



MATERIAL SAFETY DATA SHEET

DAEHEUNG CHEMICAL CO., LTD. www.dhcbond.com

PGM

Product Name

DM-60(A)

1. Product and Company Identification

- A. Product Name DM-60(A)
- B. Recommended use of the chemical and restrictions on use
- Recommended use of the chemical Bonding for the PVC sheet and film to wood and plastic, hard board, wood based materials, resin felt, etc.
 - Restrictions on use of the product Do not use for purposes other than adhesive.
- C. Manufacturer/Supplier/Distributor Information
- Name DAEHEUNG CHEMICAL CO., LTD.
 - Address 68, Sandan-ro 64beon-gil, Pyeongtaek-si, Gyeonggi-do, Korea
 - Emergency phone number 82-31-668-1424

2. Hazards identification

- A. Hazard-Risk Classification Not a dangerous substance according to GHS.
- B. Label elements including precautionary statements
- Symbol Not Applicable.
 - Signal Word Not Applicable.
 - Hazard-Risk Statement Not Applicable.
 - Precautionary Statement
 - Prevention Not Applicable.
 - Response Not Applicable.
 - Storage Not Applicable.
 - Disposal Not Applicable.

C. Other Hazard-Risk which are not included in the classification criteria (e.g. dust explosion hazard)

	Water	POLYURETHANE
Health	0	N/A
Fire	0	N/A
Reactivity	0	N/A

3. Composition/Information on ingredients

Chemical Name	Other name	CAS number	Content(%)
Water	DIHYDROGEN OXIDE	7732-18-5	50
POLYURETHANE	-	9009-54-5	50
ACETONE	2-propanone	67-64-1	0.1<

4. First aid measures

- A. Eye contact
- IF IN EYES: Wash carefully with water for several minutes. Remove contact lenses, if possible. Easy to do.
- If eye irritation persists, Consult a physician if irritation persists.
- B. Skin contact
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- If skin irritation occurs, obtain medical advice Keep.

B. Skin contact	Remove and isolate contaminated clothing and shoes. Wash skin with soap and water.
C. Inhalation	Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing.
D. Ingestion	Call 911 or emergency medical service.
E. Indication of immediate medical attention and notes for physician	Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. Fire-Fighting measures

A. Suitable (and unsuitable) extinguishing media	
Suitable extinguishing media	Small Fire: Dry chemical, dry sand, alcohol-resistant foam, water spray, foam, CO ₂ Large Fire: Water spray, foam
Unsuitable extinguishing media	A large amount of water
B. hazards arising from the chemical (e.g. nature of any hazardous combustion products)	Fire will produce irritating, corrosive and/or toxic gases. Vapors may form explosive mixtures with air.
C. Special protective equipment and precautions for fire-fighters	Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Cool containers with flooding quantities of water until well after fire is out. ALWAYS stay away from tanks engulfed in fire.

6. Accidental release measures

A. Personal precautions, protective equipment and emergency procedures	Avoid breathing dust/fume/gas/mist/vapours/spray Use water spray/stream to protect personnel and to cool endangered containers. Remove product from area of fire. Wear suitable protective clothing, gloves and eye/face protection. Stop leak if safe to do so. Remove all sources of ignition. In case of fire: Wear selfcontained breathing apparatus. Evacuate unnecessary personnel. Remove all sources of ignition. Stop leak if safe to do so. Eliminate leaks immediately.
B. Environmental precautions and protective procedures	Avoid release to the environment Waterways, sewers, basements, and Prevent entry into confined spaces.
C. Methods and materials for containment and cleaning up	Stop leak if you can do it without risk. Dike far ahead of spill; use dry sand to contain the flow of material. Dike far ahead of spill to collect runoff water. Collect in closed containers for disposal. Dispose of this material and its container to hazardous or special waste collection point. Cover powder spill with plastic sheet or tarp to minimize spreading. With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

7. Handling and storage

A. Precautions for safe handling	Do not handle until all safety precautions Read and understand all safety precautions. Use only non-sparking tools. Avoid breathing dust/fume/gas/mist/vapours/spray Wash thoroughly after handling Follow all MSDS/label precautions even after container is emptied because it may retain product residues. Use in the well-ventilated areas. Keep out of low areas.
----------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

B. Conditions for safe storage (including any incompatibilities)	Store in a well ventilated place. Keep container tightly closed Store in a well ventilated place. Keep cool
------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------

8. Exposure controls & personal protection

A. Control parameters (e.g. occupational exposure limit values, biological limit values)

– Occupational exposure limit values

Water	No data available
-------	-------------------

Polyurethane	No data available
--------------	-------------------

– ACGIH limit values

Water	No data available
-------	-------------------

Polyurethane	No data available
--------------	-------------------

– Biological limit values

Water	Not applicable.
-------	-----------------

Polyurethane	No data available
--------------	-------------------

B. Appropriate engineering controls

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Provide adequate ventilation.

C. Personal protective equipment

– Respiratory protection

The filter class must be suitable for the maximum contaminant concentration(gas/vapour/aerosol/particulates) that may arise when handling the product.

In case of fire: Wear self contained breathing apparatus.

– Eye protection

Wear eye protection/face protection.

– Hands protection

Wear proper chemical resistant gloves.

– Body protection

Wear proper Protective clothing.

9. Physical and chemical properties

A. Appearance

Physical state	Liquid
----------------	--------

Color	White
-------	-------

B. Odor

Odorless

C. Odor threshold

No data available

D. pH

7–8

E. Melting point/freezing point

No data available

F. Initial boiling point and boiling range

100 °C (1atm)

G. Flashing point

No

H. Evaporation rate

No data available

I. Flammability(solid, gas)

Not applicable.

J. Upper/lower flammability or explosive limits

No data available

K. Vapor pressure

130mmHg (at 50°C)

L. Solubility

Solubility in water (at 15°C)

M. Vapor density

No data available

N. Relative density

1.0 g/cm³

O Partition coefficient:n-octanol/water

No data available

P. Auto-ignition temperature

Not applicable.

Q. Decomposition temperature

No data available

R. Viscosity

6,000cps below

S. Formula mass

No data available

10. Stability and reactivity

A. Chemical stability and possibility of hazardous reactions	Stable under normal conditions.
B. Conditions to avoid	Heat, spark, flame etc.
C. Incompatible materials	Water reactive substances
D. Hazardous decomposition products	No decomposition if used according to specifications.

11. Toxicological information

A. Information on the likely routes of exposure	Material can enter the body by inhalation, ingestion, absorption Material can enter the body by vapor
-------------------------------------------------	----------------------------------------------------------------------------------------------------------

B. Health hazards information

– Acute toxic

Oral

Water	LD50 90000 mg/kg Rat (LD50 > 90 ml/kg (Rat))
Polyurethane	No data available

Inhalation

Water	No data available
Polyurethane	No data available

Dermal

Water	No data available
Polyurethane	No data available

– Skin corrosive/irritant

Water	Not applicable.
Polyurethane	No data available

– Serious eye damage/eye irritation

Water	Not applicable.
Polyurethane	No data available

– Respiratory sensitization

Water	Not applicable.
Polyurethane	No data available

– Skin sensitization

Water	Not applicable.
Polyurethane	No data available

– Carcinogenicity

Ministry of Employment and Labor Notice

Water	No data available
Polyurethane	No data available

IARC

Water	No data available
Polyurethane	3

OSHA

Water	No data available
Polyurethane	No data available

ACGIH

Water	No data available
Polyurethane	No data available

NTP

Water	No data available
Polyurethane	No data available

EU CLP		
	Water	No data available
	Polyurethane	No data available
– Germ Cell Mutagenicity		
	Water	Not applicable.
	Polyurethane	No data available
– Reproductive toxicity		
	Water	Not applicable.
	Polyurethane	No data available
– Specific target organ toxicity (single exposure):		
	Water	Not applicable.
	Polyurethane	No data available
– Specific target organ toxicity (repeated exposure)		
	Water	Not applicable.
	Polyurethane	No data available
– Aspiration hazard		
	Water	Not applicable.
	Polyurethane	No data available

12. Ecological information

A. Aquatic and terrestrial ecotoxicity

– Fish		
	Water	No data available
	Polyurethane	No data available
– Shellfish		
	Water	No data available
	Polyurethane	No data available
– Bird		
	Water	No data available
	Polyurethane	No data available

B. Persistence and degradability

– Persistence		
	Water	No data available
	Polyurethane	No data available
– Degradability		
	Water	No data available
	Polyurethane	No data available

C. Bioaccumulative potential

– Potential		
	Water	No data available
	Polyurethane	No data available
– Biodegradable		
	Water	No data available
	Polyurethane	No data available

D. Mobility in soil

	Water	No data available
	Polyurethane	No data available

E. Other adverse effects

	Water	No data available
--	-------	-------------------

Polyurethane

No data available

13. Disposal considerations

- | | |
|------------------------|---------------------------------------------------------------------------|
| A. Disposal method | Dispose of according to regulations by incineration or sanitary landfill. |
| B. Disposal precaution | Dispose of according to regulations by incineration or sanitary landfill. |

14. Transport information

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| A. UN number | Not regulated as a hazardous material |
| B. Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises: | |

15. Regulatory information

- | | |
|-------------------------------------------------------|-------------------|
| A. Industrial Safety and Health Act | |
| Water | No data available |
| Polyurethane | No data available |
| B. Toxic Chemical Control Act | |
| Water | No data available |
| Polyurethane | No data available |
| C. Dangerous Material Safety Control Act | |
| Water | No data available |
| Polyurethane | No data available |
| D. Wastes Management Act | |
| Water | No data available |
| Polyurethane | Designated Wastes |
| E. Other requirements in domestic and other countries | |
| – Domestic | |
| Water | Not Applicable. |
| Polyurethane | Not Applicable. |
| – Other countries | |
| OSHA | |
| Water | Not Applicable. |
| Polyurethane | Not Applicable. |
| CERCLA | |
| Water | Not Applicable. |
| Polyurethane | Not Applicable. |
| EPCRA 302 | |
| Water | Not Applicable. |
| Polyurethane | Not Applicable. |
| EPCRA 304 | |
| Water | Not Applicable. |
| Polyurethane | Not Applicable. |
| EU (Classification) | |
| Water | Not Applicable. |
| Polyurethane | Not Applicable. |
| EU (Risk Phrases) | |
| Water | Not Applicable. |
| Polyurethane | Not Applicable. |
| EU (Safety Phrases) | |

Water
Polyurethane

Not Applicable.
Not Applicable.

16. Other information

A. Information source and references

Source of data : Korea Occupational Safety and Health Agency (KOSHA)>

B. Issuing date July 21, 2016

C. Revision number and date 0

D. Others



MATERIAL SAFETY DATA SHEET

DAEHEUNG CHEMICAL CO., LTD. www.dhcbond.com

PGM

Product Name

DM-60(B)

1. Product and Company Identification

- A. Product Name DM-60(B)
- B. Recommended use of the chemical and restrictions on use
- Recommended use of the chemical Modified polyisocyanate
 - Restrictions on use of the product Do not use for purposes other than adhesive.
- C. Manufacturer/Supplier/Distributor Information
- Name DAEHEUNG CHEMICAL CO., LTD.
 - Address 68, Sandan-ro 64beon-gil, Pyeongtaek-si, Gyeonggi-do, Korea
 - Emergency phone number 82-31-668-1424

2. Hazards identification

- A. Major health hazards Harmful if inhaled, skin irritation, eye irritation, allergic reactions, respiratory tract irritation
- B. Physical hazard May react on contact with water, containers may rupture or explode.
- C. Potential health effect May cause inflammation on the skin.
- D. Eye contact
- Short term exposure irritation, tearing
 - Long term exposure irritation, tearing
- E. Ingestion
- Short term exposure vomiting
 - Long term exposure not available
- F. Inhalation
- Short term exposure irritation, allergic reactions, wheezing asthma, lung congestion
 - Long term exposure lung damage
- G. Skin contact
- Short term exposure irritation, blisters, rash
 - Long term exposure itching

3. Composition/Information on ingredients

Chemical Name	CAS number	Content(%)
Modified polyisocyanate	Trade secret	>99
Hexamethylene diisocyanate (HDI)	822-06-0	<1

4. First aid measures

- A. Eye contact
- Hold eyelids apart and immediately flush eyes with plenty of water for at least 15 minutes.
- Seek immediate medical advice.
- B. Skin contact
- Remove all contaminated clothing and shoes immediately.
- Wash the contaminated area thoroughly with water followed by soap.
- If irritation persists or inflammation is caused, seek medical advice.
- C. Inhalation
- Remove the patient immediately to an area with fresh air.
- Seek medical attention.
- D. Ingestion
- If swallowed, seek medical advice immediately.

D. Ingestion	Wash out mouth with water. Do not induce vomiting.
--------------	-------------------------------------------------------

5. Fire-Fighting measures

A. Flash point	240°C, determined by open cup flash test.
B. Autoignition point	Not available
C. Range of explosion	Not available
D. Flammability	Yes
E. Pyrophoricity	None
F. Oxidizability	None
G. Self reactivity	None
H. Dust explosion	None
I. General hazard	During a fire, aerosols or gases may be generated through decomposition.
J. Fire fighting instructions	Positive pressure self-contained breathing apparatus and full protective clothing and gloves should be provided. Splash water onto drums and facilities which are not on fire to avoid fire spreading and heat evolved. After the fire is extinguished, neutralize the spilled material with decontaminant. Restrict entry of unauthorized personnel.
K. Extinguishing media	Dry chemical powder, carbon dioxide, water and foam.

6. Accidental release measures

A. General	Protective goggles, rubber gloves, and gas mask should be worn. Restrict entry of unauthorized personnel. Stay in windward position at the time of disposal. The hazard area should be well-ventilated. Safely stop discharge.
B. Small spill	Neutralize the leakage/spillage with decontaminant, or by admixing it with sand, clay or sawdust. Dispose of in a closed chemical waste container.
C. Large spill	Admix with sand, clay or sawdust to prevent the spillage/leakage from further spreading out. Dispose of in a chemical waste container. This container should not be closed. Neutralize the residues with decontaminant. Wash the spillage area clean with water.

7. Handling and storage

A. Precautions for safe handling	The operator should be trained in handling this product. Appropriate safety measures and protective equipment should be used for this operation. Provide adequate ventilation and the operator should use protective equipment. When the drum is pressurized, unscrew the bung slowly to release the pressure before taking it off. This product should not be filled in an unwashed or wet container. The use of fire is strictly prohibited in the work area. Those who show allergenic and sensitizing effects should not be in charge.
B. Conditions for safe storage (including any incompatibilities)	Keep container properly sealed and store indoors in a well ventilated area. Once opened, the container should be closed and sealed with nitrogen gas.

B. Conditions for safe storage (including any incompatibilities)	<p>If stored outdoors, the container should be covered with waterproof canvas sheet to avoid being exposed in the rain.</p> <p>The use of fire is strictly prohibited in the work area.</p>
------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

8. Exposure controls & personal protection

A. Engineering controls	<p>Local exhaust ventilation should be provided for indoors use.</p> <p>Readily accessible eye and hand wash stations should be provided.</p>
B. Personal protection	Chemical goggles, rubber gloves and suitable respiratory equipment.
C. Exposure limit:	Refer to Section 3

9. Physical and chemical properties

A. Appearance	
Physical state	Liquid
Color	Pale yellow
B. Odor	
	No odor
C. Boiling point	
	No data available
D. Vapor pressure	
	No data available
E. Evaporation rate	
	-95 °C
F. Freezing point	
	40 °C
G. Specific gravity	
	20 °C
H. Initial boiling point	
	No data available
I. Viscosity	
	No data available
J. Solubility(Water)	
	No data available
K. Solubility(other)	
	400mmHg (at 24 °C)

10. Stability and reactivity

A. Chemical stability(Condition to avoid)	High temperature and moisture
B. Incompatibility	This product reacts with materials with active hydrogen groups such as amines and alcohols.
C. Hazardous decomposition product	Reaction with water produces heat and carbon dioxide gas.
D. Hazardous polymerization	will occur. It gets polymerized by alkaline materials or tertiary amines.

11. Toxicological information

A. Acute toxicity	
For Hexamethylene diisocyanate (HDI)	<p>Inhalation (rat) LC 50 20 ppm/4hr (calculated value based on Ministry of the Environment Risk Assessment, Vol.2(2003) and SIDS(2004))</p> <p>Oral (rat) LD 50 747 mg/kg (calculated value based on CERL Hazard data 200-50(2001) and SIDS(2004))</p>
B. Skin corrosive/irritant	
For Hexamethylene diisocyanate (HDI)	(rabbit) substance is corrosive to the skin (SIDS(2004))
C. Serious eye damage/eye irritation	
For Hexamethylene diisocyanate (HDI)	(rabbit) substance is corrosive to the eyes (SIDS(2004))
D. Respiratory sensitization/skin sensitization	
For Hexamethylene diisocyanate (HDI)	
Respiratory sensitization	Induce allergic asthma, hypersensitivity pneumonitis, hypersensitivity for human contact.
Skin sensitization	(guinea pig) Positivity (SIDS(2004))

E. Germ cell mutagenicity

For Hexamethylene diisocyanate (HDI)	There was no test data.(SIDS(2004))
--------------------------------------	-------------------------------------

F. Carcinogenicity

For Hexamethylene diisocyanate (HDI)	There was no existing classification and no information.
--------------------------------------	----------------------------------------------------------

G. Reproductive toxicity

For Hexamethylene diisocyanate (HDI)	There was no impact on the occurrence of the next generation of parent animals and breeding performance.(SIDS(2004))
--------------------------------------	----------------------------------------------------------------------------------------------------------------------

H. Specific target organ toxicity—single exposure

For Hexamethylene diisocyanate (HDI)	Inhalation exposure, pulmonary edema was seen, and pneumonia in rats.(ATSDR(1998))
--------------------------------------	------------------------------------------------------------------------------------

I. Specific target organ toxicity—repeated exposure

For Hexamethylene diisocyanate (HDI)	(man) Irritation of the eyes,nose,throat and cough and chest discomfort (rat) Inflammation of the windpipe, Necrosis of the epithelium to the nasal turbinates(CERI Hazard data 2000–50(2001))
--------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

J. ASPIRATION HAZARD

12. Ecological information

A. Aquatic Toxicity

For Hexamethylene diisocyanate (HDI)	(Acute) Daphnia magna 48hr EC50 > 89.1 mg/L (SIDS,2004) (Cronic) Not poor water solubility (Aqueous solubility=117mg/L(Physprop Database,2005))
--------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------

13. Disposal considerations

A. Disposal method

This product should be incinerated in an appropriate facility.

This product should be treated by authorized agents professionally trained in disposing industrial waste.

This product should be disposed of after forming solid foam through reaction with polyol.

Mix this product with decontaminant to form urea compound through chemical reaction, and remove the toxicity by dripping the mix and being left to stand for 24 hours.

B. Handling empty container after use

Empty drum should be left to stand with water and left unsealed for 24 hours.

Water should subsequently be removed afterward.

Used container should be punctured and scrapped.

14. Transport information

A. Proper shipping name	– (Modified polyisocyanate)
B. Hazardous class	Not applicable
C. UN number	Not available
D. Packing group	Not applicable
E. IMDG class	Not applicable

Follow all the regulations in your country.

Be sure that the container is tightly sealed, that no leakage is found and that all the necessary indications are specified.

Filling, loading and extracting operations should be performed under the supervision of an authorized operator.

Nitrogen gas or dry air should be charged into the container for transportation after filling or extracting.

15. Regulatory information

Regulatory information with regard to this substance in your country should be examined by your own responsibility.

16. Other information

A. Reason for issue	Nippon Polyurethane Industry Co., Ltd.
B. Prepared by	Technical department
C. Date of issue	October 25, 2012