

SAFETY DATA SHEET



D.E.N.® 438-A85 Epoxy Novolac

Version	Revision Date:	SDS Number:	Date of last issue: 09-30-2019
8.0	04-05-2021	101201624	Date of first issue: 04-05-2021

BLUE CUBE OPERATIONS LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

SECTION 1. IDENTIFICATION

Product name : D.E.N.® 438-A85 Epoxy Novolac

Product code : 000000001000001187

Manufacturer or supplier's details

Company name of supplier : BLUE CUBE OPERATIONS LLC

Address : 190 CARONDELET PLAZA, SUITE 1530
CLAYTON MO 63105-3467

Telephone : (844) 238-3445

E-mail address : INFO@OLIN.COM

Emergency telephone : +1 800 424 9300

Local Emergency Contact : 1-800-424-9300

Identified uses : Used in applications such as:
Can coatings.
Composites.
Casting.
Tooling.
Marine and protective coatings.
Adhesives.
Potting and encapsulation.
Coil coatings.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Flammable liquids : Category 2

Skin sensitization : Category 1

GHS label elements

Hazard pictograms :



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Signal Word : Danger

Hazard Statements : Highly flammable liquid and vapor.
May cause an allergic skin reaction.

Precautionary Statements : **Prevention:**
P210 Keep away from heat/ sparks/ open flames/ hot surfaces.
No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P272 Contaminated work clothing must not be allowed out of the workplace.
P280 Wear protective gloves/ eye protection/ face protection.

Response:
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P363 Wash contaminated clothing before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage:
P403 + P235 Store in a well-ventilated place. Keep cool.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

Static-accumulating flammable liquid.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Components

Chemical name	CAS-No.	Concentration (% w/w)
Reaction product of phenol-formaldehyde Novolac with epichlorohydrin	28064-14-4	> 85
Acetone	67-64-1	< 15

Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

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| If inhaled | : Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility. |
| In case of skin contact | : Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse.
Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands.
Suitable emergency safety shower facility should be available in work area. |
| In case of eye contact | : Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist. |
| If swallowed | : Do not induce vomiting. Call a physician and/or transport to emergency facility immediately. |
| Most important symptoms and effects, both acute and delayed | : Aside from the information found under Description of first aid measures(above)any additional important symptoms and effects are described in Section 11: Toxicology Information. |
| Protection of first-aiders | : First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection).
If potential for exposure exists refer to Section 8 for specific personal protective equipment. |
| Notes to physician | : Maintain adequate ventilation and oxygenation of the patient. The decision of whether to induce vomiting or not should be made by a physician.
If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.
No specific antidote.
Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.
Skin contact may aggravate preexisting dermatitis. |
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SECTION 5. FIRE-FIGHTING MEASURES

- | | |
|------------------------------|---|
| Suitable extinguishing media | : Water fog or fine spray.
Dry chemical fire extinguishers.
Carbon dioxide fire extinguishers.
Foam.
Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.
Water fog, applied gently may be used as a blanket for fire |
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- extinguishment.
- Unsuitable extinguishing media : Do not use direct water stream. Straight or direct water streams may not be effective to extinguish fire.
- Specific hazards during fire fighting : Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Electrically ground and bond all equipment. Flammable mixtures of this product are readily ignited even by static discharge. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Flammable mixtures may exist within the vapor space of containers at room temperature. Flammable concentrations of vapor can accumulate at temperatures above flash point; see Section 9. Dense smoke is emitted when burned without sufficient oxygen.
- Hazardous combustion products : During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Phenolic compounds. Carbon monoxide. Carbon dioxide.
- Further information : Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Water may not be effective in extinguishing fire. Do not use direct water stream. May spread fire. Eliminate ignition sources. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the 'Accidental Release Measures' and the 'Ecological Information' sections of this (M)SDS.
- Special protective equipment for fire-fighters : Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location.

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For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : Evacuate area.
Only trained and properly protected personnel must be involved in clean-up operations.
Keep upwind of spill.
Keep personnel out of low areas.
Ventilate area of leak or spill.
Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion.
Vapor explosion hazard. Keep out of sewers.
For large spills, warn public of downwind explosion hazard.
Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment.
Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Refer to section 7, Handling, for additional precautionary measures.
- Environmental precautions : Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
- Methods and materials for containment and cleaning up : Contain spilled material if possible.
Absorb with materials such as:
Sand.
Polypropylene fiber products.
Polyethylene fiber products.
Use non-sparking tools in cleanup operations.
Ground and bond all containers and handling equipment.
Collect in suitable and properly labeled containers.
Pump with explosion-proof equipment. If available, use foam to smother or suppress.
Remove residual with soap and hot water.
Residual can be removed with solvent. Solvents are not recommended for clean-up unless the recommended exposure guidelines and safe handling practices for the specific solvent are followed. Consult appropriate solvent Safety Data Sheet for handling information and exposure guidelines.
See Section 13, Disposal Considerations, for additional information.

SECTION 7. HANDLING AND STORAGE

- Advice on safe handling : Keep away from heat, sparks and flame.
No smoking, open flames or sources of ignition in handling and storage area.
Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur.

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Electrically bond and ground all containers and equipment before transfer or use of material.
 Never use air pressure for transferring product.
 Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation.
 Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers.
 Avoid contact with skin and eyes.
 Avoid prolonged or repeated contact with skin.
 Avoid breathing vapor.
 Do not swallow.
 Keep container closed.
 Use with adequate ventilation.
 Wash thoroughly after handling.
 Handling operations that can promote accumulation of static charges include but are not limited to mixing, filtering, pumping at high flow rates, splash filling, creating mists or sprays, tank and container filling, tank cleaning, sampling, gauging, switch loading, vacuum truck operations.
 See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage : Flammable mixtures may exist within the vapor space of containers at room temperature.
 Minimize sources of ignition, such as static build-up, heat, spark or flame.
 Keep container closed.

Recommended storage temperature : 36 - 109 °F / 2 - 43 °C

Storage period : 24 Months

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Ingredients with workplace control parameters**

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Acetone	67-64-1	TWA	200 ppm	OLIN OEL
		STEL	350 ppm	OLIN OEL
		TWA	250 ppm	ACGIH
		STEL	500 ppm	ACGIH
		TWA	750 ppm 1,800 mg/m ³	OSHA P0
		STEL	1,000 ppm 2,400 mg/m ³	OSHA P0
		TWA	1,000 ppm 2,400 mg/m ³	OSHA Z-1

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Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sam-pling time	Permissible concentra-tion	Basis
Acetone	67-64-1	Acetone	Urine	End of shift (As soon as possible after exposure ceases)	25 mg/l	ACGIH BEI

Engineering measures : Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.
Local exhaust ventilation may be necessary for some operations.

Personal protective equipment

Filter type : The following should be effective types of air-purifying respirators: Organic vapor cartridge.

Respiratory protection : Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus.

Hand protection

Remarks : Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ('latex'). Neoprene. Polyethylene. Ethyl vinyl alcohol laminate ('EVAL'). Examples of acceptable glove barrier materials include: Chlorinated polyethylene. Nitrile/butadiene rubber ('nitrile' or 'NBR'). Polyvinyl alcohol ('PVA'). Polyvinyl chloride ('PVC' or 'vinyl'). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Eye protection : Use safety glasses (with side shields).
If exposure causes eye discomfort, use a full-face respirator.

Skin and body protection : Use protective clothing chemically resistant to this material.

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Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Liquid.
Color	: yellow
Odor	: Acetone.
Odor Threshold	: No test data available
pH	: No test data available
Melting point/range	: Not applicable
Freezing point	No test data available
Boiling point/boiling range	: 133 °F / 56 °C Method: Literature Acetone
Flash point	: -4 °F / -20 °C Method: Tag Closed Cup ASTM D56, closed cup Acetone
Evaporation rate	: No test data available
Flammability (liquids)	: Static-accumulating flammable liquid.
Upper explosion limit / Upper flammability limit	: 13.0 %(V) Method: Literature Acetone
Lower explosion limit / Lower flammability limit	: 2.5 %(V) Method: Literature Acetone
Vapor pressure	: 181.7 mmHg (68 °F / 20 °C) Method: Literature Acetone
Relative vapor density	: 2.0 Method: Literature Acetone
Relative density	: 1.14 Method: Literature

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Density	:	1.14 g/cm ³ (77 °F / 25 °C) Method: ASTM D4052
Solubility(ies) Water solubility	:	< 10 g/l (77 °F / 25 °C) Method: Literature
Partition coefficient: n-octanol/water	:	No data available
Autoignition temperature	:	No test data available
Decomposition temperature	:	No test data available
Viscosity Viscosity, dynamic	:	500 - 1,200 mPa,s (77 °F / 25 °C) Method: ASTM D 445
Viscosity, kinematic	:	No test data available
Explosive properties	:	No data available
Oxidizing properties	:	No data available
Molecular weight	:	Not determined

Note: These are the Reference Points for these Physical Properties listed above, unless otherwise noted in their respective Physical Property value information: Boiling Point at 760 mmHg; Evaporation Rate Butyl Acetate = 1; Relative Vapor Density Air = 1; and Relative Density Water = 1.

NOTE: The physical data presented above are typical values and should not be construed as a specification.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No data available
Chemical stability	:	Stable under recommended storage conditions. See Storage, Section 7.
Possibility of hazardous reactions	:	Will not occur by itself. Masses of more than one pound (0.5 kg) of product plus an aliphatic amine will cause irreversible polymerization with considerable heat build-up.
Conditions to avoid	:	Exposure to elevated temperatures can cause product to decompose. Avoid static discharge.
Incompatible materials	:	Avoid contact with oxidizing materials. Avoid contact with: Acids. Bases. Avoid unintended contact with amines.

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Hazardous decomposition products : Decomposition products depend upon temperature, air supply and the presence of other materials. Uncontrolled exothermic reaction of epoxy resins release phenolics, carbon monoxide, and water.

SECTION 11. TOXICOLOGICAL INFORMATION**Acute toxicity****Product:**

Acute oral toxicity : Remarks: Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

LD50 (Rat): > 4,000 mg/kg
Symptoms: No deaths occurred at this concentration.
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : Remarks: Excessive exposure to solvent(s) may cause respiratory irritation and central nervous system depression. Symptoms may include headache, dizziness and drowsiness, progressing to incoordination and unconsciousness.

Remarks: As product:
The LC50 has not been determined.

Acute dermal toxicity : Remarks: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Remarks: As product:
The dermal LD50 has not been determined.

LD50 (Rabbit): > 2,000 mg/kg
Method: Estimated.
Symptoms: No deaths occurred at this concentration.
Assessment: The substance or mixture has no acute dermal toxicity

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg
Symptoms: No deaths occurred at this concentration.
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : Remarks: At room temperature, exposure to vapor is minimal due to low volatility; vapor from heated material may cause respiratory irritation.

Remarks: The LC50 has not been determined.

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Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg
Symptoms: No deaths occurred at this concentration.
Assessment: The substance or mixture has no acute dermal toxicity

Acetone:

Acute oral toxicity : LD50 (Rat): 5,800 mg/kg

Acute inhalation toxicity : LC50 (Rat): 76 mg/l
Exposure time: 4 h
Test atmosphere: vapor

Acute dermal toxicity : LD50 (Rabbit): > 20,000 mg/kg

Skin corrosion/irritation**Product:**

Remarks : Prolonged contact may cause skin irritation with local redness.

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Result : No skin irritation
Remarks : Brief contact may cause slight skin irritation with local redness.

Acetone:

Result : No skin irritation
Remarks : Essentially nonirritating to skin.
May cause drying and flaking of the skin.

Serious eye damage/eye irritation**Product:**

Result : No eye irritation
Remarks : May cause slight eye irritation.
Corneal injury is unlikely.
Vapor may cause eye irritation experienced as mild discomfort and redness.

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Result : No eye irritation
Remarks : May cause slight temporary eye irritation.
Corneal injury is unlikely.

Acetone:

Result : Eye irritation
Remarks : May cause severe eye irritation.

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May cause slight corneal injury.
Effects may be slow to heal.
Vapor may cause eye irritation experienced as mild discomfort and redness.

Respiratory or skin sensitization**Product:**

Remarks : Has caused allergic skin reactions when tested in guinea pigs.

Remarks : For respiratory sensitization:
No relevant information found.

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Assessment : The product is a skin sensitizer, sub-category 1B.
Remarks : Has caused allergic skin reactions when tested in guinea pigs.

Remarks : For respiratory sensitization:
No relevant data found.

Acetone:

Assessment : Does not cause skin sensitization.
Remarks : Did not cause allergic skin reactions when tested in guinea pigs.

Remarks : For respiratory sensitization:
No relevant data found.

Germ cell mutagenicity**Product:**

Genotoxicity in vitro : Remarks: Genetic toxicity studies in animals were negative for component(s) tested.

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Genotoxicity in vitro : Remarks: Animal genetic toxicity studies were negative.

Acetone:

Genotoxicity in vitro : Remarks: In vitro genetic toxicity studies were predominantly negative.

Carcinogenicity**Product:**

Remarks : No relevant data found.

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Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Remarks : No relevant data found.

Acetone:

Remarks : No relevant data found.

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.**OSHA** No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.**NTP** No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.**Reproductive toxicity****Product:**

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: Contains component(s) which, in laboratory animals, have been toxic to the fetus only at doses toxic to the mother.

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: No relevant data found.

Acetone:

Effects on fertility : Remarks: In animal studies, did not interfere with reproduction.

Effects on fetal development : Remarks: Has been toxic to the fetus in laboratory animals at doses toxic to the mother.

STOT-single exposure**Product:**

Assessment : Contains component(s) which are classified as specific target organ toxicant, single exposure, category 3.

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Assessment : Evaluation of available data suggests that this material is not an STOT-SE toxicant.

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Acetone:

Routes of exposure	: Inhalation
Target Organs	: Nervous system
Assessment	: May cause drowsiness or dizziness.

Repeated dose toxicity**Product:**

Remarks	: Contains component(s) which have been reported to cause effects on the following organs in animals: Blood. Kidney. Liver. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. Development of cataracts has been reported in laboratory animals after prolonged repeated skin exposure to acetone.
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Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Remarks	: No relevant data found.
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Acetone:

Remarks	: Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. In animals, effects have been reported on the following organs: Blood. Kidney. Liver. Development of cataracts has been reported in laboratory animals after prolonged repeated skin exposure to acetone.
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Aspiration toxicity**Product:**

No aspiration toxicity classification

Components:**Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Based on physical properties, not likely to be an aspiration hazard.

Acetone:

May be harmful if swallowed and enters airways.

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SECTION 12. ECOLOGICAL INFORMATION**Ecotoxicity****Components:****Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Toxicity to fish : Remarks: Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

LC50 (Leuciscus idus (Golden orfe)): 5.7 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 203 or Equivalent

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 3.5 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202 or Equivalent

Acetone:

Toxicity to fish : Remarks: Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

LC50 (Oncorhynchus mykiss (rainbow trout)): 5,500 - 6,100 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 6,084 mg/l
Exposure time: 48 h
Method: Method Not Specified.

LC50 (Ceriodaphnia dubia (water flea)): 8,098 mg/l
Exposure time: 48 h

Toxicity to algae/aquatic plants : EC50 (Skeletonema costatum (marine diatom)): 11,800 - 14,400 mg/l
End point: Biomass
Exposure time: 5 d

Toxicity to microorganisms : IC50 (activated sludge): > 1,000 mg/l
Exposure time: 3 h
Method: OECD 209 Test

Toxicity to terrestrial organisms : dietary LC50 (Coturnix japonica (Japanese quail)): > 20,000 ppm
Remarks: Material is practically non-toxic to birds on a dietary basis (LC50 > 5000 ppm).

Persistence and degradability**Components:****Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

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Biodegradability : Result: Not biodegradable.
Remarks: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Biodegradation: 10 - 16 %
Exposure time: 28 d
Method: OECD Test Guideline 301B or Equivalent
Remarks: 10-day Window: Fail

Acetone:

Biodegradability : Result: Readily biodegradable.
Remarks: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Biodegradation: 91 %
Exposure time: 28 d
Method: OECD Test Guideline 301B or Equivalent
Remarks: 10-day Window: Pass

Biochemical Oxygen Demand (BOD) : 69.1 %
Incubation time: 5 d

72.7 %
Incubation time: 10 d

73.6 %
Incubation time: 20 d

ThOD : 2.20 mg/mg
Method: Estimated.

Photodegradation : Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Rate constant: 2.04E-13 cm³/s
Method: Estimated.

Bioaccumulative potential**Components:****Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Partition coefficient: n-octanol/water : Remarks: No relevant data found.

Acetone:

Bioaccumulation : Species: Fish
Bioconcentration factor (BCF): 0.69
Method: Measured

Partition coefficient: n-octanol/water : log Pow: -0.24
Method: Measured

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Remarks: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Mobility in soil**Components:****Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Distribution among environmental compartments : Remarks: No data available.

Acetone:

Distribution among environmental compartments : Koc: 0.37 - 2.0
Method: Estimated.
Remarks: Potential for mobility in soil is very high (Koc between 0 and 50).

Other adverse effects**Components:****Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:**

Results of PBT and vPvB assessment : Remarks: No data available

Additional ecological information : No data available

Acetone:

Results of PBT and vPvB assessment : This substance has not been assessed for persistence, bioaccumulation and toxicity (PBT).

SECTION 13. DISPOSAL CONSIDERATIONS**Disposal methods**

Waste from residues : AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL.
THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information.
All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations.
Regulations may vary in different locations.
Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.
DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER.
FOR UNUSED & UNCONTAMINATED PRODUCT, the pre-

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ferred options include sending to a licensed, permitted:
Incinerator or other thermal destruction device.

SECTION 14. TRANSPORT INFORMATION**International Regulations****UNRTDG**

UN number	: UN 1866
Proper shipping name	: RESIN SOLUTION
Class	: 3
Packing group	: II
Labels	: 3

IATA-DGR

UN/ID No.	: UN 1866
Proper shipping name	: Resin solution
Class	: 3
Packing group	: II
Labels	: Flammable Liquids
Packing instruction (cargo aircraft)	: 364
Packing instruction (passenger aircraft)	: 353

IMDG-Code

UN number	: UN 1866
Proper shipping name	: RESIN SOLUTION (Epoxy resin)
Class	: 3
Packing group	: II
Labels	: 3
EmS Code	: F-E, <u>S-E</u>
Marine pollutant	: yes
Remarks	: Stowage category B

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation**49 CFR**

UN/ID/NA number	: UN 1866
Proper shipping name	: Resin solution
Class	: 3
Packing group	: II
Labels	: FLAMMABLE LIQUID
ERG Code	: 127
Marine pollutant	: no

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

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SECTION 15. REGULATORY INFORMATION**EPCRA - Emergency Planning and Community Right-to-Know****SARA 302 Extremely Hazardous Substances Threshold Planning Quantity**

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Hazard not otherwise classified (physical hazards)
Respiratory or skin sensitization

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations**Pennsylvania Right To Know**

Acetone

67-64-1

California Prop. 65

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

International Regulations

Montreal Protocol (Ozone Depleting Substances) : Not applicable

Rotterdam Convention (Prior Informed Consent) : Not applicable

Stockholm Convention (Persistent Organic Pollutants) : Not applicable

The ingredients of this product are reported in the following inventories:

CH INV : All intentional components are listed on the inventory, are exempt, or are supplier certified.

DSL : All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

AICS : All intentional components are listed on the inventory, are exempt, or are supplier certified.

NZIoC : All intentional components are listed on the inventory, are exempt, or are supplier certified.

ENCS : All intentional components are listed on the inventory, are exempt, or are supplier certified.

ISHL : All intentional components are listed on the inventory, are exempt, or are supplier certified.

KECI : All intentional components are listed on the inventory, are exempt, or are supplier certified.

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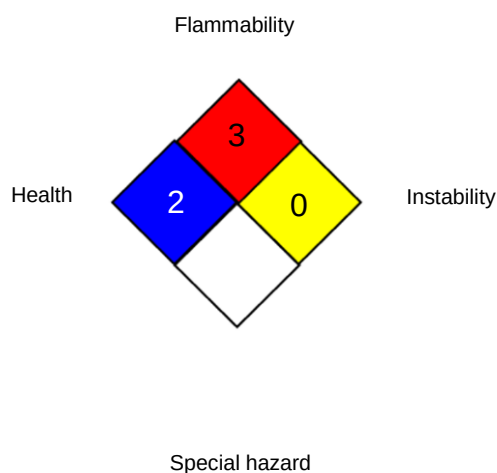
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PICCS	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
IECSC	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
TCSI	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
TSCA	:	All substances listed as active on the TSCA Inventory or are not required to be listed.

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION**Further information****NFPA 704:****Full text of other abbreviations**

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	:	ACGIH - Biological Exposure Indices (BEI)
OSHA P0	:	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / TWA	:	8-hour, time-weighted average
ACGIH / STEL	:	Short-term exposure limit
OSHA P0 / TWA	:	8-hour time weighted average
OSHA P0 / STEL	:	Short-term exposure limit

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OSHA Z-1 / TWA : 8-hour time weighted average

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

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BLUE CUBE OPERATIONS LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

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