

MATERIAL SAFETY DATA SHEET**SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT NAME: ECCOSHIELD® ES

DESCRIPTION: Solvent based coating

INTENDED USE: Electrically Conductive Adhesives and Coatings - Highly electrically conductive, silver based lacquer surface coating

COMPANY NAME: Emerson & Cuming Microwave Products, Inc.
ADDRESS: 28 York Ave, Randolph, MA 02368

EMERGENCY PHONE NUMBER CHEMTREC USA: 1-800-424-9300
INTERNATIONAL: 703-527-3887 (COLLECT)

CONTACT (TITLE): Elizabeth Sinkiewicz
Production Manager
781-437-1731

DATE OF MSDS REVISION: 09-19-2011

SECTION 2. COMPOSITION AND INFORMATION ON INGREDIENTS

ELEMENT	CAS NUMBER	WEIGHT PERCENT	OSHA PEL* (mg/m ³)	
			TWA	STEL
Additives	NA	<5%	NA	NA
Silver	7440-22-4	45-55%	0.1	NE
Butyl Acetate	123-86-4	20-30%	710 [713]	NE [950]
Toluene	108-88-3	5-15%	200 ppm	C300 ppm; 500**
Thermoplastic Resins	NE	5-10%	NA	NA
Isopropanol	67-63-0	2-5%	980 [492]	NE [984]
Methyl Ethyl Ketone	1338-23-4	1-2%	590	NE [885]

*ACGIH TLVs different from OSHA PELs are shown in brackets. NE = Not Established.

All components of this product are listed on the EPA Toxic Substance Control Act Inventory

** Concentration for 10 minute peak per 8 hour shift

SECTION 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Flammable. Skin and eye irritant.

POTENTIAL HEALTH EFFECTS:

Silver: Can cause blue-gray eyes, nasal septum, throat and skin irritation, skin ulceration, and gastrointestinal disturbance.

Butyl Acetate: Skin, eye and upper respiratory irritation could occur. May cause headache, drowsiness and narcosis.

Toluene: Nose and eye irritant; may cause lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Isopropanol: Eye, nose and throat irritation may occur. May cause drowsiness, dizziness, headache, and dry cracking skin. May cause narcosis in animals.

Methyl Ethyl Ketone: May cause skin, eye and nose irritation. Dizziness, vomiting and dermatitis may occur as a result of exposure.

INHALATION:

Silver: May cause respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.

Butyl Acetate: Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. High concentrations have a narcotic effect.

Toluene: Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.

Isopropanol: Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death.

Methyl Ethyl Ketone: Causes irritation to the nose and throat. Concentrations above the TLV may cause headache, dizziness, nausea, shortness of breath, and vomiting. Higher concentrations may cause central nervous system depression and unconsciousness.

INGESTION:

Silver: May cause irritation of the digestive tract. Effects may be cumulative. Ingestion of silver compounds may cause abdominal pain, rigidity, convulsions and shock.

Butyl Acetate: Irritant to tissues. Sore throat, abdominal pain, nausea, vomiting, diarrhea are the symptoms. Expected to have a narcotic effect. One ounce may produce severe poisoning.

Toluene: Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.

Isopropanol: Can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result.

Methyl Ethyl Ketone: May produce abdominal pain, nausea. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms expected to parallel inhalation.

SKIN:.

Silver: May cause skin irritation. May cause skin discoloration.

Butyl Acetate: This material degreases the skin. Irritation and discoloration of the skin are symptoms. Skin allergy occasionally develops. Persons who have become allergic can develop rash upon future exposure to low levels.

Toluene: Causes irritation. May be absorbed through skin.

Isopropanol: May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Methyl Ethyl Ketone: Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.

EYES:

Silver: May cause eye irritation.

Butyl Acetate: Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Toluene: Causes severe eye irritation with redness and pain.

Isopropanol: Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Methyl Ethyl Ketone: Vapors are irritating to the eyes. Splashes can produce painful irritation and eye damage.

CHRONIC HEALTH EFFECTS:

Silver: Chronic inhalation or ingestion of silver salts may cause argyria characterized by a permanent blue-gray discoloration of the eyes, skin, mucous membranes, and internal organs. This malady results from the accumulation of silver in the body.

Butyl Acetate: Repeated or prolonged skin contact may defat the skin and produce irritation and dermatitis. Kidney and liver damage are reported in animals.

Toluene: Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.

Isopropanol: Chronic exposure may cause skin effects.

Methyl Ethyl Ketone: Prolonged skin contact may defat the skin and produce dermatitis. Chronic exposure may cause central nervous system effects.

TARGET ORGANS:

Silver: Nasal septum, skin, eyes

Butyl Acetate: Eyes, skin, respiratory system, central nervous system

Toluene: Eyes, skin, respiratory system, central nervous system, liver, kidneys

Isopropanol: irritation eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin; in animals: narcosis

Methyl Ethyl Ketone: irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis

CARCINOGENICITY:

Toluene: EPA-NL; IARC-3; TLVA4

Isopropanol: IARC-3; TLV-A4

Methyl Ethyl Ketone: EPA-D; I

CONDITIONS AGGRAVATED BY EXPOSURE:

Silver: Data not available

Butyl Acetate: Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

Toluene: Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

Isopropanol: Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this agent.

Methyl Ethyl Ketone: Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

SECTION 4. EMERGENCY AND FIRST AID MEASURES

INHALATION:	Remove the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.
INGESTION:	DO NOT induce vomiting. If victim is conscious and alert, dilute by giving water to drink. Never give anything by mouth to a drowsy, unconscious, or convulsing person. Get immediate medical attention.
SKIN:	If this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly.
EYES:	Immediately wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately.
MEDICAL TREATMENT:	Treat symptoms and eliminate overexposure.

SECTION 5. FIRE FIGHTING MEASURES

WARNING: Contact with heat or open flame may result in explosion. Keep away from heat or open flame.

Flash Point:	55 (Pensky-Martens Closed Cup: ASTM D93)
Explosive Limits:	Not established
Extinguishing Media:	If a fire situation develops, use extinguishing media other than direct water spray to prevent splattering or spreading of material and possible environmental contamination.
Special Firefighting Procedures:	Cool containers with water. Firefighters should wear self-contained breathing apparatus. If large quantities of material are involved, evacuate area and fight fire from a safe distance.
Unusual Fire/Explosion Hazards:	Toxic vapors may be evolved upon exposure to heat or open flame.
NFPA and HMIS Rating:	Not available for this product.
Autoignition Temperature:	Not established

SECTION 6. ACCIDENTAL RELEASE MEASURES

Note: Cleanup of spills should be done in accordance with the provisions of OSHA 29CFR 1910.120 ("Hazardous Waste Operations and Emergency Response").

For small spills: Extinguish open flames and eliminate all other sources of ignition in the area. Turn on explosion-proof ventilation equipment to evacuate vapors from the area. Wipe up, or absorb with vermiculite or other absorbent material. Scrub area with soapy water and rinse. Prevents rinses from entering drains or other waterways. Collect waste in sealed containers. Dispose of as a hazardous material in accordance with current local, state and federal regulations.

For large spills: Evacuate all personnel not directly involved with spill response operations from the immediate area. Extinguish open flames and eliminate all other sources of ignition in the area. Turn on

~~explosion-proof ventilation equipment to evacuate vapors from the area. Dike area to contain spilled material~~ and to prevent runoff into drains, sewers, and other waterways. Use only spill response equipment that is approved for use in potential flammable/explosive environments. Shovel or pump to drum or salvage tank. Absorb residual material with sand, vermiculite, or other absorbent material. Scrape or shovel absorbed waste and absorbent into containers. Scrub area with soapy water and rinse. Prevents rinses from entering drains or other waterways. Dispose of as a hazardous material in accordance with current local, state and federal regulations.

Other Comments: If a fire situation develops, use extinguishing media other than direct water spray to prevent splattering or spreading of material and possible environmental contamination.

SECTION 7. HANDLING AND STORAGE

The recommendations described in this section are provided as general guidance for minimizing exposure when handling this product. Because usage conditions will vary depending on customer application, specific safe handling procedures should be developed by a person knowledgeable in the intended usage conditions and equipment. Employees must be properly trained in safe handling of this product prior to use.

WARNING: Treat as flammable material. Keep away from heat, sparks and open flame.

Personal Protection: Prevent contact with skin, eyes, or clothing. Wear proper protective gloves, goggles, and clothing to prevent exposure. Remove contaminated clothing and wash before reusing. Do not ingest or swallow this material.

Ventilation Recommendations and Respiratory Protection:

Do not breathe vapors, mist, or spray. Use only with proper exhaust mechanical explosion-proof ventilation, particularly in low-lying areas where vapors may accumulate. Wear an appropriate, NIOSH-approved organic vapor respirator if contaminant levels exceed the recommended exposure limits.

Storage:

Store in cool, dry place; keep removed from any heat or open flame. Avoid static electricity-large containers must be kept grounded at all times. Keep away from intense heat, open flames. Empty containers may contain flammable liquid or vapor residues; do not cut, weld, puncture, heat or pressurize container or perform other operations on or near containers that may generate heat, spark or flame.

SECTION 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

RESPIRATORY PROTECTION:

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

PROTECTIVE GLOVES:

Wear impervious solvent-resistant gloves to minimize contact.

EYE PROTECTION:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

OTHER PROTECTIVE EQUIPMENT:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

OTHER REQUIREMENTS:

Wash hands and face thoroughly after handling this product and before eating, drinking or smoking. Emergency eye wash facilities and safety shower must be available.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Silver liquid
Odor:	Solvent odor
Volatile Organic Compound content:	50-60% by weight
Physical State:	Liquid
Boiling Point:	Not established.
Vapor Pressure:	<15 mmHg
Evaporation Rate:	Not established.
Specific Gravity:	1.56
Vapor Density:	Heavier than air
Solubility in Water:	Negligible

SECTION 10. STABILITY AND REACTIVITY

Stability:	Product is stable under normal handling and storage conditions.
Incompatibility:	Strong oxidizers.
Hazardous Decomposition Products:	Carbon monoxide, carbon dioxide, oxides of nitrogen, hydrocarbons
Hazardous Polymerization:	Will not occur.
Conditions to Avoid:	Storage in open containers, exposure to heat and/or open flame, uncontrolled

mixing with (or exposure to) incompatible substances (above)

SECTION 11. TOXICOLOGICAL INFORMATION

Butyl Acetate:

Toxicological Data:

Oral rat LD50: 10.8 g/kg;

inhalation rat LC50: 390 ppm/4H

Skin rabbit LD50: >17,600 mg/kg;

Irritant, skin rabbit (Std. Draize): 500 mg/24H, moderate. Irritant, eye rabbit: 100 mg moderate. Investigated as a reproductive effector.

Reproductive Toxicity:

Has shown teratogenic effects in laboratory animals.

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---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
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n-Butyl Acetate (123-86-4)	No	No	None
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Toxicological Data:

Toluene:

Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m³/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity: Has shown some evidence of reproductive effects in laboratory animals.

-----\Cancer Lists\-----

---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
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Toluene (108-88-3)	No	No	3
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Isopropanol:

Oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation rat LC50: 16,000 ppm/8-hour; investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----

---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
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Isopropyl Alcohol (67-63-0)	No	No	3
Water (7732-18-5)	No	No	None

Methyl Ethyl Ketone:

Oral rat LD50: 2737 mg/kg; inhalation rat LC50: 23,500 mg/m³/8-hr; skin rabbit LD50: 6480 mg/kg; investigated as a mutagen, reproductive effector.

Reproductive Toxicity: Has shown teratogenic effects in laboratory animals.

-----\Cancer Lists\-----

---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
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Methyl Ethyl Ketone (78-93-3)	No	No	None
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SECTION 12. ECOLOGICAL INFORMATION

Butyl Acetate:

Environmental Fate:

When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to have a half-life of less than 1 day. When released into water, this material is expected to readily biodegrade. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has an estimated bioconcentration factor (BCF) of less than 100. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

Environmental Toxicity:

96 Hr LC50 fathead minnow: 18 mg/L (flow-through);

96 Hr LC50 bluegill: 100 mg/L (Static);

96 Hr EC50 freshwater algae (*Scenedesmus subspicatus*): 320 mg/L;

48 Hr EC50 water flea: 44 mg/L.

Toluene:

Environmental Fate:

When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).

Environmental Toxicity:

This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

Isopropanol:

Environmental Fate:

When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

Methyl Ethyl Ketone:

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material is expected to have a half-life between 10 and 30 days. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

SECTION 13. DISPOSAL CONSIDERATIONS

Maximize product recovery for reuse or recycling. Waste must be disposed of in accordance with federal, state and local environmental control regulations. If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24). Use may also generate liquid wastes with metal concentrations in excess of those permitted through pretreatment or direct discharge NPDES requirements. Appropriate analyses should be conducted to ensure compliance with existing wastewater permits.

SECTION 14. TRANSPORT INFORMATION

DOT Hazardous Material Description	Not applicable
Proper Shipping Name	Not applicable
Hazard Class	Not applicable
ID Number	1294 (toluene); 1193 (methyl ethyl ketone); 1123 (butyl acetate); 1219 (isopropanol)
Packing Group	NA Not applicable Canadian Transportation of
Dangerous Goods Classification	130 (toluene); 127(methyl ethyl ketone); 129 (butyl acetate, isopropanol);

SECTION 15. REGULATORY INFORMATION

All components of this product are listed on the EPA Toxic Substance Control Act Inventory

SECTION 16. OTHER INFORMATION

Special Notes: Volatile Organic Compound (V.O.C.): 801g/cc

Abbreviations: NA = Not Applicable NE = Not Established ND = Not Determined
ppm = Parts per Million mg/m³ = Milligrams Per Cubic Meter
C = Ceiling Concentration STEL = Short Term Exposure Limit

Safety Information and additional MSDS: 781-961-9600

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