# Hexafluoroethane (R116)

Safety Data Sheet 906851

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 09/02/2016 Version: 2.0

## SECTION 1: Identification

### 1.1. Identification

| | | |
|---|---|---|
| Product form | : | Substance |
| Substance name | : | Hexafluoroethane (R116) |
| CAS No | : | 76-16-4 |
| Product code | : | SG-1001-07264 |
| Formula | : | C2F6 |
| Synonyms | : | Ethane, hexafluoro- / F 116 / Freon 116 / Perfluoroethane / R 116 / FC-116 / Refrigerant gas R116 / PFC-116 |

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

| | | |
|---|---|---|
| Use of the substance/mixture | : | Semiconductor Purposes<br>Manufacture of substances |

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

Air Liquide USA LLC and its affiliates
9811 Katy Freeway, Suite 100
Houston, TX 77024 - USA
T 1-800-819-1704
www.us.airliquide.com

### 1.4. Emergency telephone number

| | | |
|---|---|---|
| Emergency number | : | CHEMTREC: 1-800-424-9300 |

## SECTION 2: Hazard(s) identification

### 2.1. Classification of the substance or mixture

**GHS-US classification**

Gases under pressure Liquefied gas H280

Full text of H statements : see section 16

### 2.2. Label elements

**GHS-US labeling**

Hazard pictograms (GHS-US) :

GHS04

Signal word (GHS-US) : Warning

Hazard statements (GHS-US) :
H280 - Contains gas under pressure; may explode if heated
OSHA-H01 - May displace oxygen and cause rapid suffocation
CGA-HG01 - May cause frostbite

Precautionary statements (GHS-US) :
P202 - Do not handle until all safety precautions have been read and understood
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear eye protection, face protection, protective gloves, protective clothing
P302 - IF ON SKIN: Thaw frosted parts with lukewarm water. Do not rub affected area, Get immediate medical advice/attention
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P308+P313 - If exposed or concerned: Get medical advice/attention
P403 - Store in a well-ventilated place
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52 oC/125 oF
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG06 - Close valve after each use and when empty
CGA-PG10 - Use only with equipment rated for cylinder pressure
CGA-PG14 - Approach suspected leak area with caution
CGA-PG21 - Open valve slowly

### 2.3. Other hazards

No additional information available

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substance

| Name | Product identifier | % | GHS-US classification |
|---|---|---|---|
| Hexafluoroethane (R116)<br>(Main constituent) | (CAS No) 76-16-4 | > 99 | Liquefied gas, H280 |

Full text of H-phrases: see section 16

### 3.2. Mixture

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.

First-aid measures after skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

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

Symptoms/injuries after inhalation : May displace oxygen and cause rapid suffocation.

Symptoms/injuries after skin contact : May cause frostbite.

Symptoms/injuries after eye contact : Contact with the product may cause cold burns or frostbite.

Symptoms/injuries after ingestion : Ingestion is not considered a potential route of exposure.

Symptoms/injuries upon intravenous administration : Not known.

Chronic symptoms : Adverse effects not expected from this product.

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

If you feel unwell, seek medical advice. If breathing is difficult, give oxygen.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

Unsuitable extinguishing media : Do not use water jet to extinguish.

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

Fire hazard : The product is not flammable.

Explosion hazard : Product is not explosive. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

Reactivity : None known.

### 5.3. Advice for firefighters

Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.

Protection during firefighting : Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for fire fighters. Do not enter fire area without proper protective equipment, including respiratory protection.

## SECTION 6: Accidental release measures

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

General measures : Ensure adequate ventilation.

#### 6.1.1. For non-emergency personnel

Protective equipment : Wear protective equipment consistent with the site emergency plan.

Emergency procedures : Evacuate personnel to a safe area. Close doors and windows of adjacent premises. Keep containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.

#### 6.1.2. For emergency responders

| | | |
|---|---|---|
| Protective equipment | : | Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for fire fighters. Equip cleanup crew with proper protection. |
| Emergency procedures | : | Evacuate and limit access. Ventilate area. |

### 6.2. Environmental precautions

Try to stop release if without risk.

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

| | | |
|---|---|---|
| For containment | : | Try to stop release if without risk. |
| Methods for cleaning up | : | Dispose of contents/container in accordance with local/regional/national/international regulations. |

### 6.4. Reference to other sections

See also Sections 8 and 13.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

| | | |
|---|---|---|
| Additional hazards when processed | : | Pressurized container: Do not pierce or burn, even after use. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. |
| Precautions for safe handling | : | Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. |
| Hygiene measures | : | Do not eat, drink or smoke when using this product. |

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

| | | |
|---|---|---|
| Technical measures | : | Comply with applicable regulations. |
| Storage conditions | : | Do not expose to temperatures exceeding 52 °C/ 125 °F. Keep container closed when not in use. Protect cylinders from physical damage; do not drag, roll, slide or drop. Store in well ventilated area. |
| Incompatible products | : | None known. |
| Incompatible materials | : | None known. |

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

No additional information available

### 8.2. Exposure controls

| | | |
|---|---|---|
| Appropriate engineering controls | : | Ensure exposure is below occupational exposure limits (where available). Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Oxygen detectors should be used when asphyxiating gases may be released. Consider work permit system e.g. for maintenance activities. |
| Hand protection | : | Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand protection. |
| Eye protection | : | Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection. |
| Skin and body protection | : | Wear suitable protective clothing, e.g. lab coats, coveralls or flame resistant clothing. |
| Respiratory protection | : | None necessary during normal and routine operations. See Sections 5 & 6. |
| Thermal hazard protection | : | None necessary during normal and routine operations. |
| Environmental exposure controls | : | Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. |
| Other information | : | Wear safety shoes while handling containers. 29 CFR 1910.136: Foot Protection. |

## SECTION 9: Physical and chemical properties

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

| | | |
|---|---|---|
| Physical state | : | Gas |
| Appearance | : | Clear, colorless gas. |
| Color | : | Colorless |
| Odor | : | Odorless |
| Odor threshold | : | No data available |
| pH | : | Not applicable. |
| Melting point | : | -101 °C |

| | | |
|---|---|---|
| Freezing point | : | -101 °C |
| Boiling point | : | -77.25 °C |
| Critical temperature | : | 20.85 °C |
| Critical pressure | : | 3060 kPa |
| Flash point | : | Not applicable. |
| Relative evaporation rate (butyl acetate=1) | : | No data available |
| Relative evaporation rate (ether=1) | : | Not applicable. |
| Flammability (solid, gas) | : | See Section 2.1 and 2.2 |
| Explosion limits | : | Non flammable. |
| Explosive properties | : | Not applicable (non-flammable gas). |
| Oxidizing properties | : | None. |
| Vapor pressure | : | 3000 kPa |
| Relative density | : | 1.23 |
| Relative vapor density at 20 °C | : | 4.8 |
| Molecular mass | : | 138.02 g/mol |
| Relative gas density | : | 4.8 |
| Solubility | : | Water: No data available |
| Log Pow | : | 2 |
| Auto-ignition temperature | : | No data available |
| Decomposition temperature | : | No data available |
| Viscosity | : | No data available |
| Viscosity, kinematic | : | Not applicable. |
| Viscosity, dynamic | : | Not applicable. |

### 9.2. Other information

Gas group : Liquefied gas

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

None known.

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

None known.

### 10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

### 10.5. Incompatible materials

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 : Not classified

| Hexafluoroethane (R116) (76-16-4) | |
|---|---|
| LC50 inhalation rat (ppm) | 141400 ppm/4h |
| ATE US (gases) | 141400.000 ppmV/4h |

Skin corrosion/irritation : Not classified
pH: Not applicable.

Serious eye damage/irritation : Not classified
pH: Not applicable.

Respiratory or skin sensitization : Not classified

| | | |
|---|---|---|
| Germ cell mutagenicity | : | Not classified |
| Carcinogenicity | : | Not classified |
| Reproductive toxicity | : | Not classified |
| Specific target organ toxicity (single exposure) | : | Not classified |
| Specific target organ toxicity (repeated exposure) | : | Not classified |
| Aspiration hazard | : | Not classified |
| Symptoms/injuries after inhalation | : | May displace oxygen and cause rapid suffocation. |
| Symptoms/injuries after skin contact | : | May cause frostbite. |
| Symptoms/injuries after eye contact | : | Contact with the product may cause cold burns or frostbite. |
| Symptoms/injuries after ingestion | : | Ingestion is not considered a potential route of exposure. |
| Symptoms/injuries upon intravenous administration | : | Not known. |
| Chronic symptoms | : | Adverse effects not expected from this product. |

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general : No data available.

### 12.2. Persistence and degradability

| Hexafluoroethane (R116) (76-16-4) | |
|---|---|
| Persistence and degradability | No data available. |

### 12.3. Bioaccumulative potential

| Hexafluoroethane (R116) (76-16-4) | |
|---|---|
| Log Pow | 2 |
| Bioaccumulative potential | Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9. |

### 12.4. Mobility in soil

| Hexafluoroethane (R116) (76-16-4) | |
|---|---|
| Ecology - soil | Because of its high volatility, the product is unlikely to cause ground or water pollution. |

### 12.5. Other adverse effects

Effect on ozone layer : No known effects from this product

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste treatment methods : Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded.

Waste disposal recommendations : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.

## SECTION 14: Transport information

### Department of Transportation (DOT)

In accordance with DOT

| | | |
|---|---|---|
| Transport document description | : | UN2193 Hexafluoroethane, 2.2 |
| UN-No.(DOT) | : | UN2193 |
| Proper Shipping Name (DOT) | : | Hexafluoroethane |
| Class (DOT) | : | 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115 |

| | | |
|---|---|---|
| Hazard labels (DOT) | : | 2.2 - Non-flammable gas |


| | | |
|---|---|---|
| DOT Packaging Non Bulk (49 CFR 173.xxx) | : | 304 |
| DOT Packaging Bulk (49 CFR 173.xxx) | : | 314;315 |
| DOT Packaging Exceptions (49 CFR 173.xxx) | : | 306 |
| DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) | : | 75 kg |
| DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) | : | 150 kg |
| DOT Vessel Stowage Location | : | A - The material may be stowed ''on deck'' or ''under deck'' on a cargo vessel and on a passenger vessel |
| Emergency Response Guide (ERG) Number | : | 126 |
| Other information | : | No supplementary information available. |
| 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: - Ensure there is adequate ventilation. - 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. |

### TDG

| | | |
|---|---|---|
| Transport document description | : | UN2193 HEXAFLUOROETHANE, 2.2 |
| UN-No. (TDG) | : | UN2193 |
| Proper Shipping Name | : | HEXAFLUOROETHANE |
| TDG Primary Hazard Classes | : | 2.2 - Class 2.2 - Non-Flammable, Non-Toxic Gas. |
| Explosive Limit and Limited Quantity Index | : | 0.125 L |
| Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index | : | 75 L |

### Transport by sea

| | | |
|---|---|---|
| UN-No. (IMDG) | : | 2193 |
| Proper Shipping Name (IMDG) | : | HEXAFLUOROETHANE (REFRIGERANT GAS R 116) |
| Class (IMDG) | : | 2 - Gases |
| MFAG-No | : | 126 |

### Air transport

| | | |
|---|---|---|
| UN-No. (IATA) | : | 2193 |
| Proper Shipping Name (IATA) | : | Hexafluoroethane |
| Class (IATA) | : | 2 |

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

| **Hexafluoroethane (R116) (76-16-4)** |
|---|
| Listed on the United States TSCA (Toxic Substances Control Act) inventory |

### 15.2. International regulations

#### CANADA

| **Hexafluoroethane (R116) (76-16-4)** | |
|---|---|
| Listed on the Canadian DSL (Domestic Substances List) | |
| WHMIS Classification | Class A - Compressed Gas |

#### EU-Regulations

| **Hexafluoroethane (R116) (76-16-4)** |
|---|
| Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) |

### National regulations

| Hexafluoroethane (R116) (76-16-4) |
|---|
| Listed on the AICS (Australian Inventory of Chemical Substances) |
| Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) |
| Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory |
| Listed on the Korean ECL (Existing Chemicals List) |
| Listed on NZIoC (New Zealand Inventory of Chemicals) |
| Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) |
| Listed on INSQ (Mexican National Inventory of Chemical Substances) |

### 15.3. US State regulations

| Hexafluoroethane (R116) (76-16-4) | |
|---|---|
| State or local regulations | U.S. - New Jersey - Right to Know Hazardous Substance List |

## SECTION 16: Other information

Other information : This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product.

Full text of H-phrases:

| | |
|---|---|
| H280 | Contains gas under pressure; may explode if heated |

SDS US (GHS HazCom 2012)

*This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide USA LLC and its affiliates' knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.*