



Linde Gas LLC (216) 642-6600
 P.O. Box 94737
 Cleveland, Ohio 44101
 www.us.lindegas.com

MATERIAL SAFETY DATA SHEET

No. 176

PRODUCT NAME FLAMEX: Pentane/Propane Mixture	CAS # C ₅ H ₁₂ — 1092-6-0 C ₃ H ₈ = 74-98-6
TRADE NAME AND SYNONYMS Liquefied Petroleum Gas (D.O.T.)	DOT I.D. No.: UN 1075
CHEMICAL NAME AND SYNONYMS Pentane/Propane Mixture	DOT Hazard Class: Division 2.1
ISSUE DATES AND REVISIONS May 1998	Formula C ⁿ H ²ⁿ⁺² Mixture
	Chemical Family: Saturated Hydrocarbon Mixture

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Pentane TWA = 600 Molar PPM: Propane is a simple asphyxiant (ACGIH 1997). OSHA 1995 Lista a PEL (8 hr. TWA) of 1,000 Molar PPM for both Pentane and Propane.
SYMPTOMS OF EXPOSURE <u>Inhalation:</u> Moderate concentrations so as to exclude an adequate supply of oxygen to the lungs causes dizziness, drowsiness and eventual unconsciousness. It is also a narcotic which acts as a depressant on the central nervous system. Contact with rapidly evaporating liquid could cause frostbite or cryogenic "burns".
TOXICOLOGICAL PROPERTIES Breathing high concentrations causes a narcotic effect; however, the major property is the exclusion of an adequate supply of oxygen to the lungs. Frostbite effects are a change in color of the skin to gray or white possibly followed by blistering. FIAMEX is not listed in the IARC, NTP or by OSHA as a carcinogen or potential carcinogen. (Continued on Page 4)
RECOMMENDED FIRST AID TREATMENT PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO FLAMEX. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD. <u>Inhalation:</u> Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given assisted respiration and supplemental oxygen. Further treatment should be symptomatic and supportive. (Continued on Page 4)

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition of matter or use.
 Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

FLAMEX is flammable in air.

PHYSICAL DATA

BOILING POINT Approx. -40°F (-40°C)	LIQUID DENSITY AT BOILING POINT @70°F(21.1°C)=33.1 lb/ft ³ (530kgm/m ³)
VAPOR PRESSURE @70°F(21.1°C)=116.6psia (768.9kPa)	GAS DENSITY AT 70°F, 1 atm @60°F, 1Atm=. 119 lb/ft ³ (1.906 kg/m ³)
SOLUBILITY IN WATER Negligible	FREEZING POINT <-200°F (-129°C)
EVAPORATION RATE N/A, Gas	SPECIFIC GRAVITY (AIR=1) @60°F (15.5°C) = 1.6
APPEARANCE AND ODOR Colorless liquid and gas under pressure with a paraffinic odor.	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) -150°F (-101°C) C.C.	AUTO IGNITION TEMPERATURE 890°F (477°C)	FLAMMABLE LIMITS % BY VOLUME (See Page 4) LE = 2.1 UEL =9.5
EXTINGUISHING MEDIA Water; carbon dioxide, dry chemical	ELECTRICAL CLASSIFICATION Class 1 Group D	
SPECIAL FIRE FIGHTING PROCEDURES If possible, stop the flow of FLAMEX. Use water spray to cool surrounding containers.		
UNUSUAL FIRE AND EXPLOSION HAZARDS See Page 4		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID NONE
Stable	X	
INCOMPATIBILITY (Materials to avoid) Oxidizers		
HAZARDOUS DECOMPOSITION PRODUCTS NONE		
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID NONE
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact your closest supplier location or call the emergency telephone number listed herein.
WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities. Return in the shipping container <u>properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place</u> to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed herein.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)		Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.	
VENTILATION Hood with forced ventilation	LOCAL EXHAUST To prevent accumulation above the LEL	SPECIAL	N/A
	MECHANICAL (Gen.) In accordance with electrical codes	OTHER	N/A
PROTECTIVE GLOVES As required when welding. See Other Protective Equipment			
EYE PROTECTION Safety goggles or glasses. When welding, wear helmet or use face (Continued on Page 5)			
OTHER PROTECTIVE EQUIPMENT Safety shoes and appropriate head and eye protection when welding. (Continued on Page 5)			

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION DOT Shipping Name: Liquefied Petroleum Gas DOT Shipping Label: Flammable Gas	DOT Hazard Class: Division 2.1 I.D. No. UN1075
SPECIAL HANDLING RECOMMENDATIONS Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide, or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder For additional handling recommendations, consult Compressed Gas Association's Pamphlets P-1, P-14, and Safety Bulletin SB-2.	
SPECIAL STORAGE RECOMMENDATIONS Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of noncombustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125F (52C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in - first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No smoking or Open Flames" signs in the storage area. There should be no sources of ignition in the storage area. For additional storage recommendations, consult Compressed Gas Association's Pamphlets P-1, P-14, and Safety Bulletin SB-2.	
SPECIAL PACKAGING RECOMMENDATIONS FLAMEX is noncorrosive and may be used with any common structural material.	
OTHER RECOMMENDATIONS OR PRECAUTIONS Earth-ground and bond all lines and equipment associated with the Flamex system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR). (Continued on Page 4)	

*Various Government Agencies (i.e. Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

HEALTH HAZARD DATA

TOXICOLOGICAL PROPERTIES: (Continued)

Persons in ill health where such illness would be aggravated by exposure to Flamex should not be allowed to work with or handle this product.

RECOMMENDED FIRST AID TREATMENT: (Continued)

Dermal Contact or Frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

FIRE AND EXPLOSION HAZARDS:UNUSUAL FIRE AND EXPLOSION HAZARDS: (Continued)

FLAMEX is heavier than air and may travel a considerable distance to a source of ignition. Should flame be extinguished and flow of gas continue, increase ventilation to prevent flammable mixture formation in low areas or pockets.

SPECIAL PRECAUTIONS

OTHER RECOMMENDATIONS OR PRECAUTIONS: (Continued)

Always secure cylinders in an upright position before transporting them. NEVER transport cylinders in trunks of vehicles, enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles.

NFPA 704 Number for FLAMEX is 1 4 0 NONE

Reporting under SARA, Title III, Section 313 not required.

SPECIAL PROTECTION INFORMATION - (Continued)

EYE PROTECTION: (Continued)

shield with filter lens. As a general rule, start with a shade which is too dark to see the weld zone. Then go to the next lighter shade which gives sufficient view of the weld zone. Provide protection screens and flash goggles, if necessary to shield others from arc rays radiation which can injure eyes and burn skin.

OTHER PROTECTION EQUIPMENT: (Continued)

When welding, wear head, hand and body protection which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. At a minimum, this includes welder's gloves and a protective face shield and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Train the welder not to touch live electrical parts and to insulate himself from work and ground.

CAUTION: Welding or brazing may produce fumes and gases hazardous to health. Short-term (acute overexposure to welding fumes may result in discomfort such as: dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Long-term (chronic) overexposure may lead to siderosis (iron deposits in the lungs) and is believed by some investigators to affect pulmonary function. Arc rays can injure eyes and burn skin. Electric shock can kill. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z-49.1 "Safety in Welding and Cutting" published by the American Welding Society.

Consult hazard warnings on boxes or containers (or on tags or labels thereon) containing brazing or welding filler metals, fluxes and fusible granular materials. See OSHA safety regulations under 29CFR 1910.252 "Welding, Cutting and Brazing." Also see ACGIH "TLVs (1997) for Chemical Substances in the Work Environment," Appendix B, Section B2 "Welding Fumes" (Total Particulate TLV-TWA, 5 mg/m³) for further information.

Consult manufacturer's material safety data sheet on welding consumables and related products for reactivity and health hazard data, and for further information regarding welding fumes.