

## SAFETY DATA SHEET

### 1. IDENTIFICATION THE SUBSTANCE / PREPARATION OF THE COMPANY / UNDERTAKING

Product Name: **ESTOFOAM PU (Resin)**  
Application: Concrete Crack Repair  
Company: Denka Construction Solutions Malaysia Sdn Bhd  
Address: No. 18, Jalan Utas 15/7, Seksyen 15, 40200 Shah Alam, Selangor, Malaysia  
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### 2. HAZARD IDENTIFICATION

#### A. Hazard Risk Classification

- Health Hazard
  - Skin Corrosion/Irritation : Category 2
  - Skin Sensitization : Category 1
  - Eye damage/Irritation : Category 2
  - Respiratory Sensitization : Category 1
  - Specific Target Organ Toxicity (Single Exposure) : Category 3
  - Reproductive Toxicity : Category 1B
  - Chronic aquatic toxicity : Category 3

#### B. Label elements including precaution statements.

- Symbol:



- Signal word: Danger
- Hazard Risk Statement
  - H315 Cause skin irritation.
  - H317 May cause an allergic skin reaction.
  - H332 Harmful if inhaled.
  - H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
  - H335 May cause respiratory irritation.
  - H360 May damage fertility or the unborn child.
  - H412 Harmful to aquatic life with long lasting effects.
- Precautionary Statement (Prevention)
  - P201 Obtain special instruction before use.
  - P202 Do not handle until all safety precautions have been read and understood.
  - P261 Avoid breathing dust/fume/gas/mist/vapor/spray.
  - P264 Wash thoroughly after handling.

- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P281 Use personal protective equipment as required.
- P285 In case of inadequate ventilation wear respiratory protection.

- Response
  - P302+P352 IF ON SKIN: Wash with soap and water.
  - P321 Specific treatment (Reference to supplemental first aid instruction).
  - P362 Take off contaminated clothing and wash before reuse.
  - P333+P313 If skin irritation and rash occur: Get medical advice/attention.
  - P305+P351+P338 IF IN EYES: Rinse continuously 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.
  - P304+P341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
  - P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
  - P312 Call a POISON CENTER or doctor/physician if you feel unwell.
  - P308+P313 IF exposed or concerned: Get medical advice/attention.
- Storage
  - P403+P233 Store in a well-ventilated place. Keep container tightly closed.
  - P405 Store locked up.
- Disposal
  - P501 Dispose of contents and container to appropriate waste site or reclaimer accordance with local and national regulations

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### 3. COMPOSITION / INFORMATION ON INGREDIENTS

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Chemical Composition	CAS Number	Content, %
Isocyanates	Trade Secret	30-60
Phosphites	Trade Secret	10-30
Aromatic acids	Trade Secret	10-30

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### 4. FIRST AID MEASURES

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Eyes:	Immediately flush eyes with running water for a minimum of 15 minutes. If irritation persists, repeat flushing. Obtain medical attention immediately.
Skin:	Remove contaminated clothing. Wash affected areas thoroughly with a cleaner based on polyethylene glycol, corn oil or with plenty of soap and water. If irritation, redness, or a burning sensation develops and persists, obtain medical advice.
Inhalation	Move to fresh air. Consult a physician after significant exposure. Oxygen or artificial respiration if needed.
Ingestion	Call a physician. Immediately clean mouth with water. Never give anything by mouth to an unconscious person. Do not induce vomiting: unless directed to do so by medical personnel.

**Most Important Symptoms and Effects, Both Acute and Delayed:**

The product causes irritation of eyes, skin and mucous membranes.

**Indication of Any Immediate Medical Attention and Special Treatment Needed:**

Artificial respiration and/or oxygen may be necessary.

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## 5. FIRE FIGHTING MEASURES

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Suitable Extinguishing Media	Use dry chemical, CO <sub>2</sub> , water spray or alcohol-resistant foam.
Special Exposure Hazards	Carbon oxides (CO, CO <sub>2</sub> ), nitrogen oxides (NO, NO <sub>2</sub> etc.), hydrocarbons, isocyanate vapours and traces of hydrogen cyanide can be released in case of fire. Burning produces irritant fumes. Risk of explosion if heated under confinement.
Special Protective Equipment	Standard procedure for chemical fires. In the event of fire, wear self-contained breathing apparatus. Safety glasses. Wear fire/flame resistant/retardant clothing.
Advice for Firefighters	Do not allow contaminated extinguishing water to enter the soil, ground or surface water.
Specific Methods	Water mist may be used to cool closed containers. In the event of fire, cool tanks with water spray.

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## 6. ACCIDENTAL RELEASE MEASURES

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**Personal Precautions, Protective Equipment and Emergency Procedures:**

Advice for non-emergency personnel:	Evacuate person to safe areas. Do not breathe vapor or spray mist. Avoid contact with skin and eyes. Keep people away from spill/leak.
Advice for emergency responders:	Handle in accordance with industrial hygiene and safety practice. In the case of vapor formation use respirator with an approved filter.
Environmental Precautions:	Prevent product from entering drains. Do not allow material to contaminate ground water system. Advise water authority if spillage has entered water course or drainage system. Contain and cover spill with dry sand or earth or any suitable material using shovel or broom. Keep in suitable containers for disposal.
Methods and Material for Containment and Cleaning Up:	Soak up with inert absorbent material (e.g. sawdust, chemical binder based on calcium silicate hydrate, sand). Transfer to waste container after one hour and do not seal (evolution of CO <sub>2</sub> !) Keep damp in a safe ventilated area for several days before seal. Spill area can be decontaminated with decontamination solution by adding about 10 parts per part of isocyanate, with mixing: <ul style="list-style-type: none"><li>• Decontamination solution 1: 8-10% sodium carbonate and 2% of liquid soap in water.</li><li>• Decontamination solution 2: Liquid/yellow soap (potassium soap with – 15% anionic tenside- 20ml); water (700ml); Polyethylene glycol (PEG 400- 350ml).</li></ul>

## 7. HANDLING AND STORAGE

Handling:	Do not breathe dust/fume/gas /mist/vapor/spray. Use only in well-ventilated areas. Avoid contact with skin, eyes and clothing. Wear appropriate respirator when ventilation is inadequate. Eating, drinking and smoking are prohibited in working areas.
Storage:	Keep container tightly closed in a dry and well-ventilated place. Avoid moisture. Keep containers dry and tightly closed to avoid moisture absorption and contamination. Keep at temperatures between 15 and 25°C.

## 8. EXPOSURE CONTROL / PERSONAL PROTECTION

**Control Parameters:**  
**Occupational Exposure Limits Values:-**

Components	Value	Control	Basis
Isocyanates	TWA	0.005 ppm 0.051 mg/m <sup>3</sup>	MY OEL
Isocyanates	TWA	0.005 ppm 0.051 mg/m <sup>3</sup>	MY OEL
Aromatic acids	TWA	5mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV) USA. OSHA-TABLE Z-1 Limits for Air Contaminants 1910.1000 USA Occupational Exposure Limits (OSHA) – Table z-1 Limits for Air Contaminants USA.NIOSH Recommended Exposure Limits

<b>Exposure Controls:</b>	Avoid contact with skin, eyes and clothing. Do not breathe dust/fume/gas/mist/vapor/spray.
<b>Personal Protection Equipment:</b>	
Respiratory Protection:	In the case of mist, spray or aerosol exposure, wear suitable personal respiratory protection and protective suit. Breathing apparatus with filter. Half mask with a particle filter P2 (EN 143). Respirator with combination filter for vapor/particulate.
Hand Protection:	The selected protective gloves must satisfy the specification of EU Directive 89/689/EEC and the standard EN 374 derived from it. Gloves made of Butyl, Nitrile and Chloroprene.
Eye Protection:	Safety glasses. Safety glasses with side-shields conforming to EN166. Goggles.
Skin and Body protection:	Safety shoes. Long sleeved clothing. Lightweight protective clothing. Lab coat.
<b>Thermal Hazards:</b>	Risk of explosion if heated under confinement. Decomposes on heating. Carbon oxides (CO, CO <sub>2</sub> ) nitrogen oxides (NO, NO <sub>2</sub> etc.) hydrocarbons, isocyanate vapor and hydrogen cyanide can be released in case of fire.

## Environmental Exposure

### Exposure Controls:

Should not be released into the environment. For environmental protection remove and wash all contaminated protective equipment before reuse.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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Alternate Name(s)	Modified MDI
Chemical Family	Diisocyanate
Physical State	Liquid
Colour	Dark Brown
Odour	Slightly musty
Odour Threshold	No information available
pH (concentration)	No information available
Boiling Point / Range (°C)	>204 °C (decomposes before boiling)
Melting point / Freezing (°C)	No information available
Flash Point (°C)	>230 °C
Evaporation Rate	No information available
Flammability (°C)	No information available
Explosion limits	No information available
Vapour Pressure	<10 <sup>-4</sup> mmHg (at 40°C)
Vapour Density	No information available
Specific Gravity	1.16 approx. (at 25 °C)
Oxidising Properties	No information available
Water Solubility	Reacts with water
Partition Coefficient n-Octanol/water	No information available
Auto ignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	120mPa.s (25°C)
Combustion/Explosion Hazards	No information available
Oxidising Properties	No information available

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## 10. STABILITY AND REACTIVITY

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Reactivity:	React with water. Exothermic reaction with strong acids. Exothermal reaction with amines and alcohols.
Chemical Stability:	Stable at room temperature.
Possibility of Hazardous Reactions:	Hazardous polymerization may occur. Container can be pressurized by carbon dioxide due to reaction with humid air and/or water.
Conditions to Avoid:	Avoid high temperatures. Avoid freezing. Decomposition under influence of moisture is highly accelerated by heating. Keep from any possible contact with water. Direct sources of heat.
Incompatible materials:	Strong bases. Water. Amines. Alcohols.
Hazardous Decomposition Products:	No hazardous decomposition products when stored and handled correctly.

## 11. TOXICOLOGICAL INFORMATION

### Information on Toxicological Effects:

#### Acute Toxicity:

Aromatic Acids:

Acute Toxicity	Result	Species
Oral	LD50: 8000mg/kg	Rat
Dermal	LD50: > 20860	Rabbit
Inhalation	LC50: 4250mg/m	Rat

Isocyanates:

Acute Toxicity	Result	Method
Oral	LD50 rat, male >10000mg/kg	OECD Test guideline 401
Dermal	LD50 rabbit, male/female >9400mg/kg	OECD Test guideline 402
Inhalation	LC50 rat, male/female >0.31mg/l, 4h	OECD Test guideline 403

Phosphates:

Acute Toxicity	Result	Method
Oral	LD50: 50mg/kg	Rat
Dermal	LD50: > 5000mg/kg	Rabbit
Inhalation	LC50 (1h): > 4.6mg/l	Rat, greater than 90% respirable

#### Irritation:

Aromatic acids:

Skin corrosion/Irritation: No data available

Serious eye damage/eye irritation: No data available

Isocyanates:

Irritation	Species	Result	Method
Primary skin	Rabbit	Slight irritant	OECD Test guideline 404
Primary mucosae	Rabbit	Non-irritant	OECD Test guideline 405

Phosphites:

Skin corrosion/Irritation: No data available

Serious eye damage/eye irritation: No data available

#### Sensitization:

Aromatic acids:

Respiratory or skin sensitization: No data available

Isocyanates:

Sensitization	Species	Result	Method
Skin (Magnusson/Kligmann)	Guinea pig	Negative (does not cause skin sensitization.)	OECD Test guideline 406
Skin (Local lymph node assay)	Mouse	Positive (may cause sensitization by skin contact.)	OECD Test guideline 429
Respiratory	Rat	Positive (May cause sensitization by inhalation.)	

## Subacute sub chronic and prolonged toxicity:

Aromatic acids: No data available

Isocyanates:

NOAEL: 0.2mg/m<sup>3</sup>

LOAEL (Lowest observable adverse effect level): 1mg/m<sup>3</sup>

Target Organs: Lungs, nasal inner lining

Test substance: as aerosol

Application Route	Species	Dose Levels	Exposure Duration	Frequency of treatment	Method
Inhalative	Rat, male/female	0-0, 2-1-6mg/m <sup>3</sup>	2 a	6 hours a day, 5 days a week	OECD Test guideline 453

## Carcinogenicity:

Aromatic acids:

No component of the product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC, ACGIH, NTP and OSHA.

Isocyanates:

Application Route	Species	Dose Levels	Exposure Duration	Frequency of treatment	Method
Inhalative	Rat, male/female	0-0, 2-1-6mg/m <sup>3</sup>	2 a	6 hours a day, 5 days a week	OECD Test guideline 453

Occurrence of tumors in the highest dose group.

## Reproductive toxicity/Teratogenicity:

Aromatic acids:

Presumed human reproductive toxicant.

Overexposure may cause reproductive disorder based on tests with laboratory animals.

Isocyanates:

NOAEL (teratogenicity): 012 mg/m<sup>3</sup> NOAEL (maternal): 4 mg/m<sup>3</sup>

NOAEL (developmental toxicity): 4 mg/m<sup>3</sup> Test period: 20 d

Test substance: as aerosol

Application Route	Species	Dose Levels	Exposure Duration	Frequency of treatment	Method
Inhalative	Rat, female	0-1-4-12mg/m <sup>3</sup>	10 days (day 6-15 p.c.)	6 hours/day	OECD Test guideline 414

## Genotoxicity:

Aromatic acids: No data available

## In vitro:

Isocyanates:

Test type	Test system	Metabolic activation	Result	Method
Salmonella/microsome test (Ames test)	Salmonella typhimurium	With/without	Negative	OECD Test guideline 471

**In vivo:**

Isocyanates:

Test type	Applicati on route	Species	Exposure period	Result	Method
Micronucleus test	Inhalative	Rat, male	3 x 1h/day over 3 weeks	Negative	OECD Test guideline 471

**STOT Evaluation:**

**One-time exposure:**

Aromatic acids: No data available

Isocyanates:

Route of exposure	Target organs	Result
Inhalative	Respiratory tract	May cause respiratory irritation

**Repeated exposure:**

Aromatic acids: No data available

Isocyanates:

Route of exposure	Target organs	Result
Inhalative	Respiratory tract	May cause damage to organs through prolonged or repeated exposure

**Aspiration toxicity:**

Aromatic acids: No data available

Isocyanates:

Based on available data, the classification criteria are not met.

**CMR Assessment:**

Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2)

Mutagenicity: In vitro and in vivo tested did not show mutagenic effect. Based on available data, the classification criteria are not met.

Reproductive toxicity/ Fertility: Based on available data, the classification criteria are not met.

**Toxicology Assessment:**

Acute effects:

Harmful in inhaled. The product causes irritation of eyes, skin and mucous membranes. Sensitization:

May cause sensitization by inhalation and skin contact.

## 12. ECOLOGICAL INFORMATION

Do not allow to escape into waterways, wastewater or soil.

### Toxicity:

Aromatic acids:

Toxicity to	Result	Species	Exposure
Fish	LC50 :0.85 mg/L	Pimephales promelas (fathead minnow) 96 h	96 h
	NOEC :0.32 mg/L		
Daphnia and other aquatic invertebrates	LC50 :3.7 mg/l	Daphnia magna (water flea)	48 h

Isocyanates:

Toxicity	Test type	Result	Species	Exposure	Method
Acute fish	Static test	LC50 >1000mg/L	Danio rerio (zebra fish)	96 h	OECD Test guideline 203
Acute to daphnia	Static test	EC50 >1000mg/L	Daphnia magna (water flea)	24	OECD Test guideline 202
Chronic to daphnia	-	NOEC (reproduction) > 10mg/l	Daphnia magna (water flea)	21 d	OECD Test guideline 202
Acute for algae	Growth inhibition	ErC50 > 1.640mg/l	Scenedesmus subspicatus	72 h	OECD Test guideline 201
Acute bacterial	Respiration inhibition	EC50 > 100mg/l	Activated sludge	3 h	OECD Test guideline 209

Phosphates:

Result	Species	Exposure
EC50 45 mg/L	Algae	96 h
EC50 295mg/L	Microtox	30 mins
EC50 65 mg/L	Water flea	-

### Toxicity to soil dwelling organisms:

Isocyanates:

Result	Species	Exposure	Method
NOEC (mortality). 1.000mg/kg	Eisenia fetida (earthworms)	14 d	OECD Test guideline 207

## Toxicity to terrestrial plants:

Isocyanates:

Result	Species	Exposure	Method
NOEC (seedling emergence). 1.000mg/kg	Avena sativa (oats)	14 d	OECD Test guideline 208
NOEC (growth rate). 1.000mg/kg	Avena sativa (oats)	14 d	OECD Test guideline 208
NOEC (seedling emergence). 1.000mg/kg	Lactuca sativa (lettuce)	14 d	OECD Test guideline 208
NOEC (growth rate). 1.000mg/kg	Lactuca sativa (lettuce)	14 d	OECD Test guideline 208

## Ecotoxicology Assessment:

Acute aquatic toxicity:

Chronic aquatic toxicity:

Toxicity data on soil:

Impact on sewage treatment:

Based on available data, the classification criteria are not met.

There is no evidence of a chronic aquatic toxicity.

The substance is graded as non-critical to soil-dwelling organisms.

Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

## Persistence and Degradation

### Biodegradability:

Aromatic acids: No data available

Isocyanates:

Test type	Inokulu	Biodegradation	Method
Aerobic	Activated sludge	0%, 28 d, i.e. not inherently degradable	OECD Test guideline 302C

According to the results of tests of biodegradability, this product is not readily biodegradable.

### Stability in water:

Isocyanates:

Test type	Half life
Hydrolysis	20 h at 25°C

The substance hydrolyzes rapidly in water.

### Photodegradation:

Isocyanates:

Test type	Temperature	Sensitizer	Concentration sensibilisation	Half-life indirect photolysis	Method
Photo transformation in air	25°C	OH-radicals	500.000 1/cm3	0.92 d	SRC-AOP (calculation)

After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.

## Bio accumulative potential

### Bioaccumulation:

Aromatic acids:

Bioconcentration factor (BCF)	Species	Exposure duration	Concentration	Method
2,165	Pimephales promelas (fathead minnow)	11 d	0.0348mg/l	OECD Test guideline 305C

Isocyanates:

Bioconcentration factor (BCF)	Species	Exposure duration	Concentration	Method
< 14	Cyprinus carpio (carp)	42 d	0.2mg/l	OECD Test guideline 305C

Does not significantly accumulate in organisms. The substance hydrolyzes rapidly in water.

### Environmental distribution:

No information available

### Other adverse effects:

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life with long lasting effects.

## 13. DISPOSAL CONSIDERATIONS

Waste from Residues/Unused Products:

The generation of waste should be avoided or minimized wherever possible. Disposal should be in accordance with local, state, provincial or national regulations. Can be incinerated, when in compliance with local regulations. Offer surplus and non-recyclable solutions to an established disposal company. Chemical waste, even small quantities, should never be poured down drains, sewers or waterways.

Contaminated Packaging:

Empty containers should be decontaminated and either passed to an approved drum recycler or destroyed.

## 14. TRANSPORT INFORMATION

### DOT (US)

UN Number : 3082  
 Proper shipping name : Environmentally hazardous substances, liquid, n.o.s  
 Class or Division : 9  
 Packing group : III  
 Marine Pollutant : No  
 Poison Inhalation Hazard : No

**IATA**

UN Number : 3082  
Proper shipping name : Environmentally hazardous substances, liquid, n.o.s  
Class or Division : 9  
Packing group : III

**IMDG**

UN/ID No. : UN 3082  
Proper shipping name : Environmentally hazardous substances, liquid, n.o.s  
Class or Division : 9  
Packing group : III  
Marine Pollutant : Yes

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## 15. REGULATORY INFORMATION

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**Precautionary statements****Prevention**

Wash thoroughly after handling. Wear protective gloves. Avoid breathing dust/fume/gas/mist/vapor/spray. Contaminated work clothing shall not be allowed out of the workplace. In case of inadequate ventilation wear respiratory protection. Use only outdoors or in a well-ventilated area. Obtain special instruction before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required.

Avoid release to the environment.

**Storage**

Store in a well-ventilated place. Keep container tightly closed.  
Store locked-up

**Disposal**

Dispose of contents and container in accordance with all local, regional, national and international regulations.

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

Any existing national regulation on the handling of isocyanate must be observed.

## 16. OTHER INFORMATION

The data and advice given apply when the product is used for the stated application or applications. The product is not sold as suitable for any other application. Use of the product for applications other than as stated in this sheet may give rise to risks not mentioned in this sheet. The product should not be used than for the stated application or applications without seeking advice from Denka Construction Solutions Malaysia Sdn Bhd.

If this product has been purchased to a third party for use at work, it is the purchaser's duty to take all necessary steps to secure that any person handling or using the product is provided with information in this sheet.

It is the responsibility and duty of the employer to inform employees and others who may be affected of any hazards described to this sheet and of any precautions which should be taken. This sheet does not constitute or substitute for the user's own assessment of workplace risk, as required by other health and safety legislation.

<b>SDS</b>	<b>Estofam PU (Resin)</b>
<b>Date Issue</b>	<b>20/04/2023</b>
<b>Revision</b>	<b>02</b>



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