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

1.1. Product identifier : Trans-LC

Chemical formula : C2H2 CI2

Synonyms : trans-1,2-dichloroethylene; trans-dichloroethylene acetylene, dichloride, Dioform

REACH Registration Number: 01-2120093504-55

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture : Semiconductor Processing

Restrictions on Use : No data available.

1.3. Details of the supplier of the safety data sheet : Versum Materials UK, Limited
5th Floor
6 St. Andrew Street
London
EC4A 3AE

Email Address – Technical Information : techinfo@versummaterials.com

Telephone :

1.4. Emergency telephone number :

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Flammable liquids - Category 2 H225:Highly flammable liquid and vapour.
Chronic aquatic toxicity - Category 3 H412:Harmful to aquatic life with long lasting effects.
Acute toxicity - Inhalation Category 4

2.2. 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.
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.

2.3. Other hazards

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).

SECTION 3: Composition/information on ingredients

3.1. Substances

Components	EINECS / ELINCS Number	CAS Number	Concentration (Weight)
trans-Dichloroethylene	205-860-2	156-60-5	100 %

Components	Classification (CLP)	REACH Reg. #
trans-Dichloroethylene	Flam. Liq. 2 ;H225 Acute Tox. Inha 4 ;H332 Aquatic Chronic 3 ;H412	01-2120093504-55

Refer to section 16 for full text of each relevant hazard statement (H).

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.

3.2. Mixtures : Not applicable.

SECTION 4: First aid measures

4.1. Description of 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.

4.2. Most important symptoms and effects, both acute and delayed

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.

4.3. Indication of any immediate medical attention and special treatment needed

No data available.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	Alcohol-resistant foam.Carbon dioxide (CO2). Dry chemical. Dry sand. Limestone powder.
Extinguishing media which must not be used for safety reasons.	:	No data available.
5.2. Special hazards arising from the substance or mixture	:	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.
5.3. Advice for firefighters	:	Use personal protective equipment. Wear self contained breathing apparatus for fire fighting if necessary.
Further information	:	Do not allow run-off from firefighting to enter drains or water courses., Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures	:	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.
6.2. 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.

6.3. Methods and material for containment and 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.
6.4. Reference to other sections	:	For more information refer to Sections 8 & 13

SECTION 7: Handling and storage

7.1. Precautions for safe 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.

7.2. Conditions for safe storage, including any incompatibilities

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.

7.3. Specific end use(s)

Refer to section 1 or the extended SDS if applicable.

Storage Temperature : 0 - 40 °C

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limit(s)

trans-Dichloroethylene	Time Weighted Average (TWA): EH40 WEL	200 ppm	806 mg/m3
trans-Dichloroethylene	Short Term Exposure Limit (STEL): EH40 WEL	250 ppm	1,010 mg/m3

If applicable, refer to the extended section of the SDS for further information on CSA.

8.2. Exposure controls

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	:	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. Viton gloves. Polyvinyl Alcohol Gloves (PVA). Standard EN 374 - Protective gloves against chemicals.
Eye/face 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.
Environmental Exposure Controls	:	If applicable, refer to the extended section of the SDS for further information on CSA.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

(a/b) Physical state/Colour	:	Liquid. Colorless.
(c) Odour	:	Sweet.
(e) Relative Density	:	1.257 (water = 1)
(f) Melting point / freezing point	:	-58 °F (-50 °C)
(g) Boiling point/range	:	118 °F (48 °C)
(h) Vapor pressure	:	265.41 mmHg at 68 °F (20 °C)
(i) Water solubility	:	0.0063 g/l
(j) Partition coefficient: n-octanol/water [log Kow]	:	Not known.
(k) pH	:	No data available.

(l) Viscosity	:	No data available.
(m) Particle characteristics	:	No data available.
(n) Upper and lower explosion / flammability limits	:	16.5 %(V) / 9 %(V)
(o) Flash point	:	43 °F (6 °C)
(p) Autoignition temperature	:	460 °C
(q) Decomposition temperature	:	Not applicable.

9.2. Other information

Explosive properties	:	No data available.
Oxidizing properties	:	No data available.
Molecular Weight	:	96.94 g/mol
Odor threshold	:	Odour threshold is subjective and inadequate to warn of overexposure.
Evaporation rate	:	No data available.
Flammability (solid, gas)	:	Not applicable.
Upper flammability limit	:	16.5 %(V)
Lower flammability limit	:	9 %(V)
Relative vapor density	:	3.67 (air = 1) Heavier than air.

SECTION 10: Stability and reactivity

10.1. Reactivity	:	No reactivity hazard other than the effects described in sub-sections below.
10.2. Chemical stability	:	Stable under normal conditions.
10.3. Possibility of hazardous reactions	:	No data available.
10.4. Conditions to avoid	:	Heat, flames and sparks. Exposure to air. Exposure to light. Exposure to moisture.
10.5. Incompatible materials	:	Oxidizing agents. Alkalies. Amines. Copper. Aluminium.

Aluminum alloys.
Reducing agents.
Strong oxidizing agents.
Rubber products.
Plastics.

10.6. Hazardous decomposition products : Hazardous combustion products:
Gaseous hydrogen chloride (HCl).
Carbon monoxide.
Phosgene.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

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)
Acute Inhalation Toxicity	:	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.
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.

SECTION 12: Ecological information

12.1. Toxicity

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

12.2. Persistence and degradability

No data available.

12.3. Bioaccumulative potential

Biodegradation, adsorption to sediment, and bioconcentration (BCF:22) in aquatic organisms should not be significant.

12.4. Mobility in soil

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).

12.5. Results of PBT and vPvB assessment

If applicable, refer to the extended section of the SDS for further information on CSA.

12.6. Other adverse effects

No data available.

Effect on the ozone layer

Ozone Depleting Potential	:	No data available.
Global Warming Potential	:	No data available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods	:	Contact supplier if guidance is required.

Contaminated packaging : Dispose of container and unused contents in accordance with federal, state, and local requirements.

SECTION 14: Transport information

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

Transport in bulk according to Annex II of Marpol and the IBC Code
For complete transportation information, contact customer service.
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.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Country	Regulatory list	Notification

USA	TSCA	Included on Inventory.
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.

Other Regulations
REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Regulation (EC) No 1272/2008 the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

Control of Substances Hazardous to Health Regulations 2002 (as amended)

Health and Safety at Work etc. Act 1974

Management of Health and Safety at Work Regulations (Northern Ireland) 2000 c.388, and as amended

The Health and Safety at Work etc. Act 1974 (Application to Environmentally Hazardous Substances) Regulations 2002 (England and Wales and Scotland) 11 March 2002 c.282, and as amended

Health and Safety at Work Order (Application to Environmentally Hazardous Substances) Regulations (Northern Ireland) 2003 (Northern Ireland) 14 March 2003 c52, and as amended

The Control of Major Accident Hazards Regulations 2015 c483

The Control of Major Accident Hazards Regulations (Northern Ireland) 2015 c325

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2011 c1885, and as amended

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations with amendments (Northern Ireland) 2011 c365

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 c.407

The Water Environment Regulations (Northern Ireland) 2017 c.81

Pollution Prevention and Control Act 1999 c.24

The Fluorinated Greenhouse Gases Regulations 2015 c.310

The Fluorinated Greenhouse Gases Regulations (Northern Ireland) 2015 c.425

The Acetylene Safety (England and Wales and Scotland) Regulations 2014 c.1639

The Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972 c.917

The Highly Flammable Liquids and Liquefied Petroleum Gases Regulations (Northern Ireland) 1975 c.256

Dangerous Substances and Explosive Atmospheres Regulations (Northern Ireland) 2003 c.152

The Dangerous Substances and Explosive Atmospheres Regulations 2002 c.2776

Pollution Prevention and Control Act 1999

The Environmental Permitting (England and Wales) Regulations 2016

Ozone Depleting Substances Regulations 2015

15.2. Chemical safety assessment

A CSA has not yet been carried out.

SECTION 16: Other information

Ensure all national/local regulations are observed.

Hazard Statements:
H225 Highly flammable liquid and vapour.
H332 Harmful if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Indication of Method:
Flammable liquids Category 2 Highly flammable liquid and vapour. Calculation method

Chronic aquatic toxicity Category 3 Harmful to aquatic life with long lasting effects. Calculation method

Acute toxicity Category 4 Calculation method

Abbreviations and acronyms:
ATE - Acute Toxicity Estimate
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
EINECS - European Inventory of Existing Commercial Chemical Substances

ELINCS - European List of Notified Chemical Substances
CAS# - Chemical Abstract Service number
PPE - Personal Protection Equipment
Kow - octanol-water partition coefficient
DNEL - Derived No Effect Level
LC50 - Lethal Concentration to 50 % of a test population
LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose)
NOEC - No Observed Effect Concentration
PNEC - Predicted No Effect Concentration
RMM - Risk Management Measure
OEL - Occupational Exposure Limit
PBT - Persistent, Bioaccumulative and Toxic
vPvB - Very Persistent and Very Bioaccumulative
STOT - Specific Target Organ Toxicity
CSA - Chemical Safety Assessment
EN - European Standard
UN - United Nations
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road
IATA - International Air Transport Association
IMDG - International Maritime Dangerous Goods
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail
WGK - Water Hazard Class

Key literature references and sources for data:
ECHA - Guidance on the compilation of safety data sheets
ECHA - Guidance on the application of the CLP Criteria
ARIEL database

Prepared by : Versum Materials, Product Regulatory Department

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

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws. COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

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