METAL BOND

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product Identifier

Trade name: **METAL BOND cd. 54400? - 54405?**

Designation of the mixture: POLYESTER FILLER

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

Identified use: polyester filler for bodywork, nautical, industry.

Uses advised against: recommended use are listed above; other uses are not recommended unless an assessment has provided that risks are controlled.

1.3. Details of the supplier of the safety data sheet

Company:

SARATOGA INT. SFORZA SPA

Via Edison 76

20090 Trezzano s/Naviglio (MI) - ITALY

Tel: + 39 02 445731

Fax: + 39 02 4452742

Competent person responsible for the safety data sheet e-mail:

trading@saratogasforza.com

1.4. Emergency telephone number

PCC - Children's Hospital "Bambino Gesù" - Rome - Tel. +39 06 68593726 (h24)
PCC - Hospital University Foggia - Foggia - Tel. +39 0881 732326 (h24)
PCC - Hospital "A. Cardarelli" - Naples- Tel. +39 081 7472870 (h24)
PCC - Hospital "Umberto I" - Rome - Tel. +39 06 4450618 (h24)
PCC - Hospital "A. Gemelli" - Rome - Tel. +39 06 3054343 (h24)
PCC - Hospital "Careggi" C.U. Medical Toxicology - Florence - Tel. +39 055 7947819 (h24)
PCC - National center for toxicological information - Pavia - Tel. +39 0382 24444 (h24)
PCC - Hospital "Niguarda Ca' Granda" - Milan - Tel. +39 02 66101029 (h24)
PCC - Hospital "Papa Giovanni XXIII" - Bergamo - Tel. +39 800 883300 (h24)

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification according to Regulation 1272/2008/EC:

Flammable liquid, cat. 3; H226
Skin irritation, cat. 2; H315
Eye irritation, cat. 2; H319
Reproductive toxicity, cat. 2; H361d
Specific target organ toxicity - repeated exposure (Auditory system, Inhalation), cat. 1; H372

Adverse physicochemical, human health and environmental effects: no other hazards.

2.2. Label elements

Pictograms:

Signal Word:

DANGER

Hazard statements:

H226: Flammable liquid and vapour.

H315: Causes skin irritation.
H319: Causes serious eye irritation.
H361d: Suspected of damaging the unborn child.
H372: Causes damage to the hearing organs through prolonged or repeated exposure if inhaled.

Precautionary Statement:

P101: I,IPHGLFDODGYLFHLVQHHGHGKDYHSURGXFWFRQWDLQHURUODEHODWKDQG
P102: .HHSRXWRIUHDFKRIFKLOGUHQ
P210:.HHSDZD\URPKHDWVSDUNVRSHQIODPHVKRWVXUIDFHV1RVPRNLQJ
P233: eep container tightl closed.
P260: □
P280: □□□
P302+P352: I ON S IN: ash ith plent of soap and ater.
P305+P351+P338: I IN E ES: inse cautiousl ith ater for several minutes. emove contact lenses, if present and eas to do. Continue rinsing.
P308 + P313: I e posed or concerned: et medical advice/attention.
P405: 6WRUHORFNHGXS
P501: □□□

Product identifiers:
Contains styrene.

2.3. Other hazards

PBT Substances: none.
vPvB Substances: none.

Other hazards: none.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

N.A.

3.2. Mixtures

Mixture of resin, styrene and other non-hazardous substances.
Hazardous components within the meaning of Regulation 1272/2008/EC (CLP) and related classification:

10% - 15% Styrene
REACH registration number: 01-2119457861-32-XXXX, Index number: 601-026-00-0
CAS: 100-42-5, EC: 202-851-5

Flam. Liq. 3; H226

Asp. Tox. 1; H304

Skin Irrit. 2; H315

Eye Irrit. 2; H319

Inhal Acute Tox. 4; H332

STOT SE 3; H335

Repr. 2; H361d

STOT RE 1; H372

Aq. Chronic 3; H412

0.1% - 0.2% 1,1'-(p-tolylimino)dipropan-2-ol

REACH registration number: 01-2119980937-17-XXXX, CAS: 38668-48-3, EC: 254-075-1


Oral Acute Tox. 2; H300


Eye Irrit. 2; H319

Aquatic Chronic 3; H412

Additional information: for the full text of hazard statements H see section 16.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

In case of skin contact:

Wash thoroughly with soap and water. Change clothes if necessary. If irritation persists or tissue damage occurs, consult a physician.

In case of eyes contact:

Rinse thoroughly for several minutes. Remove contact lenses if easy to do and continue rinsing. If irritation persists consult a doctor.

In case of ingestion:

Do not induce vomiting if not authorized by a physician. Never give anything by mouth to an unconscious person. Consult a physician immediately.

In case of inhalation:

Remove from the danger zone in a well ventilated area and consult a doctor immediately.

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

Inhalation: May cause irritation of respiratory tract, drowsiness and dizziness.

Skin contact: irritating to skin.

Eye contact: irritating to eyes.

Ingestion: ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea, disorientation and pneumonia. Symptoms of poisoning occur only after several hours.

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

If you feel unwell, seek medical advice.

Indications for treatment in case of ingestion (Styrene): do not use emetics. Rinse mouth and administer 5 ml/kg up to 200 ml of water if the patient can swallow, has a strong gag reflex and does not drool. Administer activated carbon.

[Data source: Currance, P.L. Clements, B., Bronstein, A. C. (Eds) .; Emergency Care For Hazardous Materials Exposure. 3rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 209-10; TOXNET - TOXICOLOGY DATA NETWORK].

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media:

Carbon dioxide (CO_2).

Chemical powder.

Sand.

Fight larger fires with water spray or alcohol resistant foam.

Extinguishing media which must not be used for safety reasons:

Direct water jets on fire.

5.2. Special hazards arising from the substance or mixture

Formation of carbon oxides.

5.3. Advice for fire-fighters

The product is flammable, use extreme care. Product is not explosive, however, formation of explosive mixtures of air/vaporis possible. Avoid formation of vapors. Ensure electrical continuity with a suitable network of ground to avoid the accumulation of electrostatic charges. Do not breathe fumes from the fire. In case of fire, use breathing apparatus with separate air supply.

Keep away form the dangerous area unprotected and unauthorized persons. Cool containers or tanks exposed to fire with water spray.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear protection gloves, clothes, glasses, boots and protection for the respiratory system (self contained breathing apparatus). Keep away form the dangerous area unprotected and unauthorized persons. Eliminate all unguarded flames and possible sources of ignition. Don't smoke. Refer to protective measures listed in sections 7 and 8.

6.2. Environmental precautions

Do not empty into drains. If the product contaminates lakes, rivers or sewages, inform appropriate authorities in accordance with local regulations.

6.3. Methods and material for containment and cleaning up

In case of solid product, avoid the dust release. In case of liquid product, limit and adsorb the spill with inert adsorbing material (for example sand, vermiculite). Put the resultant material in adeguate packiaging and send to an authorized plant for the disposal. Collect the spread product, and then wash with water area and materials. Recove the water used and send to an authorized plant for the disposal.

6.4. Reference to other sections

See also section 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Use with good manufacturing practice and with correct protection devices Avoid the contact and vapours and/or dust inhalation. See the SDS paragraph 8.

7.2. Conditions for safe storage, including any incompatibilities

Store in a cool, dry place. Avoid exposure to direct sunlight. Keep away from fire, sparks and ignition sources. Make sure that ventilation is adequate. Keep away from materials which can lead to reaction (see section 10).

Storage class: 3

Storage class (TRGS 510): 3

7.3. Specific end use(s)

Polyester mastic for bonding, filling, finishing of marble, granite and stone in general.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Occupational exposure limits:

Substance	***Reference***	***Value***
Styrene (CAS: 100-42-5)	NIOSH REL	TLV-TWA: 50 ppm - 215 mg/m^3
	NIOSH REL	TLV-STEL: 100 ppm - 425 mg/m^3
	OSHA PEL	TLV-TWA: 100 ppm
	OSHA PEL	TLV-STEL: 200 ppm
	ACGIH 1996	TLV-TWA: 20 ppm - 85 mg/m^3
	ACGIH 1996	TLV-STEL: 40 ppm - 170 mg/m^3

DNEL Exposure Limit Values:

Substance	**Styrene (CAS: 100-42-5)**	
Parameter	***Route of exposure***	***Value***
DNEL	Systemic effects_Short-term_Inhalation_Workers	289 mg/m^3
	Systemic effects_Long-term_Inhalation_Workers	85 mg/m^3
	Local effects_Short-	306 mg/m^3

	term_Inhalation_Workers	
	Systemic effects_Short-term_Inhalation_Population	174.25 mg/m^3
	Systemic effects_Long-term_Inhalation_Population	10.2 mg/m^3
	Local effects_Short-term_Inhalation_Population	182.75 mg/m^3
	Systemic effects_Long-term_ Oral_Population	2.1 mg/kg bw/day
	Systemic effects_Long-term_Dermal _Workers	406 mg/kg bw/day
	Systemic effects_Long-term_Dermal_Population	343 mg/kg bw/day
Substance	**1,1'-(p-tolylimino)dipropan-2-ol (CAS: 38668-48-3)**	
Parameter	***Route of exposure***	***Value***
DNEL	Systemic effects_Long-term_Inhalation_Workers	2 mg/m^3
	Systemic effects_Long-term_Inhalation_Population	0.4 mg/m^3
	Systemic effects_Long-term_ Oral_Population	0.3 mg/kg bw/day
	Systemic effects_Long-term_Dermal _Workers	0.6 mg/kg bw/day
	Systemic effects_Long-term_Dermal_Population	0.3 mg/kg bw/day

PNEC Exposure Limit Values:

Substance	**Styrene (CAS: 100-42-5)**	
Parameter	***Compartment***	***Value***
PNEC	Freshwater	0.028 mg/l Assessment factor - 10
	Marine water	0.014 mg/l Assessment factor - 20
	Water - Intermittent releases	0.04 mg/l Assessment factor - 100
	Sediment (freshwater)	0.614 mg/kg dw
	Sediment (marine water)	0.307 mg/kg dw
	Soil	0.2 mg/kg dw
	Sewage treatment plants	5 mg/l Assessment factor - 100
Substance	**1,1'-(p-tolylimino)dipropan-2-ol (CAS: 38668-48-3)**	
Parameter	***Compartment***	***Value***
PNEC	Freshwater	0.017 mg/l Assessment factor - 1000
	Marine water	0.002 mg/l Assessment factor - 10000
	Water - Intermittent releases	0.17 mg/l Assessment factor - 100
	Sediment (freshwater)	0.078 mg/kg dw
	Sediment (marine water)	0.008 mg/kg dw
	Soil	0.005 mg/kg dw
	Sewage treatment plants	199.5 mg/l Assessment factor - 10

8.2. Exposure controls

General protective and hygiene measures:

Do not eat or drink during work. No smoking. Use hand, eyes, skin and respiratory protection devices. The protection devices supplier must ensure those devices are suitable for the product managing.

Eye protection:

Safety glasses with side shields (EN 166).

Protection for hands:

Use protective gloves that provides comprehensive protection, approved according to the standard EN 374. Chemical resistant gloves (according to EN 374). Suitable materials for a short contact (splash protection): PVA, nitrile or fluoroelastomer, thickness 0.4 mm (recommendation: at least protection index 2, corresponding to > 30 minutes permeation according to EN 374). Suitable materials for prolonged contact: PVA or fluoroelastomer, thickness 0.7 mm (recommendation: at least protection index 4, corresponding to > 120 minutes of permeation according to EN 374). Because of the many types of gloves available on the market it is appropriate to comply with the instructions of the manufacturers. The information contained herein is based on bibliographic data, the information of glove manufacturers, or is derived by analogy with similar substances. It should be borne in mind that, because of several factors (eg. Temperature), the useful life of a glove for protection against chemical agents can be significantly less than the permeation time detected by the tests. If signs of wear and tear the gloves should be replaced.

Respiratory protection:

Use filter type A (contrast vapors of organic compounds) according to EN 141.

Use respiratory protection where ventilation is insufficient or exposure is prolonged. Use adequate protective respiratory equipment. If ventilation is insufficient, wear respiratory protection appropriate. When workers are exposed to concentrations above the exposure limit, they must wear a mask respirator appropriate and approved according to EN 140 and / or EN 136, with filter(s) anti gases and vapors (combined filters in accordance with EN 14387: filter type A - brown). In the event of a possible saturation of the environment and / or lack of oxygen (concentration <17%) and / or the absence of oxygen, it is recommended the use of self-protector or supplied air respirator.

Additional information about engineering measures:

Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and solvent vapour below the OEL (=Occupational Exposure Limit), suitable respiratory protection must be worn.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance and colour:	Viscous liquid; beige, grey
Odour:	Aromatic
Odour threshold:	N.D.
pH:	N.A.
Melting point:	-31 °C at 1013 hPa (Styrene)
Flash point:	31 °C at 1013 hPa (Styrene)
Initial boiling point:	145 °C at 1013 hPa (Styrene)
Solid/gas flammability:	N.A.
Lower explosive limit:	1.1 % Vol (Styrene)
Upper explosive limit:	6.1 % Vol (Styrene)
Vapour density:	3.6 (air=1) (Styrene)
Evaporation rate:	N.D.
Vapour pressure:	6.67 hPa at 20°C (Styrene)
Relative density:	1.93 g/cm^3 at 20°C

Solubility in water: 320 mg/L at 25°C (Styrene)
Lipid solubility: N.D.
Partition coefficient (n-octanol/water): 2.96 at 20°C (Styrene)
Auto-ignition temperature: 490 °C at 1013 hPa (Styrene)
Decomposition temperature: N.D.
Dinamic viscosity: > 2,600 mPa·s
Kinematic viscosity: > 1,340 mm^2/s
Explosive properties: Not explosive
Oxidizing properties: N.D.

9.2. Other information

Dry residue at 105 °C: 93.60 %
Acid value: 1.3 mg KOH/g
COV: 3.4 % p/p – 65.6 g/L

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

This product is stable with an appropriate level of TBC inhibitor (minimum 10 ppm), but reactive (unstable) without.

10.2. Chemical stability

Stable under recommended storage and handling conditions(See section 7).

10.3. Possibility of hazardous reactions

Stable under normal conditions.

10.4. Conditions to avoid

Keep away from fire, sparks and ignition sources.

10.5. Incompatible materials

Strong oxidizing agents, peroxides, contaminants and catalysts for vinyl polymers, alkali metal-graphite compounds, aluminum chloride, strong acids, strong alkalies, copper, copper alloys, brass.

10.6. Hazardous decomposition products

Carbon monoxide.

SECTION 11:TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Toxicological information of the mixture:

ATE_{mix} (inhalation): 73.33 mg/l/4h → not classifiable.

ATE_{mix} (ingestion): 2500 mg/kg bw → not classifiable.

Toxicological information of the main substances found in the mixture:

Styrene (CAS: 100-42-5)

LC_{50} (inhalation, rat): 11.8 mg/l/4h
LD_{50} (oral, rat): approx. 5,000 mg/kg
LD_{50} (dermal, rat): >2,000 mg/kg

1,1'-(p-tolylimino)dipropan-2-ol (CAS: 38668-48-3)

LD_{50} (oral, rat): 25 mg/kg
LD_{50} (dermal, rat): >2000 mg/kg

Subacute /chronic toxicity:

Styrene has low acute toxicity when administered orally. Ingestion may cause discomfort and irritation of the gastrointestinal tract, effects on lungs and kidneys, and CNS depression (fatigue, dizziness and possibly loss of concentration, with collapse, coma and death in cases of severe overexposure) Aspiration into the lung may cause fatal chemical pneumonitis. May increase the sensitivity of the heart to endogenous catecholamines leading to potentially fatal cardiac sensitization.

Cancerogenic and mutagenic effects, risks to reproduction:

Styrene does possess some genotoxic potential in vitro presumably reflecting conversion to

styrene oxide. There is no convincing evidence from available animal and human data that styrene possesses significant mutagenic/clastogenic potential in vivo.
Chronic inhalation resulted in hyperplasia and fibrosis and an increased incidence of late onset lung tumors in mice, which are believe to have arisen through a non-genotoxic mechanism. Tumor incidence in rats was unaffected after chronic inhalation exposure. there is no convincing evidence that styrene possesses significant carcinogenic potential in humans. Results from reproductive toxicity studies in animals exposed via drinking water or inhalation have shown no evidence of selective toxicity to the testis or ovary or adverse effects on fertility.
Results from animal studies demonstrate that styrene is not a teratogen, nor is it fetotoxic at sub-maternally-toxic treatment levels. No selective effects on nervous system development have been reported. Some indication of developmental delay was observed in pups from dams exposed to high dose levels (500 ppm) however these findings were attributed to decreased pup body weight rather than a selective effect on the offspring.

Unless otherwise specified, the information required by Annex II of Regulation (EC) No. 1907/2006 listed below must be considered as N.A.:

(a) acute toxicity;
(b) skin corrosion/irritation: the mixture is classified Skin irritant Category 2 according to Regulation (EC) 1272/2008 and subsequent amendments.
(c) serious eye damage/irritation: the mixture is classified Eye irritant Category 2 according to Regulation (EC) 1272/2008 and subsequent amendments.
(d) respiratory or skin sensitisation;
(e) germ cell mutagenicity;
(f) carcinogenicity;
(g) reproductive toxicity: the mixture is classified Reproductive toxicity Category 2 according to Regulation (EC) 1272/2008 and subsequent amendments.
(h) STOT-single exposure;
(i) STOT-repeated exposure: the mixture is classified STOT-RE Category 1 (Auditory system, Inhalation) according to Regulation (EC) 1272/2008 and subsequent amendments.
(j) aspiration hazard.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Adopt good working practices, so that the product is not released into the environment.

Styrene; CAS: 100-42-5	
EC_{50}	*Algae:* Pseudokirchneriella subcapitata: 4.9 mg/l (72h) *Crustacea:* Daphnia magna: 4.7 mg/l (48h)
LC_{50}	*Fishes:* Pimephales promelas: 4.02 mg/l (96h)

12.2. Persistence and degradability

Readily biodegradable (Styrene).

12.3. Bioaccumulative potential

Significant bioaccumulation potential is not to be expected (Styrene).

12.4. Mobility in soil

Styrene has very high potential for mobility.

12.5. Results of PBT and vPvB assessment

PBT Substances: none
vPvB Substances: none

12.6. Other adverse effects

There are no data available on the product itself.

12.7. Additional information

Danger to drinking water if even small quantities leak into the ground product. Do not empty the product into drains and waters without primary treatment and do not store on public

depositories.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Confer to an incinerator or to an approved landfill in accordance with local regulations. Avoid release of the product in soil, sewers or waterways.
Contaminated packaging: Collect all residues and contaminated packaging. After an appropriate cleaning, packaging can be recycled. Packaging that can not be washed must be disposed of in the same manner as the material.

SECTION 14: TRANSPORT INFORMATION

	Land transport (ADR/RID/ADN) (**)	Maritime transport (IMDG Code) (**)	Air transport (ICAO T.I./IATA) (**)
14.1 UN Number	1866	1866	1866
14.2 UN proper shipping name	RESIN SOLUTION	RESIN SOLUTION	RESIN SOLUTION
14.3 Transport hazard class	3	3	3
Hazard label	3	3	3
14.4 Packaging group	III	III	III
14.5 Enviromental hazard	Not classified	Not classified	Not classified
14.6 Special precautions for user	(*)	EmS : F-E, S-E (*)	(*)
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable	Not applicable	Not applicable

(*) “Transport, including loading and unloading, must be carried out by people who received the necessary training required by the modal regulations concerning the transport of dangerous goods.”

(**) *Transport additional information*: when the product UN 1866 "Resin solution" is transported packaged in common with an organic peroxide to be used as hardener (catalyst), should be classified UN 3269 "Polyester resin kit" in accordance with special provision 236 of the ADR-RID-ADN and ICAO T.I. and the IMDG Code currently in force.

SECTION 15: REGULATORY INFORMATION

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

Regulation (EC) No 1005/2009 on substances that deplete the ozone layer:
Not listed.
Regulation (EC) No 850/2004 on Persistent Organic Pollutants, Annex I:
Not listed.
Regulation (EC) No 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1:
Not listed.
Regulation (EC) No 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2:
Not listed.
Regulation (EC) No 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3:

Not listed.
Regulation (EC) No 649/2012 concerning the export and import of dangerous chemicals, Annex V:
Not listed.
Regulation (EC) No 1907/2006, Article 59(1) (Candidate List of SVHC):
Not listed.
Regulation (EC) No 1907/2006, Annex XIV (List of substances subject to authorisation):
Not listed.
Regulation (EC) No 1907/2006, Annex XVII (Restrictions on the manufacture, placing on the market and use):
MIXTURE: Point 3 and 40.
SUBSTANCES: No restriction.

VOCs value:
Directive 2004/42/EC:
Product definition: FILLERS/MASTICS.
EU limit value for this product cat. B/b: VOC 250 g/L (2007).
This product contains a maximum of 65.6 g/L of VOCs.

15.2. Chemical safety assessment: a chemical safety assessment hasn't been carried out for the mixture; are attached styrene exposure scenarios.

SECTION 16: OTHER INFORMATION

Date: 13/06/2016
Type of revision: sections 8 and 10.
Comply with Regulation (EC) No 1907/2006, Annex II, as amended by Regulation (UE) No. 2015/830.
This document was prepared by a competent person who has received appropriate training.

Acronyms and abbreviations:
ACGIH: American Conference of Governmental Industrial Hygienists.
ADN : European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR : European Agreement concerning the International Carriage of Dangerous Goods by Road.
ATE_{mix}: Acute toxicity extimation of mixture.
CAS: Chemical Abstracts Service (division of the American Chemical Society).
***CLP*:** Classification, Labeling, Packaging.
DNEL: Derived No Effect Level.
EC_{50} : Effective concentration, for 50 percent of test population.
***EINECS*:** European Inventory of Existing Commercial Chemical Substances.
GHS: Globally Harmonized System of Classification and Labelling of Chemicals.
IATA : International Air Transport Association.
IBC: International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk.
ICAO T.I. : International Civil Aviation Organization Technical Instructions.
IMDG Code : International Maritime Dangerous Goods Code.
LC_{50}: Lethal concentration, for 50 percent of test population.
LD_{50}: Lethal dose, for 50 percent of test population.
MARPOL 73/78 : International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978.
NOEC : No Observed Effect Concentration.
PBT : Persistent, Bioaccumulative, Toxic.
PNEC: Predicted No Effect Concentration.
RID: Regulation Concerning the International Transport of Dangerous Goods by Rail.
STEL: Short Term Exposure limit.

STOT: Specific Target Organ Toxicity.
TLV: Threshold Limit Value.
TWA/TLV: Threshold Limit Value for the Time Weighted Average 8 hour day.
UN: United Nations.
vPvB : Very Persistent, Very Bioaccumulative.

Remarks
N.A. = not applicable
N.D. = not determined

Safety data sheet complying with:
- Regulation (EC) n. 1907/2006 (REACH).
- Regulation (EC) n. 1272/2008 (CLP).
- Regulation (EU) n. 2015/830.

Legislation and reference sources
- Regulation (EC) n. 1272/2008 (Classification, labeling and packaging of substances and mixtures)
- ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road)
- International Maritime Dangerous Goods Code (IMDG Code)
- International Air Transport Association (IATA)
- ECDIN - Environmental Chemicals Data and Information Network - Joint Research Centre, Commission of the European Communities

Full text of hazard statements H referred to in SECTION 3:

Hazard statements H:

H226: Flammable liquid and vapour.
H300: Fatal if swallowed.
H304: May be fatal if swallowed and enters airways.
H315: Causes skin irritation.
H319: Causes serious eye irritation.
H332: Harmful 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.

The information contained herein is based on our state of knowledge at the above-specified date. It refers solely to the product indicated and shall not establish a legally valid contractual relationship.
It is the duty of the user to ensure that this information is appropriate and complete with respect to the specific use intended.

STYRENE - EXPOSURE SCENARIOS

Version 3.1 ***Print Date 19.01.2016***

Revision date / valid from 19.01.2016

No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Article Category (AC)	Specified
1	Manufacture of substance	3	8	NA	1, 2, 8a, 8b, 15	1	NA	ES26
2	Formulation & (re)packing of substances and mixtures	3	10	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 15	2	NA	ES13825
3	Continuous mass polymerisation of Polystyrene	3	12	NA	2, 8a, 8b, 9, 14, 15	6c	NA	ES114
4	Batch suspension polymerisation of Polystyrene	3	12	NA	2, 3, 8a, 8b, 9, 14, 15	6c	NA	ES121
5	Production of expandable Polystyrene	3	12	NA	2, 3, 8a, 8b, 9, 14, 15	6c	NA	ES124
6	Production of styrenic copolymers	3	12	NA	2, 3, 8a, 8b, 9, 15	6c	NA	ES126
7	Production of styrene butadiene rubber (SBR)	3	11	NA	2, 3, 8a, 8b, 9, 15	6c	NA	ES174
8	Production of styrene butadiene latex (SBL)	3	11	NA	2, 3, 8a, 8b, 9, 15	6c	NA	ES181
9	Production of styrene isoprene copolymers	3	11, 12	NA	2, 3, 8a, 8b, 9, 15	6c	NA	ES187
10	Production of other styrene based polymeric dispersions	3	12	NA	2, 3, 8a, 8b, 9, 15	6c	NA	ES202
11	Production of resins	3	12	NA	1, 3, 4, 5, 8a, 8b, 9, 15	2	NA	ES29
12	Use in liquid resins	21	NA	9a	NA	8a, 8d	NA	ES618
13	Use in resin pastes	21	NA	9b	NA	8a, 8d	NA	ES619
14	Polymer processing	3	12	NA	3, 5, 7, 8a, 10, 13, 14, 15	6d	NA	ES41
15	Use in fibre-reinforced plastic applications	22	12	NA	3, 4, 5, 8a, 10, 11	8c	NA	ES49
16	Polymer production	3	12	NA	2, 3, 8a, 8b, 9, 15	6c	NA	ES210
17	Uses in coatings	3	10	NA	1, 2, 3, 4, 5, 7, 8a, 8b, 10, 13, 14, 15	5	NA	ES13827

1. Short title of Exposure Scenario 1: Manufacture of substance		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products)	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC1: Manufacture of substances	
2.1 Contributing scenario controlling environmental exposure for: ERC1		
Amount used	Amounts used in the EU (tonnes/year)	4,5 Million tonnes/year
	Daily amount per site	3430000 kg
	Fraction of EU tonnage used in region:	1
	Fraction used at the main local source.	1
Frequency and duration of use	Continuous exposure	350 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	41
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,013 %
	Final release factor	
	Emission or Release Factor: Water	0,0048 %
	Final release factor	
	Emission or Release Factor: Soil	0,010 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	400.000 m3/d
	Degradation efficiency	95,6 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC8a, PROC8b, PROC15		
Product characteristics	Concentration of the Substance in	Covers percentage substance in the product up to 100 % (unless stated differently).

	Mixture/Article	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
Technical conditions and measures to control dispersion from source towards the worker	Clean up contamination/spills as soon as they occur.	
	General exposures (closed systems) with occasional controlled exposure	Handle substance within a closed system.(PROC2)
	Additivation and stabilisation	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Process sampling	Use a sampling system designed to control exposure.(PROC8a)
	Laboratory activities	No specific measures identified.(PROC15)
	material transfers	Transfer via enclosed lines.(PROC1)
	Additivation and stabilisation	Use in semi-automated and predominantly enclosed filling lines.(PROC8b)
	Dedicated facility Road tanker/rail car loading marine vessel/barge (un)loading	Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors.(PROC8b)
	Equipment maintenance	Drain down system prior to equipment opening or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle.(PROC8b)
	Storage	Store substance within a closed system.(PROC1)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	
	Dedicated facility Road tanker/rail car loading marine vessel/barge (un)loading	Operate activity away from sources of substance emission or release.(PROC8b)
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands. Avoid direct skin contact with product. Wear suitable gloves tested to EN374 during the activities where the skin contact is possible. Wash off any skin contamination immediately.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR

ERC1	---	Fresh water	PEC	0,018407mg/L	0,657386
ERC1	---	Fresh water sediment	PEC	0,714184mg/kg dry weight (d.w.)	0,657386
ERC1	---	Marine water	PEC	0,007304mg/L	0,521713
ERC1	---	Marine sediment	PEC	0,283395mg/kg dry weight (d.w.)	0,521713
ERC1	---	Agricultural soil	PEC	0,012311mg/kg dry weight (d.w.)	0,061554
ERC1	---	Sewage treatment plant (STP)	PEC	0,724416mg/L	0,144883
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/kg bw/day	0,000056
ERC1	---	Fresh water	Msafe	19600 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	19600 ton(s)/day	---
ERC1	---	Marine water	Msafe	24600 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	24600 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	144000 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	88700 ton(s)/day	---
Workers					

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 2: Formulation & (re)packing of substances and mixtures		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU 10: Formulation	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC2: Formulation of preparations	
2.1 Contributing scenario controlling environmental exposure for: ERC2		
No exposure assessment presented for the environment.		
2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Exposure duration per day	15 min - 1 h(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC8b)	
Technical conditions and measures to control dispersion from source towards the worker	Use in semi-automated and predominantly enclosed filling lines. Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan. (Efficiency: 30 %)(PROC1)	
	Handle substance within a closed system.(PROC2)	
	Use in semi-automated and predominantly enclosed filling lines. Provide extract ventilation to points where emissions occur. Provide a good standard of general ventilation (not less than 3 to 5 air changes	

	per hour). (Efficiency: 30 %)(PROC3, PROC4)
	Provide extraction ventilation at points where emissions occur. Put lids on containers immediately after use.(PROC5)
	Avoid dip sampling. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). (Efficiency: 30 %)(PROC4)
	Carry out in a vented booth or extracted enclosure.(PROC15)
	Fill containers/cans at dedicated filling points supplied with local extract ventilation.(PROC9)
	Drain down and flush system prior to equipment opening or maintenance. Apply vessel entry procedures including use of forced supplied air.(PROC3)
	Avoid carrying out operation for more than 1 hour. Drain down system prior to equipment opening or maintenance. Drain or remove substance from equipment prior to break-in or maintenance. Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan. (Efficiency: 30 %)(PROC8a)
	Avoid carrying out operation for more than 1 hour. Clear transfer lines prior to de-coupling.(PROC8b)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable gloves tested to EN374.

3. Exposure estimation and reference to its source

Workers

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 3: Continuous mass polymerisation of Polystyrene		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics	
2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	483
	Daily amount per site	2420000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC2, PROC8a, PROC8b, PROC9,		

PROC14, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9, PROC14)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011

ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/ kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/k g bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 4: Batch suspension polymerisation of Polystyrene	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation PROC15: Use as laboratory reagent
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics

2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	4830000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.

2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC14, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9, PROC14)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038

ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/kg bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 5: Production of expandable Polystyrene	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation PROC15: Use as laboratory reagent
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics

2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	4830000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.

2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC14, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9, PROC14)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038

ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/kg bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 6: Production of styrenic copolymers		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics	
2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	4830000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15		

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011

ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/ kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/k g bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 7: Production of styrene butadiene rubber (SBR)		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU11: Manufacture of rubber products	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics	
2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	483000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15		

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011

ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/ kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/k g bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 8: Production of styrene butadiene latex (SBL)		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU11: Manufacture of rubber products	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics	
2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	483000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15		

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011

ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/ kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/k g bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 9: Production of styrene isoprene copolymers		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU11: Manufacture of rubber products SU12: Manufacture of plastics products, including compounding and conversion	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics	
2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	483000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b,		

PROC9, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure	exposure	0,000231mg/k	0,00011

		to humans via the environment:	estimate	g bw/day	
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/kg bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 10: Production of other styrene based polymeric dispersions		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics	
2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	483000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15		

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011

ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/ kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/k g bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 11: Production of resins		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC2: Formulation of preparations	
2.1 Contributing scenario controlling environmental exposure for: ERC2		
Amount used	Amounts used in the EU (tonnes/year)	228000
	Daily amount per site	45700 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	41
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,2 %
	Final release factor	
	Emission or Release Factor: Water	0,0049 %
	Final release factor	
	Emission or Release Factor: Soil	0,01 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	400.000 m3/d
	Degradation efficiency	91,9 %

	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC1, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8a)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 ℃ above ambient temperature, unless stated differently.	
Technical conditions and measures to control dispersion from source towards the worker	Clean up contamination/spills as soon as they occur.	
	Use in semi-automated and predominantly enclosed filling lines.(PROC1, PROC3)	
	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.(PROC1)	
	Store substance within a closed system.(PROC3)	
	Use bulk or semi-bulk handling systems.(PROC3, PROC8b)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3, PROC4, PROC8a, PROC8b)	
	Provide extraction ventilation at points where emissions occur.(PROC3, PROC5)	
	Ensure dedicated sample points are provided.(PROC4)	
	Avoid dip sampling.(PROC4)	
	Put lids on containers immediately after use.(PROC5)	
	Drain down and flush system prior to equipment opening or maintenance.(PROC3, PROC8a)	
	Retain drain downs in sealed storage pending disposal or for subsequent recycle.(PROC3, PROC8a)	
	Ensure operation is undertaken outdoors.(PROC8b)	
	Use dedicated equipment.(PROC8b)	
	Fill containers/cans at dedicated filling points supplied with local extract ventilation.(PROC9)	
	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.(PROC15)	
Organisational measures to prevent /limit releases, dispersion and exposure	Dispose of empty containers and wastes safely.(PROC8a)	
	Ensure operatives are trained to minimise exposures.(PROC1, PROC3)	
	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	
	Dispose of waste in accordance with environmental legislation.(PROC8a)	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator conforming to EN140 with Type A filter or better.(PROC8a)	
	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands. Avoid direct skin contact with product. Wear suitable gloves tested to EN374 during the activities where the skin contact is possible. Wash off any skin contamination immediately.	

3. Exposure estimation and reference to its source

Environment

Used EUSES model.

Workers

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. For some of the Contributing Scenarios workplace exposures have been estimated from measured data. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 12: Use in liquid resins		
Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)	
Chemical product category	PC9a: Coatings and paints, thinners, paint removers	
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8d		
Amount used	Amounts used in the EU (tonnes/year)	135000
	Daily amount per site	73589 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,002
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,1 %
	Final release factor	
	Emission or Release Factor: Water	2 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
2.3 Contributing scenario controlling consumer exposure for: PC9a		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 35%
	Physical Form (at time of use)	liquid
	Vapour pressure	> 10 Pa
Amount used	Amount used per event	1 kg
Frequency and duration of use	Frequency of use	365 days/year
	Frequency of use	5 Times per day

	Exposure duration per event	30 min
Human factors not influenced by risk management	Exposed skin areas	Covers skin contact area: <= 108 cm²
Other given operational conditions affecting consumers exposure	Room size	34 m3
	Covers use in a one car garage (34m³) under typical ventilation.	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	No specific risk management measure identified beyond those operational conditions stated.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,006705mg/L	0,239465
ERC1	---	Fresh water sediment	PEC	0,260155mg/kg dry weight (d.w.)	0,239465
ERC1	---	Marine water	PEC	0,000659mg/L	0,0471
ERC1	---	Marine sediment	PEC	0,025585mg/kg dry weight (d.w.)	0,0471
ERC1	---	Agricultural soil	PEC	0,058214mg/kg dry weight (d.w.)	0,291069
ERC1	---	Sewage treatment plant (STP)	PEC	0,059607mg/L	0,011921
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the	exposure estimate	0,000118mg/kg bw/day	0,000056

		environment:			
ERC1	---	Fresh water	Msafe	307,306 kg/day	---
ERC1	---	Fresh water sediment	Msafe	307,306 kg/day	---
ERC1	---	Marine water	Msafe	1562,392 kg/day	---
ERC1	---	Marine sediment	Msafe	1562,392 kg/day	---
ERC1	---	Agricultural soil	Msafe	3478,412 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	6172,84 ton(s)/day	---

Consumers

The ConsExpo model has been used to estimate consumer exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

1. Short title of Exposure Scenario 13: Use in resin pastes		
Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)	
Chemical product category	PC9b: Fillers, putties, plasters, modelling clay	
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8d		
Amount used	Amounts used in the EU (tonnes/year)	135000
	Daily amount per site	73589 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,002
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,1 %
	Final release factor	
	Emission or Release Factor: Water	2 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
2.3 Contributing scenario controlling consumer exposure for: PC9b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 35%
	Physical Form (at time of use)	liquid
	Vapour pressure	> 10 Pa
Amount used	Amount used per event	0,1 kg
Frequency and duration of use	Frequency of use	365 days/year
	Frequency of use	5 Times per day

	Exposure duration per event	10 min
Human factors not influenced by risk management	Exposed skin areas	Covers skin contact area: <= 22 cm²
Other given operational conditions affecting consumers exposure	Room size	34 m3
	Covers use in a one car garage (34m³) under typical ventilation.	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	No specific risk management measure identified beyond those operational conditions stated.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,006705mg/L	0,239465
ERC1	---	Fresh water sediment	PEC	0,260155mg/kg dry weight (d.w.)	0,239465
ERC1	---	Marine water	PEC	0,000659mg/L	0,0471
ERC1	---	Marine sediment	PEC	0,025585mg/kg dry weight (d.w.)	0,0471
ERC1	---	Agricultural soil	PEC	0,058214mg/kg dry weight (d.w.)	0,291069
ERC1	---	Sewage treatment plant (STP)	PEC	0,059607mg/L	0,011921
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the	exposure estimate	0,000118mg/kg bw/day	0,000056

		environment:			
ERC1	---	Fresh water	Msafe	307,306 kg/day	---
ERC1	---	Fresh water sediment	Msafe	307,306 kg/day	---
ERC1	---	Marine water	Msafe	1562,392 kg/day	---
ERC1	---	Marine sediment	Msafe	1562,392 kg/day	---
ERC1	---	Agricultural soil	Msafe	3478,412 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	6172,84 ton(s)/day	---

Consumers

The ConsExpo model has been used to estimate consumer exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

1. Short title of Exposure Scenario 14: Polymer processing	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion
Process categories	PROC3: Use in closed batch process (synthesis or formulation) PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation PROC15: Use as laboratory reagent
Environmental Release Categories	ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers

2.1 Contributing scenario controlling environmental exposure for: ERC6d		
Amount used	Amounts used in the EU (tonnes/year)	806000
	Daily amount per site	161000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,00063 %
	Final release factor	
	Emission or Release Factor: Soil	0,025 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.

2.3 Contributing scenario controlling worker exposure for: PROC3, PROC5, PROC7, PROC8a, PROC10, PROC13, PROC14, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 25 %.(PROC5, PROC13, PROC14)	
Technical conditions and measures to control dispersion from source towards the worker	Clean up contamination/spills as soon as they occur.	
	Put lids on containers immediately after use.(PROC3, PROC5, PROC8a)	
	Transfer via enclosed lines.(PROC3)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3, PROC7, PROC14)	
	Provide extraction ventilation at points where emissions occur.(PROC5, PROC8a, PROC13)	
	Handle substance within a predominantly closed system provided with extract ventilation.(PROC5)	
	Provide a good standard of controlled ventilation (10 to 15 air changes per hour)(PROC5, PROC10)	
	Use drum pumps or carefully pour from container.(PROC5)	
	Carry out in a vented booth or extracted enclosure.(PROC7)	
	Use long handled tools where possible.(PROC7)	
	Carefully pour from containers.(PROC7)	
	Use long handled brushes and rollers where possible.(PROC10)	
	Provide the operation with a properly sited receiving hood.(PROC14)	
	No specific measures identified.(PROC15)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	
	Ensure the ventilation system is regularly maintained and tested.(PROC7, PROC10)	
	Dispose of empty containers and wastes safely.(PROC7, PROC10)	
	Contain and dispose of waste according to local regulations.(PROC8a)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands. Avoid direct skin contact with product. Wear suitable gloves tested to EN374 during the activities where the skin contact is possible. Wash off any skin contamination immediately. Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.	
	Wear suitable coveralls to prevent exposure to the skin.(PROC7, PROC10)	
	Wear a respirator conforming to EN140 with Type A filter or better.(PROC7)	
3. Exposure estimation and reference to its source		

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,004853mg/L	0,173329
ERC1	---	Fresh water sediment	PEC	0,188304mg/kg dry weight (d.w.)	0,173329
ERC1	---	Marine water	PEC	0,000474mg/L	0,033873
ERC1	---	Marine sediment	PEC	0,0184mg/kg dry weight (d.w.)	0,033873
ERC1	---	Agricultural soil	PEC	0,043752mg/kg dry weight (d.w.)	0,218759
ERC1	---	Sewage treatment plant (STP)	PEC	0,041079mg/L	0,008216
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/kg bw/day	0,000056
ERC1	---	Fresh water	Msafe	930 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	930 ton(s)/day	---
ERC1	---	Marine water	Msafe	4760 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	4760 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	3940 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	19600 ton(s)/day	---

Workers

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 15: Use in fibre-reinforced plastic applications		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion	
Process categories	PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC10: Roller application or brushing PROC11: Non industrial spraying	
Environmental Release Categories	ERC8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC8c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	483000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC3, PROC4, PROC5, PROC8a, PROC10, PROC11		

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8a)
	Frequency of use	< 4 hours/day(PROC11)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 25 %.(PROC4, PROC10)	
Technical conditions and measures to control dispersion from source towards the worker	Clean up contamination/spills as soon as they occur.	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC5, PROC8a, PROC10, PROC11)	
	Put lids on containers immediately after use.(PROC5)	
	Use drum pumps or carefully pour from container.(PROC5)	
	Use long handled brushes and rollers where possible.(PROC10)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	
	Dispose of empty containers and wastes safely.(PROC8a)	
	Segregate the activity away from other operations.(PROC11)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands. Avoid direct skin contact with product. Wear suitable gloves tested to EN374 during the activities where the skin contact is possible. Wash off any skin contamination immediately. Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.	
	Wear a respirator conforming to EN140 with Type A filter or better.(PROC4, PROC5, PROC10)	
	Wear a full face respirator conforming to EN140 with Type A filter or better.(PROC11)	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222

ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,002342mg/kg dry weight (d.w.)	0,011709
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011
ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/kg bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that

risks are managed to at least equivalent levels.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 16: Polymer production		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU12: Manufacture of plastics products, including compounding and conversion	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC6c: Industrial use of monomers for manufacture of thermoplastics	
2.1 Contributing scenario controlling environmental exposure for: ERC6c		
Amount used	Amounts used in the EU (tonnes/year)	2,42 Million tonnes/year
	Daily amount per site	483000 kg
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,6
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0,102 %
	Final release factor	
	Emission or Release Factor: Water	0,000012 %
	Final release factor	
	Emission or Release Factor: Soil	0 %
	Final release factor	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	18.000 m3/d
	Degradation efficiency	91,9 %
	Sludge Treatment	Do not apply industrial sludge to natural soils.
2.3 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15		

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Frequency of use	< 1 hours/day(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC9)	
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system.(PROC2)	
	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)	
	Use a sampling system designed to control exposure.(PROC8a)	
	Clear transfer lines prior to de-coupling.(PROC8b)	
	No specific measures identified.(PROC15)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.	

3. Exposure estimation and reference to its source

Environment

ERC1: EasyTRA

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,000982mg/L	0,035074
ERC1	---	Fresh water sediment	PEC	0,038104mg/kg dry weight (d.w.)	0,035074
ERC1	---	Marine water	PEC	0,000087mg/L	0,006222
ERC1	---	Marine sediment	PEC	0,00338mg/kg dry weight (d.w.)	0,006222
ERC1	---	Agricultural soil	PEC	0,013195mg/kg dry weight (d.w.)	0,065977
ERC1	---	Sewage treatment plant (STP)	PEC	0,002347mg/L	0,000469
ERC1	fish	Indirect exposure to humans via the environment:	exposure estimate	0,00008mg/kg bw/day	0,000038
ERC1	root crops	Indirect exposure to humans via the environment:	exposure estimate	0,000231mg/kg bw/day	0,00011

ERC1	leaf crops	Indirect exposure to humans via the environment:	exposure estimate	0,0000017mg/ kg bw/day	< 0,01
ERC1	Milk	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Meat	Indirect exposure to humans via the environment:	exposure estimate	< 0,01mg/kg bw/day	< 0,01
ERC1	Drinking water	Indirect exposure to humans via the environment:	exposure estimate	0,000118mg/k g bw/day	0,000056
ERC1	---	Fresh water	Msafe	13800 ton(s)/day	---
ERC1	---	Fresh water sediment	Msafe	13800 ton(s)/day	---
ERC1	---	Marine water	Msafe	77700 ton(s)/day	---
ERC1	---	Marine sediment	Msafe	77700 ton(s)/day	---
ERC1	---	Agricultural soil	Msafe	6070 ton(s)/day	---
ERC1	---	Sewage treatment plant (STP)	Msafe	103000 ton(s)/day	---

Workers

ECETOC TRA Version 2 with modifications has been used. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 17: Uses in coatings		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU 10: Formulation	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC5: Industrial use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC5		
No exposure assessment presented for the environment.		
2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC10, PROC13, PROC14, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).	
	Exposure duration per day	15 min - 1 h(PROC8b)
Other operational conditions affecting workers exposure	Assumes use at not more than 20 °C above ambient temperature, unless stated differently.	
	Limit the substance content in the mixture to 5 %.(PROC8b)	
	Limit the substance content in the mixture to 25 %.(PROC10, PROC14)	
Technical conditions and measures to control dispersion from source towards the worker	Clean up contamination/spills as soon as they occur.	
	Use in semi-automated and predominantly enclosed filling lines. Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a	

	powered fan.(PROC1)
	Provide extraction ventilation at points where emissions occur. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). (Efficiency: 30 %)(PROC4)
	Transfer via enclosed lines. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). (Efficiency: 30 %)(PROC3)
	Put lids on containers immediately after use. Handle substance within a predominantly closed system provided with extract ventilation. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). (Efficiency: 70 %)(PROC5)
	Use long handled brushes and rollers where possible. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). (Efficiency: 70 %)(PROC10)
	Provide the operation with a properly sited receiving hood. or Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). (Efficiency: 70 %)(PROC14)
	Use long handled tools where possible. Carefully pour from containers. Carry out in a vented booth or extracted enclosure. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). (Efficiency: 30 %)(PROC7)
	Put lids on containers immediately after use. Provide extract ventilation to points where emissions occur. (Efficiency: 70 %)(PROC8a)
	Avoid carrying out operation for more than 1 hour. Clear transfer lines prior to de-coupling.(PROC8b)
	No specific measures identified.(PROC15)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable gloves tested to EN374 during the activities where the skin contact is possible.
	Wear suitable coveralls to prevent exposure to the skin.(PROC7)

3. Exposure estimation and reference to its source

Workers

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

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

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

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.