SAFETY DATA SHEET

Section 1. Identification

Manufacturer
AGC Multi Material America, Inc.
1420 W. 12th Place, Tempe, AZ 85281, USA

Tel: +1-480-967-5600

Emergency Phone Number: +1-480-967-5600

Product Name: **RF-35HTC**

Specific Use: Laminates for circuit boards.

Section 2. Hazards Identification

Classification: This product as-sold is NOT classified as a hazardous chemical as defined by the OSHA Hazard Communication Standard 29 CFR 1910.1200.

Hazard Classification Determination (This is for documentation purposes only and will be hidden on the published final SDS sheet.): Highlight Those Hazards Only Applicable to this Product As-Sold. Refer to 1910.1200 Appendix A & B for details. Applicable = √; Not-Applicable = X.

1910.1200 Appendix A Physical Hazards		1910.1200 Appendix B Health Hazards	
X	B.1 Explosives	X	A.1 Acute Toxicity (Adverse Effects Following Oral, Dermal or Inhalation Exposure)
X	B.2 Flammable Gases (Ignitable at 68 F)	X	A.2 Skin Corrosion/Irritation (Irreversible Damage, Skin Reaction, Inflammation.)
X	B.3 Flammable Aerosols	X	A.3 Serious Eye Damage/Irritation (Irreversible Damage, Redness)
X	B.4 Oxidizing Gases	X	A.4 Respiratory or Skin Sensitization (Airway Hypersensitivity, Allergic Response)
X	B.5 Gases Under Pressure (Compressed or Liquefied)	X	A.5 Germ Cell Mutagenicity (Permanent Cell Changes)
X	B.6 Flammable Liquids (Flash Point <= 199.4 F)	X	A.6 Carcinogenicity (Induced Benign or Malignant Cancer)

X	B.7 Flammable Solids (Easily Ignited)	X	A.7 Reproductive Toxicity (Adverse Effects on Function, Fertility and Offspring Development)
X	B.8 Self-Reactive Chemicals (Organic Peroxide)	X	A.8 Specific Target Organ Toxicity Single Exposure (Identifiable Toxic Effects, Changes)
X	B.9 Pyrophoric Liquids (Ignites When Contact with Air)	X	A.9 Specific Target Organ Toxicity Repeated Exposure (Identifiable Toxic Effects, Changes)
X	B.10 Pyrophoric Solids (Ignites When Contact with Air)	X	A.10 Aspiration Hazard (Pneumonia, Pulmonary Injury or Death)
X	B.11 Self-Heating Chemicals (Gradual Reaction with Oxygen Generates Heat)		
X	B.12 Emits Flammable Gas When Contact with Water		
X	B.13 Oxidizing Liquids		
X	B.14 Oxidizing Solids		
X	B.15 Organic Peroxides		
X	B.16 Corrosive to Metals		

GHS Label Elements: This product as-sold is NOT classified as a hazardous chemical as defined by the OSHA Hazard Communication Standard 29 CFR 1910.1200.

Precautionary Statement: This product as-sold is NOT classified as a hazardous chemical as defined by the OSHA Hazard Communication Standard 29 CFR 1910.1200.

Hazards Not Otherwise Classified: Before use refer to the "Guide to the Safe Handling of Fluoropolymer Resins", published by the Society of the Plastics Industry.

Section 3. Composition/Information on Ingredients

Substance/Mixture:

Ingredient Name	CAS Number	Weight %
Polytetrafluoroethylene (PTFE)	9002-84-0	5% - 50%
Copper	7440-50-8	5% - 85%
Boron Nitride	10043-11-5	5% - 40%
Silica, amorphous	7631-86-9	2% - 20%
Titanium dioxide	13463-67-7	2% - 15%

Section 4. First Aid Measures

Description of Necessary First Aid Measures

Inhalation: No special treatment needed.

Skin Contact: No special treatment needed.
Eye Contact: No special treatment needed.
Ingestion: If product has been swallowed, get medical attention immediately.

Most Important Symptoms/Effects, Acute and Delayed

Potential Acute Health Effects

Inhalation: No known significant effects.
Skin Contact: No known significant effects.
Eye Contact: No known significant effects.
Ingestion: No known significant effects.

Over-Exposure Signs/Symptoms

Inhalation: No known significant effects.
Skin Contact: No known significant effects.
Eye Contact: No known significant effects.
Ingestion: No known significant effects.

Indication of Immediate Medical Attention and Special Treatment Needed, If Necessary

Notes to Physician: No special treatment needed.
Specific Treatments: No special treatment needed.

Section 5. Fire-Fighting Measures

Suitable Extinguishing Media: Water Spray, Carbon Dioxide (CO_2), Dry Chemical, Foam

Hazardous Thermal Decomposition Products: Hydrogen Fluoride, Carbonyl Fluoride, Carbon Monoxide, Copper Oxides, Boron Oxides, Nitrogen Oxides

Special Protective Equipment and Precautions for Fire-Fighters: Wear self-contained breathing apparatus and protective suit. Wear neoprene gloves during cleaning up work after a fire. Protect from hydrogen fluoride fumes which react with water to form hydrofluoric acid.

Section 6. Accidental Release Measures

Personal Precautions, Protective Equipment

and Emergency Procedures: Refer to Sections 4, 5 and 8.

Methods and Materials for and Cleaning Up: Material for disposal should be placed in appropriate containers. **Containment** Dispose of dry solids in a landfill that is permitted, licensed or registered, to manage industrial solid waste. Incinerate only if incinerator is capable of scrubbing out hydrogen fluoride and other acidic combustion products.

Section 7. Handling and Storage

Precautions for Safe Handling: No special handling precautions needed.

Conditions for Safe Storage, Including Any Incompatibilities: No special restrictions on storage with other products.

Section 8. Exposure Controls/Personal Protection

Occupational Exposure Limits

Ingredient Name	CAS Number	OSHA PEL Exposure Limits	ACGIH TLV Exposure Limits
Polytetrafluoroethylene (PTFE)	9002-84-0	None.	None.
Copper dust	7440-50-8	8 HR TWA Dust = 1 mg/m3	8 HR TWA Dust = 1 mg/m3
Silica, amorphous dust	7631-86-9	8 HR TWA Dust = 80 mg/m3	8 HR TWA Dust = 6 mg/m3
Titanium dioxide dust	13463-67-7	8 HR TWA Total Dust = 15 mg/m3 8 HR TWA Respirable Fraction = 5 mg/m3	8 HR TWA Total Dust = 10 mg/m3

Appropriate Engineering Controls: No special controls needed.

Individual Protection Measures

Respiratory Protection: No special protective measures needed.
Eye/Face Protection: Wear ANSI approved safety glasses when handling product.
Hand Protection: Wear cut resistant gloves when handling product.
Foot Protection: Wear ANSI/ASTM approved safety-toe shoes when handling product.

Section 9. Physical and Chemical Properties

Physical State:	Solid.
Color:	Copper/Brown.
Odor:	Odorless.
Odor Threshold:	Not applicable.
pH:	Not applicable.
Melting Point:	320ºC - 340ºC
Boiling Point:	Not applicable.
Flash Point:	Does not flash.
Evaporation Rate:	Not applicable.
Flammability:	Not flammable.
Explosive Limits:	Not applicable.
Vapor Pressure:	Not applicable.
Vapor Density:	Not applicable.
Specific Gravity:	2.30
Solubility:	Insoluble.
Auto-Ignition Temperature:	520ºC
Decomposition Temperature:	470ºC
Viscosity:	Not applicable.

Section 10. Stability and Reactivity

Reactivity:	Not reactive under recommended storage conditions.
Chemical Stability:	Stable under recommended storage conditions.
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur under recommended storage conditions.
Conditions to Avoid:	Do not overheat. High temperatures can produce irritating or toxic fumes. Refer to the "Guide to the Safe Handling of Fluoropolymer Resins", published by the Society of the Plastics Industry.
Incompatible Materials:	Acetylene, acids, finely divided aluminum, powdered metals, and very strong oxidizers, such as fluorine.
Hazardous Decomposition Products:	Hydrogen Fluoride, Carbonyl Fluoride, Carbon Monoxide, Copper Oxides, Boron Oxides, Nitrogen Oxides

Section 11. Toxicological Information

Information on Likely Routes of Exposure:	Inhalation: No known significant effects. Skin Contact: No known significant effects.

Eye Contact: No known significant effects.
Ingestion: No known significant effects.

Acute Toxicity: Polytetrafluoroethylene (PTFE): Oral LD50 = >11,280 mg/kg (rat)
Copper: Oral LD50 >5,000 mg/kg (mouse)
Silica, amorphous dust: Intratracheal LD50 = 96.77 mg/kg (mouse)
Titanium dioxide dust: Intratracheal LD50 >100 ug/kg (rat)
Boron nitride dust: Dermal LD50 >20mL/kg (rabbit)

Skin Corrosion/Irritation: Titanium dioxide dust: Skin; 300 ug/3 day-intermittent (human)

Serious Eye Damage/ Irritation: No known significant effects.

Respiratory or Skin Sensitization: No known significant effects.

Germ Cell Mutagenicity: Titanium dioxide dust: Lung; 100 ug/plate (human)

Carcinogenicity:

Ingredient Name	CAS Number	OSHA	IARC	NTP
Polytetrafluoroethylene (PTFE)	9002-84-0	No	3	None
Silica, amorphous	7631-86-9	No	3	None
Titanium dioxide	13463-67-7	No	2B	None

Reproductive Toxicity: Copper: Oral; 152 mg/kg (rat)

Specific Target Organ Toxicity Single Exposure: No known significant effects.

Specific Target Organ Toxicity Repeated Exposure: Copper: Oral; 10 mg/kg, 12 week-intermittent (mouse), Changes in lung.
Silica, amorphous dust: Inhalation; 5.41 mg/m3, 5 day-intermittent (rat), Changes in lung.
Titanium dioxide dust: Inhalation; 250 mg/m3, 6 hour/2 year-intermittent (rat), Lung tumors.

Aspiration Hazard: No known significant effects.

Section 12. Ecological Information

Aquatic Toxicity: Copper: LC50 < 20 ug/L (water flea)

Terrestrial Toxicity: Copper: LC50 > 1,601 mg/kg (earthworm)

Persistence and Degradability: Boron nitride dust.

Bioaccumulative Potential: No known significant effects.

Mobility in Soil: No known significant effects.

Other Adverse Effects: None of the components listed are Ozone Depleting Substances.

Section 13. Disposal Considerations

Disposal Methods: Disposal should be made in accordance with federal, state and local regulations. Dispose of dry solids in a landfill that is permitted, licensed or registered to manage industrial solid waste. Incinerate only if incinerator is capable of scrubbing out hydrogen fluoride and other acidic combustion products.

RCRA Classification: Not regulated.

Section 14. Transport Information

DOT Hazardous Materials: None of the components are listed.
DOT Marine Pollutants: Listed; Copper dust, 7440-50-8.

Transport Information: Not classified as dangerous goods according to the national and international regulations on the transport of dangerous goods.

Special Transport Precautions for User: No special restrictions when transporting product.

Section 15. Regulatory Information

United States Federal Regulations

Clean Air Act 112b HAPs: None of the components are listed.
Clean Air Act 112r EHS: None of the components are listed.
Clean Air Act 602 Class I Ozone Depleting Substances: None of the components are listed.
Clean Air Act 602 Class II Ozone Depleting Substances: None of the components are listed.
Clean Air Act SOCMI Chemicals: None of the components are listed.

Clean Water Act 311: Listed; Copper, 7440-50-8.
DHS Chemicals of Interest: None of the components are listed.
OSHA PSM Highly Hazardous Chemicals: None of the components are listed.
SARA 302 EHS TPQ: None of the components are listed.
SARA 304 EHS RQ: Listed; Copper, 7440-50-8.
SARA 311/312: None of the components are listed.
SARA 313 TRI: Listed; Copper, 7440-50-8.
TSCA Chemical Substance Inventory: Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
TSCA HPV Chemical: None of the components are listed.
TSCA PMNACC Addendum: None of the components are listed.
TSCA 12(b) Chemicals Listings: None of the components are listed.

States Regulations

California Hazardous Substances: Listed; Copper, 7440-50-8; Silica, amorphous, 7631-86-9.
California Proposition 65: None of the components are listed.
Delaware List of Chemicals: Listed; Copper, 7440-50-8.
Idaho Toxic Air Pollutants: Listed; Copper, 7440-50-8.
Illinois Toxic Air Contaminates: Listed; Copper, 7440-50-8.
Maine HAPs: Listed; Titanium dioxide, 13463-67-7.
Massachusetts Hazardous Substances: Listed; Copper, 7440-50-8, Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7.
Michigan Critical Materials: Listed; Copper, 7440-50-8.
Minnesota Hazardous Substances: Listed; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7.
New Jersey RTK: Listed; Copper, 7440-50-8.
New Jersey TCPA EHS: None of the components are listed.
New York Hazardous Substances: Listed; Copper, 7440-50-8.
North Carolina Toxic Air Pollutants: None of the components are listed.
Pennsylvania Hazardous Substances: Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7.
Washington PELs: Listed; Copper, 7440-50-8; Titanium dioxide, 13463-67-7.
West Virginia Toxic Air Pollutants: None of the components are listed.
Wisconsin Hazardous Air Contaminates: Listed; Copper, 7440-50-8.

International Regulations

Australia Inventory of Chemical Substances (AICS): Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
Canada CEPA Toxic Substances: None of the components are listed.
Canada DSL Inventory: Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
Canada NDSL Inventory: None of the components are listed.

Canada Priority Substances Lists: None of the components are listed.
China Inventory of Existing Chemical Substances (IECSC): Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
EU Substances of Very High Concern: Does not contain REACH SVHCs greater than 0.1%.
EU REACH Classification: Article.
EU RoHS Substances: None of the components are listed.
EU WEEE Directive: Compliant.
Europe EINECS: Listed; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
Japan Inventory of Existing & New Chemical Substances (ENCS): Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
Korea Existing Chemicals Inventory (KECI): Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
Malaysia EHS Register: Listed; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7.
New Zealand Inventory of Chemicals (NZIoC): Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
Philippines Inventory of Chemicals and Chemical Substances (PICCS): Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.
Taiwan Inventory (CSNN): Listed; Polytetrafluoroethylene (PTFE), 9002-84-0; Copper, 7440-50-8; Silica, amorphous, 7631-86-9; Titanium dioxide, 13463-67-7; Boron Nitride, 10043-11-5.

Section 16. Other Information

NON-WARRANTY: The information provided in this Safety Data Sheet is based upon the research and experience of Taconic. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, and disposal and is not to be considered a warranty or quality specification. Each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified. No representation or warranty is made concerning the accuracy or completeness of the information presented in this publication.