SAFETY DATA SHEET (SDS)

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REVISED 9-2018
SDS Number : **041**- COPPER

For Welding Consumables and Related Products
Conforms to the criteria of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS),
OSHA Hazard Communication Standard 29CFR 1910.1200
Standard Must Be Consulted for Specific Requirements

SECTION I – IDENTIFICATION of Product and Company

Manufacturer/Supplier: Washington Alloy Company	Recommended use: Braze or Gas and Arc Welding	Restriction on use: Not Known	Telephone No: 704-598-1325
Address: 7010-G Reames Rd , Charlotte, NC 28216			Emergency No: 704-598-1325
Trade Name:		Specification	Classification
Phos-Bronze A, Rainier 3A, Rainier 4A, Rainier 5A, Rainier 6A, Alloy 187, Rainier 40, Rainier 46		AWS A5.6	ECuSn-A, ECuSn-C, ECu, ECuAl-A2, ECuSi, ECuNi, ECuMnNiAl, ECuNiAl,
Silicon Bronze, Deox Copper, Phos-Bronze A, Phos-Bronze C, Aluminum Bronze A-1, Aluminum Bronze A-2, Aluminum Bronze A-3, Nickel-Aluminum Bronze, Manganese-Nickel-Aluminum, Alloy 67		AWS A5.7	ERCuSi-A, ERCu, ERCuSn-A, ERCuSn-C, ERCuAl-A1, ERCuAl-A2, ERCuAl-A3, ERCuMnNiAl ERCuNiAl, ERCuNi
Nickel Bronze, Low Fuming Bronze, Nickel Silver, Naval Bronze		AWS A5.8	RBCuZn-B, RBCuZn-C, RBCuZn-D, RBCuZn-A
Beryllium Copper or BE-CU		CDA	C17200

SECTION II – COMPOSITION / INFORMATION ON INGREDIENTS

GHS Hazard Classification: / **Signal word**: Danger / **Label Elements** –

Sensitization, skin:	Category 1
Carcinogenicity:	Category 1
Specific target organ toxicity: (repeated exposure)	Category 1 (Respiratory system)

Hazard statement = May cause cancer by inhalation. May cause allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Causes damage to organs (respiratory system) through prolonged or repeated exposure. **Precautionary statement:** Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Do not breathe dust/fume. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation wear respiratory protection.
Response: Skin: Wash with plenty of water. Inhaled: Remove person to fresh air and keep comfortable for breathing. Exposed or concerned: Call a poison center/doctor. Skin irritation/rash: Get medical advice/attention. If experiencing respiratory symptoms: Call a poison center/doctor. Wash contaminated clothing before reuse.
Other Hazards which do not result in GHS classification and Overview: Electric shock can kill. Wear approved head, hand and body protection, which help to prevent injury from radiation, sparks and electrical shock. Welding arc and sparks can ignite combustibles or flammable materials. See ANSI Z-49.1. 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 substantial clothing. Welders should be trained not to allow electrically live parts to contract the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground. Arc Rays can injure eyes and burn skin. Read and understand the manufacturer's instructions and precautionary label on this product and your employer's safety practices. See Section XIII.
As shipped these are odorless, flux cored wires that are nonflammable, non-explosive, non-reactive and non –hazardous and may be copper coated.
Substance: Welding fumes and gases cannot be classified simply. The composition and quantity of these fumes and gases are dependent upon the metal being welded, the procedures followed and the electrodes used. Fumes may affect eyes, skin, respiratory system as well as pancreas and liver.
Workers should be aware that the composition and quantity of fumes and gases to which they may be exposed, are influenced by: coatings which may be present 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, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing procedure). When the filler is consumed, the fumes and gas decomposition products generated are different in percent and form from the ingredients listed in Section III, The composition of these fumes and gases are the concerning matter and not the composition of the electrode itself. Decomposition products include those originating from the volatilization, reaction, or oxidation of the ingredients shown in Section III, plus those from the base metal, coating and the other factors noted above.
Reasonable expected fume constituents of this product may include: Complex oxides or compounds of iron, manganese, silicon, copper, aluminum, titanium. (Other complex oxides may be present when using fluxes).

Chemical Identity	CAS No.	EINECS#
Carbon dioxide	124-38-9	204-696-9
Calcium Fluoride	7789-75-5	232-188-7
Carbon monoxide	630-8-0	211-128-3
Nitrogen dioxide	10102-44-0	233-272-6
Ozone	10028-15-6	233-069-2
Manganese (Mn)	7439-96-5	231-105-1
Nickel (Ni)	7440-02-0	231-111-4
Chromium oxide	1308-38-9	215-160-9

SECTION III – COMPOSITION / INFORMATION ON INGREDIENTS

*The term "HAZARDOUS MATERIALS" should be interpreted as a term required and defined in OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 however the use of this term does not necessarily imply the existence of any hazard.

Chemical Identity Ingredients	CAS No.	EINECS#	Chemical Identity Ingredients	CAS No.	EINECS#
Iron (Fe) (limits as oxide fume)	7439-89-6	231-096-4	Tin (Sn)	7440-31-5	231-141-8
Manganese (Mn) (limits as fume)	7439-96-5	231-105-1	Nickel (Ni)	7440-02-0	231-111-4
Silicon (Si)	7440-21-3	231-130-8	Copper (Cu)	7440-50-8	231-159-6
Zinc (Zn) Fume[(1)]	7440-66-6	231-175-3	Lead (Pb)	7439-92-1	231-100-4
Aluminum (Al)	7429-90-5	231-072-3	Phosphorous (yellow)	7723-14-0	231-768-7
Titanium	7440-32-6	231-142-3	Beryllium	7440-41-7	231-150-7

Chemical Composition Percent by Weight

AWS Classification	Cu	Ag	Zn	Sn	Fe	Mn	Ni	P	Pb	Al	Si	OTHERS
AWS A5.8												
RBCuZn-A	**57.0-61.0**		**BALANCE**	**0.25-1.00**					**0.05**	**0.01**		
RBCuZn-B	**56.0-60.0**		**BALANCE**	**0.80-1.10**	**0.25-1.20**	**0.01-0.50**	**0.20-0.80**		**0.05**	**0.01**	**0.04-0.20**	
RBCuZn-C	**56.0-60.0**		**BALANCE**	**0.80-1.10**	**0.25-1.20**	**0.01-0.50**			**0.05**	**0.01**	**0.04-0.15**	
RBCuZn-D	**46.0-50.0**		**BALANCE**				**9.0-11.0**	**0.25**	**0.05**	**0.01**	**0.04-0.25**	
AWS A5.7												
ERCu	**98.0 MIN.**			**1.0**		**0.50**		**0.15**	**0.02**	**0.01**	**0.50**	
ERCuSi-A	**Balance**		**1.0**	**1.0**	**0.50**	**1.5**				**0.01**	**0.02**	
ERCuSn-A	**Balance**			**4.0-6.0**				**0.10-0.35**		**0.01**	**0.02**	
ERCuSn-C	**Balance**		**0.20**	**7.0-9.0**	**0.10**			**0.10-0.35**		**0.01**	**0.02**	
ERCuNi	**Balance**				**0.40-0.75**	**1.0**	**29.0-32.0**	**0.02**	**0.02**	**0.01**	**0.25**	**Ti=0.20-0.50**
ERCuAl-A1	**Balance**		**0.20**			**0.50**			**0.02**	**6.0-8.5**	**0.10**	
ERCuAl-A2	**Balance**		**0.02**		**0.5-1.5**				**0.02**	**8.5-11.0**	**0.10**	
ERCuAl-A3	**Balance**		**0.10**		**2.0-4.5**				**0.02**	**10.0-11.5**	**0.10**	
ERCuNiAl	**Balance**		**0.10**		**3.0-5.0**	**0.60-3.50**	**4.0-5.5**		**0.02**	**8.50-9.50**	**0.10**	
ERCuMnNiAl	**Balance**		**0.15**		**2.0-4.0**	**11.0-14.0**	**1.5-3.0**		**0.02**	**7.0-8.5**	**0.10**	
AWS A5.6												
ECu	**Balance**				**0.20**	**0.10**			**0.01**	**0.10**	**0.10**	
ECuSi	**Balance**			**1.5**	**0.50**	**1.5**			**0.02**	**0.01**	**2.4-4.0**	
ECuSn-A	**Balance**			**4.0-6.0**	**0.25**			**0.05-0.35**	**0.02**	**0.01**		
ECuSn-C	**Balance**			**7.0-9.0**	**0.25**			**0.05-0.35**	**0.02**	**0.01**		
ECuNi	**Balance**				**0.40-0.75**	**1.00-2.50**	**29.0-33.0**	**0.020**	**0.02**		**2.4-4.0**	**Ti =0.50**
ECuAl-A2	**Balance**				**0.50-5.0**				**0.02**	**6.5-9.5**	**1.5**	
ECuNiAl	**Balance**				**3.0-6.0**	**0.50-3.5**	**4.0-6.0**		**0.02**	**8.0-9.5**	**1.5**	
ECuMnNiAl	**Balance**				**2.0-4.0**	**11.0-14.0**	**1.5-3.0**		**0.02**	**6.0-8.5**	**1.5**	
CDA												
Beryllium Copper or Be-CU	**Balance**	**(Ag)**			**(Co)**		**(Co)**			**0.20**	**0.20**	**Be=2.00**

Single values are max, :**(Ag) included with copper: (Co) Ni + Co 0.20% min.: Ni + Fe + Co 0.6% max.**

Flux coating ingredients for AWS A5.6 items listed below - not included in above weld metal percent

Chemical Identity	% by Weight	CAS No.	EINECS#	Chemical Identity	% by Weight	CAS No.	EINECS#
Calcium Carbonate	< 7.5	1317-65-3	215-279-6	**Potassium Silicate**	< 2.0	1312-76-1	233-001-1
Calcium Fluoride	< 60.0	7789-75-5	232-188-7	**Sodium Silicate**	< 28.0	1344-09-8	239-981-7
Mica	< 6.0	12001-26-2	215-479-3	**Titanium Dioxide**	< 1.0	13463-67-7	236-675-5
Feldspar	< 4.5	68476-25-5	270-666-7	**Potassium Oxide**	< 2%	12136-45-7	235-227-6
Quartz (Amorphous Silica Fume)	< 1.0	14808-60-7 (69012-64-2)	238-878-4 (273-761-5)	**Bentonite**	< 2%	1302-78-9	215-108-5

If coated = Flux coating ingredients for AWS A5.7 items listed below - not included in above weld metal percent

Chemical Identity	% by Weight	CAS No.	EINECS#	Chemical Identity	% by Weight	CAS No.	EINECS#
Boric Acid (1)	55-75	10043-35-3	233-139-2	Borax Glass, Anhydrous (1)	15-25	1303-96-4	215-540-4
Acrylic Copolymer (non-haz) (1)	< 5.3	none found	none found	Residual Monomer (non regst) (1)	< 5.3	none found	none found

Other elements or ingredients may be present but in quantities much less than 1%.[(1)] Subject to reporting requirements of Section 302, 304, 311, 312, and 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and 40CFR 370 and 372; (Resp) = Respiratory/ Respiration: Welding and cutting of products that contain Chromium may produce hexavalent chromium and YOU should read and follow OSHA's final rules Fed Register #:71:10099-10385 dated 02-28-2006. Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[R]). *Ceiling Limit **Short Term Exposure Limit

SECTION IV – FIRST AID MEASURES

Contact with skin, eyes, ingestion or injection should not be a source for exposure with proper protection.

Ingestion: Avoid contact with metal fume or powers which may lead to ingestion seek medical advice immediately and show this container or label. Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Inhalation: If breathing has stop or difficult move to fresh air and as needed perform artificial respiration. Call medical assistance or physician.

Skin Contact: Remove any contaminated clothing, gloves or other personnel equipment and promptly wash/flush with mild soap and water. For reddish or blistered skin from thermal/arc radiation promptly wash/flush with water. Get medical assistance or physician help as needed.

Eye Contact: Arc radiation can injure eyes and also cause an arc flash – if this occurs, move to dark room removing lenses as required and get rest and cover eyes with non-stick dressings (padded dressing) Removal of dust and fumes requires flushing with abundant amounts of clean water for at least 15 minutes. Get medical assistance or physician help as needed or if issues persist. **Most important symptoms/effects, acute and delayed:** May cause allergic skin reaction. May cause allergic respiratory reaction. Prolonged exposure may cause chronic effects. **Symptoms:** Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, dryness or irritation of nose, throat, or eyes. Pre-existing respiratory issues may be aggregated. Long-term (chronic) over-exposure to welding fumes can lead to siderosis (iron deposits in lung) and is believed to affect pulmonary function. Manganese and Manganese compounds above safe exposure limits can affect or cause irreversible damage to the central nervous system, including the brain: symptoms may result in impaired speech and movement, lack of energy, stiffness in legs, feet, toes, muscular weakness as well as psychological disturbances. Reports of bronchitis and lung fibrosis have also been noted. **Hazards:** Welding fumes and gases cannot be classified simply. Refer to Section II under Substance **OTHER supplemental general information:** If exposed or concerned: get medical attention/advice. Get medical attention if symptoms occur. Wash contaminated clothing before reuse. As supplied, there is no immediate medical risk with beryllium products in article form. First aid measures provided are related to particulate containing beryllium. Treatment of Chronic Beryllium Disease: There is no known treatment which will cure chronic beryllium disease. Prednisone or other corticosteroids are the most specific treatment currently available. They are directed at suppressing the immunological reaction and can be effective in diminishing signs and symptoms of chronic beryllium disease. In cases where steroid therapy has had only partial or minimal effectiveness, other immunosuppressive agents, such as cyclophosphamide, cyclosporine, or methotrexate, have been used. In view of the potential side effects of all the immunosuppressive medications, including steroids such as prednisone, they should be used only under the direct care of a physician. Other treatment, such as oxygen, inhaled steroids or bronchodilators, may be prescribed by some physicians and can be effective in selected cases. In general, treatment is reserved for cases with significant symptoms and/or significant loss of lung function. The decision about when and with what medication to treat is a judgment situation for individual physicians. In their 2014 official statement on the Diagnosis and Management of Beryllium Sensitivity and Chronic Beryllium Disease, the American Thoracic Society states that "it seems prudent for workers with BeS to avoid all future occupational exposure to beryllium."

SECTION V – FIRE-FIGHTING MEASURES

As shipped these are odorless, wires or rods which may have a flux coating that are nonflammable, non-explosive, non-reactive and non –hazardous. Welding arcs and sparks can ignite combustibles or flammable materials Read and understand the manufacturer's instructions and precautionary label on this product and your employer's safety practices. Read and understand: American National Standard ANSI Z49.1 *Safety in Welding, Cutting and Allied Processes*, published by the AMERICAN WELDING SOCIETY, 550 N.W. LeJeune Road, Miami, Florida 33126; OSHA *Safety and Health Standards* are published by the U.S. Government Printing Office, 732 North Capitol Street NW, Washington, DC 20401. Also National Fire Protection Association NFPA 51B, *Standard for Fire Prevention During Welding, Cutting and other Hot Work* **Suitable (and unsuitable) extinguishing media:** As shipped these items will not burn however in the event use media recommended for the burning materials and fire situation and surroundings. Do not use water to extinguish fires around operations involving molten metal due to the potential for steam explosions. No unsuitable media known at this time. **Specific hazards arising from the chemicals:** Welding arcs and sparks can ignite combustibles or flammable materials. **Specific protective equipment and precautions for firefighters:** Wear self-contained breathing apparatus and full protective clothing in case of fire or when fumes and vapors are present. Follow general fire-fighting precautions as in the workplace.

SECTION VI – ACCIDENTAL RELEASE MEASURES

Personal Precautions, protective equipment and emergency procedures: With airborne dust and fumes be sure to use adequate engineering ventilation controls and personal protection to prevent overexposure limits recommendations found in Section VIII.

Environment precautions: Control work practices to eliminate environmental release. These products are metal cord wire, with no spill or leak hazards as shipped. If product becomes molten dam up with sand type media until it cools back to a solid and reuse/recycle as scrap.

Methods and Materials for containment and cleaning up: Cored wire can be picked up and placed back in/on the original container. Clean up immediately while following all safety guidelines as well as using all personal protection safety listed in section VIII. Avoid generating dust and prevent materials from entering and drains, sewers or water sources. Disposal considerations found in Section XIII.

When fumes and vapors are present. Follow general fire-fighting precautions as in the workplace.

SECTION VII – HANDLING AND STORAGE

Precautions for safe handling: Handle with care wearing gloves and keep formation of airborne dust and fumes to a minimum. If needed use adequate engineering ventilation controls and personal protection to prevent overexposure limits recommendations found in Section VIII. Also read American National Standard ANSI Z49.1 *Safety in Welding, Cutting and Allied Processes*, published by the AMERICAN WELDING SOCIETY, 550 N.W. LeJeune Road, Miami, Florida 33126; OSHA *Safety and Health Standards* are published by the U.S. Government Printing Office, 732 North Capitol Street NW, Washington, DC 20401. Do not eat or drink while using these products and ensure proper ventilation is used. Wash hands after use. **Conditions for safe storage, including any incompatibilities:** Store locked up. All employees who handle these products should be trained to handle it safely. Open packages of these products/containers on a safe stable surface and must be properly labeled at all times. Store products in original closed packages, cool dry place, while avoiding extreme temperatures or incompatible items such as acids, oxidizers and halogens. Always follow all regulations in accordance with local/regional/state/national guidelines.

SECTION VIII – EXPOSURE CONTOLS/PERSONAL PROTECTION

Control parameters

Flux or other ingredients	CAS No.	EINECS#	Exposure Limit (mg/m^3)		
			OSHA PEL	ACGIH TLV	NIOSH REL
Iron (Fe) (limits as oxide fume)	7439-89-6	231-096-4	10	5 (Resp)	5.0
Tin, metal	7440-31-5	231-141-8	2	2	2
Manganese (Mn) (limits as fume) (1)	7439-96-5	231-105-1	1 , 3.0** , 5*	0.02 (Resp) 0.1***	1.0, 3.0**
Silicon (Si)	7440-21-3	231-130-8	15 (dust) 5 (Resp)	WITHDRAWN	5 (Resp) 10 (TOTAL)
Copper (Cu) (1)	7440-50-8	231-159-6	1 (dust) 0.1(fume)	1 (dust) 0.2 (fume)	1.0
Beryllium	7440-41-7	239-981-7	0.002, 0.005 Ceiling, 0.025 for 30 minutes	0.00005***	Ceiling 0.0005 mg/m3
Zinc (Zn) Fume(1)	7440-66-6	231-175-3	5 mg/m3 5 mg/m3 (Resp) 15 mg/m3 (total dust)	2 (Resp)10**	5(fume, dust) 10**
Nickel (Ni) (1)	7440-02-0	231-111-4	1	1.5 (inhalable fraction)	0.015
Phosphorous (yellow)	7723-14-0	231-768-7	0.1	0.1	0.1
Lead (Pb)	7439-92-1	231-100-4	0.05	0.05	0.1
Titanium (Ti) Oxide dust (1) (2)	7440-32-6	231-142-3	15(total particulate) 5 (Resp)	10, 20**	NA
Aluminum (Al) (1) (2)	7429-90-5	231-072-3	15 (total dust) 5 (Resp)	10 (dust)1 (Resp)	15 (total dust) 5 (Resp)
Potassium Silicate	1312-76-1	215-199-1	NA	NA	NA
Sodium Silicate	1344-09-8	239-981-7	NA	NA	NA
Bentonite	1302-78-9	215-108-5	NA	NA	NA
Calcium Carbonate	1317-65-3	215-279-6	15(total dust) 5 (Resp)	3 (Resp)	10(total dust) 5 (Resp)
Calcium Fluoride	7789-75-5	232-188-7	2.5	2.5	2.5
Mica	12001-26-2	215-479-3	2 , 3(Resp) (dust)	3 (Resp)	6(total dust) 3 (Resp)
Titanium Dioxide	13463-67-7	236-675-5	15(total dust)	10	Lowest feasible
Potassium Oxide	12136-45-7	235-227-6	10(total particulate) 5 (Resp)	15(total dust) 3 (Resp)	Lowest feasible
Boric Acid ***	10043-35-3	233-139-2	NA	2, 6**	NA
Acrylic Copolymer (non-haz)	None found	None found	NA	NA	NA
Borax Glass, Anhydrous ***	1303-96-4	215-540-4	NA	2, 6**	NA
Residual Monomer (non regst)	None found	None found	NA	NA	NA
Feldspar	68476-25-5	270-666-7	NA	NA	NA
Carbon dioxide (ppm values)	124-38-9	204-696-9	5,000	5,000 , 30,000**	5,000 , 30,000**
Carbon monoxide (ppm values)	630-8-0	211-128-3	50	25	35, 200*
Nitrogen dioxide (ppm values)	10102-44-0	233-272-6	5	0.2	1** ,
Ozone (ppm values)	10028-15-6	233-069-2	0.1	0.05	0.1*
Quartz (Amorphous Silica Fume)	14808-60-7 (69012-64-2)	238-878-4 (273-761-5)	0.3(total dust)	0.025 (Resp)	0.5(Resp)

US. California Code of Regulations, Title 8, Section 5155. Airborne Contaminants Beryllium (CAS 7440-41-7) Ceiling 0.025 mg/m3

ACGIH BEL BIOLOGICAL EXPOSURE LIMITS: FLUORIDES in urine (creatinine) Prior to shift 3 mg/g & End of shift 10 mg/g In January 2017, OSHA issued a comprehensive occupational health standard for beryllium which includes a Permissible Exposure Limit (PEL) of 0.2 µg/m3 as an 8-hour TWA. In its evaluation, OSHA concluded that "despite the reduction in risk expected with the new PEL, the risks of chronic beryllium disease and cancer to workers with average exposure levels of 0.2 µg/m3 are still clearly significant." (Preamble to Final Rule, Occupational Exposure to Beryllium, Docket #OSHA-H005C-2006-0870, at 316.)Other elements or ingredients may be present but in quantities much less than 1%.(1) Subject to reporting requirements of Section 302, 304, 311, 312, and 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and 40CFR 370 and 372; (Resp) = Respiratory/ Respiration: (C) TLV & PEL for water soluble Cr. III and Cr. VI , Welding and cutting of products that contain Chromium may produce hexavalent chromium and YOU should read and follow OSHA's final rules Fed Register #:71:10099-10385 dated 02-28-2006. Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[R]).*Ceiling Limit**Short Term Exposure Limit***Inhalable fraction (SC) = Soluble compounds **ACGIH - A**merican **C**onference of **G**overnmental **I**ndustrial **H**ygienists, a professional association which establishes exposure limits used a guideline in control for health hazards but not an indication of safe and dangerous exposure limits **TLV - Threshold Limit Value** - an airborne concentration of a substance, which represents conditions under which it is generally believed that nearly all workers, may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour & **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.**OSHA** - U.S. Occupational Safety and Health Administration. **PEL - Permissible Exposure Limit** - this exposure value means the same as a TLV, except that it is limits guideline by OSHA.

Eye Protection: Wear a helmet or face shield with a filter lens shade number 12-14 or darker for arc welding. Shield other workers by providing screens and flash goggles. Use face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting").

Protective Clothing: Wear approved head, hand and body protection, which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. 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 substantial clothing. Welders should be trained not to allow electrically live parts to contract the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground.

Ventilation: Use plenty of ventilation and/or local exhaust at the arc/flame, to keep the fumes and gases below the threshold limit value within the worker's breathing zone and the general work area. Welders should be advised to keep their head out of the fumes.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in a confined space or general work area where local exhaust and/or ventilation does not keep exposure below the threshold limit value.

HYGIENE/ WORK PRACTICES: With all chemicals/materials, avoid getting these products ON YOU or IN YOU. Wash hands after handling these products. Do not eat or drink while handling these products. Use ventilation and other engineering controls to minimize potential exposure to these products.

COPPER BERYLLIUM ALLOYS: DANGER! INHALING DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR FROM EXPOSURE TO METAL FUME. POTENTIAL CANCER HAZARD.

SECTION IX – PHYSICAL AND CHEMICAL PROPERTIES

Appearance / Color / Odor / Physical state / Form: Copper, bronze to gray round welding rods that are odorless and maybe flux coated varying in color
Odor Threshold / pH / Flash Point / Evaporation Rate / Flammability (Solid, Gas) / Upper & Lower Flammability or Explosive Limits: No data available
Vapor Pressure & Density / Relative Density / Solubility(water/other) / Partition coefficient (n-octanol/water) / Auto-ignition Decomposition temperature : No data available

SECTION X – STABILITY and REACTIVITY

Chemical stability: These products are considered stable as shipped and under normal conditions
Possibility of hazard reactions: No data and will not occur **Conditions to avoid:** Avoid exposure to extreme temperatures, Incompatible materials, dust
Incompatible materials: Incompatible items such as acids, oxidizers and halogens Strong acids, strong oxidizers, mineral acids, and halogens.
Hazardous decomposition products: Read Substance in Section II. Welding and cutting of products that contain Chromium may produce hexavalent chromium and YOU should read and follow OSHA's final rules Fed Register #:71:10099-10385 dated 02-28-2006. Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). The best method to determine the actual composition of generated fumes and gases is to take an air sample from inside the welder's helmet if worn or in breathing zone. For additional information, refer to the American Welding Society Publication, "Fumes and Gases in the Welding Environment".

SECTION XI- TOXICOLOGICAL INFORMATION

Oral/Dermal/inhalation Iron: (Human-child); TDLo: 77 mg/kg. Oral (rat); LD50:30 gm/kg. Intraperitoneal (rabbit); LDLo: 20 mg/kg. Oral (guinea pig); LD50:20 gm/kg. Oral (rat); TDLo: 63 gm/kg/6W-C. Inhalation (rat); 250 mg/m3/6H/4W-I. Intratracheal (rat); TDLo: 450 mg/kg/15W-I. Silicon: Acute oral toxicity (LD50): 3160 mg/kg [Rat]. Borax Glass, Anhydrous: Dermal LD50 (rabbit) >10000 mg/kg. Boric acid: Acute oral toxicity (LD50): 2660 mg/kg [Rat] Dermal LD50 (rabbit) >2000 mg/kg. Copper: Acute oral LD50:481 mg/kg (rat). Zinc: Acute oral LD50:630 mg/kg (rat). Chromium (IV) Acute oral toxicity LD 50 (Rat): 27-59 mg/kg Inhalation (Rat 4h): 33-70 mg/m^3. Manganese: Acute oral toxicity (LD50): 9000 mg/kg [Rat]. Fluoride (as F): Acute oral LD50:4250 mg/kg (rat); Sodium Silicate: Acute oral LD50:1.1 g/kg (rat). Potassium Silicate: Acute oral LD50:1500 g/kg (rat) Inhalation LC50 (rat) >2.06 g/m^3 Dermal LD50 (rat) >5000 mg/kg. Calcium Carbonate: Acute oral LD50:6450 mg/kg (rat); **Skin corrosion or irritation / Serious eye damage or irritation / Respiratory or skin sensitization / Germ cell mutagenicity / Reproductive toxicity / Specific target organ toxicity – single exposure / Specific target organ toxicity – repeated exposure**: Not classified **Carcinogenicity:** Arc Rays can injure eyes and burn skin. Skin cancer has been reported. **Information on the likely routes of exposures: Ingestion** is not a likely route of exposure for this product or expected under normal use. If swallowed call physician immediately! Do not induce vomiting unless directed by medical personnel. Rinse mouth with water if person is conscious. Never give fluids or induce vomiting if person is unconscious, having convulsions, or not breathing. **Inhalation** of welding fumes and gases can be dangerous to your health. BERYLLIUM AND COMPOUNDS May cause sensitization by inhalation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause damage to organs (respiratory system) through prolonged or repeated exposure Symptoms Respiratory disorder. **Skin/Eye Contact:** Arc Rays can injure eyes and burn skin. Skin cancer has been reported**.** BERYLLIUM AND COMPOUNDS May cause an allergic skin reaction. **International Agency for Research on Cancer IARC**- has classified welding fumes, & Nickel as a possible carcinogenic to humans (Group 2B). Beryllium (CAS 7440-41-7) 1 Carcinogenic to humans. Borax Glass Anhydrous, Boric Acid & Manganese as a (Group A4) Not Classifiable as a human carcinogen. Quartz & Chromium (IV) evaluation as carcinogenic to humans (Group1). Calcium Fluoride & Chromium oxides evaluation, not classified as to carcinogenicity to humans (Group 3). **National Toxicology Program** (NTP) list Beryllium (CAS 7440-41-7) Known To Be Human Carcinogen,. Nickel with Reasonably Anticipated to be a Human Carcinogen; Quartz & Chromium (IV) known to be human carcinogen. **OSHA Specifically Regulated Substances** Chromium (IV) Cancer; Symptoms **related to physical, chemical and toxicological characteristics: Inhalation:**

.Chromium (IV) and compounds pose a cancer risk to humans; liver damage, allergic and skin rash have been reported. Nickel and compounds pose a respiratory cancer risk, and may give skin itch to dermatitis. Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, dryness or irritation of nose, throat, or eyes. Pre-existing respiratory issues may be aggregated. Long-term (chronic) over-exposure to welding fumes can lead to siderosis (iron deposits in lung) and is believed to affect pulmonary function. Manganese and Manganese compounds above safe exposure limits can affect or cause irreversible damage to the central nervous system, including the brain: symptoms may result in impaired speech and movement, lack of energy, stiffness in legs, feet, toes, muscular weakness as well as psychological disturbances. Reports of bronchitis and lung fibrosis have also been noted. Copper and copper alloy compounds has effects with GASTRO-INTESTINAL system. **Delayed and immediate effects and also chronic effects from short and long term exposure:** There are no immediate health hazards associated with the wire or rod form of this product. Skin, respiratory, pancreas, and liver disorders may be aggravated by prolonged over-exposures to the dusts or fumes generated by these products. Pre-existing respiratory issues may be aggregated. Long-term (chronic) over-exposure to welding fumes can lead to siderosis (iron deposits in lung) and is believed to affect pulmonary function. Manganese and Manganese compounds above safe exposure limits can affect or cause irreversible damage to the central nervous system, including the brain: symptoms may result in impaired speech and movement, lack of energy, stiffness in legs, feet, toes, muscular weakness as well as psychological disturbances. Reports of bronchitis and lung fibrosis have also been noted. Treat symptoms and eliminate overexposure. **Other information during use**: **Inhalation acute toxicity**: Carbon dioxide LC Lo (Human, 5 min): 90000 ppm, Carbon monoxide LC 50 (Rat, 4 h): 1,300 mg/l, Nitrogen dioxide LC 50 (Rat, 4 h): 88 ppm, Ozone LC Lo (Human, 30 min): 50 ppm, Information on toxicological effects;
Acute toxicity May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause allergic skin reaction. May be Harmful in contact with eyes. ACGIH: BERYLLIUM AND COMPOUNDS, SOLUBLE AND INSOLUBLE COMPOUNDS, AS BE, INHALABLE FRACTION (CAS 7440-41-7) may cause respiratory sensitization and allergy or asthma symptoms or breathing difficulties if inhaled. Also rated Carcinogenicity or Cancer hazard.

SECTION XII- TOXICOLOGICAL INFORMATION

Ecotoxicity / Persistence and Degradability / Bioaccumulative Potential / Mobility in Soil: Acute; Fish /Aquatic *Invertebrates* Aquatic *Environment* = Iron= LC50 Channel catfish (Ictalurus punctatus) > 500 mg/l, 96 hours**; Nickel** LC50 Fathead minnows (Pimephales promelas) 2.916 mg/l, 96 hours**,** *EC50 Water flea* (Daphnia obtusa) 1 mg/l, 48 hours **; Copper** LC50 Fathead minnows (Pimephales promelas) 1.6 mg/l, 96 hours**,** *EC50 Water flea* (Daphnia magna) 0.102 mg/l, 48 hours **; Zinc** *EC50 Water flea* (Daphnia magna) 2.8 mg/l, 48 hours, LC50 Rainbow trout, Donaldson trout (Oncorhynchus mykiss) 0.56 mg/l, 96 hours **;Boric Acid** LC 50 (Razorback sucker (Xyrauchen tezanus), 96 h) > 100 mg/l, **; Sodium silicate** LC 50 (Western mosquitofish (Gambusia affinis), 96 h): 1,800 mg/l, *EC50 (Water flea (Ceriodaphnia dubia)*, 48 h): 22.94 - 49.01 mg/l ; **Manganese** = *EC 50 (Water flea* (Daphnia magna), 48 h): 40 mg/l; **Potassium Silicate** = EC50 *Daphnia magna (Daphnia)* > 146 mg/L, 48-hr; **Sodium Silicate**; EC50 *Daphnia magna (Daphnia)* = 216 mg/L, 96-hr ; **Bentonite** LC 50 (Rainbow trout, donaldson trout (Oncorhynchus mykiss), 96 h): 19,000 mg/L ; 48-hr EC50 > 146 mg/L, ***Environment-Toxicity to Aquatic Plants*** *LC50(green algae (scenedesmus dimorphuis) 3 days) 0.0623 mg/l*, **Persistence and Degradability / Mobility in Soil:** No data **Bioaccumulative Potential Accumulation/**The product contains potentially bioaccumulating substances. **Bioaccumulative Potential Bioconcentration Factor (BCF)** Product: No data available. **Specified substance(s):** Nickel Zebra mussel (Dreissana polymorpha), Bioconcentration Factor (BCF): 5,000 – 10,000 (lotic) Biocencentration factor calculated using dry weight tissue concentration: Copper and/or copper alloys and compounds (as Cu) Blue-green algae (Anacystis nidulans), Bioconcentration Factor (BCF): 36.01 (Static); compounds (as Co) Brown shrimp (Penaeus aztecus), Bioconcentration Factor (BCF) : >2,250 -<2,500 (Static)
Other Adverse Effects: Possibly harmful to aquatic life. Do not allow material to be released to the environment without proper governmental permits. No further relevant information available.

SECTION XIII- DISPOSAL CONCIDERATIONS

Disposal Methods: Avoid or minimize generating waste**.** When possible collect scrap and by-products with proper id for recycling. Waste disposal must be in accordance with appropriate Federal, National, Provincial, State, and local regulations. These products, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

SECTION XIV- TRANSPORT INFORMATION

UN Number / UN Proper shipping name / Transport Hazard class (es)/ Packing group / Marine pollutant / Special Precautions: Not Regulated as Dangerous Good or Not Regulated, No international regulations

SECTION XV- REGULATORY INFORMATION

United States: TSCA INVENTORY STATUS: The components of these products are listed on the TSCA Inventory
CERCLA REPORTABLE QUANTITY (RQ): Copper = 5000 lbs. (for particulates less than 100 micrometers in size). Nickel = 100 lbs. Chromium and Chromium compounds or alloys 5000 lbs. Manganese & Beryllium = Reportable quantity: Included in the regulation but with no data values. See regulation (40 CFR 302.4).
EPCRA/SARA Title III 313 Toxic Chemicals The following metallic components are listed as SARA 313 "Toxic Chemicals" and potential subject to annual SARA 313 reporting. See Section 3 for weight percent. Ingredient & Disclosure threshold: Copper 1.0% de minimis concentration; Zinc 1.0% de minimis concentration; Manganese 1.0% de minimis concentration; Nickel 0.1% de minimis concentration; Beryllium 0.1% de minimis concentration
Section 311 Hazard Class: As shipped: Immediate (Acute) In use: Immediate & delayed (Acute) Superfund Amendments and Reauthorization Act of 1986 (SARA)
Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

California Proposition 65: **WARNING**: This product may expose you to chemicals including [Cobalt (II) Oxide, Titanium dioxide (airborne, unbound particles of respirable size), Chromium (hexavalent compounds), Nickel, Lead and Lead Compounds, Carbon Black, Cadmium, Beryllium and Beryllium Compounds] which are known to the State of California to cause cancer, and [Chromium (hexavalent compounds), Nickel, Lead and Lead Compounds, Cadmium] which are known to the State of California to cause birth defects and/or other reproductive harm. For more information go to https://www.p65warnings.ca.gov/
Nickel, Titanium Dioxide, Quartz and Chromium as possible carcinogens
US State Regulations list:
Alaska-Designated Toxic and Hazardous Substances: Carbon Black, Manganese. Beryllium and Beryllium Compounds
California-Hazardous Substances Listed substance: Carbon Black, Copper, Manganese, Silicon, Iron, Iron oxide, Nickel, Beryllium and Beryllium Compounds
California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance: Nickel - **CRT: Listed date/Carcinogenic substance**: Nickel (10-1-1989)
Florida-Substance List: Manganese **Illinois-Toxic Substance List:** Carbon Black, Copper, Manganese and Silicon.
Kansas-Section 302/313 List: Copper, and Manganese.
Massachusetts-Substance List: Carbon Black, Copper, Manganese, Nickel, Silicon, Beryllium and Beryllium Compounds
Michigan - Critical Materials Register: Copper, Beryllium and Beryllium Compounds. **Minnesota-List of Hazardous Substances:** Welding Fumes, Carbon Black, Manganese, Beryllium and Beryllium Compounds, and Silicon.
Missouri-Employer Information/Toxic Substance List: Carbon Black, Copper, Manganese, Silicon,
NEW YORK CITY RIGHT-TO-KNOW; Beryllium and Beryllium Compounds, Titanium Dioxide, Nickel, Carbon Black , Copper, Manganese, Fluoride (as F) **New Jersey-Right to Know Hazardous Substance List:** Carbon Black, Beryllium and Beryllium Compounds , Copper, Iron, Iron oxide, Manganese, Nickel, Silicon, Titanium Dioxide, Fluoride (as F) , Limestone
North Dakota-List of Hazardous Chemicals, Reportable Quantities: Copper.
Pennsylvania-Hazardous Substance List: Carbon Black, Beryllium and Beryllium Compounds Copper, Manganese, Nickel, Silicon, Titanium Dioxide, Fluoride (as F), Limestone
Rhode Island-Hazardous Substance List: Welding Fumes, Carbon Black, Manganese, Nickel, Silicon,
Texas-Hazardous Substance List: Carbon Black, Manganese **West Virginia-Hazardous Substance List:** Carbon Black, Manganese.
Wisconsin-Toxic and Hazardous Substances: Carbon Black, Manganese.

SECTION XVI- OTHER INFORMATION

Approval Date: 9-23-2018 NEW SDS Number: 041-COPPER
HMIS® ratings Health:3 Flammability: 0 Physical hazard: 0
NFPA CODES: FIRE: 0 HEALTH: 3 REACTIVITY: 0

U.S. DOT = Material is not hazardous and is not considered as a dangerous item.
Washington Alloy Co. Believes that the information contained in this (SDS) Safety Data Sheet is accurate. However, Washington Alloy Co. does not express or implies any warranty with respect to this information.
Download the most current SDS and product information @ www.weldingwire.com