

# SAFETY DATA SHEET

## 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Innershield® NR®-211-MP

**Product Size:** 0.030 in

### Other means of identification

**SDS number:** 200000000129

### Recommended use and restriction on use

**Recommended use:** FCAW-S (Self-Shielded Flux Cored Arc Welding)

**Restrictions on use:** Not known. Read this SDS before using this product.

### Manufacturer/Importer/Supplier/Distributor Information

#### Manufacturer/Supplier:

The Lincoln Electric Company  
22801 Saint Clair Avenue  
Cleveland, Ohio 44117 USA  
Phone: +1 (216) 481-8100

The Lincoln Electric Company of Canada LP  
179 Wicksteed Avenue  
Toronto, Ontario M4G 2B9 CANADA  
Phone: +1 (416) 421-2600

**Safety Data Sheet Questions:** [www.lincolnelectric.com/sds](http://www.lincolnelectric.com/sds)

**Arc Welding Safety Information:** [www.lincolnelectric.com/safety](http://www.lincolnelectric.com/safety)

### 24-Hour Emergency Response Telephone Numbers:

<u>Area</u>	<u>Telephone</u>
USA/Canada/Mexico	+1 (888) 609-1762
Americas/Europe	+1 (216) 383-8962
Asia Pacific	+1 (216) 383-8966
Middle East/Africa	+1 (216) 383-8969

**3E Company Access Code:** 333988

## 2. HAZARDS IDENTIFICATION

Classified according to the criteria of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), OSHA Hazard Communication Standard (29 CFR 1910.1200) and the Canadian Controlled Products Regulations.

**Hazard Classification** Not classified as hazardous according to applicable GHS hazard classification criteria.

### Label Elements

<b>Hazard Symbol:</b>	No symbol
<b>Signal Word:</b>	No signal word.
<b>Hazard Statement</b>	not applicable

**Precautionary Statement**

not applicable

**Other hazards which do not result in GHS classification:**

Electrical 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 work piece, use the following equipment: Semiautomatic DC Welder, DC Manual (Stick) Welder, or AC Welder with Reduced Voltage Control.

Arc rays can injure eyes and burn skin. Welding arc and sparks can ignite combustibles and flammable materials. Overexposure to welding fumes and gases can be hazardous. Read and understand the manufacturer's instructions, Safety Data Sheets and the precautionary labels before using this product. Refer to Section 8.

**Substance(s) formed under the conditions of use:**

The welding fume produced from this welding electrode may contain the following constituent(s) and/or their complex metallic oxides as well as solid particles or other constituents from the consumables, base metal, or base metal coating not listed below:

Chemical Identity	CAS-No.
Carbon dioxide	124-38-9
Carbon monoxide	630-08-0
Nitrogen dioxide	10102-44-0
Ozone	10028-15-6
Manganese	7439-96-5
Barium and soluble compounds (as Ba)	7440-39-3

**3. COMPOSITION / INFORMATION ON INGREDIENTS**
**Reportable Hazardous Ingredients**

Chemical Identity	CAS number	Content in percent (%)*
Iron	7439-89-6	60 - 100%
Barium fluoride	7787-32-8	3 - 7%
Aluminum and/or aluminum alloys (as Al)	7429-90-5	1 - 5%
Portland cement	65997-15-1	0.5 - 1.5%
Magnesium	7439-95-4	0.5 - 1.5%
Manganese	7439-96-5	0.5 - 1.5%
Lithium fluoride	7789-24-4	0.1 - 1%
Potassium fluorosilicate	16871-90-2	0.1 - 1%
Silicon	7440-21-3	0.1 - 1%

\* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

**Composition Comments:**

The term "Hazardous Ingredients" should be interpreted as a term defined in Hazard Communication standards and does not necessarily imply the existence of a welding hazard. The product may contain additional non-hazardous ingredients or may form additional compounds under the condition of use. Refer to Sections 2 and 8 for more information.

**4. FIRST AID MEASURES**

<b>Ingestion:</b>	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.
<b>Inhalation:</b>	Move to fresh air if breathing is difficult. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.
<b>Skin Contact:</b>	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.
<b>Eye contact:</b>	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.

**Most important symptoms/effects, acute and delayed**

<b>Symptoms:</b>	Short-term (acute) overexposure to fumes and gases from welding and allied processes 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 fumes and gases from welding and allied processes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Refer to Section 11 for more information.
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<b>Hazards:</b>	Welding and allied process 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.
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**Indication of immediate medical attention and special treatment needed**

<b>Treatment:</b>	Treat symptomatically.
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**5. FIRE-FIGHTING MEASURES**

<b>General Fire Hazards:</b>	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.
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**Suitable (and unsuitable) extinguishing media**

<b>Suitable extinguishing media:</b>	As shipped, the product will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.
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**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**

**Special fire fighting procedures:** Use standard firefighting procedures and consider the hazards of other involved materials.

**Special protective equipment for fire-fighters:** Selection of respiratory protection for fire fighting: follow the general fire precautions indicated in the workplace. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures** 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.

**Methods and material for containment and cleaning up** 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.

**Environmental Precautions:** Avoid release to the environment. Prevent further leakage or spillage if safe to do so.

## 7. HANDLING AND STORAGE

**Precautions for safe handling:** Prevent formation of dust. Provide appropriate exhaust ventilation at places where dust is formed.

Read and understand the manufacturer's instruction and the precautionary label on the product. Refer to Lincoln Safety Publications at [www.lincolnelectric.com/safety](http://www.lincolnelectric.com/safety). 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.gpo.gov](http://www.gpo.gov).

**Conditions for safe storage, including any incompatibilities:** Store in closed original container in a dry place. Store away from incompatible materials. Store in accordance with local/regional/national regulations.

**8. EXPOSURE CONTROLS / PERSONAL PROTECTION**
**Control Parameters**
**Occupational Exposure Limits: US**

Chemical Identity	type	Exposure Limit Values	Source
Barium fluoride - as Ba	TWA	0.5 mg/m3	US. ACGIH Threshold Limit Values (12 2010)
Barium fluoride - as F	TWA	2.5 mg/m3	US. ACGIH Threshold Limit Values (12 2010)
Barium fluoride - as Ba	REL	0.5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Barium fluoride - as F	REL	2.5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Barium fluoride - as Ba	PEL	0.5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Barium fluoride - as F	PEL	2.5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Barium fluoride - Dust.	TWA	2.5 mg/m3	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
Aluminum and/or aluminum alloys (as Al) - Respirable fraction.	TWA	1 mg/m3	US. ACGIH Threshold Limit Values (12 2010)
Aluminum and/or aluminum alloys (as Al) - Respirable dust. - as Al	PEL	5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Aluminum and/or aluminum alloys (as Al) - Total dust. - as Al	PEL	15 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Aluminum and/or aluminum alloys (as Al) - Welding fume or pyrophoric powder. - as Al	REL	5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Aluminum and/or aluminum alloys (as Al) - Respirable.	REL	5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Aluminum and/or aluminum alloys (as Al) - Total	REL	10 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Portland cement - Respirable fraction.	TWA	1 mg/m3	US. ACGIH Threshold Limit Values (12 2010)
Portland cement - Total dust.	PEL	15 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Portland cement - Respirable fraction.	PEL	5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Portland cement	TWA	50 millions of particles per cubic foot of air	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)
Portland cement - Respirable.	REL	5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Portland cement - Total	REL	10 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Manganese - Fume. - as Mn	Ceiling	5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	REL	1 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
	STEL	3 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Manganese - Inhalable fraction. - as Mn	TWA	0.1 mg/m3	US. ACGIH Threshold Limit Values (03 2014)
Manganese - Respirable fraction. - as Mn	TWA	0.02 mg/m3	US. ACGIH Threshold Limit Values (03 2014)
Lithium fluoride - as F	TWA	2.5 mg/m3	US. ACGIH Threshold Limit Values (12 2010)
	REL	2.5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
	PEL	2.5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Lithium fluoride - Dust.	TWA	2.5 mg/m3	US. OSHA Table Z-2 (29 CFR 1910.1000)

			(02 2006)
Potassium fluorosilicate - as F	TWA	2.5 mg/m3	US. ACGIH Threshold Limit Values (12 2010)
	REL	2.5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
	PEL	2.5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Potassium fluorosilicate - Dust.	TWA	2.5 mg/m3	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
Silicon - Total dust.	PEL	15 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Silicon - Respirable fraction.	PEL	5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
Silicon - Respirable.	REL	5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Silicon - Total	REL	10 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)

### Occupational Exposure Limits: CANADA

Chemical Identity	type	Exposure Limit Values	Source
Barium fluoride - as Ba	TWA	0.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
Barium fluoride - as F	TWA	2.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	2.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
Barium fluoride - as Ba	TWA	0.5 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Barium fluoride - as F	TWA	2.5 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	2.5 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
Barium fluoride - as Ba	TWA	0.5 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
Barium fluoride - as F	TWAEV	2.5 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
Barium fluoride - as Ba	TWAEV	0.5 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
Barium fluoride - as F	8 HR ACL	2.5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Barium fluoride - as Ba	8 HR ACL	0.5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Barium fluoride - as F	15 MIN ACL	5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Barium fluoride - as Ba	15 MIN ACL	1.5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Barium fluoride - as F	TWA	2.5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Barium fluoride - as Ba	TWA	0.5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the

			Work Environment) (12 2008)
Aluminum and/or aluminum alloys (as Al) - Pyrophoric powder. - as Al	TWA	5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
Aluminum and/or aluminum alloys (as Al) - Dust.	TWA	10 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
Aluminum and/or aluminum alloys (as Al) - Respirable.	TWA	1 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Aluminum and/or aluminum alloys (as Al) - Respirable fraction.	TWA	1 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
	TWAEV	1 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
Aluminum and/or aluminum alloys (as Al) - Pyrophoric powder. - as Al	8 HR ACL	5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Aluminum and/or aluminum alloys (as Al) - Dust. - as Al	8 HR ACL	10 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Aluminum and/or aluminum alloys (as Al) - Pyrophoric powder. - as Al	15 MIN ACL	10 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Aluminum and/or aluminum alloys (as Al) - Dust. - as Al	15 MIN ACL	20 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Aluminum and/or aluminum alloys (as Al)	TWA	10 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Aluminum and/or aluminum alloys (as Al) - Welding fume. - as Al	TWA	5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Aluminum and/or aluminum alloys (as Al) - as Al	TWA	5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Portland cement	TWA	10 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
Portland cement - Total dust.	TWA	10 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
Portland cement - Respirable fraction.	TWA	3 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	1 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
Portland cement	TWAEV	10 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	10 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	20 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Portland cement - Total dust.	TWA	10 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Portland cement - Respirable dust.	TWA	5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Manganese - as Mn	TWA	0.2 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)

	TWA	0.2 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWAEV	0.2 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	0.2 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	0.6 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Manganese - Fume. - as Mn	TWA	1 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Manganese - Dust. - as Mn	TWA	5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Manganese - Fume. - as Mn	STEL	3 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Manganese - Respirable fraction. - as Mn	TWA	0.02 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
Manganese - Inhalable fraction. - as Mn	TWA	0.1 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
Lithium fluoride - as F	TWA	2.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	2.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	2.5 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	2.5 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
	TWAEV	2.5 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	2.5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	TWA	2.5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Potassium fluorosilicate - as F	TWA	2.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	2.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	2.5 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	2.5 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
	TWAEV	2.5 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	2.5 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety



			Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	5 mg/m <sup>3</sup>	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	TWA	2.5 mg/m <sup>3</sup>	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Silicon - Total dust.	TWAEV	10 mg/m <sup>3</sup>	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (07 2010)
Silicon	8 HR ACL	10 mg/m <sup>3</sup>	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	20 mg/m <sup>3</sup>	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Silicon - Total dust.	TWA	10 mg/m <sup>3</sup>	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)

### Occupational Exposure Limits: MEXICO

Chemical Identity	type	Exposure Limit Values	Source
Barium fluoride - as Ba	CPT	0.5 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Barium fluoride - as F	CPT	2.5 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Aluminum and/or aluminum alloys (as Al) - Pyrophoric powder.	CPT	5 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Aluminum and/or aluminum alloys (as Al) - Dust.	CPT	10 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Aluminum and/or aluminum alloys (as Al) - Welding fume.	CPT	5 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Portland cement	CTT	20 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
	CPT	10 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Manganese - as Mn	CPT	0.2 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Manganese - Fume. - as Mn	CPT	1 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
	CTT	3 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Lithium fluoride - as F	CPT	2.5 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Potassium fluorosilicate - as F	CPT	2.5 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Silicon	CPT	10 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
	CTT	20 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)

### Biological Limit Values: US

Chemical Identity	Exposure Limit Values	Source
Barium fluoride (Fluoride: Sampling time: Prior to shift.)	2 mg/l (Urine)	ACGIH BEI (03 2013)
Barium fluoride (Fluoride: Sampling time: End of shift.)	3 mg/l (Urine)	ACGIH BEI (03 2013)
Lithium fluoride (Fluoride: Sampling time: Prior to shift.)	2 mg/l (Urine)	ACGIH BEI (03 2013)
Lithium fluoride (Fluoride: Sampling time: End of shift.)	3 mg/l (Urine)	ACGIH BEI (03 2013)

Potassium fluorosilicate (Fluoride: Sampling time: Prior to shift.)	2 mg/l (Urine)	ACGIH BEI (03 2013)
Potassium fluorosilicate (Fluoride: Sampling time: End of shift.)	3 mg/l (Urine)	ACGIH BEI (03 2013)

**Biological Limit Values: MEXICO**

Chemical Identity	Exposure Limit Values	Source
Barium fluoride (fluorides: Sampling time: End of shift.)	10 mg/g (Creatinine in urine)	MX IBE (06 2012)
Barium fluoride (fluorides: Sampling time: Prior to shift.)	3 mg/g (Creatinine in urine)	MX IBE (06 2012)
Lithium fluoride (fluorides: Sampling time: End of shift.)	10 mg/g (Creatinine in urine)	MX IBE (06 2012)
Lithium fluoride (fluorides: Sampling time: Prior to shift.)	3 mg/g (Creatinine in urine)	MX IBE (06 2012)
Potassium fluorosilicate (fluorides: Sampling time: Prior to shift.)	3 mg/g (Creatinine in urine)	MX IBE (06 2012)
Potassium fluorosilicate (fluorides: Sampling time: End of shift.)	10 mg/g (Creatinine in urine)	MX IBE (06 2012)

**Additional exposure limits under the conditions of use: US**

Chemical Identity	type	Exposure Limit Values	Source
Carbon dioxide	TWA	5,000 ppm	US. ACGIH Threshold Limit Values (12 2010)
	STEL	30,000 ppm	US. ACGIH Threshold Limit Values (12 2010)
	PEL	5,000 ppm    9,000 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	STEL	30,000 ppm    54,000 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
	REL	5,000 ppm    9,000 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Carbon monoxide	TWA	25 ppm	US. ACGIH Threshold Limit Values (12 2010)
	PEL	50 ppm    55 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	REL	35 ppm    40 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
	Ceil_Time	200 ppm    229 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Nitrogen dioxide	TWA	0.2 ppm	US. ACGIH Threshold Limit Values (02 2012)
	Ceiling	5 ppm    9 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	STEL	1 ppm    1.8 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Ozone	PEL	0.1 ppm    0.2 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	Ceil_Time	0.1 ppm    0.2 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
	TWA	0.05 ppm	US. ACGIH Threshold Limit Values (03 2014)
	TWA	0.20 ppm	US. ACGIH Threshold Limit Values (03 2014)
	TWA	0.10 ppm	US. ACGIH Threshold Limit Values (03 2014)
	TWA	0.08 ppm	US. ACGIH Threshold Limit Values (03 2014)

Manganese - Fume. - as Mn	Ceiling	5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	REL	1 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
	STEL	3 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2005)
Manganese - Inhalable fraction. - as Mn	TWA	0.1 mg/m3	US. ACGIH Threshold Limit Values (03 2014)
Manganese - Respirable fraction. - as Mn	TWA	0.02 mg/m3	US. ACGIH Threshold Limit Values (03 2014)
Barium and soluble compounds (as Ba) - as Ba	TWA	0.5 mg/m3	US. ACGIH Threshold Limit Values (12 2010)

**Additional exposure limits under the conditions of use: CANADA**

Chemical Identity	type	Exposure Limit Values	Source
Carbon dioxide	STEL	30,000 ppm 54,000 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	5,000 ppm 9,000 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	5,000 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	STEL	15,000 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	5,000 ppm	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
	STEL	30,000 ppm	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
	STEV	30,000 ppm	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	TWAEV	5,000 ppm	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	5,000 ppm	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	30,000 ppm	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	TWA	5,000 ppm 9,000 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
	STEL	30,000 ppm 54,000 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Carbon monoxide	TWA	25 ppm 29 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	25 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	STEL	100 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)

	TWA	25 ppm		Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
	STEV	100 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (07 2010)
	TWAEV	25 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (07 2010)
	8 HR ACL	25 ppm		Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	190 ppm		Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	TWA	35 ppm	40 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
	STEL	200 ppm	230 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Nitrogen dioxide	STEL	5 ppm	9.4 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	3 ppm	5.6 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	CEILING	1 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	0.2 ppm		Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2012)
	STEV	5 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	TWAEV	3 ppm		Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	3 ppm		Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	5 ppm		Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	TWA	3 ppm	5.6 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Ozone	STEL	0.3 ppm	0.6 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	0.1 ppm	0.2 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	0.05 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	0.1 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWA	0.08 ppm		Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)

	TWA	0.2 ppm	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWAEV	0.1 ppm 0.2 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (07 2010)
	STEV	0.3 ppm 0.6 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (07 2010)
	15 MIN ACL	0.15 ppm	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	8 HR ACL	0.05 ppm	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	CEILING	0.1 ppm 0.2 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
	TWA	0.20 ppm	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
	TWA	0.05 ppm	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
	TWA	0.08 ppm	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
	TWA	0.10 ppm	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
Manganese - as Mn	TWA	0.2 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	0.2 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)
	TWAEV	0.2 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	0.2 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	0.6 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
Manganese - Fume. - as Mn	TWA	1 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Manganese - Dust. - as Mn	TWA	5 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Manganese - Fume. - as Mn	STEL	3 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment) (12 2008)
Manganese - Respirable fraction. - as Mn	TWA	0.02 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
Manganese - Inhalable fraction. - as Mn	TWA	0.1 mg/m3	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2014)
Barium and soluble compounds (as Ba) - as Ba	TWA	0.5 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2) (07 2009)
	TWA	0.5 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (07 2007)

	TWA	0.5 mg/m <sup>3</sup>	Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act) (03 2011)
	TWAEV	0.5 mg/m <sup>3</sup>	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents) (11 2010)
	8 HR ACL	0.5 mg/m <sup>3</sup>	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)
	15 MIN ACL	1.5 mg/m <sup>3</sup>	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21) (05 2009)

**Additional exposure limits under the conditions of use: MEXICO**

Chemical Identity	type	Exposure Limit Values		Source
Carbon dioxide	CPT	5,000 ppm	9,000 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
	CTT	15,000 ppm	27,000 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Carbon monoxide	CTT	400 ppm	400 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
	CPT	50 ppm	55 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Nitrogen dioxide	CTT	5 ppm	10 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
	CPT	3 ppm	6 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Ozone	P	0.1 ppm	0.2 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Manganese - as Mn	CPT		0.2 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
Manganese - Fume. - as Mn	CPT		1 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)
	CTT		3 mg/m <sup>3</sup>	Mexico. Occupational Exposure Limit Values (03 2000)

**Appropriate Engineering Controls**

**Ventilation:** Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases from the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes. **Keep exposure as low as possible.**

**Individual protection measures, such as personal protective equipment**
**General information:**

**Exposure Guidelines:** Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) are values published by the American Conference of Government Industrial Hygienists (ACGIH). ACGIH Statement of Positions Regarding the TLVs® and BEIs® states that the TLV-TWA should be used as a guide in the control of health hazards and should not be used to indicate a fine line between safe and dangerous exposures. See Section 10 for information on potential fume constituents of health interest. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists.

**Maximum Fume Exposure Guideline™ (MFEG)™** for this product (based on content of Manganese) is 1.6 mg/m<sup>3</sup>. This exposure guideline is calculated using the most conservative value of the ACGIH TLV or OSHA PEL for the stated substance.

**Eye/face protection:**

Wear helmet or use face shield with filter lens shade number 12 or darker for open arc processes. No specific lens shade recommendation for submerged arc processes. Shield others by providing screens and flash goggles.

**Skin Protection**

- Hand Protection:** Wear protective gloves. Suitable gloves can be recommended by the glove supplier.
- Other:** **Protective Clothing:** Wear hand, head, and body protection which help to prevent injury from radiation, sparks and electrical shock. See 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 substantial clothing. Wear dry gloves free of holes or split seams. Train the welder not to permit electrically live parts or electrodes to contact skin . . . or clothing or gloves if they are wet. Insulate yourself from the work piece and ground using dry plywood, rubber mats or other dry insulation.
- Respiratory Protection:** Keep your head out of fumes. Use enough ventilation and local exhaust to keep fumes and gases from your breathing zone and the general area. An approved respirator should be used unless exposure assessments are below applicable exposure limits.
- Hygiene measures:** Do not eat, drink or smoke when using the product. 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.
- Determine the composition and quantity of fumes and gases to which workers are exposed by taking an air sample from inside the welder's helmet if worn or in the worker's breathing zone. Improve ventilation if exposures are not below limits. See ANSI/AWS F1.1, F1.2, F1.3 and F1.5, available from the American Welding Society, [www.aws.org](http://www.aws.org).

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance:</b>	Cored welding wire
<b>Physical state:</b>	solid
<b>Form:</b>	solid
<b>Color:</b>	No data available.
<b>Odor:</b>	No data available.
<b>Odor threshold:</b>	No data available.
<b>pH:</b>	not applicable
<b>Melting point/freezing point:</b>	No data available.
<b>Initial boiling point and boiling range:</b>	No data available.
<b>Flash Point:</b>	not applicable
<b>Evaporation rate:</b>	not applicable
<b>Flammability (solid, gas):</b>	No data available.
<b>Upper/lower limit on flammability or explosive limits</b>	
<b>Flammability limit - upper (%):</b>	No data available.
<b>Flammability limit - lower (%):</b>	No data available.
<b>Explosive limit - upper (%):</b>	No data available.
<b>Explosive limit - lower (%):</b>	No data available.
<b>Vapor pressure:</b>	not applicable
<b>Vapor density:</b>	not applicable
<b>Relative density:</b>	No data available.
<b>Solubility(ies)</b>	
<b>Solubility in water:</b>	No data available.
<b>Solubility (other):</b>	No data available.
<b>Partition coefficient (n-octanol/water):</b>	No data available.

<b>Auto-ignition temperature:</b>	No data available.
<b>Decomposition temperature:</b>	No data available.
<b>Viscosity:</b>	not applicable

## 10. STABILITY AND REACTIVITY

<b>Reactivity:</b>	The product is non-reactive under normal conditions of use, storage and transport.
<b>Chemical Stability:</b>	Material is stable under normal conditions.
<b>Possibility of hazardous reactions:</b>	No data available.
<b>Conditions to avoid:</b>	Avoid heat or contamination.
<b>Incompatible Materials:</b>	Strong oxidizing substances. Strong acids. Strong bases.
<b>Hazardous Decomposition Products:</b>	<p>Fumes and gases from welding and allied processes 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.)</p> <p>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.</p>

## 11. TOXICOLOGICAL INFORMATION

### Information on likely routes of exposure

<b>Ingestion:</b>	Health injuries from ingestion are not known or expected under normal use.
<b>Inhalation:</b>	Potential chronic health hazards related to the use of welding consumables are most applicable to the inhalation route of exposure. Refer to Inhalation statements in Section 11.
<b>Skin Contact:</b>	Arc rays can burn skin. Skin cancer has been reported.
<b>Eye contact:</b>	Arc rays can injure eyes.

### Symptoms related to the physical, chemical and toxicological characteristics



**Inhalation:** Short-term (acute) overexposure to fumes and gases from welding and allied processes 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 fumes and gases from welding and allied processes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects.

### Information on toxicological effects

#### Acute toxicity (list all possible routes of exposure)

##### Oral

<b>Product:</b>	Not classified
<b>Specified substance(s):</b>	
Iron	LD 50 (Rat): 98.6 g/kg
Barium fluoride	LD 50 (Rat): 250 mg/kg
Lithium fluoride	LD 50 (Rat): 143 mg/kg
Potassium fluorosilicate	LD 50 (Rat): 114 mg/kg

##### Dermal

**Product:** Not classified

##### Inhalation

<b>Product:</b>	Not classified
<b>Specified substance(s):</b>	
Aluminum and/or aluminum alloys (as Al)	LC 50 (Rat, 1 h): 7.6 mg/l
Potassium fluorosilicate	LC 50 (Rat, 4 h): 2.021 mg/l

#### Repeated dose toxicity

**Product:** Not classified

#### Skin Corrosion/Irritation

**Product:** Not classified

#### Serious Eye Damage/Eye Irritation

**Product:** Not classified

#### Respiratory or Skin Sensitization

**Product:** Not classified

#### Carcinogenicity

**Product:** Arc rays: Skin cancer has been reported.

#### IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

No carcinogenic components identified

#### US. National Toxicology Program (NTP) Report on Carcinogens:

No carcinogenic components identified

#### US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):

No carcinogenic components identified

#### Germ Cell Mutagenicity

##### In vitro

**Product:** Not classified

##### In vivo

**Product:** Not classified

#### Reproductive toxicity

**Product:** Not classified

#### Specific Target Organ Toxicity - Single Exposure

**Product:** Not classified

**Specific Target Organ Toxicity - Repeated Exposure**

**Product:** Not classified

**Aspiration Hazard**

**Product:** Not classified

**Other effects:**

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.

**Symptoms related to the physical, chemical and toxicological characteristics under the condition of use**

**Inhalation:**

**Specified substance(s):**

Manganese

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.

Barium and soluble compounds (as Ba)

Overexposure to soluble barium compounds may cause severe stomach pain, slow pulse rate, irregular heartbeat, convulsions, and muscle spasms.

**Additional toxicological Information under the conditions of use:**

**Acute toxicity**

**Oral**

**Specified substance(s):**

Barium and soluble compounds (as Ba)

LD 50 (Rat): 630 mg/kg

**Inhalation**

**Specified substance(s):**

Carbon dioxide

LC Lo (Human, 5 min): 90000 ppm

Carbon monoxide

LC 50 (Rat, 4 h): 1,300 mg/l

Nitrogen dioxide

LC 50 (Rat, 4 h): 88 ppm

Ozone

LC Lo (Human, 30 min): 50 ppm

**Other effects:**

**Specified substance(s):**

Carbon dioxide

asphyxia

Carbon monoxide

Carboxyhemoglobinemia

Nitrogen dioxide

Lower Respiratory Tract irritation

Barium and soluble compounds (as Ba)

Skin irritation Muscular Stimulation Eye irritation Gastro-Intestinal tract irritation

**12. ECOLOGICAL INFORMATION**

**General information:** not applicable

**Ecotoxicity**

**Acute hazards to the aquatic environment:**

**Fish**

**Product:** Not classified

**Specified substance(s):**

Aluminum and/or aluminum alloys (as Al) LC 50 (Grass carp, white amur (Ctenopharyngodon idella), 96 h): 0.21 - 0.31 mg/l

**Aquatic Invertebrates**

**Product:** Not classified  
**Specified substance(s):**  
 Manganese EC 50 (Water flea (Daphnia magna), 48 h): 40 mg/l

**Chronic hazards to the aquatic environment:**

**Fish**

**Product:** Not classified

**Aquatic Invertebrates**

**Product:** Not classified

**Toxicity to Aquatic Plants**

**Product:** Not classified

**Persistence and Degradability**

**Biodegradation**

**Product:** No data available.

**Bioaccumulative Potential**

**Bioconcentration Factor (BCF)**

**Product:** No data available.

**Mobility in Soil:**

No data available.

**13. Disposal considerations**

**General information:**

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.

**Disposal Instructions:**

Wash before disposal. Dispose to controlled facilities.

**14. TRANSPORT INFORMATION**

**DOT**

UN Number:	
UN Proper Shipping Name:	NOT DG REGULATED
Transport Hazard Class(es)	
Class:	NR
Label(s):	–
Packing Group:	–
Marine Pollutant:	Not regulated.
Special precautions for user:	–

**IMDG**

UN Number:	
UN Proper Shipping Name:	NOT DG REGULATED
Transport Hazard Class(es)	
Class:	NR
Label(s):	–
EmS No.:	
Packing Group:	–
Marine Pollutant:	Not regulated.

Special precautions for user: –

**IATA**

UN Number:  
 Proper Shipping Name: NOT DG REGULATED  
 Transport Hazard Class(es):  
   Class: NR  
   Label(s): –  
 Packing Group: –  
 Environmental Hazards Not regulated.  
 Special precautions for user: –  
   Other information  
     Passenger and cargo aircraft: Allowed.  
     Cargo aircraft only: Allowed.

**TDG**

UN Number:  
 UN Proper Shipping Name: NOT DG REGULATED  
 Transport Hazard Class(es):  
   Class: NR  
   Label(s): –  
 Packing Group: –  
 Marine Pollutant: Not regulated.  
 Special precautions for user: –

**15. REGULATORY INFORMATION**

**Canadian Controlled Products Regulations:** This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the SDS contains all required information.

**US Federal Regulations**

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

None present or none present in regulated quantities.

**US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

None present or none present in regulated quantities.

**CERCLA Hazardous Substance List (40 CFR 302.4):**

**Chemical Identity**

Manganese

**Reportable quantity**

Included in the regulation but with no data values. See regulation for further details.

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

**Hazard categories**

Acute (Immediate)

Chronic (Delayed)

**SARA 302 Extremely Hazardous Substance**

None present or none present in regulated quantities.

**SARA 304 Emergency Release Notification**

**Chemical Identity**

Manganese

**Reportable quantity**

Included in the regulation but with no data values. See regulation for further details.

**SARA 311/312 Hazardous Chemical**

<u>Chemical Identity</u>	<u>Threshold Planning Quantity</u>
Iron	10000 lbs
Barium fluoride	10000 lbs
Aluminum and/or aluminum alloys (as Al)	10000 lbs
Portland cement	10000 lbs
Magnesium	10000 lbs
Manganese	10000 lbs
Lithium fluoride	10000 lbs
Potassium fluorosilicate	10000 lbs
Silicon	10000 lbs

**SARA 313 (TRI Reporting)**

<u>Chemical Identity</u>	<u>Reporting threshold for other users</u>	<u>Reporting threshold for manufacturing and processing</u>
Barium fluoride	10000 lbs	25000 lbs.
Aluminum and/or aluminum alloys (as Al)	10000 lbs	25000 lbs.

**Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)**

None present or none present in regulated quantities.

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):**

None present or none present in regulated quantities.

**US State Regulations****US. California Proposition 65**

No ingredient regulated by CA Prop 65 present.

**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 Section 25249.5 et seq.)

**US. New Jersey Worker and Community Right-to-Know Act**Chemical Identity

Barium fluoride  
Aluminum and/or aluminum alloys (as Al)

**US. Massachusetts RTK - Substance List**

No ingredient regulated by MA Right-to-Know Law present.

**US. Pennsylvania RTK - Hazardous Substances**Chemical Identity

Barium fluoride  
Aluminum and/or aluminum alloys (as Al)

**US. Rhode Island RTK**

No ingredient regulated by RI Right-to-Know Law present.

**Inventory Status:**

Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	One or more components are not listed or are exempt from listing.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	One or more components are not listed or are exempt from listing.
Philippines PICCS:	One or more components are not listed or are exempt from listing.
US TSCA Inventory:	On or in compliance with the inventory
Japan ISHL Listing:	One or more components are not listed or are exempt from listing.
Japan Pharmacopoeia Listing:	One or more components are not listed or are exempt from listing.
Australia AICS:	One or more components are not listed or are exempt from listing.
China Inv. Existing Chemical Substances:	One or more components are not listed or are exempt from listing.
New Zealand Inventory of Chemicals:	One or more components are not listed or are exempt from listing.

**16. OTHER INFORMATION****Definitions:**

**The Maximum Fume Exposure Guideline™ (MFEG)™** is a guideline limit for total welding fume exposure for a specific consumable product which may be used by employers to manage worker exposure to welding fume where that product is used. 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 mg/m<sup>3</sup> 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 mg/m<sup>3</sup> as this is the airborne exposure guideline for total particulate (total dust). **The 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.**

**Revision Date:** 03/07/2016

**Further Information:** Additional information is available by request.

**Disclaimer:** The Lincoln Electric Company urges each end user and recipient of this SDS to study it carefully. See also [www.lincolnelectric.com/safety](http://www.lincolnelectric.com/safety). If necessary, consult an industrial hygienist or other expert to understand this information and safeguard the environment and protect workers from potential hazards associated with the handling or use of this product. This information is believed to be accurate as of the revision date shown above. However, no warranty, expressed or implied, is given. Because the conditions or methods of use are beyond Lincoln Electric's control, we assume no liability resulting from the use of this product. Regulatory requirements are subject to change and may differ between various locations. Compliance with all applicable Federal, State, Provincial, and local laws and regulations remain the responsibility of the user.

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