Tecron

LOW TEMP

PU ROOF

INSULATION ADHESIVE

VOLUME 22 LITRES
COLOUR GREEN

UN3501 CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S. (CONTAINS 1,1-Difluoroethane)

DANGER
H223 Flammable aerosol. H229 Pressurised container: may burst if heated. H315 Causes skin irritation. H319 Causes serious eye irritation. H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled. H317 May cause an allergic skin reaction. H351 Suspected of causing cancer. H335 May cause respiratory irritation. H373 May cause damage to organs through prolonged or repeated exposure. P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P211 Do not spray on an open flame or other ignition source. P251 Do not pierce or burn, even after use. P271 Use only outdoors or in a well-ventilated area. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection. P284 [In case of inadequate ventilation] wear respiratory protection. P410+P412 Protect from sunlight. Do not expose to temperatures exceeding 50°C/122°F. P501 Dispose of contents/ container in accordance with national regulations. Contains DIPHENYLMETHANEDI-ISOCYANATE -Mixture of Isomers & homologues, 4,4'- METHYLENEDIPHENYL DIISOCYANATE, O-(P-ISOCYANATOBENZYL)PHENYL ISOCYANATE, DIPHENYLMETHANE-2,2'-DI-ISO-CYANATE

For professional users only.

**Refer to Technical Data Sheet for more information

Tecron

Carnmore / Oranmore / Galway
H91 D294 / Republic of Ireland

Call 0818 757575
email info@tecron.ie

tecron.ie

DANGER

UFI: KUJ6-62XG-D00Y-THR7

Made in GB

*As from 24th August 2023, adequate training is required before industrial or professional use of this product.

Manufactured by (QDEK) Quin Global UK Ltd.

TECRON LOW TEMP PU INSULATION ADHESIVE

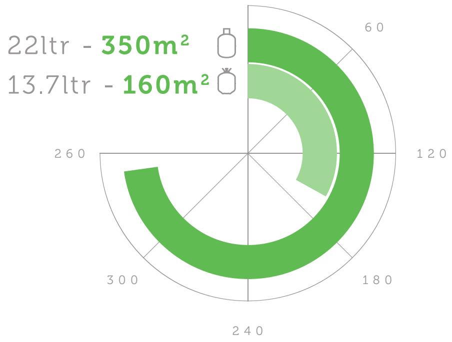
LOW TEMP PU ROOF INSULATION ADHESIVE

This is a single-part moisture-cure urethane foam adhesive designed specifically for bonding insulation boards in flat roof applications. Successful bonds are achieved when bonding ISO boards, tissue faced insulation boards, PIR and PUR boards to a variety of roof decks including concrete, plywood and cementitious boards. **It** also works with EPS or XPS (expanded and extruded polystyrene) and will adhere insulation boards to existing felt for re-roof applications.

BENEFITS

- Fast, clean and consistent application.
- Foam doesn't continue to rise.
- Tough bondline.
- Good extrudability in low temp conditions.

SQUARE METRE COVERAGE (m^2):



APPLICATION TYPE:

1 sided

OPEN TIME*:

10 mins

FLASH-OFF TIME**:

5 mins

SPRAY TYPE:

Foam Beaded

GUN TYPE:

Bead Gun

HOSE TYPE:

4m S/S Braided
C/W Valve

8m S/S Braided
C/W Valve

COLOUR:

● Green

TECHNICAL DATA:

Shelf Life	9 Months
Appearance	Green
Temperature Resistance	-30°c - 160°c
Solvent System	Polyethylene Polyphenol
Coverage	$160m^2$ - $350m^2$
Solids	100%
VOC Content	431 grams per litre
Storage	5°c - 25°c

DIRECTIONS FOR USE

- This product is designed to be applied to the roof deck. For best results, the temperature of the adhesive and the surfaces being bonded should be between 60 °F - 80 °F (16 °C - 27 °C).

- Use with adequate ventilation. When possible we recommend shaking the canister well before using.

- Attach and secure hose tightly onto the spray gun with required tip. Attach the other end of the hose onto the canister. Make sure the hose-valve connections are securely tight. Open the valve on the canister slowly and fully, check for leaks during this process. Unlock the trigger on the spray gun to start spraying.

- Prior to use, check compatibility by spraying a small test patch of the adhesive on the substrate. This product may degrade some substrates.

1. Make sure that surfaces are clean, dry and free from dirt, dust, oil, loose paint, wax or grease, etc.

2. Bead about 10 - 20 cm (4" – 8") away at a 45 degree angle to the surface, applying a consistent 20-30mm wide bead every 300mm.

3. Place insulation boards onto beads of adhesive immediately without pressure.

4. Wait 5 minutes for adhesive to set, before walking insulation board in.

5. If the spray tip clogs, unscrew the spray tip from the gun and clean with solvent such as lacquer thinner or acetone. Do not use a pin on the spray tip.

CANISTER STORAGE/CHANGE OVER

Turn valve on canister into the off position, spray out remaining adhesive left in the hose, disconnect the spray hose and gun from the canister. Reconnect the spray hose to a canister of cleaning solvent (sold separately) and spray out until liquid is clear which indicates that the hose and gun is clean. If you choose to leave the hose and spray gun on the canister, leave the valve on the canister open. Do not disconnect the hose/gun from the canister. Close and lock the spray gun.

HANDLING & STORAGE

- Consult Material Safety Data Sheet prior to use.
- DO NOT store at temperatures over 50°C.
- Avoid exposure to direct sunlight.
- DO NOT store directly on concrete floor.
- For optimum performance, store at 18°C during use, but must always be above 10°C.
- When connected, keep valve open and hose pressurised at all times.
- DO NOT close valve until ready to connect to new cylinder.
- Release pressure in hose before disconnection.
- Always test product to determine suitability for your particular application prior to use in production.

TECRON - LOW TEMP PU INSULATION ADHESIVE, GREEN, CANISTER

QUIN GLOBAL (BV) LTD

Chemwatch Hazard Alert Code: **4**

Version No: **2.2**
Safety Data Sheet (Conforms to Annex II of REACH (1907/2006) - Regulation 2020/878)

Issue Date: **30/06/2022**
Print Date: **24/08/2022**
S.REACH.IRL.EN

SECTION 1 Identification of the substance / mixture and of the company / undertaking

1.1. Product Identifier

Product name	TECRON - LOW TEMP PU INSULATION ADHESIVE, GREEN, CANISTER
Chemical Name	Not Applicable
Synonyms	Not Available
Proper shipping name	CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S. (contains 1,1-difluoroethane)
Chemical formula	Not Applicable
Other means of identification	UFI:KUJ6-62XG-D00Y-THR7

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

Chemical Product Category	PC1	Adhesives, sealants
Sectors of Use	SU22 SU3	Professional uses: Public domain (administration, education, entertainment, services, craftsmen) Industrial uses: Uses of substances as such or in preparations* at industrial sites
Sector of Use - Sub Category	SU19	Building and construction work
Relevant identified uses	Polyurethanes are used in the manufacture of high-resilience foam seating, rigid foam insulation panels, microcellular foam seals and gaskets, durable elastomeric wheels and tires, automotive suspension bushings, electrical potting compounds, high performance adhesives, surface coatings and surface sealants, synthetic fibres, carpet underlay, hard-plastic parts (e.g., for electronic instruments), condoms, and hoses Sprayed polyurethane foam is used for roofing material and other protective applications such as truck bed liners. Polyurethanes may be used in cosmetic formulations and may in certain instances be applied as a spray. Polyurethane foam or porous polyurethane films are used to make wound dressings.Polyurethane prostheses are being developed for soft tissue scaffolds of blood vessels and tissues of the cardiovascular system; some of these are impregnated with drugs to control smooth muscle cell proliferation. Polyurethanes are used to coat medical implants, including percutaneous leads, catheters, tubing, and intra-aortic balloons. Polyurethane has been used as a coating on breast implants. Thermoplastic polyurethanes (TPUs) TPU has many applications including automotive instrument panels, castor wheels, power tools, sporting goods, medical devices, drive belts, footwear, inflatable rafts, and a variety of extruded film, sheet and profile applications. TPU is also a popular material found in outer cases of mobile electronic devices, such as mobile phones. It is also used to make keyboard protectors for laptops. TPU is well known for its applications in performance films, wire and cable jacketing, hose and tube, in adhesive and textile coating applications and as an impact modifier of other polymers. TPU is a common filament material for use in fused filament fabrication 3D printing due to the fact that it is an elastic thermoplastic which makes it ideal for printing objects that need to be flexible and elastic. The fact that TPU is a thermoplastic also allows it to be melted, extruded, then cooled back into a solid which is necessary when 3D printing using fused filament fabrication. Isocyanates are a family of highly reactive, low molecular weight chemicals. They are widely used in the manufacture of flexible and rigid foams, fibres, coatings such as paints and varnishes, and elastomers, and are increasingly used in the automobile industry, autobody repair, and building insulation materials. Di-isocyanates are manufactured for reactions with polyols in the production of polyurethanes, a class of polymers. Isocyanate is the functional group with the formula R–N=C=O. Organic compounds that contain an isocyanate group are referred to as isocyanates. An isocyanate that has two isocyanate groups is known as a di-isocyanate. Isocyanates should not be confused with cyanate esters and isocyanides, whose behavior are very different. The cyanate (cyanate ester) functional group (R–O–C=N) is arranged differently from the isocyanate group (R–N=C=O). Isocyanides have the connectivity R-N=C, lacking the oxygen of the cyanate groups Isocyanate is a pseudohalide (syn pseudohalogen) whose chemistry, resembling that of the true halogens, allow it to substitute for halogens in several classes of chemical compounds.	
Uses advised against	Not Applicable	

1.3. Details of the supplier of the safety data sheet

Registered company name	**QUIN GLOBAL (BV) LTD**	**TECRON**
Address	De Droogmakerij 1851 LX Heiloo Netherlands	Carnmore East Oranmore Co. Galway H91 D294 Ireland
Telephone	0031 72 520 66 97	+353 1 963 9616
Fax	Not Available	Not Available
Website	www.quinglobal.com	Not Available
Email	technicalhelp.uk@quinglobal.com	sales@tecron.ie

1.4. Emergency telephone number

Association / Organisation	**CHEMWATCH EMERGENCY RESPONSE**

Emergency telephone numbers	+353 1 443 4289
Other emergency telephone numbers	+61 3 9573 3188

Once connected and if the message is not in your preferred language then please dial 01

SECTION 2 Hazards identification

2.1. Classification of the substance or mixture

Classification according to regulation (EC) No 1272/2008 [CLP] and amendments [1]	H334 - Sensitisation (Respiratory) Category 1, H373 - Specific Target Organ Toxicity - Repeated Exposure Category 2, H335 - Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3, H315 - Skin Corrosion/Irritation Category 2, H319 - Serious Eye Damage/Eye Irritation Category 2, H317 - Sensitisation (Skin) Category 1, H351 - Carcinogenicity Category 2, H222+H229 - Aerosols Category 1
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI*

2.2. Label elements

Hazard pictogram(s)	
Signal word	**Danger**

Hazard statement(s)

H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H373	May cause damage to organs through prolonged or repeated exposure.
H335	May cause respiratory irritation.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H222+H229	Extremely flammable aerosol. Pressurized container: may burst if heated.

Supplementary statement(s)

EUH204	Contains isocyanates. May produce an allergic reaction.

Precautionary statement(s) Prevention

P201	Obtain special instructions before use.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P211	Do not spray on an open flame or other ignition source.
P251	Do not pierce or burn, even after use.
P260	Do not breathe gas.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves, protective clothing, eye protection and face protection.
P284	[In case of inadequate ventilation] wear respiratory protection.
P264	Wash all exposed external body areas thoroughly after handling.
P272	Contaminated work clothing should not be allowed out of the workplace.

Precautionary statement(s) Response

P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308+P313	IF exposed or concerned: Get medical advice/ attention.
P342+P311	If experiencing respiratory symptoms: Call a POISON CENTER/doctor/physician/first aider.
P302+P352	IF ON SKIN: Wash with plenty of water and soap.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312	Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P337+P313	If eye irritation persists: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.

Precautionary statement(s) Storage

P405	Store locked up.
P410+P412	Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.

Continued...

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.

2.3. Other hazards

Cumulative effects may result following exposure*.

Repeated exposure potentially causes skin dryness and cracking*.

Vapours potentially cause drowsiness and dizziness*.

4,4'-diphenylmethane diisocyanate (MDI)	Listed in the Europe Regulation (EC) No 1907/2006 - Annex XVII (Restrictions may apply)
2,2'-diphenylmethane diisocyanate	Listed in the Europe Regulation (EC) No 1907/2006 - Annex XVII (Restrictions may apply)
2,4'-diphenylmethane diisocyanate	Listed in the Europe Regulation (EC) No 1907/2006 - Annex XVII (Restrictions may apply)

Not Applicable

SECTION 3 Composition / information on ingredients

3.1.Substances

See 'Composition on ingredients' in Section 3.2

3.2.Mixtures

1.CAS No **2.EC No** **3.Index No** **4.REACH No**	**%[weight]**	**Name**	**Classification according to regulation (EC) No 1272/2008 [CLP] and amendments**	**SCL / M-Factor**	**Nanoform Particle Characteristics**
1.9016-87-9 2.Not Available 3.Not Available 4.Not Available	30-50	MDI oligomer	Skin Corrosion/Irritation Category 2, Serious Eye Damage/Eye Irritation Category 2, Sensitisation (Skin) Category 1, Sensitisation (Respiratory) Category 1, Carcinogenicity Category 2, Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3 , Specific Target Organ Toxicity - Repeated Exposure Category 2; H315, H319, H317, H334, H351, H335, H373, EUH204 [1]	Not Available	Not Available
1.101-68-8 2.202-966-0|406-550-1 3.615-005-00-9 4.01- 2119457014-47-0000	10-30	4,4'-diphenylmethane diisocyanate (MDI)	Acute Toxicity (Inhalation) Category 4, Skin Corrosion/Irritation Category 2, Serious Eye Damage/Eye Irritation Category 2, Sensitisation (Skin) Category 1, Sensitisation (Respiratory) Category 1, Carcinogenicity Category 2, Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3 , Specific Target Organ Toxicity - Repeated Exposure Category 2; H332, H315, H319, H317, H334, H351, H335, H373 [2]	Eye Irrit. 2; H319: C ≥ 5 % | Skin Irrit. 2; H315: C ≥ 5 % | Resp. Sens. 1; H334: C ≥ 0,1 % | STOT SE 3; H335: C ≥ 5 %	Not Available
1.2536-05-2 2.219-799-4 3.615-005-00-9 4.01- 2119927323-43-XXXX	<1	2,2'-diphenylmethane diisocyanate	Acute Toxicity (Inhalation) Category 4, Skin Corrosion/Irritation Category 2, Serious Eye Damage/Eye Irritation Category 2, Sensitisation (Skin) Category 1, Sensitisation (Respiratory) Category 1, Carcinogenicity Category 2, Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3 , Specific Target Organ Toxicity - Repeated Exposure Category 2; H332, H315, H319, H317, H334, H351, H335, H373 [2]	Eye Irrit. 2; H319: C ≥ 5 % | Skin Irrit. 2; H315: C ≥ 5 % | Resp. Sens. 1; H334: C ≥ 0,1 % | STOT SE 3; H335: C ≥ 5 %	Not Available
1.5873-54-1 2.227-534-9 3.615-005-00-9 4.01-2119480143-45-XXXX	<1	2,4'-diphenylmethane diisocyanate	Acute Toxicity (Inhalation) Category 4, Skin Corrosion/Irritation Category 2, Serious Eye Damage/Eye Irritation Category 2, Sensitisation (Skin) Category 1, Sensitisation (Respiratory) Category 1, Carcinogenicity Category 2, Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3 , Specific Target Organ Toxicity - Repeated Exposure Category 2; H332, H315, H319, H317, H334, H351, H335, H373 [2]	Eye Irrit. 2; H319: C ≥ 5 % | Skin Irrit. 2; H315: C ≥ 5 % | Resp. Sens. 1; H334: C ≥ 0,1 % | STOT SE 3; H335: C ≥ 5 %	Not Available
1.75-37-6 2.200-866-1 3.Not Available 4.01-2119474440-43-0000	5-20	1,1-difluoroethane	Flammable Gases Category 1A, Acute Toxicity (Oral) Category 4; H220, H302 [1]	Not Available	Not Available
1.7727-37-9. 2.231-783-9 3.Not Available 4.Not Available	5-20	nitrogen	Gases Under Pressure (Compressed Gas); H280 [1]	Not Available	Not Available

Legend:	*1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; * EU IOELVs available; [e] Substance identified as having endocrine disrupting properties*

SECTION 4 First aid measures

Continued...

4.1. Description of first aid measures

Eye Contact	- 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. **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.
Skin Contact	If skin or hair contact occurs: - 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	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. - 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. If poisoning occurs, contact a doctor or Poisons Information Centre. - Avoid giving milk or oils. - Avoid giving alcohol.

4.2 Most important symptoms and effects, both acute and delayed

See Section 11

4.3. 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

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.

Continued...

- 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 Firefighting measures

5.1. Extinguishing media

- 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.
- Water spray or fog may cause frothing and should be used in large quantities.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

5.2. 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

5.3. Advice for firefighters

Fire Fighting	--- GENERAL --- ‣ 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. ‣ If safe, switch off electrical equipment until vapour fire hazard removed. ‣ Use water delivered as a fine spray to control fire and cool adjacent area. ‣ **DO NOT** approach cylinders suspected to be hot. ‣ Cool fire exposed cylinders with water spray from a protected location. ‣ If safe to do so, remove cylinders from path of fire. ‣ Equipment should be thoroughly decontaminated after use. --- FIRE FIGHTING PROCEDURES: --- ‣ Excessive pressures may develop in a gas cylinder exposed in a fire; this may result in explosion. ‣ Cylinders with pressure relief devices may release their contents as a result of fire and the released gas may constitute a further source of hazard for the fire-fighter. ‣ Cylinders without pressure-relief valves have no provision for controlled release and are therefore more likely to explode if exposed to fire. --- FIRE FIGHTING REQUIREMENTS: --- ‣ Positive pressure, self-contained breathing apparatus is required for fire-fighting of hazardous materials. ‣ Full structural fire-fighting (bunker) gear is the minimum acceptable attire. ‣ The need for proximity, entry and special protective clothing should be determined for each incident, by a competent fire-fighting safety professional.
Fire/Explosion Hazard	- Combustible. - Moderate fire hazard when exposed to heat or flame. - 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. - Burns with acrid black smoke and poisonous fumes. - Due to reaction with water producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. - Combustion yields traces of highly toxic hydrogen cyanide HCN, plus toxic nitrogen oxides NOx and carbon monoxide. ‣ 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. ‣ Runoff may create fire or explosion hazard. ‣ May decompose explosively when heated or involved in fire. ‣ Contact with gas may cause burns, severe injury and/ or frostbite.

Continued...

	▸ POISONOUS: MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN Decomposition may produce toxic fumes of: , carbon monoxide (CO) , carbon dioxide (CO2) , isocyanates , hydrogen cyanide , and minor amounts of , nitrogen oxides (NOx) , hydrogen fluoride , other pyrolysis products typical of burning organic material. **Contains low boiling substance:** Closed containers may rupture due to pressure buildup under fire conditions. ▸ Vented gas is more dense than air and may collect in pits, basements.

SECTION 6 Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

See section 8

6.2. Environmental precautions

See section 12

6.3. Methods and material for containment and cleaning up

Minor Spills	▸ 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. ▸ Increase ventilation. ▸ Clear area of personnel. ▸ Stop leak only if safe to so do. ▸ Remove leaking cylinders to safe place. Release pressure under safe controlled conditions by opening valve. ▸ Do not exert excessive pressure on the valve; do not attempt to operate a damaged valve ▸ Orientate cylinder so that the leak is gas, not liquid, to minimise rate of leakage ▸ Keep area clear of personnel until gas has dispersed.
Major Spills	For isocyanate spills of less than 40 litres (2 m2): ▸ 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). ▸ Control source of leakage (where applicable). ▸ Dike the spill to prevent spreading and to contain additions of decontaminating solution. ▸ Prevent the material from entering drains. ▸ Estimate spill pool volume or area. ▸ Absorb and decontaminate. - Completely cover the spill with wet sand, wet earth, vermiculite or other similar absorbent. - Add neutraliser (for suitable formulations: see below) to the adsorbent materials (equal to that of estimated spill pool volume). Intensify contact between spill, absorbent and neutraliser by carefully mixing with a rake and allow to react for 15 minutes ▸ Shovel absorbent/decontaminant solution mixture into a steel drum. ▸ Decontaminate surface. - Pour an equal amount of neutraliser solution over contaminated surface. - Scrub area with a stiff bristle brush, using moderate pressure. - Completely cover decontaminant with vermiculite or other similar absorbent. - After 5 minutes, shovel absorbent/decontamination solution mixture into the same steel drum used above. ▸ Monitor for residual isocyanate. If surface is decontaminated, proceed to next step. If contamination persists, repeat decontaminate procedure immediately above ▸ Place loosely covered drum (release of carbon dioxide) outside for at least 72 hours. Label waste-containing drum appropriately. Remove waste materials for incineration. ▸ Decontaminate and remove personal protective equipment. ▸ Return to normal operation. ▸ Conduct accident investigation and consider measures to prevent reoccurrence. **Decontamination:** Treat isocyanate spills with sufficient amounts of isocyanate decontaminant preparation ("neutralising fluid"). Isocyanates and polyisocyanates are generally not miscible with water. Liquid surfactants are necessary to allow better dispersion of isocyanate and neutralising fluids/ preparations. Alkaline neutralisers react faster than water/surfactant mixtures alone. Typically, such a preparation may consist of: Sawdust: 20 parts by weight Kieselguhr 40 parts by weight plus a mixture of {ammonia (s.g. 0.880) 8% v/v non-ionic surfactant 2% v/v water 90% v/v}. Let stand for 24 hours Three commonly used neutralising fluids each exhibit advantages in different situations. **Formulation A** : liquid surfactant 0.2-2% sodium carbonate 5-10% water to 100% **Formulation B** liquid surfactant 0.2-2% concentrated ammonia 3-8% water to 100% **Formulation C** ethanol, isopropanol or butanol 50% concentrated ammonia 5% water to 100%

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	After application of any of these formulae, let stand for 24 hours. Formulation B reacts faster than Formulation A. However, ammonia-based neutralisers should be used only under well-ventilated conditions to avoid overexposure to ammonia or if members of the emergency team wear suitable respiratory protection. Formulation C is especially suitable for cleaning of equipment from unreacted isocyanate and neutralizing under freezing conditions. Regard has to be taken to the flammability of the alcoholic solution. ▸ Avoid contamination with water, alkalies 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. ▸ Open all containers with care. ▸ **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. ▸ Prevent by any means available, spillage from entering drains and water-courses. ▸ Consider evacuation. ▸ Increase ventilation. ▸ No smoking or naked lights within area. ▸ Stop leak only if safe to so do. ▸ Water spray or fog may be used to disperse vapour. ▸ **DO NOT** enter confined space where gas may have collected. ▸ Keep area clear until gas has dispersed. ▸ 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.

6.4. Reference to other sections

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

SECTION 7 Handling and storage

7.1. Precautions for safe handling

Safe handling	· 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. · Before connecting gas cylinders, ensure manifold is mechanically secure and does not containing another gas. Before disconnecting gas cylinder, isolate supply line segment proximal to cylinder, remove trapped gas in supply line with aid of vacuum pump · When connecting or replacing cylinders take care to avoid airborne particulates violently ejected when system pressurises. · Consider the use of doubly-contained piping; diaphragm or bellows sealed, soft seat valves; backflow prevention devices; flash arrestors; and flow monitoring or limiting devices. Gas cabinets, with appropriate exhaust treatment, are recommended, as is automatic monitoring of the secondary enclosures and work areas for release. · Use a pressure reducing regulator when connecting cylinder to lower pressure (<100 psig) piping or systems · Use a check valve or trap in the discharge line to prevent hazardous back-flow into the cylinder · Check regularly for spills or leaks. Keep valves tightly closed but do not apply extra leverage to hand wheels or cylinder keys. · Open valve slowly. If valve is resistant to opening then contact your supervisor · Valve protection caps must remain in place must remain in place unless container is secured with valve outlet piped to use point. · Never insert a pointed object (e.g hooks) into cylinder cap openings as a means to open cap or move cylinder. Such action can inadvertently turn the valve and gas a gas leak. Use an adjustable strap instead of wrench to free an over-tight or rusted cap. · A bubble of gas may buildup behind the outlet dust cap during transportation, after prolonged storage, due to defective cylinder valve or if a dust cap is inserted without adequate evacuation of gas from the line. When loosening dust cap, preferably stand cylinder in a suitable enclosure and take cap off slowly. Never face the dust cap directly when removing it; point cap away from any personnel or any object that may pose a hazard. under negative pressure (relative to atmospheric gas) · Suck back of water into the container must be prevented. Do not allow backfeed into the container. · Do NOT drag, slide or roll cylinders - use a suitable hand truck for cylinder movement · Test for leakage with brush and detergent - **NEVER** use a naked flame. · Do NOT heat cylinder by any means to increase the discharge rate of product from cylinder. · Leaking gland nuts may be tightened if necessary. · If a cylinder valve will not close completely, remove the cylinder to a well ventilated location (e.g. outside) and, when empty, tag as FAULTY and return to supplier. · Obtain a work permit before attempting any repairs. · DO NOT attempt repair work on lines, vessels under pressure. · Atmospheres must be tested and O.K. before work resumes after leakage. ▸ **DO NOT** transfer gas from one cylinder to another.
Fire and explosion protection	See section 5
Other information	Consider storage under inert gas. · Do NOT store halogenated aliphatics in areas containing alkali or alkaline earth metals such as powdered aluminum, zinc, or beryllium ▸ 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. ▸ Cylinders stored in the open should be protected against rust and extremes of weather. ▸ Cylinders in storage should be properly secured to prevent toppling or rolling. ▸ Cylinder valves should be closed when not in use. ▸ Where cylinders are fitted with valve protection this should be in place and properly secured. ▸ Gas cylinders should be segregated according to the requirements of the Dangerous Goods Act. ▸ Preferably store full and empty cylinders separately. ▸ Check storage areas for hazardous concentrations of gases prior to entry. ▸ Full cylinders should be arranged so that the oldest stock is used first. ▸ Cylinders in storage should be checked periodically for general condition and leakage. ▸ Protect cylinders against physical damage. Move and store cylinders correctly as instructed for their manual handling.

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	NOTE: A 'G' size cylinder is usually too heavy for an inexperienced operator to raise or lower.

7.2. Conditions for safe storage, including any incompatibilities

Suitable container	▸ **DO NOT** use aluminium or galvanised containers ▸ 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. ▸ Cylinder must be properly secured either in use or in storage. ▸ Cylinder valve must be closed when not in use or when empty. ▸ Segregate full from empty cylinders. **WARNING:** Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.
Storage incompatibility	1,1-Difluorethane: ▸ reacts violently with strong oxidisers, barium, sodium and potassium ▸ is incompatible with powdered aluminium, liquid oxygen ▸ may form explosive compounds with divalent light metals and metallic azides ▸ attacks some metals in the presence of moisture ▸ undergoes thermal decomposition when exposed to flame or red-hot surfaces ▸ may generate electrostatic charges due to low conductivity. ▸ Avoid magnesium, aluminium and their alloys, brass and steel. · 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. If a di-isocyanate is treated with a compound containing two or more hydroxyl groups, such as a diol or a polyol, polymer chains are formed, which are known as polyurethanes. Reaction between a di-isocyanate and a compound containing two or more amine groups, produces long polymer chains known as polyureas. · Isocyanates and thioisocyanates are incompatible with many classes of compounds, reacting exothermically to release toxic gases. Reactions with amines, strong bases, aldehydes, alcohols, alkali metals, ketones, mercaptans, strong oxidisers, hydrides, phenols, and peroxides can cause vigorous releases of heat. Acids and bases initiate polymerisation reactions in these materials. · Isocyanates also can react with themselves. Aliphatic di-isocyanates can form trimers, which are structurally related to cyanuric acid. Isocyanates participate in Diels-Alder reactions, functioning as dienophiles · Isocyanates easily form adducts with carbodiimides, isothiocyanates, ketenes, or with substrates containing activated CC or CN bonds. · Some isocyanates react with water to form amines and liberate carbon dioxide. This reaction may also generate large volumes of foam and heat. Foaming spaces may produce pressure in confined spaces or containers. Gas generation may pressurise drums to the point of rupture. · Do NOT reseal container if contamination is expected · Open all containers with care · Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence, · Isocyanates will attack and embrittle some plastics and rubbers. · The isocyanate anion is a pseudohalide (syn pseudohalogen) whose chemistry, resembling that of the true halogens, allows it to substitute for halogens in several classes of chemical compounds.. The behavior and chemical properties of the several pseudohalides are identical to that of the true halide ions. ▸ 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. BRETHERICK: Handbook of Reactive Chemical Hazards, 4th Edition ▸ 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

7.3. Specific end use(s)

See section 1.2

SECTION 8 Exposure controls / personal protection

8.1. Control parameters

Ingredient	**DNELs** **Exposure Pattern Worker**	**PNECs** **Compartment**
4,4'-diphenylmethane diisocyanate (MDI)	Inhalation 0.05 mg/m^3 (Local, Chronic) Inhalation 0.1 mg/m^3 (Local, Acute) *Inhalation 0.025 mg/m^3 (Local, Chronic) ** *Inhalation 0.05 mg/m^3 (Local, Acute) **	1 mg/L (Water (Fresh)) 0.1 mg/L (Water - Intermittent release) 10 mg/L (Water (Marine)) 1 mg/kg soil dw (Soil) 1 mg/L (STP)
2,2'-diphenylmethane diisocyanate	Inhalation 0.05 mg/m^3 (Local, Chronic) Inhalation 0.1 mg/m^3 (Local, Acute) *Inhalation 0.025 mg/m^3 (Local, Chronic) ** *Inhalation 0.05 mg/m^3 (Local, Acute) **	1 mg/L (Water (Fresh)) 0.1 mg/L (Water - Intermittent release) 10 mg/L (Water (Marine)) 1 mg/kg soil dw (Soil) 1 mg/L (STP)
2,4'-diphenylmethane diisocyanate	Inhalation 0.05 mg/m^3 (Local, Chronic) Inhalation 0.1 mg/m^3 (Local, Acute) *Inhalation 0.025 mg/m^3 (Local, Chronic) ** *Inhalation 0.05 mg/m^3 (Local, Acute) **	1 mg/L (Water (Fresh)) 0.1 mg/L (Water - Intermittent release) 10 mg/L (Water (Marine)) 1 mg/kg soil dw (Soil) 1 mg/L (STP)
1,1-difluoroethane	Inhalation 1 085.98 mg/m^3 (Systemic, Chronic) *Inhalation 270.14 mg/m^3 (Systemic, Chronic) **	0.048 mg/L (Water (Fresh)) 0.005 mg/L (Water - Intermittent release) 0.48 mg/L (Water (Marine)) 0.19 mg/kg sediment dw (Sediment (Fresh Water)) 0.019 mg/kg sediment dw (Sediment (Marine)) 0.096 mg/kg soil dw (Soil) 4.726 mg/L (STP)

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* Values for General Population

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Europe ECHA Occupational exposure limits - Activity list	MDI oligomer	Not Available	Not Available	Not Available	Not Available	Not Available
Europe ECHA Occupational exposure limits - Activity list	4,4'-diphenylmethane diisocyanate (MDI)	Not Available	Not Available	Not Available	Not Available	Not Available
Europe ECHA Occupational exposure limits - Activity list	2,2'-diphenylmethane diisocyanate	Not Available	Not Available	Not Available	Not Available	Not Available
Europe ECHA Occupational exposure limits - Activity list	2,4'-diphenylmethane diisocyanate	Not Available	Not Available	Not Available	Not Available	Not Available

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
MDI oligomer	0.15 mg/m3	3.6 mg/m3	22 mg/m3
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
1,1-difluoroethane	Not Available	Not Available	Not Available
nitrogen	7.96E+05 ppm	8.32E+05 ppm	8.69E+05 ppm

Ingredient	Original IDLH	Revised IDLH
MDI oligomer	Not Available	Not Available
4,4'-diphenylmethane diisocyanate (MDI)	75 mg/m3	Not Available
2,2'-diphenylmethane diisocyanate	Not Available	Not Available
2,4'-diphenylmethane diisocyanate	Not Available	Not Available
1,1-difluoroethane	Not Available	Not Available
nitrogen	Not Available	Not Available

Occupational Exposure Banding

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
1,1-difluoroethane	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.*	

8.2. Exposure controls

8.2.1. 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.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.

- Areas where cylinders are stored require good ventilation and, if enclosed, need discrete/controlled exhaust ventilation.
- Secondary containment and exhaust gas treatment may be required by certain jurisdictions
- Local exhaust ventilation is required in work areas.
- Consideration should be given to the use of doubly-contained piping; diaphragm or bellows-sealed, soft-seat valves; backflow prevention devices; and flow- monitoring or limiting devices.
- Gas cabinets, with appropriate exhaust treatment, are recommended, as is automatic monitoring of the secondary enclosures and workplaces, for potential release.
- Automated alerting systems with automatic shutdown of gas-flow may be appropriate and may in fact be mandatory in certain jurisdictions.
- Respiratory protection in the form of air-supplied or self-contained breathing equipment must be worn if the oxygen concentration in the workplace air is less than 19%.
- Cartridge respirators do NOT give protection and may result in rapid suffocation.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use

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	4: Large hood or large air mass in motion — 4: Small hood-local control only Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.
8.2.2. Personal protection	
Eye and face protection	‣ Safety glasses with side shields. ‣ Chemical goggles. ‣ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]
Skin protection	See Hand protection below
Hands/feet protection	**NOTE:** ‣ 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. ‣ Butyl rubber gloves · Butyl rubber gloves should be used when handling halogenated aliphatics . · Nitrile, PVC-coated nitrile, and PVC protective equipment are not recommended ‣ 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. ‣ NOTE: Natural rubber, neoprene, PVC can be affected by isocyanates ‣ When handling sealed and suitably insulated cylinders wear cloth or leather gloves.
Body protection	See Other protection below
Other protection	· Halogen-selective detectors use a specialized sensor that allows the monitor to detect compounds containing fluorine, chlorine, bromine, and iodine with-out interference from other species.These detectors are typically easy to use, feature higher sensitivity than the nonselective detectors (detection limits are typically <5 ppm when used as an area monitor and <1.4 gm/yr [<0.05 oz/yr] when used as a leak pinpointer). · Compound-Specific Detectors are typically capable of detecting the presence of a single compound without interference from other compounds. ‣ Protective overalls, closely fitted at neck and wrist. ‣ Eye-wash unit. ‣ Ensure availability of lifeline in confined spaces. ‣ Staff should be trained in all aspects of rescue work. ‣ Rescue gear: Two sets of SCBA breathing apparatus Rescue Harness, lines etc.

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:
"Forsberg Clothing Performance Index".
The effect(s) of the following substance(s) are taken into account in the ***computer-generated*** selection:
TECRON - LOW TEMP PU INSULATION ADHESIVE, GREEN, CANISTER

Material	CPI
PE/EVAL/PE	A

* CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion
NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

Respiratory protection

Type KAX-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	KAX-AUS / Class1 P2	-
up to 50	1000	-	KAX-AUS / Class 1 P2
up to 50	5000	Airline *	-
up to 100	5000	-	KAX-2 P2
up to 100	10000	-	KAX-3 P2
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- 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.

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- 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.

8.2.3. Environmental exposure controls

See section 12

SECTION 9 Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Moisture sensitive. Coloured

Physical state	Dissolved Gas	**Relative density (Water = 1)**	1.24
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	>600
pH (as supplied)	Not Available	**Decomposition temperature (°C)**	Not Available
Melting point / freezing point (°C)	Not Available	**Viscosity (cSt)**	1050 @ 20C
Initial boiling point and boiling range (°C)	330	**Molecular weight (g/mol)**	Not Available
Flash point (°C)	>200	**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	Immiscible	**pH as a solution (Not Available%)**	Not Available
Vapour density (Air = 1)	8.5	**VOC g/L**	Not Available
Nanoform Solubility	Not Available	**Nanoform Particle Characteristics**	Not Available
Particle Size	Not Available		

9.2. Other information

Not Available

SECTION 10 Stability and reactivity

10.1.Reactivity	See section 7.2
10.2. Chemical stability	Unstable in the presence of incompatible materials. Product is considered stable. Hazardous polymerisation will not occur. Presence of elevated temperatures.
10.3. Possibility of hazardous reactions	See section 7.2
10.4. Conditions to avoid	See section 7.2
10.5. Incompatible materials	See section 7.2
10.6. Hazardous decomposition products	See section 5.3

SECTION 11 Toxicological information

11.1. Information on toxicological effects

Inhaled	The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Animal testing showed a single, high-level exposure to 1,1-difluoroethane by inhalation has caused difficulty breathing, lung irritation, lethargy, inco-ordination, and loss of consciousness, with sensitisation of the heart occurring at a concentration of 15% after adrenaline was given into a vein. Repeated exposure caused increased urinary fluoride, reduced kidney weight and reversible kidney changes. Inhaling high concentrations can depress the central nervous system, which may lead to inco-ordination, impaired judgment and, if exposure is prolonged, unconsciousness and even death. 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. Pulmonary sensitisation may

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	produce asthmatic reactions ranging from minor breathing difficulties to severe allergic attacks; this may occur following a single acute exposure or may develop without warning for several hours after exposure. Sensitized people can react to very low doses, and should not be allowed to work in situations allowing exposure to this material. Continued exposure of sensitised persons may lead to possible long term respiratory impairment. Inhalation hazard is increased at higher temperatures. Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. The vapour may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure. Acute intoxication by halogenated aliphatic hydrocarbons appears to take place over two stages. Signs of a reversible narcosis are evident in the first stage and in the second stage signs of injury to organs may become evident, a single organ alone is (almost) never involved. Depression of the central nervous system is the most outstanding effect of most halogenated aliphatic hydrocarbons. Inebriation and excitation, passing into narcosis, is a typical reaction. In severe acute exposures there is always a danger of death from respiratory failure or cardiac arrest due to a tendency to make the heart more susceptible to catecholamines (adrenalin) 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. There is strong evidence to suggest that this material can cause, if inhaled once, very serious, irreversible damage of organs.
Ingestion	Not normally a hazard due to physical form of product. Considered an unlikely route of entry in commercial/industrial environments A single high oral dose of 1,1-difluoroethane produced weight loss and lethargy. 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.
Skin Contact	This material can cause inflammation of the skin on contact in some persons. The material may accentuate any pre-existing dermatitis condition Skin contact with the material may damage the health of the individual; systemic effects may result following absorption. Open cuts, abraded or irritated skin should not be exposed to this material 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.
Eye	Not considered to be a risk because of the extreme volatility of the gas. 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.
Chronic	There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment. Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems. Inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population. Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. 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. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. This product contains a polymer with a functional group considered to be of high concern. Isothiocyanates may cause hypersensitivity of the skin and airways. Main route of exposure to the gas in the workplace is by inhalation. 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. 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. This is corroborated by the results from an MDI inhalation study. Following an inhalation exposure of rats to radiolabelled MDI, 79% of the dose was excreted in faeces. The faecal excretion in these animals was considered entirely due to ingestion of radioactivity from grooming and ingestion of deposited material from the nasopharangeal region via the mucociliary escalator, i.e. not following systemic absorption. The faecal radioactivity was tentatively identified as mixed molecular weight polyureas derived from MDI. Diamine was not present. Thus, for MDI and diisocyanates in general the oral gavage dosing route is inappropriate for toxicological studies and risk assessment. It is expected that oral gavage dosing will result in a similar outcome to that produced by TDI or MDI, that is (1) reaction with stomach contents and (2) polymerization to solid polyureas. ‣ Reaction with stomach contents is very plausibly described in case reports of accidental ingestion of polymeric MDI based glue in domestic animals. Extensive polymerization and CO2 liberation resulting in an expansion of the gastric content is described in the stomach, without apparent acute chemical toxicity ‣ Polyurea formation in organic and aqueous phases has been described. In this generally accepted chemistry of hydrolysis of an isocyanate the initially produced carbamate decarboxylates to an amine which. The amine, as a reactive intermediate, then reacts very readily with the present isocyanate to produce a solid and inert polyurea. This urea formation acts as a pH buffer in the stomach, thus promoting transformation of the diisocyanate into polyurea, even under the acidic conditions. At the resorbtive tissues in the small intestine, these high molecular reaction products are likely to be of very low bioavailability, which is substantiated by the absence of systemic toxicity in acute oral bioassays with rats at the OECD limit dose (LC50>2 g/kg bw). The respiratory tract may be regarded as the main entry for systemically available isocyanates as evidenced following MDI.exposures. A detailed summary on urinary, plasma and in vitro metabolite studies is provided below. Taken together, all available studies provide convincing evidence that MDI-protein adduct and MDI-metabolite formation proceeds: ‣ via formation of a labile isocyanate glutathione (GSH)-adduct, ‣ then transfer to a more stable adduct with larger proteins, and ‣ without formation of free MDA. MDA reported as a metabolite is actually formed by analytical workup procedures (strong acid or base hydrolysis) and is not an identified metabolite in urine or blood Animal testing shows that polymeric MDI can damage the nasal cavities and lungs, causing inflammation.and increased cell growth. Respiratory sensitisation may result in allergic/asthma like responses; from coughing and minor breathing difficulties to bronchitis with wheezing, gasping. 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.

	TOXICITY	IRRITATION
TECRON - LOW TEMP PU INSULATION ADHESIVE, GREEN, CANISTER	Not Available	Not Available
MDI oligomer	Dermal (rabbit) LD50: >9400 mg/kg[2]	Eye (rabbit): 100 mg - mild
	Inhalation(Rat) LC50; 0.49 mg/L4h[2]	

Continued...

	Oral (Rat) LD50; 43000 mg/kg[2]	
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
		Skin: adverse effect observed (irritating)[1]
2,2'-diphenylmethane diisocyanate	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >9400 mg/kg[1]	Not Available
	Inhalation(Rat) LC50; 0.368 mg/L4h[1]	
	Oral (Rat) LD50; >2000 mg/kg[1]	
2,4'-diphenylmethane diisocyanate	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >9400 mg/kg[1]	Not Available
	Inhalation(Rat) LC50; 0.368 mg/L4h[1]	
	Oral (Rat) LD50; >2000 mg/kg[1]	
1,1-difluoroethane	**TOXICITY**	**IRRITATION**
	Inhalation(Rat) LC50; >437500 ppm4h[1]	Not Available
	Oral (Rat) LD50; 484 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*	

TECRON - LOW TEMP PU INSULATION ADHESIVE, GREEN, CANISTER	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. In general, the potential to cause genetic toxicity is dependent on the nature, number and position of halogen(s) and the size of the molecule. Haloalkenes are of concern because of the potential to generate genetically toxic intermediates after epoxidation. The concern for haloalkenes may be diminished if the double bond is internal or sterically hindered. The cancer concern levels of the 14 haloalkenes and haloalkanes, have been rated, based on available screening cancer bioassays and data on genetic toxicity. Some individuals may be genetically more susceptible to brominated THMs than others. Six, two and one haloalkanes/haloalkenes have been given low-moderate, marginal and low concern, respectively.
MDI OLIGOMER	product
4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI)	Inhalation (human) TCLo: 0.13 ppm/30 mins Eye (rabbit): 0.10 mg moderate
1,1-DIFLUOROETHANE	1,1-difluoroethane is practically non-toxic following acute or chronic inhalation exposure. In animal testing, extremely high concentrations (5% and over) may cause reduced contraction of heart muscle and at even higher levels, heartbeat irregularities. It seems to have a weak effect in damaging genetic material in cells. Studies have not shown it to cause developmental or reproductive toxicity, and it has not been shown to cause mutations.
TECRON - LOW TEMP PU INSULATION ADHESIVE, GREEN, CANISTER & MDI OLIGOMER & 4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI) & 2,2'-DIPHENYLMETHANE DIISOCYANATE & 2,4'-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. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production. 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. Allergy causing activity is due to interactions with proteins. 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. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.
MDI OLIGOMER & 4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI) & 2,2'-DIPHENYLMETHANE DIISOCYANATE & 2,4'-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. 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. This group of compounds has therefore been classified as cancer-causing.

Continued...

MDI OLIGOMER & 4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI)	The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. 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.
2,2'-DIPHENYLMETHANE DIISOCYANATE & 2,4'-DIPHENYLMETHANE DIISOCYANATE & NITROGEN	No significant acute toxicological data identified in literature search.

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*

11.2 Information on other hazards

11.2.1. Endocrine Disruption Properties

Not Available

SECTION 12 Ecological information

12.1. Toxicity

	Endpoint	Test Duration (hr)	Species	Value	Source
TECRON - LOW TEMP PU INSULATION ADHESIVE, GREEN, CANISTER	Not Available	Not Available	Not Available	Not Available	Not Available
MDI oligomer	Not Available	Not Available	Not Available	Not Available	Not Available
4,4'-diphenylmethane diisocyanate (MDI)	EC50	72h	Algae or other aquatic plants	>1640mg/l	2
	BCF	672h	Fish	61-150	7
	NOEC(ECx)	504h	Crustacea	>=10mg/l	2
	LC50	96h	Fish	95.24-134.37mg/l	Not Available
2,2'-diphenylmethane diisocyanate	EC50	72h	Algae or other aquatic plants	>1640mg/l	2
	NOEC(ECx)	504h	Crustacea	>=10mg/l	2
	LC50	96h	Fish	>1000mg/l	2
2,4'-diphenylmethane diisocyanate	NOEC(ECx)	504h	Crustacea	>=10mg/l	2
	EC50	72h	Algae or other aquatic plants	>1640mg/l	2
	LC50	96h	Fish	>1000mg/l	2
1,1-difluoroethane	EC50(ECx)	96h	Algae or other aquatic plants	47.755mg/l	2
	EC50	48h	Crustacea	146.695mg/l	2
	LC50	96h	Fish	291.31mg/l	2
	EC50	96h	Algae or other aquatic plants	47.755mg/l	2
nitrogen	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*

For Haloalkanes:
Atmospheric Fate: Fully, or partially, fluorinated haloalkanes released to the air can restrict heat loss from the Earth's atmosphere by absorbing infrared emissions from the surface. The major fate of haloalkanes in the atmosphere is via breakdown by hydroxyl radicals. These substances react with atmospheric ozone and nitrates, which also causes them to change, (transform). Chlorofluorocarbons, (CFC), haloalkanes can break down into chlorine atoms in the air, which also contribute to ozone destruction.
Terrestrial Fate: Biological breakdown of these substances is expected to be faster than non-biological breakdown, provided that there are sufficient substrates, nutrients and microbial

Continued...

populations. However, because haloalkane-degrading microorganisms are not easily found, biological breakdown of these substances is rare. Several methane-utilizing bacteria have been identified that may use haloalkanes. Biological breakdown may occur through various pathways.
Aquatic Fate: Haloalkanes do not easily break down in water. Biological breakdown of these substances is expected to be faster than non-biological breakdown, provided that there are sufficient substrates, nutrients and microbial populations. In general, alpha- and alpha, omega-chlorinated haloalkanes are de-halogenated by water. Alpha- and alpha, omega-haloalkanes with longer chains, may be de-halogenated by the addition of oxygen, (oxidized). Haloalkanes may break down in water, if certain sulfur ions are present, such as bisulfide ions.
Ecotoxicity: Haloparaffins C12 to C18 may be incorporated into fatty acids in bacteria, yeasts, and fungi, resulting in their build up in the food chain. Haloalkanes are persistent and toxic to fish and wildlife.

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. Within the limits of water solubility, polyisocyanates have a low to moderate toxicity for aquatic organisms.
For 1,1-Difluorethane: Log Kow: 0.75; BCF: 2.
Environmental Fate: 1,1-difluoroethane is expected to exist solely as a vapor in the ambient atmosphere with a half-life of about 472 days. Some 1,1-difluoroethane is expected to diffuse into the stratosphere above the ozone layer where it will slowly degrade due to direct photolysis from UV-radiation.
Aquatic Fate: The estimated half-life for a model river is 2 hours and model lake is 77 hours. 1,1-Difluoroethane is not expected to adsorb to suspended solids and sediment. The chemical is expected to volatilize rapidly from surface water.
Atmospheric Fate: Ninety-nine percent of 1,1-difluorethane released to air distributes to the atmospheric compartment.
Ecotoxicity: 1,1-difluoroethane is unlikely to represent an unacceptable risk to aquatic organisms or wildlife. Bioconcentration of this chemical tends to be low and is slightly to relatively non-toxic to fish and Daphnia magna water fleas. The substance is moderately toxic to algae.
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.
Atmospheric Fate: These substances are not expected to be removed from the air via precipitation washout or dry deposition.
Terrestrial Fate: These substances are expected to sorb strongly to soil. Migration to groundwater and surface waters is not expected to occur.
Aquatic Fate: Breakdown by water, (hydrolysis), is the primary fate mechanism for the majority of commercial isocyanate monomers, however; the low solubility of these substances will generally lessen the effectiveness of hydrolysis as a fate pathway. But hydrolysis should be considered one of the two major fate processes for the isocyanates. These substances strongly sorb to suspended particulates in water. In the absence of hydrolysis, sorption to solids, (e.g., sludge and sediments), will be the primary mechanism of removal. Biological breakdown is minimal for most compounds and evaporation is negligible. Evaporation from surface water is expected to take years. In wastewater treatment this process is not expected to be significant. Isocyanates will react with water producing carbon dioxide and forming a solid mass, which is insoluble.
Biodegradation: Breakdown of these substances in oxygenated and low oxygen environments is not expected to occur. Most of the substances take several months to degrade. Degradation of the hydrolysis products will occur at varying rates.
Ecotoxicity: These substances are not expected to accumulate/biomagnify in the environment. These substances are toxic if inhaled. These substances are harmful to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

DO NOT discharge into sewer or waterways.

12.2. 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)
2,2'-diphenylmethane diisocyanate	HIGH	HIGH
2,4'-diphenylmethane diisocyanate	HIGH	HIGH
1,1-difluoroethane	LOW	LOW

12.3. Bioaccumulative potential

Ingredient	Bioaccumulation
4,4'-diphenylmethane diisocyanate (MDI)	LOW (BCF = 15)
2,2'-diphenylmethane diisocyanate	HIGH (LogKOW = 5.4481)
2,4'-diphenylmethane diisocyanate	HIGH (LogKOW = 5.4481)
1,1-difluoroethane	LOW (LogKOW = 0.75)

12.4. Mobility in soil

Ingredient	Mobility
4,4'-diphenylmethane diisocyanate (MDI)	LOW (KOC = 376200)
2,2'-diphenylmethane diisocyanate	LOW (KOC = 392000)
2,4'-diphenylmethane diisocyanate	LOW (KOC = 384000)
1,1-difluoroethane	LOW (KOC = 35.04)

12.5. Results of PBT and vPvB assessment

	P	B	T
Relevant available data	Not Available	Not Available	Not Available
PBT	✗	✗	✗
vPvB	✗	✗	✗

PBT Criteria fulfilled?	No
vPvB	No

Continued...

12.6. Endocrine Disruption Properties

Not Available

12.7. Other adverse effects

Not Available

SECTION 13 Disposal considerations

13.1. Waste treatment methods

Product / Packaging disposal	▸ **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. ▸ Where in doubt contact the responsible authority. ▸ 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. ▸ Ensure damaged or non-returnable cylinders are gas-free before disposal.
Waste treatment options	Not Available
Sewage disposal options	Not Available

SECTION 14 Transport information

Labels Required

	
Marine Pollutant	NO

Land transport (ADR-RID)

14.1. **UN number**	3501
14.2. **UN proper shipping name**	CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S. (contains 1,1-difluoroethane)
14.3. **Transport hazard class(es)**	Class: 2.1 Subrisk: Not Applicable
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	Hazard identification (Kemler): 23 Classification code: 8F Hazard Label: 2.1 Special provisions: 274 659 Limited quantity: 0 Tunnel Restriction Code: 2 (B/D)

Air transport (ICAO-IATA / DGR)

14.1. **UN number**	3501
14.2. **UN proper shipping name**	Chemical under pressure, flammable, n.o.s. * (contains 1,1-difluoroethane)
14.3. **Transport hazard class(es)**	ICAO/IATA Class: 2.1 ICAO / IATA Subrisk: Not Applicable ERG Code: 10L
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	Special provisions: A1 A187 Cargo Only Packing Instructions: 218 Cargo Only Maximum Qty / Pack: 75 kg Passenger and Cargo Packing Instructions: Forbidden Passenger and Cargo Maximum Qty / Pack: Forbidden Passenger and Cargo Limited Quantity Packing Instructions: Forbidden Passenger and Cargo Limited Maximum Qty / Pack: Forbidden

Continued...

Sea transport (IMDG-Code / GGVSee)

14.1. **UN number**	3501
14.2. **UN proper shipping name**	CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S. (contains 1,1-difluoroethane)
14.3. **Transport hazard class(es)**	IMDG Class: 2.1 IMDG Subrisk: Not Applicable
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	EMS Number: F-D, S-U Special provisions: 274 362 Limited Quantities: 0

Inland waterways transport (ADN)

14.1. **UN number**	3501
14.2. **UN proper shipping name**	CHEMICAL UNDER PRESSURE, FLAMMABLE, N.O.S. (contains 1,1-difluoroethane)
14.3. **Transport hazard class(es)**	2.1 | Not Applicable
14.4. **Packing group**	Not Applicable
14.5. **Environmental hazard**	Not Applicable
14.6. **Special precautions for user**	Classification code: 8F Special provisions: 274; 659 Limited quantity: 0 Equipment required: PP, EX, A Fire cones number: 1

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

Not Applicable

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

Product name	Group
MDI oligomer	Not Available
4,4'-diphenylmethane diisocyanate (MDI)	Not Available
2,2'-diphenylmethane diisocyanate	Not Available
2,4'-diphenylmethane diisocyanate	Not Available
1,1-difluoroethane	Not Available
nitrogen	Not Available

14.9. Transport in bulk in accordance with the ICG Code

Product name	Ship Type
MDI oligomer	Not Available
4,4'-diphenylmethane diisocyanate (MDI)	Not Available
2,2'-diphenylmethane diisocyanate	Not Available
2,4'-diphenylmethane diisocyanate	Not Available
1,1-difluoroethane	Not Available
nitrogen	Not Available

SECTION 15 Regulatory information

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

MDI oligomer is found on the following regulatory lists

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

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

Continued...

EU European Chemicals Agency (ECHA) Community Rolling Action Plan (CoRAP) List of Substances

EU REACH Regulation (EC) No 1907/2006 - Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures - Annex VI

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

2,2'-diphenylmethane diisocyanate is found on the following regulatory lists

EU REACH Regulation (EC) No 1907/2006 - Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures - Annex VI

2,4'-diphenylmethane diisocyanate is found on the following regulatory lists

EU REACH Regulation (EC) No 1907/2006 - Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

European Union (EU) Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures - Annex VI

1,1-difluoroethane is found on the following regulatory lists

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

nitrogen is found on the following regulatory lists

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2020/878; Regulation (EC) No 1272/2008 as updated through ATPs.

15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

ECHA SUMMARY

Ingredient	CAS number	Index No	ECHA Dossier
MDI oligomer	9016-87-9	Not Available	Not Available

Harmonisation (C&L Inventory)	Hazard Class and Category Code(s)	Pictograms Signal Word Code(s)	Hazard Statement Code(s)
1	Skin Irrit. 2; Eye Irrit. 2; Acute Tox. 2; Resp. Sens. 1; STOT SE 3; STOT RE 2	GHS08; GHS06; Dgr	H315; H319; H330; H334; H335; H373
2	Eye Irrit. 2; Acute Tox. 2; Resp. Sens. 1; STOT SE 3; STOT RE 2; Skin Sens. 1; Carc. 2; Acute Tox. 4; Acute Tox. 4; Skin Corr. 1B; Aquatic Chronic 1; Muta. 2	GHS08; GHS06; Dgr; GHS05; GHS09	H319; H330; H334; H335; H373; H317; H351; H302; H312; H314; H341; H410

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

Ingredient	CAS number	Index No	ECHA Dossier
4,4'-diphenylmethane diisocyanate (MDI)	101-68-8	615-005-00-9	01-2119457014-47-0000

Harmonisation (C&L Inventory)	Hazard Class and Category Code(s)	Pictograms Signal Word Code(s)	Hazard Statement Code(s)
1	Skin Irrit. 2; Skin Sens. 1; Eye Irrit. 2; Acute Tox. 4; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT RE 2	GHS08; Dgr	H315; H317; H319; H332; H334; H335; H351; H373
2	Skin Sens. 1; Eye Irrit. 2; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT SE 3; Skin Irrit. 2; Muta. 2; Acute Tox. 2; STOT RE 1; Aquatic Chronic 4	GHS08; Dgr; GHS06	H315; H317; H319; H334; H335; H351; H370; H330; H341; H372; H413
1	Skin Irrit. 2; Skin Sens. 1; Eye Irrit. 2; Acute Tox. 2; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT RE 2	GHS08; GHS06; Dgr	H315; H317; H319; H330; H334; H335; H351; H373
2	Skin Irrit. 2; Skin Sens. 1; Eye Irrit. 2; Acute Tox. 2; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT RE 2; STOT SE 3; Acute Tox. 4	GHS08; GHS06; Dgr	H315; H317; H319; H330; H334; H335; H351; H373; H370

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

Ingredient	CAS number	Index No	ECHA Dossier
2,2'-diphenylmethane diisocyanate	2536-05-2	615-005-00-9	01-2119927323-43-XXXX

Harmonisation (C&L Inventory)	Hazard Class and Category Code(s)	Pictograms Signal Word Code(s)	Hazard Statement Code(s)
1	Skin Irrit. 2; Skin Sens. 1; Eye Irrit. 2; Acute Tox. 4; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT RE 2	GHS08; Dgr	H315; H317; H319; H332; H334; H335; H351; H373
2	Skin Irrit. 2; Skin Sens. 1; Eye Irrit. 2; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT RE 2; Acute Tox. 3	GHS08; Dgr; GHS06	H315; H317; H319; H334; H335; H351; H373; H331

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

Ingredient	CAS	Index No	ECHA Dossier

Continued...

	number		
2,4'-diphenylmethane diisocyanate	5873-54-1	615-005-00-9	01-2119480143-45-XXXX

Harmonisation (C&L Inventory)	**Hazard Class and Category Code(s)**	**Pictograms Signal Word Code(s)**	**Hazard Statement Code(s)**
1	Skin Irrit. 2; Skin Sens. 1; Eye Irrit. 2; Acute Tox. 4; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT RE 2	GHS08; Dgr	H315; H317; H319; H332; H334; H335; H351; H373
2	Skin Irrit. 2; Skin Sens. 1; Eye Irrit. 2; Acute Tox. 4; Resp. Sens. 1; STOT SE 3; Carc. 2; STOT RE 2	GHS08; Dgr	H315; H317; H319; H332; H334; H335; H351; H373

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

Ingredient	**CAS number**	**Index No**	**ECHA Dossier**
1,1-difluoroethane	75-37-6	Not Available	01-2119474440-43-0000

Harmonisation (C&L Inventory)	**Hazard Class and Category Code(s)**	**Pictograms Signal Word Code(s)**	**Hazard Statement Code(s)**
1	Flam. Gas 1; Liq.	GHS02; GHS04; Dgr	H220; H280
2	Flam. Gas 1; Liq.; Muta. 1B; Carc. 1A; Flam. Liq. 1; STOT SE 3; STOT SE 1	GHS02; GHS04; Dgr; GHS08	H220; H280; H224; H336; H370

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

Ingredient	**CAS number**	**Index No**	**ECHA Dossier**
nitrogen	7727-37-9.	Not Available	Not Available

Harmonisation (C&L Inventory)	**Hazard Class and Category Code(s)**	**Pictograms Signal Word Code(s)**	**Hazard Statement Code(s)**
1	Comp.	GHS04; Wng	H280
2	Comp.; Ref. Liq.; Skin Irrit. 2; Eye Irrit. 2; Acute Tox. 4; STOT SE 3; Muta. 1B; Carc. 1A; Skin Sens. 1; Aquatic Acute 1; Aquatic Chronic 1	GHS04; GHS08; Dgr; GHS09	H280; H281; H315; H319; H332; H335; H340; H350; H317; H410

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

National Inventory Status

National Inventory	**Status**
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (MDI oligomer; 4,4'-diphenylmethane diisocyanate (MDI); 2,2'-diphenylmethane diisocyanate; 2,4'-diphenylmethane diisocyanate; 1,1-difluoroethane; nitrogen)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	No (MDI oligomer)
Japan - ENCS	No (nitrogen)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	No (2,2'-diphenylmethane diisocyanate; 2,4'-diphenylmethane diisocyanate)
Vietnam - NCI	Yes
Russia - FBEPH	No (2,2'-diphenylmethane diisocyanate)
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	30/06/2022
Initial Date	25/03/2022

Full text Risk and Hazard codes

H220	Extremely flammable gas.
H224	Extremely flammable liquid and vapour.
H280	Contains gas under pressure; may explode if heated.
H281	Contains refrigerated gas; may cause cryogenic burns or injury.
H302	Harmful if swallowed.
H312	Harmful in contact with skin.

Continued...

H314	Causes severe skin burns and eye damage.
H330	Fatal if inhaled.
H331	Toxic if inhaled.
H332	Harmful if inhaled.
H336	May cause drowsiness or dizziness.
H340	May cause genetic defects.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H370	Causes damage to organs.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.
H413	May cause long lasting harmful effects to aquatic life.

SDS Version Summary

Version	Date of Update	Sections Updated
1.2	30/06/2022	Classification, Ingredients, Physical Properties

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. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:
EN 166 Personal eye-protection
EN 340 Protective clothing
EN 374 Protective gloves against chemicals and micro-organisms
EN 13832 Footwear protecting against chemicals
EN 133 Respiratory protective devices

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
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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