



SAFETY DATA SHEET

1. Identification

Product identifier DUNAPOL™ A 310

Other means of identification

SDS number Version 2

Product code 40003

Recommended use Industrial use.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer/Supplier

Company name DUNA-USA Inc.
Address 4210 FM 1405 Baytown, TX, 77523 United States
Telephone number 281-383-3862
e-mail franco.sala@dunagroup.com
Contact person Franco Sala
Emergency telephone Number 800-424-9300

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards

Acute toxicity, inhalation	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2
Sensitization, respiratory	Category 1
Sensitization, skin	Category 1
Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
Specific target organ toxicity, repeated Exposure	Category 2 (respiratory system)

OSHA defined hazards Not classified.

Label elements



Signal word Danger

Hazard statement Harmful if inhaled. Causes skin irritation. May cause damage to organs through prolonged or repeated exposure by inhalation. Causes serious eye irritation. May cause respiratory irritation. Causes skin irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction.

Precautionary statement

Prevention

Do not breathe fume/mist/vapors/spray. Wash exposed skin thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing should not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation, wear respiratory protection.

Response	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a Poison Center/doctor if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. IF ON SKIN: wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	<p>Toxic fumes may be released in fire situations. Can decompose at high temperatures forming toxic gases. Closed containers may develop pressure and rupture on prolonged exposure to heat or if contaminated with water.</p> <p>USA: This material is considered a hazardous chemical by the OSHA Hazard Communication Standard (29 CFR 1910.1200) (2012).</p> <p>Canada: This is a controlled product under WHMIS.</p>

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Polymethylene polyphenylene isocyanate	9016-87-9	30-70
4,4' - Methylenediphenyl diisocyanate	101-68-8	30-70

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation	If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If exposed or concerned: Get medical advice/attention. If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Immediately obtain medical attention and transport victim to an emergency care facility.
Skin contact	As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Immediately wash with lukewarm, gently flowing water and non-abrasive soap for 15-20 minutes. Completely decontaminate clothing, shoes and leather goods before reuse or discard. If skin irritation or rash occurs: Get medical advice/attention.
Eye contact	Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 5 minutes, or until the chemical is removed, while holding the eyelid(s) open. If irritation persists, repeat flushing. Obtain medical attention immediately.
Ingestion	If swallowed, call a POISON CENTER or doctor/physician. Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Quickly transport victim to an emergency care facility.
Most important symptoms/effects, acute and delayed	Inhalation: Respiratory tract irritation and mucous membrane irritation. Symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, wheezing and laryngitis. Coughing with chest pain or tightness may also occur, frequently at night. These symptoms may occur during exposure or may be delayed

several hours. Exposure to isocyanates can cause difficulty breathing or asthmatic reaction. Eye Contact: Irritation of the eye tissue. Skin Contact: Tingling, irritation or redness of the skin. Ingestion: Irritation of the tissues of the mouth, throat and digestive tract. Other symptoms include headache, shortness of breath, nausea, vomiting, weakness, burning sensation in the mouth, abdominal pain and vomiting. Onset of symptoms may be delayed.

Indication of immediate medical attention and special treatment needed

Get immediate medical advice/attention allergy symptoms develop.

5. Fire-fighting measures

Suitable extinguishing media

Carbon dioxide, dry chemical powder, foam, water fog or fine spray. Alcohol resistant foams are preferred for large fires. Use water spray to cool fire-exposed containers.

Unsuitable extinguishing media

Exercise caution when using water; water contamination of product will generate CO₂ gas

Specific hazards arising from the chemical

During a fire products of combustion may include carbon monoxide, carbon dioxide, hydrogen cyanide, nitrogen oxides, dense smoke and irritating or toxic fumes. Reacts vigorously with water above 50°C. Closed containers may rupture violently when heated. Polymeric MDI decomposes rapidly above 204°C.

Special protective equipment and precautions for firefighters

Firefighters should wear full protective gear including self-contained breathing apparatus when fighting chemical fires. Fight fire from a protected location or a safe distance. When using water care must be taken since the reaction between water and hot Polymeric MDI can be vigorous.

General fire hazards

This material can burn if heated. Flashpoint = 230°C

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Wear adequate personal protective equipment as indicated in Section 8. Isolate spill area, preventing entry by unauthorized persons. Ventilate area of spill. Extinguish or remove all ignition sources. Spilled product presents a slipping hazard. Do not touch spilled material.

Methods and materials for containment and cleaning up

Immediately shut off the leak if it is safe to do so. Contain the spill with earth, sand, sawdust or suitable absorbent. If control of isocyanate vapor is required, cover the spilled material with protein foam. Shovel into open-top drums or plastic bags for further decontamination, if necessary. Do not seal drums or containers. Neutralize small spills with decontaminant solution (see below). Wash area with 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). Allow material to stand for 48 hours to let carbon dioxide gas escape.

Environmental precautions

Prevent the material from entering sewers, drainage systems, groundwater and surface water.

7. Handling and storage

Precautions for safe handling

Do not breathe fumes, vapors or spray mist from this material. Avoid contact with skin and eyes. Provide adequate ventilation in the workplace. If Polymeric MDI is released, leave the area until the severity of the release is determined. Immediately report leaks, spills or ventilation failures. Do not use with incompatible materials such as amines, alcohols, acids, bases, metal compounds, surfactants and water which may react vigorously and/or violently. Do not use near welding operations, flames or hot surfaces because of the risk of formation of toxic hydrogen cyanide and nitrogen oxides. Avoid generating mist. Prevent the release of aerosol into workplace air. Do not reseal containers if contamination of Polymeric MDI is suspected. Keep containers closed when not in use. Assume that empty containers contain residues which are hazardous.

Conditions for safe storage, including any incompatibilities

Store in a dry, well-ventilated area, out of direct sunlight and away from heat, sources of ignition and incompatible materials. Ideal storage temperature is 16 – 38°C (60 – 100°F). Keep contents away from moisture; Polymeric MDI reacts with water producing CO₂ gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Do not re-seal contaminated containers. Store product in its original container.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Methylene diphenyl diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m ³ 0.02 ppm
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)	Ceiling	0.2 mg/m ³ 0.02 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
Methylene diphenyl diisocyanate (CAS 101-68-8)	TWA	0.005 ppm
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)	TWA	0.005 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Methylene diphenyl diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m ³
		0.02 ppm
	TWA	0.05 mg/m ³ 0.005 ppm
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)	Ceiling	0.2 mg/m ³
		0.02 ppm
	TWA	0.05 mg/m ³ 0.005 ppm

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Local exhaust ventilation may be necessary when operations generate airborne concentrations of this material (e.g. molding and curing of polyurethane products, especially if heating or spraying is involved). If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire.

Individual protection measures, such as personal protective equipment.

Eye/face protection Wear safety goggles. Wear a face-shield when necessary to prevent contact with skin and eyes.

Skin protection Wear chemical protective gloves, coveralls, boots and/or other resistant protective clothing to prevent skin exposure. Protective gloves are those made from butyl rubber, nitrile rubber and polyvinyl alcohol. Evaluate resistance under conditions of use and maintain protective clothing carefully.

Respiratory protection

A respiratory protection program that meets the regulatory requirement, such as OSHA's 29 CFR 1910.134 and ANSI Z88.2 or Canadian Standards Association (CSA) Standard Z94.4-2002, must be followed whenever workplace conditions warrant a respirator's use.

NIOSH Recommendations for MDI concentrations in air:

Up to 0.5 mg/m³: (APF = 10) Any supplied-air respirator

Up to 1.25 mg/m³: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 2.5 mg/m³: (APF = 50) Any self-contained breathing apparatus with a full facepiece (APF = 50) Any supplied-air respirator with a full facepiece

Up to 75 mg/m³: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

General hygiene Considerations

Workers whose clothing has been contaminated by product should change into clean clothing promptly. Discard all contaminated leather clothing articles (e.g. belts, watchbands, shoes). Do not eat, smoke or drink in workplaces where this product is processed by machining operations. Wash hands carefully before eating, drinking, smoking or using the toilet.

9. Physical and chemical properties

Appearance

Physical state	Liquid.
Form	Liquid.
Color	Dark brown
Odor	Musty/Earthy
Odor threshold	Not available.
pH	Not applicable.
Melting point / freezing point	Not available
Initial boiling point and boiling range	>204°C
Flash point	230°C
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit lower (%)	Not available.
Flammability limit upper (%)	Not available.
Explosive limit lower (%)	Not available.
Explosive limit upper (%)	Not available.
Vapor pressure	<10 ⁻⁴ mmHg @ 40°C
Vapor density	Not available.
Relative density	1.25 (25 °C)
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temp.	Not available
Decomposition temp.	>300°C
Viscosity	200 ±50 cP (25 °C)

10. Stability and reactivity

Chemical stability	Stable under normal conditions. Isocyanates are very reactive compounds and are especially highly reactive toward a large number of compounds with active hydrogens, particularly at high temperatures and in the presence of catalysts. May attack and make brittle many plastic and rubber materials.
Possibility of hazardous reactions	Polymeric MDI may undergo uncontrolled exothermic polymerization upon contact with incompatible materials or if heated above 175-204°C. The resulting pressure build-up could rupture closed containers. May cause some corrosion to copper alloys and aluminum.
Conditions to avoid	Avoid conditions of heat, moisture and direct sunlight.

Incompatible materials Water - Reacts slowly, forming carbon dioxide and inert material comprised of polyureas which could rupture closed containers. 4,4'-methylene dianiline is formed as an intermediate product in this reaction. Above 50°C (122°F), the reaction becomes progressively more vigorous. Amines, Alcohols, Acids, Bases - May react violently with generation of heat. Metal compounds (e.g. organotin catalysts) - May polymerize with the generation of heat and pressure. Amides, phenols, mercaptans, urethanes, ureas and surface active compounds (surfactants, non-ionic detergents) May react vigorously or violently with the generation of heat.

Hazardous decomposition products By thermal decomposition and combustion, product may generate carbon monoxide, carbon dioxide, oxides of nitrogen, hydrogen cyanide, dense smoke and irritating or toxic fumes. 4,4'-Methylene dianiline can be formed by reaction of MDI with water.

11. Toxicological information

Information on likely routes of exposure

- Inhalation** Airborne exposures are unlikely to occur unless product is heated or forms an aerosol or mist during pouring, frothing or spraying operations. Polymeric MDI has an extremely low vapour pressure and it is difficult to achieve vapour concentrations necessary for inhalation toxicity testing. The desired vapour concentrations can only be obtained by heating the Polymeric MDI source. The vapour evolved readily condenses to an aerosol in the inhalation exposure chambers. Therefore, it is likely that an aerosol rather than a vapour was present. Symptoms of severe irritation and deaths occurred at 13.6 mg/m³. Less severe irritation and no deaths occurred at 4.9 mg/m³. There were no visible effects at 2.2 mg/m³. Some people may become sensitized to MDI, causing allergy or asthma symptoms or breathing difficulties if inhaled. High aerosol concentrations could cause inflammation of the lung tissue (chemical pneumonitis), chemical bronchitis with severe asthma-like wheezing, severe coughing spasms and accumulation of fluid in the lungs (pulmonary edema), which could prove fatal. Symptoms of pulmonary edema may not appear until several hours after exposure and are aggravated by physical exertion.
- Skin contact** Polymeric MDI can cause mild irritation. Isocyanates, in general, can cause skin discolouration (staining) and hardening of the skin after repeated exposures. Skin sensitization, resulting in dermatitis, may occur in some individuals. Cured material may be difficult to remove from the skin. Application of single doses of 2.5, 3.9, 6.0 and 9.4 mg/kg Polymeric MDI to abraded skin of rabbits, under a cover for 24 hours, caused only minor, local, reversible skin changes.
- Eye contact** Contact with liquid, mist and aerosols may cause irritation with redness, swelling, pain and watering of the eyes. Commercial Polymeric MDI caused eye irritation in rabbits, which cleared after 24 hours.
- Ingestion** Ingestion is not expected with normal, occupational use of this product. Animal studies indicate that ingested Polymeric MDI has low toxicity. Swallowing may result in irritation and corrosion of the mouth, throat and digestive tract.

Symptoms related to the physical, chemical and toxicological characteristics

Irritating to eyes, respiratory system and skin. Sensitization. Be aware that symptoms of lung edema (shortness of breath) may develop up to 24 hours after exposure.

Information on toxicological effects**Acute toxicity** Harmful if inhaled.

Components	Species	Test Results
Methylene diphenyl diisocyanate	(CAS 101-68-8)	
Acute		
<i>Inhalation</i>		
LC50	Rat	370 mg/m ³ , 4 Hours
<i>Dermal</i>		
LC50	Rabbit	>10000 mg/kg
<i>Oral</i>		
LC50	Mouse	2200 mg/kg
<hr/>		
Polymeric MDI	(CAS 9016-87-9)	
Acute		
<i>Inhalation</i>		
LC50	Rat	490 mg/m ³ , 4 Hours
<i>Dermal</i>		
LC50	Rabbit	>6200 mg/kg
<i>Oral</i>		
LC50	Mouse	>10000 mg/kg

Skin corrosion/irritation Causes skin irritation.**Serious eye damage/eye****Irritation** Causes serious eye irritation.**Respiratory or skin sensitization****Respiratory****sensitization** May cause allergy or asthma symptoms or breathing difficulties if inhaled.**Skin sensitization** May cause an allergic skin reaction.**Germ cell mutagenicity** No data available.**Carcinogenicity** Suspected of causing cancer.**IARC Monographs. Overall Evaluation of Carcinogenicity**

Methylene diphenyl diisocyanate (CAS 101-68-8) 3 Not classifiable as to carcinogenicity to humans.

Polymethylene polyphenyl isocyanate (CAS 9016-87-9) 3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity No data available.**Specific target organ toxicity - single exposure** May cause respiratory tract irritation.**Specific target organ toxicity - repeated exposure** May cause damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.**Aspiration hazard** No data available.**Chronic effects** Polymeric MDI is a severe respiratory irritant. Long-term, low-level exposure could cause severe, permanent respiratory impairment. Respiratory sensitization can develop in people working with Polymeric MDI or its main component Methylene diphenyl diisocyanate (MDI). Sensitized individuals react to very low levels of MDI (as low as 0.0014 ppm) that have no effect on unsensitized people. Symptoms may initially appear to be a cold or mild hay fever; severe asthmatic symptoms can develop and include wheezing, chest tightness, shortness of breath,

difficulty breathing and/or coughing. Fever, chills, general feelings of discomfort, headache and fatigue can also occur. Symptoms may occur immediately upon exposure or may be delayed. Sensitized people who continue to work with MDI may develop symptoms sooner after each exposure. The number and severity of symptoms may increase. MDI and other isocyanates may also cause hypersensitivity pneumonitis, another allergic lung disease, which is characterized by symptoms such as shortness of breath, fever, tiredness, non-productive cough, and chills.

Further information None known.

12. Ecological information

Ecotoxicity Polymeric MDI - LC50, Zebra fish >1 000 mg/L.
EC50 Daphnia magna (24 hour) >1 000 mg/L.
EC50 E. coli >100 mg/L.

Persistence and degradability Product is not readily biodegradable.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Dispose of in accordance with local regulations.

Local disposal regulations Dispose of in accordance with local regulations.

Hazardous waste code Not regulated.

Waste from residues / unused products Dispose of in accordance with local regulations. Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Contaminated packaging Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated except when shipped in bulk. Bulk containers (>5 000 lbs) must be transported as: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Methylene Diphenyl Diisocyanate), Class 9, UN3082, PG III, RQ.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Methylene diphenyl diisocyanate (CAS 101-68-8) LISTED

Polymethylene polyphenyl isocyanate (CAS 9016-87-9) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous

Chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Methylene diphenyl diisocyanate	101-68-8	30 – 70
Polymethylene polyphenyl isocyanate	9016-87-9	30 – 70

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Methylene diphenyl diisocyanate (CAS 101-68-8)
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act Not regulated.
(SDWA)

US state regulations

US. Massachusetts RTK - Substance List

Methylene diphenyl diisocyanate (CAS 101-68-8)
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)

US. New Jersey Worker and Community Right-to-Know Act

Methylene diphenyl diisocyanate (CAS 101-68-8)
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Methylene diphenyl diisocyanate (CAS 101-68-8)
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)

US. Rhode Island RTK

Methylene diphenyl diisocyanate (CAS 101-68-8)
Polymethylene polyphenyl isocyanate (CAS 9016-87-9)

US. California Proposition 65

Not Listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 14-June-2018

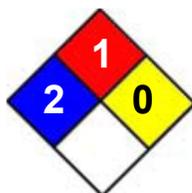
Revision date -

Version # 02

Further information HMIS® is a registered trade and service mark of the NPCA.
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

HMIS® ratings Health: 2*
Flammability: 1
Physical hazard: 0

NFPA ratings



List of abbreviations

LC50: Lethal Concentration, 50%.

Disclaimer This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.