

1 Identification of the substance/mixture and of the company

· **Product identifier**

· **Trade name:** EP-452 Two-Part Thermally Conductive Epoxy

· **Application of the substance / the mixture** Functional electronic epoxy

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

· **Manufacturer/Supplier:**

Applied Ink Solutions
200 Flanders Road
Westborough, MA 01581
USA

· **Information department:**

Product Safety
Email: sales@appliedinksolutions.com

· **Emergency telephone number:**

Applied Ink Solutions : 617-965-5511
Chemtrec USA Emergency : 800-424-9300
Chemtrec International Emergency : 703-527-3887

2 Hazard(s) identification

· **Classification of the substance or mixture**



GHS07

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.

Aquatic Acute 2 H401 Toxic to aquatic life.

Aquatic Chronic 3 H412 Harmful 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

· **Signal word** *Warning*

· **Hazard-determining components of labeling:**

Phenol, polymer with formaldehyde, glycidyl ether
Fatty acids, tall-oil, reaction products with tetraethylenepentamine
Tetraethylenepentamine
Phenoxy Resin

· **Hazard statements**

H315 Causes skin irritation.
H319 Causes serious eye irritation.
H317 May cause an allergic skin reaction.
H401 Toxic to aquatic life.
H412 Harmful to aquatic life with long lasting effects.

(Contd. on page 2)

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 1)

Precautionary statements

- P261 Avoid breathing dust/fume/gas/mist/vapors/spray
 P273 Avoid release to the environment.
 P280 Wear protective gloves/protective clothing/eye protection/face protection.
 P301+P310 If swallowed: Immediately call a poison center/doctor.
 P302+P352 If on skin: Wash with plenty of soap and water.
 P304+P341 If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
 P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P332+P313 If skin irritation occurs: Get medical advice/attention.
 P337+P313 If eye irritation persists: Get medical advice/attention.
 P403+P233 Store in a well-ventilated place. Keep container tightly closed.
 P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Classification system:
NFPA ratings (scale 0 - 4)









HMIS-ratings (scale 0 - 4)

Other hazards
Results of PBT and vPvB assessment

- PBT:** Not applicable.
- vPvB:** Not applicable.

3 Composition/information on ingredients
Chemical characterization: Mixtures
Description: Mixture of the substances listed below with nonhazardous additions.

Dangerous components:

28064-14-4	Phenol, polymer with formaldehyde, glycidyl ether  Aquatic Acute 1, H400; Aquatic Chronic 2, H411;  Skin Irrit. 2, H315; Eye Irrit. 2A, H319; Skin Sens. 1, H317	10-25%
68953-36-6	Fatty acids, tall-oil, reaction products with tetraethylenepentamine  Skin Irrit. 2, H315; Eye Irrit. 2A, H319; Skin Sens. 1, H317; STOT SE 3, H335	5-15%
112-57-2	Tetraethylenepentamine  Skin Corr. 1B, H314;  Aquatic Chronic 2, H411;  Acute Tox. 4, H302; Acute Tox. 4, H312; Skin Sens. 1, H317	1-5%
	Phenoxy Resin  Aquatic Chronic 2, H411;  Acute Tox. 4, H312; Skin Irrit. 2, H315; Eye Irrit. 2A, H319; Skin Sens. 1, H317	<1%

(Contd. on page 3)

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 2)

· Additional Components:

1344-28-1 Aluminium oxide

60-80%

4 First-aid measures

· Description of first aid measures
· After inhalation: Supply fresh air and to be sure call for a doctor.

· After skin contact: Immediately wash with water and soap and rinse thoroughly.

· After eye contact:

Wash eyes immediately with a large amount of water or normal saline, occasionally lifting upper and lower eye lids until no evidence of chemical remains (about 20 minutes). Remove contact lenses if present and easy to remove. Seek immediate medical attention.

· After swallowing:

Do not induce vomiting unless instructed to do so by a physician. Wash out mouth with water and keep person at rest. Seek immediate medical attention.

· Information for doctor:
· Most important symptoms and effects, both acute and delayed No further relevant information available.

· Indication of any immediate medical attention and special treatment needed Treat symptomatically.

5 Fire-fighting measures

· Extinguishing media
· Suitable extinguishing agents:

Alcohol resistant foam

Fire-extinguishing powder

Carbon dioxide

· For safety reasons unsuitable extinguishing agents: Water with full jet

· Special hazards arising from the substance or mixture No further relevant information available.

· Advice for firefighters
· Protective equipment: Wear SCBA.

6 Accidental release measures

· Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation

Keep away from ignition sources

Wear protective equipment. Keep unprotected persons away.

· Environmental precautions:

Inform respective authorities in case of seepage into water course or sewage system.

Do not allow to enter sewers/ surface or ground water.

· Methods and material for containment and cleaning up:

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Ensure adequate ventilation.

· Reference to other sections

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

· Protective Action Criteria for Chemicals
· PAC-1:

1344-28-1 Aluminium oxide

15 mg/m³

(Contd. on page 4)

Printing date 01/19/2018

Reviewed on 01/19/2018

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 3)

112-57-2	Tetraethylenepentamine	15 mg/m ³
	Phenoxy Resin	90 mg/m ³
· PAC-2:		
1344-28-1	Aluminium oxide	170 mg/m ³
112-57-2	Tetraethylenepentamine	130 mg/m ³
	Phenoxy Resin	990 mg/m ³
· PAC-3:		
1344-28-1	Aluminium oxide	990 mg/m ³
112-57-2	Tetraethylenepentamine	790 mg/m ³
	Phenoxy Resin	5,900 mg/m ³

7 Handling and storage

- **Handling:**
- **Precautions for safe handling**
 Ensure good ventilation/exhaust at the workplace.
 Prevent formation of aerosols.
- **Information about protection against explosions and fires:**
 Keep ignition sources away - Do not smoke.
 Protect against electrostatic charges.
- **Conditions for safe storage, including any incompatibilities**
- **Storage:**
- **Requirements to be met by storerooms and containers:** No special requirements.
- **Information about storage in one common storage facility:**
 Do not store together with alkalis (caustic solutions).
 Do not store together with oxidizing and acidic materials.
- **Further information about storage conditions:**
 Keep container well-sealed in cool, dry location.
 Protect from heat and direct sunlight.
 Store receptacle in a well ventilated area.
- **Specific end use(s)** No further relevant information available.

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 following constituent is the only constituent of the product which has a PEL, TLV or other recommended exposure limit.
 At this time, the other constituents have no known exposure limits.

112-57-2 Tetraethylenepentamine	
WEEL	Long-term value: 5 mg/m ³ Skin; DSEN

- **Additional information:** The lists that were valid during the creation were used as basis.

(Contd. on page 5)

Printing date 01/19/2018

Reviewed on 01/19/2018

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 4)

- **Exposure controls**
- **Personal protective equipment:**
- **General protective and hygienic measures:**
Keep away from food and beverages.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
- **Respiratory equipment:**
In case of low exposure, use cartridge respirator. In case of intensive or longer exposure, use SCBA.
Use suitable respiratory protective device in case of insufficient ventilation.
- **Protection of hands:**



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.

- **Material of gloves** Nitrile rubber, NBR
- **Penetration time of glove material** Contact glove manufacture for break-through time.
- **Eye protection:**
Safety glasses



Tightly sealed goggles

9 Physical and chemical properties

- **Information on basic physical and chemical properties**
- **General Information**
- **Appearance:**

Form:	Thick Paste
Color:	White
Odor:	Slightly sweet
Odor threshold:	Not determined.
- **pH-value:** Not determined.
- **Change in condition**

Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	60 °C (140 °F)
- **Flash point:** Not applicable.
- **Flammability (solid, gaseous):** Not applicable.
- **Ignition temperature:**
- **Decomposition temperature:** Not determined.
- **Auto igniting:** Product is not selfigniting.
- **Danger of explosion:** Product does not present an explosion hazard.
- **Explosion limits:**

Lower:	Not determined.
---------------	-----------------

(Contd. on page 6)

Printing date 01/19/2018

Reviewed on 01/19/2018

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 5)

Upper:	Not determined.
· Vapor pressure:	Not determined.
· Density:	See other information
· Relative density	Not determined.
· Vapor density	Not determined.
· Evaporation rate	1.6-2.3 (BuAc=1)
· Solubility in / Miscibility with Water:	Water miscible No
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity:	
Dynamic:	Not determined.
Kinematic:	Not determined.
· Solvent content:	
VOC content:	0.00 %
· Solids content:	70 +/- 2 %
· Other information	No further relevant information available.

10 Stability and reactivity

- **Reactivity** No further relevant information available.
- **Chemical stability** Stable
- **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid**
Contact with incompatible materials.
Heat, flames and sparks. Extremes of temperature and direct sunlight.
- **Incompatible materials:** Strong Oxidizing Agents, Strong Acids, Strong Bases
- **Hazardous decomposition products:** Carbon monoxide and carbon dioxide

11 Toxicological information

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

· LD/LC50 values that are relevant for classification:		
112-57-2 Tetraethylenepentamine		
Dermal	LD50	660 mg/kg (rabbit)

- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:** Irritating effect.
- **Sensitization:** Sensitization possible through skin contact.
- **Additional toxicological information:**

The product shows the following dangers according to internally approved calculation methods for preparations:
Irritant

(Contd. on page 7)

Printing date 01/19/2018

Reviewed on 01/19/2018

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 6)

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

None of the ingredients are listed.

· **NTP (National Toxicology Program)**

None of the ingredients are listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**

None of the ingredients are listed.

12 Ecological information

· **Toxicity**

· **Aquatic toxicity:**

28064-14-4 Phenol, polymer with formaldehyde, glycidyl ether

EC50/48 h 1-10 mg/l (daphnia magna)

· **Persistence and degradability** No further relevant information available.

· **Behavior in environmental systems:**

· **Bioaccumulative potential** No further relevant information available.

· **Mobility in soil** No further relevant information available.

· **Ecotoxicological effects:**

· **Remark:** Toxic for fish

· **Additional ecological information:**

· **General notes:**

Water hazard class 3 (Self-assessment): extremely 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.

Also poisonous for fish and plankton in water bodies.

Toxic for aquatic organisms

· **Results of PBT and vPvB assessment**

· **PBT:** Not applicable.

· **vPvB:** Not applicable.

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

13 Disposal considerations

· **Waste treatment methods**

· **Recommendation:**

Must not be disposed of as regular garbage/trash. Do not allow product to reach sewage system.

Disposal must be made in accordance with Federal, State, and Local regulations.

· **Uncleaned packagings:**

· **Recommendation:** Disposal must be made in accordance with Federal, State, and Local regulations.

14 Transport information

· **UN-Number**

· **DOT, ADR, IMDG, IATA**

Not Regulated

(Contd. on page 8)

Printing date 01/19/2018

Reviewed on 01/19/2018

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 7)

· **UN proper shipping name**
· **DOT, ADR, IMDG, IATA** *Not Regulated*

· **Transport hazard class(es)**
· **DOT, ADR, IMDG, IATA**
· **Class** *Not Regulated*

· **Packing group**
· **DOT, ADR, IMDG, IATA** *Not Regulated*

· **Environmental hazards:** *Not applicable.*

· **Special precautions for user** *Not applicable.*

· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** *Not applicable.*

· **UN "Model Regulation":** *Not Regulated*

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

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

· **Section 313 (Specific toxic chemical listings):**
1344-28-1 Aluminium oxide

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed or comply with TSCA regulations.

· **TSCA new (21st Century Act) (Substances not listed)**
28064-14-4 Phenol, polymer with formaldehyde, glycidyl ether

· **Proposition 65**

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

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

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

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

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients are listed.

· **TLV (Threshold Limit Value established by ACGIH)**
1344-28-1 Aluminium oxide A4

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

(Contd. on page 9)

Printing date 01/19/2018

Reviewed on 01/19/2018

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 8)

· **Massachusetts State Right To Know List**

112-57-2 Tetraethylenepentamine

· **New Jersey State Right To Know List**

112-57-2 Tetraethylenepentamine

· **Pennsylvania Hazardous Substances List**

112-57-2 Tetraethylenepentamine

· **California SCAQMD Rule 443.1 VOC's:** No information available.

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

· **Hazard pictograms**



GHS07

· **Signal word** Warning

· **Hazard-determining components of labeling:**

Phenol, polymer with formaldehyde, glycidyl ether

Fatty acids, tall-oil, reaction products with tetraethylenepentamine

Tetraethylenepentamine

Phenoxy Resin

· **Hazard statements**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H317 May cause an allergic skin reaction.

H401 Toxic to aquatic life.

H412 Harmful to aquatic life with long lasting effects.

· **Precautionary statements**

P261 Avoid breathing dust/fume/gas/mist/vapors/spray

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P301+P310 If swallowed: Immediately call a poison center/doctor.

P302+P352 If on skin: Wash with plenty of soap and water.

P304+P341 If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.

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

P332+P313 If skin irritation occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/attention.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· **National regulations:**

· **Other regulations, limitations and prohibitive regulations**

RoHS (EU)2015/863 along with EU Directive 2022/19/EU – Waste from Electrical and Electronic Equipment (WEEE):

Applied Ink Solutions products do not exceed the amount of allowable levels concerning: Cadmium (Cd); Mercury (Hg); Lead (Pb); Hexavalent chromium (Cr6+); Polybrominated biphenyls (PBB); Polybrominated diphenyl ethers (PBDE); Bis(2-Ethylhexyl) phthalate (DEHP); Benzyl butyl phthalate (BBP); Dibutyl phthalate (DBP); Diisobutyl phthalate (DIBP); Bis(2-Ethylhexyl) phthalate (DEHP); Benzyl butyl phthalate (BBP); Dibutyl phthalate (DBP); Diisobutyl phthalate (DIBP).

(Contd. on page 10)

Trade name: EP-452 Two-Part Thermally Conductive Epoxy

(Contd. of page 9)

Applied Ink Solutions has confirmed with our precious metal suppliers that they do not use conflict minerals, as outlined in the **Dodd-Frank Wall Street Reform and Consumer Protection Act in Title XV, Section 1502**.

Registration, Evaluation and Authorization of Chemicals (REACH) & Substances of Very High Concern (SVHC): This product does not contain substances on the SVHC list.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

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:** Mr. Cole

- **Revision History:** New SDS

- **Date of preparation / last revision** 01/19/2018 / -

- **Abbreviations and acronyms:**

ADR: Accord européen sur le transport 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

ACGIH: American Conference of Governmental Industrial Hygienists

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)

VOC: Volatile Organic Compounds (USA, EU)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

PBT: Persistent, Bioaccumulative and Toxic

vPvB: very Persistent and very Bioaccumulative

NIOSH: National Institute for Occupational Safety

OSHA: Occupational Safety & Health

TLV: Threshold Limit Value

PEL: Permissible Exposure Limit

REL: Recommended Exposure Limit

Acute Tox. 4: Acute toxicity – Category 4

Skin Corr. 1B: Skin corrosion/irritation – Category 1B

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 Acute 1: Hazardous to the aquatic environment - acute aquatic hazard – Category 1

Aquatic Acute 2: Hazardous to the aquatic environment - acute aquatic hazard – Category 2

Aquatic Chronic 2: Hazardous to the aquatic environment - long-term aquatic hazard – Category 2

Aquatic Chronic 3: Hazardous to the aquatic environment - long-term aquatic hazard – Category 3