

## 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND THE COMPANY/UNDERTAKING

Identification of the substance/preparation	: Trans-LC
Chemical formula	: C <sub>2</sub> H <sub>2</sub> Cl <sub>2</sub>
Other means of identification	: trans-1,2-dichloroethylene; trans-dichloroethylene acetylene, dichloride, Dioform
Use of the Substance/Mixture	: Semiconductor Processing
Restrictions on Use	: No data available.
Manufacturer/Importer/Distributor	: Versum Materials Singapore Pte. Ltd. 2 International Business Park #03-24, The Strategy Singapore 609930 Toll Free No: 800 448 1755
Email Address – Technical Information	: <a href="mailto:techinfo@versummaterials.com">techinfo@versummaterials.com</a>
Telephone	: 800 448 1755
Emergency telephone number (24h)	: 800-101-2201 / +(65)-31581349

## 2. HAZARDS IDENTIFICATION

### GHS classification

Flammable liquids - Category 2  
Chronic aquatic toxicity - Category 3  
Acute toxicity - Inhalation Category 4

### GHS label elements

#### Hazard pictograms/symbols



Signal Word: Danger

#### Hazard Statements:

H225: Highly flammable liquid and vapour.  
H412: Harmful to aquatic life with long lasting effects.

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H332:Harmful if inhaled.

## Precautionary Statements:

- Prevention : P210:Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.  
P240:Ground/Bond container and receiving equipment.  
P241:Use explosion-proof electrical/ventilating/lighting/equipment.  
P242:Use only non-sparking tools.  
P280:Wear protective gloves/protective clothing/eye protection/face protection
- Disposal : P501:Disposal of contents/container to be specified in accordance with regulations.

## Other hazards which do not result in classification

May be a static accumulator – Sparks may ignite liquid and vapor  
Immediate fire and explosion hazard exists when mixed with air at concentrations exceeding the lower flammability limit (LFL).

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Mixture : Substance

Components	Chemical formula	CAS Number	Concentration (Weight)
trans-Dichloroethylene	C2H2CL2	156-60-5	100 %

Concentration is nominal. For the exact product composition, please refer to technical specifications. Contains no other components or impurities which will influence the classification of the product.

## 4. FIRST AID MEASURES

- General advice : Seek medical advice. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.
- Eye contact : Rinse immediately with plenty of water also under the eyelids for at least 20 minutes. Remove contact lenses.
- Skin contact : Wash off immediately with plenty of water for at least 20 minutes. Wash off with soap and water. Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay.
- Ingestion : Never give anything by mouth to an unconscious person. If a person vomits when lying on his back, place him in the recovery position. Do not induce vomiting. Prevent aspiration of vomit. Turn victim's head to the side.
- Inhalation : If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Move to fresh air.
- Symptoms : Repeated and/or prolonged exposure to low concentrations of vapors and/or aerosols may cause: Sore throat. Headache. Nausea. Dizziness. Tremors.

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Incoordination. Vomiting. Drowsiness.

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## 5. FIRE-FIGHTING MEASURES

- Suitable extinguishing media : Alcohol-resistant foam.  
Carbon dioxide (CO<sub>2</sub>).  
Dry chemical.  
Dry sand.  
Limestone powder.
- Specific hazards : Burning produces noxious and toxic fumes. In the event of fire, cool tanks with water spray . Downwind personnel must be evacuated. Fire or intense heat may cause violent rupture of packages. Flash back possible over considerable distance. May form explosive mixtures in air. Ignitable by static electricity.
- Special protective equipment for fire-fighters : Use personal protective equipment. Wear self contained breathing apparatus for fire fighting if necessary.
- Further information : Do not allow run-off from fire fighting to enter drains or water courses., Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

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## 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions : Wear suitable protective clothing, gloves and eye/face protection. Use self-contained breathing apparatus and chemically protective clothing. Remove all sources of ignition. Evacuate personnel to safe areas.
- Environmental precautions : Prevent spilled product from entering streams or drinking water supplies. Local authorities should be advised if significant spillages cannot be contained. Shut off or remove all ignition sources. Construct a dike to prevent spreading.
- Methods for cleaning up : Call Emergency Response number for advice. Approach suspected leak areas with caution. Absorb with inert absorbent materials such as: Dry sand. Vermiculite. Activated charcoal. Place in appropriate chemical waste container.
- Additional advice : Open enclosed spaces to outside atmosphere. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. If possible, stop flow of product.

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## 7. HANDLING AND STORAGE

### Handling

Emergency showers and eye wash stations should be readily accessible. Adhere to work practice rules established by government regulations. 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. To reduce potential for static discharge, ensure that all equipment is properly grounded, bonded and meets appropriate electrical classification requirements. Use only in well-ventilated areas. Avoid contact with eyes. Avoid breathing vapors and/or aerosols. Use personal protective equipment. When using, do not eat, drink or smoke.

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## Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Keep away from heat and sources of ignition. Keep in a dry, cool place. Keep away from oxidizers.

## Technical measures/Precautions

Keep away from open flames, hot surfaces and sources of ignition.

Storage Temperature : 0 - 40 °C

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### Engineering measures

Use explosion-proof equipment.  
Apply process controls to ensure safe operating conditions. Assess potential flammability hazards based on flashpoint and potential ignition sources.  
Provide readily accessible eye wash stations and safety showers.  
Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

### Personal protective equipment

- Respiratory protection : Wear appropriate respirator when ventilation is inadequate. In an emergency or when the airborne concentration is greater than 1000 ppm, use positive pressure self-contained breathing apparatus (SCBA). Use a NIOSH/MSHA full face respirator with organic vapor cartridge(s) when the airborne concentration is less than 1000 ppm. Standard EN 14387 - Gas filter(s), combined filter(s) and full face mask - EN 136.
- Hand protection : Viton gloves.  
Polyvinyl Alcohol Gloves (PVA).  
Standard EN 374 - Protective gloves against chemicals.  
Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Eye protection : Chemical safety glasses.  
Standard EN 166 - Personal eye-protection.
- Skin and body protection : Long sleeve shirts and trousers without cuffs.
- Environmental exposure controls : Prevent spilled product from entering streams or drinking water supplies. Local authorities should be advised if significant spillages cannot be contained. Shut off or remove all ignition sources.
- Special instructions for protection and hygiene : Wash hands at the end of each workshift and before eating, smoking or using the toilet. Provide readily accessible eye wash stations and safety showers.

### Exposure limit(s)

trans-Dichloroethylene	Time Weighted Average (TWA): EH40 WEL	200 ppm	806 mg/m <sup>3</sup>
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trans-Dichloroethylene	Short Term Exposure Limit (STEL): EH40 WEL	250 ppm	1,010 mg/m <sup>3</sup>
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## 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Liquid. Colorless.
Odor	: Sweet.
Odor threshold	: No data available.
pH	: No data available.
Melting point/range	: -58 °F (-50 °C)
Boiling point/range	: 118 °F (48 °C)
Flash point	: 43 °F (6 °C)
Evaporation rate	: No data available.
Flammability (solid, gas)	: Not applicable.
Upper/lower explosion/flammability limit	: 16.5 %(V) / 9 %(V)
Vapor pressure	: 265.41 mmHg at 68 °F (20 °C)
Water solubility	: 0.0063 g/l
Relative vapor density	: 3.67 (air = 1) Heavier than air.
Relative density	: 1.257 (water = 1)
Partition coefficient (n-octanol/water)	: No data available.
Auto-ignition temperature	: 460 °C
Decomposition temperature	: No data available.
Viscosity	: No data available.
Molecular Weight	: 96.94 g/mol

## 10. STABILITY AND REACTIVITY

Chemical Stability	: Stable under normal conditions.
Conditions to avoid	: Heat, flames and sparks. Exposure to air. Exposure to light. Exposure to moisture.

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Reactivity/Incompatible Materials	: Oxidizing agents. Alkalies. Amines. Copper. Aluminium. Aluminum alloys. Reducing agents. Strong oxidizing agents. Rubber products. Plastics.
Hazardous decomposition products	: Hazardous combustion products: Gaseous hydrogen chloride (HCl). Carbon monoxide. Phosgene.

## 11. TOXICOLOGICAL INFORMATION

### Likely routes of exposure

Effects on Eye	: Contact with eyes may cause irritation.
Effects on Skin	: If absorbed through the skin, may cause central nervous system effects, such as headache, nausea, dizziness, confusion, breathing difficulties. Mild skin irritation.
Inhalation Effects	: May cause central nervous system effects, such as headache, nausea, dizziness, confusion, breathing difficulties. Severe cases of overexposure can result in respiratory failure. May cause nose, throat, and lung irritation. Inhalation of vapors and/or aerosols in high concentration may cause irritation of respiratory system.
Ingestion Effects	: May be harmful if swallowed.
Symptoms	: Repeated and/or prolonged exposure to low concentrations of vapors and/or aerosols may cause: Sore throat. Headache. Nausea. Dizziness. Tremors. Incoordination. Vomiting. Drowsiness.

### Acute toxicity

Acute Oral Toxicity	: LD50 : > 5,000 mg/kg Species : (Rat)
Inhalation	: LC50 (4 h) : 24100 ppm Species : Rat. Inhalation may cause nausea, vomiting, weakness, tremors, and epigastric cramps.
Acute Dermal Toxicity	: LD50 : > 5,000 mg/kg Species : Rabbit.
Skin corrosion/irritation	: Mild skin irritation.
Serious eye damage/eye irritation	: Mild eye irritation.

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Sensitization. : No data available.

## Chronic toxicity or effects from long term exposures

Carcinogenicity : No data available.  
Reproductive toxicity : No data is available on the product itself.  
Germ cell mutagenicity : Tests show no mutagenic effects.  
Specific target organ systemic toxicity (single exposure) : No data available.  
Specific target organ systemic toxicity (repeated exposure) : Primarily excreted through the lungs.  
Aspiration hazard : No data available.

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## 12. ECOLOGICAL INFORMATION

### Ecotoxicity effects

Aquatic toxicity : No data is available on the product itself.  
Toxicity to other organisms : No data available.

### Persistence and degradability

Biodegradability : No data is available on the product itself.  
Mobility : If released to the soil, the material should leach into the groundwater. It will be lost from the water primarily by volatilization (half-life is 3 hours in a model river).  
Bioaccumulation : Biodegradation, adsorption to sediment, and bioconcentration (BCF:22) in aquatic organisms should not be significant.

### Further information

If released to the atmosphere, it will be lost by reaction with hydroxy radicals (half-life is 3.6 days) or lost to rain, since it is water soluble.

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## 13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Contact supplier if guidance is required.  
Contaminated packaging : Dispose of container and unused contents in accordance with federal, state, and local requirements.

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## 14. TRANSPORT INFORMATION

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## ADR

UN/ID No. : UN1150  
Proper shipping name : 1,2-DICHLOROETHYLENE  
Class or Division : 3  
Packing group : II  
Tunnel Code : (D/E)  
Label(s) : 3  
ADR/RID Hazard ID no. : 33  
Marine Pollutant : No

## IATA

UN/ID No. : UN1150  
Proper shipping name : 1,2-Dichloroethylene  
Class or Division : 3  
Packing group : II  
Label(s) : 3  
Marine Pollutant : No

## IMDG

UN/ID No. : UN1150  
Proper shipping name : 1,2-DICHLOROETHYLENE  
Class or Division : 3  
Packing group : II  
Label(s) : 3  
Marine Pollutant : No  
Segregation Group: : Liquid Halogenated Hydrocarbons

## RID

UN/ID No. : UN1150  
Proper shipping name : 1,2-DICHLOROETHYLENE  
Class or Division : 3  
Packing group : II  
Label(s) : 3  
Marine Pollutant : No

### Further Information

The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.

## 15. REGULATORY INFORMATION

Workplace Safety and Health Act & Workplace Safety and Health (General Provisions) Regulations

Workplace Health and Safety Act , SS586 Labeling.

Flammable Materials Regulation Licensable Chemicals (Singapore Civil Defense Force).

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.



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EU	EINECS	Included on EINECS inventory or polymer substance, monomers included on EINECS inventory or no longer polymer.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.

## 16. OTHER INFORMATION

Ensure all national/local regulations are observed.

Prepared by : Versum Materials, Product Regulatory Department

For additional information, please visit Versum Materials' Product Stewardship web site.  
<http://www.versummaterials.com/productstewardship/>