EP3HTSDA-1 Master Bond Polymer System

One component, highly electrically conductive, die attach epoxy

Key Features

- ✓ Low volume resistivity
- ✓ Ideal dispensing profile
- ✓ Not premixed and frozen
- ✓ Very long open time at ambient temperatures
- ✓ Cures rapidly at 250-300°F
- ✓ Outstanding retention of conductivity

Product Description

Master Bond EP3HTSDA-1 is a fast curing, one part, conductive epoxy system primarily for die attach applications. It is not premixed and frozen and has an unlimited working life at room temperature. For storage, simple refrigeration is fine. Also, it is very fast curing as noted below. EP3HTSDA-1 dispenses smoothly and easily, without any "tailing." It is well suited for automatic dispensing equipment and can be applied to a defined area without flowing. After curing, it has excellent die shear strength. It has superior dimensional stability and can withstand thermal cycling and shock. The temperature range extends from -80°F to +400°F. It bonds well to metals, ceramics, silicon dies and many other substrates. The thermal conductivity is remarkably high, over 40-45 BTU•in/(ft²•hr•°F) [5.7-6.5 W/(m·k)]. This is substantially higher than other silver conductive epoxies. Also, it passes NASA low outgassing specifications. The extraordinary combination of convenient storage, easy handling and highly desirable properties make this a must go-to material for die attach applications. Actually, its handling and performance properties allow it to be used in many other applications besides die attaching, both in electronic and other high-tech applications where the properties mentioned previously are desirable.

Product Advantages

- Single component system; no mixing needed
- Not premixed and frozen; unlimited working life at room temperature
- Ideal viscosity and flow for die attach
- Impressive thermal conductivity
- Excellent die shear strength and dimensional stability
- NASA low outgassing
- Available in syringes that are compatible with automatic dispensing equipment

Typical Properties

Tensile lap shear strength, aluminum to aluminum, 75°F	800-1,000 psi
Tensile strength, 75°F	3,000-4,000 psi
Tensile modulus, 75°F	225,000-275,000 psi
Die shear strength, 75°F (2 x 2 mm [80 x 80 mil])	20-22 kg-f
Typical die size	4-400 mm²
Hardness, 75°F	75-85 Shore D
Thermal conductivity, 75°F	40-45 BTU•in/(ft²•hr•°F) [5.7-6.5 W/(m·K)]
Coefficient of thermal expansion, 75°F	24-28 x 10^{-6} in/in/°C
Volume resistivity, 75°F	<0.001 ohm-cm
Service temperature range	-80°F to +400°F [-62°C to +204°C]

Typical Properties (con't)

Solids content	100%
Specific gravity, 75°F	3.2
Viscosity, 75°F	>400,000 cps (thixotropic)
Thixotropic index, 75°F	3.05
Color	silver
Cure schedule options	
250°F	20-30 minutes
300°F	5-10 minutes
Optimum cure schedule	either option above, plus 1 hour at 250-300°F
Shelf life at 40-50°F in original, unopened containers	minimum 3 months, maximum 6 months

Preparation of Adhesive & Application

Master Bond EP3HTSDA-1 does not require any mixing prior to use. EP3HTSDA-1 is typically applied with an automatic dispenser. A fixed amount is dispensed onto the substrate. The parts are assembled, fixtured and the epoxy is then cured. The automatic dispenser is recommended so that the precise amount of epoxy is applied.

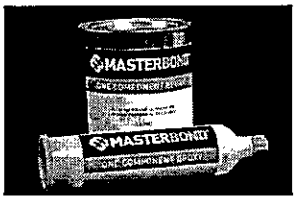
It also can be used as a more conventional adhesive. In this case, one would simply apply the measured adhesive on the surface to be bonded evenly and uniformly. All bonding surfaces should be carefully cleaned, degreased and dried for obtaining the maximum bond strengths. Also when bonding to metal surfaces other substrates, chemical etching or mechanical abrading should be employed so that the bonded joints exhibit optimum properties. In fact, most surfaces should be roughened with sandpaper, emery paper or mechanically abraded if possible.

Cure

EP3HTSDA-1 requires an elevated temperature cure. Typical recommended curing schedules are 20-30 minutes at 250°F or 5-10 minutes at 300°F. For optimal properties, cure at either schedule mentioned previously with a post cure of 1 hour at 250-300°F. Remove excess adhesive promptly before it hardens with a spatula. Then wipe with a rag and solvent, such as acetone, toluene or MEK.

Packaging

Product is available in:



- 20 grams
- 50 grams
- 100 grams
- One pound
- Multiple pounds

Packaged in either syringes or glass jars.

Handling and Storage

All epoxy resins should be used with good ventilation and skin contact should be avoided. For safe handling details, please consult the product SDS. Recommended storage is in refrigeration at 40-50°F. Containers should, however, be kept closed when not in use to avoid contamination. Cleanup of spills and equipment is readily achieved with aromatic or ketone solvents employing proper precautions of ventilation and flammability

Certifications

RoHS COMPLIANT

NASA Low Outgassing

Not to Be Used for Specification Purposes

The values contained herein are considered typical properties only and are not intended to be used as specification limits. For assistance in preparing specifications, please contact Master Bond technical support for further details.

Notice

Master Bond believes the information on the data sheets is reliable and accurate as is technical advice provided by the company. Master Bond makes no warranties, expressed or implied, regarding the accuracy of the information, and assumes no liability regarding the handling and use of this product.

D01C21

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 Reviewed on 05/04/2022

1 Identification

· **Product identifier**

· **Trade name:** EP3HTSDA-1

· **Article number:** Epoxy adhesive

· **Relevant identified uses of the substance or mixture and uses advised against**
Recommended use - Adhesives, Sealants, Coatings

· **Details of the supplier of the safety data sheet**

· **Manufacturer/Supplier:**
Master Bond Inc.
154 Hobart Street
USA-Hackensack, NJ 07601
Phone: 201-343-8983

· **Information department:**
Product safety department

Emergency phone number : (CHEMTREC)
(North America) : 800-424-9300
(International) : 703-527-3887

2 Hazard(s) identification

· **Classification of the substance or mixture**

Skin Irrit. 2	H315 Causes skin irritation.
Eye Irrit. 2A	H319 Causes serious eye irritation.
Skin Sens. 1	H317 May cause an allergic skin reaction.
STOT SE 3	H335 May cause respiratory irritation.
Aquatic Chronic 2	H411 Toxic to aquatic life with long lasting effects.

· **Label elements**

· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**

GHS07 GHS09

· **Signal word** Warning

· **Hazard statements**
Causes skin irritation.
Causes serious eye irritation.
May cause an allergic skin reaction.
May cause respiratory irritation.
Toxic to aquatic life with long lasting effects.

· **Precautionary statements**
Avoid breathing dust/fume/gas/mist/vapors/spray
Wash thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Avoid release to the environment.
Wear protective gloves / eye protection / face protection.
If swallowed: Call a poison center/doctor if you feel unwell.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 Reviewed on 05/04/2022

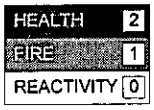
Trade name: EP3HTSDA-1

(Contd. of page 1)

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin irritation or rash occurs: Get medical advice/attention.
If eye irritation persists: Get medical advice/attention.
Take off contaminated clothing and wash it before reuse.
Store locked up.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**

Health = 2
Fire = 1
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**



Health = 2
Fire = 1
Reactivity = 0

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** *Mixture of the substances listed below with nonhazardous additions.*

· **Hazardous components:**	
Silver (CAS no. 7440-22-4)	50-100%
Polyamide based curing agent blend (CAS no. 25068-38-6, 68003-28-1, 111-40-0)	10-25%
Epoxy resin (CAS no. 25068-38-6)	1-10%
Diluent (CAS no. 68609-97-2)	<2.5%

· **Main Components:**	
Silver (CAS no. 7440-22-4)	50-100%
Polyamide based curing agent blend (CAS no. 25068-38-6, 68003-28-1, 111-40-0)	10-25%
Epoxy resin (CAS no. 25068-38-6)	1-10%
Diluent (CAS no. 68609-97-2)	<2.5%

4 First-aid measures

· **Description of first aid measures**
· **After inhalation:**
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
Seek medical treatment.
· **After skin contact:**
Immediately wash with water and soap and rinse thoroughly.
Seek medical treatment.
· **After eye contact:**
Rinse opened eye for several minutes under running water. Then consult a doctor.
Seek medical treatment.
· **After swallowing:**
Do not induce vomiting; immediately call for medical help.

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 Reviewed on 05/04/2022

Trade name: EP3HTSDA-1

(Contd. of page 2)

Seek medical treatment.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **Advice for firefighters**
· **Protective equipment:** Wear personal protective equipments.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures** Wear protective equipment.
· **Environmental precautions:** Do not allow product to reach sewage system or any water course.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Prevent formation of aerosols.
· **Information about protection against explosions and fires:** No special measures required.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No information available.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Keep receptacle tightly sealed.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**
· **Components with limit values that require monitoring at the workplace:**
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
· **Breathing equipment:** Use suitable respiratory protective device in case of insufficient ventilation.

(Contd. on page 4)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 Reviewed on 05/04/2022

Trade name: EP3HTSDA-1

(Contd. of page 3)

· **Protection of hands:**

Protective gloves

· **Material of gloves** Chemical resistant gloves.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**

Safety glasses recommended.

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Thixotropic
Color:	Silver
· **Odor:**	Mild
· **Odor threshold:**	Not available
· **pH-value:**	Not available.
· **Change in condition**	
Melting point/Melting range:	Not available
Boiling point/Boiling range:	Not available
· **Flash point:**	Not available
· **Flammability (solid, gaseous):**	Not available
· **Ignition temperature:**	Not available
· **Decomposition temperature:**	Not available
· **Auto igniting:**	Not available
· **Danger of explosion:**	Not available
· **Explosion limits:**	
Lower:	Not available
Upper:	Not available
· **Vapor pressure:**	Not available
· **Density:**	
Relative density at 20 °C (68 °F)	3.19 g/cm3
Vapor density	Not available
Evaporation rate	Not available
· **Solubility in / Miscibility with**	
Water:	Not miscible or difficult to mix.

(Contd. on page 5)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 Reviewed on 05/04/2022

Trade name: EP3HTSDA-1

(Contd. of page 4)

· **Partition coefficient (n-octanol/water):** Not available

· **Viscosity:**
Dynamic: Not available
Kinematic: Not available

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** Carbon monoxide

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

25068-38-6 bisphenol-A-(epichlorohydrin) epoxy resin

Oral	LD50	11400 mg/kg (rat)
Dermal	LD50	2000 mg/kg (rat)

· **Primary irritant effect:**
· **on the skin:** Causes skin irritation.
· **on the eye:** Severe eye irritant.
· **Sensitization:** May cause allergic skin reaction.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Harmful

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**
Substance is not listed

· **NTP (National Toxicology Program)**
None of the ingredients is listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

12 Ecological information

· **Ecotoxical effects:**
· **Remark:** Harmful to fish
· **Additional ecological information:**
· **General notes:**
Water hazard class 1 (Self-assessment): slightly hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.

(Contd. on page 6)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 Reviewed on 05/04/2022

Trade name: EP3HTSDA-1

(Contd. of page 5)

· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **UN-Number**
· **DOT, ADR, IMDG, IATA : 3082**

· **UN proper shipping name**
· **DOT, ADR, IMDG, IATA : Environmentally hazardous substance, liquid, n.o.s. (Bisphenol A epoxy resin)**

· **Transport hazard class(es)**

· **DOT, ADR, IMDG, IATA**

· **Class** 9 Miscellaneous dangerous substances and articles
· **Label** 9

· **Packing group**
· **DOT, ADR, IMDG, IATA : III**

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
No further relevant information available.
· **Sara**

· **Section 355 (extremely hazardous substances):**
None of the ingredients is listed.

· **Section 313 (Specific toxic chemical listings):**
Silver (CAS no. 7440-22-4)

· **TSCA (Toxic Substances Control Act):**
All components have the value Active.

· **Proposition 65**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.

(Contd. on page 7)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 Reviewed on 05/04/2022

Trade name: EP3HTSDA-1

(Contd. of page 6)

· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.

· **Chemicals known to cause developmental toxicity:**
None of the ingredients is listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
Silver (CAS no. 7440-22-4)

· **TLV (Threshold Limit Value)**
None of the ingredients is listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients is listed.

· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS07 GHS09

· **Signal word** Warning

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** Product safety department
· **Contact:** Master Bond Inc.
· **Date of preparation / last revision** 05/04/2022 / -
· **Abbreviations and acronyms:**
ADR: Accord relatif au transport international des marchandises dangereuses par route (European Agreement Concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value

(Contd. on page 8)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/04/2022 *Reviewed on 05/04/2022*

Trade name: EP3HTSDA-1

(Contd. of page 7)

PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Skin Irrit. 2: Skin corrosion/irritation – Category 2
Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A
Skin Sens. 1: Skin sensitisation – Category 1
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3
Aquatic Chronic 2: Hazardous to the aquatic environment - long-term aquatic hazard – Category 2