ECCOBOND® 286 A/B
Easy Mix Ratio, General Purpose Epoxy Adhesive

Key Feature: Benefit:
- Convenient mix ratio  •  Ease of use
- Room temperature cure  •  Simplified manufacturing process
- Good thermal conductivity  •  Dissipation of heat from bonded components

Product Description:
ECCOBOND 286 A/B is a two component, thermally conductive, room temperature curing, epoxy adhesive. The proper amount of thixotropy is built in to assure minimum flow without sacrificing wetting. ECCOBOND 286 A/B offers good adhesion to a variety of substrates including most metals and plastics.

Applications:
ECCOBOND 286 A/B is recommended for a wide variety of maintenance and production applications. It is ideal for use in piping applications involving metal and/or plastic pipe.

Instructions For Use:
Thoroughly read the information concerning health and safety contained in this bulletin before using. Observe all precautionary statements that appear on the product label and/or contained in individual Material Safety Data Sheets (MSDS).

Properties of Material As Supplied:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Unit</th>
<th>Value - Part A</th>
<th>Value - Part B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Type</td>
<td></td>
<td></td>
<td>Epoxy</td>
<td>Amine</td>
</tr>
<tr>
<td>Appearance</td>
<td>Visual</td>
<td></td>
<td>White paste</td>
<td>White paste</td>
</tr>
<tr>
<td>Density</td>
<td>ASTM-D-792</td>
<td>g/cm³</td>
<td>1.21</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Properties of Material As Mixed:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix Ratio - Amount of Part B per 100 parts of Part A</td>
<td>By Weight</td>
<td></td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>By Volume</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Working Life (100 g @ 25°C)</td>
<td>ERF 13-70</td>
<td>minutes</td>
<td>30</td>
</tr>
<tr>
<td>Density</td>
<td>ASTM-D-792</td>
<td>g/cm³</td>
<td>1.71</td>
</tr>
</tbody>
</table>

"Our service engineers are available to help purchasers obtain best results from our products, and recommendations are based on tests and information believed to be reliable. However, we have no control over the conditions under which our products are transported to, stored, handled, or used by purchasers and, in any event, all recommendations and sales are made on condition that we will not be held liable for any damages resulting from their use. No representative of ours has any authority to waive or change this provision. We also expect purchasers to use our products in accordance with the guiding principles of the Chemical Manufacturers Association’s Responsible Care® program."
Cure Schedule:
Cure at any one of the recommended cure schedules. For optimum performance, follow the initial cure with a post cure of 2 - 4 hours at the highest expected use temperature. Alternate cure schedules may also be possible. Contact your Emerson & Cuming Technical Representative for further information.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Cure Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>Time</td>
</tr>
<tr>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>45</td>
<td>4</td>
</tr>
<tr>
<td>65</td>
<td>2</td>
</tr>
</tbody>
</table>

Properties of Material After Application:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural Strength</td>
<td>ASTM-D-790</td>
<td>mPa</td>
<td>83</td>
</tr>
<tr>
<td>Tensile Lap Shear Strength</td>
<td>ASTM D-1002</td>
<td>mPa</td>
<td>15.2</td>
</tr>
<tr>
<td>aluminum to aluminum @ 25°C</td>
<td>psi</td>
<td>2.200</td>
<td></td>
</tr>
<tr>
<td>Coefficient of Thermal Expansion</td>
<td>ASTM-D-3386</td>
<td>W/m.K</td>
<td>1.04</td>
</tr>
<tr>
<td></td>
<td>Btu-in/hr-ft²-°F</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>Temperature Range of Use</td>
<td>°C</td>
<td>-55 to +105</td>
<td></td>
</tr>
<tr>
<td>Volume Resistivity @ 25°C</td>
<td>ASTM-D-257</td>
<td>Ohm-cm</td>
<td>&gt;10¹⁵</td>
</tr>
</tbody>
</table>

Storage and Handling:
The shelf life of ECCOBOND 286 Parts A and B are 12 months at 25°C. For best results, store in original, tightly covered containers. Storage in cool, clean and dry areas is recommended. Usable shelf life may vary depending on method of application and storage conditions. Certain resins and hardeners are prone to crystallization. If crystallization does occur, warm the contents of the shipping container to 50-60°C until all crystals have dissolved. Be sure the shipping container is loosely covered during the warming stage to prevent any pressure build-up. Allow contents to cool to room temperature before continuing.

Health and Safety:
The ECCOBOND 286 Part A, like most epoxy compounds, possesses the ability to cause skin and eye irritation upon contact. Certain individuals may also develop an allergic reaction after exposure (skin contact, inhalation of vapors, etc.) which may manifest itself in a number of ways including skin rashes, itching sensation and breathing difficulties. Handling this product may also generate vapors irritating to the respiratory system.

Good industrial hygiene and safety practices must be used when handling this product. Proper eye protection and appropriate chemical resistant clothing must be worn to prevent contact. Consult the Material Safety Data Sheet (MSDS) for detailed recommendations on the use of engineering controls, personal protective equipment and first aid procedures.

Attention Specification Writers:
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 Emerson & Cuming Quality Assurance for further details.

Medical Implantable Disclaimer

"In the event this product is intended by you for use in implantation in the human body, you are hereby advised that National Starch (or Emerson & Cuming) has not performed clinical testing of these materials for implantation in the human body nor has National Starch (Emerson & Cuming) sought, nor received, approval from the FDA for the use of these material in implantation in the human body. It is YOUR responsibility, as a manufacturer of any such device, to ensure that all materials and processes relating to the manufacture of any medical device fully comply with all applicable federal, state and local laws, rules, regulations and requirements as well as any such laws, rules, regulations, directives or other orders of any foreign country where such product is sold. If you have not undertaken the necessary investigations to ensure compliance you are advised NOT TO USE this product in the manufacture of any device which is to be implanted in the human body. No representative of ours has any authority to change the foregoing provisions."
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS ID: EC180726

PRODUCT NAME: ECCOBOND™ 286 WHITE, PART A
- MANUFACTURER - Emerson & Cuming
  A National Starch & Chemical Company
  46 Manning Road
  Billerica, MA 01821

EMERGENCY CONTACT NUMBERS:
  MEDICAL: 866-359-5657 (Health & Safety Call Center-24 hours)
  TRANSPORT: CHEMTREC: 800.424.9300 (24 hours)
  CHEMTREC International: 703.527.3887 (call collect)
  Corporate Emergency Phone: 978.436.9781 (8AM-5PM, Mon-Fri EST)
  MSDS Requests/Cust. Service: 781.828.3300 (8AM-5PM, Mon-Fri EST)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING.
- EYE IRRITANT.
- SKIN IRRITANT.
- SKIN SENSITIZER.
White Paste Slight odor

EYE CONTACT
Irritating, but does not injure eye tissue.

SKIN CONTACT
Irritating to the skin. Repeated and/or prolonged contact may cause skin sensitization.

INHALATION
Unlike to be hazardous by inhalation because of the low vapor pressure of the material at ambient temperature. Vapors and/or aerosols which may be formed at elevated temperatures may be irritating to eyes and respiratory tract.

INGESTION
Ingestion may cause irritation of the gastrointestinal tract.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL FAMILY</th>
<th>Formulated Epoxy Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPONENT</td>
<td></td>
</tr>
<tr>
<td>CAS NUMBER</td>
<td></td>
</tr>
<tr>
<td>CONCENTRATION (%)</td>
<td></td>
</tr>
<tr>
<td>Epoxy resin</td>
<td>PROPRIETARY &gt;50</td>
</tr>
</tbody>
</table>
4. FIRST-AID MEASURES

**EYE**
Immediately irrigate with eyewash solution or clean water, holding the eyelids apart, for at least 10 minutes. Obtain immediate medical attention.

**SKIN CONTACT:**
Remove grossly contaminated clothing, including shoes, and launder before reuse. Discard shoes. Wash skin with soap and water. If symptoms develop, obtain medical attention.

**INHALATION**
Remove to fresh air. Administer oxygen to aid breathing. Get medical attention.

**INGESTION**
DO NOT attempt to give anything by mouth to an unconscious person. If individual is conscious, give water to dilute stomach contents. Get prompt medical attention.

5. FIREFIGHTING MEASURES

**AUTOIGNITION**
Not available

**FLASH POINT**
> 200 °F

**EXTINGUISHING MEDIA**
Foam; Water spray or fog, CO2, Dry Chemical; Do not use direct water stream on burning liquid.

**SPECIAL FIREFIGHTING PROCEDURES**
A self contained breathing apparatus and suitable protective clothing should be worn in fire conditions.; Cool exposed equipment with water spray.

**FIRE & EXPLOSION HAZARDS**
Combustible at high temperatures. Combustion will evolve toxic and irritant vapors. Polymerization may take place at elevated temperatures.

**HAZARDOUS COMBUSTION PRODUCTS**
Thermal decomposition products are hazardous and/or toxic.
Carbon monoxide, carbon dioxide.
Aldehydes

**LOWER EXPLOSION LIMIT (%)**
Not applicable

**UPPER EXPLOSION LIMIT (%)**
Not applicable

6. ACCIDENTAL RELEASE MEASURES

**SPILL AND LEAK PROCEDURES**
Evacuate immediate area and dike area to contain spill. Extinguish open flames and ignition sources in the immediate area. Wear proper protective clothing, gloves, and splash goggles. Absorb as much of spilled material as possible with rags, sand, vermiculite or other absorbent material. Scrape absorbed material into designated waste containers. Wash area thoroughly with detergent and rinse, taking care to prevent runoff into drains or other waterways. All spilled material, absorbed waste and wash water must be disposed of in accordance with all Federal state and local regulations.

For safety and environmental precautions, please review entire Material Safety Data Sheet for necessary information.

7. HANDLING AND STORAGE

**STORAGE TEMPERATURE**
25 °C

**SHELF LIFE, (Days)**
365

**HANDLING/STORAGE**
Keep containers properly sealed when not in use.

**SENSITIVITY TO STATIC ELECTRICITY**
No

**SPECIAL SENSITIVITY**
Avoid excessive heat.

**SENSITIVITY TO MECHANICAL IMPACT**
No

**OTHER PRECAUTIONS**
This material should not be spilled, dumped, or flushed into sewers or public waterways.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION
Provide local exhaust ventilation system to meet published exposure limits.

EYE PROTECTION
Wear safety glasses with side shields.

GLOVES
Employee must wear appropriate protective gloves to prevent contact with this substance. Nitrile rubber or Viton™ gloves are recommended. Cotton or other absorbent gloves should not be worn.

CLOTHING
Employee must wear appropriate protective clothing and equipment to prevent any possibility of skin contact with this substance.

CHANGE/REMOVAL OF CLOTHING
Remove contaminated clothing and launder before reuse.

WASH REQUIREMENTS
Wash exposed areas with soap and water.

RESPIRATOR
NIOSH approved respirator if required. Self-contained breathing apparatus in emergency and non-routine situations.

9. PHYSICAL AND CHEMICAL PROPERTIES

PURE SUBSTANCE OR MIXTURE
Mixture

PHYSICAL FORM
Paste

COLOUR
White

ODOUR
Slight

ODOR THRESHOLD
Not available.

MOLECULAR WEIGHT
Not applicable

OXIDIZING PROPERTIES
Not applicable

BOILING POINT
Not determined.

SOLUBILITY IN WATER
Insoluble

PARTITION COEFFICIENT (n-octanol/water)
Not determined.

SPECIFIC GRAVITY (WATER=1)
1.21

VAPOUR PRESSURE
Negligible @ 25°C

VAPOUR DENSITY (Air=1)
< 0.5 %

VOLATILES (%)
< 0.5 %

VOLATILE ORGANIC COMPOUNDS
5.8 g/liter

AUTOIGNITION
Not available

FLASH POINT
> 200 °F

10. STABILITY AND REACTIVITY

STABILITY
Stable

HAZARDOUS DECOMPOSITION PRODUCTS
Material is stable under recommended storage temperatures and pressures.

MATERIALS TO AVOID
Strong acids, Strong bases, Strong oxidizers, Amines, Mercaptans

CONDITIONS TO AVOID
Elevated temperatures

HAZARDOUS DECOMPOSITION PRODUCTS
Thermal decomposition products are hazardous and/or toxic. Carbon monoxide, carbon dioxide. Aldehydes

REACTIVITY
May polymerize with amine compounds.

11. TOXICOLOGICAL INFORMATION

ROUTE OF ENTRY
Eye Contact; Skin Contact; Inhalation; Ingestion

CARCINOGEN
IARC
NTP
OSHA Substance Specific Regulation

COMPONENT
There is no evidence that
this product poses a carcinogenic risk under normal conditions of handling and use.

**CHRONIC (LONG TERM) EFFECTS OF EXPOSURE**

**EFFECTS OF CHRONIC EXPOSURE**
The toxicological properties of this product have not been fully evaluated. Use of good industrial hygiene practices is required. Avoid direct contact with skin or eyes. Do not ingest or inhale.

**TARGET ORGANS**

**SKIN SENSITIZATION**
Skin; Eyes
Sensitizer. May cause allergic reaction.

**PRODUCT TOXICOLOGY**

**PRODUCT INFORMATION**
This data sheet is based on a consideration of the properties of the constituents.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON ORAL TOXICITY</th>
<th>NOTES ON ORAL TOXICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy resin</td>
<td>Oral LD50: Rat &gt; 5000 mg/kg</td>
<td>Unlikely to be hazardous if swallowed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON DERMAL TOXICITY</th>
<th>NOTES ON DERMAL TOXICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy resin</td>
<td>Dermal LD50: Rabbit &gt; 6000 mg/kg</td>
<td>Repeated or prolonged skin contact may result in moderate irritation. Repeated and/or prolonged contact may cause skin sensitization.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON INHALATION TOXICITY</th>
<th>NOTES ON INHALATION TOXICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy resin</td>
<td></td>
<td>Unlikely to be hazardous by inhalation because of the low vapor pressure of the material at ambient temperature.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON EYE IRRITATION</th>
<th>NOTES ON EYE IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy resin</td>
<td></td>
<td>May cause eye irritation.</td>
</tr>
</tbody>
</table>

**12. ECOLOGICAL INFORMATION**

**POTENTIAL EFFECT ON ENVIRONMENT**
May cause harm to aquatic organisms. Do not allow to enter drains, sewers or watercourses.

**MOBILITY**
Insoluble

**PERSISTENCE AND DEGRADABILITY**
Not readily biodegradable.

**POTENTIAL TO BIOACCUMULATE**
The product has low potential for bioaccumulation.

**AQUATIC TOXICITY**
Not available.

**13. DISPOSAL CONSIDERATIONS**

**WASTE DISPOSAL METHODS**
Disposal should be in accordance with local, state or national legislation.

**EMPTY CONTAINER WARNINGS**
Empty containers may contain product residue; follow MSDS and label warnings even after they have been emptied.

**14. TRANSPORTATION INFORMATION**
This section provided for general information only. The shipping description below may not represent requirements for all modes of transportation, packaging, shipping methods or locations outside of the United States.

FOR MORE COMPLETE TRANSPORTATION REGULATORY INFORMATION PLEASE REFER TO THE SHIPPING DOCUMENTS ACCOMPANYING THE SHIPMENT OF THIS PRODUCT.

T.D.G. CLASS
Not Regulated

ICAO/IATA CLASSIFICATION
Not classified as dangerous.

15. REGULATORY INFORMATION

WHMIS CLASS
D2B

Canadian Domestic Substance List (DSL) Is on DSL
TSCA All components are on the TSCA inventory.
China (IECSC) On the IECSC Inventory.
Australia (AICS) On the AICS Inventory.
Korea (KECI) On the KECI Inventory.
Philippines (PICCS) On the PICCS Inventory.

16. OTHER INFORMATION

HMIS® Hazard Ratings
HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSSs by OSHA's 29 CFR 1910.1200, we choose to provide them as a service to our customers using HMIS®. These ratings are to be used only with a fully implemented HMIS® program. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.

NPCA recommends that employers must determine appropriate PPE for the actual conditions under which this product is used in their workplace. For information on PPE codes, consult the HMIS® Implementation Manual.

When two ratings are provided for Health, the first represents the material 'as supplied', and the second represents the material 'in use'.

* = chronic health hazard

HMIS® is a registered trademark of the National Paint and Coatings Association (NPCA).

\[
\begin{array}{ccc}
\text{Health} & \text{Flammability} & \text{Reactivity} \\
2 & 1 & 0 \\
\end{array}
\]

MSDS DATE 07-December-2007
PREPARED BY Emerson & Cuming Product Safety:
Tel: 978.436.9781
Fax: 978.436.9707

ADDITIONAL INFORMATION: The information given and the recommendations made herein apply to our product(s) alone and are not combined with other product(s). Such are based on our research and on data from other reliable sources and are believed to be accurate. No guaranty of accuracy is made. It is the purchaser's responsibility before using any product to verify this data under their own operating conditions and to determine whether the product is suitable for their purposes.
**MATERIAL SAFETY DATA SHEET**

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

<table>
<thead>
<tr>
<th>MSDS ID:</th>
<th>EC180729</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT NAME</td>
<td>ECCOBOND™ 286 WHITE, PART B Epoxy Adhesive (Hardener)</td>
</tr>
<tr>
<td>MANUFACTURER</td>
<td>Emerson &amp; Cuming A National Starch &amp; Chemical Company 46 Manning Road Billerica, MA 01821</td>
</tr>
</tbody>
</table>

**EMERGENCY CONTACT NUMBERS:**
MEDICAL: 866-359-5657 (Health & Safety Call Center-24 hours)
TRANSPORT: CHEMTREC: 800.424.9300 (24 hours)
CHEMTREC International: 703.527.3887 (call collect)
Corporate Emergency Phone: 978.436.9781 (8AM-5PM, Mon-Fri EST)
MSDS Requests/Cust. Service: 781.828.3300 (8AM-5PM, Mon-Fri EST)

2. HAZARDS IDENTIFICATION

**EMERGENCY OVERVIEW**

**DANGER!**
Possible cancer hazard.
CORROSIVE. CAUSES SEVERE OR PERMANENT DAMAGE TO EYES.
SEVERE SKIN IRRITANT. MAY CAUSE PERMANENT DAMAGE.
HARMFUL IF INHALED.
EYE IRRITANT.
HARMFUL IF SWALLOWED.
RESPIRATORY SENSITIZER.
SKIN SENSITIZER.
White Paste Amine odor

**EYE CONTACT**
Extremely severe irritant/corrosive. May cause severe burns which could lead to permanent damage or total loss of vision. The vapor and the liquid may cause burning, intense irritation and excessive watering of the eye.

**SKIN CONTACT**
Severely irritating; may cause permanent skin damage. Can be rapidly absorbed through skin. Repeated and/or prolongued contact may cause skin sensitization.

**INHALATION**
Vapor or aerosol, if generated, can cause irritation of the eyes, nose and respiratory tract. Possible respiratory sensitizer. Avoid breathing vapors or mists. Exposure to high concentrations may produce lung damage.

**INGESTION**
Severe irritation to mouth, throat, and stomach.
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL FAMILY</th>
<th>Formulated Epoxy Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPONENT</td>
<td>CAS NUMBER</td>
</tr>
<tr>
<td>3,3'-Oxybis(ethyleneoxy)bis(propylamine)</td>
<td>4246-51-9</td>
</tr>
<tr>
<td>Epoxy resin</td>
<td>PROPRIETARY</td>
</tr>
<tr>
<td>Titanium dioxide</td>
<td>13463-67-7</td>
</tr>
</tbody>
</table>

4. FIRST-AID MEASURES

**EYE**
Immediately irrigate with eyewash solution or clean water, holding the eyelids apart, for at least 10 minutes. Obtain immediate medical attention.

**SKIN CONTACT:**
Immediately flush with large amounts of water; use soap if available. Remove contaminated clothing, including shoes, after flushing has begun. Obtain immediate medical attention.

**INHALATION**
Remove to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get medical attention.

**INGESTION**
If individual is conscious, give water to dilute stomach contents. Get prompt medical attention. DO NOT attempt to give anything by mouth to an unconscious person.

5. FIREFIGHTING MEASURES

**AUTOIGNITION**
Not available

**FLASH POINT**
> 200 °F

**EXTINGUISHING MEDIA**
CO2; Dry Chemical; Water Spray

**SPECIAL FIREFIGHTING PROCEDURES**
Fire fighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes.

**FIRE & EXPLOSION HAZARDS**
A self contained breathing apparatus and suitable protective clothing should be worn in fire conditions.

**HAZARDOUS COMBUSTION PRODUCTS**
Carbon dioxide, carbon monoxide, oxides of nitrogen and unknown organics.
Aldehydes

**LOWER EXPLOSION LIMIT (%)**
Not applicable

**UPPER EXPLOSION LIMIT (%)**
Not applicable

6. ACCIDENTAL RELEASE MEASURES

**SPILL AND LEAK PROCEDURES**
Spills should be taken up with sand, earth or any suitable absorbent material and placed in containers. Spill area can be washed with water; collect wash water for approved disposal. Do not flush to storm sewer or waterway.

For safety and environmental precautions, please review entire Material Safety Data Sheet for necessary information.

7. HANDLING AND STORAGE

**STORAGE TEMPERATURE**
25 °C

**SHELF LIFE, (Days)**
365

**HANDLING/STORAGE**
Store in cool, dry place. Keep in a well ventilated place.

**SENSITIVITY TO STATIC ELECTRICITY**
No

**SPECIAL SENSITIVITY**
Keep away from heat.
SENSITIVITY TO MECHANICAL IMPACT: No

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>EXPOSURE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACGIH</td>
</tr>
<tr>
<td>Titanium dioxide</td>
<td>10 mg/m3 TWA</td>
</tr>
</tbody>
</table>

VENTILATION: Local exhaust.
EYE PROTECTION: Wear safety glasses with side shields.
GLOVES: The use of chemically resistant gloves is recommended.
CLOTHING: Employee must wear appropriate protective clothing and equipment to prevent any possibility of skin contact with this substance.
CHANGE/REMOVAL OF CLOTHING: Remove contaminated clothing and launder before reuse.
WASH REQUIREMENTS: Wash before eating, drinking, or using washroom facilities.
RESPIRATOR: Local exhaust.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Substance or Mixture</td>
<td>Mixture</td>
</tr>
<tr>
<td>Physical Form</td>
<td>Paste</td>
</tr>
<tr>
<td>Colour</td>
<td>White</td>
</tr>
<tr>
<td>Odour</td>
<td>Amine</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>Oxidizing Properties</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Solubility In Water</td>
<td>Soluble</td>
</tr>
<tr>
<td>Partition Coefficient (n-octanol/water)</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Specific Gravity (Water=1)</td>
<td>2.000</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour Pressure</td>
<td>Negligible @ 25°C</td>
</tr>
<tr>
<td>Vapour Density (Air=1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Volatiles (%)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>Negligible</td>
</tr>
<tr>
<td>Autoignition</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>&gt; 200 °F</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability: Stable
Hazardous Decomposition Products: Material is stable under normal temperatures and pressures.
Materials to Avoid: Strong oxidizers, Strong Lewis acids, Mineral acids
Conditions to Avoid: Elevated temperatures
Hazardous Decomposition Products: Carbon dioxide, carbon monoxide, oxides of nitrogen and unknown organics. Aldehydes

11. TOXICOLOGICAL INFORMATION

Route of Entry: Skin Contact; Eye Contact; Ingestion

Carcinogen

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA Specific Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>Yes (2B)</td>
<td>No</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>
**CHRONIC (LONG TERM) EFFECTS OF EXPOSURE**

**TARGET ORGANS**
- Eyes; Skin; Respiratory system

**RESPIRATORY SENSITIZATION**
- Sensitizer. May cause allergic reaction.

**SKIN SENSITIZATION**
- Sensitizer. May cause allergic reaction.

**PRODUCT TOXICOLOGY**

**PRODUCT INFORMATION**
This health hazard assessment is based on a consideration of the composition of this product.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON ORAL TOXICITY</th>
<th>NOTES ON ORAL TOXICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,3'-'Oxybis(ethyleneoxy)bis(propylamine)</td>
<td>Oral LD50: Rat 3160 mg/kg</td>
<td>Corrosive to mouth, throat and stomach.</td>
</tr>
<tr>
<td>Epoxy resin</td>
<td>Oral LD50: Rat &gt; 5000 mg/kg</td>
<td>Unlikely to be hazardous if swallowed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON DERMAL TOXICITY</th>
<th>NOTES ON DERMAL TOXICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,3'-'Oxybis(ethyleneoxy)bis(propylamine)</td>
<td>Dermal LD50: Rat &gt; 2150 mg/kg</td>
<td>Corrosive.</td>
</tr>
<tr>
<td>Dermal LD50: Rabbit 2500 mg/kg</td>
<td>Dermal LD50: Rabbit &gt; 6000 mg/kg</td>
<td>Repeated or prolonged skin contact may result in moderate irritation. Repeated and/or prolonged contact may cause skin sensitization.</td>
</tr>
<tr>
<td>Epoxy resin</td>
<td>Dermal LD50: Rabbit &gt; 6000 mg/kg</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON INHALATION TOXICITY</th>
<th>NOTES ON INHALATION TOXICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,3'-'Oxybis(ethyleneoxy)bis(propylamine)</td>
<td>Inhalation of dust or vapor may cause severe irritation to the nasal passages and/or the respiratory system.</td>
<td></td>
</tr>
<tr>
<td>Epoxy resin</td>
<td>Unlikely to be hazardous by inhalation because of the low vapor pressure of the material at ambient temperature.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NOTES ON EYE IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,3'-'Oxybis(ethyleneoxy)bis(propylamine)</td>
<td>Extremely severe irritant/Corrosive. May cause severe burns which could lead to permanent damage or total loss of vision.</td>
</tr>
<tr>
<td>Epoxy resin</td>
<td>May cause eye irritation.</td>
</tr>
</tbody>
</table>

**12. ECOLOGICAL INFORMATION**

**POTENTIAL TO BIOACCUMULATE**
- Not available.

**AQUATIC TOXICITY**
- Not available.

**13. DISPOSAL CONSIDERATIONS**

**WASTE DISPOSAL METHODS**
- Disposal should be in accordance with local, state or national legislation.
EMPTY CONTAINER WARNINGS

Empty containers may contain product residue; follow MSDS and label warnings even after they have been emptied.

14. TRANSPORTATION INFORMATION

This section provided for general information only. The shipping description below may not represent requirements for all modes of transportation, packaging, shipping methods or locations outside of the United States.

FOR MORE COMPLETE TRANSPORTATION REGULATORY INFORMATION PLEASE REFER TO THE SHIPPING DOCUMENTS ACCOMPANYING THE SHIPMENT OF THIS PRODUCT.

T.D.G. CLASS
Not Regulated

ICAO/IATA CLASSIFICATION
Not classified as dangerous.

15. REGULATORY INFORMATION

WHMIS CLASS
D2A D2B

Canadian Domestic Substance List (DSL) Is on DSL
TSCA All components are on the TSCA inventory.
Philippines (PICCS) On the PICCS Inventory.
EINECS All components of this product are listed in EINECS or ELINCS, or are otherwise exempt from EU notification requirements.

16. OTHER INFORMATION

HMIS® Hazard Ratings
HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs by OSHA’s 29 CFR 1910.1200, we choose to provide them as a service to our customers using HMIS®. These ratings are to be used only with a fully implemented HMIS® program. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.

NPCA recommends that employers must determine appropriate PPE for the actual conditions under which this product is used in their workplace. For information on PPE codes, consult the HMIS® Implementation Manual.

When two ratings are provided for Health, the first represents the material 'as supplied', and the second represents the material 'in use'.
* = chronic health hazard

HMIS® is a registered trademark of the National Paint and Coatings Association (NPCA).

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>*3</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

RECOMMENDED USE
Adhesive

MSDS DATE
11-January-2008

PREPARED BY
Emerson & Cuming Product Safety:
Tel: 978.436.9781
Fax: 978.436.9707

SECTIONS MODIFIED SINCE PREVIOUS ISSUE
2; 3
ADDITIONAL INFORMATION: The information given and the recommendations made herein apply to our product(s) alone and are not combined with other product(s). Such are based on our research and on data from other reliable sources and are believed to be accurate. No guaranty of accuracy is made. It is the purchaser's responsibility before using any product to verify this data under their own operating conditions and to determine whether the product is suitable for their purposes.