

### SECTION 1: Identification

#### 1.1. Identification

Product form	: Substance
Substance name	: Bromopentafluoroethane
CAS-No.	: 354-55-2
Product code	: SG-1001-06811
Formula	: C2BrF5
Synonyms	: PENTAFLUOROETHYL BROMIDE / PERFLUOROETHYL BROMIDE / HALON 2501 / BFC-115B1

#### 1.2. Recommended use and restrictions on use

Use of the substance/mixture	: Semiconductor Purposes Laboratory chemicals Manufacture of substances
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#### 1.3. Supplier

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](http://www.us.airliquide.com)

#### 1.4. Emergency telephone number

Emergency number	: Chemtrec: 1-800-424-9300
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### SECTION 2: Hazard(s) identification

#### 2.1. Classification of the substance or mixture

##### GHS-US classification

Gases under pressure	H280	Contains gas under pressure; may explode if heated
Liquefied gas		
Skin corrosion/irritation	H315	Causes skin irritation
Category 2		
Serious eye damage/eye irritation Category 2A	H319	Causes serious eye irritation
Specific target organ toxicity (single exposure)	H335	May cause respiratory irritation
Category 3		

Full text of H statements : see section 16

#### 2.2. GHS Label elements, including precautionary statements

##### GHS-US labeling

Hazard pictograms (GHS-US)	:	 
		GHS04      GHS07

Signal word (GHS-US)	: Warning
Hazard statements (GHS-US)	: H280 - Contains gas under pressure; may explode if heated H315 - Causes skin irritation H319 - Causes serious eye irritation H335 - May cause respiratory irritation 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. P261 - Avoid breathing gas. 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.

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P302+P352 - If on skin: Wash with plenty of water  
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.  
P405 - Store locked up.  
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations  
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing  
P362 - Take off contaminated clothing and wash before reuse.  
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C/125 °F  
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 which do not result in classification

No additional information available

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

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Name	Product identifier	%	GHS-US classification
Bromopentafluoroethane (Main constituent)	(CAS-No.) 354-55-2	> 99	Press. Gas (Liq.), H280 Skin Irrit. 2, H315 Eye Irrit. 2A, H319 STOT SE 3, H335

Full text of hazard classes and H-statements : see section 16

### 3.2. Mixtures

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. Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse.
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 (acute and delayed)

Symptoms/effects after inhalation	: May displace oxygen and cause rapid suffocation. May cause respiratory irritation.
Symptoms/effects after skin contact	: May cause frostbite. Causes skin irritation.
Symptoms/effects after eye contact	: Contact with the product may cause cold burns or frostbite. Causes serious eye irritation.
Symptoms/effects after ingestion	: Ingestion is not considered a potential route of exposure.
Symptoms/effects upon intravenous administration	: Not known.
Chronic symptoms	: Adverse effects not expected from this product.

### 4.3. Immediate medical attention and special treatment, if necessary

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

## SECTION 5: Fire-fighting measures

### 5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media	: Use extinguishing media appropriate for surrounding fire.
Unsuitable extinguishing media	: Do not use water jet to extinguish.

### 5.2. Specific hazards arising from the chemical

Fire hazard	: The product is not flammable.
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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. Special protective equipment and precautions for fire-fighters

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.
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#### 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. Store locked up.
Incompatible products	: None known.
Incompatible materials	: None known.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

No additional information available

### 8.2. Appropriate engineering 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 the use of a work permit system e.g. for maintenance activities.
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Environmental exposure controls : Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

### 8.3. Individual protection measures/Personal protective equipment

#### 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.

#### 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	: No data available
Odor threshold	: No data available
pH	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: -21 °C (at 1013.25 hPa)
Flash point	: Not applicable (non-flammable gas)
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: See Section 2.1 and 2.2
Vapor pressure	: No data available
Relative vapor density at 20 °C	: No data available
Relative density	: No data available
Specific gravity / density	: 1.8098 g/cm <sup>3</sup> (at 25 °C)
Molecular mass	: 198.92 g/mol
Relative gas density	: Heavier than air
Solubility	: Water: No data available
Log Pow	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosion limits	: Not applicable (non-flammable gas)
Explosive properties	: Not applicable (non-flammable gas).
Oxidizing properties	: None.

### 9.2. Other information

Refractive index : 1.2966 30 C

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Gas group	: Press. Gas (Liq.)
Additional information	: Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level

### 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

Strong oxidizing agents.

#### 10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. Thermal decomposition generates : Carbon oxides. Hydrogen bromide. Hydrogen fluoride.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity	: Not classified
Skin corrosion/irritation	: Causes skin irritation.
Serious eye damage/irritation	: Causes serious eye irritation.
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity – single exposure	: May cause respiratory irritation.
Specific target organ toxicity – repeated exposure	: Not classified
Aspiration hazard	: Not classified
Symptoms/effects after inhalation	: May displace oxygen and cause rapid suffocation. May cause respiratory irritation.
Symptoms/effects after skin contact	: May cause frostbite. Causes skin irritation.
Symptoms/effects after eye contact	: Contact with the product may cause cold burns or frostbite. Causes serious eye irritation.
Symptoms/effects after ingestion	: Ingestion is not considered a potential route of exposure.
Symptoms/effects upon intravenous administration	: Not known.
Chronic symptoms	: Adverse effects not expected from this product.

### SECTION 12: Ecological information

#### 12.1. Toxicity

No additional information available

#### 12.2. Persistence and degradability

No additional information available

#### 12.3. Bioaccumulative potential

No additional information available

#### 12.4. Mobility in soil

No additional information available

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### 12.5. Other adverse effects

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

## SECTION 13: Disposal considerations

### 13.1. Disposal 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.

Product/Packaging disposal recommendations : Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at [www.cganet.com](http://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 : UN3163 Liquefied gas, n.o.s. (Bromopentafluoroethane), 2.2

UN-No.(DOT) : UN3163

Proper Shipping Name (DOT) : Liquefied gas, n.o.s.

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 Symbols : G - Identifies PSN requiring a technical name

DOT Special Provisions (49 CFR 172.102) : T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter.

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.

Other information : No supplementary information available.

### Transportation of Dangerous Goods

Transport document description : UN3163 LIQUEFIED GAS, N.O.S., 2.2

UN-No. (TDG) : UN3163

Proper Shipping Name : LIQUEFIED GAS, N.O.S.

TDG Primary Hazard Classes : 2.2 - Class 2.2 - Non-Flammable, Non-Toxic Gas.

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TDG Special Provisions	: 16 - (1) The technical name of at least one of the most dangerous substances that predominantly contributes to the hazard or hazards posed by the dangerous goods must be shown, in parentheses, on the shipping document following the shipping name in accordance with clause 3.5(1)(c)(ii)(A) of Part 3 (Documentation). The technical name must also be shown, in parentheses, on a small means of containment or on a tag following the shipping name in accordance with subsections 4.11(2) and (3) of Part 4 (Dangerous Goods Safety Marks). (2) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a shipping document or on a small means of containment when Canadian law for domestic transport or an international convention for international transport prohibits the disclosure of the technical name: (a)UN1544, ALKALOID SALTS, SOLID, N.O.S. or ALKALOIDS, SOLID, N.O.S; (b)UN1851, MEDICINE, LIQUID, TOXIC, N.O.S; (c)UN3140, ALKALOID SALTS, LIQUID, N.O.S. or ALKALOIDS, LIQUID, N.O.S; (d)UN3248, MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S; or (e)UN3249, MEDICINE, SOLID, TOXIC, N.O.S. An example in Canada is the "Food and Drugs Act". (3) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a small means of containment: (a)UN2814, INFECTIOUS SUBSTANCE, AFFECTING HUMANS; or (b)UN2900, INFECTIOUS SUBSTANCE, AFFECTING ANIMALS. SOR/2014-306
Explosive Limit and Limited Quantity Index	: 0.125 L
Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index	: 75 L

### Transport by sea

Transport document description (IMDG)	: UN 3163 LIQUEFIED GAS, N.O.S., 2
UN-No. (IMDG)	: 3163
Proper Shipping Name (IMDG)	: LIQUEFIED GAS, N.O.S.
Class (IMDG)	: 2 - Gases
Limited quantities (IMDG)	: 120 ml

### Air transport

Transport document description (IATA)	: UN 3163 LIQUEFIED GAS, N.O.S., 2.2
UN-No. (IATA)	: 3163
Proper Shipping Name (IATA)	: LIQUEFIED GAS, N.O.S.
Class (IATA)	: 2

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

No additional information available

### 15.2. International regulations

#### CANADA

No additional information available

#### EU-Regulations

##### Bromopentafluoroethane (354-55-2)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

#### National regulations

No additional information available

### 15.3. US State regulations

No additional information available

## 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.
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Full text of H-phrases:

H280	Contains gas under pressure; may explode if heated
H315	Causes skin irritation
H319	Causes serious eye irritation
H335	May cause respiratory irritation

SDS US (GHS HazCom 2012)

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