

**Hexafluoro-1,3-Butadiene****131****SECTION 1. Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

|                      |   |
|----------------------|---|
| Trade name           | : Hexafluoro-1,3-Butadiene , HEXAFLUORO-1,3-BUTADIENE (N26, N35)                    |
| SDS Nr               | : 131   |
| Chemical description | : Hexafluoro-1,3-Butadiene<br>CAS No :685-63-2<br>EC No :211-681-0<br>Index No :--- |
| Registration-No.     | : Registration deadline not expired.  |
| Chemical formula     | : F <sub>2</sub> C=CF-CF=CF <sub>2</sub>  |

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

|                          |   |
|--------------------------|---|
| Relevant identified uses | : Industrial and professional. Perform risk assessment prior to use.<br>Test gas / Calibration gas. Chemical reaction / Synthesis. Laboratory use.<br>Contact supplier for more uses information. |
| Uses advised against     | : Consumer use  |

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

|                                   |   |
|-----------------------------------|---|
| Company identification            | : AIR LIQUIDE Deutschland GmbH<br>Hans-Günther-Sohl-Straße 5<br>D-40235 Düsseldorf GERMANY<br>Telefon: +49 (0)211 6699-0 - Fax: +49 (0)211 6699-222 |
| E-Mail address (competent person) | : Info.SDB@AirLiquide.de  |

**1.4. Emergency telephone number**

|                            |                      |
|----------------------------|----------------------|
| Emergency telephone number | : +49 (0)2151 398668 |
| - Availability             | : ( 24 / 7 )         |

**SECTION 2. Hazards identification****2.1. Classification of the substance or mixture****Hazard Class and Category Code(s), Regulation (EC) No 1272/2008 (CLP)**

|                    |  |
|--------------------|--|
| • Health hazards   | : Acute toxicity, Inhalation - Category 3 - Danger - (CLP : Acute Tox. 3) - H331   |
| • Physical hazards | : Flammable gases - Category 1 - Danger - (CLP : Flam. Gas 1) - H220<br>Gases under pressure - Liquefied gas - Warning - (CLP : Press. Gas) - H280 |

**Classification EC 67/548 or EC 1999/45**

|                |                           |
|----------------|---------------------------|
| Classification | : F+; R12<br>T; R23       |
|                | Not included in Annex VI. |

**2.2. Label elements****Labelling Regulation EC 1272/2008 (CLP)**

## • Hazard pictograms



|                          |   |
|--------------------------|---|
| • Hazard pictograms code | : GHS06 - GHS02 - GHS04   |
| • Signal words           | : Danger  |
| • Hazard statements      | : H220 - Extremely flammable gas.<br>H280 - Contains gas under pressure; may explode if heated.<br>H331 - Toxic if inhaled. |

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**SECTION 2. Hazards identification (continued)**

• **Precautionary statements**

- **Prevention** : P260 - Do not breathe gas, vapours.  
P210 - Keep away from heat, sparks, open flames or hot surfaces. – No smoking.
- **Response** : P304+P340+P315 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice / attention.  
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.  
P381 - Eliminate all ignition sources if safe to do so.
- **Storage** : P403 - Store in a well-ventilated place.  
P405 - Store locked up.

**2.3. Other hazards**

Other hazards : None.

**SECTION 3. Composition/information on ingredients**

**3.1. Substance / 3.2. Mixture**

Substance.

| Substance name           | Content [Vol-%] | CAS No<br>EC No<br>Index No<br>Registration no. | Classification(DSD) | Classification(CLP)  |
|--------------------------|-----------------|---|---------------------|--|
| Hexafluoro-1,3-Butadiene | 100 %           | 685-63-2<br>211-681-0<br>-----<br>* 2           | F+; R12<br>T; R23   | Flam. Gas 1 (H220)<br>Acute Tox. 3 (H331)<br>Liq. Gas (H280) |

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

\* 1: Listed in Annex IV / V REACH, exempted from registration. \* 2: Registration deadline not expired.

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

Full text of R-phrases see chapter 16. Full text of H-statements see chapter 16

**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. Apply artificial respiration if breathing stopped.
- **Skin contact** : In case of skin contact, wearing rubber gloves rub 2.5% calcium gluconate gel continuously into the affected area for 1.5 hours or until further medical care is available.
- **Eye contact** : Adverse effects not expected from this product.
- **Ingestion** : Ingestion is not considered a potential route of exposure.

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

- : Prolonged exposure to small concentrations may result in pulmonary oedema. Delayed adverse effects possible.  
In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.  
May cause stomach cramps and vomiting.  
May cause irritation to the respiratory tract, sneezing, coughing, burning sensation of throat with constricting sensation of the larynx and difficulty in breathing.  
Refer to section 11.

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



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## SECTION 4. First aid measures (continued)

: None.

## SECTION 5. Fire-fighting measures

### 5.1. Extinguishing media

- Suitable extinguishing media : Dry powder.  
Water spray or fog.
- Unsuitable extinguishing media : Carbon dioxide.  
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 : If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition :  
Carbon monoxide.  
Hydrogen fluoride.

### 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 possible, stop flow of product.  
Use fire control measures appropriate to 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.  
Use water spray or fog to knock down fire fumes if possible.
- Special protective equipment for fire fighters : Gas tight chemically protective clothing in combination with self contained breathing apparatus.  
Standard EN 137 - self-contained open-circuit compressed air breathing apparatus with full face mask.  
EN 943-2: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Gas-tight chemical protective suits for emergency teams.

## SECTION 6. Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

- : Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.  
Ensure adequate air ventilation.  
Eliminate ignition sources.  
Evacuate area.  
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.  
Try to stop release.  
Consider the risk of potentially explosive atmospheres.  
Monitor concentration of released product.

### 6.2. Environmental precautions

- : Try to stop release.

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

- : Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. ( Ground free from frost).  
Ventilate area.



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## SECTION 6. Accidental release measures (continued)

### 6.4. Reference to other sections

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

: Take precautionary measures against static discharge.  
Keep away from ignition sources (including static discharges).  
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.  
Avoid exposure, obtain special instructions before use.  
Do not smoke while handling product.  
Avoid suck back of water, acid and alkalis.  
Only experienced and properly instructed persons should handle gases under pressure.  
Ensure the complete gas system was (or is regularly) checked for leaks before use.  
Installation of a cross purge assembly between the cylinder and the regulator is recommended.  
Assess the risk of potentially explosive atmosphere and the need for explosion-proof equipment.  
Consider the use only non-sparking tools.  
The product must be handled in accordance with good industrial hygiene and safety procedures.  
Consider pressure relief device(s) in gas installations.

#### Safe handling of the gas receptacle

: Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.  
Protect cylinders from physical damage; do not drag, roll, slide or drop.  
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.  
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.  
Keep container valve outlets clean and free from contaminants particularly oil and water.  
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.  
Damaged valves should be reported immediately to the supplier.

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

#### Storage

: Segregate from oxidant gases and other oxidants in store. Store containers in location free from fire risk and away from sources of heat and ignition. Stored containers should be periodically checked for general condition and leakage.  
Observe all regulations and local requirements regarding storage of containers.  
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 valve guards or caps should be in place. All electrical equipment in the storage areas should be compatible with the risk of potentially explosive atmosphere. Keep away from combustible materials.

### 7.3. Specific end use(s)

: None.

**Hexafluoro-1,3-Butadiene****131****SECTION 8. Exposure controls/personal protection****8.1. Control parameters**

- DNEL: Derived no effect level (Workers) : 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.  
Alarm detectors should be used when toxic gases may be released.  
Systems under pressure should be regularly checked for leakages.  
Product to be handled in a closed system.  
Ensure exposure is below occupational exposure limits (where available).  
Consider work permit system e.g. for maintenance activities.  
Preferably use only permanent leak-tight installations (e.g. welded pipes).
- 8.2.2. Individual protection measures, e.g. personal protective equipment** : Protect eyes, face and skin from liquid splashes.  
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 safety glasses with side shields or goggles when transfilling or breaking transfer connections  
Wear safety glasses with side shields  
Standard EN 166 - Personal eye-protection.
  - **Hand protection** : Wear working gloves when handling gas containers.  
Standard EN 388 - Protective gloves against mechanical risk.
  - **Other** : Consider the use of flame resistant anti-static safety clothing.  
Standard EN ISO 14116 - Limited flame spread materials.  
Standard EN ISO 1149-5 - Protective clothing: Electrostatic properties.  
Wear safety shoes while handling containers.  
Standard EN ISO 20345 Personal protective equipment - Safety footwear.
  - **Respiratory protection** : Keep self contained breathing apparatus readily available for emergency use.  
Standard EN 137 - self-contained open-circuit compressed air breathing apparatus with full face mask.  
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.
  - **Thermal hazards** : None necessary.
- 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.  
Molar mass [g/mol] : 162  
Melting point [°C] : -132  
Boiling point [°C] : 6  
Critical temperature [°C] : Not known.  
Flash point [°C] : Not applicable for gases and gas-mixtures.

**Hexafluoro-1,3-Butadiene****131****SECTION 9. Physical and chemical properties (continued)**

|   |   |
|---|---|
| Evaporation rate (ether=1)                      | : Not applicable for gases and gas-mixtures.        |
| Flammability range [vol% in air]                | : 7 to 7  |
| Vapour pressure [20°C]                          | : 0.8 bar   |
| Relative density, gas (air=1)                   | : 5.6   |
| Relative density, liquid (water=1)              | : 1.4   |
| Solubility in water [mg/l]                      | : Not known, but considered to have low solubility. |
| Partition coefficient n-octanol/water [log Pow] | : Not known.  |
| Auto-ignition temperature [°C]                  | : Not applicable.                                   |

**9.2. Other information**

|            |  |
|------------|--|
| Other data | : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level. |
|------------|--|

**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.

**10.5. Incompatible materials**: May react violently with alkalis.  
May react with aluminium. Air, Oxidiser.  
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 toxicological effects**

|                                   |  |
|-----------------------------------|--|
| Acute toxicity                    | : May produce irregular heart beat and nervous symptoms. |
| Rat inhalation LC50 [ppm/4h]      | : 650  |
| Skin corrosion/irritation         | : No known effects from this product.                    |
| Serious eye damage/irritation     | : No known effects from this product.                    |
| Respiratory or skin sensitisation | : No known effects from this product.                    |
| Carcinogenicity                   | : No known effects from this product.                    |
| Germ cell mutagenicity            | : No known effects from this product.                    |
| Reproductive toxicity             | : No known effects from this product.                    |

**Hexafluoro-1,3-Butadiene****131****SECTION 11. Toxicological information (continued)**

|                        |  |
|------------------------|--|
| STOT-single exposure   | : Irritation to the respiratory tract.       |
| STOT-repeated exposure | : No known effects from this product.        |
| Aspiration hazard      | : Not applicable for gases and gas-mixtures. |

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

: No data available.

**12.2. Persistence and degradability**

: No data available.

**12.3. Bioaccumulative potential**

: No data available.

**12.4. Mobility in soil**

: Because of its high volatility, the product is unlikely to cause ground or water pollution.

**12.5. Results of PBT and vPvB assessment**

: No data available.

**12.6. Other adverse effects**

|                              |                                       |
|------------------------------|---------------------------------------|
| Effect on ozone layer        | : None.                               |
| Effect on the global warming | : No known effects from this product. |

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

: Must not be discharged to atmosphere.  
Toxic and corrosive gases formed during combustion should be scrubbed before discharge to atmosphere.  
Refer to the code of practice of EIGA (Doc. 30/10 "Disposal of Gases, downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods

List of hazardous waste : 16 05 04: Gases in pressure containers (including halons) containing dangerous substances.

**13.2. Additional information**

: None.

**SECTION 14. Transport information**

UN number : 3160  
Labelling ADR, IMDG, IATA



: 2.1 : flammable gas.  
2.3 : Toxic gas.

**Land transport (ADR/RID)**

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**SECTION 14. Transport information (continued)**

H.I. nr : 263  
 UN proper shipping name : LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S. (Hexafluoro-1,3-Butadiene)  
 Transport hazard class(es) : 2  
 Classification code : 2 TF  
 Packing Instruction(s) : P200  
 Tunnel Restriction : B/D Tank carriage: Passage forbidden through tunnels of category B, C, D  
 Environmental hazards : None.

**Sea transport (IMDG)**

Proper shipping name : LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S. (Hexafluoro-1,3-Butadiene)  
 Class : 2.3  
 Emergency Schedule (EmS) - Fire : F-D  
 Emergency Schedule (EmS) - Spillage : S-U  
 Packing instruction : P200  
 IMDG-Marine pollutant : No  
 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not applicable.

**Air transport (ICAO-TI / IATA-DGR)**

Proper shipping name (IATA) : LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S. (Hexafluoro-1,3-Butadiene)  
 Class : 2.3  
 Passenger and Cargo Aircraft : DO NOT LOAD IN PASSENGER AIRCRAFT.  
 Cargo Aircraft only : FORBIDDEN.

**Special precautions for user**

: - Ensure there is adequate ventilation.  
 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 :  
 - Ensure that containers are firmly secured.  
 - Ensure cylinder valve is closed and not leaking.  
 - Ensure valve outlet cap nut or plug (where provided) is correctly fitted.  
 - Ensure valve protection device (where provided) is correctly fitted.  
 Avoid transport on vehicles where the load space is not separated from the driver's compartment.

**SECTION 15. Regulatory information**

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

**EU legislation**

Restrictions on use : None.  
 Seveso directive 96/82/EC : Covered

**National legislation**

: Ensure all national/local regulations are observed.  
 - 4. BlmschV : Listed.  
 - Water hazard class WGK (Germany) : 3 - stark wassergefährdend  
 - Other regulations and technical rules : [German regulations]  
 (not complete) GefahrstoffV, BetriebssicherheitsV, BGR Regel 500 Teil 2.33: Umgang mit Gasen, Technische Regel Gase TRG 280, Technische Regeln Gefährliche Stoffe TRGS 400, 500, 510, 900. BGR 104, TRBS 2152.





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**SECTION 15. Regulatory information (continued)**

**15.2. Chemical safety assessment**

: This product is either exempt from REACH, does not meet the minimum volume threshold for a CSR or the CSA has not yet been carried out.

**SECTION 16. Other information**

- Indication of changes** : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010
- Training advice** : Ensure operators understand the flammability hazard.  
Users of breathing apparatus must be trained.  
Ensure operators understand the toxicity hazard.
- List of full text of R-phrases in section 3.** : R12 : Extremely flammable.  
R23 : Toxic by inhalation.
- List of full text of H-statements in section 3.** : H220 - Extremely flammable gas.  
H280 - Contains gas under pressure; may explode if heated.  
H331 - Toxic if inhaled.
- Note** : This Safety Data Sheet has been established in accordance with the applicable European Union legislation.
- 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.

**End of document**