

NITROGEN (LIQUID / REFRIGERATED)

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier	: NITROGEN (Liquid/Refrigerated)
CAS No.	: 7727-37-9
Chemical formula	: N2
Synonyms	: Nitrogen (refrigerated), Liquid Nitrogen, Cryogenic Liquid Nitrogen, LIN, Nitrogen
REACH Registration Number	: Listed in Annex IV/V REACH, exempted from registration.

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

Use of the substance/mixture	: General Industrial and Professional use. Perform risk assessment prior to use.
Restriction on use	: Not for consumer use

Details of the supplier of the safety data sheet

Physical address	: Air Products South Africa (Pty) Ltd. Silver Stream Business Park, 1 st Floor, Building 3 10 Muswell Road South Bryanston, 2191
Telephone	: +27 (0)11 570 5000 (Head Office) +27 (0)11 977 6444 (Customer Care Cylinders) 0800 023 298 (Engineering / Bulk Services)
Emergency telephone number (24h)	: 0800 650 315

SECTION 2: HAZARDS IDENTIFICATION

Classification of the substance or mixture

Gases under pressure – Refrigerated liquefied gas H281: Contains refrigerated gas; may cause cryogenic burns or injury.

Label elements

Hazard pictograms/symbol



Signal Word : Warning

Hazard Statements:

H281: Contains refrigerated gas; may cause cryogenic burns or injury.

Precautionary Statements:

Prevention	: P282: Wear cold insulating gloves/face shield/eye protection
Response	: P315: Get immediate medical advice/attention.
	P336: Thaw frostbitten parts with lukewarm water. Do not rub affected area.

Storage : P403: Store in a well-ventilated place

Other hazards

Extremely cold liquid and gas under pressure.

Direct contact with liquid can cause frostbite.

Can cause rapid suffocation.

Avoid breathing gas.

Self-contained breathing apparatus (SCBA) may be required.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Substances

Components	EINECS/ELINCS Number	CAS Number	Concentration (Volume)
Nitrogen	231-783-9	7727-37-9	100%

Components	CLASSIFICATION (CLP)	REACH Req #
Nitrogen	Press Gas (Ref. liq.) ; H281	*1

*1: Listed in Annex IV/V REACH, exempted from registration.

*2: Registration not required. Substance manufactured or imported < t/y

*3: Registration not required: substance manufactured or imported < 1 t/y for non-intermediate uses.

Concentration is nominal. For the exact product composition, please refer to Air Products product specifications.

Mixtures : Not applicable

SAFETY DATA SHEET – Nitrogen (Liquid/Refrigerated)

SDS Number: 089B

SECTION 4: FIRST AID MEASURES

Description of first aid measures

General advice	: Move victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
Eye contact	: In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Keep eye wide open while rinsing.
Skin contact	: In case of frostbite, obtain medical treatment immediately. As soon as practical, place the affected area in a warm water bath which has a temperature not to exceed 40 °C. Do not rub frozen parts as tissue damage may result. Cover wound with sterile dressing.
Ingestion	: Ingestion is not considered a potential route of exposure.
Inhalation	: Move to fresh air. If breathing has stopped or is laboured, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. In case of shortness of breath, give oxygen.

Most important symptoms and effects, both acute and delayed

Symptoms	: Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness. Salivation. Nausea. Vomiting. Loss of Mobility/consciousness.
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Indication of any immediate medical attention and special treatment needed

Treatment	: If exposed or concern: get medical attention/advice.
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SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media	: The product itself does not burn. Use extinguishing media appropriate for surrounding fire.
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Extinguishing media which must not be used for safety reasons	: Do not use water jet to extinguish.
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Specific hazards arising from the substance or mixture

Spill will rapidly vaporize forming an oxygen deficient vapour cloud. Vapour cloud may obscure visibility. Do not direct water spray at container vent. Move away from container and cool with water from a protected position. Keep containers and surroundings cool with water spray.

Advice for fire-fighters	: Wear self-contained breathing apparatus for firefighting if necessary. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 137 – Self-contained open-circuit compressed air breathing apparatus with full face mask. Standard EN 469 – Protective clothing for fire-fighters. Standard EN 659 – Protective gloves for fire-fighters
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SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Evacuate personnel to safe areas. Ventilate the area. Monitor oxygen level. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

Environmental precautions	: Prevent further leakage or spillage. Prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous. Do not discharge into any place where its accumulation could be dangerous.
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Methods and material for containment and cleaning up

Additional advice	: If possible, stop flow of product. Increase ventilation to the release area and monitor oxygen level. Vapour cloud may obscure visibility. Do not spray water directly at leak. If leak is from cylinder or cylinder valve, call the Air Products emergency telephone number. If the leak is in the user's system, close the cylinder valve and safely vent the pressure before attempting repairs.
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Reference to other sections

: For more information refer to sections 8 and 13.

SAFETY DATA SHEET – Nitrogen (Liquid/Refrigerated)

SDS Number: 089B

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling

Cylinders should be stored upright with valve protection guard in place and firmly secured to prevent falling or being knocked over. Use equipment rated for cylinder pressure. Know and understand the properties and hazards of the product before use. Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. Before using the product, determine its identity by reading the label. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. 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. 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. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Do not remove or interchange connections. Ensure the complete gas system has been checked for leaks before use. Prevent entrapment of cryogenic liquid in closed systems not protected with relief device. A small quantity of liquid produces large volumes of vaporized gas at atmospheric pressure. Containers used in shipment, storage, and transfer of cryogenic liquid are specially designed, well-insulated containers equipped with a pressure relief device and valves to control pressure. Under normal conditions, these containers will periodically vent product to limit pressure build-up. Ensure that the container is in a well-ventilated area to avoid creating an oxygen-deficient atmosphere. Use adequate pressure relief in systems and piping to prevent pressure build-up; liquid in a closed container can generate extremely high pressures when vaporized by warming.

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. Only transfer lines designed for cryogenic liquids shall be used. Do not subject containers to abnormal mechanical shocks which may cause damage to their valve or safety devices.

When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier.

Conditions for safe storage, including any incompatibilities.

Do not allow storage temperature to exceed 50°C. Containers should be stored in a purpose-built compound which should be well ventilated, preferably in the open air. Full containers should be stored so that oldest stock is used first. Do not store in a confined space. Full and empty cylinders should be segregated. Store containers in location free from fire risk and away from sources of heat and ignition. Return empty containers in a timely manner. Stored containers should be periodically checked 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. Cryogenic containers are equipped with pressure relief devices to control internal pressure. Under normal conditions these containers will periodically vent product.

All vents should be piped to the exterior of the building. Observe all regulations and local requirements regarding storage of containers.

For further information on storage, handling and use, consult Air Products' Safetygram 7: Liquid Nitrogen, available on our web site at <http://www.airproducts.com/safetygrams>.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Control parameters

DNEL: Derived no effect level (Workers) : None available.
PNEC: predicted no effect concentration : None available.

Exposure controls

Engineering measures

Provide natural or mechanical ventilation to prevent oxygen deficient atmospheres below 19.5% oxygen.

Keep self-contained breathing apparatus readily available for emergency use.

Personal protective equipment

Respiratory protection	: Use self-contained breathing apparatus. Air purifying respirators will not provide protection. Users of breathing apparatus must be trained.
Hand protection	: Wear work gloves when handling gas cylinders. Standard EN 388- Protective gloves against mechanical risk. If the operation involves possible exposure to a cryogenic liquid, wear loose fitting thermal insulated or cryo-gloves. Standard EN 511 – Cold insulating gloves
	The breakthrough time of the selected glove(s) must be greater than the intended use period.
Eye/face protection	: Safety glasses recommended when handling cylinders. Protect eyes, face and skin from liquid splashes. Wear goggles and a face shield when transfilling or breaking transfer connections. Standard EN 166- Personal eye protection
Skin and body protection	: Never allow any unprotected part of the body to touch uninsulated pipes or vessels which contain cryogenic fluids. The extremely cold metal will cause the flesh to stick fast and tear when one attempts to withdraw from it. Safety shoes are recommended when handling cylinders. Standard EN ISO 20345 – Personal protective equipment- safety footwear.
Special instructions for protection and hygiene	: Ensure adequate ventilation, especially in confined areas.
Remarks	: Simple asphyxiant.

SAFETY DATA SHEET – Nitrogen (Liquid/Refrigerated)

SDS Number: 089B

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Form	: Liquefied gas.
Colour	: Colourless
Odour	: No odour warning properties.
Molecular Weight	: 28 g/mol
Relative vapour density	: 0.97 (air = 1) Lighter or similar to air
Relative density	: 0.8 (water = 1)
Vapour pressure	: Not applicable.
Boiling point/range	: -196 °C
Critical temperature	: -147 °C
Melting point/range	: -210 °C
Water solubility	: 0.02 g/l
Partition coefficient n-octanol/water [log kow]	: Not applicable
pH	: Not applicable
Viscosity	: No reliable data available
Particle characteristics	: Not applicable
Upper and lower explosion/flammability limits	: Non flammable
Flash point	: Not applicable
Auto ignition temperature	: Non flammable
Decomposition temperature	: Not applicable
Other information	
Explosive properties	: Not applicable
Oxidizing properties	: No oxidising properties.
Odour threshold	: Odour threshold is subjective and inadequate to warn of over exposure.
Evaporation rate	: Not applicable
Flammability (solid, gas)	: Non-flammable
Upper flammability limit	: Not applicable
Lower flammability limit	: Not applicable

SECTION 10: STABILITY AND REACTIVITY

Reactivity	: No reactivity hazard other than the effects described below
Chemical Stability	: Stable under normal conditions.
Possibility of hazardous reactions	: No data available.
Conditions to avoid	: No data available.
Incompatible Materials	: Materials such as carbon steel, low alloy carbon steel and plastic become brittle at low temperatures and are subject to failure. Use appropriate materials compatible with the cryogenic conditions present in refrigerated liquefied gas systems.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on toxicological effects

Likely routes of exposure

Effects on Eye	: Contact with liquid may cause cold burn/frostbite.
Effects on Skin/Dermal	: Contact with liquid may cause cold burns/frostbite. May cause severe frostbite.
Inhalation effects	: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/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.
Ingestion effects	: Ingestion is not considered a potential route of exposure.
Symptoms	: Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness, Salivation, Nausea, Vomiting. Loss of mobility/consciousness.

Acute toxicity

Acute oral toxicity	: No known toxicological effects from this product.
Acute inhalation toxicity	: No known toxicological effects from this product.
Acute dermal toxicity	: No known toxicological effects from this product.
Skin corrosion/irritation	: No known effects from this product.
Serious eye damage/ eye irritation	: No known effects from this product.
Sensitization	: No known effects from this product.

SAFETY DATA SHEET – Nitrogen (Liquid/Refrigerated)

SDS Number: 089B

Chronic toxicity or effects from long term exposure.

Carcinogenicity : No known effects from this product.
Reproductive toxicity : No known effects from this product.
Germ cell mutagenicity : No known effects from this product.
Specific target organ systemic toxicity (single exposure) : No known effects from this product.
Specific target organ systemic toxicity (repeated exposure) : No known effects from this product.
Aspiration hazard : No known effects from this product.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Aquatic toxicity : Not applicable.
Toxicity to other organisms : Not applicable.

Persistence and degradability

No data available.

Bioaccumulative potential : Refer to section 9 partition Coefficient (n-octanol/water)".

Mobility in soil : Because of its high volatility, the product is unlikely to cause ground pollution.

Biodegradability : No data is available on the product itself.

Other adverse effects

This product has no known eco-toxicological effects.

Effect on the ozone layer : No known effects from this product.

Ozone Depleting Potential : None

Effect on global warming : No known effects from this product.

Global Warming Potential : None

SECTION: 13. DISPOSAL CONSIDERATIONS

Waste treatment methods : Return unused product in original cylinder/container to supplier. Contact supplier if guidance is required.

Contaminated packaging : Return cylinder to supplier.

SECTION 14: TRANSPORT INFORMATION

UN number or ID number

UN/ID No. : UN1977

UN proper shipping name

Transport by road/rail (ADR/RID) : NITROGEN, REFRIGERATED LIQUID

Transport by air (ICAO-TI / IATA-DGR) : Nitrogen, refrigerated liquid

Transport by sea (IMDG) : NITROGEN, REFRIGERATED LIQUID

Transport hazard class(es)

Label(s) : 2.2

Transport by road/rail (ADR/RID)

Class or Division : 2

ADR/RID/ADN Haz ID no. : 22

Tunnel Code : (C/E)

Transport by air (ICAO-TI / IATA-DGR)

Class or Division : 2.2

Transport by sea (IMDG)

Class or Division : 2.2

Packing group

Transport by road/rail (ADR/RID) : Not applicable.

Transport by air (ICAO-TI / IATA-DGR) : Not applicable.

Transport by sea (IMDG) : Not applicable.

Environmental hazards

Transport by road/rail (ADR/RID)

Marine Pollutant : No

Transport by air (ICAO-TI / IATA-DGR)

Marine Pollutant : No

Transport by sea (IMDG)

Marine Pollutant : No

Segregation Group : None

Special precautions for user

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft : Transport allowed.

Cargo Aircraft only : Transport allowed.

Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure 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. Ensure compliance with applicable regulations.

SAFETY DATA SHEET – Nitrogen (Liquid/Refrigerated)

SDS Number: 089B

Before transporting product containers ensure that they are firmly secured and cylinder valve is closed and not leaking, valve outlet cap nut or plug (where provided) is correctly fitted and the valve protection device (where provided) is correctly fitted.

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

SECTION 15: REGULATORY INFORMATION

OHS Act	: Occupational Health and Safety Act 85 of 1993 (and Regulations)
SANS 11014	: Safety data sheet for chemical products- Content and order of sections
SANS 10234	: Globally Harmonized System of classification and labelling of chemicals (GHS)
SANS 10265	: The classification and labelling of dangerous substances and preparations for sale and handling.
SANS 10019	: Transportable containers for compressed, dissolved and liquefied gases – Basic design, manufacture, use and maintenance.
SANS 1518	: Transport of dangerous goods – Design, construction, testing, approval and maintenance of road vehicles and portable tanks
SANS 10228	: The identification and classification of dangerous goods for transport
SANS 10229-1&2	: Transport of dangerous goods – Packaging and large packaging for road and rail transport Part 1: Packaging / Part 2: Large Packaging
SANS 10263-2	: The warehousing of dangerous goods Part 2: The storage and handling of gas cylinders.

NB: Refer to latest edition.

SECTION 16: OTHER INFORMATION

Ensure all national/local regulations are observed.

Hazard Statement

H281: Contains refrigerated gas; may cause cryogenic burns or injury.

Indication of Method

Gases under pressure. Refrigerated liquefied gas. Contains refrigerated gas; may cause cryogenic burns or injury.

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 Protective Clothing

Kow – octanol-water partition coefficient

LC50- Lethal Concentration to 50% of a test population

LD50 – Lethal Dose to 50% of a test population (Median Lethal Dose)

OEL – Occupational Exposure Limit

PBT – Persistent Bioaccumulative and Toxic

vPvB - Very Persistent and Very Bioaccumulative

STOT – Specific Target Organ Toxicity

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

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Note: This SDS is valid for five years from the date of publishing and will be reviewed once every five years as per Section 14A of the Hazards Chemical Agents Regulations.

(Reference www.airproducts.com :- Air Products S.A./N.V. Belgium Nitrogen Refrigerated);
SDS Number 300000000100 / Version 3.0 / Revision Date 27.02.2025)