SAFETY DATA SHEET

Quantum Technical Services Ltd.

Section 1. Product and Company Identification

Product Name	**PRECIDIUM™ MTI Bus Membrane ISO** **PRECIDIUM™** brand name is a trademark of Quantum Chemical, and is being used with permission.
Manufacturer	Quantum Technical Services Ltd. (Dba Quantum Chemical) 15 Riel Drive St. Albert, AB, Canada T8N 3Z2 Tel: (780) 458-3355 (non-emergency phone number) Fax: (780) 458-2852 www.quantumchemical.com
Chemical Emergencies	For 24-Hour Emergency call Canutec at 613.996.6666

Section 2. Hazards Identification

2.1 Classification

OSHA Regulatory Status:	This material is considered hazardous by the OSHA Hazard Communication Standard (CFR 1910.1200)
WHMIS	**D-2A** Materials causing other toxic effects – (very toxic) **D-2B** Material causing other toxic effects (toxic)

GHS Classification

Acute Toxicity: Inhalation – Category 4
Skin Corrosion/Irritation – Category 2
Serious Eye Damage/Eye Irritation – Category 2B
Respiratory Sensitization – Category 1
Skin Sensitization – Category 1
Specific Target Organ Toxicity (single exposure) [Respiratory Tract Irritation] – Category 3

2.2 Label Elements:

Pictogram:

Signal Word:	**DANGER**
Hazard Statements:	**H315+H320:** Causes skin and eye irritation. **H317:** May cause an allergic skin reaction. **H332:** Harmful if inhaled. **H334:** May cause allergy or asthma symptoms or breathing difficulties if inhaled. **H335:** May cause respiratory irritation. **R42/43:** May cause sensitization by inhalation and skin contact. **R68/20:** Harmful: possible risk of irreversible effects through inhalation.

Precautionary Statements:	**P202:** Do not handle until all safety precautions have been read and understood. **P262:** Do not get in eyes, on skin, or on clothing. **P281:** Use personal protective equipment as required. **P264:** Wash exposed skin thoroughly after handling. **P280:** Wear protective gloves/protective clothing/eye protection/face protection. **P260:** Do not breathe dust/fumes/gas/mist/vapours/spray. **P271:** Use only outdoors or in a well-ventilated area. **P272:** Contaminated work clothing should not be allowed out of the workplace. **P285:** In case of inadequate ventilation wear respiratory protection.
Response:	**P302+P350:** IF ON SKIN: Gently wash with plenty of soap and water. **P333+P313:** If skin irritation or rash occurs: Get medical advice/attention. **P361+P364:** Take off immediately all contaminated clothing and wash it before reuse. **P305+P351+P338:** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing. **P337+P313:** If eye irritation persists: Get medical advice/attention. **P304+P340:** IF INHALED: Remove person to fresh air and keep comfortable for breathing . **P312:** Call a POISON CENTER/doctor if you feel unwell. **P342+P311:** If experiencing respiratory symptoms: Call a POISON CENTER/doctor.
Storage:	**P403:** Store in a well-ventilated place. **P233:** Keep container tightly closed.
Disposal:	**P501:** Dispose of contents/containers in accordance with local /regional/national/ international regulations.

Section 3. Composition and Ingredient Information

Hazardous Ingredients	%	ACGHI TLV	C.A.S. #	LD_{50}	LC_{50}
4, 4'Diphenylmethane Diisocyanate	50-70	.005 ppm	101-68-8	Oral LD50(rat) >5,000 mg/kg Dermal LD50 (rabbit)>5,000mg/kg	50(rat)=490 mg/m^3/4H (respirable aerosol)
Modified MDI	10-20	not established	not available	not available	n/a

Section 4. First Aid Measures

Eye Contact	Immediately flush eyes with running water for a minimum of 15 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY.
Skin Contact	Remove contaminated clothing. Wash affected areas thoroughly with plenty of soap and water. Some organic materials such as corn oil and propylene glycol are effective in decontaminating MDI from the skin when applied immediately. If irritation, redness or a burning sensation develops and persists, obtain medical advice. Contaminated clothing should be thoroughly cleaned before reuse.
Inhalation	Remove patient from exposure; keep warm and at rest. Obtain medical attention. Treatment is symptomatic for primary irritation or breathing difficulty. If breathing is labored, oxygen should be administered by qualified personnel. Apply artificial respiration if breathing has ceased or shows signs of failing.
Ingestion	Do NOT induce vomiting. Provided the patient is conscious, wash out mouth with water, then give 1 or 2 glasses of water to drink. Refer person to medical personnel for immediate attention.
Additional Information	In case of accident or if you feel unwell, seek medical advice IMMEDIATELY (show the label where possible.)
NOTE to Physicians:	Symptomatic and supportive therapy as needed. Following severe exposure, medical follow-up should be monitored for at least 48 hours.

Section 5. Fire Fighting Measures

Extinguishing Media	Carbon dioxide, dry chemical or appropriate foam. If water is used, use very large quantities. The reaction between water and hot isocyanates may be vigorous. Contain run-off water with temporary barriers. Reacts slowly with water to produce carbon dioxide which may rupture closed containers. This reaction accelerates at higher temperatures.
Flash Point	219°C 427° F (COC).
Auto Ignition Temperature	240°C 464° F.
Upper Flammable Limit	Not available.
Lower Flammable Limit	Not available.
Decomposition Temperature	341°C 646° F.
Hazardous Combustion Products	Under fire conditions, fumes, smoke, carbon monoxide, carbon dioxide, nitrogen oxides and some HCN.
Explosion Data	
Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	None.
Unusual Fire and Explosion Hazards	Containers may burst under intense heat. Due to reaction with water, a hazardous build-up of pressure could result if contaminated containers are resealed.
Special Fire Fighting Procedures	Firefighter should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Protective clothing should be worn.

Section 6. Accidental Release Measures

Leak/Spill	Clean-up should only be performed by trained personnel. People dealing with major spillage should wear full protective clothing including respiratory protection. Evacuate the area. Prevent further leakage, spillage or entry into drains. Contain and absorb large spillage onto an inert, non-flammable absorbent carrier (such as earth or sand). Shovel into open-top drums or plastic bags for further decontamination, if necessary. Wash the spillage area clean with liquid decontaminant. Remove and dispose of residues. Notify applicable government authorities if release is reportable. The CERCLA RQ for MDI is 5,000 lbs.
Preparation of Decontamination Solution	Prepare a decontamination solution of 0.2-0.5% liquid detergent and 3-8% concentrated ammonium hydroxide in water (5-10% sodium carbonate may be substituted for the ammonium hydroxide). Follow the precautions on the supplier's material safety data sheets when preparing and using solution.
Use of Decontamination Solution:	Allow deactivated material to stand for at least 30 minutes before shoveling into drums. Do not tighten the bungs. Mixing with wet earth is also effective, but slower.

Section 7. Handling and Storage

Handling	Avoid personal contact with the product or reaction mixture. Use only with adequate ventilation to ensure that the defined occupational limit is not exceeded. The efficiency of the ventilation must be monitored regularly because of the possibility of blockage. Avoid breathing aerosols, mists and vapors. When the product is sprayed or heated, an approved MSHA/NIOSH positive-pressure, supplied-air respirator may be required.
Storage Needs	Keep containers properly sealed and when stored indoors, in a well-ventilated area. Keep contents away from moisture. Due to reaction with water, producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed.

Do not reseal contaminated containers! Uncontaminated containers, free of moisture, may be re-sealed only after placing under a nitrogen blanket. Do not store in containers made of copper, copper alloys or galvanized surfaces.

Section 8. Exposure Controls and Personal Protection

Protective Equipment	
Eye	Safety spectacles. If there is a potential for splashing, use a full face shield.
Respiratory	Use a NIOSH-approved respirator with organic vapour cartridges. A positive pressure air-supplied respirator equipped with a full face piece, or an air-supplied hood can also be used.
Gloves	Neoprene, nitrile-butadiene rubber, butyl rubber. Thin disposable gloves should be avoided for repeated or long term use.
Clothing	Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH.
Other/Type	Eyewash fountain. Emergency shower should be in close proximity.
Ventilation Requirements	Use local exhaust ventilation to keep airborne concentrations below the TLV. Suitable respiratory equipment should be used in cases of insufficient ventilation or where operational procedures demand it. For general guidance on engineering control measures, refer to the ACGIH publication "Industrial Ventilation."
Engineering Controls	Conditions of use, adequacy of engineering or other control measures and actual exposures will dictate the need for specific protective devices at your workplace.

HAZARDOUS INGREDIENT

4,4'-Diphenylmethane Diisocyanate:

ACGIH TLV	0.05 mg/M^3 (8-hour, 40 hours/week)
OSHA PEL CEILING	0.20 mg/M^3
NIOSH REL/TWA	0.05 mg/M^3 (10-hour, 40 hours/week)
NOISH REL/CEILING	0.20 mg/M^3 (10 minute)

NOTE: The occupational exposure limits listed for isocyanates do not apply to previously sensitized individuals.

Section 9. Physical and Chemical Properties

Physical State	Liquid.
Odor and appearance	Pale yellow liquid, slightly musty odor.
Specific Gravity (H2O=1)	1.19 (at 25^{o}C).
Odor Threshold(ppm)	0.4 mg/M^3 (4,4' - Diphenylmethane Diisocyanate).
Vapor Pressure (mm Hg)	Approximately 4 X 10^{-6}
Vapor Density (Air=1)	Approximately 8.5.
Evaporation Rate	Not available.
Boiling Point	Not available.
pH	Not applicable.
Solubility in water	Reacts with water.
Coefficient of water/oil	Not available.
Distribution	Not applicable.
Freezing Point (°C)	Not available.
Melting Point (°C)	Not applicable.

Section 10. Stability and Reactivity

Stable	Stable at room temperature.
Incompatibility	This product will react with any materials containing active hydrogens such as water, alcohol, amines, bases and acids. The reaction with water is very slow under 50^{o}C (122° F) but is accelerated at higher temperatures.

Reactivity Conditions	N/A
Hazardous Products of Decomposition	Highly unlikely under normal industrial use.
Polymerization	Polymerization may occur at elevated temperatures in the presence of alkalis, tertiary amines, and metal compounds.
Conditions to Avoid	Avoid high temperatures. Avoid freezing.

Section 11. Toxicological Information

Polymeric MDI	Oral LD50 (rat) >5000mg/kg Dermal LD50 (rabbit) >5000mg/kg Inhalation LC50 (rat) = 490mg/M^3 (4 hours exposure to respirable aerosols)
Potential Health Effects	Inhalation: This product is a respiratory irritant and potential sensitizer. Inhalation of vapour or aerosol at levels above the occupational exposure level could cause respiratory sensitization and lung injury. Symptoms may include irritation to the eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing and/or flu-like symptoms. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyperactive response to even minimal concentrations of MDI may develop in sensitized persons. In a single evaluation of 5 men occupationally exposed to MDI and hydrocarbon vapour under conditions where adequate ventilation or other safety precautions were not used, neuropsychologic findings were attributed to MDI. Skin Contact: Moderate irritant. Repeated and/or prolonged contact may cause skin sensitization. There is limited evidence from animal studies that skin contact may play a role in respiratory sensitization. These results emphasize the need for protective clothing including gloves to be worn at all times when handling these chemicals or in maintenance work. Eye Contact: The aerosol, vapour or liquid will irritate human eyes following contact. Ingestion: Ingestion may cause irritation of the gastrointestinal tract. Based on the acute oral LD50, this product is considered practically non-toxic by ingestion. Chronic Effects: A study was conducted where groups of rats were exposed for 6 hours/day, 5 days/week for a lifetime to atmospheres of respirable polymeric MDI aerosols at concentrations of 0, 0.2, 1 or 6 mg/M3. No adverse effects were observed at 0.2 mg/M3. At the 1 mg/M3 concentration, minimal nasal and lung irritant effects were seen. Only at the top concentration (6.0 mg/M3) was there an increased incidence of a benign tumor of the lung (adenoma). One malignant pulmonary tumor (adenocarcinoma) was seen in the 6.0 mg/M3 group. MDI administration to rats in this study did not change the distribution and incidence of tumors from those seen in control animals. The increased incidence of lung tumors is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumor formation will occur. There are reports that excessive chronic exposure to diisocyanates may result in permanent decrease in lung function. Carcinogenicity: The ingredients of this product are not classified as carcinogenic by ACGIH or IARC; not regulated as carcinogens by OSHA, and not listed as carcinogens by NTP. Mutagenicity: There is no substantial evidence of mutagenic potential.

Reproductive Effects: No adverse reproductive effects are anticipated.

Teratogenicity and Fetotoxicity: No birth defects were seen in two independent animal (rat) studies.
Fetotoxicity was observed at doses that were extremely toxic (including lethal) to the mother. Fetotoxicity was not observed at doses that were maternally toxic. The doses used in these studies were maximal, respirable concentrations well in excess of the defined occupational limits.

Section 12. Ecological Information

Aquatic Toxicity — Fish: LC50 (96hr) >100 mg/l.
Daphnia magna EC50 (48 hour) .1000 mg/l.

Persistence/Degradability — Poorly biodegradable.

Bioaccumulation — Data not available.

Mobility in Environmental Media — Data not available.

Section 13. Disposal Considerations

Waste Disposal — The generation of waste should be avoided or minimized wherever possible. Disposal should be in accordance with Federal, Provincial and Municipal regulations. This material is not a hazardous waste under RCRA 40 CFR 261. Small quantities should be treated with a decontaminant solution (as per procedures above). The treated waste is not a hazardous material under RCRA 40 CFR 261. Chemical waste, even small quantities, should never be poured down drains, sewers or waterways. Empty containers should be decontaminated and either passed to an approved drum recycler or destroyed.

Section 14. Transport Information

T.D.G. Classification — Non regulated.

Section 15. Regulatory Information

Inventories — DSL (all components listed)
TSCA (all components listed)

WHMIS Classification — D-1A; D-2A and D-2B.
DOT: — Single containers less than 5,000 lbs. are not regulated. Single containers with 5,000 lbs. or more of 4,4' - MDI are regulated as: Other Regulated Substances, Liquid, N.O.S. (Methylene Diphenyl Diisocyanate), 9, NA3082, PGIII, RQ
IMO: — Not regulated.
IATA/ICAO Class: — Not regulated.
OSHA Classification:
- Physical — Not regulated.
- Health — Highly toxic, respiratory sensitizer, skin sensitizer, irritant. Target organ: Respiratory tract. Skin.

TSCA (Toxic Substances Control Act) Regulations:	
EPCRA Section 313 (40 CFR 372)	This product contains the following chemical(s) subject to reporting requirements: 100% Diisocyanate compounds (Category Code N120).
CERCLA (Comprehensive Environmental Response, Compensation and Liability Act):	4,4'-Methylene diphenyl diisocyanate (CAS 101-68-8) has 5,000 lb. RQ (reportable quantity). Any spill or release above the RQ must be reported to the National Response Center (800-424-8802). The % of 4,4'-MDI in this product is listed in this SDS. This product does not contain nor is it manufactured with ozone depleting substances.
Other Regulations Which Might Apply to This Product	Massachusetts Right-to-Know, Pennsylvania Right-to-Know, New Jersey Right-to-Know, CERCLA.

Section 16. Other Information

Revision Date	August 15, 2017
Note	This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Quantum Technical Services Ltd. The data on this sheet relates only to the specific material designated herein. Quantum Technical Services Ltd. assumes no legal responsibility for use or reliance upon this data.