Safety Data Sheet (SDS)

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

Issue date 09/26/2019 Reviewed on 09/26/2019

*

1 Identification

· **Product Identifier**

· **Trade Name: Copper and Copper-Alloy Bare Welding Rods and Electrodes**
· **Product Number:**
Specification: A5.7
Classification: ERCu, ERCuAl-A2, ERCuAl-A3, ERCuNi, ERCuNiAl, ERCuSi-A, ERCuSN-C
Copper and copper alloy bare welding rods and electrodes
· **Relevant identified uses of the substance or mixture and uses advised against:**
For professional use only. Use according to manufacturer's specification.
· **Product Description:** Copper and copper-alloy bare welding rods and electrodes.
· **Application of the substance / the mixture:** Industry specific application.

· **Details of the Supplier of the Safety Data Sheet:**
· **Manufacturer/Supplier:**
SOWESCO 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

Resp. Sens. 1	H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Carc. 2	H351	Suspected of causing cancer.
Repr. 1A	H360	May damage fertility or the unborn child.
STOT RE 1	H372	Causes damage to organs through prolonged or repeated exposure.

Acute Tox. 4	H302	Harmful if swallowed.
Skin Irrit. 2	H315	Causes skin irritation.
Eye Irrit. 2A	H319	Causes serious eye irritation.
Skin Sens. 1	H317	May cause an allergic skin reaction.
STOT SE 3	H335	May cause respiratory irritation.

Aquatic Acute 3	H402	Harmful to aquatic life.
Aquatic Chronic 3	H412	Harmful to aquatic life with long lasting effects.

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

· **Signal word:** Danger

· **Hazard-determining components of labeling:**
Nickel

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Boric Acid salt
Copper
Cobalt
Titanium

· ***Hazard statements:***
H302 Harmful if swallowed.
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.
H360 May damage fertility or the unborn child.
H335 May cause respiratory irritation.
H372 Causes damage to organs through prolonged or repeated exposure.
H402 Harmful to aquatic life.
H412 Harmful to aquatic life with long lasting effects.

· ***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.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P284	[In case of inadequate ventilation] wear respiratory protection.
P301+P312	If swallowed: Call a poison center/doctor if you feel unwell.
P302+P352	If on skin: Wash with plenty of water.
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.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
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.
63.7 % 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

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· **HMIS-ratings (scale 0 - 4)**

HEALTH *2	Health = *2
FIRE 0	Fire = 0
REACTIVITY 0	Physical Hazard = 0

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

3 Composition/Information on Ingredients

· **Chemical characterization: Mixtures**

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

· **Dangerous Components:**

CAS: 7440-50-8 RTECS: GL 5325000	Copper Flam. Sol. 1, H228; STOT SE 3, H335; Aquatic Acute 3, H402; Aquatic Chronic 4, H413	15-35%
CAS: 7440-02-0	Nickel Carc. 2, H351; STOT RE 1, H372; Skin Sens. 1, H317	15-35%
CAS: 7440-22-4	Silver STOT SE 3, H335; Aquatic Acute 3, H402	15-35%
CAS: 7440-47-3 RTECS: GB 4200000	Chromium Powder STOT RE 2, H373; Skin Irrit. 2, H315; STOT SE 3, H335; Eye Irrit. 2B, H320; Combustible Dust	2-12%
CAS: 7429-90-5 RTECS: BD 0330000	Aluminium Flam. Sol. 2, H228	2-12%
CAS: 26038-87-9	Boric Acid salt Repr. 1B, H360; Acute Tox. 4, H302; Skin Irrit. 2, H315; Eye Irrit. 2A, H319	2-12%
CAS: 7439-98-7 RTECS: QA 4680000	Molybdenum	2-12%
CAS: 7439-89-6 RTECS: NO 4565500	Iron Flam. Sol. 2, H228; Skin Irrit. 2, H315; STOT SE 3, H335; Eye Irrit. 2B, H320; Combustible Dust	≤2.5%
CAS: 7439-96-5 RTECS: OO 9275000	Manganese Pyr. Sol. 1, H250; Water-react. 1, H260	≤2.5%
CAS: 7440-21-3	Silicon Flam. Sol. 2, H228; Acute Tox. 4, H302; Eye Irrit. 2B, H320; Combustible Dust	≤2.5%
CAS: 1303-96-4 RTECS: ED4588000	Borates, tetra, sodium salts, Anhydrous Repr. 1B, H360	≤2.5%
CAS: 7440-03-1 RTECS: QT9900000	Niobium Flam. Sol. 1, H228; Combustible Dust	≤2.5%
CAS: 7440-32-6 RTECS: XR 1700000	Titanium Skin Irrit. 2, H315; Skin Sens. 1, H317; Eye Irrit. 2B, H320	≤2.5%
CAS: 7440-48-4 RTECS: GF 8750000	Cobalt Resp. Sens. 1, H334; Carc. 2, H351; Skin Sens. 1, H317; Aquatic Chronic 4, H413; Combustible Dust	≤2.5%

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CAS: 7440-66-6	Zinc Aquatic Acute 1, H400; Aquatic Chronic 1, H410	≤2.5%
CAS: 7439-92-1 RTECS: OF 7525000	Lead Acute Tox. 2, H330; Carc. 2, H351; Repr. 1A, H360; Acute Tox. 4, H302	≤2.5%

· ***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 Copper and Copper-Alloy Bare Welding Rods and Electrodes 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:***
Supply fresh air. If required, provide artificial respiration. Consult doctor if symptoms persist.
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.
Induce vomiting and call for medical help.
If swallowed and symptoms occur, consult a doctor.
· ***Information for doctor***
· ***Most important symptoms and effects, both acute and delayed:***
Absorption of silver can lead to grayish blue discoloration of the skin.
· ***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.

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If incinerated, product will release the following toxic fumes: Oxides of aluminum, copper, silver, zinc, iron, manganese, nickel, silicon, boron/borates, tin, chromium, cobalt, lead, phosphorus and titanium.

· ***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:***
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” Code: SP, published by the American Welding Society.

6 Accidental Release Measures

· ***Personal precautions, protective equipment and emergency procedures:***
Ensure adequate ventilation.
Avoid contact with skin, eyes and clothing.

· ***Environmental precautions:***
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow to enter sewers/surface or ground water.

· ***Methods and material for containment and cleaning up:***
Dispose 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.

· ***Protective Action Criteria for Chemicals***

· ***PAC-1:***		
7440-50-8	Copper	3 mg/m³
7440-02-0	Nickel	4.5 mg/m³
7440-22-4	Silver	0.3 mg/m³
7440-47-3	Chromium Powder	1.5 mg/m³
7439-98-7	Molybdenum	30 mg/m³
7439-89-6	Iron	3.2 mg/m³
7439-96-5	Manganese	3 mg/m³
7440-21-3	Silicon	45 mg/m³
1303-96-4	Borates, tetra, sodium salts, Anhydrous	6 mg/m³
7440-03-1	Niobium	30 mg/m³
7440-32-6	Titanium	30 mg/m³
7440-48-4	Cobalt	0.18 mg/m³
7440-66-6	Zinc	6 mg/m³
7439-92-1	Lead	0.15 mg/m³
7723-14-0	Phosphorus	0.27 mg/m³

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· **PAC-2:**		
7440-50-8	Copper	33 mg/m³
7440-02-0	Nickel	50 mg/m³
7440-22-4	Silver	170 mg/m³
7440-47-3	Chromium Powder	17 mg/m³
7439-98-7	Molybdenum	330 mg/m³
7439-89-6	Iron	35 mg/m³
7439-96-5	Manganese	5 mg/m³
7440-21-3	Silicon	100 mg/m³
1303-96-4	Borates, tetra, sodium salts, Anhydrous	190 mg/m³
7440-03-1	Niobium	330 mg/m³
7440-32-6	Titanium	330 mg/m³
7440-48-4	Cobalt	2 mg/m³
7440-66-6	Zinc	21 mg/m³
7439-92-1	Lead	120 mg/m³
7723-14-0	Phosphorus	3 mg/m³

· **PAC-3:**		
7440-50-8	Copper	200 mg/m³
7440-02-0	Nickel	99 mg/m³
7440-22-4	Silver	990 mg/m³
7440-47-3	Chromium Powder	99 mg/m³
7439-98-7	Molybdenum	2,000 mg/m³
7439-89-6	Iron	150 mg/m³
7439-96-5	Manganese	1,800 mg/m³
7440-21-3	Silicon	630 mg/m³
1303-96-4	Borates, tetra, sodium salts, Anhydrous	1,100 mg/m³
7440-03-1	Niobium	2,000 mg/m³
7440-32-6	Titanium	2,000 mg/m³
7440-48-4	Cobalt	20 mg/m³
7440-66-6	Zinc	120 mg/m³
7439-92-1	Lead	700 mg/m³
7723-14-0	Phosphorus	18 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.
Open and handle receptacle with care.
Prevent formation of dust.

· **Information about protection against explosions and fires:** Keep protective respiratory device available.

· **Conditions for safe storage, including any incompatibilities**
Store away from strong acids, strong bases, strong oxidizing agents and strong reducing agents.

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· **Storage**
· **Requirements to be met by storerooms and receptacles:** Store in the original container.
· **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.

7440-50-8 Copper	
PEL	Long-term value: 1* 0.1** mg/m³ as Cu *dusts and mists **fume
REL	Long-term value: 1* 0.1** mg/m³ as Cu *dusts and mists **fume
TLV	Long-term value: 1* 0.2** mg/m³ *dusts and mists; **fume; as Cu
7440-02-0 Nickel	
PEL	Long-term value: 1 mg/m³
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
7440-22-4 Silver	
PEL	Long-term value: 0.01 mg/m³
REL	Long-term value: 0.01 mg/m³
TLV	Long-term value: 0.1 mg/m³ metal: dust and fume
7440-47-3 Chromium Powder	
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),**metal
7429-90-5 Aluminium	
PEL	Long-term value: 15*; 5** mg/m³ *Total dust; ** Respirable fraction
REL	Long-term value: 10* 5** mg/m³ as Al*Total dust**Respirable/pyro powd./welding f.
TLV	Long-term value: 1* mg/m³ as Al; *as respirable fraction

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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
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; *respirable **inhalable fraction
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
1303-96-4 Borates, tetra, sodium salts, Anhydrous	
REL	Long-term value: 5 mg/m³
TLV	Short-term value: 6* mg/m³ Long-term value: 2* mg/m³ *as inhalable fraction
7440-03-1 Niobium	
TWA	Long-term value: 6
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
7439-92-1 Lead	
PEL	Long-term value: 0.05* mg/m³ *see 29 CFR 1910.1025
REL	Long-term value: 0.05* mg/m³ *8-hr TWA ;See PocketGuide App.C
TLV	Long-term value: 0.05* mg/m³ *and inorganic compounds, as Pb; BEI

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· **Ingredients with biological limit values:**	
7440-48-4 Cobalt	
BEI	15 µg/L urine end of shift at end of workweek Cobalt (background) 1 µg/L blood end of shift at end of workweek Cobalt (background, semi-quantitative)
7439-92-1 Lead	
BEI	30 µg/100 ml blood not critical Lead 10 µg/100 ml blood not critical Lead (women of child bearing potential)

· ***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.
Store protective clothing separately.
Avoid contact with the eyes and skin.
· ***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:***

Protective gloves

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

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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:***

Goggles with 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:***
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:***
Keep away from drains, surface and ground waters.
Avoid release into the environment.

9 Physical and Chemical Properties

· ***Information on basic physical and chemical properties***
· ***General Information***
· ***Appearance:***

Form:	Solid Wire/Rod
Color:	Copper/bronze metallic color
· ***Odor:***	Odorless until used
· ***Odor threshold:***	Not determined.
· ***pH-value:***	Not applicable.
· ***Change in condition***	
Melting point/Melting range:	Not determined.
Boiling point/Boiling 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.

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· **Density:**
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.
· **Chemical stability:** Stable under normal conditions.
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions:** 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

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contain: aluminum, copper, silver, zinc, iron, manganese, nickel, silicon, boron/borates, tin, chromium, cobalt, lead, phosphorus and titanium. 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 200ºC 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, throat, or eyes.
- ALUMINUM OXIDE may cause irritation of the respiratory system.
- 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.
- COPPER may cause capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure.

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.
- 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.

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· COPPER may cause hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has led to hemolytic anemia and accelerates arteriosclerosis.

· ***Acute toxicity:***

· ***LD/LC50 values that are relevant for classification:***		
7440-22-4 Silver		
Oral	LD50	>5,000 mg/kg (Rat)
	LD50 Oral	100 ml/kg (Mouse)
7440-47-3 Chromium Powder		
Inhalative	LC50/96 hours	14.3 mg/l (Cyprinus carpio)
7429-90-5 Aluminium		
Oral	LD50	>2,000 mg/kg (Rat)
Inhalative	LC50/4 h	888 mg/l (Rat)
26038-87-9 Boric Acid salt		
Oral	LD50	1,580 mg/kg (Rat)
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)
7439-89-6 Iron		
Oral	LD50	7,500 mg/kg (Rat)
7439-96-5 Manganese		
Oral	LD50	9,000 mg/kg (Rat)
7440-21-3 Silicon		
Oral	LD50	3,160 mg/kg (Rat)
7440-03-1 Niobium		
Oral	Toxic Dose Low	>10,000,000 µg/kg (Mouse)
		>10,000,000 µg/kg (Rat)
7440-48-4 Cobalt		
Oral	LD50	6,170 mg/kg (Rat)
7440-66-6 Zinc		
Oral	LD50	>2,000 mg/kg (Rat)
Inhalative	LC50/4 h	>5,410 mg/l (Rat)
7439-92-1 Lead		
Inhalative	LC50/96 hours (static)	0.44 mg/l (Cyprinus carpio)
		1.17 mg/l (Oncorhynchus mykiss)

· ***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.

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· ***Subacute to chronic toxicity:***
Lead: Exposure can result in lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; encephalopathy; kidney disease; hypertension.

· ***Additional toxicological information:***
The product shows the following dangers according to internally approved calculation methods for preparations:
Harmful
Irritant
Symptoms of systemic copper poisoning may include: capillary damage, headache, cold sweat, weak pulse, and kidney and liver damage, central nervous system excitation followed by depression, jaundice, convulsions, paralysis, and coma. Death may occur from shock or renal failure. Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has lead to hemolytic anemia and accelerates arteriosclerosis.

· ***Carcinogenic categories:***

· ***IARC (International Agency for Research on Cancer):***
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 Powder	3
7440-48-4	Cobalt	2B
7439-92-1	Lead	2B

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

7440-02-0	Nickel	R
7440-48-4	Cobalt	R
7439-92-1	Lead	R

· ***OSHA-Ca (Occupational Safety & Health Administration):***
None of the ingredients are listed.

12 Ecological Information

· ***Toxicity:***

· ***Aquatic toxicity:***
Avoid release into the environment. Runoff from fire control or dilution water may cause pollution.

7440-50-8 Copper	
EC50	0.04-0.05 mg/l (Water flea)
7440-02-0 Nickel	
EC50	1 mg/l (Water flea)
7440-47-3 Chromium Powder	
EC50	0.07 mg/l (Water flea)
7439-96-5 Manganese	
EC50	40 mg/l (Water flea)

· ***Persistence and degradability:*** No further relevant information available.

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· **Behavior in environmental systems:**
· **Bioaccumulative potential:** No further relevant information available.
· **Mobility in soil:** No further relevant information available.
· **Ecotoxical effects:**
· **Remark:** Harmful to fish
· **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.
Harmful to aquatic organisms
· **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 garbage. 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.
· **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):**	
7723-14-0	Phosphorus

· **Section 313 (Specific toxic chemical listings):**	
7440-50-8	Copper
7440-02-0	Nickel
7440-22-4	Silver

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7440-47-3	Chromium Powder
7429-90-5	Aluminium
7439-96-5	Manganese
7440-48-4	Cobalt
7440-66-6	Zinc
7439-92-1	Lead
7723-14-0	Phosphorus

· **TSCA (Toxic Substances Control Act):**

All components have the value ACTIVE.

· **Hazardous Air Pollutants**

7439-96-5	Manganese
7440-48-4	Cobalt
7439-92-1	Lead
7723-14-0	Phosphorus

· **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
7440-48-4	Cobalt
7439-92-1	Lead

· **Chemicals known to cause reproductive toxicity for females:**

7439-92-1	Lead

· **Chemicals known to cause reproductive toxicity for males:**

7439-92-1	Lead

· **Chemicals known to cause developmental toxicity:**

7439-92-1	Lead

· **New Jersey Right-to-Know List:**

7440-50-8	Copper
7440-02-0	Nickel
7440-22-4	Silver
7440-47-3	Chromium Powder
7429-90-5	Aluminium
7439-98-7	Molybdenum
7439-96-5	Manganese
7440-21-3	Silicon
7440-32-6	Titanium
7440-48-4	Cobalt
7440-66-6	Zinc
7439-92-1	Lead
7723-14-0	Phosphorus

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· **New Jersey Special Hazardous Substance List:**		
7440-02-0	Nickel	CA
7440-22-4	Silver	F3
7440-47-3	Chromium Powder	F3
7429-90-5	Aluminium	F3, R1
7439-96-5	Manganese	F3, R1
7440-21-3	Silicon	F3
7440-32-6	Titanium	F3, R1
7440-48-4	Cobalt	CA, F3
7440-66-6	Zinc	F3, R1
7439-92-1	Lead	CA, TE
7723-14-0	Phosphorus	F4, R2

· **Pennsylvania Right-to-Know List:**	
7440-50-8	Copper
7440-02-0	Nickel
7440-22-4	Silver
7440-47-3	Chromium Powder
7429-90-5	Aluminium
7439-98-7	Molybdenum
7439-96-5	Manganese
7440-21-3	Silicon
1303-96-4	Borates, tetra, sodium salts, Anhydrous
7440-48-4	Cobalt
7440-66-6	Zinc
7439-92-1	Lead
7723-14-0	Phosphorus

· **Pennsylvania Special Hazardous Substance List:**		
7440-50-8	Copper	E
7440-02-0	Nickel	ES
7440-22-4	Silver	E
7440-47-3	Chromium Powder	ES
7429-90-5	Aluminium	E
7439-96-5	Manganese	E
7440-48-4	Cobalt	E
7440-66-6	Zinc	E
7439-92-1	Lead	E
7723-14-0	Phosphorus	E

· **Carcinogenic categories:**

· **EPA (Environmental Protection Agency):**		
7440-50-8	Copper	D
7440-22-4	Silver	D
7440-47-3	Chromium Powder	D

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Trade Name: Copper and Copper-Alloy Bare Welding Rods and Electrodes

7439-96-5	Manganese	D
1303-96-4	Borates, tetra, sodium salts, Anhydrous	I (oral)
7440-66-6	Zinc	D
7439-92-1	Lead	B2
7723-14-0	Phosphorus	D

· ***TLV (Threshold Limit Value established by ACGIH):***

7440-02-0	Nickel	A5
7440-47-3	Chromium Powder	A4
7429-90-5	Aluminium	A4
7439-98-7	Molybdenum	A3
1303-96-4	Borates, tetra, sodium salts, Anhydrous	A4
7440-48-4	Cobalt	A3
7439-92-1	Lead	A3

· ***NIOSH-Ca (National Institute for Occupational Safety and Health):***

7440-02-0	Nickel

· ***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
Boric Acid salt
Copper
Cobalt
Titanium
· ***Hazard statements:***
H302 Harmful if swallowed.
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.
H360 May damage fertility or the unborn child.
H335 May cause respiratory irritation.
H372 Causes damage to organs through prolonged or repeated exposure.
H402 Harmful to aquatic life.
H412 Harmful to aquatic life with long lasting effects.
· ***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.
P271 Use only outdoors or in a well-ventilated area.

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P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P284	[In case of inadequate ventilation] wear respiratory protection.
P301+P312	If swallowed: Call a poison center/doctor if you feel unwell.
P302+P352	If on skin: Wash with plenty of water.
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.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/container in accordance with local/regional/national/international regulations.

· ***National regulations:***

None of the ingredients are listed.

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

16 Other Information

SOWESCO 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 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 SOWESCO's 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.

· ***Date of last revision/ revision number:*** 09/26/2019 / 2

· ***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
ACGIH: American Conference of Governmental Industrial Hygienists
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
Flam. Sol. 1: Flammable solids – Category 1

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Flam. Sol. 2: Flammable solids – Category 2
Pyr. Sol. 1: Pyrophoric solids – Category 1
Water-react. 1: Substances and mixtures which in contact with water emit flammable gases – Category 1
Acute Tox. 4: Acute toxicity – Category 4
Acute Tox. 2: Acute toxicity – Category 2
Skin Irrit. 2: Skin corrosion/irritation – Category 2
Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A
Eye Irrit. 2B: Serious eye damage/eye irritation – Category 2B
Resp. Sens. 1: Respiratory sensitisation – Category 1
Skin Sens. 1: Skin sensitisation – Category 1
Carc. 2: Carcinogenicity – Category 2
Repr. 1A: Reproductive toxicity – Category 1A
Repr. 1B: Reproductive toxicity – Category 1B
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1
STOT RE 2: Specific target organ toxicity (repeated exposure) – Category 2
Aquatic Acute 1: Hazardous to the aquatic environment - acute aquatic hazard – Category 1
Aquatic Acute 3: Hazardous to the aquatic environment - acute aquatic hazard – Category 3
Aquatic Chronic 1: Hazardous to the aquatic environment - long-term aquatic hazard – Category 1
Aquatic Chronic 3: Hazardous to the aquatic environment - long-term aquatic hazard – Category 3
Aquatic Chronic 4: Hazardous to the aquatic environment - long-term aquatic hazard – Category 4

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