



MERECO

Material Safety Data Sheet

acc. to ISO/DIS 11014

Printing date 09/20/2012

Version 1

Reviewed on 09/20/2012

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

· Product identifier

· **Trade name:** Mereco 3554 Base

· **Relevant identified uses of the substance or mixture and uses advised against** No further relevant information available.

· **Application of the substance / the preparation** Epoxy resin

· Details of the supplier of the safety data sheet

· **Manufacturer/Supplier:** Mereco Division
Metachem Resins Corporation
1505 Main Street
West Warwick, RI 02893
USA Phone +1 / 401 / 822-9300

· **Information department:** Technical department.
email = info@mereco.com

· **Emergency telephone number:** Telephone: (401) 822-9300

2 Hazards identification

· Classification of the substance or mixture

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**

Xi; Irritant

R36/38: Irritating to eyes and skin.

· Information concerning particular hazards for human and environment:

The product has to be labelled due to the calculation procedure of international guidelines.

· **Classification system:** The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

· Label elements

· Labelling according to EU guidelines:

The product has been classified and marked in accordance with directives on hazardous materials.

· **Code letter and hazard designation of product:** Xi Irritant

· **Risk phrases:** 36/38 Irritating to eyes and skin.

· **Safety phrases:** 23 Do not breathe gas/fumes/vapour/spray.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

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Trade name: Mereco 3554 Base

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37 Wear suitable gloves.

60 This material and its container must be disposed of as hazardous waste.

- **Classification system:**

- **NFPA ratings (scale 0 - 4)**
 - Health = 2
 - Fire = 1
 - Reactivity = 0

- **HMIS-ratings (scale 0 - 4)**
 - Health = 2
 - Fire = 1
 - Reactivity = 0

- **Other hazards**

- **Results of PBT and vPvB assessment**

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

3 Composition/information on ingredients

- **Chemical characterization: Mixtures**

- **Description:** Mixture of the substances listed below with non-hazardous additions.

· Components:	
Diglycidyl ether epoxy resin	Xi R36/38
Reactive diluent	Xi R36

- **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

- **Description of first aid measures**

- **After inhalation:** In case of unconsciousness place patient in a stable side position for transportation.

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

- **After eye contact:** Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

- **After swallowing:** If symptoms persist consult doctor.

- **Information for doctor:**

- **Most important symptoms and effects, both acute and delayed**

No further relevant information available.

- **Indication of any immediate medical attention and special treatment needed**

No further relevant information available.

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5 Firefighting measures

- **Extinguishing media**
 - **Suitable extinguishing agents:** CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture** No further relevant information available.
- **Advice for firefighters**
 - **Protective equipment:** No special measures required.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures** Mouth respiratory protective device.
- **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
- **Methods and material for containment and cleaning up:** Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Ensure adequate ventilation.
- **Reference to other sections** See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

- **Handling:**
 - **Precautions for safe handling** Store in cool, dry place in tightly closed receptacles.
Ensure good ventilation/exhaustion at the workplace.
Prevent formation of aerosols.
Use only in well ventilated areas.
 - **Information about protection against explosions and fires:** No special measures required.
- **Conditions for safe storage, including any incompatibilities**
 - **Storage:**
 - **Requirements to be met by storerooms and receptacles:** No special requirements.
 - **Information about storage in one common storage facility:** Not required.
 - **Further information about storage conditions:** Keep receptacle tightly sealed.

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· **Specific end use(s)** No further relevant information available.

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8 Exposure controls/personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Control parameters**
 - **Components with limit values that require monitoring at the workplace:**

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
 - **Additional information:** The lists that were valid during the creation were used as basis.
- **Exposure controls**
 - **Personal protective equipment:**
 - **General protective and hygienic measures:**

Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
 - **Breathing equipment:**

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
 - **Protection of hands:**

Protective gloves
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material is based on consideration of the penetration times, rates of diffusion and the degradation of the material.
 - **Material of gloves**

The selection of suitable gloves depends not only on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.
 - **Penetration time of glove material**

The exact penetration time has to be determined by the glove manufacturer and has to be observed.
 - **Eye protection:**

Tightly sealed goggles

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9 Physical and chemical properties

· Information on basic physical and chemical properties	
· General Information	
· Appearance:	
· Form:	Liquid
· Color:	Blue
· Odor:	Mild
· Odour threshold:	Not determined.
· pH-value:	Not determined.
· Change in condition	
· Melting point/Melting range:	Undetermined.
· Boiling point/Boiling range:	100°C
· Flash point:	> 93°C
· Flammability (solid, gaseous):	Not applicable.
· Ignition temperature:	215°C
· Decomposition temperature:	Not determined.
· Auto igniting:	Product is not self-igniting.
· Danger of explosion:	Product does not present an explosion hazard.
· Explosion limits:	
· Lower:	Not determined.
· Upper:	Not determined.
· Vapor pressure:	Not determined.
· Density at 20°C:	1.21 g/cm ³
· Relative density	Not determined.
· Vapour density	Not determined.
· Evaporation rate	Not determined.
· Solubility in / Miscibility with	
· Water:	Not miscible or difficult to mix.
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity:	
· Dynamic:	Not determined.
· Kinematic:	Not determined.
· Solvent content:	
· Organic solvents:	0.0 %
· Water:	5.0 %
· Other information	No further relevant information available.

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10 Stability and reactivity

- **Reactivity**
 - **Chemical stability**
 - **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
 - **Possibility of hazardous reactions** Reacts with amines.
 - **Conditions to avoid** No further relevant information available.
 - **Incompatible materials:** No further relevant information available.
 - **Hazardous decomposition products:** Irritant gases/vapors

11 Toxicological information

- **Information on toxicological effects**
 - **Acute toxicity:**
 - **Primary irritant effect:**
 - **on the skin:** Irritant to skin and mucous membranes.
 - **on the eye:** Irritating effect.
 - **Sensitization:** No sensitizing effects known.
 - **Additional toxicological information:** The product shows the following dangers according to internally approved calculation methods for preparations:
Irritant
 - **Carcinogenic categories**

· IARC (International Agency for Research on Cancer)

None of the ingredients is listed.

· NTP (National Toxicology Program)
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None of the ingredients is listed.

12 Ecological information

- **Toxicity**
 - **Aquatic toxicity:** No further relevant information available.
 - **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
 - **Bioaccumulative potential** No further relevant information available.
 - **Mobility in soil** No further relevant information available.
- **Additional ecological information:**
 - **General notes:** Water hazard class 3 (Self-assessment): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.

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Danger to drinking water if even extremely small quantities leak into the ground.

· **Results of PBT and vPvB assessment**

- **PBT:** Not applicable.
 - **vPvB:** Not applicable.
 - **Other adverse effects** No further relevant information available.
-

13 Disposal considerations

· **Waste treatment methods**

- **Recommendation:** Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**

- **Recommendation:** Disposal must be made according to official regulations.
-

14 Transport information

· UN-Number	
· DOT, ADR, ADN, IMDG, IATA	Not Applicable
· UN proper shipping name	
· DOT	Not Regulated
· ADR, ADN, IMDG, IATA	Not Applicable
· Transport hazard class(es)	
· DOT, ADR, ADN, IMDG, IATA	
· Class	Not Applicable
· Packing group	
· DOT, ADR, IMDG, IATA	Not Applicable
· Environmental hazards:	
· Marine pollutant:	No
· Special precautions for user	Not applicable.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

15 Regulatory information

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

· **Section 302 (extremely hazardous substances):**

None of the ingredients is listed.

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· Section 313 (Specific toxic chemical listings):
None of the ingredients is listed by CAS number.
· Sections 311/312 (Specific hazard chemical listings):
None of the ingredients is listed.
· Sections 311/312 Hazard Categorizations:
None of the ingredients is listed.
· TSCA (Toxic Substances Control Act):
All ingredients are listed.
· Proposition 65
· Chemicals known to cause cancer:
None of the ingredients is listed.
· Chemicals known to cause reproductive toxicity for females:
None of the ingredients is listed.
· Chemicals known to cause reproductive toxicity for males:
None of the ingredients is listed.
· Chemicals known to cause developmental toxicity:
None of the ingredients is listed.
· Carcinogenic categories
· EPA (Environmental Protection Agency)
None of the ingredients is listed.
· TLV (Threshold Limit Value established by ACGIH)
None of the ingredients is listed.
· MAK (German Maximum Workplace Concentration)
None of the ingredients is listed.
· NIOSH-Ca (National Institute for Occupational Safety and Health)
None of the ingredients is listed.
· OSHA-Ca (Occupational Safety & Health Administration)
None of the ingredients is listed.
· Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- **Relevant phrases** R36 Irritating to eyes.
R36/38 Irritating to eyes and skin.
- **Department issuing MSDS:** Technical department
- **Contact:** Dr. John F. Plummer



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· Product identifier

· **Trade name:** Mereco 3554 Base

· **Relevant identified uses of the substance or mixture and uses advised against** No further relevant information available.

· **Application of the substance / the preparation** Epoxy resin

· Details of the supplier of the safety data sheet

· **Manufacturer/Supplier:** Mereco Division
Metachem Resins Corporation
1505 Main Street
West Warwick, RI 02893
USA Phone +1 / 401 / 822-9300

· **Information department:** Technical department.
email = info@mereco.com

· **Emergency telephone number:** Telephone: (401) 822-9300

2 Hazards identification

· Classification of the substance or mixture

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**

Xi; Irritant

R36/38: Irritating to eyes and skin.

· Information concerning particular hazards for human and environment:

The product has to be labelled due to the calculation procedure of international guidelines.

· **Classification system:** The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

· Label elements

· Labelling according to EU guidelines:

The product has been classified and marked in accordance with directives on hazardous materials.

· **Code letter and hazard designation of product:** Xi Irritant

· **Risk phrases:** 36/38 Irritating to eyes and skin.

· **Safety phrases:** 23 Do not breathe gas/fumes/vapour/spray.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

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37 Wear suitable gloves.

60 This material and its container must be disposed of as hazardous waste.

- **Classification system:**

- **NFPA ratings (scale 0 - 4)**
 - Health = 2
 - Fire = 1
 - Reactivity = 0

- **HMS-ratings (scale 0 - 4)**
 - Health = 2
 - Fire = 1
 - Reactivity = 0

- **Other hazards**

- **Results of PBT and vPvB assessment**

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

3 Composition/information on ingredients

- **Chemical characterization: Mixtures**

- **Description:** Mixture of the substances listed below with non-hazardous additions.

· Components:	
Diglycidyl ether epoxy resin	Xi R36/38
Reactive diluent	Xi R36

- **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

- **Description of first aid measures**

- **After inhalation:** In case of unconsciousness place patient in a stable side position for transportation.

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

- **After eye contact:** Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

- **After swallowing:** If symptoms persist consult doctor.

- **Information for doctor:**

- **Most important symptoms and effects, both acute and delayed** No further relevant information available.

- **Indication of any immediate medical attention and special treatment needed** No further relevant information available.

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5 Firefighting measures

- **Extinguishing media**
 - **Suitable extinguishing agents:** CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture** No further relevant information available.
- **Advice for firefighters**
 - **Protective equipment:** No special measures required.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures** Mouth respiratory protective device.
- **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
- **Methods and material for containment and cleaning up:** Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Ensure adequate ventilation.
- **Reference to other sections** See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

- **Handling:**
 - **Precautions for safe handling** Store in cool, dry place in tightly closed receptacles.
Ensure good ventilation/exhaustion at the workplace.
Prevent formation of aerosols.
Use only in well ventilated areas.
 - **Information about protection against explosions and fires:** No special measures required.
- **Conditions for safe storage, including any incompatibilities**
 - **Storage:**
 - **Requirements to be met by storerooms and receptacles:** No special requirements.
 - **Information about storage in one common storage facility:** Not required.
 - **Further information about storage conditions:** Keep receptacle tightly sealed.

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Trade name: Mereco 3554 Base

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· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Control parameters**
 - **Components with limit values that require monitoring at the workplace:**

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
 - **Additional information:** The lists that were valid during the creation were used as basis.
- **Exposure controls**
 - **Personal protective equipment:**
 - **General protective and hygienic measures:**

Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
 - **Breathing equipment:**

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
 - **Protection of hands:**

Protective gloves
The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material is based on consideration of the penetration times, rates of diffusion and the degradation of the material.
 - **Material of gloves**

The selection of suitable gloves depends not only on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.
 - **Penetration time of glove material**

The exact penetration time has to be determined by the glove manufacturer and has to be observed.
 - **Eye protection:**

Tightly sealed goggles

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Trade name: **Mereco 3554 Base**

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9 Physical and chemical properties

· Information on basic physical and chemical properties	
· General Information	
· Appearance:	
· Form:	Liquid
· Color:	Blue
· Odor:	Mild
· Odour threshold:	Not determined.
· pH-value:	Not determined.
· Change in condition	
· Melting point/Melting range:	Undetermined.
· Boiling point/Boiling range:	100°C
· Flash point:	> 93°C
· Flammability (solid, gaseous):	Not applicable.
· Ignition temperature:	215°C
· Decomposition temperature:	Not determined.
· Auto igniting:	Product is not self-igniting.
· Danger of explosion:	Product does not present an explosion hazard.
· Explosion limits:	
· Lower:	Not determined.
· Upper:	Not determined.
· Vapor pressure:	Not determined.
· Density at 20°C:	1.21 g/cm ³
· Relative density	Not determined.
· Vapour density	Not determined.
· Evaporation rate	Not determined.
· Solubility in / Miscibility with	
· Water:	Not miscible or difficult to mix.
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity:	
· Dynamic:	Not determined.
· Kinematic:	Not determined.
· Solvent content:	
· Organic solvents:	0.0 %
· Water:	5.0 %
· Other information	No further relevant information available.

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10 Stability and reactivity

- **Reactivity**
 - **Chemical stability**
 - **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
 - **Possibility of hazardous reactions** Reacts with amines.
 - **Conditions to avoid** No further relevant information available.
 - **Incompatible materials:** No further relevant information available.
 - **Hazardous decomposition products:** Irritant gases/vapors

11 Toxicological information

- **Information on toxicological effects**
 - **Acute toxicity:**
 - **Primary irritant effect:**
 - **on the skin:** Irritant to skin and mucous membranes.
 - **on the eye:** Irritating effect.
 - **Sensitization:** No sensitizing effects known.
 - **Additional toxicological information:** The product shows the following dangers according to internally approved calculation methods for preparations:
Irritant
 - **Carcinogenic categories**

· IARC (International Agency for Research on Cancer)

None of the ingredients is listed.

· NTP (National Toxicology Program)
--

None of the ingredients is listed.

12 Ecological information

- **Toxicity**
 - **Aquatic toxicity:** No further relevant information available.
 - **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
 - **Bioaccumulative potential** No further relevant information available.
 - **Mobility in soil** No further relevant information available.
- **Additional ecological information:**
 - **General notes:** Water hazard class 3 (Self-assessment): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.

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Danger to drinking water if even extremely small quantities leak into the ground.

- **Results of PBT and vPvB assessment**

- **PBT:** Not applicable.
 - **vPvB:** Not applicable.
 - **Other adverse effects** No further relevant information available.
-

13 Disposal considerations

- **Waste treatment methods**
 - **Recommendation:** Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
 - **Uncleaned packagings:**
 - **Recommendation:** Disposal must be made according to official regulations.
-

14 Transport information

· UN-Number	
· DOT, ADR, ADN, IMDG, IATA	Not Applicable
· UN proper shipping name	
· DOT	Not Regulated
· ADR, ADN, IMDG, IATA	Not Applicable
· Transport hazard class(es)	
· DOT, ADR, ADN, IMDG, IATA	
· Class	Not Applicable
· Packing group	
· DOT, ADR, IMDG, IATA	Not Applicable
· Environmental hazards:	
· Marine pollutant:	No
· Special precautions for user	Not applicable.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

15 Regulatory information

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

- **Section 302 (extremely hazardous substances):**

None of the ingredients is listed.

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· Section 313 (Specific toxic chemical listings):
None of the ingredients is listed by CAS number.
· Sections 311/312 (Specific hazard chemical listings):
None of the ingredients is listed.
· Sections 311/312 Hazard Categorizations:
None of the ingredients is listed.
· TSCA (Toxic Substances Control Act):
All ingredients are listed.
· Proposition 65
· Chemicals known to cause cancer:
None of the ingredients is listed.
· Chemicals known to cause reproductive toxicity for females:
None of the ingredients is listed.
· Chemicals known to cause reproductive toxicity for males:
None of the ingredients is listed.
· Chemicals known to cause developmental toxicity:
None of the ingredients is listed.
· Carcinogenic categories
· EPA (Environmental Protection Agency)
None of the ingredients is listed.
· TLV (Threshold Limit Value established by ACGIH)
None of the ingredients is listed.
· MAK (German Maximum Workplace Concentration)
None of the ingredients is listed.
· NIOSH-Ca (National Institute for Occupational Safety and Health)
None of the ingredients is listed.
· OSHA-Ca (Occupational Safety & Health Administration)
None of the ingredients is listed.
· Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- **Relevant phrases** R36 Irritating to eyes.
R36/38 Irritating to eyes and skin.
- **Department issuing MSDS:** Technical department
- **Contact:** Dr. John F. Plummer



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

· Product identifier

- **Trade name:** Mereco 3554 Activator
- **Relevant identified uses of the substance or mixture and uses advised against** No further relevant information available.
- **Application of the substance / the preparation** Epoxy curing agent

· Details of the supplier of the safety data sheet

- **Manufacturer/Supplier:** Mereco Division
Metachem Resins Corporation
1505 Main Street
West Warwick, RI 02893
USA Phone +1 / 401 / 822-9300
- **Information department:** Technical department.
email = info@mereco.com
- **Emergency telephone number:** Telephone: (800) 424-9300 (Chemtrec)
Call this number in the event of an accident resulting in a spill, leak or fire. Call this number in the event of exposure to the chemicals.
Telephone: (401) 822-9300

2 Hazards identification

· Classification of the substance or mixture

· Classification according to Directive 67/548/EEC or Directive 1999/45/EC

T; Toxic

R25: Toxic if swallowed.

Xi; Irritant

R37/38-41-43: Irritating to respiratory system and skin. Risk of serious damage to eyes. May cause sensitisation by skin contact.

R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

· Information concerning particular hazards for human and environment:

The product has to be labelled due to the calculation procedure of international guidelines.

· Classification system:

The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

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Trade name: Mereco 3554 Activator

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- **Label elements**

- **Labelling according to EU guidelines:**

The product has been classified and marked in accordance with directives on hazardous materials.

- **Code letter and hazard designation of product:**

T Toxic

- **Hazard-determining components of labelling:**

3,6,9-triazaundecamethylenediamine
1-(2-cyanoethyl)-2-ethyl-4-methylimidazole

- **Risk phrases:**

25 Toxic if swallowed.
37/38 Irritating to respiratory system and skin.
41 Risk of serious damage to eyes.
43 May cause sensitisation by skin contact.
52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

- **Safety phrases:**

20 When using do not eat or drink.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
60 This material and its container must be disposed of as hazardous waste.

- **Classification system:**

- **NFPA ratings (scale 0 - 4)**

Health = 3
Fire = 1
Reactivity = 0

- **HMIS-ratings (scale 0 - 4)**

Health = 3
Fire = 1
Reactivity = 0

- **Other hazards**

- **Results of PBT and vPvB assessment**

- **PBT:** Not applicable.

- **vPvB:** Not applicable.

3 Composition/information on ingredients

- **Chemical characterization: Mixtures**

- **Description:** Mixture of the substances listed below with non-hazardous additions.

- **Components:**

aliphatic amine	T R25; Xi R37/38-41

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	aliphatic amine	Xn R22
112-57-2	3,6,9-triazaundecamethylenediamine	C R34; Xn R21/22; Xi R43; N R51/53

· Additional information:

For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· Description of first aid measures

- **General information:** Immediately remove any clothing soiled by the product. In case of irregular breathing or respiratory arrest provide artificial respiration.
- **After inhalation:** Supply fresh air or oxygen; call for doctor. In case of unconsciousness place patient in a stable side position for transportation. Supply fresh air. For added safety, call a doctor.
- **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
- **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
- **After swallowing:** Do not induce vomiting; immediately call for medical help.
- **Information for doctor:**
 - **Most important symptoms and effects, both acute and delayed** No further relevant information available.
 - **Indication of any immediate medical attention and special treatment needed** No further relevant information available.

5 Firefighting measures

- **Extinguishing media**
 - **Suitable extinguishing agents:** CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture** No further relevant information available.
- **Advice for firefighters**
 - **Protective equipment:** No special measures required.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures** Not required.
- **Environmental precautions:** Inform respective authorities in case of seepage into water course or sewage system.

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- **Methods and material for containment and cleaning up:** Do not allow to enter sewers/ surface or ground water.
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of contaminated material as waste according to item 13.
Ensure adequate ventilation.
 - **Reference to other sections:** See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
-

7 Handling and storage

- **Handling:**
 - **Precautions for safe handling:** Store in cool, dry place in tightly closed receptacles.
Use only in well ventilated areas.
 - **Information about protection against explosions and fires:** No special measures required.
 - **Conditions for safe storage, including any incompatibilities**
 - **Storage:**
 - **Requirements to be met by storerooms and receptacles:** No special requirements.
 - **Information about storage in one common storage facility:** Not required.
 - **Further information about storage conditions:** Keep receptacle tightly sealed.
 - **Specific end use(s):** No further relevant information available.
-

8 Exposure controls/personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Control parameters**

· Components with limit values that require monitoring at the workplace:	
112-57-2 3,6,9-triazaundecamethylenediamine	
WEEL	5 mg/m ³ Skin; DSEN

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

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- **Exposure controls**

- **Personal protective equipment:**

- **General protective and hygienic measures:**

Keep away from foodstuffs, beverages and feed.
 Immediately remove all soiled and contaminated clothing.
 Wash hands before breaks and at the end of work.
 Avoid contact with the skin.
 Avoid contact with the eyes and skin.

- **Breathing equipment:**

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.

- **Protection of hands:**

Protective gloves
 The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
 Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material is based on consideration of the penetration times, rates of diffusion and the degradation of the material.

- **Material of gloves**

The selection of suitable gloves depends not only on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

- **Penetration time of glove material**

The exact penetration time has to be determined by the glove manufacturer and has to be observed.

- **Eye protection:**

Tightly sealed goggles

9 Physical and chemical properties

- **Information on basic physical and chemical properties**

- **General Information**

- **Appearance:**

- **Form:** Liquid
 - **Color:** Amber colored
 - **Odor:** Ammonia-like
 - **Odour threshold:** Not determined.

- **pH-value:** Not determined.

- **Change in condition**

- **Melting point/Melting range:** Undetermined.
 - **Boiling point/Boiling range:** 245°C

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Trade name: Mereco 3554 Activator

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· Flash point:	137°C
· Flammability (solid, gaseous):	Not applicable.
· Ignition temperature:	315°C
· Decomposition temperature:	Not determined.
· Auto igniting:	Product is not self-igniting.
· Danger of explosion:	Product does not present an explosion hazard.
· Explosion limits:	
· Lower:	2.1 Vol %
· Upper:	10.5 Vol %
· Vapor pressure:	Not determined.
· Density at 20°C:	1.13 g/cm ³
· Relative density	Not determined.
· Vapour density	Not determined.
· Evaporation rate	Not determined.
· Solubility in / Miscibility with	
· Water:	Not miscible or difficult to mix.
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity:	
· Dynamic:	Not determined.
· Kinematic:	Not determined.
· Solvent content:	
· Organic solvents:	0.0 %
· Other information	No further relevant information available.

10 Stability and reactivity

- **Reactivity**
 - **Chemical stability**
 - **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions**
 - Reacts with acids.
 - Reacts with strong acids.
- **Conditions to avoid**
 - No further relevant information available.
- **Incompatible materials:**
 - No further relevant information available.
- **Hazardous decomposition products:**
 - Nitrogen oxides

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Trade name: **Mereco 3554 Activator**

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Irritant gases/vapors

11 Toxicological information

· Information on toxicological effects

· Acute toxicity:

· LD/LC50 values that are relevant for classification:

112-57-2 3,6,9-triazaundecamethylenediamine		
Dermal	LD50	660 mg/kg (rabbit)
931-36-2 2-ethyl-4-methylimidazole		
Oral	LD50	1000 mg/kg (rat)
Dermal	LD50	>400 mg/kg (rabbit)

· Primary irritant effect:

· on the skin:

Irritant to skin and mucous membranes.

· on the eye:

Strong irritant with the danger of severe eye injury.

· Sensitization:

Sensitization possible through skin contact.

· Additional toxicological information:

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

Toxic

Irritant

· Carcinogenic categories

· IARC (International Agency for Research on Cancer)

None of the ingredients is listed.

· NTP (National Toxicology Program)

None of the ingredients is listed.

12 Ecological information

· Toxicity

· Aquatic toxicity:

No further relevant information available.

· Persistence and degradability

No further relevant information available.

· Behavior in environmental systems:

· Bioaccumulative potential

No further relevant information available.

· Mobility in soil

No further relevant information available.

· Ecotoxicological effects:

· Remark:

Harmful to fish

· Additional ecological information:

· General notes:

Water hazard class 2 (Self-assessment): hazardous for water
 Do not allow product to reach ground water, water course or sewage system.
 Danger to drinking water if even small quantities leak into the ground.

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- Harmful to aquatic organisms
- **Results of PBT and vPvB assessment**
 - **PBT:** Not applicable.
 - **vPvB:** Not applicable.
 - **Other adverse effects** No further relevant information available.
-

13 Disposal considerations

- **Waste treatment methods**
 - **Recommendation:** Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
 - **Uncleaned packagings:**
 - **Recommendation:** Disposal must be made according to official regulations.
-

14 Transport information

· UN-Number	
· DOT, ADR, ADN, IMDG, IATA	Not Applicable
· UN proper shipping name	
· DOT	Not Regulated
· ADR, ADN, IMDG, IATA	Not Applicable
· Transport hazard class(es)	
· DOT, ADR, ADN, IMDG, IATA	
· Class	Not Applicable
· Packing group	
· DOT, ADR, IMDG, IATA	Not Applicable
· Environmental hazards:	
· Marine pollutant:	No
· Special precautions for user	Not applicable.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

15 Regulatory information

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

· Section 302 (extremely hazardous substances):
None of the ingredients is listed.

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· Section 313 (Specific toxic chemical listings):			
None of the ingredients is listed by CAS number.			
· Sections 311/312 (Specific hazard chemical listings):			
23996-25-0	1-(2-cyanoethyl)-2-ethyl-4-methylimidazole		
112-57-2	3,6,9-triazaundecamethylenediamine		
· Sections 311/312 Hazard Categorizations:			
23996-25-0	1-(2-cyanoethyl)-2-ethyl-4-methylimidazole	Category = A (Acute health hazard)	>60%
112-57-2	3,6,9-triazaundecamethylenediamine	A = Acute, C = Chronic (health hazards)	3-10%
· TSCA (Toxic Substances Control Act):			
All ingredients are listed.			
· Proposition 65			
· Chemicals known to cause cancer:			
None of the ingredients is listed.			
· Chemicals known to cause reproductive toxicity for females:			
None of the ingredients is listed.			
· Chemicals known to cause reproductive toxicity for males:			
None of the ingredients is listed.			
· Chemicals known to cause developmental toxicity:			
None of the ingredients is listed.			
· Carcinogenic categories			
· EPA (Environmental Protection Agency)			
None of the ingredients is listed.			
· TLV (Threshold Limit Value established by ACGIH)			
None of the ingredients is listed.			
· MAK (German Maximum Workplace Concentration)			
None of the ingredients is listed.			
· NIOSH-Ca (National Institute for Occupational Safety and Health)			
None of the ingredients is listed.			
· OSHA-Ca (Occupational Safety & Health Administration)			
None of the ingredients is listed.			
· Chemical safety assessment: A Chemical Safety Assessment has not been carried out.			

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· Relevant phrases R21/22 Harmful in contact with skin and if swallowed.

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R22 Harmful if swallowed.
R25 Toxic if swallowed.
R34 Causes burns.
R37/38 Irritating to respiratory system and skin.
R41 Risk of serious damage to eyes.
R43 May cause sensitisation by skin contact.
R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

· **Department issuing MSDS:** Technical department
· **Contact:** Dr. John F. Plummer

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

· Product identifier

- **Trade name:** Mereco 3554 Activator
- **Relevant identified uses of the substance or mixture and uses advised against** No further relevant information available.
- **Application of the substance / the preparation** Epoxy curing agent

· Details of the supplier of the safety data sheet

- **Manufacturer/Supplier:** Mereco Division
Metachem Resins Corporation
1505 Main Street
West Warwick, RI 02893
USA Phone +1 / 401 / 822-9300
- **Information department:** Technical department.
email = info@mereco.com
- **Emergency telephone number:** Telephone: (800) 424-9300 (Chemtrec)
Call this number in the event of an accident resulting in a spill, leak or fire. Call this number in the event of exposure to the chemicals.
Telephone: (401) 822-9300

2 Hazards identification

· Classification of the substance or mixture

· Classification according to Directive 67/548/EEC or Directive 1999/45/EC

T; Toxic

R25: Toxic if swallowed.

Xi; Irritant

R37/38-41-43: Irritating to respiratory system and skin. Risk of serious damage to eyes. May cause sensitisation by skin contact.

R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

· Information concerning particular hazards for human and environment:

The product has to be labelled due to the calculation procedure of international guidelines.

· Classification system:

The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

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· Label elements
· Labelling according to EU guidelines:

The product has been classified and marked in accordance with directives on hazardous materials.

· Code letter and hazard designation of product:

T Toxic

· Hazard-determining components of labelling:

3,6,9-triazaundecamethylenediamine
1-(2-cyanoethyl)-2-ethyl-4-methylimidazole

· Risk phrases:

25 Toxic if swallowed.
37/38 Irritating to respiratory system and skin.
41 Risk of serious damage to eyes.
43 May cause sensitisation by skin contact.
52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

· Safety phrases:

20 When using do not eat or drink.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
60 This material and its container must be disposed of as hazardous waste.

· Classification system:

· NFPA ratings (scale 0 - 4) Health = 3
Fire = 1
Reactivity = 0

· HMIS-ratings (scale 0 - 4) Health = 3
Fire = 1
Reactivity = 0

· Other hazards
· Results of PBT and vPvB assessment

· PBT: Not applicable.
· vPvB: Not applicable.

3 Composition/information on ingredients

· Chemical characterization: Mixtures

· Description: Mixture of the substances listed below with non-hazardous additions.

· Components:

	aliphatic amine	T R25; Xi R37/38-41
--	-----------------	---------------------

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	aliphatic amine	Xn R22
112-57-2	3,6,9-triazaundecamethylenediamine	C R34; Xn R21/22; Xi R43; N R51/53

- **Additional information:** For the wording of the listed risk phrases refer to section 16.
-

4 First aid measures

· Description of first aid measures

- **General information:** Immediately remove any clothing soiled by the product.
In case of irregular breathing or respiratory arrest provide artificial respiration.
 - **After inhalation:** Supply fresh air or oxygen; call for doctor.
In case of unconsciousness place patient in a stable side position for transportation.
Supply fresh air. For added safety, call a doctor.
 - **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
 - **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
 - **After swallowing:** Do not induce vomiting; immediately call for medical help.
 - **Information for doctor:**
 - **Most important symptoms and effects, both acute and delayed** No further relevant information available.
 - **Indication of any immediate medical attention and special treatment needed** No further relevant information available.
-

5 Firefighting measures

- **Extinguishing media**
 - **Suitable extinguishing agents:** CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
 - **Special hazards arising from the substance or mixture** No further relevant information available.
 - **Advice for firefighters**
 - **Protective equipment:** No special measures required.
-

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures** Not required.
- **Environmental precautions:** Inform respective authorities in case of seepage into water course or sewage system.

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Trade name: Mereco 3554 Activator

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- **Methods and material for containment and cleaning up:** Do not allow to enter sewers/ surface or ground water.
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of contaminated material as waste according to item 13.
Ensure adequate ventilation.
 - **Reference to other sections** See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
-

7 Handling and storage

- **Handling:**
 - **Precautions for safe handling** Store in cool, dry place in tightly closed receptacles.
Use only in well ventilated areas.
 - **Information about protection against explosions and fires:** No special measures required.
 - **Conditions for safe storage, including any incompatibilities**
 - **Storage:**
 - **Requirements to be met by storerooms and receptacles:** No special requirements.
 - **Information about storage in one common storage facility:** Not required.
 - **Further information about storage conditions:** Keep receptacle tightly sealed.
 - **Specific end use(s)** No further relevant information available.
-

8 Exposure controls/personal protection

- **Additional information about design of technical systems:** No further data; see item 7.
- **Control parameters**

· Components with limit values that require monitoring at the workplace:	
112-57-2 3,6,9-triazaundecamethylenediamine	
WEEL	5 mg/m ³ Skin; DSEN

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

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- **Exposure controls**

- **Personal protective equipment:**

- **General protective and hygienic measures:**

Keep away from foodstuffs, beverages and feed.
 Immediately remove all soiled and contaminated clothing.
 Wash hands before breaks and at the end of work.
 Avoid contact with the skin.
 Avoid contact with the eyes and skin.

- **Breathing equipment:**

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.

- **Protection of hands:**

Protective gloves
 The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
 Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material is based on consideration of the penetration times, rates of diffusion and the degradation of the material.

- **Material of gloves**

The selection of suitable gloves depends not only on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.

- **Penetration time of glove material**

The exact penetration time has to be determined by the glove manufacturer and has to be observed.

- **Eye protection:**

Tightly sealed goggles

9 Physical and chemical properties

- **Information on basic physical and chemical properties**

- **General Information**

- **Appearance:**

- **Form:** Liquid
 - **Color:** Amber colored
 - **Odor:** Ammonia-like
 - **Odour threshold:** Not determined.

- **pH-value:** Not determined.

- **Change in condition**

- **Melting point/Melting range:** Undetermined.
 - **Boiling point/Boiling range:** 245°C

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Trade name: Mereco 3554 Activator

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· Flash point:	137°C
· Flammability (solid, gaseous):	Not applicable.
· Ignition temperature:	315°C
· Decomposition temperature:	Not determined.
· Auto igniting:	Product is not self-igniting.
· Danger of explosion:	Product does not present an explosion hazard.
· Explosion limits:	
· Lower:	2.1 Vol %
· Upper:	10.5 Vol %
· Vapor pressure:	Not determined.
· Density at 20°C:	1.13 g/cm ³
· Relative density	Not determined.
· Vapour density	Not determined.
· Evaporation rate	Not determined.
· Solubility in / Miscibility with	
· Water:	Not miscible or difficult to mix.
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity:	
· Dynamic:	Not determined.
· Kinematic:	Not determined.
· Solvent content:	
· Organic solvents:	0.0 %
· Other information	No further relevant information available.

10 Stability and reactivity

- **Reactivity**
 - **Chemical stability**
 - **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions**
 - Reacts with acids.
 - Reacts with strong acids.
- **Conditions to avoid**
 - No further relevant information available.
- **Incompatible materials:**
 - No further relevant information available.
- **Hazardous decomposition products:**
 - Nitrogen oxides

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Trade name: Mereco 3554 Activator

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Irritant gases/vapors

11 Toxicological information

- **Information on toxicological effects**

- **Acute toxicity:**

- **LD/LC50 values that are relevant for classification:**

112-57-2 3,6,9-triazaundecamethylenediamine		
Dermal	LD50	660 mg/kg (rabbit)
931-36-2 2-ethyl-4-methylimidazole		
Oral	LD50	1000 mg/kg (rat)
Dermal	LD50	>400 mg/kg (rabbit)

- **Primary irritant effect:**

- **on the skin:**

Irritant to skin and mucous membranes.

- **on the eye:**

Strong irritant with the danger of severe eye injury.

- **Sensitization:**

Sensitization possible through skin contact.

- **Additional toxicological information:**

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

Toxic

Irritant

- **Carcinogenic categories**

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

None of the ingredients is listed.

- **NTP (National Toxicology Program)**

None of the ingredients is listed.

12 Ecological information

- **Toxicity**

- **Aquatic toxicity:** No further relevant information available.

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

- **Behavior in environmental systems:**

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

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

- **Ecotoxicological effects:**

- **Remark:** Harmful to fish

- **Additional ecological information:**

- **General notes:** Water hazard class 2 (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.

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Trade name: Mereco 3554 Activator

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- Harmful to aquatic organisms
- **Results of PBT and vPvB assessment**
 - **PBT:** Not applicable.
 - **vPvB:** Not applicable.
 - **Other adverse effects** No further relevant information available.
-

13 Disposal considerations

- **Waste treatment methods**
 - **Recommendation:** Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
 - **Uncleaned packagings:**
 - **Recommendation:** Disposal must be made according to official regulations.
-

14 Transport information

· UN-Number	
· DOT, ADR, ADN, IMDG, IATA	Not Applicable
· UN proper shipping name	
· DOT	Not Regulated
· ADR, ADN, IMDG, IATA	Not Applicable
· Transport hazard class(es)	
· DOT, ADR, ADN, IMDG, IATA	
· Class	Not Applicable
· Packing group	
· DOT, ADR, IMDG, IATA	Not Applicable
· Environmental hazards:	
· Marine pollutant:	No
· Special precautions for user	Not applicable.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.

15 Regulatory information

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

· Section 302 (extremely hazardous substances):
None of the ingredients is listed.

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· Section 313 (Specific toxic chemical listings):			
None of the ingredients is listed by CAS number.			
· Sections 311/312 (Specific hazard chemical listings):			
23996-25-0	1-(2-cyanoethyl)-2-ethyl-4-methylimidazole		
112-57-2	3,6,9-triazaundecamethylenediamine		
· Sections 311/312 Hazard Categorizations:			
23996-25-0	1-(2-cyanoethyl)-2-ethyl-4-methylimidazole	Category = A (Acute health hazard)	>60%
112-57-2	3,6,9-triazaundecamethylenediamine	A = Acute, C = Chronic (health hazards)	3-10%
· TSCA (Toxic Substances Control Act):			
All ingredients are listed.			
· Proposition 65			
· Chemicals known to cause cancer:			
None of the ingredients is listed.			
· Chemicals known to cause reproductive toxicity for females:			
None of the ingredients is listed.			
· Chemicals known to cause reproductive toxicity for males:			
None of the ingredients is listed.			
· Chemicals known to cause developmental toxicity:			
None of the ingredients is listed.			
· Carcinogenic categories			
· EPA (Environmental Protection Agency)			
None of the ingredients is listed.			
· TLV (Threshold Limit Value established by ACGIH)			
None of the ingredients is listed.			
· MAK (German Maximum Workplace Concentration)			
None of the ingredients is listed.			
· NIOSH-Ca (National Institute for Occupational Safety and Health)			
None of the ingredients is listed.			
· OSHA-Ca (Occupational Safety & Health Administration)			
None of the ingredients is listed.			
· Chemical safety assessment: A Chemical Safety Assessment has not been carried out.			

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· Relevant phrases R21/22 Harmful in contact with skin and if swallowed.

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— USA —

Material Safety Data Sheet

acc. to ISO/DIS 11014

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Trade name: Mereco 3554 Activator

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R22 Harmful if swallowed.
R25 Toxic if swallowed.
R34 Causes burns.
R37/38 Irritating to respiratory system and skin.
R41 Risk of serious damage to eyes.
R43 May cause sensitisation by skin contact.
R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

· **Department issuing MSDS:** Technical department
· **Contact:** Dr. John F. Plummer

USA