

SECTION 3: COMPOSITION (continued)

<u>Insulation Type</u>	<u>Temperature Class</u>	<u>Insulation Resin</u>
Formvar	105 C / 120 C	Polyvinyl Acetal
Polyurethane	155 C / 180 C	Modified Polyurethane
Polyurethane Nylon	155 C / 180 C	Modified Polyurethane with Polyamide overcoat
Solderable Polyesterimide	180 C	Polyesterimide
Polyester 200	180 C	Modified Polyester
Armored Polyester	200 C	Modified Polyester or Polyesterimide with Amide-imide overcoat
Pyre ML ¹	240 C	Polyimide

¹ IST (USA) Corp. Registered Trademark

All insulations may be supplied with a bondable overcoat:

Butvar Bond	Polyvinyl Butyral
Polyester Bond	Polyester
Epoxy Bond	Epoxy
Polyamide Bond	Polyamide

SECTION 4: FIRST AID MEASURES

Eyes: If nuisance dust, smoke or fume is created by burning, soldering, mechanical insulation stripping or abrasion, personnel in the vicinity may experience eye irritation. Rinse with water for 15 minutes and contact physician as needed.

Inhalation: If dust, smoke or fume is created by burning, soldering, mechanical insulation stripping or abrasion, personnel in the vicinity may experience nose and throat irritation. Move to fresh air immediately and seek medical attention if needed.

Skin Contact & Ingestion: Not expected route of exposure

SECTION 5: FIRE FIGHTING MEASURES

Copper magnet wire presents minimal explosion or fire hazard, however toxic fumes may be produced when subject to high heat as from a surrounding fire. Use extinguishing media suitable for the surrounding fire. Fire fighters should use self-contained breathing apparatus if necessary.

SECTION 6: ACCIDENTAL RELEASE MEASURES

In solid form magnet wire poses no special clean up problems. If material is in powder or dust form, clean up should be conducted to minimize airborne powder and dust and to avoid contamination of air and water. Unprocessed copper magnet wire is an easily contained solid material and has reclamation value as copper scrap.

SECTION 7: HANDLING AND STORAGE

Safe Handling and Storage: Handle spools by the flanges and use powered lift equipment when necessary to lift or move heavy reels. The optimum storage environment is low humidity and temperature controlled to avoid extremes. Prolonged exposure to sunlight or artificial lighting should be avoided to prevent degradation of the polymer insulation.

Incompatible Products: Copper in contact with hydrogen peroxide or heated with magnesium may produce violent reaction. Copper in contact with acetylene can produce unstable acetylides. Also avoid contact with chlorine gas, ammonium nitrate, bromates, chlorates, hydrogen sulfide, lead azide, hydrazine mononitrate, hydroazoic acid, potassium peroxide, sodium azide and sodium peroxides.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

<u>Substance</u>	<u>OSHA PEL¹</u>	<u>TLV²</u>
Copper	1 mg/M ³ [Dust]	1 mg/M ³ [Dust]
Polymer resin insulation	Not established	Not established

¹ Occupational Safety & Health Administration Permissible Exposure Limit

² American Conference of Governmental Industrial Hygienists Threshold Limit Value

Link to NIOSH Pocket Guide to Chemical Hazards: [CDC - NIOSH Pocket Guide to Chemical Hazards - Copper \(dusts and mists, as Cu\)](#)

Engineering Controls: Operations that generate fume or dust created by burning, soldering, mechanical insulation stripping or abrasion should be conducted under a fume hood or in an area with good local ventilation as required by the circumstances of exposure.

Personal Protective Equipment: Wear safety glasses when the risk of eye injury is present, particularly during machining, grinding, soldering, brazing, welding, powder handling, etc. Gloves and other protective equipment may be required during handling operations as appropriate to the circumstances of exposure.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Solid with no odor to very mild solvent odor. Color varies with type of coating. Standard colors are red, green, brown and amber. Additional colors may be produced. Odor threshold is estimated < 1 ppm.

pH: Not Applicable

Melting Point: 1083°C (copper metal)

Boiling Point: 2563°C (copper metal) **Flash Point:** Not Applicable

Evaporation Rate: Not Applicable **Flammability:** Non-flammable solid

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES (continued)

Vapor Density (Copper): 1@1628°C **Relative Density:** 8.37– 4.33 (AWG 12H-AWG 50Q)

Solubility: Insoluble in H₂O **Partition Coefficient (n-octanol/water):** No data

Viscosity: Not applicable **Auto-ignition temperature:** No data

Decomposition temperature: Begins at 230°C for low temperature film insulations

SECTION 10: STABILITY AND REACTIVITY

Film insulated copper magnet wire is chemically stable. Copper wire and polymer film insulations have low chemical reactivity with air, water and common solvents.

Copper in contact with hydrogen peroxide may produce violent reaction. Copper in contact with acetylene can produce unstable acetylides. Also avoid contact with chlorine gas, ammonium nitrate, bromates, chlorates, hydrogen sulfide, lead azide, hydrazine mononitrate, hydroazoic acid, potassium peroxide, sodium azide and sodium peroxides.

Conditions to avoid (e.g., static discharge, shock or vibration): None known.

When burned, soldered or hot staked, magnet wire coatings may release hazardous decomposition products that can cause eye or respiratory irritation. Decomposition products may include isocyanates such as toluene diisocyanate (TDI). Decomposition of nylon and coatings rated at 155°C and lower will begin at 230°C.

SECTION 11: TOXICOLOGICAL INFORMATION

Exposure to high doses of copper can be harmful. Exposure to copper dust can irritate the nose, mouth, and eyes, and cause headaches, dizziness, nausea, and diarrhea. Workers exposed to copper dust report a number of symptoms that are suggestive of respiratory irritation, including coughing, sneezing, thoracic pain and runny nose. Data on the potential of copper to induce respiratory effects are limited to the NTP (1993) study that found no histological alterations in the lungs of rats exposed to 285 or 134 mg copper/kg/day as copper sulfate in the diet for 14 or 90 days respectively, or in mice exposed to 717 or 814 mg copper/kg/day for 14 or 90 days.

Intentionally high intakes of copper can cause liver and kidney damage and even death. It is not known if copper can cause cancer in humans. EPA does not classify copper as a human carcinogen because there are no adequate human or animal cancer studies.

(Source: Agency for Toxic Substances & Disease Registry, Public Health Statement for Copper)

The toxicological effects of polymer resin film insulation are not known but nuisance dust created by mechanically stripping and fumes from burning, soldering or brazing are known irritants to the eyes, nose, throat and lungs. Effects of chronic exposure to insulation particulate or fumes are unknown.

Copper has not been listed as a carcinogen or potential carcinogen by NTP, IARC or OSHA.

SECTION 12: ECOLOGICAL INFORMATION

When released into the environment copper strongly attaches to organic matter and minerals. In surface water copper can travel great distances, either suspended on sludge particles or as free ions. The ecological impact of magnet wire film insulation released into the environment is not known but the material is an inert solid and not expected to be more detrimental than other plastics under the same conditions.

Ecotoxicity: Copper is an essential micronutrient. Studies have shown that aquatic species differ greatly in their sensitivity to copper with some able to tolerate high concentrations while others are adversely affected by very low concentrations.

Persistence and degradability: Copper metal does not biodegrade and is expected to be persistent in the environment.

Bioaccumulative potential: No data for metallic copper, but organic ligands in water or soil can provide a large buffering capacity, limiting bioavailability of copper. The geochemistry of a particular location is also a significant factor which can increase copper bioavailability and toxicity.

Mobility in soil: Korte et al. (1976) qualitatively ranked the relative mobilities of 11 metals added to 10 soils to simulate movement of metals under an anaerobic landfill situation. The leachate used was . . . preserved under carbon dioxide and adjusted to a pH of 5. Of the cationic metals studied, lead and copper were the least mobile . . . (Source: EPA/540/S-92/018, "Behavior of Metals in Soils," Joan E. McLean and Bert E. Bledsoe, 1992)

Other adverse effects: Excessive concentration of copper can be detrimental to the growth and health of plant life and aquatic life.

SECTION 13: DISPOSAL CONSIDERATIONS

Scrap copper magnet wire has reclamation value. If this is not practical, it must be disposed in accordance with local, state and federal regulation, which may require specific labeling, packaging, transportation and disposal procedures.

RCRA Hazardous Waste Number: Not regulated.

SECTION 14: TRANSPORT INFORMATION

UN Number: Not Applicable	UN Shipping Name: Not Applicable
D.O.T. Shipping Name: Not regulated	Hazard Class: Not Applicable
Packing Group: Not Applicable	Transport in Bulk: Not Applicable
Environmental Hazards: See Section 12 above	
Special Precautions: None known.	

SECTION 15: REGULATORY INFORMATION

SARA TITLE III SECTION 313: Copper is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR Part 372 of the Federal Register. Additional information can be obtained from the Emergency Planning and Community Right-To-Know Information Hot Line, US EPA, (800) 424-9346.

CERCLA Reportable Quantity [RQ]: 5000 pounds for pieces <.004” in diameter

EC RoHS DIRECTIVE COMPLIANCE: Film insulated copper magnet wire complies with Directive 2011/65/EU [recast of RoHS Directive 2002/95/EC] of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

ECHA REACH COMPLIANCE: Copper magnet wire meets the definition of an article under REACH and does not contain SVHC listed as of the revision date of this MSDS. Also see http://www.mwswire.com/pdf_files/reach.pdf for more information on MWS Wire products and REACH.

SECTION 16: OTHER INFORMATION

SDS Title: Film Insulated Copper Magnet Wire Revision Date: March 2, 2015

MWS Wire Industries (MWS) has attempted to provide current and accurate information in this data sheet, however MWS makes no representations regarding the accuracy or completeness of the information. Information is supplied upon the condition that the persons receiving it will make their own determinations as to its suitability prior to use. MWS assumes no liability for any loss, damage or injury of any kind which may arise out of the use or reliance on the information by any person. No warranties, either express or implied, of merchantability, fitness for a particular purpose or of any other nature are made with respect to the foregoing information or the product to which the information refers.

Applicability to REACH: Film insulated copper magnet wire meets the definition of an article and as such, is outside the scope of Article 31 of REACH. This SDS conforms to 29 CFR 1900.1200 and is provided as a convenience for our customers. It is not intended, nor required to comply with REACH SDS requirements. (Source: ECHA, *Guidance on the compilation of safety data sheets, Version 2.1, February 2014*).