



**SAFETY DATA SHEET**  
according to Regulation (EC) No. 1907/2006

SDS n° : FP13156

**NORSODYNE H 88204 TAF**

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Former date 15-Aug-2019

Revision date 15-Dec-2022

Version: 4

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

1.1. Product identifier

<b>Product name</b>	<b>NORSODYNE H 88204 TAF</b>
<b>Chemical Name</b>	<b>Unsaturated polyester resin</b>
<b>Trade name</b>	NORSODYNE H 88204 TAPF;SYNOLAC 6417 CLASS I;NORSODYNE 6417
<b>Pure substance/mixture</b>	Mixture

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

**Identified uses** Resins for composites. Contact us before using for food contact application.

1.3. Details of the supplier of the safety data sheet

**Supplier**

Polynt Composites France S.A.  
Route d'Arras CS 50019 62320 Drocourt, France  
Tel : (+33) 3 21 74 84 00 - Fax : (+33) 3 21 49 55 84

Polynt S.p.A.  
Via Enrico Fermi, 51 24020 Scanzorosciate (BG), Italy  
Tel : (+39) 035 652 111 - Fax : (+39) 035 652 421

Polynt Composites Spain, S.L.U.  
Avenida República Argentina S/N 09200 Miranda de Ebro - Burgos, Spain  
Tel : (+34) 947 027 202 - Fax : (+34) 947 31 45 40

Polynt Composites Poland Sp. z o.o.  
ul. Grabska 11d, 32-005 Niepołomice, Poland  
Tel : (+48) 12 281 42 00 - Fax : (+48) 12 281 42 01

Polynt Composites Norway AS  
Lilleborggata 4, 1630 Gamle Fredrikstad, Norway  
Tel : (+47) 693 570 00 - Fax : (+47) 693 570 01

Polynt Composites Stallingborough UK Ltd.  
Laporte Road, Stallingborough - Near Grimsby North East Lincolnshire DN41 8DR,  
United Kingdom  
Tel : (+44) 1469 552 570 - Fax : (+44) 1469 552 597

The supplier of the product is, among those indicated above, the one identified on the label and / or in the sales documents

**For further information, please contact**

**E-mail address** sdsregulatory@polynt.com  
**Internet Address** http://www.polynt.com

1.4. Emergency telephone number

This telephone number is available 24 hours per day, 7 days per week.	
Europe :	+44 1235 239 670
Middle East/Africa :	+44 1235 239 671

East/South East Asia :	+65 3158 1412
America :	+1 215 207 0061

**Poison Information Centre  
telephone number**

European emergency phone number : 112  
 UK : National Poisons Emergency Number : 0344 892 0111  
 Ireland : National Poisons Information Centre (NPIC) Telephone Healthcare  
 Professionals : +353 (01) 809 2566. (24 hour service) Telephone Members of Public :  
 +353 (01) 809 2166. (8.00 a.m. to 10.00 p.m. 7 days a week)

**SECTION 2: Hazards identification****2.1. Classification of the substance or mixture**

Classification of the substance or mixture - GHS/CLP (n° 1272/2008)

Skin Corrosion/Irritation	Category 2 - (H315)
Serious Eye Damage/Eye Irritation	Category 2 - (H319)
Skin Sensitization	Category 1 - (H317)
Reproductive Toxicity	Category 2 - (H361d)
Carcinogenicity	Category 2 - (H351)
Specific Target Organ Toxicity (Single Exposure)	Category 3 - (H335)
Specific target organ toxicity - repeated exposure	Category 1 - (H372)
Flammable liquids	Category 3 - (H226)

**2.2. Label elements**

Contains cobalt octoate, diantimony trioxide, Styrene

**Signal word****Danger****Hazard statements**

H315 - Causes skin irritation  
 H317 - May cause an allergic skin reaction  
 H319 - Causes serious eye irritation  
 H335 - May cause respiratory irritation  
 H351 - Suspected of causing cancer  
 H361d - Suspected of damaging the unborn child  
 H372 - Causes damage to organs through prolonged or repeated exposure if inhaled  
 H226 - Flammable liquid and vapour

Physical hazards

**EU H -Phrases**

EUH208 - Contains phthalic anhydride- May produce an allergic reaction.

**Precautionary statements**

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking  
 P243 - Take action to prevent static discharges  
 P260 - Do not breathe vapour  
 P280 - Wear protective gloves/protective clothing/eye protection/face protection  
 P302 + P352 - IF ON SKIN: Wash with plenty of soap and water  
 P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing  
 P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing  
 P308 + P313 - IF exposed or concerned: Get medical advice/attention  
 P403 + P233 - Store in a well-ventilated place. Keep container tightly closed

2.3. Other hazards

PBT/vPvB see section 12.5.

## SECTION 3: Composition/information on ingredients

3.2. Mixtures**Hazardous components**

Chemical Name	EC-No	REACH Registration Number	CAS-No	Weight percent	GHS Classification	M-Factor (acute)	M-Factor (chronic)	Concentration limit (%)
Styrene	202-851-5	01-2119457861-32	100-42-5	20 - < 25	Flam. Liq. 3 (H226) Repr. 2 (H361d) Acute Tox. 4 (H332) Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Asp. Tox. 1 (H304) STOT SE 3 (H335) STOT RE 1 (H372) Aquatic Chronic 3 (H412)			
Aluminum hydroxide	244-492-7	01-2119529246-39	21645-51-2	> 15	-			
diantimony trioxide	215-175-0	01-2119475613-35	1309-64-4	7 - 9	Carc. 2 (H351)			
Zinc borate	235-804-2	No data available	138265-88-0	0.1 - < 1	Aquatic Acute 1 (H400)			
phthalic anhydride	201-607-5	01-2119457017-41	85-44-9	0.1 - < 1	Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Skin Sens. 1 (H317) Eye Dam. 1 (H318) Resp. Sens. 1 (H334) STOT SE 3 (H335)			
Silica, amorphous, fumed, crystalline-free	231-545-4	01-2119379499-16	112945-52-5	0.1 - < 1	-			
cobalt octoate	205-250-6	01-2119524678-29	136-52-7	0.1 - < 0.3	Skin Sens. 1A (H317) Eye Irrit. 2 (H319) Repr. 1B (H360Fd) Aquatic Acute 1 (H400) Aquatic Chronic 3 (H412)	1		

Hydroquinone	204-617-8	01-2119524016-51	123-31-9	0.01 - < 0.1	Acute Tox. 4 (H302) Eye Dam. 1 (H318) Skin Sens. 1 (H317) Muta. 2 (H341) Carc. 2 (H351) Aquatic acute 1 (H400) Aquatic Chronic 1 (H410)	10	1	
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**Additional information** Acute Toxicity Estimate See Section 11 for more information

**For the full text of the H-Statements mentioned in this Section, see Section 16**

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

<b>General advice</b>	Show this safety data sheet to the doctor in attendance Do not breathe dust/fume/gas/mist/vapours/spray
<b>Eye Contact</b>	Rinse thoroughly with plenty of water, also under the eyelids. Keep eye wide open while rinsing. If symptoms persist, call a physician
<b>Skin contact</b>	Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes If skin irritation persists, call a physician
<b>Inhalation</b>	Move to fresh air If not breathing, give artificial respiration Consult a physician
<b>Ingestion</b>	Do NOT induce vomiting Rinse mouth. Consult a physician
<b>Protection of first-aiders</b>	Use personal protective equipment See section 8 for more information

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

<b>Eye Contact</b>	Irritating to eyes
<b>Skin contact</b>	Irritating to skin May cause sensitisation by skin contact
<b>Inhalation</b>	Harmful: danger of serious damage to health by prolonged exposure through inhalation Irritating to respiratory system May produce an allergic reaction.
<b>Ingestion</b>	Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

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

**Notes to physician** No information available

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

**Suitable extinguishing media** Dry chemical, Foam, Carbon dioxide (CO<sub>2</sub>), (closed systems)

**Extinguishing Media Which Must not be Used for Safety Reasons** Do not use a solid water stream as it may scatter and spread fire.

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

**Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases** Vapours may form explosive mixtures with air. Most vapours are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks) Heating or fire can release toxic gas : Carbon monoxide

### 5.3. Advice for firefighters

**Special protective equipment for fire-fighters** Wear self-contained breathing apparatus and protective suit.

**Other information** Cool containers / tanks with water spray.  
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

## SECTION 6: Accidental release measures

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

#### **For non-emergency personnel**

##### **Personal precautions**

Remove all sources of ignition  
Heat, flames and sparks.  
Take precautionary measures against static charges.  
Ensure adequate ventilation  
Use personal protective equipment

#### **For emergency responders**

Avoid breathing vapours or mists In the event of fire and/or explosion do not breathe fumes. Use personal protective equipment

### 6.2. Environmental precautions

**Environmental precautions** The product should not be allowed to enter drains, water courses or the soil.  
Do not flush into surface water or sanitary sewer system

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

#### **Methods for cleaning up**

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13)  
Use clean non-sparking tools to collect absorbed material

### 6.4. Reference to other sections

See section 8 for more information  
See Section 12 for additional Ecological Information

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

#### **Precautions for safe handling**

Avoid static electricity build up with connection to earth  
Use only in area provided with appropriate exhaust ventilation  
In case of insufficient ventilation, wear suitable respiratory equipment  
For personal protection see section 8

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**Prevention of fire and explosion** Keep away from open flames, hot surfaces and sources of ignition Empty containers may contain flammable or explosive vapours

**Hygiene measures** When using, do not eat, drink or smoke Wash hands before breaks and at the end of workday. Provide regular cleaning of equipment, work area and clothing

### 7.2. Conditions for safe storage, including any incompatibilities

**Technical measures/Storage conditions** Keep in a dry, cool and well-ventilated place. Keep at temperature not exceeding 30°C. Keep away from heat and sources of ignition.

**Materials to avoid** Strong oxidizing agents, Peroxides, Reducing agents

**Packaging material** metallic GRP Tanks (Reinforced Glass Polyester)

**Unsuitable materials for containers** copper, Copper alloys, Bronze, Zinc

### 7.3. Specific end use(s)

**Specific use(s)** No information available

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### Occupational Exposure limits

Chemical Name	European Union	ACGIH OEL (Ceiling)	The United Kingdom	Ireland
Styrene 100-42-5	-	ACGIH (2020): TLV-TWA: 10 ppm TLV-STEL/C: 20 ppm Notes: OTO, A3, BEI Critical effects: CNS and hearing impairment, URT irr, peripheral neuropathy visual disorders	STEL 250 ppm STEL 1080 mg/m <sup>3</sup> TWA 100 ppm TWA 430 mg/m <sup>3</sup>	TWA 20 ppm TWA 85 mg/m <sup>3</sup> STEL 40 ppm STEL 170 mg/m <sup>3</sup>
Aluminum hydroxide 21645-51-2			STEL 30 mg/m <sup>3</sup> STEL 12 mg/m <sup>3</sup> TWA 10 mg/m <sup>3</sup> TWA 4 mg/m <sup>3</sup>	We are not aware of any national exposure limit.
diantimony trioxide 1309-64-4			STEL 1.5 mg/m <sup>3</sup> TWA 0.5 mg/m <sup>3</sup>	TWA 0.5 mg/m <sup>3</sup>
phthalic anhydride 85-44-9		TWA 1 ppm	STEL 12 mg/m <sup>3</sup> TWA 4 mg/m <sup>3</sup> Sen+	TWA 4 mg/m <sup>3</sup> STEL 12 mg/m <sup>3</sup> Sensitizer
cobalt octoate 136-52-7		0.02 mg/m <sup>3</sup>	STEL 0.3 mg/m <sup>3</sup> TWA 0.1 mg/m <sup>3</sup> Sen+	TWA 0.1 mg/m <sup>3</sup> Sensitizer
Hydroquinone 123-31-9		TWA 1 mg/m <sup>3</sup>	STEL 1.5 mg/m <sup>3</sup> TWA 0.5 mg/m <sup>3</sup>	TWA 0.5 mg/m <sup>3</sup>

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

#### Biological standards

Chemical Name	European Union	The United Kingdom	Ireland
Zinc borate 138265-88-0	TLV - TWA: 10 mg/m <sup>3</sup> (ACGIH) TLV - TWA: 5 mg/m <sup>3</sup>	We are not aware of any national exposure limit.	We are not aware of any national exposure limit.

#### Derived No Effect Level (DNEL)

Derived No Effect Level (DNEL)				
Styrene (100-42-5)				
Type	DNEL oral	DNEL dermal	DNEL inhalation	Remark
Workers - Long Term - Systemic effect		406 mg/Kg bw/day	85 mg/m <sup>3</sup>	

Workers - Acute Short Term - Local effect			306 mg/m <sup>3</sup>	
Workers - Acute Short term - Systemic effect			289 mg/m <sup>3</sup>	
General Population - Acute Short Term - Local effect			182.7 mg/m <sup>3</sup>	
General Population - Acute Short Term - Systemic effect			174.2 mg/m <sup>3</sup>	
General Population - Long Term - Systemic effect	2.1 mg/Kg bw/day	343 mg/Kg bw/day	10.2 mg/m <sup>3</sup>	

**Aluminum hydroxide (21645-51-2)**

Type	DNEL oral	DNEL dermal	DNEL inhalation	Remark
Workers - Long Term - Local effect			3.59 mg/m <sup>3</sup>	
General Population - Long Term - Systemic effect	2.37 mg/kg bw/day			

**diantimony trioxide (1309-64-4)**

Type	DNEL oral	DNEL dermal	DNEL inhalation	Remark
Workers - Long Term - Local effect			0.5 mg/m <sup>3</sup>	
Workers - Long Term - Systemic effect		281 mg/kg bw/day		
General Population - Long Term - Local effect			0.1 mg/m <sup>3</sup>	
General Population - Long Term - Systemic effect	168.6 mg/kg bw/day	168.6 mg/kg bw/day		

**phthalic anhydride (85-44-9)**

Type	DNEL oral	DNEL dermal	DNEL inhalation	Remark
Workers - Long Term - Systemic effect		10 mg/kg bw/day	32.2 mg/m <sup>3</sup>	
General Population - Long Term - Systemic effect	5 mg/kg bw/day	5 mg/kg bw/day	8.6 mg/m <sup>3</sup>	

**Silica, amorphous, fumed, crystalline-free (112945-52-5)**

Type	DNEL oral	DNEL dermal	DNEL inhalation	Remark
Workers - Long Term - Systemic effect			4 mg/m <sup>3</sup>	

**cobalt octoate (136-52-7)**

Type	DNEL oral	DNEL dermal	DNEL inhalation	Remark
Workers - Long Term - Local effect			235.1 µg/m <sup>3</sup>	
General Population - Long Term - Systemic effect	175 µg/kg bw/day			
General Population - Long Term - Local effect			37 µg/m <sup>3</sup>	

**Hydroquinone (123-31-9)**

Type	DNEL oral	DNEL dermal	DNEL inhalation	Remark
Workers - Long Term - Systemic effect		128 mg/kg bw/day	7 mg/m <sup>3</sup>	
Workers - Long Term - Local effect			1 mg/m <sup>3</sup>	
General Population - Long Term - Systemic effect		64 mg/kg bw/day	1.74 mg/m <sup>3</sup>	

General Population - Long Term - Local effect			0.5 mg/m <sup>3</sup>	
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**Predicted No Effect Concentration (PNEC)**

<b>PNEC Component</b>		
<b>Styrene (100-42-5)</b>		
Exposure	Type	PNEC
Fresh water	PNEC Aqua	0.028 mg/L
Marine water	PNEC Aqua	0.014 mg/L
Intermittent use/release	PNEC Aqua	0.04 mg/L
Fresh water	PNEC Sediment	0.614 mg/Kg.dw
Marine water	PNEC Sediment	0.307 mg/Kg.dw
Terrestrial Compartment	PNEC Soil	0.2 mg/Kg.dw
STP microorganisms	PNEC STP	5 mg/L

<b>Aluminum hydroxide (21645-51-2)</b>		
Exposure	Type	PNEC
	PNEC STP	20 mg/L

<b>diantimony trioxide (1309-64-4)</b>		
Exposure	Type	PNEC
Marine water	PNEC Aqua	0.0113 mg/L
Fresh water	PNEC Aqua	0.113 mg/L
	PNEC STP	2.55 mg/L
Fresh water	PNEC Sediment	11.2 mg/kg sediment dw
Marine water	PNEC Sediment	2.24 mg/kg sediment dw
	PNEC Soil	37 mg/kg soil dw

<b>phthalic anhydride (85-44-9)</b>		
Exposure	Type	PNEC
Fresh water	PNEC Aqua	1 mg/L
Marine water	PNEC Aqua	0.1 mg/L
Intermittent use/release	PNEC Aqua	5.6 mg/L
	PNEC STP	10 mg/L
Fresh water	PNEC Sediment	3.8 mg/kg sediment dw
Marine water	PNEC Sediment	0.38 mg/kg sediment dw
Terrestrial Compartment	PNEC Soil	0.173 mg/kg soil dw

<b>Silica, amorphous, fumed, crystalline-free (112945-52-5)</b>		
Exposure	Type	PNEC
Secondary Poisoning	PNEC Oral	60000 mg/kg

<b>cobalt octoate (136-52-7)</b>		
Exposure	Type	PNEC
Fresh water	PNEC Aqua	0.62 µg/L
Marine water	PNEC Aqua	2.36 µg/L
STP microorganisms	PNEC STP	0.37 mg/L
Fresh water	PNEC Sediment	53.8 mg/kg sediment dw
Marine water	PNEC Sediment	69.8 mg/kg sediment dw
Terrestrial Compartment	PNEC Soil	10.9 mg/kg soil dw

<b>Hydroquinone (123-31-9)</b>		
Exposure	Type	PNEC
Fresh water	PNEC Aqua	0.114 µg/L
Marine water	PNEC Aqua	0.0114 µg/L
Fresh water	PNEC Sediment	0.98 µg/kg sediment dw
Marine water	PNEC Sediment	0.097 µg/kg sediment dw
	PNEC Soil	0.129 µg/kg soil dw



	PNEC STP	0.71 mg/L
Intermittent use/release	PNEC Aqua	1.34 µg/L

## 8.2. Exposure controls

### Occupational exposure controls

#### Engineering measures

Apply technical measures to comply with the occupational exposure limits.  
When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment

#### Personal protective equipment

##### General Information

Use personal protective equipment.

##### Respiratory protection

Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour)  
If exposure limits are likely to be exceeded / In case of insufficient ventilation wear suitable respiratory equipment :

Breathing apparatus with filter Type A ( Organic gases and vapours filter conforming to EN 14387 , APF 40 < 1 hour, APF 200 > 1 hour) / Type A(2)/P3 in combination with Particulates filter conforming to EN 143 , if exposed to dust

##### Eye protection

Safety glasses with side-shields. Do not wear contact lenses.

##### Skin and body protection

Antistatic boots. Protective shoes or boots. Wear fire/flame resistant/retardant clothing.

##### Hand protection

Wear chemically resistant gloves (tested to EN 374) in combination with 'basic' employee training

Glove material : Neoprene , Nitriles , Viton (R) or Polyvinyl alcohol

Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

### Environmental exposure controls

**Environmental exposure controls** Do not allow material to contaminate ground water system.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

<u>Property</u>	<u>Values</u>	<u>Remark</u>
<b>Physical state</b>	Liquid	
<b>Colour</b>	white opaque	
<b>Appearance</b>		No data available
<b>Particle size</b>		No data available
<b>Odour</b>	Styrene	
<b>Odour Threshold</b>	0.15 ppm	Values related to styrene
<b>pH</b>		No data available
<b>pH (as aqueous solution)</b>		No data available
<b>Melting point/range</b>	- 30 °C	Values related to styrene
<b>Freezing Point</b>		No data available
<b>Softening point</b>		No data available
<b>Boiling point</b>	145 °C	Values related to styrene
<b>Flash point</b>	31 °C	Values related to styrene
<b>Flammability Limit in Air</b>		
<b>Upper</b>	6,1 - 6,8%	Values related to styrene
<b>Lower</b>	0,9 -1,1%	Values related to styrene
<b>Vapour pressure</b>	6 hPa	20°C
<b>Vapour density</b>	3.6	Values related to styrene
<b>Density</b>	1.45 - 1.5 g/cm3	20°C
<b>Specific Gravity</b>		No data available
<b>Bulk density</b>		No data available
<b>Water solubility</b>	Insoluble in water	
<b>Solubility in other solvents</b>	Soluble in most organic solvents	
<b>Partition coefficient: n-octanol/water</b>	3	Values related to styrene

<b>Autoignition temperature</b>	490 °C	Values related to styrene
<b>Decomposition temperature</b>		No data available
<b>Viscosity, kinematic</b>	255 - 517 mm <sup>2</sup> /s	23°C (Brookfield RVT)
<b>Viscosity, dynamic</b>	370 - 750 mPa.s	23°C (Brookfield RVT)

## 9.2. Other information

### Information with regards to physical hazard classes

<u>Property</u>	<u>Values</u>	<u>Remark</u>
<b>Explosives</b>		No data available
<b>Flammable gases</b>		No data available
<b>Aerosols</b>		No data available
<b>Oxidising gases</b>		No data available
<b>Gases under pressure</b>		No data available
<b>Flammable liquids</b>		No data available
<b>Flammable solids</b>		No data available
<b>Pyrophoric liquids</b>		No data available
<b>Pyrophoric solids</b>		No data available
<b>Self-heating substances and mixtures</b>		No data available
<b>Substances and mixtures which, in contact with water, emit flammable gases</b>		No data available
<b>Oxidising liquids</b>		No data available
<b>Oxidising solids</b>		No data available
<b>Oxidising Properties</b>		No data available
<b>Organic peroxides</b>		No data available
<b>Corrosive to metals</b>		No data available
<b>Desensitised explosives</b>		No data available

### Other safety characteristics

<b>Sensitivity to Mechanical Impact</b>	No data available
<b>SAPT (self-accelerating polymerisation temperature)</b>	No data available
<b>Formation of explosible dust/air mixtures</b>	No data available
<b>Acid/alkaline reserve</b>	No data available
<b>Miscible</b>	No data available
<b>Conductivity</b>	No data available
<b>Corrosiveness</b>	No data available
<b>Gas group</b>	No data available
<b>Redox potential</b>	No data available
<b>Photocatalytic properties</b>	No data available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

**Reactivity** Product may ignite and burn at temperatures exceeding the flash point

### 10.2. Chemical stability

**Stability** Stable under recommended storage conditions.

### 10.3. Possibility of hazardous reactions

**Hazardous reactions** In use, may form flammable/explosive vapour-air mixture.

**Hazardous polymerisation** Polymerisation can occur.

### 10.4. Conditions to avoid

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**Conditions to avoid**

Heat, flames and sparks.  
Exposure to light.  
Take precautionary measures against static charges.

**10.5. Incompatible materials****Materials to avoid**

Strong oxidizing agents, Peroxides, Reducing agents

**10.6. Hazardous decomposition products****Hazardous decomposition products**

Incomplete combustion and thermolysis produces potentially toxic gases such as carbon monoxide and carbon dioxide

**SECTION 11: Toxicological information****11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008****Acute toxicity****Inhalation**Harmful: danger of serious damage to health by prolonged exposure through inhalation  
Irritating to respiratory system May produce an allergic reaction.**Ingestion**

Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation	Read-across (Analogy)
Styrene 100-42-5	5000 mg/kg (Rat)	> 2000 mg/kg bw (Rat) 24h OECD 402	11.8 mg/L (Rat) 4h CSR	
Aluminum hydroxide 21645-51-2	> 2000 mg/kg bw (Rat) OECD 423		> 2.3 mg/L air (Rat, aerosol) 4h OECD 403, EPA 40 CFR 158	
diantimony trioxide 1309-64-4		> 8300 mg/kg bw (168h) (Rabbit) No guideline followed	> 5.2 mg/L air (Rat) 4h OECD 403, EU Method B.2	
Zinc borate 138265-88-0	> 4100 mg/kg bw (Rat)	> 2000 mg/kg bw (Rat)		
phthalic anhydride 85-44-9	1530 mg/kg bw (Rat)	> 3160 mg/kg bw (Rabbit)	> 2.14 mg/L (Rat) 4h OECD 403	
Silica, amorphous, fumed, crystalline-free 112945-52-5	> 5000 mg/kg bw (Rat) OECD 401	> 5000 mg/kg (Rabbit)	> 0.14 mg/L air (Rat) 4h (analytical) OECD 403	
cobalt octoate 136-52-7	3129 mg/kg/bw (Rat) OECD 425	> 2000 mg/kg bw (Rat) OECD 402		
Hydroquinone 123-31-9	367 mg/kg bw (Rat) OECD 401	> 2000 mg/kg bw (Rabbit) OECD 402		

**Skin corrosion/irritation**

Chemical Name	Skin corrosion/irritation	Read-across (Analogy)
Styrene 100-42-5	Irritating to skin in vivo assay rabbit	
Aluminum hydroxide 21645-51-2	No skin irritation No skin corrosion rabbit OECD 404	
diantimony trioxide 1309-64-4	No skin irritation in vivo assay rabbit	
phthalic anhydride 85-44-9	Irritating to skin in vivo assay rabbit OECD 404	
Silica, amorphous, fumed, crystalline-free 112945-52-5	No skin irritation rabbit OECD 404	

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cobalt octoate 136-52-7	No skin corrosion in vitro study OECD 431 EU Method B. 40	
Hydroquinone 123-31-9	No skin irritation	

**Serious Eye Damage/Eye Irritation**

Chemical Name	Serious Eye Damage/Eye Irritation	Read-across (Analogy)
Styrene 100-42-5	Irritating to eyes in vivo assay rabbit	
Aluminum hydroxide 21645-51-2	No eye irritation in vivo assay rabbit OECD 405	
diantimony trioxide 1309-64-4	No eye irritation in vivo assay rabbit OECD 405 EU Method B.5	
phthalic anhydride 85-44-9	Irritating to eyes in vivo assay rabbit Draize Test	
Silica, amorphous, fumed, crystalline-free 112945-52-5	No eye irritation rabbit OECD 405	
cobalt octoate 136-52-7	Moderate eye irritation OECD 437 EU Method B.47 Irritating to eyes rabbit OECD 405	
Hydroquinone 123-31-9	Risk of serious damage to eyes Severe eye irritation	

**Respiratory or skin sensitisation** May cause sensitisation by skin contact

Chemical Name	Respiratory or skin sensitisation	Read-across (Analogy)
Styrene 100-42-5	Does not cause skin sensitization Does not cause respiratory sensitization CSR	
Aluminum hydroxide 21645-51-2	Does not cause skin sensitization Does not cause respiratory sensitization in vivo assay guinea pig OECD 406 EPA OPPTS 870.2600	
diantimony trioxide 1309-64-4	Does not cause skin sensitization in vivo assay guinea pig OECD 406	
phthalic anhydride 85-44-9	May cause sensitisation by inhalation and skin contact in vivo assay guinea pig OECD 406	
Silica, amorphous, fumed, crystalline-free 112945-52-5	Does not cause skin sensitization Does not cause respiratory sensitization	
cobalt octoate 136-52-7	May cause sensitisation by skin contact in vivo assay mouse OECD 429	
Hydroquinone 123-31-9	May cause sensitisation by skin contact mouse OECD 429 guinea pig OECD 406	

**Mutagenic Effects**

## in vitro study

Chemical Name	Ames test	Read-across (Analogy)
Styrene 100-42-5	Ambiguous In vitro gene mutation study in bacteria (S. typhimurium G46, TA1530, TA 1535, TA100, TA98, TA1538, TA 1537) OECD 471	
diantimony trioxide 1309-64-4	negative In vitro gene mutation study in bacteria (S. typhimurium TA 1535, TA 1537, TA 98 and TA 100) (Escherichia coli WP2 uvrA) OECD 471	
phthalic anhydride 85-44-9	negative In vitro gene mutation study in bacteria (S. typhimurium TA 1535, TA 1537, TA 98, TA100 and TA 102) (Escherichia coli WP2 uvrA) OECD 471	
Silica, amorphous, fumed, crystalline-free 112945-52-5	negative In vitro gene mutation study in bacteria OECD 471	
cobalt octoate 136-52-7	negative In vitro gene mutation study in bacteria (S. typhimurium TA 1535, TA 1537, TA 98, TA100 and TA 102) OECD 471	Cas N°: 68956-82-1, 14024-48-7
Hydroquinone 123-31-9	negative In vitro gene mutation study in bacteria OECD 471	

Chemical Name	In vitro Mammalian Cell Gene Mutation Test	Read-across (Analogy)
Styrene 100-42-5	Ambiguous In vitro gene mutation study in mammalian cells hamster OECD 476	
Aluminum hydroxide 21645-51-2	negative In vitro gene mutation study in mammalian cells mouse OECD 476	
diantimony trioxide 1309-64-4	negative In vitro gene mutation study in mammalian cells mouse OECD 476	
phthalic anhydride 85-44-9	negative In vitro gene mutation study in mammalian cells hamster OECD 476	
Silica, amorphous, fumed, crystalline-free 112945-52-5	negative In vitro gene mutation study in mammalian cells OECD 476	
cobalt octoate 136-52-7	negative In vitro gene mutation study in mammalian cells mouse OECD 476	Cas N°: 7440-48-4, 1308-06-1, 10124-43-3, 12016-80-7
Hydroquinone 123-31-9	positive Chromosome aberration test in vitro OECD 483	
Chemical Name	In vitro Mammalian Chromosome Aberration Test	Read-across (Analogy)
Styrene 100-42-5	positive Chromosome aberration test in vitro OECD 473 OECD 479	
diantimony trioxide 1309-64-4	positive Chromosome aberration test in vitro OECD 473	

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phthalic anhydride 85-44-9	Ambiguous Chromosome aberration test in vitro hamster OECD 473	
Silica, amorphous, fumed, crystalline-free 112945-52-5	negative Chromosome aberration test in vitro OECD 473	
Hydroquinone 123-31-9	positive In vitro gene mutation study in mammalian cells mouse OECD 476	

**in vivo assay**

Chemical Name	Unscheduled DNA Synthesis (UDS)	Read-across (Analogy)
Styrene 100-42-5	negative mouse OECD 486 OECD 474	
Aluminum hydroxide 21645-51-2	negative rat OECD 474	
diantimony trioxide 1309-64-4	negative mouse OECD 474	
Silica, amorphous, fumed, crystalline-free 112945-52-5	negative rat	
cobalt octoate 136-52-7	negative rat OECD 474 OECD 475	Cas N°: 68956-82-1, 14024-48-7, 10026-24-1
<b>Chemical Name</b>	<b>European Union</b>	
Hydroquinone 123-31-9	Muta. 2	

**Carcinogenicity** Limited evidence of a carcinogenic effect**Carcinogenicity**

<b>Styrene (100-42-5)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Inhalation	OECD 453	rat	NOAEC systemic (carcinogenicity) $\geq$ 4.34 mg/L air (nominal)	negative
Inhalation	OECD 453	mouse	LOAEC (carcinogenicity) female/male = 0.09 - 0.18 mg/L air resp., NOAEC (carcinogenicity) male = 0.09 mg/L air	positive
Oral	No information available	rat	NOAEL (carcinogenicity) $\geq$ 2000 mg/kg bw /day	positive
Oral	No information available	mouse	LOAEL (carcinogenicity) = 150 mg/kg bw /day	positive

<b>Aluminum hydroxide (21645-51-2)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Inhalation	OECD TG 413	rat	LOAEC (toxicity powder) = 50 mg/m <sup>3</sup> air NOAEC (toxicity dust) = 50 mg/m <sup>3</sup> air	negative

<b>diantimony trioxide (1309-64-4)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Inhalation	similar to OECD 451	rat	NOAEC (carcinogenicity) 52 weeks > 4.5 mg/m <sup>3</sup> air	Limited evidence of a carcinogenic effect

<b>phthalic anhydride (85-44-9)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation

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Oral	No information available	mouse	NOAEL (carcinogenicity, male) = 3570 mg/kg bw/day (72w) NOAEL (carcinogenicity, female) = 1785 mg/kg bw/day (72w)	negative
Oral	No information available	rat	NOAEL (carcinogenicity) = 1000 mg/kg bw/day (105w)	negative

**Silica, amorphous, fumed, crystalline-free (112945-52-5)**

Routes of Exposure	Method	Species	Dose	Evaluation
Oral	OECD 453	rat	NOAEL = 1800 - 3200 mg/kg bw/day	negative

**Hydroquinone (123-31-9)**

Routes of Exposure	Method	Species	Dose	Evaluation
Oral	OECD 453	mouse	LOAEL = 100 mg/kg bw/day NOEL = 50 mg/kg bw/day	negative

**Reproductive toxicity****Reproductive toxicity****Styrene (100-42-5)**

Routes of Exposure	Method	Species	Dose	Evaluation
Inhalation	No information available	rat	NOAEL/LOAEL (fertility) 60d = 100 - 200 mg/kg bw/day	positive
Oral	OECD 422	rat	NOAEL/LOAEL (fertility) 60d = 200 - 400 mg/kg bw/day	positive
Inhalation	OECD 416	rat	NOAEC (P, F1) = 0.64 mg/L air LOAEC (P, F1) = 2.13 mg/L air NOAEC (F2) = 0.21 mg/L air LOAEC (F2) = 0.64 mg/L air (70d)	negative

**Aluminum hydroxide (21645-51-2)**

Routes of Exposure	Method	Species	Dose	Evaluation
Oral	OECD 422	rat	NOAEL (reproductive toxicity) = 1000 mg/kg bw/day Read across with Cas N° : 1327-41-9	negative

**diantimony trioxide (1309-64-4)**

Routes of Exposure	Method	Species	Dose	Evaluation
Oral		rat	NOAEL testicular toxicity (male) > 1200 mg/kg bw/day	negative

**phthalic anhydride (85-44-9)**

Routes of Exposure	Method	Species	Dose	Evaluation
Oral	No information available	mouse	NOAEL (reproductive, male) = 3570 mg/kg bw/day (72w) NOAEL (reproductive, female) = 1785 mg/kg bw/day (72w)	negative
Oral	No information available	rat	NOAEL (reproductive, female) = 1000 mg/kg bw/day (105w)	negative

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<b>Silica, amorphous, fumed, crystalline-free (112945-52-5)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Oral	OECD 415	rat	NOAEL = 497 mg/kg bw/day	negative

<b>cobalt octoate (136-52-7)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Oral	Read-across (Analogy) Cas N°: 7440-48-4 OECD 422	rat	NO(A)EL (P&F1) 28d = 30 mg/kg bw/day	positive

<b>Hydroquinone (123-31-9)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Oral	EPA OTS 798.4700	rat	NOAEL (parental toxicity) = 15 mg/kg bw/day LOAEL (reproductive effects) = 150 mg/kg bw/day	negative

**Developmental Toxicity** Suspected of damaging the unborn child.

<b>Developmental Toxicity</b>				
<b>Styrene (100-42-5)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Inhalation	No information available	rat	NOAEC/LOAEC (maternal toxicity + developmental toxicity) >50d = 1.08 - 2.15 mg/L air	positive
Inhalation	OECD 414	rat	LOAEC (maternal toxicity) 6-15d = 1.28 mg/L air	positive
Inhalation	OECD 414	rat	NOAEC (developmental toxicity) 6-15d >= 2.56 mg/L air	negative
Inhalation	OECD 414	rabbit	NOAEC (maternal toxicity + developmental toxicity) 6-18d = 2.56 mg/L air	negative

<b>Aluminum hydroxide (21645-51-2)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Oral	OECD 414	rat	NOAEL (embryotoxicity/teratogenic ity) = 266 mg/kg bw/day	negative

<b>diantimony trioxide (1309-64-4)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Inhalation	OECD 414	rat	LOAEC (maternal toxicity) 20d = 2.6 mg/m <sup>3</sup> air NOAEC (developmental toxicity) 20d = 6.3 mg/m <sup>3</sup> air	negative

<b>phthalic anhydride (85-44-9)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Oral	Read-across (Analogy) phthalic acid Cas N° : 88-99-3	rat	NOAEL (maternal toxicity) = 1000 mg/kg bw/day NOAEL (teratogenicity) = 1700 mg/kg bw/day	positive

<b>Silica, amorphous, fumed, crystalline-free (112945-52-5)</b>				
Routes of Exposure	Method	Species	Dose	Evaluation
Oral	OECD 414	rat	NOAEL (maternal toxicity) = 1350 mg/kg bw/day NOAEL (teratogenicity) = 1350 mg/kg bw/day	negative

<b>Hydroquinone (123-31-9)</b>				
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Routes of Exposure	Method	Species	Dose	Evaluation
Oral	OECD 414	rat	NOEL (maternal toxicity and developmental toxicity) = 100 mg/kg bw/day	negative
Oral	EPA OTS 798.4900	rabbit	NOEL (maternal toxicity) = 25 mg/kg bw/day NOEL (developmental toxicity) = 75 mg/kg bw/day	negative

**Specific target organ toxicity - single exposure**      May cause irritation of respiratory tract

**STOT - single exposure****Hydroquinone (123-31-9)**

Routes of Exposure	Method	Species	Dose	Remarks
Oral	No information available	mouse	NOAEL (90d) = 50 mg/kg bw/day	

**Specific target organ toxicity - repeated exposure**      Causes damage to organs through prolonged or repeated exposure , target organ(s) : Central nervous system , Ears

**STOT - repeated exposure****Styrene (100-42-5)**

Routes of Exposure	Method	Species	Dose	Remarks
Inhalation	OECD 412	rat mouse	NOAEC male (28d) = 3.47 mg/L air NOAEC (ototoxicity) 28d = 2.13 mg/L air NOAEC (28d) = 0.181 mg/L air NOAEC (28d) = 0.688 mg/L air	
Inhalation	No information available	rat	NOAEC (nasal tract) = 0.85 mg/L air NOAEC (overall) = 2.13 mg/L air NOAEC (ototoxicity) = 0.85 mg/L air LOAEC (ototoxicity) = 3.41 mg/L air NOAEC (overall) = 2.13 mg/L air	
Oral	No information available	rat	NOAEL (toxicity) = 1000 mg/kg bw/day LOAEL (toxicity) = 2000 mg/kg bw/day	
Oral	No information available	mouse	NOAEL (toxicity) = 150 mg/kg bw /day LOAEL (toxicity) = 300 mg/kg bw /day	
Inhalation	OECD 453	rat	LOAEC local (toxicity) = 0.21 mg/L air	

**Aluminum hydroxide (21645-51-2)**

Routes of Exposure	Method	Species	Dose	Remarks
Oral	OECD 407	rat	NOAEL (28d) = 300 mg/kg bw	
Inhalation	Read-across (Analogy) with Aluminium powder and Aluminium oxide dust OECD 413	hamster	NOAEC (dust) = 70 mg/m <sup>3</sup> air	
Inhalation	OECD 412	rat	NOAEC (aerosol) = 3 mg/m <sup>3</sup> air LOAEC (aerosol) = 28 mg/m <sup>3</sup> air	

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<b>diantimony trioxide (1309-64-4)</b>				
Routes of Exposure	Method	Species	Dose	Remarks
Oral	No information available	rat	NOAEL (male) 90d = 1686 mg/kg bw/day NOAEL (female) 90d = 1879 mg/kg bw/day	
Inhalation	similar to OECD 452	rat	NOAEC >= 0.51 mg/m <sup>3</sup> air LOAEC (impaired lung clearance) >= 4.5 mg/m <sup>3</sup> air 1 year	

<b>phthalic anhydride (85-44-9)</b>				
Routes of Exposure	Method	Species	Dose	Remarks
Oral	No information available	rat	NOAEL = 1250 mg/kg bw/day LOAEL = 2500 mg/kg bw/day 7 weeks	
Oral	No information available	rat	NOAEL (105 weeks) = 500 mg/kg bw/day	
Oral	No information available	mouse	LOAEL (male) = 2340 mg/kg bw/day LOAEL (female) = 1717 mg/kg bw/day 72 weeks	

<b>Silica, amorphous, fumed, crystalline-free (112945-52-5)</b>				
Routes of Exposure	Method	Species	Dose	Remarks
Oral	OECD 408	rat	NOEL (highest dose) 4000 <= 4500 mg/kg bw/day 90d	
Inhalation	OECD 413	rat	NOEC = 1.3 mg/m <sup>3</sup> air NOEC < 1.3 mg/m <sup>3</sup> air 90d	
Dermal	No information available	rabbit	NOAEL >= 10000 mg/kg bw/day	

<b>cobalt octoate (136-52-7)</b>				
Routes of Exposure	Method	Species	Dose	Remarks
Oral	Read-across (Analogy) cobalt dichloride hexahydrate OECD 408	rat	NOAEL (90d) = 3 mg/kg bw/day	

<b>Hydroquinone (123-31-9)</b>				
Routes of Exposure	Method	Species	Dose	Remarks
Oral	OECD 453	rat	NOAEL (chronic toxicity) = 25 mg/kg bw/day	
Dermal	OECD 411	rat	NOAEL (male) = 73.9 mg/kg bw/day NOAEL (female) = 109.6 mg/kg bw/day	

**Aspiration hazard** Due to the viscosity, this product does not present an aspiration hazard.

## 11.2 Information on other hazards

**Endocrine disrupting properties** No information available  
**Other information** None

## SECTION 12: Ecological information

### 12.1. Toxicity

Do not flush into surface water or sanitary sewer system

**Acute aquatic toxicity - Component Information**

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates.	Toxicity to fish	Toxicity to microorganisms
Styrene 100-42-5	EC50 (72h) = 4.9 mg/L (Pseudokirchnerella subcapitata) EPA OTS 797.1050	EC50 (48h) = 4.7 mg/L (Daphnia magna) NOEC = 1.9 mg/L (Daphnia magna) OECD 202	LC50 (96h) = 4.02 - 10 mg/L (Pimephales promelas) OECD 203	EC (30min) = 500 mg/L (Activated sludge of a predominantly domestic sewage) OECD 209
Aluminum hydroxide 21645-51-2	EC50 (72h) > 100 mg/L (Pseudokirchnerella subcapitata) OECD 201	EC50 (46h) > 100 mg/L (Daphnia magna) OECD 202	LC50 (96h) > 100 mg/L (Salmo trutta) OECD 203	
diantimony trioxide 1309-64-4	EC50 (72h) = 206 mg/L (Pseudokirchnerella subcapitata ) NOEC (72h) = 100 mg/L (Pseudokirchnerella subcapitata ) OECD Guideline 201	LC50 (96h) = 1.77 mg/L (Chlorohydra viridissimus) NOEC (96h) = 1.11 mg/L (Chlorohydra viridissimus) LOEC (96h) = 1.5 mg/L Chlorohydra viridissimus Read across with N°Cas : 10025-91-9 No guideline followed	LC50 (96h) = 6.9 mg/L (Pargus major) Read across with N°Cas : 12208-13-8	EC50 (4h) = 27 mg/L (activated sludge) NOEC (4h) = 2.55 mg/L (activated sludge) Read across with Cas N° : 10025-91-9 ISO DIS 9509
Zinc borate 138265-88-0		EC50 (48h) = 76 mg/L (Daphnia magna Straus)	LC50 (96h) = 2.4 mg/L (Rainbow trout)	
phthalic anhydride 85-44-9	EC50 (72h) = 68 mg/L, NOEC (72h) = 32 mg/L (Pseudokirchnerella subcapitata) OECD 201	EC50 (48h) = 71 mg/L (Daphnia magna) OECD 202	LC50 (96h) > 99 mg/L (Oryzias latipes) OECD 203	EC50 (3h) > 1000 mg/L (Activated sludge), ISO 8192 EC50 (16h) = 13 mg/L (Pseudomonas putida), ISO 10712
Silica, amorphous, fumed, crystalline-free 112945-52-5		EL50 (24h) >= 1000 mg/L (Daphnia magna) OECD 202	LC50 (96h) > 10000 mg/L (Brachydanio rerio) OECD 203	
cobalt octoate 136-52-7	EC50 (72h) = 144 µg Codiss./L (Pseudokirchnerella subcapitata) NOEC (72h) = 32.2 µg/L (Pseudokirchnerella subcapitata) LOEC (72h) = 52.7 µg Codiss./L (Pseudokirchnerella subcapitata) OECD 201		LC50 (96h) = 1.512 mg/L (Oncorhynchus mykiss) NOEC (96h) = 0.939 mg/L (Oncorhynchus mykiss) LOEC (96h) = 1.577 mg/L (Oncorhynchus mykiss) ASTM guideline (1996)	EC10 (30 min) = 3.73 mg/L (Activated sludge) EC50 (30 min) = 120 mg/L (Activated sludge) Read across with Cas N°: 7646-79-9 OECD 209
Hydroquinone 123-31-9	ErC50 (72h) = 0.330 mg/L ; NOEC (72h) (growth rate) = 0.019 mg/L (Pseudokirchnerella subcapitata ) OECD 201	EC50 (48h) = 0.134 mg/L (Daphnia magna) OECD 202 NOEC (21d) = 0.0057 mg/L (Daphnia magna) OECD 211	LC50 (96h) = 0.638 mg/L (Oncorhynchus mykiss) OECD 203	

**Chronic aquatic toxicity - Component Information**

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates.	Toxicity to fish	Toxicity to microorganisms
Styrene 100-42-5		NOEC (21d) = 1.01 mg/L (Daphnia magna) LOEC (21d) = 2.06 mg/L (Daphnia magna) EC50 (21d) = 1.88 mg/L (Daphnia magna) OECD 203		
Aluminum hydroxide 21645-51-2	NOEC (72h) >= 0.004 mg/L (Pseudokirchnerella subcapitata) OECD 201		NOEC (96h) > 48.2 mg/L (Pimephales promelas)	

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diantimony trioxide 1309-64-4		LC50 (21d) = 4.77 mg/L (Daphnia magna) EC50 (21d) = 3.82 mg/L (Daphnia magna) NOEC (21d) = 3.13 mg/L (Daphnia magna) LOEC (21d) = 5.86 mg/L (Daphnia magna) Read across with N°Cas : 10025-91-9 OECD Guideline 211	NOEC (28d) = 1.13 - 2.31 mg/L (Pimephales promelas) Read across with N°Cas : 10025-91-9 No guideline followed	
phthalic anhydride 85-44-9		NOEC (reproduction) 21d = 16 mg/L, EC50 (reproduction) 21d = 42 mg/L (Daphnia magna) OECD 211	LC50 (7d) = 560 mg/L (Danio rerio), OECD 210 LOEC (total embryotoxicity) 60d = 32 mg/L, NOEC (mortality, length, weight, embryotoxicity) 60d = 10 mg/L, OECD 210	
cobalt octoate 136-52-7	EC50 (7d) = 90.1 µg./L (Lemna minor) NOEC (7d) = 3.0 µg/L (Lemna minor) LOEC (7d) = 8.8 µg/L (Lemna minor) OECD 221	NOECR (21d) = 60.8 µg./L (Daphnia magna) LC50 (21d) = 121.3 mg/L (Daphnia magna) LOECR (21d) = 93.3 µg Codiss./L (Daphnia magna) OECD 211		

**Effects on terrestrial organisms - Component Information**

Acute toxicity				
phthalic anhydride (85-44-9)				
Acute toxicity	Test Method	Species	Values	Remarks
plants		Lactuca sativa	EC50 (germination) = 731 mg/L	

Chronic toxicity				
Styrene (100-42-5)				
Chronic toxicity	Method	Species	Values	Remarks
Toxicity to invertebrates	OECD 207	Eisenia foetida	LC50 (14d) = 120 mg/kg soil dw LOEC (burrowing time and mean percent weight change) = 65 mg/kg soil dw LOEC (survival) = 180 mg/kg soil dw NOEC (mean percent weight change) = 34 mg/kg soil dw	

**12.2. Persistence and degradability**

Chemical Name	Biodegradation	Evaluation
Styrene 100-42-5	87% (20d) similar to OECD 301D	Readily biodegradable
phthalic anhydride 85-44-9	68 % (10d), 74 % (30d) OECD 301 D	Readily biodegradable
cobalt octoate 136-52-7	60% (> 10d), OECD 301 B	Readily biodegradable
Hydroquinone 123-31-9	70 % (14d) OECD 301C	Readily biodegradable

**12.3. Bioaccumulative potential**

Bioconcentration factor (BCF)		
Styrene (100-42-5)		
Method	Species	Bioconcentration factor (BCF)
Calculation method		74

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diantimony trioxide (1309-64-4)		
Method	Species	Bioconcentration factor (BCF)
No data available		5.6 L/Kg

phthalic anhydride (85-44-9)		
Method	Species	Bioconcentration factor (BCF)
Calculation method		3.16 - 3.4

Hydroquinone (123-31-9)		
Method	Species	Bioconcentration factor (BCF)
No data available	Leuciscus idus melanotus	40 (3d)

Chemical Name	log Pow
Styrene 100-42-5	3
diantimony trioxide 1309-64-4	1.63
Zinc borate 138265-88-0	0.19
phthalic anhydride 85-44-9	1.6
Hydroquinone 123-31-9	0.59

#### 12.4. Mobility in soil

Chemical Name	LogKoc	Koc
Styrene 100-42-5	2.55	352
phthalic anhydride 85-44-9	-	31
Hydroquinone 123-31-9	0.97 - 1.7	-

#### 12.5. Results of PBT and vPvB assessment

Chemical Name	PBT	vPvB
Styrene 100-42-5	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bioaccumulating (vPvB).
Aluminum hydroxide 21645-51-2	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bioaccumulating (vPvB).
diantimony trioxide 1309-64-4	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bioaccumulating (vPvB).
Zinc borate 138265-88-0	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).	
phthalic anhydride 85-44-9	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bioaccumulating (vPvB).
Silica, amorphous, fumed, crystalline-free 112945-52-5	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bioaccumulating (vPvB).
Hydroquinone 123-31-9	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).	This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

#### 12.6 Endocrine disrupting properties

**Endocrine disrupting properties** No information available

#### 12.7 Other Adverse Effects

None known.

### SECTION 13: Disposal considerations

13.1. Waste treatment methods

<b>Waste from Residues/Unused Products</b>	Dispose of in accordance with the European Directives on waste and hazardous waste. Do not flush into surface water or sanitary sewer system
<b>Contaminated packaging</b>	Empty containers should be taken to an approved waste handling site for recycling or disposal.
<b>Other information</b>	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used.

## SECTION 14: Transport information

14.1. UN number or ID number

ADR/RID	UN1866
IMDG/IMO	UN1866
ICAO/IATA	UN1866
ADN	UN1866

14.2. UN proper shipping name

ADR/RID	Resin solution UN1866, RESIN SOLUTION, 3, PG III, (D/E)
IMDG/IMO	Resin solution UN1866, RESIN SOLUTION, 3, PG III, (31°C c.c.)
ICAO/IATA	UN1866, RESIN SOLUTION, 3, PG III
ADN	Resin solution UN1866, RESIN SOLUTION, 3, PG III

14.3. Transport hazard class(es)

ADR/RID	<b>Hazard class</b>	3
IMDG/IMO	<b>Hazard class</b>	3
ICAO/IATA	<b>Hazard class</b>	3
ADN	<b>Hazard class</b>	3

14.4. Packing group

ADR/RID	III
IMDG/IMO	III
ICAO/IATA	III
ADN	III

14.5. Environmental hazards

Former date 15-Aug-2019

Revision date 15-Dec-2022

Version: 4

ADR/RID	No
IMDG/IMO	No
Marine pollutant	No
ICAO/IATA	No
ADN	No

#### 14.6. Special precautions for user

ADR/RID	
<b>Classification Code</b>	F1
<b>Tunnel restriction code</b>	(D/E)
<b>Limited quantity</b>	5 L
IMDG/IMO	
<b>EmS</b>	F-E, S-E
<b>Limited quantity</b>	5 L
ICAO/IATA	
<b>ERG Code</b>	3L
<b>Limited quantity</b>	10 L
ADN	
<b>Classification Code</b>	F1
<b>Limited quantity</b>	5 L
<b>ventilation</b>	VE01

Special precautions for users

**Special precautions** No information available

#### 14.7. Maritime transport in bulk according to IMO instruments

**Transport in bulk according to Annex II of MARPOL and the IBC Code** not applicable

### SECTION 15: Regulatory information

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

**Regulation (EC) No. 1907/2006 (REACH)**  
**Regulation (EC) No. 1272/2008 (CLP)**  
**Regulation (EU) No. 2020/878**  
**Directive 88/642/EEC**  
**Directive 98/24/EC**  
**Directive 1999/92/EC**  
**Directive 2012/18/EU**

The mixture is subject to restrictions on use, see Annex XVII of the Regulation 1907/2006/EC (REACH): Column 1, n° 3; Column 1, n° 40.

European Union

#### National regulatory information The United Kingdom

Avoid exceeding of the given occupational exposure limits (see section 8).

#### Ireland

Avoid exceeding of the given occupational exposure limits (see section 8).

#### 15.2. Chemical safety assessment

Former date 15-Aug-2019

Revision date 15-Dec-2022

Version: 4

Chemical Safety Assessment

Yes

**Exposure scenario**

Relevant information for risk control are communicated in the form of exposure scenario attached to the safety data sheet.

**SECTION 16: Other information**

Full text of H-Statements referred to under sections 2 and 3

H226 - Flammable liquid and vapour

H302 - Harmful if swallowed

H304 - May be fatal if swallowed and enters airways

H315 - Causes skin irritation

H317 - May cause an allergic skin reaction

H318 - Causes serious eye damage

H319 - Causes serious eye irritation

H332 - Harmful if inhaled

H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled

H335 - May cause respiratory irritation

H341 - Suspected of causing genetic defects

H351 - Suspected of causing cancer

H360Fd - May damage fertility. Suspected of damaging the unborn child

H361d - Suspected of damaging the unborn child

H372 - Causes damage to organs through prolonged or repeated exposure if inhaled

H400 - Very toxic to aquatic life

H410 - Very toxic to aquatic life with long lasting effects

H412 - Harmful to aquatic life with long lasting effects

EUH208 - May produce an allergic reaction

**Training Advice**

Handle in accordance with good industrial hygiene and safety practice. To avoid risks to man and the environment, comply with the instructions for use.

**Sources of key data used to compile the datasheet**

ECHA

**Former date**

15-Aug-2019

**Revision date**

15-Dec-2022

**Revision Note**

New ANNEX II Regulation (EU) No. 2020/878

**This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006****Disclaimer**

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

End of Safety Data Sheet



## Scenario 1: Manufacturing of UP/VE resins and formulated resins (Gelcoat, Colour Paste, Putty, Bonding paste/Adhesive) (ES1)

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

An overall exposure scenario may be described by a number of contributing scenarios which may be subdivided into environmental exposure, worker exposure and consumer exposure.

The following scenarios contribute to the scenario *Manufacturing of UP/VE resins and formulated resins (Gelcoat, Colour Paste, Putty, Bonding paste/Adhesive)*.

*This document has been prepared using REACH-Practical-Guide-on-Safe-Use-Information-for-Mixtures-under-REACH-The-LCID-Methodology, considering exposure scenario of relevant raw materials contained in the mixture.*

The corresponding release to the environment, exposure of workers resulting from these contributing scenarios is summarized below.

Table 1. Description of ES 1

<b>Free short title</b>	Manufacturing of UP/VE resins and formulated resins (Gelcoat, Colour Paste, Putty, Bonding paste/Adhesive) (ES1)
<b>Systematic title based on use descriptor</b>	ERC 2; PROC 1, 3, 4, 5, 8a, 8b, 9, 15
<b>Name of contributing environmental scenario and corresponding ERC</b>	ERC 2 – Formulation into mixture
<b>Name(s) of contributing worker scenarios and corresponding PROCs</b>	<p>PROC 1 - Chemical production in closed process</p> <p>PROC 3 - Use in closed batch process (synthesis or formulation)</p> <p>PROC 4 - Chemical production where opportunity for exposure arises</p> <p>PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact)</p> <p>PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities</p> <p>PROC 8b - Transfer of substance or mixture (charging and discharging) at dedicated facilities</p> <p>PROC 9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing)</p> <p>PROC 15 - Use of laboratory reagents in small scale laboratories</p>
<b>Contributing Scenario (1) controlling environmental exposure for ERC 2</b>	
<b>Operational conditions (referred to styrene)</b>	
Daily amount used at site	45700 kg/day (referred to styrene)

Release times per year	300 days/year ( <i>justification: Continuous release</i> )
Local freshwater dilution factor	41
Local marine water dilution factor	100
Release fraction to air from process	0.102 %
Release fraction to wastewater from process	0.00063 %
Release fraction to soil from process	0.0025 %
Fraction tonnage to region	10 %
Fraction used at main source	60 %
STP	yes
River flow rate	18000 m <sup>3</sup> /day
Municipal sewage treatment plant discharge	2000000 L/day
<b>Other modified EUSES values (referred to styrene)</b>	
Fraction released to agricultural soil (Femis.agric)	0 % ( <i>justification: No direct release to soil (EU Risk Assessment Report on Styrene, European Communities, 2002)</i> )
Fraction released to industrial soil (Femis.ind)	0 % ( <i>justification: No direct release to soil (EU Risk Assessment Report on Styrene, European Communities, 2002)</i> )
Fraction released to waste water (Femis.water)	0.00063 % ( <i>justification: EU Risk Assessment Report, 2002</i> )
Fraction released to air (Femis.air)	0.102 % ( <i>justification: EU Risk Assessment Report, 2002</i> )
Fraction used at main source	60 % ( <i>justification: Value adopted to account for Worst-case European manufacturing site</i> )
Fraction of emission directed to water by local STP (Fstp.water)	0.081 - ( <i>justification: Efficiency STP 91.9%</i> )
<b>Contributing Scenario (2) controlling industrial worker exposure for PROC 1</b>	
<b>Name of contributing scenario</b>	1 - Use in closed process, no likelihood of exposure
Scenario subtitle	Use in contained batch processes. Closed processes
<b>Qualitative Risk Assessment</b>	
General	Use in semi-automated and predominantly enclosed filling lines. Provide a good standard of general ventilation. Natural ventilation is from windows and doors etc. Controlled ventilation means air is supplied or removed by a powered fan. Ensure good work practices are implemented. Provide basic employe training to prevent/minimize exposures. Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %

Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	enhanced (>30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	no
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
<b>Contributing Scenario (3) controlling industrial worker exposure for PROC 3</b>	
<b>Name of contributing scenario</b>	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Bulk transfers. Receipt and storage of raw materials in bulk or as packed goods, indoor and outdoor; Raw material assembly and charging; dispensing of liquids and solids via pipeline;
<b>Qualitative Risk Assessment</b>	
General	Use in semi-automated and predominantly enclosed filling lines; Use bulk or semi-bulk handling systems. Drain down and flush system prior to equipment break-in or maintenance. Provide extract ventilation to points where emissions occur. Ensure good work practices are implemented. Provide basic employe training to prevent/minimize exposures. Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	15 min.-1 hour
Frequency of use	5 days / week

<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	enhanced (>30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (4) controlling industrial worker exposure for PROC 3</b>	
<b>Name of contributing scenario</b>	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Dissolving linear UP/VE polymer in blending vessel (or dissolver)
<b>Qualitative Risk Assessment</b>	
General	Use in semi-automated and predominantly enclosed filling lines; Drain down and flush system prior to equipment break-in or maintenance. Apply vessel entry procedures including use of forced supplied air. Ensure good work practices are implemented. Provide basic employe training to prevent/minimize exposures. Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)

Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	no
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
<b>Contributing Scenario (5) controlling industrial worker exposure for PROC 3</b>	
<b>Name of contributing scenario</b>	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Equipment cleaning and maintenance. Cleaning and maintenance of blending vessel, roadtankers etc.
<b>Qualitative Risk Assessment</b>	
General	Use in semi-automated and predominantly enclosed filling lines. Drain or remove substance from equipment prior to break-in or maintenance. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Ensure good work practices are implemented. Provide basic employe training to prevent/minimize exposures. Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes

<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (6) controlling industrial worker exposure for PROC 4</b>	
<b>Name of contributing scenario</b>	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Scenario subtitle	Material transfers. All internal transport. Raw material assembly and charging / raw material dispensing of liquids and solids manually from bulk storage or packed goods into blending tank.
<b>Qualitative Risk Assessment</b>	
General	Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). Provide extract ventilation to points where emissions occur. Ensure good work practices are implemented. Provide basic employe training to prevent/minimize exposures. Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	Good (>30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur

Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (7) controlling industrial worker exposure for PROC 4</b>	
<b>Name of contributing scenario</b>	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Scenario subtitle	Process sampling.
<b>Qualitative Risk Assessment</b>	
General	Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour): Avoid dip sampling. Ensure good work practices are implemented. Provide basic employee training to prevent/minimize exposures. Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	15 min.-1 hour
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	Good (>30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (8) controlling industrial worker exposure for PROC 5</b>	
<b>Name of contributing scenario</b>	5 - Mixing or blending in batch processes (multistage and/or significant contact)

Scenario subtitle	Drum/batch transfers; Pouring from small containers; Transfer from/pouring from containers; Mixing operations (open systems). Mixing liquid and solid components / into final formulated resin in blending vessel
<b>Qualitative Risk Assessment</b>	
General	Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). Keep lids of containers closed during blending. Ensure good work practices are implemented. Provide basic employe training to prevent/minimize exposures. Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100%
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (9) controlling industrial worker exposure for PROC 8A</b>	
Name of contributing scenario	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Equipment cleaning and maintenance. Cleaning and maintenance of pipes, pumps, filters, etc.
<b>Qualitative Risk Assessment</b>	



General	<p>Drain down system prior to equipment break-in or maintenance.</p> <p>Drain or remove substance from equipment prior to break-in or maintenance.</p> <p>Ensure good work practices are implemented</p> <p>Provide basic employe training to prevent/minimize exposures</p> <p>Wear suitable coveralls to prevent exposure to the skin.</p> <p>Use suitable eye protection.</p> <p>Use suitable chemically resistant gloves, tested to EN374.</p> <p>In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.</p>
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	inhalation: 70 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (10) controlling industrial worker exposure for PROC 8A</b>	
<b>Name of contributing scenario</b>	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	<p>Disposal of wastes.</p> <p>Handling of non cured waste;</p> <p>Waste management / handling and storage of waste for removal for off-site treatment or for on-site treatment like incineration and/or biological waste water treatment</p>
<b>Qualitative Risk Assessment</b>	

General	<p>Provide a good standard of general ventilation. Controlled ventilation means air is supplied or removed by a powered fan. Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Dispose of empty containers and wastes safely. Dispose of waste in accordance with environmental legislation. Use suitable chemically resistant gloves, tested to EN374. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness. Use suitable eye protection.</p>
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	<1 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	Indoors/outdoor
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	no
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
<b>Contributing Scenario (11) controlling industrial worker exposure for PROC 8b</b>	
<b>Name of contributing scenario</b>	8b -Transfer of chemicals from/to vessels/ large containers at dedicated facilities
Scenario subtitle	<p>Bulk transfers. All activities related to transport finished product to customer. Dispensing final UP/VE resin (linear UP/VE polymer + styrene + additives) into roadtanker</p>
<b>Qualitative Risk Assessment</b>	

General	<p>Fill containers/cans at dedicated fill points supplied with local extract ventilation.</p> <p>Ensure good work practices are implemented</p> <p>Provide basic employe training to prevent/minimize exposures</p> <p>Use suitable chemically resistant gloves, tested to EN374.</p> <p>Use suitable eye protection.</p> <p>In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.</p>
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
Local exhaust ventilation	inhalation: 70 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (12) controlling industrial worker exposure for PROC 9</b>	
<b>Name of contributing scenario</b>	9 -Transfer of chemicals into small containers (dedicated filling line)
Scenario subtitle	<p>Bulk transfers.</p> <p>All activities related to transport finished product to customer.</p> <p>Dispensing final UP/VE resin (linear UP/VE polymer + styrene + additives) / into storage tank, IBC, drum or pail.</p>
<b>Qualitative Risk Assessment</b>	

General	Fill containers/cans at dedicated fill points supplied with local extract ventilation. Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable chemically resistant gloves, tested to EN374. Use suitable eye protection.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (13) controlling industrial worker exposure for PROC 15</b>	
<b>Name of contributing scenario</b>	15 - Use of laboratory reagents in small scale laboratories
Scenario subtitle	Laboratory activities. All laboratory activities. Quality control work of samples from reactor and blending vessel. R&D work including handling of samples from 1 kg to 1 drum.
<b>Qualitative Risk Assessment</b>	
General	Carry out in a vented booth or extracted enclosure. Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374.
<b>Product characteristics</b>	

Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )

## Scenario 2: FRP manufacturing in an industrial setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES2)

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

An overall exposure scenario may be described by a number of contributing scenarios which may be subdivided into environmental exposure, worker exposure and consumer exposure.

The following scenarios contribute to the scenario *FRP manufacturing in an industrial setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.)*.

*This document has been prepared using REACH-Practical-Guide-on-Safe-Use-Information-for-Mixtures-under-REACH-The-LCID-Methodology, considering exposure scenario of relevant raw materials contained in the mixture.*

The corresponding release to the environment, exposure of workers resulting from these contributing scenarios is summarized below.

Table 2. Description of ES 2

<b>Free short title</b>	FRP manufacturing in an industrial setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES2)
<b>Systematic title based on use descriptor</b>	ERC 6D; PROC 3, 5, 7, 8A, 10, 13, 14, 15
<b>Name of contributing environmental scenario and corresponding ERC</b>	ERC 6d Production of resins
<b>Name(s) of contributing worker scenarios and corresponding PROCs</b>	<p>PROC 3 - Use in closed batch process (synthesis or formulation)</p> <p>PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact)</p> <p>PROC 7 - Industrial spraying</p> <p>PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities</p> <p>PROC 10 - Roller application or brushing</p> <p>PROC 13 - Treatment of articles by dipping and pouring</p> <p>PROC 14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>PROC 15 - Use of laboratory reagents in small scale laboratories</p>
<b>Contributing Scenario (1) controlling environmental exposure for ERC 6D</b>	
<b>Operational conditions (referred to styrene)</b>	
Daily amount used at site	161000 kg/day (referred to styrene)
Release times per year	300 days/year (justification: Continuous release)
Local freshwater dilution factor	10

Local marine water dilution factor	100
Release fraction to air from process	0.102 %
Release fraction to wastewater from process	0.00063 %
Release fraction to soil from process	0.025 %
Fraction tonnage to region	10 %
Fraction used at main source	60 %
STP	yes
River flow rate	18000 m <sup>3</sup> /day
Municipal sewage treatment plant discharge	2000000 L/day
<b>Other modified EUSES values</b>	
Fraction released to agricultural soil (Femis.agric)	0 % ( <i>justification: No direct release to soil (EU Risk Assessment Report on Styrene, European Communities, 2002)</i> )
Fraction released to industrial soil (Femis.ind)	0 % ( <i>justification: No direct release to soil (EU Risk Assessment Report on Styrene, European Communities, 2002)</i> )
Fraction released to waste water (Femis.water)	0.00063 % ( <i>justification: EU Risk Assessment Report, 2002</i> )
Fraction released to air (Femis.air)	0.102 % ( <i>justification: EU Risk Assessment Report, 2002</i> )
Fraction used at main source	60 % ( <i>justification: Value adopted to account for Worst-case European manufacturing site</i> )
Fraction of emission directed to water by local STP (Fstp.water)	0.081 - ( <i>justification: Efficiency STP 91.9%</i> )
<b>Contributing Scenario (2) controlling industrial worker exposure for PROC 3</b>	
<b>Name of contributing scenario</b>	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Material transfers; Automated process with (semi) closed systems; Use in contained batch processes. Resin injection and transfer processes, such as vacuum infusion, RTM, impregnation of sewer relining sleeves
<b>Qualitative Risk Assessment</b>	
General	Put lids on containers immediately after use. Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)

Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	no
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
<b>Contributing Scenario (3) controlling industrial worker exposure for PROC 3</b>	
<b>Name of contributing scenario</b>	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Material transfers. Product delivery/storage - delivery of bulk and packaged products - outdoor / indoor
<b>Qualitative Risk Assessment</b>	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	no



<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
<b>Contributing Scenario (4) controlling industrial worker exposure for PROC 5</b>	
<b>Name of contributing scenario</b>	5 - Mixing or blending in batch processes (multistage and/or significant contact)
Scenario subtitle	Drum/batch transfers; Pouring from small containers; Transfer from/pouring from containers; Mixing operations (open systems). Loading of mixing equipment; Preparation of material for application; (liquid products) - batch, indoor
<b>Qualitative Risk Assessment</b>	
General	Put lids on containers immediately after use. Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )

<b>Contributing Scenario (5) controlling industrial worker exposure for PROC 5</b>	
Name of contributing scenario	5 - Mixing or blending in batch processes (multistage and/or significant contact)
Scenario subtitle	Casting operations; Mixing operations (open systems). Casting and mixing operations in (semi-) open containers. Examples are centrifugal casting, casting of polymer concrete and artificial marble and the manufacturing of SMC / BMC/ TMC, etc
<b>Qualitative Risk Assessment</b>	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	5-60%
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occur
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (6) controlling industrial worker exposure for PROC 5</b>	
Name of contributing scenario	5 - Mixing or blending in batch processes (multistage and/or significant contact)

Scenario subtitle	General exposures (closed systems). Mixing liquid and solid components / into final formulated resin in blending vessel; Examples are gelcoat blending and compounding, formulation of repair putties, bonding pastes, chemical anchoring, etc
<b>Qualitative Risk Assessment</b>	
General	Put lids on containers immediately after use. Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	inhalation: 70 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (7) controlling industrial worker exposure for PROC 7</b>	
<b>Name of contributing scenario</b>	7 - Industrial spraying
Scenario subtitle	Spraying; Spraying (automatic/robotic) All open mould applications where resins is applied by automated spraying or by robot in a spray cabin without direct worker involvement. Examples are spray lamination, gelcoat spraying and “chop-hoop” filament winding

<b>Qualitative Risk Assessment</b>	
General	<p>Ensure the ventilation system is regularly maintained and tested</p> <p>Dispose of empty containers and wastes safely</p> <p>Ensure good work practices are implemented</p> <p>Provide basic employe training to prevent/minimize exposures</p> <p>Wear suitable coveralls to prevent exposure to the skin</p> <p>Use suitable eye protection.</p> <p>Wear suitable face shield</p> <p>Wear chemically resistant gloves tested to EN374, in combination with intensive management supervision control.</p> <p>In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.</p>
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	1,500 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
Carry out in a vented booth or extracted enclosure	inhalation: 95 % ( <i>justification: Carry out in a vented booth or extracted enclosure</i> )
<b>Contributing Scenario (8) controlling industrial worker exposure for PROC 7</b>	
<b>Name of contributing scenario</b>	7 - Industrial spraying
Scenario subtitle	<p>Spraying;</p> <p>Spraying (manually)</p> <p>All open mould applications where resins is applied by manual spraying in an open work environment. Examples are spray lamination, gelcoat spraying and “chop-hoop” filament winding</p>
<b>Qualitative Risk Assessment</b>	

General	Carefully pour from containers Use long handled tools where possible Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the skin Wear chemically resistant gloves tested to EN374 in combination with intensive management supervision control. Wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	1,500 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Yes
Local exhaust ventilation	inhalation: 95 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (9) controlling industrial worker exposure for PROC 8A</b>	
Name of contributing scenario	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Equipment maintenance; Maintenance of small items. Equipment cleaning and maintenance
<b>Qualitative Risk Assessment</b>	

General	<p>Drain or remove substance from equipment prior to break-in or maintenance.</p> <p>Ensure good work practices are implemented</p> <p>Provide basic employe training to prevent/minimize exposures</p> <p>Use suitable eye protection.</p> <p>Use suitable chemically resistant gloves, tested to EN374.</p> <p>Wear suitable coveralls to prevent exposure to the skin.</p> <p>In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.</p>
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
Local exhaust ventilation	inhalation: 70 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (10) controlling industrial worker exposure for PROC 8A</b>	
<b>Name of contributing scenario</b>	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	<p>Disposal of wastes.</p> <p>Handling of non cured waste; Waste management / handling and storage of waste for removal for off-site treatment or for on-site treatment like incineration and/or biological waste water treatment</p>
<b>Qualitative Risk Assessment</b>	

General	Put lids on containers immediately after use. Contain and dispose of waste according to local regulations Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	Indoors/outdoor
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (11) controlling industrial worker exposure for PROC 10</b>	
<b>Name of contributing scenario</b>	10 - Roller application or brushing
Scenario subtitle	Rolling, Brushing; Roller, spreader, flow application All open mould applications where resins is applied by brushing, rolling and other low energy spreading operations; Examples are handlamination, gelcoatbrushing, filament winding
<b>Qualitative Risk Assessment</b>	

General	Use long handled brushes and rollers where possible Ensure the ventilation system is regularly maintained and tested Dispose of empty containers and wastes safely Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occur
Local exhaust ventilation	inhalation: 70 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (12) controlling industrial worker exposure for PROC 10</b>	
<b>Name of contributing scenario</b>	10 - Roller application or brushing
Scenario subtitle	Dipping, immersion and pouring; Rolling, Brushing; Roller, spreader, flow application Application of repair putties; Application of bonding pastes / adhesives.
<b>Qualitative Risk Assessment</b>	



General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. Wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100%
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	yes
Local exhaust ventilation	inhalation: 70 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (13) controlling industrial worker exposure for PROC 13</b>	
<b>Name of contributing scenario</b>	13 - Treatment of articles by dipping and pouring
Scenario subtitle	Dipping, immersion and pouring; Continuous process. Continuous processes with open impregnation steps, such as pultrusion with open impregnation baths and (semi-) continuous production of flat laminates
<b>Qualitative Risk Assessment</b>	

General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (14) controlling industrial worker exposure for PROC 14</b>	
<b>Name of contributing scenario</b>	14 - Production of preparations or articles by tableting, compression, extrusion, pelletisation
Scenario subtitle	Material transfers; Production or preparation or articles by tableting, compression, extrusion or pelletisation; Treatment by heating; Batch processes at elevated temperatures. Processes where curing of UP / VE resins takes place at high temperature. Examples are pultrusion with injection dies and processing of SMC / BMC / TMC, etc
<b>Qualitative Risk Assessment</b>	

General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures In case of potential exposure: Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100%
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	inhalation: 70 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )
<b>Contributing Scenario (15) controlling industrial worker exposure for PROC 15</b>	
<b>Name of contributing scenario</b>	15 - Use of laboratory reagents in small scale laboratories
Scenario subtitle	Laboratory activities. Quality control work of samples from blending vessel; R&D work including handling of samples from 1 kg to 1 drum
<b>Qualitative Risk Assessment</b>	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374.
<b>Product characteristics</b>	
Physical state	liquid

Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Domain	industrial
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	No
Local exhaust ventilation	inhalation: 90 % ( <i>justification: Use local exhaust ventilation with adequate effectiveness</i> )

### Scenario 3: FRP manufacturing in a professional setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES3)

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

An overall exposure scenario may be described by a number of contributing scenarios which may be subdivided into environmental exposure, worker exposure and consumer exposure.

The following scenarios contribute to the scenario *FRP manufacturing in a professional setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.)*.

*This document has been prepared using REACH-Practical-Guide-on-Safe-Use-Information-for-Mixtures-under-REACH-The-LCID-Methodology, considering exposure scenario of relevant raw materials contained in the mixture.*

The corresponding release to the environment, exposure of workers resulting from these contributing scenarios is summarized below.

Table 2. Description of ES 3

<b>Free short title</b>	FRP manufacturing in a professional setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES8)
<b>Systematic title based on use descriptor</b>	ERC 6C; PROC 3, 4, 5, 8A, 10, 11
<b>Name of contributing environmental scenario and corresponding ERC</b>	ERC 6c Production of plastics
<b>Name(s) of contributing worker scenarios and corresponding PROCs</b>	<p>PROC 3 - Use in closed batch process (synthesis or formulation)</p> <p>PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact)</p> <p>PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities</p> <p>PROC 10 - Roller application or brushing</p> <p>PROC 11 - Non industrial spraying</p>
<b>Contributing Scenario (1) controlling environmental exposure for ERC 6C</b>	
<b>Operational conditions</b> ( <i>referred to styrene</i> )	
Daily amount used at site	48300 kg/day ( <i>referred to styrene</i> )
Release times per year	300 days/year ( <i>justification: Continuous release</i> )
Local freshwater dilution factor	10
Local marine water dilution factor	100
Release fraction to air from process	0.102 %
Release fraction to wastewater from process	0.000012 %

Release fraction to soil from process	0 %
Fraction tonnage to region	10 %
Fraction used at main source	60 %
STP	Yes
River flow rate	18000 m <sup>3</sup> /day
Municipal sewage treatment plant discharge	2000000 L/day
<b>Other modified EUSES values</b>	
Fraction released to agricultural soil (Femis.agric)	0 % (justification: No direct release to soil (EU Risk Assessment Report on Styrene, European Communities, 2002))
Fraction released to industrial soil (Femis.ind)	0 % (justification: No direct release to soil (EU Risk Assessment Report on Styrene, European Communities, 2002))
Fraction released to waste water (Femis.water)	0.000012 % (justification: EU Risk Assessment Report, 2002)
Fraction released to air (Femis.air)	0.102 % (justification: EU Risk Assessment Report, 2002)
Fraction used at main source	60 % (justification: Value adopted to account for worst-case European manufacturing site )
Fraction of emission directed to water by local STP (Fstp.water)	0.081 - (justification: Efficiency STP 91.9%)
<b>Contributing Scenario (2) controlling professional worker exposure for PROC 3</b>	
<b>Name of contributing scenario</b>	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Use in contained batch processes. Application of chemical anchoring
<b>Qualitative Risk Assessment</b>	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures In case of potential exposure: Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100%
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	240 cm <sup>2</sup>

<b>Other given operational conditions affecting workers exposure</b>	
Location	outdoors (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	No
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
<b>Contributing Scenario (3) controlling professional worker exposure for PROC 4</b>	
<b>Name of contributing scenario</b>	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Scenario subtitle	Use in contained batch processes. Sewer relining operation
<b>Qualitative Risk Assessment</b>	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	outdoors (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	No
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs

### Contributing Scenario (4) controlling professional worker exposure for PROC 5

Name of contributing scenario	5 - Mixing or blending in batch processes (multistage and/or significant contact)
Scenario subtitle	Material transfers; Pouring from small containers. Preparation of material for application (liquids) - transfer of material from one container to another; Formulating / blending resins, gelcoats, bonding pastes, putties etc. in blending vessels
<b>Qualitative Risk Assessment</b>	
General	Use drum pumps. Put lids on containers immediately after use. Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	480 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (5) controlling professional worker exposure for PROC 8A</b>	



<b>Name of contributing scenario</b>	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Equipment maintenance; Maintenance of small items. Equipment cleaning and maintenance
<b>Qualitative Risk Assessment</b>	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	15 mins to 1 hour
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	Yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure might occur
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (6) controlling professional worker exposure for PROC 8A</b>	
<b>Name of contributing scenario</b>	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Disposal of wastes. Handling of non cured waste; Waste management / handling and storage of waste for removal for off-site treatment or for on-site treatment like incineration and/or biological waste water treatment
<b>Qualitative Risk Assessment</b>	

General	Dispose of empty containers and wastes safely Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	15 mins to 1 hour
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (7) controlling professional worker exposure for PROC 10</b>	
<b>Name of contributing scenario</b>	10 - Roller application or brushing
Scenario subtitle	Rolling, Brushing; Roller, spreader, flow application All open mould applications where resins is applied by brushing, rolling and other low energy spreading operations; Examples are handlamination, gelcoatbrushing, semi-continuous production of flat panels and laminates
<b>Qualitative Risk Assessment</b>	

General	Use long handled brushes and rollers where possible Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. In case of potential exposure wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	Use respiratory protection when exposure occurs
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (8) controlling professional worker exposure for PROC 10</b>	
<b>Name of contributing scenario</b>	10 - Roller application or brushing
Scenario subtitle	Dipping, immersion and pouring; Rolling, Brushing; Roller, spreader, flow application Application of repair putties; Application of bonding pastes / adhesives.
<b>Qualitative Risk Assessment</b>	

General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. Wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid
Concentration in substance	100%
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	no
<b>Conditions and measures related to personal protection, hygiene and health evaluation:</b> see details on sec.8 of SDS	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	yes
<b>Contributing Scenario (9) controlling professional worker exposure for PROC 10</b>	
<b>Name of contributing scenario</b>	10 - Roller application or brushing
Scenario subtitle	Dipping, immersion and pouring; Rolling, Brushing; Roller, spreader, flow application Application of floorings, mastics, coatings, castings
<b>Qualitative Risk Assessment</b>	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves, tested to EN374. Wear suitable coveralls to prevent exposure to the skin. Wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	

Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	960 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	yes
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness
<b>Contributing Scenario (10) controlling professional worker exposure for PROC 11</b>	
<b>Name of contributing scenario</b>	11 - Non industrial spraying
Scenario subtitle	Spraying; Spraying (manually) All open mould applications where resins is applied by manual spraying in an open work environment. Examples are spray lamination, gelcoat spraying and “chop-hoop” filament winding
<b>Qualitative Risk Assessment</b>	
General	Keep people not involved in the activity, away from the operation Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Wear suitable face shield Wear suitable coveralls to prevent exposure to the skin. Wear chemically resistant gloves, tested to EN374, in combination with intensive management supervision control. Wear a suitable respiratory protection with adequate effectiveness.
<b>Product characteristics</b>	
Physical state	liquid

Concentration in substance	100 %
Fugacity / Dustiness	medium
<b>Frequency and duration of use</b>	
Duration of activity	1 - 4 hours
Frequency of use	5 days / week
<b>Human factors not influenced by risk management</b>	
Exposed skin surface	1,500 cm <sup>2</sup>
<b>Other given operational conditions affecting workers exposure</b>	
Location	indoors
Ventilation	good (30%)
Domain	professional
<b>Technical conditions and measures to control dispersion and exposure</b>	
Local exhaust ventilation	yes
<b>Conditions and measures related to personal protection, hygiene and health evaluation: see details on sec.8 of SDS</b>	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	yes
Local exhaust ventilation	Use local exhaust ventilation with adequate effectiveness