SAFETY DATA SHEET

1. SECTION 1 – IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

IDENTIFICATION of the SUBSTANCE or PREPARATION:

PRODUCT NAME: NOVEC 1230
CHEMICAL NAMES: 1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone
OTHER MEANS OF IDENTIFICATION/SYNONYMS: FK-5-1,12, 3-Pentanone, 1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-
Pentafluoro(2-Methyl-3-Pentanone); Heptafluoroisopropyl Pentafluoroethyl Ketone

RELEVANT PRODUCT USE: Fire Extinguishing Material

USES ADVISED AGAINST: Other than Relevant Use

COMPANY/UNDERTAKING IDENTIFICATION:

U.S. SUPPLIER: H3R Clean Agents, Inc.
ADDRESS: 103 H Street
Petaluma, CA, U.S.A. 94952
PHONE: 1-800-249-4289 or 415-945-0800 (8:00 a.m. to 4:30 p.m. PST)
FAX: 1-707-765-3395
EMAIL ADDRESS: h3rinfo@h3rcleanagents.com WEB SITE: www.h3rcleanagents.com
EMERGENCY PHONE: CHEMTREC: 1-800-424-9300 or 703-527-3887 (U.S./Canada/Puerto Rico) [24-hours]
DATE OF PREPARATION: August 9, 2014
DATE OF REVISION: May 24, 2019

SECTION 2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION: Classified in accordance with the Global Harmonization Standard under U.S., Canadian and European Union regulations. This is a combination of harmonized classification, notified classification and self-classification.

Classification: Gases Under Pressure/Liquefied Gas, Aquatic Chronic Toxicity Category 3
Signal Word: Warning
Hazard Statements: H280: Contains gas under pressure; may explode if heated. H412: Harmful to aquatic life with long-lasting effects.
U.S. OSHA Defined Hazard Statements: May displace oxygen and cause rapid suffocation.
U.S. Hazards Not Otherwise Classified (HNOC): May cause frostbite.
Precautionary Statements:
Prevention: P273: Avoid release to the environment.
Response: None applicable.
Storage: P410 + P403: Protect from sunlight. Store in a well-ventilated place.
Disposal: P501: Dispose of contents/container in accordance with all local, regional, national and international regulations.
Hazard Symbol/Pictogram: GHS04

EMERGENCY OVERVIEW: Product Description: This product is a clear, colorless liquid at room temperature, with a mild odor, which is shipped under pressure. This compound gasifies immediately upon release from the cylinder. Health Hazards: The main acute health hazard associated with this product is irritation of eyes and possible frostbite if contents of cylinder are rapidly released. Inhalation may be harmful. High concentrations may present an asphyxiation hazard if released in confined spaces. Chronic inhalation exposure may result in adverse effects on liver. Flammability Hazards: This compound is not flammable, but can decompose at very high temperatures forming toxic gases such as carbon oxides and hydrogen fluoride and other compounds given in Section 5 (Fire-Fighting Measures). Cylinders or tanks may rupture and explode if heated. Reactivity Hazards: This compound is not reactive. Environmental Hazards: This compound can cause chronic harm to aquatic organisms. Emergency Response Considerations: Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding. WARNING—If rescue personnel need to enter an area suspected of having a low level of oxygen, they should be equipped with Self-Contained Breathing Apparatus (SCBA) and appropriate personal protective equipment.

SECTION 3. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Chemical Formula</th>
<th>CAS #</th>
<th>%</th>
<th>LABEL ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,2,2,4,5,5,5-nonafluoro-4-(trifluoromethyl)-3-pentanone</td>
<td>C5F11O</td>
<td>756-13-8</td>
<td>100%</td>
<td>Harmonized Classification - Annex VI of Regulation (EC) NO 1272/2008 (CLP Regulation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Classification: Aquatic Chronic Toxicity Cat. 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hazard Statement Codes: H412</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Additional EU ECHA Notified and Self-Classification</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Classification: Compressed Gas/Liquefied Gas, Acute Inhalation Toxicity Cat. 5, STOT (Inhalation-Liver, Cardiac System) RE Cat. 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hazard Statement Codes: H280, H333, H373</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>U.S. OSHA Defined Classification</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Classification: May displace oxygen and cause rapid suffocation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>U.S. OSHA Hazards Not Otherwise Classified</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Classification: May cause frostbite.</td>
</tr>
</tbody>
</table>

See Section 2 for full product classification information.
SECTION 4. FIRST AID MEASURES

PROTECTION OF FIRST AID RESPONDERS: RESCUEURS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. Self-Contained Breathing Apparatus should be worn if the level of oxygen cannot be determined. Rescuers should be taken for medical attention, if necessary. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

DESCRIPTION OF FIRST AID MEASURES: Remove victim(s) to fresh air, as quickly as possible. Take copy of label and SDS to physician or other health professional with victim(s).

Inhalation Exposure: If inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect occurs after removal to fresh air.

Skin Exposure: If this product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 20 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. If this product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 20 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention. Remove any clothing that may restrict circulation to any frozen area. Do not rub frozen parts as tissue damage may occur. As soon as practicable, place any affected area in warm water bath which has a temperature that does not exceed 105°F (40°C). NEVER USE HOT WATER. NEVER USE DRY HEAT. If area of frostbite is extensive, and if possible, remove clothing while showering with warm water. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area of the body in the armpit. Encourage victim to gently exercise the affected part while being warmed. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering.

Eye Exposure: If a minor irritation occurs, cover eye with bandage and seek appropriate medical attention. If rapid release has caused frostbite, cover injured eye; an ophthalmologist should be sought as soon as possible.

Ingestion: Ingestion is an unlikely route of exposure for this compound.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Liver conditions.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Administer oxygen, if necessary, and treat symptoms. Freeze burns of mucosal tissue can develop following specific exposures.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT: Not applicable.  AUTOIGNITION: Not applicable.

FLAMMABLE RANGE: Not applicable.

EXTINGUISHING MEDIA: This is a fire-extinguisher; use fire-extinguishing media appropriate for the surrounding materials.

UNSUITABLE FIRE EXTINGUISHING MEDIA: None known.

SPECIFIC HAZARDS ARISING FROM THE PRODUCT: This product does not burn; however, containers, when involved in fire, may rupture or burst in the heat of the fire. Most cylinders have a pressure release device, which will vent contents if the cylinder is exposed to high temperatures. Vapors heavier than air, creating an asphyxiation hazard in low areas.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: Not sensitive.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE: Not sensitive.

HAZARDOUS COMBUSTION PRODUCTS: Combustion or decomposition products include hydrogen fluoride and carbon oxides. These by-products can be dangerous even in low concentrations and in sufficient concentrations can result in personal injury or death.

SPECIAL PROTECTIVE ACTIONS FOR FIRE-FIGHTERS: Move fire-exposed containers if it can be done without risk to firefighters. Use water spray to cool fire-exposed cylinders. Take care not to block pressure relief valves. Stay away from ends of tanks (but realize that shrapnel may travel in any direction). Withdraw immediately in case of rising sound from venting safety device or any unusual changes in behavior of fire.

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Vapors are initially heavier than air and spread along ground, creating an oxygen-deficient atmosphere in low-lying areas or confined spaces. Detection systems should be available to monitor for level of oxygen. The level of oxygen should be above 19.5% before personnel can be allowed in the area without SCBA.

PERSONAL PROTECTIVE EQUIPMENT: Proper protective equipment should be used.

All Releases: Minimum Personal Protective Equipment should be Level B: Self-Contained Breathing Apparatus. Note: chemically protective clothing may provide little or no thermal protection against the hazard of frostbite. The atmosphere must at least 19.5 percent oxygen before non-emergent personnel can be allowed in the area without Self-Contained Breathing Apparatus and fire protection. If this compound is leaking incidentally from the cylinder or its valve, contact your supplier.

METHODS FOR CLEAN-UP AND CONTAINMENT:

All Releases: In the event of a release of this product, operator should close the source of leak if possible to do so safely. Evacuate area in the event of a significant release. Locate and seal the source of the leak. If leak is in user's gas handling equipment or system, close cylinder valve, and safely vent high pressure before attempting repairs. If leak is from the cylinder, cylinder valve or the valve pressure relief device (PRD), contact your supplier. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.
SECTION 6. ACCIDENTAL RELEASE MEASURES (Continued)

METHODS FOR CLEAN-UP AND CONTAINMENT (continued):
All Releases (continued): Call CHEMTREC (1-800-424-9300) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666).

ENVIRONMENTAL PRECAUTIONS:
Run-off water may be contaminated by other materials and should be contained to prevent possible environmental damage.

REFERENCE TO OTHER SECTIONS: See information in Section 8 (Exposure Controls – Personal Protection) and Section 13 (Disposal Considerations) for additional information.

SECTION 7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING: Releases of this product can create an oxygen-deficient atmosphere. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations could occur without any significant warning symptoms, due to oxygen-deficiency. All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release. Wearing contact lenses is not recommended when handling this compound.

Cylinder valves should be inspected regularly for physical damage or corrosion (apparent by discoloration or rust). Care should be taken to inspect the following valve locations for corrosion: neck (where valve inserts into cylinder); bonnet nut (where handle attaches to valve body). Close valve after each use and when empty.

Do not drag, roll, slide or drop cylinder. Use a suitable hand truck designed for cylinder movement. Never attempt to lift a cylinder by its cap. Secure cylinders at all times while in use. Use a pressure regulator to safely discharge product from cylinder. Use a check valve to prevent reverse flow into cylinder. Once cylinder has been connected to properly purged process, open cylinder valve slowly and carefully. If user experiences any difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, etc.) into valve cap openings; doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps.

Do not heat cylinders by any means to increase the discharge rate of product from the cylinder. Never apply flame or localized heat directly to any part of the cylinder. Cylinders should not be artificially cooled as certain types of steel undergo property changes when cryogenically cooled, thus making the cylinder unstable.

CONDITIONS FOR SAFE STORAGE: Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, Inc. at www.cganet.com pamphlet CGA P-1, Safe Handling of Compressed Gases in Containers. Local regulations may require specific equipment for storage and use. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked-over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Store containers away from heavily trafficked areas and emergency exits. Isolate from other non compatible chemicals (refer to Section 10, Stability and Reactivity). Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect cylinders against physical damage. Full and empty cylinders should be segregated. Use a first-in, first-out inventory systems to prevent full containers from being stored for long periods of time. NOTE: Use only DOT or ASME code cylinders designed for compressed gas storage. Cylinders must not be recharged except by or with the consent of owner.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA: Use the proper CGA connections, DO NOT USE ADAPTERS; PRODUCT USE: This product is used as a fire-Extinguishing agent, and as a cleaning agent.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Relieve pressure before attempting repairs.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:
Ventilation and Engineering Controls: Forced ventilation systems for the general work area should be provided. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

Occupational/Workplace Exposure Limits/Guidelines:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>OSHA PELs ppm</th>
<th>ACGIH TLVs ppm</th>
<th>NIOSH RELs ppm</th>
<th>NIOSH IDLH ppm</th>
<th>DFG MAKs ppm</th>
<th>AIHA WELs ppm</th>
<th>OTHER ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1,1,2,2,4,5,5,5-nonfluoro-4-(trifluoromethyl)-3-pentanone</td>
<td>756-13-8</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>MFG OEL: TWA: 150 (8 hrs)</td>
</tr>
</tbody>
</table>

NE = Not Established

International Exposure Limits: Currently, there are no international exposure limits are in place components of this product. In many jurisdictions, exposure limits are similar to the U.S. ACGIH TLVs or U.S. OSHA PELs. Since a TLV or PEL has not been established for these substance, appropriate government agencies in each jurisdiction should be consulted to determine which regulations apply.

Biological Exposure Indices (BEIs): Currently, Biological Exposure Indices (BEIs) have not been determined for this compound.

UK Minimum Exposure Limits: Currently, there are no UK Minimum Exposure limits determined for this compound.


Respiratory Protection: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen level is below 19.5%, or during emergency response to a release of this product. If necessary, use only respiratory protection authorized under appropriate regulations. In the U.S., oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA’s Respiratory Protection Standard (1910.134-1998).
SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION (Continued)

PERSONAL PROTECTIVE EQUIPMENT (continued):

Eye Protection: Use approved safety goggles or safety glasses. If necessary, refer to appropriate regulations for further information.

Hand Protection: Wear leather gloves when handling cylinders. Otherwise, wear glove protection appropriate to the specific operation for which this product is used. If necessary, refer to appropriate regulations.

Body Protection: Use body protection appropriate for task. Safety shoes are recommended when handling cylinders. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee’s feet may be exposed to electrical hazards, use foot protection, as described in appropriate country regulations and standards.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Liquid shipped under pressure</td>
</tr>
<tr>
<td>Color</td>
<td>Clear, colorless</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>316.04</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>C6F12O</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not determined</td>
</tr>
<tr>
<td>Specific Gravity Liquid [Relative Density] (water = 1):</td>
<td>1.6</td>
</tr>
<tr>
<td>Relative Density Gas @ 25°C and 1 atm:</td>
<td>0.0136 g/mL</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>49.2°C (120.6°F)</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>-108°C (-162.4°F)</td>
</tr>
<tr>
<td>Evaporation Rate (Butyl Acetate = 1):</td>
<td>&gt; 1</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Negligible; &lt; 0.001 % by weight.</td>
</tr>
<tr>
<td>Other Solubilities</td>
<td>Not available.</td>
</tr>
<tr>
<td>Heat of Vaporization @ boiling point</td>
<td>88.0 kJ/kg (37.9 BTU/lb)</td>
</tr>
<tr>
<td>Vapor Pressure @ 25°C</td>
<td>5.87 psig</td>
</tr>
<tr>
<td>Vapor Density (air = 1)</td>
<td>5.7</td>
</tr>
<tr>
<td>Viscosity @ 25°C</td>
<td>0.6 centipoise</td>
</tr>
<tr>
<td>VOC Less H2O &amp; Exempt Solvents:</td>
<td>1600 g/L</td>
</tr>
<tr>
<td>Percent Volatile</td>
<td>100%</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Lower Flammable Limit (volume % in air):</td>
<td>None.</td>
</tr>
<tr>
<td>Upper Flammable Limit (volume % in air):</td>
<td>None.</td>
</tr>
<tr>
<td>Partition Coefficient</td>
<td>Log Kow: 2.79 (estimated)</td>
</tr>
</tbody>
</table>

WARNING PROPERTIES: There are no good properties to act as a warning of a release. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

SECTION 10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable under conditions of normal pressure and temperature.

CONDITIONS TO AVOID: Cylinders should not be exposed to temperatures in excess of 125°F (52°C).

MATERIALS WITH WHICH COMPOUND IS INCOMPATIBLE: Strong bases, amines, alcohols, UV light.


POSSIBILITY OF HAZARDOUS REACTION OR POLYMERIZATION: Will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

ROUTES OF ENTRY, SYMPTOMS OF ACUTE EXPOSURE: WARNING: If rescue personnel need to enter an area in which a release of this compound has occurred, they should be equipped with Self-Contained Breathing Apparatus (SCBA) and appropriate personal protective equipment. High concentration of this vapors will create an oxygen-deficient atmosphere, creating the risk of asphyxiation.

Eye Contact: Release of a high-pressure gas may result in airborne objects.

Inhalation: Ingestion of this compound is not a likely route of industrial exposure.

Inhalation: High concentrations can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. The skin of a victim may have a blue color. Under some circumstances of exposure, death may occur, due to the displacement of oxygen. The effects associated with various levels of oxygen are described below.

CONCENTRATION of OXYGEN | EXPOSURE SYMPTOM
--- | ---
20.9% Oxygen: Normal oxygen concentration in air. | 15–19% Oxygen: Decreased ability to perform tasks. May impair coordination and may induce early symptoms in persons with heart, lung, or circulatory problems.
12–15% Oxygen: Breathing increases, especially in exertion. Pulse up. Impaired coordination, perception, and judgment. | 10–12% Oxygen: Breathing further increases in rate and depth, poor coordination and judgment, lips slightly blue.
8-10% Oxygen: Mental failure, fainting, unconsciousness, aseptic face, blueness of lips, nausea (upset stomach), and vomiting. | 6–8% Oxygen: 8 minutes, may be fatal in 50–100% of cases; 6 minutes, may be fatal in 25 to 50% of cases; 4–5 minutes, recovery with treatment.
4–6% Oxygen: Coma in 40 seconds, followed by convolution, breathing failure, death.
HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD 1

FLAMMABILITY HAZARD 0

PHYSICAL HAZARD 1

PROTECTIVE EQUIPMENT

EYES RESPIRATORY HANDS BODY

SEE SECTION 8

SEE SECTION 8

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe *= Chronic hazard

SECTION 11. TOXICOLOGICAL INFORMATION (Continued)

ROUTES OF ENTRY, SYMPTOMS OF ACUTE EXPOSURE (continued):
Inhalation (continued): Exposure to atmospheres containing 8–10% or less oxygen will bring about unconsciousness without warning and so quickly that individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.
Skin Contact: Transitory skin contact should not cause any adverse effects. Contact with rapidly expanding gases (which are released from under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain caused by frostbite can quickly subside, masking the injury.
Other Acute Health Effects: Sudden release of a pressurized gas (such as may occur in the event of a valve failure), presents a severe hazard of mechanical injury.

Acute Exposure Target Organs: Respiratory system, skin.

ROUTES OF ENTRY, SYMPTOMS OF CHRONIC EXPOSURE:
Inhalation: Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system. Inhalation of very high concentration may cause adverse effects on the central nervous system and liver. Symptoms of liver effects may include loss of appetite, weight loss, fatigue, weakness, abdominal tenderness and jaundice.
Skin Contact: None known.

Chronic Exposure Target Organs: Central nervous system, heart and liver (from exposure to low oxygen environment).

CARCINOGENIC POTENTIAL: This compound is not listed as a carcinogen or as potential carcinogen on EPA, NIOSH, GERMAN MAK, OSHA, NTP, IARC, or CAL/OSHA Carcinogen lists.

TOXICITY DATA: The following toxicology data are currently available for this compound.

NOAEL for cardiac sensitization: 10% v/v
Inhalation Study: No signs of acute toxicity were observed during a 4-hr acute inhalation study (rat) at 10%, a 2-hr. acute inhalation study (rat) at 10% and a 28-day acute inhalation study (rat) at 2.0%.

ADDITIONAL TOXICOLOGICAL DATA: None available.

IRRITANTITY OF PRODUCT: Not applicable.

SENSITIZATION OF PRODUCT: This compound is not a human skin or respiratory sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: This compound has not reported to cause embryotoxic, teratogenic or reproductive toxicity effects in humans. No animal data are available. This compound was not mutagenic in Ames assay.

SECTION 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: Product is highly insoluble in water and volatile. Predicted Soil Adsorption Coefficient (PCKOCWIN v1.66): Koc: 3792; Log Koc: 3.579

PERSISTENCE AND BIODEGRADABILITY: Hydrolysis is not expected to be a significant degradation pathway. This compound is highly insoluble in water. Photolytic half-life: 3-5 days. Persistent photolytic degradation product: trifluoroacetic acid. Atmospheric lifetime is about 0.014 years (about 5 days). Predicted Hydroxyl Radicals Reaction: OVERALL OH Rate Constant =0.0000 E-12 cm3/molecule-sec

POTENTIAL TO BIOACCUMULATE: Predicted Bioaccumulation from Log Kow (BCFWIN v2.17): Log BCF from regression-based method = 1.448 (BCF = 28.07) Log Kow used: 2.79 (estimated).

ECOTOXICITY: There is currently no evidence of adverse effects from exposure to this compound on aquatic life. Immediate adverse effect on plants would be related to oxygen-deficient environments or frost from rapidly expanding gases.

GLOBAL WARMING POTENTIAL: Global Warming potential (GWP): 1

OZONE-DEPLETION POTENTIAL: Zero Ozone Depleting Potential (ODP).

PHOTOCHEMICAL OZONE CREATION POTENTIAL: None.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

SECTION 13. DISPOSAL CONSIDERATIONS

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials.

UNUSED PRODUCT / EMPTY CONTAINER: Do not dispose of residual product. Return used product in cylinders to: H3R Clean Agent Specialists, Inc.

DISPOSAL INFORMATION: Relative to the environment, this material has an ozone depletion potential and a global warming potential. Refer to the regulations of the U.S. EPA or the State-specific regulations for proper waste disposal, regulations of Canada and its Provinces, or regulations of EU member states.

U.S. EPA WASTE NUMBER: Not applicable.

EU EWC WASTE NUMBER: Not applicable.
SECTION 14. TRANSPORT INFORMATION

The following shipping information applies when this product is supplied in fire-extinguishing cylinders:

**U.S. SHIPPING INFORMATION:** This compound is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

- **UN Identification Number:** UN 1044
- **Proper Shipping Name:** Fire extinguisher with compressed or liquefied gas
- **Hazard Class Number and Description:** 2.2 (Non-Flammable Gas)
- **Hazard Shipping Label(s) Required:** Class 2.2 (Non-Flammable Gas)
- **Packing Group:** Not Applicable
- **Placard (when required):** Class 2.2 (Non-Flammable Gas)

**Special Shipping Information:**
- Cylinders should be transported in a secure position in a well-ventilated truck (never transport in passenger compartment of a vehicle). Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping cylinder.
- **Caution:** Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with the owner’s written consent is a violation of Federal law (49 CFR 173.301).

**TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:**

- This product is classified as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable:
  - **UN Identification Number:** UN 1044
  - **Proper Shipping Name:** Fire extinguisher with compressed or liquefied gas
  - **Hazard Class Number and Description:** 2.2 (Non-Flammable Gas)
  - **Hazard Shipping Label(s) Required:** Class 2.2 (Non-Flammable Gas)
  - **Packing Group:** Not Applicable
  - **Excepted Quantities:** E0
  - **Special Provisions:** 109
  - **Explosive Limit & Limited Quantity Index:** 0.125 L
  - **ERAP Index:** None
  - **Passenger Carrying Ship Index:** None
  - **Passenger Carrying Road or Rail Vehicle Index:** 75

**INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA):**

- This gas is classified as dangerous goods, per the International Air Transport Association.
  - **UN Identification Number:** UN 1044
  - **Proper Shipping Name:** Fire extinguisher with compressed or liquefied gas
  - **Hazard Class or Division:** 2.2 (Non-Flammable Gas)
  - **Hazard Label(s) Required:** Class 2.2 (Non-Flammable Gas)
  - **Packing Group:** Not Applicable
  - **Excepted Quantities:** E0
  - **Passenger and Cargo Aircraft Packing Instruction:** 213
  - **Passenger and Cargo Aircraft Maximum Net Quantity per Pkg.:** 75 kg
  - **Passenger and Cargo Aircraft Limited Quantity Packing Instruction:** Forbidden
  - **Cargo Aircraft Only Packing Instruction:** 213
  - **Cargo Aircraft Only Maximum Net Quantity per Pkg.:** 150 kg
  - **Special Provisions:** A19
  - **ERG Code:** 2L

**INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO):**

- This gas is classified as dangerous goods, per the International Maritime Organization.
  - **UN No.:** 1044
  - **Proper Shipping Name:** Fire extinguisher with compressed or liquefied gas
  - **Hazard Class Number:** 2.2
  - **Packing Group:** None
  - **Special Provisions:** 225
  - **Limited Quantities:** 120 mL
  - **Excepted Quantities:** E0
  - **Packing:** Instructions: P003; Provisions: PP91
  - **IBCs:** Instructions: None; Provisions: None
  - ** Tanks:** Instructions: None; Provisions: None
  - **EmS:** F-C, S-V
  - **Stowage Category:** Category A.
  - **Segregation:** None.
  - **Marine Pollutant:** This gas does not meet the criteria of a Marine Pollutant.

**EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):**

- This gas is classified by the Economic Commission for Europe to be dangerous goods.
  - **UN Number:** UN 1044
  - **Name and Description:** Fire extinguisher with compressed or liquefied gas
  - **Class:** 2.2 (Non-Flammable Gas)
  - **Classification Code:** 6A
**EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (continued):**

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>225,594</td>
<td></td>
<td>120 mL</td>
<td>E0</td>
<td>P003;</td>
<td>Not Applicable; Special Provision:</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

The following shipping information applies when the product is supplied in types of cylinders other than fire extinguishers:

**U.S. SHIPPING INFORMATION:** This compound is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

<table>
<thead>
<tr>
<th>UN Identification Number</th>
<th>Proper Shipping Name</th>
<th>Hazard Class or Division</th>
<th>Hazard Label(s) Required</th>
<th>Packing Group</th>
<th>Excepted Quantities</th>
<th>Explosive Limit &amp; Limited Quantity Index</th>
<th>ERAP Index</th>
<th>Passenger Carrying Ship Index</th>
<th>Passenger Carrying Road or Rail Vehicle Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 1956</td>
<td>Compressed gas, n.o.s. (C-6 Perfluoroketone)</td>
<td>2.2 (Non-Flammable Gas)</td>
<td>Class 2.2 (Non-Flammable Gas)</td>
<td>Not Applicable</td>
<td>E0</td>
<td>0.125 L</td>
<td>None</td>
<td>None</td>
<td>75 L</td>
</tr>
</tbody>
</table>

**INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA):** This gas is classified as dangerous goods, per the International Air Transport Association.

<table>
<thead>
<tr>
<th>UN Identification Number</th>
<th>Proper Shipping Name</th>
<th>Hazard Class or Division</th>
<th>Hazard Label(s) Required</th>
<th>Packing Group</th>
<th>Excepted Quantities</th>
<th>Explosive Limit &amp; Limited Quantity Index</th>
<th>ERAP Index</th>
<th>Passenger Carrying Ship Index</th>
<th>Passenger Carrying Road or Rail Vehicle Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 1956</td>
<td>Compressed gas, n.o.s. (C-6 Perfluoroketone)</td>
<td>2.2 (Non-Flammable Gas)</td>
<td>Class 2.2 (Non-Flammable Gas)</td>
<td>Not Applicable</td>
<td>E0</td>
<td>16,148</td>
<td>None</td>
<td>None</td>
<td>75 L</td>
</tr>
</tbody>
</table>

**INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO):** This gas is classified as dangerous goods, per the International Maritime Organization.

<table>
<thead>
<tr>
<th>UN No.</th>
<th>Proper Shipping Name</th>
<th>Hazard Class Number</th>
<th>Packing Group</th>
<th>Special Provisions</th>
<th>Limited Quantities</th>
<th>Excepted Quantities</th>
<th>Packing</th>
<th>IBCs</th>
<th>Tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>Compressed gas, n.o.s. (C-6 Perfluoroketone)</td>
<td>2.2</td>
<td>None</td>
<td>None</td>
<td>274,378</td>
<td>E1</td>
<td>Instructions: P200; Provisions: None</td>
<td>Instructions: None; Provisions: None</td>
<td>Instructions: T50; Provisions: None</td>
</tr>
</tbody>
</table>
INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (continued):

EmS: F-C, S-V
Stowage Category: Category A.
Segregation: None
Marine Pollutant: This gas does not meet the criteria of a Marine Pollutant.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is classified by the Economic Commission for Europe to be dangerous goods.
UN Number: UN 1956
Name and Description: Compressed gas, n.o.s. (C-6 Perfluoroketone)
Class: 2.2 (Non-Flammable Gas)
Classification Code: Not Applicable
Packing Group: Class 2.2 (Non-Flammable Gas)
Special Provisions: 274, 378, 655, 662
Limited Quantities: 120 mL
Excepted Quantities: E1
Packaging: Not Applicable
Portable Tanks and Bulk Containers: Packing Instruction: P200; Special Packing Instruction: None; Mixed Packing Instruction: MP9
Hazard Identification Number: 20

TRANSPORT IN BULK ACCORDING TO THE IBC CODE: See the information under the individual jurisdiction listings for IBC information.

ENVIRONMENTAL HAZARDS: This compound meets the criteria of environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID, and ADN), and is not specifically listed in Annex III under MARPOL 73/78.

U.S. FEDERAL REGULATIONS:

EPA - ENVIRONMENTAL PROTECTION AGENCY:
Reportable Quantity (RQ): Not Applicable
SARA TITLE III: Superfund Amendment and Reauthorization Act
Sections 302/304: Emergency Planning and Notification (40 CFR Part 355)
Exempted Substances: Not listed.
Threshold Planning Quantity (TPQ): Not Applicable
Reportable Quantity (RQ): Not Applicable
Sections 311/312: Hazardous Chemical Reporting (40 CFR Part 370)
IMMEDIATE: HEALTH: No PRESSURE: Yes DELAYED HEALTH: No REACTIVITY: No FIRE: No
Section 313: Toxic Chemical Release Reporting (40 CFR 372)
Releases of this compound do not require reporting under Section 313.

CLEAN AIR ACT:
Section 112 (r): Risk Management Programs for Chemical Accidental Release (40 CFR Part 68)
Threshold Planning Quantity (TPQ): Not Applicable
TSCA: Toxic Substances Control Act
This compound is listed in the TSCA Inventory

OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:
Threshold Planning Quantity (TPQ): Not Applicable
Other U.S. Federal Regulations: None applicable.

U.S. State Regulatory Information:
California Proposition 65: This compound is NOT listed on the California Proposition 65 lists.

CANADIAN FEDERAL REGULATIONS:
Canadian DSL Inventory Status: This compound is listed on the DSL Inventory.
Canadian CEPA Regulations: This compound is not on the CEPA Priorities Substances Lists.
Canadian WHMIS HPR 2015 Classification and Symbols: See the following section for classification and symbols under WHMIS.

EUROPEAN REGULATIONS:
Safety, Health, and Environmental Regulations/Legislation Specific for The Product: Currently, there is no specific legislation pertaining to this product.

SECTION 15. REGULATORY INFORMATION

SECTION 16. OTHER INFORMATION

Information contained in this Safety Data Sheet is provided to our customers so they may comply with 29 CFR 1910.1200, Hazard Communication Standard, the Canadian WHMIS Standard, and the requirements of the European Union Directives. The intent of this Material Safety Data Sheet is to provide end users of this product with the health and physical hazards associated with possible exposure to this product. All statements, technical data and recommendations are based on readily available texts and data that HR Clean Agents, believes to be reliable and accurate. HR Clean Agents makes no warranties, guarantees or representations of any kind with respect to this product or this data. It is the responsibility of the user to obtain and use the most recent version of this MSDS.

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc. • PO Box 1961, Hilo, HI 96721 • 800/441-3365
REFERENCES AND DATA SOURCES: Contact the supplier for information.
METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION: Bridging principles were used to classify this product.
REVISION DETAILS: May 2019: Review and up-date entire SDS for current GHS classification and format.
Hazardous materials identification system hazard ratings (continued):

**Flammability hazard:**
- 0 (Minimal hazard): Materials that will not burn; air exposure at 815°C (1500°F) for a period of 5 minutes.
- 1 (Slight hazard): Materials that must be pre-heated before ignition can occur. Material requires considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur. Including: Flammable gases that will burn in air when exposed to a temperature of 815°C (1500°F) for a period of 5 minutes or less. Liquids, solids or flammable solids that have a flash point below 59.3°C (103°F) [20°F]; e.g. OSHA Class III, or; Most ordinary combustible materials [e.g. wood, paper, etc.];
- 2 (Moderate hazard): Materials that must be moderately heated or exposed to relatively high ambient temperatures before combustion can occur. Materials in this designation, not under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heat may release vapor in sufficient quantities to produce hazardous atmospheres in air; Including: Liquids having a flash point of at above 37.8°C (100°F); Solid materials in the Packing Group I or II that may burn explosively by reaction with oxygen; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fires (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors);
- 3 (Severe hazard): Materials that, when ignited, release sufficient gas to produce toxic, flammable or explosive conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, if unaffected by ambient temperature, are readily ignited under almost all conditions. Exposure to temperatures exceeding a boiling point at or above 48°C [118°F] or below 37.8°C [100°F] [e.g. OSHA Class IIIB and III];
- 4 (Extreme hazard): Materials that can ignite spontaneously when exposed to air at operating temperatures. [e.g. peroxide materials];
- 5 (Inherently dangerous): Materials that can ignite spontaneously at or below ambient temperature. [e.g. peroxide materials];
- 6 (Inherently hazardous): Materials that can ignite spontaneously under any condition.

**Explosive hazard:**
- 0 (Minimal hazard): Explosives that will not react with water or will not detonate even in the event of exposure to water.
- 1 (Slight hazard): Explosives that react explosively with water or will detonate in the event of exposure to water.
- 2 (Moderate hazard): Explosives that react explosively with water and will detonate in the event of exposure to water.
- 3 (Severe hazard): Explosives that react explosively with water and will detonate in the event of exposure to water.
- 4 (Extreme hazard): Explosives that will detonate in the event of exposure to water.
- 5 (Inherently hazardous): Explosives that will detonate in the event of exposure to water.

**Toxic hazard:**
- 0 (Minimal hazard): Toxic materials that will not react with water to form toxic or reactive compounds.
- 1 (Slight hazard): Toxic materials that react with water to form toxic or reactive compounds.
- 2 (Moderate hazard): Toxic materials that react with water to form toxic or reactive compounds.
- 3 (Severe hazard): Toxic materials that react with water to form toxic or reactive compounds.
- 4 (Extreme hazard): Toxic materials that react with water to form toxic or reactive compounds.
- 5 (Inherently hazardous): Toxic materials that react with water to form toxic or reactive compounds.

**Reactivity hazard:**
- 0 (Minimal hazard): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 1 (Slight hazard): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 2 (Moderate hazard): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 3 (Severe hazard): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 4 (Extreme hazard): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 5 (Inherently hazardous): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 6 (Inherently hazardous): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 7 (Inherently hazardous): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 8 (Inherently hazardous): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 9 (Inherently hazardous): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
- 10 (Inherently hazardous): Reactives that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are highly reactive and explosive. Oxidizers: Division III Oxidizers;
NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: 0 (materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 10,000 ppm. 50% (gases and vapors that are respiratory irritants, respiratory sensitizers, or respiratory toxins). Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 200 mg/L. Materials whose LD₅₀ for acute oral toxicity is greater than 2000 mg/kg. Materials whose LD₅₀ for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Any liquid whose saturated vapor pressure at 20°C (68°F) is greater than or equal to one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for degree of hazard 3 or degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause severe tissue damage, depending on duration of exposure. Materials that are respiratory irritants. Materials that cause severe, but reversible irritation to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers. 3 (materials that, under emergency conditions, can cause serious or permanent physical injury) Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 1.000 ppm but less than or equal to 3.000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 0.5 mg/kg but less than or equal to 2.0 mg/kg. Materials whose LC₅₀ for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg. Any liquid that is a water nonmiscible solution or dispersion with air, that, under emergency conditions, can cause temporary incapacitation or residual injury: Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 3.000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 0.2 mg/L but less than or equal to 10 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is greater than or equal to one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Organic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. 4 (materials that, under emergency conditions, can cause irreversible physical injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.100 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.05 mg/L. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5.0 mg/kg. Materials whose LC₅₀ for acute dermal toxicity is less than or equal to 100 mg/L. Materials whose LC₅₀ for acute oral toxicity is less than or equal to 10 mg/L. Materials whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.001 ppm. Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. 2 (materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at 1000 W/mL or greater. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association. 1 (Materials that either will not burn under typical fire conditions, or will not burn under typical fire conditions, but will burn under unusual circumstances): Materials whose flash point, when tested by ASTM D 92 Standard Test Method for Flash and Fire Points (current edition) and the related test methods, is less than or equal to 22°C (72°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5 percent by weight of a flammable gas, liquid, or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5 percent by weight of a flammable gas, liquid, or gaseous material that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IB liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5 percent by weight of a flammable gas, liquid, or gaseous material that is liquid while under pressure and has a flash point between 22.8°C (73°F) and 37.8°C (100°F) (i.e. Class IC liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5 percent by weight of a flammable gas, liquid, or gaseous material that is liquid while under pressure and has a flash point above 37.8°C (100°F) and a boiling point above 70°C (160°F) (i.e. Class IIIA liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5 percent by weight of a flammable gas, liquid, or gaseous material that is liquid while under pressure and has a flash point between 37.8°C (100°F) and 70°C (160°F) (i.e. Class IIIB liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5 percent by weight of a flammable gas, liquid, or gaseous material that is liquid while under pressure and has a flash point above 70°C (160°F) (i.e. Class IIIC liquids).

REGULATORY INFORMATION:

U.S. and CANADA:
ACGIH: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. This section explains the impact of various laws and regulations on the material. EPA is the U.S. Environmental Protection Agency. NIOSH is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (OSHA). OSHA is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (OSHA). NIST is the National Institute of Standards and Technology. NIST is the National Institute of Standards and Technology. DOT and TC are the U.S. Department of Transportation and the Transport Canada, respectively. DOT and TC are the U.S. Department of Transportation and the Transport Canada, respectively. Suprafund Amendments and Reauthorization Act (SARA), the Canadian Environmental Protection Act, and the United States Environmental Protection Act (U.S. EPA). SARA is the U.S. Environmental Protection Act (U.S. EPA). SARA is the U.S. Environmental Protection Act (U.S. EPA). SARA is the U.S. Environmental Protection Act (U.S. EPA). SARA is the U.S. Environmental Protection Act (U.S. EPA). SARA is the U.S. Environmental Protection Act (U.S. EPA). SARA is the U.S. Environmental Protection Act (U.S. EPA). Marine pollutant status according to the DOT: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund); and various state regulations that affect the material.

NOVEC 1230