carefully shovel or sweep up spilled material and place in suitable container.  
Dust Deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration.  
Residues should be evaluated for metal leachability and consignable waste standards.  
Do not use compressed air for cleanup.

### 6.4 Reference to other sections

- Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

## Section 7 - Handling and Storage

### 7.1 Precautions for safe handling

**Handling** • Use only with adequate ventilation. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe dust or fumes. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

### 7.2 Conditions for safe storage, including any incompatibilities

**Storage** • Store in a cool, dry place. Keep away from incompatible materials.

### 7.3 Specific end use(s)

- Refer to Section 1.2 - Relevant identified uses.

## Section 8 - Exposure Controls/Personal Protection

### 8.1 Control parameters

Exposure Limits/Guidelines						
	Result	ACGIH	Europe	France	Germany DFG	Germany TRGS
Chromium (7440-47-3)	TWAs	0.5 mg/m3 TWA	2 mg/m3 TWA	2 mg/m3 TWA [VME] (indicative limit)	Not established	2 mg/m3 TWA AGW (inhalable fraction, exposure factor 1)
Tin (7440-31-5)	TWAs	2 mg/m3 TWA	Not established	Not established	Not established	Not established
Zirconium (7440-67-7)	STELs	10 mg/m3 STEL	Not established	Not established	Not established	Not established
	TWAs	5 mg/m3 TWA	Not established	Not established	Not established	1 mg/m3 TWA AGW (including Zirconium compounds, insoluble in water, inhalable fraction, exposure factor 1)
	Ceilings	Not established	Not established	Not established	1 mg/m3 Peak (inhalable fraction)	Not established
	MAKs	Not established	Not established	Not established	1 mg/m3 TWA MAK (inhalable fraction)	Not established
Molybdenum (7439-98-7)	TWAs	10 mg/m3 TWA (inhalable fraction); 3 mg/m3 TWA (respirable fraction)	Not established	Not established	Not established	Not established
Aluminum (7429-90-5)	TWAs	1 mg/m3 TWA (respirable fraction)	Not established	10 mg/m3 TWA [VME] (metal); 5 mg/m3 TWA [VME] (dust)	Not established	Not established
	MAKs	Not established	Not established	Not established	4 mg/m3 TWA MAK (dust, inhalable fraction); 1.5 mg/m3 TWA MAK (dust, respirable fraction)	Not established
Exposure Limits/Guidelines (Con't.)						
	Result	Italy	Mexico	NIOSH	OSHA	United Kingdom
Chromium (7440-47-3)	TWAs	0.5 mg/m3 TWA	0.5 mg/m3 TWA LMPE-PPT	0.5 mg/m3 TWA	1 mg/m3 TWA	0.5 mg/m3 TWA
	STELs	Not established	Not established	Not established	Not established	1.5 mg/m3 STEL (calculated)
Tin (7440-31-5)	STELs	Not established	4 mg/m3 STEL [LMPE-CT]	Not established	Not established	Not established
	TWAs	Not established	2 mg/m3 TWA LMPE-PPT	2 mg/m3 TWA	Not established	Not established
Vanadium (7440-62-2)	Ceilings	Not established	Not established	0.05 mg/m3 Ceiling (except Vanadium metal and Vanadium carbide, dust and fume, as V, 15 min) <i>as Vanadium</i>	0.5 mg/m3 Ceiling (respirable dust, as V2O5); 0.1 mg/m3 Ceiling (fume, as V2O5)	Not established

				<i>compounds</i>		
	STELs	Not established	Not established	3 mg/m3 STEL (listed under Ferrovandium dust)	Not established	Not established
	TWAs	Not established	Not established	1 mg/m3 TWA (listed under Ferrovandium dust)	Not established	Not established
Zirconium (7440-67-7)	STELs	Not established	Not established	10 mg/m3 STEL	Not established	Not established
	TWAs	Not established	Not established	5 mg/m3 TWA	Not established	Not established
Aluminum (7429-90-5)	TWAs	Not established	10 mg/m3 TWA LMPE-PPT (dust)	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)	10 mg/m3 TWA (inhalable dust); 4 mg/m3 TWA (respirable dust)
	STELs	Not established	Not established	Not established	Not established	30 mg/m3 STEL (calculated, inhalable dust); 12 mg/m3 STEL (calculated, respirable dust)

### Exposure Control Notations

#### France

- Vanadium (7440-62-2): **Mutagens:** (Mutagen categories 1A, 1B, 2) | **Reproductive Toxins:** (Reproductive Toxin categories 1A, 1B, 2)

#### ACGIH

- Aluminum (7429-90-5): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)
- Chromium (7440-47-3): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)
- Zirconium (7440-67-7): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)

#### Germany DFG

- Aluminum (7429-90-5): **Pregnancy:** (classification not yet possible (respirable, inhalable, dust))
- Vanadium (7440-62-2): **Carcinogens:** (Category 2 (considered to be carcinogenic for man))
- Zirconium (7440-67-7): **Pregnancy:** (classification not yet possible) | **Sensitizers:** (respiratory and skin sensitizer)

### Exposure Limits Supplemental

#### ACGIH

- Aluminum (7429-90-5): **TLV Basis - Critical Effects:** (pneumoconiosis; lower respiratory tract irritation; neurotoxicity)
- Chromium (7440-47-3): **TLV Basis - Critical Effects:** (skin and upper respiratory tract irritation)
- Tin (7440-31-5): **TLV Basis - Critical Effects:** (pneumoconiosis (or stannosis))

## 8.2 Exposure controls

### Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ensure that dust handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is not leakage from the equipment). It is recommended that dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Use only appropriately classified electrical equipment.

### Personal Protective Equipment

#### Respiratory

- For limited exposure use an N95 dust mask. For prolonged exposure use an air-purifying respirator with high efficiency particulate air (HEPA) filters. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

#### Eye/Face

- Wear safety goggles.

#### Hands

- Wear appropriate gloves.

**Skin/Body**

- Wear long sleeves and/or protective coveralls.

**Environmental**

- Follow best practice for site management and disposal of waste.

**Exposure Controls****Key to abbreviations**

ACGIH = American Conference of Governmental Industrial Hygiene

TLV = Threshold Limit Value determined by the American Conference of Governmental Industrial Hygienists (ACGIH)

MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

NIOSH = National Institute of Occupational Safety and Health

STEL = Short Term Exposure Limits are based on 15-minute exposures

OSHA = Occupational Safety and Health Administration

## Section 9 - Physical and Chemical Properties

### 9.1 Information on Physical and Chemical Properties

#### Material Description

Physical Form	Solid	Appearance/Description	Solid metal alloy.
Color	Data lacking	Odor	Data lacking
Odor Threshold	Data lacking		

#### General Properties

Boiling Point	3260 C(5900 F) (for Titanium)	Melting Point/Freezing Point	1675 C(3047 F) (Titanium)
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	Data lacking	Water Solubility	Negligible < 0.1 %
Viscosity	Data lacking	Explosive Properties	Data lacking
Oxidizing Properties:	Data lacking		

#### Volatility

Vapor Pressure	Data lacking	Vapor Density	Data lacking
Evaporation Rate	Data lacking		

#### Flammability

Flash Point	Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking		

#### Environmental

Octanol/Water Partition coefficient	Data lacking		
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### 9.2 Other Information

- No additional physical and chemical parameters noted.

## Section 10: Stability and Reactivity

### 10.1 Reactivity

- Molten metal reacts violently with water. Store away from oxidizers, can react violently.

### 10.2 Chemical stability

- Stable under normal temperatures and pressures.

### 10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.



## 10.4 Conditions to avoid

- Avoid generating dust.

## 10.5 Incompatible materials

- Material may be incompatible with acids, bases, and oxidizers.

## 10.6 Hazardous decomposition products

- No data available

## Section 11 - Toxicological Information

### 11.1 Information on toxicological effects

Components		
Aluminum (3% TO 6%)	7429-90-5	<b>Multi-dose Toxicity:</b> Inhalation-Man TCLo • 4 mg/m <sup>3</sup> 1 Year(s)-Intermittent; <i>Lungs, Thorax, or Respiration:</i> <b>Cough; Lungs, Thorax, or Respiration:Dyspnea; Nutritional and Gross Metabolic:</b> <i>Gross Metabolite Changes:</i> <b>Weight loss or decreased weight gain;</b> Inhalation-Rat TCLo • 206 mg/m <sup>3</sup> 5 Hour(s) 30 Day(s)-Intermittent; <i>Lungs, Thorax, or Respiration:</i> <b>Fibrosis (interstitial); Endocrine:</b> <b>Hypoglycemia; Blood:</b> <b>Changes in serum composition (e.g., TP, bilirubin cholesterol)</b>
Titanium (59.8% TO 97%)	7440-32-6	<b>Reproductive:</b> Ingestion/Oral-Rat TDLo • 158 mg/kg (multigeneration); <i>Reproductive Effects:</i> <b>Effects on Embryo or Fetus:</b> <b>Fetotoxicity (except death, e.g., stunted fetus); Reproductive Effects:</b> <b>Effects on Embryo or Fetus:</b> <b>Fetal death</b>
Iron (0% TO 0.2%)	7439-89-6	<b>Acute Toxicity:</b> Ingestion/Oral-Rat LD50 • 750 mg/kg; <i>Blood:</i> <b>Changes in serum composition (e.g., TP, bilirubin cholesterol); Biochemical:</b> <i>Enzyme inhibition, induction, or change in blood or tissue levels:</i> <b>Transaminases;</b> Ingestion/Oral-Child TDLo • 77 mg/kg; <i>Behavioral:</i> <b>Irritability;</b> <i>Gastrointestinal:</i> <b>Nausea or vomiting; Blood:</b> <b>Normocytic anemia;</b> <b>Multi-dose Toxicity:</b> Ingestion/Oral-Rat TDLo • 105 mg/kg 5 Week(s)-Continuous; <i>Liver:</i> <b>Tumors; Tumorigenic:</b> <b>Active as anti-cancer agent; Tumorigenic:</b> <b>Protects against induction of experimental tumors</b>
Molybdenum (0% TO 6%)	7439-98-7	<b>Reproductive:</b> Ingestion/Oral-Rat TDLo • 5800 µg/kg (30W pre/1-20D preg); <i>Reproductive Effects:</i> <b>Specific Developmental Abnormalities:</b> <b>Musculoskeletal system</b>

GHS Properties	Classification
Respiratory sensitization	EU/CLP•Data lacking OSHA HCS 2012•Data lacking
Serious eye damage/Irritation	EU/CLP•Data lacking OSHA HCS 2012•Data lacking
Acute toxicity	EU/CLP•Data lacking OSHA HCS 2012•Data lacking
Aspiration Hazard	EU/CLP•Data lacking OSHA HCS 2012•Data lacking
Carcinogenicity	EU/CLP•Data lacking OSHA HCS 2012•Data lacking
Skin corrosion/Irritation	EU/CLP•Skin Irritation 2 OSHA HCS 2012•Skin Irritation 2
Skin sensitization	EU/CLP•Data lacking OSHA HCS 2012•Data lacking
STOT-RE	EU/CLP•Data lacking OSHA HCS 2012•Specific Target Organ Toxicity Repeated Exposure 1
STOT-SE	EU/CLP•Data lacking OSHA HCS 2012•Data lacking

Toxicity for Reproduction	EU/CLP•Toxic to Reproduction 2 OSHA HCS 2012•Toxic to Reproduction 2
Germ Cell Mutagenicity	EU/CLP•Data lacking OSHA HCS 2012•Data lacking

## Potential Health Effects

### Inhalation

**Acute (Immediate)** • May cause respiratory irritation. Processes such as cutting, grinding, crushing, or impact may result in generation of excessive amounts of airborne dusts in the workplace. Nuisance dust may affect the lungs but reactions are typically reversible.

**Chronic (Delayed)** • Extended exposure to excessive concentrations of metal fumes and dusts can be associated with permanent changes in the lung function and pulmonary diseases.

### Skin

**Acute (Immediate)** • Causes skin irritation. May cause skin sensitization. Symptoms include redness, and skin rash.

**Chronic (Delayed)** • No data available.

### Eye

**Acute (Immediate)** • Exposure to dust may cause mechanical irritation. Excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes.

**Chronic (Delayed)** • No data available.

### Ingestion

**Acute (Immediate)** • Excessive concentrations of nuisance dust in the workplace may cause mechanical irritation to mucous membranes.

**Chronic (Delayed)** • No data available

**Reproductive Effects** • Repeated and prolonged exposure may cause reproductive effects.

#### Key to abbreviations

LD = Lethal Dose

TC = Toxic Concentration

TD = Toxic Dose

## Section 12 - Ecological Information

### 12.1 Toxicity

- Material Data Lacking.

### 12.2 Persistence and degradability

- Material Data Lacking.

### 12.3 Bioaccumulative potential

- Material Data Lacking.

### 12.4 Mobility in Soil

- Material Data Lacking.

### 12.5 Results of PBT and vPvB assessment

- No PBT and vPvB assessment has been conducted.

### 12.6 Other adverse effects

- No studies have been found.

## Section 13 - Disposal Considerations

### 13.1 Waste treatment methods

- Product waste** • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
- Packaging waste** • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

## Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	NDA	Not Regulated	NDA	NDA	NDA
IMO/IMDG	NDA	Not Regulated	NDA	NDA	NDA
IATA/ICAO	NDA	Not Regulated	NDA	NDA	NDA

**14.6 Special precautions for user** • None specified.

**14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** • Data lacking.

## Section 15 - Regulatory Information

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

**SARA Hazard Classifications** • Acute, Chronic, Pressure(Sudden Release of)

State Right To Know				
Component	CAS	MA	NJ	PA
Aluminum	7429-90-5	Yes	Yes	Yes
Chromium	7440-47-3	Yes	Yes	Yes
Iron	7439-89-6	No	No	No
Molybdenum	7439-98-7	Yes	Yes	Yes
Tin	7440-31-5	Yes	Yes	Yes
Titanium	7440-32-6	No	Yes	No
Vanadium	7440-62-2	Yes	Yes	Yes
Zirconium	7440-67-7	Yes	Yes	Yes

Inventory				
Component	CAS	EU EINECS	EU ELNICS	TSCA
Aluminum	7429-90-5	Yes	No	Yes
Chromium	7440-47-3	Yes	No	Yes
Iron	7439-89-6	Yes	No	Yes
Molybdenum	7439-98-7	Yes	No	Yes
Tin	7440-31-5	Yes	No	Yes
Titanium	7440-32-6	Yes	No	Yes
Vanadium	7440-62-2	Yes	No	Yes
Zirconium	7440-67-7	Yes	No	Yes

## Europe

### Other

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	F; R15-17
•Aluminum	7429-90-5	F; R11-15
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Concentration Limits

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	F R:15-17 S:(2)-7/8-43
•Aluminum	7429-90-5	F R:11-15 S:(2)-7/8-43
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Notes - Substances and Preparations

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	T
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	S:(2)-7/8-43
•Aluminum	7429-90-5	S:(2)-7/8-43
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

## United States

### Labor

#### U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed

•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - OSHA - Specifically Regulated Chemicals</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

## Environment

### U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

### U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

•Chromium	7440-47-3	5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

### U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

### U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed

•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - CERCLA/SARA - Section 313 - Emission Reporting</b>		
•Chromium	7440-47-3	1.0 % de minimis concentration
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	1.0 % de minimis concentration (dust or fume only)
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	1.0 % de minimis concentration (except when contained in an alloy)
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - RCRA (Resource Conservation &amp; Recovery Act) - Basis for Listing - Appendix VII</b>		
•Chromium	7440-47-3	Included in waste streams: F032, F034, F035, F037, F038, F039
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Included in waste stream: F039
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - RCRA (Resource Conservation &amp; Recovery Act) - Constituents for Detection Monitoring</b>		
•Chromium	7440-47-3	(total)
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	(total)
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - RCRA (Resource Conservation &amp; Recovery Act) - D Series Wastes - Max Conc of Contaminants for the Tox Characteristic</b>		

•Chromium	7440-47-3	5.0 mg/L regulatory level
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

**U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261**

•Chromium	7440-47-3	hazardous constituent - no waste number
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

**U.S. - RCRA (Resource Conservation & Recovery Act) - List for Hazardous Constituents**

•Chromium	7440-47-3	(total)
•Tin	7440-31-5	(total)
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	(total)
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

**U.S. - RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards**

•Chromium	7440-47-3	2.77 mg/L (total, wastewater); 0.60 mg/L TCLP (total, nonwastewater)
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	4.3 mg/L (wastewater); 1.6 mg/L TCLP (nonwastewater)
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

**U.S. - RCRA (Resource Conservation & Recovery Act) - TSD Facilities Ground Water Monitoring**

•Chromium	7440-47-3	(total)
•Tin	7440-31-5	(total)
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	(total)
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

**United States - California**

**Environment**

**U.S. - California - Proposition 65 - Carcinogens List**

•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed

•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - California - Proposition 65 - Developmental Toxicity</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - California - Proposition 65 - Reproductive Toxicity - Female</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</b>		
•Chromium	7440-47-3	Not Listed
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

## United States - Pennsylvania

### Labor

<b>U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List</b>		
•Chromium	7440-47-3	
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	(dust or fume)



•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed
<b>U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances</b>		
•Chromium	7440-47-3	
•Tin	7440-31-5	Not Listed
•Zirconium	7440-67-7	Not Listed
•Aluminum	7429-90-5	Not Listed
•Molybdenum	7439-98-7	Not Listed
•Vanadium	7440-62-2	Not Listed
•Iron	7439-89-6	Not Listed
•Titanium	7440-32-6	Not Listed

## 15.2 Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

## Section 16 - Other Information

### Relevant Phrases (code & full text)

- H228 - Flammable solid
- H250 - Catches fire spontaneously if exposed to air
- H260 - In contact with water releases flammable gases which may ignite spontaneously
- H261 - In contact with water releases flammable gas
- H302 - Harmful if swallowed
- H319 - Causes serious eye irritation
- H335 - May cause respiratory irritation
- H373 - May cause damage to organs through prolonged or repeated exposure.
- H413 - May cause long lasting harmful effects to aquatic life
- R11 - Highly flammable.
- R15 - Contact with water liberates extremely flammable gases.
- R17 - Spontaneously flammable in air.
- R22 - Harmful if swallowed.
- R36/37/38 - Irritating to eyes, respiratory system and skin.
- R36/38 - Irritating to eyes and skin.
- R37 - Irritating to respiratory system.

### Revision Date

- 14/August/2015

### Preparation Date

- 01/October/1988

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**Key to abbreviations**

NDA = No Data Available

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