



MSDS ANNOUNCEMENT

March 2012

Epoxy Technology, Inc. is proud to introduce the first set of our newly formatted Material Safety Data Sheets (MSDS). Given the worldwide efforts to heighten environmental awareness, Epoxy Technology continues to focus on efforts to adopt sustainability policies and corporate accountability. Although the United Nations' Global Harmonized System (GHS) for MSDSs is not yet required under U.S. law, Epoxy Technology has concluded that our customers deserve to receive Material Safety Data Sheets in a format that is valid and transferable throughout the world.

This is a major undertaking, given that virtually every country or region has specific requirements regarding hazardous components and safety warnings, many of which are inconsistent or in conflict. These differences require the new global format to be lengthy and repetitive at times. Our customers will continue to see additional products' MSDSs released periodically over the course of the next several months.

Please recognize that EPO-TEK[®] products have not changed, and our recommendations about how to handle them safely remain the most important information contained in our MSDSs. We expect our colleagues throughout the adhesives industry – and other manufacturing industries – will likely follow this more comprehensive and thorough GHS model in time. As always, we appreciate your continued business and value serving your adhesive needs worldwide.

EPOXY TECHNOLOGY, INC.

Number of Components: Two

Mix Ratio By Weight: 1:1

Specific Gravity:

Part A 1.5

Part B 2.5

Pot Life: 56 Hours

Shelf Life: One year at room temperature.

Note: Container(s) should be kept closed when not in use. For filled systems, mix contents of each container (A & B) thoroughly before mixing the two together. *Please see Applications Note available on our website.

Minimum Bond Line Cure Schedule*:

175°C 1 Minute

150°C 5 Minutes

120°C 15 Minutes

80°C 90 Minutes

Product Description:

EPO-TEK® H70E is a two component, thermally conductive, electrically insulating epoxy designed for chip bonding in microelectronic and optoelectronics applications.

EPO-TEK® H70E Advantages & Application Notes:

- Heat-sinking adhesive. It is particularly recommended for thermal management applications where good heat dissipation is necessary.
- The excellent handling characteristics and the long pot life at room temperature for this unique, two component system is obtained without the use of solvents.
- Easy to use. It can be screen printed, machine dispensed, stamped, or hand applied.
- Die-attach adhesive designed to be used in the 300°C range to resist TC wire bonding operations. Meets JEDEC Level III and II packaging criteria.
- Excellent adhesion to ferrous and non-ferrous metals, lead-frame die paddle, glass, ceramic, kovar, and PCB.
- Can be cured very rapidly; excellent material to use for making fast circuit repairs; can be snap-cured for in-line semiconductor die-bonding.
- Passes NASA low outgassing standard ASTM E595 with proper cure - <http://outgassing.nasa.gov/>

Typical Properties: (To be used as a guide only, not as a specification. Data below is not guaranteed. Different batches, conditions and applications yield differing results; Cure condition: 150°C/1 hour; * denotes test on lot acceptance basis)

Physical Properties:

*Color: Part A: Grey Part B: Beige

*Consistency: Slightly pourable paste

*Viscosity (@ 50 RPM/23°C): 4,000 – 7,000 cPs

Thixotropic Index: 1.17

*Glass Transition Temp.(Tg): ≥ 80°C (Dynamic Cure
20—200°C /ISO 25 Min; Ramp -10—200°C @ 20°C/Min)

Coefficient of Thermal Expansion (CTE):

Below Tg: 15×10^{-6} in/in/°C

Above Tg: 64×10^{-6} in/in/°C

Shore D Hardness: 83

Lap Shear Strength @ 23°C: > 2,000 psi

Die Shear Strength @ 23°C: ≥ 10 Kg / 3,400 psi

Degradation Temp. (TGA): 451°C

Weight Loss:

@ 200°C: 0.24%

@ 250°C: 0.75%

@ 300°C: 1.60%

Operating Temp:

Continuous: - 55°C to 200°C

Intermittent: - 55°C to 300°C

Storage Modulus @ 23°C: 787,350 psi

Ions: Cl⁻ 186 ppm

Na⁺

NH₄⁺

K⁺

*Particle Size: ≤ 50 Microns

Thermal Properties:

Thermal Conductivity: 0.9 W/mK

Electrical Properties:

Dielectric Constant (1 KHz): 4.22

Dissipation Factor (1 KHz): 0.004

Volume Resistivity: ≥ 1×10^{13} Ohm-cm

EPOXY TECHNOLOGY, INC.

14 Fortune Drive, Billerica, MA 01821-3972 Phone: 978.667.3805 Fax: 978.663.9782

www.EPOTEK.com







Epoxy and Adhesives for Demanding Applications™

This information is based on data and tests believed to be accurate. Epoxy Technology, Inc. makes no warranties (expressed or implied) as to its accuracy and assumes no liability in connection with any use of this product.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

- 1.1 Product identifier**
 GHS Product Identifier EPO-TEK H70E Part A
 Chemical Name Not applicable
 Trade name EPO-TEK H70E Part A
 CAS No. Mixture
 EINECS No. Mixture
 REACH Registration No. Not available
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
 Identified use(s)
 Uses advised against Users are recommended to seek further advice.
- 1.3 Details of the supplier of the safety data sheet**
 Company Identification Epoxy Technology, Inc.
 Address 14 Fortune Drive, Billerica MA 01821 USA
 Telephone (978) 667-3805
 E-Mail (competent person) techserv@epotek.com
- 1.4 Emergency telephone number – Chemtel Inc.**
 Emergency Phone No. (800) 255-3924, (813) 248-0585

**SECTION 2: HAZARDS IDENTIFICATION**

- 2.1 Classification of the Substance or Mixture**
- 2.1.1 Regulation (EC) No. 1272/2008 (CLP) – Acute Toxicity 5, Skin Irritation 2, Eye Irritation 2A, Skin Sensitizer 1, (3.1/5, 3.2/2, 3.3/2A, 3.4/1)**
- 2.1.2 Directive 67/548/EEC & Directive 1999/45/EC – Harmful / Irritant**
- 2.2 Label Elements**
- 2.2.1 Label Elements According to Regulation (EC) No. 1272/2008 (CLP)**
 GHS Product Identifier (EU)
 Hazard   Signal Word(s) **Warning**
 Pictogram(s)
 Hazard Statement(s)
 H303: May be harmful if swallowed.
 H315: Causes skin irritation.
 H317: May cause an allergic skin reaction.
 H319: Causes serious eye irritation.
 H411: Toxic to aquatic life with long lasting effects.
 EUH205: Contains epoxy constituents. See information supplied by the manufacturer.
 Precautionary Statement(s)
 P264: Wash (hands and exposed skin) thoroughly after handling.
 P280: Wear protective gloves/protective clothing/eye protection/face protection.
 P301 + P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
 P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
 P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P312: Call a POISON CENTER or doctor if you feel unwell.
- 2.2.2 Label Elements According to Directive 67/548/EEC & Directive 1999/45/EC**
 Hazard Symbol  
 Risk Phrases
 R22: Harmful in contact with skin and if swallowed.
 R36/38: Irritating to eyes and skin.
 R43: May cause sensitization by skin contact.
 R51: Toxic to aquatic organisms
 Safety Phrases
 S24/25: Avoid contact with skin and eyes.
 S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 S36/39: Wear suitable protective clothing and eye/face protection.
 S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
- 2.3 Other Hazards** GHS Classification (USA): Hazardous under OSHA Hazard Communication Standard – Sensitizer/ Irritant (Eyes, Skin)
 HMIS: Health-2, Flammability-1, Reactivity – 0  

SECTION 6: ACCIDENTAL RELEASE MEASURES

- 6.1 Personal precautions, protective equipment and emergency procedures** Ensure full personal protection (including respiratory protection) during removal of spillages.
- 6.2 Environmental Precautions** Ventilation recommended.
- 6.3 Methods and material for containment and cleaning up** Transfer to a lidded container for disposal or recovery. Re- use or recycling of waste highly recommended.
- 6.4 Reference to other sections** See Also Section 7, 8, 13.
- 6.5 Additional Information** None

SECTION 7: HANDLING AND STORAGE

- 7.1 Precautions for safe handling** Avoid ingestion. Use only in well-ventilated areas. Keep away from oxidizing agents. Keep away from fire, sparks and heated surfaces - no smoking.
- 7.2 Conditions for safe storage, including any incompatibilities** Protect from sunlight. Store in a well-ventilated place. Do not use or store near heat or open flame. Do not store and transport with oxidizers etc.
- Storage Temperature Ambient.
- Storage Life Not available
- Incompatible materials Oxidizing agents, Can react violently if in contact with acids, alkalis, reducing agents and heavy metals.
- 7.3 Specific end use(s)** Consult the supplier.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**8.1 Control parameters****8.1.1 Occupational Exposure Limits**

SUBSTANCE.	CAS No.	LTEL (8 hr TWA ppm)	LTEL (8 hr TWA mg/m ³)	STEL (ppm)	STEL (mg/m ³)	Note:
No occupational exposure limits have been established for this product or any listed components. OELs are not available for non-listed components.						

8.1.2 Biological limit value

Limit value type (country of origin)	SUBSTANCE.	CAS No.	Biological limit value	Note:
USA	None	None	None	None

8.1.3 PNECs and DNELs

DNEL	Oral	Inhalation	Dermal
Industry - Long Term - Local effects	NA	NA	NA
Industry - Long Term - Systemic effects	NA	NA	NA
Industry - Short term - Local effects	NA	NA	NA
Industry - Short term - Systemic effects	NA	NA	NA
Professional - Long Term - Local effects	NA	NA	NA
Professional - Long Term - Systemic effects	NA	NA	NA
Professional - Short term - Local effects	NA	NA	NA
Professional - Short term - Systemic effects	NA	NA	NA
Consumer - Long Term - Local effects	NA	NA	NA
Consumer - Long Term - Systemic effects	NA	NA	NA
Consumer - Short term - Local effects	NA	NA	NA
Consumer - Short term - Systemic effects	NA	NA	NA

EPO-TEK H70E Part A

11.1 Information on toxicological effects**11.1.2 Mixtures**

Acute toxicity	No data
Irritation	May cause irritation. May cause sensitization by skin contact.
Corrosivity	None
Repeated dose toxicity	Expected to be similar to single exposures.
Carcinogenicity	No data.
Mutagenicity	No data.
Toxicity for reproduction	No data

11.2 Other information None**SECTION 12: ECOLOGICAL INFORMATION**

12.1 Toxicity	No data
12.2 Persistence and degradability	Moderately/partially biodegradable. Not persistent.
12.3 Bioaccumulative potential	Moderately/partially biodegradable.
12.4 Mobility in soil	The product has high mobility in soil.
12.5 Results of PBT and vPvB assessment	No data.
12.6 Other adverse effects	No data.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods	Disposal should be in accordance with local, state or national legislation. Containers must not be punctured or destroyed by burning, even when empty.
13.2 Additional Information	None

SECTION 14: TRANSPORT INFORMATION

Land transport (ADR/RID) (b)(c)(d)		Land transport (Within USA) (c)(d)	
UN number	UN3082	UN number	None
Proper Shipping Name	Environmentally Hazardous Substance, Liquid, n.o.s.	Proper Shipping Name	None
Transport hazard class(es)	9	Transport hazard class(es)	None
Packing Group	III	Packing Group	None
Hazard label(s)	Miscellaneous	Hazard label(s)	None
Environmental hazards	Marine Pollutant	Environmental hazards	None
Special precautions for user	None	Special precautions for user	None
Sea transport (IMDG) (c)(d)		Air transport (ICAO/IATA) (c) (d)	
UN number	UN3082	UN number	None
Proper Shipping Name	Environmentally Hazardous Substance, Liquid, n.o.s.	Proper Shipping Name	None
Transport hazard class(es)	9	Transport hazard class(es)	None
Packing Group	III	Packing Group	None
Marine Pollutant	Yes	Environmental hazards	None
Special precautions for user	None	Special precautions for user	None

(b)- Full proper shipping name: Environmentally Hazardous Substance, Liquid, n.o.s.(Epoxy Phenol Novolac)

(c)- Consult with transport provider.

(d)- Check relevant regulations for Special Provisions.

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

EPO-TEK H70E Part A

DSCL	Dangerous Substances Classification And Labeling	RTK	Right To Know
EEC	European Economic Community	SARA	Superfund Amendments And Reauthorization Act
FDA	Food And Drug Administration	STEL	Short-Term Exposure Limit
HMIS	Hazardous Materials Information System	SUSDP	Standard For The Uniform Scheduling Of Drugs And Poisons (Australia)
IARC	International Agency For Research On Cancer	TCC	Tagliabue Closed Cup
IDLH	Immediate Danger To Life Or Health	TDG	Transportation Of Dangerous Goods
kg	Kilogram	TPQ	Threshold Planning Quantity
L	Liter	TQ	Threshold Quantity
LC ₅₀	Median Lethal Concentration	TSCA	Toxic Substances Control Act
LD ₅₀	Median Lethal Dose	TWA	Time-Weighted Average
LEL	Lower Explosive Limit	UEL	Upper Explosive Limit
mg	Milligram	WES	Workplace Exposure Standard (New Zealand)
mL	Milliliter	WHMIS	Workplace Hazardous Material Information System

References: RTECS, CAS Registry, EINECS/ESIS, *Casarett & Doull's Toxicology*, *Goldfrank's Toxicological Emergencies*, Manufacturer Information

Risk Phrases and Safety Phrases

R22: Harmful if swallowed.

R36/38: Irritating to eyes and skin.

R43: May cause sensitization by skin contact.

R51: Toxic to aquatic organisms.

S24/25: Avoid contact with skin and eyes.

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36/39: Wear suitable protective clothing and eye/face protection.

S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Hazard Statement(s) and Precautionary Statement(s)

H303: May be harmful if swallowed.

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EUH205: Contains epoxy constituents. See information supplied by the manufacturer.

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P301 + P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P302 + P352: IF ON SKIN: Wash with plenty of soap and water.

P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P312: Call a POISON CENTER or doctor if you feel unwell.

Training Advice: None



Additional Information: None

Information contained in this publication or as otherwise supplied to Users is believed to be accurate and is given in good faith, but it is for the Users to satisfy themselves of the suitability of the product for their own particular purpose. Epoxy Technology, Inc. gives no warranty as to the fitness of the product for any particular purpose and any implied warranty or condition (statutory or otherwise) is excluded except to the extent that exclusion is prevented by law. Epoxy Technology, Inc. accepts no liability for loss or damage (other than that arising from death or personal injury caused by defective product, if proved), resulting from reliance on this information. Freedom under Patents, Copyright and Designs cannot be assumed.



2.4 Additional Information None

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

EC Classification No. 1272/2008/EC

Hazardous ingredient(s)	%W/W	CAS No.	EC No.	REACH Registration No.	Hazard pictogram(s) and Hazard statement(s)
Reactive Diluent	<10	Proprietary	Proprietary	NA	 3.1/4, 3.3/1, 3.8/3b, H302, H318, H336
Substituted Imidazole	<20	Proprietary	Proprietary	NA	 3.1/3, 3.2/2, 3.3/1, 3.8/3a H301, H315, H318, H335

EC Classification No. 67/548/EEC

Hazardous ingredient(s)	%W/W	CAS No.	EC No.	REACH Registration No.	Hazard pictogram(s) and Risk (R) Phras(es)
Reactive Diluent	<10	Proprietary	Proprietary	NA	 Xn, Xi: R22, R41, R67
Substituted Imidazole	<20	Proprietary	Proprietary	NA	 T, Xi: R25, R37/38, R41

- 3.3 Additional Information - For full text of H phrases see section 16. For full text of R phrases see section 16. Non-Hazardous ingredients are not listed and make up the balance of the product.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

- Inhalation** Remove patient from exposure. Keep patient at rest and give oxygen if breathing difficult. If symptoms develop, obtain medical attention.
- Skin Contact** Causes skin irritation. Remove contaminated clothing immediately and drench affected skin with plenty of water, then wash with soap and water. If irritation (redness, rash, blistering) develops, get medical attention.
- Eye Contact** May cause corneal injury. May cause corneal damage. Remove any contact lenses. Irrigate with eyewash solution or clean water, holding the eyelids apart, for at least 15 minutes. Obtain immediate medical attention.
- Ingestion** Ingestion may cause irritation of the gastrointestinal tract. If swallowed, seek medical advice immediately and show this container or label. Do not induce vomiting. Make victim drink plenty of water. Get immediate medical attention.

- 4.2 Most important symptoms and effects, both acute and delayed** **Acute:** May cause irritation to skin. Causes serious eye irritation. Toxic if swallowed.
Delayed and chronic effects: May cause corneal damage. Discolors skin and mucous membranes. Effects similar to acute exposures.
- 4.3 Indication of the immediate medical attention and special treatment needed** Treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES





Combustible but not readily ignited. Acid smoke. Flash Point > 93.3°C / 200°F.

- 5.1 Extinguishing media**
Suitable Extinguishing Media Extinguish preferably with dry chemical, foam or water spray.
Unsuitable Extinguishing Media None known.
- 5.2 Special hazards arising from the substance or mixture** A self contained breathing apparatus and suitable protective clothing should be worn in fire conditions. Inhalation of metal fumes from fire may result in metal fume disease.

EPO-TEK H70E Part B

Terrestrial Compartment	Not available
Atmospheric Compartment	Not available

8.2.2 Personal Protection Equipment

	Respirators	Wear suitable respiratory protective equipment if exposure to levels above the occupational exposure limit is likely.
	Eye Protection	Safety glasses.
	Gloves	Wear protective gloves.
	Body Protection	Wear suitable protective clothing and gloves. Wear chemical resistant apron.
	Engineering Controls	Use adequate ventilation and/or engineering controls in high temperature processing to prevent exposure to vapors.
	Other	Remove contaminated, saturated clothing immediately. Contaminated clothing should be thoroughly cleaned.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Tan paste	Color	Tan
Odor	Mild / Slight	Odor Threshold (ppm)	Not available
Melting Point (°C) / Freezing Point (°C)	Not available	Boiling point/boiling range (°C):	Not available
Flash Point (°C)	> 200°F / 93°C	Explosive limit ranges	Not available
Auto Ignition Temperature (°C)	Not available	Decomposition Temperature (°C)	Not available
Explosive properties	Not available	Oxidizing properties	Not available
Flammability (solid, gas)	Not available	pH (Value)	Not available
Evaporation rate	<BuAc	Vapor Pressure (mm Hg)	Not available
Vapor Density (Air=1)	Not available	Density (g/ml)	Not available
Solubility (Water)	Practically insoluble.	Solubility (Other)	Not available
Partition Coefficient (n-Octanol/water)	Not available	Viscosity (mPa.s)	Paste

9.2 Other information Volatile Organic Chemical (VOC) Content – Not available.

SECTION 10: STABILITY AND REACTIVITY

10.1	Reactivity	See information supplied by the manufacturer. May react with incompatible materials.
10.2	Chemical stability	Stable under normal conditions.
10.3	Possibility of hazardous reactions	Can react violently if in contact with - Oxidizing agents. Can react violently if in contact with acids, alkalis, reducing agents and heavy metals.
10.4	Conditions to avoid	Avoid contact with heat and ignition sources.
10.5	Incompatible materials	Bleaching products and comparable oxidisers. Can react violently if in contact with acids, alkalis, reducing agents and heavy metals.
10.6	Hazardous Decomposition Product(s)	Carbon monoxide, carbon dioxide, metal fumes and oxides. Thermal decomposition will evolve toxic, irritant and flammable vapors.

SECTION 11: TOXICOLOGICAL INFORMATION

SUBSTANCE.	CAS No.	LD ₅₀ (Oral, Rat)	LC ₅₀ (Inhalation, Rat)	LD ₅₀ (Dermal, Rat)
Reactive Diluent	Proprietary	1540 mg/kg	5100 mg/m ³ / 4H	5000 mg/kg (guinea pig)
Substituted Imidazole	Proprietary	Not established	Not established	Not established

SAFETY DATA SHEET

EPO-TEK H70E Part B

Date: 3 April 2013

15.1.2 National regulations**USA**

TSCA (Toxic Substance Control Act)	All chemicals listed.
SARA 311/312 - Hazard Categories	Acute Health
SARA 302 - Extremely Hazardous Substances	Listed – None.
SARA 313 - Toxic Chemicals	Listed – None.
CERCLA (Comprehensive Environmental Response Compensation and Liability Act)	Listed – None.
CAA (Clean Air Act 1990)	Listed – None.
CWA (Clean Water Act)	Listed – None.
State Right to Know Lists	Listed – MA, NJ, PA, and RI.

Proposition 65 (California) - This product contains the following substance(s) known to the state of California to cause cancer and/or reproductive harm; Acrylonitrile (CAS # 107-13-1), <0.05%.

Canada

WHMIS Classification	Class D2B, Material with Toxic Effects Class E, Corrosive Material
Canada (DSL/NDSL)	Listed - DSL
Canada Ingredient Disclosure List (CIDL)	Listed as required.

15.2 Chemical Safety Assessment

Corrosive (Eye), Irritant (Skin, Respiratory system)

15.3 Label elements (EU)

Label as Harmful under 1999/45/EC and Harmful, Corrosive under 1907/2006/EC and 1272/2008/EC. See Section 2 for full label requirements.

SECTION 16: OTHER INFORMATION

The following sections contain revisions or new statements: 1-16.

LEGEND

ACGIH	American Conference of Governmental Industrial Hygienists	NA	not applicable, not available
AICS	Australian Inventory of Chemical Substances	NIOSH	National Institute for Occupational Safety and Health
ANSI	American National Standards Institute	ND	not determined
atm	atmosphere (pressure unit)	NFPA	National Fire Prevention Association
BOD	biological oxygen demand	NTP	National Toxicology Program
CAS	Chemical Abstracts Service	OC	open cup
CC	closed cup	OSHA	Occupational Safety and Health Administration
CDTA	Chemical Drug and Trafficking Act	Part	partition
COC	Cleveland Open Cup	PEL	permissible exposure limits
COD	chemical oxygen demand	ppb	parts per billion
coeff.	coefficient	PPE	personal protective equipment
CFR	Code of Federal Regulations	ppm	parts per million
CPR	cardio-pulmonary resuscitation	psi	pounds per square inch
DEA	Drug Enforcement Agency	RCRA	Resource Conservation and Recovery Act
DOT	Department of Transportation	RQ	Reportable quantity
DSCL	Dangerous Substances Classification and Labeling	RTK	Right to Know
EEC	European Economic Community	SARA	Superfund Amendments and Reauthorization Act
FDA	Food and Drug Administration	STEL	short-term exposure limit
HMIS	Hazardous Materials Information System	SUSDP	Standard for the Uniform Scheduling of Drugs and Poisons (Australia)
IARC	International Agency for Research on Cancer	TCC	Tagliabue Closed Cup
IDLH	immediate danger to life or health	TDG	Transportation of Dangerous Goods
kg	kilogram	TPQ	threshold planning quantity
L	liter	TQ	threshold quantity
LC50	median lethal concentration	TSCA	Toxic Substances Control Act