This document does not contain any US export controlled technical data.

Heptfluoropropane (HFC-227ea) and Kiddex® (5% and 10%) (Pressurized with Nitrogen)
1. IDENTIFICATION

Product Name
Heptafluoropropane (HFC-227ea) and Kiddex® (5% and 10%) (Pressurized with Nitrogen)

Other Names
HFC227-BC

Recommended use of the chemical and restrictions on use
Identified uses
Fire Extinguishing Agent

Restrictions on Use
Consult applicable fire protection codes

Company Identification
UTC Aerospace Systems
4200 Airport Drive, NW
Wilson, NC 27896

Customer Information Number
(253) 237-7004

Emergency Telephone Number
3E Company
1-800-451-8386 Site Code: 33067

Issue Date
July 15, 2015

Supersedes Date
Rev. A, July 10, 2013

Safety Data Sheet prepared in accordance with OSHA’s Hazard Communication Standard (29 CFR 1910.1200) and the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

2. HAZARD IDENTIFICATION

Hazard Classification
Gas under pressure – Liquefied gas
Simple asphyxiant

Label Elements
Hazard Symbols

Signal Word: Warning

Hazard Statements
Contents under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary Statements
Prevention
Do not enter confined space unless adequately ventilated.
In case of inadequate ventilation wear respiratory protection.

Response
None

Storage
Protect from sunlight and store in well-ventilated place.
Keep container tightly closed.
2. HAZARD IDENTIFICATION

Disposal

None

Other Hazards
Direct contact with the cold gas or liquid can cause freezing of exposed tissues. Exposure to vapor at high concentrations can cause cardiac sensitization and suffocation if air is displaced by vapors.

Specific Concentration Limits
The values listed below represent the percentages of ingredients of unknown toxicity.
- Acute oral toxicity: 0%
- Acute dermal toxicity: 0%
- Acute inhalation toxicity: 0%
- Acute aquatic toxicity: 5 - 15%

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: HFC227-BC
This product is a substance.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS Number</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,2,3,3,3-Heptafluoropropane</td>
<td>431-89-0</td>
<td>&gt;90%</td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>144-55-8</td>
<td>1 – 10%</td>
</tr>
<tr>
<td>Amorphous Silica</td>
<td>7631-86-9</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

Note: This product uses nitrogen as the expellant and also contains a small amount of helium.

4. FIRST-AID MEASURES

Description of necessary first-aid measures

Eyes
Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

Skin
Flush with water. Obtain medical attention if frostbite or blistering occurs or redness persists.

Ingestion
Ingestion is not considered a potential route of exposure.

Inhalation
Remove from exposure. If there is difficulty in breathing, give oxygen. Obtain medical attention immediately.

Most important symptoms/effects, acute and delayed
Aside from the information found under Description of necessary first aid measures (above) and Indication of immediate medical attention and special treatment needed, no additional symptoms and effects are anticipated.
SAFETY DATA SHEET
Heptafluoropropane (HFC-227ea) and Kiddex® (5% and 10%)
(Pressurized with Nitrogen)

4. FIRST- AID MEASURES

Indication of immediate medical attention and special treatment needed

Notes to Physicians
In case of frostbite, place the frostbitten part in warm water. If warm water is not available or impractical to use, wrap the affected parts gently in blankets. DO NOT USE HOT WATER. The use of epinephrine or similar compounds can increase susceptibility to heart irregularities caused by excessive exposure to these types of compounds.

5. FIRE - FIGHTING MEASURES

Suitable Extinguishing Media
This preparation is used as an extinguishing agent and therefore is not a problem when trying to control a fire. Use extinguishing agent appropriate to other materials involved. Keep pressurized containers and surroundings cool with water spray as they may rupture or burst in the heat of a fire.

Specific hazards arising from the chemical
Pressurized containers may explode in heat of fire.

Special Protective Actions for Fire-Fighters
Wear full protective clothing and self-contained breathing apparatus as appropriate for specific fire conditions.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Wear full protective clothing and self-contained breathing apparatus. Remove leaking cylinder to a safe place. Ventilate the area. Leaks inside confined spaces may cause suffocation as vapors may displace air, and should not be entered without a self-contained breathing apparatus.

Environmental Precautions
Prevent the material from being released into the environment.

Methods and materials for containment and cleaning up
Sweep up or vacuum and transfer into suitable containers for recovery or disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Wear appropriate protective clothing. Prevent skin and eye contact.

Conditions for safe storage
Pressurized containers should be properly stored and secured to prevent falling or being knocked over. Do not drag, slide or roll pressurized containers. Do not drop pressurized containers or permit them to strike against each other. Never apply flame or localized heat directly to any part of the pressurized or plastic container. Store pressurized and plastic containers away from high heat sources. Storage area should be: cool - dry - well ventilated - under cover - out of direct sunlight.
8. **EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Control parameters**
Exposure limits are listed below, if they exist.

**1,1,1,2,3,3,3-Heptafluoropropane**
None assigned.

**Silica: Amorphous, including diatomaceous earth**
OSHA: PEL 20 mppcf 8h TWA
0.8 mg/m$^3$ 8h TWA

The exposure limit is calculated from the equation, $80/($%SiO$_2$), using a value of 100% SiO$_2$. Lower values of % SiO$_2$ will give higher exposure limits.

**Nuisance Dust Limit**
OSHA PEL: 50 mppcf or 15 mg/m$^3$ TWA, total dust
15 mppcf or 5 mg/m$^3$ TWA, respirable fraction

**Appropriate engineering controls**
Use with adequate ventilation. There should be local procedures for the selection, training, inspection and maintenance of this equipment. When used in large volumes, use local exhaust ventilation.

**Individual protection measures**

**Respiratory Protection**
Use dust mask where dustiness is prevalent, or TLV is exceeded. In oxygen deficient atmospheres, use a self-contained breathing apparatus, as an air purifying respirator will not provide protection.

**Skin Protection**
Rubber gloves.

**Eye/Face Protection**
Chemical goggles or safety glasses with side shields.

**Body Protection**
Normal work wear.

9. **PHYSICAL AND CHEMICAL PROPERTIES**

**Agent**

**Appearance**
Liquefied gas under pressure (Heptafluoropropane)

**Physical State**
Colorless

**Color**
Slight ether like (Heptafluoropropane)

**Odor**
No data available

**Odor Threshold**
Neutral

**pH**
1.46 (Heptafluoropropane)

**Specific Gravity**
-16.4°C/3 °F (Heptafluoropropane)

**Boiling Range/Point (°C/F)**
-129.5°C/265 °F (Heptafluoropropane)

**Melting Point (°C/F)**
Not flammable

**Flash Point (PMCC) (°C/F)**
540 hPa at -30 °C (Heptafluoropropane)
29,360 hPa at 123 °C (Heptafluoropropane)

**Vapor Pressure**
29,360 hPa at 123 °C (Heptafluoropropane)

**Evaporation Rate (BuAc=1)**
Not applicable

**Solubility in Water**
0.23 g/l at 25°C (Heptafluoropropane)

**Vapor Density (Air = 1)**
5.8 (Heptafluoropropane)
9. PHYSICAL AND CHEMICAL PROPERTIES

- VOC (%): Not applicable
- Partition coefficient (n-octanol/water): 2289 (Heptafluoropropane)
- Viscosity: Not applicable
- Auto-ignition Temperature: No data available
- Decomposition Temperature: No data available

**Expellant**
- Appearance: Compressed gas
- Physical State: Colorless
- Color: None
- Odor: None
- Odor Threshold: No data available
- pH: Not applicable
- Specific Gravity: 1.251 g/l (Nitrogen), 0.1786 g/l (Helium)
- Boiling Range/Point (°C/F): -196 °C/-321 °F (Nitrogen), -268.9 °C/-109.3 °F (Helium)
- Melting Point (°C/F): -210 °C/-346 °F (Nitrogen), -272.2 °C/-452.0 °F (Helium)
- Flash Point (PMCC) (°C/F): Not flammable
- Vapor Pressure: No data available
- Evaporation Rate (BuAc=1): No data available
- Solubility in Water: No data available
- Vapor Density (Air = 1): Not applicable
- VOC (g/l): None
- VOC (%): None
- Partition coefficient (n-octanol/water): No data available
- Viscosity: Not applicable
- Auto-ignition Temperature: No data available
- Decomposition Temperature: No data available
- Upper explosive limit: Not explosive
- Lower explosive limit: Not explosive
- Flammability (solid, gas): Not flammable

10. STABILITY AND REACTIVITY

**Reactivity**
Decomposes on heating. Containers may rupture or explode if exposed to heat.

**Chemical Stability**
Stable under normal conditions.

**Possibility of hazardous reactions**
Hazardous polymerization will not occur.

**Conditions to Avoid**
Heat - High temperatures - Exposure to direct sunlight
10. STABILITY AND REACTIVITY

Incompatible Materials
Powdered metals (ex. aluminum, zinc, etc.) - strong oxidizing agents – strong reducing agents – strong alkalis

Hazardous Decomposition Products
Oxides of carbon – hydrogen halides – fluorocarbons – carbonyl halides

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
Heptfluoropropane
4 hour LC50(rat) >788,698 ppm
Low Observed Adverse Effect Concentration (LOAEC)/dog : 105000 ppm
Cardiac sensitization
No Observed Adverse Effect Concentration (NOAEC)/dog : 90000 ppm
Sodium Bicarbonate:
Oral LD50 (Rat) >4000 mg/kg
Inhalation LC50(rat) >4.74 mg/l
Amorphous Silica:
Oral LD50 (Rat) >5000 mg/kg
Dermal LD50 (Rabbit) >2000mg/kg
Nitrogen
Simple asphyxiant
Helium
Simple asphyxiant

Specific Target Organ Toxicity (STOT) – single exposure
Nitrogen and Helium: Exposure to nitrogen and helium gas at high concentrations can cause suffocation by reducing oxygen available for breathing. Breathing very high concentrations can cause dizziness, shortness of breath, unconsciousness or asphyxiati.on.

Specific Target Organ Toxicity (STOT) – repeat exposure
No data available.

Serious Eye damage/Irritation
Sodium Bicarbonate: Slightly irritating (rabbit)
Heptfluoropropane: No data available.

Skin Corrosion/Irritation
Sodium Bicarbonate: Slightly irritating (rabbit)
Heptfluoropropane: No data available.

Respiratory or Skin Sensitization
Heptfluoropropane: Not expected to cause skin sensitization based on review of properties of the substance. Did not cause respiratory sensitization in laboratory animals.

Carcinogenicity
Not considered carcinogenic by NTP, IARC, and OSHA.
11. TOXICOLOGICAL INFORMATION

Germ Cell Mutagenicity
Heptafluoropropane: Animal testing and testing on bacterial or mammalian cell cultures did not show mutagenic effects.
Sodium Bicarbonate: Negative test results in animal studies.

Reproductive Toxicity
Heptafluoropropane: Animal testing showed no reproductive toxicity. (Based on data obtained from similar substances.) Animal testing showed no developmental toxicity.
Sodium Bicarbonate: Available data indicates this component is not expected to cause reproductive toxicity or birth defects.

Aspiration Hazard
Not an aspiration hazard.

Other
Heptafluoropropane: Cardiac sensitization threshold limit : 730190 mg/m3

12. ECOLOGICAL INFORMATION

Ecotoxicity
Heptafluoropropane
LC50 > 200 mg/l zebra fish 96h
EC50> 200 mg/l Water flea 48h
Sodium Bicarbonate:
LC50 Lepomis macrochirus 7100 mg/l 96h
EC50 Daphnia magna 4100 mg/l 48h

Mobility in soil
Nitrogen occurs naturally in the atmosphere.

Persistence/Degradability
Nitrogen occurs naturally in the atmosphere.

Bioaccumulative Potential
Nitrogen occurs naturally in the atmosphere.

Other adverse effects
No relevant studies identified.

13. DISPOSAL CONSIDERATIONS

Disposal Methods
Dispose of container in accordance with all applicable local and national regulations. Do not cut, puncture or weld on or near to the pressurized container. If spilled, expellant will vaporize to the atmosphere.
14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>DOT CFR 172.101 Data</th>
<th>Compressed Gas, N.O.S., (Heptafluoropropane, Nitrogen), (2.2) UN1956</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Proper Shipping Name</td>
<td>Compressed Gas, N.O.S., (Heptafluoropropane, Nitrogen)</td>
</tr>
<tr>
<td>UN Class</td>
<td>(2.2)</td>
</tr>
<tr>
<td>UN Number</td>
<td>UN1956</td>
</tr>
<tr>
<td>UN Packaging Group</td>
<td>None</td>
</tr>
<tr>
<td>Classification for AIR Transportation (IATA)</td>
<td>Consult current IATA Regulations prior to shipping by air.</td>
</tr>
</tbody>
</table>

Containers must be shipped with the appropriate safety caps.

15. REGULATORY INFORMATION

United States TSCA Inventory
All components of this product are in compliance with the inventory listing requirements of the US Toxic Substance Control Act (TSCA) Chemical Substance Inventory.

Canada DSL Inventory
All ingredients in this product have been verified for inclusion on the Domestic Substance List (DSL).

SARA Title III Sect. 311/312 Categorization
Pressure Hazard

SARA Title III Sect. 313
This product does not contain any chemicals that are listed in Section 313 at or above de minimis concentrations.

California Proposition 65
This product does not contain materials which the State of California has found to cause cancer, birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Ratings
NFPA Code for Health - 1
NFPA Code for Flammability - 0
NFPA Code for Reactivity - 1
NFPA Code for Special Hazards - None

HMIS Ratings
HMIS Code for Health - 1
HMIS Code for Flammability - 0
HMIS Code for Physical Hazard - 1
HMIS Code for Personal Protection - See Section 8
*Chronic
16. OTHER INFORMATION

Legend
ACGIH: American Conference of Governmental Industrial Hygienists
CAS#: Chemical Abstracts Service Number
EC50: Effect Concentration 50%
IARC: International Agency for Research on Cancer
LC50: Lethal Concentration 50%
LD50: Lethal Dose 50%
N/A: Denotes no applicable information found or available
OSHA: Occupational Safety and Health Administration
PEL: Permissible Exposure Limit
RQ: Reportable Quantity
STEL: Short Term Exposure Limit
TLV: Threshold Limit Value
TSCA: Toxic Substance Control Act

Revision Date: July 15, 2015
Changes made: Updated to GHS Classification.

Information Source and References
This SDS is prepared by Hazard Communication Specialists based on information provided by internal company references.

Prepared By: EnviroNet LLC.

Kiddex is a registered trademark of Kidde IP Holdings Inc.

The information and recommendations presented in this SDS are based on sources believed to be accurate. UTC Aerospace Systems assumes no liability for the accuracy or completeness of this information. It is the user’s responsibility to determine the suitability of the material for their particular purposes. In particular, we make NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, with respect to such information, and we assume no liability resulting from its use. Users should ensure that any use or disposal of the material is in accordance with applicable Federal, State, and local laws and regulations.