MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/ Supplier: The Lincoln Electric Company 22801 St. Clair Avenue Cleveland, OH 44117-1199 (216) 481-8100

Product Type: Covered Electrode

Classification: AWS E7118M, CSA E7618-M

SECTION II - HAZARDOUS MATERIAL (1)

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.

CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.

The term "hazardous" in "Hazardous Materials" should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>15</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>10</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Fluorides (as F)</td>
<td>7789-75-5</td>
<td>&lt;5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)*****</td>
<td>7439-96-5</td>
<td>&lt;5</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Nickel (metal)*****</td>
<td>7440-02-0</td>
<td>&lt;5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>&lt;5</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>1</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
<td>7440-21-3</td>
<td>1</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Zirconium alloys and compounds (as Zr)</td>
<td>12004-83-0</td>
<td>0.5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Molybdenum alloys (as Mo)</td>
<td>7439-98-7</td>
<td>&lt;0.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>0.025**</td>
<td>0.1**</td>
</tr>
<tr>
<td>Lithium compounds (as Li)</td>
<td>554-13-2</td>
<td>&lt;0.5</td>
<td>10*</td>
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<tr>
<td>Carbon steel tube</td>
<td>7439-89-6</td>
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Supplemental Information:
(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(**) As respirable dust.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(*****) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(****) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

SECTION III - HAZARD DATA
Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.

Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(CONTINUED ON SIDE TWO)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section II for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:
- Fumes and gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.
- When inhaled, 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). Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death.
- Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Repeated exposure to fluorides may cause excessive calcification of the bone and calcification of ligaments of the ribs, pelvis and spinal column. May cause skin rash. Nickel 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. Nickel compounds are skin sensitizers with symptoms usually occurring after repeated exposure - ranging from a slight itch to severe dermatitis. Respiratory exposures to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). 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.)

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 hydrocarbons from cleaning and degreasing activities.)

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross. IF BREATHEING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques. IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and electrodes used.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the reaction from the arc. 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, 550 N.W. LeJeune Road, Miami, FL 33126.

Gaseous products may include hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, nitrogen oxides, ozone, fluorides, silica, manganese, molybdenum, nickel, potassium, sodium, sulfur, and zirconium. Maximum fume exposure guideline for this product (based on manganese content) is 2.5 milligrams per cubic meter.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
Date: 10/16/2012  
Trade Name: Excalibur 9018M MR  
Sizes: All  
Supersedes: 11/7/06

Material Safety Data Sheet  
For Welding Consumables and Related Products  

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Manufacturer/Supplier: The Lincoln Electric Company  
22801 St. Clair Avenue  
Cleveland, OH 44117-1199  
(216) 481-8100  
Product Type: Covered Electrode  
Classification: AWS E9018-MH4R

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IMPORTANT!
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Carbon steel core wire  
7439-89-6  
55  
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Supplemental Information:
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(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (short term exposure limit).
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SECTION III - HAZARD DATA

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.
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CONTINUED ON SIDE TWO
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³.

ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

- Fumes and gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.
- 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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Nickel 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. Nickel compounds are skin sensitizers with symptoms usually occurring after repeated exposure - ranging from a slight itch to severe dermatitis. Repeated exposure to fluorides may cause excessive calcification of the bone and calcification of ligaments of the ribs, pelvis and spinal column. May cause skin rash. Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). 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.)

- Arc Rays can injure eyes and burn skin. Skin cancer has been reported.

- Electric Shock can kill. If welding must be performed in damp locations or with wet clothing, on metal structures or 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.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.

IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 flame 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

- Reasonably expected fume constituents of this product would include: Primarily iron oxide and fluorides; secondarily complex oxides of aluminum, manganese, nickel, potassium, silicon, sodium and titanium.

- Maximum fume exposure guideline for this product (based on manganese content) is 4.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL, 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL, 33126 (both available for free download at http://www.lincolnsolutions.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

- 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.
- Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.
- Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.
- Protective Clothing: Wear hand, head, and body protection which help to prevent injury fromradiation, 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 clothing. Train the welder not to permit electrically live parts or electrodes to contact skin. ... or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
Material Safety Data Sheet
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<td>Carbon steel core wire</td>
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Supplemental Information:

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Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

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(Continued on Side Two)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

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- Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

- Arc Rays can injure eyes and burn skin. Skin cancer has been reported. 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: Semi-automatic DC Welder, DC Manual (Stick) Welder, or AC Welder with Reduced Voltage Control.

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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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide and fluorides; secondarily complex oxides of manganese, potassium, silicon and sodium.

Maximum fume exposure guideline for this product (based on manganese content) is 0.4 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

- 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.

- Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

- Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

- 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 clothes. Keep the welder from peering electrically live parts or electrodes to contact skin...or clothing or gloves if they are wet. Insulate from work and ground.

- Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.

| Product: | Excalibur 7018MR |
| Date:    | 7/10/2013       |
**SECTION I - IDENTIFICATION**

**Manufacturer/Supplier:**
The Lincoln Electric Company  
22801 St. Clair Avenue  
Cleveland, OH 44117-1199  
(216) 481-8100

**Product Type:** Cored Electrode  
**Classification:** AWS E6011

---

**SECTION II - HAZARDOUS MATERIAL (1)**

**IMPORTANT!**
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.

CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.

(1) The term “hazardous” in “Hazardous Materials” should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA Inventory.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m^3</th>
<th>PEL mg/m^3</th>
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</thead>
<tbody>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>1</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)*****</td>
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<td>0.5</td>
<td>0.02</td>
<td>5 (c)</td>
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<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>0.5</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Alkali carbonates</td>
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<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Graphite</td>
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<td>Quartz</td>
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<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
<tr>
<td>Carbon steel core wire</td>
<td>7439-89-6</td>
<td>80</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

**Supplemental Information:**

(•) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(••) As respirable dust.

(•••••) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR 370 and 372.

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(#) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

---

**SECTION III - HAZARD DATA**

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.

Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(Continued on Side Two)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:
- Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.
- 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 lungs) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported.
- Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is in the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies).
- Electric arc welding may create one or more of the following health hazards:
  - 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.
  - Be familiar with the product. Read and understand the manufacturer's instruction and the precautionary label on the product. Request LincolnSafetyPublication E205. See American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126. (both available for free download at http://www.lincolnelectric.com/community/safety/ and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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, etc. as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities.)

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

IF BREATHEING IS DIFFICULT give oxygen. IF NOT BREATHERING employ CPR (Cardiopulmonary Resuscitation) techniques.

IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z40.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL, 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

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.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

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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, 550 N.W. LeJeune Road, Miami, FL 33126.
**SECTION I - IDENTIFICATION**

**Manufacturer/Supplier:** The Lincoln Electric Company  
22801 St. Clair Avenue  
Cleveland, OH 44117-1199  
(216) 481-8100  

**Product Type:** Covered Electrode  
**Classification:** AWS E6011  

**SECTION II - HAZARDOUS MATERIAL (1)**

**Ingredients:**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Magnesite</td>
<td>1309-48-4</td>
<td>1</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)*****</td>
<td>7439-96-5</td>
<td>0.5</td>
<td>0.02</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Alkali carbonates</td>
<td>584-08-7</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>&lt;0.5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>&lt;0.5</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
</tbody>
</table>

**Supplemental Information:**

(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(**) As respirable dust.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(##) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

**SECTION III - HAZARD DATA**

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI. Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(CONTINUED ON SIDE TWO)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³.

ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Titanium dioxide is listed on the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25349.5 et seq.)

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: Semi-automatic DC Welder, DC Manual (Stick) Welder, or AC Welder with Reduced Voltage Control.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.

IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxides; secondarily complex oxides of manganese, potassium, silicon and sodium.

Maximum fume exposure guideline for this product (based on manganese content) is 0.5 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

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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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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. Train the welder not to permit electrically live parts or electrodes to contact skin... or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
Date: 1/14/2011  
MSDS No.: US-M240  
Trade Name: Fleetweld 37  
Sizes: All  
Supersedes: 7/5/2010  

MATERIAL SAFETY DATA SHEET  
For Welding Consumables and Related Products  

SECTION I - IDENTIFICATION  
Manufacturer/Supplier: The Lincoln Electric Company  
22801 St. Clair Avenue  
Cleveland, OH 44117-1199  
(216) 481-8100  
Product Type: Covered Electrode  
Classification: AWS E6013

SECTION II - HAZARDOUS MATERIAL (1)  
IMPORTANT!  
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.  
CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.  
(1) The term “hazardous” in “Hazardous Materials” should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

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<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>20</td>
<td>10</td>
<td>15</td>
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<td>Iron</td>
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</tr>
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<td>Mineral silicates</td>
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<td>5**</td>
</tr>
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<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)****</td>
<td>7439-96-5</td>
<td>&lt;5</td>
<td>0.2</td>
<td>(c)</td>
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<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>1</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Magnesite</td>
<td>1309-48-4</td>
<td>1</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>&lt;0.5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
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<td>&lt;0.5</td>
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<td>Carbon steel core wire</td>
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<td>60</td>
<td>10*</td>
<td>15*</td>
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Supplemental Information:  
(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.  
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(**) As respirable dust.  
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(h) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

SECTION III - HAZARD DATA  
Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.  
Product is inert, no special handling or spill procedures required. Not regulated by DOT.
Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³ and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:
- Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.
- 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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Titanium dioxide is listed on the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. 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.)

Are Rays can injure eyes and burn skin. Skin cancer has been reported. 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.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.
- IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.
- IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxides; secondarily complex oxides of manganese, potassium, silicon, sodium, and titanium.

Maximum fume exposure guideline for this product (based on manganese content) is 4.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instructions and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910). U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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. Train the welder not to permit electrically live parts or electrodes to contact skin or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
# MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

## SECTION I - IDENTIFICATION

<table>
<thead>
<tr>
<th>Manufacturer/Supplier:</th>
<th>Product Type:</th>
<th>Covered Electrode</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Lincoln Electric Company</td>
<td>Classification:</td>
<td>AWS E7014</td>
</tr>
<tr>
<td>22801 St. Clair Avenue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleveland, OH 44117-1199</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(216) 481-8100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SECTION II - HAZARDOUS MATERIAL (1)

### IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information. CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes. (1) The term “hazardous” in “Hazardous Materials” should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

<table>
<thead>
<tr>
<th>Ingredients:</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
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</thead>
<tbody>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>15</td>
<td>10*</td>
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<td>Titanium dioxide</td>
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<td>15</td>
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<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>&lt;5</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)***</td>
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<td>5 (c)</td>
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<td>Aluminum oxide and/or Bauxite</td>
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<td>Alkali carbonates</td>
<td>584-08-7</td>
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<td>10*</td>
<td>15*</td>
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<tr>
<td>Iron oxides</td>
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<td>0.2</td>
<td>5 (c)</td>
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<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
<td>7440-21-3</td>
<td>&lt;0.5</td>
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<td>15*</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
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<td>Carbon steel core wire</td>
<td>7439-89-6</td>
<td>60</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

### Supplemental Information:

- (*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.
- (**) As respirable dust.
- (***) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and 40CFR 370 and 372
- (****) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.
- (c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).
Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Governmental Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

- Fumes and gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.
- 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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. 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.) Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies).

- Arc Rays can injure eyes and burn skin. Skin cancer has been reported.
- Electric Shock can kill. If welding must be performed in damp positions or with wet clothing, on metal structures or when crampod in 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.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

If breathing is difficult give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.

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

ARC RAYS: Arc radiant energy can injure skin and eyes. Skin cancer has been reported. Arc rays can cause cataracts.

Proper protective clothing should be worn. See Z49.1 for protective clothing requirements.

- Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies).

- Arc Rays can injure eyes and burn skin. Skin cancer has been reported.
- Electric Shock can kill. If welding must be performed in damp positions or with wet clothing, on metal structures or when cramped in 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.

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IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.

IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities.)

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily complex oxides of manganese, potassium, silicon, sodium and titanium.

Maximum fume exposure guideline for this product (based on manganese content) is 4.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

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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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Use full face protective helmet with filter lens shade number 15 or darker. Shield others by providing screens and flash goggles.

Proper Clothing: Wear head, hand, and body protection which help to prevent injury from radiation, sparks and electrical shock. See Z49.1.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
**SECTION I - IDENTIFICATION**

**Manufacturer/Supplier:** The Lincoln Electric Company  
22801 St. Clair Avenue  
Cleveland, OH 44117-1199  
(216) 481-8100

**Product Type:** Covered Electrode  
**Classification:** AWS E6010

**SECTION II - HAZARDOUS MATERIAL (1)**

**IMPORTANT!**
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.  
CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes. (*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.  
Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).  
Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

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<th>Ingredients:</th>
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<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>5</td>
<td>10**</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
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<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
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<td>Manganese and/or manganese alloys and compounds (as Mn)*****</td>
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<td>0.02</td>
<td>5 (c)</td>
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<td>Magnesite</td>
<td>1309-48-4</td>
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<tr>
<td>Mineral silicates</td>
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<td>5**</td>
<td>5**</td>
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<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>0.5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
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<td>10*</td>
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<td>Quartz</td>
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<td>Carbon steel core wire</td>
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<td>85</td>
<td>10*</td>
<td>15*</td>
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</tbody>
</table>

**SECTION III - HAZARD DATA**

Non Flammable; Welding arc and sparks can Ignite combustibles and flammable products. See Z49.1 referenced in Section VI.  
Product is inert, no special handling or spill procedures required. Not regulated by DOT.
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

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- Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

- Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies).

- Arc Rays can injure eyes and burn skin. Skin cancer has been reported. 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.

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IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.

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Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily complex oxides of manganese, silicon and sodium.

Maximum fume exposure guideline for this product (based on manganese content) is 0.4 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

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Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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 clothing. Train the welder not to permit electrically live parts or electrodes to contact skin ... or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
MATERIAL SAFETY DATA SHEET

For Welding Consumables and Related Products

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22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Covered Electrode
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<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>&lt;5</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)</td>
<td>7439-96-5</td>
<td>1</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>&lt;0.5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
<td>7440-21-3</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

Carbon steel core wire

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon steel core wire</td>
<td>7439-89-6</td>
<td>85</td>
<td>10*</td>
<td>10*</td>
</tr>
</tbody>
</table>

Supplemental Information:
(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. TLV value for iron oxide is 10 milligrams per cubic meter. PEL value for iron oxide is 5 milligrams per cubic meter.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

SECTION III - HAZARD DATA

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI. Product is inert, no special handling or spill procedures required. Not regulated by DOT.

Rev 9/07

(CONTINUED ON SIDE TWO)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m^3 and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchiłla and some lung fibrosis have been reported. Titanium dioxide is listed on the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

Are Rays can injure eyes and burn skin. Skin cancer has been reported. 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.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques. IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily complex oxides of manganese, silicon, sodium and titanium.

Maximum fume exposure guideline for this product is 5.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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 FL1, F1.2, F1.3 and F1.5, available from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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. Train the welder not to permit electrically live parts or electrodes to contact skin . . . or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/Supplier: The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Aluminum Electrodes
Products: Lincoln 4043 and 5356

SECTION II - HAZARDOUS MATERIAL (1)

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.

CAS Number shown is representative for the ingredients listed.

(1) The term "hazardous" in "Hazardous Materials" should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

Ingredients:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum wire</td>
<td>7429-90-5</td>
<td>100</td>
<td>10*</td>
<td>10*</td>
</tr>
<tr>
<td>Nominal wire composition:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum*****</td>
<td>7429-90-5</td>
<td>95</td>
<td>10**</td>
<td>15</td>
</tr>
<tr>
<td>Silicon (4043 only)</td>
<td>7440-21-3</td>
<td>5</td>
<td>10*</td>
<td>10*</td>
</tr>
<tr>
<td>Magnesium (5356 only)</td>
<td>7439-95-4</td>
<td>5</td>
<td>10*</td>
<td>10*</td>
</tr>
<tr>
<td>Manganese***** (5356 only)</td>
<td>7439-96-5</td>
<td>&lt;0.2</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Chromium ***** (5356 only)</td>
<td>7440-47-3</td>
<td>&lt;0.5</td>
<td>0.5(b)</td>
<td>1.0(b)</td>
</tr>
</tbody>
</table>

Supplemental Information:

*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(**) TLV for aluminum welding fume is 5 mg/m³.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(b) The OSHA PEL for chromium (VI) is 5 micrograms (0.005 milligrams) per cubic meter. The TLV for water soluble chromium (VI) is 0.05 milligrams per cubic meter and the TLV for insoluble chromium (VI) is 0.01 milligrams per cubic meter.

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

SECTION III - HAZARD DATA

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI. Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(CONTINUED ON SIDE TWO)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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) and may affect pulmonary function. Bronchitis and some lung fibrosis have been reported. Chromates may cause ulceration and perforation of the nasal septum. Liver damage and allergic reactions, including skin rash, have been reported. 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. 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.)

Arc Rays can injure eyes and burn skin. Skin cancer has been reported. 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.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross. IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques. IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily aluminum oxide; secondarily magnesium oxide (for 5356, and complex oxides of silicon (for 4043). Maximum fume exposure guideline and PEL for this product is 5.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL, 33126 (both available for free download at http://www.lincolnelectric.com/community/safety) and OSHA Publication 2206 (29CFR1910). U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

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 fume. Keep exposure as low as possible.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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. Train the welder not to permit electrically live parts or electrodes to contact skin or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
Date: 1/26/2011  MSDS No.: US-M275
Trade Name: Jetweld LH-70
Sizes: All
Supersedes: 12/4/2009

MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION
Manufacturer/Supplier: The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Covered Electrode
Classification: AWS E7018H4R

SECTION II - HAZARDOUS MATERIAL (1)

Ingredients:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>15</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>10</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Fluorides (as F)</td>
<td>7789-75-5</td>
<td>5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>&lt;5</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)***</td>
<td>7439-96-5</td>
<td>&lt;5</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
<td>7440-21-3</td>
<td>1</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>1</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>0.5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Vanadium alloys (as V)</td>
<td>7440-62-2</td>
<td>&lt;0.5</td>
<td>05(@)</td>
<td>05(@)</td>
</tr>
<tr>
<td>Lithium compounds (as Li)</td>
<td>554-13-2</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

Carbon steel core wire
7439-89-6  60  10*  15*

Supplemental Information:

(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(**) As respirable dust.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(1) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

(2) As V₂O₅ fume or dust.

SECTION III - HAZARD DATA
Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI. Product is inert, no special handling or spill procedures required. Not regulated by DOT.
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Repeated exposure to fluorides may cause excessive calcification of the bone and calcification of ligaments of the ribs, pelvis and spinal column. May cause skin rash. Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

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 hydrocarbons vapor 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide and fluorides; secondarily complex oxides of manganese, potassium, silicon, sodium.

Maximum fume exposure guideline for this product (based on manganese content) is 4.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques. IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 hydrocarbons vapor 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide and fluorides; secondarily complex oxides of manganese, potassium, silicon, sodium.

Maximum fume exposure guideline for this product (based on manganese content) is 4.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE


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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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. Train the welder not to permit electrical live parts or electrodes to contact skin or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
M A T E R I A L  S A F E T Y  D A T A  S H E E T
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/Supplier:
The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Carbon Steel Electrode
Classification: AWS ER70S-6

SECTION II - HAZARDOUS MATERIAL (1)

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.

CAS Number shown is representative for the ingredients listed.

(i) The term “hazardous” in “Hazardous Materials” should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

Ingredients:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon steel wire</td>
<td>7439-96-5</td>
<td>100</td>
<td>10*</td>
<td>10*</td>
</tr>
<tr>
<td>Nominal wire composition:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total manganese*****</td>
<td>7439-96-5</td>
<td>&lt; 2.0</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Total copper including plated coating*****</td>
<td>7440-50-8</td>
<td>&lt; 0.5</td>
<td>0.2(a)</td>
<td>0.1(a)</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>bal.</td>
<td>10*</td>
<td>10*</td>
</tr>
</tbody>
</table>

Supplemental Information:

(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(a) Value for copper fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value).

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

SECTION III - HAZARD DATA

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI. Product is inert, no special handling or spill procedures required. Not regulated by DOT.

Rev 9/07

(CONTINUED ON SIDE TWO)
### SECTION IV - HEALTH HAZARD DATA

**Threshold Limit Value:** The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

**Effects of Overexposure:** Electric arc welding may create one or more of the following health hazards:

- Fumes and gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

  **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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported.**

  **WARNING:** This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

- Electric arcs can injure eyes and burn skin. Skin cancer has been reported.

**Emergency and First Aid Procedures:** Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

**IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.**

**IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.**

**SECTION V - REACTIVITY DATA**

**Hazardous Decomposition Products:** Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily complex oxides of copper, manganese and silicon when used with gas shielding.

Maximum fume exposure guideline for this product (based on manganese content) is 1.5 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, F1.3 and F1.5, available from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

### SECTION VI AND VII

**CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE**

Read and understand the manufacturer’s instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, “Safety In Welding, Cutting and Allied Processes” published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

**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.**

**Respiratory Protection:** Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

**Eye Protection:** Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

**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. Train the welder not to permit electrically live parts or electrodes to contact skin or clothing or gloves if they are wet. Insulate from work and ground.

**Disposal Information:** Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/Supplier: The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Covered Electrode
Classification: AWS E8010-G

SECTION II - HAZARDOUS MATERIAL (1)

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.

CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.
(1) The term "hazardous" in "Hazardous Materials" should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)*****</td>
<td>7439-96-5</td>
<td>&lt;5</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>&lt;5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>1</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Magnesite</td>
<td>1309-48-4</td>
<td>1</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Nickel (metal)*****</td>
<td>7440-02-0</td>
<td>0.5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>Molybdenum alloys (as Mo)</td>
<td>7439-98-7</td>
<td>&lt;0.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
<td>7440-21-3</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
<tr>
<td>Carbon steel core wire</td>
<td>7439-89-6</td>
<td>85</td>
<td>10*</td>
<td>15*</td>
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</tbody>
</table>

Supplemental Information:
(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. TLV value for iron oxide is 10 milligrams per cubic meter. PEL value for iron oxide is 5 milligrams per cubic meter.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(***) As respirable dust.

(****) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

SECTION III - HAZARD DATA
Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.
Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(CONTINUED ON SIDE TWO)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Values: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Titanium dioxide is listed on the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). Nickel 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. Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. 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.)

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

If breathing is difficult, give oxygen. If not breathing, employ CPR (Cardiopulmonary Resuscitation) techniques. In case of electrical shock, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily complex oxides of manganese, nickel, silicon, sodium and titanium.

Maximum fume exposure guideline for this product (based on manganese content) is 2.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Oxide and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

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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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

Protective Clothing: Wear hand, head, and body protection which help to prevent injury from radiation, sparks and electrical shock. See Z49.1.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/Supplier: The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100
Product Type: Covered Electrode
Classification: AWS E7010-A1

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information. CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.

(i) The term "hazardous" in "Hazardous Materials" should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

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<tbody>
<tr>
<td>Iron</td>
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<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Titanium oxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>&lt;5</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)*****</td>
<td>7439-96-5</td>
<td>1</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>1</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Molybdenum alloys (as Mo)</td>
<td>7439-98-7</td>
<td>0.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
</tbody>
</table>

Carbon steel core wire
7439-89-6 80 10* 15*

Supplemental Information:

(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 5 milligrams per cubic meter. TLV value for iron oxide is 5 milligrams per cubic meter.

(**) As respirable dust.

(******) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

VALUE is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

SECTION III - HAZARD DATA
Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.
Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(continued on side two)
### Threshold Limit Value

The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³.

ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as time lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

### Effects of Overexposure

Electric arc welding may create one or more of the following health hazards:

- Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.
- 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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Titanium dioxide is listed on the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. **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.)

### Emergency and First Aid Procedures

- **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.

- To avoid lung damage, be sure that the welding area is well ventilated. Fumes and gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

- **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.

- **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.

- If breathing is difficult, give oxygen. If not breathing, employ CPR (Cardiopulmonary Resuscitation) techniques. In case of electrical shock, turn off power and follow recommended treatment. In all cases, call a physician.

### SECTION V - REACTIVITY DATA

**Hazardous Decomposition Products:** Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

- Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily complex oxides of manganese, molybdenum, silicon, sodium and titanium.

- Maximum fume exposure guideline for this product is 5.0 milligrams per cubic meter.

### Gaseous Reaction Products

- Gaseous reaction products may include carbon monoxide and carbon dioxide. Oxide and nitrogen oxides may be formed by the radiation from the arc.

### SECTION VI AND VII

**CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE**

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety in Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelcctric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

**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.

**Respiratory Protection:** Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

**Eye Protection:** Wear helmet or face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

**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. Train the welder not to permit electrically live parts or electrodes to contact skin... or clothing or gloves if they are wet. Insulate from work and ground.

**Disposal Information:** Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
**SECTION I - IDENTIFICATION**

**Manufacturer/Supplier:** The Lincoln Electric Company  
22801 St. Clair Avenue  
Cleveland, OH 44117-1199  
(216) 481-8100  

**Product Type:** Cored Electrode  
**Classification:** AWS E7010-G

**SECTION II - HAZARDOUS MATERIAL (1)**

**Ingredients:**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>&lt;5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>&lt;5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)****</td>
<td>7439-96-5</td>
<td>1</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>1</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Magnesite</td>
<td>1309-48-4</td>
<td>1</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Alkali carbonates</td>
<td>584-08-7</td>
<td>0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Molybdenum alloys (as Mo)</td>
<td>7439-98-7</td>
<td>&lt;0.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
<tr>
<td>Carbon steel tube</td>
<td>7439-89-6</td>
<td>85</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

**Supplemental Information:**

(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(**) As respirable dust.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and 40CFR 370 and 372

(c) Value is for manganese fume. Present PEL is 6 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(#) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

**SECTION III - HAZARD DATA**

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI. Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(CONTINUED ON SIDE TWO)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³.

ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies).

Arc Rays can injure eyes and burn skin. Skin cancer has been reported.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.
If breathing is difficult, give oxygen. If not breathing, employ CPR (Cardiopulmonary Resuscitation) techniques.
In case of electrical shock, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily complex oxides of magnesium, manganese, molybdenum, silicon, sodium and titanium.

Maximum fume exposure guideline for this product (based on manganese content) is 4.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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. Train the welder not to permit electrically live parts or electrodes to contact skin... or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
ELECTRIC
Date: 9/30/2011 MSDS No.: US-CW705
Trade Name: UltraCore 71C
Sizes: All
Supersedes: 8/7/2009

MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/Supplier: The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Flux Cored Electrode
Classification: AWS E71T-1CH8

SECTION II - HAZARDOUS MATERIAL (1)

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.
CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.
(1) The term “hazardous” in “Hazardous Materials” should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA Inventory.

Ingredients:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxides</td>
<td>13463-67-7</td>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)******</td>
<td>7439-96-5</td>
<td>&lt;5</td>
<td>0.2</td>
<td>5(c)</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>&lt;5</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Aluminum oxide and/or Bauxite</td>
<td>1344-28-1</td>
<td>1</td>
<td>10*</td>
<td>15</td>
</tr>
<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
<td>7440-21-3</td>
<td>0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Magnesium and/or magnesium alloys and compounds (as Mg)</td>
<td>7439-95-4</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Fluorides (as F)</td>
<td>7789-75-5</td>
<td>&lt;0.5</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Boron alloys (as B)</td>
<td>11108-67-1</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt;0.5</td>
<td>#0.025**</td>
<td>#0.1**</td>
</tr>
</tbody>
</table>

Carbon steel tube

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon steel tube</td>
<td>7439-89-6</td>
<td>85</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

Supplemental Information:
(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(##) Crystalline silica (quartz) is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans.

Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

SECTION III - HAZARD DATA

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.
Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(CONTINUED ON SIDE TWO)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³ and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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). Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death.

Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Titanium dioxide is listed by the IARC (International Agency for Research on Cancer) as a Group 2B carcinogen (possibly carcinogenic to humans based on animal studies). Repeated exposure to fluorides may cause excessive calcification of the bone and calcification of ligaments of the ribs, pelvis and spinal column. May cause skin rash. Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

Electric arc welding may cause one or more of the following health hazards:

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: Semi-automatic DC Welders, DC Manual (Stick) Welders, or DC Welders with Reduced Voltage Control.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily fluorides and complex oxides of manganese, silicon, sodium and titanium.

Maximum fume exposure guideline for this product (based on manganese content) is 3.0 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

Determine the composition and quantity of fumes and gases to which workers are exposed by taking an air sample from inside the welder'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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

Protective Clothing: Wear as specified Plumbing the use of suitable personal protective equipment. Additional information available at http://www.lincolnelectric.com/community/safety/
Date: 10/15/2012 MSDS No.: US-M574
Trade Name: Wearshield 60
Sizes: All
Supersedes: 11/5/06

MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/Supplier: The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Covered Electrode
Classification: None

SECTION II - HAZARDOUS MATERIAL (1)

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information. CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.
(1) The term “hazardous” in “Hazardous Materials” should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

Ingredients:

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>WL%</th>
<th>TLV</th>
<th>PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-47-3</td>
<td>30</td>
<td>0.5(b)</td>
<td>1.0(b)</td>
</tr>
<tr>
<td>7439-89-6</td>
<td>10</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>7782-42-5</td>
<td>&lt;5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>7439-98-7</td>
<td>&lt;5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>1332-58-7</td>
<td>&lt;5</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>7439-96-5</td>
<td>0.5</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>7440-62-2</td>
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<td>0.05(@)</td>
</tr>
<tr>
<td>12719-90-3</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>65996-61-4</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>7429-90-5</td>
<td>&lt;0.5</td>
<td>1.0*</td>
<td>15</td>
</tr>
</tbody>
</table>

Carbon steel core wire
7439-89-6
45
10*
15*

Supplemental Information:
(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.
(**) As respirable dust.

(****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(b) The OSHA PEL for chromium (VI) is 5 micrograms (0.605 milligrams) per cubic meter. The TLV for water soluble chromium (VI) is 0.65 milligrams per cubic meter and the TLV for insoluble chromium (VI) is 0.01 milligrams per cubic meter.

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

(@) As V6O3 fume or dust.

SECTION III - HAZARD DATA

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.

Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(Continued on Side Two)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³.

ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:

- Fumes and gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.
- 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). Chromates present in the fume have been known to cause severe irritation of the bronchial tubes and lungs. Asthma has been reported.
- Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Chromates may cause ulceration and perforation of the nasal septum. Liver damage and allergic reactions, including skin rash, have been reported. 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. 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.)

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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonable expected fume constituents of this product would include: Primarily iron and chromium oxides; secondarily complex oxides of magnesium, manganese, molybdenum, potassium, silicon and sodium.

Maximum fume exposure guideline for this product (based on Cr (VI) content) is 0.2 milligrams per cubic meter.

KEEP EXPOSURE AS LOW AS POSSIBLE. Indoors, use local exhaust; outdoors, a respirator may be required.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.
Date: 10/15/2012 MSDS No.: US-M570
Trade Name: Wearshield ABR
Sizes: All
Supersedes: 11/5/06

MATERIAL SAFETY DATA SHEET
For Welding Consumables and Related Products

SECTION I - IDENTIFICATION

Manufacturer/ Supplier: The Lincoln Electric Company
22801 St. Clair Avenue
Cleveland, OH 44117-1199
(216) 481-8100

Product Type: Covered Electrode
Classification: None

SECTION II - HAZARDOUS MATERIAL (1)

IMPORTANT!
This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.

CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.

(1) The term "hazardous" in "Hazardous Materials" should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV, mg/m^3</th>
<th>PEL, mg/m^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium and chromium alloys or compounds (as Cr)*****</td>
<td>7440-47-3</td>
<td>10</td>
<td>0.5(b)</td>
<td>1.0(b)</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Graphite</td>
<td>7782-42-5</td>
<td>&lt;5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt;5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Zirconium alloys and compounds (as Zr)</td>
<td>12004-83-0</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)*****</td>
<td>7439-96-5</td>
<td>1</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>1</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Silicon and/or silicon alloys and compounds (as Si)</td>
<td>7440-21-3</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Molybdenum alloys (as Mo)</td>
<td>7439-98-7</td>
<td>&lt;0.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>&lt;0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Carbon steel core wire</td>
<td>7439-89-6</td>
<td>75</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

Supplemental Information:

(*) Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. TLV value for iron oxide is 10 milligrams per cubic meter. PEL value for iron oxide is 5 milligrams per cubic meter.

(b) The OSHA PEL for chromium (VI) is 5 micrograms (0.005 milligrams) per cubic meter. The TLV for water soluble chromium (VI) is 0.05 milligrams per cubic meter and the TLV for insoluble chromium (VI) is 0.01 milligrams per cubic meter.

(**) As respirable dust.

(c) Value is for manganese fume. Present PEL is 5 milligrams per cubic meter (ceiling value). Values proposed by OSHA in 1989 were 1.0 milligrams per cubic meter TWA and 3.0 milligrams per cubic meter STEL (Short Term Exposure Limit).

***** Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

SECTION III - HAZARD DATA
Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.

Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(Continued on Side Two)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³. ACGIH-1999 Preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards:
Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

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) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Chromates may cause ulceration and perforation of the nasal septum. Liver damage and allergic reactions, including skin rash, have been reported. 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. 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.)

Arc Rays can injure eyes and burn skin. Skin cancer has been reported.
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.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

If breathing is difficult give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.

IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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, plated, 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 II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide; secondarily fluorides and complex oxides of chromium, magnesium, manganese, potassium, silicon, sodium and titanium.

Maximum fume exposure guideline for this product (based on Cr (VI) content) is 1.5 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E285. See American National Standard Z49.1, "Safety in Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

Protective Clothing: Wear hard, 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. Training the welder not to permit electrically live parts or electrodes to contact skin . . . or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.
# Material Safety Data Sheet

**For Welding Consumables and Related Products**


## SECTION I - IDENTIFICATION

### Manufacturer/Supplier:
The Lincoln Electric Company  
22801 St. Clair Avenue  
Cleveland, OH 44117-1199  
(216) 451-8100

### Product Type:
Covered Electrode

### Classification:
- Blue Max 309/309L AC-DC 309/309L AC-DC  
- 316/316L AC-DC 2100

## IMPORTANT!

This section covers the materials from which this product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered by Section V; see it for industrial hygiene information.  
CAS Number shown is representative for the ingredients listed. All ingredients listed may not be present in all sizes.  
(i) The term "hazardous" in "Hazardous Materials" should be interpreted as a term required and defined in the Hazards Communication Standard and does not necessarily imply the existence of any hazard. All materials are listed on the TSCA inventory.

### Ingredients:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt.%</th>
<th>TLV mg/m³</th>
<th>PEL mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>13463-67-7</td>
<td>15</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Mineral silicates</td>
<td>1332-58-7</td>
<td>10</td>
<td>5**</td>
<td>5**</td>
</tr>
<tr>
<td>Chromium and chromium alloys or compounds (as Cr)**</td>
<td>7440-47-3</td>
<td>&lt; 5</td>
<td>0.5(b)</td>
<td>1.0(b)</td>
</tr>
<tr>
<td>Limestone and/or calcium carbonate</td>
<td>1317-65-3</td>
<td>&lt; 5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Silicates and other binders</td>
<td>1344-09-8</td>
<td>&lt; 5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt; 5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Iron oxides</td>
<td>65996-74-9</td>
<td>&lt; 5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Quartz</td>
<td>14808-60-7</td>
<td>&lt; 5</td>
<td>0.05**</td>
<td>0.1**</td>
</tr>
<tr>
<td>Manganese and/or manganese alloys and compounds (as Mn)**</td>
<td>7439-96-5</td>
<td>1</td>
<td>0.2</td>
<td>5 (c)</td>
</tr>
<tr>
<td>Fluorides (as F)</td>
<td>7789-75-5</td>
<td>1</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Nickel (metal)** (2100 and 316 types only)</td>
<td>7440-02-0</td>
<td>&lt; 0.5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>Cellulose and other carbohydrates</td>
<td>65996-61-4</td>
<td>&lt; 0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
<tr>
<td>Molybdenum alloys (as Mo) (316 type only)</td>
<td>7439-98-7</td>
<td>&lt; 0.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Lithium compounds (as Li)</td>
<td>554-13-2</td>
<td>&lt; 0.5</td>
<td>10*</td>
<td>15*</td>
</tr>
</tbody>
</table>

Stainless steel core wire:
- 7439-89-6 65 10* 15*

Nominal core wire composition:
- Chromium****  
- Nickel*****  
- Molybdenum (316 type only)  
- Manganese*****  
- Iron

### Supplemental Information:

- Not listed. The OSHA PEL for nuisance particles is 15 milligrams per cubic meter. The ACGIH guideline for total particulate is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxides is 5 milligrams per cubic meter.
- As respirable dust.

Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

## SECTION III - HAZARD DATA

Non Flammable; Welding arc and sparks can ignite combustibles and flammable products. See Z49.1 referenced in Section VI.  
Product is inert, no special handling or spill procedures required. Not regulated by DOT.

(continued on side two)
SECTION IV - HEALTH HAZARD DATA

Threshold Limit Value: The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m³.

ACGIH-1999 prefab states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Limit Values are figures published by the American Conference of Governmental Industrial Hygienists. Units are milligrams per cubic meter of air.

Effects of Overexposure: Electric arc welding may create one or more of the following health hazards. Fumes and gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausia, or dryness of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death.

Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Chromates may cause ulceration and perforation of the nasal septum. Liver damage and allergic reactions, including skin rash, have been reported. 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. Respiratory exposure to the crystalline silica present in this welding electrode is not anticipated during normal use. Respiratory overexposure to airborne crystalline silica is known to cause silicosis, a form of disabling pulmonary fibrosis which can be progressive and may lead to death. Crystalline silica is on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a cancer risk to humans. Repeated exposure to fluorides may cause excessive calcification of the bone and calcification of ligaments of the ribs, pelvis, and spinal column. May cause skin rash. Nickel 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. Nickel compounds are skin sensitizers with symptoms usually occurring after repeated exposure - ranging from a slight itch to severe dermatitis. 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.)

Arc Rays can injure eyes and burn skin. Skin cancer has been reported.

Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques.

IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, 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 II. Decomposition products of normal operation include those origins of the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily fluorides and complex oxides of potassium, iron and silicon; secondarily complex oxides of aluminum, chromium, manganese, nickel, sodium and titanium.

Maximum fume exposure guideline for this product (based on Cr (VI) content) is 0.08 milligrams per cubic meter. Keep exposure as low as possible. Indoors, use local exhaust; outdoors, a respirator may be required.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. 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, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION VI AND VII

CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126 (both available for free download at http://www.lincolnelectric.com/community/safety/) and OSHA Publication 2206 (29CFR1910). U.S. Government Printing Office, Superintendent of Documents, P.O. Box 33054, Pittsburgh, PA 15234-7595 for more details on many of the following:

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.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

Eye Protection: Wear helmet or use face shield with filter lens shade number 12 or darker. Shield others by providing screens and flash goggles.

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 colored clothing. Train the welder not to permit electrically live parts or electrodes to contact skin or clothing or gloves if they are wet. Insulate from work and ground.

Disposal Information: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.