

### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1 Product identifier

### Damping layer DG-U1 green, comp B

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

##### Use:

Hardener for sound damping material.

For details of the identified uses according to REACH-Regulation (EU) No. 1907/2006 refer to the annex of this safety data sheet.

#### 1.3 Details of the supplier of the safety data sheet

Swedac, Swedish Acoustic Products  
Innovation AB  
Storås Industrigata 5  
424 69 Angered  
Sweden  
Telephone: +46 317441890  
Fax: +46 31 229960

### SECTION 2: Hazards identification

#### 2.1 Classification of the substance or mixture

Acute toxicity, Inhalative, Category 4 (H332)  
Skin irritation, Category 2 (H315)  
Eye irritation, Category 2 (H319)  
Sensitization of the respiratory airways, Category 1 (H334)  
Sensitization of the skin, Category 1 (H317)  
Carcinogenicity, Category 2 (H351)  
Specific target organ toxicity (single exposure), Category 3 (H335)  
Specific target organ toxicity (repeated exposure), Category 2 (H373)

#### 2.2 Label elements



Danger

##### Hazardous components which must be listed on the label

diphenylmethane-4,4'-diisocyanate  
diphenylmethane-diisocyanate, isomers and homologues  
Diphenylmethane-2,4'-diisocyanate  
2,2'-Methylenediphenyl diisocyanate

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### Hazard statements:

H315 Causes skin irritation.  
 H317 May cause an allergic skin reaction.  
 H319 Causes serious eye irritation.  
 H332 Harmful if inhaled.  
 H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
 H335 May cause respiratory irritation.  
 H351 Suspected of causing cancer.  
 H373 May cause damage to organs through prolonged or repeated exposure.

### Precautionary statements:

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
 P280 Wear protective gloves/ eye protection/ face protection.  
 P302 + P352 IF ON SKIN: Wash with plenty of soap and water.  
 P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
 P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
 P308 + P313 IF exposed or concerned: Get medical advice/ attention.

### Supplementary hazardous characteristics and labeling elements:

EUH204 Contains isocyanates. May produce an allergic reaction.

### 2.3 Other hazards

No information available.

## SECTION 3: Composition/information on ingredients

**Type of product:** Mixture

### 3.2 Mixtures

polyisocyanate based on diphenylmethane diisocyanate

#### Hazardous components

diphenylmethane-diisocyanate, isomers and homologues

Concentration [wt.-%]:  $\geq 75 - < 100$

CAS-No.: 9016-87-9

Classification (1272/2008/CE): Acute Tox. 4 Inhalative H332 Skin Irrit. 2 H315 Eye Irrit. 2 H319 Resp. Sens. 1 H334 Skin Sens. 1 H317 Carc. 2 H351 STOT SE 3 H335 STOT RE 2 Inhalative H373

Specific threshold concentration (GHS):

Eye Irrit. 2	H319	$\geq 5 \%$
Skin Irrit. 2	H315	$\geq 5 \%$
Resp. Sens. 1	H334	$\geq 0,1 \%$
STOT SE 3	H335	$\geq 5 \%$

diphenylmethane-4,4'-diisocyanate

Concentration [wt.-%]:  $\geq 10 - < 20$

Index-No.: 615-005-00-9

EC-No.: 202-966-0

REACH Registration Number: 01-2119457014-47-0006, 01-2119457014-47-0007, 01-2119457014-47-0008, 01-2119457014-47-0009

CAS-No.: 101-68-8

Classification (1272/2008/CE): Acute Tox. 4 Inhalative H332 Skin Irrit. 2 H315 Eye Irrit. 2 H319 Resp. Sens. 1 H334 Skin Sens. 1 H317 Carc. 2 H351 STOT SE 3 H335 STOT RE 2 Inhalative H373

Specific threshold concentration (GHS):

Eye Irrit. 2	H319	$\geq 5 \%$
Skin Irrit. 2	H315	$\geq 5 \%$
Resp. Sens. 1	H334	$\geq 0,1 \%$
STOT SE 3	H335	$\geq 5 \%$

Diphenylmethane-2,4'-diisocyanate

Concentration [wt.-%]:  $\geq 5 - < 10$

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Index-No.: 615-005-00-9

REACH Registration Number: 01-2119480143-45-0000, 01-2119480143-45-0001, 01-2119480143-45-0002

CAS-No.: 5873-54-1

Classification (1272/2008/CE): Acute Tox. 4 Inhalative H332 Skin Irrit. 2 H315 Eye Irrit. 2 H319 Resp. Sens. 1 H334 Skin Sens. 1 H317 Carc. 2 H351 STOT SE 3 H335 STOT RE 2 Inhalative H373

Specific threshold concentration (GHS):

Eye Irrit. 2	H319	>= 5 %
Skin Irrit. 2	H315	>= 5 %
Resp. Sens. 1	H334	>= 0,1 %
STOT SE 3	H335	>= 5 %

2,2'-Methylenediphenyl diisocyanate

Concentration [wt.-%]: >= 1 - < 5

Index-No.: 615-005-00-9

EC-No.: 219-799-4

REACH Registration Number: 01-2119927323-43-0000, 01-2119927323-43-0001

CAS-No.: 2536-05-2

Classification (1272/2008/CE): Acute Tox. 4 Inhalative H332 Skin Irrit. 2 H315 Eye Irrit. 2 H319 Resp. Sens. 1 H334 Skin Sens. 1 H317 Carc. 2 H351 STOT SE 3 H335 STOT RE 2 Inhalative H373

Specific threshold concentration (GHS):

Eye Irrit. 2	H319	>= 5 %
Skin Irrit. 2	H315	>= 5 %
Resp. Sens. 1	H334	>= 0,1 %
STOT SE 3	H335	>= 5 %

### Candidate List of Substances of Very High Concern for Authorisation

This product does not contain substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 57).

## SECTION 4: First aid measures

### 4.1 Description of first aid measures

**General advice:** Soiled, soaked clothing and shoes must be immediately removed, decontaminated and disposed of.

**If inhaled:** Take the person into the fresh air and keep him warm, let him rest; if there is difficulty in breathing, medical advice is required.

**In case of skin contact:** In the event of contact with the skin, preferably wash with a cleanser based on polyethylene glycol or with plenty of warm water and soap. Consult a doctor in the event of a skin reaction.

**In case of eye contact:** Hold the eyes open and rinse with preferably lukewarm water for a sufficiently long period of time (at least 10 minutes). Contact an ophthalmologist.

**If swallowed:** DO NOT induce the patient to vomit, medical advice is required.

### 4.2 Most important symptoms and effects, both acute and delayed

**Notes to physician:** The product irritates the respiratory tract and may trigger sensitisation of the skin and respiratory tract. Treatment of acute irritation or bronchial constriction is primarily symptomatic. Extended medical treatment may be required depending on the degree of exposure and the severity of the symptoms.

### 4.3 Indication of any immediate medical attention and special treatment needed

**Therapeutic measures:** No information available.

## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

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**Suitable extinguishing media:** Carbon dioxide (CO<sub>2</sub>), Foam, extinguishing powder, in cases of larger fires, water spray should be used.

**Unsuitable extinguishing media:** High volume water jet

### 5.2 Special hazards arising from the substance or mixture

Burning releases carbon monoxide, carbon dioxide, oxides of nitrogen, isocyanate vapors and traces of hydrogen cyanide. In the event of fire and/or explosion do not breathe fumes.

Fire in vicinity poses risk of pressure build-up and rupture. Containers at risk from fire should be cooled with water and, if possible, removed from the danger area.

### 5.3 Advice for fire-fighters

During fire-fighting respirator with independent air-supply and airtight garment is required.

Do not allow contaminated extinguishing water to enter the soil, ground-water or surface waters.

## SECTION 6: Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures

Put on protective equipment (see section 8). Ensure adequate ventilation/exhaust extraction. Keep unauthorized persons away.

### 6.2 Environment related measures

Do not allow to escape into waterways, wastewater or soil.

### 6.3 Methods and material for containment and cleaning up

Remove mechanically; cover the remainder with wet, absorbent material (e.g. sawdust, chemical binder based on calcium silicate hydrate, sand). After approx. one hour transfer to waste container and do not seal (evolution of CO<sub>2</sub>!). Keep damp in a safe ventilated area for several days.

Spill area can be decontaminated with the following recommended decontamination solution:

Decontamination solution 1: 8-10% sodium carbonate and 2% of liquid soap in water

Decontamination solution 2: Liquid/yellow soap (potassium soap with ~15% anionic tenside): 20ml;  
Water:700ml; Polyethylenglycol (PEG 400): 350ml

### 6.4 Reference to other sections

For further disposal measures see section 13.

## SECTION 7: Handling and storage

### 7.1 Precautions for safe handling

If an annex according to REACH-Regulation (EU) No. 1907/2006 is attached to this MSDS, the general conditions of use are further specified in the corresponding exposure scenarios.

Provide sufficient air exchange and/or exhaust in work rooms. Exhaust ventilation necessary if product is sprayed. The threshold limit values noted in section 8 must be monitored.

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In all areas where isocyanate aerosols and/or vapor concentrations are produced in elevated concentrations, exhaust ventilation must be provided in such a way that the workplace exposure limits (WEL) is not exceeded. The air should be drawn away from the personnel handling the product

The personal protective measures described in section 8 must be observed. The precautions required in the handling of isocyanates must be taken. Avoid contact with skin and eyes and the inhalation of vapor.

Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at end of work and use skin-protecting ointment. Keep working clothes separately. Take off all contaminated clothing immediately.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed and dry. Further information on the storage conditions which must be observed to preserve quality can be found in our product information sheet.

Storage class (TRGS 510) : 10: Combustible liquids

**7.3 Specific end use(s)**

No information available.

**SECTION 8: Exposure controls/personal protection**

If an annex according to Regulation (EU) No. 1907/2006 is attached to this MSDS, the general RMMs are further specified in the corresponding exposure scenarios.

**8.1 Control parameters****Components with workplace control parameters**

Substance	CAS-No.	Basis	Type	Value	Ceiling Limit Value	Remarks
diphenylmethane-4,4'-diisocyanate	101-68-8	TRGS 900	STEL CL			Category I: substances for which the localized effect has an assigned OEL or for substances with a sensitizing effect in respiratory passages.
diphenylmethane-4,4'-diisocyanate	101-68-8	TRGS 900				Listed.
diphenylmethane-4,4'-diisocyanate	101-68-8	TRGS 900		0,05 mg/m <sup>3</sup>	=2=	Y
diphenylmethane-4,4'-diisocyanate	101-68-8	TRGS 900	STEL FAC		1	Substance listed with both Peak factor and STEL factor. The Peak factor is supplied with the AGW values.
diphenylmethane-4,4'-diisocyanate	101-68-8	TRGS 900				Dermal absorption possible
diphenylmethane-diisocyanate, isomers and homologues	9016-87-9	TRGS 900				Listed., measured as MDI
diphenylmethane-diisocyanate, isomers and homologues	9016-87-9	TRGS 900		0,05 mg/m <sup>3</sup>	=2=	Y, measured as MDI
diphenylmethane-diisocyanate, isomers and homologues	9016-87-9	TRGS 900	STEL FAC		1	Substance listed with both Peak factor and STEL factor. The Peak factor is supplied with the AGW values., measured as MDI

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diphenylmethane-diisocyanate, isomers and homologues	9016-87-9	TRGS 900				Dermal absorption possible, measured as MDI
diphenylmethane-diisocyanate, isomers and homologues	9016-87-9	TRGS 900	STEL CL			Category I: substances for which the localized effect has an assigned OEL or for substances with a sensitizing effect in respiratory passages., measured as MDI
Diphenylmethane-2,4'-diisocyanate	5873-54-1	TRGS 900				Listed.
Diphenylmethane-2,4'-diisocyanate	5873-54-1	TRGS 900		0,05 mg/m3	=2=	
Diphenylmethane-2,4'-diisocyanate	5873-54-1	TRGS 900	STEL FAC		1	Substance listed with both Peak factor and STEL factor. The Peak factor is supplied with the AGW values.
Diphenylmethane-2,4'-diisocyanate	5873-54-1	TRGS 900	STEL CL			Category I: substances for which the localized effect has an assigned OEL or for substances with a sensitizing effect in respiratory passages.
2,2'-Methylenediphenyl diisocyanate	2536-05-2	TRGS 900				Listed.
2,2'-Methylenediphenyl diisocyanate	2536-05-2	TRGS 900		0,05 mg/m3	=2=	
2,2'-Methylenediphenyl diisocyanate	2536-05-2	TRGS 900	STEL FAC		1	Substance listed with both Peak factor and STEL factor. The Peak factor is supplied with the AGW values.
2,2'-Methylenediphenyl diisocyanate	2536-05-2	TRGS 900	STEL CL			Category I: substances for which the localized effect has an assigned OEL or for substances with a sensitizing effect in respiratory passages.

Exposition assessment value (EBW) per TGRS 430: Polyisocyanate content (MDI oligomers and/or prepolymers) 45 %. Use an exposition assessment value of 0,05 mg/m<sup>3</sup>.

The product may contain traces of phenylisocyanate.

Substance	CAS-No.	Basis	Type	Value	Ceiling Limit Value	Remarks
Phenyl isocyanate	103-71-9	TRGS 900				Listed.
Phenyl isocyanate	103-71-9	TRGS 900		0,01 ppm 0,05 mg/m3	1	
Phenyl isocyanate	103-71-9	TRGS 900	STEL CL			Category I: substances for which the localized effect has an assigned OEL or for substances with a sensitizing effect in respiratory passages.

**Derived No Effect Level (DNEL) or Derived Minimal Effect Level (DMEL)****diphenylmethane-4,4'-diisocyanate**

Value type	Route of	Health Effects	Value	Remarks
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	exposure			
Worker (short-term)				
DNEL	Dermal	- systemic effects	50 mg/kg body weight/day	
DNEL	Inhalation	- systemic effects	0,1 mg/m <sup>3</sup> air	
DNEL	Dermal	- local effects	28,7 mg/cm <sup>2</sup>	
DNEL	Inhalation	- local effects	0,1 mg/m <sup>3</sup> air	
Worker (long-term)				
DNEL	Dermal	- systemic effects		No quantitative risk assessment possible.
DNEL	Inhalation	- systemic effects	0,05 mg/m <sup>3</sup> air	
DNEL	Dermal	- local effects		No quantitative risk assessment possible.
DNEL	Inhalation	- local effects	0,05 mg/m <sup>3</sup> air	
General population (short-term)				
DNEL	Dermal	- systemic effects	25 mg/kg body weight/day	
DNEL	Inhalation	- systemic effects	0,05 mg/m <sup>3</sup> air	
DNEL	Oral	- systemic effects	20 mg/kg body weight/day	
DNEL	Dermal	- local effects	17,2 mg/cm <sup>2</sup>	
DNEL	Inhalation	- local effects	0,05 mg/m <sup>3</sup> air	
General population (long-term)				
DNEL	Dermal	- systemic effects		No quantitative risk assessment possible.
DNEL	Inhalation	- systemic effects	0,025 mg/m <sup>3</sup> air	
DNEL	Oral	- systemic effects		No quantitative risk assessment possible.
DNEL	Dermal	- local effects		No quantitative risk assessment possible.
DNEL	Inhalation	- local effects	0,025 mg/m <sup>3</sup> air	

**Diphenylmethane-2,4'-diisocyanate**

Value type	Route of exposure	Health Effects	Value	Remarks
Worker (short-term)				
DNEL	Dermal	- systemic effects	50 mg/kg body weight/day	
DNEL	Inhalation	- systemic effects	0,1 mg/m <sup>3</sup> air	
DNEL	Dermal	- local effects	28,7 mg/cm <sup>2</sup>	
DNEL	Inhalation	- local effects	0,1 mg/m <sup>3</sup> air	
Worker (long-term)				
DNEL	Dermal	- systemic effects		No quantitative risk assessment possible.
DNEL	Inhalation	- systemic effects	0,05 mg/m <sup>3</sup> air	
DNEL	Dermal	- local effects		No quantitative risk assessment possible.

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DNEL	Inhalation	- local effects	0,05 mg/m <sup>3</sup> air	
General population (short-term)				
DNEL	Dermal	- systemic effects	25 mg/kg body weight/day	
DNEL	Inhalation	- systemic effects	0,05 mg/m <sup>3</sup> air	
DNEL	Oral	- systemic effects	20 mg/kg body weight/day	
DNEL	Dermal	- local effects	17,2 mg/cm <sup>2</sup>	
DNEL	Inhalation	- local effects	0,05 mg/m <sup>3</sup> air	
General population (long-term)				
DNEL	Dermal	- systemic effects		No quantitative risk assessment possible.
DNEL	Inhalation	- systemic effects	0,025 mg/m <sup>3</sup> air	
DNEL	Oral	- systemic effects		No quantitative risk assessment possible.
DNEL	Dermal	- local effects		No quantitative risk assessment possible.
DNEL	Inhalation	- local effects	0,025 mg/m <sup>3</sup> air	

**2,2'-Methylenediphenyl diisocyanate**

Value type	Route of exposure	Health Effects	Value	Remarks
Worker (short-term)				
DNEL	Dermal	- systemic effects	50 mg/kg body weight/day	
DNEL	Inhalation	- systemic effects	0,1 mg/m <sup>3</sup> air	
DNEL	Dermal	- local effects	28,7 mg/cm <sup>2</sup>	
DNEL	Inhalation	- local effects	0,1 mg/m <sup>3</sup> air	
Worker (long-term)				
DNEL	Dermal	- systemic effects		No quantitative risk assessment possible.
DNEL	Inhalation	- systemic effects	0,05 mg/m <sup>3</sup> air	
DNEL	Dermal	- local effects		No quantitative risk assessment possible.
DNEL	Inhalation	- local effects	0,05 mg/m <sup>3</sup> air	
General population (short-term)				
DNEL	Dermal	- systemic effects	25 mg/kg body weight/day	
DNEL	Inhalation	- systemic effects	0,05 mg/m <sup>3</sup> air	
DNEL	Oral	- systemic effects	20 mg/kg body weight/day	
DNEL	Dermal	- local effects	17,2 mg/cm <sup>2</sup>	
DNEL	Inhalation	- local effects	0,05 mg/m <sup>3</sup> air	
General population (long-term)				
DNEL	Dermal	- systemic effects		No quantitative risk assessment possible.



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DNEL	Inhalation	- systemic effects	0,025 mg/m <sup>3</sup> air	
DNEL	Oral	- systemic effects		No quantitative risk assessment possible.
DNEL	Dermal	- local effects		No quantitative risk assessment possible.
DNEL	Inhalation	- local effects	0,025 mg/m <sup>3</sup> air	

**Predicted No Effect Concentration (PNEC)****diphenylmethane-4,4'-diisocyanate**

Compartment	Value	Remarks
Freshwater	> 1 mg/l	
Marine water	> 0,1 mg/l	
Sediment		Not relevant
Soil	> 1 mg/kg dry weight	
STP (sewage-treatment plant)	> 1 mg/l	
Oral		Not relevant

**Diphenylmethane-2,4'-diisocyanate**

Compartment	Value	Remarks
Freshwater	> 1 mg/l	
Marine water	> 0,1 mg/l	
Sediment		Not relevant
Soil	> 1 mg/kg dry weight	
STP (sewage-treatment plant)	> 1 mg/l	
Oral		Not relevant

**2,2'-Methylenediphenyl diisocyanate**

Compartment	Value	Remarks
Freshwater	> 1 mg/l	
Marine water	> 0,1 mg/l	
Sediment		Not relevant
Soil	> 1 mg/kg dry weight	
STP (sewage-treatment plant)	> 1 mg/l	
Oral		Not relevant

**8.2 Exposure controls****Respiratory protection**

Respiratory protection required in insufficiently ventilated working areas and during spraying. An air-fed mask, or for short periods of work, a combination of charcoal filter and particulate filter is recommended.

Further recommendations regarding respiratory protection can be found in the individual exposure scenarios in the appendix.

In case of hypersensitivity of the respiratory tract (e.g. asthmatics and those who suffer from chronic bronchitis) it is inadvisable to work with the product.

**Hand protection**

Suitable materials for safety gloves; EN 374:

Polychloroprene - CR: thickness  $\geq 0,5$ mm; breakthrough time  $\geq 480$ min.

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Nitrile rubber - NBR: thickness  $\geq 0,35\text{mm}$ ; breakthrough time  $\geq 480\text{min}$ .  
 Butyl rubber - IIR: thickness  $\geq 0,5\text{mm}$ ; breakthrough time  $\geq 480\text{min}$ .  
 Fluorinated rubber - FKM: thickness  $\geq 0,4\text{mm}$ ; breakthrough time  $\geq 480\text{min}$ .  
 Recommendation: contaminated gloves should be disposed of.

**Eye protection**

Wear eye/face protection.

**Skin and body protection**

Wear suitable protective clothing.

**SECTION 9: Physical and chemical properties****9.1 Information on basic physical and chemical properties**

Appearance:	liquid	
Colour:	brown	
Odour:	earthy, musty	
Odour Threshold:	not established	
pH:	not applicable	
Pour point:	ca. $-30\text{ }^{\circ}\text{C}$	ISO 3016
Boiling point/boiling range:	$> 300\text{ }^{\circ}\text{C}$ at 1.013 hPa	DIN 53171
Flash point:	ca. $229\text{ }^{\circ}\text{C}$	DIN EN 22719
Evaporation rate:	not established	
Flammability (solid, gas):	not applicable	
Burning number:	not applicable	
Vapour pressure:	ca. 11 hPa at $20\text{ }^{\circ}\text{C}$ ca. 20 hPa at $50\text{ }^{\circ}\text{C}$ ca. 22 hPa at $55\text{ }^{\circ}\text{C}$ Diphenyl-methane-diisocyanate (MDI) $< 0,00001$ hPa at $20\text{ }^{\circ}\text{C}$	EG A4 EG A4 EG A4
Vapour density:	not established	
Density:	ca. $1,23\text{ g/cm}^3$ at $20\text{ }^{\circ}\text{C}$	DIN 51757
Miscibility with water:	immiscible at $15\text{ }^{\circ}\text{C}$	
Surface tension:	not established	
Partition coefficient (n-octanol/water):	not established	
Auto-ignition temperature:	not applicable	
Ignition temperature:	$> 500\text{ }^{\circ}\text{C}$	DIN 51794
Decomposition temperature:	not established	
Viscosity, dynamic:	ca. $145\text{ mPa}\cdot\text{s}$ at $20\text{ }^{\circ}\text{C}$	DIN 53019
Explosive properties:	not established	
Dust explosion class:	not applicable	
Oxidising properties:	not established	

**9.2 Other information**

The indicated values do not necessarily correspond to the product specification. Please refer to the technical information sheet for specification data.

**SECTION 10: Stability and reactivity****10.1 Reactivity**

This information is not available.

**10.2 Chemical stability**

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Polymerises at about 200 °C with evolution of CO<sub>2</sub>.

### 10.3 Possibility of hazardous reactions

Exothermic reaction with amines and alcohols; reacts with water forming CO<sub>2</sub>; in closed containers, risk of bursting owing to increase of pressure.

### 10.4 Conditions to avoid

This information is not available.

### 10.5 Incompatible materials

This information is not available.

### 10.6 Hazardous decomposition products

No hazardous decomposition products when stored and handled correctly.

## SECTION 11: Toxicological information

Toxicological studies on the product are not yet available.

Please find below the toxicological data available to us for the components (hazardous components).

### 11.1 Information on toxicological effects

#### Acute toxicity, oral

diphenylmethane-diisocyanate, isomers and homologues

LD50 rat, male/female: > 10.000 mg/kg

Method: OECD Test Guideline 401

diphenylmethane-4,4'-diisocyanate

LD50 rat, male/female: > 2.000 mg/kg

Method: Directive 84/449/EEC, B.1

Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

LD50 rat, male/female: > 2.000 mg/kg

Method: Directive 84/449/EEC, B.1

Toxicological studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate

LD50 rat, male/female: > 2.000 mg/kg

Method: Directive 84/449/EEC, B.1

Toxicological studies of a comparable product.

#### Acute toxicity, dermal

diphenylmethane-diisocyanate, isomers and homologues

LD50 rabbit, male/female: > 9.400 mg/kg

Method: OECD Test Guideline 402

diphenylmethane-4,4'-diisocyanate

LD50 rabbit, male/female: > 9.400 mg/kg

Method: OECD Test Guideline 402

Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

LD50 rabbit, male/female: > 9.400 mg/kg

Method: OECD Test Guideline 402

Studies of a comparable product.

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2,2'-Methylenediphenyl diisocyanate  
LD50 rabbit, male/female: > 9.400 mg/kg  
Method: OECD Test Guideline 402  
Studies of a comparable product.

### Acute toxicity, inhalation

ATEmix (inhal.): 1,5 mg/l, 4 h  
Test atmosphere: dust/mist  
Method: Calculation method

diphenylmethane-diisocyanate, isomers and homologues

LC50 rat, male/female: 0,31 mg/l, 4 h  
Test atmosphere: dust/mist  
Method: OECD Test Guideline 403

The test atmosphere generated in the animal study is not representative of workplace environments, how the substance is placed on the market, and how it can reasonably be expected to be used. Therefore the test result cannot be directly applied for the purpose of assessing hazard. Based on expert judgment and the weight of the evidence, a modified classification for acute inhalation toxicity is justified.

Assessment: Harmful by inhalation.

Converted acute toxicity point estimate 1,5 mg/l

Test atmosphere: dust/mist  
Method: Expert judgement

diphenylmethane-4,4'-diisocyanate

LC50 rat, male: 0,368 mg/l, 4 h  
Test atmosphere: dust/mist

Method: OECD Test Guideline 403

The test atmosphere generated in the animal study is not representative of workplace environments, how the substance is placed on the market, and how it can reasonably be expected to be used. Therefore the test result cannot be directly applied for the purpose of assessing hazard. Based on expert judgment and the weight of the evidence, a modified classification for acute inhalation toxicity is justified.

Assessment: Harmful if inhaled.

Converted acute toxicity point estimate 1,5 mg/l

Test atmosphere: dust/mist  
Method: Expert judgement

Diphenylmethane-2,4'-diisocyanate

LC50 rat, male: 0,387 mg/l, 4 h  
Test atmosphere: dust/mist

The test atmosphere generated in the animal study is not representative of workplace environments, how the substance is placed on the market, and how it can reasonably be expected to be used. Therefore the test result cannot be directly applied for the purpose of assessing hazard. Based on expert judgment and the weight of the evidence, a modified classification for acute inhalation toxicity is justified.

Assessment: Harmful by inhalation.

Converted acute toxicity point estimate 1,5 mg/l

Test atmosphere: dust/mist  
Method: Expert judgement

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2,2'-Methylenediphenyl diisocyanate

LC50 rat, male: 0,527 mg/l, 4 h

Test atmosphere: dust/mist

Method: OECD Test Guideline 403

The test atmosphere generated in the animal study is not representative of workplace environments, how the substance is placed on the market, and how it can reasonably be expected to be used. Therefore the test result cannot be directly applied for the purpose of assessing hazard. Based on expert judgment and the weight of the evidence, a modified classification for acute inhalation toxicity is justified. Studies at the product.

Assessment: Harmful if inhaled.

Converted acute toxicity point estimate 1,5 mg/l

Test atmosphere: dust/mist

Method: Expert judgement

### Primary skin irritation

diphenylmethane-diisocyanate, isomers and homologues

Species: rabbit

Result: slight irritant

Method: OECD Test Guideline 404

diphenylmethane-4,4'-diisocyanate

Species: rabbit

Result: irritating

Classification: Causes skin irritation.

Method: OECD Test Guideline 404

Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

Species: rabbit

Result: irritating

Classification: Causes skin irritation.

Method: OECD Test Guideline 404

Toxicological studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate

Species: rabbit

Result: slight irritant

Classification: No skin irritation

Method: OECD Test Guideline 404

Toxicological studies at the product

### Primary mucosae irritation

diphenylmethane-diisocyanate, isomers and homologues

Species: rabbit

Result: non-irritant

Method: OECD Test Guideline 405

Toxicological studies of a comparable product.

diphenylmethane-4,4'-diisocyanate

Species: rabbit

Result: non-irritant

Method: OECD Test Guideline 405

Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

Species: rabbit

Result: non-irritant

Method: OECD Test Guideline 405

Toxicological studies of a comparable product.

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2,2'-Methylenediphenyl diisocyanate

Species: rabbit

Result: slight irritant

Classification: No eye irritation

Method: OECD Test Guideline 405

Toxicological studies at the product

### Sensitisation

diphenylmethane-diisocyanate, isomers and homologues

Skin sensitisation according to Magnusson/Kligmann (maximizing test):

Species: Guinea pig

Result: negative

Classification: Does not cause skin sensitization.

Method: OECD Test Guideline 406

Skin sensitization (local lymph node assay (LLNA)):

Species: Mouse

Result: positive

Classification: May cause sensitization by skin contact.

Method: OECD Test Guideline 429

Toxicological studies of a comparable product.

Respiratory sensitization

Species: rat

Result: positive

Classification: May cause sensitization by inhalation.

diphenylmethane-4,4'-diisocyanate

Skin sensitisation according to Buehler (epicutaneous test):

Species: Guinea pig

Result: negative

Classification: Does not cause skin sensitization.

Method: OECD Test Guideline 406

Skin sensitization (local lymph node assay (LLNA)):

Species: Mouse

Result: positive

Classification: May cause sensitization by skin contact.

Method: OECD Test Guideline 429

Respiratory sensitization

Species: Guinea pig

Result: positive

Classification: May cause sensitization by inhalation.

Diphenylmethane-2,4'-diisocyanate

Skin sensitisation according to Buehler (epicutaneous test):

Species: Guinea pig

Result: negative

Classification: Does not cause skin sensitization.

Method: OECD Test Guideline 406

Toxicological studies of a comparable product.

Skin sensitization (local lymph node assay (LLNA)):

Species: Mouse

Result: positive

Classification: May cause sensitization by skin contact.

Method: OECD Test Guideline 429

Toxicological studies of a comparable product.

Respiratory sensitization

Species: Guinea pig

Result: positive

Classification: May cause sensitization by inhalation.

Toxicological studies of a comparable product.

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2,2'-Methylenediphenyl diisocyanate  
Skin sensitization (local lymph node assay (LLNA)):  
Species: Mouse  
Result: positive  
Classification: May cause sensitization by skin contact.  
Method: OECD Test Guideline 429  
Studies at the product.

Respiratory sensitization  
Species: Guinea pig  
Result: positive  
Classification: May cause sensitization by inhalation.  
Toxicological studies of a comparable product.

**Subacute, subchronic and prolonged toxicity**  
diphenylmethane-diisocyanate, isomers and homologues  
NOAEL: 0,2 mg/m<sup>3</sup>  
LOAEL (Lowest observable adverse effect level): 1 mg/m<sup>3</sup>  
Application Route: Inhalative  
Species: rat, male/female  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Exposure duration: 2 a  
Frequency of treatment: 6 hours a day, 5 days a week  
Target Organs: Lungs, Nasal inner lining  
Test substance: as aerosol  
Method: OECD Test Guideline 453  
Findings: Irritation to nasal cavity and to lungs.  
Studies of a comparable product.

diphenylmethane-4,4'-diisocyanate  
NOAEL: 0,2 mg/m<sup>3</sup>  
LOAEL (Lowest observable adverse effect level): 1 mg/m<sup>3</sup>  
Application Route: Inhalative  
Species: rat, male/female  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Exposure duration: 2 a  
Frequency of treatment: 6 hours a day, 5 days a week  
Target Organs: Lungs, Nasal inner lining  
Test substance: as aerosol  
Method: OECD Test Guideline 453  
Findings: Irritation to nasal cavity and to lungs.  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
NOAEL: 0,2 mg/m<sup>3</sup>  
LOAEL (Lowest observable adverse effect level): 1 mg/m<sup>3</sup>  
Application Route: Inhalative  
Species: rat, male/female  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Exposure duration: 2 a  
Frequency of treatment: 6 hours a day, 5 days a week  
Target Organs: Lungs, Nasal inner lining  
Test substance: as aerosol  
Method: OECD Test Guideline 453  
Findings: Irritation to nasal cavity and to lungs.  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
NOAEL: 0,2 mg/m<sup>3</sup>  
LOAEL (Lowest observable adverse effect level): 1 mg/m<sup>3</sup>  
Application Route: Inhalative  
Species: rat, male/female  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Exposure duration: 2 a  
Frequency of treatment: 6 hours a day, 5 days a week  
Target Organs: Lungs, Nasal inner lining

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Test substance: as aerosol  
Method: OECD Test Guideline 453  
Findings: Irritation to nasal cavity and to lungs.  
Studies of a comparable product.

### **Carcinogenicity**

diphenylmethane-diisocyanate, isomers and homologues  
Species: rat, male/female  
Application Route: Inhalative  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Test substance: as aerosol  
Exposure duration: 2 a  
Frequency of treatment: 6 hours/day, 5 days/week  
Method: OECD Test Guideline 453  
Occurrence of tumors in the highest dose group.

diphenylmethane-4,4'-diisocyanate  
Species: rat, male/female  
Application Route: Inhalative  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Test substance: as aerosol  
Exposure duration: 2 a  
Frequency of treatment: 6 hours/day, 5 days/week  
Method: OECD Test Guideline 453  
Occurrence of tumors in the highest dose group.  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
Species: rat, male/female  
Application Route: Inhalative  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Test substance: as aerosol  
Exposure duration: 2 a  
Frequency of treatment: 6 hours/day, 5 days/week  
Method: OECD Test Guideline 453  
Occurrence of tumors in the highest dose group.  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
Species: rat, male/female  
Application Route: Inhalative  
Dose Levels: 0 - 0,2 - 1 - 6 mg/m<sup>3</sup>  
Test substance: as aerosol  
Exposure duration: 2 a  
Frequency of treatment: 6 hours/day, 5 days/week  
Method: OECD Test Guideline 453  
Occurrence of tumors in the highest dose group.  
Studies of a comparable product.

### **Reproductive toxicity/Fertility**

diphenylmethane-diisocyanate, isomers and homologues  
No data available.

diphenylmethane-4,4'-diisocyanate  
No data available.

Diphenylmethane-2,4'-diisocyanate  
No data available.

2,2'-Methylenediphenyl diisocyanate  
No data available.

### **Reproductive toxicity/Teratogenicity**

diphenylmethane-diisocyanate, isomers and homologues  
NOAEL (teratogenicity): 12 mg/m<sup>3</sup>  
NOAEL (maternal): 4 mg/m<sup>3</sup>



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NOAEL (developmental toxicity): 4 mg/m<sup>3</sup>  
Species: rat, female  
Application Route: Inhalative  
Dose Levels: 0 - 1 - 4 - 12 mg/m<sup>3</sup>  
Frequency of treatment: 6 hours/day (Exposure duration: 10 days (day 6 - 15 p.c.))  
Test period: 20 d  
Test substance: as aerosol  
Method: OECD Test Guideline 414  
NOAEL (developmental toxicity): 4 mg/m<sup>3</sup>  
Did not show teratogenic effects in animal experiments.

diphenylmethane-4,4'-diisocyanate  
NOAEL (teratogenicity): 12 mg/m<sup>3</sup>  
NOAEL (maternal): 4 mg/m<sup>3</sup>  
NOAEL (developmental toxicity): 4 mg/m<sup>3</sup>  
Species: rat, female  
Application Route: Inhalative  
Dose Levels: 0 - 1 - 4 - 12 mg/m<sup>3</sup>  
Frequency of treatment: 6 hours/day (Exposure duration: 10 days (day 6 - 15 p.c.))  
Test period: 20 d  
Test substance: as aerosol  
Method: OECD Test Guideline 414  
NOAEL (developmental toxicity): 4 mg/m<sup>3</sup>  
Did not show teratogenic effects in animal experiments.  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
NOAEL (teratogenicity): 12 mg/m<sup>3</sup>  
NOAEL (maternal): 4 mg/m<sup>3</sup>  
NOAEL (developmental toxicity): 4 mg/m<sup>3</sup>  
Species: rat, female  
Application Route: Inhalative  
Dose Levels: 0 - 1 - 4 - 12 mg/m<sup>3</sup>  
Frequency of treatment: 6 hours/day (Exposure duration: 10 days (day 6 - 15 p.c.))  
Test period: 20 d  
Test substance: as aerosol  
Method: OECD Test Guideline 414  
NOAEL (developmental toxicity): 4 mg/m<sup>3</sup>  
Did not show teratogenic effects in animal experiments.  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
NOAEL (teratogenicity): 12 mg/m<sup>3</sup>  
NOAEL (maternal): 4 mg/m<sup>3</sup>  
NOAEL (developmental toxicity): 4 mg/m<sup>3</sup>  
Species: rat, female  
Application Route: Inhalative  
Dose Levels: 0 - 1 - 4 - 12 mg/m<sup>3</sup>  
Frequency of treatment: 6 hours/day (Exposure duration: 10 days (day 6 - 15 p.c.))  
Test period: 20 d  
Test substance: as aerosol  
Method: OECD Test Guideline 414  
Did not show teratogenic effects in animal experiments.  
Studies of a comparable product.

### Genotoxicity in vitro

diphenylmethane-diisocyanate, isomers and homologues  
Test type: Salmonella/microsome test (Ames test)  
Test system: Salmonella typhimurium  
Metabolic activation: with/without  
Result: negative  
Method: OECD Test Guideline 471

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diphenylmethane-4,4'-diisocyanate  
Test type: Salmonella/microsome test (Ames test)  
Test system: Salmonella typhimurium  
Metabolic activation: with/without  
Result: negative  
Method: OECD Test Guideline 471  
Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
Test type: Salmonella/microsome test (Ames test)  
Test system: Salmonella typhimurium  
Metabolic activation: with/without  
Result: negative  
Method: OECD Test Guideline 471

2,2'-Methylenediphenyl diisocyanate  
Test type: Salmonella/microsome test (Ames test)  
Test system: Salmonella typhimurium  
Metabolic activation: with/without  
Result: negative  
Method: OECD Test Guideline 471  
Studies at the product.

### Genotoxicity in vivo

diphenylmethane-diisocyanate, isomers and homologues  
Test type: Micronucleus test  
Species: rat, male  
Application Route: Inhalative (exposure period: 3x1h/day over 3 weeks)  
Result: negative  
Method: OECD Test Guideline 474  
Studies of a comparable product.

diphenylmethane-4,4'-diisocyanate  
Test type: Micronucleus test  
Species: rat, male  
Application Route: Inhalative (exposure period: 3x1h/day over 3 weeks)  
Result: negative  
Method: OECD Test Guideline 474

Diphenylmethane-2,4'-diisocyanate  
Test type: Micronucleus test  
Species: rat, male  
Application Route: Inhalative (exposure period: 3x1h/day over 3 weeks)  
Result: negative  
Method: OECD Test Guideline 474  
Toxicological studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
Test type: Micronucleus test  
Species: rat, male  
Application Route: Inhalative (exposure period: 3x1h/day over 3 weeks)  
Result: negative  
Method: OECD Test Guideline 474  
Toxicological studies of a comparable product.

### STOT evaluation – one-time exposure

diphenylmethane-diisocyanate, isomers and homologues  
Route of exposure: Inhalative  
Target Organs: Respiratory Tract  
May cause respiratory irritation.

diphenylmethane-4,4'-diisocyanate  
Route of exposure: Inhalative  
Target Organs: Respiratory Tract  
May cause respiratory irritation.

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Diphenylmethane-2,4'-diisocyanate

Route of exposure: Inhalative

Target Organs: Respiratory Tract

May cause respiratory irritation.

2,2'-Methylenediphenyl diisocyanate

Route of exposure: Inhalative

Target Organs: Respiratory Tract

May cause respiratory irritation.

### STOT evaluation – repeated exposure

diphenylmethane-diisocyanate, isomers and homologues

Route of exposure: Inhalative

Target Organs: Respiratory Tract

May cause damage to organs through prolonged or repeated exposure.

diphenylmethane-4,4'-diisocyanate

Route of exposure: Inhalative

Target Organs: Respiratory Tract

May cause damage to organs through prolonged or repeated exposure.

Diphenylmethane-2,4'-diisocyanate

Route of exposure: Inhalative

Target Organs: Respiratory Tract

May cause damage to organs through prolonged or repeated exposure.

2,2'-Methylenediphenyl diisocyanate

Route of exposure: Inhalative

Target Organs: Respiratory Tract

May cause damage to organs through prolonged or repeated exposure.

### Aspiration toxicity

diphenylmethane-diisocyanate, isomers and homologues

Based on available data, the classification criteria are not met.

diphenylmethane-4,4'-diisocyanate

Based on available data, the classification criteria are not met.

Diphenylmethane-2,4'-diisocyanate

Based on available data, the classification criteria are not met.

2,2'-Methylenediphenyl diisocyanate

Based on available data, the classification criteria are not met.

### CMR Assessment

diphenylmethane-diisocyanate, isomers and homologues

Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2).

Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.

Teratogenicity: Did not show teratogenic effects in animal experiments. Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

diphenylmethane-4,4'-diisocyanate

Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2).

Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.

Teratogenicity: Did not show teratogenic effects in animal experiments. Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

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### Diphenylmethane-2,4'-diisocyanate

Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2).

Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.

Teratogenicity: Did not show teratogenic effects in animal experiments. Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

### 2,2'-Methylenediphenyl diisocyanate

Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2).

Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.

Teratogenicity: Did not show teratogenic effects in animal experiments. Based on available data, the classification criteria are not met.

Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

### Toxicology Assessment

diphenylmethane-diisocyanate, isomers and homologues

Acute effects: Harmful if inhaled. The product causes irritation of eyes, skin and mucous membranes.

Sensitization: May cause sensitization by inhalation and skin contact.

### diphenylmethane-4,4'-diisocyanate

Acute effects: Harmful if inhaled. The product causes irritation of eyes, skin and mucous membranes.

Sensitization: May cause sensitization by inhalation and skin contact.

### Diphenylmethane-2,4'-diisocyanate

Acute effects: Harmful if inhaled. The product causes irritation of eyes, skin and mucous membranes.

Sensitization: May cause sensitization by inhalation and skin contact.

### 2,2'-Methylenediphenyl diisocyanate

Acute effects: Harmful if inhaled. The product causes irritation of eyes, skin and mucous membranes.

Sensitization: May cause sensitization by inhalation and skin contact.

### Additional information

Special properties/effects: Over-exposure entails the risk of concentration-dependent irritating effects on eyes, nose throat, and respiratory tract. Delayed appearance of the complaints and development of hypersensitivity (difficult breathing, coughing, asthma) are possible. Hypersensitive persons may suffer from these effects even at low isocyanate concentrations, including concentrations below the UK Workplace Exposure Limit (WEL). Prolonged contact with the skin may cause tanning and irritant effects.

## SECTION 12: Ecological information

Ecotoxicological studies of the product are not available.

Do not allow to escape into waterways, wastewater or soil.

Please find below the ecotoxicological data available to us for the components.

### 12.1 Toxicity

#### Acute Fish toxicity

diphenylmethane-diisocyanate, isomers and homologues

LC50 > 1.000 mg/l

Test type: Acute Fish toxicity

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

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diphenylmethane-4,4'-diisocyanate  
LC50 > 1.000 mg/l  
Test type: Acute Fish toxicity  
Species: Danio rerio (zebra fish)  
Exposure duration: 96 h  
Method: OECD Test Guideline 203  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
LC50 > 1.000 mg/l  
Test type: Acute Fish toxicity  
Species: Danio rerio (zebra fish)  
Exposure duration: 96 h  
Method: OECD Test Guideline 203  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
LC50 > 1.000 mg/l  
Test type: Acute Fish toxicity  
Species: Danio rerio (zebra fish)  
Exposure duration: 96 h  
Method: OECD Test Guideline 203  
Studies of a comparable product.

### Acute toxicity for daphnia

diphenylmethane-diisocyanate, isomers and homologues  
EC50 > 1.000 mg/l  
Test type: static test  
Species: Daphnia magna (Water flea)  
Exposure duration: 24 h  
Method: OECD Test Guideline 202

diphenylmethane-4,4'-diisocyanate  
EC50 > 1.000 mg/l  
Species: Daphnia magna (Water flea)  
Exposure duration: 24 h  
Method: OECD Test Guideline 202  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
EC50 > 1.000 mg/l  
Species: Daphnia magna (Water flea)  
Exposure duration: 24 h  
Method: OECD Test Guideline 202  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
EC50 > 1.000 mg/l  
Species: Daphnia magna (Water flea)  
Exposure duration: 24 h  
Method: OECD Test Guideline 202  
Studies of a comparable product.

### Chronic toxicity to daphnia

diphenylmethane-diisocyanate, isomers and homologues  
NOEC (Reproduction) > 10 mg/l  
Species: Daphnia magna (Water flea)  
Exposure duration: 21 d  
Method: OECD Test Guideline 202

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diphenylmethane-4,4'-diisocyanate  
NOEC (Reproduction) > 10 mg/l  
Species: Daphnia magna (Water flea)  
Exposure duration: 21 d  
Method: OECD Test Guideline 202  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
NOEC (Reproduction) > 10 mg/l  
Species: Daphnia magna (Water flea)  
Exposure duration: 21 d  
Method: OECD Test Guideline 202  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
NOEC (Reproduction) > 10 mg/l  
Species: Daphnia magna (Water flea)  
Exposure duration: 21 d  
Method: OECD Test Guideline 202  
Studies of a comparable product.

### Acute toxicity for algae

diphenylmethane-diisocyanate, isomers and homologues  
ErC50 > 1.640 mg/l  
Test type: Growth inhibition  
Species: scenedesmus subspicatus  
Exposure duration: 72 h  
Method: OECD Test Guideline 201

diphenylmethane-4,4'-diisocyanate  
ErC50 > 1.640 mg/l  
Test type: Growth inhibition  
Species: scenedesmus subspicatus  
Exposure duration: 72 h  
Method: OECD Test Guideline 201  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
ErC50 > 1.640 mg/l  
Test type: Growth inhibition  
Species: scenedesmus subspicatus  
Exposure duration: 72 h  
Method: OECD Test Guideline 201  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
EC50 > 1.640 mg/l  
Test type: Growth inhibition  
Species: scenedesmus subspicatus  
Exposure duration: 72 h  
Method: OECD Test Guideline 201  
Studies of a comparable product.

### Acute bacterial toxicity

diphenylmethane-diisocyanate, isomers and homologues  
EC50 > 100 mg/l  
Test type: Respiration inhibition  
Species: activated sludge  
Exposure duration: 3 h  
Method: OECD Test Guideline 209

diphenylmethane-4,4'-diisocyanate  
EC50 > 100 mg/l  
Test type: Respiration inhibition  
Species: activated sludge  
Exposure duration: 3 h

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Method: OECD Test Guideline 209  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
EC50 > 100 mg/l  
Test type: Respiration inhibition  
Species: activated sludge  
Exposure duration: 3 h  
Method: OECD Test Guideline 209  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
EC50 > 100 mg/l  
Test type: Respiration inhibition  
Species: activated sludge  
Exposure duration: 3 h  
Method: OECD Test Guideline 209  
Studies of a comparable product.

### **Toxicity to soil dwelling organisms**

diphenylmethane-diisocyanate, isomers and homologues  
NOEC (mortality) > 1.000 mg/kg  
Species: Eisenia fetida (earthworms)  
Exposure duration: 14 d  
Method: OECD Test Guideline 207

diphenylmethane-4,4'-diisocyanate  
NOEC (mortality) > 1.000 mg/kg  
Species: Eisenia fetida (earthworms)  
Exposure duration: 14 d  
Method: OECD Test Guideline 207  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
NOEC (mortality) > 1.000 mg/kg  
Species: Eisenia fetida (earthworms)  
Exposure duration: 14 d  
Method: OECD Test Guideline 207  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
NOEC (mortality) > 1.000 mg/kg  
Species: Eisenia fetida (earthworms)  
Exposure duration: 14 d  
Method: OECD Test Guideline 207  
Studies of a comparable product.

### **Toxicity to terrestrial plants**

diphenylmethane-diisocyanate, isomers and homologues  
NOEC (seedling emergence) > 1.000 mg/kg  
Species: Avena sativa (oats)  
Exposure duration: 14 d  
Method: OECD Test Guideline 208

NOEC (Growth rate) > 1.000 mg/kg  
Species: Avena sativa (oats)  
Exposure duration: 14 d  
Method: OECD Test Guideline 208

NOEC (seedling emergence) > 1.000 mg/kg  
Species: Lactuca sativa (lettuce)  
Exposure duration: 14 d  
Method: OECD Test Guideline 208

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NOEC (Growth rate) > 1.000 mg/kg

Species: Lactuca sativa (lettuce)

Exposure duration: 14 d

Method: OECD Test Guideline 208

diphenylmethane-4,4'-diisocyanate

NOEC (seedling emergence) > 1.000 mg/kg

Species: Avena sativa (oats)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

NOEC (Growth rate) > 1.000 mg/kg

Species: Avena sativa (oats)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

NOEC (seedling emergence) > 1.000 mg/kg

Species: Lactuca sativa (lettuce)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

NOEC (Growth rate) > 1.000 mg/kg

Species: Lactuca sativa (lettuce)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

NOEC (seedling emergence) > 1.000 mg/kg

Species: Avena sativa (oats)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

NOEC (Growth rate) > 1.000 mg/kg

Species: Avena sativa (oats)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

NOEC (seedling emergence) > 1.000 mg/kg

Species: Lactuca sativa (lettuce)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

NOEC (Growth rate) > 1.000 mg/kg

Species: Lactuca sativa (lettuce)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate

NOEC (seedling emergence) > 1.000 mg/kg

Species: Avena sativa (oats)

Exposure duration: 14 d

Method: OECD Test Guideline 208

Studies of a comparable product.



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NOEC (Growth rate) > 1.000 mg/kg  
Species: Avena sativa (oats)  
Exposure duration: 14 d  
Method: OECD Test Guideline 208  
Studies of a comparable product.

NOEC (seedling emergence) > 1.000 mg/kg  
Species: Lactuca sativa (lettuce)  
Exposure duration: 14 d  
Method: OECD Test Guideline 208  
Studies of a comparable product.

NOEC (Growth rate) > 1.000 mg/kg  
Species: Lactuca sativa (lettuce)  
Exposure duration: 14 d  
Method: OECD Test Guideline 208  
Studies of a comparable product.

### Ecotoxicology Assessment

diphenylmethane-diisocyanate, isomers and homologues

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: There is no evidence of a chronic aquatic toxicity.

Toxicity Data on Soil: Not expected to adsorb on soil. The substance is graded as non-critical to soil-dwelling organisms.

Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

diphenylmethane-4,4'-diisocyanate

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: There is no evidence of a chronic aquatic toxicity.

Toxicity Data on Soil: Not expected to adsorb on soil. The substance is graded as non-critical to soil-dwelling organisms.

Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

Diphenylmethane-2,4'-diisocyanate

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: There is no evidence of a chronic aquatic toxicity.

Toxicity Data on Soil: Not expected to adsorb on soil. The substance is graded as non-critical to soil-dwelling organisms.

Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

2,2'-Methylenediphenyl diisocyanate

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: There is no evidence of a chronic aquatic toxicity.

Toxicity Data on Soil: Not expected to adsorb on soil.

Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

Toxicity Data on Soil: The substance is graded as non-critical to soil-dwelling organisms.

### 12.2 Persistence and degradability

#### Biodegradability

diphenylmethane-diisocyanate, isomers and homologues

Test type: aerobic

Inoculum: activated sludge

Biodegradation: 0 %, 28 d, i.e. not inherently degradable

Method: OECD Test Guideline 302 C

According to the results of tests of biodegradability this product is not readily biodegradable.

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diphenylmethane-4,4'-diisocyanate  
Biodegradation: 0 %, 28 d, i.e. not inherently degradable  
Method: OECD Test Guideline 302 C  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
Biodegradation: 0 %, 28 d, i.e. not inherently degradable  
Method: OECD Test Guideline 302 C  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
Biodegradation: 0 %, 28 d, i.e. not inherently degradable  
Method: OECD Test Guideline 302 C  
Studies of a comparable product.

### Stability in water

diphenylmethane-diisocyanate, isomers and homologues  
Test type: Hydrolysis  
Half life: 20 h at 25 °C  
The substance hydrolyzes rapidly in water.  
Studies of a comparable product.

diphenylmethane-4,4'-diisocyanate  
Test type: Hydrolysis  
Half life: 20 h at 25 °C  
The substance hydrolyzes rapidly in water.  
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate  
Test type: Hydrolysis  
Half life: 20 h at 25 °C  
The substance hydrolyzes rapidly in water.  
Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate  
Test type: Hydrolysis  
Half life: 20 h at 25 °C  
The substance hydrolyzes rapidly in water.  
Studies of a comparable product.

### Photodegradation

diphenylmethane-diisocyanate, isomers and homologues  
Test type: Phototransformation in air  
Temperature: 25 °C  
sensitizer: OH-radicals  
Concentration sensibilisator: 500.000 1/cm<sup>3</sup>  
Half-life indirect photolysis: 0,92 d  
Method: SRC - AOP (calculation)  
After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.  
Studies of a comparable product.

diphenylmethane-4,4'-diisocyanate  
Test type: Phototransformation in air  
sensitizer: OH-radicals  
Concentration sensibilisator: 500.000 1/cm<sup>3</sup>  
Rate constant: 1,16E-11 cm<sup>3</sup>/s  
Half-life indirect photolysis: 0,92 d  
Method: SRC - AOP (calculation)  
After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.

Diphenylmethane-2,4'-diisocyanate  
Test type: Phototransformation in air  
sensitizer: OH-radicals  
Concentration sensibilisator: 500.000 1/cm<sup>3</sup>

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Rate constant:  $1,16E-11$  cm<sup>3</sup>/s  
Half-life indirect photolysis: 0,92 d  
Method: SRC - AOP (calculation)  
After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.

2,2'-Methylenediphenyl diisocyanate  
Test type: Phototransformation in air  
sensitizer: OH-radicals  
Concentration sensibilisator: 500.000 1/cm<sup>3</sup>  
Rate constant:  $1,16E-11$  cm<sup>3</sup>/s  
Half-life indirect photolysis: 0,92 d  
Method: SRC - AOP (calculation)  
After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.

### Volatility (Henry's Law constant)

diphenylmethane-4,4'-diisocyanate  
Calculated value = 0,0229 Pa\*m<sup>3</sup>/mol  
The substance has to be scored as being slightly volatile from water.

Diphenylmethane-2,4'-diisocyanate  
Calculated value = 0,0229 Pa\*m<sup>3</sup>/mol  
The substance has to be scored as being slightly volatile from water.

2,2'-Methylenediphenyl diisocyanate  
Calculated value = 0,0229 Pa\*m<sup>3</sup>/mol  
The substance has to be scored as being slightly volatile from water.

### 12.3 Bioaccumulative potential

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### Bioaccumulation

diphenylmethane-diisocyanate, isomers and homologues

Bioconcentration factor (BCF): < 14

Species: Cyprinus carpio (Carp)

Exposure duration: 42 d

Concentration: 0,2 mg/l

Method: OECD Test Guideline 305 C

An accumulation in aquatic organisms is not to be expected.

The substance hydrolyzes rapidly in water.

Studies of hydrolysis products.

diphenylmethane-4,4'-diisocyanate

Bioconcentration factor (BCF): 200

Species: Cyprinus carpio (Carp)

Exposure duration: 28 d

Concentration: 0,00008 mg/l

Test substance: 14C-labelled

Method: OECD Test Guideline 305 E

An accumulation in aquatic organisms is not to be expected.

Diphenylmethane-2,4'-diisocyanate

Bioconcentration factor (BCF): 200

Species: Cyprinus carpio (Carp)

Exposure duration: 28 d

Concentration: 0,00008 mg/l

Test substance: 14C-labelled

Method: OECD Test Guideline 305 E

An accumulation in aquatic organisms is not to be expected.

Studies of a comparable product.

2,2'-Methylenediphenyl diisocyanate

Bioconcentration factor (BCF): 200

Species: Cyprinus carpio (Carp)

Exposure duration: 28 d

Concentration: 0,00008 mg/l

Test substance: 14C-labelled

Method: OECD Test Guideline 305 E

An accumulation in aquatic organisms is not to be expected.

Studies of a comparable product.

### 12.4 Mobility in soil

#### Distribution among environmental compartments

diphenylmethane-4,4'-diisocyanate

Adsorption/Soil

not applicable

Diphenylmethane-2,4'-diisocyanate

Adsorption/Soil

not applicable

2,2'-Methylenediphenyl diisocyanate

Adsorption/Soil

not applicable

#### Environmental distribution

diphenylmethane-diisocyanate, isomers and homologues

no data available

diphenylmethane-4,4'-diisocyanate

no data available

Diphenylmethane-2,4'-diisocyanate

no data available

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2,2'-Methylenediphenyl diisocyanate  
no data available

### 12.5 Results of PBT and vPvB assessment

diphenylmethane-diisocyanate, isomers and homologues  
This substance does not meet the criteria for classification as PBT or vPvB.

diphenylmethane-4,4'-diisocyanate  
This substance does not meet the criteria for classification as PBT or vPvB.

Diphenylmethane-2,4'-diisocyanate  
This substance does not meet the criteria for classification as PBT or vPvB.

2,2'-Methylenediphenyl diisocyanate  
This substance does not meet the criteria for classification as PBT or vPvB.

### 12.6 Other adverse effects

Isocyanate reacts with water at the interface forming CO<sub>2</sub> and a solid insoluble product with high melting point (polyurea). This reaction is accelerated by surfactants (e.g. detergents) or by watersoluble solvents. Previous experience shows that polyurea is inert and non-degradable.

## SECTION 13: Disposal considerations

Dispose in accordance with applicable international, national and local laws, ordinances and statutes.

For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used.

### 13.1 Waste treatment methods

After final product withdrawal, all residues must be removed from containers (drip-free, powder-free or paste-free). Once the product residues adhering to the walls of the containers have been rendered harmless, the product and hazard labels must be invalidated. These containers can be returned for recycling to the appropriate centres set up within the framework of the existing take-back scheme of the chemical industry. Containers must be recycled in compliance with national legislation and environmental regulations.

None disposal into waste water.

## SECTION 14: Transport information

### ADR/RID

14.1 UN number : Not dangerous goods  
14.2 UN proper shipping name : Not dangerous goods  
14.3 Transport hazard class(es) : Not dangerous goods  
14.4 Packing group : Not dangerous goods  
14.5 Environmental hazards : Not dangerous goods

### ADN

14.1 UN number : Not dangerous goods  
14.2 UN proper shipping name : Not dangerous goods  
14.3 Transport hazard class(es) : Not dangerous goods  
14.4 Packing group : Not dangerous goods  
14.5 Environmental hazards : Not dangerous goods

### IATA

14.1 UN number : Not dangerous goods  
14.2 UN proper shipping name : Not dangerous goods  
14.3 Transport hazard class(es) : Not dangerous goods  
14.4 Packing group : Not dangerous goods

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14.5 Environmental hazards : Not dangerous goods

### IMDG

14.1 UN number : Not dangerous goods  
14.2 UN proper shipping name : Not dangerous goods  
14.3 Transport hazard class(es) : Not dangerous goods  
14.4 Packing group : Not dangerous goods  
14.5 Environmental hazards : Not dangerous goods

### 14.6 Special precautions for user

See section 6 - 8.

Additional information : Not dangerous cargo.  
Keep dry.  
Avoid heat above +50 °C. Avoid temperatures below +10 °C.  
Keep away from foodstuffs, acids and alkalis.

### 14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

## SECTION 15: Regulatory information

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

**Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.**  
not applicable

#### TA Luft List (Germany)

Type: Organic Substances  
portion Class 1: 99,9 %  
Fraction of other substances: 0,1 %

#### Water contaminating class (Germany)

1 slightly water endangering  
(in accordance with Annex 4 to the Directive on Water-Hazardous Substances)

Any existing national regulations on the handling of isocyanates must be observed.

### 15.2 Chemical Safety Assessment

**A Chemical Safety Assessment has been carried out for:**

diphenylmethane-4,4'-diisocyanate  
Diphenylmethane-2,4'-diisocyanate  
2,2'-Methylenediphenyl diisocyanate

## SECTION 16: Other information

**Full text of hazardous (H) warnings referred to under sections 2, 3 and 10 of the CLP classification (1272/2008/CE).**

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.

ISOPA Guidelines for safe loading/unloading, transport and storage of TDI and MDI. ISOPA Order No.: PSC-0005-GUIDL

Changes since the last version are highlighted in the margin. This version replaces all previous versions.

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**Further information**

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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### Annex - Exposure Scenario

The operational conditions and the implementation of Risk Management Measures (RMM) are dependent on the following priority-/lead substances for the respective exposure routes:

**Priority substance(s), Respiratory sensitiser:**

diphenylmethane-diisocyanate, isomers and homologues  
For RMMs see chapter 8 of the SDS.  
diphenylmethane-4,4'-diisocyanate

**Lead substance(s), Oral:**

diphenylmethane-diisocyanate, isomers and homologues  
For RMMs see chapter 8 of the SDS.  
diphenylmethane-4,4'-diisocyanate

**Lead substance(s), Inhalative:**

diphenylmethane-4,4'-diisocyanate

**Lead substance(s), Dermal:**

diphenylmethane-diisocyanate, isomers and homologues  
For RMMs see chapter 8 of the SDS.  
diphenylmethane-4,4'-diisocyanate

**Lead substance(s), Eyes:**

diphenylmethane-diisocyanate, isomers and homologues  
For RMMs see chapter 8 of the SDS.  
diphenylmethane-4,4'-diisocyanate

**Lead substance(s), aquatic environment:**

Not relevant

### Summary of Exposure Scenarios

- Use for Manufacturing of other Substances and Formulation (including Resin Manufacture), Repackaging and Distribution (ES1) : SU 3; SU8, SU9, SU 10; PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15; ERC2, ERC3, ERC6a, ERC6c
  - Industrial use for Flexible Foam and TPU, Polyamide, Polyimide and Synthetic Fibres and Manufacturing of other Polymers (ES2) : SU 3; PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC14, PROC15; ERC2, ERC3, ERC6c
  - Industrial use for rigid foam, coatings and adhesives and sealants (ES3) : SU 3; PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15; ERC2, ERC3, ERC5, ERC6c
  - Professional end use in rigid foam, coatings, adhesives and sealants and other composite material (ES4) : SU 22; SU 22; PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC10, PROC11, PROC13, PROC14, PROC15; ERC8c, ERC8f
  - Consumer end use in rigid foam, coatings and adhesives and sealants (ES5) : SU 21; SU 21; PC1, PC9a, PC32; ERC8c, ERC8f
-



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**1. Short title of Exposure Scenario: - Use for Manufacturing of other Substances and Formulation (including Resin Manufacture), Repackaging and Distribution (ES1)**

Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	: <b>SU8:</b> Manufacture of bulk, large scale chemicals (including petroleum products) <b>SU9:</b> Manufacture of fine chemicals <b>SU 10:</b> Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)
Process category	: <b>PROC1:</b> Use in closed process, no likelihood of exposure <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC3:</b> Use in closed batch process (synthesis or formulation) <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing) <b>PROC15:</b> Use as laboratory reagent
Environmental release category	: <b>ERC2:</b> Formulation of preparations <b>ERC3:</b> Formulation in materials <b>ERC6a:</b> Industrial use resulting in manufacture of another substance (use of intermediates) <b>ERC6c:</b> Industrial use of monomers for manufacture of thermoplastics
Further information	: Only the uses defined in the short title and the use descriptors listed above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

**2.1 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15**

**[MDI]**

**- Use for Manufacturing of other Substances and Formulation (including Resin Manufacture), Repackaging and Distribution**

**Product characteristics**

Concentration of the Substance in Mixture/Article

Remarks : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Liquid substance (unless stated differently)  
Substance is a unique structure, OR, Substance of unknown or variable composition, complex reaction products or biological material (UVCB)

**Frequency and duration of use**

Exposure duration : 8 hours/day

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Frequency of use : daily

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor/Outdoor use

### Technical conditions and measures

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Provide extract ventilation to material transfer points and other openings. Handle in a fume cupboard or under extract ventilation.

Additional measures are specific for the following contributing scenarios:

#### **PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)**

Provide extraction ventilation at points where emissions occur.

### Conditions and measures related to personal protection, hygiene and health evaluation

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin.

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin. If above technical/organisational control measures are not feasible, then adopt following PPE: Wear a respirator conforming to EN140 with Type A filter or better. OR: Demonstrate, e.g. by workplace monitoring, that exposures are below the relevant worker DNEL values for acute and long-term.

#### **PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities: solid**

Wear a respirator conforming to EN140 with Type A/P2 filter or better.

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### 3. Exposure estimation and reference to its source

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**Workers**

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (Exposure value/DNEL)
2.1 PROC 1	Measured value	LEV: Reflected in measured data	short term, inhalation	0,026 mg/m <sup>3</sup>	0,260
2.1 PROC 2	Measured value	LEV: Reflected in measured data	short term, inhalation	0,026 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	short term, inhalation	0,018 mg/m <sup>3</sup>	0,184
2.1 PROC 4	Measured value	LEV: Reflected in measured data	short term, inhalation	0,016 mg/m <sup>3</sup>	0,164
2.1 PROC 5	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 8b	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 9	Measured value	LEV: Reflected in measured data	short term, inhalation	0,009 mg/m <sup>3</sup>	0,094
2.1 PROC 15	Measured value	LEV: Reflected in measured data	short term, inhalation	0,011 mg/m <sup>3</sup>	0,112
2.1 All PROCs	Qualitative assessment		short term, dermal	*	
2.1 PROC 1	Measured value	LEV: Reflected in measured data	long term, inhalation	0,013 mg/m <sup>3</sup>	0,260
2.1 PROC 2	Measured value	LEV: Reflected in measured data	long term, inhalation	0,013 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	long term, inhalation	0,009 mg/m <sup>3</sup>	0,184
2.1 PROC 4	Measured value	LEV: Reflected in measured data	long term, inhalation	0,008 mg/m <sup>3</sup>	0,164
2.1 PROC 5	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 8b	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 9	Measured value	LEV: Reflected in measured data	long term, inhalation	0,005 mg/m <sup>3</sup>	0,094
2.1 PROC 15	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,112
2.1 All PROCs	Qualitative assessment		long term, dermal	*	

\*Due to the applied RMMs it is considered that the risks of dermal exposure are sufficiently controlled.

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR ≤ 1).

#### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

**MDI**

Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

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Further information on the assumptions contained in this Exposure Scenario can be found at:  
[www.ISOPA.org](http://www.ISOPA.org) - "ISOPA interpretation on selection of Use Descriptors"

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### 1. Short title of Exposure Scenario: - Industrial use for Flexible Foam and TPU, Polyamide, Polyimide and Synthetic Fibres and Manufacturing of other Polymers (ES2)

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Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category	: <b>PROC1:</b> Use in closed process, no likelihood of exposure <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC3:</b> Use in closed batch process (synthesis or formulation) <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) <b>PROC7:</b> Industrial spraying <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing) <b>PROC14:</b> Production of preparations or articles by tableting, compression, extrusion, pelletisation <b>PROC15:</b> Use as laboratory reagent
Environmental release category	: <b>ERC2:</b> Formulation of preparations <b>ERC3:</b> Formulation in materials <b>ERC6c:</b> Industrial use of monomers for manufacture of thermoplastics
Further information	: Only the uses defined in the short title and the use descriptors listed above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

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#### 2.1 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC21

[MDI]

#### - Industrial use for Flexible Foam and TPU, Polyamide, Polyimide and Synthetic Fibres and Manufacturing of other Polymers

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##### Product characteristics

Concentration of the Substance in Mixture/Article

Remarks	: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	: Liquid substance (unless stated differently) Substance is a unique structure, OR, Substance of unknown or variable composition, complex reaction products or biological material (UVCB)

##### Frequency and duration of use

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Exposure duration : 8 hours/day  
Frequency of use : daily

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor/Outdoor use

### Technical conditions and measures

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Provide extract ventilation to material transfer points and other openings. Handle in a fume cupboard or under extract ventilation.

Additional measures are specific for the following contributing scenarios:

#### **PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)**

Provide extraction ventilation at points where emissions occur.

#### **PROC7: Industrial spraying**

Carry out in a vented booth provided with laminar airflow. Carry out in a vented booth or extracted enclosure. Minimise exposure by extracted full enclosure for the operation or equipment. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.

### Conditions and measures related to personal protection, hygiene and health evaluation

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin.

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin. If above technical/organisational control measures are not feasible, then adopt following PPE: Wear a respirator conforming to EN140 with Type A filter or better. OR: Demonstrate, e.g. by workplace monitoring, that exposures are below the relevant worker DNEL values for acute and long-term.

Additional measures are specific for the following contributing scenarios:

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**PROC7: Industrial spraying**

If above technical/organisational control measures are not feasible, then adopt following PPE: Wear a respirator conforming to EN140 with Type A/P2 filter or better.

**PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities: solid**

Wear a respirator conforming to EN140 with Type A/P2 filter or better.

**3. Exposure estimation and reference to its source****Workers**

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (Exposure value/DNEL)
2.1 PROC 1	Measured value	LEV: Reflected in measured data	short term, inhalation	0,026 mg/m <sup>3</sup>	0,260
2.1 PROC 2	Measured value	LEV: Reflected in measured data	short term, inhalation	0,026 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	short term, inhalation	0,018 mg/m <sup>3</sup>	0,184
2.1 PROC 4	Measured value	LEV: Reflected in measured data	short term, inhalation	0,016 mg/m <sup>3</sup>	0,116
2.1 PROC 5 Flexible foam	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 5 Elastomers etc.	Measured value	LEV: Reflected in measured data	short term, inhalation	0,025 mg/m <sup>3</sup>	0,246
2.1 PROC 7	Measured value	LEV: Reflected in measured data	short term, inhalation	0,022 mg/m <sup>3</sup>	0,224
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 8b	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 9	Measured value	LEV: Reflected in measured data	short term, inhalation	0,01 mg/m <sup>3</sup>	0,094
2.1 PROC 14	Measured value	LEV: Reflected in measured data	short term, inhalation	0,012 mg/m <sup>3</sup>	0,116
2.1 PROC 15	Measured value	LEV: Reflected in measured data	short term, inhalation	0,011 mg/m <sup>3</sup>	0,112
2.1 PROC 21	Measured value	LEV: Reflected in measured data	short term, inhalation	0,013 mg/m <sup>3</sup>	0,128
2.1 All PROCs	Qualitative assessment		short term, dermal	*	
2.1 PROC 1	Measured value	LEV: Reflected in measured data	long term, inhalation	0,013 mg/m <sup>3</sup>	0,260
2.1 PROC 2	Measured value	LEV: Reflected in measured data	long term, inhalation	0,013 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	long term, inhalation	0,009 mg/m <sup>3</sup>	0,184
2.1 PROC 4	Measured value	LEV: Reflected in measured data	long term, inhalation	0,008 mg/m <sup>3</sup>	0,116
2.1 PROC 5 Flexible foam	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 5 Elastomers etc.	Measured value	LEV: Reflected in measured data	long term, inhalation	0,012 mg/m <sup>3</sup>	0,246
2.1 PROC 7	Measured value	LEV: Reflected in measured data	long term, inhalation	0,011 mg/m <sup>3</sup>	0,224
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582

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2.1 PROC 8b	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 9	Measured value	LEV: Reflected in measured data	long term, inhalation	0,005 mg/m <sup>3</sup>	0,094
2.1 PROC 14	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,116
2.1 PROC 15	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,112
2.1 PROC 21	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,128
2.1 All PROCs	Qualitative assessment		long term, dermal	*	

\*Due to the applied RMMs it is considered that the risks of dermal exposure are sufficiently controlled.

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR ≤ 1).

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#### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

**MDI**

Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Further information on the assumptions contained in this Exposure Scenario can be found at: [www.ISOPA.org](http://www.ISOPA.org) - "ISOPA interpretation on selection of Use Descriptors"



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### 1. Short title of Exposure Scenario: - Industrial use for rigid foam, coatings and adhesives and sealants (ES3)

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Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category	: <b>PROC1:</b> Use in closed process, no likelihood of exposure <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC3:</b> Use in closed batch process (synthesis or formulation) <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) <b>PROC7:</b> Industrial spraying <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing) <b>PROC10:</b> Roller application or brushing <b>PROC13:</b> Treatment of articles by dipping and pouring <b>PROC14:</b> Production of preparations or articles by tableting, compression, extrusion, pelletisation <b>PROC15:</b> Use as laboratory reagent
Environmental release category	: <b>ERC2:</b> Formulation of preparations <b>ERC3:</b> Formulation in materials <b>ERC5:</b> Industrial use resulting in inclusion into or onto a matrix <b>ERC6c:</b> Industrial use of monomers for manufacture of thermoplastics
Further information	: Only the uses defined in the short title and the use descriptors listed above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

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### 2.1 Contributing scenario controlling worker exposure for: **PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC21** **[MDI]** **- Industrial use for rigid foam, coatings and adhesives and sealants**

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#### Product characteristics

Concentration of the Substance in Mixture/Article

Remarks	: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	: Liquid substance (unless stated differently) Substance is a unique structure, OR, Substance of unknown or variable composition, complex reaction products or biological material (UVCB)

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### Frequency and duration of use

Exposure duration : 8 hours/day  
Frequency of use : daily

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor/Outdoor use

### Technical conditions and measures

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Provide extract ventilation to material transfer points and other openings. Handle in a fume cupboard or under extract ventilation.

Additional measures are specific for the following contributing scenarios:

#### **PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)**

Provide extraction ventilation at points where emissions occur.

#### **PROC7: Industrial spraying**

Carry out in a vented booth provided with laminar airflow. Carry out in a vented booth or extracted enclosure. Minimise exposure by extracted full enclosure for the operation or equipment. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.

### Conditions and measures related to personal protection, hygiene and health evaluation

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin.

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin. If above technical/organisational control measures are not feasible, then adopt following PPE: Wear a respirator conforming to EN140 with Type A filter or better. OR: Demonstrate, e.g. by workplace monitoring, that exposures are below the relevant worker DNEL values for acute and long-term.

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Additional measures are specific for the following contributing scenarios:

**PROC7: Industrial spraying**

If above technical/organisational control measures are not feasible, then adopt following PPE: Wear a respirator conforming to EN140 with Type A/P2 filter or better.

**PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities: solid**

Wear a respirator conforming to EN140 with Type A/P2 filter or better.

**3. Exposure estimation and reference to its source****Workers**

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (Exposure value/DNEL)
2.1 PROC 1	Measured value	LEV: Reflected in measured data	short term, inhalation	0,026 mg/m <sup>3</sup>	0,260
2.1 PROC 2	Measured value	LEV: Reflected in measured data	short term, inhalation	0,026 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	short term, inhalation	0,018 mg/m <sup>3</sup>	0,184
2.1 PROC 4	Measured value	LEV: Reflected in measured data	short term, inhalation	0,016 mg/m <sup>3</sup>	0,164
2.1 PROC 5	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 7 Hotmelt	Measured value	LEV: Reflected in measured data	short term, inhalation	0,022 mg/m <sup>3</sup>	0,224
2.1 PROC 7 Indoor Excluding hotmelt	Measured value	LEV: Reflected in measured data	short term, inhalation	0,020 mg/m <sup>3</sup>	0,204
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 8b	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 9	Measured value	LEV: Reflected in measured data	short term, inhalation	0,009 mg/m <sup>3</sup>	0,094
2.1 PROC 10	Measured value	LEV: Reflected in measured data	short term, inhalation	0,034 mg/m <sup>3</sup>	0,344
2.1 PROC 13	Measured value	LEV: Reflected in measured data	short term, inhalation	0,034 mg/m <sup>3</sup>	0,344
2.1 PROC 14	Measured value	LEV: Reflected in measured data	short term, inhalation	0,012 mg/m <sup>3</sup>	0,116
2.1 PROC 15	Measured value	LEV: Reflected in measured data	short term, inhalation	0,011 mg/m <sup>3</sup>	0,112
2.1 PROC 21	Measured value	LEV: Reflected in measured data	short term, inhalation	0,013 mg/m <sup>3</sup>	0,128
2.1 All PROCs	Qualitative assessment		short term, dermal	*	
2.1 PROC 1	Measured value	LEV: Reflected in measured data	long term, inhalation	0,013 mg/m <sup>3</sup>	0,260
2.1 PROC 2	Measured value	LEV: Reflected in measured data	long term, inhalation	0,013 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	long term, inhalation	0,009 mg/m <sup>3</sup>	0,184
2.1 PROC 4	Measured value	LEV: Reflected in measured data	long term, inhalation	0,008 mg/m <sup>3</sup>	0,164
2.1 PROC 5	Measured value	LEV: Reflected in measured	long term,	0,029 mg/m <sup>3</sup>	0,582

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		data	inhalation		
2.1 PROC 7 Hotmelt	Measured value	LEV: Reflected in measured data	long term, inhalation	0,011 mg/m <sup>3</sup>	0,224
2.1 PROC 7 Indoor Excluding hotmelt	Measured value	LEV: Reflected in measured data	long term, inhalation	0,010 mg/m <sup>3</sup>	0,204
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 8b	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 9	Measured value	LEV: Reflected in measured data	long term, inhalation	0,005 mg/m <sup>3</sup>	0,094
2.1 PROC 10	Measured value	LEV: Reflected in measured data	long term, inhalation	0,017 mg/m <sup>3</sup>	0,344
2.1 PROC 13	Measured value	LEV: Reflected in measured data	long term, inhalation	0,017 mg/m <sup>3</sup>	0,344
2.1 PROC 14	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,116
2.1 PROC 15	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,112
2.1 PROC 21	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,112
2.1 All PROCs	Qualitative assessment		long term, dermal	*	

\*Due to the applied RMMs it is considered that the risks of dermal exposure are sufficiently controlled.

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR ≤ 1).

#### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

##### MDI

Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Further information on the assumptions contained in this Exposure Scenario can be found at: [www.ISOPA.org](http://www.ISOPA.org) - "ISOPA interpretation on selection of Use Descriptors"

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### 1. Short title of Exposure Scenario: - Professional end use in rigid foam, coatings, adhesives and sealants and other composite material (ES4)

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Main User Groups	: <b>SU 22:</b> Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	: <b>SU 22:</b> Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process category	: <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC3:</b> Use in closed batch process (synthesis or formulation) <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities <b>PROC10:</b> Roller application or brushing <b>PROC11:</b> Non industrial spraying <b>PROC13:</b> Treatment of articles by dipping and pouring <b>PROC14:</b> Production of preparations or articles by tableting, compression, extrusion, pelletisation <b>PROC15:</b> Use as laboratory reagent
Environmental release category	: <b>ERC8c:</b> Wide dispersive indoor use resulting in inclusion into or onto a matrix <b>ERC8f:</b> Wide dispersive outdoor use resulting in inclusion into or onto a matrix
Further information	: Only the uses defined in the short title and the use descriptors listed above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

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### 2.1 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC10, PROC11, PROC13, PROC14, PROC15, PROC21

[MDI]

- Professional end use in rigid foam, coatings, adhesives and sealants and other composite material

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#### Product characteristics

Concentration of the Substance in Mixture/Article

Remarks	: Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	: Liquid substance (unless stated differently) Substance is a unique structure, OR, Substance of unknown or variable composition, complex reaction products or biological material (UVCB)

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### Frequency and duration of use

Frequency of use	:	daily
General exposures	:	8 hours/day
PROC 11	:	< 4 hours/day
Remarks	:	Indoor

### Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor/Outdoor use
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### Technical conditions and measures

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Provide extract ventilation to material transfer points and other openings. Handle in a fume cupboard or under extract ventilation.

Additional measures are specific for the following contributing scenarios:

#### **PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises: Close to the former line, Composite Material Based on Wood/Man-made/Mineral/Natural Fibres**

Provide extract ventilation to material transfer points and other openings.

#### **PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact): Adhesives and sealings and other composite material**

Provide extraction ventilation at points where emissions occur.

#### **PROC14: Production of preparations or articles by tableting, compression, extrusion, pelletisation**

Provide extraction ventilation at points where emissions occur.

#### **PROC21: Low energy manipulation of substances bound in materials and/ or articles**

Provide extraction ventilation at points where emissions occur.

### Conditions and measures related to personal protection, hygiene and health evaluation

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin.

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These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin. If above technical/organisational control measures are not feasible, then adopt following PPE: Wear a respirator conforming to EN140 with Type A filter or better. OR: Demonstrate, e.g. by workplace monitoring, that exposures are below the relevant worker DNEL values for acute and long-term.

Additional measures are specific for the following contributing scenarios:

**PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises: Close to the former line, Composite Material Based on Wood/Man-made/Mineral/Natural Fibres**

Wear a respirator conforming to EN140 with Type A/P2 filter or better.

**PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities: solid**

Wear a respirator conforming to EN140 with Type A/P2 filter or better.

**PROC11: Non industrial spraying**

Wear a full face respirator conforming to EN136 with Type A/P2 filter or better. Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.

**3. Exposure estimation and reference to its source****Workers**

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (Exposure value/DNEL)
2.1 PROC 2	Measured value	LEV: Reflected in measured data	short term, inhalation	0,026 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	short term, inhalation	0,018 mg/m <sup>3</sup>	0,184
2.1 PROC 3 Composite Material Based on Wood/Man-made/Mineral/Natural Fibres	Measured value	LEV: Reflected in measured data	short term, inhalation	0,004 mg/m <sup>3</sup>	0,038
2.1 PROC 4	Measured value	LEV: Reflected in measured data	short term, inhalation	0,012 mg/m <sup>3</sup>	0,116
2.1 PROC 4 Composite Material Based on Wood/Man-made/Mineral/Natural Fibres	Measured value	LEV: Reflected in measured data	short term, inhalation	0,023 mg/m <sup>3</sup>	0,227
2.1 PROC 5	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 5	Measured value	LEV: Reflected in measured	short term,	0,025 mg/m <sup>3</sup>	0,246

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Closed system		data	inhalation		
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 8b	Measured value	LEV: Reflected in measured data	short term, inhalation	0,058 mg/m <sup>3</sup>	0,582
2.1 PROC 8b Composite Material Based on Wood/Man-made/Mineral/Natural Fibres	Measured value	LEV: Reflected in measured data	short term, inhalation	0,003 mg/m <sup>3</sup>	0,034
2.1 PROC 10	Measured value	LEV: Reflected in measured data	short term, inhalation	0,034 mg/m <sup>3</sup>	0,328
2.1 PROC 11 Indoor	Measured value	LEV: Reflected in measured data	short term, inhalation	0,08 mg/m <sup>3</sup>	0,80
2.1 PROC 11 Outdoor	Measured value		short term, inhalation	0,087 mg/m <sup>3</sup>	0,87
2.1 PROC 13	Measured value	LEV: Reflected in measured data	short term, inhalation	0,034 mg/m <sup>3</sup>	0,344
2.1 PROC 14	Measured value	LEV: Reflected in measured data	short term, inhalation	0,012 mg/m <sup>3</sup>	0,116
2.1 PROC 15	Measured value	LEV: Reflected in measured data	short term, inhalation	0,011 mg/m <sup>3</sup>	0,112
2.1 PROC 21	Measured value	LEV: Reflected in measured data	short term, inhalation	0,001 mg/m <sup>3</sup>	0,008
2.1 All PROCs	Qualitative assessment		short term, dermal	*	
2.1 PROC 2	Measured value	LEV: Reflected in measured data	long term, inhalation	0,013 mg/m <sup>3</sup>	0,260
2.1 PROC 3	Measured value	LEV: Reflected in measured data	long term, inhalation	0,009 mg/m <sup>3</sup>	0,184
2.1 PROC 3 Composite Material Based on Wood/Man-made/Mineral/Natural Fibres	Measured value	LEV: Reflected in measured data	long term, inhalation	0,002 mg/m <sup>3</sup>	0,038
2.1 PROC 4	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,116
2.1 PROC 4 Composite Material Based on Wood/Man-made/Mineral/Natural Fibres	Measured value	LEV: Reflected in measured data	long term, inhalation	0,011 mg/m <sup>3</sup>	0,227
2.1 PROC 5	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 5 Closed system	Measured value	LEV: Reflected in measured data	long term, inhalation	0,012 mg/m <sup>3</sup>	0,246
2.1 PROC 8a	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 8b	Measured value	LEV: Reflected in measured data	long term, inhalation	0,029 mg/m <sup>3</sup>	0,582
2.1 PROC 8b Composite Material Based on Wood/Man-made/Mineral/Natural Fibres	Measured value	LEV: Reflected in measured data	long term, inhalation	0,002 mg/m <sup>3</sup>	0,034
2.1 PROC 10	Measured value	LEV: Reflected in measured data	long term, inhalation	0,017 mg/m <sup>3</sup>	0,328
2.1 PROC 11 Indoor	Measured value	LEV: Reflected in measured data	long term, inhalation	0,04 mg/m <sup>3</sup>	0,80
2.1 PROC 11 Outdoor	Measured value		long term, inhalation	0,043 mg/m <sup>3</sup>	0,87
2.1 PROC 13	Measured value	LEV: Reflected in measured data	long term, inhalation	0,017 mg/m <sup>3</sup>	0,344
2.1 PROC 14	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,116
2.1 PROC 15	Measured value	LEV: Reflected in measured data	long term, inhalation	0,006 mg/m <sup>3</sup>	0,112
2.1 PROC 21	Measured value	LEV: Reflected in measured data	long term, inhalation	0,0004 mg/m <sup>3</sup>	0,008



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2.1 All PROCs	Qualitative assessment		long term, dermal	*	
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\*Due to the applied RMMS it is considered that the risks of dermal exposure are sufficiently controlled.

Based on the applied RMMS the risk towards humans and the environment is sufficiently controlled (RCR  $\leq$  1).

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### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

#### MDI

Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Further information on the assumptions contained in this Exposure Scenario can be found at:  
[www.ISOPA.org](http://www.ISOPA.org) - "ISOPA interpretation on selection of Use Descriptors"

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### 1. Short title of Exposure Scenario: - Consumer end use in rigid foam, coatings and adhesives and sealants (ES5)

Main User Groups	: <b>SU 21:</b> Consumer uses: Private households (= general public = consumers)
Sector of use	: <b>SU 21:</b> Consumer uses: Private households (= general public = consumers)
Product category	: <b>PC1:</b> Adhesives, sealants <b>PC9a:</b> Coatings and paints, thinners, paint removers <b>PC32:</b> Polymer preparations and compounds
Environmental release category	: <b>ERC8c:</b> Wide dispersive indoor use resulting in inclusion into or onto a matrix <b>ERC8f:</b> Wide dispersive outdoor use resulting in inclusion into or onto a matrix
Further information	: Only the uses defined in the short title and the use descriptors listed above are regarded as safe/covered within this Exposure Scenario. In case of mixtures the other chapters may also contain additional information about further uses that are not safe/covered within this scenario.

### 2.1 Contributing scenario controlling consumer exposure for: PC1, PC9a, PC32

[MDI]

#### - Consumer end use in rigid foam, coatings and adhesives and sealants

#### Product characteristics

Physical Form (at time of use)	: Liquid substance (unless stated differently)
Physical Form (at time of use)	: Substance is a unique structure, OR, Substance of unknown or variable composition, complex reaction products or biological material (UVCB)

#### Amount used

PC1: Adhesives and sealants: Sealant joint	: 75 g/activity
Remarks	: Substance concentration 2%
PC1: Adhesives and sealants: Sealant assembly	: 390 g/activity
Remarks	: Substance concentration 2%
PC1: Adhesives and sealants: Adhesive hotmelt	: 65 g/activity
PC9a: Coatings, paints: Use of 2-component paint, high solids	: 150 g/activity
Remarks	: Substance concentration 30%
PC9a: Coatings, paints: Use of 2-component paint, solvent rich	: 195 g/activity
Remarks	: Substance concentration 30%
PC9a: Coatings, paints: Mixing and loading of 2-component solvent rich paint	: 150 g/activity
Remarks	: Substance concentration 100%
PC9a: Coatings, paints: Mixing and	: 195 g/activity

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loading of 2-component high solid paint  
 Remarks : Substance concentration 100%  
 PC9a: Coatings, paints: Floor coating : 3000 g/activity  
 high solid  
 Remarks : Substance concentration 10%  
 PC32: Rigids, insulation foams : 825 g/activity

**Frequency and duration of use**

PC1: Adhesives and sealants: Sealant joint : 45 min  
 PC1: Adhesives and sealants: Sealant assembly : 4 h  
 PC1: Adhesives and sealants: Adhesive hotmelt : 25 min  
 PC9a: Coatings, paints: Use of 2-component paint, high solids : 0,5 h  
 PC9a: Coatings, paints: Use of 2-component paint, solvent rich : 2 h  
 PC9a: Coatings, paints: Mixing and loading of 2-component solvent rich paint : 5 min  
 PC9a: Coatings, paints: Mixing and loading of 2-component high solid paint : 5 min  
 PC9a: Coatings, paints: Floor coating high solid : 1 h  
 PC32: Rigids, insulation foams : 0,5 h

**Human factors not influenced by risk management**

Exposed skin area :  
 PC1: Adhesives and sealants: Sealant joint : 2 cm<sup>2</sup>  
 PC1: Adhesives and sealants: Sealant assembly : 43 cm<sup>2</sup>  
 PC1: Adhesives and sealants: Adhesive hotmelt : 43 cm<sup>2</sup>  
 Substance concentration :  
 PC1: Adhesives and sealants: Sealant joint : 30 %

**Other given operational conditions affecting consumers exposure**

Outdoor / Indoor : Indoor/Outdoor use

Room size :  
 PC1: Adhesives and sealants: Sealant joint : 10 m<sup>3</sup>  
 PC1: Adhesives and sealants: Sealant assembly : 20 m<sup>3</sup>  
 PC1: Adhesives and sealants: Adhesive hotmelt : 20 m<sup>3</sup>  
 PC9a: Coatings, paints: Use of 2-component paint, high solids : 20 m<sup>3</sup>  
 PC9a: Coatings, paints: Use of 2-component paint, solvent rich : 20 m<sup>3</sup>  
 PC9a: Coatings, paints: Floor coating high solid : 34 m<sup>3</sup>  
 PC32: Rigids, insulation foams : 57,5 m<sup>3</sup>

**Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)**

Application Route : General advice  
 Consumer Measures : Avoid using without gloves.  
 Application Route : PC9a: Coatings, paints: Use of 2-component paint, solvent rich  
 Consumer Measures : Recommend: Not using in small, enclosed areas/rooms without ventilation. Ensure good ventilation when using indoors e.g. open windows.  
 Application Route : PC9a: Coatings, paints: Use of 2-component paint, high solids

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Consumer Measures	: Recommend: Not using in small, enclosed areas/rooms without ventilation. Ensure good ventilation when using indoors e.g. open windows.
Application Route	: PC9a: Coatings, paints: Floor coating high solid
Consumer Measures	: Recommend: Not using in small, enclosed areas/rooms without ventilation. Ensure good ventilation when using indoors e.g. open windows.
Application Route	: PC1: Adhesives and sealants: Sealant assembly
Consumer Measures	: Recommend: Not using in small, enclosed areas/rooms without ventilation. Ensure good ventilation when using indoors e.g. open windows.

**3. Exposure estimation and reference to its source****Consumers**

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (Exposure value/DNEL)
2.1 PC1 Sealant joint	Consexpo		long term, inhalation	0,0000231 mg/m <sup>3</sup> /day	< 0,01
2.1 PC1 Sealant assembly	Consexpo		long term, inhalation	0,01 mg/m <sup>3</sup> /day	0,30
2.1 PC1 Hotmelt	Consexpo		long term, inhalation	0,000000694 mg/m <sup>3</sup> /day	< 0,01
2.1 PC9a Use of 2-component paint, high solids	Consexpo		long term, inhalation	0,00372 mg/m <sup>3</sup> /day	0,15
2.1 PC9a Use of 2-component paint, solvent rich	Consexpo		long term, inhalation	0,000822 mg/m <sup>3</sup> /day	0,03
2.1 PC9a Mixing and loading of 2-component solvent rich paint	Consexpo		long term, inhalation	0,000000192 mg/m <sup>3</sup> /day	< 0,01
2.1 PC9a Mixing and loading of 2-component high solid paint	Consexpo		long term, inhalation	0,000000192 mg/m <sup>3</sup> /day	< 0,01
2.1 PC9a Floor coating high solid	Consexpo		long term, inhalation	0,00193 mg/m <sup>3</sup> /day	0,06
2.1 PC32	Consexpo		long term, inhalation	0,0000254 mg/m <sup>3</sup> /day	0,01
2.1	Qualitative assessment		Dermal exposure		

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR ≤ 1).

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

The risk management measures given in this exposure scenario apply to the specified substance in a concentration as indicated in the scenario. The concentration of the substance in the product may differ. A downstream user should evaluate if the risk management measures may be adapted accordingly.

**MDI**

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Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

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[www.ISOPA.org](http://www.ISOPA.org) - "ISOPA interpretation on selection of Use Descriptors"