Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) revised in 2012 and GHS Rev 03.

Issue date 09/13/2022 Reviewed on 09/13/2022

1 Identification

· **Product Identifier**

· **Trade Name: Nickel-Alloy Electrodes for Flux Cored Arc Welding**
· **Product Number:**
Specification: A5.34
Classification: ENiCr3T1-1/4, ENiCrMo10T1-1/4, ENiCrMo3T1-1/4, ENiCrMo4T1-1/4
Nickel-alloy electrodes for flux cored arc welding
· **Relevant identified uses of the substance or mixture and uses advised against:**
For professional use only. Use according to manufacturer's specification.
· **Product Description:** Nickel-alloy electrodes for flux cored arc welding
· **Application of the substance / the mixture:** Industry specific application.

· **Details of the Supplier of the Safety Data Sheet:**
· **Manufacturer/Supplier:**
Pinnacle Alloys I, LLC
9384 Wallisville Road
Houston, TX 77013
Telephone: 800-856-9353
· **Emergency telephone number:** 713-688-9353

2 Hazard(s) Identification

· **Classification of the substance or mixture:**

Health hazard

Sensitization - Respiratory 1	H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Carcinogenicity 2	H351 Suspected of causing cancer. Route of exposure: Inhalation.
Specific Target Organ Toxicity - Repeated Exposure 1	H372 Causes damage to the respiratory system through prolonged or repeated exposure. Route of exposure: Inhalation.

Skin Irritation 2	H315 Causes skin irritation.
Eye Irritation 2A	H319 Causes serious eye irritation.
Sensitization - Skin 1	H317 May cause an allergic skin reaction.

· **Label elements:**
· **Hazard pictograms:**

· **Signal word:** Danger

· **Hazard-determining components of labeling:**
Nickel
Cobalt
Titanium Dioxide

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Titanium

· ***Hazard statements:***

H315 Causes skin irritation.
H319 Causes serious eye irritation.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer. Route of exposure: Inhalation.
H372 Causes damage to the respiratory system through prolonged or repeated exposure. Route of exposure: Inhalation.

· ***Precautionary statements:***

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.
P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing must not be allowed out of the workplace.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352	If on skin: Wash with plenty of water.
P304+P312	IF INHALED: Call a POISON CENTER/doctor if you feel unwell.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P321	Specific treatment (see supplementary first aid instructions on this Safety Data Sheet).
P362+P364	Take off contaminated clothing and wash it before reuse.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P342+P311	If experiencing respiratory symptoms: Call a poison center/doctor.
P405	Store locked up.
P501	Dispose of contents/container in accordance with local/regional/national/international regulations.

· ***Unknown acute toxicity:***

This value refers to knowledge of known, established toxicological or ecotoxicological values.
63.8 % of the mixture consists of component(s) of unknown toxicity.

· ***Classification system:*** NFPA/HMIS Definitions: 0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme

· ***NFPA ratings (scale 0 - 4)***

Health = 2
Fire = 0
Reactivity = 0

· ***HMIS-ratings (scale 0 - 4)***

Health = *2
Fire = 0
Physical Hazard = 0

· ***Hazard(s) not otherwise classified (HNOC):*** None known

3 Composition/Information on Ingredients

· ***Chemical characterization: Substance***

· ***Description:*** Mixture of substances listed below with non-hazardous additions.

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· **Dangerous Components:**		
CAS: 7440-02-0	Nickel Carcinogenicity 2, H351; Specific Target Organ Toxicity - Repeated Exposure 1, H372; Sensitization - Skin 1, H317; Aquatic Acute 3, H402	Balance%
CAS: 7440-47-3 RTECS: GB 4200000	Chromium	2-23%
CAS: 7439-98-7 RTECS: QA 4680000	Molybdenum	0-17%
CAS: 13463-67-7	Titanium Dioxide Carcinogenicity 2, H351	0-15%
CAS: 7439-89-6 RTECS: NO 4565500	Iron Flammable Solids 2, H228; Skin Irritation 2, H315; Specific Target Organ Toxicity - Single Exposure 3, H335; Eye Irritation 2B, H320; Combustible Dust	0-10%
CAS: 7439-96-5 RTECS: OO 9275000	Manganese Pyrophoric Solids 1, H250; Substances and mixtures which, in contact with water, emit flammable gases 1, H260	0-10.5%
CAS: 7440-33-7 RTECS: YO 7175000	Tungsten Flammable Solids 1, H228; Acute Toxicity - Oral 4, H302; Acute Toxicity - Dermal 4, H312; Skin Irritation 2, H315; Eye Irritation 2A, H319	0-4.5%
CAS: 7440-32-6 RTECS: XR 1700000	Titanium Skin Irritation 2, H315; Sensitization - Skin 1, H317; Eye Irritation 2B, H320	0-7%
CAS: 7440-48-4 RTECS: GF 8750000	Cobalt Sensitization - Respiratory 1, H334; Germ Cell Mutagenicity 2, H341; Carcinogenicity 1B, H350; Toxic to Reproduction 1B, H360; Sensitization - Skin 1, H317; Combustible Dust	0-2.5%
CAS: 7440-67-7 RTECS: ZH 7070000	Zirconium Pyrophoric Solids 1, H250; Substances and mixtures which, in contact with water, emit flammable gases 1, H260	0-5%
CAS: 7440-03-1 RTECS: QT9900000	Niobium Flammable Solids 1, H228; Combustible Dust	0-4.2%
CAS: 7440-21-3	Silicon Flammable Solids 2, H228; Acute Toxicity - Oral 4, H302; Eye Irritation 2B, H320; Combustible Dust	0-1%

· ***Additional information:***
The exact percentages of the ingredients of this mixture are considered to be proprietary and are withheld in accordance with the provisions of paragraph (i) of §1910.1200 of 29 CFR 1910.1200 Trade Secrets.
Note: Certain chemical constituents listed in Section 3 may vary depending upon the Classification of the Nickel-Alloy Electrodes for Flux Cored Arc Welding products.

*
4 First-Aid Measures

· ***Description of first aid measures***
· ***General information:***
Symptoms of poisoning may occur after exposure to dust, fumes or particulates; seek medical attention if feeling unwell.
· ***After inhalation:***
If symptoms develop, move victim to fresh air. If symptoms persist, obtain medical attention. Give oxygen or artificial respiration if needed. Lie victim down in the recovery position; cover to keep warm. Physicians should treat chronic exposure as chemical pneumonia. A 2.5% calcium gluconate solution in normal saline

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administered by nebulizer, or by ippb with 100% oxygen may decrease pulmonary damage. Bronchodilators may also be administered. Monitor for hypocalcemia.
In case of unconsciousness place patient stably in the side position for transportation.

· ***After skin contact:***
Immediately wash with water and soap and rinse thoroughly.
If skin irritation occurs, consult a doctor.

· ***After eye contact:***
Do NOT rub eyes. Immediately rinse opened eye(s) for at least 15 minutes under running water, lifting upper and lower lids occasionally. If symptoms persist, consult a physician.
If easy to do so, remove contact lenses if worn.

· ***After swallowing:***
Rinse out mouth and then drink plenty of water.
Do not induce vomiting without medical advice.

· ***Information for doctor***

· ***Most important symptoms and effects, both acute and delayed:*** No further relevant information available.

· ***Indication of any immediate medical attention and special treatment needed:***
No further relevant information available.

* 5 Fire-Fighting Measures

· ***Extinguishing media***

· ***Suitable extinguishing agents:*** Use fire fighting measures that suit the environment.

· ***For safety reasons unsuitable extinguishing agents:*** No further relevant information.

· ***Special hazards arising from the substance or mixture:***
Amorphous or crystalline silicon both react exothermically when heated with alkali-metal carbonates attaining incandescence and evolving carbon monoxide.
Material in powder form, capable of creating a dust explosion. Mixture of silicon, aluminum, and lead oxide explodes when heated.
Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame. Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence. Pyrophoric chromium unites with nitric oxide with incandescence. Incandescent reaction with nitrogen oxide or sulfur dioxide.

Special Remarks on Explosion Hazards:
Powdered Chromium metal +fused ammonium nitrate may react violently or explosively. Powdered Chromium will explode spontaneously in air.
Material in powder form is capable of creating a dust explosion. Mixture of silicon, aluminum, and lead oxide explodes when heated.
Amorphous or crystalline silicon both react exothermically when heated with alkali-metal carbonates attaining incandescence and evolving carbon monoxide. Mixtures of silicon, aluminum, and lead explode when heated.
If incinerated, product will release the following toxic fumes: Oxides of nickel, chromium, molybdenum, iron, manganese, silicon, corbon, niobium, titanium, cobalt, tungsten, zirconium, niobium, and fluorides and ozone.

· ***Advice for firefighters***

· ***Special protective equipment for firefighters:***
As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent) and full protective gear to prevent contact with skin and eyes.

· ***Additional information:***
At temperatures above 200°C Zirconium reacts exothermically with the following: fluorine, chloride, bromide, iodine, halocarbons, carbon tetrachloride, carbon, tetra fluoride and Freon's.
These items are not reactive, flammable, or explosive and essentially not hazardous at ambient temperatures. Welding arcs and sparks can ignite combustibles and flammable products. If involved in a fire, these products may generate irritating aluminum fumes and a variety of metal oxides. Emergency responders must wear personal protection equipment suitable for the situation. Use the extinguishing media recommended for the burning materials and fire situation. See ANSI Z49.1 "Safety in Welding and Cutting" and "Safe Practices"

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Code: SP, published by the American Welding Society.

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6 Accidental Release Measures

· ***Personal precautions, protective equipment and emergency procedures:***
Ensure adequate ventilation.
Avoid contact with skin, eyes and clothing.
Wear assigned protective equipment. Keep unprotected persons away.
· ***Environmental precautions:*** Do not allow product to reach sewage system or any water course.
· ***Methods and material for containment and cleaning up:***
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Dispose of the collected material according to regulations.
Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources.
· ***Reference to other sections:***
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

· ***PAC-1:***		
7440-02-0	Nickel	4.5 mg/m³
7440-47-3	Chromium	1.5 mg/m³
7439-98-7	Molybdenum	30 mg/m³
13463-67-7	Titanium Dioxide	30 mg/m³
7439-89-6	Iron	3.2 mg/m³
7439-96-5	Manganese	3 mg/m³
7440-33-7	Tungsten	10 mg/m³
7440-32-6	Titanium	30 mg/m³
7440-48-4	Cobalt	0.18 mg/m³
7440-67-7	Zirconium	10 mg/m³
7440-03-1	Niobium	30 mg/m³
7440-21-3	Silicon	45 mg/m³
7440-44-0	Carbon Fiber	6 mg/m³
· ***PAC-2:***		
7440-02-0	Nickel	50 mg/m³
7440-47-3	Chromium	17 mg/m³
7439-98-7	Molybdenum	330 mg/m³
13463-67-7	Titanium Dioxide	330 mg/m³
7439-89-6	Iron	35 mg/m³
7439-96-5	Manganese	5 mg/m³
7440-33-7	Tungsten	330 mg/m³
7440-32-6	Titanium	330 mg/m³
7440-48-4	Cobalt	2 mg/m³
7440-67-7	Zirconium	83 mg/m³
7440-03-1	Niobium	330 mg/m³

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7440-21-3	Silicon	100 mg/m³
7440-44-0	Carbon Fiber	330 mg/m³
· ***PAC-3:***		
7440-02-0	Nickel	99 mg/m³
7440-47-3	Chromium	99 mg/m³
7439-98-7	Molybdenum	2,000 mg/m³
13463-67-7	Titanium Dioxide	2,000 mg/m³
7439-89-6	Iron	150 mg/m³
7439-96-5	Manganese	1,800 mg/m³
7440-33-7	Tungsten	2,000 mg/m³
7440-32-6	Titanium	2,000 mg/m³
7440-48-4	Cobalt	20 mg/m³
7440-67-7	Zirconium	500 mg/m³
7440-03-1	Niobium	2,000 mg/m³
7440-21-3	Silicon	630 mg/m³
7440-44-0	Carbon Fiber	2,000 mg/m³

7 Handling and Storage

· ***Handling***
· ***Precautions for safe handling:***
Avoid creating and breathing dust/fume/gas/mist/vapors/spray.
Ensure good ventilation/exhaustion at the workplace.
Prevent formation of dust.
· ***Information about protection against explosions and fires:*** No special measures required.

· ***Conditions for safe storage, including any incompatibilities***
Store away from strong acids, strong bases, strong oxidizing agents and strong reducing agents.
· ***Storage***
· ***Requirements to be met by storerooms and receptacles:*** No special requirements.
· ***Information about storage in one common storage facility:*** Not required.
· ***Further information about storage conditions:*** Keep receptacle tightly sealed.
· ***Specific end use(s):*** No further relevant information available.

* 8 Exposure Controls/Personal Protection

· ***Additional information about design of technical systems:*** No further data; see section 7.

· ***Control parameters:***
All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94). Use local exhaust at filling zones and where leakage and dust formation is probable. Use mechanical (general) ventilation for storage areas. Use appropriate ventilation as required to keep Exposure Limits in Air below TLV & PEL limits.
· ***Components with occupational exposure limits:***
The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit.
At this time, the other constituents have no known exposure limits.

7440-02-0 Nickel	
PEL	Long-term value: 1 mg/m³

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REL	Long-term value: 0.015 mg/m³ as Ni; See Pocket Guide App. A
TLV	Long-term value: 1.5* mg/m³ elemental, *inhalable fraction, A5, BEI
7440-47-3 Chromium	
PEL	Long-term value: 1 mg/m³
REL	Long-term value: 0.5* mg/m³ *metal+inorg.compds.as Cr;See Pocket Guide App. C
TLV	Long-term value: 0.003* 0.5** mg/m³ inh. fraction, *as Cr(III): A4,**metal
7439-98-7 Molybdenum	
PEL	Long-term value: 15* mg/m³ *Total dust, as Mo
TLV	Long-term value: 10* 3** mg/m³ as Mo; *inhalable fraction ** respirable fraction
13463-67-7 Titanium Dioxide	
PEL	Long-term value: 15* mg/m³ *total dust
REL	See Pocket Guide App. A
TLV	Long-term value: 0.2* 2.5** mg/m³ resp. fraction, *nanoscale,**finescale, A3
7439-96-5 Manganese	
PEL	Ceiling limit value: 5 mg/m³ as Mn
REL	Short-term value: 3 mg/m³ Long-term value: 1 mg/m³ fume, as Mn
TLV	Long-term value: 0.02* 0.1** mg/m³ as Mn; A4, *respirable **inhalable fraction
7440-33-7 Tungsten	
PEL	and insoluble compounds, as We
REL	Short-term value: 10 mg/m³ Long-term value: 5 mg/m³ as W
TLV	Long-term value: 3* mg/m³ as W; * respirable fraction
7440-48-4 Cobalt	
PEL	Long-term value: 0.1* mg/m³ as Co; *for metal dust and fume
REL	Long-term value: 0.05 mg/m³ as Co; metal dust & fume
TLV	Long-term value: 0.02* mg/m³ *inh. fraction; DSEN, RSEN, BEI, A3

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7440-67-7 Zirconium	
PEL	Long-term value: 5 mg/m³ as Zr
REL	Short-term value: 10 mg/m³ Long-term value: 5 mg/m³ as Zr
TLV	Short-term value: 10 mg/m³ Long-term value: 5 mg/m³ as Zr; A4
7440-03-1 Niobium	
TWA	Long-term value: 6
7440-21-3 Silicon	
PEL	Long-term value: 15* 5** mg/m³ *total dust **respirable fraction
REL	Long-term value: 10* 5** mg/m³ *total dust **respirable fraction
TLV	TLV withdrawn
· ***Ingredients with biological limit values:***	
7440-02-0 Nickel	
BEI	5 µg/L urine post-shift at end of workweek Nickel (background) 30 µg/L urine post-shift at end of workweek Nickel (background)
7440-47-3 Chromium	
BEI	0.7 µg/L urine end of shift at end of workweek Total chromium (population based)
7440-48-4 Cobalt	
BEI	15 µg/L urine end of shift at end of workweek Cobalt (nonspecific)

· ***Additional information:*** The lists that were valid during the creation of this SDS were used as basis.

· ***Exposure controls:***
· ***Personal protective equipment***
· ***General protective and hygienic measures:***
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing and wash before reuse.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.

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Trade Name: Nickel-Alloy Electrodes for Flux Cored Arc Welding

· ***Breathing equipment:***

Suitable respiratory protective device recommended.

Use NIOSH approved or equivalent fume respirator or air supplied respirator when welding, brazing, cutting, grinding, or soldering in a confined space or general work area where local exhaust and/or ventilation does not keep exposure below the limits outlined in Section 8. Monitor the air quality inside the welder's helmet, and/or worker's breathing zone to determine if a respirator is required and the type needed.

· ***Protection of hands:***

Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

Select glove material based on penetration times, rates of diffusion and degradation.

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.

· ***Material of gloves:***

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

· ***Penetration time of glove material:***

The exact break-through time has to be determined and observed by the manufacturer of the protective gloves.

· ***Eye protection:***

Helmet or face shield

Wear a helmet or face shield with a filter lens around shade number 14. Adjust if needed by selecting the next lighter or darker shade number. See ANSI/ASC Z49.1 Section 4.2 or publication F2.2. Shield other workers by providing screens and flash goggles.

· ***Body protection:***

Protective work clothing

Wear approved head, hand, and body protection, which help to prevent injury from radiation, sparks, and electrical shock. This would include wearing welder's gloves and a protective face shield and may include arm protectors, apron, hats, shoulder protection, as well as dark, non-synthetic, substantial clothing. See ANSI Z49.1. Welders should be trained not to allow electrically live parts to contact the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground and should not touch live electrical parts. Welders should not wear short sleeve shirts or short pants.

· ***Limitation and supervision of exposure into the environment:*** None

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* 9 Physical and Chemical Properties

· **Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**
Form: Flux Coated Wire/Rod
Color: Silver/gray metallic color
· **Odor:** Odorless until used
· **Odor threshold:** Not determined.

· **pH-value:** Not applicable.

· **Change in condition**
Melting point/Melting range: Not determined.

· **Flash point:** None

· **Flammability (solid, gaseous):** Not determined.

· **Ignition temperature:** Not applicable

· **Decomposition temperature:** Not determined.

· **Auto igniting:** Product is not self-igniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Explosion limits:**
Lower: Not determined.
Upper: Not determined.

· **Vapor pressure:** Not applicable.

· **Density:** Not determined.
· **Relative density:** Not determined.
· **Vapor density:** Not applicable.
· **Evaporation rate:** Not applicable.

· **Solubility in / Miscibility with:**
Water: Insoluble.

· **Partition coefficient (n-octanol/water):** Not determined.

· **Viscosity:**
Dynamic: Not applicable.
Kinematic: Not applicable.

· **Solvent content:**
VOC content: 0.00 %

Solids content: 100.0 %

· **Other information:** No further relevant information available.

* 10 Stability and Reactivity

· **Reactivity:**
Stable under normal conditions.
May react violently or explosively on contact with water. Will react with water or steam to product hydrogen. Incompatible (violent reactions) with chlorine, fluorine, oxidizers, calcium, carbide, alkali carbonates, iodine pentafluoride, cobaltic fluoride, rubidium carbide, MnF3, nitrosyl fluoride, AgF. Mixtures of cesium acetylide with silicon react vigorously on heating. Rubidium acetylide reacts vigorously with silicon on warming.

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· **Chemical stability:** Stable under normal conditions.
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions:**
May react violently or explosively on contact with water. Will react with water or steam to product hydrogen Incompatible (violent reactions) with chlorine, fluorine, oxidizers, calcium, carbide, alkali carbonates, iodine pentafluoride, cobaltic fluoride, rubidium carbide, MnF3, nitrosyl fluoride, AgF. Mixtures of cesium acetylide with silicon react vigorously on heating. Rubidium acetylide reacts vigorously with silicon on warming.
Contact with acids or strong bases may cause generation of gas.
· **Conditions to avoid:** No further relevant information available.
· **Incompatible materials:**
Incompatible (violent reactions) with chlorine, fluorine, oxidizers, calcium, carbide, alkali carbonates, iodine pentafluoride, cobaltic fluoride, rubidium carbide, MnF3, nitrosyl fluoride, AgF.
Strong acids, strong bases, strong oxidizing agents and strong reducing agents.
· **Hazardous decomposition products:**
Toxic chromium oxide fumes.
Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the processes and procedures followed, and the welding consumables used. Other conditions that also influence the composition and quantity of 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 in operation and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, and the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing procedures). When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 8. Fume and gas decomposition, 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. Also, new compounds not in the electrodes may form. The known gases and fumes that may form during welding or cutting and their exposure limits are noted in the list in Section 11 below. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 8, plus those from the base metal and coating, etc. as noted above. Chlorinated solvents may be decomposed into toxic gases such as phosgene.
It is understood, however, that the elements and/or oxides to be mentioned are virtually always present as complex oxides and not as metals (See "Characterization of Arc Welding Fume", from the American Welding Society). The elements or oxides listed Section 8 correspond to the ACGIH catergories found in "Threshold Limit Values for Chemical Substances and Physical Agents" listed in Section 8. Some products will also contain: Oxides of nickel, chromium, molybdenum, iron, manganese, silicon, corbon, niobium, titanium, cobalt, tungsten, zirconium, niobium, and fluorides and ozone. Some elements or compounds may exceed thier PELs/TLVs before the total fumes exceed 5 mg/m3.
· **Additional information:**
Niobium metal is rapidly dissolved by hydrofluoric acid or hydrofluoric-nitric acid mixtures. Niobium ignites in cold fluorine and above 200°C will react exothermically with chlorine, bromide and halocarbons such as carbon tetrachloride, carbon tetra fluoride and Freon's.

* 11 Toxicological Information

· **Information on toxicological effects:**
Effects of Over-Exposure: Electric arc welding may create one or more of the following health hazards:
・ARC RAYS can injure eyes and burn skin. Incidences of skin cancer have been reported.
・ELECTRIC SHOCK can kill.
・FUMES AND GASES GENERATED FROM WELDING can be dangerous to your health.
・PRIMARY ROUTES OF ENTRY are the respiratory system, eyes, skin, and/or indigestion.
・NOISE can damage hearing.

Short-term (acute) over-exposure effects:
・WELDING FUMES may result in discomfort, such as dizziness, nausea, or dryness or irritation of the nose,

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throat, or eyes.

· ALUMINUM OXIDE may cause irritation of the respiratory system.

· FLUORIDES, FLUORIDE COMPOUNDS may cause skin and eye burns, pulmonary edema, and bronchitis.

· IRON, IRON OXIDE have no known effects. Treat as a nuisance dust or fume.

· MANGANESE, MANGANESE COMPOUNDS may cause metal fume fever, characterized by irritation of the throat, vomiting, nausea, fever, body aches, and chills. Recovery is generally complete within 48 hours of overexposure.

· MOLYBDENUM may cause irritation of the eyes, nose, and throat.

· NICKEL, NICKEL COMPOUNDS may cause metallic taste, nausea, tightness in chest, fever, and allergic reactions.

· TITANIUM DIOXIDE may cause irritation of the respiratory system.

Long-term (chronic) over-exposure effects:

· WELDING FUMES in excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis, or 'siderosis.' Overexposure to air contaminants may lead to their accumulation in the lungs, a condition which may be seen as dense areas on chest x-rays. The severity of the change is proportional to the length of exposure. The changes seen are not necessarily associated with symptoms or signs of reduced lung function or disease. In addition, the changes on X-rays may be caused by non-work factors such as smoking, etc.

· ALUMINUM OXIDE may cause pulmonary fibrosis and emphysema.

· FLUORIDES may cause serious bone erosion (osteoporosis) and mottling of teeth.

· IRON, IRON OXIDE may cause siderosis or deposits of iron in the lungs, which is believed to affect pulmonary function. Lungs will clear in time when exposure to iron fumes and its compounds ceases. Iron and magnetite (Fe_3O_4) are not regarded as fibrogenic materials.

· MANGANESE, MANGANESE COMPOUNDS may cause central nervous system effects referred to as 'manganism.' Symptoms include languor, sleepiness, muscular weakness, emotional disturbances, spastic gait, and tremors. Behavioral changes and changes in handwriting may also appear. These effects are irreversible. Employees overexposed to manganese should receive regular medical examinations for early detection of manganism.

· MOLYBDENUM prolonged overexposure may result in loss of appetite, weight loss, loss of muscle coordination, difficulty in breathing, and anemia.

· NICKEL, NICKEL COMPOUNDS may lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers.

· TITANIUM DIOXIDE may cause pulmonary irritation and slight fibrosis.

· ***Acute toxicity:***

· ***LD/LC50 values that are relevant for classification:***		
7440-47-3 Chromium		
Inhalative	LC50/96 hours	14.3 mg/l (Cyprinus carpio)
7439-98-7 Molybdenum		
Oral	LD50	>5,000 mg/kg (Rat)
Dermal	LD50	>2,000 mg/kg (Rat)
Inhalative	LC50/4 h	800 mg/l (Trout)
		>5.84 mg/l (Rat)
13463-67-7 Titanium Dioxide		
Oral	LD50	>10,000 mg/kg (Rat)
Dermal	LD50	>10,000 mg/kg (Rabbit)
Inhalative	LC50/4 h	>6.82 mg/l (Rat)

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7439-89-6 Iron		
Oral	LD50	7,500 mg/kg (Rat)
7439-96-5 Manganese		
Oral	LD50	9,000 mg/kg (Rat)
7440-33-7 Tungsten		
Oral	LD50	2,000 mg/kg (Rat)
Dermal	LD50	2,000 mg/kg (Rat)
Inhalative	LC50/4 h	5.4 mg/l (Rat)
7440-48-4 Cobalt		
Oral	LD50	6,170 mg/kg (Rat)
7440-03-1 Niobium		
Oral	Toxic Dose Low	>10,000,000 µg/kg (Mouse) >10,000,000 µg/kg (Rat)
7440-21-3 Silicon		
Oral	LD50	3,160 mg/kg (Rat)

· ***Primary irritant effect:***

· ***On the skin:***
Irritant to skin and mucous membranes.
May cause an allergic skin reaction.

· ***On the eye:*** Irritating effect.

· ***Sensitization:***
Sensitization possible through inhalation.
Sensitization possible through skin contact.

· ***Additional toxicological information:***
The product shows the following dangers according to internally approved calculation methods for preparations:
Harmful
Irritant

· ***Carcinogenic categories:***

· ***IARC (International Agency for Research on Cancer):***
(a) Although IARC has classified titanium dioxide as possible carcinogenic to human (2B), their summary concludes: “No significant exposure to titanium dioxide is thought to occur during the use of products which titanium dioxide is bound to other materials, such as in cosmetics or in paints.”
(b) OSHA does not regulate Titanium Dioxide as a carcinogen. However, under 29 CFR 1910.1200 the SDS must convey the fact that Titanium Dioxide is a potential carcinogen to rats.
Group 1 - Carcinogenic to humans
Group 2A - Probably carcinogenic to humans
Group 2B - Possibly carcinogenic to humans
Group 3 - Not classifiable as to its carcinogenicity to humans
Group 4 - Probably not carcinogenic to humans

7440-02-0	Nickel	2B
7440-47-3	Chromium	3
13463-67-7	Titanium Dioxide	2B
7440-48-4	Cobalt	2B

· ***NTP (National Toxicology Program):***

7440-02-0	Nickel	R

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7440-48-4	Cobalt	R

· **OSHA-Ca (Occupational Safety & Health Administration):**

None of the ingredients are listed.

12 Ecological Information

· **Toxicity:**

· **Aquatic toxicity:**	
7440-02-0 Nickel	
EC50	1 mg/l (Water flea)
7440-47-3 Chromium	
EC50	0.07 mg/l (Water flea)
13463-67-7 Titanium Dioxide	
EC50	>1,000 mg/l (Water flea)
7439-96-5 Manganese	
EC50	40 mg/l (Water flea)

· **Persistence and degradability:** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential:** No further relevant information available.
· **Mobility in soil:** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
· **Results of PBT and vPvB assessment:**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects:** No further relevant information available.

13 Disposal Considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household waste. Do not allow product to reach sewage system.
Observe all federal, state and local environmental regulations when disposing of this material.

· **Uncleaned packaging**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport Information

· **UN-Number:**
· **DOT, ADR/ADN, ADN, IMDG, IATA** Non-Regulated Material
· **UN proper shipping name:**
· **DOT, ADR/ADN, ADN, IMDG, IATA** Non-Regulated Material
· **Transport hazard class(es):**

· **DOT, ADR/ADN, ADN, IMDG, IATA**
· **Class:** Non-Regulated Material
· **Packing group:**
· **DOT, ADR/ADN, IMDG, IATA** Non-Regulated Material
· **Environmental hazards:** Not applicable.

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· **Special precautions for user:** Not applicable.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:** Not applicable.
· **UN "Model Regulation":** Non-Regulated Material

* 15 Regulatory Information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture:**
· **SARA (Superfund Amendments and Reauthorization):**

· **Section 355 (extremely hazardous substances):**	
None of the ingredients are listed.	
· **Section 313 (Specific toxic chemical listings):**	
7440-02-0	Nickel
7440-47-3	Chromium
7439-96-5	Manganese
7440-48-4	Cobalt
· **TSCA (Toxic Substances Control Act):**	
All components have the value ACTIVE.	
· **Hazardous Air Pollutants**	
7439-96-5	Manganese
7440-48-4	Cobalt

· **California Proposition 65:**

WARNING: This product can expose you to chemicals including the listed chemicals which are known to the State of California to cause cancer, birth defects and/or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

· **Chemicals known to cause cancer:**	
7440-02-0	Nickel
13463-67-7	Titanium Dioxide
7440-48-4	Cobalt
· **Chemicals known to cause reproductive toxicity for females:**	
None of the ingredients are listed.	
· **Chemicals known to cause reproductive toxicity for males:**	
None of the ingredients are listed.	
· **Chemicals known to cause developmental toxicity:**	
None of the ingredients are listed.	
· **New Jersey Right-to-Know List:**	
7440-02-0	Nickel
7440-47-3	Chromium
7439-98-7	Molybdenum
13463-67-7	Titanium Dioxide
7439-96-5	Manganese
7440-33-7	Tungsten
7440-32-6	Titanium

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7440-48-4	Cobalt	
7440-67-7	Zirconium	
7440-21-3	Silicon	
· ***New Jersey Special Hazardous Substance List:***		
7440-02-0	Nickel	CA
7440-47-3	Chromium	F3
7439-96-5	Manganese	F3, R1
7440-33-7	Tungsten	F3
7440-32-6	Titanium	F3, R1
7440-48-4	Cobalt	CA, F3
7440-67-7	Zirconium	F4, R1
7440-21-3	Silicon	F3
· ***Pennsylvania Right-to-Know List:***		
7440-02-0	Nickel	
7440-47-3	Chromium	
7439-98-7	Molybdenum	
13463-67-7	Titanium Dioxide	
7439-96-5	Manganese	
7440-33-7	Tungsten	
7440-48-4	Cobalt	
7440-67-7	Zirconium	
7440-21-3	Silicon	
· ***Pennsylvania Special Hazardous Substance List:***		
7440-02-0	Nickel	ES
7440-47-3	Chromium	ES
7439-96-5	Manganese	E
7440-48-4	Cobalt	E

· ***Carcinogenic categories:***

· ***EPA (Environmental Protection Agency):***		
7440-47-3	Chromium	D
7439-96-5	Manganese	D
· ***TLV (Threshold Limit Value established by ACGIH):***		
7440-02-0	Nickel	A5
7440-47-3	Chromium	A4
7439-98-7	Molybdenum	A3
13463-67-7	Titanium Dioxide	A4
7440-48-4	Cobalt	A3
7440-67-7	Zirconium	A4
· ***NIOSH-Ca (National Institute for Occupational Safety and Health):***		
7440-02-0	Nickel	
13463-67-7	Titanium Dioxide	

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· **GHS label elements**
The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms:**

· **Signal word:** Danger

· **Hazard-determining components of labeling:**
Nickel
Cobalt
Titanium Dioxide
Titanium
· **Hazard statements:**
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer. Route of exposure: Inhalation.
H372 Causes damage to the respiratory system through prolonged or repeated exposure. Route of exposure: Inhalation.
· **Precautionary statements:**

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.
P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing must not be allowed out of the workplace.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352	If on skin: Wash with plenty of water.
P304+P312	IF INHALED: Call a POISON CENTER/doctor if you feel unwell.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P321	Specific treatment (see supplementary first aid instructions on this Safety Data Sheet).
P362+P364	Take off contaminated clothing and wash it before reuse.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P342+P311	If experiencing respiratory symptoms: Call a poison center/doctor.
P405	Store locked up.
P501	Dispose of contents/container in accordance with local/regional/national/international regulations.

· **National regulations:**

The product is not subject to be labelled according with the prevailing version of the regulations on hazardous substances.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other Information

Pinnacle Alloys urges each end user and recipient of this SDS to study it carefully. If necessary, consult an industrial hygienist or other expert to understand this information and safeguard the environment and protect workers from potential hazards associated with the handling or use of this product. This information is

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believed to be accurate as of the revision date shown above. However, no warranty, expressed or implied, is given. Because the conditions or methods of use are beyond Pinnacle Alloys' control, we assume no liability resulting from the use of this product. Regulatory requirements are subject to change and may differ between various locations. Compliance with all applicable Federal, State, Provincial, and Local laws and regulations remain the responsibility of the user.

· ***Contact:***

· ***Abbreviations and acronyms:***

ADR: The European Agreement concerning the International Carriage of Dangerous Goods by Road
ADN: The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety and Health
OSHA: Occupational Safety & Health Administration
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Flammable Solids 1: Flammable solids – Category 1
Flammable Solids 2: Flammable solids – Category 2
Pyrophoric Solids 1: Pyrophoric solids – Category 1
Substances and mixtures which, in contact with water, emit flammable gases 1: Substances and mixtures which in contact with water emit flammable gases – Category 1
Acute Toxicity - Oral 4: Acute toxicity – Category 4
Skin Irritation 2: Skin corrosion/irritation – Category 2
Eye Irritation 2A: Serious eye damage/eye irritation – Category 2A
Eye Irritation 2B: Serious eye damage/eye irritation – Category 2B
Sensitization - Respiratory 1: Respiratory sensitisation – Category 1
Sensitization - Skin 1: Skin sensitisation – Category 1
Germ Cell Mutagenicity 2: Germ cell mutagenicity – Category 2
Carcinogenicity 1B: Carcinogenicity – Category 1B
Carcinogenicity 2: Carcinogenicity – Category 2
Toxic to Reproduction 1B: Reproductive toxicity – Category 1B
Specific Target Organ Toxicity - Single Exposure 3: Specific target organ toxicity (single exposure) – Category 3
Specific Target Organ Toxicity - Repeated Exposure 1: Specific target organ toxicity (repeated exposure) – Category 1
Aquatic Acute 3: Hazardous to the aquatic environment - acute aquatic hazard – Category 3

· **** Data compared to the previous version altered.***

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