SAFETY DATA SHEET

D.E.N.™ 438-MK75 Epoxy Novolac

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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 pre-cautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

SECTION 1. IDENTIFICATION

Product name	:	D.E.N.™ 438-MK75 Epoxy Novolac
Product code	:	000000001000002416

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: Composites. Electrical laminate for printed wire board manufacturing. Marine and protective coatings. Coil coatings.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Flammable liquids	:	Category 2
Eye irritation	:	Category 2A
Skin sensitization	:	Sub-category 1B
Specific target organ toxicity - single exposure	:	Category 3 (Respiratory system)

GHS label elements

Hazard pictograms :

Signal Word : Danger

Hazard Statements : Highly flammable liquid and vapor.
May cause an allergic skin reaction.
Causes serious eye irritation.
May cause respiratory irritation.

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.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
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.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: 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 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

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	>= 70 - <= 80
Methyl isobutyl ketone	108-10-1	>= 20 - <= 30

Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

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.

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 : No emergency medical treatment necessary.

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. No specific antidote.
Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

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 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	:	Container may rupture from gas generation in a fire situation. 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. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. 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 pro-

tect 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.
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 : Isolate area.
Keep unnecessary and unprotected personnel from entering the area.
Keep personnel out of low areas.
Keep upwind of spill.
Ventilate area of leak or spill.
No smoking in area.
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.
Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Ground and bond all containers and handling equipment.
Vapor explosion hazard. Keep out of sewers.
Refer to section 7, Handling, for additional precautionary measures.
Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

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.
Ground and bond all containers and handling equipment.
Pump with explosion-proof equipment. If available, use foam to smother or suppress.
Collect in suitable and properly labeled containers.
See Section 13, Disposal Considerations, for additional information.
Absorb with materials such as:
Sand.

Polypropylene fiber products.
Polyethylene fiber products.
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.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : Keep away from heat, sparks and flame.
Avoid contact with eyes, skin, and clothing.
Avoid prolonged or repeated contact with skin.
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Electrically bond and ground all containers, personnel and equipment before transfer or use of material.
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.
Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.
See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

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

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

Storage period : 24 Months

Further information on storage stability : Shelf life begins from date of manufacture.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Methyl isobutyl ketone	108-10-1	TWA	20 ppm	ACGIH
		STEL	75 ppm	ACGIH

		TWA	50 ppm 205 mg/m3	OSHA P0
		STEL	75 ppm 300 mg/m3	OSHA P0
		TWA	100 ppm 410 mg/m3	OSHA Z-1

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Methyl isobutyl ketone	108-10-1	methyl isobutyl ketone	Urine	End of shift (As soon as possible after exposure ceases)	1 mg/l	ACGIH BEI

Engineering measures : Use engineering controls to maintain airborne level below exposure limit requirements or guidelines.
If there are no applicable exposure limit requirements or guidelines, use only with adequate ventilation.
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, use an approved respirator.
Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material.
For emergency conditions, use an approved positive-pressure self-contained breathing apparatus.

Hand protection

Remarks : Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Polyethylene. Ethyl vinyl alcohol laminate ('EVAL'). Examples of acceptable glove barrier materials include: Chlorinated polyethylene. Natural rubber ('latex'). Neoprene. Nitrile/butadiene rubber ('nitrile' or 'NBR'). Polyvinyl chloride ('PVC' or 'vinyl'). Viton. 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 chemical goggles.
If exposure causes eye discomfort, use a full-face respirator.

Skin and body protection : Wear clean, body-covering clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid.
Color	:	Yellow
Odor	:	Gasoline-like
Odor Threshold	:	No test data available
pH	:	Not applicable
Melting point/range	:	Not applicable
Freezing point		Not determined
Boiling point/boiling range	:	244 °F / 118 °C Method: Literature (MIBK)
Flash point	:	64 °F / 18 °C Method: ASTM D3278, closed cup (methyl isobutyl ketone)
Evaporation rate	:	No test data available
Flammability (solid, gas)	:	Not applicable
Upper explosion limit / Upper flammability limit	:	8.0 %(V) Method: Literature (MIBK)
Lower explosion limit / Lower flammability limit	:	1.3 %(V) (122 °F / 50 °C) Method: Literature (MIBK)
Vapor pressure	:	15 mmHg (68 °F / 20 °C) Method: Literature (MIBK)
Relative vapor density	:	3.45 Method: Literature

(MIBK)

Relative density	:	1.09 Method: Literature
Density	:	1.10 g/cm3 (77 °F / 25 °C) Method: ASTM D4052
Solubility(ies)		
Water solubility	:	<= 10 g/l Negligible (77 °F / 25 °C) Method: Literature
Partition coefficient: n-octanol/water	:	No data available
Autoignition temperature	:	887 °F / 475 °C Method: Literature (methyl isobutyl ketone)
Decomposition temperature	:	No test data available
Viscosity		
Viscosity, dynamic	:	200 - 600 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

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

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	:	Avoid temperatures above 300°C (572°F) Potentially violent decomposition can occur above 350°C (662°F) Generation of gas during decomposition can cause pressure in closed systems. Pressure build-up can be rapid.

Avoid static discharge.

Incompatible materials : Avoid contact with oxidizing materials.
Avoid contact with:
Acids.
Bases.
Avoid unintended contact with amines.

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

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Product:

Acute oral toxicity : Remarks: Very low toxicity if swallowed.
Harmful effects not anticipated from swallowing small amounts.

LD50 (Rat): > 5,000 mg/kg

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.
May cause nausea and vomiting.
Prolonged excessive exposure may cause adverse effects.

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.

LD50 (Rabbit): > 5,000 mg/kg
Method: Estimated.
Remarks: As product:
The dermal LD50 has not been determined.
For component(s) tested.

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.

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

Methyl isobutyl ketone:

Acute oral toxicity : LD50 (Rat): 2,080 mg/kg
Method: OECD Test Guideline 401

Acute inhalation toxicity : LC50 (Rat, male): 8.2 - 16.4 mg/l
Exposure time: 4 h
Test atmosphere: vapor
Assessment: The component/mixture is moderately toxic after short term inhalation.

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

Skin corrosion/irritation

Product:

Remarks : Prolonged contact may cause skin irritation with local redness.
Repeated contact may cause skin irritation with local redness.
Repeated contact may cause flaking and softening of skin.

Components:

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

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

Methyl isobutyl ketone:

Remarks : Prolonged contact may cause slight skin irritation with local redness.
May cause drying and flaking of the skin.

Serious eye damage/eye irritation

Product:

Remarks : May cause moderate eye irritation.
May cause slight corneal injury.
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.

Methyl isobutyl ketone:

Result : Eye irritation
Remarks : May cause moderate eye irritation.
May cause slight corneal injury.
Vapor may cause eye irritation experienced as mild discomfort and redness.

Respiratory or skin sensitization

Product:

Assessment : The product is a skin sensitizer, sub-category 1B.
Remarks : Contains component(s) which have caused allergic skin sensitization in guinea pigs.

Remarks : For respiratory sensitization:
No relevant data 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.

Methyl isobutyl ketone:

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 on tested components were predominantly negative.
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.

Methyl isobutyl ketone:

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

Carcinogenicity

Product:

Remarks : Contains component(s) which have caused cancer in some laboratory animals.
However, the relevance of this to humans is unknown.

Components:

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Remarks : No relevant data found.

Methyl isobutyl ketone:

Remarks : Has caused cancer in some laboratory animals.
However, the relevance of this to humans is unknown.
Kidney effects and/or tumors have been observed in male rats. These effects are believed to be species specific and unlikely to occur in humans.

IARC Group 2B: Possibly carcinogenic to humans
Methyl isobutyl ketone 108-10-1

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: Contains component(s) which did not interfere with reproduction in animal studies.

Effects on fetal development : Remarks: Contains component(s) which did not cause birth defects in animals; other fetal effects occurred 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.

Methyl isobutyl ketone:

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.
Did not cause birth defects in laboratory animals.

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.

Methyl isobutyl ketone:

Routes of exposure : Inhalation
Target Organs : Respiratory Tract
Assessment : May cause respiratory irritation.

Repeated dose toxicity

Product:

Remarks : Excessive exposure to methyl isobutyl ketone may cause respiratory irritation, gastrointestinal distress, anesthesia, kidney and liver effects.

Components:

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Remarks : No relevant data found.

Methyl isobutyl ketone:

Remarks : Excessive exposure to methyl isobutyl ketone may cause respiratory irritation, gastrointestinal distress, anesthesia, kidney and liver effects.

Aspiration toxicity

Product:

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

Components:

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:
Based on physical properties, not likely to be an aspiration hazard.

Methyl isobutyl ketone:
May be harmful if swallowed and enters airways.

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

Methyl isobutyl ketone:

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 (Danio rerio (zebra fish)): > 179 mg/l Exposure time: 96 h Test Type: static test Method: OECD Test Guideline 203 or Equivalent
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 200 mg/l Exposure time: 48 h Method: OECD Test Guideline 202 or Equivalent
Toxicity to algae/aquatic plants	:	EC50 (Pseudokirchneriella subcapitata (green algae)): 400 mg/l End point: Growth rate inhibition Exposure time: 96 h Test Type: static test Method: OECD Test Guideline 201 or Equivalent EC50 (Lemna minor (duckweed)): > 146 mg/l End point: Growth rate inhibition Exposure time: 7 d Test Type: semi-static test

Method: OECD 221.

Toxicity to fish (Chronic toxicity) : NOEC (Pimephales promelas (fathead minnow)): 57 mg/l
End point: weight
Exposure time: 31 d

LOEC (Pimephales promelas (fathead minnow)): 105 mg/l
End point: weight
Exposure time: 31 d

MATC (Maximum Acceptable Toxicant Level) (Pimephales promelas (fathead minnow)): 77.4 mg/l
End point: weight
Exposure time: 31 d

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 30 mg/l
Exposure time: 21 d

Persistence and degradability

Components:

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

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

Methyl isobutyl ketone:

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

Result: Readily biodegradable.
Biodegradation: 83 %
Exposure time: 28 d
Method: OECD Test Guideline 301F or Equivalent
Remarks: 10-day Window: Pass

ThOD : 2.72 mg/mg

Photodegradation : Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Rate constant: 8.86E-12 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.

Methyl isobutyl ketone:

Partition coefficient: n-octanol/water : log Pow: 1.9
Method: Measured

Mobility in soil

Components:

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Distribution among environmental compartments : Remarks: No data available.

Methyl isobutyl ketone:

Distribution among environmental compartments : Koc: 101
Method: Estimated.
Remarks: Potential for mobility in soil is high (Koc between 50 and 150).

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

Methyl isobutyl ketone:

Results of PBT and vPvB assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

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 preferred 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, S-E
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.

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)
Serious eye damage or eye irritation
Respiratory or skin sensitization
Specific target organ toxicity (single or repeated exposure)

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Methyl isobutyl ketone	108-10-1	>= 20 - <= 30 %

US State Regulations

Pennsylvania Right To Know

Methyl isobutyl ketone	108-10-1

California Prop. 65

WARNING: This product can expose you to chemicals including Methyl isobutyl ketone, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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:

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.

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

TSCA list

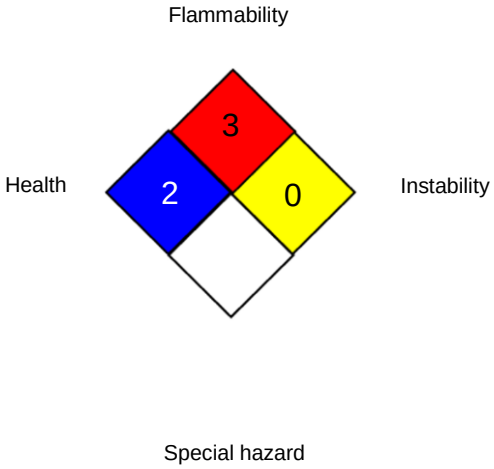
No substances are subject to a Significant New Use Rule.

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
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

Revision Date : 05-20-2021

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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