### SECTION 1: Identification

#### 1.1. Identification

<table>
<thead>
<tr>
<th>Product name</th>
<th>HARDSIL™ AR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>PP1-HSAR</td>
</tr>
<tr>
<td>Product form</td>
<td>Mixture</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Synonyms</td>
<td>PHENYL-METHYL T RESIN SILOXANE SOLUTION</td>
</tr>
<tr>
<td></td>
<td>PHENYL-METHYLSILSESQUIOXANE RESIN SOLUTION</td>
</tr>
<tr>
<td>Chemical family</td>
<td>ORGANOSILOXANE</td>
</tr>
</tbody>
</table>

#### 1.2. Recommended use and restrictions on use

Recommended use: Chemical intermediate

#### 1.3. Supplier

**GELEST, INC.**  
11 East Steel Road  
Morrisville, PA 19067  
**USA**  
T 215-547-1015 - F 215-547-2484 - (M-F): 8:00 AM - 5:30 PM EST  
info@gelest.com - www.gelest.com

#### 1.4. Emergency telephone number

Emergency number: CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)

### SECTION 2: Hazard(s) Identification

#### 2.1. Classification of the substance or mixture

<table>
<thead>
<tr>
<th>GHS-US classification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable liquids Category 3</td>
<td>H226 - Flammable liquid and vapor</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation Category 2</td>
<td>H319 - Causes serious eye irritation</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure) Category 3</td>
<td>H336 - May cause drowsiness or dizziness</td>
</tr>
</tbody>
</table>

Full text of H statements: see section 16

#### 2.2. GHS Label elements, including precautionary statements

<table>
<thead>
<tr>
<th>GHS US labeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard pictograms (GHS US)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal word (GHS US)</th>
<th>Warning</th>
</tr>
</thead>
</table>
| Hazard statements (GHS US) | H226 - Flammable liquid and vapor  
H319 - Causes serious eye irritation  
H336 - May cause drowsiness or dizziness |
| Precautionary statements (GHS US) | P280 - Wear protective gloves/protective clothing/eye protection/face protection.  
P312 - Call a doctor if you feel unwell  
P210 - Keep away from heat, open flames, sparks. - No smoking.  
P240 - Ground/Bond container and receiving equipment  
P241 - Use explosion-proof electrical equipment  
P242 - Use only non-sparking tools.  
P243 - Take precautionary measures against static discharge.  
P261 - Avoid breathing vapors.  
P264 - Wash hands thoroughly after handling.  
P271 - Use only outdoors or in a well-ventilated area.  
P303+P361+P353 - If on skin (or hair): take off immediately all contaminated clothing, rinse skin with water/shower  
P304+P340 - If inhaled: 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.  
P337+P313 - If eye irritation persists: Get medical advice/attention.  
P370+P378 - In case of fire: Use water spray, foam, carbon dioxide, dry chemical to extinguish.  
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.  
P403+P235 - Keep in a cool place  
P405 - Store locked up.  
P501 - Dispose of contents/container to licensed waste disposal facility. |
2.3. Hazards not otherwise classified (HNOC)
No additional information available

2.4. Unknown acute toxicity (GHS US)
Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances
Not applicable

3.2. Mixtures

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
</table>

Full text of hazard classes and H-statements: see section 16

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general:
Remove contaminated clothing and shoes. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If possible show this sheet; if not available show packaging or label.

First-aid measures after inhalation:
Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.

First-aid measures after skin contact:
Wash with plenty of soap and water. Get medical advice/attention.

First-aid measures after eye contact:
Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention.

First-aid measures after ingestion:
Never give anything by mouth to an unconscious person. Get medical advice/attention.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation:
May cause drowsiness or dizziness. May cause irritation to the respiratory tract.

Symptoms/effects after skin contact:
May cause skin irritation.

Symptoms/effects after eye contact:
Causes serious eye irritation.

Symptoms/effects after ingestion:
May be harmful if swallowed.

4.3. Immediate medical attention and special treatment, if necessary
No additional information available

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:

Unsuitable extinguishing media:
Do not use straight streams.

5.2. Specific hazards arising from the chemical

Fire hazard:
Flammable liquid and vapor. Irritating fumes and organic acid vapors may develop when material is exposed to water or open flame.

Explosion hazard:
May form flammable/explosive vapor-air mixture.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions:
Exercise caution when fighting any chemical fire. Use water spray to cool exposed surfaces. Avoid all eye and skin contact and do not breathe vapor and mist.

Protection during firefighting:
Do not enter fire area without proper protective equipment, including respiratory protection. Evacuate unnecessary personnel.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures:
Eliminate every possible source of ignition. Use special care to avoid static electric charges.

6.1.1. For non-emergency personnel

Protective equipment:
Wear protective equipment as described in Section 8.

Emergency procedures:
Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment:
For further information refer to section 8: “Exposure controls/personal protection”. Equip cleanup crew with proper protection. Do not attempt to take action without suitable protective equipment.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.
6.3. Methods and material for containment and cleaning up

For containment: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.

Methods for cleaning up: Clean up any spills as soon as possible, using an absorbent material to collect it. Use only non-sparking tools.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed: Handle empty containers with care because residual vapors are flammable. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Precautions for safe handling: Avoid all eye and skin contact and do not breathe vapor and mist. Ground/bond container and receiving equipment. Take precautionary measures against static discharge. Use only outdoors or in a well-ventilated area. Use only non-sparking tools.

Hygiene measures: Wash contaminated clothing before reuse. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures: Proper grounding procedures to avoid static electricity should be followed. Use explosion-proof electrical equipment.

Storage conditions: Keep container tightly closed. Keep in a cool place. Store locked up.

Incompatible materials: Oxidizing agent.

Storage area: Store in a well-ventilated place. Store away from heat.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Methoxypropanol (107-98-2)</th>
<th>ACGIH</th>
<th>ACGIH TWA (ppm)</th>
<th>50 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td></td>
<td>ACGIH STEL (ppm)</td>
<td>100 ppm</td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (TWA) (mg/m³)</td>
<td>360 mg/m³</td>
<td></td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (TWA) (ppm)</td>
<td>100 ppm</td>
<td></td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (STEL) (mg/m³)</td>
<td>540 mg/m³</td>
<td></td>
</tr>
<tr>
<td>NIOSH</td>
<td>NIOSH REL (STEL) (ppm)</td>
<td>150 ppm</td>
<td></td>
</tr>
</tbody>
</table>

8.2. Appropriate engineering controls

Appropriate engineering controls: Provide local exhaust or general room ventilation.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:
Avoid all unnecessary exposure. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Hand protection:
Neoprene or nitrile rubber gloves

Eye protection:
Chemical goggles. Contact lenses should not be worn

Skin and body protection:
Wear suitable protective clothing

Respiratory protection:
Where exposure through inhalation may occur from use, respiratory protection equipment is recommended. NIOSH-certified organic vapor (black cartridge) respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state: Liquid
Appearance: Clear liquid.
Color: Straw.
Odor: Mild.
Odor threshold: No data available
Refractive index: No data available
pH: No data available
Relative evaporation rate (butyl acetate=1): No data available
Melting point: No data available
Freezing point: < -20 °C
Boiling point: 117 °C initial
Flash point: 35 °C
Auto-ignition temperature: No data available
Decomposition temperature: No data available
Flammability (solid, gas): Flammable liquid and vapor
Vapor pressure: No data available
Relative vapor density at 20 °C: > 1
Relative density: 0.94
% Volatiles: > 75 %
Solubility: Reacts with water.
Log Pow: No data available
Log Kow: No data available
Viscosity, kinematic: No data available
Viscosity, dynamic: No data available
Explosive properties: No data available
Oxidizing properties: No data available
Explosion limits: No data available

9.2. Other information
No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity
No additional information available

10.2. Chemical stability
Stable in sealed containers stored under a dry inert atmosphere.

10.3. Possibility of hazardous reactions
No additional information available

10.4. Conditions to avoid
Heat. Open flame. Sparks.

10.5. Incompatible materials
Oxidizing agent.

10.6. Hazardous decomposition products
Organic acid vapors.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity: Not classified

Methoxypropanol (107-98-2)

LC50 inhalation rat (mg/l): > 6 mg/l/4h
Skin corrosion/irritation: Not classified
Serious eye damage/irritation: Causes serious eye irritation.
Respiratory or skin sensitization: Not classified
Germ cell mutagenicity: Not classified
Carcinogenicity: Not classified

None of the components in this product at concentrations >0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

Reproductive toxicity: Not classified
Specific target organ toxicity – single exposure: May cause drowsiness or dizziness.
Specific target organ toxicity – repeated exposure : Not classified
Aspiration hazard : Not classified
Symptoms/effects after inhalation : May cause drowsiness or dizziness. May cause irritation to the respiratory tract.
Symptoms/effects after skin contact : May cause skin irritation.
Symptoms/effects after eye contact : Causes serious eye irritation.
Symptoms/effects after ingestion : May be harmful if swallowed.
Reason for classification : Expert judgment

SECTION 12: Ecological information

12.1. Toxicity
Methoxypropanol (107-98-2)

<table>
<thead>
<tr>
<th>Toxicity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 fish 1</td>
<td>20.8 g/l (Exposure time: 96 h - Species: Pimephales promelas [static])</td>
</tr>
<tr>
<td>EC50 Daphnia 1</td>
<td>23300 mg/l (Exposure time: 48 h - Species: Daphnia magna)</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential
Methoxypropanol (107-98-2)

<table>
<thead>
<tr>
<th>Bioaccumulative potential</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCF fish 1</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Log Pow</td>
<td>-0.437</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil
No additional information available

12.5. Other adverse effects
Other adverse effects : This substance may be hazardous to the environment.
Effect on the ozone layer : No additional information available

SECTION 13: Disposal considerations

13.1. Disposal methods
Sewage disposal recommendations : Do not dispose of waste into sewer.
Product/Packaging disposal recommendations : May be incinerated. Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to licensed waste disposal facility.
Additional information : Handle empty containers with care because residual vapors are flammable.
Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

14.1. UN number
UN-No.(DOT) : 1866
DOT NA No : UN1866

14.2. UN proper shipping name
Transport document description : UN1866 Resin solution (PHENYL-METHYLSILSESQUIOXANE RESIN SOLUTION), 3, III
Proper Shipping Name (DOT) : Resin solution (PHENYL-METHYLSILSESQUIOXANE RESIN SOLUTION)
Class (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120
Packing group (DOT) : III - Minor Danger
Hazard labels (DOT) : 3 - Flammable liquid

DOT Packaging Non Bulk (49 CFR 173.xxx) : 173
DOT Packaging Bulk (49 CFR 173.xxx) : 242
DOT Packaging Exceptions (49 CFR 173.xxx) : 150

14.3. Additional information
Emergency Response Guide (ERG) Number : 127
Other information : No supplementary information available.
Transport by sea

DOT Vessel Stowage Location: A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.

Air transport

DOT Quantity Limitations Passenger aircraft/rail: 60 L
(49 CFR 173.27)
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)

SECTION 15: Regulatory information

15.1. US Federal regulations

Methoxypropanol (107-98-2)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

Methoxypropanol (107-98-2)
Listed on the Canadian DSL (Domestic Substances List)
WHMIS Classification: Class B Division 2 - Flammable Liquid

EU-Regulations

Methoxypropanol (107-98-2)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

National regulations

Methoxypropanol (107-98-2)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)
Listed on INSO (Mexican National Inventory of Chemical Substances)
Listed on CICR (Turkish Inventory and Control of Chemicals)

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

Methoxypropanol (107-98-2)
U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

Full text of H-phrases:

H226 Flammable liquid and vapor
H319 Causes serious eye irritation
H336 May cause drowsiness or dizziness

Abbreviations and acronyms:

Abbreviations: ND: Not Determined, No Data; NA: Not Applicable; LD: Lethal Dose; LC: Lethal Concentration; ATE: Acute Toxicity Estimates; H: hour; °: °C unless otherwise stated; mm: millimeters Hg, torr; PEL: permissible exposure level; TWA: time weighted average; TLV: threshold limit value; TG: Test Guideline; NIOSH: National Institute for Occupational Safety and Health; IARC: International Agency for Research on Cancer; NTP: National Toxicology Program; HMIS: Hazardous Material Information System; CAS No.: Chemical Abstract Service Registration Number; EC No.: European Commission Registration Number; EC Index No.: European Commission Index Number; OECD: The Organisation for Economic Co-operation and Development; GHS: The Globally Harmonized System of Classification and Labelling; APF: Assigned Protection Factor.
HARDSIL™ AR
Safety Data Sheet

Hazard Rating
Health : 2 Moderate Hazard - Temporary or minor injury may occur
Flammability : 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)
Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Prepared by safety and environmental affairs.

Date of issue: 08/26/2015     Revision date: 07/10/2019     Version: 2.0

SDS US (GHS HazCom 2012) - Custom
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

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Gelest HardSil™ AR

Electrical and Optical Barrier Silicone Resin Coating

Features: A clear silicone hard coat with excellent thermal and optical properties that provides a mechanical and oxidation barrier. HardSil™ AR is a curable polysilsesquioxane T-resin modified to provide sufficient flexibility to withstand thermal cycling associated with power-up of electrical and optical circuit components.

Applications:

**Optical Components** - provides effective scratch-resistant coatings with good adhesion to glass. High refractive index provides a step-index cladding.

**Electrical components** - hard, heat resistant coating for thermal cycling from room temperature to 290°C. Examples include resistor and capacitor coatings.

<table>
<thead>
<tr>
<th>Capsular Description</th>
<th>Thickness</th>
<th>Cure</th>
<th>Hardness</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>thin-thick</td>
<td>thermal</td>
<td>high</td>
<td>solvent-borne</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1-part</td>
</tr>
</tbody>
</table>

**HardSil™ AR** High Temperature Electrical Coating - Thermal Cure

**Description**

HardSil™ AR is a primerless modified phenyl silicone resin for continuous use at temperatures up to 325°C, dispersed in methoxypropanol.

**Film Properties**

- Color: clear
- Hardness, Rockwell R: 110
- Refractive Index: 1.56-1.58
- Volume Resistivity: $1 \times 10^{13}$ ohm-cm

**Solution Properties**

- Form: liquid
- Solids: 20%
- Flashpoint: 35°C
- Specific Gravity: 0.92
- Viscosity: 3-5 cSt.

Shelf life: 12 months when stored below 25°C in sealed containers. Keep container sealed after dispensing product.

**Standard Packaging**

PP1-HSAR HardSil™ AR

- 100g: $29.00
- 1kg: $196.00
- 10kg: commercial package

**Cautions**

Use in a well ventilated area.
Flammable.
Avoid contact with skin and eyes.

**Application Methods**

Gelest HardSil™ AR is applied as a coating by spraying, dipping or brushing. Material is allowed to dry for 1 hour and then cured at 220°C for 20-25 minutes. Thinner films may be prepared by diluting with methoxypropanol. Cure can be accelerated by adding 0.5% zinc 2-ethylhexanoate, although this will reduce volume resistivity.