SAFETY DATA SHEET

1. Identification

Product identifier **Metal Cored Welding Electrodes for Hardfacing**

Other means of identification

Synonyms The products covered by this document are:

Select A2-XTRA; Select Carbo-Arc; SelectWear 26-MCG; SelectWear 410NiMo-S; SelectWear 4135-S; SelectWear 414N-S; SelectWear 420-MCG; SelectWear 420-S; SelectWear 420-S Plus; SelectWear 423HC-S; SelectWear 42-MCG; SelectWear 42-S; SelectWear 43-S; SelectWear 44-MCO; SelectWear 50-MCO; SelectWear 52-MMS; SelectWear 52W-MCG; SelectWear 52W-S; SelectWear 57GW-MCG; SelectWear 58-MCG; SelectWear 60CP-MCO ; SelectWear 60HB-MCO; SelectWear 60HC-MCG ; SelectWear 60HC-MCO; SelectWear 60HC-MCO Plus; SelectWear 60HCMo-MCO; SelectWear 60XHP-MCO; SelectWear 62-MCO; SelectWear 63-MCO; SelectWear 65-MCO; SelectWear 67-MCO; SelectWear 700VTiC-MCO; SelectWear 8620-S; SelectWear BU24-S; SelectWear BU30-S; SelectWear BU-S; SelectWear CLN60B-MCO; SelectWear H12 EXTRA; SelectWear M7-MCG; SelectWear MI100D-MCO; SelectWear MN-H; SelectWear MultiPlex-MCO; SelectWear WP60B-MCO; SelectWear WP60-MCO; SelectWear WP892HF-MCO; SelectWear Zucar-MCO; SelectWear 430-S; SelectWear MP5-S; SelectWear NiBWC;SelectWear 423-S.

Recommended use Arc Welding.

Recommended restrictions Uses other than the recommended use.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer/Supplier

Company name Select-Arc, Inc.

Address 600 Enterprise Drive
Fort Loramie, OH 45845
United States

Telephone (800) 341-5215

Fax 1-888-511-5217

Contact person Technical Assistance

E-mail CSR1@select-arc.com

Supplier

Company name

Address

Telephone

Emergency phone number

USA / Canada 1-866-519-4752

Mexico 52 55 41696225

Europe 1-760-476-3962

Asia Pacific 1-760-476-3960

Middle East/Africa 1-760-476-3959

Access code 334276

2. Hazard identification

Physical hazards Not classified.

Health hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement None.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash skin with soap and water.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Supplemental information Read and understand the manufacturer's instructions, Safety Data Sheets and the precautionary labels before using this product. Refer to Section 8.

The composition and quantity of welding fumes and gases are dependent upon the metal being welded, the process, procedures and electrodes used. Most fume ingredients are present as complex oxides and compounds and not as pure metals. When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 3. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation, plus those from the base metal and coating, etc., of the materials shown in the composition (section 3) of this Safety Data Sheet.

Fumes from the use of this product may contain complex oxides or compounds of the following elements and molecules: amorphous silica fume, chromium, manganese, nickel, silica and other metal traces. Other reasonably expected constituents of the fume would also include complex oxides of iron, titanium, and silicon. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

The intended use of this product does not include grinding.

Other hazards This product presents no hazards in its intrinsic form. However, several hazards are generated during welding operations that can be harmful.

WARNING! - Avoid breathing welding fumes and gases, they may be dangerous to your health. Always use adequate ventilation. Always use appropriate personal protective equipment. ARC RAYS: The welding arc can injure eyes and burn skin. HEAT: Molten metal and weld spatter can burn skin and start fires. ELECTRIC SHOCK: Arc welding and associated processes can kill. FUMES AND GASES: Can be dangerous to your health.

Electric Shock can kill. If welding must be performed in damp locations or with wet clothing, on metal structures or when in cramped positions such as sitting, kneeling or lying, or if there is a high risk of unavoidable or accidental contact with workpiece, use the following equipment: Semiautomatic DC Welder, DC Manual (Stick) Welder, or AC Welder with Reduced Voltage Control.

Overexposure to welding fumes and gases can be hazardous. Workers allergic to nickel may develop eczema or rashes.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Tungsten		7440-33-7	>0 - <60
Nickel		7440-02-0	>0 - <55
Chromium		7440-47-3	>0 - <31
Manganese		7439-96-5	>0 - <20
Carbon		7440-44-0	>0 - <19
Molybdenum		7439-98-7	>0 - <9
Boron		7440-42-8	>0 - <5
Silicon		7440-21-3	>0 - <5
Calcium fluoride		7789-75-5	>0 - <2

Chemical name	CAS number	%
Copper	7440-50-8	>0 - <1
Rutile (TiO2)	1317-80-2	>0 - <1

Composition comments All concentrations are in percent by weight.

4. First-aid measures

Inhalation Move to fresh air if breathing is difficult cause by inhalation of dust or fume from this product. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.

Skin contact Remove contaminated clothing and wash the skin thoroughly with soap and water. For reddened or blistered skin, or thermal burns, obtain medical assistance at once.

Eye contact Dust or fume from this product should be flushed from the eyes with copious amounts of clean, tepid water until transported to an emergency medical facility. Do not allow victim to rub or keep eyes tightly closed. Obtain medical assistance at once. Arc rays can injure eyes. If exposed to arc rays, move victim to dark room, remove contact lenses as necessary for treatment, cover eyes with a padded dressing and rest. Obtain medical assistance if symptoms persist.

Ingestion Unlikely due to form of product, except for granular materials. Avoid hand, clothing, food, and drink contact with metal fume or powder which can cause ingestion of particulate during hand to mouth activities such as drinking, eating, smoking, etc. If ingested, do not induce vomiting. Contact a poison control center. Unless the poison control center advises otherwise, wash out mouth thoroughly with water. If symptoms develop, seek medical attention at once.

Most important symptoms/effects, acute and delayed Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Chronic overexposure to nickel fumes and hexavalent chromium can cause cancer. Workers allergic to nickel may develop eczema or rashes. Prolonged exposure to welding fume may cause lung damage and various types of cancer, including lung, larynx and urinary tract.

Indication of immediate medical attention and special treatment needed Treat symptomatically.

General information Welding hazards are complex and may include physical and health hazards such as but not limited to electric shock, physical strains, radiation burns (eye flash), thermal burns due to hot metal or spatter and potential health effects of overexposure to welding fume or dust. Refer to Section 11 for more information.

In case of electrical shock turn off power and follow recommended treatment. In all cases call a physician.

Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media Special powder against metal fires. Dry sand. As shipped, the product will not burn.

Unsuitable extinguishing media None known.

Specific hazards arising from the chemical Welding arc and sparks can ignite combustibles and flammable products.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do it without risk.

General fire hazards

As shipped, this product is nonflammable. However, welding arc and sparks can ignite combustibles and flammable products. Read and understand American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" and National Fire Protection Association NFPA 51B, "Standard for Fire Prevention During Welding, Cutting and Other Hot Work" before using this product.
This material has the potential to ignite if subjected to high enough temperatures or create an airborne dust combustion (deflagration) hazard if sufficient concentrations become airborne in an environment with high enough energy sources to cause ignition. For additional information refer to Section 16 of this M(SDS). Handle according to applicable company safety instructions and procedures.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Metallic dust or fumes may be produced during welding: Avoid inhalation of dust and fumes. Avoid contact with skin and eyes. If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8. Isolate the area and keep non-essential people away. Do not touch or walk through spilled material. Allow the molten metallic material to solidify and cool before disposal. If molten metal spills out of the weldment, turn off the power. Contain the flow using sand or submerged arc flux.

Methods and materials for containment and cleaning up

Stop the flow of material, if this is without risk. Clean up spills immediately, observing precautions in the personal protective equipment in Section 8. Avoid generating dust. Prevent product from entering any drains, sewers or water sources. Refer to Section 13 for proper disposal. Recover and recycle, if practical.

Environmental precautions

Avoid release to the environment.

7. Handling and storage

Precautions for safe handling

Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed.

Read and understand the manufacturer's instruction and the precautionary label on the product. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, http://pubs.aws.org and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, www.gpro.gov.

Do not breathe fumes and dusts. If dust or fumes are generated during use, use local exhaust in combination with general ventilation as necessary to remove fumes/dust from the workers' breathing zone and to ensure exposures do not exceed applicable limits. Avoid contact with skin and eyes. Wear appropriate personal protective equipment. Keep the workplace clean. Observe good industrial hygiene practices.

Electric Shock can kill. If welding must be performed in damp locations or with wet clothing, on metal structures or when in cramped positions such as sitting, kneeling or lying, or if there is a high risk of unavoidable or accidental contact with workpiece, use the following equipment: Semiautomatic DC Welder, DC Manual (Stick) Welder, or AC Welder with Reduced Voltage Control.

Conditions for safe storage, including any incompatibilities

Store in original tightly closed container. Store in a dry place. Use care in handling/storage. Store in accordance with local/regional/national/international regulation. Store away from incompatible materials.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	Inhalable fraction.
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value	Form
Tungsten (CAS 7440-33-7)	TWA	3 mg/m3	Respirable fraction.

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	
Tungsten (CAS 7440-33-7)	STEL	10 mg/m3	
	TWA	5 mg/m3	

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	Inhalable
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable
		0.02 mg/m3	Respirable.
Nickel (CAS 7440-02-0)	TWA	0.05 mg/m3	
Tungsten (CAS 7440-33-7)	TWA	3 mg/m3	

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act), as amended

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	Inhalable fraction.
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.
Tungsten (CAS 7440-33-7)	TWA	3 mg/m3	Respirable fraction.

Canada. New Brunswick OELs: Threshold Limit Values (TLVs) Based on the 1991 and 1997 ACGIH TLVs and BEIs Publication (New Brunswick Regulation 91-191)

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable fraction.
Tungsten (CAS 7440-33-7)	STEL	10 mg/m3	

Canada. New Brunswick OELs: Threshold Limit Values (TLVs) Based on the 1991 and 1997 ACGIH TLVs and BEIs Publication (New Brunswick Regulation 91-191)

Components	Type	Value	Form
	TWA	5 mg/m3	

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
		0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Nickel (CAS 7440-02-0)	TWA	1 mg/m3	Inhalable fraction.
Tungsten (CAS 7440-33-7)	TWA	3 mg/m3	Respirable fraction.

Canada. Quebec OELs. (Ministry of Labor - Regulation respecting occupational health and safety)

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	TWA	0.5 mg/m3	Inhalable aerosol fraction
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	Inhalable aerosol fraction
		0.05 mg/m3	Respirable aerosol fraction
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m3	Inhalable dust.
Tungsten (CAS 7440-33-7)	TWA	3 ppm	Respirable aerosol fraction

Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21), as amended

Components	Type	Value	Form
Chromium (CAS 7440-47-3)	15 minute	1.5 mg/m3	
	8 hour	0.5 mg/m3	
Copper (CAS 7440-50-8)	15 minute	3 mg/m3	Dust and mist.
		0.6 mg/m3	Fume.
	8 hour	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Manganese (CAS 7439-96-5)	15 minute	0.6 mg/m3	
	8 hour	0.2 mg/m3	
Nickel (CAS 7440-02-0)	15 minute	3 mg/m3	Inhalable fraction.
	8 hour	1.5 mg/m3	Inhalable fraction.
Tungsten (CAS 7440-33-7)	15 minute	10 mg/m3	
	8 hour	5 mg/m3	

Biological limit values

ACGIH Biological Exposure Indices (BEI)

Components	Value	Determinant	Specimen	Sampling Time
Chromium (CAS 7440-47-3)	0.7 µg/l	Total chromium	Urine	*
Nickel (CAS 7440-02-0)	5 µg/l	Nickel	Urine	*

* - For sampling details, please see the source document.

Appropriate engineering controls	Local ventilation should be provided. Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. If engineering measures are not sufficient to maintain concentrations of dust particulates below the OEL (occupational exposure limit), suitable respiratory protection must be worn. If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits . Provide adequate ventilation and/or local exhaust at the weld station to keep fumes and gases away from the welder. Train welders and welding operators to keep their head out of the fumes. See ANSI Z49.1 “Safety in Welding, Cutting, and Allied Processes” for recommendations of safe work practices.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses with side shields (or goggles). Wear a helmet or face shield with an appropriate filter lens. Use protective screens to shield others in the work area.
Skin protection	
Hand protection	Wear hand protection which help to prevent injury from radiation, sparks and electrical shock. At a minimum this includes welder's gloves and may include arm protectors. Suitable gloves can be recommended by the glove supplier.
Other	Wear appropriate chemical resistant clothing. Use of a welding apron is recommended.
Respiratory protection	Use NIOSH approved fume respirator or air supplied respirator when where ventilation is inadequate, welding in confined spaces or where required to by OSHA regulations. Fume sampling per AWS F1.1 “Method for Sampling Airborne Particulates Generated by Welding and Allied Processes” may be required. Other appropriate standards that may be considered include, but are not limited to, AWS F1.2 “Laboratory Method for Measuring Fume Generation Rate and Total Fume Emission of Welding and Allied Processes” and AWS F3.2 “Ventilation Guide for Weld Fume”. For actual weld fume and particulate analysis, refer to the appropriate analytical methods recommended by NIOSH or OSHA, and consult an industrial hygiene professional. Selection and use of respiratory protective equipment should be in accordance with CSA Standard Z94.4.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Observe any medical surveillance requirements. When using do not eat or drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Physical state	Solid.
Form	Cored Wire.
Colour	Grey
Odour	Odourless.
Odour threshold	Not applicable (material is odourless).
Melting point/freezing point	> 1093.33 °C (> 1999.99 °F)
Boiling point or initial boiling point and boiling range	> 1093.33 °C (> 1999.99 °F)
Flammability	Not flammable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not applicable, material is a solid.
Explosive limit – upper (%)	Not applicable, material is a solid.
Flash point	Not applicable, material is a solid.
Auto-ignition temperature	Not applicable, material is a solid.
Decomposition temperature	> 1093.3 °C (> 1999.9 °F)
pH	Not applicable as the product is insoluble in water.

Kinematic viscosity	Not applicable, material is a solid.
Solubility	
Solubility (water)	Insoluble (<0.1%)
Partition coefficient (n-octanol/water) (log value)	Not applicable, product is a mixture.
Vapour pressure	Not applicable, material is a solid.
Density and/or relative density	
Density	Property has not been measured.
Relative density	Property has not been measured.
Vapour density	Not applicable, material is a solid.
Particle characteristics	Property has not been measured.
Other information	
Evaporation rate	Not applicable, material is a solid.
Explosive properties	Not explosive.
Oxidising properties	Not oxidising.
Viscosity	Not applicable, material is a solid.

10. Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	None expected under normal conditions of use.
Conditions to avoid	Avoid heat. Contamination. Moisture.
Incompatible materials	Strong acids. Strong oxidising substances. Strong bases.
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, procedure 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 worker 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 3. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 3, plus those from the base metal and coating, etc., as noted above. Reasonably expected fume constituents produced during arc welding include the oxides of iron, manganese and other metals present in the welding consumable or base metal. Hexavalent chromium compounds may be in the welding fume of consumables or base metals which contain chromium. Gaseous and particulate fluoride may be in the welding fume of consumables which contain fluoride. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects.
Skin contact	Arc rays can burn skin. Skin cancer has been reported.
Eye contact	Arc rays can injure eyes.
Ingestion	Health injuries are not known or expected under normal use.

Symptoms related to the physical, chemical and toxicological characteristics

Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Workers allergic to nickel may develop eczema or rashes. Prolonged exposure to welding fume may cause lung damage and various types of cancer, including lung, larynx and urinary tract. Chronic overexposure to nickel fumes and hexavalent chromium can cause cancer.

Information on toxicological effects

Acute toxicity

Fumes and gases can be dangerous to your health.

Organic polymers may be used in the manufacture of various welding consumables. Overexposure to their decomposition byproducts may result in a condition known as polymer fume fever. Polymer fume fever usually occurs within 4 to 8 hours of exposure with the presentation of flu like symptoms, including mild pulmonary irritation with or without an increase in body temperature. Signs of exposure can include an increase in white blood cell count. Resolution of symptoms typically occurs quickly, usually not lasting longer than 48 hours.

Overexposure to manganese fumes may affect the brain and central nervous system, resulting in poor coordination, difficulty speaking, and arm or leg tremor. This condition can be irreversible .

Chromates may cause ulceration, perforation of the nasal septum, and severe irritation of the bronchial tubes and lungs. Liver damage and allergic reactions, including skin rash, have been reported. Asthma has been reported in some sensitized individuals. Skin contact may result in irritation, ulceration, sensitization, and contact dermatitis. Chromates contain the hexavalent form of chromium. Hexavalent chromium and its compounds are on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans.

Components	Species	Test Results
Boron (CAS 7440-42-8)		
Acute		
Oral		
LD50	Rat	650 mg/kg
Chromium (CAS 7440-47-3)		
Acute		
Inhalation		
Aerosol		
LC50	Rat	> 5.41 mg/l, 4 Hours
Oral		
LD50	Rat	> 5000 mg/kg
Manganese (CAS 7439-96-5)		
Acute		
Oral		
LD50	Rat	9000 mg/kg
Nickel (CAS 7440-02-0)		
Acute		
Inhalation		
NOAEC	Rat	10200 mg/l, 1 hours
Oral		
LD50	Rat	> 9000 mg/kg
Tungsten (CAS 7440-33-7)		
Acute		
Dermal		
LD50	Rat	> 2000 mg/kg

Components	Species	Test Results
Inhalation		
dust/mist		
LC50	Rat	> 5.4 mg/l, 4 Hours
Oral		
LD50	Rat	> 2000 mg/kg

Skin corrosion/irritation Not classified.

Serious eye damage/eye irritation Not classified.

Respiratory or skin sensitisation

Canada - Alberta OELs: Irritant

Chromium (CAS 7440-47-3)	Irritant
Tungsten (CAS 7440-33-7)	Irritant

Respiratory sensitisation Not classified.

Skin sensitisation Not classified.

Germ cell mutagenicity Not classified.

Carcinogenicity Arc rays: Skin cancer has been reported. Prolonged exposure to welding fume may cause lung damage and various types of cancer, including lung, larynx and urinary tract.

ACGIH Carcinogens

Manganese (CAS 7439-96-5)	A4 Not classifiable as a human carcinogen.
Nickel (CAS 7440-02-0)	A5 Not suspected as a human carcinogen.
Rutile (TiO2) (CAS 1317-80-2)	A3 Confirmed animal carcinogen with unknown relevance to humans.

Canada - Alberta OELs: Carcinogen category

Nickel (CAS 7440-02-0)	Confirmed human carcinogen.

Canada - Manitoba OELs: carcinogenicity

Manganese (CAS 7439-96-5)	Not classifiable as a human carcinogen.
Nickel (CAS 7440-02-0)	Not suspected as a human carcinogen.
Rutile (TiO2) (CAS 1317-80-2)	Confirmed animal carcinogen with unknown relevance to humans.

Canada - New Brunswick OELs: Carcinogen category

Chromium (CAS 7440-47-3)	A4: Not classifiable as a human carcinogen
Manganese (CAS 7439-96-5)	A4: Not classifiable as a human carcinogen
Nickel (CAS 7440-02-0)	A5: Not suspected as a human carcinogen
Rutile (TiO2) (CAS 1317-80-2)	A4: Not classifiable as a human carcinogen

IARC Monographs. Overall Evaluation of Carcinogenicity

Chromium (CAS 7440-47-3)	3 Not classifiable as to carcinogenicity to humans.
Nickel (CAS 7440-02-0)	2B Possibly carcinogenic to humans.
Rutile (TiO2) (CAS 1317-80-2)	2B Possibly carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens

Nickel (CAS 7440-02-0)	Reasonably Anticipated to be a Human Carcinogen.

Reproductive toxicity Not classified.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Due to the physical form of the product it is not an aspiration hazard.

Chronic effects Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Chromates may cause ulceration, perforation of the nasal septum, and severe irritation of the bronchial tubes and lungs. Liver damage and allergic reactions, including skin rash, have been reported. Asthma has been reported in some sensitized individuals. Skin contact may result in irritation, ulceration, sensitization, and contact dermatitis. Chromates contain the hexavalent form of chromium. Hexavalent chromium and its compounds are on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. Workers allergic to nickel may develop eczema or rashes.

Further information Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Arc rays can injure eyes. Arc rays can burn skin.

12. Ecological information

Ecotoxicity Not expected to be harmful to aquatic organisms.

Components		Species	Test Results
Chromium (CAS 7440-47-3)			
Aquatic			
Acute			
Fish	LL50	Danio rerio	> 100 mg/l, 96 Hours
Chronic			
Crustacea	NOELR	Daphnia magna	> 1 mg/l, 21 days
Fish	NOELR	Danio rerio	> 1 mg/l, 30 days
Copper (CAS 7440-50-8)			
Aquatic			
Chronic			
Other	NOEC	Juga plicifera	6 µg/l
Nickel (CAS 7440-02-0)			
Aquatic			
Chronic			
Crustacea	NOEC	Ceriodaphnia dubia	2.8 µg/l
Fish	NOEC	Zebra danio (Danio rerio)	40 µg/l
Tungsten (CAS 7440-33-7)			
Aquatic			
Acute			
Algae	EC10	Pseudokirchneriella subcapitata	> 10 - 100 mg/l, 72 Hours
	ErC50	Pseudokirchneriella subcapitata	> 100 mg/l, 72 Hours
Crustacea	EC50	Daphnia magna	> 100 mg/l, 48 Hours
	NOEC	Daphnia magna	> 1 mg/l, 21 days
Fish	LC50	Danio rerio	> 100 mg/l, 96 Hours
Other	EC50	Activated sludge	> 100 mg/l, 30 minutes
Chronic			
Fish	NOEC	Danio rerio	> 1 mg/l, 38 days

Persistence and degradability The product contains inorganic compounds which are not biodegradable.

Bioaccumulative potential No data available.

Mobility in soil Due to form of product, mobility in soil is not expected.

Mobility in general Not considered mobile.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions	The generation of waste should be avoided or minimized whenever possible. When practical, recycle in an environmentally acceptable, regulatory compliant manner. Dispose of non-recyclable products in accordance with all applicable Federal, State, Provincial, and Local requirements.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose in accordance with all local, provincial, state and federal regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

TDG

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable.

15. Regulatory information

Canadian regulations

This product has been classified in accordance with the hazard criteria of the HPR and the SDS contains all the information required by the HPR.

Canada Controlled Drugs and Substances Act, Schedule I

Not regulated.

Canada Controlled Drugs and Substances Act, Schedule II

Not regulated.

Canada Controlled Drugs and Substances Act, Schedule III

Not regulated.

Canada Controlled Drugs and Substances Act, Schedule IV

Not regulated.

Canada Controlled Drugs and Substances Act, Schedule V

Not regulated.

Canada Controlled Drugs and Substances Act, Schedule VI

Not regulated.

Canada Controlled Drugs and Substances Act, Schedule VII

Not regulated.

Canada Controlled Drugs and Substances Act, Schedule VIII

Not regulated.

Export Control List (CEPA 1999, Schedule 3)

Not listed.

Greenhouse Gases

Not listed.

Precursor Control Regulations

Not regulated.

International regulations

Stockholm Convention

Not listed.

Rotterdam Convention

Not listed.

Kyoto Protocol

Not listed.

Montreal Protocol

Not listed.

Basel Convention

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information

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Further information

The Maximum Fume Exposure Guideline™ (MFEG)™ is provided to assist with the management of workplace exposures where granular solid welding products or other materials are being utilized. The MFEG™ is an estimate of the level of total welding fume exposure for a given product above which the exposure limit for one of the fume constituents may be exceeded. The exposure limits referenced are the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV®) and the U.S. OSHA Permissible Exposure Limit (PEL) whichever limit is lower. The MFEG™ never exceeds 5.0 mg/m3 which is the maximum recommended exposure limit for total welding fume. The MFEG™ is intended to serve as a general guideline to assist in the management of workplace exposure to welding fume and does not replace the regular measurement and analysis of worker exposure to individual welding fume constituents.

The Maximum Dust Exposure Guideline™ (MDEG)™ is provided to assist with the management of workplace exposures where granular solid welding products or other materials are being utilized. It is derived from relevant compositional data and estimates the lowest level of total airborne dust exposure, for a given product, at which some specific constituent might potentially exceed its individual exposure limit. The specific exposure limits referenced are the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV®) and the U. S. OSHA Permissible Exposure Limit (PEL), which ever value is the lowest. The MDEG™ is never greater than 10.0 mg/m³ as this is the airborne exposure guideline for total particulate (total dust). MDEG™ is intended to serve as a general guideline to assist in the management of workplace exposure and does not replace the regular measurement and analysis of worker exposure to individual airborne dust constituents.

List of abbreviations

CAS: Chemical Abstract Service.
EC50: Effective Concentration, 50%.
GHS: Globally Harmonized System of Classification and Labeling of Chemicals.
IATA: International Air Transport Association.
IBC Code: International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.
IDLH: Immediately Dangerous To Life or Health.
IMDG: International Maritime Dangerous Goods.
LC50: Lethal Concentration, 50%.
LD50: Lethal Dose, 50%.
LOEC: Lowest observable effect concentration.
MARPOL: International Convention for the Prevention of Pollution from Ships.
NOEC: No observed effect concentration.
TDG: Transportation of Dangerous Goods.
TWA: Time Weighted Average.

References

IARC Monographs. Overall Evaluation of Carcinogenicity
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices (2011)

Disclaimer

Select-Arc, Inc. cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.