

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Silane, Enriched in Silicon-28
Chemical Formula	H ₄ Si ²⁸
Molecular Weight	32 g/mol
CA Index Name	Silane- ²⁸ Si
Synonyms	Silane, Silicon tetrahydride, Monosilane, Silicane
Product Use	For general analytical/synthetic chemical uses
CAS No.	7803-62-5
Concentration (Volume)	100%
Supplier Address*	ISOFLEX USA PO Box 472615 San Francisco CA 94147 United States
Telephone	+1 415-440-4433
Fax	+1 415-563-4433
Emergency Phone Number (both supplier and manufacturer)	Infotrac/ +1 800-535-5053 *May include subsidiaries or affiliate companies/divisions
Email	iusa@isoflex.com
Website	www.isoflex.com
Preparation Information	ISOFLEX USA Product Safety +1 415-440-4433

2. HAZARDS IDENTIFICATION

Emergency Overview:

PYROPHORIC GAS! This product is a colorless, air-reactive gas, with a choking effect. This gas usually ignites upon contact with air, releasing a dense white cloud of amorphous silicon dioxide. Silane can react with water to form corrosive silicic acid. The primary health hazard associated with Silane is the potential for severe thermal burns from contact with flames resulting from the spontaneous ignition of this gas. Depending on the severity of the burns, such exposures can be fatal. Flame or high temperature impinging on a localized area of the cylinder of this product can cause the cylinder to burst without activating the cylinder's relief devices. If Silane is released at high pressure or high flow velocity, a delayed detonation may occur. Silane releases which have not spontaneously ignited must be considered extremely dangerous and should not be approached. Emergency responders must have personal protective equipment and fire protection appropriate for the situation to which they are responding.

NFPA Ratings: (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health Hazard = 1 Flammability = 4 Reactivity = 3



HMS Ratings: (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health Hazard = 1 Flammability = 4 Physical Hazard = 3

HEALTH HAZARD	1
FLAMMABILITY	4
PHYSICAL HAZARD	3

GHS-US Classification:

Flammable gases (Category 1), H220
Gases under pressure (Compressed gas), H280
Acute Tox. 4 (Inhalation:gas), H332
Simple Asphyxiant

GHS-US Labeling:



GHS02



GHS04



GHS07

Signal word (GHS-US): DANGER

Hazard statements (GHS-US):

H220 - EXTREMELY FLAMMABLE GAS
H250 - CATCHES FIRE SPONTANEOUSLY IF EXPOSED TO AIR
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
H332 - HARMFUL IF INHALED

Precautionary statements (GHS-US):

P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - **No smoking**
P222 - Do not allow contact with air
P261 - Avoid breathing gas
P271+P403 - Use and store only outdoors or in a well-ventilated place
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG06 - Close valve after each use and when empty
CGA-PG10 - Use only with equipment rated for cylinder pressure
CGA-PG17 - Use only with equipment purged with inert gas or evacuated prior to discharge from cylinder
CGA-PG12 - Do not open valve until connected to equipment prepared for use
CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

Potential Health Effects

Inhalation

In high concentrations, product may cause asphyxiation. Symptoms may include loss of mobility and/or consciousness. Victim may not be aware of asphyxiation. Asphyxiation may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves.

Skin and Eye Contact

Silane reacts with water to form silicic acid, which can be irritating to the skin and eyes. Decomposition of Silane will result in the production of amorphous silicon dioxide. Skin or eye contact with particulate of amorphous silicon dioxide may be irritating.

Ingestion

Ingestion is not considered a potential route of exposure.

Chronic Health Hazard

Not applicable

Exposure Guidelines

Primary Routes of Entry: Inhalation.

Target Organs: ACUTE: Respiratory system, skin, eyes. CHRONIC: None known.

Symptoms: Exposure to oxygen-deficient atmosphere may cause the following symptoms: dizziness, salivation, nausea, vomiting, loss of mobility/consciousness.

Aggravated Medical Condition: None known

Environmental Effects: Not harmful

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name: Silane
CAS No.: 7803-62-5
Chemical Formula: H₄Si
Molecular Weight: 32 g/mol

4. FIRST AID MEASURES

General Advice

Rescuers should not attempt to retrieve victims of exposure to this product without adequate personal protective equipment. At a minimum, self-contained breathing apparatus and fire-retardant equipment should be worn. Adequate fire protection must be provided during rescue situations.

Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stops.

Eye Exposure

Rinse immediately with plenty of water for at least 15 minutes.

Dermal Exposure

Wash with water and soap for at least 15 minutes as a precaution.

Oral Exposure

Ingestion is not considered a potential route of exposure.

Inhalation Exposure

In case of shortness of breath, give oxygen. Move to fresh air. 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. Seek medical advice.

Notes to Physician

Treatment: Be observant for initial signs of pulmonary edema.

5. FIREFIGHTING MEASURES

Flash Point Not applicable; pyrophoric gas

Autoignition Temperature Not applicable; pyrophoric gas

*Flammable Limits
(in air by volume, %)*

Lower (LEL) 1.4%

Upper (UEL) 96.0%

NFPA Rating Health: 1; Flammability: 4; Reactivity: 3

Suitable Extinguishing Media Extinguish Silane fires by shutting off the source of the gas. Use a fine water spray or fog to reduce combustion products formed in air. Cool fire-exposed cylinders with water spray, from the maximum distance possible.

Unsuitable Extinguishing Media Halocarbon type - Do not use halon fire extinguisher..

Specific Hazards Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Keep containers and surroundings cool with water spray. Extinguish fire only if gas flow can be stopped. If possible, shut off the source of gas and allow the fire to burn itself out. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Move away from container and cool with water from a protected position. Keep adjacent cylinders cool by spraying with large amounts of water until fire burns itself out. If flames are accidentally extinguished, explosive re-ignition may occur; therefore, appropriate measures should be taken (e.g. total evacuation to protect persons from cylinder fragments and toxic fumes should a rupture occur). Most cylinders are designed to vent contents when exposed to elevated temperatures.

Unusual Fire and This product is a colorless, air-reactive gas. This gas usually ignites upon

Explosion Hazards contact with air, releasing a dense white cloud of amorphous silicon dioxide. The products of thermal decomposition of this material include amorphous silicon dioxide and hydrogen. Silane can react with water to form corrosive silicic acid. The decomposition products of Silane can be irritating to exposed tissue. If Silane is released at high pressure or high flow velocity, a delayed detonation may occur. Silane releases which have not spontaneously ignited must be considered extremely dangerous and should not be approached.

Special Firefighting Procedures Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. The best firefighting technique may be simply to let the burning gas escape from the leak. Stop the leak before extinguishing fire. If the fire is extinguished before the leak is sealed, the still leaking gas could explosively re-ignite without warning and cause extensive damage,

injury, or fatality. In this case, increase ventilation to prevent flammable or explosive mixture formation.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions

Evacuate personnel to safe areas. Remove all sources of ignition. Never enter a confined space or other area where the flammable gas concentration is greater than 10% of its lower flammable limit. Ventilate the area.

Environmental Precautions

Do not discharge into any place where its accumulation could be dangerous. Should not be released into the environment. Prevent further leakage or spillage if safe to do so.

Methods for Cleaning Up

Ventilate the area. Approach suspected leak areas with caution.

Additional Advice

Increase ventilation to the release area and monitor concentrations. If leak is from cylinder or cylinder valve, call the ISOFLEX USA emergency telephone number. If the leak is in the user's system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs.

7. HANDLING AND STORAGE

Handling

Evacuate and thoroughly pressure-check all systems for leaks at pressures two to three times the anticipated working pressure, preferably with helium. Any portion of a system that is dead-ended or does not allow free flow purging should be treated with vacuum-purge cycles. Before opening system or disconnecting container, thoroughly purge with an inert gas. Packless diaphragm or bellows-type valves should be used. Handling systems should be purged free of halogens that might exist from degreasing agents or chlorinated hydrocarbons. The use of packed valves on handling systems containing product should not be permitted. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50 °C (122 °F). Only experienced and properly instructed persons should handle compressed gases. Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back-feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve, discontinue use and contact supplier. Close container valve after each use and when empty,

even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shocks, which may cause damage to their valve or safety devices. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. Purge air from system before introducing gas. When returning cylinder, install valve outlet cap or plug leak tight. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50 °C (122 °F). Prolonged periods of cold temperature below – 30 °C (-20 °F) should be avoided. All piped systems and associated equipment must be grounded.

Storage

Containers should be stored in a purpose-build compound which should be well-ventilated, preferably in the open air. Observe all regulations and local requirements regarding storage of containers. Stored containers should be checked periodically for general condition and leakage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. Container valves should be tightly closed and, where appropriate, valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in a location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50 °C (122 °F). Smoking should be prohibited within storage areas or while handling product or containers. Display “No Smoking or Open Flames” signs in the storage areas. The amounts of flammable or toxic gases in storage should be kept to a minimum. Return empty containers in a timely manner. Flammable storage areas should be separated from oxygen and other oxidizers by a minimum distance of 20 ft (6.1 m) or by a barrier of non-combustible material at least 5 ft (1.5 m) high, having a fire resistance rating of at least 1/2 hour.

Technical

Containers should be segregated in the storage area according to the

Measures/Precautions

various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations. Containers containing flammable gases should be stored away from other combustible materials. All electrical equipment in the storage areas should be compatible with stored flammable materials. Where necessary, containers containing oxygen and oxidants should be separated from flammable gases by a fire-resistant partition.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures

The product dispensing area should be monitored with the use of

hydride monitors to detect leaks and releases and a UV/IR monitor to detect fires. Provide natural or explosion-proof ventilation that is adequate to ensure flammable gas does not reach its lower explosive limit.

EXPOSURE LIMITS IN AIR					
ACGIH-TLV		OSHA-PEL		NIOSH IDLH ppm	OTHER ppm
TWA ppm	STEL ppm	TWA ppm	STEL ppm		
5 (Vacated 1989 PEL)	Not Established	5 (Vacated 1989 PEL)	Not Established	Not Established	NIOSH REL: TWA - 5 ppm

None of the trace impurities of this gas contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per of the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards and Canadian Workplace Hazardous Materials Identification System Standards (CPR 4).

ALL WHMIS-required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas has been classified in accordance with the hazard criteria of the CPR and the SDS contains all the information required by the CPR.

Exposure Limits
Recommended exposure limit (REL): Time Weighted Average (TWA): ACGIH: 5 ppm
NIOSH: 5 ppm, 7 mg/m³

Personal Protective Equipment

Respiratory Protection High concentrations that can cause rapid suffocation are within the flammable range and should not be entered.

Hand Protection Sturdy work gloves are recommended for handling cylinders. The breakthrough time of the selected glove(s) must be greater than the intended use period.

Eye Protection Safety glasses recommended when handling cylinders.

Skin and Body Protection Use fire-resistant gloves and clothing in emergency situations. Safety shoes are recommended when handling cylinders. Wear as appropriate: Flame-retardant protective clothing.

Ventilation Ensure adequate ventilation, especially in confined areas.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

<i>Form</i>	Compressed gas
<i>Color</i>	Colorless gas
<i>Odor</i>	No information available

Safety Data

Molecular Weight:	32 g/mol
Relative Vapor Density:	1.1 (air = 1)
Relative Density:	0.55 (water = 1)
Specific Volume:	11.98 ft ³ /lb (0.7479 m ³ /kg) at 70 °F (21 °C)
Boiling Point/Range:	-168 °F (-111 °C)
Critical Temperature:	26 °F (- 3.5 °C)
Melting Point/Range:	-303 °F (-186 °C)
Autoignition Temperature:	< 185 °F (< 85 °C)
Upper Flammability Limit:	96.0 % (V)
Lower Flammability Limit:	1.4 % (V)
Water Solubility:	No data available

10. STABILITY AND REACTIVITY

<i>Stability</i>	Stable under normal conditions; ignites spontaneously on exposure to air
<i>Conditions to Avoid</i>	Heat, flames and sparks. Contact with air. Avoid exposing cylinders to extremely high temperatures, which could cause the cylinders to rupture. Avoiding exposing this product to incompatible chemicals.
<i>Materials to Avoid</i>	Silane will react violently with heavy-metal halides and free halogens (i.e. bromine, chlorine, carbonyl chloride, antimony pentachloride, tin[IV] chloride). Silane ignites in oxygen and can react with other oxidizers. Silane is also incompatible with bases.
<i>Hazardous Polymerization</i>	Will not occur
<i>Hazardous Decomposition Products</i>	Silica dust (inert - but may irritate respiratory tract and eyes); amorphous silicon dioxide and hydrogen

11. TOXICOLOGICAL INFORMATION

Acute Health Hazard

<i>Ingestion</i>	No data is available on the product itself.
<i>Inhalation LC50 Rat (1 h)</i>	20000 ppm
<i>Skin</i>	No data is available on the product itself.

Chronic Health Hazard

Studies in mice showed that exposure to 10,000 ppm of Silane for 1 hour or exposure to 2500 ppm of Silane for 4 hours resulted in adverse kidney effects. Mice exposed to 1000 ppm, 6 hours/day, 5 days/week for 2 to 4 weeks only exhibited mild respiratory tract irritation. This material was mutagenic in a bacterial assay.

Carcinogenicity

Silane is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA or IARC, and therefore is not considered to be, nor suspected to be, a cancer-causing agent by these agencies.

Irritancy or Product

Decomposition products of Silane are irritating to the eyes, skin, and tissues of the respiratory system.

Sensitization

Silane is not known to be a human skin or respiratory sensitizer.

12. ECOLOGICAL INFORMATION

Environmental Stability

Silane ignites spontaneously upon contact with air, generating amorphous silicon dioxide and hydrogen. Silane, upon contact with water or moisture, will generate silicic acid. All work practices must be directed at eliminating environmental contamination.

Effects on Plants

The primary health hazard associated with Silane is the potential for

and Animals

severe thermal burns to plants and animals from contact with flames which result from the spontaneous ignition of this gas. Depending on the severity of the burns, such exposures can be fatal.

Effects on Aquatic Life

Silane, upon contact with water or moisture, will generate silicic acid. Silicic acid can lower the pH of water; subsequently, releases of Silane can have an adverse effect on aquatic life in contaminated bodies of water.

13. DISPOSAL CONSIDERATIONS

Product

Contact supplier if guidance is required. Return unused product in original cylinder to supplier. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrester.

Contaminated Packaging

Return cylinder to supplier.

14. TRANSPORT INFORMATION

This gas is hazardous as defined by 49 CFR 172.101 by The U.S. Department of Transportation. Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure that the vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

CFR / IATA / IMDG / CTC:

Proper Shipping Name

Silane

Hazard Class

2.1 (Flammable Gas)

(Number and Description)

UN No.

UN 2203

Packing Group

Not applicable

DOT Label(s) Required

Flammable Gas

North American Emergency

116

Response Guidebook

Number (2000)

Marine Pollutant

Silane is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

15. REGULATORY INFORMATION

U.S. Federal

SARA Reporting:

Silane is not subject to the reporting requirements of Sections 302, 304 or 313 of Title III of the Superfund Amendments and Reauthorization Act.

SARA TPQ:

There are no specific Threshold Planning Quantities for this material. The default Federal SDS submission and inventory requirement filing threshold of 10,000 lb (4544 kg) may apply, per 40 CFR 370.20.

CERCLA RQ:

Not applicable.

TSCA Inventory Status:

Silane is listed on the TSCA Inventory.

Other U.S. Federal Regulations: Depending on specific operations involving the use of Silane, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Silane is not listed in Appendix A of this regulation; however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lbs (4544 kg) or greater is covered under this regulation unless it is used as a fuel. Silane is listed under Table 3 as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Release Prevention, as a flammable substance. The threshold quantity for Silane under this regulation is 10,000 lbs. Silane is listed under Section 112(r) of the Clean Air Act. The threshold quantity for Silane under this regulation is 10,000 lb (4544 kg).

U.S. State

Silane is covered under specific state regulations, as denoted below:

Alaska:	Designated Toxic and Hazardous Substances: Silane
California:	Permissible Exposure Limits for Chemical Contaminants: Silane
Florida:	Substance List: Silane
Illinois:	Toxic Substance List: Silane
Kansas:	Section 302/313 List: None
Massachusetts:	Substance List: Silane
Michigan:	Critical Materials Register: None
Minnesota:	List of Hazardous Substances: Silane
Missouri:	Employer Information/Toxic Substance List: Silane
New Jersey:	Right to Know Hazardous Substance List: Silane
North Dakota:	List of Hazardous Chemicals, Reportable Quantities: None
Pennsylvania:	Hazardous Substance List: Silane
Rhode Island:	Hazardous Substance List: Silane
Texas:	Hazardous Substance List: Silane
West Virginia:	Hazardous Substance List: None
Wisconsin:	Toxic and Hazardous Substances: None

California Prop. 65 Components Silane is not on the California Proposition 65 lists.

CGA Labeling (For Compressed Gas):

DANGER: PYROPHORIC, FLAMMABLE, HIGH PRESSURE GAS.

CAN IGNITE ON CONTACT WITH AIR.

MAY FORM EXPLOSIVE MIXTURE WITH AIR.

Keep away from heat, flames, and sparks.

Use only with equipment purged with inert gas or evacuated prior to discharge from cylinder.

Use equipment rated for cylinder pressure.

Store and use with adequate ventilation.

Close valve after each use and when empty.

WHEN RETURNING CYLINDER, INSTALL VALVE OUTLET CAP OR PLUG, LEAK TIGHT.

Use in accordance with the Safety Data Sheet.

DO NOT REMOVE THIS PRODUCT LABEL.

Prepared By ISOFLEX USA
PO Box 472615
San Francisco CA 94147
United States

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Revision Number 4

Revision Note Update supplier address

ISOFLEX USA's Commonly Used Abbreviations and Acronyms*

ACGIH	American Conference of Governmental Industrial Hygienists
ADR	European Agreement Concerning the International Carriage of Dangerous Goods by Road
AICS	Australian Inventory of Chemical Substances
ALARA	As Low As Is Reasonably Achievable
AMU	Atomic Mass Unit
ANSI	American National Standards Institute
BLS	Basic Life Support
BOD5	Biochemical Oxygen Demand
CAM	Continuous Air Monitor
CAS	Chemical Abstracts Service (division of the American Chemical Society)
CEN	European Committee for Standardization
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLP	Classification, Labelling and Packaging (European Union)
COD	Chemical Oxygen Demand
CPR	Controlled Products Regulations (Canada)
CWA	Clean Water Act (USA)
DAC	Derived Air Concentration (USA)
DOE	United States Department of Energy (USA)
DOT	United States Department of Transportation (USA)
DSL	Domestic Substances List (Canada)
EC50	Half Maximal Effective Concentration
ECL	Korean Existing Chemicals List
EINECS	European Inventory of Existing Commercial Chemical Substances
EHS	Environmentally Hazardous Substance
ELINCS	European List of Notified Chemical Substances
EMS	Emergency Response Procedures for Ships Carrying Dangerous Goods
EPA	Environmental Protection Agency (USA)
EPCRA	Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986
GHS	Globally Harmonized System
HMIS	Hazardous Materials Identification System (USA)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IBC	Intermediate Bulk Containers
ICAO	International Civil Aviation Organization
IDLH	Immediately Dangerous to Life or Health
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
IMDG	International Maritime Code for Dangerous Goods
LC50	Lethal concentration, 50 percent
LD50	Lethal dose, 50 percent
LDLO	Lethal Dose Low
LOEC	Lowest-Observed-Effective Concentration
MARPOL	International Convention for the Prevention of Pollution from Ships

MSHA	Mine Safety and Health Administration (USA)
NCRP	National Council on Radiation Protection & Measurements (USA)
NDSL	Non-Domestic Substances List (Canada)
NFPA	National Fire Protection Association (USA)
NIOSH	National Institute for Occupational Safety and Health (USA)
NOEC	No Observed Effect Concentration
N.O.S.	Not Otherwise Specified
NRC	Nuclear Regulatory Commission (USA)
NTP	National Toxicology Program (USA)
OSHA	Occupational Safety and Health Administration (USA)
PBT	Persistent Bioaccumulative and Toxic Chemical
PEL	Permissible Exposure Limit
PICCS	Philippines Inventory of Chemicals and Chemical Substances
PIH	Poisonous by Inhalation Hazard
RCRA	Resource Conservation and Recovery Act (USA)
RCT	Radiation Control Technician
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Europe)
RID	Regulations Concerning the International Transport of Dangerous Goods by Rail
RQ	Reportable Quantity
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act (USA)
SNUR	Significant New Use Rule (TSCA)
TDG	Transportation of Dangerous Goods (Canada)
TIH	Toxic by Inhalation Hazard
TLV	Threshold Limit Value
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
UN	United Nations (Number)
VOC	Volatile Organic Compound
vPvB	Very Persistent Very Bioaccumulative Chemical
WGK	Wassergefährdungsklassen (Germany: Water Hazard Classes)
WHMIS	Workplace Hazardous Materials Information System

*One or more of the above-listed items may not appear in this document.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between ISOFLEX USA (or any of its affiliates and subsidiaries) and the purchaser.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

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