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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in TremShield 660 and Tremflex 25

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in TremShield 660 and Tremflex 25

1. APPLICANT

Tremco Pty Limited of 5 Cal Close, SOMERSBY NSW 2250 has submitted a limited notification statement in support of the application for an assessment certificate for Polymer in TremShield 660 and Tremflex 25.

2. IDENTITY OF THE CHEMICAL

Polymer in TremShield 660 and Tremflex 25 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data and details of the polymer composition have been exempted from publication in the Full Public Report and the Summary Report.

Trade names:	TremShield 660 The Heavy Body Urethane Adhesive (contains < 10% notified polymer)
	Tremflex 25 (contains < 20% notified polymer)
Number-average molecular weight:	> 2 000
Weight-average molecular weight:	> 20 000
Maximum percentage of low molecular weight species molecular weight < 1000:	< 5%
Method of detection and determination:	size exclusion chromatography; infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Some of the physical and chemical data provided by the notifier are for the imported product TremShield 660, not the notified polymer, as indicated below.

Appearance at 20°C and 101.3 kPa:	At room temperature and pressure the end use product is a thick paste. TremShield 660 is black and Tremflex 25 is provided in a range of colours
Boiling point:	not relevant; TremShield 660 is a thick paste
Specific gravity:	1.17 (TremShield 660)
Vapour pressure:	not determined; vapour pressure of polymer is expected to be negligible due to high number-average molecular weight (NAMW); product contains up to 10% (w/w) volatiles
Water solubility:	not determined; expected to be negligible for the polymer
Partition co-efficient (n-octanol/water):	not determined; polymer is expected to partition completely into the organic phase
Hydrolysis as a function of pH:	not determined; the notified polymer contains urethane functional groups which may undergo hydrolysis under extreme temperature and pH
Adsorption/desorption:	not determined; the notified polymer is expected to absorb strongly to organic matter
Dissociation constant:	the notified polymer has no dissociable groups
Flash point:	not applicable - TremShield 660 is a thick paste
Flammability limits:	Upper Explosive Limit = 7% (toluene) Lower Explosive Limit = 1.2% (toluene)
Autoignition temperature:	not determined
Explosive properties:	not explosive
Reactivity/stability:	imported product is stable under normal conditions of use; it will react with strong oxidants (eg liquid chlorine, concentrated oxygen, sodium hypochlorite); may also react with nitrogen compounds (eg amines and amides); products of thermal decomposition may include hydrocyanic acid, nitrogen oxides and carbon monoxide.

Comments on Physico-Chemical Properties

The majority of the physical and chemical data provided are for the imported product (TremShield 660) in its ready-to-use form and not the notified polymer.

The notifier has stated that the polymer has been designed to cross-link in the presence of moisture. Therefore, water solubility is difficult to determine but is expected to be low, as there are no hydrophilic groups likely to confer solubility.

The polymer contains urethane functional groups which may hydrolyse under extreme temperature and pH, but this is unlikely in the environmental range. Partition coefficient data is not applicable as a polymer of this molecular size (NAMW > 1000) and low solubility is not expected to cross biological membranes. It would be difficult to measure.

No measurement of adsorption/desorption was made, however, the notifier expects the notified polymer to strongly adsorb to organic matter. The polymer is not expected to dissociate under environmental conditions. The latter two properties would not be able to be determined for a polymer that is insoluble in water. The large, complex molecular structure also makes the measurement of such properties difficult.

4. PURITY OF THE CHEMICAL

Degree of purity: > 99%

Toxic or hazardous impurities:

<i>Chemical name:</i>	1,1'-methylenebis [4-isocyanatobenzene]
<i>Synonyms:</i>	MDI methylene bisphenyl isocyanate
<i>CAS No.:</i>	101-68-8
<i>Weight percentage:</i>	< 1%
<i>Toxic properties:</i>	harmful by inhalation; irritating to eyes, respiratory system and skin at and above concentrations of 20%; may cause sensitisation by inhalation at and above concentrations of 1% (1)

Non-hazardous impurities (> 1% by weight):

none

Maximum content of residual monomers:

< 1%

Additives/Adjuvants: the following substances are additives to the notified polymer

Chemical name: toluene

CAS No.: 108-88-3

Weight percentage: < 10%

Chemical name: phthalate ester plasticisers

Weight percentage: < 20%

5. USE, VOLUME AND FORMULATION

The notified chemical will be imported only as a component of two urethane based adhesive sealants. No reformulation of the notified chemical will occur in Australia. TremShield 660 is used in the automotive industry to seal windscreens, and contains the notified polymer at a concentration of < 10%. Tremflex 25 contains the notified polymer at a concentration of < 20% and is used in the construction industry to seal construction joints, such as door and window frames.

The total import volume of the notified chemical is expected to be approximately 20 tonnes per year for the next 5 years, based on an annual import volume of 70.2 tonnes/year of TremShield 660 (< 7 tonnes/year notified polymer) and 70.2 tonnes/year of Tremflex 25 (< 13 tonnes/year notified polymer).

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported as a component of two adhesive sealants. The sealants will be imported in 310 mL aluminium cartridges and in 600 mL foil sausages, which will be packed into shipping containers.

Waterside, transport and warehouse workers will be involved in unloading the containers and transporting them to a central warehouse. These workers are not expected to come into contact with the notified polymer under normal circumstances.

The end use products, TremShield 660 and Tremflex 25, will be delivered to automotive and construction industry distributors. Distributors are expected to handle only unopened cartridges and foil sausages containing the end use products, for an estimated 0.25 to 0.5 hours per day, 50 days per year. Exposure to the notified chemical is expected to occur only in the event of an accident or damage to the packaging.

Automotive applicators may be exposed to the notified chemical in TremShield 660 when fitting windscreens. Dermal exposure may occur when the end use product is applied to the edge of an automobile windscreen frame using a hand held caulking gun or air gun. Dermal exposure may also occur when the windscreen is fitted and excess adhesive material is removed using a cloth and suitable solvent. Inhalational

exposure to the notified chemical is not expected to occur, due to the expected low vapour pressure of the polymer, however inhalational exposure to the solvent components of the end use product may occur if ventilation is inadequate. Eye exposure to the notified chemical is expected to be limited to accidental contact.

Similar exposure patterns will apply to workers in the construction industry who may be exposed to the notified chemical in Tremflex 25 when using this product to seal dynamic joints, window and door frames. Excess material will be removed using a cloth and suitable solvent. As discussed above for workers in the automotive industry, dermal exposure is likely to be the main route of exposure to the notified chemical.

Once applied, both Tremflex 25 and TremShield are expected to cure within 24 hours, encapsulating the notified polymer in the sealant/adhesive matrix.

7. PUBLIC EXPOSURE

TremShield 660 and Tremflex 25 will not be available for use by the public, and will be used in automotive workshops and in the construction industry, respectively. Minimal exposure may occur if the automobile windscreen or construction joint sealant is accidentally exposed due to vehicle or building damage.

The potential for minor public exposure exists during transport and disposal of the polymer if accidentally spilt. This is minimised by the recommended practices during storage and transportation.

8. ENVIRONMENTAL EXPOSURE

Release

There is no reformulation or further treatment of the polymer within Australia. The notified polymer, as a component of TremShield 660 and Tremflex 25, will be transported in sealed 310 mL aluminium cartridges and 600 mL foil sausages, where the risk of environmental exposure is limited to incidents involving accidents or leaking packaging.

During automotive application, TremShield 660 will be applied to the edge of automobile windscreen frames using either a hand held caulking gun or air gun. During construction application, Tremflex 25 will be applied to dynamic joints and windows and door frames using either a caulking gun or air gun. The adhesive is said to cure in less than 24 hours.

Any excess adhesive is wiped off with an appropriate solvent recommended by manufacturer's instructions. Cloths (used to wipe off excessive adhesive or clean up spills) and contaminated protective clothing will be disposed of to landfill in accordance with Local and State Regulations or incinerated. The notifier has estimated that approximately 10 mL (less than 0.18 g of the notified polymer) of

adhesive is lost from each 600 mL foil, as wastage from application and cleaning.

The notifier has estimated that less than 30 g of adhesive will remain in the 310 mL cartridges, and less than 40 g will remain in the 600 mL foils. In a worst case, this equates to approximately 7.2 g of the notified polymer per sausage. Residual material in the cartridges and foils will cure and solidify. The cartridge and foils containing the solid residual will be disposed of to landfill.

Therefore the total release from application and the disposal of cartridges and foils will amount to less than 10% of the total import volume of the notified polymer.

Fate

TremShield 660 and Tremflex 25 are expected to be used as an adhesive in automotive and construction industries and remain with the jointed surfaces until it is removed or disposed of with the articles to which it is bound. Therefore most of notified polymer manufactured will be incorporated in a polymer matrix, most of which will eventually be disposed of by landfill.

A small amount of waste is generated during application which it is expected to eventually go to landfill or be incinerated.

Most of the notified polymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix. The resultant matrix structure should limit the hydrolysis or biodegradation potential of the polymer. Bioaccumulation of the polymer is unlikely due to the high molecular weight (~2 000) of the polymer even before curing. Leaching from landfill sites is not expected as the notified polymer is a polymer with low water solubility. Upon drying, the polymer will become a rubber-like solid.

9. EVALUATION OF TOXICOLOGICAL DATA

According to the Act, toxicological data are not required for polymers with NAMW > 1 000 and no data were submitted.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

According to the Act, environmental effects testing is not required for polymers with NAMW > 1 000 and no data were submitted by the notifier.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Use of TremShield 660 and Tremflex 25 is not expected to cause any significant release of the notified polymer to the environment, due to the nature of the product and method of application. On exposure to ambient conditions, TremShield 660 and Tremflex 25 are expected to cure to inert solids, which will prevent any release of the

notified polymer to the environment.

In landfill the notified polymer is not expected to leach and should stay in the landfill. The environmental hazard from the disposal of vehicles and construction material which contain the cured notified polymer by landfill is rated as negligible.

The overall environmental hazard can be rated as negligible.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

As the notified polymer has a NAMW of $> 1\,000$, it is not expected to cross biological membranes to cause systemic effects. The level of low molecular weight species (NAMW $< 1\,000$, less than 5%) is not expected to cause adverse health effects. 1,1'-methylenebis [4-isocyanatobenzene] is present as a residual monomer at a concentration of $< 0.6\%$.

Based on the information provided, the notified polymer is not expected to cause adverse health effects. The phthalate ester content, however, may cause irritation of the eyes and mild skin irritation if exposure occurs. If heated, the mist of phthalate esters can also cause respiratory irritation. Phthalate esters have also been shown to cause cancer and reproductive effects in animals at high doses (2). While the concentration of residual 1,1'-methylenebis [4-isocyanatobenzene] is below that listed by Worksafe criteria (1, 3), respiratory sensitisation may occur if susceptible individuals are exposed to this substance.

The occupational health risk posed to waterside, warehouse and transport workers will be negligible, as the notified chemical is not expected to cause adverse health effects, and exposure will only occur in the event of an accident or leaking packaging.

Likewise, a negligible occupational health risk will be posed to distributors for the automotive and construction industries, due to the expected lack of exposure under normal circumstances and the low health hazard of the polymer.

The notified polymer is expected to pose a low occupational health risk to workers in the construction and automotive industries, who will be using Tremflex 25 and TremShield 660 respectively. Dermal exposure to the notified polymer may occur during application of the end use products and removal of excess product. The notified polymer is not expected to cause adverse health effects, however, other components of the end use product may cause dermal irritation if exposure occurs. Use of the product at room temperature is not expected to cause inhalational exposure to the notified polymer, due to the expected negligible vapour pressure, however solvent components of the products may be harmful if inhaled. Susceptible individuals may experience respiratory sensitisation if exposure to 1,1'-methylenebis [4-isocyanatobenzene] occurs. Eye contact with the end use products is expected to be limited to accidents. The notified polymer is not expected to be an eye irritant, although other components of the end use product may cause eye irritation.

Minimal public exposure to the notified chemical may result following accidental damage to motor vehicles or buildings in which the sealant has been used. However, the polymer, which has a NAMW of more than 2 000, will be immobilised in the sealant/adhesive and as such will pose a negligible public risk. The potential for minor public exposure exists during transport and disposal of the polymer if accidentally spilt. This is minimised by the recommended practices during storage and transportation.

Based on the above information, it is unlikely that the notified polymer in TremShield 660 and Tremflex 25 will pose a significant risk to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in TremShield 660 and Tremflex 25 the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees.

Workers should be aware that TremShield 660 and Tremflex 25 contain substances which are potentially irritating to the skin, eyes and respiratory tract. Respiratory sensitisation may also occur in susceptible individuals. To avoid exposure to these components of the end use products:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (4) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (5);
- Industrial clothing should conform to the specifications detailed in AS 2919 (6);
- Impermeable gloves or mittens should conform to AS 2161 (7);

- A mask which conforms with AS/NZS 1715-1994: *Use and Maintenance of Respiratory Protective Devices* (8) and AS/NZS 1716-1991: *Respiratory Protective Devices* (9) should be selected and fitted if ventilation is inadequate;
- The Worksafe Australia document *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards* (10) should be used as a guide in the control of workplace exposure to potentially hazardous components of the end use products.

14. MATERIAL SAFETY DATA SHEET

These MSDS for products containing the notified chemical were provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (11).

These MSDS were provided by the applicant as part of the notification statement. They are reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

1. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.
2. Canadian Centre for Occupational Health and Safety, 1988, *Phthalates (Phthalate Esters) - Chemical Hazard Summary No. 43*, Canadian Centre for Occupational Health and Safety, Ontario.
3. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(1994)], Australian Government Publishing Service, Canberra.
4. Standards Australia 1994, *Australian Standard 1336-1994, Eye protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney.
5. Standards Australia/Standards New Zealand 1992, *Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.

6. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia Publ., Sydney.
7. Standards Australia 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding electrical and medical gloves)*, Standards Association of Australia Publ., Sydney.
8. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 1715-1994, Selection, Use and Maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.
9. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.
10. National Occupational Health and Safety Commission 1995, 'Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment', [NOHSC: 1003(1995)], in *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards*, Australian Government Publishing Service Publ., Canberra.
11. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets* [NOHSC:2011(1994)], Australian Government Publishing Service, Canberra