SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

ARALDITE® STANDARD G RESIN

<table>
<thead>
<tr>
<th>Version</th>
<th>Revision Date</th>
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<tbody>
<tr>
<td>1.0</td>
<td>20.07.2018</td>
<td>400001021217</td>
<td>-</td>
<td>20.07.2018</td>
</tr>
</tbody>
</table>

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
   Trade name: ARALDITE® STANDARD G RESIN

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Use of the Substance/Mixture: Epoxy constituents

1.3 Details of the supplier of the safety data sheet
   Company: Huntsman Advanced Materials (Europe)BVBA
   Address: Everslaan 45
            3078 Everberg
            Belgium
   Telephone: +41 61 299 20 41
   Telefax: +41 61 299 20 40
   E-mail address of person responsible for the SDS: Global_Product_EHS_AdMat@huntsman.com

1.4 Emergency telephone number
   Emergency telephone number: EUROPE: +32 35 75 1234
                               France ORFILA: +33(0)145425959
                               ASIA: +65 6336-6011
                               China: +86 20 39377888
                               +86 532 83889090
                               India: + 91 22 42 87 5333
                               Australia: 1800 786 152
                               New Zealand: 0800 767 437
                               USA: +1/800/424.9300

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification (REGULATION (EC) No 1272/2008)
   Skin irritation, Category 2
   Eye irritation, Category 2
   Skin sensitisation, Category 1
   Long-term (chronic) aquatic hazard, Category 2
   H315: Causes skin irritation.
   H319: Causes serious eye irritation.
   H317: May cause an allergic skin reaction.
   H411: Toxic to aquatic life with long lasting effects.
2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

- Warning

Signal word : H315

Causes skin irritation.

- H317

May cause an allergic skin reaction.

- H319

Causes serious eye irritation.

- H411

Toxic to aquatic life with long lasting effects.

Precautionary statements :

Prevention:

- P261

Avoid breathing mist or vapours.

- P264

Wash skin thoroughly after handling.

- P273

Avoid release to the environment.

- P280

Wear protective gloves/ eye protection/ face protection.

Response:

- P333 + P313

If skin irritation or rash occurs: Get medical advice/ attention.

- P391

Collect spillage.

Hazardous components which must be listed on the label:

- 2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane

bisphenol A - epoxy resins, number average MW >700 - <1100

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Registration number</th>
<th>Classification</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane</td>
<td>1675-54-3</td>
<td>216-823-5</td>
<td>603-073-00-2</td>
<td>01-2119456619-26</td>
<td>Skin Irrit. 2; H315</td>
<td>&gt;&gt; 60 - &lt; 100</td>
</tr>
</tbody>
</table>

| Eye Irrit. 2; H319 | Skin Sens. 1; H317 | Aquatic Chronic 2; H411 |
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<thead>
<tr>
<th>Compound</th>
<th>CAS Number</th>
<th>Skin Irrit.</th>
<th>Eye Irrit.</th>
<th>Skin Sens.</th>
<th>Aquatic Chronic 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphenol A - epoxy resins, number average MW &gt;700 - &lt;1100</td>
<td>25068-38-6</td>
<td>Polymer</td>
<td>Skin Irrit. 2; H315</td>
<td>Eye Irrit. 2; H319</td>
<td>Skin Sens. 1; H317</td>
</tr>
<tr>
<td>Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol</td>
<td>9003-36-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>500-006-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>01-2119454392-40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For explanation of abbreviations see section 16.

Both 25068-38-6 and 1675-54-3 can be used to describe the epoxy resin which is produced through the reaction of Bisphenol A and Epichlorohydrin

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Treat symptomatically.
Get medical attention if symptoms occur.

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : Get medical attention if irritation develops and persists.

In case of eye contact : Flush eyes with water as a precaution.
Remove contact lenses.
If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

4.2 Most important symptoms and effects, both acute and delayed

None known.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media : High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during : No information available.
5.3 Advice for firefighters

Special protective equipment for firefighters: Wear self-contained breathing apparatus for firefighting if necessary.

Specific extinguishing methods: Standard procedure for chemical fires.

Further information: No action shall be taken involving any personal risk or without suitable training.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions: Refer to protective measures listed in sections 7 and 8.

6.2 Environmental precautions

Environmental precautions: No special environmental precautions required.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up: Wipe up with absorbent material (e.g. cloth, fleece). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal considerations see section 13. See Section 1 for emergency contact information. For personal protection see section 8.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling: For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area.

Advice on protection against fire and explosion: Normal measures for preventive fire protection.

Hygiene measures: General industrial hygiene practice.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers: No special storage conditions required. Keep in properly labelled containers.

Advice on common storage: For incompatible materials please refer to Section 10 of this
Further information on storage stability: Stable under normal conditions.

Recommended storage temperature: 2 - 40 °C

7.3 Specific end use(s)
Specific use(s): No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon dioxide</td>
<td>7631-86-9</td>
<td>TWA (inhalable dust)</td>
<td>6 mg/m3 (Silica)</td>
<td>GB EH40</td>
</tr>
</tbody>
</table>

Further information: For the purposes of these limits, respirable dust and inhalable dust are those fractions of airborne dust which will be collected when sampling is undertaken in accordance with the methods described in MDHS14/3 General methods for sampling and gravimetric analysis of respirable and inhalable dust. The COSHH definition of a substance hazardous to health includes dust of any kind when present at a concentration in air equal to or greater than 10 mg.m⁻³ 8-hour TWA of inhalable dust or 4 mg.m⁻³ 8-hour TWA of respirable dust. This means that any dust will be subject to COSHH if people are exposed above these levels. Some dusts have been assigned specific WELs and exposure to these must comply with the appropriate limit. Most industrial dusts contain particles of a wide range of sizes. The behaviour, deposition and fate of any particular particle after entry into the human respiratory system and the body response that it elicits, depend on the nature and size of the particle. HSE distinguishes two size fractions for limit-setting purposes termed ‘inhalable’ and ‘respirable’. Inhalable dust approximates to the fraction of airborne material that enters the nose and mouth during breathing and is therefore available for deposition in the respiratory tract. Respirable dust approximates to the fraction that penetrates to the gas exchange region of the lung. Fuller definitions and explanatory material are given in MDHS14/3. Where dusts contain components that have their own assigned WEL, all the relevant limits should be complied with, Where no specific short-term exposure limit is listed, a figure three times the long-term exposure should be used.

<table>
<thead>
<tr>
<th></th>
<th>TWA (Respirable dust)</th>
<th>2.4 mg/m3 (Silica)</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Further information</td>
<td></td>
<td></td>
<td>GB EH40</td>
</tr>
</tbody>
</table>
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### Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

<table>
<thead>
<tr>
<th>Substance name</th>
<th>End Use</th>
<th>Exposure routes</th>
<th>Potential health effects</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylen e)bisoxirane</td>
<td>Workers</td>
<td>Dermal</td>
<td>Systemic effects, Short-term exposure</td>
<td>8.33 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhalation</td>
<td>Systemic effects, Short-term exposure</td>
<td>12.25 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Dermal</td>
<td>Systemic effects, Long-term exposure</td>
<td>8.33 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Inhalation</td>
<td>Systemic effects, Long-term exposure</td>
<td>12.25 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Dermal</td>
<td>Systemic effects, Short-term exposure</td>
<td>3.571 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Oral</td>
<td>Systemic effects, Long-term exposure</td>
<td>0.75 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Dermal</td>
<td>Systemic effects, Long-term exposure</td>
<td>3.571 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Oral</td>
<td>Systemic effects, Long-term exposure</td>
<td>0.75 mg/kg bw/day</td>
</tr>
<tr>
<td>Bis(2-ethylhexyl) adipate</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>17.8 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Inhalation</td>
<td>Systemic effects</td>
<td>17.8 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>4.4 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Systemic effects</td>
<td>4.4 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Dermal</td>
<td>Long-term systemic</td>
<td>25.5 mg/kg</td>
</tr>
<tr>
<td>Substance name</td>
<td>Environmental Compartment</td>
<td>Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,2'-[[1-methylethylidene]bis(4,1-phenyleneoxymethylene)]bisoxiranone</td>
<td>Fresh water</td>
<td>0.006 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remarks:</td>
<td>Assessment Factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine water</td>
<td>0.0006 mg/l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment Factors</td>
<td>Freshwater - intermittent</td>
<td>0.018 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equilibrium method</td>
<td>Fresh water sediment</td>
<td>0.996 mg/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0.0996 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equilibrium method</td>
<td>Soil</td>
<td>0.196 mg/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equilibrium method</td>
<td>Sewage treatment plant</td>
<td>10 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment Factors</td>
<td>Secondary Poisoning</td>
<td>11 mg/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bis(2-ethylhexyl) adipate</td>
<td>Fresh water</td>
<td>0.0032 mg/l</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:**
8.2 Exposure controls

**Personal protective equipment**

**Eye protection** : Tightly fitting safety goggles

**Hand protection**

**Material** : butyl-rubber
**Break through time** : > 8 h

**Material** : Solvent-resistant gloves (butyl-rubber)

**Material** : Nitrile rubber
**Break through time** : 10 - 480 min

**Material** : Neoprene gloves

**Remarks** : The suitability for a specific workplace should be discussed
with the producers of the protective gloves.

Skin and body protection: Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Respiratory protection: No personal respiratory protective equipment normally required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance: liquid

Colour: light cream

Odour: slight

Odour Threshold: No data is available on the product itself.

pH: No data is available on the product itself.

Freezing point: No data is available on the product itself.

Melting point: No data is available on the product itself.

Boiling point: No data is available on the product itself.

Flash point: 210 °C
Method: Pensky-Martens closed cup

Evaporation rate: No data is available on the product itself.

Flammability (solid, gas): No data is available on the product itself.

Burning rate: No data is available on the product itself.

Upper explosion limit / Upper flammability limit: No data is available on the product itself.

Lower explosion limit / Lower flammability limit: No data is available on the product itself.

Vapour pressure: 0.0001 kPa

Relative vapour density: No data is available on the product itself.

Relative density: No data is available on the product itself.

Density: 1.15 g/cm^3 (25 °C)

Solubility(ies)
Water solubility: No data is available on the product itself.
Solubility in other solvents: No data is available on the product itself.
Partition coefficient: n-octanol/water: No data is available on the product itself.
Auto-ignition temperature: No data is available on the product itself.
Decomposition temperature: No data is available on the product itself.
Viscosity: No data is available on the product itself.
Explosive properties: No data is available on the product itself.
Oxidizing properties: No data is available on the product itself.

9.2 Other information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No dangerous reaction known under conditions of normal use.

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Hazardous reactions: No hazards to be specially mentioned.

10.4 Conditions to avoid
Conditions to avoid: None known.

10.5 Incompatible materials
Materials to avoid: Strong acids and strong bases
Strong oxidizing agents

10.6 Hazardous decomposition products
No hazardous decomposition products are known.
Hazardous decomposition products: carbon dioxide
carbon monoxide
Halogenated compounds

SECTION 11: Toxicological information

11.1 Information on toxicological effects
Acute toxicity
Components:
2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane:
Acute oral toxicity : LD50 (Rat, female): > 2,000 mg/kg
Method: OECD Test Guideline 420
Assessment: The substance or mixture has no acute oral toxicity

bisphenol A - epoxy resins, number average MW >700 - <1100:
Acute oral toxicity : LD50 (Rat, female): > 2,000 mg/kg
Method: OECD Test Guideline 420
Assessment: The substance or mixture has no acute oral toxicity

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:
Acute oral toxicity : LD50 (Rat, male and female): > 5,000 mg/kg
Method: OECD Test Guideline 401

Acute dermal toxicity : No data available

Components:

2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane:
Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

bisphenol A - epoxy resins, number average MW >700 - <1100:
Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:
Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Acute toxicity (other routes of administration) : No data available

Skin corrosion/irritation

Components:

2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane:
Species: Rabbit
Assessment: Mild skin irritant  
Method: OECD Test Guideline 404  
Result: Irritating to skin.

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Method: OECD Test Guideline 404  
Result: Skin irritation

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Species: Rabbit  
Method: OECD Test Guideline 404  
Result: Irritating to skin.

**Serious eye damage/eye irritation**

**Components:**  
2,2''-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
Species: Rabbit  
Assessment: Mild eye irritant  
Method: OECD Test Guideline 405  
Result: Irritating to eyes.

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Species: Rabbit  
Method: OECD Test Guideline 405  
Result: Eye irritation

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Species: Rabbit  
Method: OECD Test Guideline 405  
Result: No eye irritation

**Respiratory or skin sensitisation**

**Components:**  
2,2''-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
Exposure routes: Skin  
Species: Mouse  
Assessment: May cause sensitisation by skin contact.  
Method: OECD Test Guideline 429  
Result: Causes sensitisation.

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Exposure routes: Skin  
Species: Guinea pig  
Method: OECD Test Guideline 406  
Result: May cause sensitisation by skin contact.

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Exposure routes: Skin  
Species: Mouse  
Method: OECD Test Guideline 429  
Result: May cause sensitisation by skin contact.
Assessment: No data available

**Germ cell mutagenicity**

**Components:**

2,2'-(1-methylene)bis(4,1-phenyleneoxymethylene)bisoxirane:

Genotoxicity in vitro:
- Metabolic activation: with and without metabolic activation
  - Method: OECD Test Guideline 476
  - Result: positive

  - Concentration: 0 - 5000 ug/plate
  - Metabolic activation: with and without metabolic activation
  - Method: OECD Test Guideline 471
  - Result: positive

bisphenol A - epoxy resins, number average MW >700 - <1100:

Genotoxicity in vitro:
- Metabolic activation: with and without metabolic activation
  - Method: OECD Test Guideline 476
  - Result: Positive results were obtained in some in vitro tests.

  - Metabolic activation: with and without metabolic activation
  - Method: OECD Test Guideline 471
  - Result: negative

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Genotoxicity in vitro:
- Metabolic activation: with and without metabolic activation
  - Method: OECD Test Guideline 471
  - Result: positive

  - Metabolic activation: with and without metabolic activation
  - Method: OECD Test Guideline 473
  - Result: positive

  - Metabolic activation: with and without metabolic activation
  - Method: OECD Test Guideline 476
  - Result: positive

**Components:**

2,2'-(1-methylene)bis(4,1-phenyleneoxymethylene)bisoxirane:

Genotoxicity in vivo:
- Cell type: Germ
  - Application Route: Oral
  - Method: OECD Test Guideline 478
  - Result: negative
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</tbody>
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**Genotoxicity in vivo**

**bisphenol A - epoxy resins, number average MW >700 - <1100:**
- **Cell type:** Somatic
- **Application Route:** Oral
- **Dose:** 0 - 5000 mg/kg
- **Method:** OPPTS 870.5395
- **Result:** negative

**Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:**
- **Cell type:** Somatic
- **Application Route:** Oral
- **Exposure time:** 48 h
- **Dose:** 2000 mg/kg
- **Method:** OECD Test Guideline 474
- **Result:** negative

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**Carcinogenicity**

**Components:**

**2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane:**
- **Species:** Rat, male and female
- **Application Route:** Oral
- **Exposure time:** 24 month(s)
- **Dose:** 15 mg/kg
- **Frequency of Treatment:** 7 days/week
- **Method:** OECD Test Guideline 453
- **Result:** negative

- **Species:** Mouse, male
  - **Application Route:** Dermal
  - **Exposure time:** 24 month(s)
  - **Dose:** 0.1 mg/kg
Frequency of Treatment: 3 days/week
Method: OECD Test Guideline 453
Result: negative

Species: Rat, female
Application Route: Dermal
Exposure time: 24 month(s)
Dose: 1 mg/kg
Frequency of Treatment: 5 days/week
Method: OECD Test Guideline 453
Result: negative

bisphenol A - epoxy resins, number average MW >700 - <1100:
Species: Rat, male and female
Application Route: Oral
Exposure time: 24 month(s)
Dose: 15 mg/kg
Frequency of Treatment: 7 daily
Method: OECD Test Guideline 453
Result: negative

Carcinogenicity - : No data available
Assessment

Reproductive toxicity

Components:
2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane:
Effects on fertility : Test Type: Two-generation study
Species: Rat, male and female
Application Route: Oral
Dose: >750 milligram per kilogram
General Toxicity - Parent: No-observed-effect level: 540 mg/kg body weight
General Toxicity F1: No-observed-effect level: 540 mg/kg body weight
Symptoms: No adverse effects
Method: OECD Test Guideline 416
Result: No effects on fertility and early embryonic development were detected.

bisphenol A - epoxy resins, number average MW >700 - <1100:
Species: Rat, male and female
Application Route: Oral
General Toxicity - Parent: No-observed-effect level: 750 mg/kg body weight
General Toxicity F1: No-observed-effect level: 750 mg/kg body weight
Method: OECD Test Guideline 416
Result: No effects on fertility and early embryonic development were detected.

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:
Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 416
Result: No effects on fertility and early embryonic development were detected.

Components:

2,2'-(1-methylene)bis(4,1-phenyleneoxymethylene)bisoxirane:
Effects on foetal development
Species: Rabbit, female
Application Route: Dermal
General Toxicity Maternal: No observed adverse effect level:
30 mg/kg body weight
Method: Other guidelines
Result: No teratogenic effects

Species: Rabbit, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
60 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Species: Rat, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
180 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

bisphenol A - epoxy resins, number average MW >700 - <1100:
Species: Rabbit, female
Application Route: Dermal
General Toxicity Maternal: No observed adverse effect level:
30 mg/kg body weight
Method: Other guidelines
Result: No teratogenic effects

Species: Rabbit, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
60 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Species: Rat, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
180 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:
Species: Rabbit, female
Application Route: Dermal
General Toxicity Maternal: No observed adverse effect level: 30 mg/kg body weight
Result: No teratogenic effects

Reproductive toxicity - Assessment: No data available

STOT - single exposure
No data available

STOT - repeated exposure
No data available

Repeated dose toxicity

**Components:**

- **2,2’-[(1-methylene)bis(4,1-phenyleneoxymethylene)]bisoxirane:**
  - Species: Rat, male and female
  - NOAEL: 50 mg/kg
  - Application Route: Ingestion
  - Exposure time: 14 Weeks
  - Number of exposures: 7 d
  - Method: Subchronic toxicity

- **Species: Rat, male and female**
  - NOEL: 10 mg/kg
  - Application Route: Skin contact
  - Exposure time: 13 Weeks
  - Number of exposures: 5 d
  - Method: Subchronic toxicity

- **Species: Mouse, male**
  - NOAEL: 100 mg/kg
  - Application Route: Skin contact
  - Exposure time: 13 Weeks
  - Number of exposures: 3 d
  - Method: Subchronic toxicity

- **bisphenol A - epoxy resins, number average MW >700 - <1100:**
  - Species: Rat, male and female
  - NOAEL: 50 mg/kg
  - Application Route: Ingestion
  - Exposure time: 14 Weeks
  - Number of exposures: 7 d
  - Method: Subchronic toxicity

- **Species: Rat, male and female**
  - NOEL: 10 mg/kg
  - Application Route: Skin contact
  - Exposure time: 13 Weeks
  - Number of exposures: 5 d
  - Method: Subchronic toxicity

- **Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:**
  - Species: Rat, male and female
  - NOAEL: 250 mg/kg
  - Application Route: Ingestion
Exposure time: 13 Weeks
Number of exposures: 7 d
Method: Subchronic toxicity

Repeated dose toxicity - Assessment: No data available

Aspiration toxicity
No data available

Experience with human exposure
General Information: No data available

Inhalation: No data available

Skin contact: No data available

Eye contact: No data available

Ingestion: No data available

Toxicology, Metabolism, Distribution
No data available

Neurological effects
No data available

Further information
Ingestion: No data available

SECTION 12: Ecological information

12.1 Toxicity

Components:
2,2’-[(1-methylene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Toxicity to fish: LC50 (Oncorhynchus mykiss (rainbow trout)): 1.5 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 2.7 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water

Toxicity to algae: EC50 (Selenastrum capricornutum (green algae)): 9.4 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: EPA-660/3-75-009

Toxicity to microorganisms: IC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC: 0.3 mg/l
Exposure time: 21 d
Species: Daphnia magna (Water flea)
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

Toxicity to fish: LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 203
GLP: no

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): > 100 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 202
GLP: yes

Toxicity to algae: EgC50 (Selenastrum capricornutum (green algae)): > 100 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
GLP: no

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:
Toxicity to fish: LC50 (Fish): 2.54 mg/l
Exposure time: 96 h
Method: Calculation method

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 2.55 mg/l
Exposure time: 48 h
12.2 Persistence and degradability

Components:

2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane:

Biodegradability: Inoculum: Sewage (STP effluent)
Concentration: 20 mg/l
Result: Not readily biodegradable.
Biodegradation: 5%
Exposure time: 28 d
Method: OECD Test Guideline 301F

Stability in water:
Degradation half life (DT50): 4.83 d (25 °C)
pH: 4
Method: OECD Test Guideline 111
Remarks: Fresh water

Degradation half life (DT50): 7.1 d (25 °C)
pH: 9
Method: OECD Test Guideline 111
Remarks: Fresh water

Degradation half life (DT50): 3.58 d (25 °C)
pH: 7
Method: OECD Test Guideline 111
Remarks: Fresh water

bisphenol A - epoxy resins, number average MW >700 - <1100:

Biodegradability:
Test Type: aerobic
Inoculum: Sewage (STP effluent)
Concentration: 20 mg/l
Result: Not biodegradable
Biodegradation: 5 %
Exposure time: 28 d
Method: OECD Test Guideline 301F

Stability in water:
- Degradation half life (DT50): 4.83 d (25 °C)
  pH: 4
  Method: OECD Test Guideline 111
  Remarks: Fresh water
- Degradation half life (DT50): 7.1 d (25 °C)
  pH: 9
  Method: OECD Test Guideline 111
  Remarks: Fresh water
- Degradation half life (DT50): 3.58 d (25 °C)
  pH: 7
  Method: OECD Test Guideline 111
  Remarks: Fresh water

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Biodegradability:
- Inoculum: activated sludge
  Concentration: 3 mg/l
  Result: Not biodegradable
  Biodegradation: ca. 0 %
  Exposure time: 28 d

12.3 Bioaccumulative potential

Components:
- 2,2'-(1-methylethylidene)bis(4,1-phenyleneoxymethylene)bisoxirane:
  Bioaccumulation: Bioconcentration factor (BCF): 31
  Remarks: Does not bioaccumulate.
  Partition coefficient: n-octanol/water: log Pow: 3.242 (25 °C)
  pH: 7.1
  Method: OECD Test Guideline 117

- bisphenol A - epoxy resins, number average MW >700 - <1100:
  Bioaccumulation: Species: Fish
  Bioconcentration factor (BCF): 31
  Remarks: Does not bioaccumulate.

- Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:
  Bioaccumulation: Species: Fish
  Bioconcentration factor (BCF): 150
  Remarks: Does not bioaccumulate.
  Partition coefficient: n-octanol/water: log Pow: 2.7 - 3.6
  Method: OECD Test Guideline 117
12.4 Mobility in soil

**Components:**

2,2'-(1-methyleneidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:
Distribution among environmental compartments: Koc: 445

bisphenol A - epoxy resins, number average MW >700 - <1100:
Distribution among environmental compartments: Koc: 445

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:
Distribution among environmental compartments: Koc: 4460
Method: OECD Test Guideline 121

12.5 Results of PBT and vPvB assessment

**Product:**
Assessment: This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product: Dispose of as hazardous waste in compliance with local and national regulations. Dispose of contents/ container to an approved waste disposal plant.

SECTION 14: Transport information

**IATA**

14.1 UN number: UN 3082

14.2 UN proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)

14.3 Transport hazard class(es): 9

14.4 Packing group: III

Labels: Miscellaneous

Packing instruction (cargo aircraft): 964

Packing instruction: 964
(passenger aircraft)

IMDG
14.1 UN number : UN 3082
14.2 UN proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)

14.3 Transport hazard class(es) : 9
14.4 Packing group : III
14.5 Environmental hazards : F-A, S-F

AERIAL
14.1 UN number : UN 3082
14.2 UN proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)

14.3 Transport hazard class(es) : 9
14.4 Packing group : III
14.5 Environmental hazards : yes

RID
14.1 UN number : UN 3082
14.2 UN proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)

14.3 Transport hazard class(es) : 9
14.4 Packing group : III
14.5 Environmental hazards : yes

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code
Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : This product does not contain substances of very high concern
REACH - List of substances subject to authorisation (Annex XIV): Not applicable

REACH - List of substances subject to authorisation - Future sunset date: Not applicable

Other regulations:
Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

The components of this product are reported in the following inventories:
DSL: All components of this product are on the Canadian DSL
AICS: On the inventory, or in compliance with the inventory
NZIoC: Not in compliance with the inventory
ENCS: On the inventory, or in compliance with the inventory
KECI: On the inventory, or in compliance with the inventory
PICCS: On the inventory, or in compliance with the inventory
IECSC: On the inventory, or in compliance with the inventory
TCSI: On the inventory, or in compliance with the inventory
TSCA: On the inventory, or in compliance with the inventory

Inventories
AICS (Australia), DSL (Canada), IECSC (China), ENCS (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (United States of America (USA))

15.2 Chemical safety assessment

SECTION 16: Other information

Full text of H-Statements
H315: Causes skin irritation.
**H317**: May cause an allergic skin reaction.
**H319**: Causes serious eye irritation.
**H411**: Toxic to aquatic life with long lasting effects.

**Full text of other abbreviations**
- **Aquatic Chronic**: Long-term (chronic) aquatic hazard
- **Eye Irrit.**: Eye irritation
- **Skin Irrit.**: Skin irritation
- **Skin Sens.**: Skin sensitisation
- **GB EH40**: UK. EH40 WEL - Workplace Exposure Limits
- **GB EH40 / TWA**: Long-term exposure limit (8-hour TWA reference period)

**Further information**

**Classification of the mixture**: 

<table>
<thead>
<tr>
<th>Mixture</th>
<th>Classification</th>
<th>Calculation method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Irrit. 2</td>
<td>H315</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Eye Irrit. 2</td>
<td>H319</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Skin Sens. 1</td>
<td>H317</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Aquatic Chronic 2</td>
<td>H411</td>
<td>Calculation method</td>
</tr>
</tbody>
</table>

While the information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

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THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.

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SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

ARALDITE® STANDARD G HARDENER

Version: 1.1
Revision Date: 17.08.2018
SDS Number: 400001021218
Date of last issue: 20.07.2018
Date of first issue: 20.07.2018

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
Trade name: ARALDITE® STANDARD G HARDENER

1.2 Relevant identified uses of the substance or mixture and uses advised against
Use of the Substance/Mixture: Hardener

1.3 Details of the supplier of the safety data sheet
Company: Huntsman Advanced Materials (Europe)BVBA
Address: Everslaan 45
3078 Everberg
Belgium
Telephone: +41 61 299 20 41
Telefax: +41 61 299 20 40
E-mail address of person responsible for the SDS: Global_Product_EHS_AdMat@huntsman.com

1.4 Emergency telephone number
Emergency telephone number:
EUROPE: +32 35 75 1234
France ORFILA: +33(0)145425959
ASIA: +65 6336-6011
China: +86 20 39377888
+86 532 83889090
India: +91 22 42 87 5333
Australia: 1800 786 152
New Zealand: 0800 767 437
USA: +1/800/424.9300

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Classification (REGULATION (EC) No 1272/2008)
Serious eye damage, Category 1: H318: Causes serious eye damage.
Skin sensitisation, Category 1: H317: May cause an allergic skin reaction.
Long-term (chronic) aquatic hazard, Category 2: H411: Toxic to aquatic life with long lasting effects.

2.2 Label elements
Labelling (REGULATION (EC) No 1272/2008)
Hazard pictograms:

Signal word: Danger

Hazard statements:

- H317: May cause an allergic skin reaction.
- H318: Causes serious eye damage.
- H411: Toxic to aquatic life with long lasting effects.

Precautionary statements:

**Prevention:**
- P261: Avoid breathing mist or vapours.
- P273: Avoid release to the environment.
- P280: Wear protective gloves/eye protection/face protection.

**Response:**
- P305 + P351 + P338 + P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
- P333 + P313: If skin irritation or rash occurs: Get medical advice/attention.
- P391: Collect spillage.

Hazardous components which must be listed on the label:
- Fatty acids, C18-unsatd., dimers, polymers with oleic acid and triethylenetetramine
- Amines, polyethylenepoly-, tetraethylenepentamine fraction

**2.3 Other hazards**

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**SECTION 3: Composition/information on ingredients**

**3.2 Mixtures**

**Hazardous components**

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Registration number</th>
<th>Classification</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatty acids, C18-unsatd., dimers, polymers with oleic acid and triethylenetetramine (UVCB)</td>
<td>68154-62-1</td>
<td>614-339-2</td>
<td>01-2119972322-40</td>
<td>01-2119972322-40</td>
<td>Skin Irrit. 2; H315 Eye Dam. 1; H318 Skin Sens. 1A; H317 Aquatic Chronic 2; H411</td>
<td>&gt;= 50 - &lt; 70</td>
</tr>
<tr>
<td>Fatty acids, C18-unsatd., dimers, polymers with oleic acid</td>
<td>68154-62-1</td>
<td></td>
<td></td>
<td></td>
<td>Skin Irrit. 2; H315 Eye Irrit. 2; H319</td>
<td>&gt;= 30 - &lt; 50</td>
</tr>
</tbody>
</table>
and triethylenetetramine | Polymer | Skin Sens. 1; H317 Aquatic Chronic 3; H412
Amines, polyethylenepoly-, tetraethylenepentamine fraction | 90640-66-7 292-587-7 01-2119487290-37 | Acute Tox. 4; H302 Acute Tox. 4; H312 Skin Corr. 1B; H314 Eye Dam. 1; H318 Skin Sens. 1; H317 Aquatic Chronic 2; H411

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Treat symptomatically.
Get medical attention if symptoms occur.

If inhaled
If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact
Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact
Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Continue rinsing eyes during transport to hospital.
Remove contact lenses.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.

If swallowed
Keep respiratory tract clear.
Do NOT induce vomiting.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.
Take victim immediately to hospital.

4.2 Most important symptoms and effects, both acute and delayed
None known.

4.3 Indication of any immediate medical attention and special treatment needed
Treatment
Treat symptomatically.
SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media: High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting: Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion products: No hazardous combustion products are known

5.3 Advice for firefighters

Special protective equipment for firefighters: Wear self-contained breathing apparatus for firefighting if necessary.

Specific extinguishing methods: No data is available on the product itself.

Further information: Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions: Use personal protective equipment.

Refer to protective measures listed in sections 7 and 8.

6.2 Environmental precautions

Environmental precautions: Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up: Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.
6.4 Reference to other sections
For disposal considerations see section 13., See Section 1 for emergency contact information.,
For personal protection see section 8.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Advice on safe handling : Do not breathe vapours or spray mist.
Avoid exposure - obtain special instructions before use.
Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
To avoid spills during handling keep bottle on a metal tray.
Dispose of rinse water in accordance with local and national regulations.
Persons susceptible to skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

Advice on protection against fire and explosion : Normal measures for preventive fire protection.

Hygiene measures : When using do not eat or drink. When using do not smoke.
Wash hands before breaks and at the end of workday.

7.2 Conditions for safe storage, including any incompatibilities
Requirements for storage areas and containers : Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Keep in properly labelled containers.

Advice on common storage : For incompatible materials please refer to Section 10 of this SDS.

Further information on storage stability : Stable under normal conditions.

Recommended storage temperature : 2 - 40 °C

7.3 Specific end use(s)
Specific use(s) : No data available
### SECTION 8: Exposure controls/personal protection

#### 8.1 Control parameters

Contains no substances with occupational exposure limit values.

**Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:**

<table>
<thead>
<tr>
<th>Substance name</th>
<th>End Use</th>
<th>Exposure routes</th>
<th>Potential health effects</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amines, polyethylenepoly-, tetraethylenepentamine fraction</td>
<td>Workers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>1.29 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>6940 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Dermal</td>
<td>Long-term systemic effects</td>
<td>0.74 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>Dermal</td>
<td>Long-term local effects</td>
<td>0.036 mg/cm²</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Long-term systemic effects</td>
<td>0.38 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Inhalation</td>
<td>Acute systemic effects</td>
<td>2071 mg/m³</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Dermal</td>
<td>Long-term systemic effects</td>
<td>0.32 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Dermal</td>
<td>Acute systemic effects</td>
<td>10 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Dermal</td>
<td>Long-term local effects</td>
<td>0.56 mg/cm²</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Dermal</td>
<td>Acute local effects</td>
<td>1.29 mg/cm²</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Oral</td>
<td>Long-term systemic effects</td>
<td>0.53 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td>Consumers</td>
<td>Oral</td>
<td>Acute systemic effects</td>
<td>26 mg/kg bw/day</td>
</tr>
</tbody>
</table>

**Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:**

<table>
<thead>
<tr>
<th>Substance name</th>
<th>Environmental Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amines, polyethylenepoly-, tetraethylenepentamine fraction</td>
<td>Secondary Poisoning</td>
<td>0.23 mg/kg</td>
</tr>
</tbody>
</table>

Remarks:
- **Assessment Factors**
  - Fresh water: 0.0068 mg/l
  - Marine water: 0.0068 mg/l
  - Freshwater - intermittent: 0.068 mg/l
Assessment Factors

<table>
<thead>
<tr>
<th>Assessment Factors</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh water sediment</td>
<td>0.341 mg/kg</td>
</tr>
<tr>
<td>Marine sediment</td>
<td>0.746 mg/kg</td>
</tr>
<tr>
<td>Soil</td>
<td>0.274 mg/kg</td>
</tr>
<tr>
<td>Sewage treatment plant</td>
<td>4.6 mg/l</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Personal protective equipment

Eye protection: Eye wash bottle with pure water
Tightly fitting safety goggles
Wear face-shield and protective suit for abnormal processing problems.

Hand protection
Material: butyl-rubber
Break through time: > 8 h

Material: Nitrile rubber
Break through time: 10 - 480 min

Material: Ethyl Vinyl Alcohol Laminate (EVAL)
Break through time: > 8 h

Remarks: The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough. Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact). The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Skin and body protection: Impervious clothing
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Respiratory protection: Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines.
Recommended Filter type: Combined particulates and organic vapour type

Filter type: Filter type A-P
SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

- **Appearance**: liquid
- **Colour**: yellow
- **Odour**: No data is available on the product itself.
- **Odour Threshold**: No data is available on the product itself.
- **pH**: No data is available on the product itself.
- **Freezing point**: No data is available on the product itself.
- **Melting point**: No data is available on the product itself.
- **Boiling point**: No data is available on the product itself.
- **Flash point**: $>$ 150 °C
  Method: Pensky-Martens closed cup
- **Evaporation rate**: No data is available on the product itself.
- **Flammability (solid, gas)**: No data is available on the product itself.
- **Burning rate**: No data is available on the product itself.
- **Upper explosion limit / Upper flammability limit**: No data is available on the product itself.
- **Lower explosion limit / Lower flammability limit**: No data is available on the product itself.
- **Vapour pressure**: No data is available on the product itself.
- **Relative vapour density**: No data is available on the product itself.
- **Relative density**: No data is available on the product itself.
- **Density**: No data is available on the product itself.
- **Solubility(ies)**
  - **Water solubility**: insoluble (20 °C)
- **Solubility in other solvents**: No data is available on the product itself.
- **Partition coefficient: n-octanol/water**: No data is available on the product itself.
Auto-ignition temperature : No data is available on the product itself.
Decomposition temperature : No data is available on the product itself.
Viscosity
   Viscosity, dynamic : 25,000 - 30,000 mPa.s (25 °C)
Explosive properties : No data is available on the product itself.
Oxidizing properties : No data is available on the product itself.

9.2 Other information
   No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
   No dangerous reaction known under conditions of normal use.

10.2 Chemical stability
   Stable under normal conditions.

10.3 Possibility of hazardous reactions
   Hazardous reactions : No hazards to be specially mentioned.

10.4 Conditions to avoid
   Conditions to avoid : None known.

10.5 Incompatible materials
   Materials to avoid : Strong acids and strong bases
                       Strong oxidizing agents

10.6 Hazardous decomposition products
   No hazardous decomposition products are known.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

   Acute toxicity
   Acute oral toxicity - Product : Acute toxicity estimate : > 2,000 mg/kg
                                  Method: Calculation method
   Acute inhalation toxicity : No data available

   Acute dermal toxicity - Product : Acute toxicity estimate : > 2,000 mg/kg
                                  Method: Calculation method
Acute toxicity (other routes of administration): No data available

Skin corrosion/irritation

**Product:**
Species: Rabbit
Assessment: Mild skin irritant
Method: OECD Test Guideline 404
Result: Normally reversible injuries
GLP: yes

Serious eye damage/eye irritation

**Product:**
Species: Rabbit
Assessment: Corrosive
Method: OECD Test Guideline 405
Result: Irreversible effects on the eye
GLP: yes

Remarks: May cause irreversible eye damage.

Respiratory or skin sensitisation

**Product:**
Assessment: No data available

Germ cell mutagenicity

**Components:**
Fatty acids, C18-unsatd., dimers, polymers with oleic acid and triethylenetetramine:
Genotoxicity in vitro: Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Amines, polyethylenopoly-, tetraethylenepentamine fraction:
Genotoxicity in vitro: Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 479
Result: positive
Components:
Amines, polyethylene-poly-, tetraethylenepentamine fraction:
Genotoxicity in vivo

Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Carcinogenicity
No data available

Carcinogenicity - Assessment: No data available

Reproductive toxicity
Components:
Fatty acids, C18-unsatd., dimers, polymers with oleic acid and triethylenetetramine:
Effects on fertility
Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 422
Result: Animal testing did not show any effects on fertility.

Components:
Amines, polyethylene-poly-, tetraethylenepentamine fraction:
Effects on foetal development
Species: Rabbit, female
Application Route: Dermal
General Toxicity Maternal: No-observed-effect level: 50 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Species: Rat, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level: 750 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Reproductive toxicity - Assessment: No data available
**ARALDITE® STANDARD G HARDENER**

**Version**: 1.1  
**Revision Date**: 17.08.2018  
**SDS Number**: 400001021218  
**Date of last issue**: 20.07.2018  
**Date of first issue**: 20.07.2018

**STOT - single exposure**
No data available

**STOT - repeated exposure**
No data available

**Repeated dose toxicity**

**Components:**
Fatty acids, C18-unsatd., dimers, polymers with oleic acid and triethylenetetramine:
Species: Rat, male and female  
NOAEL: 1000 mg/kg  
Application Route: Ingestion  
Exposure time: 6 Weeks  
Number of exposures: 7 d  
Method: Subacute toxicity

Amines, polyethylene-poly-, tetraethylenepentamine fraction:
Species: Rat, male and female  
NOAEL: 50  
Application Route: Ingestion  
Exposure time: 26 Weeks  
Method: Subchronic toxicity

Species: Rabbit, male and female  
NOAEL: 50  
Application Route: Skin contact  
Exposure time: 744 h  
Number of exposures: 5 d  
Method: Subacute toxicity

Repeated dose toxicity - : No data available  
Assessment

**Aspiration toxicity**
No data available

**Experience with human exposure**

**General Information**: No data available

**Inhalation**: No data available

**Skin contact**: No data available

**Eye contact**: No data available
Ingestion: No data available

**Toxicology, Metabolism, Distribution**
No data available

**Neurological effects**
No data available

**Further information**
Ingestion: No data available

### SECTION 12: Ecological information

#### 12.1 Toxicity

**Components:**
- Fatty acids, C18-unsatd., dimers, polymers with oleic acid and triethylenetetramine:

**Toxicity to fish**
- LC50 (Brachydanio rerio (zebrafish)): 7.07 mg/l
  - Exposure time: 96 h
  - Test Type: semi-static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 203

**Toxicity to daphnia and other aquatic invertebrates**
- EC50 (Daphnia magna (Water flea)): 5.18 mg/l
  - Exposure time: 48 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 202

**Toxicity to algae**
- EC50 (Selenastrum capricornutum (green algae)): 2.43 mg/l
  - Exposure time: 72 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 201

**Toxicity to microorganisms**
- EC50 (activated sludge): 421 mg/l
  - Exposure time: 3 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 209

Fatty acids, C18-unsatd., dimers, polymers with oleic acid and triethylenetetramine:

Ecotoxicology Assessment
- Chronic aquatic toxicity: Harmful to aquatic life with long lasting effects.

Amines, polyethylenepoly-, tetraethylenepentamine fraction:
Toxicity to fish: LC50 (Poecilia reticulata (guppy)): 420 mg/l
Exposure time: 96 h
Test Type: semi-static test
Test substance: Fresh water

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 24.1 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water
Method: Tested according to Annex V of Directive 67/548/EEC.

Toxicity to algae: ErC50 (Selenastrum capricornutum (green algae)): 6.8 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 201

Toxicity to microorganisms: EC50: 97.3 mg/l
Exposure time: 2 h
Test Type: static test
Test substance: Fresh water

12.2 Persistence and degradability

Components:
Amines, polyethylenepoly-, tetraethylenepentamine fraction:
Biodegradability: Inoculum: activated sludge
Result: Not biodegradable
Biodegradation: 17%
Exposure time: 84 d
Method: OECD Test Guideline 302 A

12.3 Bioaccumulative potential

Components:
Amines, polyethylenepoly-, tetraethylenepentamine fraction:
Partition coefficient: n-octanol/water: log Pow: -3.16

12.4 Mobility in soil

Components:
Amines, polyethylenepoly-, tetraethylenepentamine fraction:
Distribution among environmental compartments: Koc: 3.2 - 3.7
Method: OECD Test Guideline 106

12.5 Results of PBT and vPvB assessment

Product: This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or
very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

**Product:**
Additional ecological information: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product: The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company. Dispose of as hazardous waste in compliance with local and national regulations. Dispose of contents/container to an approved waste disposal plant.

Contaminated packaging: Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

SECTION 14: Transport information

**IATA**
14.1 UN number: UN 3082
14.2 UN proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (POLYAMIDE RESIN)

14.3 Transport hazard class(es): 9
14.4 Packing group: III
Labels: Miscellaneous
Packing instruction (cargo aircraft): 964
Packing instruction (passenger aircraft): 964

**IMDG**
14.1 UN number: UN 3082
14.2 UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (POLYAMIDE RESIN)

14.3 Transport hazard class(es): 9
class(es)
14.4 Packing group : III
Labels : 9
EmS Code : F-A, S-F
14.5 Environmental hazards
Marine pollutant : yes

ADR
14.1 UN number : UN 3082
14.2 UN proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (POLYAMIDE RESIN)
14.3 Transport hazard class(es) : 9
14.4 Packing group : III
Labels : 9
14.5 Environmental hazards
Environmentally hazardous : yes

RID
14.1 UN number : UN 3082
14.2 UN proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (POLYAMIDE RESIN)
14.3 Transport hazard class(es) : 9
14.4 Packing group : III
Labels : 9
14.5 Environmental hazards
Environmentally hazardous : yes

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code
Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : This product does not contain substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 57).

REACH - List of substances subject to authorisation (Annex XIV) : Not applicable

REACH - List of substances subject to authorisation - Future sunset date : Not applicable

Other regulations:
Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.
The components of this product are reported in the following inventories:

- **DSL**: All components of this product are on the Canadian DSL.
- **AICS**: On the inventory, or in compliance with the inventory.
- **NZIoC**: Not in compliance with the inventory.
- **ENCS**: On the inventory, or in compliance with the inventory.
- **KECI**: On the inventory, or in compliance with the inventory.
- **PICCS**: Not in compliance with the inventory.
- **IECSC**: On the inventory, or in compliance with the inventory.
- **TCSI**: On the inventory, or in compliance with the inventory.
- **TSCA**: On the inventory, or in compliance with the inventory.

**Inventories**

AICS (Australia), DSL (Canada), IECSC (China), ENCS (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (United States of America (USA))

**15.2 Chemical safety assessment**

Chemical Safety Assessments for all substances in this product are either Complete or Not applicable.

**SECTION 16: Other information**

**Full text of H-Statements**

- **H302**: Harmful if swallowed.
- **H312**: Harmful in contact with skin.
- **H314**: Causes severe skin burns and eye damage.
- **H315**: Causes skin irritation.
- **H317**: May cause an allergic skin reaction.
- **H318**: Causes serious eye damage.
- **H319**: Causes serious eye irritation.
- **H411**: Toxic to aquatic life with long lasting effects.
- **H412**: Harmful to aquatic life with long lasting effects.

**Full text of other abbreviations**
## ARALDITE® STANDARD G HARDENER

<table>
<thead>
<tr>
<th>Version</th>
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<td>20.07.2018</td>
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### Further information

#### Classification of the mixture:

<table>
<thead>
<tr>
<th></th>
<th>Classification procedure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Dam. 1</td>
<td>H318 Based on product data or assessment</td>
</tr>
<tr>
<td>Skin Sens. 1</td>
<td>H317 Calculation method</td>
</tr>
<tr>
<td>Aquatic Chronic 2</td>
<td>H411 Calculation method</td>
</tr>
</tbody>
</table>

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