MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards .This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard (29 CFR 1910.1200). Other government regulations must be reviewed for applicability to these products.

WARNING: PRODUCT COMPONENTS PRESENT HEALTH AND SAFETY HAZARDS. READ AND UNDERSTAND THIS MATERIAL SAFETY DATA SHEET (M.S.DS.). ALSO, FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES. This product may contain Chromium and/or Nickel which are listed by OSHA, NTP, or IARC as being a carcinogen or potential carcinogen. Use of this product may expose you or others to fumes and gases at levels exceeding those established by the American Conference of Governmental Industrial Hygienists (ACGIH) or the Occupational Safety and Health Administration (OSHA) The information contained herein relates only to the specific product. If the product is combined with other materials, all component properties must be considered. **BE SURE TO CONSULT THE LATEST VERSION OF THE MSDS. MATERIAL SAFETY DATA SHEETS ARE AVAILABLE FROM HARRIS PRODUCTS GROUP** 513-754-2000 www.harrisproductsgroup.com

STATEMENT OF LIABILITY-DISCLAIMER

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PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):	**Listed in Section 2 under Class**
CHEMICAL NAME/CLASS:	**STAINLESS STEEL WIRE OR RODS AND **SUPER MISSILEWELD TIG and 99T**
SYNONYMS:	Not Applicable
PRODUCT USE:	Metal Welding
DOCUMENT NUMBER:	0106
SUPPLIER/MANUFACTURER'S NAME:	**HARRIS PRODUCTS GROUP**
ADDRESS:	4501 Quality Place Mason, Ohio 45040
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	513-754-2000 **FAX** 513-754-8778
DATE OF PREPARATION:	November 24, 2010

2. COMPOSITION and INFORMATION ON INGREDIENTS

Class	C	Cr	Ni	Mo	Mn	Si	Cu	Fe
99T	-	-	Balance	-	0.50	-	-	-
3SMW **	0.20	35.00	25.00	3.00	2.50	1.00	(c)	Balance
ER308	0.08	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance
ER308H	0.06	19.5	10.0	-	0.70-1.0	0.70	0.75	Balance
ER308L	0.03	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance
ER308LSi	0.03	19.5-22.0	9.0-11.0	0.75	1.0-2.5	0.65-1.00	0.75	Balance
ER309	0.12	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance
ER309L	0.03	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.30-0.65	0.75	Balance
ER309LSi	0.03	23.0-25.0	12.0-14.0	0.75	1.0-2.5	0.65-1.00	0.75	Balance
ER310	0.08-0.15	25.0-28.0	20.0-22.5	0.75	1.0-2.5	0.30-0.65	0.75	Balance
ER312	0.12	28.0-32.0	8.0-10.5	0.75	1.0-2.5	0.30-0.65	0.75	Balance
ER316	0.08	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75	Balance
ER316H	0.08	18.0-20.0	11.0-14.0	2.0-3.0	0.05-2.0	0.50-1.0	0.75	Balance
ER316L	0.03	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.30-0.65	0.75	Balance
ER316LSi	0.03	18.0-20.0	11.0-14.0	2.0-3.0	1.0-2.5	0.65-1.00	0.75	Balance
ER317L	0.03	18.5-20.5	13.0-15.0	3.0-4.0	1.0-2.5	0.30-0.65	0.75	Balance
ER330	0.03	15.0-20.0	32.0-37.0	-	1.5-3.0	0.25-0.50	0.75	Balance

ER347 (a)	0.08	19.0-21.5	9.0-11.0	0.75	1.0-2.0	0.30-0.65	0.75	Balance
ER410	0.12	11.5-13.5	0.6	0.75	0.6	0.5	0.75	Balance
ER420	0.25 – 0.40	12.0 – 14.0	0.60	0.75	0.60	0.50	0.75	Balance
ER630 (b)	0.05	16.0-16.75	4.5-5.0	0.75	0.25-0.75	0.75	3.25-4.00	Balance
Single values are maximums, P and S =0.30% max. each , a: Cb(Nb)+Ta = 10XC min./1.0 max. , b= Cb(Nb)+Ta 0.15-0.30 c = Ti, Ta & Cb = 1.50 max each								

2. COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR					
		ACGIH-TLV		OSHA-PEL		NIOSH	OTHER
		TWA mg/m^3	STEL mg/m^3	TWA mg/m^3	STEL mg/m^3	IDLH mg/m^3	mg/m^3
Iron (exposure limits are for iron oxide dust and	7439-89-6	5	NE	10	NE	2500	NIOSH REL: TWA = 5 DFG MAK: TWA = 1.5 (respirable fraction) Carcinogen: IARC-3, TLV-A4
Manganese (exposure limits are for Manganese, elemental, inorganic compounds, and fume, as Mn)	7439-96-5	0.2	NE	1 (vacated 1989 PEL)	5 (ceiling) 3 (vacated 1989 PEL)	500	NIOSH REL: TWA = 1 STEL = 3 DFG MAKs: TWA = 0.5 (inhalable fraction) PEAK = 10•MAK 30 min., average value Carcinogen: EPA-D
Silicon	7440-21-3	10	NE	15 (Total dust) 5 (Respirable fraction) 10 (Total dust) (vacated 1989 PEL)	NE	NE	NIOSH REL: TWA = 10 (total dust), 5 (respirable fraction)
Molybdenum	7439-98-7	10 NIC-10 (inhalable fraction) NIC-3 (respirable fraction)	NE	15 10 (vacated 1989 PEL)	NE	5000	DFG MAK: TWA = 4 (inhalable fraction)
Niobium	7440-03-1	NE	NE	NE	NE	NE	NE
Phosphorus	7723-14-0	0.1	NE	0.1	NE	5	NIOSH REL: TWA = 0.1 DFG MAK: TWA = 01 (respirable fraction) PEAK = 2•MAK, 5 min., momentary value DFG MAK Pregnancy Risk Classification: D Carcinogen: EPA-D
Sulfur	7704-34-9	NE	NE	NE	NE	NE	NE
Carbon (exposure limits are for Particles Not Otherwise Specified)	7440-44-0	10 (Inhalable) 3 (Respirable)	NE	50 mppcf or 15 (Total Dust) 15 mppcf or 5 (Respirable Fraction)	NE	NE	DFG MAKs: TWA = 4 (Inhalable fraction); 1.5 (Respirable Fraction)
Copper (exposure limits are for "Copper fume, as Cu")	7440-50-8	0.2 (fume) 1 (dusts & mists)	NE	0.1 (fume) 1 (dusts & mists)	NE	100	NIOSH REL: TWA = 0.1 DFG MAK: TWA = 0.1 (Inhalable Fraction) PEAK = 2•MAK 30 min., average value Carcinogen: EPA-D

NE = Not Established. mppcf = Millions of Particles Per Cubic Foot See Section 16 for Definitions of Terms Used.

NOTE (1): The ACGIH has an established exposure limit for Welding Fumes, Not Otherwise Classified. The Threshold Limit Value is 5 mg/m^3. NIOSH classifies welding fumes as carcinogens. Single values shown are maximum, unless otherwise noted.

NOTE (2): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. These products have been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

2. COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR					
		ACGIH-TLV		OSHA-PEL		NIOSH	OTHER
		TWA mg/m³	STEL mg/m³	TWA mg/m³	STEL mg/m³	IDLH mg/m³	mg/m³
Chromium (Chromium, metal)	7440-47-3	0.5 0.5 (Cr. III)* 0.05 (Cr. VI,)*	NE	1.0 0.5 (Cr. III)* 5.0 ug/m³ (CrVI)	NE	250	NIOSH REL : TWA = 0.5 Carcinogen: EPA-D, EPA-CBD, IARC-3, TLV-A4 Cr.VI; IARC-1, TLV-A1
Nickel (exposure limits are for Nickel, elemental metal)	7440-02-0	1.5 (inhalable fraction)	NE	1	NE	10	NIOSH REL: TWA = 0.015 Carcinogen: IARC-2B, MAK-1, NIOSH-Ca, NTP-R, TLV-A5

NE = Not Established. See Section 16 for Definitions of Terms Used. * Compounds as Cr. & Cr. VI Water Soluble

NOTE (1): The ACGIH has an established exposure limit for Welding Fumes, Not Otherwise Classified. The Threshold Limit Value is 5 mg/m³. NIOSH classifies welding fumes as carcinogens. Single values shown are maximum, unless otherwise noted.

NOTE (2): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. These products have been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: These products consist of solid metal rods that are odorless. There are no immediate health hazards associated with these products. The Nickel and Chromium components of some of these products are suspect carcinogens. These products are not flammable nor reactive. If involved in a fire, these products may generate irritating iron fumes, a variety of iron compounds, carbon dioxide, carbon monoxide, and metal oxides. Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: During welding operations, the most significant route of over-exposure is via inhalation of fumes.

INHALATION: Inhalation is not anticipated to be a significant route of over-exposure to the coated rods. Inhalation of large amounts of particulates generated by this product during metal processing operations may result in pneumoconiosis (a disease of the lungs). Repeated over-exposures, via inhalation, to the dusts or fumes generated by this product during welding operations may have adverse effects on the lungs with possible pulmonary edema and emphysema (life-threatening lung injuries). Nickel (a component of some of these products) can cause pulmonary asthma in hypersensitive individuals. Damage to lungs can occur. Inhalation of dusts and fumes of Iron can also cause metal fume fever. Inhalation of copper oxide fumes, which may be generated by some of these products during welding operations, can cause metal fume fever and Chronic over-exposure to Copper dust may cause tiredness, stuffiness, diarrhea, and vomiting. Symptoms of metal fume fever can be delayed 24-48 hours. Refer to Section 10 (Stability and Reactivity) for information on the specific composition of welding fumes and gases.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH	(BLUE)	2
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		X

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For routine industrial applications for the rods

See Section 16 for Definition of Ratings

CONTACT WITH SKIN or EYES: Contact of the rod form of these products with the skin is not anticipated to be irritating. Contact with the rod form of these products can be physically damaging to the eye. Fumes generated during welding operations can be irritating to the skin and eyes. Contact with the hot rods will burn contaminated skin or eyes. Due to the presence of Nickel, prolonged exposure of the eyes may result in sensitization resulting in conjunctivitis (inflammation of the mucous membranes of the eyes). Symptoms of skin over-exposure may include irritation and redness; prolonged or repeated skin over-exposures may lead to allergic contact dermatitis. Contact with the hot electrodes or rods will burn contaminated skin or eyes.

3. HAZARD IDENTIFICATION (Continued)

SKIN ABSORPTION: Skin absorption is not anticipated to be a significant route of over-exposure to the components of these products.

INGESTION: Ingestion is not anticipated to be a route of occupational exposure for these products.

INJECTION: Though not a likely route of occupational exposure for these products, injection (via punctures or lacerations in the skin) may cause local reddening, tissue swelling, and discomfort.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Symptoms associated with over-exposure to these products and the fumes generated during welding operations are as follows:

ACUTE: The chief acute health hazard associated with these products would be the potential for irritation of contaminated skin and eyes when exposed to fumes during welding operations. Inhalation of large amounts of particulates generated by these products during metal processing operations can result in pneumoconiosis (a disease of the lungs). Inhalation of copper oxide fumes can cause metal fume fever. Rare cases of allergic contact dermatitis have been reported in people working with copper dust. Severe ingestion over-exposure to Copper (a component of some of these products) may be fatal. In extreme cases, burns may occur from contact that are generated during thermal decomposition. Contact with the molten material will burn contaminated skin or eyes.

CHRONIC: Chronic skin over-exposure to the fumes generated during welding operations may produce dermatitis (red, inflamed skin). Repeated over-exposures to the fumes generated by these products via inhalation can have adverse effects on the lungs (e.g., pulmonary edema and emphysema). Repeated or prolonged ingestion exposures to > 50–100 mg of Iron per day can result in deposition of iron in the body tissues, which can cause disease. Hypersensitivity to Nickel is common and can cause allergic contact dermatitis, pulmonary asthma, conjunctivitis and inflammatory reactions. Chronic over-exposure to Copper dust may cause tiredness, stuffiness, diarrhea, vomiting, discoloration of the skin and eyes, and kidney and liver disorder. Repeated over-exposures to the fumes generated by these products via inhalation can have adverse effects on the lungs (e.g., pulmonary edema and emphysema). Refer to Section 11 (Toxicological Information) for further information.

TARGET ORGANS: For fumes: ACUTE: Skin, eyes, respiratory system. CHRONIC: Skin, respiratory system, pancreas and liver.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.

SKIN EXPOSURE: If fumes generated by welding operations involving these products contaminate the skin, begin decontamination with running water. If molten material contaminates the skin, immediately begin decontamination with cold, running water. Minimum flushing is for 15 minutes. Victim must seek medical attention if any adverse reaction occurs.

EYE EXPOSURE: If fumes generated by welding operations involving these products enter the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

INHALATION: If fumes generated by welding operations involving these products are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

INGESTION: If swallowed call physician immediately! Do not induce vomiting unless directed by medical personnel. Rinse mouth with water if person is conscious. Never give fluids or induce vomiting if person is unconscious, having convulsions, or not breathing.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Skin, respiratory, pancreas, and liver disorders may be aggravated by prolonged over-exposures to the dusts or fumes generated by these products.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES (Continued)

FLASH POINT: Not flammable.

NFPA RATING

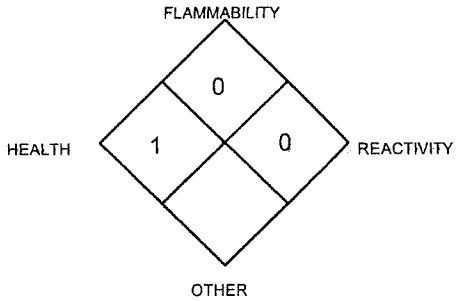
AUTOIGNITION TEMPERATURE: Not flammable.
FLAMMABLE LIMITS (in air by volume, %):
Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: These products are not flammable; use fire-extinguishing agents appropriate for surrounding materials.

Water Spray: YES	Carbon Dioxide: YES
Halon: YES	Foam: YES
Dry Chemical: YES	Other: Any "ABC" Class

UNUSUAL FIRE AND EXPLOSION HAZARDS When involved in a fire, these products may decompose and produce iron fumes, a variety of nickel, iron , copper and a variety of metal compounds and metal oxides. The hot material can present a significant thermal hazard to firefighters.
Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Not applicable.



See Section 16 for Definition of Ratings

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Not applicable.

PART III *How can I prevent hazardous situations from occurring*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting these products ON YOU or IN YOU. Wash thoroughly after handling these products. Do not eat or drink while handling these products. Use ventilation and other engineering controls to minimize potential exposure to these products.

STORAGE AND HANDLING PRACTICES: All employees who handle these products should be trained to handle it safely. Use in a well-ventilated location. Avoid breathing fumes of these products during welding operations. Open containers on a stable surface. Packages of these products must be properly labeled. When these products are used during welding operations, follow the requirements of the Federal Occupational Safety and Health Welding and Cutting Standard (29 CFR 1910 Subpart Q) and the safety standards of the American National Standards Institute for welding and cutting (ANSI Z49.1). Store packages in a cool, dry location. Store away from incompatible materials (see Section 10, Stability and Reactivity).

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Not applicable.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Prudent practice is to ensure eyewash/safety shower stations are available near areas where these products are used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below guidelines listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed (i.e. a Weld Fume Respirator, or Air-Line Respirator for welding in confined spaces), U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Respiratory Protection is recommended to be worn during welding operations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998 The following are NIOSH recommendations for respirator selection for Welding fumes, based on NIOSH REL:

CONCENTRATION	RESPIRATORY EQUIPMENT FOR WELDING FUMES
At Concentrations above the NIOSH REL, or where there is no REL, at any Detectable Concentration:	Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode; or any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape:	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter; or any appropriate escape-type, self-contained breathing apparatus
NOTE:	IDLH Concentration: Potential NIOSH carcinogen. [Not determined yet].

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EYE PROTECTION: Safety glasses. When these products are used in conjunction with welding, wear safety glasses, goggles, welding helmet or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding

and Cutting"). If necessary, refer to U.S. OSHA 29 CFR 1910.133, or appropriate Canadian Standards. If necessary, refer to U.S. OSHA 29 CFR 1910.138, or appropriate Standards of Canada.

HAND PROTECTION: Wear gloves for routine industrial use. When these products are used in conjunction with welding, wear gloves that protect from sparks and flame (per ANSI Z49.1-1988, "Safety in Welding and Cutting"). If necessary, refer to U.S. OSHA 29 CFR 1910.138, or appropriate Standards of Canada.

BODY PROTECTION: None normally needed for normal circumstances of use. Use body protection appropriate for task (i.e. apron, coveralls, chemically resistant boots). If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for elemental iron:

RELATIVE VAPOR DENSITY (air = 1): Not applicable.
SPECIFIC GRAVITY (water = 1): 7.86
SOLUBILITY IN WATER: Insoluble.
VAPOR PRESSURE, mm Hg @ 20°C: Not applicable.
ODOR THRESHOLD: Not applicable.
EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING/MELTING POINT: 1535°C (2795°F)
pH: Not applicable.
BOILING POINT: 3000°C (5432°F)
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not applicable.

The following information is for these products:

APPEARANCE AND COLOR: These products consist of solid rods, which are odorless.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance is a distinctive characteristic of these products.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Iron fumes, a variety of iron compounds, carbon dioxide, carbon monoxide, metal oxides.

NOTE: The composition and quality of welding fumes and gases are dependent upon the metal being welded, the process, the procedure, and the filler used. Other conditions that could also influence the composition and quantity of fumes and gases to which workers may be exposed include the following: any coatings on metal being welded (e.g., paint, plating, or galvanizing), the number of welders and the volume of the work area, the quality of ventilation, the position of the welder's head with respect to the fume plume, and the presence of other contaminates in the atmosphere. When the filler is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2 (Composition and Information on Ingredients). Fume and gas decomposition products, and not the ingredients in the filler, are important. Concentration of the given fume or gas component may decrease or increase by many times the original concentration. New compounds in the filler may form. Decomposition products of normal operations include not only those originating from volatilization, reaction, or oxidation of the product's components but also those from base metals and any coating (as noted previously). The best method to determine the actual composition of generated fumes and gases is to take an air sample from inside the welder's helmet if worn or in breathing zone. For additional information, refer to the American Welding Society Publication, "Fumes and Gases in the Welding Environment".

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, strong oxidizers, halogens, phosphorous.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid uncontrolled exposure to extreme temperatures and incompatible materials.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Presented below are human toxicological data available for the components of these products present in concentration greater than 1%. Other data for animals are available for the components of these products, but are not presented in this Material Safety Data Sheet.

PHOSPHORUS (YELLOW):
LDLo (oral, woman) = 22 mg/kg; cardiovascular effects
TDLo (oral, woman) = 11 mg/kg
LDLo (oral, human) = 1400 μg/kg
LDLo (oral, woman) = 4600 μg/kg; pulmonary system, gastrointestinal tract, skin effects
TDLo (oral, woman) = 2600 μg/kg

MANGANESE:
TCLo (inhalation, man) = 2300 μg/m^3; BRN, central nervous system effects **IRON:** TDLo (oral, child) = 77 mg/kg; BAH, gastrointestinal tract, blood effects
SULFUR: Eye Irritancy (human) = 8 ppm **COPPER:** TDLo (oral, human) = 1200 μg/kg; gastrointestinal tract effects

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: The components of these products are listed as follows:

COPPER: EPA-D (Not Classifiable as to Human Carcinogenicity)

CHROMIUM: ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen; agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of lack of data), EPA-D (Not Classifiable as to Human Carcinogenicity (inadequate human and animal evidence of carcinogenicity or no data available), EPA-CBD (Cannot Be Determined); IARC-3 (Unclassifiable as to Carcinogenicity in Humans)

PHOSPHOROUS: EPA-D (Not Classifiable as to Human Carcinogenicity)

CHROMIUM VI: ACGIH TLV-A1 (Confirmed Human Carcinogen : Agent is carcinogenic to humans based epidemiologic studies of, or convincing clinical evidence in, exposed humans),EPA-A (Human Carcinogen: sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer), IARC-1(Carcinogenic to Humans: sufficient evidence of carcinogenicity),NIOSH-X (Carcinogen defined with no further categorization),NTP-1(Known to be carcinogenic: sufficient evidence from human studies), MAK-1(Substances which are considered to be carcinogenic for man because adequate results of long-term animal studies or evidence from animal and epidemiological studies)

CHROMIUM OXIDE: ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen; agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of lack of data), EPA-D (Not Classifiable as to Human Carcinogenicity (inadequate human and animal evidence of carcinogenicity or no data available), EPA-CBD (Cannot Be Determined); IARC-3 (Unclassifiable as to Carcinogenicity in Humans)

IRON (as Iron Oxide): ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen; agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of lack of data), IARC-3 (Unclassifiable as to Carcinogenicity in Humans)

MANGANESE: EPA-D (Not Classifiable as to Human Carcinogenicity)

NICKEL: ACGIH TLV-A5 (Not Suspected as a Human Carcinogen), IARC-2B (Possibly Carcinogenic to Humans), MAK-1(Substances That Cause Cancer in Man and Which Can Be Assumed to Make a Significant Contribution to Cancer Risk), NIOSH-Ca (Potential Occupational Carcinogen with No Further Categorization), NTP-R (Reasonably Anticipated to Be A Human Carcinogen)

The other components of these products are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Dusts or fumes of these products may be irritating to contaminated skin and eyes. Fumes may be irritating to the respiratory system.

SENSITIZATION TO THE PRODUCT: Hypersensitivity to the Nickel component of these products can cause allergic contact dermatitis, asthma, and conjunctivitis. Rare cases of allergic contact dermatitis have been reported in people working with copper dust.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of these products and their components on the human reproductive system.

Mutagenicity: These products are not reported to produce mutagenic effects in humans. Animal mutation data are available for the, Chromium (III) Oxide, Molybdenum, Nickel, components of these products; these data were obtained during clinical studies on specific animal tissues exposed to high doses of this compound.

Embryotoxicity These products are not reported to produce embryotoxic effects in humans.

Teratogenicity: These products are not reported to cause teratogenic effects in humans. Clinical studies on test animals exposed to relatively high doses of the Copper, Molybdenum, and Nickel components of these products indicate teratogenic effects.

Reproductive Toxicity: These products are not reported to cause reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of the Copper, Molybdenum and Phosphorus components of these products indicate adverse reproductive effects.

A mutagen is a chemical, which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical, which causes damage to a developing embryo (i.e., within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical, which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance, which interferes in any way with the reproductive process.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of these products are expected to persist in the environment for an extended period of time. Iron, the major component in some of these products, will react with water and air to form a variety of stable iron oxides. The following environmental data are available for components of these products:

CHROMIUM: Chromium (metal) is insoluble in water, and is not oxidized by air, even in the presence of much moisture. The biological half-life of Chromium is listed as 0.5, 5.9, and 83.4 days, respectively, for three different components. Snails show a bioaccumulation factor of $1x10^6$ (total Chromium).

PHOSPHORUS (RED): Bioconcentrates in sediments, clams, fish, birds, and mammals.

COPPER: Solubility: Insoluble. There is no evidence of any biotransformation for copper compounds. Copper is accumulated by all plants and animals. BCF Algae = 12; plants = 1,000; invertebrate = 1,000, fish = 667 and fish =200 (Soluble copper salts).

NICKEL: Water solubility: Insoluble. Nickel is stable in air at ordinary temperature and is not affected by water. No data were found to suggest that nickel is involved in any biological transformation in the aquatic environment.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: These products are not expected to cause adverse effects on plant or animal life. Animal studies on copper, manganese, nickel, and silicon indicate various health effects after ingestion and exposures. **SULFUR:** Carrot and bean production is greatly reduced with high sulfur residues in the soil.

EFFECT OF CHEMICAL ON AQUATIC LIFE: These products may cause adverse effects on aquatic life, especially if large quantities are released into bodies of water. Low chronic aquatic limits indicate a high chronic hazard, it may be concentrated to toxic levels in food chain. The Nickel component of these products is toxic to aquatic life. Exposure of 0.095 ppm of Nickel for 3 weeks to Daphnid and Fathead minnows affected reproduction in these fish.

PHOSPHORUS (RED): Radioactive phosphorus has been concentrated by factors of 75,000 by waterfowl and up to 850,000 by aquatic life.

SULFUR: TLm (mosquito fish) 10,000 ppm/ 96 hours/ fresh water

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. These products, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: Wastes of these products should be tested per the Toxicity Characteristic Leaching Procedures requirements of RCRA to determine if such wastes meet the following characteristic: D007 (Chromium) 5.0 mg/L (Regulated Level).

14. TRANSPORTATION INFORMATION

THESE PRODUCTS ARE NOT HAZARDOUS (Per 49 CFR 172.101) BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Not applicable.
HAZARD CLASS NUMBER and DESCRIPTION: Not applicable.
UN IDENTIFICATION NUMBER: Not applicable.
PACKING GROUP: Not applicable.
DOT LABEL(S) REQUIRED: Not applicable.
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER, 2000: Not applicable.

MARINE POLLUTANT: No component of these products is designated as a marine pollutant by the Department of Transportation (49 CFR 172.101, Appendix B). The Department of Transportation (49 CFR 172.101, Appendix B), lists Copper, metal powder as a Marine Pollutant. This component is not present in the specific form listed and therefore, this product does not meet the marking requirement of 49 CFR 172.322.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: These products are not considered as dangerous goods, per regulations of Transport Canada.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of these products are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Chromium	No	Yes	No
Copper	No	Yes	Yes
Chromium (III) Oxide (Chromium Compound Category)	No	Yes	Yes
Manganese	No	No	Yes
Nickel	No	Yes	Yes

15. REGULATORY INFORMATION (Continued)

ADDITIONAL U.S. REGULATIONS:

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of these products. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. TSCA INVENTORY STATUS: The components of these products are listed on the TSCA Inventory.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Chromium = 5000 lbs; Copper =5000 lbs.; Nickel = 100 lbs; RQs for Chromium, Copper, and Nickel are applicable to particles 100 micrometers or less in diameter.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: The components of these products are covered under specific State regulations, as denoted below:

Alaska-Designated Toxic and Hazardous Substances:, Chromium, Copper Fume, Chromium (III) Compounds), Molybdenum, Nickel, Phosphorus .

California-Permissible Exposure Limits for Chemical Contaminants:, Chromium, Copper, Manganese, Nickel, Phosphorus , Silicon, and.

Florida-Substance List: Chromium, Copper, Manganese, Molybdenum, Nickel, Sulfur and Phosphorus.

Illinois-Toxic Substance List: Chromium, Copper, Manganese, Nickel, Phosphorus, Silicon, Molybdenum, , and.

Kansas-Section 302/313 List: Chromium, Manganese, Nickel, and Copper.

Massachusetts-Substance List: Chromium, Chromium (III) Oxide, Copper, Sulfur Manganese, Molybdenum, Nickel, Phosphorus.

Michigan-Critical Materials Register: Chromium, Copper, and Nickel.

Minnesota-List of Hazardous Substances:, Chromium, Manganese, Nickel, , Silicon, and Phosphorus.

Missouri-Employer Information/Toxic Substance List:, Chromium, Chromium (III) Oxide, Copper , Manganese, Molybdenum, Nickel, Phosphorus, Silicon,.

New Jersey-Right to Know Hazardous Substance List: Chromium, Chromium (III) Oxide, Copper, Phosphorus , Manganese, Molybdenum, Nickel, Sulfur ,.

North Dakota-List of Hazardous Chemicals, Reportable Quantities: Chromium, Copper, Nickel, and Phosphorus.

Pennsylvania-Hazardous Substance List: Copper, Chromium, Manganese, Molybdenum, Nickel, Sulfur , Silicon, and Phosphorus.

Rhode Island-Hazardous Substance List:, Chromium, Copper Fume, Manganese, Molybdenum, Nickel, Sulfur , Silicon, and Phosphorus.

Texas-Hazardous Substance List: Chromium, Manganese, Copper Fume Molybdenum, Nickel, and Phosphorus.

West Virginia-Hazardous Substance List: Chromium, Phosphorus, Manganese, Molybdenum, Nickel, and Copper Fume.

Wisconsin-Toxic and Hazardous Substances: Chromium, Manganese, Molybdenum, Nickel, Copper Fume and Phosphorus.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The Chromium and Nickel components of these products are on the California Proposition 65 List. **WARNING: These products may contain chemicals, and when used for welding may produce fumes or gases containing chemicals, known to the State of California to cause cancer, and/or birth defects (or other reproductive harm.)**

LABELING (Precautionary Statements):

WARNING:

PROTECT yourself and others. Read and understand this information.

FUMES AND GASES can be hazardous to your health.

ARC RAYS can injure your eyes and burn skin.

ELECTRIC SHOCK can kill.

- Before use, read and understand the manufacturer's instructions. Material Safety Data Sheets (MSDSs), and your employer's safety policies.
- Keep your head out of the fumes.
- Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases from your breathing zone and the general area.
- Wear correct eye, ear, and body protection.
- 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, Florida 33126. OSHA Safety and Health Standards, *29 CFR 1910*, available from the U.S. Government Printing Office, Washington, DC 20402.

DO NOT REMOVE THIS INFORMATION.

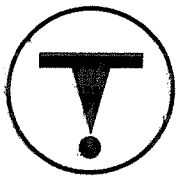
ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: The components of these products are on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Not applicable.

CANADIAN WHMIS SYMBOLS: Class D2A/D2B: Materials Causing Other Toxic Effects-Contains Potential Sensitizer



16. OTHER INFORMATION

DATE OF PRINTING: November 24, 2010

This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard (29 CFR 1910.1200). Other government regulations must be reviewed for applicability to these products. The information contained herein relates only to the specific product. If the product is combined with other materials, all component properties must be considered. To the best of the Harris Products Group knowledge, the information and recommendations contained in this publication are reliable and accurate as of the date of issue. However, accuracy, suitability, or completeness are not guaranteed, and no warranty, guarantee, or representation, expressed or implied, is made Harris Products Group. as to the absolute correctness or sufficiency of any representation contained in this and other publications Harris Products Group. assumes no responsibility in connection therewith; nor can it be assumed that all acceptable safety measures may not be required under particular or exceptional conditions or circumstances. Data may be changed from time to time. Be sure to consult the latest edition.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these, which are commonly used, include the following:

CAS #: This is the Chemical Abstract Service Number, which uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance, which represents conditions under which it is generally believed that nearly all workers, may be repeatedly exposed without adverse effect. The duration

must be considered, including the 8-hour Time Weighted Average **(TWA)**, the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level **(C)**. Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL, which was vacated by Court Order. **IDLH** - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); 1 (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information: BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **Ecological Information:** EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **U.S.: EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA: CEPA** is the Canadian Environmental Protection Act. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDSL** are the Canadian Domestic/Non-Domestic Substances Lists. **The CPR is the Canadian Product Regulations.** This section also includes information on the precautionary warnings, which appear, on the materials package label.