INEOS		
SAFETY DATA SHEET		Revision Date: 10.11.2022
		Print Date: 30.03.2023
		SDS Number: 000000273216
Modar™ NX 860 TF RESIN ™ Trademark, INEOS or its subsidiaries, registered in various countries 882707		Version: 6.0

Conforms to EU Regulation 1907/2006/EC as amended. - SDSGHS_ES

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

1.1 Product identifier

Trade name : Modar™ NX 860 TF RESIN
™ Trademark, INEOS or its subsidiaries, registered in various countries

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

Recommended use : Reserved for industrial and professional use.

Restrictions on use

Consumer use

1.3 Details of the supplier of the safety data sheet	**1.4 Emergency telephone number**
INEOS Composites Hispania S.L. Carretera Reial 137-139 08960 Sant Just Desvern - Barcelona Spain +34 93 206 51 20 (in Spain) sds.composites@ineos.com	001-800-424-9300/001-703-527-3887, or contact your local emergency telephone number at + 34 91 562 04 20 **Regulatory Information Number** +34 93 206 51 20 (in Spain), or contact your local CSR contact person **Product Information** +34 93 206 51 20 (in Spain)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Flammable liquids, Category 2	H225: Highly flammable liquid and vapour.
Skin irritation, Category 2	H315: Causes skin irritation.
Skin sensitisation, Category 1	H317: May cause an allergic skin reaction.

Reproductive toxicity, Category 2	H361d: Suspected of damaging the unborn child.
Specific target organ toxicity - repeated exposure, Category 2, hearing organs	H373: May cause damage to organs through prolonged or repeated exposure.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Danger

Hazard statements :
H225 Highly flammable liquid and vapour.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H361d Suspected of damaging the unborn child.
H373 May cause damage to organs (hearing organs) through prolonged or repeated exposure.

Precautionary statements :

Prevention:

P201 Obtain special instructions before use.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P260 Do not breathe mist or vapours.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.

Response:

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Hazardous components which must be listed on the label:

methyl methacrylate

Styrene

maleic anhydride

Precautionary statements : **Keep dust/air mixtures away from ignition sources.**

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
methyl methacrylate	80-62-6 201-297-1 607-035-00-6 01-2119452498-28-xxxx	Flam. Liq. 2; H225 Skin Irrit. 2; H315 Skin Sens. 1; H317 STOT SE 3; H335 (Respiratory system)	>= 5 - < 10
Styrene	100-42-5 202-851-5 601-026-00-0 01-2119457861-32-xxxx	Flam. Liq. 3; H226 Acute Tox. 4; H332 Skin Irrit. 2; H315 Eye Irrit. 2; H319 Repr. 2; H361d STOT SE 3; H335 (Respiratory system) STOT RE 1; H372 (hearing organs) Asp. Tox. 1; H304 Aquatic Chronic 3; H412	>= 5 - < 10
maleic anhydride	108-31-6 203-571-6	Acute Tox. 4; H302 Skin Corr. 1B; H314	>= 0 - < 0,001

	607-096-00-9 01-2119472428-31-xxxx	Eye Dam. 1; H318 Resp. Sens. 1; H334 Skin Sens. 1A; H317 STOT RE 1; H372 (Respiratory system) EUH071 specific concentration limit Skin Sens. 1A; H317 >= 0,001 % Acute toxicity estimate Acute oral toxicity: 1.090 mg/kg	

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Move out of dangerous area.
Call a POISON CENTRE or doctor/physician if exposed or you feel unwell.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : Move to fresh air.
IF INHALED: Call a POISON CENTER/ doctor if you feel unwell.
Keep patient warm and at rest.
If unconscious, place in recovery position and seek medical advice.

In case of skin contact : Remove contaminated clothing. If irritation develops, get medical attention.
If on skin, rinse well with water.
Wash contaminated clothing before re-use.

If on clothes, remove clothes.

In case of eye contact : Immediately flush eye(s) with plenty of water.
Remove contact lenses.
Protect unharmed eye.

If swallowed : Obtain medical attention.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include:
stomach or intestinal upset (nausea, vomiting, diarrhea)
irritation (nose, throat, airways)
Cough
Headache
effects on memory
loss of appetite
Shortness of breath
confusion
pain in the hands and feet
Difficulty in breathing

Risks : Causes skin irritation.
May cause an allergic skin reaction.
Suspected of damaging the unborn child.
May cause damage to organs through prolonged or repeated exposure.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : No hazards which require special first aid measures.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Water spray
Foam
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively.
Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion products : Hydrocarbons
carbon dioxide and carbon monoxide
toxic fumes

Metal oxides
Carbon dioxide (CO2)
Carbon monoxide
Hydrocarbons
Burning produces noxious and toxic fumes.

5.3 Advice for firefighters

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.

Specific extinguishing methods : Product is compatible with standard fire-fighting agents.

Further information : Do not use a solid water stream as it may scatter and spread fire.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Use a water spray to cool fully closed containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Evacuate personnel to safe areas.
Remove all sources of ignition.
Use personal protective equipment.
Ensure adequate ventilation.
Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.
Comply with all applicable federal, state, and local regulations.
Suppress (knock down) gases/vapours/mists with a water spray jet.

6.2 Environmental precautions

Environmental precautions : Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform respective authorities.

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).

6.4 Reference to other sections

For further information see Section 8 and Section 13 of the safety data sheet.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Open drum carefully as content may be under pressure.
Avoid formation of aerosol.
Provide sufficient air exchange and/or exhaust in work rooms.
Do not breathe vapours/dust.
Do not smoke.
Persons susceptible to skin sensitisation problems or asthma,

allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
Container hazardous when empty.
Take precautionary measures against static discharges.
Avoid exposure - obtain special instructions before use.
Avoid contact with skin and eyes.
Smoking, eating and drinking should be prohibited in the application area.
For personal protection see section 8.
Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). No sparking tools should be used. Keep away from open flames, hot surfaces and sources of ignition. Use only explosion-proof equipment.

Hygiene measures : Wash hands before breaks and at the end of workday. When using do not eat or drink. When using do not smoke.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. No smoking.

Other data : No decomposition if stored and applied as directed.

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis

methyl methacrylate	80-62-6	TWA	50 ppm	2009/161/EU
		STEL	100 ppm	2009/161/EU
		VLA-ED	50 ppm	ES VLA
		VLA-EC	100 ppm	ES VLA
Styrene	100-42-5	VLA-EC	40 ppm 172 mg/m3	ES VLA
		VLA-ED	20 ppm 86 mg/m3	ES VLA
maleic anhydride	108-31-6	VLA-ED (Inhalable fraction and vapor)	0,1 ppm 0,4 mg/m3 Inhalable fraction and vapor	ES VLA

Biological occupational exposure limits

Substance name	CAS-No.	Control parameters	Sampling time	Basis
Styrene	100-42-5	mandelic acid and phenylglyoxilic acid: 400 mg/g Creatinine When the end of the exposure does not coincide with the end of the workday, the sample is taken as soon as possible after the actual exposure has stopped, The biological indicator is non-specific because it can be found after exposure to other chemical agents.(Urine)	End of workday	ES VLB
		styrene: 0,2 mg/l When the end of the exposure does not coincide with the end of the workday, the sample is taken	End of workday	ES VLB

		as soon as possible after the actual exposure has stopped, The biological indicator is an indicator of exposure to the chemical agent in question, but that the quantitative interpretation of its measurement is ambiguous (semi-quantitative). These biological indicators should be used as a screening test when a quantitative test is not possible or used as a confirmatory test if the quantitative test is not specific and the origin of the determinant is doubtful.(venous blood)		

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Styrene : End Use: Workers
Exposure routes: Inhalation
Potential health effects: Short-term exposure, Systemic effects
Value: 289 mg/m3
End Use: Workers
Exposure routes: Inhalation
Potential health effects: Short-term exposure, Local effects
Value: 306 mg/m3
End Use: Workers
Exposure routes: Inhalation
Potential health effects: Long-term exposure, Systemic effects
Value: 85 mg/m3
End Use: Workers
Exposure routes: Skin contact
Potential health effects: Long-term exposure, Systemic effects
Value: 406 mg/kg
End Use: Consumers

Exposure routes: Inhalation
Potential health effects: Short-term exposure, Systemic effects
Value: 174,25 mg/m3
End Use: Consumers
Exposure routes: Inhalation
Potential health effects: Short-term exposure, Local effects
Value: 182,75 mg/m3
End Use: Consumers
Exposure routes: Skin contact
Potential health effects: Long-term exposure, Systemic effects
Value: 343 mg/kg
End Use: Consumers
Exposure routes: Ingestion
Potential health effects: Long-term exposure, Systemic effects
Value: 2,1 mg/kg
End Use: Consumers
Exposure routes: Inhalation
Potential health effects: Long-term exposure, Systemic effects
Value: 10,2 mg/m3

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Styrene : Fresh water
Value: 0,028 mg/l
Fresh water
Value: 0,04 mg/lIntermittent use/release

Marine water
Value: 0,014 mg/l
Sewage treatment plant
Value: 5 mg/l
Fresh water sediment
Value: 0,614 mg/kg
Marine sediment
Value: 0,307 mg/kg
Soil
Value: 0,2 mg/kg

maleic anhydride : Fresh water
Value: 0,04281 mg/l
Marine water
Value: 0,00428 mg/l
Fresh water sediment
Value: 0,334 mg/kg
Marine sediment
Value: 0,0334 mg/kg
Sewage treatment plant

Value: 44,6 mg/l
Soil
Value: 0,0415 mg/kg

8.2 Exposure controls

Engineering measures

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure guidelines (if applicable) or below levels that cause known, suspected or apparent adverse effects.

Personal protective equipment

Eye protection : Wear chemical splash goggles and face shield when there is potential for exposure of the eyes or face to liquid, vapor or mist.
Use eye protection according to EN 166.

Hand protection
Material : Laminate (Barrier© or Silvershield©)
Break through time : 480 min
Glove thickness : > 0,5 mm

Remarks : The exact break through time can be obtained from the protective glove producer and this has to be observed. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough. The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it.

Skin and body protection : Wear chemical resistant clothing such as a permeation-resistant or chemical apron, gloves and boots whenever skin contact is possible.
Additional body garments should be used based upon the task being performed (e.g., sleevelets, apron, gauntlets, disposable suits) to avoid exposed skin surfaces.
Protective clothing complying with EN 13688.
Safety shoes complying with EN ISO 20345.

Respiratory protection : In the case of vapour formation use a respirator with an approved filter.
Respiratory protection complying with EN 136.
Respiratory protection complying with EN 140.
Respiratory protection complying with EN 14387.

Filter type : Organic vapour type (A)

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	:	liquid
Colour	:	off-white
Odour	:	aromatic
Odour Threshold	:	No data available
Melting point/freezing point	:	No data available
Boiling point/boiling range	:	> 145 °C
Flammability	:	May form combustible dust concentrations in air (during processing).
Upper explosion limit / Upper flammability limit	:	ca. 12,5 %(V)
Lower explosion limit / Lower flammability limit	:	ca. 2,1 %(V)
Flash point	:	20,3 °C Method: ASTM D 56
Decomposition temperature	:	No data available
		No data available
pH	:	Not applicable
Viscosity		
Viscosity, dynamic	:	ca. 500 mPa.s
Viscosity, kinematic	:	> 20,5 mm2/s (40 °C)
Solubility(ies)		
Water solubility	:	immiscible
Solubility in other solvents	:	No data available

Partition coefficient: n-octanol/water	:	No data available
Vapour pressure	:	ca. 6 hPa
Relative density	:	No data available
Density	:	ca. 1,15 g/cm3
Relative vapour density	:	No data available

9.2 Other information

Oxidizing properties	:	No data available
Self-ignition	:	No data available
Evaporation rate	:	No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No decomposition if stored and applied as directed.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions : Hazardous polymerisation may occur.
Vapours may form explosive mixture with air.

10.4 Conditions to avoid

Conditions to avoid : Exposure to air.
Exposure to sunlight.
Exposure to moisture

Heat, flames and sparks.

10.5 Incompatible materials

Materials to avoid	:	Acids aluminum aluminum chloride Amines Bases Copper Copper alloys halogens iron chloride metal salts nitrates reducing agents strong alkalis Strong oxidizing agents UV light. Peroxides

10.6 Hazardous decomposition products

Hazardous decomposition products	:	aluminum oxides Carbon monoxide Carbon dioxide (CO2) Hydrocarbons Acetone

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Information on likely routes of exposure	:	Inhalation Skin contact Eye Contact Ingestion

Acute toxicity

Not classified based on available information.

Product:

Acute inhalation toxicity	:	Acute toxicity estimate: > 20 mg/l Exposure time: 4 h Test atmosphere: vapour Method: Calculation method

Components:

methyl methacrylate:

Acute oral toxicity	:	LD50 (Rat): 7.800 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): 29,8 mg/l Exposure time: 4 h Test atmosphere: vapour
Acute dermal toxicity	:	LD50 (Rabbit): > 5.000 mg/kg

Styrene:

Acute oral toxicity	:	LD50 (Rat): > 2.000 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): 11,8 mg/l, 2770 ppm Exposure time: 4 h Test atmosphere: vapour No observed adverse effect level (Humans): 100 ppm Exposure time: 7 h Test atmosphere: vapour
Acute dermal toxicity	:	LD50 (Rat): > 2.000 mg/kg Method: OECD Test Guideline 402 Assessment: No adverse effect has been observed in acute dermal toxicity tests.

maleic anhydride:

Acute oral toxicity	:	LD50 (Rat): 1.090 mg/kg Acute toxicity estimate: 1.090 mg/kg Method: Calculation method
Acute inhalation toxicity	:	LC50 (Rat): > 4,35 mg/l Exposure time: 1 h Test atmosphere: dust/mist Assessment: No adverse effect has been observed in acute inhalation toxicity tests. Assessment: Corrosive to the respiratory tract.
Acute dermal toxicity	:	LD50 (Rabbit): 2.620 mg/kg

Skin corrosion/irritation

Causes skin irritation.

Components:

methyl methacrylate:

Result : Irritating to skin.

Styrene:

Species : Rabbit
Result : Irritating to skin.

Species : human skin
Result : No skin irritation

maleic anhydride:

Result : Corrosive after 3 minutes to 1 hour of exposure

Serious eye damage/eye irritation

Not classified based on available information.

Components:

methyl methacrylate:

Result : Slight, transient irritation

Styrene:

Result : Irritating to eyes.
Remarks : Vapour during processing may be irritating to the respiratory tract and to the eyes.

maleic anhydride:

Result : Corrosive

Respiratory or skin sensitisation

Skin sensitisation

May cause an allergic skin reaction.

Respiratory sensitisation

Not classified based on available information.

Components:

methyl methacrylate:

Test Type	:	Local lymph node assay
Species	:	Mouse
Method	:	OECD Test Guideline 429
Result	:	The product is a skin sensitiser, sub-category 1B.

Styrene:

Exposure routes	:	Skin contact
Species	:	Guinea pig
Assessment	:	Does not cause skin sensitisation.
Result	:	negative

Exposure routes	:	inhalation (vapour)
Species	:	Humans
Assessment	:	Does not cause respiratory sensitisation.
Result	:	negative

maleic anhydride:

Test Type	:	Buehler Test
Exposure routes	:	Skin contact
Species	:	Guinea pig
Assessment	:	The product is a skin sensitiser, sub-category 1A.
Result	:	positive

Test Type	:	Local lymph node assay
Exposure routes	:	Skin contact
Species	:	Mouse
Assessment	:	The product is a skin sensitiser, sub-category 1A.
Result	:	May cause sensitisation by skin contact.

Exposure routes	:	Skin contact
Species	:	Humans
Result	:	Causes sensitisation.

Exposure routes	:	inhalation (dust/mist/fume)
Species	:	Rat
Assessment	:	May cause sensitisation by inhalation.
Result	:	Causes sensitisation.

Exposure routes	:	inhalation (dust/mist/fume)
Species	:	Humans
Result	:	Causes sensitisation.

Germ cell mutagenicity

Not classified based on available information.

Components:

maleic anhydride:

Genotoxicity in vitro	:	Test Type: Ames test Metabolic activation: with and without metabolic activation Result: negative Test Type: In vitro mammalian cell gene mutation test Metabolic activation: with and without metabolic activation Result: negative
Genotoxicity in vivo	:	Test Type: Mammalian bone marrow sister chromatid exchange Species: Rat (male and female) Application Route: Inhalation Result: negative

Carcinogenicity

Not classified based on available information.

Components:

maleic anhydride:

Species	:	Rat, male and female
Application Route	:	Oral
NOAEL	:	100 mg/kg bw/day

Reproductive toxicity

Suspected of damaging the unborn child.

Components:

Styrene:

Reproductive toxicity - Assessment	:	Some evidence of adverse effects on development, based on animal experiments.

maleic anhydride:

Effects on fertility	:	Test Type: Two-generation study Species: Rat, male and female Application Route: Oral

Fertility: NOAEL Mating/Fertility: 55 mg/kg body weight

Effects on foetal development : Test Type: Fertility/early embryonic development
Species: Rat, female
Application Route: Oral
Developmental Toxicity: NOAEL F1: 140 mg/kg body weight

STOT - single exposure

Not classified based on available information.

Components:

methyl methacrylate:

Target Organs : Upper respiratory tract
Assessment : May cause respiratory irritation.

Styrene:

Assessment : May cause respiratory irritation.

STOT - repeated exposure

May cause damage to organs (hearing organs) through prolonged or repeated exposure.

Components:

Styrene:

Exposure routes : inhalation (vapour)
Target Organs : Auditory system
Assessment : Causes damage to organs through prolonged or repeated exposure.

maleic anhydride:

Exposure routes : inhalation (vapour)
Target Organs : Respiratory system
Assessment : Causes damage to organs through prolonged or repeated exposure.

Exposure routes : Ingestion
Target Organs : Kidney
Assessment : May cause damage to organs through prolonged or repeated exposure.

Repeated dose toxicity

Components:

Styrene:

Species	:	Human
	:	85 mg/m3
Application Route	:	inhalation (vapour)

Species	:	Human
	:	615 mg/kg
Application Route	:	Skin contact

maleic anhydride:

Species	:	Rat, male
NOAEL	:	40 mg/kg
Application Route	:	Oral
Exposure time	:	90-day

Species	:	Rat, male
LOAEL	:	100 mg/kg
Application Route	:	Oral
Exposure time	:	90-day

Species	:	Rat, male and female
NOAEL	:	10 mg/kg
Application Route	:	Oral
Exposure time	:	2 yr

Species	:	Rat, male and female
LOAEL	:	32 mg/kg
Application Route	:	Oral
Exposure time	:	2 yr

Species	:	Rat, male and female
NOAEL	:	0,0033 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	132 - 136 d

Species	:	Rat, male and female
LOAEL	:	0,0098 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	132 - 136 d

Species	:	Rat, male and female

LOAEL	:	0,0011 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	132 - 136 d
Symptoms	:	Local irritation

Species	:	Hamster, male and female
NOAEL	:	0,0098 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	132 - 136 d

Species	:	Hamster, male and female
LOAEL	:	0,0011 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	132 - 136 d
Symptoms	:	Local irritation

Species	:	Monkey, male and female
NOAEL	:	0,0098 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	132 - 136 d

Species	:	Monkey, male and female
LOAEL	:	0,0011 mg/l
Application Route	:	inhalation (vapour)
Exposure time	:	132 - 136 d
Symptoms	:	Local irritation

Aspiration toxicity

Not classified based on available information.

Components:

Styrene:

May be fatal if swallowed and enters airways.

11.2 Information on other hazards

Endocrine disrupting properties

Product:

Assessment	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12: Ecological information

12.1 Toxicity

Components:

methyl methacrylate:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): 130 mg/l Exposure time: 96 h Method: static test LC50 (Oncorhynchus mykiss (rainbow trout)): > 79 mg/l Exposure time: 96 h Test Type: flow-through test
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 69 mg/l Exposure time: 48 h Test Type: flow-through test
Toxicity to algae/aquatic plants	:	EC50 (Pseudokirchneriella subcapitata (algae)): > 110 mg/l Exposure time: 72 h Test Type: static test
Toxicity to fish (Chronic toxicity)	:	LC50: 33,7 mg/l Exposure time: 35 d Species: Danio rerio (zebra fish) Test Type: flow-through test Method: OECD Test Guideline 210
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 37 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea) Test Type: flow-through test Method: OECD Test Guideline 211

Styrene:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): 4,02 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 4,7 mg/l Exposure time: 48 h

Toxicity to algae/aquatic plants	:	ErC50 (Pseudokirchneriella subcapitata (green algae)): 4,9 mg/l Exposure time: 72 h EC10 (Pseudokirchneriella subcapitata (green algae)): 0,28 mg/l Exposure time: 96 h
Toxicity to microorganisms	:	EC50 (activated sludge): ca. 500 mg/l Exposure time: 0,5 h
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 1,01 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea)
Toxicity to soil dwelling organisms	:	NOEC: 34 mg/kg Exposure time: 14 d Species: Eisenia fetida (earthworms) Method: OECD Test Guideline 207

maleic anhydride:

Toxicity to fish	:	LC50 (Fish): 75 mg/l Exposure time: 96 h Method: static test Remarks: mortality
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 43 mg/l Exposure time: 48 h Test Type: static test
Toxicity to algae/aquatic plants	:	EC10 (Pseudokirchneriella subcapitata (green algae)): 12 mg/l Exposure time: 72 h Test Type: Growth inhibition EC50 (Pseudokirchneriella subcapitata (green algae)): 74 mg/l Exposure time: 72 h Test Type: Growth inhibition
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 10 mg/l End point: Reproduction Test Exposure time: 21 d Species: Daphnia magna (Water flea) Test Type: semi-static test

12.2 Persistence and degradability

Components:

methyl methacrylate:

Biodegradability : Result: Readily biodegradable.
Biodegradation: 94,3 %
Exposure time: 14 d
Method: OECD Test Guideline 301C

Styrene:

Biodegradability : Result: Readily biodegradable.
Biodegradation: > 60 %
Exposure time: 10 d

maleic anhydride:

Biodegradability : Test Type: aerobic
Inoculum: activated sludge
Result: Readily biodegradable.
Biodegradation: 81 %
Exposure time: 28 d
Method: OECD Test Guideline 301E

12.3 Bioaccumulative potential

Components:

methyl methacrylate:

Partition coefficient: n-octanol/water : log Pow: 1,38

Styrene:

Bioaccumulation : Bioconcentration factor (BCF): < 100

Partition coefficient: n-octanol/water : log Pow: 2,96 (25 °C)

maleic anhydride:

Partition coefficient: n-octanol/water : Remarks: Not applicable

12.4 Mobility in soil

Components:

Styrene:

Distribution among environmental compartments : Koc: 352

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Components:

methyl methacrylate:

Assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT).. This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Styrene:

Assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT).. This substance is not considered to be very persistent and very bioaccumulating (vPvB).

maleic anhydride:

Assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT).. This substance is not considered to be very persistent and very bioaccumulating (vPvB).

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation

(EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Empty containers should be taken to an approved waste handling site for recycling or disposal.
Do not re-use empty containers.
Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: Transport information

SECTION 14: Transport information

14.1 UN number

ADN: UN1866
ADR: UN1866
INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO: UN1866
INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER: UN1866
INTERNATIONAL MARITIME DANGEROUS GOODS: UN1866
RID: UN1866

14.2 UN proper shipping name

ADN: RESIN SOLUTION
ADR: RESIN SOLUTION
INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO: Resin solution
INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER: Resin solution
INTERNATIONAL MARITIME DANGEROUS GOODS: RESIN SOLUTION
RID: RESIN SOLUTION

14.3 Transport hazard class(es)

ADN: 3

ADR: 3
INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO: 3
INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER: 3
INTERNATIONAL MARITIME DANGEROUS GOODS: 3
RID: 3

14.4 Packing group

ADN: II
ADR: II
INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO: II
INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER: II
INTERNATIONAL MARITIME DANGEROUS GOODS: II
RID: II

14.5 Environmental hazards

ADN: Not applicable
ADR: Not applicable
INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO: Not applicable
INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER: Not applicable
INTERNATIONAL MARITIME DANGEROUS GOODS: Not applicable
RID: Not applicable

14.6 Special precautions for user

Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Ship Type: Not applicable
Hazard code(s): Not applicable
Pollutant Category: Not applicable

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15: Regulatory information

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

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : Not applicable

REACH - List of substances subject to authorisation (Annex XIV)	:	Not applicable
Regulation (EC) No 1005/2009 on substances that deplete the ozone layer	:	Not applicable
Regulation (EC) No 850/2004 on persistent organic pollutants	:	Not applicable
Regulation (EC) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals	:	Not applicable
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	:	Conditions of restriction for the following entries should be considered: (3)

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

		Quantity 1	Quantity 2
P5c	FLAMMABLE LIQUIDS	5.000 t	50.000 t

Other regulations	:	Take note of Directive 92/85/EEC regarding maternity protection or stricter national regulations, where applicable. Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

The components of this product are reported in the following inventories:

TCSI	:	Not in compliance with the inventory
TSCA		Product contains substance(s) not listed on TSCA inventory.
AIIC		Not in compliance with the inventory
DSL		This product contains one or several components that are not on the Canadian DSL and have annual quantity limits.
ENCS		Not in compliance with the inventory
KECI		Not in compliance with the inventory

PICCS	Not in compliance with the inventory
NZIoC	Not in compliance with the inventory
IECSC	Low volume exemption

Inventories
AIIC (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TECI (Thailand), TSCA (USA)

15.2 Chemical safety assessment
No data available

SECTION 16: Other information

Further information
Revision Date: 10.11.2022

Classification procedure:

H225	Highly flammable liquid and vapour.	Based on product data or assessment
H315	Causes skin irritation.	Calculation method
H317	May cause an allergic skin reaction.	Calculation method
H361d	Suspected of damaging the unborn child.	Calculation method
H373	May cause damage to organs through prolonged or repeated exposure.	Calculation method

Full text of H-Statements

H225	Highly flammable liquid and vapour.
H226	Flammable liquid and vapour.
H302	Harmful if swallowed.
H304	May be fatal if swallowed and enters airways.
H314	Causes severe skin burns and eye damage.
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.
H361d	Suspected of damaging the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H412	Harmful to aquatic life with long lasting effects.

Other information : The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by INEOS's Environmental Health and Safety Department (+34 93 206 51 20 (in Spain)).

Sources of key data used to compile the Safety Data Sheet
INEOS internal data including own and sponsored test reports
The UNECE administers regional agreements implementing harmonised classification for labelling (GHS) and transport.

List of abbreviations and acronyms that could be, but not necessarily are, used in this safety data sheet :
ACGIH : American Conference of Industrial Hygienists
BEI : Biological Exposure Index
CAS : Chemical Abstracts Service (Division of the American Chemical Society).
CMR : Carcinogenic, Mutagenic or Toxic for Reproduction
FG : Food grade
GHS : Globally Harmonized System of Classification and Labeling of Chemicals.
H-statement : Hazard Statement
IATA : International Air Transport Association.
IATA-DGR : Dangerous Goods Regulation by the “International Air Transport Association” (IATA).

ICAO : International Civil Aviation Organization
ICAO-TI (ICAO) : Technical Instructions by the “International Civil Aviation Organization”
IMDG : International Maritime Code for Dangerous Goods

ISO : International Organization for Standardization
logPow : octanol-water partition coefficient
LCxx : Lethal Concentration, for xx percent of test population
LDxx : Lethal Dose, for xx percent of test population.
ICxx : Inhibitory Concentration for xx of a substance
Ecxx : Effective Concentration of xx
N.O.S.: Not Otherwise Specified
OECD : Organization for Economic Co-operation and Development
OEL : Occupational Exposure Limit
P-Statement : Precautionary Statement
PBT : Persistent , Bioaccumulative and Toxic
PPE : Personal Protective Equipment
STEL : Short-term exposure limit
STOT : Specific Target Organ Toxicity
TLV : Threshold Limit Value
TWA : Time-weighted average
vPvB : Very Persistent and Very Bioaccumulative
WEL : Workplace Exposure Level
GAM : Water Hazard Class for the Netherlands
ADR : Agreement concerning the International Carriage of Dangerous Goods by Road.
ADNR: Regulation for the Carriage of Dangerous Substances on the Rhine
CLP : Classification, Labelling and Packaging
CSA : Chemical Safety Assessment
CSR : Chemical Safety Report
DNEL : Derived No Effect Level.
EINECS : European Inventory of Existing Commercial Chemical Substances.
ELINCS : European List of Notified Chemical Substances
GV: Exposure limits (DK)
PEC : Predicted Effect Concentration
PEL : Permissible Exposure Limits
PNEC : Predicted No Effect Concentration
REACH : Registration, Evaluation, Authorisation and Restriction of Chemicals
RID : Regulation Concerning the International Transport of Dangerous Goods by Rail
WGK : German Water Hazard Class

ES / EN

INEOS

SAFETY DATA SHEET (1907/2006)

Revision Date: 2019-12-16
Version: 1
PRODUCTS THAT CONTAIN STYENE

Scenario 7: FRP manufacturing in an industrial setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES7)

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.)*.
Table 7. Description of ES 7

Free short title	FRP manufacturing in an industrial setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES7)
Systematic title based on use descriptor	ERC 6D; PROC 10, 7, 13, 5, 3, 14, 8A, 15
Name of contributing environmental scenario and corresponding ERC	ERC 6d Production of resins/rubbers
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 10 - Roller application or brushing PROC 7 - Industrial spraying PROC 13 - Treatment of articles by dipping and pouring PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact) PROC 3 - Use in closed batch process (synthesis or formulation) PROC 14 - Production of preparations or articles by tabletting, compression, extrusion, pelletisation PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities PROC 15 - Use of laboratory reagents in small scale laboratories
7.1 Contributing Scenario (1) controlling environmental exposure for ERC 6D	
Operational conditions	
Annual European tonnage	8.06E5 to/year
Daily amount used at site	7.61E5 kg/day
Release times per year	300 days/year *(justification: Continous 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^3/day
Municipal sewage treatment plant discharge	2000000 L/day
Other modified EUSES values	
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)	0.00063 % *(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 Worstcase European manufacturing site)*
Fraction of emission directed to water by local STP (Fstp.water)	0.081 - *(justification: Efficiency STP 97.9%)*
7.2 Contributing Scenario (2) controlling industrial worker exposure for PROC 10	
Name of contributing scenario	10 - Roller application or brushing
Scenario subtitle	Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] All open mould applications where resins is applied by brushing, rolling and other low energy spreading operations; Examples are handlamination, gelcoatbrushing, filament winding
Qualitative Risk Assessment	
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. Wear suitable coveralls to prevent exposure to the skin
Product characteristics	

Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
7.3 Contributing Scenario (3) controlling industrial worker exposure for PROC 7	
Name of contributing scenario	7 - Industrial spraying
Scenario subtitle	Spraying [CS10]; Spraying (automatic/robotic) [CS97] 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
Qualitative Risk Assessment	
General	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 Wear suitable coveralls to prevent exposure to the skin Use suitable eye protection. Wear suitable face shield Wear chemically resistant gloves in combination with intensive management supervision control.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	

Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	1,500 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
Carry out in a vented booth or extracted enclosure	inhalation: 95 % *(justification: Carry out in a vented booth or extracted enclosure)*
7.4 Contributing Scenario (4) controlling industrial worker exposure for PROC 7	
Name of contributing scenario	7 - Industrial spraying
Scenario subtitle	Spraying [CS10]; Spraying (manually) [CS97] All open mould applications where resins is applied by manual spraying in an open work environement. Examples are spray lamination, gelcoat spraying and “chop-hoop” filament winding
Qualitative Risk Assessment	
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 in combination with intensive management supervision control.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	1,500 cm^2

Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	90 %
7.5 Contributing Scenario (5) controlling industrial worker exposure for PROC 10	
Name of contributing scenario	10 - Roller application or brushing
Scenario subtitle	Dipping, immersion and pouring [CS4]; Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] Application of repair putties; Application of bonding pastes / adhesives.
Qualitative Risk Assessment	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	5-25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %

Respiratory protection	no
7.6 Contributing Scenario (6) controlling industrial worker exposure for PROC 13	
Name of contributing scenario	13 - Treatment of articles by dipping and pouring
Scenario subtitle	Dipping, immersion and pouring [CS4]; Continuous process [CS54]. Continuous processes with open impregnation steps, such as pultrusion with open impregnation baths and (semi-) continuous production of flat laminates
Qualitative Risk Assessment	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	No
Respiratory protection	no
7.7 Contributing Scenario (7) controlling industrial worker exposure for PROC 5	
Name of contributing scenario	5 - Mixing or blending in batch processes (multistage and/or significant contact)
Scenario subtitle	Casting operations [CS32]; Mixing operations (open systems) [CS30]. 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
Qualitative Risk Assessment	

General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	5-25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
7.8 Contributing Scenario (8) controlling industrial worker exposure for PROC 5	
Name of contributing scenario	5 - Mixing or blending in batch processes (multistage and/or significant contact)
Scenario subtitle	General exposures (closed systems) [CS15]. 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
Qualitative Risk Assessment	
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. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %

Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
7.9 Contributing Scenario (9) controlling industrial worker exposure for PROC 3	
Name of contributing scenario	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Material transfers [CS3]; Automated process with (semi) closed systems [CS93]; Use in contained batch processes [CS37]. Resin injection and transfer processes, such as vacuüm infusion, RTM, impregnation of sewer relining sleeves
Qualitative Risk Assessment	
General	Put lids on containers immediately after use. 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.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	240 cm^2
Other given operational conditions affecting workers exposure	

Location	indoors
Ventilation	good (30%)
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
7.10 Contributing Scenario (10) controlling industrial worker exposure for PROC 14	
Name of contributing scenario	14 - Production of preparations or articles by tabletting, compression, extrusion, pelletisation
Scenario subtitle	Material transfers [CS3]; Production or preparation or articles by tabletting, compression, extrusion or pelletisation [CS100]; Treatment by heating [CS129]; Batch processes at elevated temperatures [CS136]. 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
Qualitative Risk Assessment	
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.
Product characteristics	
Physical state	liquid
Concentration in substance	5-25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	enhanced (70%)
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no

7.11 Contributing Scenario (11) controlling industrial worker exposure for PROC 3	
Name of contributing scenario	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Material transfers [CS3]. Product delivery/storage - delivery of bulk and packaged products - outdoor / indoor
Qualitative Risk Assessment	
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.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	240 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
7.12 Contributing Scenario (12) controlling industrial worker exposure for PROC 5	
Name of contributing scenario	5 - Mixing or blending in batch processes (multistage and/or significant contact)
Scenario subtitle	Drum/batch transfers [CS8]; Pouring from small containers [CS9]; Transfer from/pouring from containers [CS22]; Mixing operations (open systems) [CS30]. Loading of mixing equipment; Preparation of material for application; (liquid products) - batch, indoor
Qualitative Risk Assessment	
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. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
7.13 Contributing Scenario (13) controlling industrial worker exposure for PROC 8A	
Name of contributing scenario	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Equipment maintenance [CS5]; Maintenance of small items [CS18]. Equipment cleaning and maintenance, open indoor
Qualitative Risk Assessment	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	

Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no
Local exhaust ventilation	inhalation: 70 % *(justification: Use local exhaust ventilation with adequate effectiveness)*
7.14 Contributing Scenario (14) controlling industrial worker exposure for PROC 15	
Name of contributing scenario	15 - Use of laboratory reagents in small scale laboratories
Scenario subtitle	Laboratory activities [CS36]. Quality control work of samples from blending vessel; R&D work including handling of samples from 1 kg to 1 drum
Qualitative Risk Assessment	
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.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	240 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no

7.15 Contributing Scenario (15) controlling industrial worker exposure for PROC 8A	
Name of contributing scenario	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Disposal of wastes [CS28]. 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
Qualitative Risk Assessment	
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. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no

Scenario 8: FRP manufacturing in a professional setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES8)

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.)*.

Table 8. Description of ES 8

Free short title	FRP manufacturing in a professional setting, using UP/VE resins and/or formulated resins (gelcoat, bonding paste, putty etc.) (ES8)
Systematic title based on use descriptor	ERC 8E; PROC 10, 11, 5, 4, 3, 8A
Name of contributing environmental scenario and corresponding ERC	ERC 8e Wide dispersive outdoor use of reactive substances in open systems
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 10 - Roller application or brushing PROC 11 - Non industrial spraying PROC 5 - Mixing or blending in batch processes (multistage and/or significant contact) PROC 4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC 3 - Use in closed batch process (synthesis or formulation) PROC 8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
8.1 Contributing Scenario (1) controlling environmental exposure for ERC 8E	
Operational conditions	
Annual European tonnage	8.42E6 to/year
Daily amount used at site	4.83E5 kg/day
Release times per year	300 days/year *(justification: Continous production)*
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^3/day
Municipal sewage treatment plant discharge	2000000 L/day
Other modified EUSES values	
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 97.9%)*
8.2 Contributing Scenario (2) controlling professional worker exposure for PROC 10	
Name of contributing scenario	10 - Roller application or brushing
Scenario subtitle	Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] 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
Qualitative Risk Assessment	
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. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	90 %
8.3 Contributing Scenario (3) controlling professional worker exposure for PROC 11	
Name of contributing scenario	11 - Non industrial spraying
Scenario subtitle	Spraying [CS10]; Spraying (manually) [CS97] All open mould

	applications where resins is applied by manual spraying in an open work environement. Examples are spray lamination, gelcoat spraying and “chop-hoop” filament winding
Qualitative Risk Assessment	
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 in combination with intensive management supervision control.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	1 - 4 hours
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	1,500 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	95 %

8.4 Contributing Scenario (4) controlling professional worker exposure for PROC 10

Name of contributing scenario	10 - Roller application or brushing
Scenario subtitle	Dipping, immersion and pouring [CS4]; Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] Application of repair putties; Application of bonding pastes / adhesives.
Qualitative Risk Assessment	

General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	5-25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	90 %

8.5 Contributing Scenario (5) controlling professional worker exposure for PROC 10

Name of contributing scenario	10 - Roller application or brushing
Scenario subtitle	Dipping, immersion and pouring [CS4]; Rolling, Brushing [CS51]; Roller, spreader, flow application [CS98] Application of floorings, mastics, coatings, castings

Qualitative Risk Assessment	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	90 %

8.6 Contributing Scenario (6) 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 [CS3]; Pouring from small containers [CS9]. 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
Qualitative Risk Assessment	
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. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	90 %

8.7 Contributing Scenario (7) controlling professional worker exposure for PROC 4

Name of contributing scenario	4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Scenario subtitle	Use in contained batch processes [CS37]. Sewer relining operation
Qualitative Risk Assessment	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	480 cm^2
Other given operational conditions affecting workers exposure	
Location	outdoors (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	90 %

8.8 Contributing Scenario (8) controlling professional worker exposure for PROC 3

Name of contributing scenario	3 - Use in closed batch process (synthesis or formulation)
Scenario subtitle	Use in contained batch processes [CS37]. Application of chemical anchoring
Qualitative Risk Assessment	
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.
Product characteristics	
Physical state	liquid
Concentration in substance	5-25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	>4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	240 cm^2
Other given operational conditions affecting workers exposure	
Location	outdoors (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no

8.9 Contributing Scenario (9) controlling professional worker exposure for PROC 8A

Name of contributing scenario	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Equipment maintenance [CS5]; Maintenance of small items [CS18]. Equipment cleaning and maintenance, open indoor
Qualitative Risk Assessment	
General	Ensure good work practices are implemented Provide basic employe training to prevent/minimize exposures Use suitable eye protection. Use suitable chemically resistant gloves. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	15 mins to 1 hour
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no

8.10 Contributing Scenario (10) controlling professional worker exposure for PROC 8A

Name of contributing scenario	8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
Scenario subtitle	Disposal of wastes [CS28]. 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
Qualitative Risk Assessment	
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. Wear suitable coveralls to prevent exposure to the skin.
Product characteristics	
Physical state	liquid
Concentration in substance	100 %
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	15 mins to 1 hour
Frequency of use	5 days / week
Human factors not influenced by risk management	
Exposed skin surface	960 cm^2
Other given operational conditions affecting workers exposure	
Location	indoors
Ventilation	good (30%)
Domain	professional
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	no
Conditions and measures related to personal protection, hygiene and health evaluation	
Protective gloves	Gloves APF 5 80 %
Respiratory protection	no