



# SAFETY DATA SHEET

This Safety Data Sheet complies with European Commission Directive 91/155/EEC, ISO 11014-1 and ANSI Z400.1

## 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** ARCALOY BARE STAINLESS STEEL WELDING ELECTRODES  
**Application:** Arc Welding  
**Classification:** AWS A5.9  
**Supplier:** THE ESAB GROUP, INC., 801 Wilson Avenue, Hanover, PA 17331  
**Telephone No.:** 1-717-637-8911, 1-800-933-7070  
**Emergency No.:** 1-717-637-8911 and 1-800-424-9300 (CHEMTREC)  
**Web site:** [www.esabna.com](http://www.esabna.com)

## 2. HAZARDS IDENTIFICATION

**Emergency Overview:** Metal wires or rods in varying colors. These products are normally not considered hazardous as shipped. Gloves should be worn when handling to prevent cuts and abrasions.

These products contain nickel, which is classified as a skin sensitizer and a suspect carcinogen. In the form that nickel is present in these products it does not contribute to a hazard classification of the products.

Skin contact is normally no hazard but should be avoided to prevent possible allergic reactions.

Persons with a pacemaker should not go near welding or cutting operations until they have consulted their doctor and obtained information from the manufacturer of the device.

When these products are used in a welding process, the most important hazards are heat, radiation, electric shock and welding fumes.

**Heat:** Spatter and melting metal can cause burn injuries and start fires.

**Radiation:** Arc rays can severely damage eyes or skin.

**Electricity:** Electric shock can kill.

**Fumes:** Overexposure to welding fumes may result in symptoms like metal fume fever, dizziness, nausea, dryness or irritation of the nose, throat or eyes. Chronic overexposure to welding fumes may affect pulmonary function. Prolonged inhalation of nickel and chromium compounds above safe exposure limits can cause cancer. Overexposure to manganese and manganese compounds above safe exposure limits can cause irreversible damage to the central nervous system, including the brain, symptoms of which may include slurred speech, lethargy, tremor, muscular weakness, psychological disturbances and spastic gait.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

These products are continuous metal wires and solid metal rods.

| Ingredients | CAS#      | EINECS#   | Hazard classification <sup>(1)</sup> | IARC <sup>(2)</sup> | NTP <sup>(3)</sup> | OSHA List <sup>(4)</sup> |
|-------------|-----------|-----------|--------------------------------------|---------------------|--------------------|--------------------------|
| Chromium    | 7440-47-3 | 231-157-5 | No                                   | --                  | --                 | --                       |
| Copper      | 7440-50-8 | 213-159-6 | No                                   | --                  | --                 | --                       |
| Iron        | 7439-89-6 | 231-096-4 | No                                   | --                  | --                 | --                       |
| Manganese   | 7439-96-5 | 231-105-1 | No                                   | --                  | --                 | --                       |
| Molybdenum  | 7439-98-7 | 231-107-2 | No                                   | --                  | --                 | --                       |
| Nickel      | 7440-02-0 | 231-111-4 | Carc. Cat. 3;<br>R40-R43             | 2B                  | S                  | --                       |
| Niobium     | 7440-03-1 | 231-113-5 | No                                   | --                  | --                 | --                       |
| Silicon     | 7440-21-3 | 231-130-8 | No                                   | --                  | --                 | --                       |

<sup>(1)</sup> Hazard Classification according to European Council Directive 67/548/EEC, for R-phrases, see Section 16.

<sup>(2)</sup> Evaluation according to the International Agency for Research on Cancer.

1 – Human Carcinogen 2B – Possibly carcinogenic to humans

<sup>(3)</sup> Classification according to the 11th Report on Carcinogens, published by the US National Toxicology Program.

K – Known Carcinogen S – Suspect Carcinogen

<sup>(4)</sup> Carcinogen listing according to OSHA, Occupational Safety & Health Administration (USA).

## APPROXIMATE COMPOSITION (Wt. %)

| Product Trade Name | Mn      | Ni        | Cr        | Cu      | Mo      | Si        | Nb    | Fe   | AWS Classification |
|--------------------|---------|-----------|-----------|---------|---------|-----------|-------|------|--------------------|
| <b>ARCALOY</b>     |         |           |           |         |         |           |       |      |                    |
| ER308/308H         | 1.0-2.5 | 9.0-11.0  | 19.5-22.0 | <0.75   | <0.75   | 0.30-0.65 | --    | Bal. | ER308/308H         |
| ER308L             | 1.0-2.5 | 9.0-11.0  | 19.5-22.0 | <0.75   | <0.75   | 0.30-0.65 | --    | Bal. | ER308/308L         |
| ER308LSi           | 1.0-2.5 | 9.0-11.0  | 19.5-22.0 | <0.75   | <0.75   | 0.65-1.00 | --    | Bal. | ER308Si/308LSi     |
| ER309              | 1.0-2.5 | 12.0-14.0 | 23.0-25.0 | <0.75   | <0.75   | 0.30-0.65 | --    | Bal. | ER309              |
| ER309L             | 1.0-2.5 | 12.0-14.0 | 23.0-25.0 | <0.75   | <0.75   | 0.30-0.65 | --    | Bal. | ER309/309L         |
| ER309LMo           | 1.0-2.5 | 12.0-14.0 | 23.0-25.0 | <0.75   | 2.0-3.0 | 0.30-0.65 | --    | Bal. | ER309Mo/309LMo     |
| ER309LSi           | 1.0-2.5 | 12.0-14.0 | 23.0-25.0 | <0.75   | <0.75   | 0.65-1.00 | --    | Bal. | ER309Si/309LSi     |
| ER310              | 1.0-2.5 | 20.0-22.5 | 25.0-28.0 | <0.75   | <0.75   | 0.30-0.65 | --    | Bal. | ER310              |
| ER312              | 1.0-2.5 | 8.0-10.5  | 28.0-32.0 | <0.75   | <0.75   | 0.30-0.65 | --    | Bal. | ER312              |
| ER316              | 1.0-2.5 | 11.0-14.0 | 18.0-20.0 | <0.75   | 2.0-3.0 | 0.30-0.65 | --    | Bal. | ER316              |
| ER316L             | 1.0-2.5 | 11.0-14.0 | 18.0-20.0 | <0.75   | 2.0-3.0 | 0.30-0.65 | --    | Bal. | ER316/316L         |
| ER316LSi           | 1.0-2.5 | 11.0-14.0 | 18.0-20.0 | <0.75   | 2.0-3.0 | 0.65-1.00 | --    | Bal. | ER316Si/316LSi     |
| ER317L             | 1.0-2.5 | 13.0-15.0 | 18.5-20.5 | <0.75   | 3.0-4.0 | 0.30-0.65 | --    | Bal. | ER317/317L         |
| ER320LR            | 1.5-2.0 | 32.0-36.0 | 19.0-21.0 | 3.0-4.0 | 2.0-3.0 | <0.15     | <0.40 | Bal. | ER320LR            |
| ER347              | 1.0-2.5 | 9.0-11.0  | 19.0-21.5 | <0.75   | <0.75   | 0.30-0.65 | <1.0  | Bal. | ER347              |
| ER409Nb            | <0.8    | <0.6      | 10.5-13.5 | <0.75   | <0.50   | <1.0      | <0.75 | Bal. | ER409Nb            |
| ER410              | <0.6    | <0.6      | 11.5-13.5 | <0.75   | <0.75   | <0.5      | --    | Bal. | ER410              |
| ER430 LNb          | <0.8    | <0.5      | 17.0-19.0 | <0.75   | <0.75   | <0.8      | <0.75 | Bal. | None               |

**4. FIRST AID MEASURES**

- Inhalation:** If breathing has stopped, perform artificial respiration and obtain medical assistance immediately! If breathing is difficult, provide fresh air and call physician.
- Eye contact:** For radiation burns due to arc flash, see physician. To remove dusts or fumes flush with water for at least fifteen minutes. If irritation persists, obtain medical assistance.
- Skin contact:** For skin burns from arc radiation, promptly flush with cold water. Get medical attention for burns or irritations that persist. To remove dust or particles wash with mild soap and water.
- Electric shock:** Disconnect and turn off the power. Use a nonconductive material to pull victim away from contact with live parts or wires. If not breathing, begin artificial respiration, preferably mouth-to-mouth. If no detectable pulse, begin Cardio Pulmonary Resuscitation (CPR). Immediately call a physician.
- General:** Move to fresh air and call for medical aid.

**5. FIRE FIGHTING MEASURES**

No specific recommendations for welding consumables. Welding arcs and sparks can ignite combustible and flammable materials. Use the extinguishing media recommended for the burning materials and fire situation. Wear self-contained breathing apparatus as fumes or vapors may be harmful.

**6. ACCIDENTAL RELEASE MEASURES**

Solid objects may be picked up and placed into a container. Liquids or pastes should be scooped up and placed into a container. Wear proper protective equipment while handling these materials. Do not discard as refuse.

- Personal precautions:** refer to Section 8.  
**Environmental precautions:** refer to Section 13.

**7. HANDLING AND STORAGE****Handling:**

Handle with care to avoid stings and cuts. Wear gloves when handling welding consumables. Avoid exposure to dust. Do not ingest. Some individuals can develop an allergic reaction to certain materials. Retain all warning and identity labels.

**Storage:**

Keep separate from chemical substances like acids and strong bases, which could cause chemical reactions.



**8. EXPOSURE CONTROL/PERSONAL PROTECTION**

Avoid exposure to welding fumes, radiation, spatter, electric shock, heated materials and dust.

Engineering measures:

Ensure sufficient ventilation, local exhaust, or both, to keep welding fumes and gases from breathing zone and general area. Keep working place and protective clothing clean and dry. Train welders to avoid contact with live electrical parts and insulate conductive parts. Check condition of protective clothing and equipment on a regular basis.

Personal protective equipment:

Use respirator or air supplied respirator when welding or brazing in a confined space, or where local exhaust or ventilation is not sufficient to keep exposure values within safe limits. Use special care when welding painted or coated steels since hazardous substances from the coating may be emitted. Wear hand, head, eyes, ear and body protection like welders gloves, helmet or face shield with filter lens, safety boots, apron, arm and shoulder protection. Keep protective clothing clean and dry.

Use industrial hygiene monitoring equipment to ensure that exposure does not exceed applicable national exposure limits. The following limits can be used as guidance. For information about welding fume analysis refer to Section 10.

| Substance                                   | CAS#      | ACGIH TLV <sup>(1)</sup> mg/m <sup>3</sup> | OSHA PEL <sup>(2)</sup> mg/m <sup>3</sup> |
|---|-----------|--|---|
| Chromium Compounds                          | 7440-47-3 |  |   |
| Metal (as Cr)                               |           | 0.5  | 1   |
| Cr (VI), inorganic, water insoluble (as Cr) |           | 0.05*                                      | 0.005*                                    |
| Cr (VI), inorganic, water soluble (as Cr)   |           | 0.01*                                      | 0.005*                                    |
| Copper (metal)                              | 7440-50-8 | 0.2  | 0.1 (fume)                                |
|   |           |  | 1 (dust/mist)                             |
| Iron (as iron oxide)                        | 7439-89-6 | 5**  | 10 (fume)                                 |
| Manganese & Manganese compounds (as Mn)     | 7439-96-5 | 0.2  | 5 Ceiling                                 |
| Molybdenum                                  | 7439-98-7 | 3 **, 10 ***                               | 15*                                       |
|   |           | 0.5 **                                     | 5   |
| Nickel (inhalable fraction)                 | 7440-02-0 | 1.5  | 1   |
| Niobium                                     | 7440-03-1 | None                                       | None                                      |
| Silicon (nuisance dust)                     | 7440-21-3 | Withdrawn                                  | 15*, 5**                                  |

<sup>(1)</sup> Threshold Limit Values according to American Conference of Governmental Hygienists, 2007

<sup>(2)</sup> Permissible Exposure Limits according to the Occupational Safety & Health Administration (USA)

Unless noted, all values are for 8 hour time weighted averages (TWA).

\* Total dust, \*\* Respirable fraction, \*\*\* Inhalable fraction.

**NOTE:** Some of these products may not contain all of the materials listed. For details of composition, refer to the COMPOSITION TABLE in Section 3.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

Appearance: Solid, non-volatile with varying color

Melting point: >1000°C / >1800°F

**10. STABILITY AND REACTIVITY**

General: These products are only intended for normal welding purposes.

Stability: These products are stable under normal conditions.

Reactivity: Contact with chemical substances like acids or strong bases could cause generation of gas.

When these products are used in a welding process, hazardous decomposition products would include those from the volatilization, reaction or oxidation of the materials listed in Section 3 and those from the base metal and coating.

The amount of fumes generated from these products varies with welding parameters and dimensions but is generally no more than 1 to 10 g/kg consumable. Fumes from these products may contain compounds of the following chemical elements: Fe, O, Mn, Cr, Ni, Si, Mo, Cu and Nb. The rest is not analyzed, according to available standards.

Refer to applicable national exposure limits for fume compounds, including those exposure limits for fume compounds found in Section 8. A significant amount of the chromium in the fumes can be hexavalent chromium, which has a very low exposure limit in some countries. Manganese and nickel also have low exposure limits, in some countries, that may be easily exceeded.

Reasonably expected gaseous products would include carbon oxides, nitrogen oxides and ozone. Air contaminants around the welding area can be affected by the welding process and influence the composition and quantity of fumes and gases produced.

**11. TOXICOLOGICAL INFORMATION**

Inhalation of welding fumes and gases can be dangerous to your health. Classification of welding fumes is difficult because of varying base materials, coatings, air contamination and processes. The International Agency for Research on Cancer has classified welding fumes as possibly carcinogenic to humans (Group 2B).

Acute toxicity: Overexposure to welding fumes may result in symptoms like metal fume fever, dizziness, nausea, dryness or irritation of the nose, throat or eyes.

Chronic toxicity: Overexposure to welding fumes may affect pulmonary function. Prolonged inhalation of nickel and chromium compounds above safe exposure limits can cause cancer. Overexposure to manganese and manganese compounds above safe exposure limits can cause irreversible damage to the central nervous system, including the brain, symptoms of which may include slurred speech, lethargy, tremor, muscular weakness, psychological disturbances and spastic gait.

**12. ECOLOGICAL INFORMATION**

Welding consumables and materials could degrade/weather into components originating from the consumables or from the materials used in the welding process. Avoid exposure to conditions that could lead to accumulation in soils or groundwater.

**13. DISPOSAL CONSIDERATIONS**

Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal and local regulations. Use recycling procedures if available.

USA RCRA: Unused products or product residue containing chromium is considered hazardous waste if discarded, RCRA ID characteristic Toxic Hazardous Waste D007.

Residues from welding consumables and processes could degrade and accumulate in soils and groundwater.

**14. TRANSPORT INFORMATION**

No international regulations or restrictions are applicable.

**15. REGULATORY INFORMATION**

Read and understand the manufacturer's instructions, your employer's safety practices and the health and safety instructions on the label. Observe any federal and local regulations. Take precautions when welding and protect yourself and others.

WARNING: Welding fumes and gases are hazardous to your health and may damage lungs and other organs. Use adequate ventilation.

ELECTRIC SHOCK can kill.

ARC RAYS and SPARKS can injure eyes and burn skin.

Wear correct hand, head, eye and body protection.

Canada: WHMIS classification: Class D; Division 2, Subdivision A

Canadian Environmental Protection Act (CEPA): All constituents of these products are on the Domestic Substance List (DSL).

USA: Under the OSHA Hazard Communication Standard, these products are considered hazardous.

These products contain or produce a chemical known to the state of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code § 25249.5 et seq.)

United States EPA Toxic Substance Control Act: All constituents of these products are on the TSCA inventory list or are excluded from listing.

**CERCLA/SARA Title III**

Reportable Quantities (RQs) and/or Threshold Planning Quantities (TPQs):

| Ingredient name   | RQ (lb) | TPQ (lb) |
|---|---------|----------|
| Product is a solid solution in the form of a solid article. | -       | -        |

Spills or releases resulting in the loss of any ingredient at or above its RQ require immediate notification to the National Response Center and to your Local Emergency Planning Committee.

**Section 311 Hazard Class**

As shipped: Immediate                      In use: Immediate delayed



**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 name | Disclosure threshold          |
|-----------------|-------------------------------|
| Chromium        | 1.0% de minimis concentration |
| Copper          | 1.0% de minimis concentration |
| Manganese       | 1.0% de minimis concentration |
| Nickel          | 0.1% de minimis concentration |

**16. OTHER INFORMATION**

This Safety Data Sheet has been revised due to modifications to several paragraphs and/or new format. This SDS supersedes 7922-S.

Refer to ESAB "Welding and Cutting - Risks and Measures", F52-529 "Precautions and Safe Practices for Electric Welding and Cutting" and F2035 "Precautions and Safe Practices for Gas Welding, Cutting and Heating" available from ESAB, and to:

USA: Contact ESAB at [www.esabna.com](http://www.esabna.com) or 1-800-ESAB-123 if you have questions about this SDS.

American National Standard Z49.1 "Safety in Welding and Cutting", ANSI/AWS F1.5 "Methods for Sampling and Analyzing Gases from Welding and Allied Processes", ANSI/AWS F1.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes", AWSF3.2M/F3.2 "Ventilation Guide for Weld Fume", American Welding Society, 550 North Le Jeune Road, Miami, Florida, 33135. Safety and Health Fact Sheets available from AWS at [www.aws.org](http://www.aws.org).

OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

American Conference of Governmental Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices, 6500 Glenway Ave., Cincinnati, Ohio 45211, USA.

NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work" published by the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169.

UK: WMA Publication 236 and 237, "Hazards from Welding Fume", "The arc welder at work, some general aspects of health and safety".

Germany: Unfallverhütungsvorschrift BGV D1, "Schweißen, Schneiden und verwandte Verfahren".

Canada: CSA Standard CAN/CSA-W117.2-01 "Safety in Welding, Cutting and Allied Processes".

These products have been classified according to the hazard criteria of the CPR and the SDS contains all the information required by the CPR.

R-phrases: R40 – Limited evidence of a carcinogenic effect.

R43 – May cause sensitization by skin contact.

ESAB requests the users of these products to study this Safety Data Sheet (SDS) and become aware of product hazards and safety information. To promote safe use of these products a user should:

- notify its employees, agents and contractors of the information on this SDS and any product hazards/safety information.
- furnish this same information to each of its customers for these products.
- request such customers to notify employees and customers for the same product hazards and safety information.

The information herein is given in good faith and based on technical data that ESAB believes to be reliable. Since the conditions of use are outside our control, we assume no liability in connection with any use of this information and no warranty, expressed or implied is given. Contact ESAB for more information.

This Material Safety Data Sheet (MSDS) complies with the requirements of OSHA's Hazard Communication Standard.

**MATERIAL SAFETY DATA SHEET**

**E71T-GS FLUX-CORED WELDING WIRE**

**RADNOR WELDING PRODUCTS**  
 Emergency Phone Number: 866-734-3438  
 Product Information Number: 388-838-0615  
**SECTION 1 - PRODUCT IDENTIFICATION**  
 Product Name/Class: AWS A5.20, E71T-GS Self-Shielded, Flux-Cored Welding Wire  
 Product Number: 004022  
 Manufacturer: Radnor Welding Products 259 N. Radnor-Chester Road Suite 100 Radnor, PA 19087-5283

**SECTION 2 - HAZARDOUS INGREDIENTS**  
 The term "Hazardous Materials" should be interpreted as a term required and defined in OSHA Hazard Communication Standard (29 CFR Part 1910.1200).  
 The following chemicals are subject to reporting under Title III of the Super Fund Amendments and Reauthorization Act (SARA) of 1986: aluminum (fume or dust) and compounds of barium, and manganese.

| Ingredient      | Percent | Exposure Limits |               | CAS No.    |
|-----------------|---------|-----------------|---------------|------------|
|                 |         | TLV             | PEL           |            |
| Iron            | 85 - 90 | Not Reported    | Not Reported  | 7439-89-6  |
| Manganese       | <2      | 5               | 1             | 7439-96-5  |
| Silicon         | <2      | 10              | 5             | 7440-21-3  |
| Fluorspar       | 1 - 10  | 2.5 (as F)      | 2.5 (as F)    | 14542-23-5 |
| Aluminum        | <5      | 10              | Nothing Found | 7429-90-5  |
| Magnesium       | <2      | Not Reported    | Not Reported  | 7429-95-4  |
| Barium Fluoride | <5      | 0.5 (as Ba)     | 0.5 (as Ba)   | 7787-52-8  |

**SECTION 3 - PHYSICAL CHARACTERISTICS**  
 Boiling Point: N/A  
 Specific Gravity (H<sub>2</sub>O = 1): N/A  
 Solubility in Water: N/A  
 Vapor Pressure (mm Hg.): N/A  
 Melting Point: %Volatile: N/A  
 Vapor Density (Air = 1): N/A  
 Evaporation Rate (Butyl Acetate = 1): Appearance and Odor: N/A

**SECTION 4 - FIRE AND EXPLOSION HAZARD DATA**  
 Non Flammable: Welding arc and sparks can ignite combustibles. See Z49.1 referenced in Section 7.  
 Flash Point (Method Used): N/A  
 Flammable Limits: UEL: N/A

Extinguishing Media: N/A  
 Special Fire Fighting Procedures: Non Flammable. Welding arc and sparks can ignite combustibles and flammables. Refer to American National Standard Z49.1 for fire prevention during the use of welding and allied procedures.  
 Unusual Fire and Explosion Hazards: N/A

**SECTION 5 - REACTIVITY DATA**  
 Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedures, and electrodes used. Other conditions which also influence the composition and quantity of the 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 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 activities). When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 2, plus those from the base metal and coating, etc., as noted above. It is understood, however, that the elements and/or oxides to be mentioned are virtually always present as complex oxides and not as metals. (Characterization of Arc Welding Fume: American Welding Society). The elements or oxides listed below correspond to the ACGIH categories located in (TLV) Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment). Reasonably expected constituents of the fume would include: complex oxides of iron, manganese, silicon, aluminum, magnesium, calcium, and barium. Fluorides will also be present.

Stability: Unstable  Stable   
 Conditions to Avoid: Avoid breathing fumes created by the welding process.  
 Incompatibility (Materials to Avoid): Avoid welding on painted, galvanized or plated surfaces.  
 Hazardous Decomposition or Byproducts: Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet if worn or in the worker's breathing zone. (See ANSI/AWS F1.1, available from the "American Welding Society", P.O. Box 551040, Miami, FL 33135. Also, from AWS is F1.3 "Evaluating Contaminants in the Welding Environment - A Sampling Strategy Guide", which gives additional advice on sampling). At a minimum, materials listed in this section should be analyzed.  
 Hazardous: May Occur  Will Not Occur   
 Polymerization: May Occur  Conditions to Avoid: N/A

**SECTION 6 - HEALTH HAZARD DATA**

Threshold Limit Value: The exposure level for welding fume has been established at 5 mg/m<sup>3</sup> with OSHA's PEL and ACGIH's TLV. TLV-1 WAs should be used as a guide in the control of health hazards and not as fine lines between safe and excessive concentrations. Effects of Overexposure: Electric arc welding may create one or more of the following health hazards: Fumes and Gases can be dangerous to your health. Primary Routes of Entry are the respiratory system, eyes and/or skin. Short-Term (Acute) Overexposure to welding fumes may result in discomfort such as dizziness, nausea, or dryness or irritation of nose, throat or eyes. Manganese - Manganese Dioxide (MnO<sub>2</sub>) Remove from overexposure and apply artificial respiration, if needed. Wash eyes or skin with water to remove dusts. Fluoride - Fluoride compounds evolved may cause skin and eye burns; pulmonary edema bronchitis. Long-Term (Chronic) Overexposure may lead to siderosis (iron deposits in lungs) and is believed by some investigators to affect pulmonary functions. Manganese - Manganese Dioxide (MnO<sub>2</sub>) Long term overexposure to manganese compounds may affect the central nervous system. Symptoms include muscular weakness, tremors similar to Parkinson's disease. Behavioral changes and changes in handwriting may also appear. Employees overexposed to manganese compounds should get quarterly examinations for early detection of manganism. Fluoride - Repeated overexposure to fluorides can cause serious bone erosion although the effect is minimized in combination with iron. Arc Rays can injure eyes and burn skin. Electric Shock can kill. Emergency and First Aid Procedures Call for medical aid. Employ first aid techniques recommended by the American Red Cross. Eyes & Skin: If irritation or flash burns develop after exposure, consult a physician. Carcinogenicity: The composition of welding fumes may contain carcinogens, depending on several factors that are unknown and unknowable to the product manufacturer (see Section 5). Always assume that welding fumes may contain toxic and/or carcinogenic materials, and follow sound Work/Hygienic practices as recommended by ANSI Z49.1.

| HMSIS Rating     | HMSIS Scale         | NFPA Rating      | NFPA Scale          |
|------------------|---------------------|------------------|---------------------|
| Health = 2       | 4 = Severe Hazard   | Health = 1       | 4 = Severe Hazard   |
| Flammability = 0 | 3 = Serious Hazard  | Flammability = 0 | 3 = Serious Hazard  |
| Reactivity = 0   | 2 = Moderate Hazard | Reactivity = 0   | 2 = Moderate Hazard |
|                  | 1 = Slight Hazard   | Other = N/A      | 1 = Slight Hazard   |
|                  | 0 = Minimal Hazard  |                  | 0 = Minimal Hazard  |

**SECTION 7 - PRECAUTIONS FOR SAFE HANDLING AND USE**

Read and understand the manufacturer's instructions and precautionary label on the product. See American National Standard Z49.1, "Safety in Welding and Cutting", published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Washington, D.C. 20402 for more details on many of the following:  
 Steps to Be Taken in Case Material Is Released or Spilled: Product is non-hazardous. No special precautions are required for spills of bulk material. Scrap metal can be reclaimed for reuse. Follow federal, state, and local regulations regarding disposal.

Waste Disposal Method: Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations.

**SECTION 8 - CONTROL MEASURES**

Respiratory Protection (Specify Type) Use NIOSH approved or equivalent fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below TLV.

Ventilation: Use enough ventilation, local exhaust at the arc, or both, to keep the fumes and gases below TLV's in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes.

Protective Gloves: Wear welding gloves made of leather or other heat-resistant resistant materials.  
 Eye Protection: Wear helmet or use face shield with filler lens. As a rule of thumb begin with Shade Number 14. Adjust if needed by selecting the next lighter and/or darker shade number. Provide protective screens and flash goggles, if necessary, to shield others.

Other Protective Clothing or Equipment: Wear hand, head, and body protection which help to prevent injury from radiation, sparks, and electrical shock. See ANSI Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark nonsynthetic clothing. Train the welder not to touch live electrical parts and to insulate himself from work and ground.

Work/Hygienic Practices: Maintain exposure below the PEL/TLV. Use industrial hygiene monitoring to ensure that your use of this material does not create exposures which exceed PEL/TLV. Always use exhaust ventilation. Refer to the following sources for important additional information. ANSI Z49.1 The American Welding Society, P.O. Box 351040, Miami, FL 33135 - OSHA (29CFR1910) U.S. Dept. of Labor, Washington, D.C. 20210.

**OTHER INFORMATION REQUIRED BY STATE OR FEDERAL LAW**

California Proposition 65 Information: Warning: This product contains a chemical known to the State of California to cause cancer.

New Jersey Right-To-Know Information: 5 most predominant ingredients/hazardous and non-hazardous  
 1. Iron; 2. Fluorspar; 3. Barium Fluoride; 4. Aluminum; 5. Manganese  
 SARA Title III Notification Information: All chemical compounds marked with an asterisk (\*) are toxic chemicals subject to the reporting requirements of Section 313 of Title III of the Super Fund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372.

Disclaimer of Expressed and Implied Warranties: The information in this document is believed to be correct as of the date issued. However, no warranty of merchantability, fitness for any particular purpose, or any other warranty is expressed or to be implied regarding the accuracy or completeness of this information, the results to be obtained from the use of this information or the product, the safety of this product, or the hazards related to its use.