

TJEP Fuel Cell Red Ring

Ideal Fasteners

Chemwatch: 5463-34
Version No: 2.1.1.1

Safety Data Sheet according to WHS Regulations (Hazardous Chemicals) Amendment 2020 and ADG requirements

Issue Date: 03/31/2021
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S.GHS.AUS.EN

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

Product Identifier

Product name	TJEP Fuel Cell Red Ring
Chemical Name	Not Applicable
Synonyms	TJEP Fuel Cell green ring; Fuel Cell 80 ml, Fuel Cell 40g, Fuel Cell 31.5 x 165 High Pressure; Item #: 100857 + 100859
Proper shipping name	RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) without a release device, non-refillable (Flammable gas)
Chemical formula	Not Applicable
Other means of identification	UFI:KK3T-T4TX-H10W-4GDG

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

Relevant identified uses	Professional use, industrial use, fuel cell. Packed as liquid under pressure and remains liquid only under pressure. Sudden release of pressure or leakage may result in rapid vapourisation with generation of large volumes of gas. The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. Use according to manufacturer's directions.
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Details of the supplier of the safety data sheet

Registered company name	Ideal Fasteners
Address	10-12 Ausco Place Dandenong South VIC 3175 Australia
Telephone	Not Available
Fax	Not Available
Website	Not Available
Email	Not Available

Emergency telephone number

Association / Organisation	CHEMWATCH EMERGENCY RESPONSE
Emergency telephone numbers	+61 2 9186 1132
Other emergency telephone numbers	+61 1800 951 288

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


SECTION 2 Hazards identification

Classification of the substance or mixture

HAZARDOUS CHEMICAL. DANGEROUS GOODS. According to the WHS Regulations and the ADG Code.

Poisons Schedule	Not Applicable
Classification [1]	Gas under Pressure (Compressed gas), Flammable Gas Category 1A
Legend:	1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

Label elements

Hazard pictogram(s)	
Signal word	Danger

Hazard statement(s)

AUH044	Risk of explosion if heated under confinement.
H280	Contains gas under pressure; may explode if heated.
H220	Extremely flammable gas.

Supplementary statement(s)

Not Applicable

Precautionary statement(s) Prevention

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
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Precautionary statement(s) Response

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	In case of leakage, eliminate all ignition sources.

Precautionary statement(s) Storage

P410+P403	Protect from sunlight. Store in a well-ventilated place.
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Precautionary statement(s) Disposal

Not Applicable

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

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
115-07-1	25-50	propylene
106-98-9	25-50	1-butene
74-98-6	10-25	propane
9003-13-8	1-3	polypropylene glycol monobutyl ether

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

Eye Contact	<p>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.</p>
Skin Contact	<p>If skin or hair contact occurs: Flush skin and hair with running water (and soap if available). Seek medical attention in event of irritation. In case of cold burns (frost-bite): Move casualty into warmth before thawing the affected part; if feet are affected carry if possible Bathe the affected area immediately in luke-warm water (not more than 35 deg C) for 10 to 15 minutes, immersing if possible and without rubbing DO NOT apply hot water or radiant heat. Apply a clean, dry, light dressing of "fluffed-up" dry gauze bandage If a limb is involved, raise and support this to reduce swelling If an adult is involved and where intense pain occurs provide pain killers such as paracetamol Transport to hospital, or doctor Subsequent blackening of the exposed tissue indicates potential of necrosis, which may require amputation.</p>
Inhalation	<p>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.</p>

Ingestion	<p>Avoid giving milk or oils. Avoid giving alcohol. Not considered a normal route of entry. If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.</p>
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Indication of any immediate medical attention and special treatment needed

For acute or short term repeated exposures to petroleum distillates or related hydrocarbons:
 Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
 Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO₂ 50 mm Hg) should be intubated.
 Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
 A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
 Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
 Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology]

For frost-bite caused by liquefied petroleum gas:
 If part has not thawed, place in warm water bath (41-46 C) for 15-20 minutes, until the skin turns pink or red.
 Analgesia may be necessary while thawing.
 If there has been a massive exposure, the general body temperature must be depressed, and the patient must be immediately rewarmed by whole-body immersion, in a bath at the above temperature.
 Shock may occur during rewarming.
 Administer tetanus toxoid booster after hospitalization.
 Prophylactic antibiotics may be useful.
 The patient may require anticoagulants and oxygen.

[Shell Australia 22/12/87]

For gas exposures:

BASIC TREATMENT

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

ADVANCED TREATMENT

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

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

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

SECTION 5 Firefighting measures

Extinguishing media

**DO NOT EXTINGUISH BURNING GAS UNLESS LEAK CAN BE STOPPED SAFELY:
 OTHERWISE: LEAVE GAS TO BURN.**

FOR SMALL FIRE:

Dry chemical, CO₂ or water spray to extinguish gas (only if absolutely necessary and safe to do so).
DO NOT use water jets.

FOR LARGE FIRE:

Cool cylinder by direct flooding quantities of water onto upper surface until well after fire is out.
DO NOT direct water at source of leak or venting safety devices as icing may occur.

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
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Advice for firefighters

Fire Fighting	<p>----- GENERAL -----</p> <p>Alert Fire Brigade and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Consider evacuation 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.</p>
Fire/Explosion Hazard	<p>HIGHLY FLAMMABLE: will be easily ignited by heat, sparks or flames. Will form explosive mixtures with air Fire exposed containers may vent contents through pressure relief valves thereby increasing fire intensity and/ or vapour concentration. Vapours may travel to source of ignition and flash back. Containers may explode when heated - Ruptured cylinders may rocket</p>

	<p>Fire may produce irritating, poisonous or corrosive gases. Runoff may create fire or explosion hazard. May decompose explosively when heated or involved in fire. High concentration of gas may cause asphyxiation without warning.</p> <p>Combustion products include: carbon monoxide (CO) carbon dioxide (CO₂) other pyrolysis products typical of burning organic material.</p> <p>Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.</p>
HAZCHEM	Not Applicable

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	<p>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. Shut off all sources of possible ignition and increase ventilation. Clear area of personnel. Stop leak only if safe to so do. Remove leaking cylinders to safe place.</p>
Major Spills	<p>Clear area of all unprotected personnel and move upwind. Alert Emergency Authority and advise them of the location and nature of hazard. May be violently or explosively reactive. Wear full body clothing with breathing apparatus. Prevent by any means available, spillage from entering drains and water-courses. Consider evacuation. Shut off all possible sources of ignition and increase ventilation.</p>

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

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	<p>The conductivity of this material may make it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid.</p> <p>Containers, even those that have been emptied, may contain explosive vapours. Do NOT cut, drill, grind, weld or perform similar operations on or near containers. Electrostatic discharge may be generated during pumping - this may result in fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<=1 m/sec until fill pipe submerged to twice its diameter, then <= 7 m/sec). Avoid splash filling. Do NOT use compressed air for filling discharging or handling operations. Avoid all personal contact, including inhalation. Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area. Prevent concentration in hollows and sumps. DO NOT enter confined spaces until atmosphere has been checked. Avoid smoking, naked lights or ignition sources. Avoid contact with incompatible materials.</p>
Other information	<p>Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can Store in original containers in approved flammable liquid storage area. DO NOT store in pits, depressions, basements or areas where vapours may be trapped. No smoking, naked lights, heat or ignition sources. Keep containers securely sealed. Contents under pressure. Store away from incompatible materials. Store in a cool, dry, well ventilated area.</p>

Conditions for safe storage, including any incompatibilities

Suitable container	<p>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.</p> <p>WARNING: Suckback into cylinder may result in rupture.</p>
Storage incompatibility	<p>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 Avoid reaction with oxidising agents</p>

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA


Not Available

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
propylene	1,500 ppm	2800* ppm	17000** ppm
1-butene	750 ppm	2900* ppm	17000*** ppm
1-butene	750 ppm	1,100 ppm	6,600 ppm
1-butene	750 ppm	2200* ppm	13000** ppm
1-butene	750 ppm	2400* ppm	14000** ppm
propane	Not Available	Not Available	Not Available
polypropylene glycol monobutyl ether	27 mg/m3	300 mg/m3	1,800 mg/m3

Ingredient	Original IDLH	Revised IDLH
propylene	Not Available	Not Available
1-butene	Not Available	Not Available
propane	2,100 ppm	Not Available
polypropylene glycol monobutyl ether	Not Available	Not Available

Exposure controls

Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>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.</p> <p>Employers may need to use multiple types of controls to prevent employee overexposure.</p>
Personal protection	
Eye and face protection	<p>Chemical goggles.</p> <p>Full face shield may be required for supplementary but never for primary protection of eyes.</p> <p>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.</p>
Skin protection	See Hand protection below
Hands/feet protection	<p>When handling sealed and suitably insulated cylinders wear cloth or leather gloves.</p> <p>Insulated gloves:</p> <p>NOTE: Insulated gloves should be loose fitting so that they may be removed quickly if liquid is spilled upon them. Insulated gloves are not made to permit hands to be placed in the liquid; they provide only short-term protection from accidental contact with the liquid.</p>
Body protection	See Other protection below
Other protection	<p>The clothing worn by process operators insulated from earth may develop static charges far higher (up to 100 times) than the minimum ignition energies for various flammable gas-air mixtures. This holds true for a wide range of clothing materials including cotton.</p> <p>Avoid dangerous levels of charge by ensuring a low resistivity of the surface material worn outermost.</p> <p>BREThERICK: Handbook of Reactive Chemical Hazards.</p> <p>Protective overalls, closely fitted at neck and wrist.</p> <p>Eye-wash unit.</p> <p>IN CONFINED SPACES:</p> <p>Non-sparking protective boots</p> <p>Static-free clothing.</p> <p>Ensure availability of lifeline.</p> <p>Staff should be trained in all aspects of rescue work.</p> <p>Rescue gear: Two sets of SCBA breathing apparatus Rescue Harness, lines etc.</p> <p>Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.</p> <p>For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets).</p> <p>Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot an shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</p>

Respiratory protection

Type AX-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	AX-AUS / Class1 P2	-
up to 50	1000	-	AX-AUS / Class 1 P2
up to 50	5000	Airline *	-
up to 100	5000	-	AX-2 P2
up to 100	10000	-	AX-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.

Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)

Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Gas under pressure with characteristic odour.		
Physical state	Liquified Gas	Relative density (Agua= 1)	Not Available
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	350
pH (as supplied)	Not Available	Decomposition temperature	Not Available
Melting point / freezing point (°C)	-185	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	-48	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	<0	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	HIGHLY FLAMMABLE.	Oxidising properties	Not Available
Upper Explosive Limit (%)	11	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	Not Available	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	Unstable in the presence of incompatible materials. Product is considered stable. Hazardous polymerisation will not occur. Presence of heat source Presence of an ignition source
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

Inhaled	Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
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	<p>There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.</p> <p>Inhalation of non-toxic gases may cause:</p> <ul style="list-style-type: none"> CNS effects: headache, confusion, dizziness, stupor, seizures and coma; respiratory: shortness of breath and rapid breathing; cardiovascular: collapse and irregular heart beats; gastrointestinal: mucous membrane irritation, nausea and vomiting. <p>Inhalation of high concentrations of gas/vapour causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination.</p> <p>Central nervous system (CNS) depression may include general discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.</p> <p>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.</p> <p>The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.</p>
Ingestion	<p>Accidental ingestion of the material may be damaging to the health of the individual.</p> <p>Not normally a hazard due to physical form of product.</p> <p>Considered an unlikely route of entry in commercial/industrial environments</p> <p>Central nervous system (CNS) depression may include general discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.</p>
Skin Contact	<p>Vapourising liquid causes rapid cooling and contact may cause cold burns, frostbite, even through normal gloves. Frozen skin tissues are painless and appear waxy and yellow. Signs and symptoms of frost-bite may include "pins and needles", paleness followed by numbness, a hardening and stiffening of the skin, a progression of colour changes in the affected area, (first white, then mottled and blue and eventually black; on recovery, red, hot, painful and blistered).</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p>
Eye	<p>Not considered to be a risk because of the extreme volatility of the gas.</p>
Chronic	<p>Main route of exposure to the gas in the workplace is by inhalation.</p> <p>In animal testing, propylene caused an increase in the rate of cell changes in the airway, and inflammation of the nose with discharge including pus.</p>

TJEP Fuel Cell Red Ring	TOXICITY Not Available	IRRITATION Not Available
propylene	TOXICITY Inhalation(Rat) LC50; 382321.768 ppm4 ^[2]	IRRITATION Not Available
1-butene	TOXICITY Inhalation(Rat) LC50; >10000 ppm4 ^[1]	IRRITATION Not Available
propane	TOXICITY Inhalation(Rat) LC50; >13023 ppm4 ^[1]	IRRITATION Not Available
polypropylene glycol monobutyl ether	TOXICITY dermal (rat) LD50: >2000 mg/kg ^[1] Oral(Rat) LD50; >300<2000 mg/kg ^[1]	IRRITATION Skin (rabbit): 500 mg open - mild
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	

PROPYLENE	<p>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.</p>
POLYPROPYLENE GLYCOL MONOBUTYL ETHER	<p>For propylene glycol ethers (PGEs): Typical propylene glycol ethers include propylene glycol n-butyl ether (PnB); dipropylene glycol n-butyl ether (DPnB); dipropylene glycol methyl ether acetate (DPMA) and tripropylene glycol methyl ether (TPM). Testing of a wide variety of propylene glycol ethers has shown that propylene glycol-based ethers are less toxic than some ethers of the ethylene series. The common toxicities associated with the lower molecular weight homologues of the ethylene series, such as adverse effects on the reproductive organs, the developing embryo and foetus, blood or thymus gland, are not seen with the commercial-grade propylene glycol ethers. In the ethylene series, metabolism of the terminal hydroxyl group produces and alkoxyacetic acid. The reproductive and developmental toxicities of the lower molecular weight homologues in the ethylene series are due specifically to the formation of methoxyacetic and ethoxyacetic acids. Longer chain homologues in the ethylene series are not associated with reproductive toxicity, but can cause haemolysis in sensitive species, also through formation of an alkoxyacetic acid. The predominant alpha isomer of all the PGEs (which is thermodynamically favoured during manufacture of PGEs) is a secondary alcohol incapable of forming an alkoxypropionic acid. In contrast, beta-isomers are able to form the alkoxypropionic acids and these are linked to birth defects (and possibly, haemolytic effects). The alpha isomer comprises more than 95% of the isomeric mixture in the commercial product, and therefore PGEs show relatively little toxicity. The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.</p>
PROPYLENE & 1-BUTENE & PROPANE	<p>No significant acute toxicological data identified in literature search.</p>

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

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

SECTION 12 Ecological information

Toxicity

	Endpoint	Test Duration (hr)	Species	Value	Source
TJEP Fuel Cell Red Ring	Not Available	Not Available	Not Available	Not Available	Not Available
propylene	LC50	96	Fish	51.7mg/l	2
	EC50(ECx)	96	Algae or other aquatic plants	12.1mg/l	2
	EC50	96	Algae or other aquatic plants	12.1mg/l	2
1-butene	LC50	96	Fish	32.471mg/l	2
	NOEC(ECx)	504	Crustacea	1.349mg/l	2
	EC50	96	Algae or other aquatic plants	14.882mg/l	2
propane	EC50(ECx)	96	Algae or other aquatic plants	7.71mg/l	2
	LC50	96	Fish	24.11mg/l	2
	EC50	96	Algae or other aquatic plants	7.71mg/l	2
polypropylene glycol monobutyl ether	EC50(ECx)	48	Crustacea	2.33-2.644mg/L	4
	EC50	48	Crustacea	2.33-2.644mg/L	4
	LC50	96	Fish	1.256-1.361mg/L	4
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
propylene	LOW (Half-life = 56 days)	LOW (Half-life = 0.57 days)
1-butene	LOW	LOW
propane	LOW	LOW
polypropylene glycol monobutyl ether	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
propylene	LOW (BCF = 31)
1-butene	LOW (LogKOW = 2.4)
propane	LOW (LogKOW = 2.36)
polypropylene glycol monobutyl ether	LOW (LogKOW = 1.4138)

Mobility in soil

Ingredient	Mobility
1-butene	LOW (KOC = 43.79)
propane	LOW (KOC = 23.74)
polypropylene glycol monobutyl ether	LOW (KOC = 10)


SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	Evaporate or incinerate residue at an approved site. Return empty containers to supplier. Ensure damaged or non-returnable cylinders are gas-free before disposal.
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SECTION 14 Transport information

Labels Required

	
Marine Pollutant	NO
HAZCHEM	Not Applicable

Land transport (ADG)

UN number	2037	
UN proper shipping name	RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) without a release device, non-refillable (Flammable gas)	
Transport hazard class(es)	Class	2.1
	Subrisk	Not Applicable
Packing group	Not Applicable	
Environmental hazard	Not Applicable	
Special precautions for user	Special provisions	191 277 303 327 344
	Limited quantity	See SP 277

Air transport (ICAO-IATA / DGR)

UN number	2037	
UN proper shipping name	Gas cartridges (flammable) without a release device, non-refillable; Receptacles, small, containing gas (flammable) without a release device, non-refillable	
Transport hazard class(es)	ICAO/IATA Class	2.1
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	10L
Packing group	Not Applicable	
Environmental hazard	Not Applicable	
Special precautions for user	Special provisions	A145 A167 A802
	Cargo Only Packing Instructions	203
	Cargo Only Maximum Qty / Pack	15 kg
	Passenger and Cargo Packing Instructions	203
	Passenger and Cargo Maximum Qty / Pack	1 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Y203
Passenger and Cargo Limited Maximum Qty / Pack	1 kg	

Sea transport (IMDG-Code / GGVSee)

UN number	2037	
UN proper shipping name	RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) without a release device, non refillable	
Transport hazard class(es)	IMDG Class	2.1
	IMDG Subrisk	Not Applicable
Packing group	Not Applicable	
Environmental hazard	Not Applicable	
Special precautions for user	EMS Number	F-D , S-U
	Special provisions	191 277 303 344
	Limited Quantities	See SP277

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

Not Applicable

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

Product name	Group
propylene	Not Available
1-butene	Not Available
propane	Not Available
polypropylene glycol monobutyl ether	Not Available

Transport in bulk in accordance with the ICG Code

Product name	Ship Type
propylene	Not Available
1-butene	Not Available
propane	Not Available
polypropylene glycol monobutyl ether	Not Available

SECTION 15 Regulatory information**Safety, health and environmental regulations / legislation specific for the substance or mixture****propylene is found on the following regulatory lists**

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals
 Australian Inventory of Industrial Chemicals (AIIC)

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

1-butene is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

Australian Inventory of Industrial Chemicals (AIIC)

propane is found on the following regulatory lists

Australia Hazardous Chemical Information System (HCIS) - Hazardous Chemicals

Australian Inventory of Industrial Chemicals (AIIC)

polypropylene glycol monobutyl ether is found on the following regulatory lists

Australian Inventory of Industrial Chemicals (AIIC)

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (propylene; 1-butene; propane; polypropylene glycol monobutyl ether)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	No (polypropylene glycol monobutyl ether)
Vietnam - NCI	Yes
Russia - FBEPH	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory and are not exempt from listing (see specific ingredients in brackets)

SECTION 16 Other information

Revision Date	03/31/2021
Initial Date	03/31/2021

SDS Version Summary

Version	Issue Date	Sections Updated
2.1.1.1	03/31/2021	Classification, Handling Procedure, Spills (major), Storage (storage requirement)

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.

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
AII: 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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TEL (+61 3) 9572 4700.