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### MATERIAL SAFETY DATA SHEET FOR FR4

#### I. CHEMICAL PRODUCT

**PRODUCT NAME:** FR4

**IN CASE OF EMERGENCY CALL:** (24 Hours/Day, 7 Days/Week) (608) 784-6070

#### II. COMPOSITION/INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS#</u>	<u>WEIGHT%</u>
Continuous Filament Fiber Glass	(65997-17-3)	40-70
Copper	(7440-50-8)	8-28
Epoxy Resin	(26265-08-7)	20-30

Trace impurities and additional material names not listed above may also appear in the Regulatory Information section (#15) towards the end of the MSDS. These materials may be listed for local 'Right to Know' compliance and for other reasons.

#### III. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW:** A nonflammable, sheet material. Dust, when machined or punched may cause skin or eye irritation. Fumes, if decomposed may irritate eyes, nose, and throat.

#### POTENTIAL HEALTH HAZARDS

**SKIN:** Dust may cause moderate skin irritation.

**EYES:** Dust may cause moderate eye irritation. Fumes may irritate eyes.

**INHALATION:** Fibrous glass dust may be released from the fiberglass cloth substrate when machined. ACGIH TLV is 10 mg/m<sup>3</sup> TWA for particles <5 microns in diameter.

**INGESTION:** Not determined.

**DELAYED EFFECTS:** Our product is reinforced with continuous filament fiberglass. Dust generated from the cutting, grinding, machining, etc., would not be expected to produce respirable particles. IARC considers continuous glass filaments as unclassifiable or probably non-carcinogenic.

**Ingredients found on one of the OSHA designated carcinogen lists are listed below.**

<u>Ingredient Name</u>	<u>NTP Status</u>	<u>IARC Status</u>	<u>OSHA List</u>
None	None	None	None

#### IV. FIRST AID MEASURES

**SKIN:** Wash in flowing water or shower. Remove contaminated clothing.

**EYE:** Irrigate with flowing water for 15 minutes. If irritation persists, consult a physician.

**INHALATION:** If overcome by dust or smoke, move to fresh air. If not breathing, give mouth-to-mouth resuscitation. Call physician.

**INGESTION:** If large amounts are ingested, consult physician.

**ADVICE TO PHYSICIAN:** Treat symptomatically

#### V. FIRE FIGHTING MEASURES

##### FLAMMABLE PROPERTIES

**FLASH POINT:** N/A

**FLASH POINT METHOD:** N/A

**AUTOIGNITION TEMPERATURE:** Not determined

**UPPER FLAME LIMIT (Volume % in air):** N/A

**LOWER FLAME LIMIT (Volume % in air):** N/A

**FLAME PROPAGATION RATE (Solids):** UL V-O

**OSHA FLAMMABILITY CLASS:** N/A

**EXTINGUISHING MEDIA:** Water, CO<sub>2</sub> and dry chemical

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** May give off toxic hydrogen bromide when thermally decomposed.

**SPECIAL FIREFIGHTING PRECAUTIONS/INSTRUCTIONS:** Firemen should wear proper protective equipment and positive pressure self-contained breathing apparatus.

#### VI. ACCIDENTAL RELEASE MEASURES

**IN CASE OF SPILL OR OTHER RELEASE:** Always wear recommended personal protection equipment.

Spills and releases may have to be reported to Federal and/or local authorities. See the Regulatory Information section (#15) regarding reporting requirements.

### **VII. HANDLING AND STORAGE**

**NORMAL HANDLING:** Always wear recommended personal protective equipment. The primary exposure route is inhalation of dust when machine/punched or from fumes or vapors when heated.

**STORAGE RECOMMENDATIONS:** N/A

### **VIII. EXPOSURE CONTROLS/PERSONAL PROTECTION**

**ENGINEERING CONTROLS:** Use local exhaust ventilation to control dust.

#### **PERSONAL PROTECTIVE EQUIPMENT**

**SKIN PROTECTION:** For brief contact to dust, no precautions other than clean body-covering clothing should be needed. Use gloves and aprons when prolonged or frequently repeated contact occurs.

**EYE PROTECTION:** Use appropriate eye protection when machining material.

**RESPIRATORY PROTECTION:** Atmospheric levels of Fibrous glass and Copper Dust should be maintained below exposure guidelines. When respiratory protection is required for certain operations, use a NIOSH-approved dust respirator.

**ADDITIONAL RECOMMENDATIONS:** N/A

**EXPOSURE GUIDELINES:** Guidelines exist for the following ingredients

<b><u>Ingredient Name</u></b>	<b><u>CAS. NO.</u></b>	<b><u>ACGIH TLV</u></b>	<b><u>OSHA PEL</u></b>	<b><u>Other Limit</u></b>
Copper Dust	(7440-50-8)	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	N/A
Fibrous Glass Dust	(65997-17-3)	10 mg/m <sup>3</sup>	None	1 f/cc >5u long and 3:1 aspect ratio, TWA

Other exposure limits for the decomposition products normally associated with product use are as follows: None

### **IX. PHYSICAL AND CHEMICAL PROPERTIES**

**APPEARANCE:** Yellow to amber sheets

**PHYSICAL STATE:** Solid

**MOLECULAR WEIGHT:** N/A

**CHEMICAL FORMULA:** N/A

**ODOR:** None, unless heated

**SPECIFIC GRAVITY (Water = 1.0):** 1.5 +/- 0.25

**SOLUBILITY IN WATER:** (Weight %) Negligible in most aqueous and organic solvents.

**pH:** N/A

**BOILING POINT:** N/A

**MELTING POINT:** N/A

**VAPOR PRESSURE:** N/A

**VAPOR DENSITY: (Air = 1.0)** N/A

**EVAPORATION RATE:** N/A **Compared to:** N/A

**% VOLATILES:** N/A

**FLASH POINT:** N/A

(Flash point method and additional flammability data are found in section 5.)

#### **X. STABILITY AND REACTIVITY**

**NORMALLY STABLE:** (conditions to avoid) Stable

**INCOMPATIBILITIES:** Not determined

**HAZARDOUS DECOMPOSITION PRODUCTS:** CO, CO<sub>2</sub>, HBr, oxides of nitrogen if heated in excess of 300° C.

**HAZARDOUS POLYMERIZATION:** None

#### **XI. TOXICOLOGICAL INFORMATION**

**IMMEDIATE (ACUTE) EFFECTS:** Dust may cause moderate eye, skin and respiratory irritation.

**DELAYED (SUBCHRONIC & CHRONIC) EFFECTS:** NTP has determined that respirable size glasswool may be reasonably anticipated to be a carcinogen. IARC has also classified glasswool as a possible carcinogen. Our product is reinforced with continuous filament fiberglass. Dust generated from the cutting, grinding, machining, etc. would not be expected to produce respirable particles. IARC considers glass filaments as unclassifiable or probably non-carcinogenic.

**OTHER DATA:** The toxicity of the combustion products was evaluated in a similar product with 95% confidence limits; the LC50 was calculated (Probit Analysis) to be 40.4 (32.3-69.9) mg/L. The LC50 of the standard reference material, Douglas *fir*, is 27.1 mg/L.

#### **XII. ECOLOGICAL INFORMATION**

Not Biodegradable

#### **XIII. DISPOSAL CONSIDERATIONS**

##### **RCRA**

**Is the unused product a RCRA hazardous waste if discarded:** No

**OTHER DISPOSAL CONSIDERATIONS:** Disposal must be made in accordance with all applicable Local, State and Federal regulations. Copper should be recycled.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing

#### **XIV. TRANSPORT INFORMATION**

**US DOT HAZARD CLASS:** Not regulated

**US DOT ID NUMBER:** N/A

For additional information on shipping regulations affecting this material, contact the information number found on the first page.

## **XV. REGULATORY INFORMATION**

### **TOXIC SUBSTANCES CONTROL ACT (TSCA)**

**TSCA INVENTORY STATUS:** The resin system components used to make this material are on the TSCA inventory list.

**OTHER TSCA ISSUES:** N/A

### **SARA TITLE III/CERCLA**

**RQs & TPQs:** Reportable Quantities” (RQs) and/or “Threshold Planning Quantities” (TPQs) exist for the following ingredients.

<u>Ingredient</u>	<u>SARA/CERCLA RQ(lbs)</u>	<u>SARA EHS TPQ(lbs)</u>
N/A	N/A	N/A

**Spills/releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center (1-800-424-8802) and to your Local Emergency Planning Committee.**

**SECTION 311 HAZARD CLASS:** N/A

### **SARA 313 TOXIC CHEMICALS:**

The following ingredients are SARA 313 “Toxic Chemicals”. CAS #-s and wt.% are found in section ~2.

<u>Ingredient</u>	<u>CAS. NO.</u>	<u>Comment</u>
Copper	(7440-50-8)	Recycle

### **STATE RIGHT TO KNOW:**

In addition to the ingredients found in section 2, the following are listed for state right-to-know purposes:

<u>Ingredient</u>	<u>Wt.%</u>	<u>Comment</u>
N/A	N/A	N/A

### **ADDITIONAL REGULATORY INFORMATION**

Injectorall Electronics Corp. does not use polybromide-biphenls or polybromide-biphenyloxides as a fire retardant in any of our epoxy or phenolic resin systems.

**WHMIS CLASSIFICATION (CANADA):** N/A

**FOREIGN INVENTORY STATUS:** N/A

## **XVI. OTHER INFORMATION**

**CURRENT ISSUE DATE:** 7/15/05

**Although the information and recommendations in this Material Safety Data Sheet (‘information’) are presented faith**

and believed to be correct as of the date stated above. Injectorall Electronics Corp. makes no warranty as to the completeness or accuracy of this information. This information is supplied with the condition that the persons receiving it will make their own determination as to its suitability for their purpose prior to implementation.

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