



MATERIAL SAFETY DATA SHEET

Sid Harvey part #'s T720-18,19,20 66000 SDS # Z0328

1. Product and Company Identification

Material name Phosphorus/Copper/Silver Brazing Filler Metal.
Version # 01
Issue date 05-November-2013
Revision date -
Supersedes date -
CAS # Mixture
Product names Stay Silv® 2, Stay Silv® 2 LP, Stay Silv® 2 HP, LAg2P, Stay Silv® 5, Stay Silv® 5LP, Stay Silv® 5HP, LAg5P, Stay Silv® 6, Stay Silv® 6LP, Stay Silv® 6HP, FS70, LCuPSn7, PSN4, Dynaflow®, Blockade®, Phoson Plus™, Stay Silv® 15, Stay Silv® 15 HP, LAg15P, MB15, Stay Silv® 18, Stay Silv® 18M, Stay Silv® 18 LP, LAg18P, Super Dynaflow
Product use Metal brazing.
Manufacturer information
Manufacturer/Supplier Harris Products Group
4501 Quality Place
Mason, Ohio 45040 US
salesinfo@jwharris.com
Telephone number 513-754-2000
Emergency Telephone Numbers 1-866-519-4752 (US, Canada, Mexico only)
(+) 1-760-476-3962
Please quote 333895

2. Hazards Identification

Physical state Solid.
Appearance Metallic-copper wire and rods.
Emergency overview May cause eye, skin and respiratory tract irritation.
OSHA regulatory status When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.
Potential health effects
Routes of exposure Inhalation. Skin contact. Eye contact. Ingestion.
Eyes May cause eye irritation.
Skin Contact may cause irritation and redness. Prolonged skin contact may cause dermatitis. Contact with molten material may cause thermal burns.
Inhalation Irritating to the nose, throat, and respiratory tract. Overexposure to Copper fumes may produce metal fume fever. Symptoms of metal fume fever resemble the flu and include sweating, fever, headache, chills, muscle aches, nausea, vomiting, weakness, and tiredness.
Ingestion Copper poisoning can result in hemolytic anemia and kidney, liver and spleen damage.
Target organs Respiratory system Eyes. Skin. Kidneys.
Chronic effects Chronic inhalation of fumes or dust may cause irritation or other respiratory conditions (e.g., bronchitis). Ingestion of silver may cause a permanently benign bluish gray discoloration to the skin (argyria). May cause damage to the liver and kidneys. Phosphorus is toxic and may produce poisoning if taken by mouth. Prolonged exposure to silver may cause damage to the nasal septum. Refer to Section 11 Toxicological Information for more details.
Signs and symptoms Contact may cause irritation and redness. Dust may irritate respiratory system. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. During brazing operations, the most significant route of overexposure is via inhalation of fumes.
Potential environmental effects Alloys in massive forms present a limited hazard for the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Silver	7440-22-4	1 - 18
Phosphorus/Copper/Silver Brazing Filler Metal.		CPH MSDS NA
903403 Version #: 01 Revision date: - Issue date: 05-November-2013		

Components	CAS #	Percent
Phosphorus	7723-14-0	5 - 9
Tin	7440-31-5	0 - 7
Copper	7440-50-8	Balance

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures

Eye contact	Rinse immediately with plenty of water for at least 15 minutes. Remove any contact lenses. Get medical attention if irritation develops or persists.
Skin contact	Remove contaminated clothes and rinse skin thoroughly with water for at least 15 minutes. Get medical attention if irritation develops and persists.
Inhalation	Remove person from contaminated area to fresh air. Apply artificial respiration if needed. Call a physician if symptoms develop or persist.
Ingestion	Do NOT induce vomiting. Immediately rinse mouth and drink a cupful of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Notes to physician

Treat symptomatically.

General advice

Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties

Solid metal is not flammable; however, finely divided metallic dust or powder may form an explosive mixture with air. Do not use water on molten metal: Explosion hazard could result.

Extinguishing media

Suitable extinguishing media Extinguish with foam, carbon dioxide or dry powder.

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Protection of firefighters

Specific hazards arising from the chemical Fire or high temperatures create: Metal oxides.

Fire fighting equipment/instructions

Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Move containers from fire area if you can do it without risk.

6. Accidental Release Measures

Personal precautions

Keep unnecessary personnel away. Avoid inhalation of dust from the spilled material. Wear protective clothing as described in Section 8 of this MSDS. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not contaminate water.

Methods for containment

Stop leak if you can do so without risk. Local authorities should be advised if significant spillages cannot be contained.

Methods for cleaning up

Large Spills: Sweep up and place into a proper container for disposal. Avoid the generation of dusts during clean-up.

Small Spills: Wipe up spilled material and place in a suitable container for disposal. For waste disposal, see Section 13 of the MSDS.

Other information

Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling

Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Avoid inhalation of dust and fumes. Avoid contact with skin and eyes. Wear appropriate personal protective equipment (See Section 8). Do not get this material on clothing. Do not eat, drink or smoke when using the product. Wash thoroughly after handling. Avoid release to the environment.

Storage

Store in tightly closed original container in a dry, cool and well-ventilated place. Store in a closed container away from incompatible materials. Keep away from food, drink and animal feedingstuffs.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3 0.2 mg/m3	Dust and mist. Fume.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silver (CAS 7440-22-4)	TWA	0.1 mg/m3	Dust and fume.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	PEL	1 mg/m3 0.1 mg/m3	Dust and mist. Fume.
Phosphorus (CAS 7723-14-0)	PEL	0.1 mg/m3	
Silver (CAS 7440-22-4)	PEL	0.01 mg/m3	
Tin (CAS 7440-31-5)	PEL	2 mg/m3	

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3 0.2 mg/m3	Dust and mist. Fume.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silver (CAS 7440-22-4)	TWA	0.1 mg/m3	
Tin (CAS 7440-31-5)	TWA	2 mg/m3	

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3 0.2 mg/m3	Dust and mist. Fume.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silver (CAS 7440-22-4)	STEL TWA	0.03 mg/m3 0.01 mg/m3	
Tin (CAS 7440-31-5)	TWA	2 mg/m3	

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3 0.2 mg/m3	Dust and mist. Fume.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silver (CAS 7440-22-4)	TWA	0.1 mg/m3	Dust and fume.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	0.2 mg/m3	Fume.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silver (CAS 7440-22-4)	TWA	0.1 mg/m3	Dust and fume.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Phosphorus (CAS 7723-14-0)	TWA	0.1 mg/m3	
Silver (CAS 7440-22-4)	TWA	0.1 mg/m3	
Tin (CAS 7440-31-5)	TWA	2 mg/m3	

Mexico. Occupational Exposure Limit Values

Components	Type	Value	Form
Copper (CAS 7440-50-8)	STEL	2 mg/m3	Dust and mist.
		2 mg/m3	Fume.
	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Phosphorus (CAS 7723-14-0)	STEL	0.3 mg/m3	
	TWA	0.1 mg/m3	
Silver (CAS 7440-22-4)	TWA	0.1 mg/m3	
Tin (CAS 7440-31-5)	STEL	4 mg/m3	
	TWA	2 mg/m3	

Engineering controls Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust. Shower, hand and eye washing facilities near the workplace are recommended.

Personal protective equipment

Eye / face protection Wear safety glasses with side shields (or goggles). When these products are used in conjunction with brazing, it is recommended that safety glasses, goggles, or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting") be worn.

Skin protection Chemical resistant clothing is recommended. When these products are used in conjunction with brazing, wear protective clothing that protects from sparks and flame (per ANSI Z49.1-1988, "Safety in Welding and Cutting").

Respiratory protection Use a respirator when local exhaust or ventilation is not adequate to keep exposures below the TLV. In a confined space a supplied respirator may be required. Selection and use of respiratory protective equipment should be in accordance with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical & Chemical Properties

Appearance	Metallic-copper wire and rods.
Physical state	Solid.
Form	Solid.
Color	Not available.
Odor	None.
Odor threshold	Not available.
pH	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Boiling point	Not available.
Melting point/Freezing point	1190 °F (643.33 °C)
Solubility (water)	Not available.
Specific gravity	8.94 (H2O=1)
Flash point	Not available.

Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Auto-ignition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	Extreme temperatures. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Strong acids. Strong bases. Halogens. Acid chlorides.
Hazardous decomposition products	Thermal decomposition may produce copper, phosphorous, and silver compounds and a variety of metal oxides.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Toxicological data	
Components	Species
Silver (CAS 7440-22-4)	
Acute	
Dermal	
LD50	Rat
	> 2000 mg/kg
Oral	
LD50	Rat
	> 5000 mg/kg
Sensitization	Rare cases of allergic contact dermatitis have been reported in people working with copper dust.
Acute effects	High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever. When heated, the vapors/fumes given off may cause respiratory tract irritation.
Local effects	Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye, mucous membranes and respiratory tract.
Chronic effects	Prolonged exposure may cause chronic effects. Ingestion of silver may cause a permanently benign bluish gray discoloration to the skin (argyria).
Carcinogenicity	Not classifiable as to carcinogenicity to humans.
Epidemiology	No data available.
Mutagenicity	Not classified.
Reproductive effects	Not classified.
Further information	No other specific acute or chronic health impact noted.

12. Ecological Information

Ecotoxicological data	
Components	Species
Copper (CAS 7440-50-8)	
Aquatic	
Crustacea	EC50
	Water flea (Daphnia obtusa)
	0.0076 - 0.026 mg/l, 48 hours
Phosphorus (CAS 7723-14-0)	
Aquatic	
Crustacea	EC50
	Water flea (Daphnia magna)
	0.025 - 0.037 mg/l, 48 hours
Fish	LC50
	Bluegill (Lepomis macrochirus)
	0.002 - 0.006 mg/l, 96 hours
Silver (CAS 7440-22-4)	
Aquatic	
Fish	LC50
	Fathead minnow (Pimephales promelas)
	0.0019 - 0.003 mg/l, 96 hours
Ecotoxicity	Alloys in massive forms present a limited hazard for the environment.
Environmental effects	Significant environmental persistence and bioaccumulation can be expected.
Aquatic toxicity	May cause long lasting harmful effects to aquatic life.

Persistence and degradability	The product is not biodegradable.
Bioaccumulation / Accumulation	The product contains potentially bioaccumulating substances.
Mobility in environmental media	Alloys in massive forms are not mobile in the environment.

13. Disposal Considerations

Waste codes	D011: Waste Silver
Disposal instructions	Dispose in accordance with all applicable regulations.
Waste from residues / unused products	Scrapped material should be sent for refining to recover precious metal content. Solid metal and alloys in the form of particles may be reactive. Its hazardous characteristics, including fire and explosion, should be determined prior to disposal.

14. Transport Information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations	This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.
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TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Phosphorus (CAS 7723-14-0)

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Spill: Reportable quantity

Phosphorus (CAS 7723-14-0) 1 lbs

US EPCRA (SARA Title III) Section 302 - Extremely Hazardous Substance: Threshold Planning Quantity

Phosphorus (CAS 7723-14-0) 100 lbs

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Copper (CAS 7440-50-8) 1.0 %

Phosphorus (CAS 7723-14-0) 1.0 %

Silver (CAS 7440-22-4) 1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Copper (CAS 7440-50-8) Listed.

Phosphorus (CAS 7723-14-0) Listed.

Silver (CAS 7440-22-4) Listed.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Silver: 1000

Phosphorus: 1

Copper: 5000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
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Section 302 extremely hazardous substance (40 CFR 355, Appendix A)	No
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SARA 311/312 Hazardous chemical	No
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Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)	Not controlled
Canadian regulations	This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.
WHMIS status	Non-controlled

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Hazardous Substances (Director's): Listed substance

Copper (CAS 7440-50-8)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silver (CAS 7440-22-4)	Listed.
Tin (CAS 7440-31-5)	Listed.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

US - New Jersey RTK - Substances: Listed substance

Copper (CAS 7440-50-8)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silver (CAS 7440-22-4)	Listed.
Tin (CAS 7440-31-5)	Listed.

US - Pennsylvania RTK - Hazardous Substances: All compounds of this substance are considered environmental hazards

Copper (CAS 7440-50-8)	LISTED
Silver (CAS 7440-22-4)	LISTED

US. Massachusetts RTK - Substance List

Copper (CAS 7440-50-8)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silver (CAS 7440-22-4)	Listed.
Tin (CAS 7440-31-5)	Listed.

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

Copper (CAS 7440-50-8)	500 lbs
Phosphorus (CAS 7723-14-0)	100 lbs
Silver (CAS 7440-22-4)	500 lbs

US. Pennsylvania RTK - Hazardous Substances

Copper (CAS 7440-50-8)	Listed.
Phosphorus (CAS 7723-14-0)	Listed.
Silver (CAS 7440-22-4)	Listed.
Tin (CAS 7440-31-5)	Listed.

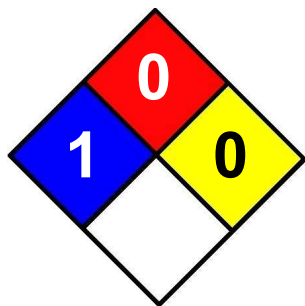
Mexico regulations This safety data sheet was prepared in accordance with the Official Mexican Standard (NOM-018-STPS-2000).

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 1
Flammability: 0
Physical hazard: 0

NFPA Ratings



Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available.



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.D.S.). 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 J.W. HARRIS CO., INC.** salesinfo@jwharris.com 513-754-2000 www.jwharris.com

STATEMENT OF LIABILITY-DISCLAIMER

To the best of the J.W. Harris Company, Inc.'s knowledge, the information and recommendations contained in this publication are reliable and accurate as of the date prepared. However, accuracy, suitability, or completeness are not guaranteed, and no warranty, guarantee, or representation, expressed or implied, is made by J.W. Harris Co., Inc. as to the absolute correctness or sufficiency of any representation contained in this and other publications; J.W. Harris Co., Inc. assumes no responsibility in connection therewith; nor can it be assumed that all acceptable safety measures are contained in this and other publications, or that other or additional measures may not be required under particular or exceptional conditions or circumstances. Data may be changed from time to time.

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):

DYNAFLOW®
SUPER DYNAFLOW®
HARRIS 0
HARRIS 0AM
HARRIS 0LP
HARRIS 0HP (LCuP 7)
HARRIS 0HHP
HARRIS 0XHP
LAg2PA
LAg5PA
LCuP 6

PHOS/COPPER BRAZING ALLOYS:

LCuP 8
LCuPSn-7
PHOSON +®
PSN 4
QUICKSILVER®
STAY-SILV® 2
STAY-SILV® 2.5
STAY-SILV® 2HP
STAY-SILV® 2LP (LAg2PB)
STAY-SILV® 5
FLASH®
STAY-SILV® 5HP (LAg5PB)
STAY-SILV® 5LP
STAY-SILV® 6
STAY-SILV® 6.5
STAY-SILV® 6HP
STAY-SILV® 6LP
STAY-SILV® 15
STAY-SILV® 15HP
STAY-SILV® 15LP
STAY-SILV® 18LP (18M)
BLOCKADE® Bare & Flux-Coated

CHEMICAL NAME/CLASS:

Metal Brazing Alloy

SYNONYMS:

Not Applicable

PRODUCT USE:

Metal Brazing

DOCUMENT NUMBER:

0082

SUPPLIER/MANUFACTURER'S NAME:

J.W. HARRIS CO., INC.

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:

July 19, 2004 **REVIEWED** July 19, 2004

PRINT DATE:

November 11, 2004

2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS

PRODUCT NAME	Ag	Cu	Sn	Si	P
DYNAFLOW®	6.0	Balance			6.1
SUPER DYNAFLOW®	18.0	Balance			7.3
HARRIS 0		Balance			7.1
HARRIS 0AM		Balance			6.95
HARRIS 0LP		Balance			6.8
HARRIS 0HP (LCuP 7)		Balance			7.4
HARRIS 0HHP		Balance			7.6
HARRIS 0XHP		Balance			7.8

2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

PRODUCT NAME	Ag	Cu	Sn	Si	P
LAg2PA	1.7	Balance			6.4
LAg5PA	4.6	Balance			6.3
LCuP 6		Balance			6.5
LCuP 8		Balance			8.1
LCuPSn-7		Balance	7.0		6.8
PHOSON +®	15.0	Balance			7.3
PSN 4		Balance	4.0		6.0
QUICKSILVER®		Balance			7.2
STAY-SILV® 2	2.0	Balance			7.0
STAY-SILV® 2.5	2.4	Balance			6.4
STAY-SILV® 2HP	2.0	Balance			7.4
STAY-SILV® 2LP (LAgPB)	2.0	Balance			6.5
STAY-SILV® 5	5.0	Balance			6.0
STAY-SILV® 5HP (LAg5PB)	5.0	Balance			6.5
STAY-SILV® 5LP	5.0	Balance			5.7
STAY-SILV® 6	6.0	Balance			6.5
STAY-SILV® 6.5	6.4	Balance			6.1
STAY-SILV® 6HP	6.0	Balance			7.2
STAY-SILV® 6LP	6.0	Balance			6.2
STAY-SILV® 15	15.0	Balance			5.0
STAY-SILV® 15HP	15.0	Balance			5.4
STAY-SILV® 15LP	15.0	Balance			4.7
STAY-SILV® 18LP (18M)	18.0	Balance			5.8
FLASH®		Balance			8.2
BLOCKADE®		Balance	<10.0	<4.0	<8.0

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR					
		ACGIH-TLV		OSHA-PEL		IDLH mg/m	OTHER mg/m³
		TWA mg/m³	STEL mg/m³	TWA mg/m³	STEL mg/m³		
Phosphorous (yellow)	7723-14-0	0.1	NE	0.1	NE	5	NIOSH REL: TWA = 0.1 DFG MAKs: TWA = 0.1 PEAK = 2•MAK 5 min., momentary value DFG Pregnancy Risk Classification: D Carcinogen: EPA-D
Tin The following exposure limits are for "Tin, Metal"	7440-31-5	2	NE	2	NE	100	NIOSH REL: TWA = 2
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)
Silver, Metal	7440-22-4	0.1	NE	0.01	NE	10	NIOSH REL: TWA = 0.01 DFG MAK: TWA = 0.01 (Inhalable Fraction) PEAK = 10•MAK 30 min., average value Carcinogen: EPA-D
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.

See Section 16 for Definitions of Terms Used.

NOTE (1): The ACGIH has an established exposure limit for Brazing Fumes, Not Otherwise Classified. The Threshold Limit Value is 5 mg/m³. NIOSH classifies Brazing 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. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

Flux coated BLOCKADE consist of metal wire or rods, with a thin coating of flux on them. The exact amount of coating on each rod may vary. It can be reasonably estimated that there is less than 1% of each of the flux constituents present on any given rod when compared to the mass of the rod itself. The composition values given for the flux coating are the composition of the flux when the rods are flux-coated.

COMPONENT 2: FLUX COATING ON BLOCKADE FLUX COATED RODS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		IDLH mg/m ³	OTHER mg/m ³
			TLV mg/m ³	STEL mg/m ³	PEL mg/m ³	STEL mg/m ³		
Boric Acid	10043-35-3	10-35	NE	NE	NE	NE	NE	NE
Proprietary Fluoride Compound (exposure limits are for inorganic, solid Fluoride compounds, as F; 7789-75-5)	Proprietary	30-50	2.5, A4 (Not Classifiable as a human carcinogen)	NE	2.5	NE	NE	DFG MAKs:TWA = 2.5 (Inhalable Fraction) PEAK = 5•MAK 30 min., average value Carcinogen: IARC-3, TLV-A4
Methacrylate/Aliphatic & Naphthenic Hydrocarbon Compound	Proprietary		NE	NE	NE	NE	NE	NE
Water	7732-18-5	Balance	NE	NE	NE	NE	NE	NE

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: These products consist of odorless, metallic, copper-colored wires and rods in a variety of diameters which may have a flux coating. There is no immediate health hazard associated with the wire products. These products are not reactive under normal circumstances of use. Though the products are not flammable, when heated they will produce fumes containing a variety of copper and silver compounds. Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

During brazing operations, the most significant route of overexposure is via inhalation of fumes.

INHALATION Exposure to fumes of these products will irritate the nose, throat and other tissues of the respiratory system. Overexposure to Copper fumes may produce metal fume fever. Symptoms of metal fume fever resemble the flu and include sweating, fever, headache, chills, muscle aches, nausea, vomiting, weakness, and tiredness. If dusts or particulates generated by the flux coating on the flux coated products are inhaled, they will irritate the nose, throat, and lungs. Dusts and particulates of the flux coating on the flux coated products may destroy mucous membranes and may cause pneumonitis.

CONTACT WITH SKIN or EYES: Contact with the wire or rod forms of these products is not anticipated to be irritating. Contact with the wire form can be physically damaging to the eye. Fumes generated during brazing or welding operations can irritate the skin and eyes. Symptoms of skin overexposure may include irritation and redness; prolonged or repeated skin overexposures may lead to dermatitis. Contact with the molten material will burn contaminated skin or eyes. Eye contact with dusts or particulates generated by the flux coating on the flux coated products will cause irritation, pain, tearing, and reddening. Brief contact may cause eye damage and prolonged contact may cause permanent damage. Depending on the duration of over-exposure, skin contact with dusts or particulates generated by the flux coating on the flux coated products may cause irritation and burns. Chronic over-exposure to dusts or particulates generated by the flux coating on the flux coated products may cause borism (dry skin, eruptions, and gastrointestinal disturbances) or pustular dermatitis (visible collections of pus).

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH

(BLUE)

1

FLAMMABILITY

(RED)

0

REACTIVITY

(YELLOW)

0

PROTECTIVE EQUIPMENT

X

EYES

RESPIRATORY

HANDS

BODY



See
Section 8



See
Section 8

For routine industrial applications

See Section 16 for Definition of Ratings

3. HAZARD IDENTIFICATION (Continued)

SKIN ABSORPTION: Skin absorption is not a significant route of overexposure for any component of these bare products. In some situations, one of the decomposition products of the flux coating may be hydrogen fluoride. Hydrogen fluoride can penetrate the skin and produce burns that may not be immediately painful or visible; the burns impact the lower layers of skin and bone tissue. Hydrogen fluoride exposures involving 20 percent of the body or more can be fatal through systemic fluoride poisoning.

INGESTION: Ingestion of the rods is not a likely route of occupational exposure.

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 overexposure to these products and the fumes generated during brazing operations are as follows:

ACUTE: The chief health hazard associated with these products would be the potential for overexposure to fumes during brazing operations. Overexposure to Copper fumes may produce metal fume fever. Contact with the molten material will burn contaminated skin or eyes. Depending on the duration of over-exposure, dusts or particulates generated by the flux coating on the flux coated products may be irritating or damaging to the entire respiratory tract, eyes, and skin. In some situations, one of the flux coating's decomposition products may be hydrogen fluoride. Hydrogen fluoride can penetrate the skin and produce burns that may not be immediately painful or visible; the burns impact the lower layers of skin and bone tissue. If dusts or particulates generated by the flux coating on the flux coated products are swallowed, they may burn the mouth, throat, esophagus, and other tissues of the digestive system.

CHRONIC: Chronic skin overexposure to the fumes of these products during brazing operations may produce dermatitis (red, inflamed skin). Chronic skin over-exposure to dusts or particulates generated by the flux coating on the flux coated products may cause borism (dry skin, eruptions, and gastrointestinal disturbances) or pustular dermatitis (visible collections of pus). Chronic ingestion of the fluoride component of the flux coating may cause osseous fluorosis (increased radiographic density of the bones). Symptoms of chronic ingestion of dusts or particulates generated by the flux coating on the flux coated products may include kidney damage, asthma, and pain in the joints and muscles. Chronic skin contact or ingestion of dusts, salts, or fumes of Silver, (a component of these products) can result in a condition known as Argyria. This condition is marked by a bluish appearance of the skin and eyes. Refer to Section 11 (Toxicological Information) for further information.

TARGET ORGANS: ACUTE: Skin, eyes, and respiratory system. CHRONIC: Skin, respiratory system.

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 dust or particulates generated by the flux coating on the flux coated products or fumes generated by brazing operations involving this product 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 dust or particulates generated by the flux coating on the flux coated products or fumes generated by brazing operations involving this product 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 dust or particulates generated by the flux coating on the flux coated products or fumes generated by brazing operations involving this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

INGESTION: Ingestion is not a likely route of exposure for these products. 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 and respiratory disorders, may be aggravated by prolonged overexposures to the fumes of these products.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not flammable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES

Halon: YES

Dry Chemical: YES

Carbon Dioxide: YES

Foam: YES

Other: Any "ABC" Class

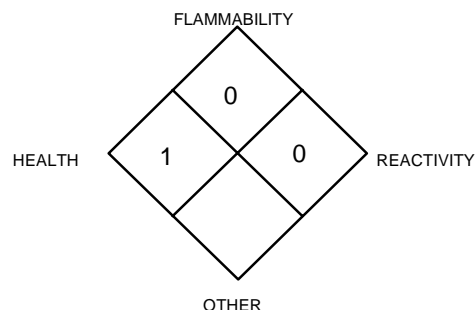
UNUSUAL FIRE AND EXPLOSION HAZARDS When involved in a fire, these products may generate irritating fumes and a variety of metal oxides. If involved in a fire, the flux coating on the flux coated products may decompose to release fluoride compounds, boric anhydride, and hydrogen fluoride. The molten rods can present significant thermal hazards to firefighters.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Not applicable.

NFPA RATING



**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 these products.

STORAGE AND HANDLING PRACTICES: All employees who handle these products should be trained to handle them safely. Use in a well-ventilated location. Avoid breathing fumes generated by these products during brazing operations. Packages of these products must be properly labeled. Store containers in a cool, dry location. Store away from incompatible materials (see Section 10, Stability and Reactivity).

When these products are used during brazing operations, it is recommended that 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) be followed.

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 brazing in confined spaces), use only protection authorized in 29 CFR 1910.134 or applicable State regulations. Respiratory Protection is recommended to be worn during brazing 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). Respiratory protection guidelines for Copper and Silver dusts (as may be generated during metal processing or during brazing) are provided as follows:

NIOSH RECOMMENDATIONS FOR COPPER DUSTS AND MISTS (as Cu) CONCENTRATIONS IN AIR:

Up to 5 mg/m³: Dust and mist respirator.

Up to 10 mg/m³: Dust and mist respirator except single-use and quarter-mask respirator (if not present as a fume); or Supplied Air Respirator (SAR).

Up to 25 mg/m³: Powered air-purifying respirator with dust and mist filter(s); or SAR operated in a continuous-flow mode.

Up to 50 mg/m³: Full-facepiece respirator with high-efficiency particulate filter(s); or full-facepiece Self-Contained Breathing Apparatus (SCBA); or full-facepiece SAR; or powered air-purifying respirator with tight-fitting facepiece and high-efficiency particulate filter.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

Up to 100 mg/m³: Positive pressure, full-facepiece SAR.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece respirator with high-efficiency particulate filter(s); or escape-type SCBA.

NIOSH/OSHA RECOMMENDATIONS FOR SILVER (METAL DUST AND SOLUBLE COMPOUNDS, AS SILVER) CONCENTRATIONS IN AIR:

Up to 0.25 mg/m³: Supplied Air Respirator (SAR) operated in a continuous-flow mode or powered air-purifying respirator with high-efficiency particulate filter.

Up to 0.5 mg/m³: Full-facepiece respirator with high-efficiency particulate filter(s), full-facepiece Self-Contained Breathing Apparatus (SCBA), or full-facepiece SAR.

Up to 10 mg/m³: Positive pressure, full-facepiece SAR.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece respirator with high-efficiency particulate filter(s) or escape-type SCBA.

EYE PROTECTION: Safety glasses. When these products are used in conjunction with brazing, it is recommended that safety glasses, goggles, or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting") be worn.

HAND PROTECTION: Wear gloves for routine industrial use. When these products are used in conjunction with brazing, it is recommended that gloves that protect from sparks and flame (per ANSI Z49.1-1988, "Safety in Welding and Cutting") be worn.

BODY PROTECTION: Use body protection appropriate for task.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Copper, the main component of this product:

RELATIVE VAPOR DENSITY (air = 1): Not applicable.

SPECIFIC GRAVITY (water = 1): 8.94

SOLUBILITY IN WATER: Insoluble.

VAPOR PRESSURE, mm Hg @ 20°C: Not applicable.

ODOR THRESHOLD: Not applicable.

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not applicable.

The following information is for the product:

APPEARANCE AND COLOR: These products consist of metallic-copper wire and rods with no odor, which may have a flux coating.

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

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal decomposition may produce copper, phosphorous, and silver compounds and a variety of metal oxides.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, oxidizers, halogens, and acid chlorides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Uncontrolled exposure to extreme temperatures, 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. Other data for animals are available for the components of these products, but are not presented in this Material Safety Data Sheet.

BORIC ACID:

Skin Irritancy (human) = 15 mg/ 3 days/ intermittent; mild

LD (oral, human) = 37 mg/kg/ boron as boric acid

LD (skin, infant) = 210 mg/kg/ boron as boric acid

TDLo (oral, rat) = 45000 mg/kg/ 90 days/ male; reproductive effects

TDLo (oral, child) = 500 mg/kg; gastrointestinal effects

LDLo (oral, man) = 429 mg/kg; cardiovascular, systemic effects

LDLo (oral, woman) = 200 mg/kg

TDLo (oral, infant) = 800 mg/kg/ 4 weeks/ intermittent

LDLo (oral, infant) = 934 mg/kg

LDLo (skin, infant) = 1200 mg/kg

LDLo (skin, child) = 4000 mg/kg/ 4 days

LDLo (skin, man) = 2430 mg/kg

LDLo (skin, child) = 1500 mg/kg

LDLo (subcutaneous, infant) = 1100 mg/kg

TDLo (unreported, man) = 170 mg/kg; gastrointestinal effects

LDLo (unreported, man) = 147 mg/kg

COPPER:

TDLo (oral, human) = 120 µg/kg; gastrointestinal tract effects

SILVER:

TCLo (inhalation, human) = 1 mg/m³; skin effects

PHOSPHOROUS:

LDLo (unreported, man) = 4412 µg/kg

11. TOXICOLOGICAL INFORMATION(Continued)

SUSPECTED CANCER AGENT: The components of this product are listed as follows:

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

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

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

PROPRIETARY FLUORIDE COMPOUND (as a Fluoride Compound): IARC-3 (Unclassifiable as to Carcinogenicity in Humans), ACGIH TLV-A4 (Not Classifiable as 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 neither considered to be nor suspected to be cancer-causing agents by these agencies.

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

SENSITIZATION TO THE PRODUCT: 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 is available for Boric Acid (constituent of flux coated products); this data was 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. Studies on test animals exposed to relatively high doses of Copper (a component of this product) indicate adverse teratogenic effects.

Reproductive Toxicity: These products are not reported to cause reproductive effects in humans. Studies on test animals exposed to relatively high doses of Boric Acid and Copper (components of some 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.*

Currently, there are Biological Exposure Indices (BEIs) determined for the Fluoride Compound component of the Flux Coating (as a Fluoride).

BIOLOGICAL EXPOSURE INDICES (BEIs) for components of these products are as follows:

CHEMICAL: DETERMINANT	SAMPLING TIME	BEI
FLUORIDES: Fluorides in urine	Prior to shift End of shift	3 mg/g creatinine 10 mg/g creatinine

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of these products occur naturally in the environment and are expected to persist in the environment for an extended period of time. The components will react with water and air to form a variety of metal oxide compounds. The following environmental data are available for the components of these products.

BORIC ACID: Water solubility = 1 g/ 18 mL (cold), 1 g/ 4 mL (boiling).

SILVER: Solubility: Insoluble. Many silver salts are only slightly soluble and so silver cations will rapidly be reduced to lower levels. The Biological half-life for silver is a few days for animals and up to 50 days for humans.

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).

PHOSPHOROUS: Solubility in water 1 part/300,000 parts water. Radioactive phosphorous has been concentrated by factors of 75,000 by waterfowl and 850,000 by aquatic life.

TIN: Solubility: Insoluble in water.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Animal studies on copper indicate various health effects after ingestion and exposures. Specific data on test animals are available, but are not presented in this Material Safety Data Sheet.

EFFECT OF CHEMICAL ON AQUATIC LIFE: These products are expected to cause adverse effects on aquatic life. Low chronic aquatic limits indicate a high chronic hazard, it may be concentrated to toxic levels in food chain. The following aquatic toxicity data are available for the components:

BORIC ACID:

LC₅₀ (trout eggs) = 100 ppm/ soft

LC₅₀ (trout eggs) = 79 ppm/ hard

LC₅₀ (catfish eggs) = 155 ppm/ soft

LC₅₀ (catfish eggs) = 22 ppm/ hard

LC₅₀ (goldfish eggs) = 46 ppm/ soft

LC₅₀ (goldfish eggs) = 75 ppm/ hard

LC₅₀ (*Daphnia magna*) = 133 mg/L/ 48 hours

COPPER:LC₅₀(fathead minnows) = 0.14 ppm in hard waterLC₅₀(bluegill) = 0.02 ppm in soft waterLC₅₀(brook trout) = 0.09 ppm in soft water

SILVER: 0.1 ppm is toxic to bacteria and aquatic life. Discharge into marine waters should not exceed /20 of 96 hour LC₅₀, 0.25-0.025 mg/kg/day.

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: Waste of these products should be analyzed for Toxicity Characteristic Leaching Procedure chemicals, as follows: D011 (Silver), Regulated Level: 5.0 mg/L.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS 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 this product is designated as a marine pollutant by the Department of Transportation (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This material is 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)
Copper	No	Yes	Yes
Silver	No	Yes	Yes
Phosphorous	Yes	Yes	Yes (yellow or white)

U.S. SARA THRESHOLD PLANNING QUANTITY: Phosphorous = 100 lbs.

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

U.S. CERCLA REPORTABLE QUANTITY (RQ): Copper = 5000 lb.; Silver = 1,000 lb.; (for metal particles under 100 micrometers in diameter). Phosphorous = 1 lb.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

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

Alaska-Designated Toxic and Hazardous Substances: Copper, fume, dust and mist, Phosphorous (yellow), Tin.

California-Permissible Exposure Limits for Chemical Contaminants: Copper, Silicon, Silver, Phosphorous (yellow), and Tin.

Florida-Substance List: Copper fume, dust and mist; Silver, Phosphorous (yellow), Tin.

Illinois-Toxic Substance List: Copper, Inorganic Fluoride Compounds, Silicon, Silver, and Phosphorous.

Kansas-Section 302/313 List: Copper and compounds.

Massachusetts-Substance List: Phosphorous (yellow), Tin.

Michigan-Critical Materials Register: Copper.

Minnesota-List of Hazardous Substances: Copper, fume; Silver, Silicon, Phosphorous (yellow), Tin.

Missouri-Employer Information/Toxic Substance List: Copper; Fluoride Compounds, Silicon, Silver, Phosphorous (yellow), Tin.

New Jersey-Right to Know Hazardous Substance List: Copper, Fluoride Compounds, Silver, and Tin.

North Dakota-List of Hazardous Chemicals, Reportable Quantities: Copper, Silver, and Phosphorous.

Pennsylvania-Hazardous Substance List: Copper, Silicon, Silver, Phosphorous, and Tin.

Rhode Island-Hazardous Substance List: Copper, fume, dust, mist; Silicon, Silver, Phosphorous (red, white, yellow), Tin.

Texas-Hazardous Substance List: Copper, fume, Phosphorous (yellow), Tin.

West Virginia-Hazardous Substance List: Copper, fume, Phosphorous (yellow), Tin.

Wisconsin-Toxic and Hazardous Substances: Copper, fume, Phosphorous (yellow), Tin.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The components of these products are not on the California Proposition 65 lists.

15. REGULATORY INFORMATION (Continued)

LABELING (Precautionary Statements): FOR FLUX-COATED RODS: CONTAINS FLUORIDES. CAN BE FATAL IF SWALLOWED

FOR FLUX-COATED RODS AND BARE WIRE:

WARNING: PROTECT yourself and others. Read and understand this information.

FUMES AND GASES can be hazardous to your health.

HEAT RAYS (INFRARED RADIATION) from flame or hot metal can injure your eyes.

- 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.
- Avoid contact of flux with the eyes and skin.
- Do not take internally.
- Use enough ventilation, exhaust at the flame, 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, available from the U.S. Government Printing Office, Superintendent Office, P.O. Box 371954, Pittsburgh, PA 15250-7954.

DO NOT REMOVE THIS INFORMATION.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDL 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: The components of these products are not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS SYMBOLS: Not applicable.

16. OTHER INFORMATION

DATE OF PRINTING:

November 11, 2004

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 this product. 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 J.W. Harris Company, Inc.'s 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 by J.W. Harris Co., Inc. as to the absolute correctness or sufficiency of any representation contained in this and other publications; J.W. Harris Co., Inc. 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. **IARC** - International Agency for Research on Cancer **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. **NTP** - National Toxicology Program

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: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - 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/m³** 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; **TD₀**, **LDLo**, and **LD₀**, 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/NDL** 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.