

Material Safety Data Sheet

(This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard (29 CFR 1910.1200); the content is intended to also conform to the Canadian WHMIS Standards and ANSI 2400.1)

I. Product Identification

Product Type - NICKEL-ARC ELECTRODES FOR CAST IRON WELDING



EMERGENCY	NUMBER	(CHEMTREC)	1-800-424-9300
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Product Description: SMAW (shielded metal arc welding) electrodes are covered rods manufactured by concentrically extruding silicated chemical mixtures followed by an oven cure.

Process Description: The Shielded Metal Arc Welding (SMAW) process uses an electric arc between a covered electrode and the weld pool. The arc and molten metal are shielded by the decomposition of the electrode covering. The SMAW electrode also supplies filler metal to the weld pool and to the weld metal. The extreme heat from the electric welding arc creates hazardous fumes and gases that emanate from the base plate, shielding gases, and the electrode.

II. Hazards Identification

1. Emergency Overview:

 **Warning:** Contains Fluorides 

- a. This Product, a SMAW electrode, is a mixture; all of its components are hazardous.
- b. The SMAW Process
 - (1) Fumes and Gases may be hazardous to your health.
 - (2) Arc Rays can injure eyes and burn skin.
 - (3) Electric Shock can kill.

2. Potential Health Affects:

- a. Product (covered electrode)
 - (1) As shipped, these products are nonflammable, non-explosive, non-reactive, and non-hazardous.
 - (2) If the covering is pulverized, the dust may contain respirable silicon dioxide.
 - (3) The dusts from the covering can cause skin sensitization.
 - (4) Dusts from the covering can be irritating to the skin, eyes and respiratory system.
- b. Process (SMAW) Acute exposure:
 - (1) Inhalation/ingestion of fumes and gases can cause acute poisoning or death.
 - (2) Inhalation/ingestion of fumes and gases can cause metal fume fever, characterized by irritation of the nose, mouth and throat; coughing; stomach pains; nausea; chills; fever; muscle and joint pain; thirst; bronchitis or pneumonia; and bluish tint to the skin.
 - (3) Inhalation/ingestion of fumes and gases can cause metal irritation of the nose, mouth, throat and respiratory tract.
 - (4) Exposure may aggravate preexisting conditions (e.g. asthma, emphysema).
- c. Process (SMAW) Chronic exposure:
 - (1) Chronic exposure can cause siderosis, pneumocosis, pulmonary edema and fibrosis.
 - (2) Can cause irreversible toxic effects to the central nervous system.
 - (3) May result in sclerosis of the bones, calcification of the ligaments and mottling of the teeth.
 - (4) May result in exposure to chemicals known to cause cancer.

3. **Carcinogenic Assessment:** These products contain nickel metal. Nickel and its compounds are on the IARC and NTP lists as posing a carcinogenic risk to humans. Welding Fumes (NOS) are possibly carcinogenic.
4. The process gases may contain carbon monoxide. Carbon Monoxide is known to cause developmental and birth defects.
5. These SMAW covered electrodes contain fluoride compounds that are toxic to aquatic life and terrestrial fauna. Avoid contamination of the environment

III. Product Composition

Full Disclosure of Components
APPROXIMATE COMPOSITION (Wt. %)

	Nickel-Arc 55	Nickel-Arc 99
Materials:		
Aluminum	1-3	1-3
Boron		<0.5
Copper	--	1-3
Graphite	1-3	1-3
Iron	35-45	1-5
Manganese	0.3-1	0.3-1
Silicon	<0.5	1-3
Barium Carbonate	<0.5	1-5
Calcium Carbonate	<0.5	1-3
Calcium Fluoride	1-3	1-3
Silicon Dioxide	<0.5	<0.5
Strontium Carbonate	6-12	2-7
Strontium Fluoride	--	
Silicate Binder (cured)	1-3	1-3
Organic Extrusion Aids	<1	<1
Nickel	Bal. >40	Bal. >70
AWS Specification and Classification	A5.15 ENiFe-CI-A	A5.15 ENi-CI-A

IV. First Aid Measures

Emergency First Aid Measures: In case of emergency, call for medical aid. Employ first aid technique recommended by the Red Cross. **IF BREATHING IS DIFFICULT**, give oxygen and call for a physician. **FOR ELECTRIC SHOCK**, turn off and disconnect the power. Use a nonconducting 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. CPR should be continued until breathing is restored, or until a physician arrives. **FOR ARC BURN**, apply cold, clean compresses. Contamination should be avoided; the area should be covered with a clean, dry dressing; and the patient should be transported to medical assistance.

Eye Contact: Flush eyes with water for at least fifteen minutes, lifting upper and lower lids, to remove all residue. Get medical help **IMMEDIATELY!!**

Skin Contact: Promptly flush skin with water for at least fifteen minutes to remove all residue. If rash or burn develops, consult a physician.

Inhalation: Remove to fresh air. If breathing has stopped, administer artificial respiration. Get medical help **IMMEDIATELY!!**

Ingestion: Do not induce vomiting. Call a physician at once or your Poison Control Center. Advise of Section III chemicals.

V. Fire-Fighting Measures

Extinguishing Media: CO₂, dry chemical, foam, water.

Unsuitable Extinguishing Media: None identified.

Fire Hazard: The SMAW Process can ignite combustible and flammable materials. Use the extinguishing media recommended for the burning materials and fire situation. See ANSI Z49.1 "Safety in Welding, Cutting and Allied Processes" and the AWS publication, "Safe Practices", both published by the American Welding Society, P. O. Box 351040, Miami, FL 33135, and 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, for additional fire prevention and protection information.

Flammable Properties:

Flash Point: Not known. Not applicable.

Flash Point Method: Not known.

Upper Flame Limit (volume % in air): Not known.

Lower Flame Limit (volume % in air): Not known.

Auto Ignition Temperature:

Hazardous Combustion Products:

When involved in a fire, these products may emit very toxic and irritating fumes of the metals, metal oxides, their compounds, metal fluorides and hydrogen fluoride.

Explosion Data- Mechanical Impact:

Explosion Data- Static Discharge: Not known.

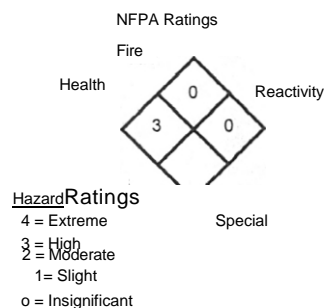
Flame Propagation Rate (solids): OSHA Not known.

Flammability Class: Not known.

Unusual Fire and Explosion Hazards: Not known.

Special Fire Fighting Procedures: Not known.

Full protective equipment required. Wear self contained breathing apparatus.



VI. Accidental Release Measures

Personal Precaution: Use personal protection recommended in Section 8.

Environmental Impact: Prevent product from entering waterways.

Method for clean up: Gather and absorb spilled electrodes. Place waste in container for recovery or disposal.

Method of Disposal: Dispose of according to law.

VII. Handling and Storage

Storage Precaution: No unusual methods are required. Keep product contained and retain all warning and identity labels. Preferred storage is a sheltered warm area with temperature and humidity control to prevent high humidity and "going through the dew point".

Preferred Storage for Product Performance: Depending on the classification, covered electrodes vary in moisture content and final bake temperature.

Handling Precaution: Read and understand the manufacturer's instructions and the precautionary label on this product. Before use obtain, read and understand American National Standard Z-49.1, "Safety in Welding, Cutting and Allied Processes" published by the American Welding Society, P. O. Box 351040, Miami, FL, 33135, and OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA, 15250-7954, for more detail on many of the following:

Exposure to Fumes and Gases: Keep the exposure within legal limits. In the worker's breathing zone and the general area, the fumes and gases must be kept below the TLVs and the *equivalent exposure* must compute to less than one. Keep exposure as low as possible.

Confined Spaces: Test confined space atmosphere for (1) suitable oxygen content, (2) no combustibles or reactives, (3) no toxins. Continuously ventilate and monitor confined spaces to ensure that fumes and gases do not exceed safe exposure limits.

Special Precaution: Use industrial hygiene monitoring equipment to ensure that exposure does not exceed threshold limit values.

Eye Protection: Wear helmet or use face shield with filter lens according to ANSI Z87.1. Provide protective screens and flash goggles, if necessary, to shield others. Wear safety glasses with UV protective side shields or goggles. Wear contact lenses in combination with safety eyewear, except where the contact lenses create a likelihood of injury from intense heat, highly particulate atmosphere, or where their use is prohibited.

Protective Clothing: Wear head, hand and body protection that help to prevent injury from radiation, sparks and electrical shock. Wear flame resistant ear plugs to keep sparks out of ears. See ANSI Z-49.1.

Avoid Fire and Explosion: Remove any combustible material from the work area; if relocation is not possible, protect with a cover of fire-resistant material. Sparks can travel horizontally throughout an area within a 10 meter radius.

Protect Against Noise: Reduce the intensity of the sound; the TLV for noise is 85 dBA for an eight hour duration. Wear approved ear plugs or ear muffs.

Protect Against Electric Shock: Do not touch live electrical parts. Wear dry, insulating gloves (in good condition) and clothing. Insulate yourself from the workpiece and ground, (wear rubber soled shoes, stand on dry insulating mat or platform). Do not dip the electrode holder (gun) in water to cool it; do not lay it on a conductive surface or the work surface.

Heart Pacemakers: Warn wearers of heart pacemakers or other electronic equipment vital to life that the welding operation may impede the function of the device. Consult a physician and the manufacturer of the device.

VIII. Exposure Controls/Personal Protection

Hazardous decomposition products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the material being worked, the process, procedures, and consumables 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 material being worked (such as paint, plating or galvanizing), the number of welding operations and the volume of the work area, the quality and amount of ventilation, the position of the worker'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 or painting activities). When the materials are consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section III. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the ingredients, plus those from the material being worked and the coatings etc. noted above.

Reasonably expected decomposition products from normal use of these products include a complex of the oxides of the materials listed in Section III, as well as carbon monoxide, carbon dioxide, ozone and nitrogen oxides (refer to "Characterization of Arc Welding Fume" available from the American Welding Society). THE FUME LIMIT FOR NICKEL AND/OR MANGANESE MAY BE REACHED BEFORE THE GENERAL LIMIT FOR WELDING FUMES OF 5 mg/m³ IS REACHED. MONITOR FUMES FOR NICKEL AND MANGANESE. The only way to determine the true identity of the decomposition products is by sampling and analysis. The composition and quantity of the fumes and gases to which a worker may be overexposed can be determined from a sample obtained from inside the welder's helmet, if worn, or in the workers breathing zone. See ANSI/AWS F1.5, "Methods for Sampling and Analyzing Gases from Welding and Allied Processes," and ANSI/AWS F1.1 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes," available from the American Welding Society.

Hazardous Ingredients exposure guidelines:

IMPORTANT: This section covers the materials from which this product is manufactured. A second table of possible gaseous emissions is also appended. The term **HAZARDOUS** should be interpreted as a term required and defined by Laws, Statutes, or Regulations, and does not necessarily imply the existence of any hazard when the products are used as directed by **Weldcote Metals**.

WHMIS (Workplace Hazardous Material Information System) Classification: Toxic Class D, Division 2, Subdivision A

Material	(CAS No.)	SARA	ACGIH TLV		OSHA – PEL	
			TWA (mg/m³)	STEL (mg/m³)	TWA (mg/m³)	STEL (mg/m³)
Aluminum (Al)	(7429-90-5)		5 (Welding Fume)		5 (Respirable Fraction)	--
Barium Carbonate (BaCO3)	(513-77-9)		0.5 (Soluble Compounds as Ba)		0.5 (Soluble Compounds as Ba)	--
Boron (B)	(7440-42-8)		10 (Oxide)		5(Oxide - Respirable)	--
Calcium Carbonate (CaCO3)	(1317-65-3)		10 (Dust)		5 (Respirable)	--
Calcium Fluoride (CaF2)	(7789-75-5)		2.5 (as F)		2.5 (as F)	
Copper (Cu)	(7440-50-8)		0.2 (Fume)		0.1 (Fume)	
Graphite (C)	(7782-42-5)		2 (Respirable Dust)		2.5 (Respirable Fraction)	
Iron (Fe)	(7439-89-6)		Not listed		Not listed	
Iron Oxide (FeO)	(1345-25-1)		Not listed		Not listed	
Iron Oxide (Fe2O3)	(1309-37-1)		5 (as Fe) (dusts and fume)		10 (Fume)	
Manganese (Mn)	(7439-96-5)		0.2 (Fume)			5
Nickel (Ni)	(7440-02-0)		1.5 (Inhalable Fraction, elemental)		0.1 (Soluble)	
			0.2 (Inhalable insoluble inorganic compounds)			
			0.1 (Inhalable soluble inorganic compounds)			
Silicate Binder	(1344-09-8) & (1312-76-1)		10		5 (Respirable)	
Silicon (Si)	(7440-21-3) &		10 (Dust)		5 (Respirable)	
Ferro-Silicon (FeSi)	(8049-17-0)					
Silicon Dioxide (SiO2)	(14808-60-7)		0.05 (Respirable Fraction)		10/(% SiO2+2) ; SiO2 measured as Respirable Fraction	
Strontium Carbonate (SrCO3)	(1633-05-2)		Not Listed		Not Listed	
Strontium Fluoride (SrF2)	(7783-48-4)		2.5 (as F)		2.5 (as F)	
Extrusion aids						
Cellulose	(9004-34-6)		10 (Dust)		5(Respirable)	
CarboxymethylCellulose	(9004-32-4)		10 (Dust)		5(Respirable)	
Sodium Alginate	(9005-38-3)		10 (Dust)		5(Respirable)	
Calcium Alginate	(9005-35-0)		10 (Dust)		5(Respirable)	
Guar Gum	(68130-15-4)		10 (Dust)		5(Respirable)	
Dextrin	(9004--53-9)		10 (Dust)		5(Respirable)	

NOTE: In the ingredients table, an asterisk (*) after the CAS number indicates a toxic chemical subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 (SARA) and 40 CFR Part 372.

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

In the table above, when "C" appears with an exposure number, the "C" indicates a "Ceiling Limit"; the number is the concentration that should not be exceeded during any part of the working exposure.

This section covers some of the additional hazardous ingredients that may be generated by the Brazing process.

	ACGIH TLV	OSHA PEL
Ozone	0.1 ppm (ceiling)	0.1 ppm
Nitric Oxide Nitrogen Dioxide	25 ppm	25 ppm
Welding fumes	3, 5ppm (STEL)	5 ppm (ceiling)
Carbon	5 mg/m3	
Hydrogen Monoxide	25 ppm	50 ppm
Phosgene	0.5 ppm, 2 (ceiling)	3 ppm
gas	0.1 ppm	0.1 ppm

ENGINEERING CONTROLS:

Ventilation: Clean air for welding operations is provided by ventilation systems. Ventilation systems consist of local exhaust and general ventilation supply. The most efficient method of contaminant control in the occupied zone of the welding shop, particularly in the breathing zone of the welder, is local exhaust which captures the contaminants at or near their source. Consult AWSF3.2M/F3.2 "Ventilation Guide for Weld Fume" published by the American Welding Society, P. O. Box 351040, Miami, FL 33135, for the design of ventilation and exhaust systems. Use enough ventilation, local exhaust at the arc, or both, to keep the exposure within legal limits. In the worker's breathing zone and the general area, the fumes and gases must be kept below the TLVs and the *equivalent exposure* must compute to less than one. The AWS publication F1.3, "A Sampling Strategy Guide for Evaluating Contaminants in the Welding Environment" discusses the sampling scheme for various AWS classified electrodes that will assure adequate ventilation.

PERSONAL PROTECTIVE EQUIPMENT:

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below TLV. Where respiratory protection is necessary, NIOSH approved respiratory protection should be used. The selection of the appropriate respiratory protection (dust respirator, etc.) should be based on the actual or potential airborne contaminants and their concentrations present. However, at least a NIOSH approved type TC-21-C dust mask is recommended.

Eye Protection: Wear helmet or use face shield with filter lens. As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to the next lighter shade that gives sufficient view of the weld zone. Provide protective screens and flash goggles, if necessary, to shield others. Wear safety glasses with UV protective side shields or goggles to provide needed protection from reflected radiation and to prevent eye contact. Readily available eye baths are recommended in areas where operations may produce fumes and dusts.

Skin Protection: Wear head, hand and body protection that helps to prevent injury from hot metal, sparks, slag, infrared radiation, UV radiation, abrasions, contusions and heat stress. Protective clothing will not generally prevent shock except for leather if kept dry. The clothing may include heat/fire resistant gloves, overalls, aprons, sleeves, footwear, welder's spats and head cover. Gloves made of leather with inside seams (or those that give equal performance) are preferred. Wear garments made of leather, heavyweight tightly woven wool or cotton. Keep clothing clean (free of oil, grease or solvents) and in good repair. Do not wear clothing with frayed edges, tears or holes. Do not roll up sleeves or trousers (pants should not be cuffed).

Hygienic Work Practices: Avoid contact to eyes, skin, and mucous membranes. Avoid inhalation of vapors, gases, fumes and dusts. Wash thoroughly after handling and use. Do not smoke, eat, drink, chew gum or tobacco, or apply cosmetics within the working area. Do not store or bring tobacco products, gum, food, drinks or cosmetics within the working area. Otherwise follow the standards of good industrial hygiene practices.

Ear Plugs: Wear flame resistant ear plugs to keep sparks out of ears. See ANSI Z-49.1.

IX. Physical and Chemical Properties

Physical State:	Solid.
Appearance:	Dark grey covering on a cut length metal wire.
Odor:	Odorless.
Odor Threshold:	Not applicable.
Specific Gravity:	8.89 main component.
Vapor Pressure:	Not applicable
Vapor Density:	Not applicable.
Density (g/cc):	Not known.
Evaporation Rate:	Not applicable.
Percent Volatile by Wt:	Not applicable.
Boiling Point:	Not determined.
Freezing Point:	Not determined.
Melting Point:	1440°C (2625°F)
Solubility in Water:	Insoluble.
pH:	Not determined.
Thermal Decomposition:	Not determined.
Volatile Organic Compounds (lbs/lb):	Not determined.
Coefficient of Water/Oil Distribution:	Not determined.
Other:	

X. Stability and Reactivity

Chemical Stability: Stable (X) Unstable () Polymerization will not occur.

Reacts With: Air Water ___ Heat Oxidizers X Acids X Alkalis X Metals _____ Other _____ None _____

Hazardous Reaction Products: Contact with acid may evolve hydrogen gas.

Comments: Review Section III.

XI. Toxicological Information

Introduction: Electric arc working creates health and physical hazards. Fumes and gases can be dangerous to your health. Fumes and gases containing fluoride burn eyes and skin on contact and can be fatal if swallowed. Electric shock can kill you. Arc rays can injure eyes and burn skin. Heat rays (infrared radiation) from flame or hot metal can injure eyes. Noise can damage hearing

Route of overexposure: The most likely route of overexposure is inhalation of fumes and gases during the welding processes and skin/eye exposure to radiation. Fumes are solid respirable particles which originate from filler metals and fluxes, the base material, coating on the base material, etc. During welding, gases are produced by the decomposition of the covering, by sublimation and evaporation from the intense heat, and gases can also be generated in the vicinity of the process by the emitted radiation.

Effects of overexposure to radiation: Welding, cutting and allied processes may produce radiant energy harmful to health. The radiant energy emitted by the arc welding and brazing process is non-ionizing radiation (ultraviolet, visible light or infrared). If excessive exposure occurs, it can produce eye damage and skin burns; the severity depends on the intensity and wavelength of the radiant energy.

Effects of acute (short-term) overexposure to fumes and gases: The possible effect of overexposure range from irritation of eyes, skin, and respiratory system to more severe complications. Effects can occur immediately or at some later time. Acute overexposure to fumes may include signs and symptoms such as watery eyes, nose and throat irritation, headache, dizziness, metal fume fever, difficulty in breathing, frequent coughing, or chest pain. The possibility of more serious health effects exists when especially toxic materials are involved. Some toxic gases associated with welding/brazing may cause pulmonary edema, asphyxiation, and death.

Pre-existing Medical Conditions Aggravated by Overexposure: Individuals with allergies or impaired respiratory function may have symptoms worsened by exposure to welding fumes; however, such reaction cannot be predicted due to the variation in the composition and in the quantity of the decomposition products.

Effects of chronic (long-term) 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. Long term exposure to welding and allied processes gases, dusts and fumes may contribute to pulmonary irritation or pneumoconiosis. Welding fumes (not otherwise specified) has been listed by IARC as possibly carcinogenic to humans.

Toxicity Data: Presented below is a briefing of the safety profile on the components of this product:

	ACUTE	CHRONIC
Aluminum/ aluminum oxide	Irritant.	Pulmonary fibrosis, emphysema.
Boron/ boron oxide	Irritant.	Poisonous by ingestion.
Carbon/ carbon monoxide	Headaches, dizziness, fatigue; loss of consciousness and death at high concentrations.	Experimental teratogenic and reproductive effects. (On CA prop 65 List).
Copper	Irritant by inhalation. Copper fumes can cause metal fume fever.	Overexposure to copper fumes may lead to copper poisoning, resulting in hemolytic anemia and liver, kidney and spleen damage. High levels of copper may cause central nervous system damage characterized by nerve fiber separation and cerebral degeneration.
Iron/ iron oxides	Metal fume fever.	Can cause siderosis, sometimes called "iron pigmentation" of the lung, overexposure to iron (>50-100 mg Fe per day) can result in pathological deposition of iron in body tissues, symptoms of which are fibrosis of the pancreas, diabetes mellitus, and liver cirrhosis.
Manganese	Metal fume fever, irritant.	Overexposure to manganese compounds may affect the central nervous system, symptoms of which are languor, sleepiness, muscular weakness, emotional disturbances, and spastic gait. The effect of manganese on the nervous system is irreversible.
	ACUTE	CHRONIC
Nickel	Allergic reactions, metal fume fever.	Nickel is considered carcinogenic. Long term overexposure to nickel fumes may also cause pulmonary fibrosis and edema.

Barium Carbonate	Soluble barium compounds can cause severe stomach pain, slow pulse rate, irregular heartbeat, convulsions, spasms and in extreme exposures death.	Long term overexposure to soluble barium compounds may cause nervous disorders.
Calcium carbonate/oxide	Irritant.	
Calcium fluoride & strontium fluoride	Fluoride fumes are very irritating. Some fluorides can cause death.	Chronic fluoride exposure causes sclerosis of the bones, calcification of the ligaments, mottled teeth.
Silicon dioxide and silicates	Irritant.	Overexposure to respirable crystalline silica may result in silicosis, a disabling lung disease; overexposure to respirable crystalline silica is a known cause of carcinogenicity in humans.
Welding Fume, not otherwise specified.		May be carcinogenic.

Exposure limits: The 2003 TLV for welding fume is 5 mg/m³. At times, the limit for a particular hazardous chemical is reached before the limit for welding fumes. TLV-TWAs should be used as a guide in the control of health hazards and not as firm lines between safe and excessive concentrations. As previously noted, the fume from welding, brazing, soldering and allied processes is a mixture of many components. Therefore, a statutory computation of the *equivalent exposure* is required. The *equivalent exposure* value for the fume mixture from the welding or from an allied process shall always be less than one. The exposure to fumes and gases must be kept as low as possible.

Carcinogenic Assessment (NTP Annual Report, IARC Monographs, Other):

Nickel, Alloys: IARC-2B possibly carcinogenic to humans.

Nickel Compounds: IARC-1 carcinogenic to humans; MAK-1 substances that cause cancer in man and can be assumed to make a significant contribution to cancer risk; NTP-K known to be a human carcinogen.

Nickel, Elemental: IARC-2B possibly carcinogenic to humans; NTP-K known to be a human carcinogen; MAK-1 substances that cause cancer in man and can be assumed to make a significant contribution to cancer risk; TLV-A5 not suspected as a human carcinogen on the basis of properly conducted epidemiological studies in humans.

Nickel, Insoluble Compounds, as Ni: NTP-K known to be a human carcinogen; TLV-A1 confirmed human carcinogen; NTP-K known to be a human carcinogen.

Nickel, Soluble Compounds, as Ni: NTP-K known to be a human carcinogen; TLV-A4 not classified as a human carcinogen.

Nickel Carbonate: IARC-1 carcinogenic to humans; MAK-1 substances that cause cancer in man and can be assumed to make a significant contribution to cancer risk; NTP-K known to be a human carcinogen.

Nickel Dioxide: IARC-1 carcinogenic to humans; MAK-1 substances that cause cancer in man and can be assumed to make a significant contribution to cancer risk; NTP-K known to be a human carcinogen.

Nickel Hydroxide: IARC-1 carcinogenic to humans; MAK-1 substances that cause cancer in man and can be assumed to make a significant contribution to cancer risk; NTP-K known to be a human carcinogen.

Nickel Oxide: IARC-1 Carcinogenic to humans; MAK-1 substances that cause cancer in man and can be assumed to make a significant contribution to cancer risk; NTP-K known to be a human carcinogen. TLV-A1 confirmed human carcinogen; NTP-K known to be a human carcinogen.

Nickel Sub sulfide: EPA-A human carcinogen, studies support a causal association between exposure and cancer; IARC-1 carcinogenic to humans; MAK-1 substances that cause cancer in man and can be assumed to make a significant contribution to cancer risk; NTP-K known to be a human carcinogen. TLV-A1 confirmed human carcinogen; NTP-K known to be a human carcinogen.

Welding Fumes (not otherwise classified)—IARC-2B: Possibly carcinogenic to humans.

XII. Ecological Information

Product Persistence: These ESAB Nickel-Arc cast iron SMAW covered electrodes have components that are water soluble, fluoride compounds that are somewhat soluble and metals that are not soluble. The covering is bonded by cured silicate and hydrogen bonding. The covering will persist but is expected to slowly revert and degrade.

Biodegradability: The water soluble components can release fluoride into the environment.

Biological Oxygen Demand (BOD): No test data.

Chemical Oxygen Demand: No test data.

Note on Ecotoxicity: Fluoride can be highly toxic to aquatic and terrestrial flora and fauna. The metals are not expected to cause adverse affects on animals and plants. However, if copper and zinc migrate into a body of water, they may cause adverse affects on aquatic life.

CEPA Toxic Substance List contains the following groupings of chemicals:

40. Inorganic Fluorides.

51. Respirable particulate matter less than or equal to 10 microns.

XIII. Disposal Considerations

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. If used or waste product(s), such as slag and filtered fumes, are disposed of, testing including TCLP, should be conducted to determine hazard characteristics. However, alloy wastes are normally collected to recover metal values.

RCRA: The (unused) product does not contain hazardous RCRA listed components.

XIV. Transport information

U.S. DEPARTMENT OF TRANSPORTATION:

THIS MATERIAL IS NOT HAZARDOUS (PER 49 CFR 172.101) BY THE U.S. DEPARTMENT OF TRANSPORTATION

XV. Regulatory Information

Environmental Protection:

United States EPA Toxic Substance Control Act: All constituents of this product are on the TSCA inventory list.

Canadian Environmental Protection Act (CEPA): All constituents of these products are on the Domestic Substance List (DSL) or (1317-65-3) on Non-DSL.

EPCRA (SARA Title III) 302 Extremely Hazardous Substances:

Ingredient name	304 EHS RQ	302 EHS TPQ
No ingredients listed in this section.		

EPCRA (SARA Title III) 313 Toxic Chemical (May be subject to annual reporting; see Section II for weight percent.):

Ingredient name	CAS Number
Aluminum (Al)	7429-90-5
Barium Carbonate/Barium compounds	N040
Copper (Cu)	7440-50-8
Manganese (Mn)	7439-96-5
Nickel (Ni)	7440-02-0

Note on Welding Process Emission Factors to compute released quantities. *The Plain English Guide to the Clean Air Act*, EPA-400-K-93-001, April 1993, AP-42, Section 12.19 contains compiled emission factors for the SMAW, GMAW, FCAW and SAW welding processes. The emission factors for SAW are substantially lower than the open arc processes. The emission factors for GTAW are very low and generally not measured. *Also See: ANSI/AWS F1.6 "Guide for Estimating Welding Emissions for EPA and Ventilation Permit Reporting"* available from the American Welding Society.

CERCLA Reportable Quantities:

Ingredient name	CAS Number	RQ pounds
Copper (Cu)	7440-50-3	5000
Nickel (Ni)	7440-02-0	100

Hazard: Immediate acute health hazard; delayed health hazard.

CANADIAN ENVIRONMENTAL PROTECTION ACT PRIORITIES LISTS

PSL1 *Inorganic Fluorides* are a part of these products. See "Approximate Composition Tables".
Oxidic, Sulphidic, and Soluble Inorganic Nickel Compounds may be in the emissions from the process.

PSL2 *Respirable particulate matter less than or equal to 10 microns* are found in the welding fumes from the process.

CANADA; INGREDIENT DISCLOSURE LIST

Aluminum, elemental	7429-90-5	Manganese, elemental	7439-96-5
Barium Carbonate	513-77-9	Nickel, elemental	7440-02-2
Copper, elemental	7440-50-8	Ferrosilicon	8049-17-0
Fluoride Compounds Inorganic, n.o.s.		Silia, crystalline, quartz	14808-60-7

CANADIAN WHMIS SYMBOL D2-A Material Causing Other Toxic Effects.



SAFETY LABEL INFORMATION:

California Proposition 65

WARNING: This product contains or produces 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.)

See: AWS "Safety and Health Fact Sheet No. 23" at: www.aws.org.



WARNING: CONTAINS FLUORIDES

Protect yourself and others. Read and understand this information:

FUMES and **GASES** can be hazardous to your health.

Fumes from this product may contain chromium and nickel compounds that are known to cause cancer. Consult the MSDS for this product.

ARC RAYS can injure eyes and burn skin.

ELECTRIC SHOCK can kill.

- Before use, read and understand the manufacturer's instructions, Material Safety Data Sheets (MSDSs), and your employer's safety practices and the references noted below.
- Keep your head out of the fumes.
- Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases from your breathing zone and the general area. If this cannot be done, use an air supplied respirator.
- Wear correct eye, ear, and body protection.
- Do not touch live electrical parts.
- Obtain and read American National Standard ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, published by the American Welding Society, 550 N.W. LeJeune Rd., Miami, Florida 33126; OSHA *Safety and Health Standards*, available from U.S. Government Printing Office, 732 N. Capitol Street NW, Washington, DC 20401

First Aid: If contact with eyes or skin, flush immediately with water for at least 15 minutes. If swallowed, induce vomiting. Never give anything by mouth to an unconscious person. Call a physician.

DO NOT REMOVE THIS INFORMATION

XVI. Other Information

HMIS Classifications:

HMIS: SMAW covered electrodes are not HMIS rated. The label and the values presented on this page are best effort intended to communicate safety information and practices.

HMIS RATINGS

HEALTH:		1
FLAMMABILITY:		0

PHYSICAL HAZARD: a

Personal Protection: B

HMIS: The Shielded Metal Arc Welding Processes with these covered electrodes is not HMIS rated. The label and the values presented on this page are a best effort intended to communicate safety information and practices.

HMIS RATINGS

HEALTH:	*	4
FLAMMABILITY:		4

PHYSICAL HAZARD: 4

Personal Protection
See Section VIII

Note: This product has been classified according to hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

Weldcote Metals and its employees request the users of these products to study this Material Safety Data Sheet (MSDS,) the product labels, the power source manual and instructions, and process literature, especially the sources cited herein, and to become fully aware of the product hazards and safety information. To promote the safe use of these products, a user should (1) notify and train its employees, agents and contractors concerning the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for these products, and (3) request that such customers notify and train their employees and customers, for these products, of the same product hazards and safety information.

The opinions expressed in this MSDS are those of qualified experts within Weldcote Metals. We believe that the information contained herein is current as of the date of this MSDS. Since the use of this information and these opinions and the conditions of use of these products are not within the control of **Weldcote Metals**, it is the user's obligation to determine the conditions of safe use of these products.

Weldcote Metals believes this data to be accurate and to reflect qualified expert opinion regarding current research. However, Weldcote Metals can not make any expressed or implied warranty as to this information.