

SAFETY DATA SHEET

Refrigerant R417A

Version 1.0

Revision Date: 28.09.2011



SAFETY DATA SHEET REFRIGERANT R417A

This SDS is compiled according to the standards and regulatory requirements of Great Britain. It may not meet the regulatory requirements in other countries.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

1.1. Product Identifier

Product name: REFRIGERANT R417A

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

Use: Refrigerant.
Advised Against: No identified use advised against.

1.3. Details of the supplier of the safety data sheet

Company name: National Refrigerants Ltd.
4 Watling Close
Sketchley Meadows Business Park
Hinckley
LE10 3EZ

Telephone Number: +44(0)1455 630790
Fax Number: +44(0)1455 630791
Email: sds@nationalref.com

1.4. Emergency telephone number

Emergency Telephone: +44(0)1865 407333
Opening hours: 24 Hour.
Other comments: English only.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification under Directive 67/548/EEC and 1999/45/EC: Not a hazardous substance or mixture according to EC-directives 67/548/EEC or 199/45/EC.

2.2. Label elements

Directives 67/458/EEC or 1999/45/EC: Not a hazardous substance or mixture according to EC-directives 67/548/EEC or 199/45/EC.

Label elements under Directive 67/458/EEC and 1999/45/EC:

Special labelling of certain substances and mixtures: Contains 1,1,1,2-Tetrafluoroethane, Pentafluoroethane/Contains fluorinated greenhouse gas covered by the Kyoto Protocol.

2.3. Other hazards

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Rapid evaporation can cause frostbite.
Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
May cause cardiac arrhythmia.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

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3.1. Substances

Hazardous Ingredients: Not applicable

3.2 Mixtures

1,1,1,2-TETRAFLUOROETHANE (HFC134a) [REGISTRATION NO. 01-2119459374-33]

EINECS	CAS	67/548/EEC Classification	CLP Classification	Percent
212-337-0	811-97-2	-	Pressurised Gas H280	50%

PENTAFLUOROETHANE (HFC125)

EINECS	CAS	67/548/EEC Classification	CLP Classification	Percent
206-557-8	354-33-6	-	Pressurised Gas H280	46.6%

BUTANE (<0.1% BUTADIENE)(HC600)

EINECS	CAS	67/548/EEC Classification	CLP Classification	Percent
203-448-7	106-97-8	F+;R12	Flammable Gas H220 Pressurised Gas H280	3.4%

The above products are REACH compliant; Registration number(s) may not be provided because substance(s) are exempted, not yet registered under REACH or registered under another regulatory process (biocide uses, plant protection products etc.).

For full text of R-phrases mentioned in this Section see Section 16.

For full text of H-Statements mentioned in this Section see Section 16.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

- General Advice:** If unconscious place in recovery position and seek medical advice. Never give anything by mouth to an unconscious person. If breathing is irregular or stopped administer artificial respiration.
First aider needs to protect himself.
If symptoms persist seek medical advice.
- Skin contact:** Take off contaminated clothing and shoes immediately. Flush area with lukewarm water. Do not use hot water. If frostbite has occurred call a physician.
- Eye contact:** Hold eyelids apart and flush with plenty of water for at least 15 minutes. Get medical attention.
- Ingestion:** Not considered a potential route of exposure.
- Inhalation:** Remove from exposure to fresh air and lie down. Keep patient warm and at rest. Artificial respiration and/or oxygen may be necessary. Consult a physician.

4. 2. Most important symptoms and effects, both acute and delayed

- Skin contact:** Skin contact may give the following symptoms: Frostbite, Irritation, Discomfort, Itching, and Redness of skin, Swelling of tissue.
- Eye contact:** Eye contact may give the following symptoms: Frostbite, Irritation, Tearing, Redness or discomfort.
- Ingestion:** Ingestion is not considered as a route of exposure.
- Inhalation:** Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects. Other symptoms potentially related to misuse or inhalation abuse are: Anaesthetic effects, Light-headedness, dizziness, confusion, incoordination, drowsiness, unconsciousness, irregular heartbeat, with a strange sensation in the chest, heart thumping, apprehension, feeling of fainting or weakness, Narcosis.
- Irritating to the respiratory system. Cough, sneezing, runny nose, sore throat or shortness of

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Delayed/immediate effects: breath.
Skin contact may not give immediate symptoms of frostbite.

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

Immediate/special treatment: Do not give adrenaline or similar drugs.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Use water spray to cool cylinders/tanks in a fire.

5.2. Special hazards arising from the substance or mixture

Special hazards arising from the mixture: Pressure build-up. Fire or intense heat may cause violent rupture of cylinders. Hazardous thermal decomposition products may form. They are: Carbon oxides, Hydrogen Fluoride, Fluorinated compounds. Exposure to decomposition products may be hazardous to health.

5.3. Advice for fire-fighters

Advice for fire-fighters: In event of a fire wear self-contained breathing apparatus. Use personal protective equipment. Wear neoprene gloves during cleaning up work after a fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where heavy vapours might collect. Refer to protective measures listed in Sections 7 and 8.

6.2. Environmental precautions

Environmental precautions: Do not release into the environment. Treat according to local and national regulations.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Product evaporates.

6.4. Reference to other sections

Reference to other sections: For Handling and Storage see Section 7.
For Exposure Controls and Personal Protection see Section 8.
For Disposal Methods see Section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Handling requirements: Avoid breathing vapours or mist. Avoid contact with the skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. For personal protection see Section 8. Vapours are heavier than air and may spread along the floor.

Cylinder Handling: Do not drag, slide or roll cylinders.
Never attempt to lift cylinder by its valve or cap.
Use a check valve or trap in the discharge line to prevent back flow into the cylinder.
See General Safety & Handling Data.

7.2. Conditions for safe storage, including any incompatibilities

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Storage conditions: Store in a cool, dry and well-ventilated area at temperatures not exceeding 52°C. Keep out of direct sunlight. Keep cylinders tightly closed. Protect from contamination. See General Safety & Handling Data.

Suitable packaging: Store in original cylinders only.

7.3. Specific end use(s)

Specific end use(s) No data available.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

Hazardous ingredients:

1,1,1,2-TETRAFLUOROETHANE (HFC134a) (CAS No. 811-97-2)

Workplace exposure limits

Form of Exposure	Control Parameter	Basis
TWA	4 240 mg/m ³ 1 000 ppm	EH40 WEL (2007)

BUTANE (HC600) (CAS No. 106-97-8)

Workplace exposure limits

Form of Exposure	Control Parameter	Basis
TWA	1 450 mg/m ³ 600 ppm	EH40 WEL (2007)
STEL	1 810 mg/m ³ 750 ppm	EH40 WEL (2007)

Derived No Effect Level (DNEL's):

1,1,1,2-Tetrafluoroethane: Type of application (use): Worker
Exposure routes: Inhalation
Health Effects: Chronic effects, Systemic toxicity
Value: 13 939 mg/m³

Type of application (Use): Consumers
Exposure routes: inhalation
Health Effect: Chronic effects, Systemic toxicity
Value: 2 476 mg/m³

Pentafluoroethane: Type of application (use): Worker
Exposure routes: Inhalation
Health Effects: Chronic effects, Systemic toxicity
Value: 16 444 mg/m³

Type of application (Use): Consumers
Exposure routes: inhalation
Health Effect: Chronic effects, Systemic toxicity
Value: 1 753 mg/m³

Predicted No Effect concentration

1,1,1,2-Tetrafluoroethane: Value: 0.1 mg/l
Compartment: Fresh Water

Value: 0.01 mg/l

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Compartment: Marine Water

Value: 1 mg/l
Compartment: Water
Remarks: Intermittent use/release.

Value: 0.75 mg/kg dry weight (d.w.)
Compartment: Fresh water sediment.

Value: 73 mg/l
Compartment: Water
Remarks: Sewage treatment plants.

Pentafluoroethane: Value: 1mg/l
Compartment: Water
Remarks: Intermittent use/release

Value: 0.6 mg/kg
Compartment: Fresh water sediment

8.2. Exposure controls

- Engineering measures:** Ensure adequate ventilation, especially in confined areas. Local exhaust should be used when large amounts are released.
- Respiratory protection:** For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing the oxygen available for breathing. Respiratory protection to comply with EN 137.
- Hand protection:** Material: leather gloves
The suitability for specific workplace should be discussed with the producers of the protective gloves.
- Eye protection:** Wear safety glasses or coverall chemical splash goggles. Eye protection should comply with EN 166 or ANSI Z87.1.
Wear a face shield where the possibility exists for face contact due to splashing, spraying or airborne contact with this material.
- Skin protection:** Wear suitable protective equipment. Wear as appropriate: impervious clothing.
- Protective Measures:** Self-contained breathing apparatus (SCBA) is required if a large release occurs. The type of protective equipment must be selected according to the concentration and amount of the substance at the specific workplace.
- Hygiene Measures:** Handle in accordance with good industrial hygiene and safety practice.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

State:	Liquefied gas
Colour:	Colourless
Odour:	Slight, ether-like.
pH:	Neutral
Melting Point:	Not available for this mixture
Boiling Point/range:	-39.1°C
Flash Point:	Does not flash
Flammability:	Type: lower flammability limit. Method ASTM E681: None
Ignition Temperature:	None
Upper explosive limit/upper flammability limit:	Type: Upper flammability limit Method ASTM E681: None
Vapour pressure:	9.835 Bar (9 835 hPa) at 25°C

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Liquid Density: 1.2 g/cm³ at 20°C
Vapour Density: 0.0044 g/cm³ at 25°C (1 Bar)
Vapour Density (Air = 1) 3.8 at 25°C

9.2 Other Information

No data available.

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity: Decomposes on heating.

10.2. Chemical stability

Chemical stability: The product is chemically stable.

10.3. Possibility of hazardous reactions

Hazardous reactions: Stable under recommended storage conditions. Polymerization will not occur.

10.4. Conditions to avoid

Conditions to avoid: Avoid open flames and high temperatures. The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HFC's with chlorine may become flammable or reactive under certain conditions. Pressurized container: Do not pierce or burn even after use. Keep at temperature not exceeding 52°C

10.5. Incompatible material

Materials to avoid: Alkali metals, Alkaline earth metals, Powdered metals, Powdered metal salts.

10.6. Hazardous decomposition products

Hazardous decomposition products Hazardous thermal decomposition products may include: Hydrogen fluorides, Carbon oxides, Fluorocarbons, Carbonyl Fluoride.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute toxicity:

Oral toxicity
Pentafluoroethane
Not applicable

Butane (<0.1 % butadiene)
Not applicable

Inhalation toxicity
1,1,1,2-Tetrafluoroethane
LC50/4 h rat: 567 000 ppm

Low Observed Adverse Effect Concentration (LOEC)/ dog: 75 000 ppm

No Observed Adverse Effect Concentration (NOEC)/ dog: 50 000 ppm

Pentafluoroethane
LC50/4 h rat: >800 000 ppm

Low Observed Adverse Effect Concentration (LOEC)/ dog: 100 000 ppm

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Butane (<0.1% butadiene)
LC50/4 h rat: 277 018 ppm
Irritating to respiratory system. Central nervous system depression narcosis.

Low Observed Adverse Effect Concentration (LOEC)/ dog: 150 000 ppm
Cardiac sensitization

Dermal toxicity
Pentafluoroethane
Not applicable

Butane (,0.1% butadiene)
Not applicable

Irritation:

Skin irritation
1,1,1,2-Tetrafluoroethane
Rabbit
Classification: Not classified as an irritant.
Result: Slight irritation.
Not expected to cause skin irritation based on expert review of the properties of the substance.

Human
Classification: Not classified as an irritant.
Result: No irritation.

Pentafluoroethane
Not tested on animals
Classification: Not classified as an irritant.
Result: No skin irritation.
Not expected to cause skin irritation based on expert review of the properties of the substance.

Butane (<0.1% butadiene)
Not tested on animals
Classification: Not classified as an irritant.
Result: No skin irritation.
Not expected to cause skin irritation based on expert review of the properties of the substance.

Eye irritation
1,1,1,2-Tetrafluoroethane
Rabbit
Classification: Not classified as an irritant.
Result: Slight irritation.
Not expected to cause eye irritation based on expert review of the properties of the substance.

Human
Classification: Not classified as an irritant.
Result: No irritation.

Pentafluoroethane
Not tested on animals
Classification: Not classified as an irritant.
Result: No skin irritation.
Not expected to cause eye irritation based on expert review of the properties of the substance.

Butane (<0.1% butadiene)
Not tested on animals
Classification: Not classified as an irritant.
Result: No skin irritation.
Not expected to cause eye irritation based on expert review of the properties of the substance.

Sensitisation:

1,1,1,2-tetrafluoroethane
Guinea pig

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Classification: Not a skin sensitizer.
Result: Did not cause skin sensitization on laboratory animals,
Not expected to cause sensitization based on expert review of the properties of the substance.

Did not cause respiratory sensitization on laboratory animals. There are no reports of human respiratory sensitization.

Pentafluoroethane

Not tested on animals.

Classification: Not a skin sensitizer

Result: Does not cause skin sensitization.

Not expected to cause sensitization bases on expert review of the properties of the substance.

There are no reports of human repertory sensitization.

Butane (<0.1% butadiene)

Not tested on animals.

Classification: Not a skin sensitizer

Result: Does not cause skin sensitization.

Not expected to cause sensitization bases on expert review of the properties of the substance.

Not tested on animals.

Classification: Not a skin sensitizer

Result: Does not cause skin sensitization.

Not expected to cause sensitization bases on expert review of the properties of the substance.

Repeated dose toxicity:

1,1,1,2-Tetrafluoroethane

Inhalation rat

No toxicologically significant effects were found.

Pentafluoroethane

Inhalation rat

No toxicologically significant effects were found.

Butane (<0.1% butadiene)

Inhalation multiple species

No toxicologically significant effects were found.

Carcinogenic assessment:

1,1,1,2-Tetrafluoroethane

Not classified as a human carcinogen.

Pentafluoroethane

Not classified as a human carcinogen.

Butane (<0.1% butadiene)

No data available.

Mutagenic assessment:

1,1,1,2-Tetrafluoroethane

Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Pentafluoroethane

Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Butane (<0.1% butadiene)

Animal testing did not show any mutagenic effects.

Toxicity to reproduction Assessment:

1,1,1,2-Tetrafluoroethane

No toxicity to reproduction.

Pentafluoroethane

No toxicity to reproduction.

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Butane (<0.1% butadiene)
No data available.

Assessment Teratogenicity

Pentafluoroethane
Did not show teratogenic effects in animal experiments.

Butane (<0.1% butadiene)
No data available.

SECTION 12. ECOLOGICAL INFORMATION

12.1. Toxicity

Toxicity to fish:

1,1,1,2-Tetrafluoroethane
LC50/96 h/Oncorhynchus mykiss (rainbow trout): 450 mg/l

Pentafluoroethane
LC50/96 h/Danio rerio (zebra fish): >200 mg/l
Information given is based on data obtained from similar substances.

LC50/96 h/Oncorhynchus mykiss (rainbow trout): 450 mg/l
Information given is based on data obtained from similar substances.

Butane (<0.1% butadiene)
LC50/96 h/Fish (unspecified species) >1 000 mg/l

Toxicity to Aquatic plants:

1,1,1,2-Tetrafluoroethane
EC50/72 h/Algae: >118 mg/l
Data given is based on data obtained from similar substances.

Pentafluoroethane
EC50/96 h/Algae: 142 mg/l
Data given is based on data obtained from similar substances.

Acute Toxicity to aquatic invertebrates:

1,1,1,2-Tetrafluoroethane
EC50/48 h/Daphnia magna (Water flea): 980 mg/l

Pentafluoroethane
EC50/48 h/Daphnia magna (Water flea): >200 mg/l
Information given is based on data obtained from similar substances.

12.2. Persistence and degradability

Biodegradability:

1,1,1,2 Tetrafluoroethane
/28 d Biodegradation: 3%
Not readily biodegradable.

Butane (<0.1% butadiene)
/34 d Biodegradation: 100%
Readily biodegradable.

12.3. Bio accumulative potential

Bio-accumulative potential:

1,1,1,2-Tetrafluoroethane
Bioaccumulation is unlikely.

12.4. Mobility in soil

Mobility:

No data available.

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12.5. Results of PBT and vPvB assessment

PBT identification: No data available

12.6. Other adverse effects

Other adverse effects:

Ozone deletion potential (ODP) (R11 = 1)
1,1,1,2-Tetrafluoroethane: 0
Pentafluoroethane: 0
Butane (<0.1% butadiene): 0
R417A (Blend): 0

Global Warming Potential (GWP) (CO₂ = 1)
1,1,1,2-Tetrafluoroethane: 1430
Pentafluoroethane: 3500
Butane (<0.1% butadiene): 20
R417A (Blend): 2300

SECTION 13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Disposal operations: Can be used after reclaiming. If reclaiming is not practicable, dispose of in compliance with local regulations.

Disposal of packaging: Empty pressure cylinders should be returned to the supplier. If recycling is not practicable, dispose of in compliance with local regulations.

N.B.

SECTION 14. TRANSPORT INFORMATION

14.1. ADR

UN Number: 1078
Proper Shipping Name: REFRIGERANT GAS N.O.S. (1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE)
Class: 2.2
Packing Group: N/A
Tunnel Code: (C/E)
Transport Group: 2.2

14.2. IMDG

UN Number: 1078
Proper Shipping Name: REFRIGERANT GAS N.O.S. (1,1,1,2-TETRAFLUOROETHANE, PENTAFLUOROETHANE)
Class: 2.2
Packing Group: N/A
EmS codes: F-C, S-V
Marine Pollutant: No

SECTION 15. REGULATORY INFORMATION

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

Take note of Directive 98/24/EC on the protection of health and safety of workers from the risks related to chemical agents at work.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has not been carried out by the supplier of this mixture.

16. OTHER INFORMATION

Other information: This safety sheet is prepared in accordance with Commission Regulation (EU) No. 453/2010.

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* Indicates text in SDS which has changed since the last revision.

R-Phrases

Text of R-Phrases mentioned in Section 3

R12: Extremely flammable.

H-Statements

Text of H-statements mentioned in Section 3

H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

Legal disclaimer: National Refrigerants Ltd. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other methods of use of the product and of the information referred to herein are beyond the control of National Refrigerants Ltd. National Refrigerants Ltd. expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

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GENERAL SAFETY & HANDLING DATA

1. GENERAL

Only trained persons should handle compressed gases. Observe all regulations and local requirements regarding the storage of Cylinders.
Do not remove or deface labels provided by the supplier for the identification of the Cylinder contents.
Ascertain the identity of the gas before using it.
Know and understand the properties and hazards associated with each gas before using it.
When doubt exists as to the correct handling procedure for a particular gas contact the supplier.

HANDLING AND USE

Wear stout gloves.
Never lift a Cylinder by the cap or guard unless the supplier states it is designed for that purpose.
Use trolley or other suitable device or technique for transporting heavy Cylinders, even for a short distance.
Where necessary wear suitable eye and face protection.
The choice between safety glasses, chemical goggles, or full face shield will depend on the pressure and nature of the gas being used,

Where necessary for toxic gases see that self-contained positive pressure breathing apparatus or full face airline respirator is available in the vicinity of the working area.
Employ suitable pressure regulating device on all Cylinders when gas is being emitted to systems with lower pressure rating than that of the Cylinder.
Ascertain that all electrical systems in the area are suitable for service with each gas.

Never use direct flame or electrical heating devices to raise the pressure of a Cylinder, Cylinders should not be subjected to temperatures above 45°C.
Never re-compress a gas mixture without consulting the supplier. Never attempt to transfer gases from one Cylinder to another.
Do not use Cylinders as rollers or supports, or for any other purpose other than to contain the gas as supplied.
Never permit oil, grease or other readily combustible substances to come into contact with valves of Cylinders containing oxygen or other oxidants.
Keep Cylinder valves clean and free from contaminants particularly oil and water.

Do not subject Cylinders to mechanical shocks which may cause damage to their valves or safety devices.

Never attempt to repair or modify Cylinder valves or safety relief devices. Damaged valves should be reported immediately to the supplier.
Close the Cylinder valve whenever gas is not required even if the Cylinder is still connected to the equipment.

2. STORAGE

Cylinders should be stored in a well-ventilated area. Some gases will require a purpose built area.
Store Cylinders in a location free from fire risk and away from sources of heat and ignition. Designate as a no smoking area.

Gas Cylinders should be segregated in the storage according to the various categories.

The storage area should be kept clear and access should be restricted to authorized persons only, the area should be clearly marked as a storage area and appropriate hazard warning signs displayed (Flammable, Toxic etc.).

The amount of flammable or toxic gases should be kept to a minimum.

Flammable gases should be stored away from other combustible materials.

Cylinders held in storage should be periodically checked for general condition and leakage.

Cylinders in storage should be properly secured to prevent toppling or rolling.

Vertical storage is recommended where the Cylinder is designed for this.

Cylinder valves should be tightly closed and, where appropriate, valves should be capped or plugged.

Protect Cylinders stored in the open against rusting and extremes of weather.

Cylinders should not be stored in conditions likely to encourage corrosion.

Store full and empty Cylinders separately and arrange full Cylinders so that the oldest stock is used first.

FOR FURTHER INFORMATION CONTACT YOUR NEAREST DISTRIBUTION CENTRE