

**Danger****SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Trade name : hydrogen refrigerated Liquid  
SDS no : EIGA067B  
Other means of identification : hydrogen refrigerated Liquid  
CAS-No. : 1333-74-0  
EC-No. : 215-605-7  
EC Index-No. : 001-001-00-9

REACH registration No : Listed in Annex IV / V REACH, exempted from registration.

Chemical formula : H<sub>2</sub>

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

Relevant identified uses : Industrial use. Perform risk assessment prior to use.  
Test gas/Calibration gas.  
Chemical reaction / Synthesis.  
Laboratory use.  
Use as a fuel.

Uses advised against : Consumer use.  
Uses other than those listed above are not supported, contact your supplier for more information on other uses.

**1.3. Details of the supplier of the safety data sheet**

Air Liquide Maritime SAS  
6 Rue Cognac Jay  
Paris, France  
[MaritimeCryoSupply.Solutions@airliquide.com](mailto:MaritimeCryoSupply.Solutions@airliquide.com)

**1.4. Emergency telephone number**

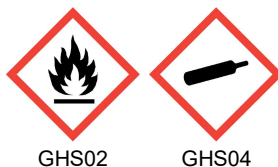
Emergency telephone number : 00 33 1 71 25 26 15

**SECTION 2: Hazards identification****2.1. Classification of the substance or mixture****Classification according to Regulation (EC) No. 1272/2008 [CLP]**

Physical hazards      Flammable gases, Category 1A      H220  
Gases under pressure : Refrigerated liquefied gas      H281

**2.2. Label elements****Labelling according to Regulation (EC) No. 1272/2008 [CLP]**

Hazard pictograms (CLP) :



Signal word (CLP)	: Danger
Hazard statements (CLP)	: H220 - Extremely flammable gas. H281 - Contains refrigerated gas; may cause cryogenic burns or injury.
Precautionary statements (CLP)	
- Prevention	: P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P282 - Wear cold insulating gloves and either face shield or eye protection.
- Response	: P336+P315 - Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention. P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381 - In case of leakage, eliminate all ignition sources.
- Storage	: P403 - Store in a well-ventilated place.

### 2.3. Other hazards

Asphyxiant in high concentrations.  
These high concentrations are within the flammability range.  
Not classified as PBT or vPvB.  
The substance/mixture has no endocrine disrupting properties.

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP] ATE, EUH-statements, M-Factors
hydrogen refrigerated Liquid	CAS-No.: 1333-74-0 EC-No.: 215-605-7 EC Index-No.: 001-001-00-9 REACH registration No: *1	100	Flam. Gas 1A, H220 Press. Gas (Ref. Liq.), H281

Contains no other components or impurities which will influence the classification of the product.

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

\*3: Registration not required: Substance manufactured or imported < 1t/y.

### 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

- Inhalation	: Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.
- Skin contact	: In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.
- Eye contact	: Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion	: Ingestion is not considered a potential route of exposure.

### 4.2. Most important symptoms and effects, both acute and delayed

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.  
See section 11.

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

None.

**SECTION 5: Firefighting measures****5.1. Extinguishing media**

- Suitable extinguishing media : Water spray or fog.  
Dry powder.  
Carbon dioxide.  
Shutting off the source of the gas is the preferred method of control.  
Be aware of the risk of formation of static electricity with the use of CO2 extinguishers. Do not use them in places where a flammable atmosphere may be present.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

**5.2. Special hazards arising from the substance or mixture**

- Specific hazards : Exposure to fire may cause containers to rupture/explode.  
Hazardous combustion products : None.

**5.3. Advice for firefighters**

- Specific methods : Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.  
If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire.  
Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.  
If possible, stop flow of product.  
Use water spray or fog to knock down fire fumes if possible.  
Move containers away from the fire area if this can be done without risk.
- Special protective equipment for fire fighters : In confined space use self-contained breathing apparatus.  
Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.  
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters. EN 15090 Footwear for firefighters. EN 443 Helmets for fire fighting in buildings and other structures.  
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

**SECTION 6: Accidental release measures****6.1. Personal precautions, protective equipment and emergency procedures**

- For non-emergency personnel : Act in accordance with local emergency plan.  
Try to stop release.  
Evacuate area.  
Eliminate ignition sources.  
Ensure adequate air ventilation.  
Use protective clothing.  
Stay upwind.  
See section 8 of the SDS for more information on personal protective equipment.
- For emergency responders : Monitor concentration of released product.  
Consider the risk of potentially explosive atmospheres.  
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.  
See section 5.3 of the SDS for more information.

**6.2. Environmental precautions**

- Try to stop release.  
Liquid spillages can cause embrittlement of structural materials.

**6.3. Methods and material for containment and cleaning up**

- Ventilate area.

**6.4. Reference to other sections**

See also sections 8 and 13.

**SECTION 7: Handling and storage****7.1. Precautions for safe handling**

Safe use of the product

- : Do not breathe gas.
- Avoid release of product into work area.
- The product must be handled in accordance with good industrial hygiene and safety procedures.
- Only experienced and properly instructed persons should handle gases under pressure.
- Consider pressure relief device(s) in gas installations.
- Ensure the complete gas system was (or is regularly) checked for leaks before use.
- Do not smoke while handling product.
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
- Avoid suck back of water, acid and alkalis.
- Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment.
- Purge air from system before introducing gas.
- Take precautionary measures against static discharge.
- Keep away from ignition sources (including static discharges).
- Consider the use of only non-sparking tools.
- Ensure equipment is adequately earthed.

Safe handling of the gas receptacle

- : Refer to supplier's container handling instructions.
- Do not allow backfeed into the container.
- Protect containers from physical damage; do not drag, roll, slide or drop.
- 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.
- If user experiences any difficulty operating valve discontinue use and contact supplier.
- Never attempt to repair or modify container valves or safety relief devices.
- Damaged valves should be reported immediately to the supplier.
- Keep container valve outlets clean and free from contaminants particularly oil and water.
- Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
- Close container valve after each use and when empty, even if still connected to equipment.
- Never attempt to transfer gases from one cylinder/container to another.
- Never use direct flame or electrical heating devices to raise the pressure of a container.
- Do not remove or deface labels provided by the supplier for the identification of the content of the container.
- Suck back of water into the container must be prevented.
- Open valve slowly to avoid pressure shock.

**7.2. Conditions for safe storage, including any incompatibilities**

For more guidance on the safe storage of liquid hydrogen, refer to EIGA Doc.06 "Safety in storage, handling and distribution of liquid hydrogen", downloadable at <http://www.eiga.eu> and consult your supplier.

Segregate from oxidant gases and other oxidants in store.

All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.

Observe all regulations and local requirements regarding storage of containers.

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

Container valve guards or caps should be in place.

Containers should be stored in the vertical position and properly secured to prevent them from falling over.

Stored containers should be periodically checked for general condition and leakage.

Keep container below 50°C in a well ventilated place.

Store containers in location free from fire risk and away from sources of heat and ignition.

Keep away from combustible materials.

**7.3. Specific end use(s)**

None.

**SECTION 8: Exposure controls/personal protection****8.1. Control parameters**

OEL (Occupational Exposure Limits) : None available.

DNEL (Derived-No Effect Level) : None available.

PNEC (Predicted No-Effect Concentration) : None available.

**8.2. Exposure controls****8.2.1. Appropriate engineering controls**

Provide adequate general and local exhaust ventilation.

Product to be handled in a closed system.

Gas detectors should be used when flammable gases/vapours may be released.

Consider the use of a work permit system e.g. for maintenance activities.

Systems under pressure should be regularly checked for leakages.

**8.2.2. Individual protection measures, e.g. personal protective equipment**

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk.

The following recommendations should be considered:

PPE compliant to the recommended EN/ISO standards should be selected.

• Eye/face protection : Wear goggles and a face shield when transfilling or breaking transfer connections.  
Standard EN 166 - Personal eye-protection - specifications.

• Skin protection : Wear working gloves when handling gas containers.  
- Hand protection : Wear working gloves when handling gas containers.

Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher. Recommended types include wrist gloves from leather or synthetic material with equivalent performance, fabric gloves, fabric gloves with leather palms.

Wear cold insulating gloves when transfilling or breaking transfer connections.

Standard EN 511 - Cold insulating gloves, performance level 1 or higher. Recommended types include insulated gauntlets or gloves specifically selected to prevent liquid penetration and ingress of cryogenic liquids and to provide mechanical resistance.

- Other : Consider the use of flame resistant anti-static safety clothing.

Standard EN ISO 14116 - Limited flame spread materials.

Standard EN 1149-5 - Protective clothing: Electrostatic properties.

Wear safety shoes while handling containers.

Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

- Respiratory protection : Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.  
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.  
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
- Thermal hazards : None in addition to the above sections.

### 8.2.3. Environmental exposure controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Appearance	
- Physical state at 20°C / 101.3kPa	: Gas.
- Colour	: Colourless.
Odour	: Odourless.
Melting point / Freezing point	: -259 °C
Boiling point	: -253 °C
Flammability	: Extremely flammable gas.
Lower explosion limit	: 4 vol %
Upper explosion limit	: 77 vol %
Flash point	: Not applicable for gases and gas mixtures.
Auto-ignition temperature	: 560 °C
Decomposition temperature	: Not applicable.
pH	: Not applicable for gases and gas mixtures.
Viscosity, kinematic	: No reliable data available.
Water solubility [20°C]	: 1.6 mg/l
Partition coefficient n-octanol/water (Log Kow)	: Not applicable for inorganic products.
Vapour pressure [20°C]	: Not applicable.
Vapour pressure [50°C]	: Not applicable.
Density and/or relative density	: Not applicable for gases and gas mixtures.
Relative vapour density (air=1)	: 0.07
Particle characteristics	: Not applicable for gases and gas mixtures. Nanoforms are not relevant for gases and gas mixtures.

### 9.2. Other information

#### 9.2.1. Information with regard to physical hazard classes

Explosion limits	: Not known.
Oxidising properties	: No oxidising properties.
Tci	: 5.5 %
Critical temperature [°C]	: -240 °C

#### 9.2.2. Other safety characteristics

Molar mass	: 2 g/mol
Other data	: Burns with an invisible flame.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

### 10.2. Chemical stability

Stable under normal conditions.

**10.3. Possibility of hazardous reactions**

Can form explosive mixture with air.  
May react violently with oxidants.

**10.4. Conditions to avoid**

Keep away from heat/sparks/open flames/hot surfaces. – No smoking.  
Avoid moisture in installation systems.

**10.5. Incompatible materials**

Air, Oxidisers.  
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.  
For additional information on compatibility refer to ISO 11114.

**10.6. Hazardous decomposition products**

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

**SECTION 11: Toxicological information****11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008**

<b>Acute toxicity</b>	: No known toxicological effects from this product.
<b>Skin corrosion/irritation</b>	: No known effects from this product.
<b>Serious eye damage/irritation</b>	: No known effects from this product.
<b>Respiratory or skin sensitisation</b>	: No known effects from this product.
<b>Germ cell mutagenicity</b>	: No known effects from this product.
<b>Carcinogenicity</b>	: No known effects from this product.
<b>Toxic for reproduction : Fertility</b>	: No known effects from this product.
<b>Toxic for reproduction : unborn child</b>	: No known effects from this product.
<b>STOT-single exposure</b>	: No known effects from this product.
<b>STOT-repeated exposure</b>	: No known effects from this product.
<b>Aspiration hazard</b>	: Not applicable for gases and gas mixtures.

**11.2. Information on other hazards**

Other information : The substance/mixture has no endocrine disrupting properties.

**SECTION 12: Ecological information****12.1. Toxicity**

Assessment	: No ecological damage caused by this product.
EC50 48h - Daphnia magna [mg/l]	: No data available.
EC50 72h - Algae [mg/l]	: No data available.
LC50 96 h - Fish [mg/l]	: No data available.

**12.2. Persistence and degradability**

Assessment	: No ecological damage caused by this product.
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**12.3. Bioaccumulative potential**

Assessment	: No ecological damage caused by this product.
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**12.4. Mobility in soil**

Assessment	: No ecological damage caused by this product.
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**12.5. Results of PBT and vPvB assessment**

Assessment	: Not classified as PBT or vPvB.
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**12.6. Endocrine disrupting properties**

Assessment : The substance/mixture has no endocrine disrupting properties.

**12.7. Other adverse effects**

Other adverse effects : Can cause frost damage to vegetation.  
Effect on the ozone layer : No effect on the ozone layer.  
Effect on global warming : None.

**SECTION 13: Disposal considerations****13.1. Waste treatment methods**

Contact supplier if guidance is required.  
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 arrestor.  
Ensure that the emission levels from local regulations or operating permits are not exceeded.  
Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.eu> for more guidance on suitable disposal methods.  
Do not discharge into any place where its accumulation could be dangerous.  
Return unused product in original container to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended) : 16 05 04 \*: Gases in pressure containers (including halons) containing hazardous substances.

**13.2. Additional information**

External treatment and disposal of waste should comply with applicable local and/or national regulations.

**SECTION 14: Transport information****14.1. UN number or ID number**

In accordance with ADR / RID / IMDG / IATA / ADN  
UN-No. : 1966

**14.2. UN proper shipping name**

Transport by road/rail/inland waterways (ADR/RID/ADN) : HYDROGEN, REFRIGERATED LIQUID  
Transport by air (ICAO-TI / IATA-DGR) : Hydrogen, refrigerated liquid  
Transport by sea (IMDG) : HYDROGEN, REFRIGERATED LIQUID

**14.3. Transport hazard class(es)**

Labelling :



2.1 : Flammable gases.

Transport by road/rail/inland waterways (ADR/RID/ADN)

Class : 2  
Classification code : 3F  
Hazard identification number : 223  
Tunnel Restriction : B/D - Tank carriage: Passage forbidden through tunnels of category B, C, D and E. Other carriage: Passage forbidden through tunnels of category D and E

Transport by sea (IMDG)

Class / Div. (Sub. risk(s)) : 2.1  
Emergency Schedule (EmS) - Fire : F-D  
Emergency Schedule (EmS) - Spillage : S-U

**14.4. Packing group**

Transport by road/rail/inland waterways (ADR/RID/ADN)	: Not applicable.
Transport by air (ICAO-TI / IATA-DGR)	: Not applicable.
Transport by sea (IMDG)	: Not applicable.

**14.5. Environmental hazards**

Transport by road/rail/inland waterways (ADR/RID/ADN)	: None.
Transport by air (ICAO-TI / IATA-DGR)	: None.
Transport by sea (IMDG)	: None.

**14.6. Special precautions for user****Packing Instruction(s)**

Transport by road/rail/inland waterways (ADR/RID/ADN)	: P203.
Transport by air (ICAO-TI / IATA-DGR)	
Passenger and Cargo Aircraft	: Forbidden.
Cargo Aircraft only	: Forbidden.
Transport by sea (IMDG)	: P203.

Special transport precautions	: 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. Before transporting product containers: <ul style="list-style-type: none"><li>- Ensure there is adequate ventilation.</li><li>- Ensure that containers are firmly secured.</li><li>- Ensure valve is closed and not leaking.</li><li>- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.</li><li>- Ensure valve protection device (where provided) is correctly fitted.</li></ul>
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**14.7. Maritime transport in bulk according to IMO instruments**

Not applicable.

**SECTION 15: Regulatory information****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****EU-Regulations**

Restrictions on use	: None.
Other information, restriction and prohibition regulations	: Not listed on the PIC list (Regulation EU 649/2012).
Seveso Directive : 2012/18/EU (Seveso III)	: Listed.

**National regulations**

Regulatory reference	: Ensure all national/local regulations are observed.
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**15.2. Chemical safety assessment**

A CSA does not need to be carried out for this product.

**SECTION 16: Other information**

Indication of changes	: Safety data sheet in accordance with commission regulation (EU) No 2020/878.
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### 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.
  - CAS# - Chemical Abstract Service number.
  - PPE - Personal Protection Equipment.
  - LC50 - Lethal Concentration to 50 % of a test population.
  - RMM - Risk Management Measures.
  - PBT - Persistent, Bioaccumulative and Toxic.
  - vPvB - Very Persistent and Very Bioaccumulative.
  - STOT- SE : Specific Target Organ Toxicity - Single Exposure.
  - CSA - Chemical Safety Assessment.
  - EN - European Standard.
  - UN - United Nations.
  - ADR - Agreement concerning the International Carriage of Dangerous Goods by Road.
  - IATA - International Air Transport Association.
  - IMDG code - International Maritime Dangerous Goods.
  - RID - Regulations concerning the International Carriage of Dangerous Goods by Rail.
  - WGK - Water Hazard Class.
  - STOT - RE : Specific Target Organ Toxicity - Repeated Exposure.
  - UFI : Unique Formula Identifier.
- Training advice : Ensure operators understand the flammability hazard.
- Further information : Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP).  
Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at <http://www.Eiga.eu> .

### Training advice

### Further information

Full text of H- and EUH-statements	
Flam. Gas 1A	Flammable gases, Category 1A
H220	Extremely flammable gas.
H281	Contains refrigerated gas; may cause cryogenic burns or injury.
Press. Gas (Ref. Liq.)	Gases under pressure : Refrigerated liquefied gas

### DISCLAIMER OF LIABILITY

- : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
- 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.

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