# Material Safety Data Sheet

## DUNAPACK™ AS 600 ISOCYANATE

## 1. PRODUCT AND COMPANY IDENTIFICATION

| | |
|---|---|
| Product name: | DUNAPACK™ AS 600 ISOCYANATE |
| Product type and use: | Component of a Polyurethane System |
| Company: | DUNA-USA Inc.<br>4210 FM 1405<br>Baytown, TX, USA<br>1-281-383-3862 |
| In case of emergency call: | CHEMTREC 1-800-424-9300 (24 HOURS DAY, 7 DAYS A WEEK) |

## 2. HAZARDS IDENTIFICATION

| | |
|---|---|
| Physical state: | liquid. |
| Odor: | slightly musty |
| OSHA/HCS status: | This material is classified as hazardous under OSHA Hazard Communication Standard (29 CFR 1910.1200). |
| Emergency overview: | WARNING! Harmful by inhalation.Irritating to eyes and respiratory system.May cause sensitization by inhalation and skin contact. This product is a respiratory irritant and potential respiratory sensitiser: repeated inhalation of vapour or aerosol at levels above the occupational exposure limit could cause respiratory sensitisation. A hyper-reactive response to even minimal concentrations of diisocyanates may develop in sensitised persons. The onset of the respiratory symptoms may be delayed for several hours after exposure. Reacts slowly with water to produce carbon dioxide which may rupture closed containers. This reaction accelerates at higher temperatures. |
| General information: | Read the entire MSDS for a more thorough evaluation of the hazards. |

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

| Name | CAS number | % |
|---|---|---|
| Diphenylmethanediisocyanate, isomers and homologues | 9016-87-9 | 60 – 100 |
| 4,4'-Diphenylmethane Diisocyanate | 101-68-8 | 30 - 60 |

## 4. FIRST AID MEASURES

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| Eye contact: | In case of contat, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately. |
| Skin contact: | Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse. |

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| Inhalation: | If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention immediately. Treatment is symptomatic for primary irritation or bronchospasm. If breathing is laboured, oxygen should be administered by qualified personnel. |
| Ingestion: | Wash out mouth with water. Move exposed person to fresh air. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur. Never give anything by mouth to an unconscious person. |
| Notes to physician: | Symptomatic and supportive therapy as needed. Following severe exposure medical follow-up should be monitored for at least 48 hours. |

## 5. FIRE-FIGHTING MEASURES

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| Flash piont: | Open cup: 230°C (446°F). |
| Product of combustion: | Combustion products may include: carbon oxides (CO, $CO_2$) nitrogen oxides (NO, $NO_2$ etc.) hydrocarbons and HCN. |

Extinguish media:

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| Suitable: | Use an extinguishing agent suitable for the surrounding fire. |
| Not suitable: | None known. |
| Special exposure hazards: | In a fire or if heated, a pressure increase will occur and the container may burst. No specific hazard. |

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. PVC boots gloves, safety helmet and protective clothing should be worn. PVC boots, gloves, safety helmet and protective clothing should be worn.

Special remarks on explosion hazards: Due to reaction with water producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Containers may burst if overheated.

## 6. ACCIDENTAL RELEASE MEASURES

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| Personal precautions: | Immediately contact emergency personnel. Evacuate the area. Keep upwind to avoid inhalation of vapours. Clean-up should only be performed by trained personnel. People dealing with major spillages should wear full protective clothing including respiratory protection. Use suitable protective equipment (section 8). |
| Environmental precautions: | Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. |
| Methods for cleaning up: | Contain and absorb large spillages onto an inert, non-flammable adsorbent 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. Test atmosphere for MDI. Neutralize small spillages with decontaminant. Remove and properly dispose of residues. (See Section 13 for disposal considerations.) Notify applicable government authorities if release is reportable. The CERCLA RQ for 4,4-MDI is 5,000 lbs (seeCERCLA in Section 15). |

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## 7. HANDLING AND STORAGE

Storage: Keep container in a cool, well-ventilated area. Keep container tightly closed. Keep 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 resealed only after placing under a nitrogen blanket. Do not store in containers made of copper, copper alloys or galvanized surfaces.

Handling: Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits of Diphenylmethane 4,4'- diisocyanate: *ACGIH TLV (United States, 1/2007).* TWA: 0.05 ppm 8 hour(s). TWA: 0,01 ppm 8 hour(s).

*NIOSH REL (United States, 12/2001).* CEIL: 0.2 mg/m³ 10 minute(s). CEIL: 0.02 ppm 10 minute(s). TWA: 0.05 mg/m³ 10 hour(s). TWA: 0.005 ppm 10 hour(s).

*OSHA PEL (United States, 11/2006).* CEIL: 0,2 mg/$m^3$ 0 hour(s) CEIL: 0.02 ppm 0 hour(s).

*OSHA PEL 1989* (United States, 3/1989). CEIL: 0.2 mg/m³. 0 hour(s) CEIL: 0.02 ppm 0 hour(s).

*Consult local authorities for acceptable exposure limits*

Preventive Measures: Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace. Medical supervision of all employees who handle or come in contact with respiratory sensitizers is recommended. Persons with respiratory problems including asthmatic-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin eczema or skin allergies should be evaluated for their suitability of working with this product. Once a person is diagnosed as sensitized, no further exposure to the material that caused the sensitization should be permitted.

Engineering controls: Use local exhaust ventilation to maintain airborne concentrations below the TLV. Suitable respiratory equipment should be used in cases of insufficient ventilation or where operational procedures demand it. For guidance on engineering control measures refer to publications such as the ACGIH current edition of 'Industrial Ventilation, a manual of Recommended Practice.'

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**Personal protection:**

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| Eyes: | Chemical safety goggles. If there is a potential for splashing, use a full face shield. |
| Skin: | The following protective materials are recommended: Gloves - neoprene, nitrile rubber, butyl rubber. Thin latex disposable gloves should be avoided for repeated or long term use. Protective clothing should be selected and used in accordance with 'Guidelines for the Selection of Chemical Protective Clothing' published by ACGIH. |
| Respiratory : | When the product is sprayed or heated without adequate ventilation, an approved MSHA/NIOSH positive-pressure, supplied-air respirator may be required. Air purifying respirators equipped with organic vapor cartridges and a HEPA (P100) particulate filter may be used under certain conditions when a cartridge change-out schedule has been developed in accordance with the OSHA respiratory protection standard (29 C.F.R. 1910.134). |
| Hands : | Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. |
| Other protection : | Consult your supervisor or S.O.P. for special handling instructions. |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

General information

Appearance

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|---|---|
| Physical state: | Liquid |
| Color: | Brown. |
| Odor: | slightly musty. |
| Odor threshold: | Not available. |

Importanth health, safety and environmental information.

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| Boiling point: | >300°C decomposes |
| Melting point: | Not available. |
| Flash point: | Open cip: 230°C (446°F) |
| Oxidizing properties: | Not available. |

Saturated vapor concentration: >32 µg/$m^3$ at 20°C

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| Vapor pressure: | Not available. |
| Relative density: | 1.23 |
| Vapor density: | 8.5 |
| Auto-ignition temperature: | >600°C |
| VOC content: | Not available |

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### 10. STABILITY AND REACTIVITY

Stability and reactivity: Stable at room temperature. Reaction with water (moisture) produces C02-gas. Exothermic reaction with materials containing active hydrogen groups. The reaction becomes progressively more vigorous and can be violent at higher temperatures if the miscibility of the reaction partners is good or is supported by stirring or by the presence solvents. MDI is insoluble with, and heavier than water and sinks to the bottom but reac slowly at the interface. A solid water-insoluble layer of polyurea is formed at the interfac by liberating carbon dioxide gas.

Conditions of instability: Avoid high temperatures.

Incompatibility with various substances: water, alcohols, amines, bases, and acids.

Hazardous polymerization: Polymerization may occur at elevated temperatures in the presence of alkalies, tertiary amines and metal compounds.

Hazardous decomposition products: Combustion products may include: carbon oxides (CO, $CO_2$) nitrogen oxides (NO, $NO_2$ etc.) hydrocarbons and HCN.

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### 11. TOXICOLOGICAL INFORMATION

Toxicity data

Acute toxicity

| *Product/ingredient name* | *test* | *Species* | *Result* | *Exposure* |
|---|---|---|---|---|
| Methylenediphenyldiisocyanate, isomers and homologues | LD50 Dermal | Rabbit | >5000 mg/kg | - |
| | LD50 Oral | Rat | >5000 mg/kg | - |
| | LC50 Inhalation, dusts and mists | Rat | 0.49 mg/L | 4 hours |
| Diphenylmethane 4,4'- diisocyanate | LD50 Dermal | Rabbit | >5000 mg/kg | - |
| | LD50 Oral | Rat | >5000 mg/kg | - |
| | LC50 Inhalation, dusts and mists | Rat | 0.49 mg/L | 4 hours |

Classification

Methylenediphenyldiisocyanate, isomers and homologues IARC: 3

Diphenylmethane 4,4'- diisocyanate IARC: 3

Potential acute health effects

Ingestion: Low oral toxicity. Ingestion may cause irritation of the gastrointestinal tract.

Inhalation: Toxic by inhalation. May cause sensitization by inhalation.

Eyes: Irritating to eyes.

Skin: Irritating to skin. May cause sensitisation by skin contact

Potential acute health effects

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| Target organs: | Contains material which causes damage to the following organs: lungs, upper respiratory tract, skin. |
| Carcinogenicity: | Rats have been exposed for two years to a respirable aerosol of polymeric MDI which resulted in chronic pulmonary irritation at high concentrations. Only at the top level (6 mg/m$^3$), there was a significant incidence of a benign tumour of the lung (adenoma) and one malignant tumour (adenocarcinoma). There were no lung tumours at 1 mg/m$^3$ and no effects at 0.2 mg/m$^3$. Overall, the tumour incidence, both benign and malignant, and the number of animals with the tumours were not different from controls. The increased incidence of lung tumours is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumour formation will occur. |
| Mutagenicity: | There is no substantial evidence of mutagenic potential. |
| Teratogenicity: | No birth defects were seen in two independant 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 not maternally toxic. The doses used in these studies were maximal, respirable concentrations, which are well in excess of defined occupational exposure limits. |
| Developmental effects: | No known significant effects or critical hazards. |
| Fertility effects: | No known significant effects or critical hazards. |

## 12. ECOLOGICAL INFORMATION

Aquatic ecotoxicity

Diphenylmethane 4,4'- diisocyanate : Acute EC50 >1000 mg/L for Daphnia (Expousure 48 hours) and for Fish (Exposure 96 hours).

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| Mobility: | By considering the production and use of the substance, it is unlikely that significant environmental exposure in the air or water will arise. Immiscible with water, but will react with water to produce inert and non-biodegradable solids. Conversion to soluble products, including MDA, is very low under the optimal laboratory conditions of good dispersion and low concentration. In air, the predominant degradation process is predicted to be a relatively rapid OH radical attack, by calculation and by analogy with related diisocyanates. |
| Environmental effects: | By comparison with an analogous product, the following values are anticipated. The measured ecotoxicity is that of the hydrolised product, generally under conditions maximising production of soluble species. Even so, the observed ecotoxicity is low/very low. A pond study showed gross contamination caused no significant toxic effects on a wide variety of flora in all trophic levels (including fish), no detectable MDA, and no evidence of bioaccumulation of MDI or MDA. |

## 13. DISPOSAL CONSIDERATIONS

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Waste disposal: The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by- products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

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## 14. TRANSPORT INFORMATION

DOT Classification: UN number: UN3082; Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Methylene Diphenyl Diisocyanate); Class: 9; Packing group: III; Additional information: Reportable quantity is 5000 lbs and single containers less than 5000 lbs are not regulated.

TDG Classification, IMDG Class, IATA-DGR Class: Not regulated.

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## 15. REGULATORY INFORMATION

United States

HCS Classification: Toxic material, Irritant, Sensitizer

U.S. Federal regulations: United States inventory (TSCA 8b): All components are listed or exempted. TSCA 12(b) one-time export: Chlorobenzene

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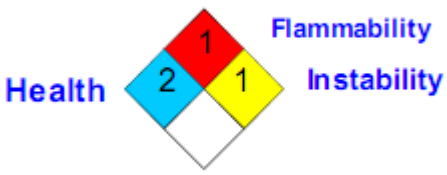
## 16. OTHER INFORMATION

Label requirements: Harmful by inhalation. Irritating to eyes and respiratory system.May cause sensitization by inhalation and skin contact. This product is a respiratory irritant and potential respiratory sensitiser: repeated inhalation of vapour or aerosol at levels above the occupational exposure limit could cause respiratory sensitisation. A hyper-reactive response to even minimal concentrations of diisocyanates may develop in sensitised persons. The onset of the respiratory symptoms may be delayed for several hours after exposure.

Hazardous Material Information System (U.S.A.):


National Fire Protection Association (U.S.A.):




Notice to reader

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While the information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.