

# POWERS GLUG PLUG COMPONENT B

Chemwatch Independent Material Safety Data Sheet

Issue Date: 12-Nov-2009

NC317ECP

CHEMWATCH 22-5184

Version No:2.0

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## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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### PRODUCT NAME

POWERS GLUG PLUG COMPONENT B

### PRODUCT USE

■ Refer also to protective measures for the other component used with the product. Read both MSDS before using; store and attach MSDS together.

Component B of a compound mortar. Supplied as two part components packaged in a single tube.

### SUPPLIER

Company: Powers Fasteners Australasia Pty Ltd

Address:

Factory 3, 205 Abbots Road

Dandenong South

VIC, 3175

AUS

Telephone: +61 3 8795 4600

Fax: +61 3 8787 5899

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## Section 2 - HAZARDS IDENTIFICATION

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### STATEMENT OF HAZARDOUS NATURE

**HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.**

### POISONS SCHEDULE

S6

#### RISK

- Harmful by inhalation.
- Irritating to eyes respiratory system and skin.
- May cause SENSITISATION by inhalation and skin contact.

#### SAFETY

- Avoid contact with eyes.
- Wear suitable protective clothing.
- Use only in well ventilated areas.
- Keep container in a well ventilated place.
- To clean the floor and all objects contaminated by this material use water and detergent.
- Keep away from food drink and animal feeding stuffs.
- In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

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## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

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NAME	CAS RN	%
polymeric diphenylmethane diisocyanate	9016-87-9	25-<50
4, 4' - diphenylmethane diisocyanate (MDI)	101-68-8	10-<30
methylenediphenyl diisocyanate		1-<5

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## Section 4 - FIRST AID MEASURES

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### SWALLOWED

- For advice, contact a Poisons Information Centre or a doctor.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

### EYE

- If this product comes in contact with the eyes:
  - Wash out immediately with fresh running water.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - If pain persists or recurs seek medical attention.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

### SKIN

- If skin contact occurs:
  - Immediately remove all contaminated clothing, including footwear.
  - Flush skin and hair with running water (and soap if available).
  - Seek medical attention in event of irritation.

### INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

### NOTES TO PHYSICIAN

- 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 edema 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].

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## Section 5 - FIRE FIGHTING MEASURES

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### 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.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

### FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

### 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.
- Combustion yields traces of highly toxic hydrogen cyanide HCN, plus toxic nitrogen oxides NOx and carbon monoxide.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), isocyanates, and minor amounts of, hydrogen cyanide, nitrogen oxides (NO<sub>x</sub>), other pyrolysis products typical of burning organic material. May emit poisonous fumes.

### FIRE INCOMPATIBILITY

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

**HAZCHEM: None**

### Personal Protective Equipment

Gas tight chemical resistant suit.

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## Section 6 - ACCIDENTAL RELEASE MEASURES

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### MINOR SPILLS

- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Wear impervious gloves and safety goggles.
- Trowel up/scrape up.
- Place spilled material in clean, dry, sealed container.
- Flush spill area with water.

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Section 6 - ACCIDENTAL RELEASE MEASURES

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## MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Neutralise/decontaminate residue.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.
- Treat isocyanate spills with sufficient amounts of isocyanate decontaminant preparation.
- 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.

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

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## Section 7 - HANDLING AND STORAGE

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### PROCEDURE FOR HANDLING

- 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.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Refer also to protective measures for the other component used with the product. Read both MSDS before using; store and attach MSDS together.

### SUITABLE CONTAINER

- Metal can or drum
- Packaging as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

### STORAGE INCOMPATIBILITY

- Avoid cross contamination between the two liquid parts of product (kit).
- If two part products are mixed or allowed to mix in proportions other than manufacturer's recommendation, polymerisation with gelation and evolution of heat (exotherm) may occur.
- This excess heat may generate toxic vapour.
- Avoid reaction with water, alcohols and detergent solutions.
- 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,

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Section 7 - HANDLING AND STORAGE

mercaptans, strong oxidisers, hydrides, phenols, and peroxides can cause vigorous releases of heat. Acids and bases initiate polymerisation reactions in these materials.

- 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 in confined 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.
- 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.

## STORAGE REQUIREMENTS

- Rotate all stock to prevent ageing. Use on FIFO (First In-First Out) basis.
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

Source	Material	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	Notes
Australia Exposure Standards	polymeric diphenylmethane diisocyanate (Isocyanates, all (as- NCO))	0.02	0.07	Sen
Australia Exposure Standards	4, 4' - diphenylmethane diisocyanate (MDI) (Isocyanates, all (as- NCO))	0.02	0.07	Sen

### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m <sup>3</sup> )	Revised IDLH Value (ppm)
4, 4' - diphenylmethane diisocyanate (MDI)	75	

### MATERIAL DATA

POWERS GLUG PLUG COMPONENT B:

Not available

POLYMERIC DIPHENYLMETHANE DIISOCYANATE:

- Some jurisdictions require that health surveillance be conducted on occupationally exposed workers. This

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## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

should emphasise:

- demography, occupational and medical history and health advice
- completion of a standardised respiratory questionnaire
- physical examination of the respiratory system and skin
- standardised respiratory function tests such as FEV1, FVC and FEV1/FVC.

4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI):

- for diphenylmethane diisocyanate (methylene bisphenyl isocyanate; MDI)

Odour Threshold Value: 0.39 ppm

IDLH Level: 10 mg/m<sup>3</sup>

Mean MDI exposures of less than 0.003 ppm appear to have no acute or chronic effect on pulmonary function.

MDI produces identical toxicological responses to those produced by TDI and the recommended TLV-TWA is identical for the two isocyanates. Exposure at or below the recommended value is thought to protect the worker against pulmonary function decrements as well as to minimise the potential for respiratory tract sensitisation. Individuals who may be hypersusceptible or otherwise unusually responsive to exposure to certain industrial chemicals may not adequately protected from adverse health effects caused by MDI at the recommended TLV-TWA. Ceiling values recommended by NIOSH and OSHA are synonymous with normal excursions allowable for exposures to the TLV-TWA (in excess of 3 x TLV-TWA for no more than a total of 30 minutes during a work day but in any case not exceeding 5 x TLV-TWA).

## PERSONAL PROTECTION

### EYE

- 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 lens 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].

### HANDS/FEET

#### ■ 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.
- 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.

### OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

### RESPIRATOR

■ 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.

Breathing Zone Level

Maximum Protection

Half- face Respirator

Full- Face Respirator

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## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

ppm (volume)	Factor		
1000	10	A- AUS P	-
1000	50	-	A- AUS P
5000	50	Airline *	-
5000	100	-	A- 2 P
10000	100	-	A- 3 P
	100+		Airline**

\* - Continuous Flow

\*\* - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

### ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### APPEARANCE

Beige, brown paste with a characteristic odour; reacts with water.

### PHYSICAL PROPERTIES

Molecular Weight: Not Available	Boiling Range (°C): Not Applicable	Melting Range (°C): Not Available
Specific Gravity (water=1): Not Available	Solubility in water (g/L): Reacts	pH (as supplied): Not Available
pH (1% solution): Not Available	Vapour Pressure (kPa): Not Available	Volatile Component (%vol): Not Available
Evaporation Rate: Not Available	Relative Vapour Density (air=1): Not Available	Flash Point (°C): Not Available
Lower Explosive Limit (%): Not Applicable	Upper Explosive Limit (%): Not Applicable	Autoignition Temp (°C): Not Available
Decomposition Temp (°C): Not Available	State: Non Slump Paste	Viscosity: Not Available

## Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

### CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of elevated temperatures.
- Presence of incompatible materials.

Product is considered stable and hazardous polymerisation will not occur.

*For incompatible materials - refer to Section 7 - Handling and Storage.*

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## Section 11 - TOXICOLOGICAL INFORMATION

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### POTENTIAL HEALTH EFFECTS

#### ACUTE HEALTH EFFECTS

##### SWALLOWED

■ The material is not thought to produce adverse health effects following ingestion (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum. Considered an unlikely route of entry in commercial/industrial environments.

##### EYE

■ 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.

##### SKIN

■ This material can cause inflammation of the skin on contact in some persons. The material may accentuate any pre-existing dermatitis condition. Open cuts, abraded or irritated skin should not be exposed to this material. Toxic effects may result from skin absorption.

##### INHALED

■ 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 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. Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful. Inhalation hazard is increased at higher temperatures.

#### CHRONIC HEALTH EFFECTS

■ 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.

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. [CCTRADE-Bayer, APMF].

Respiratory sensitisation may result in allergic/asthma like responses; from coughing and minor breathing difficulties to bronchitis with wheezing, gasping.

Sensitisation may result in allergic dermatitis responses including rash, itching, hives or swelling of extremities.

Sensitisation may give severe responses to very low levels of exposure, i.e. hypersensitivity. Sensitised persons should not be allowed to work in situations where exposure may occur.

#### TOXICITY AND IRRITATION

■ Not available. Refer to individual constituents.

#### POLYMERIC DIPHENYLMETHANE DIISOCYANATE:

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

product

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## Section 11 - TOXICOLOGICAL INFORMATION

Oral (rat) LD50: 43000 mg/kg

Eye (rabbit): 100 mg - mild

Dermal (rabbit) LD50: >9400 mg/kg

Inhalation (rat) LC50: 490 mg/m<sup>3</sup>/4h

■ 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.

4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI):

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

### TOXICITY

Oral (rat) LDLo: 9200 mg/kg

Inhalation (rat) LC50: 178 mg/m<sup>3</sup>/4h Dermal

Sensitiser \*

Oral (mouse) LD50: 2200 mg/kg Respiratory

Sensitiser (g.pig) \*

Dermal (rabbit) LD50: >6200 mg/kg \* [\* = Bayer

CCINFO 2133615]

Oral (Rat) LD50: 9200 mg/kg

■ for diisocyanates:

In general, there appears to be little or no difference between aromatic and aliphatic diisocyanates as toxicants. In addition, there are insufficient data available to make any major distinctions between polymeric (<1000 MW) and monomeric diisocyanates. Based on repeated dose studies in animals by the inhalation route, both aromatic and aliphatic diisocyanates appear to be of high concern for pulmonary toxicity at low exposure levels. Based upon a very limited data set, it appears that diisocyanate prepolymers exhibit the same respiratory tract effects as the monomers in repeated dose studies. There is also evidence that both aromatic and aliphatic diisocyanates are acutely toxic via the inhalation route. Most members of the diisocyanate category have not been tested for carcinogenic potential. Though the aromatic diisocyanates tested positive and the one aliphatic diisocyanate tested negative in one species, it is premature to make any generalizations about the carcinogenic potential of aromatic versus aliphatic diisocyanates. In the absence of more human data, it would be prudent at this time to assume that both aromatic and aliphatic diisocyanates are respiratory sensitizers. Diisocyanates are moderate to strong dermal sensitizers in animal studies. Skin irritation studies performed on rabbits and guinea pigs indicate no difference in the effects of aromatic versus aliphatic diisocyanates.

For monomers, effects on the respiratory tract (lungs and nasal cavities) were observed in animal studies at exposure concentrations of less than 0.005 mg/L. The experimental animal data available on prepolymeric diisocyanates show similar adverse effects at levels that range from 0.002 mg/L to 0.026 mg/L.

There is also evidence that both aromatic and aliphatic diisocyanates are acutely toxic via the inhalation route

Oncogenicity: Most members of the diisocyanate category have not been tested for carcinogenic potential. Commercially available Poly-MDI was tested in a 2-year inhalation study in rats. The tested material contained 47% aromatic 4,4'-methylenediphenyl diisocyanate (MDI) and 53% higher molecular weight oligomers. Interim sacrifices at one year showed that males and females in the highest dose group (6 mg/m<sup>3</sup>) had treatment related histological changes in the nasal cavity, lungs and mediastinal lymph nodes. The incidence and severity of degeneration and basal cell hyperplasia of the olfactory epithelium and Bowman's gland hyperplasia were increased in males at the mid and high doses and in females at the high dose following the two year exposure period. Pulmonary adenomas were found in 6 males and 2 females, and pulmonary adenocarcinoma in one male in the high dose group. However, aliphatic hexamethylene diisocyanate (HDI) was found not to be carcinogenic in a two year repeated dose study in rats by the inhalation route. HDI has not been tested in mice by the inhalation route.

Though the oral route is not an expected route of exposure to humans, it should be noted that in two year repeated dose studies by the oral route, aromatic toluene diisocyanate (TDI) and 3,3'-dimethoxy-benzidine-4,4'-diisocyanate (dianisidine diisocyanate, DADI) were found to be carcinogenic in rodents. TDI induced a statistically significant increase in the incidence of liver tumors in rats and mice as well as dose-related hemangiosarcomas of the circulatory system and has been classified by the Agency as a B2 carcinogen. DADI was found to be carcinogenic in rats, but not in mice, with a statistically increase in the incidence of pancreatic tumors observed.

Respiratory and Dermal Sensitization: Based on the available toxicity data in animals and epidemiologic studies of humans, aromatic diisocyanates such as TDI and MDI are strong respiratory sensitizers. Aliphatic

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Section 11 - TOXICOLOGICAL INFORMATION

diisocyanates are generally not active in animal models for respiratory sensitization. However, HDI and possibly isophorone diisocyanate (IPDI), are reported to be associated with respiratory sensitization in humans. Symptoms resulting from occupational exposure to HDI include shortness of breath, increased bronchoconstriction reaction to histamine challenges, asthmatic reactions, wheezing and coughing. Two case reports of human exposure to IPDI by inhalation suggest IPDI is a respiratory sensitizer in humans. In view of the information from case reports in humans, it would be prudent at this time to assume that both aromatic and aliphatic diisocyanates are respiratory sensitizers. Studies in both human and mice using TDI, HDI, MDI and dicyclohexylmethane-4,4'-diisocyanate (HMDI) suggest cross-reactivity with the other diisocyanates, irrespective of whether the challenge compound was an aliphatic or aromatic diisocyanate. Diisocyanates are moderate to strong dermal sensitizers in animal studies. There seems to be little or no difference in the level of reactivity between aromatic and aliphatic diisocyanates.

**Dermal Irritation:** Skin irritation studies performed on rabbits and guinea pigs indicate no difference in the effects of aromatic versus aliphatic diisocyanates. The level of irritation ranged from slightly to severely irritating to the skin. One chemical, hydrogenated MDI (1,1-methylenebis-4-isocyanatocyclohexane), was found to be corrosive to the skin in guinea pigs.

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 sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing 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.

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. 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. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, 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.

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. Digestive effects include nausea and vomiting. Breathing difficulties may occur unpredictably after a period of tolerance and after skin contact. Allergic inflammation of the skin can occur, with rash, itching, blistering, and swelling of the hands and feet. Sensitive people can react to very low levels and should not be exposed to this material.

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.

Inhalation (human) TClO: 0.13 ppm/30 mins Eye (rabbit): 0.10 mg moderate

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Section 11 - TOXICOLOGICAL INFORMATION

## CARCINOGEN

Polymethylene polyphenyl isocyanate	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3
4, 4' - Methylenediphenyl diisocyanate	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

POWERS GLUG PLUG COMPONENT B:

4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI):

- DO NOT discharge into sewer or waterways.

POWERS GLUG PLUG COMPONENT B:

POLYMERIC DIPHENYLMETHANE DIISOCYANATE:

Aquatic toxicity:

Fish (Brachydanio rerio) 96h LC0: >1000 mg/l \*

(Daphnia) 24h EC50: >1000 mg/l \*

Bacterial toxicity (activated sludge microorganism) 3h EC50: >100 mg/l \*

\* [Bayer]

4,4'-DIPHENYLMETHANE DIISOCYANATE (MDI):

■ Half- life Soil - High (hours):	24
■ Half- life Soil - Low (hours):	6
■ Half- life Air - High (hours):	5.8
■ Half- life Air - Low (hours):	0.58
■ Half- life Surface water - High (hours):	24
■ Half- life Surface water - Low (hours):	6
■ Half- life Ground water - High (hours):	24
■ Half- life Ground water - Low (hours):	6
■ Aqueous biodegradation - Aerobic - High (hours):	672
■ Aqueous biodegradation - Aerobic - Low (hours):	168
■ Aqueous biodegradation - Anaerobic - High (hours):	2688
■ Aqueous biodegradation - Anaerobic - Low (hours):	672
■ Photooxidation half- life air - High (hours):	5.8
■ Photooxidation half- life air - Low (hours):	0.58
■ First order hydrolysis half- life (hours):	12

■ Hydrolysis would represent the primary fate mechanism for the majority of the commercial isocyanate monomers, but, is tempered somewhat by the lack of water solubility. In the absence of hydrolysis, sorption to solids (e.g., sludge and sediments) will be the primary mechanism of removal. Biodegradation is minimal for most compounds and volatilisation is negligible. Atmospheric degradation is not expected with removal from air occurring by washout or dry deposition. Volatilisation from surface waters (e.g., lakes and rivers) is expected to take years. In wastewater treatment this process is not expected to be significant.

Review of the estimated properties of the isocyanates suggest that sorption is the primary removal mechanism in the ambient environment and in wastewater treatment in the absence of significant hydrolysis. Sorption to solids in wastewater treatment is considered strong to very strong for most compounds. Sorption to sediments and soils in the ambient environment is very strong in most instances. Migration to groundwater and surface waters is not expected due to sorption or hydrolysis.

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Section 12 - ECOLOGICAL INFORMATION

Hydrolysis of the N=C=O will occur in less than hours in most instances and within minutes for more than 90% of the commercial isocyanates. However, the low to very 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.

Aerobic and/or anaerobic biodegradation of the isocyanates is not expected to occur at significant levels.

Most of the substances take several months to degrade.

Degradation of the hydrolysis products will occur at varying rates depending on the moiety formed.

Toxicity Fish: LC50(96)95.24-134.37mg/L

## Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
Powers Glug Plug Component B		No data		
polymeric diphenylmethane diisocyanate		No data		
4, 4' - diphenylmethane diisocyanate (MDI)	LOW	LOW	LOW	LOW

## Section 13 - DISPOSAL CONSIDERATIONS

- DO NOT recycle spilled material.
- Consult State Land Waste Management Authority for disposal.
- Neutralise spill material carefully and decontaminate empty containers and spill residues with 10% ammonia solution plus detergent or a proprietary decontaminant prior to disposal.
- DO NOT seal or stopper drums being decontaminated as CO<sub>2</sub> gas is generated and may pressurise containers.
- Puncture containers to prevent re-use.
- Bury or incinerate residues at an approved site.

## Section 14 - TRANSPORTATION INFORMATION

HAZCHEM: None (ADG7)

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: ADG7, UN, IATA, IMDG

## Section 15 - REGULATORY INFORMATION

**POISONS SCHEDULE: S6**

### REGULATIONS

Regulations for ingredients

**polymeric diphenylmethane diisocyanate (CAS: 9016-87-9) is found on the following regulatory lists;**

"Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "OECD Representative List of High Production Volume (HPV) Chemicals"

**4,4'-diphenylmethane diisocyanate (MDI) (CAS: 101-68-8,26447-40-5) is found on the following regulatory lists;**

"Australia - Queensland Hazardous Materials and Prescribed Quantities for Major Hazard Facilities", "Australia Hazardous Substances", "Australia High Volume

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Section 15 - REGULATORY INFORMATION

Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "Australia National Pollutant Inventory", "GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Air Transport Association (IATA) Dangerous Goods Regulations", "OECD Representative List of High Production Volume (HPV) Chemicals"

**No data for Powers Glug Plug Component B (CW: 22-5184)**

## Section 16 - OTHER INFORMATION

### Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
4, 4' - diphenylmethane diisocyanate (MDI)	26447- 40- 5	R43

### INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
4, 4' - diphenylmethane diisocyanate (MDI)	101- 68- 8, 26447- 40- 5

■ 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.

A list of reference resources used to assist the committee may be found at:

[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)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.

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*This is the end of the MSDS.*