FILTERPAVE®

CONTRACTOR HANDBOOK

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INTRODUCTION

SOILTEC's FilterPave® Sales Model

SOILTEC has a long-standing established network of distributors and Distributors in the erosion control and stormwater industry who work closely with architects, engineers and contractors in their territories. The FilterPave porous paving systems (FPPS) fit well with other products that these distributors and Distributors market and sell for SOILTEC. In order to most effectively develop FPPS projects in your territory, many of SOILTEC's existing distributors and Distributors will be acting as the FilterPave Distributor in your territory.

FilterPave Distributor and Master Contractor Partnership

The coordination between the FilterPave Distributor and the regional exclusive FilterPave Master Contractor/Installer will be critical to the program's success. SOILTEC or the FilterPave Distributor are offering a site if requested.

The FilterPave Distributor in your territory will be responsible for business development activities within your territory. These activities include working with architects, engineers and municipal storm water regulators to develop FPPS projects, specifications, assisting to assure properly designed base requirements and the FPPS wearing course for the intended application. Additionally, the FilterPave Distributor will attend appropriate regional trade shows/ construction conferences to introduce and promote the FilterPave technology to the marketplace. The products for the FilterPave System have to be purchased through the FP Distributor only.

Master Contractors who establish projects on their own will be required to report upcoming projects to their local FilterPave Distributor for logging and assistance. The contractor recognizes that the Distributor's efforts promoting FPPS at tradeshows and through engineering and architectural firm visits often yield contacts that will come directly to the Contractor.

All business development activities need to be closely coordinated with the FilterPave Distributor as this relationship will be become the backbone to positive selling results of the FPPS in the territory. Clear and frequent communication between the FilterPave Distributor and the Master Contractor will build successful FPPS projects in the territory.

The Master Contractor and the territory FilterPave Distributor will need to coordinate schedule expectations and pricing. While the Master Contractor is solely responsible for scheduling and pricing, the FilterPave Distributor must be kept informed of Contractor availability and pricing so that they can confidently interact with the potential customers. As large projects develop, it is critical to inform SOILTEC of the tentative raw material requirements and schedule of construction at least four weeks prior to installation to assure adequate material supply is readily available.

Subcontractor Relationship Rights

A Master Contractor may choose to employ subcontractors for site preparation, forming and FPPS finishing tasks. This is acceptable only if the Master Contractor take the responsibility of the subcontractors work.

Quality Assurance

The FilterPave Distributor will be responsible to assure that the Master Contractor is carrying out Quality Assurance. All phases of the project including base construction, sample procurement and testing and final FPPS finish will be the responsibility of the Master Contractor. SOILTEC will rely on the regional FilterPave Distributors to ensure the proper quality of construction is met and will periodically monitor how well this activity is being completed.

Intellectual Property

Using Local Recycled Glass

The target of SOILTEC's environmental friendly product is to use local recycled glass for the FilterPave System. Together with SOILTEC your FilterPave Distributor have set up a local glass supplier to ensure the lowest possible environmental impact. FilterPave is made of 96% local materials. For origin details ask your FilterPave Distributor.

Key Contacts

FilterPave Distributor:

Territory:

SOILTEC Customer Service Support
Sabrina Luttmann | SOILTEC GmbH | Ph: +49-4202-7670-32 | Email: sabrina.luttmann@soiltec.de

SOILTEC Marketing and Communications
Anna Winkler | SOILTEC GmbH | Ph: +49-4202-7670-36 | Email: anna.winkler@soiltec.de

SOILTEC Business Development and Management
Kai Tietjen | SOILTEC GmbH | Ph: +49-4202-7670-30 | Email: kai.tietjen@soiltec.de

INSTALLATION GUIDELINES

Base Preparation

Excavation

1. Excavate the subgrade using low ground pressure (LGP) equipment. Narrow and/or high pressure wheeled vehicles should be avoided as they over-compact the soil and reduce infiltration.
2. Excavate to the design depth of base to meet design requirement, or to the design depth of base required plus 4cm. A 3cm FilterPave depth may be applicable for pedestrian traffic and residential areas. Permeability and CBR or EV_2 testing of subgrade should be performed prior to construction to confirm field porosity and load support capacity in order to facilitate proper base design depth.

Geotextile and Under Drain Pipe Installation (if required)

1. If required by design, install a minimum 150gr. non-woven filter fabric, with a minimum infiltration rate of 300 l/min per sq meter, on the bottom and sides of the excavated area. Overlap textile a minimum of 30cm at the edge of fabric, and keep seems clear of aggregate. Run fabric up the sides of the excavation and tack to the backside of forms to prevent sediment migration into storage reservoir.
2. If underdrain piping is specified, place them over the geotextile and build pipe boots as per project drawings.

Placement of Base Materials

1. Place a substructure of crushed stone with a grading of 0-2/22-32mm in the excavated reservoir in 30cm lifts to the specified depth. Fines contained in the base should be minimized, and should not exceed 5%. The base course should extend a minimum of 1 foot beyond the edges of the pavement.
2. Level the base course. Angular base stone is required to assure a more true and workable base surface. It is advisable to use an optional 2-3cm levelling layer of fine grit (2-4mm). This will allow permeability, yet offer a tight and easy-to-grade surface to assure true fine grading for the top of base elevation.
3. Lightly compact the base with plate compactors or hydrostatic roller.

Forming

Form the area as you would form for the installation of a concrete pour. Plan an area to allow for mixer access, pouring and finishing crews. Set forms securely using steel pins which will punch through the underlying geotextile better than wood stakes. Keep all stakes below the top of the forms to allow for screeds to pass.

Site Considerations

Both the FilterPave System utilize an adhesive binder. As such, the surface will remain tacky several hours while curing. Blowing debris, dust, and particles from nearby spoils piles may contaminate the surface and discolor it permanently. Appropriate precautions to avoid contamination of the surface shall be taken, such as: covering of spoils piles, wetting unvegetated areas, etc.

Pouring of the FilterPave® Mixture

Material Preparation

1. All paving mix shall be kept dry until mixed with the polyurethane. Supersaks of glass shall be waterproof or shall be kept under moisture-resistant cover. They shall also be kept from direct contact with the grade to avoid ground moisture by use of pallets or other elevating mechanisms. The pan-mixer and construction tools shall be kept dry.

2. Use a drum-pal. to lay down the resin & iso drums for easy flow out into clean buckets. A portable digital scale to determine is exact ratio of the FilterPave glue is absolutely needed.

3. Pigment Resin for the FilterPave system shall be added to the FilterPave A component resin prior to the mix with the FilterPave B Iso Component. Quantity of pigmented resin per recommendation by SOILTEC or FilterPave Distributor.

- ***Resin & ISO Ratios***

  The Resin to ISO ratio is 1 parts Resin (component A) to 2,5 parts ISO (component B). In large scale operations (non-FP Kit application) the color pigmented Resin will be added to the Resin before mix it with the ISO. The Resin and ISO shall be mixed using a static mixer for at least 3 minutes.

- ***FilterPave™ glue & Glass Ratio***

  The ready FilterPave® glue (Resin+ISO) are mixed at a 4,2 - 4,4% ratio to glass weight by using a suitable pan-mixer. The mixing time shall not be under 5 minutes. The operator of the pan-mixer must ensure that all glass particles are covered with the FilterPave® glue and that every batch will be completely discharged.

Test Cylinders

1. Once mix ratio is set, and the pour begins, pour a test cylinder in accordance with the established SOILTEC procedure, listed below, using one of the supplied 10cm diameter, 15cm deep cylinders and send to FilterPave Distributors or to SOILTEC.
   a. Fill the cylinder 1/3 full and drop on a hard surface, from a height of 8-10cm, 5 times.
   b. Fill the cylinder to 2/3 full and repeat drop from 8-10cm on a hard surface, 5 times.
   c. Fill cylinder to overflowing, compact and screed off with the edge of a 5cm x 10cm or similar item.
2. Average FilterPave compression strength of 800PSI with no results below 700PSI is required for each day's cylinders to be eligible for a Warranty.
3. **Critical: cylinders must be prepared exactly per #1 above.**

Protection of the Base

1. When it is necessary for equipment to be driven directly on the base aggregate, plywood sheets or the GeoRunner® Surface Protection System should be laid out to maintain the continuity and level elevation of the prepared base.

Installing Expansion Joints

1. Expansion joints shall be placed as per design to allow for expansion and contraction. Troweled joints are also acceptable at shorter intervals, but do not substitute for full gap joints. Sawed joints are acceptable and must be filled with compression joint material. Joints are necessary after one day installation rate or as per design.

Finishing Procedure for FilterPave Pavement

1. When using forms, rake the material relatively flat, about 1-2cm higher than the top of the forms. Use a vibra-strike or vibratory power screed to screed the material level with the top of the forms. Care should be taken to fill low spots along edges.

2. Fill all low spots immediately before final finishing. Do not attempt to fill low spots after the material has been in place for more than 10 minutes as it will not bind properly with the screeded slab.
3. Finishing is time-sensitive and must be completed with hand trowels and a Fresno within 20 minutes of screeding. DO NOT rework surface after 20 minutes.
4. Use walking or hand edgers along forms and hand trowel out lines left by the edger. Fresno finishing needs to be done quickly as the mix will begin to set in approximately 30 minutes, sooner in extremely hot weather.
5. Edge trowel at construction expansion joint.

Form Release

1. If using forms, apply the form release agent, such as 100% natural Alderox® ASA-12 or vegetable oil to all areas that come in contact with the FilterPave surface.
2. Upon stripping the forms a 2/3 aggregate, 1/3 topsoil mixture should be placed along the edges of the FilterPave installation for protection against tires dropping off the pavement.

Clean-Up and Safety Precautions

1. Clean-up must be affected immediately after the pour is completed. Begin by running dry aggregate material through the mixer until aggregate has picked up all resident wet urethane from within the auger/upper zone.
2. Final clean-up should be completed by running base course through the mixer for a minimum of five minutes. The mixer must be cleaned out first as a delay or inadequate cleaning of the mixer will lead potential lock-up as the binder sets. Other areas to pay close attention to are the straight and swivel chutes as well as all finishing equipment. Areas contacted by the polyurethane that are not properly cleaned may require sandblasting later.
3. Hand tools, and screeds are best cleaned by scraping excess mix off on a regular basis and thoroughly after project completion. Power buggies and wheel barrows need to be similarly scraped immediately after project completion. Additional material may be removed with Alderox.

Curing Times/Temperature Ranges

1. Initial set times of the FilterPave mix will vary with temperature, with warmer temperatures causing a more rapid set up. As temperatures increase, the window of opportunity for finishing will decrease.
2. A minimum cure period of three days should be followed in all cases. When ambient low temperatures dip below 15° C, five days shall be allowed for cure.
3. No material shall be placed when temperatures are below 10°C. ISO, Resin and glass should be kept above 10°C F at all times. Do not install material if frost is expected within 72 hours after the installation.

Topcoating Guide

Top coat may need to be re-applied when pavement needs to be refreshed – especially areas used by cars will need a refreshment after approx.5 years. The top coat material used with the FilterPave system must be supplied from SOILTEC GmbH, Germany. The FP Top coat consists is a one component clear (PU) material. Distributor/Contractor shall keep a MSDS sheet of the two parts of the top coat material on file.

The following steps describe the process.

Materials Needed:

- Leaf Blower/Leaf Vacuum
- Stiff bristled push broom
- Low pressure washer (optional)
- Paint trays
- Paint Rollers/Pads
- Pigment (recommended)
- Acetone
- poles for rollers
- Mixing sticks
- Gloves
- Eye Protection
- Tape
- Dry Fine Sand

1. Ensure that the pavement is clean of debris and dirt and is **dry**. Depending on site conditions and the time between the completion of the installation and the application of the topcoat, this is accomplished using one, or a combination, of the following: leaf blower, leaf vacuum (similar in form to lawnmower), hard bristled push broom, and/or low pressure washer. If the surface is pressure washed, wait for the surface to dry completely, typically overnight, before applying topcoat.
2. Tape off all areas that abut FilterPave area to prevent topcoat from getting on other surfaces.
3. If pigmenting the topcoat add ~160 grams of pigment into the 12-kg drum. Mix well. The material will have an even color throughout with no dry pigment particles present when fully mixed.
4. Thoroughly mix the pigmented or un-pigmented top coat with 0,5 liter of Acetone . As it is imperative that the mix ratio is correct. Mixing should be done with a small power mixer. Product should be vigorously mixed for a minimum of 90 seconds.
5. Pour topcoat into paint tray and apply a thin coat of topcoat with a roller. Product should be placed at 5 mil thickness, using 12-kg drum to cover approximately 50sqm. Care should be taken to avoid applying the material too thick when the roller is first set on the surface as results will be uneven and material will be wasted.
6. For high friction surfaces, apply sand to the top-coated surface while still tacky. Using a hand lawn seeder, evenly broadcast sand on the surface at a rate of approximately 1 kg of sand for 20 square meters.
7. Do not apply additional topcoat to areas that are already becoming tacky as this will prevent the material from thoroughly setting up.
8. Product must be completely placed within 20 minutes of mixing. Any product not placed within 20 minutes should not be used and should be properly disposed. Allow remaining topcoat to thoroughly harden and dispose with ordinary garbage.
9. Do not walk on wet or tacky top-coated surface.
10. The material will completely set up in approximately 4 hours. Surface must be dry for at least 4 hours after the application is complete. Prevent any traffic on areas until the day after the application.
11. Apply only when temperatures are above 15°C. If the nights are cooler than 10°C, store material in a covered, heated area.
12. In cases where a repair is to be completed, two coats of topcoat are recommended. Follow the steps above for the second coat, allowing at least 24 hours between the applications.

INSTALLATION RATES

1. For installations at 3cm depth with large pan-mixers (500kgs and +), 400-500sqm square meters can easily be poured per day. For sure it depends number of works/crew members.
   One installation crew usually consists of:
   - 2 for operating the mixer and mixing the glue
   - 1 operator excavator
   - 2 for leveling the FilterPave pour for the screed operator
   - 1 operator for the vibrating screed
   - 1-2 for finishing the surface (hand screed) & edges.

2. The limiting factor for production rates tends to be glass material handling/loading which means the logistic on site.

3. Use of an all terrain extendable boom forklift (telehandler) will greatly expedite the movement of Supersaks of material from the staging area into the mixer.

4. Power buggies are helpful to allow for stationary “mobile plant” use of the FilterPave mixer and are particularly useful in pathway construction where access is difficult.

5. Finish crew should be maintained in close proximity to the pouring crew in order to provide the best surface finish possible.

Ordering Guide

Material Ordering & Calculation Guides

An Excel spreadsheet is available from SOILTEC to use as a calculation tool as from May 2014.
The contractor shall give early prior notice of approaching projects. Actual orders must be received no later than 21 days in advance of delivery. Shorter delivery times will be granted when possible.

One ton (1000 kgs.) of glass covers 20 square meters at a 3cm high depth.

One ton (1000 kgs.) of glass covers 15 square meters at a 4cm high depth.

One ton (1000 kgs.) of glass requires 42-44 kgs. of FilterPave glue (A+B Component)

Note: We use a safety factor of 10% for material calculation (glass)

For small application

The FilterPave Kits for small application such as tree discs are recommendable for areas of less than approx. 50sqm. Refer to the product list.

Construction Material/Tool List

Construction Material/Tool List

This list recommend the minimum needs for the installation of the FilterPave System (no earth works/no forming materials):

- Pan Mixer
- Excavator or power buggies
- extendable boom forklift (telehandler)
- vibrating screed
- hand screed
- Sword-type smoothing trowel (floor)
- Craft knife / scissors
- Stirrer / hand power mixer
- Gloves (nitrile)
- Mixing bucket (50 l)
- Construction foil
- Masking tape
- Cleaning rags
- Release agent (e.g. commercially available vegetable oil)

SUPPORTING DOCUMENTS SECTION

- FilterPave Specifications
- FilterPave Product List
- General Guidelines
- General Drawing
- MSDS Sheets

Specifications

ATTRIBUTE	RESULTS	TEST METHOD
raw material	recycled glass gravel: 100 % recycled and special broken recycled glass, gradation = 2-4 mm	transmission of grain size according DIN 18123
binding material	Polyurethan, FilterPave > 50 % recycled	
chemical persistence	consistent	
tensile strength (NEAT Elastomer)	17.170 kN/m² - 7 days 21.980 kN/m² - 21 days	ASTM D412 + D638
stretching at max. tensile strength (NEAT Elastomer)	50 % - 28 days	ASTM D412 + D638
splitting tensile strength	22.000 kN/m² - 24 hours waterstored	DIN EN 1338, Annex F
tear strength	4.120 kN/m² - 7 days	ASTM D624
bending tensile strength	3.435 kN/m²	ASTM C78/ DIN EN 12390-5
flexural modul	515 Nm	
uniaxial compressive strength	5.500 kN/m² - 7 days 8.240 kN/m² - 28 days	ASTM C39 ASTM D2166
uniaxial compressive strength	6.300 kN/m²	DIN EN 12390-3
friction coefficient	static (wet/dry): 0.90 – 1.05 kinetic (wet/dry): 0.75 – 0.85	ASTM D1895
abrasion according Böhm	loss of volume 19.000 mm³/5000 mm²	DIN EN 1338, Annex H
water permeability	Kv = 2,3 x 10-3 m/s (vertical) KH = 3,5 x 10-3 m/s (horizontal)	TP-Asphalt-StB, Part 19
Porosity	0,40- 0,47 %	
grain loss	22,3 masse-%	TP Asphalt-StB, Part 17
sliding resistance	USRV = 44	DIN EN 1338
resistance against change of frost and dew	loss of mass per areal unit L = 0,004 kg/m²	DIN EN 1338
drain coefficient	0,05 – 0,10 % (percentage of flow water; for comparison asphalt, concrete ca. 0,75 – 0,95)	
Solar Reflexions Index	Jade green 62 %, Amber 61 % Sedona red 53 %, Topaz 51 % Saphire blue 49 %, Natural Blend 65 %	ASTM E1980
hydrocarbon bonding	15 kg per m³ FilterPave®	University Wisconsin
temperature at installation	minimum 9°C	
temperature of environment	minimum 4 °C (72 hours)	
cure temperature (at least 15,5 °C temperature of environment)	72 hours (3 days)	
cure temperature (under 15,5 °C temperature of environment)	120 hours (5 days)	

Product List

Product	Packing Unit	Part no.
FilterPave® Resin	200-kg drum	FP0005-1
FilterPave® Isocyanate	230-kg drum	FP0006-1
Additional color resin, optional:		
FilterPave® Jade Green	25-kg bucket	FP0015
FilterPave® Sedona Red	25-kg bucket	FP0013
FilterPave® Topaz Brown	25-kg bucket	FP0011
FilterPave® Amber Brown	25-kg bucket	FP0010
FilterPave® Sapphire Blue	25-kg bucket	FP0014
FilterPave® Glass Granulat	1000-kg Super Sack special treated recycled glass granular, size 2-4mm	FP1000-1
FilterPave® Kits – for small applications *1 Kit is suitable for 0,4 m² with a thickness of 3 cm*		
FilterPave® Kit -Natural Blend-	20-kg bucket of glass with 2-chamber pouch of glue	FPK01
Additional color resin, optional:		
FilterPave® Sedona Red	25g. / pouch 2 pouches/kit recommended	FP0024
FilterPave® Topaz Brown	25g. / pouch 1 pouch/kit recommended	FP0025
FilterPave® Jade Green	25g. / pouch 1 pouch/kit recommended	FP0026
FilterPave® Sapphire Blue	25g. / pouch 1 pouch/kit recommended	FP0027
FilterPave® Amber Brown	25g. / pouch 1 pouch/kit recommended	FP0028

Remarks: Packing units of the FP Kits are:
24 buckets – 1 PAL, 1,20 x 0,80 x 1,00m, ca. 536 kg
36 buckets – 1 PAL, 1,20 x 1,00 x 1,00 m, ca. 794 kg

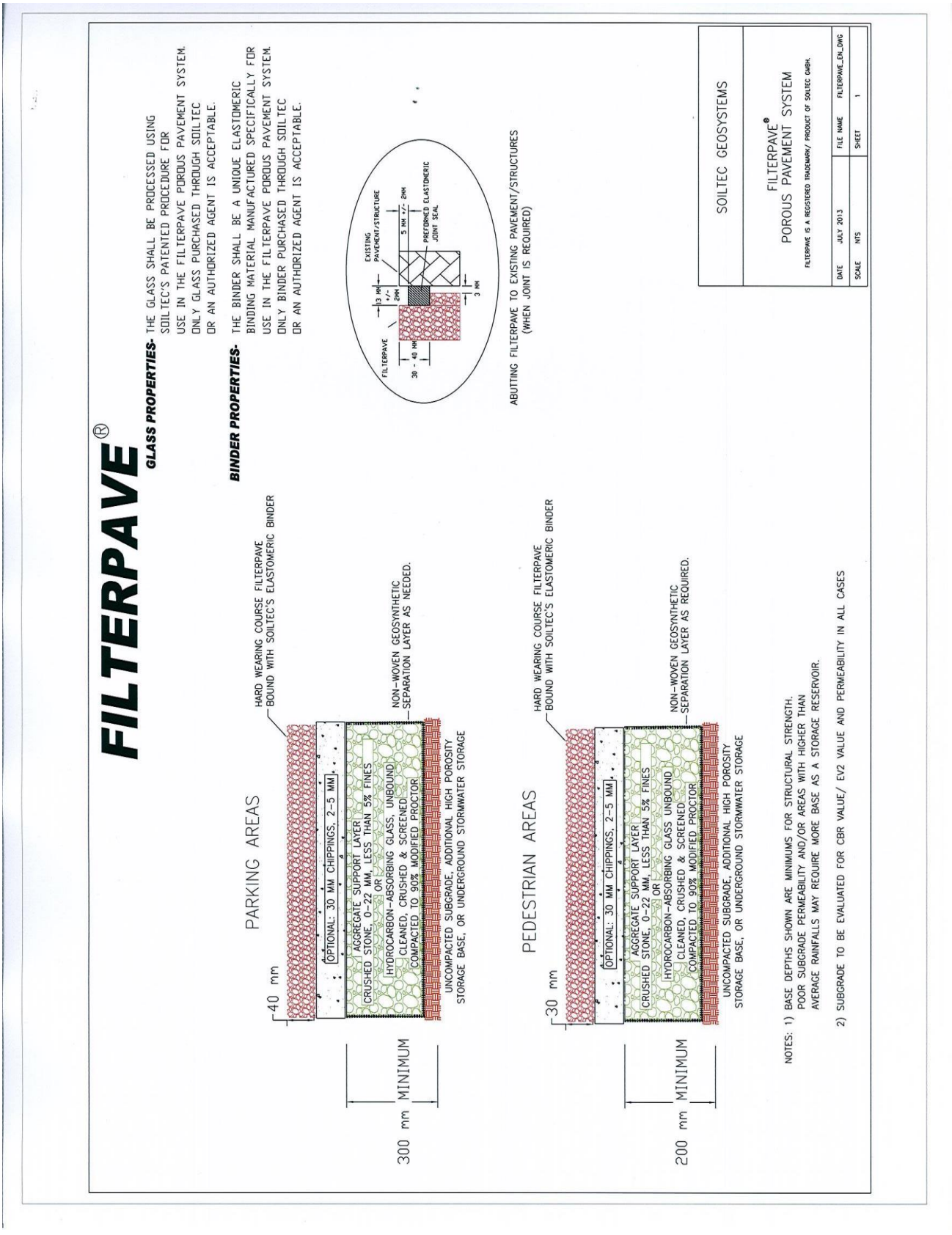
General Guidelines

LOADING	CARRYING CAPACITY PLANED SUBGRADE: 20 – 45 MN/ M² 5 – 15% CBR		CARRYING CAPACITY PLANED SUBGRADE: > 45 MN/ M² 15% CBR	
	Installation height of substructure	Installation height of FILTERPAVE™	Installation height of substructure	Installation height of FILTERPAVE™
PARKING SPACES For car's, motorcycles and other vehicles up to 2.7 to.	300 mm	40 mm	250 mm	40 mm
TREE DISC Without traffic volume	200 mm	30 mm	150 mm	30 mm
FOOTHPATH For pedestrian, wheelchair user, bicycles and light motorcycles.	200 mm	30 mm	150 mm	30 mm

BASIC CONDITIONS	
Temperature at installation	Minimum 10°C – dry without rainfall
Temperature of enviroment	Minimum 4 °C (72 hours)
Temperature of glass & glue	Minimum 10°C
Rainfall	Minimum 24hours without rainfall
Cure temperature (at least. 15.5 ° C temperature of environment)	72 hours (3 days)
Cure temperature (under 15.5 ° C temperature of environment)	120 hours (5 days)

1. The installation height is a general guideline which is based on typical rainfall. If the FilterPave™ surface is to be used for taking measures against extreme surface water, the installation height of substructure can be increased accordingly.
2. MN/sqm is the abbreviation for Mega-Newton per square meter. This value of load bearing capacity must be determined prior to start of construction..

   If the required load bearing capacity of sub-grade is not reached after excavation, measures must be taken to increase the load bearing capacity.
3. As substructure of crushed stone with a grading of 0-2/22-32mm with a fines content of less than 5% is to be used. It is advisable to use an optional additional 2-3cm levelling layer of fine grit (2-4mm).
4. A geotextile to GRK3 classification must be used under the sub-base.
5. The sub-grade should be compacted to a minimum Proctor density of 92%.


FILTERPAVE®
GLASS PROPERTIES- THE GLASS SHALL BE PROCESSED USING SOILTEC'S PATENTED PROCEDURE FOR USE IN THE FILTERPAVE POROUS PAVEMENT SYSTEM. ONLY GLASS PURCHASED THROUGH SOILTEC OR AN AUTHORIZED AGENT IS ACCEPTABLE.
BINDER PROPERTIES- THE BINDER SHALL BE A UNIQUE ELASTOMERIC BINDING MATERIAL MANUFACTURED SPECIFICALLY FOR USE IN THE FILTERPAVE POROUS PAVEMENT SYSTEM. ONLY BINDER PURCHASED THROUGH SOILTEC OR AN AUTHORIZED AGENT IS ACCEPTABLE.
PARKING AREAS
40 mm
HARD WEARING COURSE FILTERPAVE BOUND WITH SOILTEC'S ELASTOMERIC BINDER
OPTIONAL: 30 MM CHIPPINGS, 2-5 MM.
AGGREGATE SUPPORT LAYER CRUSHED STONE, 0-22 MM, LESS THAN 5% FINES OR HYDROCARBON-ABSORBING GLASS, UNBOUND CLEANED, CRUSHED & SCREENED COMPACTED TO 90% MODIFIED PROCTOR
NON-WOVEN GEOSYNTHETIC SEPARATION LAYER AS NEEDED.
UNCOMPACTED SUBGRADE, ADDITIONAL HIGH POROSITY STORAGE BASE, OR UNDERGROUND STORMWATER STORAGE
300 mm MINIMUM
PEDESTRIAN AREAS
30 mm
HARD WEARING COURSE FILTERPAVE BOUND WITH SOILTEC'S ELASTOMERIC BINDER
OPTIONAL: 30 MM CHIPPINGS, 2-5 MM.
AGGREGATE SUPPORT LAYER CRUSHED STONE, 0-22 MM, LESS THAN 5% FINES OR HYDROCARBON-ABSORBING GLASS UNBOUND CLEANED, CRUSHED & SCREENED COMPACTED TO 90% MODIFIED PROCTOR
NON-WOVEN GEOSYNTHETIC SEPARATION LAYER AS REQUIRED.
UNCOMPACTED SUBGRADE, ADDITIONAL HIGH POROSITY STORAGE BASE, OR UNDERGROUND STORMWATER STORAGE
200 mm MINIMUM
NOTES: 1) BASE DEPTHS SHOWN ARE MINIMUMS FOR STRUCTURAL STRENGTH. POOR SUBGRADE PERMEABILITY AND/OR AREAS WITH HIGHER THAN AVERAGE RAINFALLS MAY REQUIRE MORE BASE AS A STORAGE RESERVOIR.
2) SUBGRADE TO BE EVALUATED FOR CBR VALUE/ EV2 VALUE AND PERMEABILITY IN ALL CASES
FILTERPAVE
EXISTING PAVEMENT/STRUCTURE
3 MM +/- 2MM
5 MM +/- 2MM
PREFORMED ELASTOMERIC JOINT SEAL
30 - 40 MM
3 MM
ABUTTING FILTERPAVE TO EXISTING PAVEMENT/STRUCTURES (WHEN JOINT IS REQUIRED)
SOILTEC GEOSYSTEMS
FILTERPAVE® POROUS PAVEMENT SYSTEM
FILTERPAVE IS A REGISTERED TRADEMARK/ PRODUCT OF SOILTEC GMBH.
DATE JULY 2013
SCALE NTS
FILE NAME FILTERPAVE_EN_DWG
SHEET 1

Material Safety Data Sheets

Issued by BASF | The Chemical Company

- for FilterPave A Polyol component (11 pages)
- for FilterPave B Iso component (33 pages)

Safety data sheet

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

1.1. Product identifier

FilterPave A Polyol component

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

Recommended use: polyurethane component

1.3. Details of the supplier of the safety data sheet

Company:
BASF Polyurethanes GmbH
Postfach 1140
49440 Lemfoerde, GERMANY

Telephone: +49 5443 12-2121
E-mail address: Product-Safety-Elastogran@basf.com

1.4. Emergency telephone number

International emergency number:
Telephone: +49 180 2273-112 (state ID no.30616302/SDS_GEN_EU/EN)

SECTION 2: Hazards Identification

2.1. Classification of the substance or mixture

According to Regulation (EC) No 1272/2008 [CLP]

No need for classification according to GHS criteria for this product.

According to Directive 67/548/EEC or 1999/45/EC

Possible Hazards:

No particular hazards known.

2.2. Label elements

Globally Harmonized System, EU (GHS)

The product does not require a hazard warning label in accordance with GHS criteria.

According to Directive 67/548/EEC or 1999/45/EC

Directive 1999/45/EC ('Preparation Directive')

The product does not require a hazard warning label in accordance with EC Directives.

2.3. Other hazards

According to Regulation (EC) No 1272/2008 [CLP]

No specific dangers known, if the regulations/notes for storage and handling are considered.

SECTION 3: Composition/Information on Ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Chemical nature

Preparation based on: polyol, catalyst, additives

Hazardous ingredients (GHS)
according to Regulation (EC) No. 1272/2008

Does not contain any hazardous ingredients.

Hazardous ingredients
according to Directive 1999/45/EC

Does not contain any hazardous ingredients.

SECTION 4: First-Aid Measures

4.1. Description of first aid measures

Remove contaminated clothing.

If inhaled:
If difficulties occur after vapour/aerosol has been inhaled, remove to fresh air and seek medical attention.

On skin contact:
Wash thoroughly with soap and water.

On contact with eyes:
Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

On ingestion:
Immediately rinse mouth and then drink plenty of water, do not induce vomiting, seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed
Symptoms: No significant reaction of the human body to the product known.

Hazards: No hazards anticipated.

4.3. Indication of any immediate medical attention and special treatment needed
Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

SECTION 5: Fire-Fighting Measures

5.1. Extinguishing media
Suitable extinguishing media:
water spray, dry powder, foam, carbon dioxide

5.2. Special hazards arising from the substance or mixture
carbon monoxide, Carbon dioxide, nitrogen oxides
The substances/groups of substances mentioned can be released in case of fire.

5.3. Advice for fire-fighters
Special protective equipment:
Wear a self-contained breathing apparatus.

Further information:
Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

SECTION 6: Accidental Release Measures

High risk of slipping due to leakage/spillage of product.

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective clothing.

6.2. Environmental precautions
Do not empty into drains. Do not discharge into the subsoil/soil.

6.3. Methods and material for containment and cleaning up
For large amounts: Pump off product.
For residues: Pick up with suitable absorbent material (e.g. sand, sawdust, general-purpose binder, kieselguhr). Dispose of contaminated material as prescribed.

6.4. Reference to other sections
Information regarding exposure controls/personal protection and disposal considerations can be found in section 8 and 13.

SECTION 7: Handling and Storage

7.1. Precautions for safe handling
Ensure thorough ventilation of stores and work areas.

Protection against fire and explosion:
No special precautions necessary.

7.2. Conditions for safe storage, including any incompatibilities
Segregate from oxidants. Segregate from acids. Segregate from foods and animal feeds.

Suitable materials for containers: carbon steel (iron), High density polyethylene (HDPE), Low density polyethylene (LDPE), tin (tinplate), Stainless steel 1.4301 (V2)
Further information on storage conditions: Containers should be stored tightly sealed in a dry place.

7.3. Specific end use(s)
For the relevant identified use(s) listed in Section 1 the advice mentioned in this section 7 is to be observed.

SECTION 8: Exposure Controls/Personal Protection

8.1. Control parameters

PNEC
Chemical Safety Assessment not yet performed due to registration timelines

DNEL
Chemical Safety Assessment not yet performed due to registration timelines

8.2. Exposure controls

Personal protective equipment

Respiratory protection:
Wear respiratory protection if ventilation is inadequate. Particle filter with medium efficiency for solid and liquid particles (e.g. EN 143 or 149, Type P2 or FFP2)

Hand protection:
Suitable chemical resistant safety gloves (EN 374) also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN 374): E.g. nitrile rubber (0.4 mm), chloroprene rubber (0.5 mm), butyl rubber (0.7 mm) and other

Eye protection:
Safety glasses with side-shields (frame goggles) (e.g. EN 166)

Body protection:
Standard work clothes and shoes.

General safety and hygiene measures
Wearing of closed work clothing is required additionally to the stated personal protection equipment. When using, do not eat, drink or smoke. Hands and/or face should be washed before breaks and at the end of the shift. At the end of the shift the skin should be cleaned and skin-care agents applied.

SECTION 9: Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Form:	liquid	
Colour:	yellowish	
Odour:	amine-like	
Odour threshold:	not applicable	
pH value:	approx. 6 - 8 (20 °C)	
solidification temperature:	< 0 °C	
Boiling point:	> 200 °C	
Flash point:	> 200 °C	(DIN 51758)
Evaporation rate:	Value can be approximated from Henry's Law Constant or vapor pressure.	
Flammability:	not flammable	
Lower explosion limit:	For liquids not relevant for classification and labelling., The lower explosion point may be 5 - 15 °C below the flash point.	
Upper explosion limit:	For liquids not relevant for classification and labelling.	
Ignition temperature:	> 250 °C	
Vapour pressure:	< 10 mbar (20 °C)	

Density: 1.05 g/cm3
(20 °C)
Relative density: 1.05
(20 °C)
Relative vapour density (air):
not applicable
Solubility in water: partly soluble
Partitioning coefficient n-octanol/water (log Kow):
not applicable
Thermal decomposition: No decomposition if stored and handled as prescribed/indicated.
Viscosity, dynamic:
not determined
Explosion hazard: not explosive
Fire promoting properties: not fire-propagating

9.2. Other information

Miscibility with water:
partly miscible
Other Information:
If necessary, information on other physical and chemical parameters is indicated in this section.

SECTION 10: Stability and Reactivity

10.1. Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals: No corrosive effect on metal.

10.2. Chemical stability
The product is stable if stored and handled as prescribed/indicated.

10.3. Possibility of hazardous reactions
No hazardous reactions if stored and handled as prescribed/indicated.

10.4. Conditions to avoid
Temperature: < 0 °C

10.5. Incompatible materials

Substances to avoid:
acids, oxidizing agents, isocyanates

10.6. Hazardous decomposition products

No hazardous decomposition products if stored and handled as prescribed/indicated.

SECTION 11: Toxicological Information

11.1. Information on toxicological effects

Acute toxicity

Assessment of acute toxicity:
Virtually nontoxic after a single skin contact. Virtually nontoxic by inhalation. Virtually nontoxic after a single ingestion.

Experimental/calculated data:
LD50 rat (oral): > 2,000 mg/kg

Irritation

Assessment of irritating effects:
Not irritating to the eyes. Not irritating to the skin.

Respiratory/Skin sensitization

Assessment of sensitization:
The chemical structure does not suggest a sensitizing effect.

Germ cell mutagenicity

Assessment of mutagenicity:
The chemical structure does not suggest a specific alert for such an effect.

Carcinogenicity

Assessment of carcinogenicity:
The chemical structure does not suggest a specific alert for such an effect.

Reproductive toxicity

Assessment of reproduction toxicity:
The chemical structure does not suggest a specific alert for such an effect.

Developmental toxicity

Assessment of teratogenicity:
The chemical structure does not suggest a specific alert for such an effect.

Specific target organ toxicity (single exposure)

Assessment of STOT single:
Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:
Repeated dermal uptake of the substance did not cause substance-related effects. Repeated inhalative uptake of the substance did not cause substance-related effects. Repeated oral uptake of the substance did not cause substance-related effects.

Aspiration hazard

No aspiration hazard expected.

Other relevant toxicity information

The product has not been tested. The statement has been derived from the properties of the individual components.

SECTION 12: Ecological Information

12.1. Toxicity

Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms.

12.2. Persistence and degradability

Assessment biodegradation and elimination (H2O):
Poorly biodegradable.

Elimination information:
Poorly biodegradable.

12.3. Bioaccumulative potential

Assessment bioaccumulation potential:
Does not significantly accumulate in organisms.

12.4. Mobility in soil

Assessment transport between environmental compartments:
Adsorption to solid soil phase is not expected.

12.5. Results of PBT and vPvB assessment

According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): The product does not contain a substance fulfilling the PBT (persistent/bioaccumulative/toxic) criteria.

12.6. Other adverse effects

The product does not contain substances that are listed in Annex I of Regulation (EC) 2037/2000 on substances that deplete the ozone layer.

12.7. Additional information

Adsorbable organically-bound halogen (AOX):
This product contains no organically-bound halogen.

Other ecotoxicological advice:
Do not allow to enter soil, waterways or waste water channels. Inhibition of degradation activity in activated sludge is not to be anticipated during correct introduction of low concentrations. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

SECTION 13: Disposal Considerations

13.1. Waste treatment methods

Incinerate in suitable incineration plant, observing local authority regulations.

Waste key:
07 02 08¤ other still bottoms and reaction residues

Contaminated packaging:
Contaminated packaging should be emptied as far as possible; then it can be passed on for recycling after being thoroughly cleaned.

SECTION 14: Transport Information

Land transport

ADR

	Not classified as a dangerous good under transport regulations
UN number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

RID

	Not classified as a dangerous good under transport regulations
UN number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for	None known

user

Inland waterway transport

ADN

	Not classified as a dangerous good under transport regulations
UN number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known
Transport in inland waterway vessel:	Not evaluated

Sea transport

IMDG

	Not classified as a dangerous good under transport regulations
UN number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

Air transport

IATA/ICAO

	Not classified as a dangerous good under transport regulations
UN number:	Not applicable
UN proper shipping name:	Not applicable
Transport hazard class(es):	Not applicable
Packing group:	Not applicable
Environmental hazards:	Not applicable
Special precautions for user	None known

14.1. UN number

See corresponding entries for “UN number” for the respective regulations in the tables above.

14.2. UN proper shipping name

See corresponding entries for “UN proper shipping name” for the respective regulations in the tables above.

14.3. Transport hazard class(es)

See corresponding entries for “Transport hazard class(es)” for the respective regulations in the tables above.

14.4. Packing group

See corresponding entries for “Packing group” for the respective regulations in the tables above.

14.5. Environmental hazards

See corresponding entries for “Environmental hazards” for the respective regulations in the tables above.

14.6. Special precautions for user

See corresponding entries for “Special precautions for user” for the respective regulations in the tables above.

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

Regulation:	Not evaluated
Shipment approved:	Not evaluated
Pollution name:	Not evaluated
Pollution category:	Not evaluated
Ship Type:	Not evaluated

SECTION 15: Regulatory Information

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

15.2. Chemical Safety Assessment

Chemical Safety Assessment not yet performed due to registration timelines. Exposure scenarios for the mixture can not be provided at the moment because exposure scenarios are not yet available for all relevant substances due to registration timelines. For advice on essential measures see sections 7 and 8 of this safety data sheet.

SECTION 16: Other Information

The data contained in this safety data sheet are based on our current knowledge and experience and describe the product only with regard to safety requirements. The data do not describe the product's properties (product specification). Neither should any agreed property nor the suitability of the product for any specific purpose be deduced from the data contained in the safety data sheet. It is the responsibility of the recipient of the product to ensure any proprietary rights and existing laws and legislation are observed.

Vertical lines in the left hand margin indicate an amendment from the previous version.

*) FilterPave® is a product and registrated trademark of SOILTEC GmbH, 28832 Achim, Germany.

Safety data sheet

1. Identification of the substance/mixture and of the company/undertaking

Product identifier

FilterPave* B Iso component

Chemical name: Hexane, 1,6-diisocyanato-, homopolymer
CAS Number: 28182-81-2

REACH registration number: 01-2119485796-17-0004

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

Relevant identified uses: Chemical
Uses advised against: All consumer uses are strongly advised against., The hazardous properties of the substance require safety measures which can, in principle, not be sufficiently ensured in the home worker sector.

For the detailed identified uses of the product see appendix of the safety data sheet.

Details of the supplier of the safety data sheet

Company:
BASF Polyurethanes GmbH
Postfach 1140
49440 Lemfoerde, Germany

Telephone: +49 5443 12-2121
E-mail address: Product-Safety-Elastogran@basf.com

Emergency telephone number

International emergency number:
Telephone: +49 180 2273-112 (state ID no. 30230145/SDS_GEN_GB/EN)

2. Hazards Identification

Label elements

Globally Harmonized System, EU (GHS)

Pictogram:

Signal Word:
Warning

Hazard Statement:

H332	Harmful if inhaled.
H317	May cause an allergic skin reaction.
H335	May cause respiratory irritation.

Precautionary Statements (Prevention):

P280c	Wear protective gloves.
P271	Use only outdoors or in a well-ventilated area.
P260i	Do not breathe dust/gas/mist/vapours.
P260h	Do not breathe mist or vapour.
P272	Contaminated work clothing should not be allowed out of the workplace.

Precautionary Statements (Response):

P311	Call a POISON CENTER or doctor/physician.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P303 + P352	IF ON SKIN (on hair): Wash with plenty of soap and water.
P362	Take off contaminated clothing and wash before reuse.

Precautionary Statements (Storage):

P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Precautionary Statements (Disposal):

P501	Dispose of contents/container to hazardous or special waste collection point.

Labeling of special preparations (GHS):
Contains isocyanates. May produce an allergic reaction.

According to Regulation (EC) No 1272/2008 [CLP]

Hazard determining component(s) for labelling: POLYFUNCTIONAL ISOCYANATE

According to Directive 67/548/EEC or 1999/45/EC

as in Annex VI of Directive 67/548/EEC

Hazard symbol(s)

Xn Harmful.

R-phrase(s)

R20	Harmful by inhalation.
R37	Irritating to respiratory system.
R43	May cause sensitization by skin contact.

S-phrase(s)

S23.1	Do not breathe spray.
S24	Avoid contact with skin.
S36/37/39 bis	Wear suitable protective clothing, gloves and eye/face protection, also during mixing and loading of the agent.
S38	In case of insufficient ventilation, wear suitable respiratory equipment.

Self classification

Hazard determining component(s) for labelling: POLYFUNCTIONAL ISOCYANATE

Contains isocyanates. Observe manufacturer's instructions.

Classification of the substance or mixture

According to Regulation (EC) No 1272/2008 [CLP]

Acute Tox. 4 (Inhalation - mist)
Skin Sens. 1
STOT SE 3 (irritating to respiratory system)

According to Directive 67/548/EEC or 1999/45/EC

Possible Hazards:
May cause sensitization by skin contact.
Harmful by inhalation.
Irritating to respiratory system.

For the classifications not written out in full in this section the full text can be found in section 16.

Other hazards

According to Regulation (EC) No 1272/2008 [CLP]

No specific dangers known, if the regulations/notes for storage and handling are considered.

3. Composition/Information on Ingredients

Substances

Chemical nature

Hexamethylene diisocyanate, oligomers (Content (W/W): 100 %)
CAS Number: 28182-81-2
EC-Number: 500-060-2

Hazardous ingredients (GHS)
according to Regulation (EC) No. 1272/2008

hexamethylene diisocyanate

Content (W/W): <= 0.3 %	Acute Tox. 4 (oral)
CAS Number: 822-06-0	Acute Tox. 1 (Inhalation - mist)
EC-Number: 212-485-8	Skin Corr./Irrit. 2
INDEX-Number: 615-011-00-1	Eye Dam./Irrit. 2
	Resp. Sens. 1
	Skin Sens. 1
	STOT SE 3 (irr. to respiratory syst.)
	H319, H315, H330, H302, H334, H317, H335

Hexamethylene diisocyanate, oligomers

Content (W/W): >= 95 %	Acute Tox. 4 (Inhalation - mist)
CAS Number: 28182-81-2	Skin Sens. 1
EC-Number: 500-060-2	STOT SE 3 (irr. to respiratory syst.)
	H332, H317, H335

Hazardous ingredients
according to Directive 1999/45/EC

hexamethylene diisocyanate
Content (W/W): <= 0.3 %
CAS Number: 822-06-0
EC-Number: 212-485-8
INDEX-Number: 615-011-00-1
Hazard symbol(s): T
R-phrase(s): 23, 36/37/38, 42/43, 22

Hexamethylene diisocyanate, oligomers
Content (W/W): >= 95 %
CAS Number: 28182-81-2
EC-Number: 500-060-2
Hazard symbol(s): Xn
R-phrase(s): 20, 37, 43

For the classifications not written out in full in this section, including the indication of danger, the hazard symbols, the R phrases, and the hazard statements, the full text is listed in section 16.

4. First-Aid Measures

Description of first aid measures

Immediately remove contaminated clothing.

If inhaled:
If difficulties occur after vapour/aerosol has been inhaled, remove to fresh air and seek medical attention.

On skin contact:
Wash thoroughly with soap and water.

On contact with eyes:
Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

On ingestion:
Rinse mouth immediately and then drink plenty of water, seek medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms: The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11., Further important symptoms and effects are so far not known.

Indication of any immediate medical attention and special treatment needed

Treatment: Inhale corticosteroid dose aerosol. Treat according to symptoms (decontamination, vital functions), no known specific antidote, administer corticosteroid dose aerosol to prevent pulmonary odema.

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media:
dry powder, foam

Special hazards arising from the substance or mixture

harmful vapours
Evolution of fumes/fog. The substances/groups of substances mentioned can be released in case of fire.

Advice for fire-fighters

Special protective equipment:
Wear a self-contained breathing apparatus.

Further information:

The degree of risk is governed by the burning substance and the fire conditions. Contaminated extinguishing water must be disposed of in accordance with official regulations.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures
Use personal protective clothing.

Environmental precautions
Contain contaminated water/firefighting water. Do not discharge into drains/surface waters/groundwater.

Methods and material for containment and cleaning up
For large amounts: Pump off product.
For residues: Pick up with suitable absorbent material. Dispose of absorbed material in accordance with regulations.

Reference to other sections
Information regarding exposure controls/personal protection and disposal considerations can be found in section 8 and 13.

7. Handling and Storage

Precautions for safe handling
No special measures necessary provided product is used correctly.

Protection against fire and explosion:
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy.

Conditions for safe storage, including any incompatibilities
Further information on storage conditions: Keep container tightly closed and in a cool place.

Storage stability:
If moisture enters isocyanate containers, CO2 forms and pressure builds up.

Specific end use(s)
See exposure scenario(s) in the attachment to this safety data sheet.

8. Exposure Controls/Personal Protection

Control parameters

Components with workplace control parameters

28182-81-2: Hexane, 1,6-diisocyanato-, homopolymer
TWA value 0.02 mg/m3 (EH40 (UK))
Measured as: NCO
STEL value 0.07 mg/m3 (EH40 (UK))
Measured as: NCO
822-06-0: hexamethylene diisocyanate
TWA value 0.02 mg/m3 (EH40 (UK))
Measured as: NCO
STEL value 0.07 mg/m3 (EH40 (UK))
Measured as: NCO

PNEC
freshwater: 0.127 mg/l

marine water: 0.0127 mg/l

intermittent release: 1.27 mg/l

sediment (freshwater): 266700 mg/kg

marine water: 26670 mg/kg

soil: 53182 mg/kg

STP: 38.28 mg/l

DNEL
worker:
Short-term exposure - local effects, Inhalation: 1 mg/m3

worker:
Long-term exposure - local effects, Inhalation: 0.5 mg/m3

Exposure controls

Personal protective equipment

Respiratory protection:
Respiratory protection in case of vapour/aerosol release. Combination filter for gases/vapours of organic compounds and solid and liquid particles (f.e. EN 14387 Type A-P2)

Hand protection:
Chemical resistant protective gloves (EN 374)
Suitable materials short-term contact and/or splashes (recommended: At least protective index 2, corresponding > 30 minutes of permeation time according to EN 374)
butyl rubber (butyl) - 0.7 mm coating thickness
Manufacturer's directions for use should be observed because of great diversity of types.

Eye protection:
Safety glasses with side-shields (frame goggles) (e.g. EN 166)

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. apron, protecting boots, chemical-protection suit (according to EN 14605 in case of splashes or EN ISO 13982 in case of dust).

General safety and hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wearing of closed work clothing is required additionally to the stated personal protection equipment.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Form:	liquid	
Colour:	colourless to slightly yellow	
Odour:	faint odour	
pH value:	not applicable	
Melting point:	approx. -70 °C	
Boiling range:	300 - 355 °C	
Flash point:	208 °C	(DIN EN 22719; ISO 2719)
Evaporation rate:	not determined	
Flammability:	does not ignite	
Lower explosion limit:	As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.	
Upper explosion limit:	As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.	
Ignition temperature:	> 200 °C	(DIN 51794)
Vapour pressure:	0.0001 mbar (20 °C)	
Density:	1.166 g/cm3 (20 °C)	(DIN 51757)
Relative density:	1.166 (20 °C)	
Relative vapour density (air):	not determined	
Solubility in water:	Reacts with water.	
Partitioning coefficient n-octanol/water (log Kow):	9.81	(calculated)

Self ignition:	Based on its structural properties the product is not classified as self-igniting.	Test type: Spontaneous self-ignition at room-temperature.
Thermal decomposition:	470 °C, > 130 kJ/kg (DSC (DIN 51007)) 346 °C, 550 J/g (DSC (DIN 51007)) approx. 355 °C (DSC (DIN 51007))	
Viscosity, dynamic:	2.5 - 4 Pa.s (23 °C)	
Explosion hazard:	Based on the chemical structure there is no indicating of explosive properties.	
Fire promoting properties:	Based on its structural properties the product is not classified as oxidizing.	

Other information

Self heating ability:	Currently, no data available	
Miscibility with water:	Reacts with water.	
Hygroscopy:	hygroscopic	
adsorption/water - soil:	log KOC: 7.3 - 7.8	(calculated)
Surface tension:	Based on chemical structure, surface activity is not to be expected.	
Grain size distribution:	The substance / product is marketed or used in a non solid or granular form.	

10. Stability and Reactivity

Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:	Corrosive effects to metal are not anticipated.	
Formation of flammable gases:	Remarks:	Forms no flammable gases in the presence of water.

Chemical stability
The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions
Reacts with alcohols. Reacts with amines. Reacts with substances which contain active hydrogen. Reacts with water, with formation of carbon dioxide. The formation of gaseous decomposition products builds up pressure in tightly closed containers.

Conditions to avoid

Avoid moisture.

Incompatible materials

Substances to avoid:
water, alcohols, amines

Hazardous decomposition products

Hazardous decomposition products:
No hazardous decomposition products if stored and handled as prescribed/indicated.

11. Toxicological Information

Information on toxicological effects

Acute toxicity

Assessment of acute toxicity:
Virtually nontoxic after a single ingestion. Virtually nontoxic after a single skin contact. Of moderate toxicity after short-term inhalation.

Experimental/calculated data:
LD50 rat (oral): > 2,500 mg/kg (OECD Guideline 423)
No mortality was observed.

LC50 rat (by inhalation): 0.467 mg/l 4 h (OECD Guideline 403)
The test result applies only to the substance transferred into respirable aerosol (particles < 20 µm).

LD50 rat (dermal): > 2,000 mg/kg

Irritation

Assessment of irritating effects:
May cause slight irritation to the skin. May cause slight irritation to the eyes.

Experimental/calculated data:
Skin corrosion/irritation rabbit: non-irritant (OECD Guideline 404)

Serious eye damage/irritation rabbit: non-irritant (OECD Guideline 405)

Respiratory/Skin sensitization

Assessment of sensitization:
Caused skin sensitization in animal studies.

Experimental/calculated data:
Guinea pig maximization test : skin sensitizing
sensitizing effect in animal tests

Germ cell mutagenicity

Assessment of mutagenicity:
The substance was not mutagenic in bacteria. The substance was not mutagenic in mammalian cell culture.

Carcinogenicity

Assessment of carcinogenicity:
Study scientifically not justified.

Reproductive toxicity

Assessment of reproduction toxicity:
Study scientifically not justified.

Developmental toxicity

Assessment of teratogenicity:
Study scientifically not justified.

Specific target organ toxicity (single exposure)

Assessment of STOT single:
Causes temporary irritation of the respiratory tract.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:
After repeated exposure the prominent effect is local irritation.

Aspiration hazard

No aspiration hazard expected.

12. Ecological Information

Toxicity

Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms. The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations. The product may hydrolyse. The test result maybe partially due to degradation products.

Toxicity to fish:
LC0 (96 h) >= 100 mg/l, Brachydanio rerio (OECD 203; ISO 7346; 92/69/EEC, C.1, static)
The product may hydrolyse. The test result maybe partially due to degradation products. The product has low solubility in the test medium. An eluate has been tested. Nominal concentration.

Aquatic invertebrates:
EL50 (48 h) 127 mg/l, Daphnia magna (Directive 92/69/EEC, C.2, static)
Nominal concentration. The product may hydrolyse. The test result maybe partially due to degradation products.

Aquatic plants:
EC50 (72 h) > 1,000 mg/l (growth rate), Scenedesmus subspicatus (OECD Guideline 201, static)
Nominal concentration. The product may hydrolyse. The test result maybe partially due to degradation products.

Microorganisms/Effect on activated sludge:
EC20 (3 h) 880 mg/l, (OECD Guideline 209, static)
Nominal concentration. The product may hydrolyse. The test result maybe partially due to degradation products.

Chronic toxicity to fish:
Study not necessary due to exposure considerations.

Chronic toxicity to aquatic invertebrates:
Study not necessary due to exposure considerations.

Assessment of terrestrial toxicity:
Study not necessary due to exposure considerations.

Persistence and degradability

Assessment biodegradation and elimination (H2O):
Poorly biodegradable. The product is unstable in water. The elimination data also refer to products of hydrolysis.

Elimination information:
1 % BOD of the ThOD (28 d) (OECD 301D; EEC 92/69, C.4-E) (aerobic, activated sludge, domestic, non-adapted)

Assessment of stability in water:
In contact with water the substance will hydrolyse rapidly.
Information on Stability in Water (Hydrolysis):
$t_{1/2}$ < 1 h, (OECD Guideline 111, pH4)

$t_{1/2}$ < 1 h, (OECD Guideline 111, pH7)

$t_{1/2}$ < 1 h, (OECD Guideline 111, pH9)

Bioaccumulative potential

Bioaccumulation potential:
Bioconcentration factor: 367.7 (calculated)
Analogous: Assessment derived from products with similar chemical character.

Mobility in soil (and other compartments if available)

Assessment transport between environmental compartments:
The substance will not evaporate into the atmosphere from the water surface.
No data available.

Results of PBT and vPvB assessment

According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): The product does not fulfill the criteria for PBT (Persistent/bioaccumulative/toxic) and vPvB (very persistent/very bioaccumulative). Self classification

Additional information

Other ecotoxicological advice:
Do not release untreated into natural waters. The local regulations on waste-water treatment must be followed.

13. Disposal Considerations

Waste treatment methods

Incinerate in suitable incineration plant, observing local authority regulations.

The UK Environmental Protection (Duty of Care) Regulations (EP) and amendments should be noted (United Kingdom).
This product and any uncleaned containers must be disposed of as hazardous waste in accordance with the 2005 Hazardous Waste Regulations and amendments (United Kingdom)

Contaminated packaging:
Uncontaminated packaging can be re-used.
Packs that cannot be cleaned should be disposed of in the same manner as the contents.
Refer to manufacturer/supplier for information on recovery/recycling.

14. Transport Information

Land transport

ADR

Not classified as a dangerous good under transport regulations

RID

Not classified as a dangerous good under transport regulations

Inland waterway transport
ADN

Not classified as a dangerous good under transport regulations

Sea transport
IMDG

Not classified as a dangerous good under transport regulations

Air transport
IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory Information

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

This product is classified under the Chemicals (Hazard Information and Packaging) Regulations, (CHIP) (United Kingdom).
The data should be considered when making any assessment under the Control of Substances Hazardous to Health Regulations (COSHH), and related guidance, for example, 'COSHH Essentials' (United Kingdom).

If other regulatory information applies that is not already provided elsewhere in this safety data sheet, then it is described in this subsection.

Chemical Safety Assessment

Chemical Safety Assessment performed

16. Other Information

This product is of industrial quality and unless otherwise specified or agreed intended exclusively for industrial use. This includes the mentioned and recommended usage. Any other intended applications should be discussed with the manufacturer. In particular this concerns the application for products that are the object of special standards and regulations.

The product is used mainly as a hardener in coating materials or adhesives. The handling of coating materials or adhesives containing reactive polyisocyanates and residual monomeric HDI requires appropriate protective measures referred to in this safety data sheet. These products may therefore be used only in industrial or trade applications. They are not suitable for use in homeworker (DIY) applications.

Full text of the classifications, including the indication of danger, the hazard symbols, the R phrases, and the hazard statements, if mentioned in section 2 or 3:

T	Toxic.
Xn	Harmful.
23	Toxic by inhalation.

36/37/38	Irritating to eyes, respiratory system and skin.
42/43	May cause sensitization by inhalation and skin contact.
22	Also harmful if swallowed.
20	Harmful by inhalation.
37	Irritating to respiratory system.
43	May cause sensitization by skin contact.
Acute Tox.	Acute toxicity
Skin Sens.	Skin sensitization
STOT SE	Specific target organ toxicity — single exposure
Skin Corr./Irrit.	Skin corrosion/irritation
Eye Dam./Irrit.	Serious eye damage/eye irritation
Resp. Sens.	Respiratory sensitization
H319	Causes serious eye irritation.
H315	Causes skin irritation.
H330	Fatal if inhaled.
H302	Harmful if swallowed.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317	May cause an allergic skin reaction.
H335	May cause respiratory irritation.
H332	Harmful if inhaled.

If you have any queries relating to this MSDS, it's contents or any other product safety related questions, please write to the following e-mail address: Product-Safety-Elastogran@basf.com

The data contained in this safety data sheet are based on our current knowledge and experience and describe the product only with regard to safety requirements. The data do not describe the product's properties (product specification). Neither should any agreed property nor the suitability of the product for any specific purpose be deduced from the data contained in the safety data sheet. It is the responsibility of the recipient of the product to ensure any proprietary rights and existing laws and legislation are observed.

Annex: Exposure Scenarios

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SU3, SU8; ERC1; PROC1, PROC2, PROC3, PROC4, PROC8b, PROC9, PROC15

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1. Short title of exposure scenario

Production
SU3, SU8; ERC1; PROC1, PROC2, PROC3, PROC4, PROC8b, PROC9, PROC15

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	ERC1: Manufacture of substances	
Operational conditions		
Annual amount per site	1,000,000 kg	
Minimum emission days per year	300	
Emission factor air	0 %	
Emission factor water	0 %	
Emission factor soil	0 %	
Risk Management Measures		
Air treatment measures considered suitable are, e.g.		Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.		No generation of waste water during process
Soil treatment measures considered suitable are, e.g.		Sealing of all relevant soil surfaces
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0	

Contributing exposure scenario	
Use descriptors covered	PROC1: Use in closed process, no likelihood of exposure. PROC2: Use in closed, continuous process with occasional controlled exposure. PROC3: Use in closed batch process (synthesis or formulation). PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises. PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 100 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures.	
Wear suitable face shield Wear suitable coveralls to prevent exposure to the skin. Use suitable eye protection.	
Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity exceeds break through time	
Ensure material transfers are under containment or extract ventilation	
Relevant for long-term processes	
Relevant for short-term processes, Wear an air-fed mask., Alternatively:, Wear a mask with an activated carbon filter combined with a particulate filter.	

Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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2. Short title of exposure scenario

Formulation
SU3, SU10; ERC2; PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15

Control of exposure and risk management measures

Contributing exposure scenario		
Use descriptors covered	ERC2: Formulation of preparations	
Operational conditions		
Annual amount per site	100,000 kg	
Minimum emission days per year	300	
Emission factor air	0 %	
Emission factor water	0 %	
Emission factor soil	0 %	
Risk Management Measures		
Air treatment measures considered suitable are, e.g.		Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.		No generation of waste water during process
Soil treatment measures considered suitable are, e.g.		Sealing of all relevant soil surfaces
Exposure estimate and reference to its source		
Risk Characterization Ratio (RCR)	0	

Contributing exposure scenario	
Use descriptors covered	PROC1: Use in closed process, no likelihood of exposure. PROC2: Use in closed, continuous process with occasional controlled exposure. PROC3: Use in closed batch process (synthesis or formulation). PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises. PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). PROC15: Use a laboratory reagent. Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 100 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures.	
Wear suitable face shield Wear suitable coveralls to prevent exposure to the skin. Use suitable eye protection.	
Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity exceeds break through time	
Ensure material transfers are under containment or extract ventilation	
Relevant for long-term processes	
Relevant for short-term processes, Wear an air-fed mask., Alternatively:, Wear a mask with an activated carbon filter combined with a particulate filter.	
Exposure estimate and reference to its source	

Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). PROC8a: Transfer of substance or preparation (charging/discharging) from/to ves-sels/large containers at non-dedicated facilities Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 100 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures.	
Use suitable eye protection. Wear suitable coveralls to prevent exposure to the skin. Wear suitable face shield	
Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity	

exceeds break through time	
Ensure material transfers are under containment or extract ventilation	
Relevant for long-term processes	
Relevant for short-term processes, Wear an air-fed mask., Alternatively:, Wear a mask with an activated carbon filter combined with a particulate filter.	
Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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3. Short title of exposure scenario

Industrial applications
SU3, SU12, SU13, SU19; ERC5, ERC6a, ERC6c, ERC6d; PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC5: Industrial use resulting in inclusion into or onto a matrix
Operational conditions	
Annual amount per site	100,000 kg
Minimum emission days per year	300
Emission factor air	0 %
Emission factor water	0 %
Emission factor soil	0 %
Risk Management Measures	
Air treatment measures considered suitable are, e.g.	Waste gas treatment by

	thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.	No generation of waste water during process
Soil treatment measures considered suitable are, e.g.	Sealing of all relevant soil surfaces
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0

Contributing exposure scenario	
Use descriptors covered	ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)
Operational conditions	
Annual amount per site	100,000 kg
Minimum emission days per year	300
Emission factor air	0 %
Emission factor water	0 %
Emission factor soil	0 %
Risk Management Measures	
Air treatment measures considered suitable are, e.g.	Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.	No generation of waste water during process
Soil treatment measures considered suitable are, e.g.	Sealing of all relevant soil surfaces
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0

Contributing exposure scenario	
Use descriptors covered	ERC6c: Industrial use of monomers for manufacture of thermoplastics
Operational conditions	
Annual amount per site	1,000,000 kg
Minimum emission days per year	300
Emission factor air	0 %
Emission factor water	0 %
Emission factor soil	0 %
Risk Management Measures	

Air treatment measures considered suitable are, e.g.	Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.	No generation of waste water during process
Soil treatment measures considered suitable are, e.g.	Sealing of all relevant soil surfaces
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0

Contributing exposure scenario	
Use descriptors covered	ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers
Operational conditions	
Annual amount per site	1,000,000 kg
Minimum emission days per year	300
Emission factor air	0 %
Emission factor water	0 %
Emission factor soil	0 %
Risk Management Measures	
Air treatment measures considered suitable are, e.g.	Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.	No generation of waste water during process
Soil treatment measures considered suitable are, e.g.	Sealing of all relevant soil surfaces
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0

Contributing exposure scenario	
Use descriptors covered	PROC1: Use in closed process, no likelihood of exposure. PROC2: Use in closed, continuous process with occasional controlled exposure. Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 50 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week
Duration and Frequency of activity	Exposure duration: 240 min 5 days per week

	Relevant for PROC 8a
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures.	
Wear suitable face shield Wear suitable coveralls to prevent exposure to the skin. Use suitable eye protection.	
Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity exceeds break through time	
Ensure material transfers are under containment or extract ventilation Ensure samples are obtained under containment or extract ventilation.	
Relevant for long-term processes	
Relevant for short-term processes, Wear an air-fed mask., Alternatively:, Wear a mask with an activated carbon filter combined with a particulate filter.	
Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes for

	formulation of preparations and articles (multistage and/or significant contact). PROC10: Roller application or brushing Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 50 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week Relevant for PROC 10
Duration and Frequency of activity	Exposure duration: 240 min 5 days per week Relevant for PROC 5
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	
Wear suitable face shield Wear a impervious suit. Use suitable eye protection.	
Wear an air-fed mask., Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity exceeds break through time	
Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical	

examination including a pulmonary function test.
Guidance to Downstream Users
For scaling see: http://www.ecetoc.org/tra

Contributing exposure scenario	
Use descriptors covered	PROC7: Industrial spraying Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 50 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 240 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Engineering controls have to be used to reduce exposures.	
Wear suitable face shield Wear a impervious suit. Use suitable eye protection.	
Wear an air-fed mask., Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity exceeds break through time	
Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known	

skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.
Guidance to Downstream Users
For scaling see: http://www.ecetoc.org/tra

Contributing exposure scenario	
Use descriptors covered	PROC3: Use in closed batch process (synthesis or formulation). PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises. PROC8a: Transfer of substance or preparation (charging/discharging) from/to ves-sels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). PROC13: Treatment of articles by dipping and pouring. PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelettisation. PROC15: Use a laboratory reagent. Use domain: industrial and professional
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 50 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week
Duration and Frequency of activity	Exposure duration: 240 min 5 days per week Relevant for PROC 8a
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures.	
Use suitable eye protection. Wear suitable face shield Wear suitable coveralls to prevent exposure to the skin.	
Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with ‘basic’ employee	Effectiveness: 90.0 %

training.	
Change gloves, if duration of activity exceeds break through time	
Ensure material transfers are under containment or extract ventilation	
Relevant for long-term processes	
Relevant for short-term processes, Wear an air-fed mask., Alternatively:, Wear a mask with an activated carbon filter combined with a particulate filter.	
Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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4. Short title of exposure scenario

Professional applications
SU22, SU10, SU12, SU13, SU19; ERC2, ERC8c, ERC8f; PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC14, PROC15

Control of exposure and risk management measures

Contributing exposure scenario	
Use descriptors covered	ERC2: Formulation of preparations
Operational conditions	
Annual amount per site	1,000,000 kg
Minimum emission days per year	300
Emission factor air	0 %
Emission factor water	0 %
Emission factor soil	0 %
Risk Management Measures	

Air treatment measures considered suitable are, e.g.	Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.	No generation of waste water during process
Soil treatment measures considered suitable are, e.g.	Sealing of all relevant soil surfaces
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0

Contributing exposure scenario	
Use descriptors covered	ERC8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix
Operational conditions	
Annual amount per site	1,000,000 kg
Minimum emission days per year	300
Emission factor air	0 %
Emission factor water	0 %
Emission factor soil	0 %
Risk Management Measures	
Air treatment measures considered suitable are, e.g.	Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.	No generation of waste water during process
Soil treatment measures considered suitable are, e.g.	Sealing of all relevant soil surfaces
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0

Contributing exposure scenario	
Use descriptors covered	ERC8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix
Operational conditions	
Annual amount per site	1,000,000 kg
Minimum emission days per year	300
Emission factor air	0 %
Emission factor water	0 %
Emission factor soil	0 %

Risk Management Measures	
Air treatment measures considered suitable are, e.g.	Waste gas treatment by thermal oxidation, Activated Carbon Adsorption
Wastewater treatment measures considered suitable are, e.g.	No generation of waste water during process
Soil treatment measures considered suitable are, e.g.	Sealing of all relevant soil surfaces
Exposure estimate and reference to its source	
Risk Characterization Ratio (RCR)	0

Contributing exposure scenario	
Use descriptors covered	PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). PROC10: Roller application or brushing Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 50 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week Relevant for PROC 10
Duration and Frequency of activity	Exposure duration: 240 min 5 days per week Relevant for PROC 5
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	
Wear suitable face shield Wear a impervious suit. Use suitable eye protection.	
Wear an air-fed mask., Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity exceeds break through time	

Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC7: Industrial spraying Use domain: industrial
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 50 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the work area every day.	
Engineering controls have to be used to reduce exposures. Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.	
Wear suitable face shield Wear a impervious suit. Use suitable eye protection.	
Risk Management Measures are based on qualitative risk characterisation., Wear an air-fed mask.	
Local exhaust ventilation	Effectiveness: 90 %
Wear chemically resistant gloves in combination with ‘basic’ employee training.	Effectiveness: 90.0 %

Change gloves, if duration of activity exceeds break through time	
Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

Contributing exposure scenario	
Use descriptors covered	PROC3: Use in closed batch process (synthesis or formulation). PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises. PROC8a: Transfer of substance or preparation (charging/discharging) from/to ves-sels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing). PROC13: Treatment of articles by dipping and pouring. PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelettisation. PROC15: Use a laboratory reagent. Use domain: industrial and professional
Operational conditions	
Concentration of the substance	Hexamethylene diisocyanate, oligomers Content: >= 0 % - <= 50 %
Physical state	Liquid, very low fugacity
Duration and Frequency of activity	Exposure duration: 480 min 5 days per week
Duration and Frequency of activity	Exposure duration: 240 min 5 days per week Relevant for PROC 8a
Indoor/Outdoor	Indoor
Risk Management Measures	
Regular inspection and maintenance of equipment and machines. Avoid frequent and direct contact with substance. Clean equipment and the	

work area every day.	
Engineering controls have to be used to reduce exposures.	
Use suitable eye protection. Wear suitable face shield Wear suitable coveralls to prevent exposure to the skin.	
Risk Management Measures are based on qualitative risk characterisation.	
Local exhaust ventilation	Effectiveness: 90.0 %
Wear chemically resistant gloves in combination with 'basic' employee training.	Effectiveness: 90.0 %
Change gloves, if duration of activity exceeds break through time	
Ensure material transfers are under containment or extract ventilation	
Relevant for long-term processes	
Relevant for short-term processes, Wear an air-fed mask., Alternatively:, Wear a mask with an activated carbon filter combined with a particulate filter.	
Exposure estimate and reference to its source	
Assessment method	Qualitative assessment
	Worker - dermal
Assessment method	ECETOC TRA v2.0 Worker
	Worker - inhalative, long-term - local
Exposure estimate	0.21 mg/m³
Risk Characterization Ratio (RCR)	0.42
	The short-term exposure is covered by the assessment of long-term exposure.
Additional good practice advice	
Ensure good work practices are implemented. Avoid handling of the substance in case of known skin complaints, hypersensitivity reactions, chronic respiratory disease, astmatic attacks or bronchial attacks. Worker should receive a pre-placement and subsequently a periodically medical examination including a pulmonary function test.	
Guidance to Downstream Users	
For scaling see: http://www.ecetoc.org/tra	

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