

MATERIAL SAFETY DATA SHEET

This Material Safety Data Sheet (MSDS) is for welding consumables and related products and may be used to comply with OSHA's Hazard Communication standard, 29 CFR 1910.1200, and Superfund Amendments and Reauthorization Act (SARA) of 1986 Public Law 99-499. The OSHA standard must be consulted for specific requirements. This Safety Data Sheet complies with European Commission Directive 89/106/EEC, 91/155/EEC, ISO 11014-1 and ANSI Z400.1. This document is translated in several languages and 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

Manufacturer/Supplier: HOBART BROTHERS COMPANY Telephone No: +1 (937) 332-4000
 Name: HOBART BROTHERS COMPANY
 Address: 101 TRADE SQUARE EAST, TROY, OH 45373 Emergency No: +1 (800) 424-9300
 Website: www.hobartbrothers.com

Products Type: TUBULAR ARC WELDING ELECTRODES FOR FLUX CORED, METAL CORED AND COMPOSITE SUBMERGED ARC WELDING
 GROUP A: Product For: Gas Shielded Carbon and Low Alloy Steel
 Trade Name: E71T-1M; **ECLIPSE** RXR-XLS, ULTIMET 716; **EXCEL-ARC** 71; **FABCO** 82HD, 85, 90, HORNET, RXR, RXR-XLS, TR70, XL-71; **FABCOR** 71, 80XLS, 86R, 96, 702, F6; **FABDUAL** T9M, T91M; **FLUX-COR** 2, 7, 37, 80A1; **GALVACOR**; **HOBART** E71T-GS; **METAL-COR** 6, 6L, 80D2, EN-VISION; **METALLOY** 70, 70R, 70X, 76, 80D2, EM12K-S, EM13K-S, EM13K-S MOD, X-CEL; **SPEED-ALLOY** 70, 71, 71A, 71-V, 719, 75, 105D2; **SPEED-COR** 6; **SUPER-COR**; **TM** 11, 22, 37, 55, 72, 73, 81A1, 95D2, 105D2, 711M, 791, 811A1, RX7; **TRIPLE-7**, 8; **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: **ELEMENT** 70C6, 70T LF, 71Ni1C, 71Ni1M, 71T1C, 71T LF, 71T1M, 81K2C, 81Ni2C, 81K2M; **FABCO** 70XHP, 80K2-C, 81K2-C, 85XHP, 811N1, 91K2-C, 107G, 110, 110K3-M, 115, 712 C, 712M, 750M, 803, 812 Ni1M, MIL-101-TM, 911N2; **FABCO XTREME** 101, 120, B2, B3, B3V; **FABCOR** 90, 100F3-S, 209, 1100, 4130SR, CVN, EDGE, EDGE MC; **FABSHIELD** 3Ni1, 71K6, 71T8, 81N1, 81N1+, 81N2, K54, XLNT-6, XLR-8, X80, X90, X100, OFFSHORE 71Ni, OFFSHORE 81Ni; **FLUX-COR** 90K2; **FORMULA** XL8Ni1, XL8Ni1-C, XL525, XL550; **HOBART** SSW-10; **MATRIX**; **METAL-COR** MAXIM; **METALLOY** 71, 715G, 80B2, 80N1, 80N2, 90, 90B3, 92-S, F2-S, 100, 100F3-S, 120-S, B2-S, B3-S, N1-S, N2-S, VANTAGE, VANTAGE D2, VANTAGE Ni1, W-S; **MX2**; **PREMIER** 70; **PW**-201; **SPEED-ALLOY** 81Ni1-V, 81Ni2-V, 85, 91B3, 111-V, 115, 125, 712, 712M, 790; **TM** 71 HYD, 81B2, 81N1, 81N2, 81W, 91B3, 91K2, 91N2, 95K2, 101K3, 111K3, 115, 125K4, 770, 771, 71HYN, 811B2, 811N1, 811N2, 811N3, 811W, 881K2, 910, 911B3, 911N2, 991K2, 101, 1101K3-C, 1101K3-M; **VERTI-COR** 70, 72, 81Ni2, 91B3, 91K2, 91Ni2, IINi1; **MEGAFIL** 810M, 710M, 713R, 350B, 731B, 235M, 825R, 735B 240M, 716R, 821R, 822R, 740B, 281 M, 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: **FABCOR** 409, F6W; **FABLOY** 409, 439; **FABTUF** 960; **METAL-COR** 409, 409Cb, 439; **METALLOY** 18CrCb, 409, 439; **POWERCORE** 91; **SPEED-ALLOY** 5055; **TM** B6, B9; **MEGAFIL** P5M; **SubCOR** SL P5, SL P9, SL P91, SL P92

SECTION 2 – IDENTIFICATION OF HAZARDS

IMPORTANT - This section covers the hazardous materials from which this product is manufactured. The fumes and gases produced during welding with normal use of this product are also addressed in Section 8. The term "hazardous" in this section should be interpreted as a term required and defined in OSHA Hazard Communication Standard (29 CFR Part 1910.1200).

HAZARDOUS INGREDIENT	CAS	EINECS ^f	REGULATORY HAZARD CLASSIFICATION/DESIGNATION 67/548/EEC ^Δ	IARC ^E	NTP ^Z	OSHA ^H	65 ^Θ
ALUMINUM	7429-90-5	231-072-3	F - R10, R15, R17	---	---	---	---
ALUMINUM OXIDE	1344-28-1	215-691-6	None	---	---	---	---
ANTIMONY TRIOXIDE	1309-64-4	215-175-0	Carc 3 ^Θ - R40	2B	---	---	X
BARIUM COMPOUNDS (as Barium)	7440-39-3	231-149-1	None	---	---	---	---
BARIUM FLOURIDE	7787-32-8	232-108-0	None	---	---	---	---
CALCIUM CARBONATE	1317-65-3	215-279-6	None	---	---	---	---
CERIUM OXIDE	1306-38-3	215-150-4	None	---	---	---	---
CHROMIUM	7440-47-3	231-157-5	O - R9; Carc 1 ^Θ - R45; Muta 2 - R46; Repr 3 - R62; T+ - R26; T - R24/25, R48/23; C - R35, R42/43; N - R50, R53 ^{ΣΣ}	1 ^{ΣΣ} , 3 ^{ΣΣ}	K ^{ΣΣ}	X ^{ΣΣ}	X ^{ΣΣ}
COBALT	7440-48-4	231-158-0	Xn; R42/43, R53	2B	---	X	X
COPPER	7440-50-8	231-159-6	None	---	---	---	---
FLUORSPAR	7789-75-5	232-188-7	None	---	---	---	---
IRON	7439-89-6	231-096-4	None	---	---	---	---
IRON OXIDE	1309-37-1	215-168-2	None	3	---	---	---
LITHIUM CARBONATE	554-13-2	209-062-5	F - R14/15; C - R34 ^T	---	---	---	---
LITHIUM FLUORIDE	7789-24-4	232-152-0	F - R14/15; C - R34 ^T	---	---	---	---
LITHIUM OXIDE	12057-24-8	235-019-5	F - R14/15; C - R34 ^T	---	---	---	---
MAGNESIUM	7439-95-4	231-104-6	F - R11, R15, R17	---	---	---	---
MAGNESIUM OXIDE	1309-48-4	215-171-9	None	---	---	---	---
MANGANESE	7439-96-5	231-105-1	Xn - R20/22 ^Y	---	---	---	---
MANGANESE OXIDE	1344-43-0	215-171-9	None	---	---	---	---
MOLYBDENUM	7439-98-7	231-107-2	Xn - R48/20/22; Xi - R36/37 ^X	---	---	---	---
NICKEL	7440-02-0	231-111-4	Carc 3 ^Θ - R40; T - R43, R48/23	1 ^ψ	K	X	X
SILICA (Amorphous Silica Fume)	14808-60-7	238-878-4	Xn - R48/20, R40/20	1 ^ψ	K	X	X
SILICON	69012-64-2	273-761-5	None	3	K	---	X
STRONTIUM FLUORIDE	7440-21-3	231-130-8	None	---	---	---	---
TITANIUM	7783-48-4	232-000-3	None	---	---	---	---
TITANIUM DIOXIDE	7440-32-6	231-142-3	None	---	---	---	---
ZIRCONIUM	13463-67-7	236-675-5	None	2B	---	---	X
	7440-67-7	231-176-9	F - R15, R17	---	---	---	---

Γ – European Inventory of Existing Chemical Substances Number Δ - European Union Directive 67/548/EEC – Annex 1 E – International Agency for Research on Cancer (1 – Human Carcinogen, 2A – Probably Carcinogenic to Humans, 2B – Possibly Carcinogenic to Humans, 3 – Unclassifiable as to Carcinogenicity in Humans, 4 Probably Not Carcinogenic to Humans) Z – US National Toxicology Program (K – Known Carcinogen, S – Suspected Carcinogen) H – OSHA Known Carcinogen List Θ – California Proposition 65 (X – On Proposition 65 list) --- Dashes indicate the ingredient is not listed with the IARC, NTP, OSHA or 65 Φ – Carcinogen, Mutagen or Reproductive Category per European Council Directive 67/548/EEC Annex I Σ – Metal and Chromium III Compounds ΣΣ – Chromium VI Compounds ΣΣΣ – Chromium (VI) Trioxide EU 67/548/EEC Classification/Designation Y – Manganese Dioxide EU 67/548/EEC Classification/Designation X – Molybdenum Trioxide EU 67/548/EEC Classification/Designation T – Lithium EU 67/548/EEC Classification/Designation ψ – Silica Crystalline α-Quartz

The following symbols correspond with the EU 67/548/EEC column above are in European Union Directive 67/548/EEC Annex 1 and EC 1272/2008 Annex VI – Table 3.2:

	F – Flammable		Xn – Harmful		Xi – Irritant		O – Oxidizer
	C – Corrosive		N – Dangerous for the Environment		T – Toxic		T+ – Extremely Toxic

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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 of the materials shown in this section, plus those from the base metal and coating, etc., as noted above. Monitor for the materials identified in the list within this section.

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. See ANSI/AWS F1.1 and F1.3, available from the "American Welding Society", 8669 Doral Blvd., Suite 130, Doral, FL 33166.

SECTION 3 – HAZARDOUS INGREDIENTS

INGREDIENT	CAS	EINECS	GROUP AND %WEIGHT				INGREDIENT	CAS	EINECS	GROUP AND %WEIGHT			
			A	B	C	D				A	B	C	D
ALUMINUM	7429-90-5	231-072-3	<2	<5	<3 ⁽⁶⁾	---	LITHIUM OXIDE	12057-24-8	235-019-5	---	---	<2	---
ALUMINUM OXIDE	1344-28-1	215-691-6	---	---	<3	---	MAGNESIUM	7439-95-4	231-104-6	---	<3	<2	---
ANTIMONY TRIOXIDE	1309-64-4	215-175-0	---	---	<1 ⁽¹²⁾	---	MAGNESIUM OXIDE	1309-48-4	215-171-9	---	<3	<2	---
BARIUM CMPDS (as Ba)	7440-39-3	231-149-1	---	---	<1 ⁽¹³⁾	---	MANGANESE	7439-96-5	231-105-1	<5	<2	<4	<2
BARIUM FLOURIDE	7787-32-8	232-108-0	---	<1 ⁽¹¹⁾	<12 ⁽³⁾	---	MANGANESE OXIDE	1344-43-0	215-171-9	---	---	<2	---
CALCIUM CARBONATE	1317-65-3	215-279-6	---	<2 ⁽⁷⁾	---	---	MOLYBDENUM	7439-98-7	231-107-2	<1	---	<2	<2
CERIUM OXIDE	1306-38-3	215-150-4	---	---	<2 ⁽¹¹⁾	---	NICKEL	7440-02-0	231-111-4	---	---	<4	<1
CHROMIUM	7440-47-3	231-157-5	---	---	<3	5-20	SILICA	14808-60-7	238-878-4	<2	<2	<2	---
COBALT	7440-48-4	231-158-0	---	---	<1 ⁽¹⁰⁾	---	(Amorphous Silica Fume)	69012-64-2	273-761-5	---	---	---	---
COPPER	7440-50-8	231-159-6	<1 ⁽²⁾	---	<2 ⁽²⁾	<1 ⁽²⁾	SILICON	7440-21-3	231-130-8	<4	<2 ⁽⁴⁾	<4	<2
FLUORSPAR	7789-75-5	232-188-7	<5 ⁽⁵⁾	<10	<5	---	STRONTIUM FLUORIDE	7783-48-4	232-000-3	---	<2 ⁽⁸⁾	<4	---
IRON	7439-89-6	231-096-4	75-98	75-95	75-98	75-95	TITANIUM	7440-32-6	231-142-3	---	<2	<2	<2
IRON OXIDE	1309-37-1	215-168-2	---	---	<12	---	TITANIUM DIOXIDE	13463-67-7	236-675-5	<10	<4 ⁽⁴⁾	<10	<2
LITHIUM CARBONATE	554-13-2	209-062-5	---	---	<2	---	ZIRCONIUM	7440-67-7	231-176-9	---	---	<1	---
LITHIUM FLUORIDE	7789-24-4	232-152-0	---	<2 ⁽⁹⁾	<2 ⁽⁹⁾	---							

--- Dashes indicate the ingredient is not present within the group of products (1) Present only in FABSHIELD 21B, 23; TM 121, 123; SELF-SHIELD 11, 11GS (2) Present only in FABCO 110K3-M; FABCOR F6W; GALVACOR; METALLOY W5; TM-81W, 811W; all MEGAFIL and SubCOR SL products (3) Present only in FABCO XTREME 120, B2, B3; FABSHIELD 3Ni1, 71K6, 71T8, 81N1, 81N1+, 81N2, XLNT-6, X90; FABSHIELD OFFSHORE 71Ni (4) Present only in FABSHIELD 55 (5) Present only in METALLOY EM13K-S; SPEED-ALLOY 105D2; TM 55, 75A1, 95D2, 105D2 (6) Present only in FABCO XTREME 120, B2, B3; FABSHIELD 3Ni1, 71K6, 71T8, 81N1, 81N1+, 81N2, XLNT-6; FABSHIELD OFFSHORE 71Ni (7) Present only in FABSHIELD 7027 (8) Present only in FABSHIELD 21B; TM 121 (9) Present only in FABCO 750M; FABSHIELD 7027 (10) Present only in FABSHIELD 71K6, 81N1, 81N2 (11) Present only in FABSHIELD 71T8, 81N1+, XLNT-6, X90; FABSHIELD OFFSHORE 71Ni; (12) Present only in FABCOR CVN; MATRIX; METAL-COR MAXIM; METALLOY VANTAGE, VANTAGE CVN, VANTAGE D2, VANTAGE Ni1 (13) Present only in ELEMENT 70T LF

SECTION 4 – FIRST AID MEASURES

INHALATION: If breathing is difficult provide fresh air and contact physician.

EYE/SKIN INJURIES: For radiation burns, see physician.

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

SECTION 5 – FIRE AND EXPLOSION HAZARD DATA

Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, nonexplosive and essentially nonhazardous until welded. Welding arcs and sparks can ignite combustibles and flammable products. Unused welding consumables may remain hot for a period of time after completion of a welding process. See American National Standard (ANSI) Z49.1 for further general safety information on the use and handling of welding consumables and associated procedures.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Solid objects can be picked up and placed into a container. Wear proper personal protective equipment while handling. Do not discard as general trash.

SECTION 7 – HANDLING AND STORAGE

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. Some individuals can develop an allergic reaction to certain materials. Retain all warning and product labels.

STORAGE: Keep separate from acids and strong bases to prevent possible chemical reactions.

SECTION 8 – EXPOSURE CONTROL AND PERSONAL PROTECTION

Read and understand the instructions and the labels on the packaging. Welding fumes do not have a specific OSHA PEL or ACGIH TLV. The OSHA PEL for Particulate – Not Otherwise Classified (PNOC) is 5 mg/m³ – Respirable Fraction, 15 mg/m³ – Total Dust. The ACGIH TLV for Particles – Not Otherwise Specified (PNOS) is 3 mg/m³ – Respirable Particles, 10 mg/m³ – Inhalable Particles. The individual complex compounds within the fume may have a lower OSHA PEL or ACGIH TLV than the OSHA Particulate – Not Otherwise Classified (PNOC) and ACGIH Particles – Not Otherwise Specified (PNOS). An Industrial Hygienist, the OSHA Permissible Exposure Limits for Air Contaminants (29 CFR 1910.1000), and the ACGIH Threshold Limit Values should be consulted to determine the specific fume constituents present and their respective exposure limits. European Union Occupational Exposure Limits (EU OEL) are listed with the most stringent limit among the EU member nations. All exposure limits are in milligrams per cubic meter (mg/m³).

INGREDIENT	CAS	EINECS	OSHA PEL	ACGIH TLV	EU OEL
ALUMINUM###	7429-90-5	231-072-3	5 R* (Dust)	1 R* {A4}	4 I*; 1.5 R* - Germany
ALUMINUM OXIDE##	1344-28-1	215-691-6	5 R*	1 R* {A4}	1.5 R* (Aerosol) - Germany; 2 - Poland
ANTIMONY TRIOXIDE	1309-64-4	215-175-0	0.5 (as Sb)	0.5 (as Sb) {A2}	0.1 I*; 0.4*** - Hungary
BARIUM CMPDS (as Ba)	7440-39-3	231-149-1	0.5 (as Ba)	0.5 (as Ba) {A4}	0.1 I* (Aerosol); 0.4*** (Aerosol) - Austria
BARIUM FLOURIDE#	7787-32-8	232-108-0	0.5 (as Ba)	0.5 (as Ba) {A4}	0.5 I* (Aerosol as Ba), 4*** (Aerosol as Ba) - Germany
CALCIUM CARBONATE	1317-65-3	215-279-6	5 R*, 5 (as CaO)	3 R*, 2 (as CaO)	0.5 I* (Aerosol as Ba), 4*** (Aerosol as Ba) - Germany
CERIUM OXIDE	1306-38-3	215-150-4	5 R* (Dust), 15 (Dust)	3 R* (Dust), 10 (Dust)	10 I* (Aerosol) – UK; 3 R* (Aerosol) - Switzerland
CHROMIUM#	7440-47-3	231-157-5	1 (Metal)	0.5 (Metal) {A4}	4 I*; 1.5 R* (as Dust - NOS) - Germany
			0.5 (Cr II & Cr III Cpnds)	0.5 (Cr III Cpnds) {A4}	0.1 I* (Aerosol) - Switzerland
			0.005 (Cr VI Cpnds)	0.05 (Cr VI Sol Cpnds) {A1}	0.005; 0.01*** - Denmark
				0.01 (Cr VI Insol Cpnds) {A1}	0.005 (Total Aerosol); 0.015*** (Total Aerosol) - Sweden
COBALT	7440-48-4	231-158-0	0.1 (Dust and Fume)	0.02 {A3}	0.01 I*; 0.02*** - Denmark
COPPER	7440-50-8	231-159-6	0.1 (Fume), 1 (Dust)	0.2 (Fume), 1 (Dust)	0.1 I* (Aerosol); 0.2 I*** (Aerosol) - Germany
FLUORSPAR	7789-75-5	232-188-7	2.5 (as F)	2.5 (as F) {A4}	0.1; 0.2*** - Denmark
IRON+	7439-89-6	231-096-4	5 R*	5 R* (Fe ₂ O ₃) {A4}	1 I* (Aerosol as F); 4*** (Aerosol as F) - Germany
					3 R* (Aerosol as Fe ₂ O ₃) – Switzerland
					7*** (as Fe ₂ O ₃) - Denmark

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IRON OXIDE	1309-37-1	215-168-2	10 (Oxide Fume)	5 R* (Fe ₂ O ₃) {A4}	3 R* (Aerosol as Fe ₂ O ₃) – Switzerland 7*** (as Fe ₂ O ₃) - Denmark
LITHIUM CARBONATE	554-13-2	209-062-5	5 R* (Dust), 15 (Dust)	3 R* (Dust), 10 (Dust)	4 I*; 1.5 R* (as Dust - NOS) - Germany
LITHIUM FLUORIDE	7789-24-4	232-152-0	2.5 (as F)	2.5 (as F) {A4}	2.5 - UK
LITHIUM OXIDE	12057-24-8	235-019-5	1 ■ ■	3 R* (Dust), 10 (Dust)	4 I*; 1.5 R* (as Dust - NOS) - Germany
MAGNESIUM+	7439-95-4	231-104-6	5 R*	3 R*	3 R* (Aerosol) - Switzerland 4 I* (Aerosol); 1.5 R*** (Aerosol) - Germany
MAGNESIUM OXIDE	1309-48-4	215-171-9	15 (Fume, Total Part)	10 I* {A4}	3 R* (Aerosol as Mg) – Switzerland 4 I* (Aerosol as Mg); 1.5 R*** (Aerosol as Mg) - Germany
MANGANESE#	7439-96-5	231-105-1	5 CL ** (Fume) 1, 3 STEL*** ■	0.1 I* {A4} ◆ 0.02 R* ◆◆	0.02 R* (Aerosol); 0.16 R*** (Aerosol) - Germany 0.2 I* (Aerosol) - Germany 0.2; 0.4*** - Denmark
MANGANESE OXIDE	1344-43-0	215-171-9	5 CL ** (Fume) 1, 3 STEL*** ■	0.1 I* {A4} ◆ 0.02 R* ◆◆	0.02 R* (Aerosol); 0.16 R*** (Aerosol) - Germany 0.2 I* (Aerosol) - Germany 0.2; 0.4*** - Denmark
MOLYBDENUM	7439-98-7	231-107-2	5 R*	3 R*; 10 I* (Ele and Insol) 0.5 R* (Sol Cpnds) {A3}	3 R* - Spain; 4; 10*** - Poland
NICKEL#	7440-02-0	231-111-4	1 (Metal) 1 (Sol Cpnds) 1 (Insol Cpnds)	1.5 I* (Ele) {A5} 0.1 I* (Sol Cpnds) {A4} 0.2 I* (Insol Cpnds) {A1}	0.05; 0.1*** - Denmark
SILICA++	14808-60-7	238-878-4	0.1 R*	0.025 R* {A2}	0.1 (Fused, Respirable Dust) - Denmark 0.2*** (Fused, Respirable Dust) - Denmark
(Amorphous Silica Fume)	69012-64-2	273-761-5	0.8	3 R*	2 I*; 4 I*** - Denmark
SILICON+	7440-21-3	231-130-8	5 R*	3 R*	4 R* (Aerosol); 10 I* (Aerosol) - Denmark
STRONTIUM FLUORIDE	7783-48-4	232-000-3	2.5 (as F)	2.5 (as F) {A4}	1 I* (Aerosol as F); 4*** (Aerosol as F) - Germany
TITANIUM+	7440-32-6	231-142-3	5 R*	3 R*	1.5 R* (as TiO ₂) - Germany
TITANIUM DIOXIDE	13463-67-7	236-675-5	15 (Dust)	10 {A4}	1.5 R* - Germany
ZIRCONIUM	7440-67-7	231-176-9	5 (Zr Cpnds)	5, 10 STEL*** (Zr Cpnds) {A4}	1 I* (Aerosol); 0.1 I*** (Aerosol) - Germany

R* - Respirable Fraction R*** - Respirable Fraction - Short Term Exposure Limit I* - Inhalable Fraction I*** - Inhalable Fraction - Short Term Exposure Limit ** - Ceiling Limit *** - Short Term Exposure Limit + - As a nuisance particulate covered under "Particulates Not Otherwise Regulated" by OSHA or "Particulates Not Otherwise Classified" by ACGIH ++ - 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 #- Reportable material under Section 313 of SARA ## - Reportable material under Section 313 of SARA only in fibrous form ### - Reportable material under Section 313 of SARA as dust or fume ■ - NIOSH REL TWA and STEL ■■ - AIHA Ceiling Limit of 1 mg/m³ ◆ - Limit of 0.1 mg/m³ is for Inhalable Mn in 2013 by ACGIH ◆◆ - Limit of 0.02 mg/m³ is for Respirable Mn in 2013 by ACGIH Ele - Element Sol - Soluble Insol - Insoluble Inorg - Inorganic Cpnds - Compounds NOS - Not Otherwise Specified {A1} - Confirmed Human Carcinogen per ACGIH {A2} - Suspected Human Carcinogen per ACGIH {A3} - Confirmed Animal Carcinogen with Unknown Relevance to Humans per ACGIH {A4} - Not Classifiable as a Human Carcinogen per ACGIH {A5} - Not Suspected as a Human Carcinogen per ACGIH (noncrystalline) form

VENTILATION: Use enough ventilation, local exhaust at the arc or both to keep the fumes and gases below the PEL/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 NIOSH approved or equivalent fume respirator or air supplied respirator 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. 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. See ANSI 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 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): Maintain exposure below the PEL/TLV/OEL. Use industrial hygiene monitoring to ensure that your use of this material does not create exposures which exceed PEL/TLV/OEL. Always use exhaust ventilation. Refer to the following sources for important additional information: American National Standard (ANSI) Z49.1; Safety in Welding and Cutting published by the American Welding Society, 8669 Doral Blvd., Suite 130, Doral, FL 33166 and OSHA Publication 2206 (29 CFR 1910), U.S. Government Printing Office, Washington, DC 20402.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Welding consumables applicable to this sheet as shipped are nonreactive, nonflammable, nonexplosive and essentially nonhazardous until welded.

PHYSICAL STATE: Cored Wire

ODOR: N/A

COLOR: Gray

FORM: Round Wire

SECTION 10 – STABILITY AND REACTIVITY

GENERAL: Welding consumables applicable to this sheet are solid and nonvolatile as shipped. This product is only intended for use per the welding parameters it was designed for. 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.

STABILITY: This product is stable under normal conditions.

REACTIVITY: Contact with acids or strong bases may cause generation of gas.

SECTION 11 – TOXICOLOGICAL INFORMATION

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 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. **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." **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

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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 (Fe₃O₄) 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. **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 American Red Cross. If irritation or flash burns develop after exposure, consult a physician.

CARCINOGENICITY: Chromium VI compounds, nickel compounds and silica (crystalline quartz) are classified as IARC Group 1 and NTP Group K carcinogens. Titanium dioxide, antimony trioxide compounds and cobalt compounds are classified as IARC Group 2B carcinogens. Chromium VI compounds, cobalt compounds, nickel compounds, silica (crystalline quartz) and welding fumes must be considered as carcinogens under OSHA (29 CFR 1910.1200).

CALIFORNIA PROPOSITION 65: For Group C and D products: 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.) For Group A and B products: 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.)

SECTION 12 – ECOLOGICAL INFORMATION

Welding processes can release fumes directly to the environment. Welding wire can degrade if left outside and unprotected. Residues from welding consumables and processes could degrade and accumulate in the soil and groundwater.

SECTION 13 – DISPOSAL CONSIDERATIONS

Use recycling procedures if available. Discard any product, residue, packaging, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations.

SECTION 14 – TRANSPORT INFORMATION

No international regulations or restrictions are applicable. No special precautions are necessary.

SECTION 15 – REGULATORY INFORMATION

Read and understand the manufacturer's instructions, your employer's safety practices and the health and safety instructions on the label and the material safety data sheet. Observe all local and federal rules and regulations. Take all necessary precautions to protect yourself and others.

United States EPA Toxic Substance Control Act: All constituents of these products are on the TSCA inventory list or are excluded from listing.

CERCLA/SARA TITLE III: Reportable Quantities (RQs) and/or Threshold Planning Quantities (TPQs):

Ingredient name	RQ(lb)	TPQ (lb)
Products on this MSDS are a solid solution in the form of a solid article.	--	--

Spills or releases resulting in the loss of any ingredient at or above its RQ require immediate notification to the National Response Center and to your Local Emergency Planning Committee.

Section 311 Hazard Class
 As shipped: Immediate In use: Immediate delayed

EPCRA/SARA TITLE III 313 TOXIC CHEMICALS: The following metallic components are listed as SARA 313 "Toxic Chemicals" and potentially subject to annual SARA 312 reporting: Antimony Trioxide, Chromium, Cobalt, Copper, Lithium Carbonate, Manganese, and Nickel. See Section 3 for weight percentage.

CANADIAN WHMIS CLASSIFICATION: Class D; Division 2, Subdivision A

CANADIAN CONTROLLED PRODUCTS REGULATION: This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): All constituents of these products are on the Domestic Substance List (DSL).

SECTION 16 – OTHER INFORMATION

The following Risk and Safety Phrase Texts and Hazard Statements correspond with the columns labeled - EU 67/548/EEC within Section 2 of this material safety data sheet. Take appropriate precautions and protective measures to eliminate or limit the associated hazard.

EU Directive 67/548/EEC - Risk Phrase Texts

R9 – Explosive when mixed with combustible material	R24/25 – Toxic in contact with skin and if swallowed	R42/43 – May cause sensitization by inhalation and skin contact	R48/20/22 – Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R10 – Flammable	R26 – Very toxic by inhalation	R43 – May cause sensitization by skin contact	R48/23 – Toxic: danger of serious damage to health by prolonged exposure through inhalation
R11 – Highly flammable	R34 – Causes burns	R45 – May cause cancer	R50 – Very toxic to aquatic organisms
R14/15 – Reacts violently with water, liberating extremely flammable gases	R35 – Causes severe burns	R46 – May cause heritable genetic damage	R53 – May cause long-term adverse effects in the aquatic environment
R15 – Contact with water liberates extremely flammable gases	R36/37 – Irritating to eyes and respiratory system	R48/20 – Harmful: danger of serious damage to health by prolonged exposure through inhalation	R62 – Possible risk of impaired fertility
R17 – Spontaneously flammable in air	R40 – Limited evidence of a carcinogenic effect		
R20/22 – Harmful by inhalation and if swallowed	R40/20 – Harmful: possible risk of irreversible effects through inhalation		

For additional information please refer to the following sources:

USA: **American National Standard (ANSI) Z49.1** "Safety in Welding and Cutting", **ANSI/American Welding Society (AWS) F1.5** "Methods for Sampling and Analyzing Gases from Welding and Allied Processes", **ANSI/AWS F1.1** "Method for Sampling Airborne Particles Generated by Welding and Allied Processes", **AWSF3.2M/F3.2** "Ventilation Guide for Weld Fume", American Welding Society, 8669 Doral Blvd., Suite 130, Doral, FL 33166. Safety and Health Fact Sheets available from AWS at www.aws.org.

OSHA Publication 2206 (29 C.F.R. 1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954.

Threshold Limit Values and Biological Exposure Indices, American Conference of Governmental Hygienists (ACGIH), 6500 Glenway Ave., Cincinnati, Ohio 45211, USA. **NFPA 51B** "Standard for Fire Prevention During Welding, Cutting and Other Hot Work" published by the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169.

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

Canada: **CSA Standard CAN/CSA-W117.2-01** "Safety in Welding, Cutting and Allied Processes".

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