



HandiFoam FR HFO B-side

ICP Construction Inc.

Version No: 3.5
Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Issue Date: 07/25/2022
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S.GHS.USA.EN

SECTION 1 Identification

Product Identifier

| | |
|-------------------------------|--|
| Product name | HandiFoam FR HFO B-side |
| Synonyms | Not Available |
| Proper shipping name | CHEMICAL UNDER PRESSURE, N.O.S.(Hydrofluoroolefin, Nitrogen) |
| Other means of identification | Not Available |

Recommended use of the chemical and restrictions on use

| | |
|--------------------------|--|
| Relevant identified uses | Low Pressure Polyurethane Foam B-Component |
|--------------------------|--|

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

| | |
|-------------------------|--|
| Registered company name | ICP Construction Inc. |
| Address | 150 Dascomb Road Andover, MA 01810 United States |
| Telephone | 1-866-667-5119 1-978-623-9987 |
| Fax | Not Available |
| Website | www.icpgroup.com |
| Email | sds@icpgroup.com |

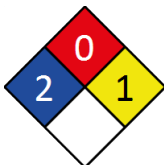
Emergency phone number

| | |
|-----------------------------------|----------------|
| Association / Organisation | ChemTel |
| Emergency telephone numbers | 1-800-255-3924 |
| Other emergency telephone numbers | 1-813-248-0585 |

SECTION 2 Hazard(s) identification

Classification of the substance or mixture

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

| | |
|----------------|--|
| Classification | Serious Eye Damage/Eye Irritation Category 2A, Skin Corrosion/Irritation Category 2, Reproductive Toxicity Category 1B, Gases Under Pressure (Compressed Gas), Sensitisation (Skin) Category 1 |
|----------------|--|

Label elements

| | |
|---------------------|--------|
| Hazard pictogram(s) | |
| Signal word | Danger |

Hazard statement(s)

| | |
|------|--------------------------------|
| H319 | Causes serious eye irritation. |
|------|--------------------------------|

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| H315 | Causes skin irritation. |
| H360 | May damage fertility or the unborn child. |
| H280 | Contains gas under pressure; may explode if heated. |
| H317 | May cause an allergic skin reaction. |

Hazard(s) not otherwise classified

Not Applicable

Precautionary statement(s) Prevention

| | |
|------|--|
| P202 | Do not handle until all safety precautions have been read and understood |
| P280 | Wear protective gloves, protective clothing, eye protection and face protection. |
| P261 | Avoid breathing gas. |
| P264 | Wash hands and other skin areas exposed to material thoroughly after handling |
| P271 | Use only outdoors or in a well-ventilated area. |

Precautionary statement(s) Response

| | |
|---------------------|--|
| P308+P313 | IF exposed or concerned: Get medical advice/ attention. |
| P305+P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P302+P352+P333+P313 | IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical attention |
| P333+P313 | If skin irritation or rash occurs: Get medical advice/attention. |

Precautionary statement(s) Storage

| | |
|-----------|--|
| P405 | Store locked up. |
| P410+P403 | Protect from sunlight. Store in a well-ventilated place. |

Precautionary statement(s) Disposal

| | |
|------|--|
| P501 | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|------|--|

Not Applicable

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

See section below for composition of Mixtures

Mixtures

| CAS No | %[weight] | Name |
|-------------|-----------|---|
| 111-46-6 | 5-10 | <u>diethylene glycol</u> |
| 13674-84-5* | 15-45 | <u>tris(2-chloroisopropyl)phosphate</u> |
| 1185-81-5 | 0.1-1 | <u>dibutyltin dilauryl mercaptide</u> |
| 107-21-1 | 0.1-1 | <u>ethylene glycol</u> |
| 29118-24-9 | 10-20 | <u>1,3,3,3-tetrafluoropropene</u> |
| 56-81-5 | 1-5 | <u>glycerol</u> |
| 7727-37-9. | <5 | <u>nitrogen</u> |

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4 First-aid measures**Description of first aid measures**

| | |
|--------------------|--|
| Eye Contact | <ul style="list-style-type: none"> ▶ If product comes in contact with eyes remove the patient from gas source or contaminated area. ▶ Take the patient to the nearest eye wash, shower or other source of clean water. ▶ Open the eyelid(s) wide to allow the material to evaporate. ▶ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners. ▶ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage. ▶ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s) ▶ Transport to hospital or doctor. ▶ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur. ▶ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage. ▶ Ensure verbal communication and physical contact with the patient. <p>DO NOT allow the patient to rub the eyes DO NOT allow the patient to tightly shut the eyes DO NOT introduce oil or ointment into the eye(s) without medical advice DO NOT use hot or tepid water.</p> |
|--------------------|--|

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| | |
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| Skin Contact | <p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Immediately flush body and clothes with large amounts of water, using safety shower if available. ▶ Quickly remove all contaminated clothing, including footwear. ▶ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. ▶ Transport to hospital, or doctor. |
| Inhalation | <ul style="list-style-type: none"> ▶ Following exposure to gas, remove the patient from the gas source or contaminated area. ▶ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ▶ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ▶ If the patient is not breathing spontaneously, administer rescue breathing. ▶ If the patient does not have a pulse, administer CPR. ▶ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ▶ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction. ▶ Keep the patient warm, comfortable and at rest while awaiting medical care. ▶ MONITOR THE BREATHING AND PULSE, CONTINUOUSLY. ▶ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary. |
| Ingestion | <p>Not considered a normal route of entry.</p> <ul style="list-style-type: none"> ▶ Avoid giving milk or oils. ▶ Avoid giving alcohol. |

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

for intoxication due to Freons/ Halons;

A: Emergency and Supportive Measures

- ▶ Maintain an open airway and assist ventilation if necessary
- ▶ Treat coma and arrhythmias if they occur. Avoid (adrenaline) epinephrine or other sympathomimetic amines that may precipitate ventricular arrhythmias. Tachyarrhythmias caused by increased myocardial sensitisation may be treated with propranolol, 1-2 mg IV or esmolol 25-100 microgm/kg/min IV.
- ▶ Monitor the ECG for 4-6 hours

B: Specific drugs and antidotes:

- ▶ There is no specific antidote

C: Decontamination

- ▶ Inhalation; remove victim from exposure, and give supplemental oxygen if available.
- ▶ Ingestion; (a) Prehospital: Administer activated charcoal, if available. **DO NOT** induce vomiting because of rapid absorption and the risk of abrupt onset CNS depression. (b) Hospital: Administer activated charcoal, although the efficacy of charcoal is unknown. Perform gastric lavage only if the ingestion was very large and recent (less than 30 minutes)

D: Enhanced elimination:

- ▶ There is no documented efficacy for diuresis, haemodialysis, haemoperfusion, or repeat-dose charcoal.

POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition

- ▶ Do not administer sympathomimetic drugs unless absolutely necessary as material may increase myocardial irritability.
- ▶ No specific antidote.
- ▶ Because rapid absorption may occur through lungs if aspirated and cause systematic effects, the decision of whether to induce vomiting or not should be made by an attending physician.
- ▶ If lavage is performed, suggest endotracheal and/or esophageal control.
- ▶ Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.
- ▶ Treatment based on judgment of the physician in response to reactions of the patient

To treat poisoning by the higher aliphatic alcohols (up to C7):

- ▶ Gastric lavage with copious amounts of water.
- ▶ It may be beneficial to instill 60 ml of mineral oil into the stomach.
- ▶ Oxygen and artificial respiration as needed.
- ▶ Electrolyte balance: it may be useful to start 500 ml. M/6 sodium bicarbonate intravenously but maintain a cautious and conservative attitude toward electrolyte replacement unless shock or severe acidosis threatens.
- ▶ To protect the liver, maintain carbohydrate intake by intravenous infusions of glucose.
- ▶ Haemodialysis if coma is deep and persistent. [GOSELIN, SMITH HODGE: Clinical Toxicology of Commercial Products, Ed 5)

BASIC TREATMENT

- ▶ Establish a patent airway with suction where necessary.
- ▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- ▶ Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- ▶ Monitor and treat, where necessary, for shock.
- ▶ Monitor and treat, where necessary, for pulmonary oedema.
- ▶ Anticipate and treat, where necessary, for seizures.
- ▶ **DO NOT use emetics.** Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.
- ▶ Give activated charcoal.

ADVANCED TREATMENT

- ▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- ▶ Positive-pressure ventilation using a bag-valve mask might be of use.
- ▶ Monitor and treat, where necessary, for arrhythmias.
- ▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- ▶ If the patient is hypoglycaemic (decreased or loss of consciousness, tachycardia, pallor, dilated pupils, diaphoresis and/or dextrose strip or glucometer readings below 50 mg), give 50% dextrose.
- ▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- ▶ Drug therapy should be considered for pulmonary oedema.
- ▶ Treat seizures with diazepam.
- ▶ Proparacaine hydrochloride should be used to assist eye irrigation.

EMERGENCY DEPARTMENT

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- ▶ Laboratory analysis of complete blood count, serum electrolytes, BUN, creatinine, glucose, urinalysis, baseline for serum aminotransferases (ALT and AST), calcium, phosphorus and magnesium, may assist in establishing a treatment regime. Other useful analyses include anion and osmolar gaps, arterial blood gases (ABGs), chest radiographs and electrocardiograph.
- ▶ Positive end-expiratory pressure (PEEP)-assisted ventilation may be required for acute parenchymal injury or adult respiratory distress syndrome.
- ▶ Acidosis may respond to hyperventilation and bicarbonate therapy.
- ▶ Haemodialysis might be considered in patients with severe intoxication.
- ▶ Consult a toxicologist as necessary. BRONSTEIN, A.C. and CURRANCE, P.L. EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

For C8 alcohols and above.

Symptomatic and supportive therapy is advised in managing patients.

For gas exposures:

BASIC TREATMENT

- ▶ Establish a patent airway with suction where necessary.
- ▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- ▶ Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- ▶ Monitor and treat, where necessary, for pulmonary oedema .
- ▶ Monitor and treat, where necessary, for shock.
- ▶ Anticipate seizures.

ADVANCED TREATMENT

- ▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- ▶ Positive-pressure ventilation using a bag-valve mask might be of use.
- ▶ Monitor and treat, where necessary, for arrhythmias.
- ▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- ▶ Drug therapy should be considered for pulmonary oedema.
- ▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- ▶ Treat seizures with diazepam.
- ▶ Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

SECTION 5 Fire-fighting measures

Extinguishing media

- ▶ Alcohol stable foam.
- ▶ Dry chemical powder.
- ▶ BCF (where regulations permit).

Special hazards arising from the substrate or mixture

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| Fire Incompatibility | ▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result |
|-----------------------------|--|

Special protective equipment and precautions for fire-fighters

| | |
|------------------------------|---|
| Fire Fighting | <p>----- GENERAL -----</p> <ul style="list-style-type: none"> ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear full body protective clothing with breathing apparatus. ▶ Fight fire from a safe distance, with adequate cover. |
| Fire/Explosion Hazard | <ul style="list-style-type: none"> ▶ Containers may explode when heated - Ruptured cylinders may rocket ▶ May burn but does not ignite easily. ▶ Fire exposed cylinders may vent contents through pressure relief devices thereby increasing vapour concentration.. ▶ Fire may produce irritating, poisonous or corrosive gases. <p>Decomposition may produce toxic fumes of: carbon monoxide (CO) carbon dioxide (CO2) hydrogen fluoride other pyrolysis products typical of burning organic material.</p> |

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

| | |
|---------------------|--|
| Minor Spills | <ul style="list-style-type: none"> ▶ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used. ▶ DO NOT enter confined spaces where gas may have accumulated. |
| Major Spills | <ul style="list-style-type: none"> ▶ Clear area of all unprotected personnel and move upwind. ▶ Alert Emergency Authority and advise them of the location and nature of hazard. ▶ Wear full body clothing with breathing apparatus. |

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- ▶ Remove leaking cylinders to a safe place.
- ▶ Fit vent pipes. Release pressure under safe, controlled conditions
- ▶ Burn issuing gas at vent pipes.
- ▶ **DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.**

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

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|--------------------------|--|
| Safe handling | <ul style="list-style-type: none"> · Consider use in closed pressurised systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal. · Use only properly specified equipment which is suitable for this product, its supply pressure and temperature · The tubing network design connecting gas cylinders to the delivery system should include appropriate pressure indicators and vacuum or suction lines. · Fully-welded types of pressure gauges, where the bourdon tube sensing element is welded to the gauge body, are recommended. ▶ DO NOT transfer gas from one cylinder to another. |
| Other information | <ul style="list-style-type: none"> ▶ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open. ▶ Such compounds should be sited and built in accordance with statutory requirements. ▶ The storage compound should be kept clear and access restricted to authorised personnel only. |

Conditions for safe storage, including any incompatibilities

| | |
|--------------------------------|---|
| Suitable container | <ul style="list-style-type: none"> ▶ Cylinder: ▶ Ensure the use of equipment rated for cylinder pressure. ▶ Ensure the use of compatible materials of construction. ▶ Valve protection cap to be in place until cylinder is secured, connected. |
| Storage incompatibility | <ul style="list-style-type: none"> ▶ Glycols and their ethers undergo violent decomposition in contact with 70% perchloric acid. This seems likely to involve formation of the glycol perchlorate esters (after scission of ethers) which are explosive, those of ethylene glycol and 3-chloro-1,2-propanediol being more powerful than glyceryl nitrate, and the former so sensitive that it explodes on addition of water. As a general rule, hydrofluorocarbons tend to be flammable unless they contain more fluorine atoms than hydrogen atoms. Alcohols <ul style="list-style-type: none"> ▶ are incompatible with strong acids, acid chlorides, acid anhydrides, oxidising and reducing agents. ▶ reacts, possibly violently, with alkaline metals and alkaline earth metals to produce hydrogen ▶ react with strong acids, strong caustics, aliphatic amines, isocyanates, acetaldehyde, benzoyl peroxide, chromic acid, chromium oxide, dialkylzincs, dichlorine oxide, ethylene oxide, hypochlorous acid, isopropyl chlorocarbonate, lithium tetrahydroaluminate, nitrogen dioxide, pentafluoroguanidine, phosphorus halides, phosphorus pentasulfide, tangerine oil, triethylaluminium, triisobutylaluminium ▶ should not be heated above 49 deg. C. when in contact with aluminium equipment ▶ Avoid magnesium, aluminium and their alloys, brass and steel. ▶ Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances |

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

| Source | Ingredient | Material name | TWA | STEL | Peak | Notes |
|--|--------------------------------|-------------------------------------|---------------|---------------|---------------|--|
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | dibutyltin dilauryl mercaptide | Tin, organic compounds (as Sn) | 0.1 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | dibutyltin dilauryl mercaptide | Tin (organic compounds, as Sn) | 0.1 mg/m3 | Not Available | Not Available | [skin] [*Note: The REL applies to all organic tin compounds except Cyhexatin.] |
| US NIOSH Recommended Exposure Limits (RELs) | ethylene glycol | Ethylene glycol | Not Available | Not Available | Not Available | See Appendix D |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | glycerol | Glycerin (mist)-Respirable fraction | 5 mg/m3 | Not Available | Not Available | Not Available |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | glycerol | Glycerin (mist)- Total dust | 15 mg/m3 | Not Available | Not Available | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | glycerol | Glycerin (mist) | Not Available | Not Available | Not Available | See Appendix D |

Emergency Limits

| Ingredient | TEEL-1 | TEEL-2 | TEEL-3 |
|----------------------------|--------------|---------------|---------------|
| diethylene glycol | 6.9 ppm | 140 ppm | 860 ppm |
| ethylene glycol | 30 ppm | 150 ppm | 900 ppm |
| 1,3,3,3-tetrafluoropropene | 1,400 ppm | Not Available | Not Available |
| glycerol | 45 mg/m3 | 180 mg/m3 | 1,100 mg/m3 |
| nitrogen | 7.96E+05 ppm | 8.32E+05 ppm | 8.69E+05 ppm |

| Ingredient | Original IDLH | Revised IDLH |
|----------------------------------|---------------|---------------|
| diethylene glycol | Not Available | Not Available |
| tris(2-chloroisopropyl)phosphate | Not Available | Not Available |

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| Ingredient | Original IDLH | Revised IDLH |
|--------------------------------|----------------------|---------------|
| dibutyltin dilauryl mercaptide | 25 mg/m ³ | Not Available |
| ethylene glycol | Not Available | Not Available |
| 1,3,3,3-tetrafluoropropene | Not Available | Not Available |
| glycerol | Not Available | Not Available |
| nitrogen | Not Available | Not Available |


Occupational Exposure Banding

| Ingredient | Occupational Exposure Band Rating | Occupational Exposure Band Limit |
|----------------------------------|-----------------------------------|----------------------------------|
| diethylene glycol | E | ≤ 0.1 ppm |
| tris(2-chloroisopropyl)phosphate | E | ≤ 0.1 ppm |

Notes:

Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

Exposure controls

| | |
|---|---|
| Appropriate engineering controls | Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. |
| Personal protection |  |
| Eye and face protection | <ul style="list-style-type: none"> ▶ Safety glasses with side shields. ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. |
| Skin protection | See Hand protection below |
| Hands/feet protection | NOTE: <ul style="list-style-type: none"> ▶ The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact. ▶ Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed. ▶ When handling sealed and suitably insulated cylinders wear cloth or leather gloves. |
| Body protection | See Other protection below |
| Other protection | <ul style="list-style-type: none"> ▶ Protective overalls, closely fitted at neck and wrist. ▶ Eye-wash unit. ▶ Ensure availability of lifeline in confined spaces. |

Respiratory protection

Full face respirator with supplied air.

- ▶ Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- ▶ The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- ▶ Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used
- ▶ Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)
- ▶ Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

| | | | |
|---|----------------|--|---------------|
| Appearance | Not Available | | |
| Physical state | Compressed Gas | Relative density (Water = 1) | Not Available |
| Odour | Not Available | Partition coefficient n-octanol / water | Not Available |
| Odour threshold | Not Available | Auto-ignition temperature (°C) | Not Available |
| pH (as supplied) | Not Available | Decomposition temperature (°C) | Not Available |
| Melting point / freezing point (°C) | Not Available | Viscosity (cSt) | Not Available |
| Initial boiling point and boiling range (°C) | Not Available | Molecular weight (g/mol) | Not Available |

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|----------------------------------|---------------|--|---------------|
| Flash point (°C) | Not Available | Taste | Not Available |
| Evaporation rate | Not Available | Explosive properties | Not Available |
| Flammability | Not Available | Oxidising properties | Not Available |
| Upper Explosive Limit (%) | Not Available | Surface Tension (dyn/cm or mN/m) | Not Available |
| Lower Explosive Limit (%) | Not Available | Volatile Component (%vol) | Not Available |
| Vapour pressure (kPa) | Not Available | Gas group | Not Available |
| Solubility in water | Immiscible | pH as a solution (Not Available%) | Not Available |
| Vapour density (Air = 1) | Not Available | VOC g/L | <25 |

SECTION 10 Stability and reactivity

| | |
|---|--|
| Reactivity | See section 7 |
| Chemical stability | <ul style="list-style-type: none"> ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur. |
| Possibility of hazardous reactions | See section 7 |
| Conditions to avoid | See section 7 |
| Incompatible materials | See section 7 |
| Hazardous decomposition products | See section 5 |

SECTION 11 Toxicological information**Information on toxicological effects**

| | |
|---------------------|---|
| Inhaled | <p>The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of the material, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.</p> <p>Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.</p> <p>Exposure to fluorocarbons can produce non-specific flu-like symptoms such as chills, fever, weakness, muscle pain, headache, chest discomfort, sore throat and dry cough with rapid recovery. High concentrations can cause irregular heartbeats and a stepwise reduction in lung capacity.</p> <p>Inhalation of the vapour is hazardous and may even be fatal</p> <p>The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.</p> <p>Aliphatic alcohols with more than 3-carbons cause headache, dizziness, drowsiness, muscle weakness and delirium, central depression, coma, seizures and behavioural changes. Secondary respiratory depression and failure, as well as low blood pressure and irregular heart rhythms, may follow.</p> <p>Inhalation of toxic gases may cause:</p> <ul style="list-style-type: none"> ▶ Central Nervous System effects including depression, headache, confusion, dizziness, stupor, coma and seizures; ▶ respiratory: acute lung swellings, shortness of breath, wheezing, rapid breathing, other symptoms and respiratory arrest; ▶ heart: collapse, irregular heartbeats and cardiac arrest; ▶ gastrointestinal: irritation, ulcers, nausea and vomiting (may be bloody), and abdominal pain. |
| Ingestion | <p>Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.</p> <p>Overexposure to non-ring alcohols causes nervous system symptoms. These include headache, muscle weakness and inco-ordination, giddiness, confusion, delirium and coma.</p> <p>Not normally a hazard due to physical form of product.</p> <p>Considered an unlikely route of entry in commercial/industrial environments</p> |
| Skin Contact | <p>Skin contact is not thought to produce harmful health effects (as classified under EC Directives using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>Fluorocarbons remove natural oils from the skin, causing irritation, dryness and sensitivity.</p> <p>Most liquid alcohols appear to act as primary skin irritants in humans. Significant percutaneous absorption occurs in rabbits but not apparently in man.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p> |
| Eye | <p>This material can cause eye irritation and damage in some persons.</p> <p>Not considered to be a risk because of the extreme volatility of the gas.</p> |
| Chronic | <p>Repeated or long-term occupational exposure is likely to produce cumulative health effects involving organs or biochemical systems.</p> <p>Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.</p> <p>Ample evidence exists from experimentation that reduced human fertility is directly caused by exposure to the material.</p> <p>The reactivity of an epoxide intermediate may be the reason for the cancer-causing properties of halogenated oxiranes. It is reported that 1,1-dichloroethyne, vinyl chloride, trichloroethylene, tetrachloroethylene and chloroprene all cause cancer.</p> <p>Generally speaking, substances with one halogen substitution show higher potential to cause cancer compared to substances with two.</p> |

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| | | |
|----------------------------------|--|---|
| | Main route of exposure to the gas in the workplace is by inhalation. There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Fluorocarbons can cause an increased risk of cancer, spontaneous abortion and birth defects. | |
| HandiFoam FR HFO B-side | TOXICITY | IRRITATION |
| | Not Available | Not Available |
| diethylene glycol | TOXICITY | IRRITATION |
| | Dermal (rabbit) LD50: 11890 mg/kg ^[2] | Eye (rabbit) 50 mg mild |
| | Inhalation(Rat) LC50; >4.6 mg/4h ^[1] | Eye: no adverse effect observed (not irritating) ^[1] |
| | Oral (Rat) LD50; 12565 mg/kg ^[2] | Skin (human): 112 mg/3d-I mild |
| | | Skin (rabbit): 500 mg mild |
| | Skin: no adverse effect observed (not irritating) ^[1] | |
| tris(2-chloroisopropyl)phosphate | TOXICITY | IRRITATION |
| | Dermal (rabbit) LD50: >5000 mg/kg ^[2] | Eye (rabbit): non-irritating* |
| | Inhalation(Rat) LC50; >4.6 mg/kl/4H ^[2] | Skin (rabbit): mild (24 h): |
| | Intravenous (Mouse) LD50: 56 mg/kg ^[2] | |
| | Oral (Rat) LD50; 1500 mg/kg ^[2] | |
| dibutyltin dilauryl mercaptide | TOXICITY | IRRITATION |
| | Dermal (rabbit) LD50: >1000<2000 mg/kg ^[1] | Eye: no adverse effect observed (not irritating) ^[1] |
| | Oral (Rat) LD50; 136 mg/kg ^[2] | Skin: adverse effect observed (irritating) ^[1] |
| ethylene glycol | TOXICITY | IRRITATION |
| | dermal (mouse) LD50: >3500 mg/kg ^[1] | Eye (rabbit): 100 mg/1h - mild |
| | Oral (Rat) LD50; >2000 mg/kg ^[2] | Eye (rabbit): 12 mg/m3/3D |
| | | Eye (rabbit): 1440mg/6h-moderate |
| | | Eye (rabbit): 500 mg/24h - mild |
| | | Eye: no adverse effect observed (not irritating) ^[1] |
| | Skin (rabbit): 555 mg(open)-mild | |
| | Skin: no adverse effect observed (not irritating) ^[1] | |
| 1,3,3,3-tetrafluoropropene | TOXICITY | IRRITATION |
| | Inhalation(Rat) LC50; >1157.752 ppm4h ^[2] | Not Available |
| glycerol | TOXICITY | IRRITATION |
| | dermal (guinea pig) LD50: 58500 mg/kg ^[1] | Not Available |
| | Oral (Mouse) LD50; 4090 mg/kg ^[2] | |
| nitrogen | TOXICITY | IRRITATION |
| | Not Available | Not Available |
| Legend: | 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances | |

| | |
|----------------------------------|--|
| HandiFoam FR HFO B-side | The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. |
| DIETHYLENE GLYCOL | The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Diglycolic acid is formed following the oxidation of accidentally ingested diethylene glycol in the body and can lead to severe complications with fatal outcome. |
| tris(2-chloroisopropyl)phosphate | Non-chlorinated triphosphates have varying chemical, physical, toxicological and environmental properties. Blooming has been identified as a source of potential exposure (human and environmental) to triphosphate plasticisers / flame retardants. Blooming is the movement of an ingredient in rubber or plastic to the outer surface after curing. For tris(2-chloro-1-methylethyl)phosphate (TCPP) The flame retardant product supplied in the EU, marketed as TCPP, is actually a reaction mixture containing four isomers. The individual isomers in this reaction mixture are not separated or marketed. The individual components are never produced as such. Alkyl esters of phosphoric acid exhibit a low to moderate acute toxicity and metabolised. From studies done on mice, they are not likely to cause gene damage or affect reproduction. However, 2-ethylhexanoic acid produced an effect on newborn rats at high doses to the pregnant female. |
| DIBUTYL TIN DILAURYL MERCAPTIDE | * Arkema Canada MSDS for substance in 40% mineral oil ** Gelest MSDS |
| ETHYLENE GLYCOL | [Estimated Lethal Dose (human) 100 ml; RTECS quoted by Orica] Substance is reproductive effector in rats (birth defects). Mutagenic to rat cells. For ethylene glycol: Ethylene glycol is quickly and extensively absorbed throughout the gastrointestinal tract. Limited information suggests that it is also absorbed |

HandiFoam FR HFO B-side

| | |
|---|--|
| | through the airways; absorption through skin is apparently slow. Following absorption, it is distributed throughout the body. |
| 1,3,3,3-TETRAFLUOROPROPENE | Inhalation (rat) NOEL (28 days): >1.5 mg/l * * Vendor HFO-1234ze is not likely to accumulate in the bodies of humans or animals HFO-1234ze is practically non-toxic. Short-term exposures at levels higher than 10% have not induced cardiac sensitization to adrenalin nor induced serious toxic effects. Rats and rabbits did not exhibit any serious toxic, developmental or reproductive effects even with exposures to high levels of HFO-1234ze. Based on a series of mutagenicity and genomics studies, the cancer risk for HFO-1234ze is low, no cardiac sensitisation was observed in dogs with exposures up to 120,000 ppm; repeated dose toxicity in rats (13-wk) found mild effects on the heart (NOEL 5,000ppm); in vitro genotoxicity findings include negative Ames Test and negative human lymphocyte chromosome aberration test; in vivo genotoxicity findings in the mouse micronucleus test were negative (inhalation, mammalian bone-marrow cytogenetic test with chromosomal analysis). |
| GLYCEROL | Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. At very high concentrations, evidence predicts that glycerol may cause tremor, irritation of the skin, eyes, digestive tract and airway. Otherwise it is of low toxicity. There is no significant evidence to suggest that it causes cancer, genetic, reproductive or developmental toxicity. |
| NITROGEN | No significant acute toxicological data identified in literature search. |
| HandiFoam FR HFO B-side & 1,3,3,3-TETRAFLUOROPROPENE | Inhalation of perfluoroalkenes can cause lung injury, kidney damage, brain changes and death. Repeated exposures may alter blood pressure and the production of blood cells. The potential for causing cancer is the subject of speculation. Disinfection byproducts (DBPs) are formed when disinfectants such as chlorine, chloramines and ozone react with organic and inorganic matter in water. Animal studies have shown that some DBPs cause cancer. To date, several hundred DBPs have been identified. Numerous haloalkanes and haloalkenes have been tested for cancer-causing and mutation-causing activities. |

| | | | |
|--|---|---------------------------------|---|
| Acute Toxicity | ✗ | Carcinogenicity | ✗ |
| Skin Irritation/Corrosion | ✓ | Reproductivity | ✓ |
| Serious Eye Damage/Irritation | ✓ | STOT - Single Exposure | ✗ |
| Respiratory or Skin sensitisation | ✓ | STOT - Repeated Exposure | ✗ |
| Mutagenicity | ✗ | Aspiration Hazard | ✗ |

Legend: ✗ – Data either not available or does not fill the criteria for classification
 ✓ – Data available to make classification

SECTION 12 Ecological information

Toxicity

| | Endpoint | Test Duration (hr) | Species | Value | Source |
|---|---------------|--------------------|-------------------------------|----------------|---------------|
| HandiFoam FR HFO B-side | Not Available | Not Available | Not Available | Not Available | Not Available |
| diethylene glycol | Endpoint | Test Duration (hr) | Species | Value | Source |
| | EC50 | 48h | Crustacea | 84000mg/l | 1 |
| | NOEC(ECx) | 192h | Algae or other aquatic plants | 800mg/l | 1 |
| | LC50 | 96h | Fish | >100mg/l | 4 |
| | EC50 | 96h | Algae or other aquatic plants | 6500-13000mg/l | 2 |
| tris(2-chloroisopropyl)phosphate | Endpoint | Test Duration (hr) | Species | Value | Source |
| | BCF | 1008h | Fish | 0.8-2.8 | 7 |
| | EC50 | 72h | Algae or other aquatic plants | 82mg/l | Not Available |
| | ErC50 | 72h | Algae or other aquatic plants | 4mg/l | 1 |
| | EC50 | 48h | Crustacea | 65335mg/l | 1 |
| | EC50(ECx) | 96h | Algae or other aquatic plants | 4mg/l | 1 |
| | LC50 | 96h | Fish | 56.2mg/l | Not Available |
| | EC50 | 96h | Algae or other aquatic plants | 4mg/l | 1 |
| dibutyltin dilauryl mercaptide | Endpoint | Test Duration (hr) | Species | Value | Source |
| | EC50 | 72h | Algae or other aquatic plants | >=1.6mg/l | 2 |
| | EC50 | 48h | Crustacea | 0.023mg/l | 2 |
| | EC50(ECx) | 48h | Crustacea | 0.023mg/l | 2 |
| ethylene glycol | Endpoint | Test Duration (hr) | Species | Value | Source |
| | EC50(ECx) | Not Available | Algae or other aquatic plants | 6500-7500mg/l | 1 |
| | EC50 | 48h | Crustacea | >100mg/l | 2 |
| | LC50 | 96h | Fish | >10000mg/l | 1 |
| | EC50 | 96h | Algae or other aquatic plants | 6500-13000mg/l | 1 |
| 1,3,3,3-tetrafluoropropene | Endpoint | Test Duration (hr) | Species | Value | Source |
| | EC50 | 72h | Algae or other aquatic plants | >170mg/l | 2 |
| | EC50 | 48h | Crustacea | >160mg/l | 2 |

Continued...

HandiFoam FR HFO B-side

| | | | | | |
|----------------|--|---------------------------|----------------|---------------|---------------|
| | EC50(ECx) | 48h | Crustacea | >160mg/l | 2 |
| glycerol | Endpoint | Test Duration (hr) | Species | Value | Source |
| | EC0(ECx) | 24h | Crustacea | >500mg/l | 1 |
| | LC50 | 96h | Fish | 885mg/l | 2 |
| nitrogen | Endpoint | Test Duration (hr) | Species | Value | Source |
| | Not Available | Not Available | Not Available | Not Available | Not Available |
| Legend: | Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data | | | | |

In addition to carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), the greenhouse gases mentioned in the Kyoto Protocol include synthetic substances that share the common feature of being highly persistent in the atmosphere and inhibit radiation from escaping out of the atmosphere. These synthetic substances include hydrocarbons that are partially fluorinated (HFCs) or totally fluorinated (PFCs) as well as sulfur hexafluoride (SF₆). The greenhouse potential of these substances, expressed as multiples of that of CO₂, are within the range of 140 to 11,700 for HFCs, from 6500 to 9,200 for PFCs and 23,900 for SF₆.

DO NOT discharge into sewer or waterways.

Persistence and degradability

| Ingredient | Persistence: Water/Soil | Persistence: Air |
|----------------------------------|---------------------------|-----------------------------|
| diethylene glycol | LOW | LOW |
| tris(2-chloroisopropyl)phosphate | HIGH | HIGH |
| dibutyltin dilauryl mercaptide | HIGH | HIGH |
| ethylene glycol | LOW (Half-life = 24 days) | LOW (Half-life = 3.46 days) |
| glycerol | LOW | LOW |

Bioaccumulative potential

| Ingredient | Bioaccumulation |
|----------------------------------|----------------------|
| diethylene glycol | LOW (BCF = 180) |
| tris(2-chloroisopropyl)phosphate | LOW (BCF = 4.6) |
| dibutyltin dilauryl mercaptide | LOW (LogKOW = 16.42) |
| ethylene glycol | LOW (BCF = 200) |
| glycerol | LOW (LogKOW = -1.76) |

Mobility in soil

| Ingredient | Mobility |
|----------------------------------|------------------------|
| diethylene glycol | HIGH (KOC = 1) |
| tris(2-chloroisopropyl)phosphate | LOW (KOC = 1278) |
| dibutyltin dilauryl mercaptide | LOW (KOC = 6187000000) |
| ethylene glycol | HIGH (KOC = 1) |
| glycerol | HIGH (KOC = 1) |


SECTION 13 Disposal considerations

Waste treatment methods

| | |
|-------------------------------------|---|
| Product / Packaging disposal | <ul style="list-style-type: none"> Evaporate residue at an approved site. Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase. |
|-------------------------------------|---|

SECTION 14 Transport information

Labels Required

| | |
|-------------------------|---|
| |  |
| Marine Pollutant | NO |

Land transport (DOT)

| | |
|--------------------------------|---|
| UN number | 3500 |
| UN proper shipping name | Chemical under pressure, n.o.s. (Hydrofluoroolefin, Nitrogen) |

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| | | |
|-------------------------------------|--------------------|----------------|
| Transport hazard class(es) | Class | 2.2 |
| | Subrisk | Not Applicable |
| Packing group | Not Applicable | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Hazard Label | 2.2 |
| | Special provisions | 362, T50, TP40 |

Air transport (ICAO-IATA / DGR)

| | | |
|-------------------------------------|---|----------------|
| UN number | 3500 | |
| UN proper shipping name | Chemical under pressure, n.o.s. * (Hydrofluoroolefin, Nitrogen) | |
| Transport hazard class(es) | ICAO/IATA Class | 2.2 |
| | ICAO / IATA Subrisk | Not Applicable |
| | ERG Code | 2L |
| Packing group | Not Applicable | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Special provisions | A187 |
| | Cargo Only Packing Instructions | 218 |
| | Cargo Only Maximum Qty / Pack | 150 kg |
| | Passenger and Cargo Packing Instructions | 218 |
| | Passenger and Cargo Maximum Qty / Pack | 75 kg |
| | Passenger and Cargo Limited Quantity Packing Instructions | Forbidden |
| | Passenger and Cargo Limited Maximum Qty / Pack | Forbidden |

Sea transport (IMDG-Code / GGVSee)

| | | |
|-------------------------------------|---|----------------|
| UN number | 3500 | |
| UN proper shipping name | CHEMICAL UNDER PRESSURE, N.O.S. (Hydrofluoroolefin, Nitrogen) | |
| Transport hazard class(es) | IMDG Class | 2.2 |
| | IMDG Subrisk | Not Applicable |
| Packing group | Not Applicable | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | EMS Number | F-C, S-V |
| | Special provisions | 274 362 |
| | Limited Quantities | 0 |

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| Product name | Group |
|----------------------------------|---------------|
| diethylene glycol | Not Available |
| tris(2-chloroisopropyl)phosphate | Not Available |
| dibutyltin dilauryl mercaptide | Not Available |
| ethylene glycol | Not Available |
| 1,3,3,3-tetrafluoropropene | Not Available |
| glycerol | Not Available |
| nitrogen | Not Available |

Transport in bulk in accordance with the ICG Code

| Product name | Ship Type |
|----------------------------------|---------------|
| diethylene glycol | Not Available |
| tris(2-chloroisopropyl)phosphate | Not Available |
| dibutyltin dilauryl mercaptide | Not Available |
| ethylene glycol | Not Available |
| 1,3,3,3-tetrafluoropropene | Not Available |
| glycerol | Not Available |
| nitrogen | Not Available |

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SECTION 15 Regulatory information

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

diethylene glycol is found on the following regulatory lists

US AIHA Workplace Environmental Exposure Levels (WEELs)
 US DOE Temporary Emergency Exposure Limits (TEELs)
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL)
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

tris(2-chloroisopropyl)phosphate is found on the following regulatory lists

US - California - Biomonitoring - Priority Chemicals
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US TSCA Chemical Substance Inventory - Interim List of Active Substances

dibutyltin dilauryl mercaptide is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List
 US NIOSH Recommended Exposure Limits (RELs)
 US OSHA Permissible Exposure Limits (PELs) Table Z-1

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

ethylene glycol is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List
 US - California Hazardous Air Pollutants Identified as Toxic Air Contaminants
 US - California Proposition 65 - Maximum Allowable Dose Levels (MADLs) for Chemicals Causing Reproductive Toxicity
 US - California Proposition 65 - Reproductive Toxicity
 US - California Safe Drinking Water and Toxic Enforcement Act of 1986 - Proposition 65 List
 US - Massachusetts - Right To Know Listed Chemicals
 US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)

US Clean Air Act - Hazardous Air Pollutants
 US DOE Temporary Emergency Exposure Limits (TEELs)
 US EPA Integrated Risk Information System (IRIS)
 US EPCRA Section 313 Chemical List
 US NIOSH Recommended Exposure Limits (RELs)
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

1,3,3,3-tetrafluoropropene is found on the following regulatory lists

US AIHA Workplace Environmental Exposure Levels (WEELs)
 US DOE Temporary Emergency Exposure Limits (TEELs)
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL)
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

glycerol is found on the following regulatory lists

US - Massachusetts - Right To Know Listed Chemicals
 US DOE Temporary Emergency Exposure Limits (TEELs)
 US NIOSH Recommended Exposure Limits (RELs)

US OSHA Permissible Exposure Limits (PELs) Table Z-1
 US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

nitrogen is found on the following regulatory lists

US - Massachusetts - Right To Know Listed Chemicals
 US DOE Temporary Emergency Exposure Limits (TEELs)

US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
 US TSCA Chemical Substance Inventory - Interim List of Active Substances

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 311/312 hazard categories

| | |
|--|-----|
| Flammable (Gases, Aerosols, Liquids, or Solids) | No |
| Gas under pressure | Yes |
| Explosive | No |
| Self-heating | No |
| Pyrophoric (Liquid or Solid) | No |
| Pyrophoric Gas | No |
| Corrosive to metal | No |
| Oxidizer (Liquid, Solid or Gas) | No |
| Organic Peroxide | No |
| Self-reactive | No |
| In contact with water emits flammable gas | No |
| Combustible Dust | No |
| Carcinogenicity | No |
| Acute toxicity (any route of exposure) | No |
| Reproductive toxicity | Yes |
| Skin Corrosion or Irritation | Yes |
| Respiratory or Skin Sensitization | Yes |
| Serious eye damage or eye irritation | Yes |
| Specific target organ toxicity (single or repeated exposure) | No |
| Aspiration Hazard | No |
| Germ cell mutagenicity | No |
| Simple Asphyxiant | No |
| Hazards Not Otherwise Classified | No |

Continued...

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US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

| Name | Reportable Quantity in Pounds (lb) | Reportable Quantity in kg |
|-----------------|------------------------------------|---------------------------|
| ethylene glycol | 5000 | 2270 |

State Regulations

US. California Proposition 65

WARNING: This product can expose you to chemicals including **ethylene glycol**, which is known to the State of California to cause birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

National Inventory Status

| National Inventory | Status |
|--|---|
| Australia - AIIIC / Australia Non-Industrial Use | Yes |
| Canada - DSL | Yes |
| Canada - NDSL | No (diethylene glycol; tris(2-chloroisopropyl)phosphate; dibutyltin dilauryl mercaptide; ethylene glycol; glycerol; nitrogen) |
| China - IECSC | Yes |
| Europe - EINEC / ELINCS / NLP | No (1,3,3,3-tetrafluoropropene) |
| Japan - ENCS | No (nitrogen) |
| Korea - KECL | Yes |
| New Zealand - NZIoC | No (1,3,3,3-tetrafluoropropene) |
| Philippines - PICCS | No (1,3,3,3-tetrafluoropropene) |
| USA - TSCA | Yes |
| Taiwan - TCSI | Yes |
| Mexico - INSQ | No (1,3,3,3-tetrafluoropropene) |
| Vietnam - NCI | Yes |
| Russia - FBEPH | No (1,3,3,3-tetrafluoropropene) |
| Legend: | Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration. |

SECTION 16 Other information

| | |
|---------------|------------|
| Revision Date | 07/25/2022 |
| Initial Date | 01/17/2022 |

CONTACT POINT

PLEASE NOTE THAT TITANIUM DIOXIDE IS NOT PRESENT IN CLEAR OR NEUTRAL BASES

SDS Version Summary

| Version | Date of Update | Sections Updated |
|---------|----------------|--|
| 2.5 | 07/25/2022 | Ingredients, Physical Properties, Supplier Information |

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
 PC—STEL: Permissible Concentration-Short Term Exposure Limit
 IARC: International Agency for Research on Cancer
 ACGIH: American Conference of Governmental Industrial Hygienists
 STEL: Short Term Exposure Limit
 TEEL: Temporary Emergency Exposure Limit.
 IDLH: Immediately Dangerous to Life or Health Concentrations
 ES: Exposure Standard
 OSF: Odour Safety Factor
 NOAEL :No Observed Adverse Effect Level
 LOAEL: Lowest Observed Adverse Effect Level
 TLV: Threshold Limit Value
 LOD: Limit Of Detection
 OTV: Odour Threshold Value
 BCF: BioConcentration Factors
 BEI: Biological Exposure Index
 AIIIC: Australian Inventory of Industrial Chemicals
 DSL: Domestic Substances List
 NDSL: Non-Domestic Substances List
 IECSC: Inventory of Existing Chemical Substance in China
 EINECS: European INventory of Existing Commercial chemical Substances
 ELINCS: European List of Notified Chemical Substances
 NLP: No-Longer Polymers
 ENCS: Existing and New Chemical Substances Inventory

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KECI: Korea Existing Chemicals Inventory

NZIoC: New Zealand Inventory of Chemicals

PICCS: Philippine Inventory of Chemicals and Chemical Substances

TSCA: Toxic Substances Control Act

TCSI: Taiwan Chemical Substance Inventory

INSQ: Inventario Nacional de Sustancias Químicas

NCI: National Chemical Inventory

FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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HandiFoam FR HFO, HandiFoam FR Black HFO A-side

ICP

Version No: 1.1
Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Issue Date: **03/07/2022**
Print Date: **03/07/2022**
S.GHS.USA.EN

SECTION 1 Identification

Product Identifier

| | |
|-------------------------------|---|
| Product name | HandiFoam FR HFO & HandiFoam FR Black HFO A-side |
| Synonyms | Not Available |
| Proper shipping name | Chemical under pressure, n.o.s. (Hydrofluoroolefin, Nitrogen) |
| Other means of identification | Not Available |

Recommended use of the chemical and restrictions on use

| | |
|--------------------------|---|
| Relevant identified uses | Low pressure polyurethane foam. Side A Component. For PROFESSIONAL USE ONLY |
|--------------------------|---|

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

| | |
|-------------------------|--|
| Registered company name | ICP |
| Address | 2775 Barber Road Ohio United States |
| Telephone | 330-753-4585 1-800-321-5585 |
| Fax | Not Available |
| Website | www.handifoam.com |
| Email | Not Available |

Emergency phone number

| | |
|-----------------------------------|----------------|
| Association / Organisation | CHEMTEL |
| Emergency telephone numbers | 1-800-255-3924 |
| Other emergency telephone numbers | 1-813-248-0585 |

SECTION 2 Hazard(s) identification

Classification of the substance or mixture



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

| | |
|----------------|--|
| Classification | Serious Eye Damage/Eye Irritation Category 2A, Sensitisation (Respiratory) Category 1, Specific Target Organ Toxicity - Repeated Exposure Category 2, Acute Toxicity (Inhalation) Category 4, Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3, Skin Corrosion/Irritation Category 2, Gases Under Pressure (Compressed Gas), Sensitisation (Skin) Category 1, Carcinogenicity Category 2 |
|----------------|--|

Label elements

| | |
|---------------------|--|
| Hazard pictogram(s) | |
|---------------------|--|

| | |
|-------------|---------------|
| Signal word | Danger |
|-------------|---------------|

Hazard statement(s)

| | |
|------|--|
| H319 | Causes serious eye irritation. |
| H334 | May cause allergy or asthma symptoms or breathing difficulties if inhaled. |

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| | |
|------|--|
| H373 | May cause damage to organs through prolonged or repeated exposure. (Respiratory system) (Inhalation) |
| H332 | Harmful if inhaled. |
| H335 | May cause respiratory irritation. |
| H315 | Causes skin irritation. |
| H280 | Contains gas under pressure; may explode if heated. |
| H317 | May cause an allergic skin reaction. |
| H351 | Suspected of causing cancer. |

Hazard(s) not otherwise classified

Persons previously sensitized to isocyanates may develop a cross-sensitization reaction to other isocyanates.

Precautionary statement(s) Prevention

| | |
|------|---|
| P202 | Do not handle until all safety precautions have been read and understood |
| P262 | Do not get in eyes, on skin, or on clothing |
| P260 | Do not breathe gas. |
| P264 | Wash hands and other skin areas exposed to material thoroughly after handling |
| P271 | Use only outdoors or in a well-ventilated area. |
| P280 | Wear protective gloves, protective clothing and eye protection |
| P284 | Wear respiratory protection |

Precautionary statement(s) Response

| | |
|---------------------|--|
| P308+P313 | IF exposed or concerned: Get medical advice/ attention. |
| P342+P311 | If experiencing respiratory symptoms: Call a POISON CENTER/doctor/physician/first aider. |
| P305+P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P302+P352+P333+P313 | IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical attention |
| P304+P341 | IF INHALED: if breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing |

Precautionary statement(s) Storage

| | |
|-----------|--|
| P405 | Store locked up. |
| P410+P403 | Protect from sunlight. Store in a well-ventilated place. |
| P403+P233 | Store in a well-ventilated place. Keep container tightly closed. |

Precautionary statement(s) Disposal

| | |
|------|--|
| P501 | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|------|--|

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

See section below for composition of Mixtures

Mixtures

| CAS No | %[weight] | Name |
|------------|-----------|--|
| 101-68-8 | 30-60 | <u>4,4'-diphenylmethane diisocyanate (MDI)</u> |
| 9016-87-9 | 30-60 | <u>polymeric diphenylmethane diisocyanate</u> |
| 29118-24-9 | 5-10 | <u>1,3,3,3-tetrafluoropropene</u> |
| 7727-37-9. | 1 | <u>nitrogen</u> |

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4 First-aid measures**Description of first aid measures**

| | |
|--------------------|---|
| Eye Contact | <ul style="list-style-type: none"> ▶ If product comes in contact with eyes remove the patient from gas source or contaminated area. ▶ Take the patient to the nearest eye wash, shower or other source of clean water. ▶ Open the eyelid(s) wide to allow the material to evaporate. ▶ Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners. ▶ The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage. ▶ Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s) ▶ Transport to hospital or doctor. ▶ Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur. ▶ If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage. ▶ Ensure verbal communication and physical contact with the patient. <p>DO NOT allow the patient to rub the eyes DO NOT allow the patient to tightly shut the eyes DO NOT introduce oil or ointment into the eye(s) without medical advice</p> |
|--------------------|---|

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| | |
|---------------------|---|
| | DO NOT use hot or tepid water. |
| Skin Contact | <p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Immediately flush body and clothes with large amounts of water, using safety shower if available. ▶ Quickly remove all contaminated clothing, including footwear. ▶ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. ▶ Transport to hospital, or doctor. |
| Inhalation | <p>Following uptake by inhalation, move person to an area free from risk of further exposure. Oxygen or artificial respiration should be administered as needed. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Treatment is essentially symptomatic. A physician should be consulted.</p> <ul style="list-style-type: none"> ▶ Following exposure to gas, remove the patient from the gas source or contaminated area. ▶ NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer. ▶ Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures. ▶ If the patient is not breathing spontaneously, administer rescue breathing. ▶ If the patient does not have a pulse, administer CPR. ▶ If medical oxygen and appropriately trained personnel are available, administer 100% oxygen. ▶ Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction. ▶ Keep the patient warm, comfortable and at rest while awaiting medical care. ▶ MONITOR THE BREATHING AND PULSE, CONTINUOUSLY. ▶ Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary. |
| Ingestion | Not considered a normal route of entry. |

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

For gas exposures:

BASIC TREATMENT

- ▶ Establish a patent airway with suction where necessary.
- ▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- ▶ Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- ▶ Monitor and treat, where necessary, for pulmonary oedema .
- ▶ Monitor and treat, where necessary, for shock.
- ▶ Anticipate seizures.

ADVANCED TREATMENT

- ▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- ▶ Positive-pressure ventilation using a bag-valve mask might be of use.
- ▶ Monitor and treat, where necessary, for arrhythmias.
- ▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- ▶ Drug therapy should be considered for pulmonary oedema.
- ▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- ▶ Treat seizures with diazepam.
- ▶ Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

For sub-chronic and chronic exposures to isocyanates:

- ▶ This material may be a potent pulmonary sensitiser which causes bronchospasm even in patients without prior airway hyperreactivity.
- ▶ Clinical symptoms of exposure involve mucosal irritation of respiratory and gastrointestinal tracts.
- ▶ Conjunctival irritation, skin inflammation (erythema, pain vesiculation) and gastrointestinal disturbances occur soon after exposure.
- ▶ Pulmonary symptoms include cough, burning, substernal pain and dyspnoea.
- ▶ Some cross-sensitivity occurs between different isocyanates.
- ▶ Noncardiogenic pulmonary oedema and bronchospasm are the most serious consequences of exposure. Markedly symptomatic patients should receive oxygen, ventilatory support and an intravenous line.
- ▶ Treatment for asthma includes inhaled sympathomimetics (epinephrine [adrenalin], terbutaline) and steroids.
- ▶ Activated charcoal (1 g/kg) and a cathartic (sorbitol, magnesium citrate) may be useful for ingestion.
- ▶ Mydriatics, systemic analgesics and topical antibiotics (Sulamyd) may be used for corneal abrasions.
- ▶ There is no effective therapy for sensitised workers.

[Ellenhorn and Barceloux; Medical Toxicology]

NOTE: Isocyanates cause airway restriction in naive individuals with the degree of response dependant on the concentration and duration of exposure. They induce smooth muscle contraction which leads to bronchoconstrictive episodes. Acute changes in lung function, such as decreased FEV1, may not represent sensitivity.

[Karol & Jin, Frontiers in Molecular Toxicology, pp 56-61, 1992]

Personnel who work with isocyanates, isocyanate prepolymers or polyisocyanates should have a pre-placement medical examination and periodic examinations thereafter, including a pulmonary function test. Anyone with a medical history of chronic respiratory disease, asthmatic or bronchial attacks, indications of allergic responses, recurrent eczema or sensitisation conditions of the skin should not handle or work with isocyanates. Anyone who develops chronic respiratory distress when working with isocyanates should be removed from exposure and examined by a physician. Further exposure must be avoided if a sensitivity to isocyanates or polyisocyanates has developed.

SECTION 5 Fire-fighting measures**Extinguishing media**

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- ▶ Small quantities of water in contact with hot liquid may react violently with generation of a large volume of rapidly expanding hot sticky semi-solid foam.
- ▶ Presents additional hazard when fire fighting in a confined space.
- ▶ Cooling with flooding quantities of water reduces this risk.
- ▶ Dry chemical powder.
- ▶ BCF (where regulations permit).
- ▶ Carbon dioxide.

Special hazards arising from the substrate or mixture

| | |
|-----------------------------|--|
| Fire Incompatibility | ▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result |
|-----------------------------|--|

Special protective equipment and precautions for fire-fighters

| | |
|------------------------------|---|
| Fire Fighting | <p>-----</p> <p>GENERAL</p> <p>-----</p> <ul style="list-style-type: none"> ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear full body protective clothing with breathing apparatus. ▶ Fight fire from a safe distance, with adequate cover. |
| Fire/Explosion Hazard | <p>-Combustible.</p> <p>-Moderate fire hazard when exposed to heat or flame.</p> <p>-When heated to high temperatures decomposes rapidly generating vapour which pressures and may then rupture containers with release of flammable and highly toxic isocyanate vapour.</p> <ul style="list-style-type: none"> ▶ Containers may explode when heated - Ruptured cylinders may rocket ▶ May burn but does not ignite easily. ▶ Fire exposed cylinders may vent contents through pressure relief devices thereby increasing vapour concentration.. ▶ Fire may produce irritating, poisonous or corrosive gases. <p>Decomposition may produce toxic fumes of:</p> <p>carbon monoxide (CO)</p> <p>carbon dioxide (CO₂)</p> <p>isocyanates</p> <p>hydrogen cyanide</p> <p>and minor amounts of</p> <p>nitrogen oxides (NO_x)</p> <p>other pyrolysis products typical of burning organic material.</p> |

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

| | |
|---------------------|---|
| Minor Spills | <ul style="list-style-type: none"> ▶ Avoid breathing vapour and any contact with liquid or gas. Protective equipment including respirator should be used. ▶ DO NOT enter confined spaces where gas may have accumulated. |
| Major Spills | <p>For isocyanate spills of less than 40 litres (2 m²):</p> <ul style="list-style-type: none"> ▶ Evacuate area from everybody not dealing with the emergency, keep them upwind and prevent further access, remove ignition sources and, if inside building, ventilate area as well as possible. ▶ Notify supervision and others as necessary. ▶ Put on personal protective equipment (suitable respiratory protection, face and eye protection, protective suit, gloves and impermeable boots). ▶ Avoid contamination with water, alkalis and detergent solutions. ▶ Material reacts with water and generates gas, pressurises containers with even drum rupture resulting. ▶ DO NOT reseal container if contamination is suspected. ▶ DO NOT touch the spill material ▶ Clear area of all unprotected personnel and move upwind. ▶ Alert Emergency Authority and advise them of the location and nature of hazard. ▶ Wear full body clothing with breathing apparatus. ▶ Remove leaking cylinders to a safe place. ▶ Fit vent pipes. Release pressure under safe, controlled conditions ▶ Burn issuing gas at vent pipes. ▶ DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve. |

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

| | |
|----------------------|--|
| Safe handling | <ul style="list-style-type: none"> ·Consider use in closed pressurised systems, fitted with temperature, pressure and safety relief valves which are vented for safe dispersal. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature ·The tubing network design connecting gas cylinders to the delivery system should include appropriate pressure indicators and vacuum or suction lines. ·Fully-welded types of pressure gauges, where the bourdon tube sensing element is welded to the gauge body, are recommended. ▶ DO NOT transfer gas from one cylinder to another. |
|----------------------|--|

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Other information

- Consider storage under inert gas.
- ▶ Cylinders should be stored in a purpose-built compound with good ventilation, preferably in the open.
 - ▶ Such compounds should be sited and built in accordance with statutory requirements.
 - ▶ The storage compound should be kept clear and access restricted to authorised personnel only.

Conditions for safe storage, including any incompatibilities

| | |
|-------------------------|--|
| Suitable container | <ul style="list-style-type: none"> ▶ Cylinder: ▶ Ensure the use of equipment rated for cylinder pressure. ▶ Ensure the use of compatible materials of construction. ▶ Valve protection cap to be in place until cylinder is secured, connected. |
| Storage incompatibility | <p>-Avoid reaction with water, alcohols and detergent solutions. Isocyanates are electrophiles, and as such they are reactive toward a variety of nucleophiles including alcohols, amines, and even water. Upon treatment with an alcohol, an isocyanate forms a urethane linkage.</p> <ul style="list-style-type: none"> ▶ A range of exothermic decomposition energies for isocyanates is given as 20-30 kJ/mol. ▶ The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy released per unit of mass, rather than on a molar basis (J/g) be used in the assessment. ▶ For example, in 'open vessel processes' (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 J/g are unlikely to present a danger, whilst those in 'closed vessel processes' (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 J/g. ▶ Compressed gases may contain a large amount of kinetic energy over and above that potentially available from the energy of reaction produced by the gas in chemical reaction with other substances |

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

| Source | Ingredient | Material name | TWA | STEL | Peak | Notes |
|--|---|--------------------------------------|------------------------|---------------|---|--|
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 | 4,4'-diphenylmethane diisocyanate (MDI) | Methylene bisphenyl isocyanate (MDI) | Not Available | Not Available | 0.02 ppm / 0.2 mg/m3 | Not Available |
| US NIOSH Recommended Exposure Limits (RELs) | 4,4'-diphenylmethane diisocyanate (MDI) | Methylene bisphenyl isocyanate | 0.005 ppm / 0.05 mg/m3 | Not Available | 0.020 (10-minute) ppm / 0.2 (10-minute) mg/m3 | Not Available |
| US ACGIH Threshold Limit Values (TLV) | 4,4'-diphenylmethane diisocyanate (MDI) | Methylene bisphenyl isocyanate | 0.005 ppm | Not Available | Not Available | Not Available |
| US ACGIH Threshold Limit Values (TLV) | nitrogen | Nitrogen | Not Available | Not Available | Not Available | See Appendix F: Minimal Oxygen Content |

Emergency Limits

| Ingredient | TEEL-1 | TEEL-2 | TEEL-3 |
|---|--------------|---------------|---------------|
| 4,4'-diphenylmethane diisocyanate (MDI) | 0.45 mg/m3 | Not Available | Not Available |
| 4,4'-diphenylmethane diisocyanate (MDI) | 29 mg/m3 | 40 mg/m3 | 240 mg/m3 |
| polymeric diphenylmethane diisocyanate | 0.15 mg/m3 | 3.6 mg/m3 | 22 mg/m3 |
| 1,3,3,3-tetrafluoropropene | 1,400 ppm | Not Available | Not Available |
| nitrogen | 7.96E+05 ppm | 8.32E+05 ppm | 8.69E+05 ppm |

| Ingredient | Original IDLH | Revised IDLH |
|---|---------------|---------------|
| 4,4'-diphenylmethane diisocyanate (MDI) | 75 mg/m3 | Not Available |
| polymeric diphenylmethane diisocyanate | Not Available | Not Available |
| 1,3,3,3-tetrafluoropropene | Not Available | Not Available |
| nitrogen | Not Available | Not Available |

Occupational Exposure Banding

| Ingredient | Occupational Exposure Band Rating | Occupational Exposure Band Limit |
|--|-----------------------------------|----------------------------------|
| polymeric diphenylmethane diisocyanate | E | ≤ 0.1 ppm |


Notes:

Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

Exposure controls

| | |
|----------------------------------|---|
| Appropriate engineering controls | <p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> |
|----------------------------------|---|

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| | |
|--------------------------------|--|
| Personal protection |  |
| Eye and face protection | <ul style="list-style-type: none"> ▶ Safety glasses with side shields. ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. |
| Skin protection | See Hand protection below |
| Hands/feet protection | <p>NOTE:</p> <ul style="list-style-type: none"> ▶ The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact. ▶ Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed. ▶ Isocyanate resistant materials include Teflon, Viton, nitrile rubber and some PVA gloves. ▶ Protective gloves and overalls should be worn as specified in the appropriate national standard. ▶ Contaminated garments should be removed promptly and should not be re-used until they have been decontaminated. ▶ When handling sealed and suitably insulated cylinders wear cloth or leather gloves. |
| Body protection | See Other protection below |
| Other protection | <ul style="list-style-type: none"> ▶ Protective overalls, closely fitted at neck and wrist. ▶ Eye-wash unit. ▶ Ensure availability of lifeline in confined spaces. |

Respiratory protection

- ▶ Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- ▶ The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- ▶ Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used
- ▶ Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)
- ▶ Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

SECTION 9 Physical and chemical properties**Information on basic physical and chemical properties**

| | | | |
|---|---------------------|--|---------------|
| Appearance | Moisture sensitive. | | |
| Physical state | Compressed Gas | Relative density (Water = 1) | 1.2 |
| Odour | Not Available | Partition coefficient n-octanol / water | Not Available |
| Odour threshold | Not Available | Auto-ignition temperature (°C) | Not Available |
| pH (as supplied) | Not Available | Decomposition temperature | Not Available |
| Melting point / freezing point (°C) | Not Available | Viscosity (cSt) | Not Available |
| Initial boiling point and boiling range (°C) | 208 | Molecular weight (g/mol) | Not Available |
| Flash point (°C) | >199 | Taste | Not Available |
| Evaporation rate | Not Available | Explosive properties | Not Available |
| Flammability | Not Applicable | Oxidising properties | Not Available |
| Upper Explosive Limit (%) | Not Available | Surface Tension (dyn/cm or mN/m) | Not Available |
| Lower Explosive Limit (%) | Not Available | Volatile Component (%vol) | Not Available |
| Vapour pressure (kPa) | Not Available | Gas group | Not Available |
| Solubility in water | Partly miscible | pH as a solution (%) | Not Available |
| Vapour density (Air = 1) | Not Available | VOC g/L | Not Available |

SECTION 10 Stability and reactivity

| | |
|---------------------------|--|
| Reactivity | See section 7 |
| Chemical stability | <ul style="list-style-type: none"> ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. |

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| | |
|---|--|
| | <ul style="list-style-type: none"> ▶ Hazardous polymerisation will not occur. ▶ Presence of elevated temperatures. |
| Possibility of hazardous reactions | See section 7 |
| Conditions to avoid | See section 7 |
| Incompatible materials | See section 7 |
| Hazardous decomposition products | See section 5 |

SECTION 11 Toxicological information

Information on toxicological effects

| | |
|---------------------|--|
| Inhaled | <p>The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Inhalation of the vapour is hazardous and may even be fatal</p> <p>The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.</p> <p>Inhalation of toxic gases may cause:</p> <ul style="list-style-type: none"> ▶ Central Nervous System effects including depression, headache, confusion, dizziness, stupor, coma and seizures; ▶ respiratory: acute lung swellings, shortness of breath, wheezing, rapid breathing, other symptoms and respiratory arrest; ▶ heart: collapse, irregular heartbeats and cardiac arrest; ▶ gastrointestinal: irritation, ulcers, nausea and vomiting (may be bloody), and abdominal pain. <p>The vapour/mist may be highly irritating to the upper respiratory tract and lungs; the response may be severe enough to produce bronchitis and pulmonary oedema. Possible neurological symptoms arising from isocyanate exposure include headache, insomnia, euphoria, ataxia, anxiety neurosis, depression and paranoia. Gastrointestinal disturbances are characterised by nausea and vomiting.</p> <p>There is strong evidence to suggest that this material can cause, if inhaled once, very serious, irreversible damage of organs.</p> <p>Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may produce severely toxic effects. Relatively small amounts absorbed from the lungs may prove fatal.</p> |
| Ingestion | <p>Not normally a hazard due to physical form of product.</p> <p>Considered an unlikely route of entry in commercial/industrial environments</p> <p>Accidental ingestion of the material may be seriously damaging to the health of the individual; animal experiments indicate that ingestion of less than 40 gram may be fatal.</p> |
| Skin Contact | <p>This material can cause inflammation of the skin on contact in some persons.</p> <p>The material may accentuate any pre-existing dermatitis condition</p> <p>Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p> |
| Eye | <p>Not considered to be a risk because of the extreme volatility of the gas.</p> <p>This material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Moderate inflammation may be expected with redness; conjunctivitis may occur with prolonged exposure.</p> |
| Chronic | <p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.</p> <p>Inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population.</p> <p>Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.</p> <p>Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.</p> <p>This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p> <p>This product contains a polymer with a functional group considered to be of high concern. Isothiocyanates may cause hypersensitivity of the skin and airways.</p> <p>The reactivity of an epoxide intermediate may be the reason for the cancer-causing properties of halogenated oxiranes. It is reported that 1,1-dichloroethyne, vinyl chloride, trichloroethylene, tetrachloroethylene and chloroprene all cause cancer.</p> <p>Generally speaking, substances with one halogen substitution show higher potential to cause cancer compared to substances with two.</p> <p>Main route of exposure to the gas in the workplace is by inhalation.</p> <p>Persons with a history of asthma or other respiratory problems or are known to be sensitised, should not be engaged in any work involving the handling of isocyanates.</p> <p>The chemistry of reaction of isocyanates, as evidenced by MDI, in biological milieu is such that in the event of a true exposure of small MDI doses to the mouth, reactions will commence at once with biological macromolecules in the buccal region and will continue along the digestive tract prior to reaching the stomach. Reaction products will be a variety of polyureas and macromolecular conjugates with for example mucus, proteins and cell components.</p> <p>Animal testing shows that polymeric MDI can damage the nasal cavities and lungs, causing inflammation and increased cell growth.</p> <p>Isocyanate vapours are irritating to the airways and can cause their inflammation, with wheezing, gasping, severe distress, even loss of consciousness and fluid in the lungs. Nervous system symptoms that may occur include headache, sleep disturbance, euphoria, inco-ordination, anxiety, depression and paranoia.</p> |

| | | |
|--|---|---|
| HandiFoam E84 HFO, HandiFoam Slow Rise HFO A-side | TOXICITY | IRRITATION |
| | Not Available | Not Available |
| 4,4'-diphenylmethane diisocyanate (MDI) | TOXICITY | IRRITATION |
| | Dermal (rabbit) LD50: >6200 mg/kg ^[2] | Dermal Sensitiser * |
| | Inhalation(Rat) LC50: 0.368 mg/L4h ^[1] | Eye: no adverse effect observed (not irritating) ^[1] |
| | Oral(Rat) LD50: >2000 mg/kg ^[1] | Skin (rabbit): 500 mg /24 hours |

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| | | |
|--|---|-----------------------------|
| | Skin: adverse effect observed (irritating) ^[1] | |
| polymeric diphenylmethane diisocyanate | TOXICITY | IRRITATION |
| | Dermal (rabbit) LD50: >9400 mg/kg ^[2] | Eye (rabbit): 100 mg - mild |
| | Inhalation(Rat) LC50; 0.49 mg/L4h ^[2] | |
| | Oral(Rat) LD50; 43000 mg/kg ^[2] | |
| 1,3,3,3-tetrafluoropropene | TOXICITY | IRRITATION |
| | Inhalation(Rat) LC50; >1157.752 ppm4h ^[2] | Not Available |
| nitrogen | TOXICITY | IRRITATION |
| | Not Available | Not Available |
| Legend: | 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances | |

| | |
|--|--|
| 4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI) | Inhalation (human) TCLo: 0.13 ppm/30 mins Eye (rabbit): 0.10 mg moderate |
| POLYMERIC DIPHENYLMETHANE DIISOCYANATE | product |
| 1,3,3,3-TETRAFLUOROPROPENE | Inhalation (rat) NOEL (28 days): >1.5 mg/l * * Vendor HFO-1234ze is not likely to accumulate in the bodies of humans or animals HFO-1234ze is practically non-toxic. Short-term exposures at levels higher than 10% have not induced cardiac sensitization to adrenalin nor induced serious toxic effects. Rats and rabbits did not exhibit any serious toxic, developmental or reproductive effects even with exposures to high levels of HFO-1234ze. Based on a series of mutagenicity and genomics studies, the cancer risk for HFO-1234ze is low, no cardiac sensitisation was observed in dogs with exposures up to 120,000 ppm; repeated dose toxicity in rats (13-wk) found mild effects on the heart (NOEL 5,000ppm); in vitro genotoxicity findings include negative Ames Test and negative human lymphocyte chromosome aberration test; in vivo genotoxicity findings in the mouse micronucleus test were negative (inhalation, mammalian bone-marrow cytogenetic test with chromosomal analysis). Inhalation of perfluoroalkenes can cause lung injury, kidney damage, brain changes and death. Repeated exposures may alter blood pressure and the production of blood cells. ♦The potential for causing cancer is the subject of speculation. Fluoroalkanes, in contrast, are less toxic. |
| NITROGEN | No significant acute toxicological data identified in literature search. |
| HandiFoam E84 HFO, HandiFoam Slow Rise HFO A-side & 4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI) & POLYMERIC DIPHENYLMETHANE DIISOCYANATE | Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Allergic reactions involving the respiratory tract are usually due to interactions between IgE antibodies and allergens and occur rapidly. Allergic potential of the allergen and period of exposure often determine the severity of symptoms. Some people may be genetically more prone than others, and exposure to other irritants may aggravate symptoms. Attention should be paid to atopic diathesis, characterised by increased susceptibility to nasal inflammation, asthma and eczema. Exogenous allergic alveolitis is induced essentially by allergen specific immune-complexes of the IgG type; cell-mediated reactions (T lymphocytes) may be involved. Such allergy is of the delayed type with onset up to four hours following exposure. The following information refers to contact allergens as a group and may not be specific to this product. Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. |
| HandiFoam E84 HFO, HandiFoam Slow Rise HFO A-side & 1,3,3,3-TETRAFLUOROPROPENE | Disinfection byproducts (DBPs) are formed when disinfectants such as chlorine, chloramines and ozone react with organic and inorganic matter in water. Animal studies have shown that some DBPs cause cancer. To date, several hundred DBPs have been identified. Numerous haloalkanes and haloalkenes have been tested for cancer-causing and mutation-causing activities. |
| 4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI) & POLYMERIC DIPHENYLMETHANE DIISOCYANATE | Isocyanate vapours are irritating to the airways and can cause their inflammation, with wheezing, gasping, severe distress, even loss of consciousness and fluid in the lungs. Nervous system symptoms that may occur include headache, sleep disturbance, euphoria, inco-ordination, anxiety, depression and paranoia. The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. Aromatic and aliphatic diisocyanates may cause airway toxicity and skin sensitization. Monomers and prepolymers exhibit similar respiratory effect. Of the several members of diisocyanates tested on experimental animals by inhalation and oral exposure, some caused cancer while others produced a harmless outcome. The substance is classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing. |

| | | | |
|-----------------------------------|---|--------------------------|---|
| Acute Toxicity | ✓ | Carcinogenicity | ✓ |
| Skin Irritation/Corrosion | ✓ | Reproductivity | ✗ |
| Serious Eye Damage/Irritation | ✓ | STOT - Single Exposure | ✓ |
| Respiratory or Skin sensitisation | ✓ | STOT - Repeated Exposure | ✓ |
| Mutagenicity | ✗ | Aspiration Hazard | ✗ |

Legend: ✗ – Data either not available or does not fill the criteria for classification
 ✓ – Data available to make classification

HandiFoam FR HFO, HandiFoam FR Black HFO A-side

Toxicity

| HandiFoam E84 HFO, HandiFoam Slow Rise HFO A-side | Endpoint | Test Duration (hr) | Species | Value | Source |
|---|----------|--------------------|---------------|---------------|---------------|
| | | Not Available | Not Available | Not Available | Not Available |

| 4,4'-diphenylmethane diisocyanate (MDI) | Endpoint | Test Duration (hr) | Species | Value | Source |
|--|-----------|--------------------|-------------------------------|-----------|--------|
| | EC50 | 72h | Algae or other aquatic plants | >1640mg/l | 2 |
| | LC50 | 96h | Fish | >1000mg/l | 2 |
| | NOEC(ECx) | 504h | Crustacea | >=10mg/l | 2 |
| | BCF | 672h | Fish | 61-150 | 7 |

| polymeric diphenylmethane diisocyanate | Endpoint | Test Duration (hr) | Species | Value | Source |
|---|----------|--------------------|---------------|---------------|---------------|
| | | Not Available | Not Available | Not Available | Not Available |

| 1,3,3,3-tetrafluoropropene | Endpoint | Test Duration (hr) | Species | Value | Source |
|----------------------------|-----------|--------------------|-------------------------------|----------|--------|
| | EC50 | 72h | Algae or other aquatic plants | >170mg/l | 2 |
| | EC50 | 48h | Crustacea | >160mg/l | 2 |
| | EC50(ECx) | 48h | Crustacea | >160mg/l | 2 |

| nitrogen | Endpoint | Test Duration (hr) | Species | Value | Source |
|----------|----------|--------------------|---------------|---------------|---------------|
| | | Not Available | Not Available | Not Available | Not Available |

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

for polyisocyanates:

Polyisocyanates are not readily biodegradable. However, due to other elimination mechanisms (hydrolysis, adsorption), long retention times in water are not to be expected. The resulting polyurea is more or less inert and, due to its molecular size, not bioavailable.

For Isocyanate Monomers:

Environmental Fate: Isocyanates, (di- and polyfunctional isocyanates), are commonly used to make various polymers, such as polyurethanes. Polyurethanes find significant application in the manufacture of rigid and flexible foams. They are also used in the production of adhesives, elastomers, and coatings.

DO NOT discharge into sewer or waterways.

Persistence and degradability

| Ingredient | Persistence: Water/Soil | Persistence: Air |
|---|--------------------------|-----------------------------|
| 4,4'-diphenylmethane diisocyanate (MDI) | LOW (Half-life = 1 days) | LOW (Half-life = 0.24 days) |

Bioaccumulative potential

| Ingredient | Bioaccumulation |
|---|-----------------|
| 4,4'-diphenylmethane diisocyanate (MDI) | LOW (BCF = 15) |

Mobility in soil

| Ingredient | Mobility |
|---|--------------------|
| 4,4'-diphenylmethane diisocyanate (MDI) | LOW (KOC = 376200) |

SECTION 13 Disposal considerations


Waste treatment methods

| Product / Packaging disposal | |
|------------------------------|--|
| | <ul style="list-style-type: none"> ▶ DO NOT allow wash water from cleaning or process equipment to enter drains. ▶ It may be necessary to collect all wash water for treatment before disposal. ▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▶ Evaporate residue at an approved site. ▶ Return empty containers to supplier. If containers are marked non-returnable establish means of disposal with manufacturer prior to purchase. |

SECTION 14 Transport information

Labels Required

HandiFoam FR HFO, HandiFoam FR Black HFO A-side

| | |
|-------------------------|---|
| |  |
| Marine Pollutant | NO |

Land transport (DOT)

| | | |
|-------------------------------------|---|----------------|
| UN number | 3500 | |
| UN proper shipping name | Chemical under pressure, n.o.s. (Hydrofluoroolefin, Nitrogen) | |
| Transport hazard class(es) | Class | 2.2 |
| | Subrisk | Not Applicable |
| Packing group | Not Applicable | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Hazard Label | 2.2 |
| | Special provisions | 362, T50, TP40 |

Air transport (ICAO-IATA / DGR)

| | | |
|-------------------------------------|---|----------------|
| UN number | 3500 | |
| UN proper shipping name | Chemical under pressure, n.o.s. * (Hydrofluoroolefin, Nitrogen) | |
| Transport hazard class(es) | ICAO/IATA Class | 2.2 |
| | ICAO / IATA Subrisk | Not Applicable |
| | ERG Code | 2L |
| Packing group | Not Applicable | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Special provisions | A187 |
| | Cargo Only Packing Instructions | 218 |
| | Cargo Only Maximum Qty / Pack | 150 kg |
| | Passenger and Cargo Packing Instructions | 218 |
| | Passenger and Cargo Maximum Qty / Pack | 75 kg |
| | Passenger and Cargo Limited Quantity Packing Instructions | Forbidden |
| | Passenger and Cargo Limited Maximum Qty / Pack | Forbidden |

Sea transport (IMDG-Code / GGVSee)

| | | |
|-------------------------------------|---|----------------|
| UN number | 3500 | |
| UN proper shipping name | CHEMICAL UNDER PRESSURE, N.O.S. (Hydrofluoroolefin, Nitrogen) | |
| Transport hazard class(es) | IMDG Class | 2.2 |
| | IMDG Subrisk | Not Applicable |
| Packing group | Not Applicable | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | EMS Number | F-C , S-V |
| | Special provisions | 274 362 |
| | Limited Quantities | 0 |

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| Product name | Group |
|---|---------------|
| 4,4'-diphenylmethane diisocyanate (MDI) | Not Available |
| polymeric diphenylmethane diisocyanate | Not Available |
| 1,3,3,3-tetrafluoropropene | Not Available |
| nitrogen | Not Available |

Transport in bulk in accordance with the ICG Code

| Product name | Ship Type |
|--------------|-----------|
|--------------|-----------|

Continued...

HandiFoam FR HFO, HandiFoam FR Black HFO A-side

| Product name | Ship Type |
|---|---------------|
| 4,4'-diphenylmethane diisocyanate (MDI) | Not Available |
| polymeric diphenylmethane diisocyanate | Not Available |
| 1,3,3,3-tetrafluoropropene | Not Available |
| nitrogen | Not Available |

SECTION 15 Regulatory information

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

4,4'-diphenylmethane diisocyanate (MDI) is found on the following regulatory lists

| |
|---|
| International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs |
| US - California Hazardous Air Pollutants Identified as Toxic Air Contaminants |
| US - Massachusetts - Right To Know Listed Chemicals |
| US ACGIH Threshold Limit Values (TLV) |
| US Clean Air Act - Hazardous Air Pollutants |
| US DOE Temporary Emergency Exposure Limits (TEELs) |
| US EPA Integrated Risk Information System (IRIS) |

| |
|--|
| US EPCRA Section 313 Chemical List |
| US NIOSH Recommended Exposure Limits (RELs) |
| US OSHA Permissible Exposure Limits (PELs) Table Z-1 |
| US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory |
| US TSCA Chemical Substance Inventory - Interim List of Active Substances |
| US TSCA New Chemical Exposure Limits (NCEL) |

polymeric diphenylmethane diisocyanate is found on the following regulatory lists

| |
|---|
| International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs |
| US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs) |
| US DOE Temporary Emergency Exposure Limits (TEELs) |

| |
|--|
| US EPCRA Section 313 Chemical List |
| US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory |
| US TSCA Chemical Substance Inventory - Interim List of Active Substances |

1,3,3,3-tetrafluoropropene is found on the following regulatory lists

| |
|---|
| US AIHA Workplace Environmental Exposure Levels (WEELs) |
| US DOE Temporary Emergency Exposure Limits (TEELs) |
| US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory |

| |
|--|
| US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL) |
| US TSCA Chemical Substance Inventory - Interim List of Active Substances |

nitrogen is found on the following regulatory lists

| |
|---|
| US - Massachusetts - Right To Know Listed Chemicals |
| US ACGIH Threshold Limit Values (TLV) |
| US DOE Temporary Emergency Exposure Limits (TEELs) |

| |
|--|
| US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory |
| US TSCA Chemical Substance Inventory - Interim List of Active Substances |

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 311/312 hazard categories

| | |
|--|-----|
| Flammable (Gases, Aerosols, Liquids, or Solids) | No |
| Gas under pressure | Yes |
| Explosive | No |
| Self-heating | No |
| Pyrophoric (Liquid or Solid) | No |
| Pyrophoric Gas | No |
| Corrosive to metal | No |
| Oxidizer (Liquid, Solid or Gas) | No |
| Organic Peroxide | No |
| Self-reactive | No |
| In contact with water emits flammable gas | No |
| Combustible Dust | No |
| Carcinogenicity | Yes |
| Acute toxicity (any route of exposure) | Yes |
| Reproductive toxicity | No |
| Skin Corrosion or Irritation | Yes |
| Respiratory or Skin Sensitization | Yes |
| Serious eye damage or eye irritation | Yes |
| Specific target organ toxicity (single or repeated exposure) | Yes |
| Aspiration Hazard | No |
| Germ cell mutagenicity | No |
| Simple Asphyxiant | No |
| Hazards Not Otherwise Classified | No |

US EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

| Name | Reportable Quantity in Pounds (lb) | Reportable Quantity in kg |
|----------------------|------------------------------------|---------------------------|
| 4,4'-diphenylmethane | 5000 | 2270 |

Continued...

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| Name | Reportable Quantity in Pounds (lb) | Reportable Quantity in kg |
|--------------------|------------------------------------|---------------------------|
| diisocyanate (MDI) | | |

State Regulations

US. California Proposition 65

None Reported

National Inventory Status

| National Inventory | Status |
|---|---|
| Australia - AIIC / Australia Non-Industrial Use | Yes |
| Canada - DSL | Yes |
| Canada - NDSL | No (4,4'-diphenylmethane diisocyanate (MDI); polymeric diphenylmethane diisocyanate; nitrogen) |
| China - IECSC | No (1,3,3,3-tetrafluoropropene) |
| Europe - EINEC / ELINCS / NLP | No (polymeric diphenylmethane diisocyanate; 1,3,3,3-tetrafluoropropene) |
| Japan - ENCS | Yes |
| Korea - KECI | Yes |
| New Zealand - NZIoC | No (1,3,3,3-tetrafluoropropene) |
| Philippines - PICCS | No (1,3,3,3-tetrafluoropropene) |
| USA - TSCA | Yes |
| Taiwan - TCSI | Yes |
| Mexico - INSQ | No (1,3,3,3-tetrafluoropropene) |
| Vietnam - NCI | Yes |
| Russia - FBEPH | Yes |
| Legend: | Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration. |

SECTION 16 Other information

| | |
|---------------|------------|
| Revision Date | 03/07/2022 |
| Initial Date | 03/07/2022 |

SDS Version Summary

| Version | Date of Update | Sections Updated |
|---------|----------------|------------------|
| 1.1 | 03/07/2022 | New Format |

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
 PC—STEL: Permissible Concentration-Short Term Exposure Limit
 IARC: International Agency for Research on Cancer
 ACGIH: American Conference of Governmental Industrial Hygienists
 STEL: Short Term Exposure Limit
 TEEL: Temporary Emergency Exposure Limit.
 IDLH: Immediately Dangerous to Life or Health Concentrations
 ES: Exposure Standard
 OSF: Odour Safety Factor
 NOAEL :No Observed Adverse Effect Level
 LOAEL: Lowest Observed Adverse Effect Level
 TLV: Threshold Limit Value
 LOD: Limit Of Detection
 OTV: Odour Threshold Value
 BCF: BioConcentration Factors
 BEI: Biological Exposure Index
 AIIC: Australian Inventory of Industrial Chemicals
 DSL: Domestic Substances List
 NDSL: Non-Domestic Substances List
 IECSC: Inventory of Existing Chemical Substance in China
 EINECS: European INventory of Existing Commercial chemical Substances
 ELINCS: European List of Notified Chemical Substances
 NLP: No-Longer Polymers
 ENCS: Existing and New Chemical Substances Inventory
 KECI: Korea Existing Chemicals Inventory
 NZIoC: New Zealand Inventory of Chemicals
 PICCS: Philippine Inventory of Chemicals and Chemical Substances

Continued...

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TSCA: Toxic Substances Control Act

TCSI: Taiwan Chemical Substance Inventory

INSQ: Inventario Nacional de Sustancias Químicas

NCI: National Chemical Inventory

FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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