SAFETY DATA SHEET

This Safety Data Sheet (SDS) is for welding consumables and related products and may be used to comply with the European Parliament and Council Regulation (EC) No 1907/2006 (known as REACH) and Regulation (EC) No 1272/2008 (known as CLP), which adapted the REACH provisions regarding Safety Data Sheets to comply with the United Nations' Globally Harmonised System (GHS, fifth version) for classifying and labelling chemical substances and mixtures. The REACH and CLP regulations must be consulted for specific requirements. This Safety Data Sheet complies with ISO 11014-1. This document is translated in several languages and is available on our website at www.hobartbrothers.com, from your sales representative or by calling customer service at +1 (937) 332-4000.

SECTION 1 – IDENTIFICATION OF THE SUBSTANCE /MIXTURE AND OF THE COMPANY /UNDERTAKING

1.1 PRODUCT IDENTIFIER

Products Type: TUBULAR ARC WELDING ELECTRODES

GROUP A: Product For: Gas Shielded Carbon and Low Alloy Steel

Trade Name: **ECLIPSE** RXR-XLS, ULTIMET 716; **FABCO** 11, 22, 37, 72, 73, 82HD, 85, 90, 105D2, 711M, 791, 811A1, EXCEL-ARC 71, FABDUAL T9M, HORNET, RXR, RXR-XLS, SUPER-COR, TR70, TRIPLE-7, TRIPLE-8, XL-71; **FABCOR** 70, 71, 80D2, 80XLS, 86R, 96, 702, F6, F6LS, ULTIMET 716; **FLUX-COR** 2, 7, 37, 80A1; **GALVACOR**; **HOBART** 71T, 71TM, 77TM, E71T-GS; **METAL-COR** 6, 6L, 80D2, EN-VISION; **METALLOY** 70R, 76, X-CEL; **SPEED-ALLOY** 70, 71, 71A, 71-V, 719, 75; **SPEED-COR** 6; **TM** 55, 81A1, 95D2, RX7; **VERSATILE**; **VERTI-COR** I, II, III; **VISION** AP70, HiDep 70, MetCOR 70; **SubCOR** EM12K-S, EM13K-S, EM13K-S MOD

GROUP B: Product For: Self-Shielded Carbon Steel

Trade Name: **FABSHIELD** 4, 21B, 23, 55, 7027; **SELF-SHIELD** 4, 11, 11GS; **SPEED-SHIELD** 11, GS; **TM** 44, 121, 123

GROUP C: Product For: Carbon and Low Alloy Steel

Trade Name: **FABCO ELEMENT** 70C, 70M, 71C, 71M, 71Ni1C, 71Ni1M, 71T1C, 71T1M, 81K2C, 81Ni2C, 81K2M; **FABCO** 70XHP, 71 HYD, 71 HYN, 80K2-C, 81B2, 81K2-C, 81N1, 85K2, 85XHP, 90K2, 91B3,91K2-C, 95K2, 101, 101K3, 101M, 107G, 110, 110K3-M, 111-V, 115, 115K3, 125K4, 712C, 712M, 750C, 750M, 803, 811B2, 811N1, 811W, 812 Ni1M, 881K2, 910, 911B3, 911N2, 1101K3-C, MIL-101-TM, PREMIER 70, XL525; **FABCO XTREME** 71, 81K2C, 101, 120, B2, B3, B3V; **FABCOR** 80B2, 80N1, 80N2, 90, 90B3, 100, 100N2G, 209, 1100, 4130SR, ACE, CVN, EDGE, EDGE D2, EDGE MC, EDGE Ni1, EDGE XP, ELEVATE, HERCULES, MATRIX; **FABCOR ELEMENT** 70C6, 80Ni1; **FABSHIELD** 3Ni1, 71K6, 71K6-NP, 71T8, 81N1, 81N1+, 81N2, 91T8, K54, PIPE ROOT 1, XLNT-6, XLR-8, X80, X90, X100, OFFSHORE 71Ni, OFFSHORE 81Ni; **FLUX-COR** 90K2; **FORMULA** XL8Ni1, XL8Ni1-C, XL550; **HOBART** SSW-10; **METAL-COR** MAXIM; **METALLOY** 71, 71SG, 90, 92-S, F2-S, 100F3-S, 120-S, B2-S, B3-S, N1-S, N2-S, VANTAGE, W-S; **MX2**; **PW**-201; **SPEED-ALLOY** 81Ni1-V, 81Ni2-V, 91B3, 115, 125, 712, 712M, 790; **TM** 81N2, 81W, 91N2, 111K3, 770, 771, 71HYN, 811N1, 811N2, 811N3, 911N2, 991K2, 1101K3-M; **VERTI-COR** 70, 72, 81Ni2, 91B3, 91K2, 91Ni2, IINi1; **MEGAFIL** 810M, 710M, 713R, 350B, 731B, 235M, 825R, 735B, 240M, 716R, 819R, 740B, 281M, 281MCr, 781R, 781RCr, 281B, 741M, 610M, 940M, 742M, 1100M, 550R, 610R, 620R, 690R, 741B, 501B, 610B, 742B, 745, 807M, 807B, 236M, 237M, 836R, P36B, 736B, 737B; **SubCOR SL** 731, SL 840 HC, SL 735 1W, SL 735 2W, SL 735 3W, SL 735 4W, SL 735 5W, SL 741, SL 742, SL 745, SL 281 Cr, SL P1, SL P1 MOD, SL P11, SL P12 MOD, SL P36, SL P22, SL P24; **SubCOR** 92-S, F2-S, 100F3-S, 120-S, N1-S, W-S, B2-S, B3-S, 4130 SR

GROUP D: Product For: Corrosion Resisting Steel

Trade Name: **FABCO** 5055, B6, B9; **FABCOR** 409, F6W; **FABLOY** 409, 439; **FABTUF** 960; **POWERCORE** 91; **MEGAFIL** P5M; **SubCOR SL** P5, SL P9, SL P91, SL P92

1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST

Product Use: Tubular arc welding electrodes for flux cored, metal cored and composite submerged arc welding.
Uses Advised Against: Use only as indicated for welding operations.

1.3 DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET

Name: HOBART BROTHERS LLC
Address: 101 TRADE SQUARE EAST, TROY, OH 45373
United States
Website: www.hobartbrothers.com
Competent Person Responsible for the SDS: David.Castro@HobartBrothers.com

1.4 EMERGENCY TELEPHONE NUMBER

Telephone No: +1 (937) 332-4000 [8 am to 5 pm – Eastern US Time Zone]
Emergency No: +1 (800) 424-9300 [Chemtrec Day or Night, within USA and Canada: 1-800-424-9300 CCN11662]
[Outside USA and Canada: +1-703-527-3887 (collect calls accepted)]

SECTION 2 – HAZARDS IDENTIFICATION

2.1 CLASSIFICATION OF THE SUBSTANCE OR MIXTURE – The products described in Section 1 is not classified as hazardous according to applicable GHS hazard classification criteria as required and defined in European Parliament and Council Regulations (EC) No 1907/2006 and (EC) No 1272/2008.

2.2 LABEL ELEMENTS

Hazard Pictogram – No symbol required
Signal Word – No signal word required
Hazard Statement – Not applicable
Precautionary Statement – Not Applicable

2.3 OTHER HAZARDS

WARNING! - Avoid breathing welding fumes and gases, they may be dangerous to your health. Always use adequate ventilation. Always use appropriate personal protective equipment.
PRIMARY ROUTES OF ENTRY: Respiratory System, Eyes and/or Skin.
ELECTRIC SHOCK: Arc welding and associated processes can kill. See Section 8.
ARC RAYS: The welding arc can injure eyes and burn skin.
FUMES AND GASES: Can be dangerous to your health.

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

Fumes from the use of this product may contain complex oxides or compounds of the following elements and molecules: amorphous silica fume, antimony trioxide, barium, calcium oxide, chromium, cobalt, copper, fluorspar or fluorides, lithium, manganese, nickel, silica and strontium. Other reasonably expected constituents of the fume would also include complex oxides of iron, titanium, silicon and molybdenum. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. 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). One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet if worn or in the worker's breathing zone.

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SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

3.2 MIXTURES

IMPORTANT - This section covers the hazardous materials from which this product is manufactured. This data has been classified according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) as required and defined in European Parliament and Council Regulations (EC) No 1907/2006 and (EC) No 1272/2008. The fumes and gases produced during welding with normal use of this product are addressed in Section 8.

INGREDIENT	CAS NO.	EINECS[r]	GROUP AND %WEIGHT				GHS Classification(s)	GHS HAZARD STATEMENTS (See Section 16 for Complete Phrases)
			A	B	C	D		
ALUMINUM	7429-90-5	231-072-3	<2	<5	<3(1)	---	Powder (pyrophoric): - Pyr. Sol. 1(2) - Water-react. 2(3) Powder (Stabilized): - Flam. Sol. 1(4) - Water-react. 2(3)	H250 H261 H228 H261
ALUMINUM OXIDE	1344-28-1	215-691-6	---	---	<3	---	NONE	
ANTIMONY TRIOXIDE	1309-64-4	215-175-0	---	---	<1(5)	---	- Carc. 2(6)	H351
BARIUM CMPDS (as Ba)	7440-39-3	231-149-1	---	---	<2(7)	---	NONE	
BARIUM FLOURIDE	7787-32-8	232-108-0	---	<12(8)	<12(9)	---	NONE	
CALCIUM CARBONATE	1317-65-3	215-279-6	---	<2(10)	<2(10)	---	NONE	
CERIUM OXIDE	1306-38-3	215-150-4	---	---	<2(11)	---	NONE	
CHROMIUM (metal)	7440-47-3	231-157-5	---	---	<3	5-20	NONE	
COBALT	7440-48-4	231-158-0	---	---	<1(12)	---	- Resp. Sens. 1(13) - Skin Sens. 1(14) - Aquatic Chronic 4	H334 H317 H413
COPPER	7440-50-8	231-159-6	<1(15)	---	<2(15)	<1(15)	NONE	
FLUORSPAR	7789-75-5	232-188-7	<5(16)	<10	<5	---	NONE	
IRON	7439-89-6	231-096-4	75-98	75-95	75-98	75-95	NONE	
IRON OXIDE	1309-37-1	215-168-2	---	---	<12	---	NONE	
LITHIUM CARBONATE	554-13-2	209-062-5	---	---	<2	---	- EUH014(17) - Skin Corr. 1B(18)	EUH014 H314
LITHIUM FLUORIDE	7789-24-4	232-152-0	---	<2(19)	<2(19)	---	- EUH014(17) - Skin Corr. 1B(18)	EUH014 H314
LITHIUM OXIDE	12057-24-8	235-019-5	---	---	<2	---	- EUH014(17) - Skin Corr. 1B(18)	EUH014 H314
MAGNESIUM	7439-95-4	231-104-6	---	<3	<2	---	Powder (pyrophoric): - Pyr. Sol. 1(2) - Water-react. 1(3) Powder or turnings: - Flam. Sol. 1(4) - Self-heat. 1(20) - Water-react. 2(3)	H250 H260 H228 H252 H261
MAGNESIUM OXIDE	1309-48-4	215-171-9	---	<3	<2	---	NONE	
MANGANESE	7439-96-5	231-105-1	<5	<2	<4	<2	- Acute Tox. 4 (Inhalation)(21) - Acute Tox. 4 (Oral) (21) - STOT RE 1(22)	H332 H302 H372
MANGANESE OXIDE	1344-43-0	215-171-9	---	---	<2	---	NONE	
MOLYBDENUM	7439-98-7	231-107-2	<1	---	<2	<2	- STOT RE 2(22) - Eye Irrit. 2(23) - STOT SE 3(24)	H373 H319 H335
NICKEL	7440-02-0	231-111-4	---	---	<4	<1	Powder/Element: - Carc. 2(6) - Skin Sens. 1(14)	H351 H317

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INGREDIENT	CAS NO.	EINECS[r]	GROUP AND %WEIGHT				GHS Classification(s)	GHS HAZARD STATEMENTS (See Section 16 for Complete Phrases)
			A	B	C	D		
							- STOT RE 1[(22)] **- Aquatic Chronic 3**	**H372** **H412**
SILICA	14808-60-7	238-878-4	<2	<2	<2	---	**- STOT RE 2[(22)]** **- Carc. 2[(6)]** **- Acute Tox. 4 (Inhalation)[(21)]**	**H373** **H351** **H332**
(Amorphous Silica Fume)	69012-64-2	273-761-1	---	---	---	---	**NONE**	
SILICON	7440-21-3	231-130-8	<4	<2[(25)]	<4	<2	**NONE**	
STRONTIUM FLUORIDE	7783-48-4	232-000-3	---	<2[(26)]	---	---	**NONE**	
TITANIUM	7440-32-6	231-142-3	---	<2	<2	<2	**NONE**	
TITANIUM DIOXIDE	13463-67-7	236-675-5	<10	<4[(25)]	<10	<2	**Carc. 2[(6)]**	**H351**
ZINC	7440-66-6	231-175-3	<1[(27)]	---	---	---	**Powder (pyrophoric):** **- Pyr. Sol. 1[(2)]** **- Water-react. 1[(3)]**	 **H250** **H260**
ZIRCONIUM	7440-67-7	231-176-9	---	---	<1	---	**- Pyr. Sol. 1[(2)]** **- Water-react. 1[(3)]**	**H250** **H260**
HEXAVALENT CHROMIUM [CHROMIUM (VI) TRIOXIDE] (Fume constituent)	1333-82-0	215-607-8	Varies	Varies	Varies	Varies	**- Ox. Sol. 1[(28)]** **- Carc. 1A[(6)]** **- Muta. 1B[(29)]** **- Repr. Tox 2[(30)]** **- Acute Tox. 2 (Inhalation)[(21)]** **- Acute Tox. 3 (Skin & Oral)[(21)]** **- STOT RE 1[(22)]** **- Skin Corr. 1A[(18)]** **- Skin Sens. 1[(14)]** **- Resp. Sens. 1[(13)]** **- Aquatic Acute 1** **- Aquatic Chronic 1**	**H271** **H350** **H340** **H361f** **H330** **H311, H301** **H372** **H314** **H317** **H334, H317** **H400** **H410**

--- Dashes indicate the ingredient is not present within the group of products; **Γ** – European Inventory of Existing Commercial Chemical Substances Number **(1)** Present only in FABCO ELEMENT 70C, 70M and 71M; FABCO XTREME 71, 81K2C, 101, 120, B2, B3; FABSHIELD 3Ni1, 71K6, 71K6-NP, 71T8, 81N1, 81N1+, 81N2, 91T8, OFFSHORE 71Ni, PIPE ROOT 1, X80, X90, X100, XLNT-6 **(2)** Pyrophoric solid (Cat. 1) **(3)** Substance or mixture which in contact with water emits flammable gases (Cat. 1, 2 and 3) **(4)** Flammable solid (Cat. 1 and 2) **(5)** Present only in FABCOR 90, ACE, CVN, EDGE, EDGE D2, EDGE MC, EDGE Ni1, EDGE XP, ELEMENT 70C6, ELEMENT 80Ni1, ELEVATE, HERCULES, MATRIX; METAL-COR MAXIM; METALLOY VANTAGE, VANTAGE CVN, VANTAGE D2, VANTAGE Ni1 **(6)** Carcinogenicity (Cat. 1A, 1B and 2) **(7)** Present only in FABCO ELEMENT 70T LF; FABCO XTREME 71, 81K2C, 101, 120, B2, B3; FABSHIELD XLNT-6 **(8)** Present only in FABSHIELD 21B, 23; TM 121, 123; SELF-SHIELD 11, 11GS **(9)** Present only in FABCO XTREME 71, 81K2C, 101, 120, B2, B3; FABSHIELD 3Ni1, 71K6, 71K6-NP, 71T8, 81N1, 81N1+, 81N2, 91T8, XLNT-6, X80, X90, X100; FABSHIELD OFFSHORE 71Ni **(10)** Present only in FABSHIELD 21B, 0.030" and 0.035" 23, 7027, PIPE ROOT 1; SELF-SHIELD 11, 0.030" and 0.035" 11GS; SPEED-SHIELD 11, 0.030" and 0.035" GS; TM 121, 0.030" and 0.035" 123 **(11)** Present only in FABSHIELD 71K6, 71K6-NP, 71T8, 81N1, 81N1+, 81N2, 91T8, OFFSHORE 71Ni, XLNT-6, X80, X90, X100 **(12)** Present only in FABSHIELD 71K6, 81N1, 81N2, X80, X90, X100 **(13)** Respiratory sensitization (Cat. 1, Sub-cat. 1A and 1B) **(14)** Skin sensitization (Cat. 1, Sub-cat. 1A and 1B) **(15)** Present only in ELEMENT 71T1C, 81Ni2C; FABCO 105D2, 110K3-M; FABCOR F6W; GALVACOR; METALLOY WS; TM-81W, 811W; SubCOR WS;all MEGAFIL and SubCOR SL products **(16)** Present only in FABCO 85, 105D2; METALLLOY EM13K-S; SPEED-ALLOY 105D2; TM 55, 75, 95D2, 105D2; SubCOR EM13K-S, EM13K-S MOD **(17)** See EUH-Statements in Section 16 **(18)** Skin corrosion/irritation (Cat. 1, 1A, 1B, 1C and 2) **(19)** Present only in FABCO 70XHP, 71 HYD, 101, 101M, 712C, 712M, 750C, 750M, 812 Ni1M, 91K2-C (0.052-in. only); ELEMENT 71T1C, 71T1M, 71Ni1C, 71Ni1M, 81K2C, 81K2M, 81Ni2C; FABSHIELD 3Ni1, 7027, 71K6, 71K6-NP, 71T8, 81N1, 81N2, 91T8, OFFSHORE 71Ni, PIPE ROOT 1, X80, X90, X100 **(20)** Self-heating substance or mixture (Cat. 1 and 2) **(21)** Acute toxicity (Cat. 1, 2, 3 and 4) **(22)** Specific target organ toxicity (STOT) – repeated exposure (Cat. 1 and 2) **(23)** Serious eye damage/eye irritation (Cat. 1 and 2) **(24)** Specific target organ toxicity (STOT) – single exposure ((Cat. 1, 2) and Cat. 3 for narcotic effects and respiratory tract irritation, only) **(25)** Present only in FABSHIELD 55 **(26)** Present only in FABSHIELD 0.045" – 3/32" 21B; TM 121 **(27)** Present only in FabCOR F6LS **(28)** Oxidizing solid (Cat. 1, 2 and 3) **(29)** Germ cell mutagenicity (Cat. 1A, 1B and 2) **(30)** Reproductive toxicity (Cat. 1A, 1B and 2)

SECTION 4 – FIRST AID MEASURES

4.1 DESCRIPTION OF FIRST AID MEASURES

Ingestion: Not an expected route of exposure. Do not eat, drink, or smoke while welding; wash hands thoroughly before performing these activities. If symptoms develop, seek medical attention at once.
Inhalation during welding: If breathing is difficult, provide fresh air and contact physician. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.
Skin Contact during welding: Remove contaminated clothing and wash the skin thoroughly with soap and water. If symptoms develop, seek medical attention at once.
Eye Contact during welding: Dust or fume from this product should be flushed from the eyes with copious amounts of clean, tepid water until victim is transported to an emergency medical facility. Do not allow victim to rub or keep eyes tightly closed. Obtain medical assistance at once.
Arc rays can injure eyes. If exposed to arc rays, move victim to dark room, remove contact lenses as necessary for treatment, cover eyes with a padded dressing and rest. Obtain medical assistance if symptoms persist.

4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED

No adverse effects are expected from welding consumables (wire and rods) until they are welded. Inhalation of welding fumes may cause dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Arc rays may injure eyes and burn skin. Hexavalent chromium compounds, nickel metal and compounds and respirable crystalline silica are listed as a human carcinogen in the International Agency for Research on Cancer (IARC) Monographs. Prolonged or repeated exposure to welding fumes causes damage to respiratory system, teeth and bones. Prolonged or repeated exposure to welding fumes may cause damage to brain and nervous system. Prolonged or repeated exposure to welding fumes may cause siderosis (iron deposits in lungs), liver or kidney damage, skin and respiratory sensitization (allergic reaction) and affect pulmonary function.

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4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED
Specific Treatment: If eye or skin burns occur, get immediate medical attention.
Notes for the doctor: Treat symptomatically.

Section 11 of this SDS covers the acute effects of overexposure to the various ingredients within the welding consumable. Section 8 of this SDS lists the exposure limits and covers methods for protecting yourself and your co-workers.

SECTION 5 – FIRE-FIGHTING MEASURES

5.1 EXTINGUISHING MEDIA
Suitable Extinguishing Media: Use a suitable extinguishing agent for a surrounding fire.
Unsuitable Extinguishing Media: None known.

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE
Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, non-explosive and essentially nonhazardous until welded. Welding arcs and sparks can ignite combustibles and flammable products. If there are flammable materials, including fuel or hydraulic lines, in the work area and the worker cannot move the work or the flammable material, a fire-resistant shield such as a piece of sheet metal or fire resistant blanket should be placed over the flammable material. If welding work is conducted within 10 meters (~35 feet) or so of flammable materials, station a responsible person in the work zone to act as fire watcher to observe where sparks are flying and to grab an extinguisher or sound the alarm if needed. Unused welding consumables may remain hot for a period of time after completion of a welding process.

5.3 ADVICE FOR FIRE-FIGHTERS
Self-contained breathing apparatus and protective clothing should be worn in fighting fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT, AND EMERGENCY PROCEDURES
Not applicable to solid metal/welding electrodes in massive form. During use of product in a welding process, wear personal protective equipment as specified in Section 8. Avoid contact with the skin. Do not inhale dust, fumes or gases that arise from the welding process.

6.2 ENVIRONMENTAL PRECAUTIONS
Collect powder from welding operations using a vacuum cleaner or by gentle sweeping to keep dust away from drains, surface and ground water. Prevent particulates from entering watercourses or drains. Avoid formation of dust clouds.

6.3 METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP
In the case of a release of solid welding consumable products, solid objects can be picked up and placed into a disposal container. Collect powder from welding operations using a vacuum cleaner or by gentle sweeping. If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8. Wear proper personal protective equipment while handling. Do not discard as general trash.

6.4 REFERENCE TO OTHER SECTIONS
Refer to Section 8.

SECTION 7 - HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING
No specific requirements in the form supplied. Handle with care to avoid cuts. Wear gloves when handling welding consumables. Avoid exposure to dust. Do not ingest. Avoid breathing welding fumes. Keep your head out of the fumes. Use with enough ventilation or exhaust at the arc, or both, to keep fumes and gases below the occupational exposure limits in your breathing zone and the general area. Use air sampling to determine the need for corrective action. (Refer to Section 10 for additional information). Some individuals can develop an allergic reaction to certain materials. Retain all warning and product labels.

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES
Store in a dry area to protect product quality. Keep separate from acids and strong bases to prevent possible chemical reactions.

7.3 SPECIFIC END USE(S)
Industrial uses: Welding electrodes (also known as welding rods)
Professional uses: Welding electrodes (also known as welding rods)

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 CONTROL PARAMETERS
Read and understand the instructions and the labels on the packaging. Welding fumes are a varying mixture of airborne gases and fine particles which, if inhaled or swallowed, constitute a health hazard. The degree of risk will depend on the composition of the fume, concentration of the fume and duration of exposure. The fume composition is dependent upon the material being worked, the process and consumables being used, coatings on the work such as paint, galvanizing or plating, oil or contaminants from cleaning and degreasing activities. A systematic approach to the assessment of exposure is necessary, taking into account the particular circumstances for the operator or nearby coworkers who could be exposed. One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet, if worn, or in the worker's breathing zone.

Welding fumes do not have a specific European Union (EU) Occupational Exposure Limit (OEL). The most stringent available EU member nation 8-hour Threshold Limit Value (TLV) for Particulates-Not Otherwise Regulated (PNOR) is provided by Belgium at 10 mg/m^3 and at 3 mg/m3 for PNOR as a respirable fraction. The individual complex compounds within the fume may have a lower OEL than the Belgium PNOR limit value. An Industrial Hygienist and/or the EU member nation should be consulted to determine the specific fume constituents present and their respective exposure limits. The GESTIS International Limit Value database at the website http://limitvalue.ifa.dguv.de/WebForm_gw2.aspx may be accessed for international OELs for chemical agents. European Union OELs are listed below for EU countries to which Hobart Brothers distributes product. All exposure limits are in milligrams per cubic meter (mg/m^3).

INGREDIENT	CAS	EINECS	EU OEL
ALUMINUM	7429-90-5	231-072-3	TLV: 5 (I*), TLV: 2 (R*), STLV: 10 (I*), STLV: 4 (R*) – Denmark; TLV: 10 (I*), TLV: 5 (R*) – France; TLV: 4 (I*), TLV: 1.5 (R*) – Germany (DFG); TLV: 2.5 (Pyrophoric powder-fume, total dust), TLV: 1.2 (Pyrophoric powder-fume, respirable dust) – Poland; TLV: 10 (I*), TLV: 5 (R*) – Spain; TLV: 5 (total dust), TLV: 2 (Respirable dust) – Sweden; TLV: 3 (R*) – Switzerland;
ALUMINUM OXIDE	1344-28-1	215-691-6	TLV: 5 (R*), STLV: 10 (R*) - Austria; TLV: 1 (Respirable fraction) - Belgium; TLV: 5 (I*), TLV: 2 (R*), STLV: 10 (I*), STLV: 4 (R*) - Denmark; TLV: 10 (R*) - France; TLV: 4 (I*), TLV: 1.5 (R*) - Germany (DFG); TLV: 2.5 (fume, total dust), TLV: 1.2 (fume, respirable dust), STLV: 16 - Poland; TLV: 10 (I*), TLV: 5 (R*) - Spain; TLV: 5 (I*), TLV: 2 (R*) - Sweden; TLV: 3 (R*) - Switzerland;
ANTIMONY TRIOXIDE	1309-64-4	215-175-0	TLV: 0.1 (I*), STLV: 0.4 (I*) – Austria; TLV: 0.5 – Finland; TLV: 0.25 (Inhalable dust) – Sweden;

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			TLV: 0.1 (I*) - Switzerland;
BARIUM CMPDS, soluble (as Ba)	7440-39-3	231-149-1	TLV: 0.5 (I*), STLV: 2 (I*) – Austria; TLV: 0.5, STLV: 1.0 – Denmark; TLV: 0.5 – European Union; TLV: 0.5 – France; TLV: 0.5 (I*), STLV: 0.5 (I*; 15 min avg) – Germany (AGS); TLV: 0.5 (I*), STLV: 4 (I*; 15 min avg) – Germany (DFG); TLV: 0.5 – Italy; TLV: 0.5 – The Netherlands; TLV: 0.5 – Poland; TLV: 0.5 – Spain; TLV: 0.5 (Total dust) – Sweden; TLV: 0.5 (I*), STLV: 4 (I*) – Switzerland;
BARIUM FLOURIDE	7787-32-8	232-108-0	Not established for countries to which Hobart Brothers distributes product;
CALCIUM CARBONATE	1317-65-3	215-279-6	TLV: 10 (I*) - Spain; TLV: 3 (R*) - Switzerland;
CERIUM OXIDE	1306-38-3	215-150-4	Not established for countries to which Hobart Brothers distributes product;
CHROMIUM (metal &/or insoluble salts)	7440-47-3	231-157-5	TLV: 0.5 (as Cr) – Finland; TLV: 0.5 – The Netherlands; TLV: 0.5 (Inhalable fraction) – Switzerland;
(Cr (II) & Cr(III) cmpds)	7440-47-3	231-157-5	TLV: 0.5, STLV: 1.0 – Denmark; TLV: 2 – European Union; TLV: 2 – France; TLV: 2 (I*), STLV: 2 (I*; 15 min avg) – Germany (AGS); TLV: 0.5 (as Cr) – Poland; TLV: 2 – Spain; TLV: 0.5 – Sweden; TLV: 0.5 (I*) – Switzerland;
COBALT (and cmpds, as Co)	7440-48-4	231-158-0	TLV: 0.1, STLV: 0.4 – Austria; TLV: 0.01, STLV: 0.02 – Denmark; TLV: 0.02 (Dust & fume) – Netherlands; TLV: 0.02 – Poland; TLV: 0.02 – Spain; TLV: 0.02 (Co & inorg cmpds) – Sweden;
COPPER (and inorg Cu cmpds, inhalable)	7440-50-8	231-159-6	TLV: 0.01 (Respirable fraction), STLV: 0.02 (Respirable fraction; 15 min ref period) – Germany (DFG); TLV: 0.1 – The Netherlands; TLV: 0.2 – Poland;
(as Cu dusts & mists)	7440-50-8	231-159-6	TLV: 1 (I*) – Austria; TLV: 1, STLV: 2 – Denmark; TLV: 1, STLV: 2 – France; TLV: 0.01 (Respirable fraction), STLV: 0.02 (Respirable fraction; 15 min avg) – Germany (DFG); TLV: 0.1 (I*) – The Netherlands; TLV: 1, STLV: 2 – Poland; TLV: 1 – Spain; TLV: 1 – Sweden; TLV: 0.1 (I*), STLV: 0.2 (I*) – Switzerland;
(fume, respirable dust)	7440-50-8	231-159-6	TLV: 0.1, STLV: 0.4 – Austria; TLV: 0.1, STLV: 0.2 – Denmark; TLV: 0.1 (as Cu respirable fraction) – Finland; TLV: 0.2 – France; TLV: 0.01 (Respirable fraction), STLV: 0.02 (Respirable fraction; 15 min ref period) – Germany; TLV: 0.1, STLV: 0.3 – Poland; TLV: 0.2 – Spain; TLV: 0.2 – Sweden;
FLUORSPAR (CALCIUM FLUORIDE)	7789-75-5	232-188-7	TLV: 2.5 as F, STLV: 5 as F - Denmark; TLV: 2.5 as F – Finland; TLV: 2.5 - France; TLV: 1 (I* as F), STLV: 4 (I* as F) - Germany (AGS&DFG); STLV: 2 (as inorganic, soluble fluorides, as F) - Netherlands; TLV: 2 as F - Poland; TLV: 1 (I* as F), STLV: 4 (I* as F) - Switzerland;
IRON+	7439-89-6	231-096-4	TLV: 5 (R*), STLV: 10 (R*) - Austria; TLV: 3.5, STLV: 7 - Denmark; TLV: 5 (as Fe and fume) - Finland; TLV: 5, STLV: 10 - Poland; TLV: 5 - Spain; TLV: 3 (R*) - Switzerland;
IRON OXIDE	1309-37-1	215-168-2	Same as for Iron+ above;
LITHIUM (and cmpds as Li)	7439-93-2	NA	TLV: 0.2 (Inhalable fraction), STLV: 0.2 (Inhalable fraction; 15 min avg) – Germany (AGS); TLV: 0.2, STLV: 0.2 (15 min ref. period) – Germany (DFG); STLV: 0.02 (Inhalable dust; ceiling limit) – Sweden; TLV: 0.2 (Inhalable fraction), STLV: 0.2 (Inhalable fraction) – Switzerland;
LITHIUM CARBONATE	554-13-2	209-062-5	Not established;
LITHIUM FLUORIDE	7789-24-4	232-152-0	Not established for countries to which Hobart Brothers distributes product;
LITHIUM OXIDE	12057-24-8	235-019-5	Not established;
MAGNESIUM+	7439-95-4	231-104-6	Not established;
MAGNESIUM OXIDE	1309-48-4	215-171-9	TLV: 6 (I*), STLV: 12 (I*) - Denmark; TLV: 10 (R*) – France; TLV: 4 (I*), STLV: 1.5 (R*) - Germany (DFG); TLV: 5 (fume), 10 (dust) - Poland; TLV: 10 (R*and I*) - Spain; TLV: 3 (R*) - Switzerland;
MANGANESE++	7439-96-5	231-105-1	TLV: 0.1, STLV: 0.2 – Denmark; TLV: 1 – France; TLV: 0.02 (R*), STLV: 0.16 (R*) (STV for permanganates: 0.02, 15 min average value) – Germany (DFG); TLV: 0.2 – Sweden;
MANGANESE OXIDE	1344-43-0	215-695-8	Calculated as Mn - TLV: 0.2 (Inhalable fraction), 0.02 mg/m3 (Respirable fraction) - Finland;
MOLYBDENUM (Cmpds as Mo)	7439-98-7	231-107-2	TLV: 15 (I*), STLV: 30 (I*) – Austria; TLV: 10 (Insol cmpds) , STLV: 20 (Insol cmpds) – Denmark; TLV: 4, STLV: 10 – Poland; TLV: 10 (Inhalable fraction), TLV: 3 (Respirable fraction) – Spain; TLV: 10 (I*), TLV: 5 (R*) – Sweden; TLV: 10 (I*) – Switzerland;
MOLYBDENUM (Cmpds as Mo, soluble)	7439-98-7	231-107-2	TLV: 5 (I*), STLV: 10 (I*) – Austria; TLV: 5, STLV: 10 – Denmark; TLV: 0.5 – Finland; TLV: 5, STLV: 10 – France; TLV: 0.5 (Respirable fraction) – Spain; TLV: 5 – Sweden; TLV: 5 (I*) – Switzerland;
NICKEL (metal, total dust)	7440-02-0	231-111-4	TLV: 0.5, STLV: 2 – Austria; TLV: 0.05, STLV: 1 – Denmark; TLV: 0.01 (Respirable fraction; calc'd as Ni) – Finland; TLV: 1 – France; TLV: 0.006 (Respirable fraction), STLV: 0.048 (Respirable fraction; 15 min avg) – Germany (AGS); TLV: 1 – Spain; TLV: 0.5 – Sweden; TLV: 0.5 (I*) – Switzerland;
SILICA +++ (respirable crystalline quartz)	14808-60-7	238-878-4	TLV: 0.15 (R*) – Austria; TLV: 0.3 (I*), TLV: 0.1 (R*), STLV: 0.6 (I*), STLV: 0.2 (R*) – Denmark; TLV: 0.05 (respirable fraction) – Finland; TLV: 0.075 (respirable dust) – Netherlands; TLV: 0.15 (R*) Switzerland;
(Amorphous silica fume and fused respirable dust)	69012-64-2 60676-86-0	273-761-1	TLV: 0.3 (fused, respirable dust) - Austria; TLV: 2 (fume, respirable fraction), STLV: 4 (fume, respirable fraction), TLV: 0.1 (fused respirable dust), STLV: 0.2 (fused, respirable dust) - Denmark; TLV: 0.3 (fume, R*) - Germany AGS; TLV: 0.3 (fused, respirable dust aerosol) – Germany (AGS & DFG); TLV: 0.3 (fused, respirable dust aerosol) - Switzerland;
SILICON+	7440-21-3	231-130-8	TLV: 10 (I*), STLV: 20 (I*) – Denmark; TLV: 10 (R*) – France; TLV: 3 (R*) – Switzerland;
STRONTIUM FLUORIDE	7783-48-4	232-000-3	Not established;
TITANIUM	7440-32-6	231-142-3	Not established for countries to which Hobart Brothers distributes product;
TITANIUM DIOXIDE	13463-67-7	236-675-5	TLV: 6 (total dust), STLV: 12 (total dust) - Denmark; TLV: 11 (I*) – France; TLV: 10, STLV: 30 - Poland; TLV: 10 (I*) - Spain; TLV: 3 (R*) - Switzerland;
ZINC (& inorg zinc cmpds, (as Zn)	7440-66-6	231-175-3	TLV: 2 (Inhalable fraction), TLV: 0.1 (Respirable fraction), STLV: 4 (Inhalable fraction; 15 min ref period), STLV: 0.4 (Respirable fraction; 15 min ref period) – Germany (DFG); TLV: 2 (I*), TLV: 0.1 (R*), STLV: 4 (I*), STLV: 0.4 (R*) – Switzerland;
ZIRCONIUM (Compounds, as Zr)	7440-67-7	231-176-9	TLV: 5 (I*) – Austria; TLV: 5, STLV: 10 – Denmark; TLV: 1 (as element & as stabilized and nonstablilized powder) – Finland; TLV: 1 (I*), STLV: 1 (I*) (AGS-15 min avg value) – Germany (AGS & DFG); TLV: 5, STLV: 10 – Poland; TLV: 5, STLV: 10 – Spain; TLV: 5 (I*) – Switzerland;
HEXAVALENT CHROMIUM [CHROMIUM (VI) TRIOXIDE] (Fume constituent)	1333-82-0	215-607-8	TLV: 0.05 (I*), STLV: 0.2 (I*) – Austria; TLV: 0.005 (as Cr) – Finland; TLV: 0.05, STLV: 0.1 – France; TLV: 0.025, STLV: 0.05 – The Netherlands; TLV: 0.05 – Spain; TLV: 0.02 – Sweden; TLV: 0.05 (I*) – Switzerland.

R* - Respirable Aerosol; I* - Inhalable Aerosol; + - as oxide, fume, or respirable dust; ++ - as fume, or respirable dust; +++ - Crystalline silica is bound within the product as it exists in the package. However, research indicates silica is present in welding fume in the amorphous (noncrystalline) form; AGS - Ausschuss für Gefahrstoffe (German Committee on Hazardous substances); DFG- Deutsche Forschungsgemeinschaft (German Research Foundation); TLV - Threshold Limit Value; STLV - Short Term Limit Value; EINECS - European Inventory of Existing Commercial Chemical Substances.

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8.2 EXPOSURE CONTROLS
VENTILATION: Use enough ventilation or local exhaust at the arc or both to keep the fumes and gases below the TLV/OELs in the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes.
RESPIRATORY PROTECTION: Use a fume respirator or air-supplied respirator approved by the EU Member State agency responsible for personal protective equipment certification under Directive 89/686/EEC (list available upon request) when welding in confined space or where local exhaust or ventilation does not keep exposure below the regulatory limits.
EYE PROTECTION: Wear helmet or use face shield with filter lens for open arc welding processes. As a rule of thumb begin with Shade Number 14. Adjust if needed by selecting the next lighter and/or darker shade number. Provide protective screens and flash goggles, if necessary, to shield others from the weld arc flash.
PROTECTIVE CLOTHING: Wear hand, head and body protection which help to prevent injury from radiation, sparks and electrical shock. 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 non-synthetic clothing. Train the welder not to touch live electrical parts and to insulate himself from work and ground.
PROCEDURE FOR CLEANUP OF SPILLS OR LEAKS: Not applicable
SPECIAL PRECAUTIONS (IMPORTANT): When welding with electrodes that require special ventilation (such as stainless or hard facing, or other products which require special ventilation, or on lead- or cadmium-plated steel and other metals or coatings like galvanized steel, which produce hazardous fumes) maintain exposure below the TLV/OEL. Use industrial hygiene monitoring to ensure that your use of this material does not create exposures which exceed TLV/OEL. Always use exhaust ventilation. Refer to the following sources for important additional information: EU OSHA - European Agency for Safety and Health at Work OSHwiki database, *Dust and aerosols – welding fumes*, last modified 17 May 2013, retrieved 4 August 2015.

SECTION 9 – PHYSICAL AND CHEMCIAL PROPERTIES

9.1 INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES
Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, non-explosive and essentially nonhazardous until welded.
PHYSICAL STATE: Solid
APPEARANCE: Round, Cored Wire
COLOR: Gray or Copper (shiny metallic)
ODOR: Odorless
ODOR THRESHOLD: Not Applicable
pH: Not Applicable
MELTING POINT/FREEZING POINT: Not Available
INITIAL BOILING POINT AND BOILING RANGE: Not Available
FLASH POINT: Not Available
EVAPORATION RATE: Not Applicable
FLAMMABILITY (SOLID, GAS): Not Available
UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS: Not Available
VAPOR PRESSURE: Not Applicable
VAPOR DENSITY: Not Applicable
RELATIVE DENSITY: Not Available
SOLUBILITY: Not Available
PARTITION COEFFICIENT: N-OCTANOL/WATER: Not Applicable
AUTO-IGNITION TEMPERATURE: Not Available
DECOMPOSITION TEMPERATURE: Not Available
VISCOSITY: Not Applicable
EXPLOSIVE PROPERTIES: Not Available
OXIDIZING PROPERTIES: Not Available

9.2 OTHER INFORMATION
No other physical or chemical parameters are necessary for welding electrodes.

SECTION 10 – STABILITY AND REACTIVITY

10.1 REACTIVITY
Welding consumables applicable to this sheet are solid, stable, and nonvolatile as shipped.

10.2 CHEMICAL STABILITY
This product is stable under normal conditions.

10.3 POSSIBILITY OF HAZARDOUS REACTIONS
Contact with acids or strong bases may cause generation of gas. See also Section 8.

10.4 CONDITIONS TO AVOID
This product is only intended for use per the welding parameters it was designed for.

10.5 INCOMPATIBLE MATERIALS
Contact with acids or strong bases may cause generation of explosive gases (e.g., hydrogen).

10.6 HAZARDOUS DECOMPOSITION PRODUCTS
When this product is used for welding, hazardous fumes may be created. Other factors to consider include the base metal, base metal preparation and base metal coatings. All of these factors can contribute to the fume and gases generated during welding. The amount of fume varies with the welding parameters. When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form than ingredients in the manufactured product. Decomposition products of normal operation include those originating from the volatilization reaction, or oxidation of the materials shown in Section 3, plus those from the base metal and coating, etc., as noted above.

SECTION 11 – TOXICOLOGICAL INFORMATION

11.1 INFORMATION ON TOXICOLOGICAL EFFECTS

Potential Health Effects: Welding consumables are not hazardous until welded.

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

Short-Term (Acute) Overexposure Effects: Welding Fumes - May result in discomfort such as dizziness, nausea or dryness or irritation of nose, throat or eyes. **Aluminum Oxide** - Irritation of the respiratory system. **Antimony Compounds** - Irritation of nose, throat, eyes and skin. **Barium** - Aching eyes, rhinitis, frontal headache, wheezing, laryngeal spasms, salivation or anorexia. **Calcium Oxide** - Dust or fumes may cause irritation of the respiratory system, skin and eyes. **Chromium** - Inhalation of fume with chromium (VI) compounds can cause irritation of the respiratory tract, lung damage and asthma-like symptoms. Swallowing chromium (VI) salts can cause severe injury or death. Dust on skin

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can form ulcers. Eyes may be burned by chromium (VI) compounds. Allergic reactions may occur in some people. **Cobalt** - Pulmonary irritation, cough, dermatitis, weight loss. **Copper** - Metal fume fever characterized by metallic taste, tightness of chest and fever. Symptoms may last 24 to 48 hours following overexposure. **Fluorides** - Fluoride compounds evolved may cause skin and eye burns, pulmonary edema and bronchitis. **Iron, Iron Oxide** - None are known. Treat as nuisance dust or fume. **Lithium Compounds** - Overexposure may cause tremor and nausea. **Magnesium, Magnesium Oxide** - Overexposure to the oxide may cause metal fume fever characterized by metallic taste, tightness of chest and fever. Symptoms may last 24 to 48 hours following overexposure. **Manganese, Manganese Oxide** - Metal fume fever characterized by chills, fever, upset stomach, vomiting, irritation of the throat and aching of body. Recovery is generally complete within 48 hours of the overexposure. **Molybdenum, Cerium Oxide** - Irritation of the eyes, nose and throat. **Nickel, Nickel Compounds** - Metallic taste, nausea, tightness in chest, metal fume fever, allergic reaction. **Silica (Amorphous)** - Dust and fumes may cause irritation of the respiratory system, skin and eyes. **Strontium Compounds** - Strontium salts are generally non-toxic and are normally present in the human body. In large oral doses, they may cause gastrointestinal disorders, vomiting and diarrhea. **Titanium Dioxide** - Irritation of respiratory system. **Zinc -** metal fume fever stomach cramps, skin irritations, vomiting, nausea and anemia. **Zirconium** - May cause irritation of the eyes, nose and throat due to mechanical effects.

Long-Term (Chronic) Overexposure Effects: Welding Fumes - Excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis or "siderosis." Studies have concluded that there is sufficient evidence for ocular melanoma in welders. **Aluminum Oxide** - Pulmonary fibrosis and emphysema. **Antimony Compounds** - Metal fume fever, dermatitis, keratitis, conjunctivitis and ulceration and perforation of the nasal septum. Avoid conditions in which fresh hydrogen will react with antimony to form stibine which is extremely toxic. **Barium** - Long term overexposure to soluble barium compounds may cause nervous disorders and may have deleterious effects on the heart, circulatory system and musculature. **Calcium Oxide** - Prolonged overexposure may cause ulceration of the skin and perforation of the nasal septum, dermatitis and pneumonia. **Chromium** - Ulceration and perforation of nasal septum. Respiratory irritation may occur with symptoms resembling asthma. Studies have shown that chromate production workers exposed to hexavalent chromium compounds have an excess of lung cancers. Chromium (VI) compounds are more readily absorbed through the skin than chromium (III) compounds. Good practice requires the reduction of employee exposure to chromium (III) and (VI) compounds. **Cobalt** - Repeated overexposure to cobalt compounds can produce reduced pulmonary function, diffuse nodular fibrosis of lungs and respiratory hypersensitivity. **Copper** - Copper poisoning has been reported in the literature from exposure to high levels of copper. Liver damage can occur due to copper accumulating in the liver characterized by cell destruction and cirrhosis. High levels of copper may cause anemia and jaundice. High levels of copper may cause central nervous system damage characterized by nerve fiber separation and cerebral degeneration. **Fluorides** - Serious bone erosion (Osteoporosis) and mottling of teeth. **Iron, Iron Oxide Fumes** - Can cause siderosis (deposits of iron in lungs) which some researchers believe may affect pulmonary function. Lungs will clear in time when exposure to iron and its compounds ceases. Iron and magnetite (Fe_3O_4) are not regarded as fibrogenic materials. **Lithium Compounds** - May be considered as potentially teratogenic. **Magnesium, Magnesium Oxide** - No adverse long term health effects have been reported in the literature. **Manganese, Manganese Oxide** - Long-term overexposure to manganese compounds may affect the central nervous system. Symptoms may be similar to Parkinson's disease and can include slowness, changes in handwriting, gait impairment, muscle spasms and cramps and less commonly, tremor and behavioral changes. Employees who are overexposed to manganese compounds should be seen by a physician for early detection of neurologic problems. Overexposure to manganese and manganese compounds above safe exposure limits can cause irreversible damage to the central nervous system, including the brain, symptoms of which may include slurred speech, lethargy, tremor, muscular weakness, psychological disturbances and spastic gait. **Molybdenum, Cerium Oxide** - Prolonged overexposure may result in loss of appetite, weight loss, loss of muscle coordination, difficulty in breathing and anemia. **Nickel, Nickel Compounds** - Lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers. **Silica (Amorphous)** - Research indicates that silica is present in welding fume in the amorphous form. Long term overexposure may cause pneumoconiosis. Noncrystalline forms of silica (amorphous silica) are considered to have little fibrotic potential. **Strontium Compounds** - Strontium at high doses is known to concentrate in bone. Major signs of chronic toxicity, which involve the skeleton, have been labeled as "strontium rickets". **Titanium Dioxide** - Pulmonary irritation and slight fibrosis. **Zinc** - damage the pancreas and disturb the protein metabolism, and cause arteriosclerosis. **Zirconium** - May cause pulmonary fibrosis and pneumoconiosis.

Medical Conditions Aggravated By Exposure: Persons with pre-existing impaired lung functions (asthma-like conditions). Persons with a pacemaker should not go near welding and cutting operations until they have consulted their doctor and obtained information from the manufacturer of the device. Respirators are to be worn only after being medically cleared by your company-designated physician.

Emergency And First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the International Red Cross. If irritation or flash burns develop after exposure, consult a physician.

Carcinogenicity: Chromium VI compounds, nickel compounds, silica (crystalline quartz), ultraviolet radiation and welding fumes are classified as IARC[E] Group 1 carcinogens. Titanium dioxide, nickel metal/alloys, antimony trioxide and cobalt are classified as IARC Group 2B carcinogens.

INGREDIENT	CAS	IARC[E]
ALUMINUM	7429-90-5	---
ALUMINUM OXIDE	1344-28-1	---
ANTIMONY TRIOXIDE	1309-64-4	2B
BARIUM CMPDS (as Ba)	7440-39-3	---
BARIUM FLOURIDE	7787-32-8	---
CALCIUM CARBONATE	1317-65-3	---
CERIUM OXIDE	1306-38-3	---
CHROMIUM	7440-47-3	$1^{\Sigma\Sigma}$, 3^{Σ}
COBALT	7440-48-4	2B
COPPER	7440-50-8	---
FLUORSPAR	7789-75-5	---
IRON	7439-89-6	---
IRON OXIDE	1309-37-1	3
LITHIUM CARBONATE	554-13-2	---
LITHIUM FLUORIDE	7789-24-4	---
LITHIUM OXIDE	12057-24-8	---
MAGNESIUM	7439-95-4	---
MAGNESIUM OXIDE	1309-48-4	---
MANGANESE	7439-96-5	---
MANGANESE OXIDE	1344-43-0	---
MOLYBDENUM	7439-98-7	---
NICKEL	7440-02-0	$2B^{\beta}$, $1^{\beta\beta}$
SILICA	14808-60-7	1^{Ψ}
(Amorphous Silica Fume)	69012-64-2	
SILICON	7440-21-3	---
STRONTIUM FLUORIDE	7783-48-4	---
TITANIUM	7440-32-6	---
TITANIUM DIOXIDE	13463-67-7	2B
Ultraviolet Radiation	---	1
Welding Fumes	---	1

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ZINC	7440-66-6	---
ZIRCONIUM	7440-67-7	---

E – International Agency for Research on Cancer (1 – Carcinogenic to Humans, 2A – Probably Carcinogenic to Humans, 2B – Possibly Carcinogenic to Humans, 3 – Not Classifiable as to its Carcinogenicity to Humans, 4 Probably Not Carcinogenic to Humans Σ – Chromium Metal and Chromium III Compounds ΣΣ – Chromium VI β – Nickel metal and alloys ββ - Nickel compounds Ψ – Silica Crystalline α-Quartz --- Dashes indicate the ingredient is not listed with the IARC.

SECTION 12 – ECOLOGICAL INFORMATION

12.1 TOXICITY
No environmental toxicity data is available for the solid product. Welding processes can release fumes directly to the environment.

12.2 PERSISTANCE AND DEGRADABILITY
Welding wire can degrade if left outside and unprotected.

12.3 BIOACCUMULATIVE POTENTIAL
Residues from welding consumables and processes could degrade and accumulate in the soil and groundwater.

12.4 MOBILITY IN SOIL
Welding rods are not soluble in water or soil. Particles formed by working welding rods can be transported in air or water.

12.5 RESULTS OF PBT AND vPvB ASSESSMENT
No REACH Chemical Safety Report is required for welding rods; however, neither the welding electrode itself nor the substances of which it consists meets the criteria for PBT (persistent, bioaccumulative and toxic) or vPvB (very persistent and very bioaccumulative) in accordance with REACH, Annex XIII.

12.6 OTHER ADVERSE EFFECTS
In solid form, welding electrodes present no hazards to the environment. Particles and ions can, nevertheless, enter the environment by means of dust or smoke from welding operations, or by chemical liberation due to erosion thereby introducing iron or heavy metals into the ground or water.

SECTION 13 – DISPOSAL CONSIDERATIONS

13.1 WASTE TREATMENT METHODS
Non-contaminated waste from production and welding rods is recyclable. Use recycling procedures if available. The unused product is not classified as hazardous waste. Any residues of finely-divided product (particles, dust, fumes) may be regarded as Hazardous Waste, depending on local regulations. Discard any product, residue, packaging, disposable container or liner in an environmentally acceptable manner, in full compliance with regional, national, and European regulations. Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.

SECTION 14 – TRANSPORT INFORMATION

14.1 UN NUMBER
Welding electrodes are not classified as dangerous goods for transport and have no UN number. No international regulations or restrictions are applicable. No special precautions are necessary.

14.2 UN PROPER SHIPPING NAME
Not regulated.

14.3 TRANSPORT HAZARD CLASS(S)
Not regulated.

14.4 PACKING GROUP
Not regulated.

14.5 ENVIRONMENTAL HAZARDS
Not regulated.

14.6 SPECIAL PRECAUTIONS FOR USER
None.

14.7 TRANSPORT IN BULK ACCORDING TO ANNEX II OF MARPOL 73/78 AND THE IBC CODE
Not applicable – product is transported only in packaged form.

SECTION 15 – REGULATORY INFORMATION

15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCE OR MIXTURE
Read and understand the manufacturer's instructions, your employer's safety practices and the health and safety instructions on the label and the safety data sheet. Observe all local and national rules and regulations. Take all necessary precautions to protect yourself and others. This Safety Data Sheet was prepared in accordance with Regulations (EC) No 1907/2006 and No 1272/2008 of the European Parliament and Council. All the components in this product are listed on the European Inventory of Existing Commercial Chemical Substances (EINECS) for the European Union or are exempt.

15.2 CHEMICAL SAFETY ASSESSMENT
No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16 – OTHER INFORMATION

The following Hazard Statements, provided in Annex I of (EC) No 1272/2008 (CLP) correspond to the columns labeled 'GHS Hazard Statements' within Section 3 of this safety data sheet. Take appropriate precautions and protective measures to eliminate or limit the associated hazard:

H228: Flammable solid
H250: Catches fire spontaneously if exposed to air
H252: Self-heating in large quantities; may catch fire
H260: In contact with water releases flammable gases which may ignite spontaneously

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H261: In contact with water releases flammable gases
H271: May cause fire or explosion; strong oxidizer
H301: Toxic if swallowed
H302: Harmful if swallowed
H311: Toxic in contact with skin
H314: Causes severe skin burns and eye damage
H317: May cause an allergic skin reaction
H319: Causes serious eye irritation
H330: Fatal if inhaled
H332: Harmful if inhaled
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335: May cause respiratory irritation
H340: May cause genetic defects
H350: May cause cancer
H351: Suspected of causing cancer
H361f: Suspected of damaging fertility or the unborn child
H372: Causes damage to organs through prolonged or repeated exposure
H373: May cause damage to organs through prolonged or repeated exposure
H400: Very toxic to aquatic life.
H410: Very toxic to aquatic life with long lasting effects
H412: Harmful to aquatic life with long lasting effects.
H413: May cause long lasting harmful effects to aquatic life.

The following Supplemental Hazard Information (EUH-Statement) pertaining to Section 3 is also taken from Annex I of (EC) No 1272/2008 (CLP):
EUH014: Reacts violently with water

For additional information please refer to the following sources:

ISO **International Standardization Organization,** 11014: 2009 **–** "Safety Data sheet for chemical products—Content and order of sections".

ECHA **European Chemicals Agency**, created under REACH,
"Safety data sheets and exposure scenarios, Advice for recipients", eGuide 1, (http://view.pagetiger.com/ECHAeGuide1-1/Issue1).
"Compilation of Safety Data Sheets", Version 3.0, August 2015 (http://echa.europa.eu/documents/10162/13643/sds_en.pdf).

EU OSHA **European Agency for Safety and Health at Work,** OSHwiki database, "Dust and aerosols – welding fumes", last modified 17 May 2013, retrieved 4 August 2015.

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

Hobart Brothers LLC strongly recommends the users of this product study this SDS, the product label information and become aware of all hazards associated with welding. Hobart Brothers LLC believes this data to be accurate and to reflect qualified expert opinion regarding current research. However, Hobart Brothers LLC cannot make any expressed or implied warranty as to this information.