



Safety Data Sheet

Material Name: Diborane

Section 1 - IDENTIFICATION

GHS product identifier Diborane
Chemical name diborane(6)
Other means of identification Diborane
Product use Synthetic/Analytical chemistry.
Synonym Diborane

Supplier's details Electronic Fluorocarbons
3266 Bergey Road
Hatfield PA 19440

Emergency telephone # 1-800-535-5053

Outside the US (call collect) 1-352-323-3500

Section 2 - HAZARDS IDENTIFICATION

OSHA/HCS status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Compressed gas
PYROPHORIC GASES
ACUTE TOXICITY (inhalation) - Category 1

GHS label elements

Hazard pictograms



Signal word Danger

Hazard statements Extremely flammable gas.
May form explosive mixtures in Air.
Contains gas under pressure; may explode if heated.
Catches fire spontaneously if exposed to air.
Fatal if inhaled.

Precautionary statements

General

Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use.
Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use only with equipment purged with inert gas or evacuated prior to discharge from cylinder. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Approach suspected leak area with caution.

Prevention

Never Put cylinders into unventilated areas of passenger vehicles. Wear respiratory protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use only outdoors or in a well-ventilated area. Do not breathe gas. Use and store only outdoors or in a well ventilated place.

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Response	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or physician. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
Storage	Store locked up. Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place. Decomposition Hazard: Store under Dry Ice.
Disposal	Dispose of contents and container in accordance with all local, regional, national and international regulations.
Supplemental label elements	Keep container tightly closed. Keep away from heat, sparks, open flames and hot surfaces. - No smoking.
Hazards not otherwise classified	In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

Substance/mixture	Substance
Chemical name	diborane(6)
Other means of identification	Diborane

CAS number/other identifiers

CAS number	19287-45-7
Product code	001071

Ingredient name	%	CAS number
diborane(6)	100	19287-45-7

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4 - FIRST AID MEASURES

Description of necessary first aid measures

Eye contact	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.
Inhalation	Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

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Potential acute health effects

Eye contact	Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation	Fatal if inhaled.
Skin contact	Contact with rapidly expanding gas may cause burns or frostbite.
Frostbite	Try to warm up the frozen tissues and seek medical attention.
Ingestion	As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact	No specific data.
Inhalation	No specific data.
Skin contact	No specific data.
Ingestion	No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	:reat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	No specific treatment.
Protection of first-aiders	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5 - FIRE FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media	Use dry chemical powder.
Unsuitable extinguishing media	Do not use water jet.

Specific hazards arising from the chemical	Spontaneously flammable in air. Contains gas under pressure. Extremely flammable gas. May re-ignite itself after fire is extinguished. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.
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Hazardous thermal decomposition products	No specific data.
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Special protective actions for fire-fighters	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.
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Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
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Section 6 - ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

- Small spill** Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.
- Large spill** Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

* * *Section 7 - HANDLING AND STORAGE* * *

Precautions for safe handling

Protective measures Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. This product should be handled using appropriate techniques that avoid exposure to atmospheric oxygen and moisture. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Use non-sparking tools. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Keep under an inert atmosphere. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
diborane(6)	ACGIH TLV (United States, 3/2012). TWA: 0.11 mg/m ³ 8 hours. TWA: 0.1 ppm 8 hours. NIOSH REL (United States, 1/2013). TWA: 0.1 mg/m ³ 10 hours. TWA: 0.1 ppm 10 hours. OSHA PEL (United States, 6/2010). TWA: 0.1 mg/m ³ 8 hours. TWA: 0.1 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). TWA: 0.1 mg/m ³ 8 hours. TWA: 0.1 ppm 8 hours.

Appropriate engineering controls

Use only with adequate ventilation. Engineering controls may be required to control the primary or secondary risks associated with this product. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

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Other skin protection Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

* **Section - - D\ mg]WU'UbX'7\ Ya]WU'DfcdYf]h]Yg* **

Appearance

Physical state	Gas. [Compressed gas.]
Color	Colorless.
Molecular weight	27.67 g/mole
Molecular formula	B ₂ H ₆
Boiling/condensation point	-92°C (-133.6°F)
Melting/freezing point	-165°C (-265°F)
Critical temperature	16.7°C (62.1°F)
Odor	Characteristic.
Odor threshold	Not available.
pH	Not available.
Flash point	Closed cup: -90.15°C (-130.3°F)
Burning time	Not applicable.
Burning rate	Not applicable.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Lower and upper explosive (flammable) limits	Lower: 0.8% Upper: 88%
Vapor pressure	536 (psig)
Vapor density	0.96 (Air = 1)
Specific Volume (ft³/lb)	
Gas Density (lb/ft³)	Not available.
Relative density	Not applicable.
Solubility	Not available.
Solubility in water	Not available.
Partition coefficient: n-octanol/water	Not available.
Auto-ignition temperature	40 to 50°C (104 to 122°F)
Decomposition temperature	Not available.
SADT	Not available.
Viscosity	Not applicable.

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Section 10 - STABILITY AND REACTIVITY

Reactivity	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	The product is stable.
Possibility of hazardous reactions	Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with air Reactions may include the following: spontaneous flammability
Conditions to avoid	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow contact with air.
Incompatibility with various substances	Highly reactive or incompatible with the following materials: oxidizing materials and moisture.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
diborane(6)	LC50 Inhalation Gas.	Mouse	58 ppm	1 hours
	LC50 Inhalation Gas.	Rat	80 ppm	1 hours
	LC50 Inhalation Gas.	Rat	40 ppm	4 hours
	LC50 Inhalation Vapor	Rat	60 mg/m ³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

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Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure Not available.

Potential acute health effects

Eye contact	Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation	Fatal if inhaled.
Skin contact	Contact with rapidly expanding gas may cause burns or frostbite.
Ingestion	As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact	No specific data.
Inhalation	No specific data.
Skin contact	No specific data.
Ingestion	No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Long term exposure

Potential immediate effects	Not available.
Potential delayed effects	Not available.

Potential chronic health effects

Not available.

General	No known significant effects or critical hazards.
Carcinogenicity	No known significant effects or critical hazards.
Mutagenicity	No known significant effects or critical hazards.
Teratogenicity	No known significant effects or critical hazards.
Developmental effects	No known significant effects or critical hazards.
Fertility effects	No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

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Section 12 - ECOLOGICAL INFORMATION

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil






Soil/water partition coefficient (K_{oc}) Not available.

Other adverse effects No known significant effects or critical hazards.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal methods The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14 - Transport Information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1911	UN1911	UN1911	UN1911	UN1911
UN proper shipping name	DIBORANE	DIBORANE, COMPRESSED	DIBORANE	DIBORANE	DIBORANE
Transport hazard class(es)	2.3 (2.1) 	2.3 (2.1) 	2.3 (2.1) 	2.3 (2.1) 	2.3 (2.1) 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	Inhalation hazard zone A <u>Limited quantity</u> Yes. <u>Packaging instruction</u> <u>Passenger aircraft</u> Quantity limitation: Forbidden.	<u>Explosive Limit and Limited Quantity Index</u> 0 <u>ERAP Index</u> 25 <u>Passenger Carrying Ship Index</u> Forbidden	-	-	<u>Passenger and Cargo Aircraft</u> Quantity limitation: 0 Forbidden <u>Cargo Aircraft Only</u> Quantity limitation: 0 Forbidden

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	Cargo aircraft Quantity limitation: Forbidden.	Passenger Carrying Road or Rail Index Forbidden Special			
	Special provisions 1	provisions 38			

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Special precautions for user **Transport within user’s premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not available.

*****Section 15 - REGULATORY INFORMATION*****

U.S. Federal regulations **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined
United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) **Clean Air Act (CAA) 112 regulated toxic substances:**
diborane(6) : Not listed

Clean Air Act Section 602 Class I Substances Not listed

Clean Air Act Section 602 Class II Substances Not listed

DEA List I Chemicals (Precursor Chemicals) Not listed

DEA List II Chemicals (Essential Chemicals) Not listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
diborane(6)	100	Yes.	-	-	-	-

SARA 304 RQ Not applicable.

SARA 311/312

Classification Fire hazard
Sudden release of pressure
Immediate (acute) health hazard

Composition/information on ingredients

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Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
diborane(6)	100	Yes.	Yes.	No.	Yes.	No.

State regulations

Massachusetts	This material is listed.
New York New Jersey	This material is listed.
Pennsylvania	This material is listed.
Canada inventory	This material is listed or exempted.

International regulations

International lists	<p>Australia inventory (AICS): Not determined.</p> <p>China inventory (IECSC): This material is listed or exempted.</p> <p>Japan inventory: This material is listed or exempted.</p> <p>Korea inventory: This material is listed or exempted.</p> <p>Malaysia Inventory (EHS Register): Not determined.</p> <p>New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.</p> <p>Philippines inventory (PICCS): This material is listed or exempted.</p> <p>Taiwan inventory (CSNN): Not determined.</p>
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Chemical Weapons Convention List Schedule I Chemicals Not listed

Chemical Weapons Convention List Schedule II Chemicals Not listed

Chemical Weapons Convention List Schedule III Chemicals Not listed

Canada

WHMIS (Canada)

Class A: Compressed gas.
 Class B-1: Flammable gas.
 Class D-1A: Material causing immediate and serious toxic effects (Very toxic).

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is not listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16 - OTHER INFORMATION

Canada Label requirements	Class A: Compressed gas. Class B-1: Flammable gas. Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
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NFPA Ratings

Health: 4 Fire: 4 Reactivity: 3

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Other Information

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